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DRAFT RESOURCE CONSERVATION AND RECOVERY ACT PART A AND PART B PERMIT APPLICATIONS FOR BURNING GROUNDS AND HAZARDOUS WASTE CONTAINER STORAGE BUILDINGS 366 AND 810 VOLUME 2 OF 2 APPENDICES WITH TRANSMITTAL

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Volume II - Appendices

Resource Conservation and Recovery Act

Part A and B Permit Applications for Allegany Ballistics Laboratory Burning Grounds and Hazardous Waste Container Storage Buildings 366 and 810

Prepared for

ATK Tactical Systems Company LLC

EPA I.D. No. WVO170023691

January 2002

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December 27, 2001

Mrs. Maritza Montegross
LANTDIV Project Manager
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, Virginia 23511-2699

Subject: Draft Part A and Part B Permit Applications for Allegany Ballistics Laboratory Burning Grounds and Hazardous Waste Container Storage Buildings 366 and 810, Rocket Center, West Virginia

Dear Maritza:

Enclosed are four (4) copies of the above-referenced document. This document was prepared under the Navy CLEAN II Program, Contract No. N62470-95-D-6007, Contract Task Order 0175, Modification 03. In addition, two copies are being sent directly to Louis Williams/NAVSEA and four copies are being sent directly to John Waugaman/ATK. We plan to discuss the contents of this draft permit application and other related issues in our meeting scheduled for January 10, 2002 in the CH2M HILL, Herndon, Virginia office.

If you have any questions, please do not hesitate to contact me at (703) 471-6405, ext. 4310 or Bob Blanz at (501) 372-6060.

Sincerely,

Sana Hamady

Sana Hamady
Project Manager, Environmental Engineer
CH2M HILL

Enclosure

Copy to: Mr. Louis Williams/NAVSEA
Mr. John Waugaman/ATK

Draft

Volume II – Appendixes

Resource Conservation and Recovery Act

Part A and B Permit Applications for Allegany Ballistics Laboratory Burning Grounds and Hazardous Waste Container Storage Buildings 366 and 810

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January 2002

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Contents

Volume II

Appendixes

Appendix A Air Modeling Results
- Attachment 1 Isopleths
- Attachment 2 Air Modeling Runs

Appendix B Human Health Risk Assessment
- Attachment 1 Soil Sampling Data
- Attachment 2 Dispersion Modeling Information
- Attachment 3 Concentrations in Environmental Media, Maximum Exposed Individual, Offsite Resident, and Subsistence Farmer
- Attachment 4 Intake and Risks – Maximum Exposed Individual, Offsite Resident, and Subsistence Farmer Scenario
- Attachment 5 Intake and Risks – Maximum Exposed Individual, Offsite Resident, and Subsistence Farmer Scenario – Child Receptor
- Attachment 6 Concentrations in River and Fish, Subsistence Fisher
- Attachment 7 Intake and Risks – Subsistence Fisher

Appendix C Ecological Risk Assessment
- Attachment 1 Analytical Data – Burning Grounds – Surface Soil
- Attachment 2 Analytical Data – Burning Grounds – Subsurface Soil
- Attachment 3 Deposition Modeling

Appendix D-1 Soil Investigation Results
Appendix D-2 Field Investigation Project Plans
Appendix D-3 Data Validation Report

Volume I

Part B Certitication iii

Acronyms and Abbreviations xxi

Section A Part A Application A-1

Section B Facility Description B-1

B-1 General Description B-1
B-2 Topographic Map B-2
B-2a General Requirements B-2
B-2b Additional Requirements for Land Disposal Facilities B-3
B-3 Location Information B-3
B-3a Seismic Standard B-3
B-3b Floodplain Standard B-4
B-4 Traffic Information B-4

Section C Waste Characteristics C-1

C-1 Chemical and Physical Analyses C-1
C-1a Containerized Waste C-1
C-1b Wastes in Tank Systems C-2
C-1c Wastes in Piles C-2
C-1d Landfilled Wastes C-2
C-1e Wastes Incinerated and Wastes Used in Performance Tests C-2
C-1f Wastes to be Land Treated C-2
C-1g Wastes in Miscellaneous Treatment Units C-2
C-1h Wastes in Boilers and Industrial Furnaces C-3
C-1i Wastes at Facilities with Process Vents C-3
C-1j Equipment Leak Organic Air Emissions C-3
C-1k Wastes at Drip Pads C-3
C-1l Process Unit Organic Air Emissions C-4
C-2 Waste Analysis Plan C-4
C-2a Parameters and Rationale C-4
C-2b Test Methods C-4
C-2c Sampling Methods C-5
C-2d Frequency of Analysis C-5
C-2e Additional Requirements for Wastes Generated OffSite C-5
C-2f Additional Requirements for Ignitable, Reactive, or Incompatible Wastes C-5
C-2g Additional Requirements Pertaining to Boiler and Industrial Furnace Facilities C-5
C-2h Additional Requirements Pertaining to Containment Buildings C-6
C-3 Waste Analysis Requirements Pertaining to Land Disposal Restrictions C-6
C-3a Waste Analysis C-6
C-3a(1) Spent Solvent and Dioxin Wastes C-6
C-3a(2) California List Wastes C-6
C-3a(3) Listed Wastes C-6
C-3a(4) Characteristic Wastes C-6
C-3a(5) Radioactive Mixed Waste C-6

C-3a(6) Leachates C-7
C-3a(7) Lab Packs C-7
C-3a(8) Contaminated Debris C-7
C-3a(9) Waste Mixtures and Wastes with Overlapping Requirements C-7
C-3a(10) Dilution and Aggregation of Wastes C-7
C-3b Notification, Certification, and Recordkeeping Requirements C-7
C-3b(1) Retention of Generator Notices and Certifications C-7
C-3b(2) Notification and Certification Requirements for Treatment Facilities C-8
C-3b(3) Notification and Certification Requirements for Land Disposal Facilities C-9
C-3b(4) Wastes Shipped to Subtitle C Facilities C-9
C-3b(5) Wastes Shipped to Subtitle D Facilities C-9
C-3b(6) Recyclable Materials C-9
C-3b(7) Recordkeeping C-9
C-3c Requirements Pertaining to the Storage of Restricted Wastes C-10
C-3c(1) Restricted Wastes Stored in Containers C-10
C-3c(2) Restricted Wastes Stored in Tanks C-10
C-3c(3) Storage of Liquid PCB Wastes C-10
C-3d Exemptions, Extensions, and Variances to Land Disposal Restrictions C-10
C-4 Treatment Effectiveness of Open Burning in Pans C-10

Section D Process Information D-1

D-1 Containers D-1
D-1a Containers with Free Liquids D-1
D-1a(1) Description of Containers D-1
D-1a(2) Container Management Practices D-2
D-1a(3) Secondary Containment System Design and Operation D-2
D-1a(3)(a) Requirement for the Base or Liner to Contain Liquids D-3
D-1a(3)(b) Containment System Drainage D-3
D-1a(3)(c) Containment System Capacity D-4
D-1a(3)(d) Control of Run-On D-4
D-1a(3)(e) Removal of Liquids from Containment System D-4
D-1b Containers Without Free Liquids D-5
D-1b(1) Test for Free Liquids D-5
D-1b(2) Description of Containers D-5
D-1b(3) Container Management Practices D-5
D-1b(4) Container Storage Area Drainage D-5
D-2 Tank Systems D-5
D-3 Waste Piles D-5
D-4 Surface Impoundments D-5
D-5 Incinerators D-5
D-6 Landfills D-5
D-7 Land Treatment D-6
D-8 Miscellaneous Units D-6
D-8a Description of Miscellaneous Units D-6
D-8b Waste Characterization D-8

D-8c Treatment Effectiveness D-8
D-8d Environmental Performance Standards for Miscellaneous Units D-9
D-8d(1) Protection of Groundwater and Subsurface Environment D-9
D-8d(1)(a) Environmental Assessment D-10
D-8d(1)(a)-1 Waste Characteristics and Volume, Including Potential for Migration through Soils, Liners, or Other Containing Structures D-10
D-8d(1)(a)-2 Hydrologic and Geologic Characteristics of the Unit and Surrounding Areas D-11
D-8d(1)(a)-3 Existing Groundwater Quality, Including Other Sources of Contamination and Their Cumulative Impact on the Groundwater D-15
D-8d(1)(a)-4 Quantity and Direction of Groundwater Flow D-16
D-8d(1)(a)-5 Proximity to and Withdrawal Rates of Current and Potential Groundwater Users D-16
D-8d(1)(a)-6 Regional Land Use Patterns D-17
D-8d(1)(a)-7 Potential for Deposition or Migration of Waste Constituents into Subsurface Physical Structures and the Root Zone of Vegetation D-17
D-8d(1)(a)-8 Potential for Human Health Risks Caused by Exposure to Waste Constituents D-17
D-8d(1)(a)-9 Potential for Damage to Domestic Animals, Wildlife, Crops, Vegetation, and Physical Structures Caused by Exposure to Waste Constituents D-17
D-8d(1)(a)-10 Potential Magnitude and Nature of Exposure of Humans or Environmental Receptors to Hazardous Waste or Hazardous Constituents D-18
D-8d(1)(b) Performance Standards D-18
D-8d(1)(b)-1 Design and Operating Requirements D-18
D-8d(1)(b)-2 RCRA Detection Monitoring Program D-19
D-8d(1)(b)-3 RCRA Corrective Action Monitoring Program D-20
D-8d(1)(b)-4 Requirements for Responses to Releases D-22
D-8d(2) Protection of Surface Water, Wetlands, and Soil Surface D-22
D-8d(2)(a) Environmental Assessment D-22
D-8d(2)(a)-1 Waste Characteristics and Volume D-22
D-8d(2)(a)-2 Effectiveness and Reliability of Containing, Confining, and Collecting Systems and Structures in Preventing Migration D-22
D-8d(2)(a)-3 Hydrologic Characteristics of the Unit and the Surrounding Area D-23
D-8d(2)(a)-4 Topography of the Surrounding Area and Hydrologic Unit Characteristics D-23
D-8d(2)(a)-5 Regional Precipitation Patterns D-23
D-8d(2)(a)-6 Quantity, Quality, and Direction of Groundwater Flow D-23
D-8d(2)(a)-7 Proximity of the Unit to Surface Waters D-23
D-8d(2)(a)-8 Current and Potential Uses of Nearby Surface Waters D-23
D-8d(2)(a)-9 Established Water Quality Standards for Surface Waters D-23

D-8d(2)(a)-10 Existing Quality of Surface Waters and Surface Soils, Including Other Sources of Contamination and their Cumulative Impact on Surface Waters and Surface Soils....D-24
D-8d(2)(a)-11 Regional Land Use Patterns....D-28
D-8d(2)(a)-12 Potential for Human Health Risks Caused by Exposure to Waste Constituents....D-28
D-8d(2)(a)-13 Potential for Damage to Domestic Animals, Wildlife, Crops, Vegetation, and Physical Structures Caused by Exposure to Waste Constituents....D-29
D-8d(2)(b) Performance Standards....D-32
D-8d(3) Protection of the Atmosphere....D-33
D-8d(3)(a) Environmental Assessment....D-33
D-8d(3)(b) Performance Standards....D-39
D-8e Monitoring, Analysis, Inspection, Response, Reporting, and Corrective Action....D-39
D-8e(1) Elements of the Monitoring Program....D-39
D-8e(2) Air Monitoring Alternatives....D-41
D-9 Boilers and Industrial Furnaces (BIFs)....D-41
D10 Containment Buildings....D-42

Section E Groundwater Monitoring....E-1

E-1 Exemption from Groundwater Protection Requirements....E-1
E-1a Waste Piles....E-1
E-1b Landfill....E-1
E-1c No Migration....E-1
E-2 Interim Status Groundwater Monitoring Data....E-1
E-2a Description of Interim Status Period Wells and Analytical Parameters....E-1
E-2b Description of Sampling/Analysis Procedures....E-2
E-2c Monitoring Data....E-2
E-2d Statistical Procedures....E-3
E-2e Groundwater Assessment Plan....E-3
E-3 General Hydrogeologic Information....E-4
E-4 Topographic Map Requirements....E-7
E-5 Contaminant Plume Description....E-8
E-6 General Monitoring Program Requirements....E-9
E-6a Description of Wells....E-9
E-6b Description of Sampling/Analysis Procedures....E-9
E-6c Procedures for Establishing Background Quality....E-9
E-6d Statistical Procedures....E-9
E-7 Detection Monitoring Program....E-9
E-8 Compliance Monitoring Program....E-10
E-9 Corrective Action Program....E-10
E-9a Characterization of Contaminated Groundwater....E-10
E-9b Concentration Limits....E-10
E-9c Alternative Concentration Limits....E-10
E-9d Corrective Action Plan....E-11
E-9d(1) Location....E-11

E-9d(2) Construction Detail E-11
E-9d(3) Plans for Removing Wastes E-11
E-9d(4) Treatment Technologies E-11
E-9d(5) Effectiveness of Correction Program E-11
E-9d(6) Reinjection System E-11
E-9d(7) Additional Hydrogeologic Data E-12
E-9d(8) Operation and Maintenance E-12
E-9d(9) Closure and Post-Closure Plans E-12
E-9e Groundwater Monitoring Program E-12
E-9e(1) Description of Monitoring System E-12
E-9e(2) Description of Sampling and Analysis Procedures E-12
E-9e(3) Monitoring Data and Statistical Procedures E-12
E-9e(4) Reporting Requirements E-13

Section F Procedures to Prevent Hazards F-1

F-1 Security F-1
F-1a Security Procedures and Equipment F-1
F-1a(1) 24-Hour Surveillance F-1
F-1a(2)(a) Barrier F-1
F-1a(2)(b) Means to Control Entry F-2
F-1a(3) Warning Signs F-2
F-1b Waiver F-2
F-2 Inspection Schedule F-2
F-2a General Inspection Requirements F-2
F-2a(1) Types of Problems Addressed at the Inspection F-3
F-2a(2) Frequency of Inspections F-5
F-2b Specific Process Inspection Requirements F-6
F-2b(1) Container Inspection F-6
F-2b(2) Tanks System Inspection F-6
F-2b(3) Waste Pile Inspection F-6
F-2b(4) Surface Impoundment Inspection F-6
F-2b(5)(a) Incinerator and Associated Equipment F-7
F-2b(6) Landfill Inspection F-7
F-2b(7) Land Treatment Facility Inspection F-7
F-2b(8) Miscellaneous Unit Inspections F-7
F-2b(9) Boilers and Industrial Furnaces (BIF) Inspections F-7
F-2b(10) Containment Building Inspection F-7
F-3 Waiver or Documentation of Preparedness and Prevention Requirements F-7
F-3a Equipment Requirements F-7
F-3a(1) Internal Communications and Alarms System F-7
F-3a(2) External Communications F-8
F-3a(3) Emergency Equipment F-8
F-3a(4) Water for Fire Control F-9
F-3b Aisle Space Requirement F-9
F-4 Preventive Procedures, Structures, and Equipment F-10
F-4a Unloading Operations F-10
F-4b Runoff F-10

F-4c Water Supplies F-11
F-4d Equipment and Power Failure F-11
F-4e Personal Protective Equipment F-11
F-5 Prevention of Reaction of Ignitable Reactive, and Incompatible Wastes F-12
F-5a Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Wastes F-12
F-5b General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste F-12
F-5c Management of Ignitable or Reactive Wastes in Containers F-13
F-5d Management of Incompatible Wastes in Containers F-13
F-5e Management of Ignitable or Reactive Wastes in Tank Systems F-14
F-5f Management of Incompatible Wastes in Tank Systems F-14
F-5g Management of Ignitable or Reactive Wastes Placed in Waste Piles F-14
F-5h Management of Incompatible Wastes Placed in Waste Piles F-14
F-5i Management of Ignitable or Reactive Wastes Placed in Surface Impoundments F-14
F-5j Management of Incompatible Wastes Placed in Surface Impoundments F-14
F-5k Management of Ignitable or Reactive Wastes Placed in Landfills F-14
F-5l Management of Incompatible Wastes Placed in Landfills F-14
F-5m Management of Ignitable or Reactive Wastes Placed in Land Treatment Units F-15
F-5n Management of Incompatible Wastes Placed in Land Treatment Units F-15
F-5o Management of Incompatible Wastes in Containment Buildings F-15

Section G Contingency Plan G-1

G-1 General Information G-1
G-2 Emergency Coordinators G-3
G-3 Implementation G-4
G-4 Emergency Actions G-8
G-4a Notification G-8
G-4b Identification of Hazardous Materials G-8
G-4c Assessment G-9
G-4d Control Procedures G-9
G-4e Prevention of Recurrence or Spread of Fires, Explosions, or Releases G-11
G-4f Storage and Treatment of Released Materials G-12
G-4g Incompatible Waste G-12
G-4h Post-Emergency Equipment Maintenance G-12
G-4i Container Spills and Leakage G-12
G-4j Tank Spills and Leakage G-13
G-4k Surface Impoundment Spills and Leakage G-13
G-4l Containment Building Leaks G-13
G-5 Emergency Equipment G-13
G-6 Coordination Arrangements G-15
G-7 Evacuation Plan G-15
G-8 Required Reports G-16
G-9 Amendment of Contingency Plan G-16

Section H Personnel Training H-1

H-1 Outline of the Training Program H-1
H-1a Job Title/Job Description H-1
H-1b Training Content, Frequency, and Techniques H-3
H-1c Training Director H-4
H-1d Relevance of Training to Job Position H-4
H-1e Training for Emergency Response H-5
H-2 Implementation of Training Program H-5

Section I Closure Plans, Post-Closure Plans, and Financial Requirements I-1

I-1 Closure Plans I-1
I-1a Closure Performance Standard I-2
I-1b Partial and Final Closure Procedures I-4
I-1c Maximum Waste Inventory I-5
I-1d Schedule for Closure I-5
I-1e Closure Procedures I-7
I-1f Amendment to Closure Plan I-12
I-2 Post-Closure Plan/Contingent Post-Closure I-13
I-2a Inspection Plan I-13
I-2b Monitoring Plan I-14
I-2c Maintenance Plan I-14
I-2d Land Treatment I-14
I-2e Post-Closure Care for Miscellaneous Units I-15
I-2f Post-Closure Security I-15
I-2g Post-Closure Contact I-15
I-2h Amendment to Post-Closure Plan I-15
I-3 Notices Required for Disposal Facilities I-15
I-3a Certification of Closure I-15
I-3b Survey Plat I-16
I-3c Post-Closure Certification I-16
I-3d Post-Closure Notices I-16
I-4 Closure Cost Estimate I-16
I-5 Financial Assurance Mechanism for Closure I-17
I-6 Post-Closure Cost Estimate I-17
I-7 Financial Assurance Mechanisms for Post-Closure Care I-17
I-8 Liability Requirements I-17
I-9 Use of State-Required Mechanisms I-17

Section J Solid Waste Management Units J-1

Section K Other Federal Laws K-1

K-1 The Wild and Scenic Rivers Act K-1
K-2 The National Historic Preservation Act of 1966 ..... K-1
K-3 The Endangered Species Act K-1
K-4 The Coastal Zone Management Act K-1
K-5 The Fish and Wildlife Coordination Act K-1
K-6 Clean Water Act (33 USC 1251 et seq) K-2

K-7 Safe Drinking Water Act (42 UCS 300f) K-2
K-8 Clean Air Act (42 USC 7401) K-2
K-9 Resource Conservation and Recovery Act (42 USC 6901 et seq) K-2

Attachments

Attachment C-1 Waste Analysis Plan
Attachment E-1 Design and Construction of Background Status Monitoring Wells
Attachment E-2 Design and Construction of Extraction Wells
Attachment E-3 Field Sampling Plan
Attachment E-4 Record of Decision (ROD) for Site 1 Allegany Ballistic Laboratory

Tables (located at the end of each section)

C-1	Summary of RCRA Regulated Wastes at ABL
C-2	Non-Regulated Wastes at ABL
C-3	Burning Grounds Waste Stream Designations and Associated Major Formulation Ingredients
D-1	Burning Constraints
D-2	Existing Surface Water Quality for Ecoregion 67, WVDEP, 1997
D-3	Waste Volumes
D-4	Estimated Annual Air Emissions of Criteria Pollutants
D-5	Estimated Maximum Annual Non-Criteria Air Emissions
D-6	Estimated Maximum Hourly and Daily Air Emissions of Criteria Pollutants
D-7	Estimated Maximum Hourly and Daily Air Emissions of Non-Criteria Pollutants
D-8	Air Emission Sources Located in Mineral County, West Virginia, within 10 Kilometers of the ABL Burning Grounds
D-9	Air Emission Sources Located within Allegany County, Maryland, that are within 10 Kilometers of the ABL Burning Grounds
E-1	Analytical Parameter List for RCRA Baseline Groundwater Monitoring
E-2	Detected Compounds from Groundwater Compliance Monitoring at the Burning Grounds - Upgradient Monitoring Wells
E-3	Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
E-4	Groundwater Surface Elevation Measurements for Each Sampling Event
E-5	Mean and Variance Data for Background Wells
E-6	Summary of Constituents at Statistically Higher Concentrations in Downgradient Wells During RCRA Baseline Groundwater Monitoring
E-7	Range of Detection for the Most Commonly Detected VOCs during RCRA Baseline Groundwater Sampling
E-8	Concentration Limits for the Corrective Action Monitoring Program (from 40 CFR 264.94)
E-9	Corrective Action Monitoring Program Wells and Screened Intervals
E-10	Analytical Parameters, Analytical Methods and Instrument Quantitation Limits – Corrective Acton Program
G-1	List of Emergency Coordinators
I-1	U.S. EPA Region III Soil Screening Levels

Figures (located at the end of each section or as noted below)

A-1 Topographic Map (one-mile radius), Allegany Ballistics Laboratory

A-2 Facility Drawing, Allegany Ballistics Laboratory

B-1 Facility Location Map, Allegany Ballistics Laboratory

B-2 Location of Burning Grounds and Storage Buildings 366 and 810, Allegany Ballistics Laboratory

B-3 Topographic Map (1,000 feet radius), Allegany Ballistics Laboratory **[located under separate tab at the end of Volume I]**

B-4 Predominant Surrounding Land Use, Allegany Ballistics Laboratory

B-5 Wind Rose, Allegany Ballistics Laboratory

D-1 Burning Grounds Paving Plan Concept

D-2 Burn Pan (Conceptual) Plan view and Cross Section

D-3 Burn Pan Cover (Conceptual)

D-4 Rocket Motor Tie-Down (Conceptual) Plan View and Cross Sections

D-5 Geologic Map of the Allegany Ballistics Laboratory Area

D-6 Cross Section Alignmentsfor Burning Grounds, Allegany Ballistics Laboratory

D-7 Cross Section A-A', Burning Grounds, Allegany Ballistics Laboratory

D-8 Cross Section B-B', Burning Grounds, Allegany Ballistics Laboratory

D-9 Cross Section C-C', Burning Grounds, Allegany Ballistics Laboratory

D-10 Cross Section D-D', Burning Grounds, Allegany Ballistics Laboratory

D-11 Well Locations, Burning Grounds, Allegany Ballistics Laboratory

D-12 Alluvial Water Levels at Burning Grounds

D-13 Bedrock Water Levels at Burning Grounds

D-14 Surface and Subsurface Soil Sample Locations, Burning Grounds, Allegany Ballistics Laboratory

D-15 Detected Volatile Organic Compounds in Surface Soil Samples, Burning Grounds, Allegany Ballistics Laboratory

D-16 Detected Semi Volatile Organic Compounds, Surface Soil Samples, Burning Grounds, Allegany Ballistics Laboratory

D-17 Detected Dioxins/Furans, Surface Soil Samples, Burning Grounds, Allegany Ballistics Laboratory

D-18 Detected Explosive Compounds, Surface Soil Samples, Burning Grounds, Allegany Ballistics Laboratory

D-19 Detected Lead, Surface Soil Samples, Burning Grounds, Allegany Ballistics Laboratory

D-20 Detected Volatile Organic Compounds, Subsurface Soil Samples, Burning Grounds, Allegany Ballistics Laboratory

D-21 Detected Dioxins/Furans, Subsurface Soil Samples, Burning Grounds, Allegany Ballistics Laboratory

D-22 Detected Explosive Compounds, Subsurface Soil Samples, Burning Grounds, Allegany Ballistics Laboratory

D-23 Detected Lead, Subsurface Soil Samples, Burning Grounds, Allegany Ballistics Laboratory
E-1 Topographic Map – Burning Grounds, Allegany Ballistics Laboratory
E-2 Isoconcentration Map of Total VOCs in Alluvial Aquifer, Allegany Ballistics Laboratory
E-3 Isoconcentration Map of Total VOCs in Bedrock Aquifer, Allegany Ballistics Laboratory
E-4 Vertical Distribution of Total VOCs, Burning Grounds, Allegany Ballistics Laboratory
E-5 Explosive Compounds Detected in Groundwater, Allegany Ballistics Laboratory
F-1 Open Burning Facility Inspection Check Sheet
F-2 Hazardous Waste Storage Unit Inspection Sheet
G-1 Plant 1 RCRA Permitted Units Evacuation Routes

Photos (located in Section A)

No. 1 Eastern view of the Burning Grounds at Allegany Ballistics Laboratory (ABL) (June 5, 2001)

No. 2 Building 366 where hazardous waste generated at ABL is stored (June 5, 2001)

No. 3 Hazardous waste at Building 366 stored on pallets and containment trays (June 4, 2001)

No. 4 Building 810 where hazardous waste generated at ABL will be stored (June 5, 2001)

Acronyms

1,1,1-TCA	1,1,1-trichloroethane
1,2-DCE	1,2-dichloroethene
ABL	Allegany Ballistics Laboratory
AIRS	Aerometric Information Retrieval System
amsl	Above Mean Sea Level
AP	Ammonium Perchlorate
ASTM	American Society for Testing and Materials
ATK	ATK Tactical Systems Company LLC
BG	Burning Ground
bgs	Below Ground Surface
BIF	Boiler and Industrial Furnace
BKNO3	Boron/Potassium Nitrate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CoC	Chain-of-Custody
COPC	Constituent of Potential Concern
CWA	Clean Water Act
DI	Deionozed
DMR	Discharge Monitoring Reports
DO	Dissolved Oxygen
DOT	U.S. Department of Transportation
DWEL	Drinking Water Exposure Limit
FEMA	Federal Emergency Management Agency
FFA	Federal Facility Agreement

FSP	Field Sampling Plan
ft	Feet
ft^2/day	Square Feet per Day
ft^3	Cubic Feet
GOP	General Operating Procedures
gpm	Gallons per Minute
GW	Groundwater
HAZWOPER	Hazardous Waste Operations and Emergency Response
HBGL	Health-based Guidance Levels
HCl	Hydrogen Chloride
HI	Hazard Index
HMX	Cyclotetramethylenetetranitramine
HpCDD	Heptachlorodibenzo-p-dioxin
HpCDF	Heptachlorodibenzofuran
HQ	Hazard Quotient
HxCDF	Hexachlorodibenzofuran
IDW	Investigation-derived Waste
in.	Inch
IQL	Instrument Quantitation Limit
lbs	Pounds
LDR	Land Disposal Restriction
MBK	Methyl butyl Ketone
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MEK	Methyl ethyl Ketone
MEKP	Methyl ethyl Ketone Peroxide
mg/kg	Milligrams per Kilogram
MIBK	Methyl isobutyl Ketone
MS/MSD	Matrix Spike/Matrix spike Duplicate
MSDS	Material Safety Data Sheets

msl	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NAVSEA	Naval Sea Systems Command
NC	Nitrocellulose
NEW	Net Explosive Weight
NG	Nitroglycerin
NIROP	Naval Industrial Reserve Ordnance Plant
NMOC	Non Methane Organic Compound
NO	Nitrogen Oxide
NO_2	Nitrogen Dioxide
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NSR	New Source Review
NTU	Nephelometric Turbidity Unit
NWW	Nonwastewater
OB	Open Burning
OB/OD	Open Burning/Open Detonation
OBOD-M	Open Burn/Open Detonation Dispersion Model
OCDD	Octachlorodibenzo-p-dioxin
OCDF	Octachlorodibenzofuran
OSHA	Occupational Safety and Health Administration
P/E	Propellant/Explosive
PAH	Polycyclic Aromatic Hydrocarbons
PBX	Plastic-Bonded Explosives
PCB	Polychlorinated Biphenyl
PGA	Polyglycol Adipate
PPE	Personal Protective Equipment
PSD	Prevention of Significant Deterioration
QA	Quality Assurance
QC	Quality Control

RBC	Risk-based Concentration
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetritramine
REL	Reference Exposure Level
RfC	Reference Concentration
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SCBA	Self-Contained Breathing Apparatus
SNL	Sandia National Laboratory
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compounds
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TC	Toxicity Characteristic
TCDF	Tetrachlorodibenzofuran
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TRV	Toxicity Reference Value
TSD	Treatment, Storage, and Disposal
TSDF	Treatment, Storage, and Disposal Facility
TSS	Total Suspended Solids
UHC	Underlying Hazardous Constituents
UOP	Unit Operating Procedures
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
UTS	Universal Treatment Standards
VOC	Volatile Organic Compounds
WQ	Water Quality

WVDEP	West Virginia Department of Environmental Protection
WW	Wastewater

Appendix A
Air Modeling Results

DRAFT

Air Modeling Report for the Burning Grounds

Allegany Ballistics Laboratory (ABL) Rocket Center, West Virginia

Contract Task Order 0175

January 2002

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN II Program
Contract No. N62470-95-D-6007

Prepared by

Herndon, Virginia

Contents

Acronyms and Abbreviations ..... **v**

ABL Open Burning Modeling Report **A-1**

Executive Summary A-1

1.0 Introduction A-2

1.1 Background A-2

1.2 Site Summary A-2

1.3 Synopsis of Approach A-3

2.0 Open Burning/Open Detonation Model (OBOD-M) A-3

2.1 Emission Scenarios A-4

2.2 Averaging Periods A-4

3.0 Emission Factors A-5

3.1 Emission Factor Data A-5

3.2 Emission Factor Assessment A-6

3.3 Emission Factor Conclusions A-7

4.0 Estimated Emissions A-8

5.0 OBOD-M Input Parameters A-9

5.1 Meteorological Data A-9

5.2 Receptor Grid A-9

5.3 Source and Emission Input Parameters A-10

6.0 Background Concentration Data A-10

7.0 OBOD-M Modeling Results A-11

8.0 Conclusion A-12

9.0 References A-13

Attachments

A-1 Isopleths

A-2 Air Modeling Runs

Tables (located at the end of Appendix A)

3-1 Data Sources Used in the Air Modeling
3-2 Data Used to Estimate HCl Scrubbing Efficiency
3-3 CO Emission Factor Comparison
3-4 Criteria Pollutant Emission Factors – g/g
3-5 Other Pollutant Emission Factors - g/g (maximum of reported or ½ of detection levels)

4-1 Projected Material Throughput at the Burning Grounds
4-2 Estimated Annual Air Emissions of Criteria Pollutants
4-3 Estimated Maximum Annual Air Emission
4-4 Estimated Maximum Hourly and Daily Air Emissions of Criteria Pollutants
4-5 Estimated Maximum Hourly and Daily Air Emissions of Non-Criteria Pollutants

5-1 General Source and Emission Input Parameters Required by OBOD-M
5-2 Detailed Source and Emission Input Parameters for OBOD-M
5-3 Burn Rates for P/E Wastes
5-4 Burn Pan Locations and Waste Capacity

6-1 Air Emission Sources Located in Mineral County, West Virginia, within 10 Kilometers of the ABL Burning Grounds
6-2 Air Emission Sources Located within Allegany County, Maryland, within 10 Kilometers of the ABL Burning Grounds
6-3 Air Emission Modeling Results, Receptor Locations, Background Levels and Limits

7-1 Burning Constraints

Figures (located at the end of Appendix A)

1 Air Model Receptors

2 Air Model Fine Grid Receptors

Acronyms and Abbreviations

ABL	Allegany Ballistics Laboratory
AP	Ammonium Perchlorate
ATK	ATK Tactical Systems Company LLC
DBP	Double-base Propellants
DDESB	Department of Defense Explosives Safety Board
DoD	Department of Defense
EF	Emission Factor
HBGL	Health-based Guidance Level
HMX	Cyclotetramethylenetetranitramine
NAAQS	National Ambient Air Quality Standards
NC	Nitrocellulose
NG	Nitroglycerine
NSR	New Source Review
OB	Open Burning
OBOD-M	Open Burn/Open Detonation Dispersion Model
OESO	Ordnance Environmental Support Office
P/E	Propellant and Explosives
PBE	Plastic-bonded Explosives
PSD	Prevention of Significant Deterioration
QD	Quantity-distance
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetrinitramine
REL	Reference Exposure Level
RfC	Reference Concentration
SNL	Sandia National Laboratory
SVOC	Semivolatile Organic Compound
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound
WVDEP	West Virginia Department of Environmental Protection

APPENDIX A

ABL Open Burning Modeling Report

Executive Summary

Dispersion modeling of emissions to the air from open burning (OB) of propellants and explosives on the Burning Grounds at the Allegany Ballistic Laboratory (ABL) were Resource Conservation and Recovery Act (RCRA) Part B permit application under Subpart X. This document provides the protocol used for modeling of these emissions, model inputs, and modeling results.

The Open Burn/Open Detonation Model (OBOD-M) was used to characterize the air quality impacts from OB events at the ABL Burning Grounds. Various scenarios and constraints were applied to OBOD-M to determine the optimal burning strategy for daily operations at the ABL Burning Grounds. The model was run with the intent to achieve acceptable ground level concentrations of the criteria pollutants (PM_{10}, CO, lead, NOx, SO_2) and non-criteria pollutants (HCl, SVOCs, VOCs).

To conservatively model the OB, it was initially assumed that two burns were conducted per day with seven burn pans burning at the same time at full capacity (maximum of 1,630 lbs. per burn) with no constraints on wind direction or velocity. This scenario was adequate for all the pollutants except HCl, PM_{10} and lead, which are the limiting compounds for OB of Aluminum Composite Propellant, Non-Aluminized Composite Propellant and Double-Base Propellant. Due to the potential elevated ground level concentrations of HCl and PM_{10} in close proximity to the ABL facility, the burning of Aluminum Composite Propellant was constrained. The constraints applied were limiting the OB of Aluminum Composite Propellant to one burn per day (1,630 lbs.) with no burning during times when the wind direction is between 120-260 degrees and burning limited to 5 days per week. Due to the potential elevated ground level concentrations of HCl in close proximity to the ABL facility without operational constraints, the burning of Non-Aluminum Composite Propellant was also constrained. The burning of Non-Aluminum Composite Propellant was limited to one burn per day (1,630 lbs.) with the same wind constraint and limited days. The OB of Double Base Propellant was also limited to one burn per day (1,630 lbs.) with no burning during times when the wind direction is between 120-260 degrees and burning limited to 5 days per week to avoid elevated lead concentrations. These constraints were identified by successively adding operational constraints until modeled pollutant concentrations at points of maximum ground level impact were acceptable for the Clean Air Act National Ambient Air Quality Standards (NAAQS) and ecological and human health risks.

In order for the emission concentrations from OB activities at the Burning Grounds to be compliant with the NAAQS, constraints on the meteorological conditions and the number of daily burns were imposed. Further details of the imposed constraints on the various P/E wastes are discussed herein.

1.0 Introduction

This document presents the protocol, inputs, and results from dispersion modeling of emissions to the air from Open Burning (OB) of propellants and explosives on the Burning Grounds at the Allegany Ballistic Laboratory (ABL). Dispersion modeling was conducted to provide an understanding of the nature, composition, and impact of the air emissions from the OB activities. The modeling results are necessary to support the Resource Conservation and Recovery Act (RCRA) Part B permitting and for evaluation of the impact of the OB activities in the context of state and federal air quality standards. The results of the modeling are used in human health and ecological risk assessments also required for the RCRA Part B permit application.

1.1 Background

ABL is located in Rocket Center, West Virginia on the West Virginia-Maryland border along the North Branch Potomac River. The facility, operated by ATK Tactical Systems Company (ATK), develops, manufactures, and tests solid propellant rocket motors, gas generators, warheads, and laser initiation systems for the Department of Defense. Other activities include development and production of metal parts, metal components, and filament wound composite structures. Excess propellants and explosives (P/E wastes) are treated by burning in an open burning area, referred to as the "Burning Grounds," within the ABL property (fenceline). In accordance with West Virginia regulatory requirements, a Part B permit application under Subpart X of RCRA is being developed for the Burning Grounds facility.

Modeling of air emissions from the open burning was performed to support the Subpart X permitting, and results were used specifically in ecological and human health risk assessments. The permit application will be submitted by ATK to the West Virginia Department of Environmental Protection (WVDEP).

Emissions from the Burning Grounds are fugitive emissions because they are not emitted through a duct, stack, or control device. The air emissions are subject to the air quality analysis under the federally required New Source Review (NSR) air permitting requirements throughout the State of West Virginia. These fugitive emissions, however, are not subject to the Prevention of Significant Deterioration (PSD) pre-construction review requirements under NSR.

1.2 Site Summary

Since 1943, ABL has been used primarily for research, development, testing, and production of solid propellant motors for ammunition and rockets. Excess or waste P/E generated during various production and testing operations at the facility are treated by open burning at the Burning Grounds facility. Typical wastes managed at the burn pads include: nitroglycerine (NG); nitrocellulose (NC); ammonium perchlorate (AP); cyclotetramethylenetetranitramine (HMX); cyclotrimethylenetrinitramine (RDX); and various other propellants and explosives. Currently, steel burn pans are in place at six separate burn pads on the site. Five of the six burn pads are currently operational. Modeling was conducted based on the proposed configuration of seven pans and one motor tie down unit which may be used in place of one of the pans. Waste material is placed in the various burn pans, under

suitable meteorological conditions, and is ignited by the Burning Grounds personnel. Historically, the burning rates have varied considerably and have ranged from very high rates for the pure energetics to very slow rates for P/E waste mixed with sawdust as a desensitizer.

1.3 Synopsis of Approach

This work is being performed in accordance with the Detailed Permitting Approach (CH2M HILL, 2000) for this project. Air dispersion modeling was used to characterize the air quality impacts from OB events at the ABL Burning Grounds. The air dispersion modeling used appropriate emission factors as discussed below and the OBOD-M. OBOD-M is a dispersion model used to calculate ground-level compound concentrations on a polar or rectangular coordinate receptor grid extending from the Burning Grounds boundary out to a distance of 10 km from the source. (For ABL, a Cartesian [rectangular] grid system was used per WV regulator's request).

The selection of appropriate emission factors required an analysis of available data and studies, including the Sandia National Laboratory (SNL) Report (SNL, December 1996), POLU13 (U.S. Naval Surface Warfare Center), the BangBox Test Data (Mitchell and Suggs, 1998), and the AP-42 Emission Factor Database (5th Edition). These studies and data sources are further described in this report.

Based on these studies, the primary compounds of interest for OB include criteria pollutants:

- Particulate matter less than 10 microns in aerodynamic equivalent diameter (PM_{10}), oxides of nitrogen (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2) and lead,
- Non-criteria pollutants: gaseous hydrogen chloride (HCl), semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs) and metals.

The primary source of emissions data is a series of tests conducted at Sandia National Laboratory (SNL) using ABL specific wastes. The results of the modeling effort were compared to the NAAQS for PM_{10}, NO_x, CO, SO_2, and lead. HCl is evaluated in this document against health-based guidance levels (HBGLs). In addition, modeling results for non-criteria pollutants were evaluated in the human health and ecological risk assessments.

2.0 Open Burning/Open Detonation Model (OBOD-M)

The most recent version of the OBOD-M (Bjorklund et al., 1998) was used to characterize the air quality impacts from OB events at the ABL Burning Grounds. OBOD-M is intended for use in evaluating the potential air quality impacts of the open burning and detonation (OB/OD) of obsolete munitions and solid propellants. OBOD-M uses cloud/plume rise, dispersion and deposition algorithms taken from existing models for instantaneous and quasi-continuous sources to predict the downwind transport and dispersion of pollutants released by OB/OD operations. Although there is no preferred model for application to the open burning of obsolete or unsafe munitions, OBOD-M is specifically designed to predict the buoyant rise and dispersion of emissions from short-term quasi-continuous (open burn) releases when a refined model is needed. Several other models such as ISCT3 and CALPUF were reviewed for use at the site but were deemed less conservative and/or inappropriate

for modeling this type of release. Specific data inputs to the model are described in Section 4.

2.1 Emission Scenarios

In the actual burning operation the burn pans are loaded with waste, igniters are attached in each pan, and the pans are sequentially ignited. The ignition sequence is initiated with the most downwind pan, pausing several minutes before igniting the next pan in the sequence. If a pan contains liquid explosives such as NG, that pan is ignited first in the sequence. Quantity-Distance (QD) constraints imposed by safety restrictions limit the specific pans and total number of pans loaded and used during a burning operation. The quantity of material burnt in each pan and the location of the burn pans are based on the safety standards provided in the Department of Defense (DoD) Contractor's Safety Manual for Ammunition and Explosives (September 1997). These distances were approved by the DoD Explosives Safety Board (DDESB). Modeling will be performed for quantities not exceeding the specified safety limits. Actual burns are conducted with wastes segregated in pans by material type, however each pan is not designated for a specific waste.

Initially, for the purposes of conservatively modeling the worst-case emissions scenario from the ABL facility, it is assumed that all seven burn pans are simultaneously operating at capacity. For purposes of selecting meteorological data for modeling, it is assumed that OB operations occur only during the daylight hours between 0900 and 1700. The modeled scenarios included use of the pans with the assumption that the effect of a tie-down firing of a motor is conservatively represented with the adjacent burn pan having a larger capacity than the tie-down pad. When the tie-down pad is used, the adjacent burn pans is not used. For the purposes of conservatively estimating the impact of emissions, it is assumed that the burning from each burn event is complete in 1 hour. Both one and two burn events per day are modeled.

These initial modeling scenarios did not include constraints on wind direction, velocity, or pan loads other than those required for safety. This initial scenario resulted in excessive concentrations of HCl, PM_{10} or lead for the burning of Aluminum Composite Propellant, Double Base Propellant and Non-Aluminized Composite Propellant. Due to these high concentrations, a wind constraint was applied to these scenarios. Operational constraints were added until modeled pollutant concentrations at points of maximum ground level impact were acceptable for the Clean Air Act National Ambient Air Quality Standards (NAAQS) and ecological and human health risks. The resulting combination of constraints was to limit burns for those materials to 1 burn per day (1630 lbs.) with no burning during times when the wind direction is between 120-260 degrees and burning limited to 5 days per week.

2.2 Averaging Periods

The modeling was performed to determine the 1-hr, 3-hr, 8-hr, 24-hr, quarterly, and annual average concentrations resulting from emissions from OB at ABL. Concentrations of criteria pollutants (PM_{10}, CO, lead, NO_x, SO_2) are compared to NAAQS based on appropriate averaging periods for evaluations of the impacts of the emissions. Concentrations of the non-criteria pollutants (i.e. VOCs, SVOCs, metals and HCL) are evaluated in the human health and ecological risk assessments.

3.0 Emission Factors

Wastes from the propellant operations are energetic and are treated onsite via burning on above-ground pans. Propellants are grouped into categories according to their ingredients. The categories are:

- Aluminized Composite Propellants (principally aluminum and ammonium perchlorate)
- Non-Aluminized Composite Propellants (principally ammonium perchlorate, ammonium nitrate and polymer binder consisting of polybutadiene)
- Double Base Propellants (principally RDX or HMX, with lesser quantities of nitroglycerine or nitrocellulose, bismuth and/or tin, and/or 1 to 2 percent lead salts)
- Plastic-Bonded Explosives (principally RDX or HMX, aluminum and various synthetic binder materials)

Two types of mixed wastes are also destroyed on site. Type 1 wastes include double base propellant components with acetone and sawdust as an absorbent and stabilizer. Type 2 wastes include Plastic-Bonded Explosives (PBE) components, composite propellant components, miscellaneous materials, with acetone and sawdust as an absorbent and stabilizer. Miscellaneous materials in Type 2 waste are materials such as stir sticks that contain or may contain energetic materials.

The emissions of concern and potential emissions were identified by evaluating potential emissions using a combustion model and actual emission testing data. Several data sources were used to develop the emission factors to be used in the air modeling (Table 3-1).

3.1 Emission Factor Data

Emissions from the OB activities at ABL are criteria pollutants (including fine particulate matter [PM10], carbon monoxide, oxides of nitrogen, lead, and sulfur dioxide), hydrogen chloride, VOCs (benzene and xylenes), selected classes of SVOCs (including polycyclic aromatic hydrocarbons, dinitrotoluenes and trinitrobenzene, and phenolics and nitrosamines) and metals (aluminum, copper, iron, lead, and nickel) (SNL, 1996, Section 4).

The calculation of emission factors for the modeled waste is based on emission factors for each of the components that make up the waste burned. For the pure energetic materials and propellants, POLU13 was used to develop emission factors in conjunction with the SNL data. Emission factors were generated for all anticipated pollutants. Because the calculated emission factors are dependent on the estimated percent excess air available for mixing during the open burning process, the percent excess air was calculated. The percent excess air represents oxygen available from the atmosphere rather than from the combustion material and provides atmospheric constituents of air for modeling the combustion process. The percent excess air must be established to accurately generate emission factors. The percent excess air was estimated by comparing CO levels measured during testing to the relevant POLU13 generated emissions factor. The corresponding percent excess air was used for the matching CO emission factors to estimate a suite of emission factors for various pollutants, as described in the following section.

3.2 Emission Factor Assessment

Following the collection of pertinent emission factor data, an assessment of the validity of those emission factors was performed. The emission factor assessment compared emission factors from various sources and identified the most realistic emission factors to be used in the modeling effort. In most cases, emission test data from the Sandia study were used.

3.2.1 HCl Emission Factor

To determine the appropriate HCl emission factor, the HCl emission factor developed by SNL for the ABL wastes was first reviewed against other sources. The SNL HCl emission factor was based on an extremely conservative analytical approach rather than test data. It was assumed by SNL that all available Cl in the P/E wastes would form HCl. This approach identifies the HCl generated, but overestimates the HCl emissions because it does not account for reaction chemistry of HCl with pollutants in the plume.

Tests more recently conducted for the U.S. Air Force at Hill Air Force Base indicate innate scrubbing effects of the plume for HCl due to the highly reactive nature of HCl and the specific properties of the plume matrix. The Hill AFB testing has shown that HCl readily combines with many compounds in the plumes (such as aluminum oxide (Al_2O_3) and water vapor) and is rapidly neutralized in subsequent reactions including the formation of salts. The net result is that HCl is rapidly 'scrubbed' from the plume by material in the plume. Only a small portion of the HCl theoretically produced in burn was found in the emissions in the SNL study; however, the exact values were not reported. Evaluations of the HCl scrubbing in OB/OD operations by Hill Air Force Base indicate a range of scrubbing efficiency from 87% to over 96%. Further evaluation and extrapolation was therefore necessary to identify an appropriate HCl scrubbing efficiency and emission factor for the ABL OB operation.

BangBox and POLU13 data were used to estimate the level of HCl being scrubbed in the plume for P/E wastes at ABL. The POLU13 modeling runs calculated 42-43% excess air at conditions with CO at 0.314 g/100 g. The 42-43% excess air condition was then used to estimate the total theoretical unscrubbed amount (or maximum formation) of HCl that will form in the plume when burning a composite propellant. Actual sampling data from BangBox testing of similar wastes (from the ATK facility in West Jordan, Utah) was used to calculate the amount of HCl remaining in the plume[1]. Comparisons of the two data sets (POLU and BangBox) were used to estimate the level of scrubbing of HCl by material in the plume.

Table 3-2 lists the emission factors used to estimate scrubbing efficiencies of HCl in the P/E waste plume. (Based on matching CO emissions with the corresponding excess air requirement.)

The sampled HCl emissions in the BangBox burn were 10.9% of what POLU13 predicts with 42-43% excess air. This represents an HCl scrubbing efficiency of 89.1%. A scrubbing factor

[1] Although BangBox test burn results are used as an indicator of HCl scrubbing efficiency for ABL, the BangBox testing emissions of criteria pollutants and HAP are much higher than those projected for ABL. The BangBox test used double-base propellant, plastic materials, paper, cloth/wood, and diesel fuel. ABL does not burn plastic wastes with diesel fuel. The plastic, paper, cloth, wood and diesel fuel in the BangBox test matrix produces higher levels of chlorinated emissions as well as VOC and particulate emissions relative to those from ABL wastes.

of 89% will be applied to the estimated maximum formation of HCl estimated from the open burning operations at the ABL facility (estimated using POLU 13) to estimate HCl emissions from these operations.

3.2.2 CO Emission Factor

Determination of an appropriate CO emission factor (EF) involved first reviewing the CO EF in the SNL report. The SNL study reported a CO emission factor of 35 g/100g (700 lb/ton) for P/E waste. While the chemistry of burning P/E waste cannot be exactly quantified, it is possible to benchmark emission factor values with existing data. The SNL CO emission factor was benchmarked against a realistic maximum CO emission factor calculated using the POLU13 model. Because the CO emission factors for pure energetic propellants are inversely proportional to the amount of excess air (oxygen available from the atmosphere rather than from the combustion material) available during burning and mixing inside the plume, the excess air value selected for input to the POLU13 model was chosen as follows. Typically, increasing the range of excess air from 0 to 50% increases the conversion of CO to CO_2 for open burning operations. Zero % excess air corresponds to combustion in an inert gas or a vacuum while values above 70-80 % correspond to a highly mixed and turbulent air (oxygen) addition. Increasing excess air above 50% yields an insignificant increase in the conversion of the remaining CO to CO_2. Using 50% excess air, POLU13 generates CO emission factors of less than 0.06 g/100g propellant for both Double Base Propellants (DBP) and Composite Propellants. The value of 50% excess air is consistent with a combustion process using no external air mixing. Based on this comparison and on other emissions estimating experience, the SNL CO emission factor was considered unrepresentative of the ABL OB operations.

A weighted average of AP-42 and POLU13 CO emission factors were employed as a reference to evaluate the burning of the P/E waste mix from ABL. Table 3-3 shows the specific makeup of the estimated P/E waste CO emission factors from the individual constituents used to calculate the overall CO emission factor.

A weighted average of these emission factors yields a CO emission factor of approximately 8.3 g/100g (166 lb/ton) of P/E waste. The BangBox data indicate a CO emission factor of 1.13 g/100g (23 lb/ton) propellant.

3.3 Emission Factor Conclusions

The emission factor validation process resulted in newly calculated emission factors for HCl and CO as described above. The HCl produced by the burns is estimated based on all of the available Cl forming HCl. The HCl scrubbing efficiency is estimated at 89%. The CO emission factor to be used in the modeling is 8.3g/100g for mixed P/E wastes.

Uncertainties exist in the emissions factors developed by SNL for non-criteria pollutants because most of these constituents were not detected in SNL's testing. For compounds other than CO and HCl, the measured values reported in the SNL test data will be used. For compounds listed as non-detects in the SNL data, one half of the lowest detection level will be used in estimating emissions. An additional uncertainty in the SNL data is the lack of speciation of dioxin/furan emissions. SNL also cites other emissions tests with similar propellants that have resulted in lower dioxin/furan emission rates. The risk assessments will discuss the uncertainties in risk results based on development of emissions factors for

undetected constituents, and limitations in dioxin/furan emissions factors. The emission factors are listed in Tables 3-4 and 3-5.

4.0 Estimated Emissions

Emissions from the Burning Grounds are fugitive emissions because they are not emitted through a duct, stack, or control device. The air emissions will be subject to the air quality analysis under NSR air permitting requirements. These fugitive emissions, however, are not subject to the PSD pre-construction review requirements under NSR. To conservatively estimate the worst case scenario of emissions, the worst case emissions for each material treated were used in the modeling. This worst case emission rate was based on all of the burns being composed of 100% of the worst emitting material on a pollutant by pollutant basis. A maximum throughput of 300,000 pounds of any P/E material and a total maximum throughput of 300,000 pounds was used for the modeling. Table 4-1 presents projected material throughput at the Burning Grounds to be used for modeling.

Particulate transport and deposition were conservatively modeled by treating particulate emissions as gases without plume depletion. Deposition flux onto the soil was estimated from the modeled ground-level concentrations using a selected deposition velocity. A point-estimate of deposition velocity was conservatively selected based on available information on the particle size distribution from emissions during open burning operations. A deposition velocity of 1 cm/sec is used, which corresponds approximately to a particle size of 30 um (which represents the cut-point for total suspended particulate). No differentiation between wet and dry deposition is included. Deposition data are addressed in the human and ecological health risk assessments.

Modeling results are used in conjunction with manufacturing projections and safety requirements to define material throughput limits for the Burning Grounds. The number of burns are reduced to achieve acceptable levels. Operational constraints based on meteorological conditions are also imposed. The results section of this modeling report identifies all constraints used in the modeling effort to achieve acceptable impact levels.

Table 4-2 presents the estimated annual air emissions of criteria pollutants from the facility, based on the worst case (by pollutant rather than waste) emissions using the maximum material throughput projections in Table 4-1 and emission factors in Table 3-4.

Table 4-3 presents other estimated maximum annual air emissions from the facility, based on the worst case (by pollutant rather than waste) emissions using the maximum material throughput projections in Table 4-1 and emission factors in Table 3-5.

Based on the capacity of the burning pans, the maximum waste limit for the Burning Grounds is 1,630 lbs. per burn. Up to two burns per day may be conducted, totaling 3,260 lbs per day for the facility. Table 4-4 presents the maximum estimated hourly and daily air emissions of criteria pollutants from the facility, based on the worst case (by pollutant rather than waste) emissions.

Table 4-5 presents the maximum estimated hourly and daily air emissions of non-criteria pollutants from the facility, based on the worst case (by pollutant rather than waste)

emissions using these maximum hourly and daily material throughput projections (including constraints) and emission factors in Table 3-5.

5.0 OBOD-M Input Parameters

5.1 Meteorological Data

OBOD-M allows the user to enter sequential hourly meteorological data. Concentration and deposition values are calculated for the number of hours entered into the model. Hourly meteorological data are available from the Burning Grounds for a continuous year. The following data sets are used in the model runs:

- Sequential, hourly surface data from the ABL meteorological monitoring station during daylight hours. Valid, available data for the 2000 year was used.
- Corresponding twice-daily mixing height data from the nearest National Weather Service station at Sterling, VA.

These meteorological data files were processed for input into OBOD-M using the EPA's PCRAMMET program. This process was used to validate the data and put the data in the proper format for the model. The meteorological data include the year, month, day, hour, wind vector, wind speed (m/s), temperature (K), stability class, rural mixing height (m), and urban mixing height (m).

5.2 Receptor Grid

A receptor grid network is used to locate the maximum ground-level (1.8m above the average ground surface elevation in each cell) concentrations resulting from OB emissions. The receptor grid extends outward to a distance of 10 km from the Burning Grounds. The receptor grid incorporates both discrete receptors and rectangular grid receptors and are constructed as follows:

- 100 discrete receptors are available in OBOD-M for modeling. Discrete receptors are placed along the Burning Grounds and ABL property fenceline, spaced every 100 meters along the boundary of ABL closest to the Burning Grounds.
- 1,600 coarse rectangular-grid receptors are placed along lines measured outward from the property boundary to a maximum distance of 10-km from the Burning Grounds for a 20x20 km coarse grid coverage area. The coarse grid receptors are placed every 500 meters.
- 1,600 fine rectangular-grid receptors are placed along lines measured outward from the property boundary to a maximum distance of 2-km from the Burning Grounds for a 4x4 km fine grid coverage area. The fine grid receptors are placed every 100 meters.

The data at the discrete, coarse, and fine grid receptors are incorporated into isopleth concentration maps and are available in Attachment D-1. The Kridging method of interpolation was used to develop the isopleths while maintaining the modeled impact values at each receptor.

A grid map with coarse grid receptor locations, the ABL property boundary, and the Burning Grounds location is provided in Figure 5-1. The fine grid receptor locations are shown in Figure 5-2.

5.3 Source and Emission Input Parameters

The data in Table 5-1 were used to characterize the source and emission impacts. The input files for the modeling runs are provided in Attachment D-2.

The data implemented into the OBOD-M runs for each compound varied as to the characteristics of the compound and the P/E waste material. The input data for each compound and P/E waste are presented in Table 5-2. Each P/E waste was run with a unity emission factor of 0.01 g/g to be used for scaling purposes in the human health and ecological risk assessment. The worse case emission factors summarized in Table 3-4 and Table 3-5 were used for each compound. Both the heat content and the burn rate are P/E material specific. The burn rate varies for each of the P/E wastes, with the propellants expressed with a high burn rate (5,000 g/s) and the mixed waste with a slow burn rate of 1,000 g/s. The burn rates assumed for each P/E waste is presented in Table 5-3.

The OBOD-M sources denote the actual burn sources input into OBOD-M. The burn sources in this case are the burn pans located on the Burning Grounds, which is shown in Figure 5-1. The burn pans used for the OBOD-M are referred to as A', A, B, C, D, E, and F. The pan locations and capacity are presented in Table 5-4. The maximum amount of waste per burn is 1,630 pounds, assuming all pans are being utilized. The burn events modeled for each compound assumed that all the burn pans were used and all pans were full to a total of 1,630 pounds per burn. Both the release height and the plume dimension were kept consistent through all modeling scenarios as 1 m and 10,10, 100 m, respectively.

It was determined during the modeling that it was necessary to apply restrictions to the burning to achieve target ground level concentrations. Those restrictions are indicated in Table 5-2.

6.0 Background Concentration Data

The site is in a rural area of Mineral County on the West Virginia – Maryland Border. It is bordered immediately to the north by Allegany County, Maryland. Both counties are characterized as sparsely populated, rural environments, with a limited number of other sources of pollutant emissions. The general area is largely agricultural with widely dispersed, light industry.

There are no air monitoring sites in Mineral County, West Virginia. The state presently classifies Mineral County as attainment/unclassifiable. This classification means that insufficient air quality data exist to definitively classify the county attainment or non-attainment. There are no non-attainment areas proximate to the area. The entire state of Maryland is in attainment of all of the NAAQS with the exception of ozone. Ozone non-attainment areas in Maryland are in the central and eastern portions of the state. Emission inventory records for sources of criteria and hazardous pollutants in each county were requested from both West Virginia and Maryland environmental protection departments. A listing of reported contaminant emission sources within Mineral County, West Virginia is

shown in Table 6-1. Sources located in Allegany County, Maryland, are summarized in Table 6-2.

Background concentration data for criteria pollutants at the site were not available. A monitoring station was located in Allegany County, MD in 1997 and part of 1998. The SO_2 and PM_{10} data from this site were used for those background concentrations. These data are available at: http://www.mde.state.md.us/environment/air/air_data/datareport.htm. In lieu of local data, background concentrations were estimated by using the averages of all available monitoring data in the state of West Virginia obtained from EPA's AIRS database (http://www.epa.gov/air/data/monvals.html) for the most recently available year. The year 1997 was used for lead, 1998 for NO_2, and 2000 for CO. These data are presented in Table 6-3 and are considered to be rough, conservative estimates. These data are used to demonstrate conservative compliance with NAAQS. Modeling indicates no new violations of NAAQS will occur and that considerable 'margin' exists between modeled concentrations and NAAQS.

7.0 OBOD-M Modeling Results

The results from the coarse, fine, and discrete-grid OBOD-M modeling analysis are summarized in Table 6-3. The NAAQS were compared to the ground level concentrations calculated from OBOD-M to determine a plausible number of burns allowed per day for each compound. Results are only given for the time period for which NAAQS are applicable (i.e., 1hr and 8hr concentrations for CO). For the 1-hr, 8-hr, and 24-hr periods, the Reference Exposure Level (REL) and the USEPA's Reference Concentration (RfC) were used as the threshold limit for HCl emission concentrations because NAAQS are not applicable. Table 6-3 presents the highest and second highest ground level concentrations, receptor location, threshold limit, and indicates whether the concentration exceeds the threshold at any receptor.

The coarse and fine receptor locations are not limited to the surrounding topography beyond the ABL property fenceline. The highest and second highest emission concentrations may be located at receptors that are within the ABL property fenceline. The isopleths that are presented in Attachment D-1 give a visual representation of the concentration levels that extend beyond the property fenceline. It is evident from the isopleths that the dispersion of the pollutants is isolated within the 4 by 4 kilometer square of the fine grid receptors. The emission concentrations that extend to the outer coarse grid receptors are minimal and do not pose a threat to humans or the environment. The bodies of water that are of concern (pond, wetland, and North Branch Potomac River) are located within the fine grid receptors. The exposure to these bodies of water is further discussed in the human health and ecological risk assessments.

For Aluminum Composite Propellant, the limiting emission compounds are HCl and PM_{10}. HCl ground level concentration limits the number of burns for the Non-Aluminized Composite Propellant. For the Plastic Bonded Explosives, the compound of concern is SO_2. Lead is the limiting compound in Double Base Propellant for Ecological Risk requirements and is a compound of concern for compliance with NAAQS. In the mixed wastes, the compounds of concern are CO and NO_x.

The burning of both Aluminum Composite Propellant and Non-Aluminized Composite Propellant triggered wind constraints as well as limited burn days. For the initial scenario with no constraints, the ground level concentrations of both HCl and PM_{10} exceeded the threshold level at several receptor locations beyond the ABL property fenceline. The NAAQS of 150 $\mu g/m^3$ for a 24-hour period and 50 $\mu g/m^3$ for annual were used as the threshold levels for PM_{10} ground level concentrations. For the 1-hr, 8-hr, and 24-hr period, the Reference Exposure Level (REL) and the USEPA's Reference Concentration (RfC) were used as the threshold limit for HCl ground level concentrations. Due to these exceedances, a constraint on wind direction and eliminating weekend burn events was applied to the modeling inputs. The final scenario excluded days when the wind direction was between 120 to 260 degrees and the wind speed is greater than 1 m/s at the start of the burn. By applying this wind speed/direction constraint, the exposure of HCL, PM_{10} and lead to the north-west of the Burning Grounds were limited. Burn events were also excluded from weekends, which complies with current operating procedures. Applying these constraints brought the ground level concentrations of HCl, PM_{10} and lead below the threshold limit. The Open Burning constraints for all wastes, as identified in the modeling, are as detailed in Table 7-1.

8.0 Conclusion

Dispersion modeling of emissions to the air from open burning of propellants and explosives on the Burning Grounds at ABL was conducted to support human health and ecological risk assessments required for the RCRA Part B permit application under Subpart X. OBOD-M characterized the air quality impacts from OB events and identified constraints required in order to meet NAAQS for ground level concentrations of PM_{10}, CO, lead, NOx, and SO_2. Burning scenarios were also identified for HCl although NAAQS do not apply. Each P/E waste was run with a unity emission factor of 0.01 g/g to be used in the human health and ecological risk assessments. The dispersion model was run with the intent to achieve ground level concentrations of the criteria pollutants (PM_{10}, CO, lead, NOx, SO_2) and non-criteria pollutants (HCl, SVOCs, VOCs) that meet threshold limits.

To conservatively model the OB, it was initially assumed that two burns were conducted per day with seven burn pans burning at the same time at full capacity with no constraints on wind direction or velocity. This scenario was adequate for the mixed wastes and plastic bonded explosives. Constraints were necessary for the Double Base Propellant, Aluminum Composite Propellant and Non-Aluminized Composite Propellant. These propellants are limited to 1 burn per day with no burning during times when the wind direction is blowing from 120-260 degrees and burning limited to 5 days per week. Due to the high emission concentrations for HCl and PM_{10}, constraints were applied for the Aluminum Composite Propellant and Non-Aluminized Composite Propellant. Double Base Propellant is limited by Ecological Risk rather than NAAQS due to the lead emission concentrations. These constraints were added until modeled pollutant concentrations at points of maximum ground level impact were acceptable.

In order for the emission concentrations from the Burning Grounds to be compliant with the NAAQS, constraints on the meteorological conditions and the number of daily burns are

imposed. The operational strategy for the Burning Grounds is summarized in the following burning constraints for each P/E waste:

- Aluminum Composite Propellant OB events are limited to one burn per day (1630 lbs.). There is no burning when wind direction is blowing from 120-260 degrees while the wind speed is greater than 1 meter per second at beginning of the burn. Burning is limited to 5 days per week.
- Non-Aluminized Composite Propellant OB events are limited to one burn per day (1,630 lbs.). There is no burning when wind direction is blowing from 120-260 degrees while the wind speed is greater than 1 meter per second at beginning of the burn. Burning is limited to 5 days per week.
- Double Base Propellant OB events are limited to one burn event per day (1,630 lbs.). There is no burning when wind direction is blowing from 120-260 degrees while the wind speed is greater than 1 meter per second at beginning of the burn. Burning is limited to 5 days per week
- Plastic Bonded Explosives OB events are limited to two (1,630 lbs.) burn events per day (3260 lbs.) with a 3-hour period between burns.
- Type 1 and Type 2 mixed wastes are limited to two (1,630 lbs.) burn events per day (3,260 lbs.) with a 3-hour period between burns.

These constraints are based on the ground level concentrations of the limiting compound in each P/E waste.

9.0 References

USEPA. *AP-42*. 5th Edition, January 1995.

CH2M HILL. *Draft Detailed Permitting Approach/ Allegany Ballistics Laboratory* Rocket Center, West Virginia. November 3, 2000.

Mitchell, William J. and Jack C. Suggs. *Emission Factors for the Disposal of Energetic Materials by Open Burning and Open Detonation (OB/OD)*. EPA/600/R-98/1-3. USEPA, MD-46. August 1998.

Sandia National Laboratories. 1996. *Allegany Ballistics Laboratory Open Burning Disposal Operations Air Pathways Health Risk Assessment. Final Report.* December 1996.

Tables

TABLE 3-1
Data Sources Used in the Air Modeling

Data Source	Purpose	Use in this Modeling Effort
SNL Report (December 1996)	Combustion study specifically to develop emission factors for ABL OB operations	• Indication of the suite of chemicals that may be found after combustion • Emission factors for all emissions except HCl and CO.
POLU13[1] (U.S. Naval Surface Warfare Center)	Chemical combustion modeling program to calculate emission factors for pure energetic materials	• Used to calculate HCl generated with no scrubbing. • Used to calculate CO emissions for sub-components of the typical mixed waste burned.
BangBox Test Data (EPA, Mitchell and Suggs, 1998)	Enclosed testing to determine emission factors from burning of P/E.	• Data used with POLU13 calculation to determine appropriate HCl scrubbing efficiency.
AP-42 Emission Factor Database (EPA, 5th Edition)	Database of standard emission factors from combustion	• Used to calculate CO emissions for subcomponents of the mixed waste burned.

Note:

[1] POLU13 is an update of the original POLU10 computer modeling published by the Ordnance Environmental Support Office (OESO).

TABLE 3-2
Data Used to Estimate HCl Scrubbing Efficiency

BangBox pure energetic Propellant, Composite (MK-6) (Sandia) – measured CO emission factor	0.314	g/100g
POLU13 EF – calculated % excess air for CO at 0.314g/100g	42-43	%
POLU 13 HCl EF at 42-43% excess air (no scrubbing)	20.2	g/100g
BangBox Burn HCl EF (measured)	2.2	g/100g
Percent scrubbing (BangBox Burn HCl EF/ POLU 13 HCl EF)	89.1	%

TABLE 3-3
CO Emission Factor Comparison

Waste/ Energetic Mass	Reference	Weight % of P/E Mass*	CO (lb/ton)
Miscellaneous Waste			
Paper	Open Burning AP-42 2.5-1	2.8%	85.0
Wood Scraps	Residential Fireplace AP-42 1.9-1	2.8%	252.6
Wood Chips	Residential Fireplace AP-42 1.9-1	16.6%	252.6
Plastics	Open Burning AP-42 2.5-1	8.3%	85.0
Cotton Rags	Open Burning AP-42 2.5-1	5.5%	85.0
Cardboard	Open Burning AP-42 2.5-1	2.8%	85.0
Other (plastic Miscellaneous)	Open Burning AP-42 2.5-1	16.6%	85.0
Energetic Mass			
Acetone	POLU 13	8.3%	4.7
Acetone/Sawdust (50/50)	POLU 13/AP-42 1.9-1	29.6%	128.6
Double Base Propellant	POLU 13	4.2%	0.0
Explosive (Assumption is PBE)	POLU 13	7.1%	94.5

* This P/E composition is considered representative of the waste burned at the ABL Burning Grounds based on Waste Characterization, SNL Risk Assessment, 1996, Sections 3 and 4.

TABLE 3-4
Criteria Pollutant Emission Factors – g/g

	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	SNL Mix #1 (Wastes)	SNL Mix #2 (Wastes)
NO	3.60E-03	4.00E-03	2.30E-03	2.40E-03	2.40E-03	2.00E-03
NO_2	5.90E-04	5.90E-04	1.90E-04	3.10E-04	9.20E-04	1.10E-03
SO_2	4.00E-04	1.00E-04	4.10E-05	1.40E-03	1.70E-04	7.60E-04
PM_{10}	5.70E-02	4.80E-03	1.10E-02	5.30E-03	5.10E-03	7.40E-06
VOC*	1.17E-03	4.06E-04	5.03E-05	2.76E-05	9.90E-04	4.44E-03
CO	1.00E-04	1.20E-04	3.00E-03	2.90E-04	8.30E-02	8.30E-02

* Summation of speciated NMOC at the maximum of reported or ½ of detection levels

TABLE 3-5
Other Pollutant Emission Factors - g/g (maximum of reported or ½ of detection levels) [1]

	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	SNL Mix #1 (Wastes)	SNL Mix #2 (Wastes)
HCl (gas)	2.42E-02	2.86E-02	0.00E+00	0.00E+00	0.00E+00	1.21E-03
1,3-Butadiene	8.00E-06	1.10E-05	2.25E-06	1.55E-06	1.65E-04	2.40E-07
1,6-Dinitropyrene	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
1-Methylnaphthalene	2.40E-06	9.00E-07	1.20E-07	2.40E-07	5.50E-09	9.00E-09
1-Nitropyrene	2.20E-06	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
2,4-Dinitrotoluene	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
2,5-Diphenyloxazole	9.50E-07	4.30E-10	1.70E-07	2.50E-07	5.50E-09	9.00E-09
2,6-Dinitrotoluene	7.20E-09	5.80E-06	4.70E-06	5.40E-06	5.50E-09	9.00E-09
2-Methylnaphthalene	2.40E-06	9.00E-07	1.20E-07	2.40E-07	5.50E-09	9.00E-09
2-Nitronaphthalene	2.70E-07	1.70E-06	2.30E-07	3.80E-07	5.50E-09	9.00E-09
4-Nitrophenol	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
4-Nitrosodiphenylamine	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
Benzo[a]anthracene	4.50E-08	4.40E-06	3.30E-06	1.65E-06	5.50E-09	9.00E-09
Benzene	1.10E-03	1.50E-04	2.10E-05	1.55E-06	1.65E-04	2.40E-07
Benzo[a]pyrene	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
Biphenyl	4.70E-06	1.00E-06	1.90E-07	1.30E-06	5.50E-09	9.00E-09
Dibenz[a,h]anthracene	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
Dibenzofuran	1.00E-06	6.90E-07	1.70E-07	1.40E-07	5.50E-09	9.00E-09
Di-n-propyl adipate	1.35E-06	1.35E-06	4.75E-07	9.00E-07	5.50E-09	9.00E-09
Dioxin	2.60E-11	2.60E-11	2.60E-11	2.60E-11	2.60E-11	2.60E-11
Diphenylamine	1.90E-07	9.50E-08	7.00E-08	1.40E-07	5.50E-09	9.00E-09
Mesitylene	3.50E-08	5.90E-08	8.40E-08	3.00E-07	5.50E-09	9.00E-09
Naphthalene	1.10E-06	3.90E-06	7.10E-08	2.50E-07	5.50E-09	9.00E-09
n-Hexane	8.00E-06	1.10E-05	2.25E-06	1.55E-06	1.65E-04	2.40E-07
N-Nitrosodiphenylamine	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
Phenanthrene	2.00E-06	2.90E-07	3.50E-07	1.10E-07	5.50E-09	9.00E-09
Phenol	1.40E-06	2.80E-06	2.30E-07	6.20E-07	5.50E-09	9.00E-09
Pyrene	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
Resorcinol	5.50E-06	2.30E-06	6.00E-06	1.20E-06	5.50E-09	9.00E-09
Styrene	8.00E-06	1.10E-05	2.65E-06	1.55E-06	1.65E-04	2.40E-07
Thianaphthene	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
Toluene	1.60E-05	1.10E-04	2.65E-06	1.55E-06	1.65E-04	3.50E-03
Tractin	4.50E-08	4.25E-08	2.70E-08	2.45E-08	5.50E-09	9.00E-09
Xylenes	8.00E-06	8.60E-05	2.65E-06	6.20E-06	1.65E-04	9.40E-04

TABLE 3-5
Other Pollutant Emission Factors - g/g (maximum of reported or ½ of detection levels) [1]

	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	SNL Mix #1 (Wastes)	SNL Mix #2 (Wastes)
Aluminum	1.00E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	0.00E+00	0.00E+00	8.80E-03	0.00E+00	0.00E+00	0.00E+00
Zirconium	0.00E+00	8.80E-03	8.80E-03	0.00E+00	0.00E+00	0.00E+00
Copper	0.00E+00	0.00E+00	0.00E+00	1.00E-03	0.00E+00	0.00E+00
Iron	0.00E+00	0.00E+00	0.00E+00	1.10E-05	0.00E+00	0.00E+00

Note:

[1] Maximum of reported concentration or ½ of detection levels. Note that 0.00E+00 values represent rounding.

TABLE 4-1
Projected Material Throughput at the Burning Grounds

Material	Max Annual Quantity, lbs
Al Composite Propellant	300,000
Composite Propellant	300,000
Double Base Propellant	300,000
PBX Explosive	300,000
Type 1 P/E Waste	300,000
Type 2 P/E Waste	300,000
MAXIMUM TOTAL	**300,000**

TABLE 4-2
Estimated Annual Air Emissions of Criteria Pollutants

Criteria Pollutants	lbs/year	Tons/year
NO	1200.00	**0.60**
NO_2	330.00	**0.17**
SO_2	420.00	**0.21**
PM_{10}	17100.00	**8.55**
VOC*	1332.39	**0.67**
CO	24900.00	**12.45**

* Summation of speciated NMOC at the maximum of reported or ½ of detection levels

TABLE 4-3
Estimated Maximum Annual Air Emission

Other Emissions[1]	lbs/year	Tons/year
HCl (gas)	8580.00	**4.29**
1,3-Butadiene	49.50	**0.02**
1,6-Dinitropyrene	0.01	**0.00**
1-Methylnaphthalene	0.72	**0.00**
1-Nitropyrene	0.66	**0.00**
2,4-Dinitrotoluene	0.01	**0.00**
2,5-Diphenyloxazole	0.29	**0.00**
2,6-Dinitrotoluene	1.74	**0.00**
2-Methylnaphthalene	0.72	**0.00**
2-Nitroaphthalene	0.51	**0.00**
4-Nitrophenol	0.01	**0.00**
4-Nitrosodiphenylamine	0.01	**0.00**
Benzo[a]anthracene	1.32	**0.00**
Benzene	330.00	**0.17**
Benzo[a]pyrene	0.01	**0.00**
Biphenyl	1.41	**0.00**
Dibenz[a,h]anthracene	0.01	**0.00**
Dibenzofuran	0.30	**0.00**
Di-n-propyl adipate	0.41	**0.00**
Dioxin	7.8E-06	**0.00**
Diphenylamine	0.06	**0.00**
Mesitylene	0.09	**0.00**
Naphthalene	1.17	**0.00**
n-Hexane	49.50	**0.02**
N-Nitrosodiphenylamine	0.01	**0.00**
Phenanthrene	0.60	**0.00**
Phenol	0.84	**0.00**
Pyrene	0.01	**0.00**
Resorcinol	1.80	**0.00**
Styrene	49.50	**0.02**
Thianaphthene	0.01	**0.00**
Toluene	1050.00	**0.53**
Tractin	0.01	**0.00**
Xylenes	282.00	**0.14**
Aluminum	30000.00	**15.00**
Lead	2640.00	**1.32**
Zirconium	2640.00	**1.32**
Copper	300.00	**0.15**
Iron	3.30	**0.00**

Note:

[1] Maximum of reported concentration or ½ of detection levels. Note that 0.00E+00 values represent rounding.

TABLE 4-4
Estimated Maximum Hourly and Daily Air Emissions of Criteria Pollutants

Criteria Pollutants	Maximum, lbs./day	Maximum, tons/day	Maximum, lbs./hr	Maximum, tons/hr
NO	**13.0**	**0.01**	**6.5**	**0.00**
NO_2	**3.6**	**0.00**	**1.8**	**0.00**
SO_2	**4.6**	**0.00**	**2.3**	**0.00**
PM_{10}	**185.8**	**0.09**	**92.9**	**0.05**
VOC*	**14.5**	**0.01**	**7.2**	**0.00**
CO	**270.6**	**0.14**	**135.3**	**0.07**

* Summation of speciated NMOC at the maximum of reported or ½ of detection levels

TABLE 4-5
Estimated Maximum Hourly and Daily Air Emissions of Non-Criteria Pollutants

Other Emissions[1]	Maximum, lbs./day	Maximum, tons/day	Maximum, lbs./hr	Maximum, tons/hr
HCl	93.2360	0.05	46.6180	0.02
1,3-Butadiene	0.5379	0.00	0.2690	0.00
1,6-Dinitropyrene	0.0001	0.00	0.0001	0.00
1-Methylnaphthalene	0.0078	0.00	0.0039	0.00
1-Nitropyrene	0.0072	0.00	0.0036	0.00
2,4-Dinitrotoluene	0.0001	0.00	0.0001	0.00
2,5-Diphenyloxazole	0.0031	0.00	0.0015	0.00
2,6-Dinitrotoluene	0.0189	0.00	0.0095	0.00
2-Methylnaphthalene	0.0078	0.00	0.0039	0.00
2-Nitroaphthalene	0.0055	0.00	0.0028	0.00
4-Nitrophenol	0.0001	0.00	0.0001	0.00
4-Nitrosodiphenylamine	0.0001	0.00	0.0001	0.00
Benzo[a]anthracene	0.0143	0.00	0.0072	0.00
Benzene	3.5860	0.00	1.7930	0.00
Benzo[a]pyrene	0.0001	0.00	0.0001	0.00
Biphenyl	0.0153	0.00	0.0077	0.00
Dibenz[a,h]anthracene	0.0001	0.00	0.0001	0.00
Dibenzofuran	0.0033	0.00	0.0016	0.00
Di-n-propyl adipate	0.0044	0.00	0.0022	0.00
Dioxin	0.0000	0.00	0.0000	0.00
Diphenylamine	0.0006	0.00	0.0003	0.00
Mesitylene	0.0010	0.00	0.0005	0.00
Naphthalene	0.0127	0.00	0.0064	0.00
n-Hexane	0.5379	0.00	0.2690	0.00
N-Nitrosodiphenylamine	0.0001	0.00	0.0001	0.00

TABLE 4-5
Estimated Maximum Hourly and Daily Air Emissions of Non-Criteria Pollutants

Other Emissions[1]	Maximum, lbs./day	Maximum, tons/day	Maximum, lbs./hr	Maximum, tons/hr
Phenanthrene	0.0065	0.00	0.0033	0.00
Phenol	0.0091	0.00	0.0046	0.00
Pyrene	0.0001	0.00	0.0001	0.00
Resorcinol	0.0196	0.00	0.0098	0.00
Styrene	0.5379	0.00	0.2690	0.00
Thianaphthene	0.0001	0.00	0.0001	0.00
Toluene	11.4100	0.01	5.7050	0.00
Tractin	0.0001	0.00	0.0001	0.00
Xylenes	3.0644	0.00	1.5322	0.00
Aluminum	326.0000	0.16	163.0000	0.08
Lead	28.6880	0.01	14.3440	0.01
Zirconium	28.6880	0.01	14.3440	0.01
Copper	130.4000	0.07	65.2000	0.03
Iron	0.0359	0.00	0.0179	0.00

Note:

[1] Maximum of reported concentration or ½ of detection levels. Note that 0.00E+00 values represent rounding.

TABLE 5-1
General Source and Emission Input Parameters Required by OBOD-M

Input Parameter	Input Values	Source of Data	Notes
Source identification name	ABL P/E Wastes	Assumed	---
Source type (volume or line)	V	OBODM manual	"V" for volume
Source emission type	Q	OBODM manual	"Q" (Quasi-Continuous) for open burns
Total mass of material burned or released	1230-1630 lbs/burn	George Fletcher/ABL	---
Fuel material heat content	Material Specific	POLU13	---
Fuel material burn rate	Material Specific	AMPC	
Hours of day during which source can be burned	0900 – 1700 (5 days/week)	Assumed	Encompasses daylight hours only
X, Y source coordinates (rectangular, polar)	R	---	"R" for rectangular (Cartesian)
X source coordinate	Specific Pan Locations	Site Data	---
Y source coordinate	Specific Pan Locations	Site Data	---
Z source base elevation	Specific Pan Locations	Site Data	---
Effective height of release above ground (meters)	1	Ground level burn	---

TABLE 5-1
General Source and Emission Input Parameters Required by OBOD-M

Input Parameter	Input Values	Source of Data	Notes
Volume of initial source plume (lxwxh, meters)	10, 10, 100	Observations	Actual Plume volume is usually larger
Fuel/explosive label	P/E Wastes	---	---
Compound/species label	PM_{10}, NO_x, HCl, CO, SO_2	SNL, POLU13	---
Compound/species molecular weight (grams/gram-mole)	Default	---	---
Compound/species half life (hours)	Default	---	---
Fraction of exhaust cloud constituting compound/species (fraction)	---	Calculated by POLU13	---
Source data varies with hourly input meteorological data (Y or N)?	Y	---	"Y" for Yes
Meteorological data restrictions: - Hours of Day - Season of Operation	0900-1700	N/A	---
HCl scrubbing efficiency	89.1%	ABL Emission Factor Assessment	---

TABLE 5-2
Detailed Source and Emission Input Parameters for OBOD-M

Compound of Concern	Fuel Material	Number of Burns	Burn Times	Emission Factor (g/g)	Heat Content (Cal/g)	Burn Rate (g/s)	OBOD-M Sources	Burn Pans Used	Amount of Waste per Burn (lbs.)	Release Height (m)	Plume Dimension (m^3)	Days Excluded from OB Activities (Based on the model runs)
HCl	Aluminized Composite Propellant	1	0900	0.0242	23.4	5,000	1-7	all	1630	1	10,10,100	Weekends and days when wind is between 120-260 and >1m/s.
HCl	Non-Aluminized Composite Propellant	1	0900	0.0286	18.2	5,000	1-7	all	1630	1	10,10,100	Weekends and days when wind is between 120-260 and >1m/s.
PM10	Aluminized Composite Propellant	1	0900	0.0570	23.4	5,000	1-7	all	1630	1	10,10,100	Weekends and days when wind is between 120-260 and >1m/s.
CO	Mixed Waste	2	0900 and 1200	0.083	11.9	1,000	1-14	all	1630	1	10,10,100	none
NOx	Mixed Waste	2	0900 and 1200	0.0011	12.7	1,000	1-14	all	1630	1	10,10,100	none
SO_2	Plastic-Bonded Explosives	2	0900 and 1200	0.0014	24	3,000	1-14	all	1630	1	10,10,100	none
Lead	Double Base Propellant	1	0900	0.0088	17	5,000	1-7	all	1630	1	10,10,100	Weekends and days when wind is between 120-260 and >1m/s.
Model Runs Using Scalable Emission Factors For Human Health and Ecological Risk Assessment												
	Aluminized Composite	1	0900	0.01	23.4	5,000	1-7	all	1630	1	10,10,100	Weekends and days when wind is between 120-260 and >1m/s.
	Non-Aluminized Composite	1	0900	0.01	18.2	5,000	1-7	all	1630	1	10,10,100	Weekends and days when wind is between 120-260 and >1m/s.
	Plastic-Bonded Explosives	2	0900 and 1200	0.01	24	3,000	1-14	all	1630	1	10,10,100	none
	Double Base	2	0900 and 1200	0.01	17	3,000	1-14	all	1630	1	10,10,100	Weekends and days when wind is between 120-260 and >1m/s.
	Mixed Wastes	2	0900 and 1200	0.01	12.7	1,000	1-14	all	1630	1	10,10,100	none

TABLE 5-3
Burn Rates for P/E Wastes

P/E Waste	Burn Rate (g/s)
Aluminum Composite Propellant	5,000
Non-Aluminized Composite Propellant	5,000
Plastic-Bonded Explosive	3,000
Double Base Propellant	3,000
Mixed Waste (Type 1 and 2)	1,000

TABLE 5-4
Burn Pan Locations and Waste Capacity

	Location (UTM)			
Burn Pan	X	Y	Z	Capacity (lbs.)
A'	686304	4381463	207	200
A	686256	4381487	211	200
B	686194	4381506	211	155
C	686121	4381503	211	275
D	686067	4381507	209	400
E	686029	4381545	207	200
F	685982	4381555	204	200

TABLE 6-1
Air Emission Sources Located in Mineral County, West Virginia, within 10 Kilometers of the ABL Burning Grounds

Source Name	Pollutant	Emissions (tons/yr)
Kingsford Manufacturing	Particulate	91.2
	Sulfur dioxide	29.2
	Nitrogen dioxide	68.1
	Carbon monoxide	1.1
	Volatile organic Compounds	1.3
	Methyl alcohol	0.4
Westvaco Corporation	Particulate	148.0
	Sulfur dioxide	0.4
	Nitrogen dioxide	108.0
	Carbon monoxide	77.3
	Volatile organic Compounds	12.6
	Styrene	0.03
	Ethylene dichloride	0.0001
	Hexone	0.02
	Toluene	0.04

TABLE 6-1
Air Emission Sources Located in Mineral County, West Virginia, within 10 Kilometers of the ABL Burning Grounds

Source Name	Pollutant	Emissions (tons/yr)
	Hexane	0.001
	Trichlorobenzene	0.002
	1,2,4-Trichlorobenzene	0.02
	Tetrachloroethylene	0.03
	Formaldehyde	0.3
	1,2-Dichloroethylene	0.006
	Carbon tetrachloride	0.0007
	Methyl disulfide	1.6
	Lactol spirits	0.15
	Methyl alcohol	0.02
	Acetone	1.4
	Chloroform	0.007
	Benzene	0.01
	Methyl chloroform	0.01
	Methyl chloride	0.07
	Methyl mercaptan	2.3
	Acetaldehyde	1.07
	Methylene chloride	0.0005
	Ammonia	17.0
	Hydrogen sulfide	1.09
	2-Butanone	0.16
	1,1,2-Trichloroethane	0.0004
	Trichloroethylene	0.0004
	Napthalene	0.5

TABLE 6-2
Air Emission Sources Located within Allegany County, Maryland, within 10 Kilometers of the ABL Burning Grounds

Source Name	Location	Pollutant	Emissions (tons/yr)
Westvaco	Allegany County	Particulates	750
		Sulfur dioxide	19,883
		Nitrogen dioxide	5,030
		Carbon monoxide	139
		Volatile Organic Compounds	668
John Duckworth Coal Co.		Nitrogen dioxide	3
Westvaco Warehouse		Nitrogen dioxide	2

TABLE 6-3
Air Emission Modeling Results, Receptor Locations, Background Levels and Limits

Compound	Max Ground-level Concentration within the Property Boundary (µg/m3)	Receptor Location (UTM)	Max Ground-level Concentration Outside the Property Boundary (µg/m3)	Receptor Location (UTM)	Max Ground-level Concentration at the Fenceline (µg/m3)	Receptor Location (UTM)	Background Concentration (µg/m3)	*Threshold Limit (µg/m3)	Exceeds Threshold with Background?
Highest 1-hr Ground-Level Concentration									
CO	35655.80	686115, 4381520	9378.28	685946, 4381666	10393.60	686127, 4381610	15500	40,000	No
HCl (Al Composite)	1203.09	686115, 4381520	413.50	685946, 4381766	405.50	686223, 4381584	N/A	2,100	No
HCl (Non-Al Composite)	1601.92	686115, 4381520	580.67	685946, 4381766	529.49	686127, 4381610	N/A	2,100	No
Second Highest 1-hr Ground-Level Concentration									
CO	34163.60	686115, 4381520	9349.34	685946, 4381666	8603.42	686127, 4381610	15500	40,000	No
HCl (Al Composite)	1065.81	686115, 4381520	373.65	685946, 4381766	322.78	686320, 4381557	N/A	2,100	No
HCl (Non-Al Composite)	1463.59	686115, 4381520	525.80	685946, 4381766	485.33	686127, 4381610	N/A	2,100	No
Highest 3-hr Ground-Level Concentration									
SO2	35.78	686115, 4381520	11.87	685846, 4381766	10.34	686576, 4381409	106	1,300	No
Second Highest 3-hr Ground-Level Concentration									
SO2	35.72	686115, 4381520	11.18	685846, 4381766	9.96	686576, 4381409	106	1,300	No
Highest 8-hr Ground-Level Concentration									
CO	6007.48	686115, 4381520	1920.10	685946, 4381666	2214.48	685934, 4381663	7770	10,000	No
HCl (Al Composite)	150.39	686115, 4381520	61.02	685746, 4381766	50.69	686223, 4381584	N/A	250	No
HCl (Non-Al Composite)	200.24	686115, 4381520	85.91	685746, 4381766	66.19	686127, 4381610	N/A	250	No
Second Highest 8-hr Ground-Level Concentration									
CO	5843.22	686115, 4381520	1603.88	685946, 4381666	1755.72	685934, 4381663	7770	10,000	No
HCl (Al Composite)	133.23	686115, 4381520	46.71	685946, 4381766	40.35	686320, 4381557	N/A	250	No
HCl (Non-Al Composite)	182.95	686115, 4381520	65.73	685946, 4381766	60.67	686127, 4381610	N/A	250	No
Highest 24-hr Ground-Level Concentration									
HCl (Al Composite)	50.13	686115, 4381520	18.80	685946, 4381766	16.90	686223, 4381584	N/A	20	Only within the fenceline
HCl (Non-Al Composite)	66.75	686115, 4381520	26.39	685946, 4381766	22.06	686127, 4381610	N/A	20	Only at and within the fenceline
PM10	118.07	686115, 4381520	44.27	685946, 4381766	39.80	686223, 4381584	60	150	No
SO2	7.95	686115, 4381520	2.22	685946, 4381666	1.92	685934, 4381663	53	365	No
Second Highest 24-hr Ground-Level Concentration									
HCl (Al Composite)	44.41	686115, 4381520	15.57	685946, 4381766	13.45	686320, 4381557	N/A	20	Only within the fenceline
HCl (Non-Al Composite)	60.98	686115, 4381520	21.91	685946, 4381766	20.22	686127, 4381610	N/A	20	Only at and within the fenceline
PM10	104.60	686115, 4381520	36.67	685946, 4381766	31.68	686320, 4381557	60	150	No
SO2	6.63	686115, 4381520	2.03	685946, 4381666	1.92	685934, 4381663	0.01	365	No
Highest Quarterly Ground-Level Concentration									
Lead	4.73	686115, 4381520	0.72	686146, 4381666	1.03	686223, 4381584	0	1.5	Only within the fenceline
Highest Annual Ground-Level Concentration									
HCl (Al Composite)	6.51	686115, 4381520	0.80	686146, 4381666	1.26	686223, 4381584	N/A	20	No
HCl (Non-Al Composite)	10.57	686115, 4381520	1.17	685946, 4381666	1.93	686223, 4381584	N/A	20	No
NOx	4.59	686115, 4381520	0.51	685946, 4381666	0.68	686127, 4381610	34.9	100	No
PM10	15.32	686115, 4381520	1.84	685846, 4381766	2.98	686223, 4381584	26	50	No
SO2	2.17	686115, 4381520	0.23	686046, 4381666	0.31	686223, 4381584	14	80	No

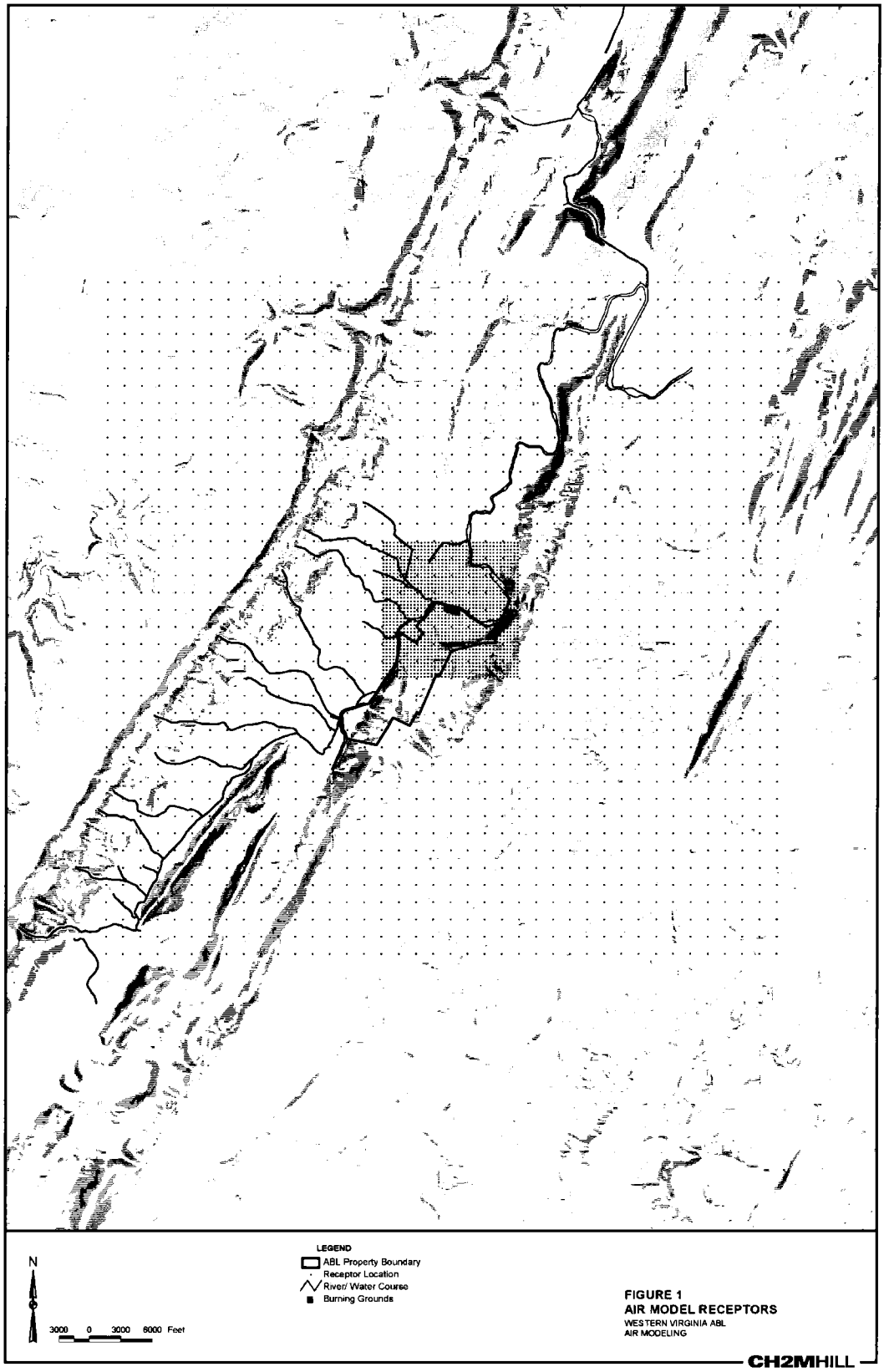
***Sources:** NAAQS for CO, NOx, PM10, SO2, and Lead.

1-hr concentration is the acute Reference Exposure Level (REL published by California Environmental Protection Agency.)
. 8-hr concentration is extrapolated from the 1-hr REL.
HCl 24-hour concentration is USEPA's Reference Concentration (RfC).

TABLE 7-1
Burning Constraints

Material	Number of Burns per day	Amount of Waste per Burn (lbs.)	Days Excluded from OB Activities (Based on the model runs)
Aluminized Composite Propellant	1	1630	Weekends and days when wind is between 120-260 and >1m/s.
Non-Aluminized Composite Propellant	1	1630	Weekends and days when wind is between 120-260 and >1m/s.
Plastic-Bonded Explosives	2	1630	None
Double Base Propellant	1	1630	Weekends and days when wind is between 120-260 and >1m/s.
Type 1 Mixed Waste	2	1630	None
Type 2 Mixed Waste	2	1630	None

Figures


LEGEND
ABL Property Boundary
Receptor Location
River/ Water Course
Burning Grounds
N
3000 0 3000 6000 Feet
FIGURE 1
AIR MODEL RECEPTORS
WESTERN VIRGINIA ABL
AIR MODELING
CH2MHILL

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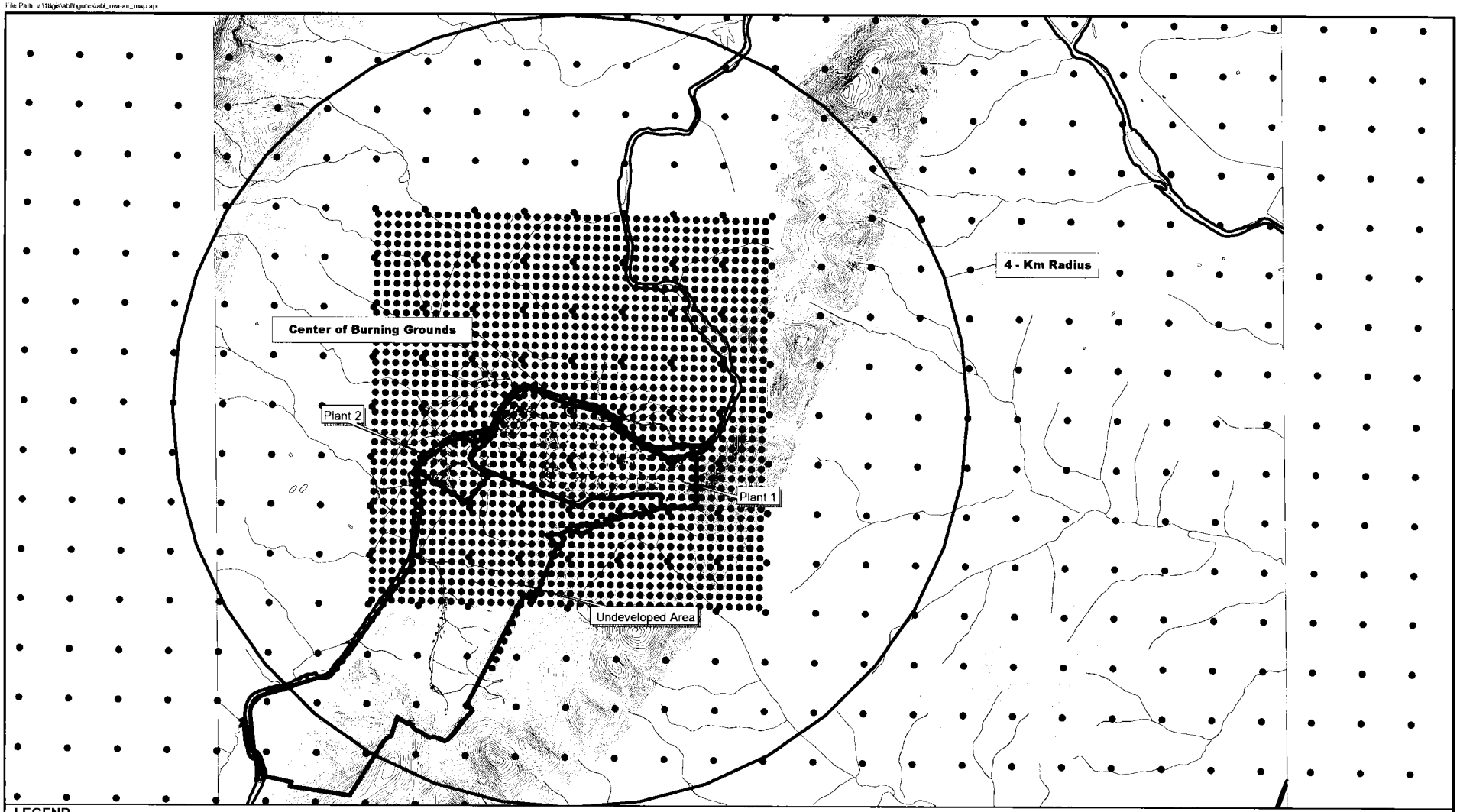

LEGEND

- Receptor Grid
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

N

3000 0 3000 6000 Feet

Figure 2
Air Model Fine Grid Receptors
Burning Ground Location and ABL Fence Property
Allegany Ballistics Laboratory

CH2MHILL

Attachment A-1
Isopleths

List of Isopleths

- Aluminum Composite Propellant, Annual, Ground Level Concentration **(1 Total)**
- Non-Aluminized Composite Propellant, Annual, Ground Level Concentration **(1 Total)**
- Double Base Propellant, Annual, Ground Level Concentration **(1 Total)**
- Plastic-bonded Explosives, Annual, Ground Level Concentration **(1 Total)**
- Mixed Waste (Type 1 and 2), Annual, Ground Level Concentration **(1 Total)**
- Hydrogen Chloride (gaseous) from Aluminized Composite, Annual, Ground Level Concentration **(1 Total)**
- Hydrogen Chloride (gaseous) from Aluminized Composite Highest (1hr, 8hr, 24hr) Ground Level Concentration **(3 Total)**
- Hydrogen Chloride (gaseous) from Aluminized Composite Second Highest (1hr, 8hr, 24hr) Ground Level Concentration **(3 Total)**
- Hydrogen Chloride (gaseous) from Non-aluminized Composite Highest, Annual, Ground Level Concentration **(1 Total)**
- Hydrogen Chloride (gaseous) from Non-aluminized Composite Highest (1hr, 8hr, 24hr) Ground Level Concentration **(3 Total)**
- Hydrogen Chloride (gaseous) from Non-aluminized Composite, Second Highest (1hr, 8hr, 24hr) Ground Level Concentration **(3 Total)**
- PM_{10} Highest, Annual, Ground Level Concentration **(1 Total)**
- PM_{10} Highest, 24-hour, Ground Level Concentration **(1 Total)**
- PM_{10} Second Highest, 24-hour, Ground Level Concentration **(1 Total)**
- Carbon Monoxide Highest (1hr, 8hr) Ground Level Concentration **(2 Total)**
- Carbon Monoxide Second Highest (1hr, 8hr) Ground Level Concentration **(2 Total)**
- NOx Highest, Annual, Ground Level Concentration **(1 Total)**
- Sulfur Dioxide Highest Annual Ground Level Concentration **(1 Total)**
- Sulfur Dioxide Highest (3hr, 24hr) Ground Level Concentration **(2 Total)**
- Sulfur Dioxide Second Highest (3hr, 24hr) Ground Level Concentration **(2 Total)**
- Lead Highest (Quarterly) Ground Level Concentration **(1 Total)**

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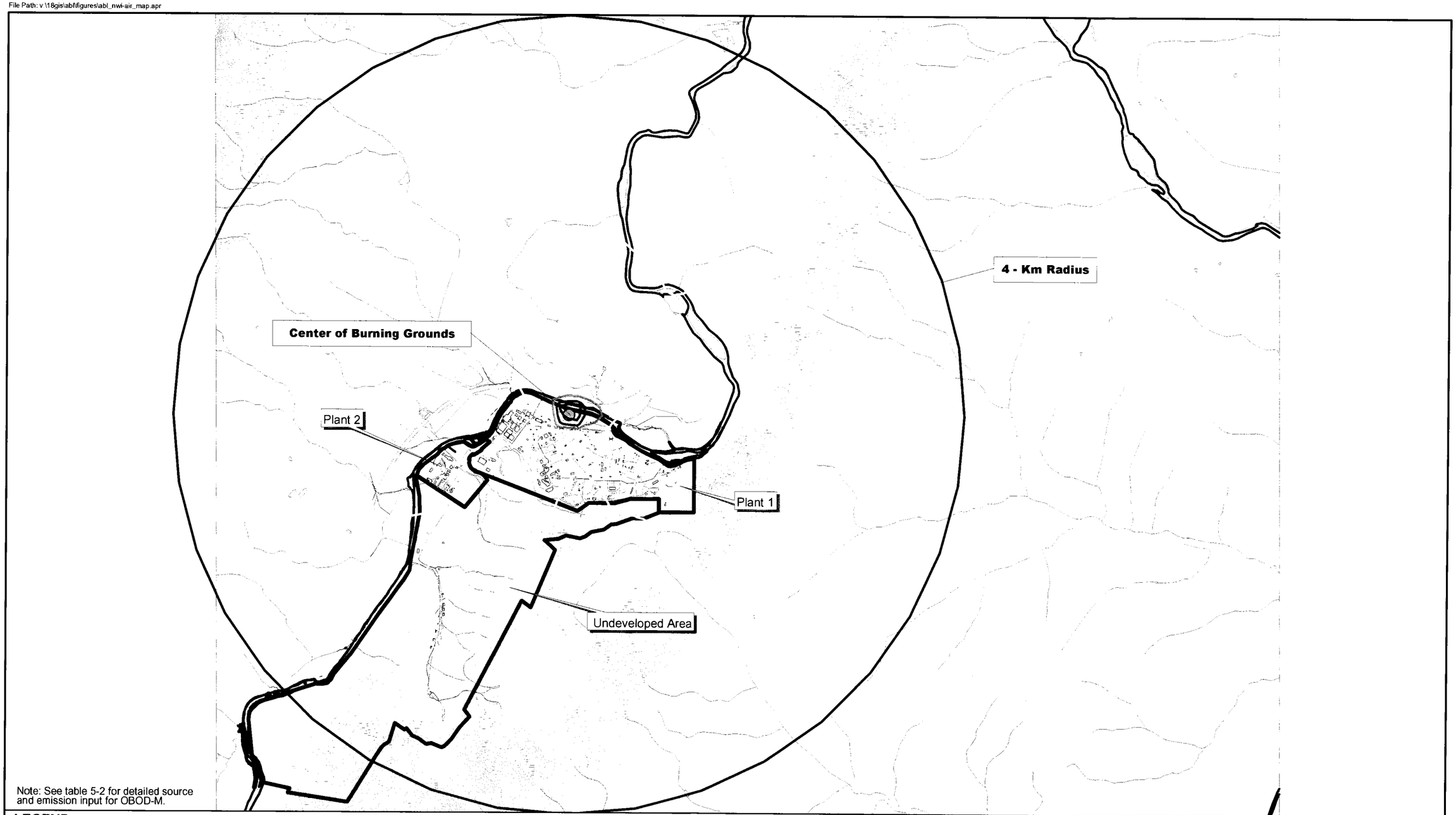

Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.01 - 0.12 ug/m3
- 0.12 - 0.23 ug/m3
- 0.23 - 0.34 ug/m3
- 0.34 - 0.45 ug/m3
- 0.45 - 0.56 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

N

3000 0 3000 6000 Feet

Aluminum Composite Propellant
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

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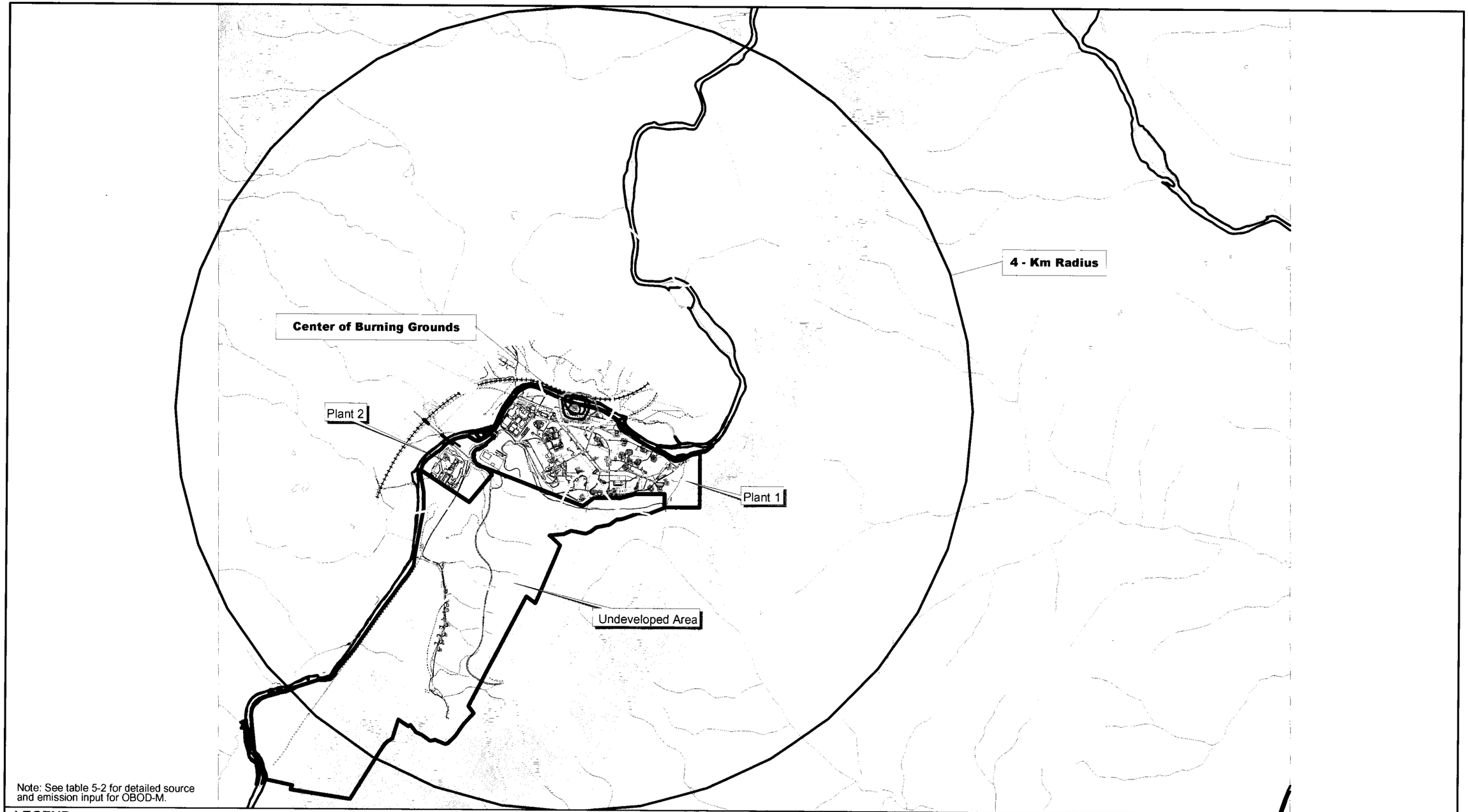

Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.01 - 0.16 ug/m3
- 0.16 - 0.31 ug/m3
- 0.31 - 0.47 ug/m3
- 0.47 - 0.62 ug/m3
- 0.62 - 0.77 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

N

3000 0 3000 6000 Feet

Non-Aluminized Composite Propellant
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

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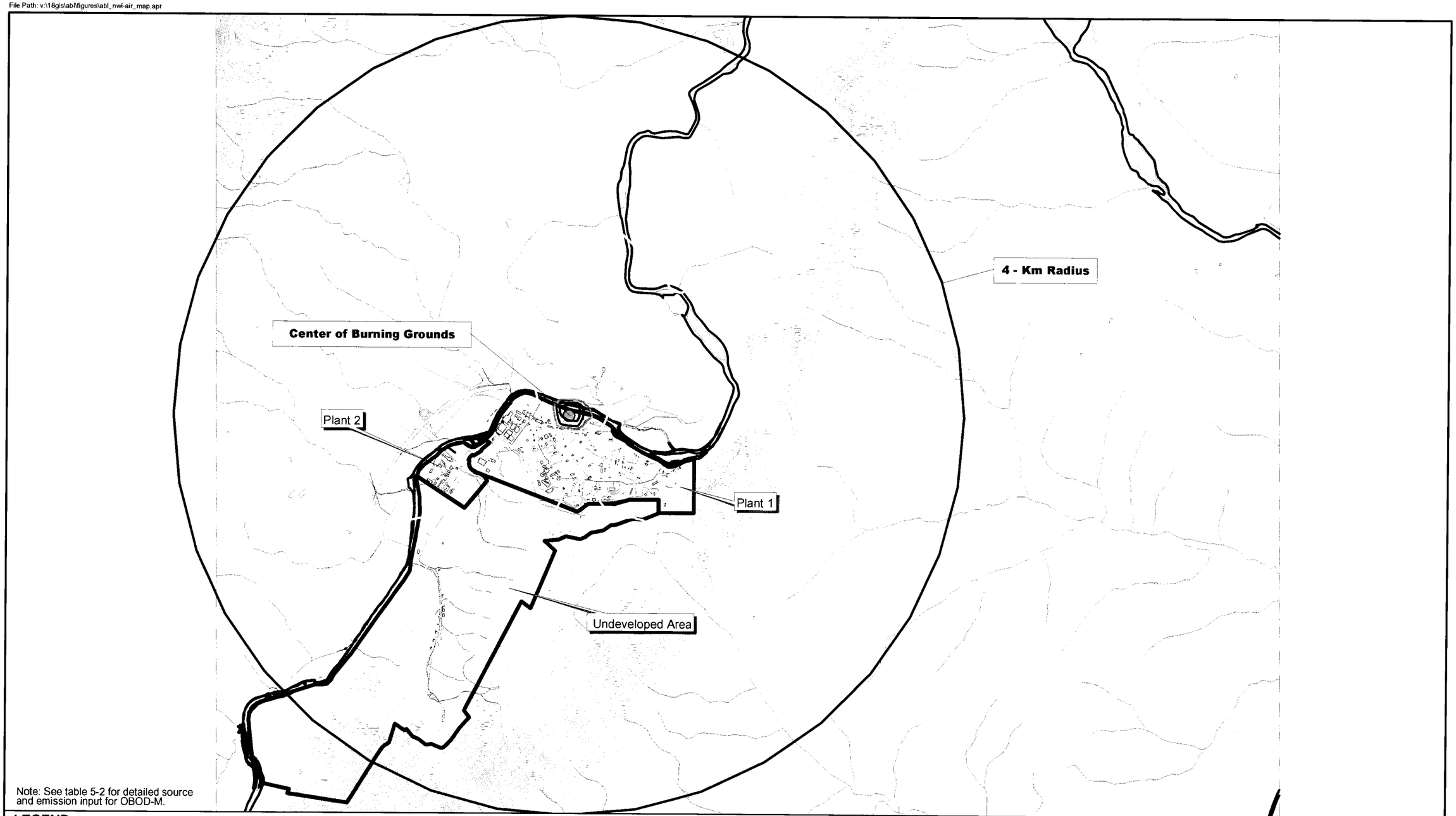

Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.01 - 0.17 ug/m3
- 0.17 - 0.34 ug/m3
- 0.34 - 0.5 ug/m3
- 0.5 - 0.67 ug/m3
- 0.67 - 0.83 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

N

3000 0 3000 6000 Feet

Double Base Propellant
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

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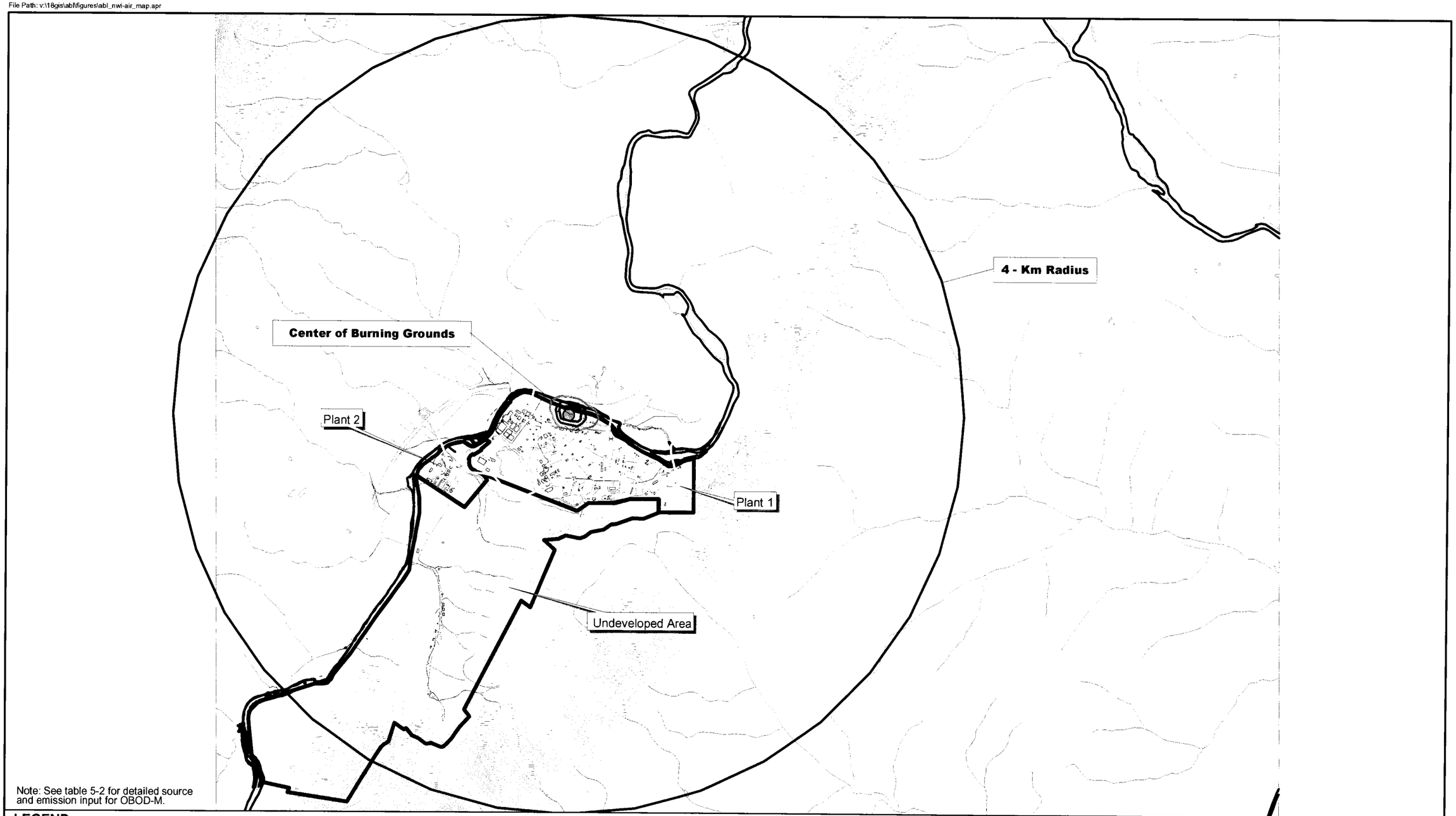

Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.01 - 0.7 ug/m3
- 0.7 - 1.4 ug/m3
- 1.4 - 2 ug/m3
- 2 - 2.5 ug/m3
- 2.5 - 3 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

N

3000 0 3000 6000 Feet

Plastic-bonded Explosives
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

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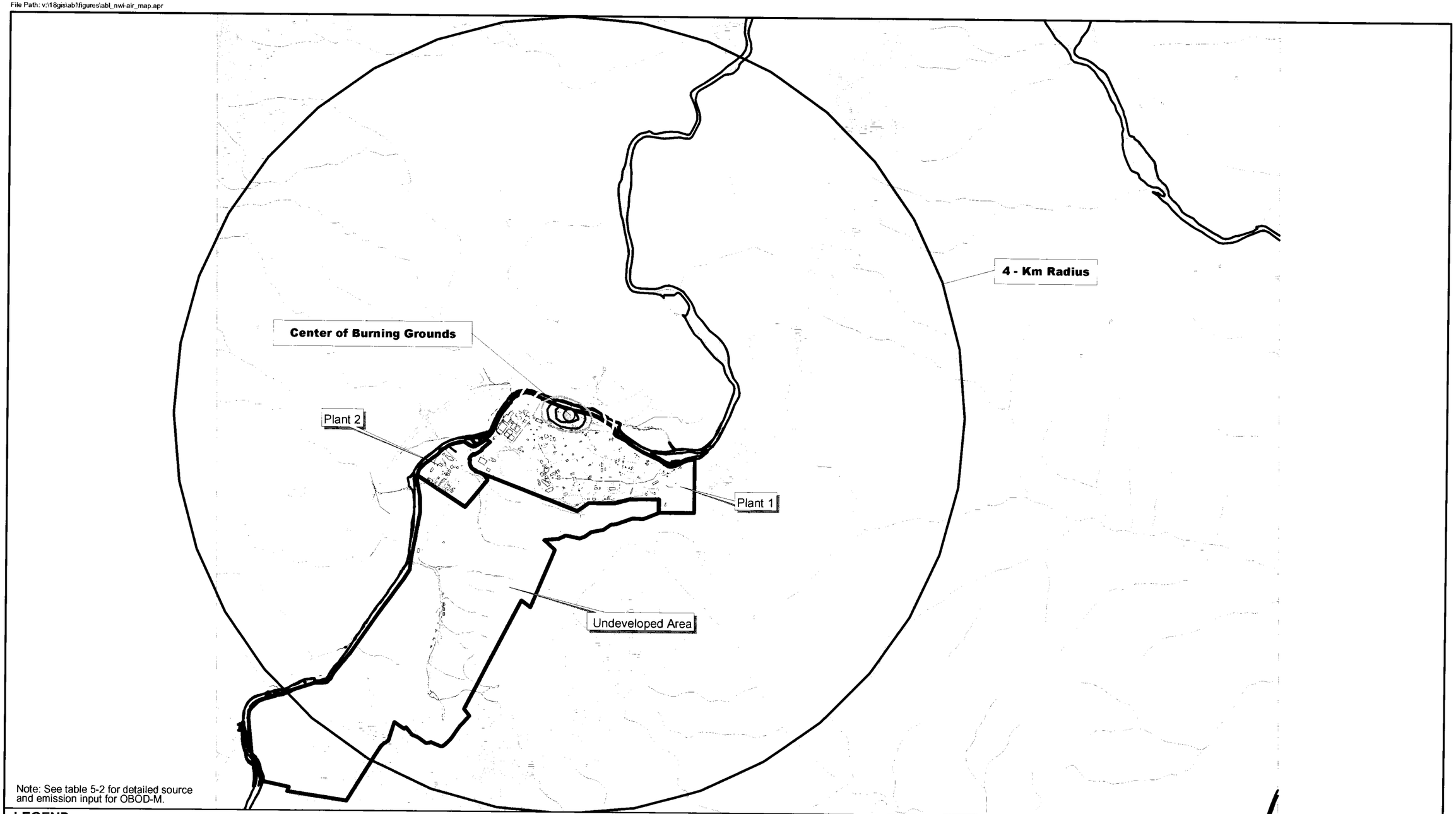

Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.01 - 1 ug/m3
- 2 - 4 ug/m3
- 5 - 6 ug/m3
- 7 - 9 ug/m3
- 10 - 12 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

N

3000 0 3000 6000 Feet

Mixed Waste (Type 1 and 2)
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

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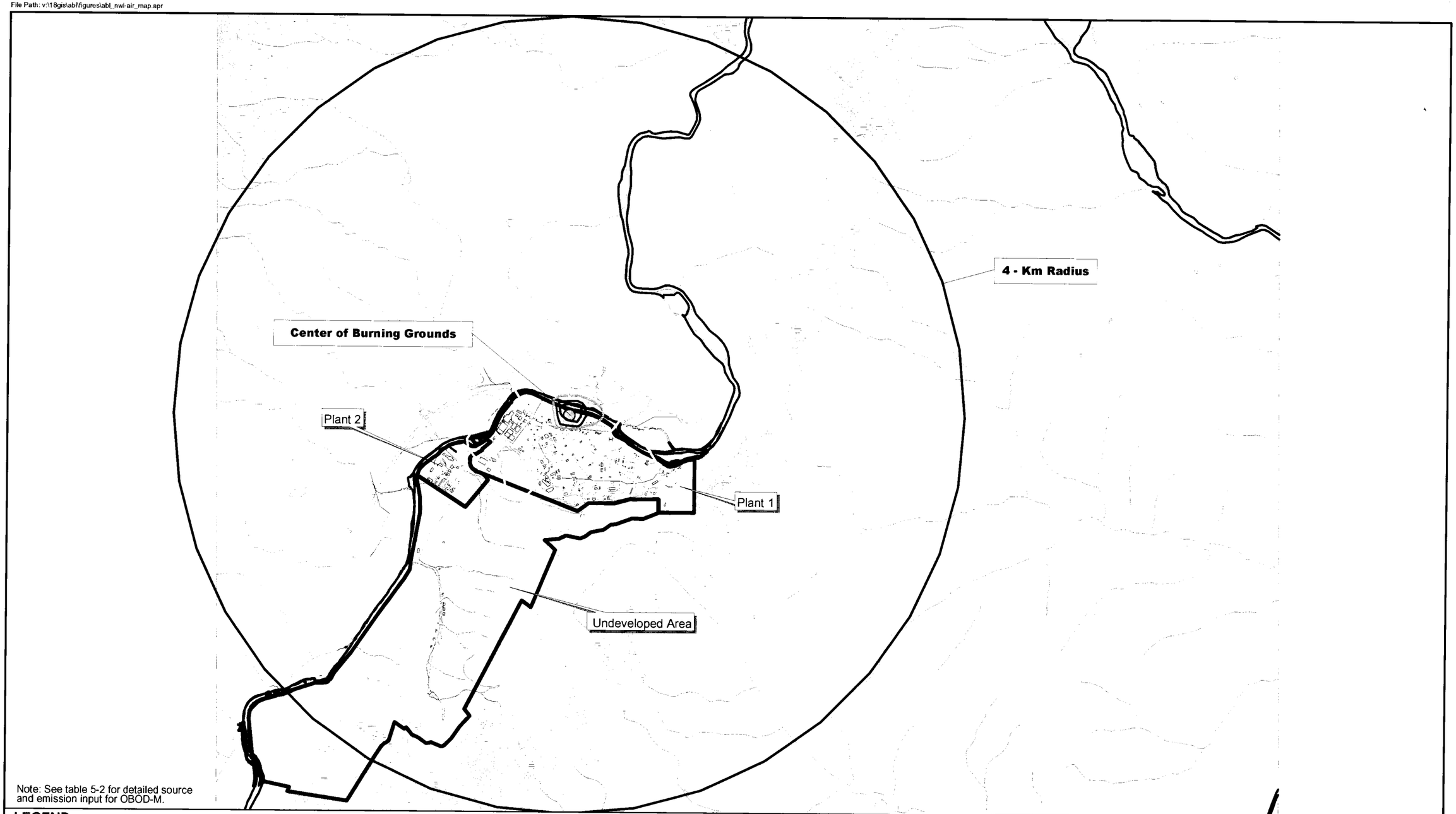


Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.1 - 0.34 ug/m3
- 0.34 - 0.58 ug/m3
- 0.58 - 0.82 ug/m3
- 0.82 - 1.06 ug/m3
- 1.06 - 1.3 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

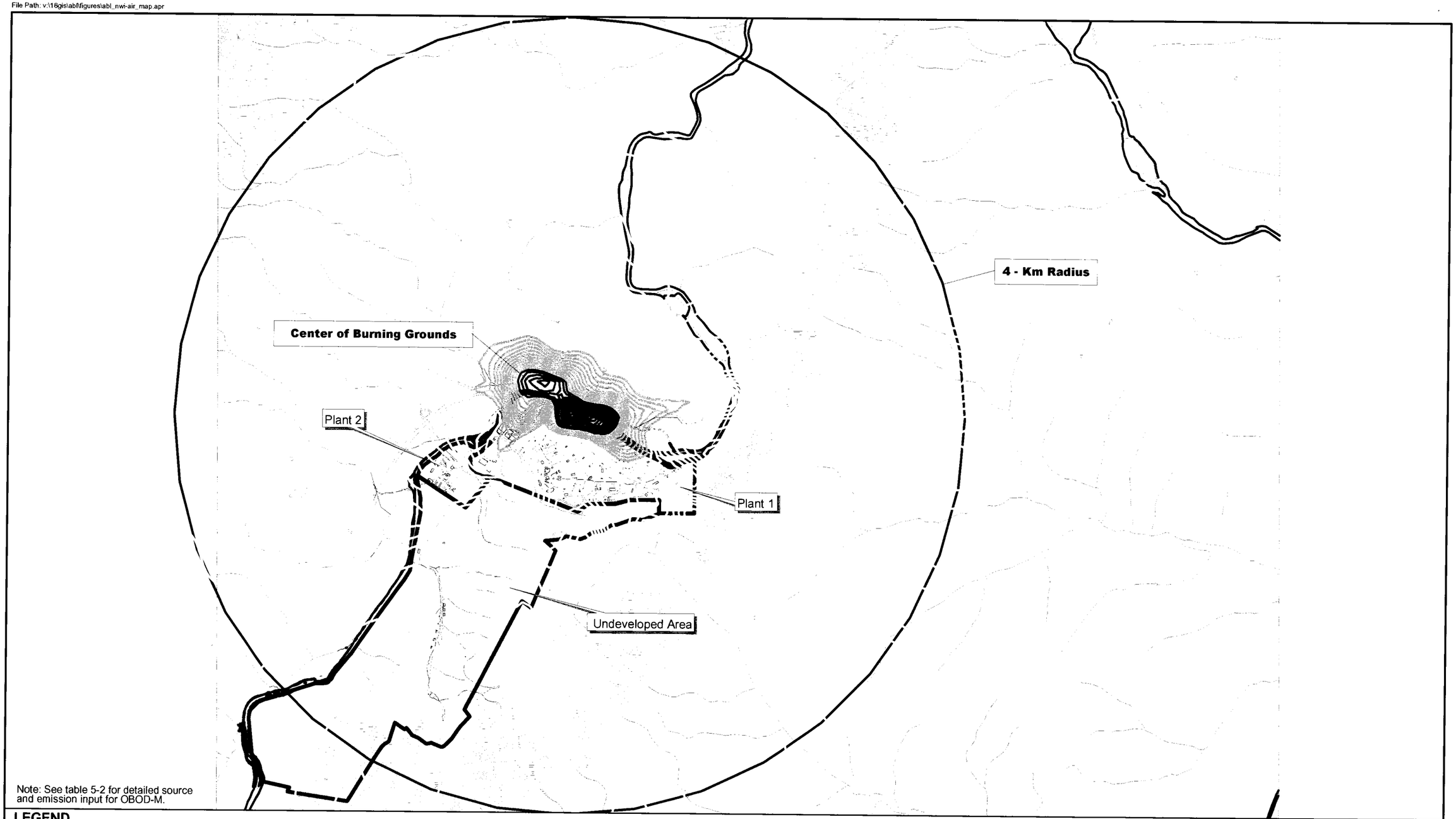
N

3000 0 3000 6000 Feet

HCL Aluminized Composite
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 60 ug/m3
- 61 - 150 ug/m3
- 151 - 260 ug/m3
- 261 - 370 ug/m3
- 371 - 480 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

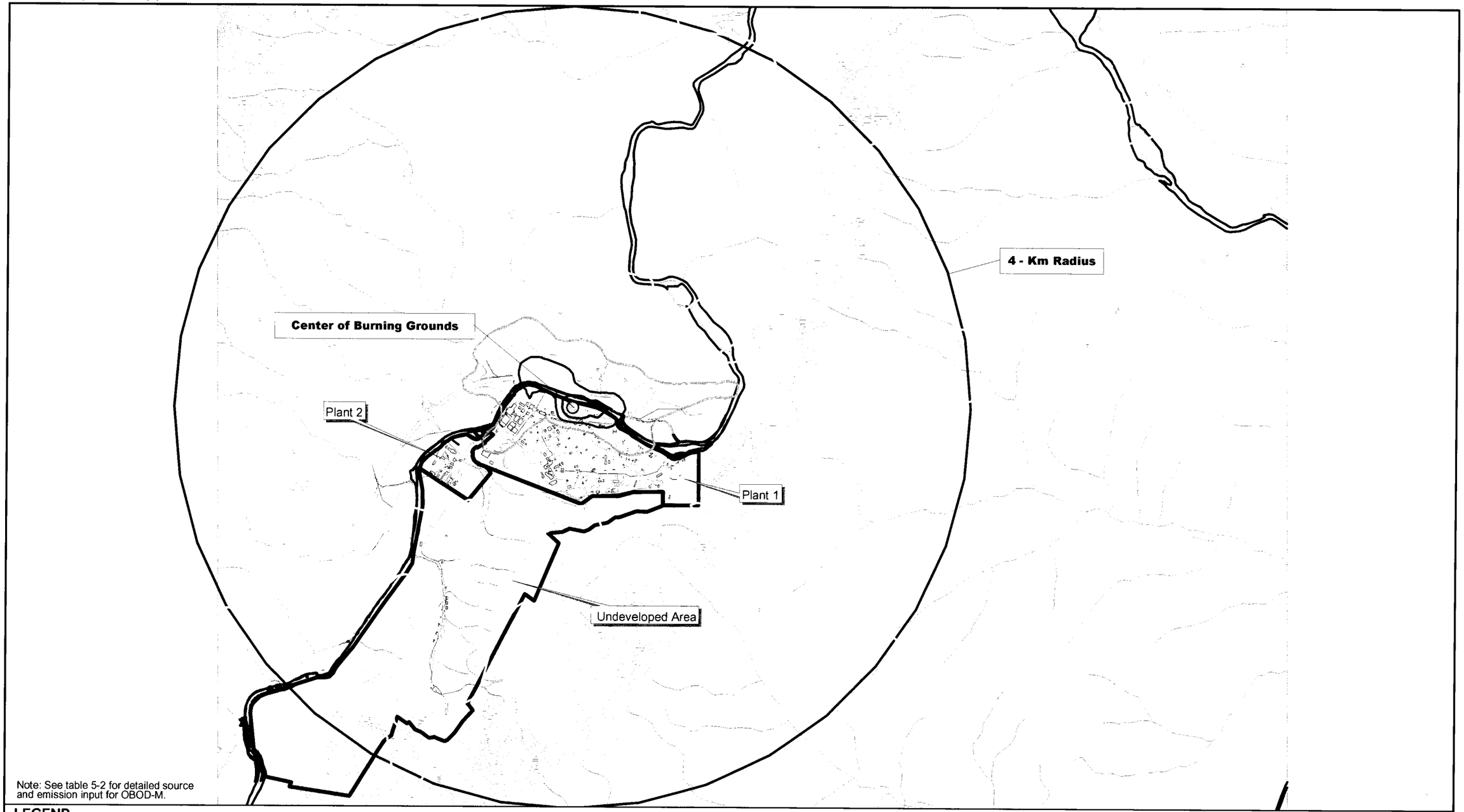
N

3000 0 3000 6000 Feet

HCL Aluminized Composite Highest
1 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 2 - 6 ug/m3
- 7 - 18 ug/m3
- 19 - 32 ug/m3
- 33 - 46 ug/m3
- 47 - 60 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

N

3000 0 3000 6000 Feet

HCL Aluminized Composite Highest
8 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

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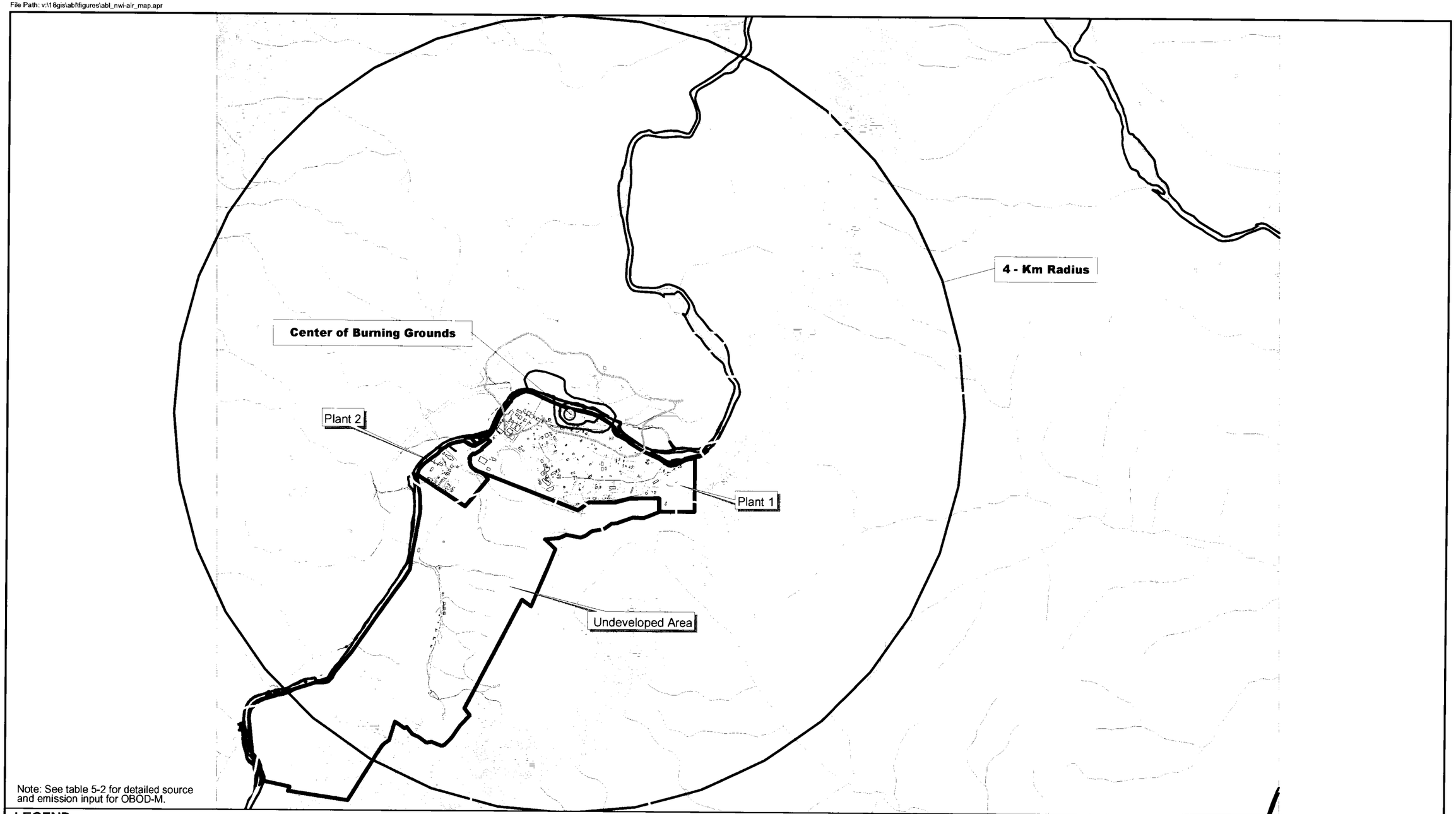


Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 2 ug/m3
- 3 - 6 ug/m3
- 7 - 11 ug/m3
- 12 - 15 ug/m3
- 16 - 20 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

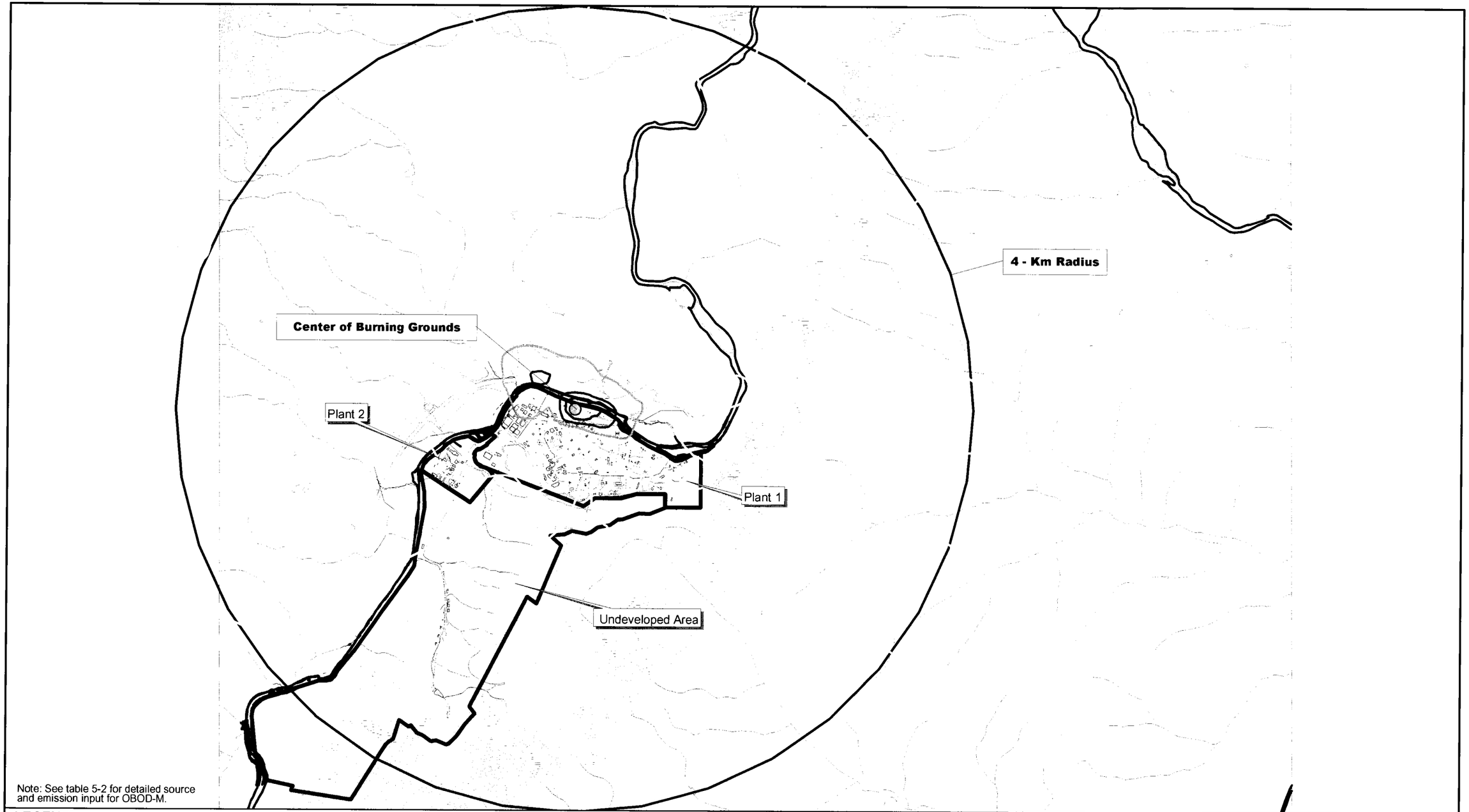
N

3000 0 3000 6000 Feet

HCL Aluminized Composite Highest
24 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\ab\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 60 ug/m3
- 61 - 160 ug/m3
- 161 - 250 ug/m3
- 251 - 340 ug/m3
- 341 - 430 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

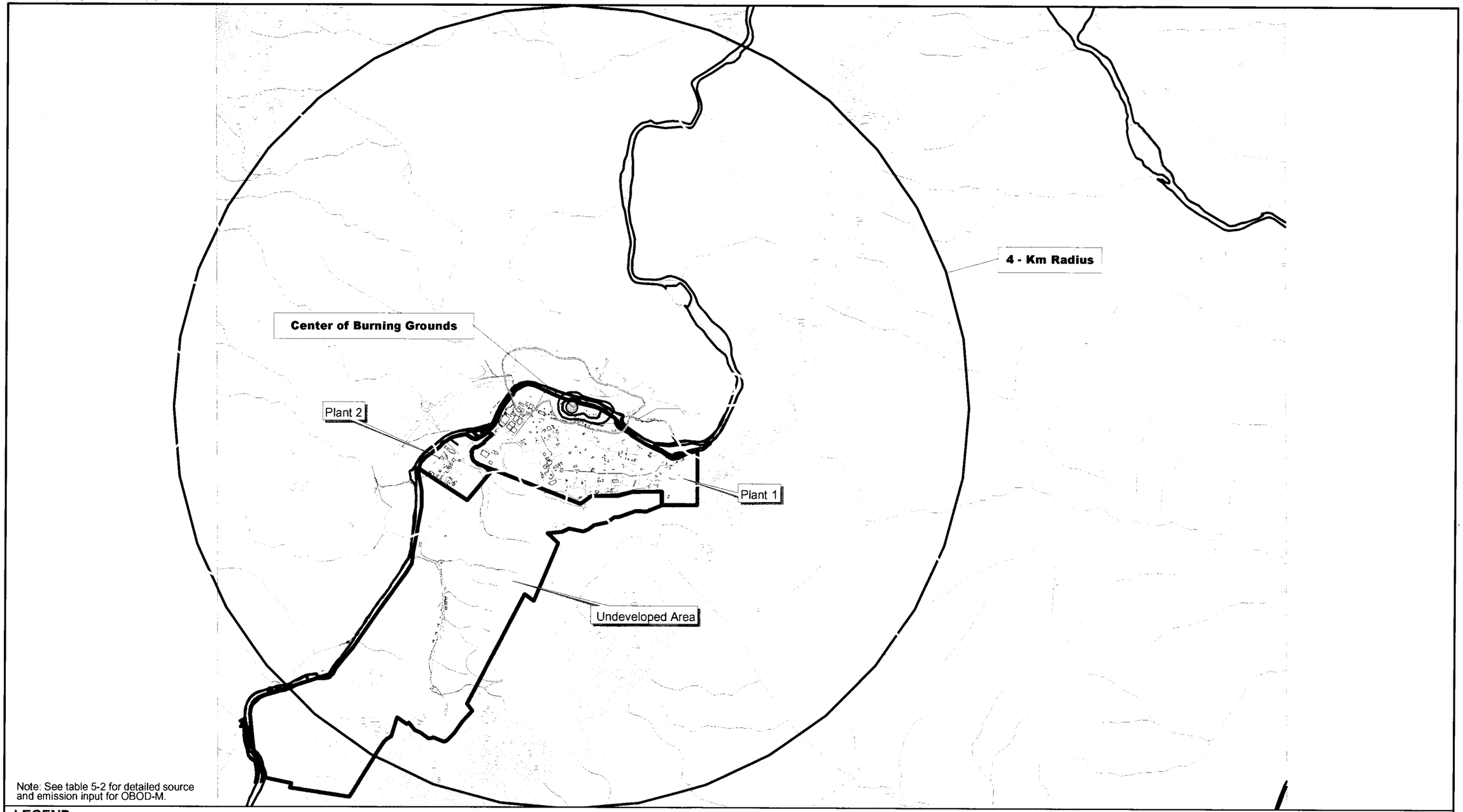
N

3000 0 3000 6000 Feet

HCL Aluminized Composite Second Highest
1 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 2 - 8 ug/m3
- 9 - 22 ug/m3
- 23 - 34 ug/m3
- 35 - 45 ug/m3
- 46 - 56 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

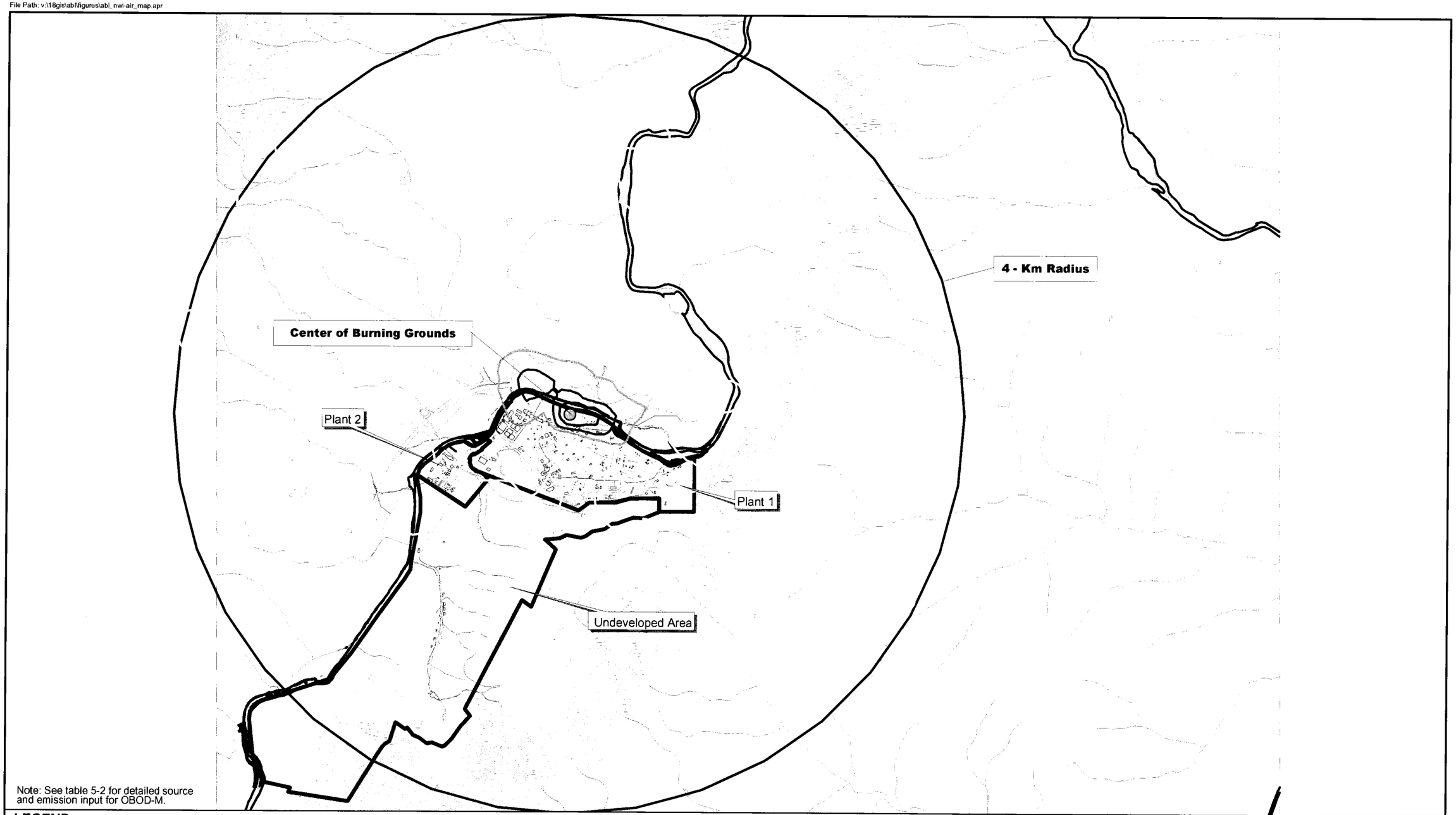
N

3000 0 3000 6000 Feet

HCL Aluminized Composite Second Highest
8 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 2 ug/m3
- 3 - 6 ug/m3
- 7 - 9 ug/m3
- 10 - 13 ug/m3
- 14 - 17 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

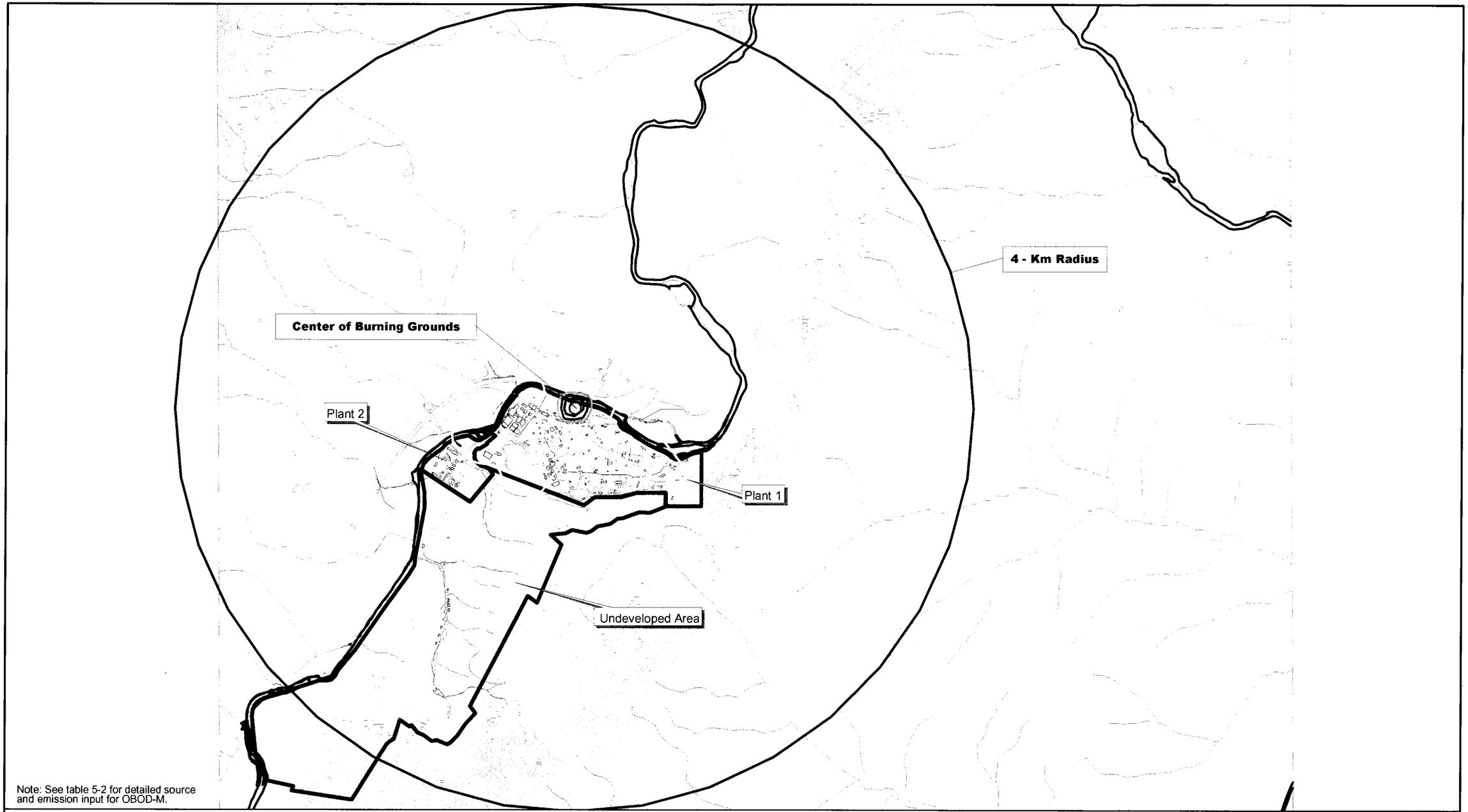
N

3000 0 3000 6000 Feet

HCL Aluminized Composite Second Highest
24 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.1 - 0.58 ug/m3
- 0.58 - 1.06 ug/m3
- 1.06 - 1.54 ug/m3
- 1.54 - 2.02 ug/m3
- 2.02 - 2.5 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

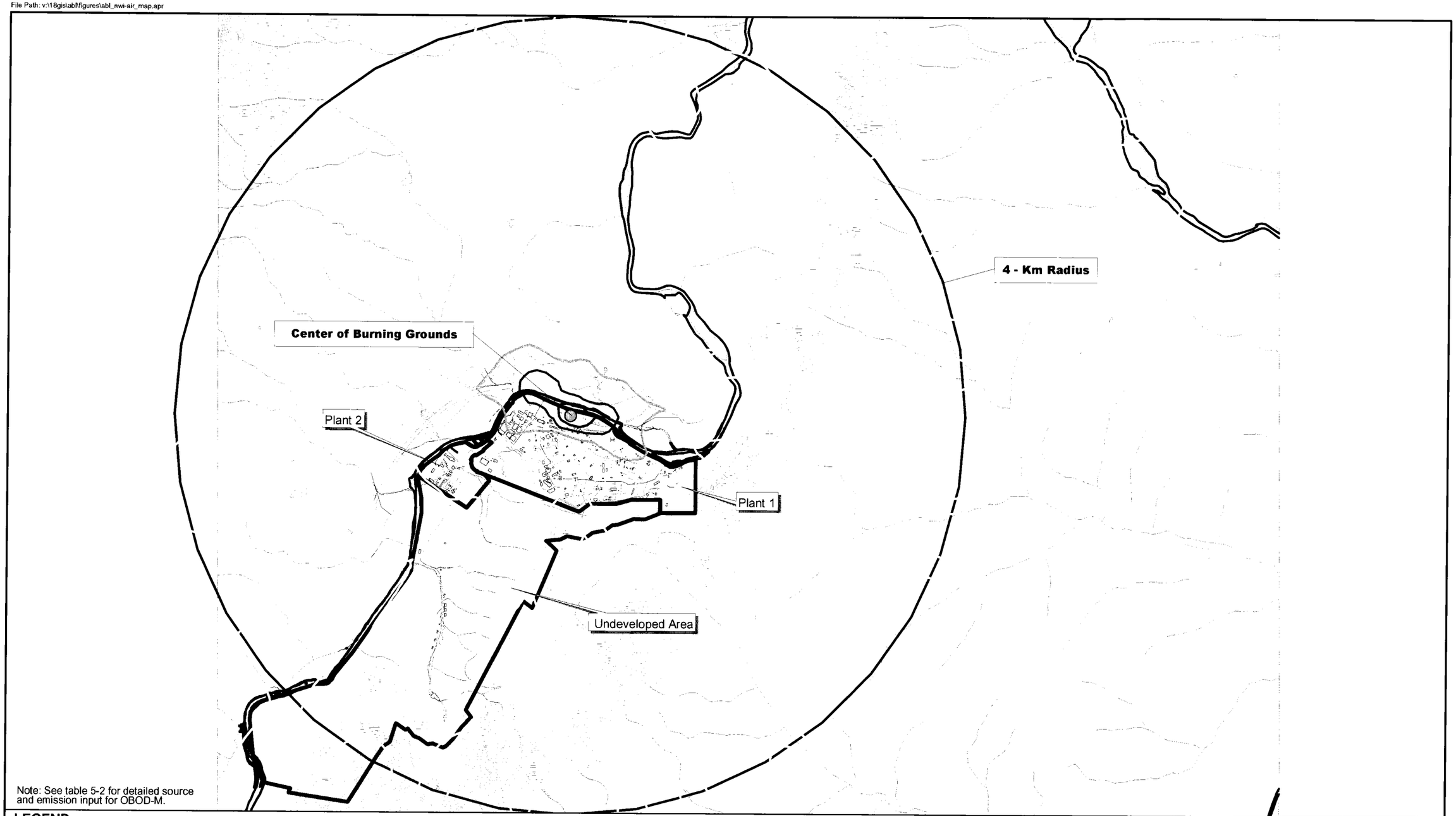
N

3000 0 3000 6000 Feet

HCL Non-Aluminized Composite High
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 108 ug/m3
- 109 - 216 ug/m3
- 217 - 324 ug/m3
- 325 - 432 ug/m3
- 433 - 540 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

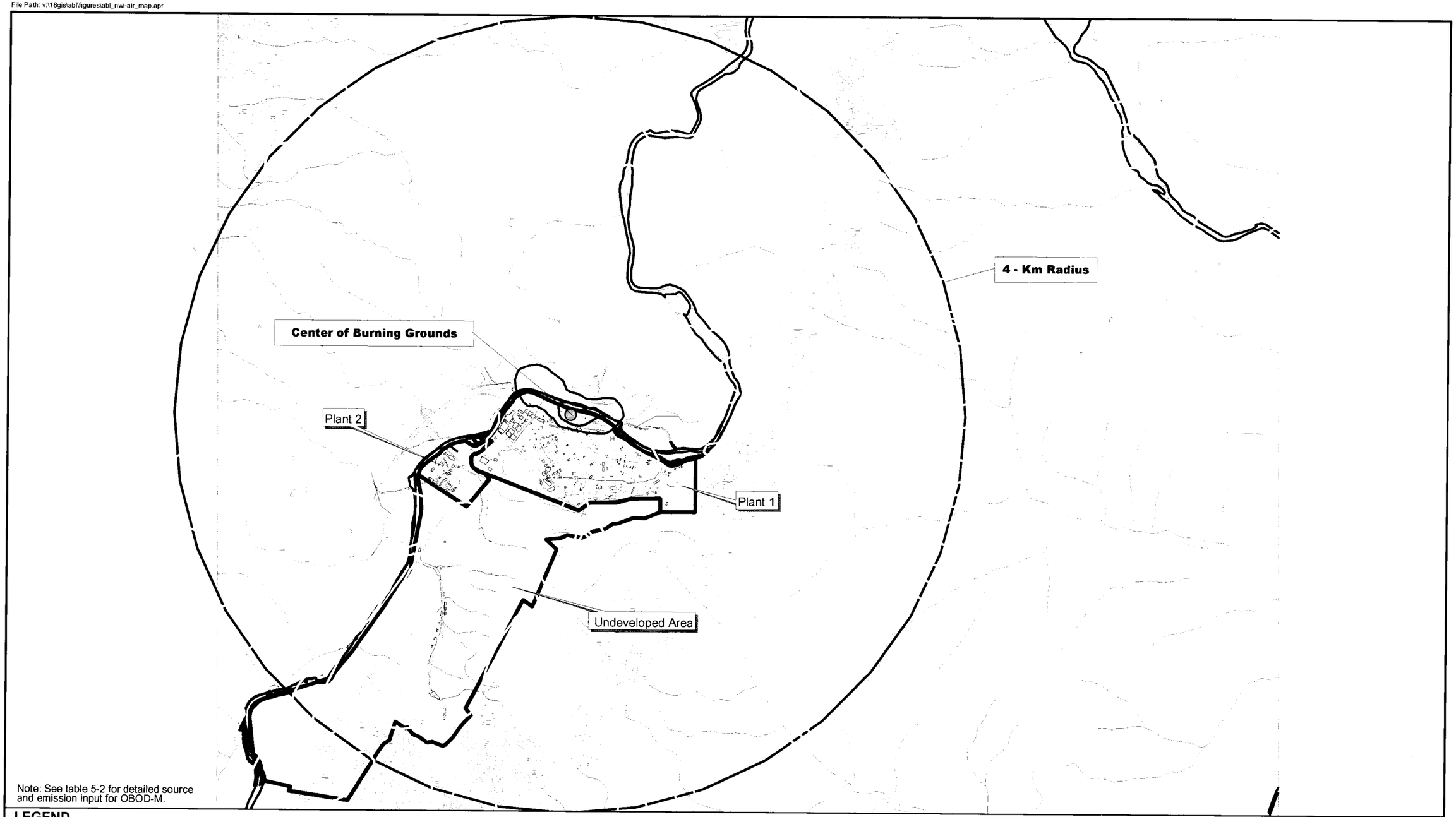
N

3000 0 3000 6000 Feet

HCL Non-Aluminized Composite Highest
1 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\ab\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 13 ug/m3
- 13 - 27 ug/m3
- 28 - 40 ug/m3
- 41 - 54 ug/m3
- 55 - 68 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

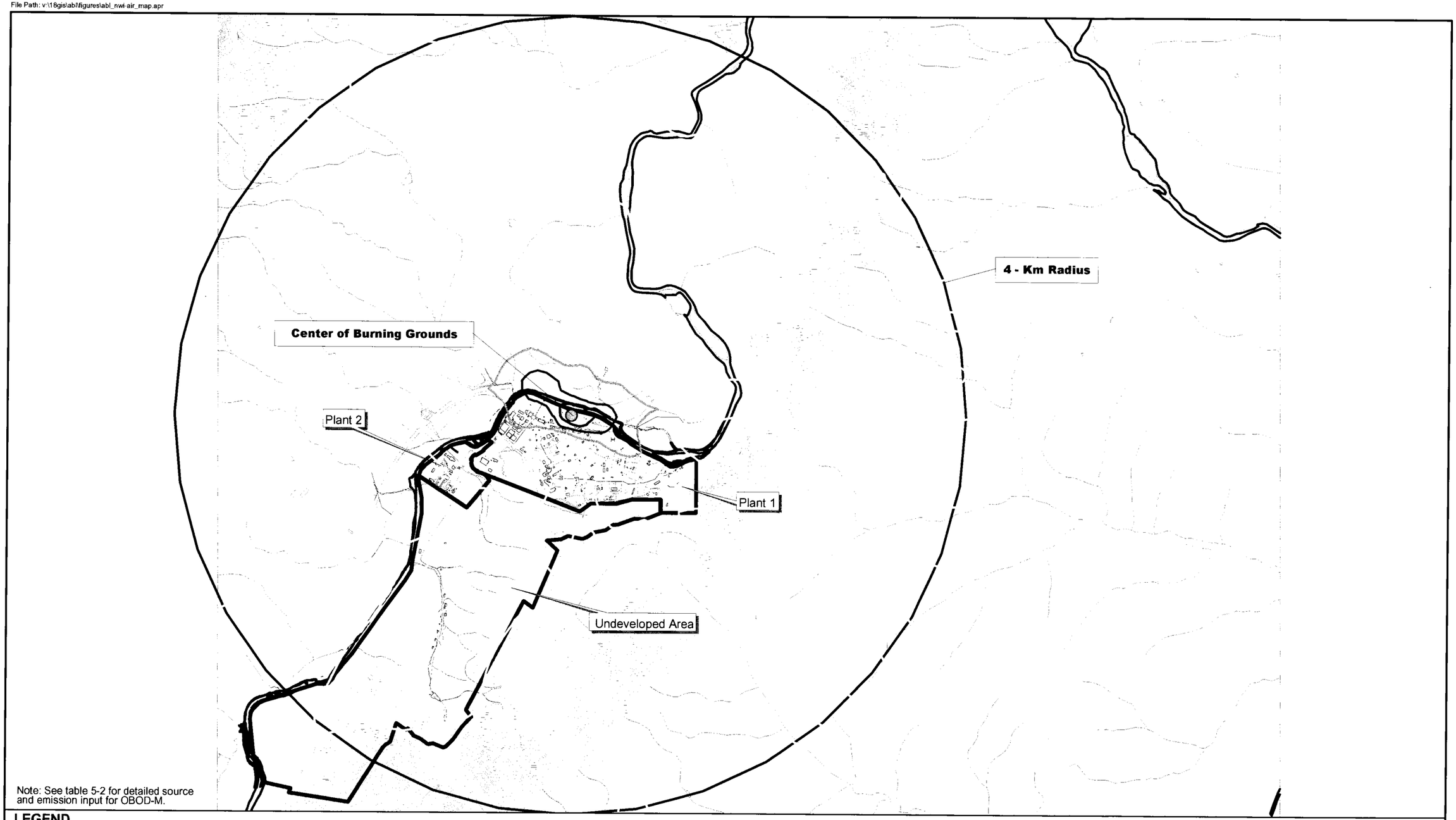
N

3000 0 3000 6000 Feet

HCL Non-Aluminized Composite Highest
8 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 4 ug/m3
- 5 - 9 ug/m3
- 10 - 13 ug/m3
- 14 - 18 ug/m3
- 19 - 23 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

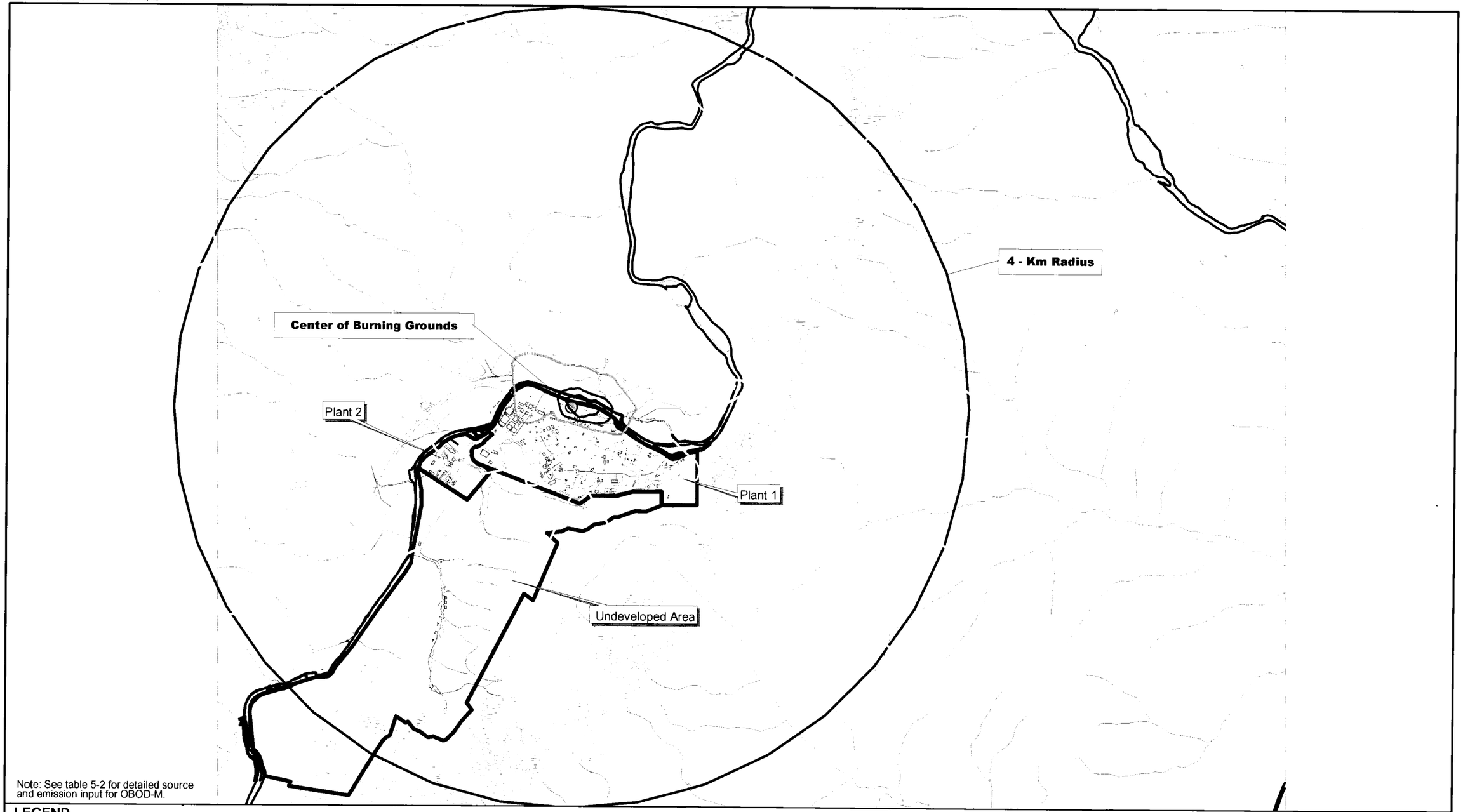
N

3000 0 3000 6000 Feet

HCL Non-Aluminized Composite Highest
24 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



LEGEND

- 4 - 70 ug/m3
- 71 - 200 ug/m3
- 201 - 320 ug/m3
- 321 - 430 ug/m3
- 431 - 550 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

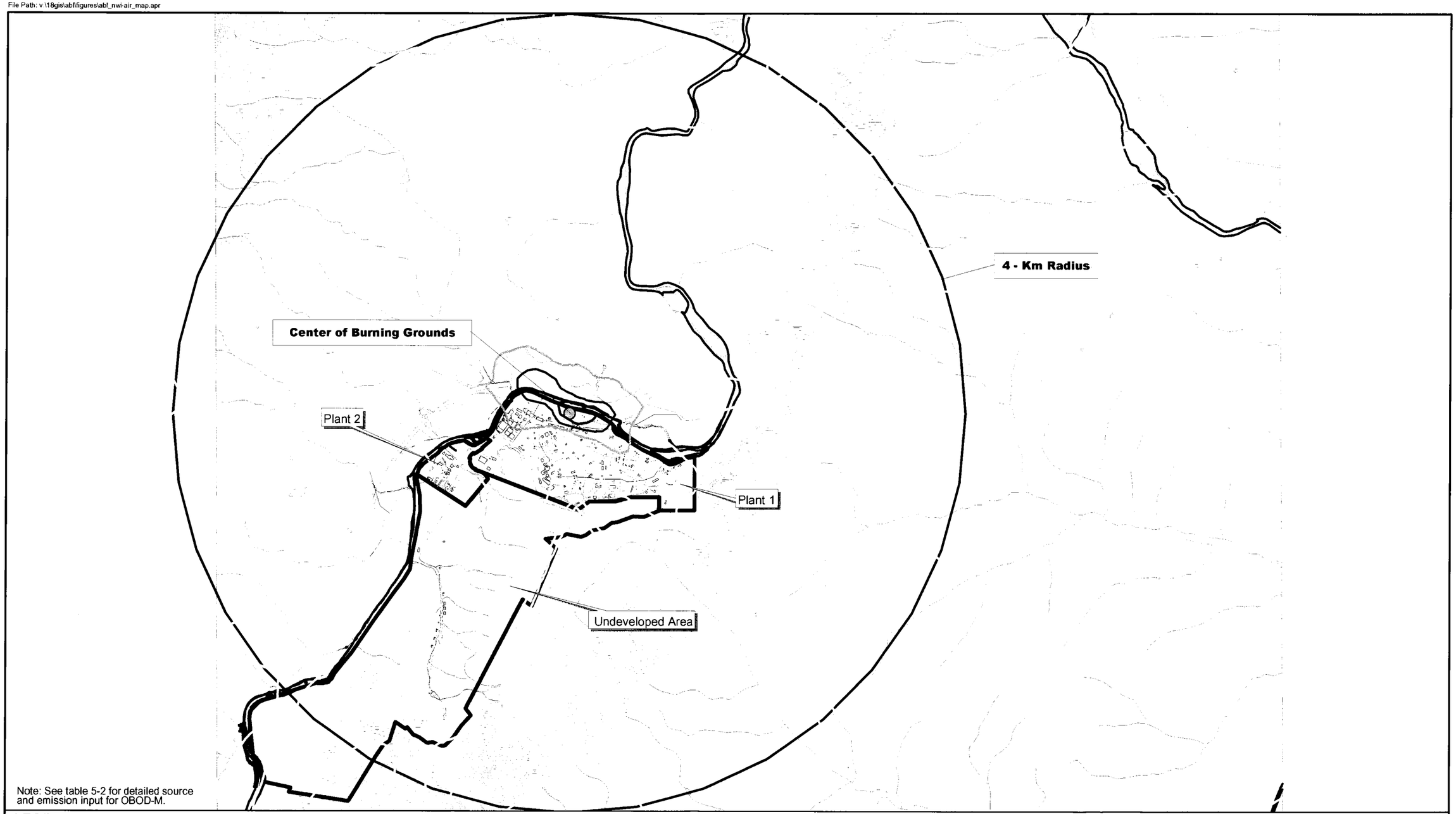
N

3000 0 3000 6000 Feet

HCL Non-Aluminized Composite Second Highest
1 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\ab\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 12 ug/m3
- 13 - 24 ug/m3
- 25 - 37 ug/m3
- 38 - 49 ug/m3
- 50 - 62 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

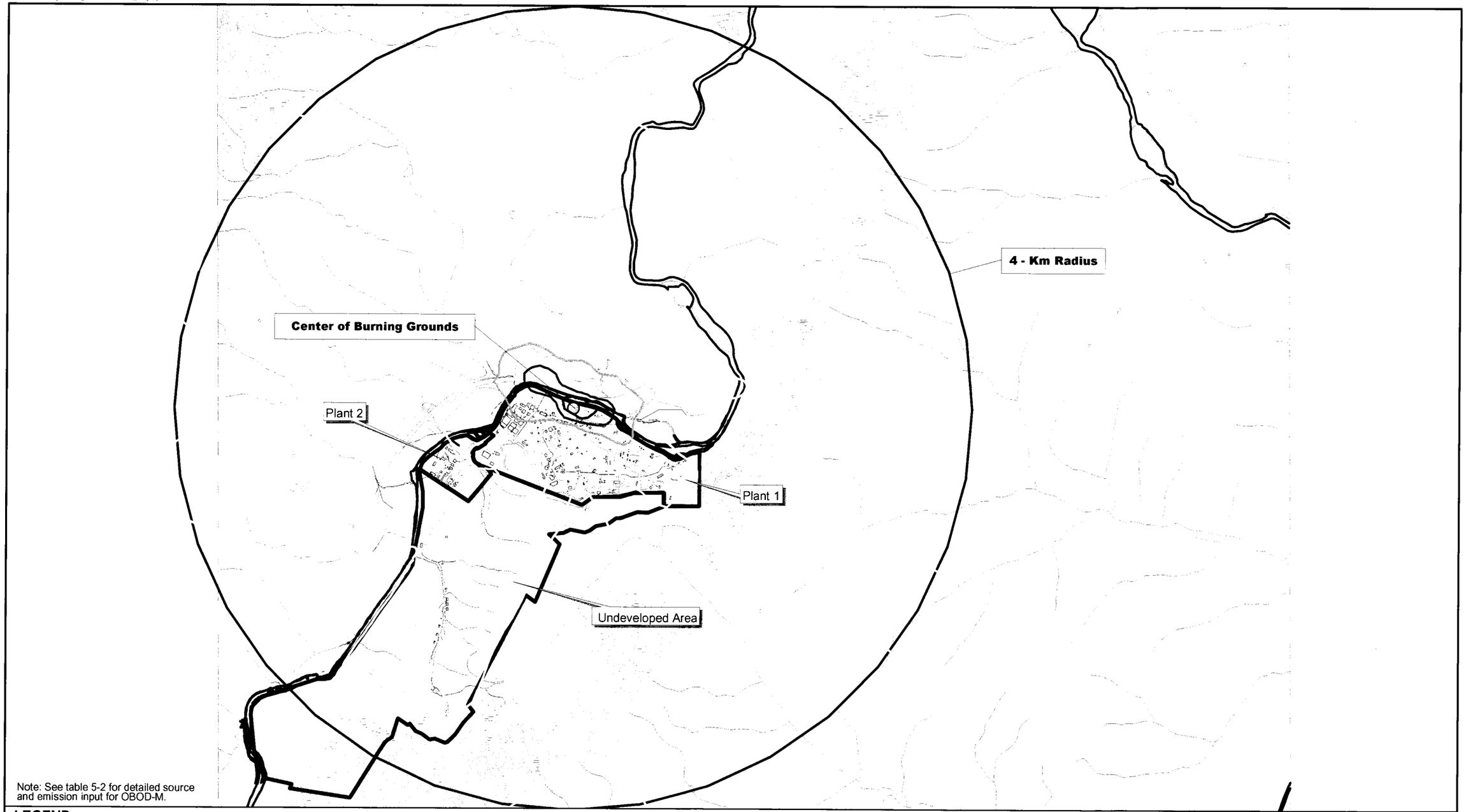
N

3000 0 3000 6000 Feet

HCL Non-Aluminized Composite Second Highest
8 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 4 ug/m3
- 5 - 8 ug/m3
- 9 - 12 ug/m3
- 13 - 16 ug/m3
- 17 - 21 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

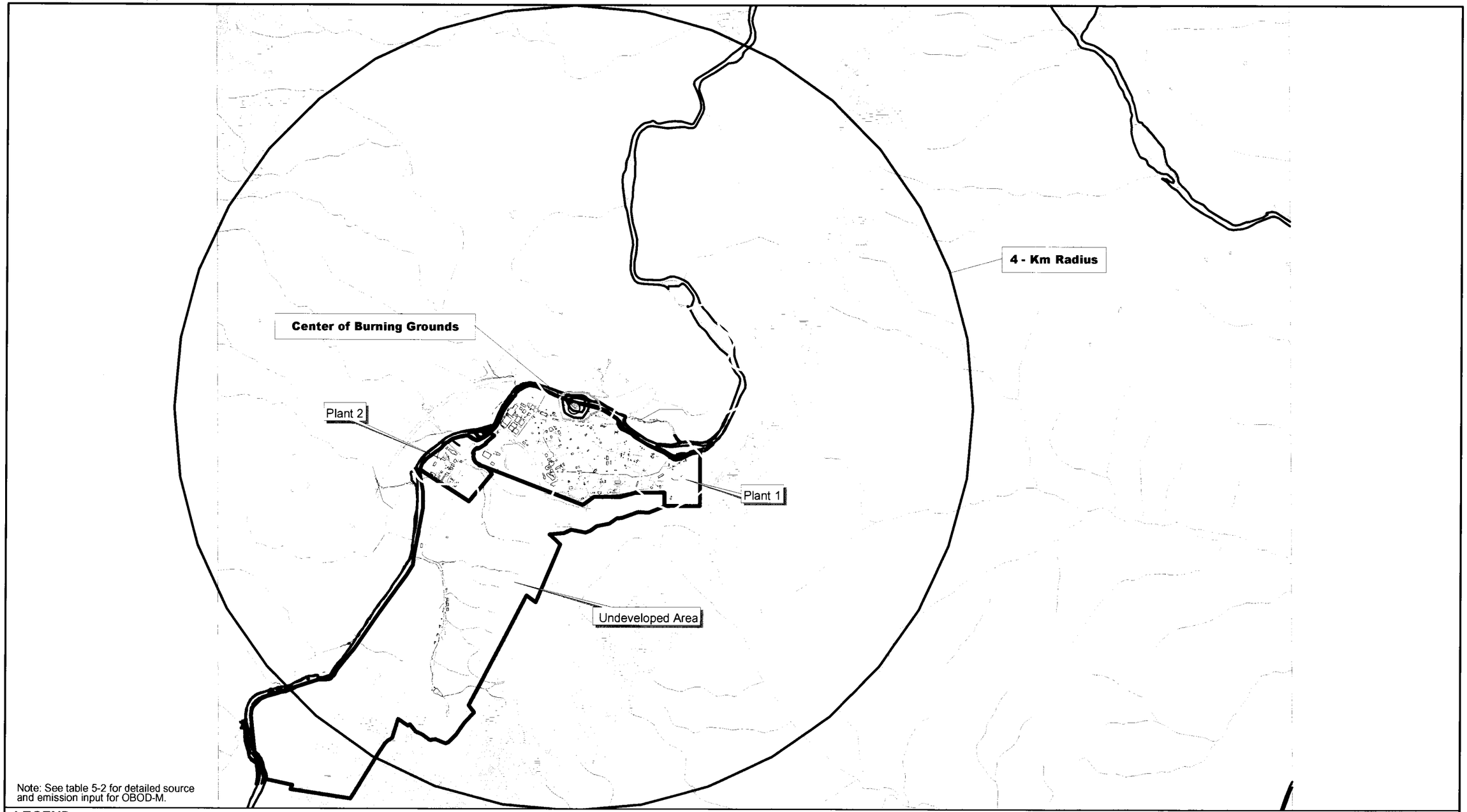
N

3000 0 3000 6000 Feet

HCL Non-Aluminized Composite Second Highest
24 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.1 - 0.74 ug/m3
- 0.74 - 1.38 ug/m3
- 1.38 - 2.02 ug/m3
- 2.02 - 2.66 ug/m3
- 2.66 - 3.3 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

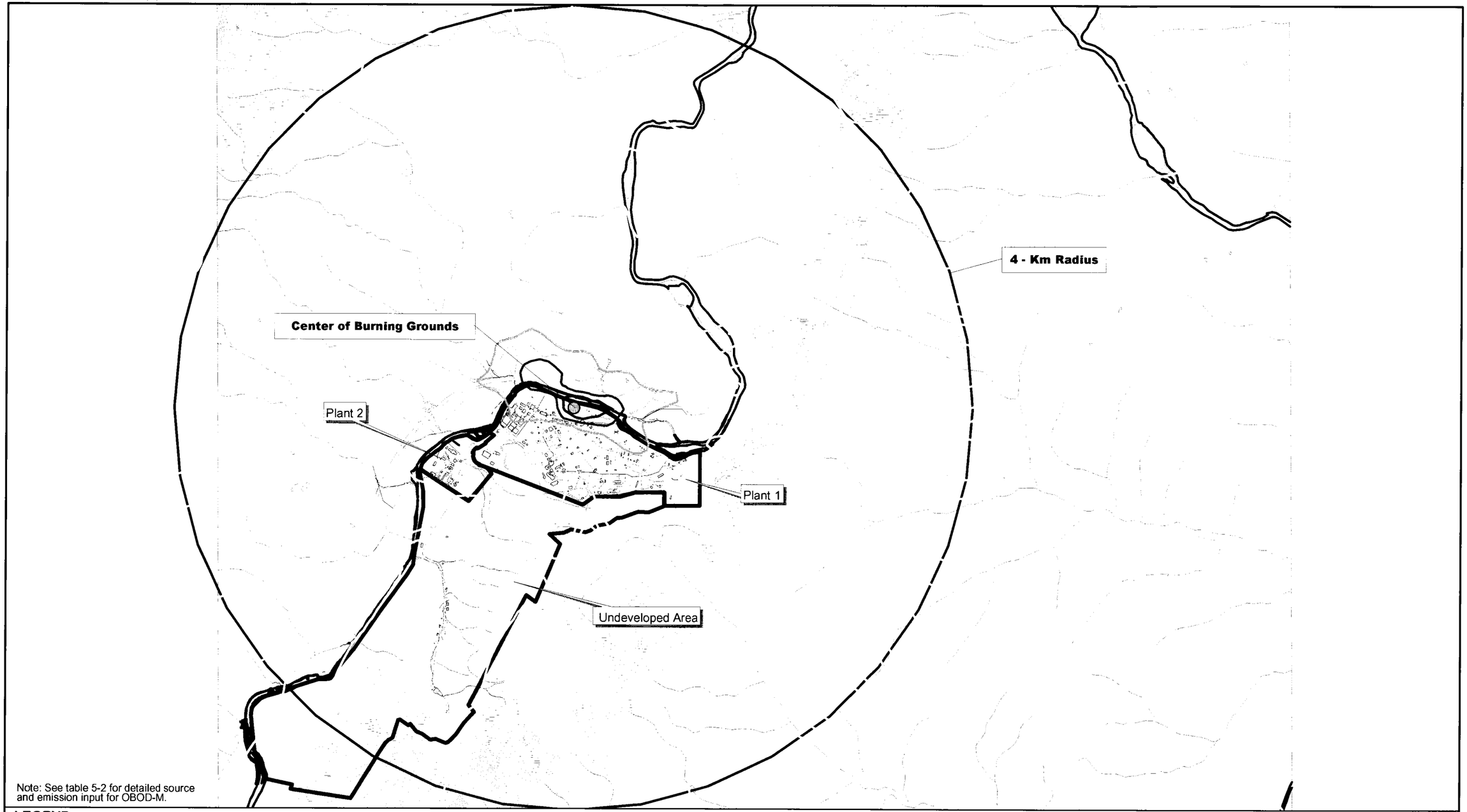
N

3000 0 3000 6000 Feet

PM10 Highest
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 1 - 8 ug/m3
- 9 - 15 ug/m3
- 16 - 22 ug/m3
- 23 - 29 ug/m3
- 30 - 37 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

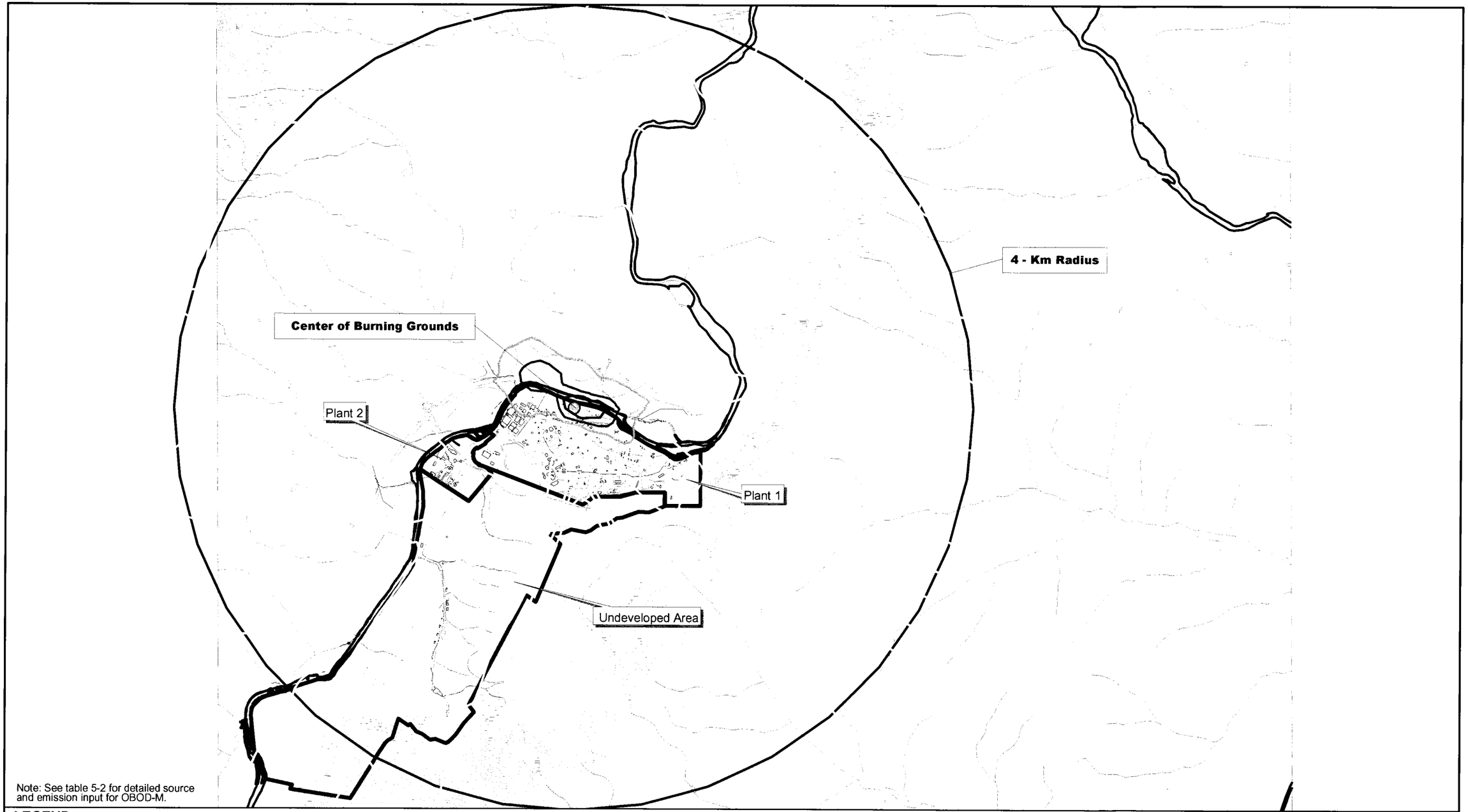
N

3000 0 3000 6000 Feet

PM10 Highest
24 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\ab\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 6 ug/m3
- 7 - 13 ug/m3
- 14 - 19 ug/m3
- 20 - 26 ug/m3
- 27 - 33 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

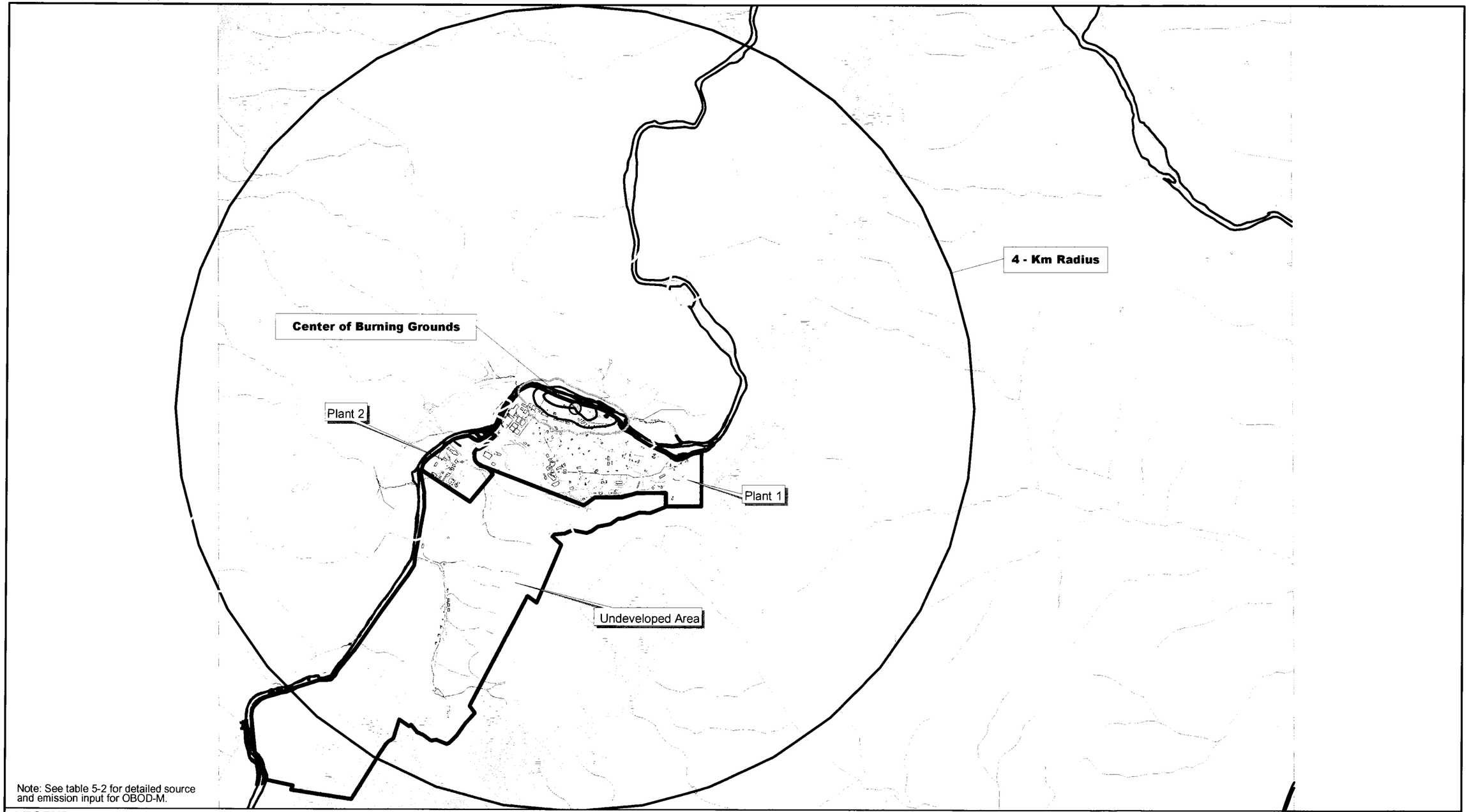
N

3000 0 3000 6000 Feet

PM10 Second Highest
24 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 250 - 1500 ug/m3
- 1501 - 3750 ug/m3
- 3751 - 6000 ug/m3
- 6001 - 8000 ug/m3
- 8001 - 10250 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

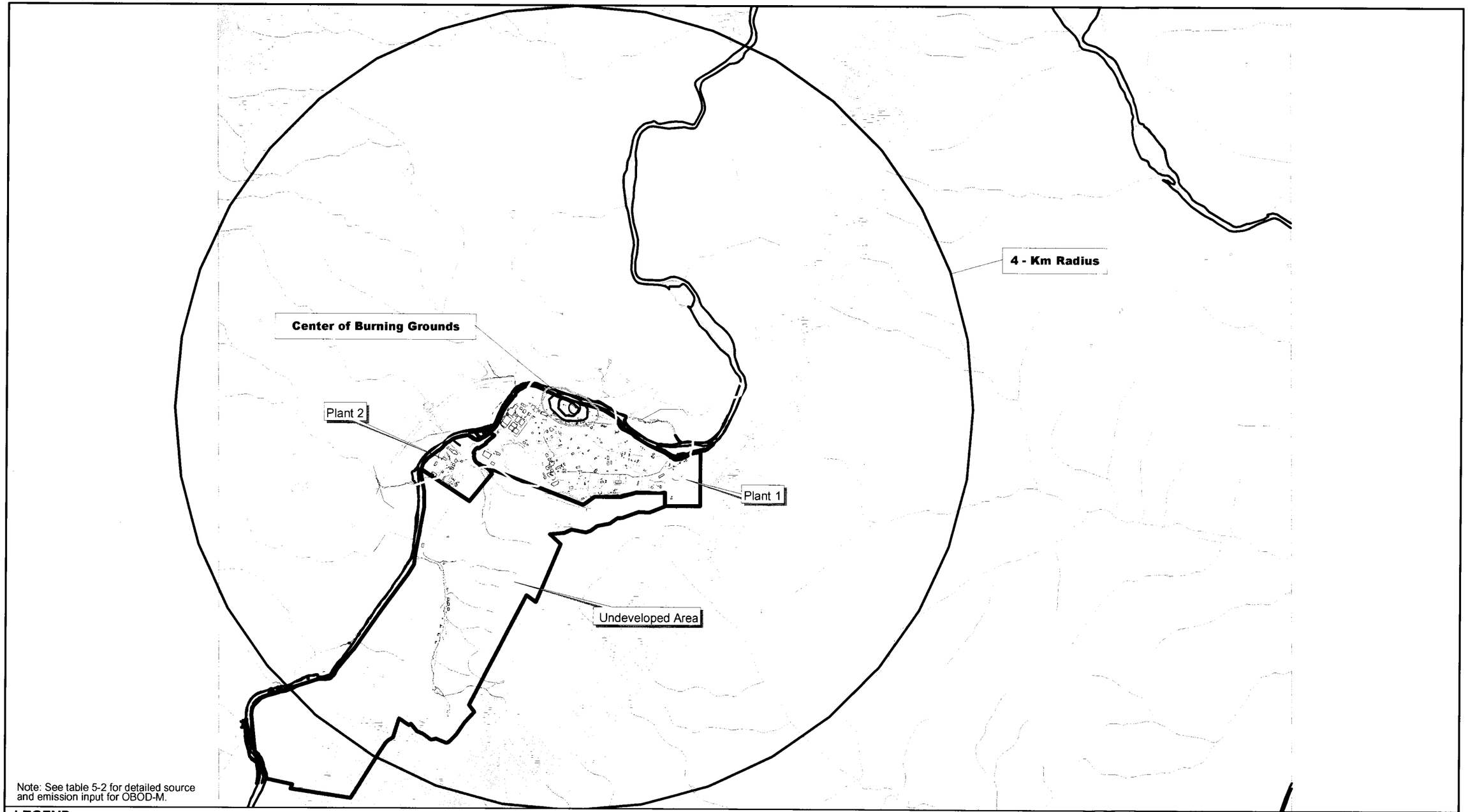
N

3000 0 3000 6000 Feet

Carbon Monoxide Highest
1 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 100 - 600 ug/m3
- 601 - 1200 ug/m3
- 1201 - 1800 ug/m3
- 1801 - 2400 ug/m3
- 2401 - 3000 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

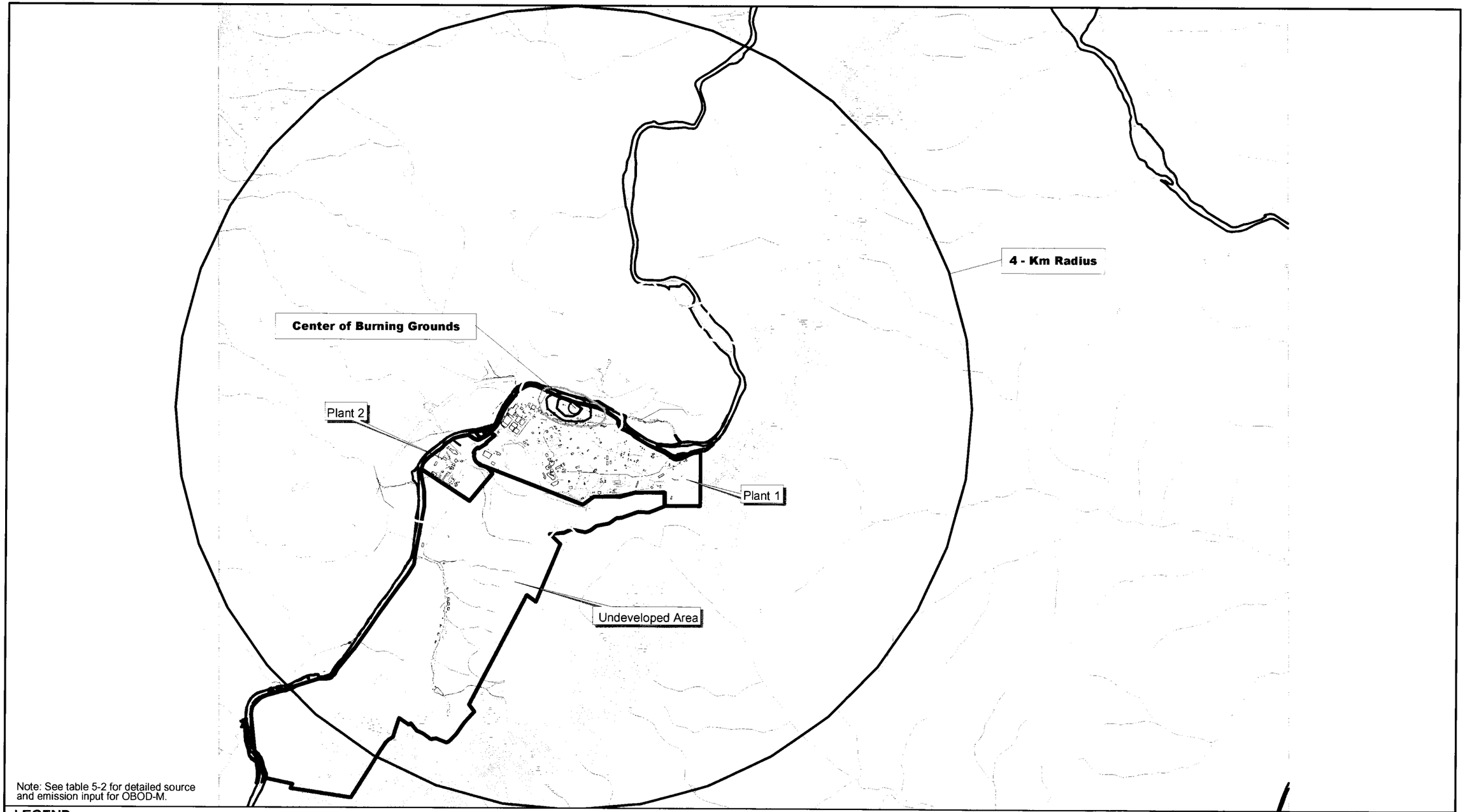
N

3000 0 3000 6000 Feet

Carbon Monoxide Highest
8 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 250 - 3250 ug/m3
- 3251 - 6750 ug/m3
- 6751 - 10000 ug/m3
- 10001 - 13500 ug/m3
- 13501 - 17000 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

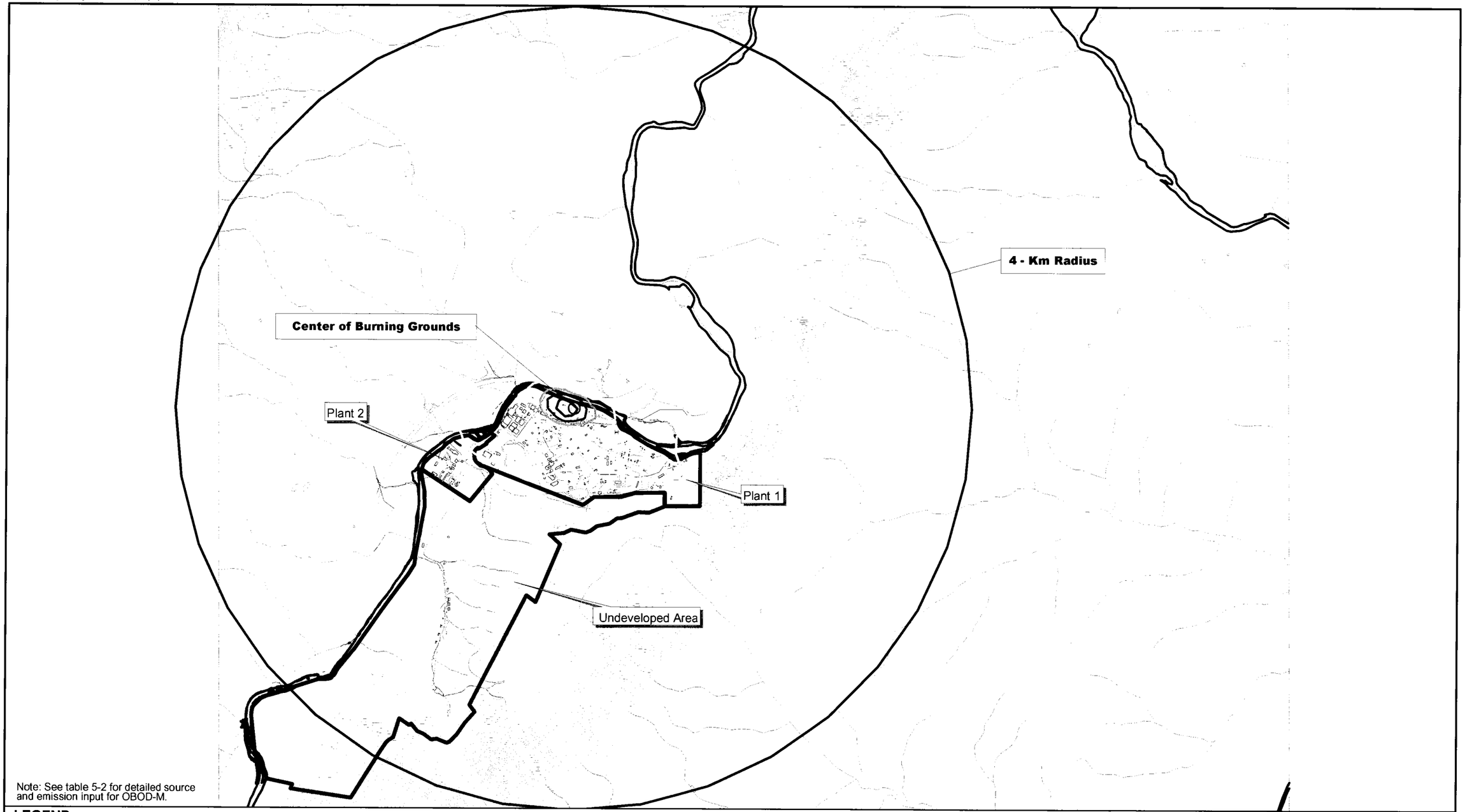
N

3000 0 3000 6000 Feet

Carbon Monoxide Second Highest
1 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 100 - 500 ug/m3
- 501 - 1100 ug/m3
- 1101 - 1600 ug/m3
- 1601 - 2200 ug/m3
- 2201 - 2800 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

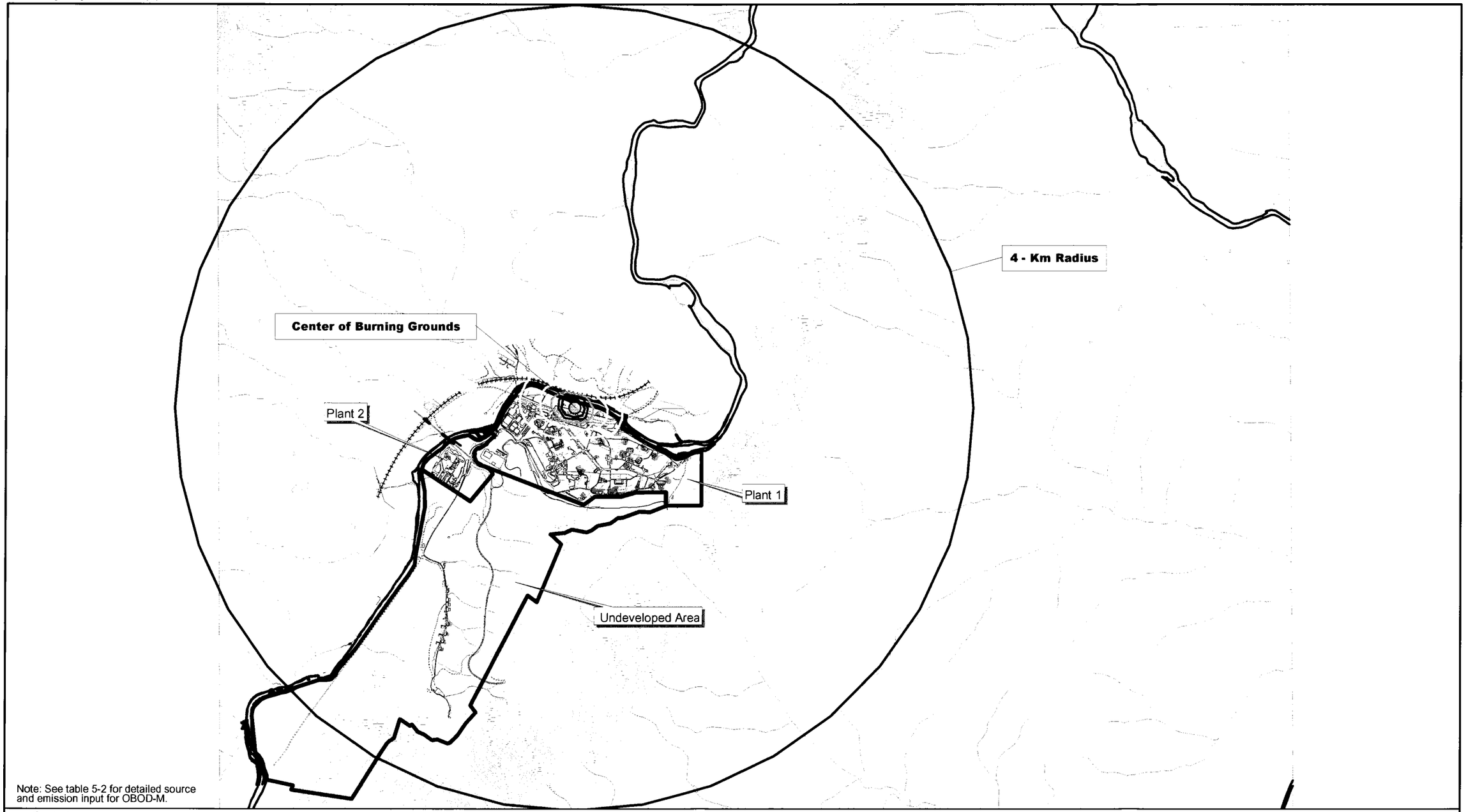
N

3000 0 3000 6000 Feet

Carbon Monoxide Second Highest
8 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 0.2 ug/m3
- 0.2 - 0.6 ug/m3
- 0.6 - 0.9 ug/m3
- 0.9 - 1.1 ug/m3
- 1.1 - 1.4 ug/m3
- 4 Kilometer Radius Around Center of Burnground
- Center of Burnground

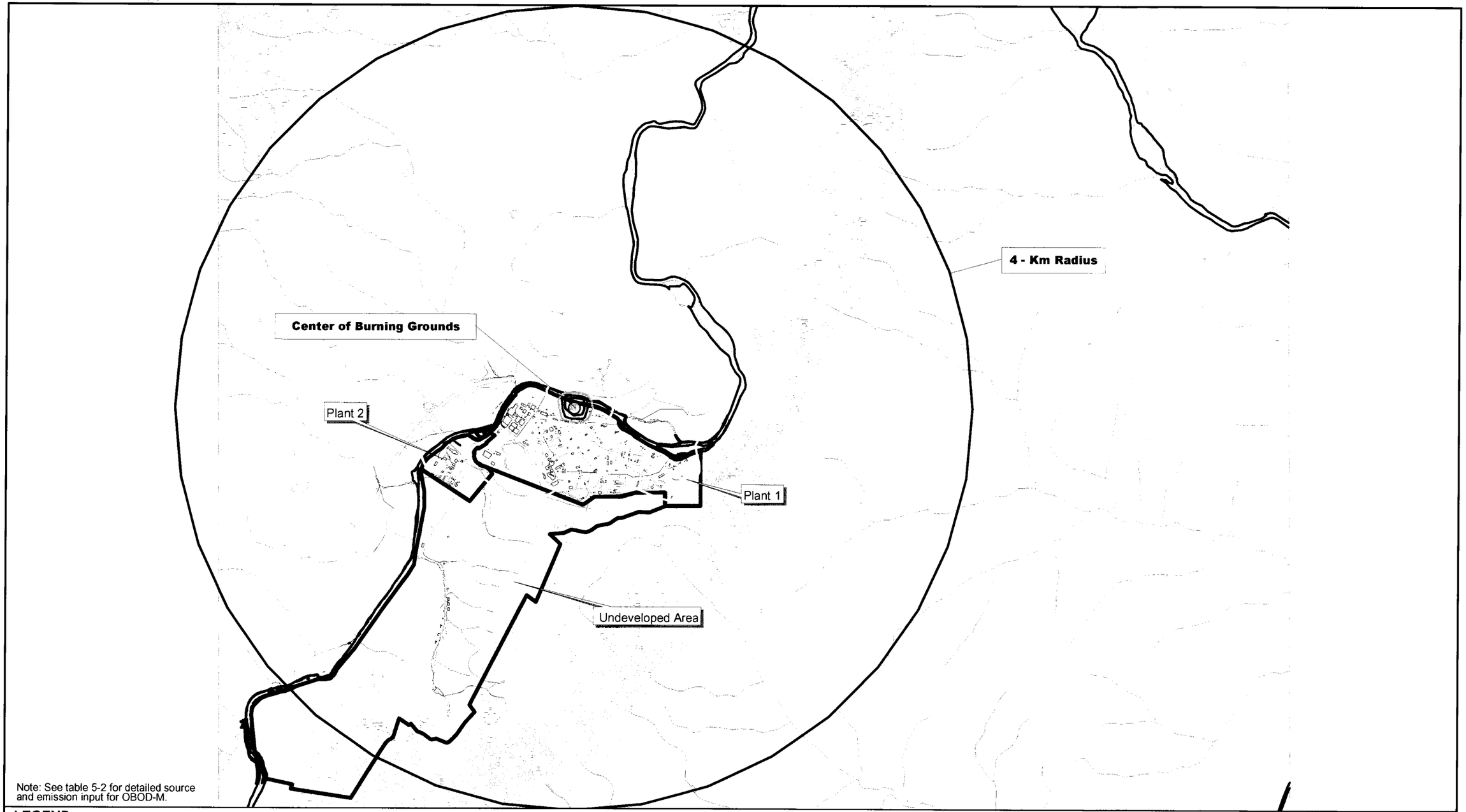
N

3000 0 3000 6000 Feet

NOx Highest
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.01 - 0.13 ug/m3
- 0.13 - 0.25 ug/m3
- 0.25 - 0.35 ug/m3
- 0.35 - 0.43 ug/m3
- 0.43 - 0.51 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

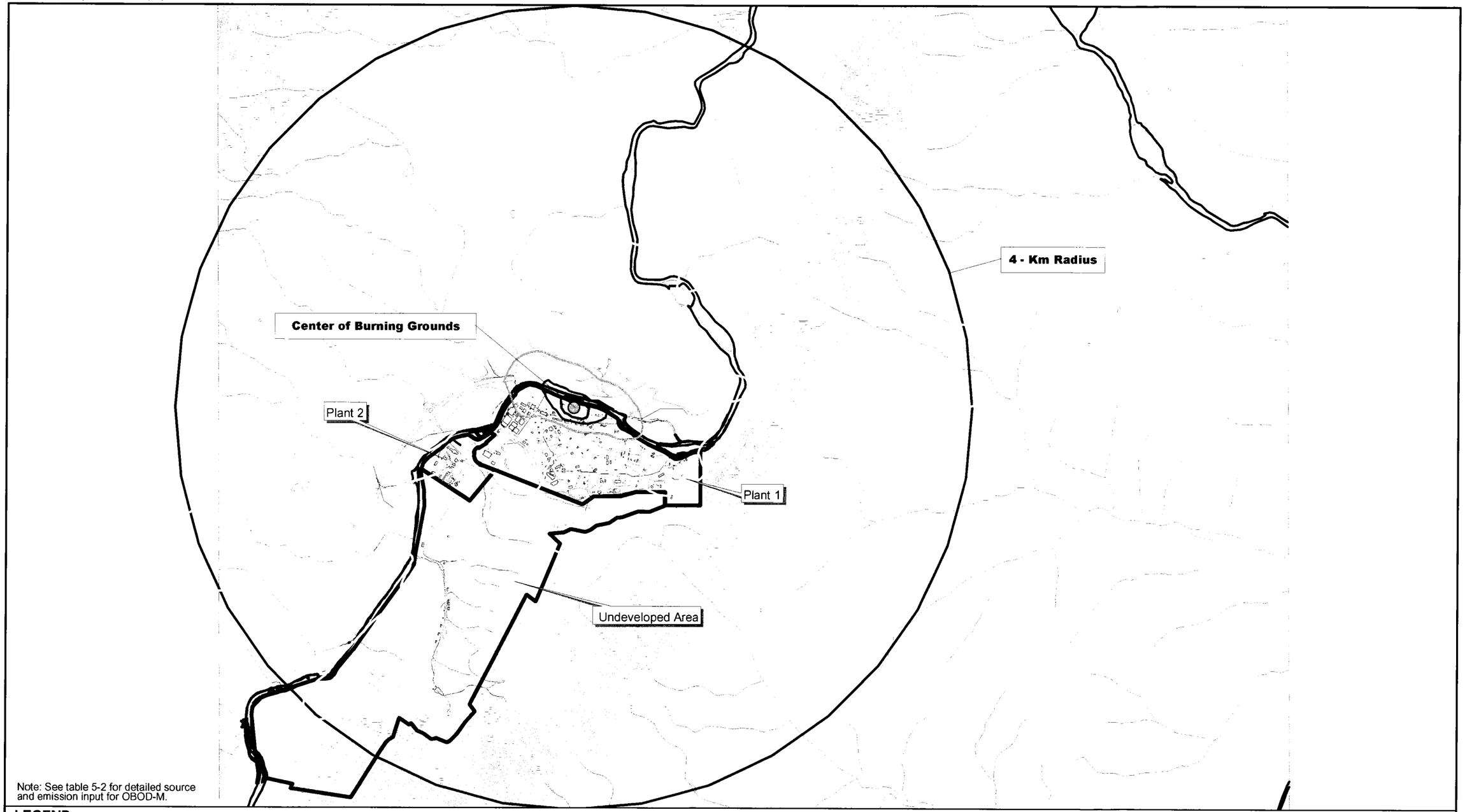
N

3000 0 3000 6000 Feet

Sulfur Dioxide Highest
Annual
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: V:\18gis\abl\figures\abl_nwi-air_map2.apr



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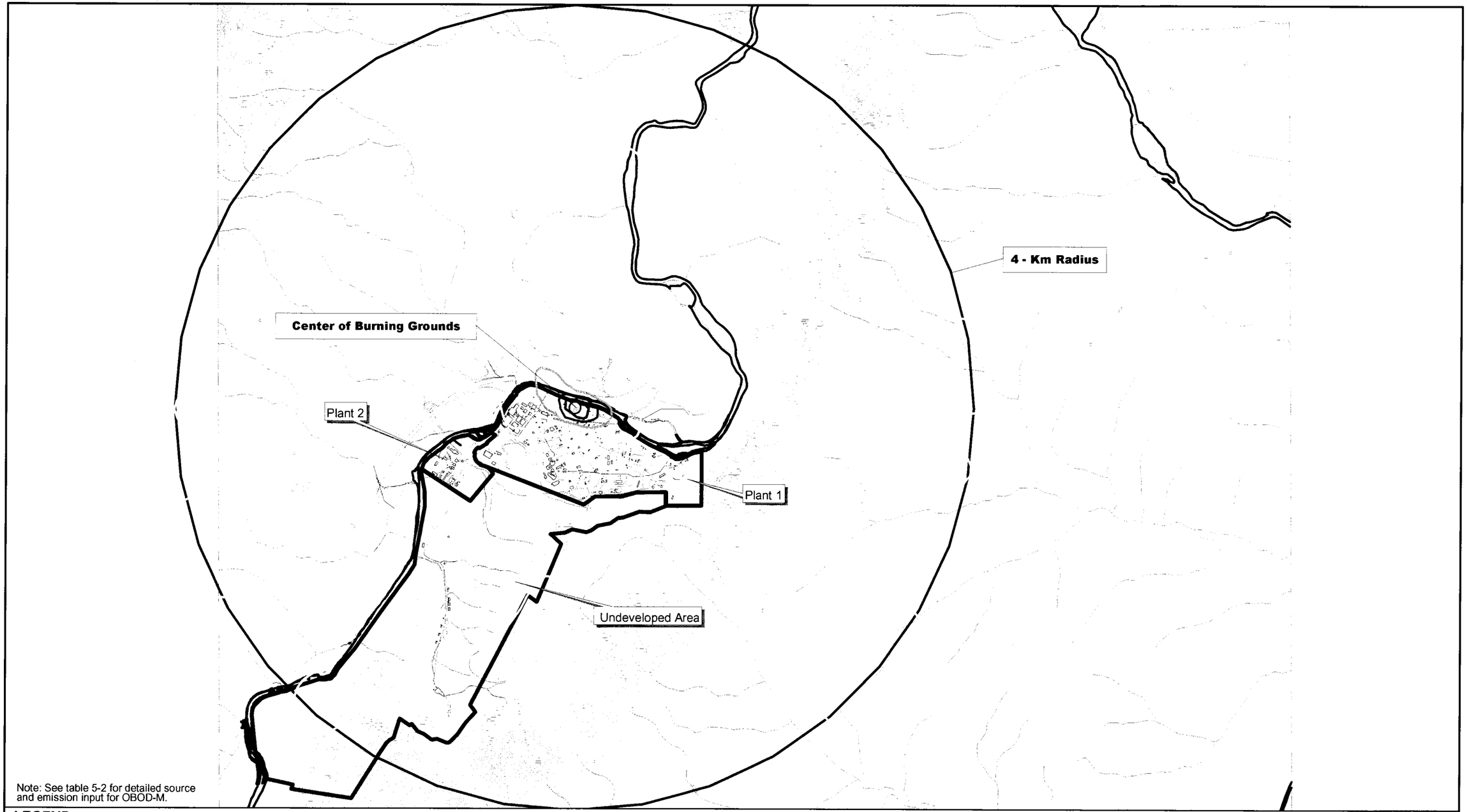


Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.1 - 0.7 ug/m3
- 0.7 - 1.5 ug/m3
- 1.5 - 2.1 ug/m3
- 2.1 - 2.6 ug/m3
- 2.6 - 3 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

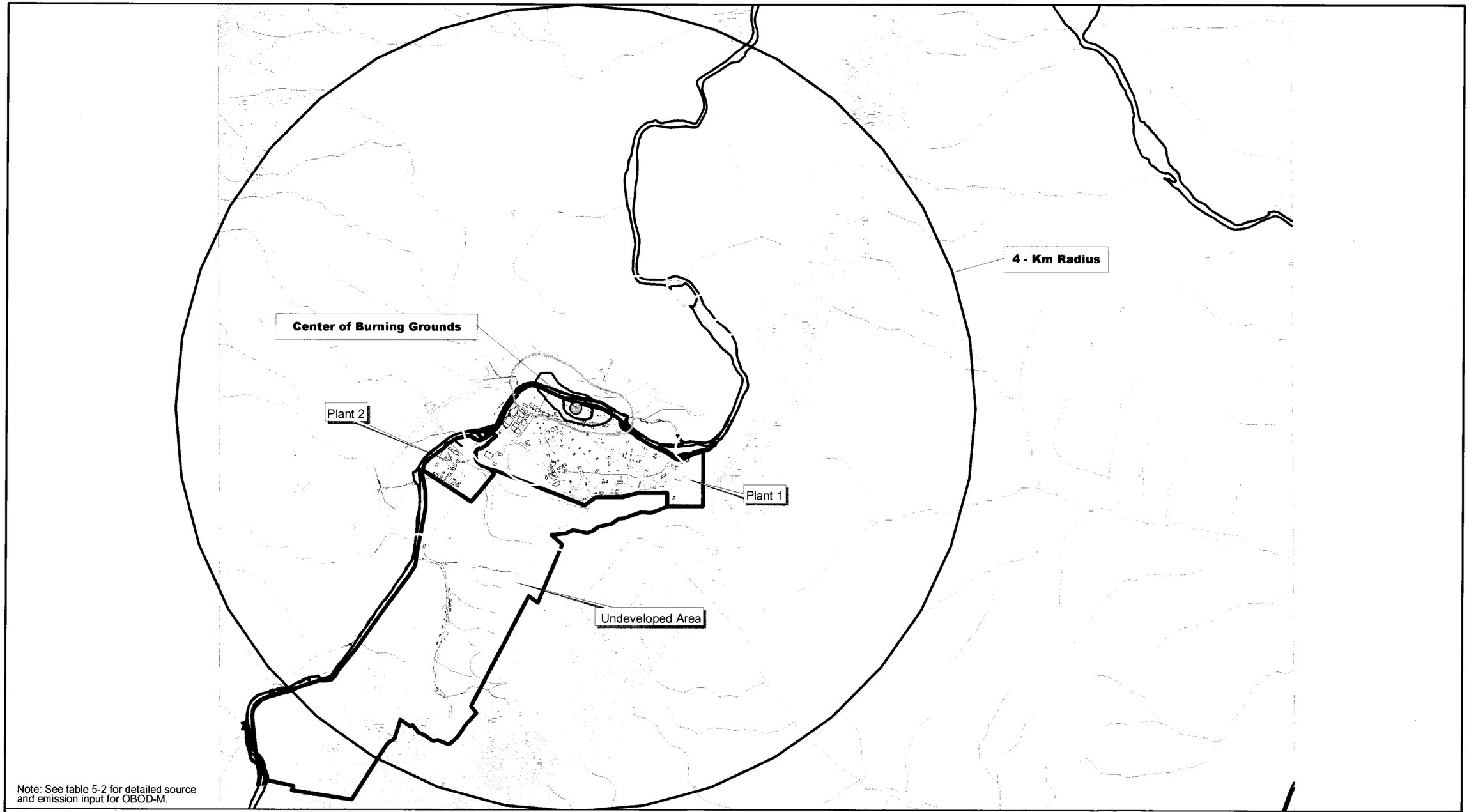
N

3000 0 3000 6000 Feet

Sulfur Dioxide Highest
24 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: V:\18gis\abl\figures\abl_nwi-air_map2.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 1 - 3 ug/m3
- 4 - 5 ug/m3
- 6 - 7 ug/m3
- 8 - 9 ug/m3
- 10 - 12 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

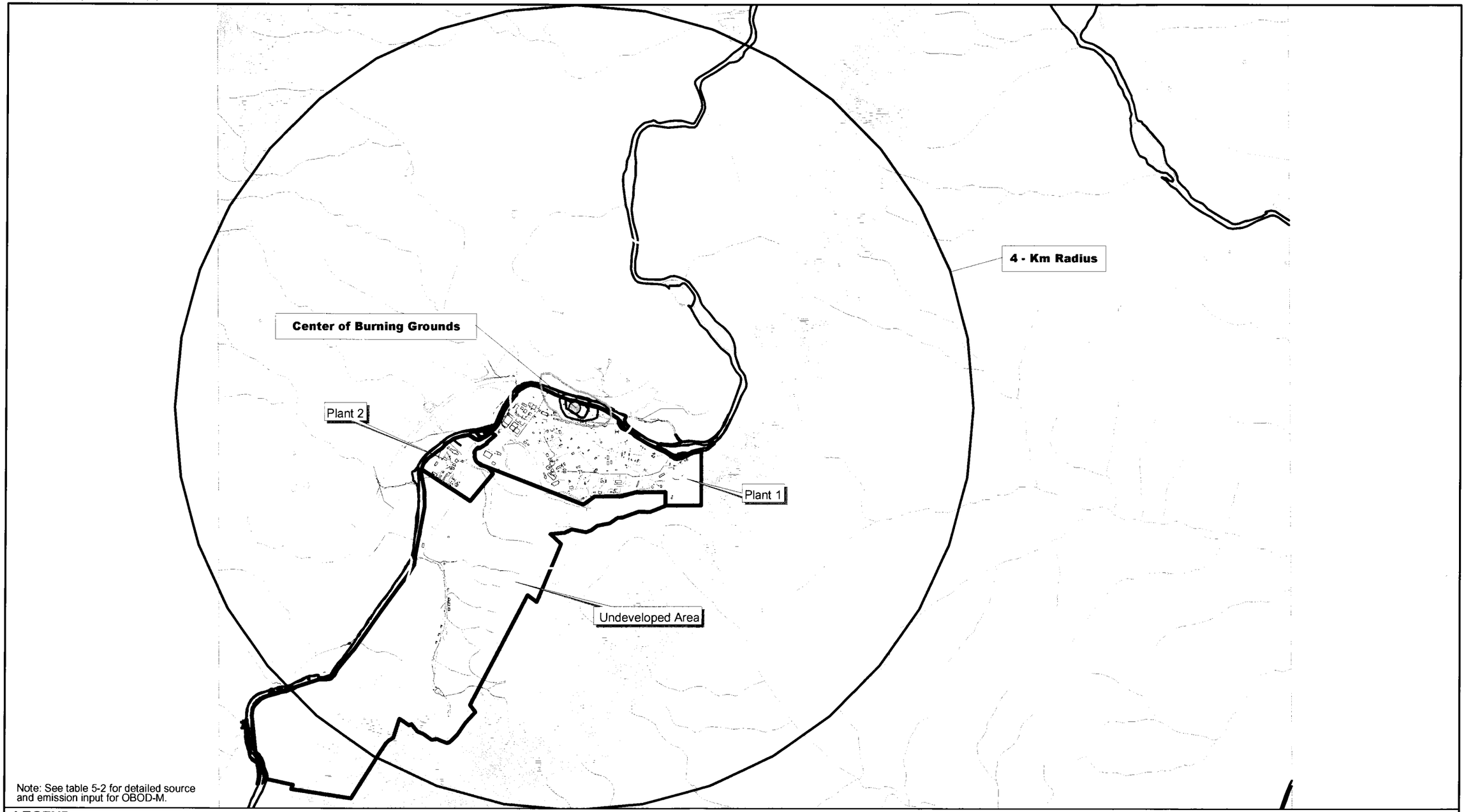
N

3000 0 3000 6000 Feet

Sulfur Dioxide Second Highest
3 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0.1 - 0.7 ug/m3
- 0.7 - 1.4 ug/m3
- 1.4 - 1.9 ug/m3
- 1.9 - 2.3 ug/m3
- 2.3 - 2.7 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

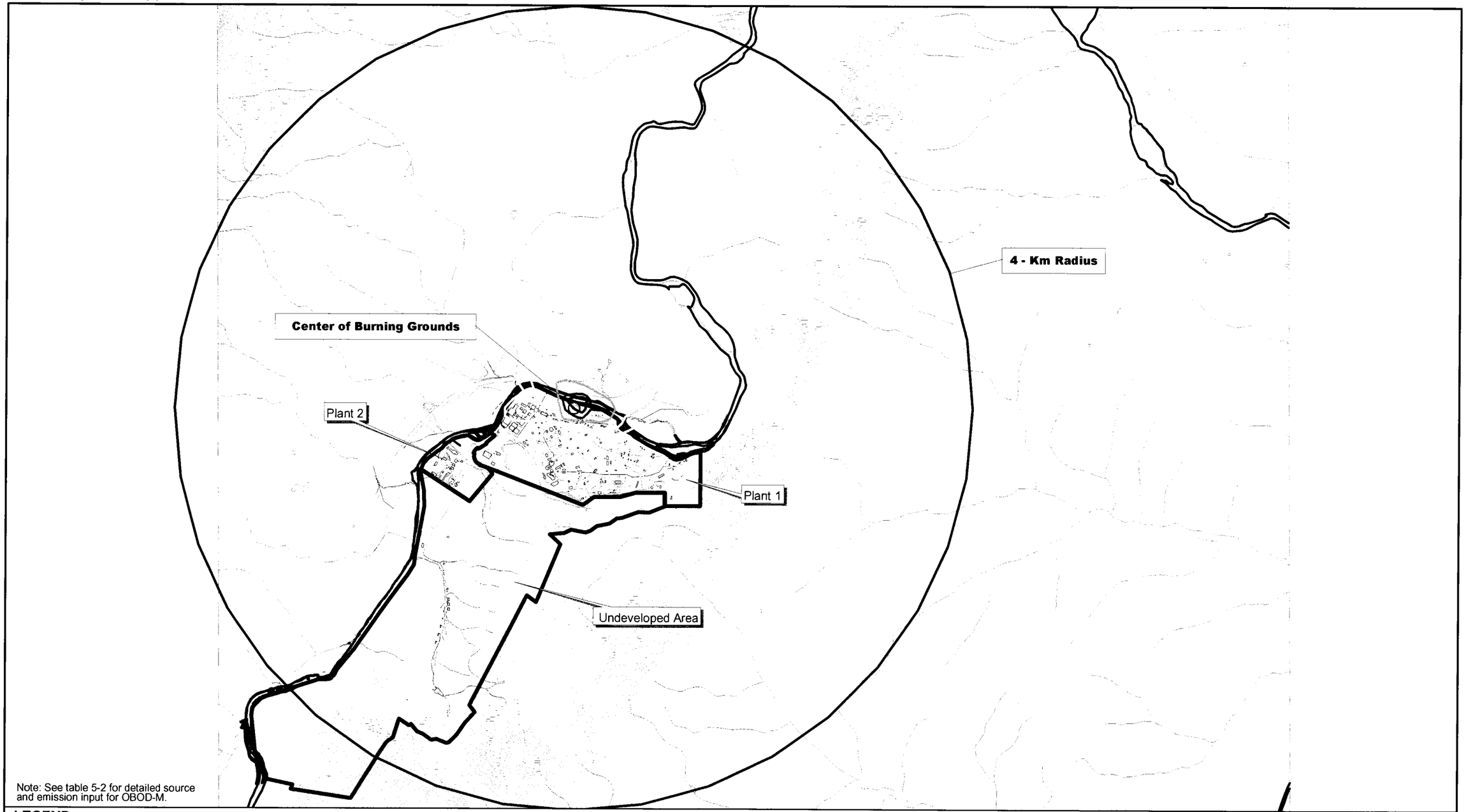
N

3000 0 3000 6000 Feet

Sulfur Dioxide Second Highest
24 hour
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\ab\figures\abl_nwi-air_map.apr



Note: See table 5-2 for detailed source and emission input for OBOD-M.

LEGEND

- 0 - 0.2 ug/m3
- 0.2 - 0.4 ug/m3
- 0.4 - 0.6 ug/m3
- 0.6 - 0.8 ug/m3
- 0.8 - 1 ug/m3
- 4 Kilometer Buffer Around Center of Burnground
- Center of Burnground

N

3000 0 3000 6000 Feet

Lead Highest
Quarterly
Ground Level Concentration
Allegany Ballistics Laboratory

CH2MHILL

Attachment A-2
Air Modeling Runs

A single copy of the Air Modeling Runs on CD is provided with this shipment.

Appendix B
Human Health Risk Assessment

DRAFT

Human Health Risk Assessment Report for the Burning Grounds

Allegany Ballistics Laboratory (ABL) Rocket Center, West Virginia

Contract Task Order 0175

January 2002

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN II Program
Contract No. N62470-95-D-6007

Prepared by

Herndon, Virginia

Contents

Acronyms and Abbreviations ix

Human Health Risk Assessment B-1

Executive Summary B-1

Human Health Risks Under Current Conditions B-1

Human Health Risks with Continued Operations B-2

1.0 Introduction B-3

1.1 Human Health Risk Assessment Approach B-4

1.2 Site History and Use B-5

1.3 Document Overview B-6

2.0 Human Health Risk Assessment for Current Conditions B-8

2.1 Conceptual Model of Exposure Pathways B-8

2.2 Identification of Chemicals of Potential Concern B-11

2.3 Exposure Assessment B-12

2.4 Toxicity Assessment B-15

2.5 Risk Characterization B-18

3.0 Human Health Risk Assessment for Continued Operations B-21

3.1 Site Setting B-21

3.2 Conceptual Model of Exposure Pathways B-22

3.3 Identification of Chemicals of Potential Concern B-23

3.4 Emissions Estimation B-26

3.5 Dispersion Modeling B-27

3.6 Exposure Assessment B-28

3.7 Toxicity Assessment B-31

3.8 Risk Characterization B-32

4.0 References B-35

Attachments

B-1 Soil Samping Data

B-2 Dispersion Modeling Information

B-3 Concentrations in Environmental Media, Maximum Exposed Individual, Offsite Resident, and Subsistence Farmer

B-4 Intake and Risks - Maximum Exposed Individual, Offsite Resident, and Subsistence Farmer Scenario

B-5 Intake and Risks - Maximum Exposed Individual, Offsite Resident, and Subsistence Farmer Scenario - Child Receptor

B-6 Concentrations in River and Fish, Subsistence Fisher

B-7 Intake and Risks - Subsistence Fisher

Tables (located at the end of Appendix B)

2-1 Exposure Scenarios Evaluated in the Human Health Risk Assessment – Current Conditions
2-2 Occurrence, Distribution, and Selection of Chemicals of Potential Concern in Surface Soil
2-3 Occurrence, Distribution, and Selection of Chemicals of Potential Concern in Subsurface Soil
2-4 Risk-Based Concentrations for Screening Soil Data
2-5 Chemicals of Potential Concern (COPCs) in Surface and Subsurface Soil
2-6 Summary of Exposure Point Concentrations in Soil
2-7 Standard Default Exposure Assumptions
2-8 Dermal Absorption Factors for COPCs
2-9 Noncarcinogenic Hazards and Cancer Risks from Surface Soil
2-10 Noncarcinogenic Hazards and Cancer Risks from Subsurface Soil

3-1 Target Analyte Gases
3-2 Target Analyte Non-Carcinogenic Volatile and Semi-Volatile Organic Compounds
3-3 Target Analyte Carcinogenic Metals, Volatile and Semi-volatile Organic Compounds
3-4 Target Analyte Non-Carcinogenic Heavy Metals
3-5 Constituents Detected in Emissions from Pure Energetic Materials and P/E Materials
3-6 Summary of COPCs Evaluated in the Risk Assessment
3-7 Emission Factors for Pure Propellant and Explosive Materials
3-8 Emission Factors for P/E Contaminated Material
3-9 Evaluation of Dioxin/Furan Emission Factors
3-10 Calculated Annual Emissions Rates for Each Waste Type and Maximum Emission Rates
3-11 Dispersion Modeling Summary
3-12 Identification of Exposure Pathways
3-13 Summary of Concentrations of Toxic Pollutants in Air
3-14 Summary of Concentrations in Environmental Media - maximum exposed individual (resident and subsistence farmer)
3-15 Site-specific Parameters for Evaluating Environmental Fate and Transport - maximum exposed individual (offsite resident and subsistence farmer)
3-16 Summary of Concentrations in Environmental Media - subsistence fisher scenario
3-17 Site-specific Parameters for Evaluating Environmental Fate and Transport - subsistence fisher scenario
3-18 Chemical-Specific Inputs - Fate and Transport Analysis
3-19 Summary of Chemical Intake Rates - maximum exposed individual (offsite resident and subsistence farmer)
3-20 Summary of Exposure Factors - maximum exposed individual (resident and subsistence farmer)
3-21 Summary of Chemical Intake Rates - subsistence fisher scenario
3-22 Summary of Exposure Factors - subsistence fisher scenario
3-23 Summary of Toxicity Factors
3-24 Air Pathway Human Health Risk Assessment, Burning Grounds
3-25 Summary of Estimated Health Risks - subsistence farmer
3-26 Summary of Estimated Health Risks - subsistence fisher scenario
3-27 Principal Sources of Uncertainty in the Human Health Risk Assessment

Figures (located at the end of Appendix B)

2-1 Conceptual Model of Human Exposure Pathways, ABL Open Burning Grounds, Potential Future Risks from Continued Operations

3-1 Conceptual Model of Human Exposure Pathways, ABL Open Burning Grounds, Evaluation of Current Site Conditions

3-2 Fate and Transport Analysis, ABL Open Burning Grounds, Potential Future Risks from Continued Operations

Acronyms and Abbreviations

ABL	Allegany Ballistics Laboratory
ABS	Skin Absorption Factor
ADI	Average Daily Intake
AP	Ammonium Perchlorate
AP	Ammonium Perchlorate
ATK	ATK Tactical Systems Company LLC
COPCs	Chemicals of Potential Concern
EPC	Exposure Point Concentration
FTIR	Fourier Transform Infrared Spectroscopy
GC-MS	Gas Chromatography-Mass Spectroscopy
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	Hazard Index
HMX	Cyclotetramethylenetetranitramine
HpCDF	1,2,3,4,6,7,8-heptachlorodibenzofuran
HQ	Hazard Quotient
HxCDF	1,2,3,4,7,8-hexachlorodibenzofuran
IPSC	Interagency Perchlorate Steering Committee
IRIS	Integrated Risk Information System
NAAQS	National Ambient Air Quality Standard
NC	Nitrocellulose
NG	Nitroglycerine
OB/OD	Open Burning and Detonation
OBOD-M	Open Burn/Open Detonation Dispersion Model
OCDF	Octochlorinated dibenzo-p-furan
OSWER	Office of Solid Waste and Emergency Response
P/E	Propellant and Explosives
PAH	Polycyclic Aromatic Hydrocarbon
PEF	Particulate Emission Factors

PRG	Preliminary Remediation Goals
RAGS	*Risk Assessment Guidance for Superfund*
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetrinitramine
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
SF	Slope Factor
SNL	Sandia National Laboratory
SVOC	Semivolatile Organic Compound
UCL	Upper Confidence Limit
UF	Uncertainty Factor
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound
WVDEP	West Virginia Department of Environmental Protection

APPENDIX B

Human Health Risk Assessment

Executive Summary

A human health risk assessment has been prepared for the Burning Grounds at the Allegany Ballistics Laboratory, in Rocket Center, West Virginia. This risk assessment has been prepared as a part of the Subpart X permitting at the facility. This risk assessment evaluates risks under current conditions, and risks associated with continued operations at the Burning Grounds. The purpose for risk assessment of current conditions is to identify actions, if any, to address estimated risks, prior to construction of the new burn pans and pads, based on chemical concentrations detected in soil at the Burning Grounds. The results of this risk assessment also may support development, in the future, of a closure plan for the unit. The risk assessment for continued operations was conducted to evaluate potential risks to human receptors from ongoing facility operations so that measures can be taken to reduce any identified risks to acceptable levels through modifications to the design or other appropriate mechanisms. The evaluation of potential future risks from continued operations is based on concentrations in relevant media as determined from available emissions estimates information (Mitchell and Suggs, 1998; SNL, 1996) and air dispersion modeling. The air dispersion modeling is based on the new facility design as described in the RCRA Part B permit.

Human Health Risks Under Current Conditions

The risk assessment incorporated sampling and analytical data collected in soil during a field investigation of the Burning Grounds. Contaminants of potential concern were identified from these analytical data, using procedures outlined by USEPA Region III. Potential intake of these contaminants by workers was estimated using intake equations and conservative exposure factors. Health risks potentially associated with these estimated intake rates were characterized using USEPA-derived toxicity values.

Risks estimated for workers were driven largely by concentrations of metals detected in soil. The chemical providing the largest contribution to total risks was arsenic. The arsenic found in the soils is not likely due to the Burning Grounds operations based on waste characterization. While the concentration of lead in a single soil sample exceeded levels deemed to be protective of adult receptors, this single result was 100-fold higher than lead results in all other soil samples. Therefore, it is likely that typical lead exposures would fall within acceptable levels.

The results from this risk assessment indicate that the total estimated risk is below 1×10^{-5}, and that noncancer hazard quotients are less than 0.25, which are the risk thresholds for consideration of risk management actions under current conditions at the Burning Grounds (USEPA, 1998c). Therefore, action does not appear warranted to prevent unacceptable cancer and non-cancer risks from chemicals in soils. Characterization of health risks associated with chemical contaminants in soil in the Burning Grounds has been based on a

series of conservative assumptions that tend to overstate rather than understate health risks. The results of the risk assessment, using these conservative approaches, is that contaminants in soil are highly unlikely to pose significant human health risks to receptors who may enter the Burning Grounds.

Human Health Risks with Continued Operations

For the purposes of RCRA permitting, the total individual risk associated with exposures to potential carcinogens released from a single facility should not exceed 1×10^{-5}. Also for the purposes of RCRA permitting, a modified target hazard level, to account for background contributions, should be set at a hazard quotient or hazard index value of 0.25 (USEPA, 1998c).

The risk assessment for continued operations evaluated potential risks for an individual at a hypothetical maximum exposure levels. This hypothetical individual was assumed to be an offsite resident located approximately 300 meters north of the facility fenceline and potentially exposed through inhalation, soil ingestion, and ingestion of home-grown fruits and vegetables. Potential risks also were evaluated for an offsite subsistence farmer also assumed to be at this location and potentially exposed through inhalation, soil ingestion, ingestion of home-grown fruits and vegetables, and ingestion of livestock products (beef, milk, pork, chicken and eggs). Potential risks were evaluated for an offsite subsistence fisher who is assumed to fish from the North Branch Potomac River, adjacent to the facility, and is potentially exposed through fish ingestion. The results from the risk assessment indicated that for all of these scenarios, estimated risks fell below an excess lifetime cancer risk level of 1×10^{-5} and a non-cancer hazard index of 0.25.

Uncertainties in the risk estimation process may result in these numerical estimates either understating or overstating health risks associated with the emissions from the Burning Grounds. In addition, assumptions used to develop the emissions estimates may either overstate or understate potential exposures and health risks. The exposure scenarios and exposure factors used in the risk assessment generally will overstate potential exposures and health risks. Quantitative risks were not estimated for some chemicals, due to a lack of appropriate toxicity values. While not including these chemicals potentially understates health risks, in general, not including these chemicals should have relatively little effect on the risk assessment conclusions. The conclusion of the risk assessment for continued operations at the Burning Grounds is that potential health risks associated with these emissions to offsite residents that may be located at the point of highest impact associated with burning operations fall below conservative regulatory thresholds, indicating that emissions from this facility should not pose a significant risk to human health.

1.0 Introduction

The Allegany Ballistics Laboratory (ABL) is located in Rocket Center, West Virginia on the West Virginia-Maryland border along the North Branch Potomac River. The facility, operated by ATK Tactical Systems Company LLC (ATK), develops, manufactures, and tests solid propellant rocket motors, gas generators, warheads, and laser initiation systems for the Department of Defense. Other activities include development and production of metal parts, metal components, and filament wound composite structures. Excess explosives and propellants are burned in an open burning area at ABL referred to as the "Burning Grounds." In accordance with State of West Virginia regulatory requirements, Part A and B permit applications under Subpart X of the Resource Conservation and Recovery Act (RCRA) are being developed for the Burning Grounds. The permit application will be submitted by ATK to the West Virginia Department of Environmental Protection (WVDEP).

A human health risk assessment (HHRA) has been prepared as a part of the Subpart X permitting. The HHRA will support the following information requirements for permitting the Burning Grounds:

- Criteria for determining decontamination levels - 40CFR264.112(b)(4)
- Protection of Groundwater and Subsurface Environment
  - Potential impacts to human health - 40CFR264.601(a)(8)
  - Potential for damage to flora and fauna - 40CFR264.601(a)(9)
- Protection of Surface Waters, Wetlands, and Surface Soils
  - Potential impacts to human health - 40CFR264.601(b)(10)
  - Potential for damage to flora and fauna - 40CFR264.601(b)(11)
- Air Quality Assessments
  - Risk Analysis - 40CFR264.601(c)(6)
- Identification of Potential Human and Environmental Receptors - 40CFR270.23(c)
- Identification of Potential Exposure Pathways, Magnitude and Nature of Exposure - 40CFR270.23(c)

A description of the overall permitting approach for the Burning Grounds and the relationship of the HHRA to other technical activities is presented in the *Detailed Permitting Approach, Allegany Ballistics Laboratory, Rocket Center, West Virginia* (CH2M HILL, December 2000).

The HHRA will: (1) quantify risks due to current conditions within the RCRA unit, based primarily on the results (analytical data) of a field investigation described in Section 4.2, and (2) quantify potential future risks posed by ongoing operations based on the new facility design and the air quality modeling results. The evaluation of current and future risks are documented in separate sections of this risk assessment appendix. The assessment of risks due to current conditions within the RCRA unit may be used to identify actions, if any, to address estimated risks, prior to construction of the new burn pans and pads. The results of

this risk assessment also may support development, in the future, of a closure plan for the unit. The evaluation of potential future risks from continued operations relies on modeled exposure estimates (i.e., concentrations in relevant media as determined from the air dispersion and deposition modeling) based on the new facility design. The results from the risk assessment for continued operations will be used to identify conditions on Burning Grounds operations in order to protect human health. Further discussion of this risk assessment approach is presented in the *Detailed Permitting Approach* (CH2M HILL, December 2000).

1.1 Human Health Risk Assessment Approach

The HHRA was conducted in accordance with applicable human health risk assessment guidance for direct and, as needed, indirect exposure pathways. The HHRA evaluated the current and potential human health risks of burning-related chemical constituents in relevant media (particularly air, surface soil and groundwater) as determined from existing and proposed sampling data, and air dispersion and deposition modeling. The characterization of risks to human health involved identifying the potential exposures of human receptors and evaluating the potential effects associated with such exposures.

The human health risk assessment:

- Quantified risks due to current conditions within the RCRA unit, based primarily on the results (analytical data) of a site investigation
- Quantified potential future risks from continued operations based on the new facility design and air dispersion modeling of emissions from proposed future operations.

1.1.1 Human Health Risks Under Current Conditions

The evaluation of risks under current conditions will rely primarily on soil analytical data collected within the RCRA unit during the field investigation described in the *Field Investigation Work Plan for the Burning Grounds RCRA Subpart X Permit Application Allegany Ballistics Laboratory, Rocket Center, West Virginia* (CH2M HILL, February 2001). The assessment of potential human health risks from direct exposure pathways under current conditions follows EPA's *Risk Assessment Guidance for Superfund* (RAGS) (USEPA 1989, 1991) and the methodology presented in EPA Region 3's *Updated Risk-Based Concentration Table* (USEPA Region III, 2001).

1.1.2 Human Health Risks Under Continued Operations

The objective of this risk assessment is to evaluate potential risks to human receptors from ongoing facility operations so that measures can be taken to reduce any identified risks to acceptable levels through modifications to the design or other appropriate mechanisms. The evaluation of potential future risks from continued operations is based on concentrations in relevant media as determined from available emissions estimates information (Mitchell and Suggs, 1998; SNL, 1996), and air dispersion modeling; the air dispersion modeling is based on the new facility design as described in the RCRA Part B permit.

The HHRA for continued operations also incorporates a tiered approach to evaluate risks for potential receptors associated with emissions from the Burning Grounds. The purpose of the tiered approach is to determine potential risks from exposure to open burning emissions

at the modeled maximum point of exposure and, if need be, more realistic exposure points and exposure pathways for possible receptors.

Assessment of direct (i.e., inhalation) and indirect pathways in this HHRA was developed using the *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Peer Review Draft* (USEPA 1998a). Additional assumptions and data for the HHRA were obtained from combustion risk assessments prepared for USEPA in a manner consistent with the 1998 combustion guidance (RTI, 1996; RTI, 1999). Modifications to the dispersion modeling portion of the 1998 combustion guidance to be consistent with the preferred dispersion model for open burning operations (Bjorklund, et al 1998) are discussed herein.

1.2 Site History and Use

ABL is a government-owned (Navy), contractor-operated research, development, and production facility located in Mineral County, West Virginia. The facility consists of two plants: Plant 1, occupying approximately 1,572 acres, is owned by the Navy and operated by ATK; Plant 2, a 56-acre area adjacent to Plant 1, is owned and operated exclusively by ATK.

Since 1943, the ABL facility has been used primarily for research, development, testing, and production of solid propellant motors for ammunition and rockets. Excess or waste propellant and explosives (P/E) are generated during various production and testing operations at the facility. In addition, qualification batches of various energetic materials are periodically formulated for performance testing and other material qualification tests. Excess or waste P/E generated during various production and testing operations at the facility are disposed of by open burning at the Burning Grounds. Typical wastes managed at the burn pads include: nitroglycerine (NG); nitrocellulose (NC); ammonium perchlorate (AP); cyclotetramethylenetetranitramine (HMX); cyclotrimethylenetrinitramine (RDX); and various propellants and explosives. Previous site investigations have detected volatile organic compounds (VOCs),;semi-volatile organic compounds (SVOCs), including traces of explosives; and metals in soil and groundwater at the Burning Grounds. Continued operations of the Burning Grounds may result in the emission of various gaseous and particulate substances into the air.

Currently, eight steel burn pans are in place at the site, five of which are currently in use. Waste material is placed in the various burn pans, under suitable meteorological conditions, and is ignited by the Burning Grounds personnel. The burning rates have varied considerably and have ranged from very high rates for the pure energetics to very slow rates for P/E that formerly had been combusted along with quantities of sawdust and other material such as burlap or cardboard.

The ABL facility is located in the Valley and Ridge Physiographic Province, near its western boundary with the Allegheny Plateau Province. The transition between these provinces is referred to as the Allegheny Structural Front. Approximately 400 acres of Plant 1 is in the 500-year floodplain of the North Branch Potomac River, with the remaining acreage on forested mountainous land.

The Burning Grounds, which are located within the Plant 1 boundaries, is situated on a broad, flat floodplain of the North Branch Potomac River. The area is predominantly grass covered and the current Burning Grounds area is surrounded by a chain-link fence. The area is bordered to the north by the North Branch Potomac River and to the south, east, and west

by other portions of the ABL facility. A portion of the Burning Grounds is located within the 100-year floodplain of the North Branch Potomac River.

1.3 Document Overview

The HHRA is presented in two different sections, to accommodate the differences in data sources, methodologies, and potential receptors and exposure pathways between current conditions and continued operations. The two sections consist of the current conditions HHRA and the facility operations HHRA.

The HHRA for current conditions is presented in Section 2.0. Information developed in this HHRA is presented in the following subsections:

- **Development of the Conceptual Model of Human Exposure Pathways (Section 2.1)**: The conceptual model describes contaminant transport pathways, exposure media, exposure routes, and receptors, and accounts for inclusion or exclusion of pathways in the risk assessment. The human exposure conceptual model was developed to account for current onsite workers.

- **Identification of Chemicals of Potential Concern (COPCs) (Section 2.2)**: COPCs are those chemicals that potentially present the greatest human health concerns (i.e., those which are present at the highest concentrations, most widespread at the site, most mobile, and/or most highest toxic). The purpose of identifying COPCs was to focus the risk assessment on the most important chemicals at the site. Site data and USEPA Region III guidance (USEPA, 2000) were used to identify COPCs. In a few cases, there were chemicals without available toxicity values or USEPA Region III Risk-Based Concentrations (RBCs) (used for identifying COPCs). Chemicals without existing toxicity values or USEPA Region III RBCs were evaluated qualitatively to determine if they should be retained as COPCs. Factors considered in evaluating these chemicals included quantities emitted or released and qualitative toxicity information obtained from a review of the literature.

- **Exposure Assessment (Section 2.3)**: The exposure assessment was based on scenarios that define worker populations potentially exposed to COPCs at the site. The potential pathways of exposure, frequency and duration of potential exposures, and exposure factors for contact with environmental media were obtained from USEPA guidance. The concentrations of COPCs in environmental media used to estimate potential exposures were based on data from a site investigation conducted as part of the facility permitting (*Field Investigation Work Plan*, CH2M HILL, 2001) and the groundwater monitoring program.

- **Toxicity Assessment (Section 2.4)**: The toxicity assessment evaluates the relationship between the magnitude of exposure to a chemical and the adverse health effects. This assessment provides, where possible, a numerical estimate of the increased likelihood and/or severity of adverse effects associated with chemical exposure. Toxicity values were obtained from USEPA sources, including the National Center for Environmental Assessment (source for the Integrated Risk Information System, or IRIS, database), the Office of Solid Waste and Emergency Response (source for the Health Effects

Assessment Summary Tables), and USEPA Regional office publications. Brief toxicity profiles are provided for selected COPCs.

- **Risk Characterization (Section 2.5)**: Risk characterization combines the results of the toxicity and exposure assessments to provide numerical estimates of potential health effects. Also, the risk characterization qualitatively evaluated the nature and weight of evidence supporting these numerical estimates, and described the uncertainties surrounding such estimates.

The HHRA for continued operations is presented in Section 3.0. Information developed in this HHRA is presented in the following subsections:

- **Description of Site Setting (Section 3.1)**: Presents a brief description of populations and surrounding land uses around the Burning Grounds.
- **Conceptual Model of Exposure Pathways (Section 3.2)**: Uses information from the site setting to identify receptor populations, potentially complete exposure pathways from Burning Grounds emissions to those populations, and describes the exposure scenarios to be evaluated in the risk assessment.
- **Identification of Chemicals of Potential Concern (Section 3.3)**: COPCs are those chemicals representing the largest potential for human health risks. Historical information on open burning operations (Mitchell and Suggs, 1998) and available emissions test information (SNL, 1996) are combined to identify COPCs.
- **Emissions Estimation (Section 3.4)**: Source testing data from open burning operations are combined with information on quantities and types of wastes to be treated at the Burning Grounds to develop emissions estimates for the COPCs.
- **Dispersion Modeling (Section 3.5)**: The air dispersion model selected for use is the most recent version of the Open Burn/Open Detonation Dispersion Model (OBOD-M). OBOD-M is a dispersion model intended for use in evaluating the potential air quality impacts of open burning and open detonation of obsolete or unsafe munitions and propellants. A brief discussion of the modeling approach and receptor selection are presented in this section. Further detail on the dispersion modeling approach is provided in the *Open Burning Modeling Protocol, Allegany Ballistics Laboratory, Rocket Center, West Virginia* (CH2M HILL, 2001).
- **Exposure Assessment (Section 3.6)**: The objectives of an exposure assessment are to identify the relevant pathways of human exposure and to determine the total intake of COPCs from operation emissions. This section summarizes the methods and assumptions used in the environmental fate and transport analysis, and estimates of chemical intake through the relevant complete exposure pathways.
- **Toxicity Assessment (Section 3.7)**: This section provides a brief description of the adverse effects and toxicity values that were used to calculate total site risks for chemicals emitted into the air from continued operations of the Burning Grounds.
- **Risk Characterization (Section 3.8)**: Risk characterization combines the results of the toxicity and exposure assessments to provide numerical estimates of potential health effects. The risk characterization also qualitatively evaluates the nature of, and weight

of, evidence supporting these numerical estimates, and will describe the uncertainties surrounding such estimates.

References for the HHRA are presented in Section 4.0. Calculations used to prepare the HHRA are provided in Attachments B-1 through B-7.

2.0 Human Health Risk Assessment for Current Conditions

2.1 Conceptual Model of Exposure Pathways

The conceptual model identifies the exposure scenarios (the media, exposure pathways, and receptors) addressed in the HHRA. The principal use of the conceptual model in this risk assessment is to identify potentially complete exposure pathways from the facility to receptor populations under current conditions. Table 2-1 shows the exposure scenarios evaluated for the current conditions.

An exposure pathway describes the mechanism through which a chemical comes into contact with a receptor. There must be a complete exposure pathway from the source of chemicals in the environment (i.e., in soil or groundwater) to human receptors in order for chemical intake to occur. In this section, the complete exposure pathways and associated receptor populations are chosen from all potential pathways.

A complete chemical exposure pathway consists of the following elements:

- A source of chemical release to the environment;
- An environmental transport medium;
- A point of contact (known as the exposure point) for receptors with the COPCs; and
- A route of chemical intake into the receptor.

If one of these elements is missing, then the exposure pathway is incomplete and there is no intake (or subsequent health risk) associated with that pathway. The presence or absence of any of these elements depends on the specific conditions found at the site.

2.1.1 Release Sources

Releases to the environment occurred from the combustion of energetic materials on the burn pans. Burning of these materials resulted in chemical emissions to the air and probable releases to surrounding soils. Previous investigations detected chemical concentrations in soil at the Burning Grounds. These chemicals are listed in the following section.

To assess risks to workers from exposure under current conditions, potential contaminant sources at the Burning Grounds is considered to be existing chemicals in soil believed to have been released during past operations.

Burning operations have been ongoing since 1958. During the 1960s and 1970s, general facility refuse and non-explosive combustible materials were incinerated in a wire mesh cage and residual wastes were disposed of at the adjacent ash landfill (neither of which are associated with the Burning Grounds). The disposal of spent solvents within the Burning Grounds and other historical waste disposal activities adjacent to the Burning Grounds,

neither of which were associated with the Burning Grounds activities are probable sources of contamination in groundwater.

Existing chemicals in and around the Burning Grounds were characterized during a Focused Remedial Investigation (RI), Interim RI, and RI conducted in 1994. Low levels of VOCs were detected in soil around the Burning Grounds (note: elevated concentrations of VOCs detected in the solvent pits adjacent to the Burning Grounds is being addressed as part of the sitewide investigation at ABL under CERCLA, and are not addressed in this risk assessment for the Burning Grounds). Chlorinated VOCs, particularly TCE and its degradation products, have been detected in groundwater underlying the Burning Grounds and attributed to the historical disposal of spent solvents in the solvent disposal pits. Other chemicals detected at the Burning Grounds occur at relatively low levels in soils and groundwater. Some SVOCs, principally polycyclic aromatic hydrocarbons, but also traces of RDX, HMX and dioxins/furans, were detected in soil and ash in the open burn area and inert burn area landfills, which are adjacent to the Burning Grounds, but are part of historical activities being addressed under CERCLA.

2.1.2 Identification of Transport Media

The release and transport of existing contamination within the Burning Grounds soil may occur by particulate suspension during soil disturbances and volatilization of VOCs, leaching from soil to groundwater, and soil erosion due to storm water runoff to the North Branch Potomac River.

2.1.3 Identification of Potential Receptors

Potential receptors (human populations that could become exposed to chemicals released from the Burning Grounds) consist principally of offsite residents, onsite workers performing waste burning activities within the Burning Grounds, and workers at the ABL facility not associated with Burning Grounds activities.

The receptors most likely to be exposed to existing chemicals concentrations in soil are onsite workers within the Burning Grounds who prepare, ignite, and clean up energetic materials. These activities are conducted in accordance with an established safety procedure that also requires the use of personal protective equipment. As described previously, the Burning Grounds is fenced and access is restricted.

Offsite residents and other workers present at the ABL facility (not involved with Burning Ground operations) are not likely to become exposed to existing contaminants in soil, because access to the facility is restricted. Construction workers, wearing appropriate personal protective equipment, will enter the site for short periods of time for the purpose of maintaining the burn pans. Additional construction will take place during the Burning Grounds upgrades. and will possibly involve trenching for utilities, scraping/grading soil for pad sites, and building new pads.

2.1.4 Identification of Exposure Media and Routes of Potential Exposure

Exposure media and potential routes of exposure to the three potential receptor populations are depicted on Figure 2-1, and are described below:

Surface water and sediment. Surface runoff could potentially transport chemicals in soil at the Burning Grounds to water and sediment in the North Branch Potomac River. Work activities at the Burning Grounds is unlikely to bring workers into contact with surface water or sediment. Therefore, direct contact exposure pathways from surface water or sediment are not complete, and are not quantitatively evaluated in the HHRA.

Ingestion of biota (fish). Chemicals in surface water or sediment could accumulate in fish in the river. Work activities at the Burning Grounds is unlikely to result in fish ingestion exposures by onsite workers. Therefore, an ingestion pathway from this media is unlikely to be complete to workers. While individuals located offsite might ingest fish from the river, contaminant transport from the Burning Grounds via surface runoff is likely to be limited.

The site is relatively flat, contains no drainage features (such as ditches), and is completely covered with periodically mowed grasses and other herbaceous plants (except on a few unpaved roads and in the area immediately surrounding a few of the active burn pans). Thus, significant surface runoff is not likely to occur even during flood events. However, this potential transport pathway was evaluated based on the three surface soil samples collected in the most obvious drainage feature present, a shallow depression located just south of the Burning Grounds fence line. Evaluation of site topography indicates this depression has no connection with the river.

The site maximum for six metals occurred within this set of three samples although only chromium was elevated (in one of the three samples) relative to background. While the site maximums for PAHs occurred in one of these three samples (SS-01), concentrations were lower than the USEPA Region III RBCs. The site maximum for total dioxin (consisting of hepta and octa congeners) also occurred at SS-01, although the most commonly occurring dioxin and furan congeners (octa) were fairly uniformly distributed over the site. Based on the available data, there does not appear to be any systematic contaminant transport via surface runoff to this low area south of the Burning Grounds. In addition, this depressional area does not appear to outlet to the North Branch Potomac River. Therefore fish ingestion exposure pathways are not quantitatively evaluated in the risk assessment of current conditions at the facility.

Onsite surface soil. "Onsite" surface soil is defined as soil within the fenced boundary of the Burning Grounds. Residents would not have access to the Burning Grounds; therefore, they would not have direct contact with the soils. Workers at the Burning Grounds could have direct contact with the soil, with the potential routes of exposure being soil ingestion, absorption of chemicals in soil adhering to the skin (dermal exposure), and inhalation of chemicals suspended by windblown soil. The potential for exposure is probably limited because the area is grass-covered, and workers use personal protective equipment when in the Burning Grounds. However, these pathways are included for quantitative evaluation in the HHRA. Construction workers may be present for limited periods of time at the Burning Grounds during construction of the burn pans. Construction activities could result in higher intensity intake rates (i.e. higher soil ingestion rate), but a much lower duration of exposure. It is likely that the potential exposure of construction worker would not be greater than workers assigned to the Burning Grounds. Also, it is assumed that construction activities would be conducted in accordance with health and safety procedures that could include the use of personal protective equipment and safe work practices to reduce potential exposures.

Therefore, a separate construction worker scenario has not been evaluated as part of this risk assessment.

2.2 Identification of Chemicals of Potential Concern

2.2.1 Approach

Identifying COPCs was performed by comparing the analytical results of soil samples collected during a field investigation with USEPA Region III RBCs. If the maximum detected concentration of a chemical was greater than the RBC, the chemical was identified as a COPC and retained in the risk assessment for further evaluation. If the maximum detected concentration was less than the RBC, the chemical was not evaluated quantitatively in the risk assessment. Detected chemicals without RBCs were retained for qualitative consideration.

2.2.2 Summary of Field Sampling Event and Analytical Results

Information used to identify COPCs was obtained from a field investigation conducted in March 2001. The field investigation of the Open Burning Grounds RCRA Unit was intended to provide information on the nature and extent of surface and shallow subsurface soil contamination at the site. The data collected from the field investigation were intended for use in assessing potential risks to workers on-site and to determine if any action is required at the site prior to closure. The detailed approach to this investigation is described in *Field Investigation Work Plan for the Burning Grounds RCRA Subpart X Permit Application Allegany Ballistics Laboratory, Rocket Center, West Virginia* (CH2M HILL, February 2001). Analytical results from this investigation have been submitted to the state of West Virginia.

Surface soil samples were collected to characterize the types of released materials at the site resulting from burning activities. Surface and subsurface soil samples were collected from selected locations within the Open Burning Grounds and surface soil samples were collected from depressions on or directly adjacent to the Open Burning Grounds.

The results of the field investigation are summarized in Tables 2-2 and 2-3. Table 2-2 provides a summary of the occurrence, distribution, and selection of COPCs in surface soil; Table 2-3 provides the summary for subsurface soil.

2.2.3 Comparison with USEPA Region III Risk-Based Concentrations (RBCs)

The maximum detected chemical concentrations in groundwater and soil were compared with the RBCs in USEPA Region III *Risk-Based Concentration Table* (EPA, 2001). The RBCs for noncarcinogens were adjusted to reflect a target hazard quotient of 0.1. The RBCs for carcinogens are based on a target cancer risk of $1x10^{-6}$ (this target risk level is used only for the identification of COPCs) and were not adjusted from the values presented in the RBC table. The RBCs used to identify COPCs are listed in Table 2-4.

2.2.4 Summary of Contaminants Selected for Risk Assessment

The final four columns of tables 2-2 and 2-3 show the results of the screening process. In this screening process, the maximum concentration is compared to the RBC. If the maximum concentration is greater than the RBC, that chemical is carried in the risk assessment as a COPC. Table 2-5 provides a summary table of those chemicals selected as COPCs carried

forward in the quantitative risk assessment. All of the COPCs were inorganic chemicals (aluminum, arsenic, cadmium, chromium, iron, lead, manganese, and thallium). Perchlorate was evaluated qualitatively in the risk assessment because it has no RBC.

2.3 Exposure Assessment

The pathways in this risk assessment were evaluated solely on the basis of analytical data from soil sampling. Two of the pathways—incidental ingestion of soil and dermal contact with soil—are direct contact exposure pathways that assume the receptor comes into contact with contaminants in soil in the same general location where the samples were taken. Fate and transport modeling was not required to estimate exposure point concentrations. The other two pathways—inhalation of particulates or inhalation of VOCs—also place the receptor in the same general location as the sampling. Estimates were made to predict concentrations of particulates or VOCs in the breathing zone above the soil. These estimates were made through the simple application of emission factors that predict the inhalation dose from the concentration in soil (along with other exposure parameters), without having to estimate chemical concentrations in air.

2.3.1 Exposure Point Concentrations

The reasonable maximum exposure (RME) exposure point concentrations (EPCs) were calculated as the 95 percent upper confidence limit (95% UCL) of the arithmetic mean concentration (USEPA, 1989; 1992). The maximum detected concentration was used in place of the 95% UCL when the calculated 95% UCL was greater than the maximum detected value. The Shapiro-Wilk W-test was used to determine if the data fit a lognormal or normal distribution. If the W-test could not conclusively show that the data fit a lognormal or normal distribution, the distribution the data most closely fit was used to determine the 95% UCL.

The statistical evaluation tested the distributions of the data to see if they fit normal, lognormal, or nonparametric distributions. EPCs were selected from the distribution tests and summary statistics. If a distribution passed the test for both lognormal and normal distributions the lognormal statistic was used as the EPC. If the distribution passed one or the other (was either normal or lognormal, but not both), the appropriate statistic was used. If the distribution failed both tests, the maximum detected value was used.

The 95% UCL for a lognormal distribution was calculated as follows:

$$95\%\ UCL = \exp(TM + 0.5*s^2 + (s*H/(n-1)^{0.5}))$$

Where:

exp	=	natural log
TM	=	transformed mean
s	=	standard deviation of the transformed data
H	=	H-statistic
n	=	sample size

The 95% UCL for a normal distribution was calculated as follows:

$$95\%\ UCL = NM+(t*s/(n)0.5)$$

Where:

NM = normal arithmetic mean
t = t-statistic
s = standard deviation
n = sample size

In calculating the 95% UCL, a value of one-half the sample quantitation limit (SQL) was assumed for cases where no detectable contaminant quantities were found in that specific sample, but the contaminant was detected in that medium. For duplicate samples, the higher of the two samples was chosen as representative of the sample concentration. Estimated values, flagged with a 'C,' 'J,' 'K,' or 'L' qualifier, were treated as detected concentrations. Data qualified with an 'R' (rejected) were not used in the risk assessment. Data qualified with a 'B,' indicating blank contamination, were assumed not detected and one-half the SQL was used as the sample concentration.

Table 2-6 provides a summary of EPCs used to quantify exposure and risk.

2.3.2 Estimation of Chemical Intakes

Exposure to chemicals in soil was estimated by applying standard equations designed to predict average daily intake (ADI) by route of exposure. Separate equations were used to predict uptake by ingestion, dermal contact, and inhalation of particulates emitted to the air from soil. Standard default exposure assumptions as defined by USEPA (USEPA, 1991; 1999; 2000) were used in the equations; these standard default exposure assumptions are also used by USEPA Region III. These exposure factors are summarized in Table 2-7.

2.3.2.1 Equations for Exposure Estimation

Incidental Ingestion of Soil

Incidental ingestion of soil was estimated using the following equation:

$$ADI_{SI} = \frac{C_{soil} \times IRS_a \times EF_o \times ED_o \times FC \times Conv}{BW_a \times AT}$$

Where:

ADI_{SI} = Average daily intake by the soil ingestion route (mg/kg-d)

C_{soil} = Contaminant concentration in soil (mg_{chem}/kg_{soil})

IRS_a = Rate of incidental soil ingestion for an adult (mg_{soil}/d)

EF_o = Exposure frequency for an occupational receptor (d/yr)

ED_o = Exposure duration for an occupational receptor (yr)

FC = Fraction of incidentally ingested soil that comes from the contaminated source (unitless)

Conv = Conversion factor (kg_{soil}/mg_{soil})

BW_a = Adult body weight (kg_{bw})

AT = Averaging time (d)

The FC term is applied in occupational settings (not usually in residential settings) to account for the fact that adult exposure to soils will not be limited to the Burning Grounds site.

Dermal Contact with Soil

Exposure through dermal contact with soil was estimated using the following equation:

$$ADI_{derm} = \frac{C_{soil} \times SA_a \times AF \times ABS \times EF_o \times ED_o \times Conv}{BW_a \times AT}$$

Where:

ADI_{derm} = Average daily intake by the dermal contact route (mg/kg-d)

C_{soil} = Contaminant concentration in soil (mg_{chem}/kg_{soil})

SA_a = Skin surface area exposed to contact with soil, adult worker (cm^2/d)

AF = Soil to skin adherence factor (mg_{soil}/cm^2)

ABS = Skin absorption factor (unitless)

EF_o = Exposure frequency for an occupational receptor (d/yr)

ED_o = Exposure duration for an occupational receptor (yr)

$Conv$ = Conversion factor (kg_{soil}/mg_{soil})

BW_a = Adult body weight (kg_{bw})

AT = Averaging time (d)

Inhalation of Chemicals Adsorbed to Soil Particulates

Inhalation of particulates emitted from soil was estimated using the following equation:

$$ADI_{inh} = \frac{C_{soil} \times IRA_a \times EF_o \times ED_o}{PEF \times BW_a \times AT}$$

Where:

ADI_{inh} = Average daily intake by the particulate inhalation route (mg/kg-d)

C_{soil} = Contaminant concentration in soil (mg_{chem}/kg_{soil})

IRA_a = Inhalation rate for an adult (m^3/d)

EF_o = Exposure frequency for an occupational receptor (d/yr)

ED_o = Exposure duration for an occupational receptor (yr)

PEF = Particulate emission factors (m^3/kg_{soil})

BW_a = Adult body weight (kg_{bw})

AT = Averaging time (d)

This equation was taken from USEPA Region IX's technical support document for the PRGs (USEPA, 2000), and adopts the use of the default particulate emission factors (PEF) from that document to estimate inhalation doses from soil concentrations. This is consistent with the approach used by USEPA Region III.

2.3.2.2 Standard Default Exposure Assumptions

Standard default exposure assumptions were used for all parameters in the equations used to estimate ADI, except where site-specific or chemical specific inputs were required. Table 2-7 provides the exposure assumptions, except for the parameters described in the following paragraphs.

The parameter C_{soil} used in the equations presented in Section 2.3.2.1 is represented by the EPCs provided in Table 2-6. These EPC were calculated from analytical results in soil using the statistical methods presented in Section 2.3.1.

The parameter ABS (the absorption factor for estimating chemical intake from dermal exposure to soil) is a chemical-specific parameter. Values for ABS are presented in Table 2-8. These values were taken from USEPA Region IX's technical support document for the PRGs (USEPA, 2000). Dermal exposure was not estimated for COPCs if the Region IX guidance did not provide a value for ABS.

2.3.3 Estimation of Average Daily Intakes

Tables 2-9 and 2-10 provide the estimates of ADI for each route of exposure and uptake. Presented in Table 2-9 are the exposure estimates for chemicals detected in surface soil. Presented in Table 2-10 are the exposure estimates for chemicals detected in subsurface soil. Estimates of ADI were derived using the equations given above, the standard default exposure assumptions, the EPCs, and chemical-specific ABS values, where available.

2.4 Toxicity Assessment

The toxicity assessment describes the relationship between the magnitude of exposure to a chemical and adverse health effects. This assessment provides, where possible, a numerical estimate of the increased likelihood and/or severity of adverse effects associated with chemical exposure (EPA, 1989). This section provides a brief description of the adverse effects and toxicity values used to characterize health risks for the identified for the Burning Grounds.

For purposes of the toxicity assessment, the COPCs have been classified into two broad categories: noncarcinogens and carcinogens. This classification has been selected because health risks are calculated quite differently for carcinogenic and noncarcinogenic effects. Separate toxicity values have been developed for carcinogenic and noncarcinogenic effects. These toxicity values, developed by the U.S. EPA, represent the potential magnitude of adverse health effects associated with exposure to chemicals. Toxicity studies with laboratory animals or epidemiological studies of human populations provide the data used to develop these toxicity values. These values represent allowable levels of exposure based upon the results of toxicity studies or epidemiological studies. The toxicity values are then combined with the exposure estimates (as presented in the previous section) to develop the numerical estimates of carcinogenic risk and noncancer health risks. These numerical

estimates are then used in the risk characterization process to estimate adverse effects from chemicals soil in the Burning Grounds.

Toxicity values (cancer slope factors and Reference Doses) used in the risk assessment were obtained from these sources:

- The IRIS, a database available through by the National Center for Environmental Assessment in Cincinnati, Ohio (www.epa.gov/iris). IRIS, prepared and maintained by EPA, is an electronic database containing health risk and EPA regulatory information on specific chemicals.
- The Health Effects Assessment Summary Tables (HEAST), provided by the EPA Office of Solid Waste and Emergency Response (OSWER) (EPA, 1997). HEAST is a compilation of toxicity values published in various health effects documents issued by EPA.

2.4.1 Toxicity Values for Carcinogens

Evidence of carcinogenicity of a chemical comes from two sources: lifetime studies with laboratory animals and human studies where excess cancer risk is associated with exposure to the chemical. Unless evidence to the contrary exists, if a carcinogenic response occurs at the exposure levels studied (typically high doses), it is assumed that responses will occur at all lower doses. Exposure to any level of a carcinogen is then considered to have a finite risk of inducing cancer.

Because risks at low levels of exposure cannot be quantified directly by either animal or epidemiological studies, mathematical models are used to extrapolate from high to low doses. The linearized multi-stage model for low dose extrapolation is recommended by regulatory agencies (EPA, 1986; 1999). Use of the linearized multi-stage model leads to a conservative upper bound estimate of risk. The linearized multi-stage model incorporates a procedure for estimating the largest possible slope at low doses that is consistent with experimental dose-response data (use of a large slope tends to produce a higher estimate of cancer risk). The most sensitive species of animal is used for extrapolation to humans (*i.e.*, the assumption being that man is as sensitive as the most sensitive animal species). The true risk is not likely to be higher than the estimate and is most likely lower, and could even be zero.

Numerical estimates of cancer potency are presented as Slope Factors (SFs). Under an assumption of dose-response linearity at low doses, the SF defines the cancer risk due to continuous constant lifetime exposure to one unit of carcinogen (in units of risk per mg/kg-day). These slope factors are presented in tables 2-9 and 2-10.

2.4.2 Toxicity Values for Noncarcinogens

Noncarcinogenic effects were evaluated using either reference doses (RfDs) or reference concentrations (RfC), developed by EPA. The RfD is a health-based criterion, expressed as chemical intake rate in units of mg/kg-day, used in evaluating noncarcinogenic effects. The RfD is based on the assumption that thresholds exist for certain toxic effects such as liver or kidney damage, but may not exist for other toxic effects such as carcinogenicity. In general, the RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime of exposure (EPA, 1989).

RfDs are developed for oral routes of exposure. The RfC, expressed as a concentration in air with units of mg/m^3, is used to evaluate adverse effects from inhalation exposure. Exposures to chemical substances in air were estimated in units of mg/kg-day. Therefore, RfCs were converted to inhalation RfDs as follows:

$$RfD_i = RfC(mg/m^3) \times \left(\frac{20 m^3/day}{70 kg} \right)$$

where RfD_i is the inhalation reference dose, 20 m^3/day is the daily inhalation rate, and 70 kg is body weight. These toxicity values are shown in tables 2-9 and 2-10.

2.4.3 Toxicity Information for Perchlorate and Lead

Toxicity information is presented for perchlorate and lead, which were not addressed quantitatively in the risk assessment. Perchlorate was not addressed quantitatively because as yet, it has no verified toxicity values. Perchlorate concentrations in soil were evaluated by comparison with provisional toxicity values. Potential risks from lead were evaluated using the methodology developed by the USEPA Technical Review Workgroup for Lead. The evaluations for these two chemicals are presented in the following paragraphs.

2.4.3.1 Perchlorate

This section provides a brief qualitative evaluation of the toxicity of perchlorate. Verified toxicity values are not available for perchlorate, limiting the ability to develop quantitative risk estimates. However, an authoritative toxicity review has been published by USEPA, that provides information regarding the nature of risks associated with perchlorate (USEPA, 1998b). Information presented in this section has been developed from USEPA's review.

The principal concern related to perchlorate has been its occurrence in groundwater used for drinking water supplies. Perchlorate has been of concern because of existing uncertainties in the toxicological database to adequately evaluate the potential for perchlorate to produce human health effects at low levels in drinking water. In response to these uncertainties, a toxicity testing strategy has been implemented by an Interagency Perchlorate Steering Committee (IPSC), with representatives of federal agencies and affected state, local and tribal governments.

Perchlorate is readily absorbed by ingestion and oral uptake is considered the major route of exposure. Dermal contact and inhalation are considered to be negligible routes of exposure. Animal toxicity studies indicate that high levels of perchlorate exposure may affect the functioning of the endocrine system. The studies in laboratory animals indicate possible effects, including neurobehavioral effects, tumors of the thyroid gland, reproductive and immunotoxic effects. These adverse effects have not been observed in human populations. Based on the available data developed in laboratory animal studies, USEPA considers perchlorate-related effects to have no-effect thresholds, and has proposed a provisional oral RfD of 0.0009 mg/kg-day.

Using this provisional toxicity value and the exposure factors presented in Section 5, the intake rate associated with the highest concentration detected in soil (2,500 ug/kg or 2.5 mg/kg) is 2.4 x 10^{-6} mg/kg-day. This corresponds to a hazard quotient of 0.003. This hazard quotient falls below one, which is a level of concern for determining if human health risks

may be associated with environmental contaminants. Based on this evaluation, perchlorate in soil should not be considered to pose increased health risks to human receptors within the Burning Grounds.

2.4.3.2 Lead

The *USEPA Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil* (USEPA, 1996) presents tools that can be used in a risk assessment to provide an evaluation of risk relevant to the adult population. This report, referred to as the interim Adult Lead Methodology (ALM), focuses on the estimation of the blood lead concentrations in fetuses carried by women exposed to lead contaminated soils. This methodology presents equations for calculation of fetal risks from adult exposures to specified levels of soil lead contamination. This approach will support USEPA's goal of limiting the risk of elevated fetal blood lead concentrations (based on a blood-lead action level of 10 ug/dl) due to lead exposures to women of child-bearing age.

Using this methodology, target lead concentrations in soil corresponding to a fetal blood lead level of 10 ug/dl (via adult exposure) range from 888 to 1,545 mg/kg. While the highest lead concentration in detected in soil in the Burning Grounds was 1,730 mg/kg, this was an isolated occurrence, and was approximately 100-fold greater than the other analytical results in soil. Because this elevated concentration is unlikely to represent typical lead exposure to an individual in the Burning Grounds, lead in soil should not be considered to pose increased health risks to human receptors within the Burning Grounds.

2.5 Risk Characterization

Risk characterization involves estimating the magnitude of the potential adverse health effects under study. This is accomplished by combining the results of the dose-response and exposure assessments to provide numerical estimates of potential health effects. These values represent comparisons of exposure levels with appropriate RfDs and estimates of excess cancer risk. Risk characterization also considers the nature of and weight of evidence supporting these estimates, as well as the magnitude of uncertainty surrounding such estimates.

Although the risk assessment produces numerical estimates of risk, these numbers do not predict actual health outcomes. The estimates are calculated to overestimate risk, and thus any actual risks are likely to be lower than these estimates, and may even be zero.

2.5.1 Risk Management Threshold

In order to evaluate potential health risks, USEPA has established targets within which the Agency strives to manage risks. To evaluate potential carcinogenic risks, the Agency generally uses a risk range of 10^{-4} to 10^{-6} , and to evaluate the potential for non-cancer health effects, the Agency generally uses a hazard index/quotient of 1.0. However, for purposes of RCRA combustion permitting decisions, USEPA Region VI has modified the target levels to reflect the contribution of background levels of contamination. For the purposes of RCRA permitting decisions, the total individual risk associated with exposures to potential carcinogens released from a single facility should not exceed 1×10^{-5}. As described above for risks, for the purposes of RCRA permitting decisions, a modified target hazard level, to

account for background contributions, should be set at a HQ or HI value of 0.25 (USEPA, 1998c).

2.5.2 Numerical Risk Estimates

Potential health risks associated with exposure to noncarcinogenic compounds were evaluated by calculating a hazard quotient (HQ). The potential hazard quotient was calculated as the ratio of the intake to the RfD, as follows:

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

If the estimated daily intake for any single chemical is greater than its reference dose, the hazard quotient will exceed unity. A hazard quotient that exceeds unity indicates that there is a potential for adverse health effects associated with exposure to that chemical.

A hazard index (HI) is calculated to assess the potential for noncarcinogenic effects posed by more than one chemical. The hazard index approach assumes that simultaneous subthreshold exposures to several chemicals could result in an adverse health effect. It also assumes that the magnitude of the adverse effect will be proportional to the sum of the ratios of the subthreshold exposures to the acceptable exposure (the RfD). The hazard index is equal to the sum of the hazard quotients, and is calculated as follows:

$$HI=\frac{E_1}{RfD_1}+\frac{E_2}{RfD_2}+\cdots+\frac{E_i}{RfD_i}$$

where E_i is the exposure level (or intake) for the ith chemical, and RfD_i is the reference dose for the ith chemical. E and RfD are expressed in the same units (mg/kg-day), and represent the same exposure period (i.e. chronic, subchronic or short-term).

Individual cancer risk was calculated as the product of exposure to a chemical (in mg/kg-day) and the SF for that chemical (in mg/kg-day)$^{-1}$, as follows:

$$Risk = Intake \times SF$$

Cancer risks from exposure to multiple carcinogens and multiple pathways were assumed to be additive, based on the EPA carcinogen risk assessment guidelines (EPA, 1986).

2.5.2.1 Carcinogens

Tables 2-9 and 2-10 provide estimates of carcinogenic risks from contaminants in surface and subsurface soil, respectively, at the Burning Grounds. In surface soil, arsenic, cadmium and chromium (as Cr^{VI}) were evaluated as carcinogens. Arsenic was evaluated along all three pathways. Cadmium and chromium were evaluated as carcinogens by the inhalation route only, as these are considered by USEPA to be carcinogenic only by inhalation.

The total cancer risk from chemicals in surface soil is 2.32×10^{-6}. Arsenic contributes the major proportion of cancer risk, most of which comes from incidental ingestion of soil. However, the total estimated risk is below 1×10^{-5}, which is the risk threshold for consideration of risk management actions under current conditions at the Burning Grounds (USEPA, 1998c). Previous investigations have evaluated background concentrations of metals at the ABL

facility. These studies indicate that the average arsenic concentration in surface soil is 6.42 mg/kg, while a maximum concentration is 11.5 mg/kg. By comparison, the exposure point concentration in surface soil is 7.32 mg/kg. Based on these data, it is likely that the concentrations of arsenic measured in surface soil in the Burning Grounds resemble background levels. Therefore, action does not appear to be warranted to prevent unacceptable cancer risks from chemicals in surface soil.

The total cancer risk from chemicals in subsurface soil is 2.29×10^{-6}. All the risk is from arsenic, and most of the estimate comes from the soil ingestion pathway. As with surface soil, the total cancer risk is below 1×10^{-5}. The background concentration of arsenic in subsurface soil, based on previous investigations, is 8.15 mg/kg, while a maximum concentration is 13.1 mg/kg. By comparison, the exposure point concentration in surface soil is 7.2 mg/kg. Based on these data, it is likely that the concentrations of arsenic measured in subsurface soil in the Burning Grounds resemble background levels. Therefore, action does not appear to be warranted to prevent unacceptable cancer risks from chemicals in subsurface soil.

2.5.2.2 Noncarcinogens

Tables 2-9 and 2-10 provide estimates of noncarcinogenic hazards from contaminants in surface and subsurface soil, respectively, at the Burning Grounds. In summary, all HQs are less than 0.25, which indicates that noncancer hazards from chemicals in surface and subsurface soil are not of concern under the occupational exposure scenario.

2.5.3 Evaluation of Uncertainties

The risk estimates presented in this section are based on a specified set of assumptions regarding potential exposure and toxicity. Thus, it is important to specify the assumptions and uncertainties inherent in the risk assessment to place the risk estimates in proper perspective (EPA, 1989).

2.5.3.1 Uncertainty in COPC Selection

The uncertainty associated with sampling and the possibility of missing a contaminated location is expected to be minimal based on the methods used to select the sampling locations. The general assumptions used in the COPC selection process were conservative to ensure that true COPCs were not eliminated from the quantitative risk assessment and that the highest possible risk was estimated. As shown in tables 2-9 and 2-10, estimated risks were driven by arsenic concentrations in soil. Arsenic is naturally-occurring in soil, and is often found at concentrations of 10 mg/kg or less in soil (Kabata-Pendias and Pendias, 1992). Based on the analytical results obtained during the field investigation, it is likely that arsenic detected in soil is naturally-occurring. Furthermore, the arsenic found in the soils is not likely due to the Burning Grounds operations based on waste characterization. Therefore, including arsenic in soil as a COPC potentially overstates risks.

2.5.3.2 Uncertainty Associated with Exposure Assessment

Most of the exposure pathways evaluated at the site were assumed, and the exposure factors used for the quantitation of exposure were conservative and, in many cases, reflect worst-case or upper-bound assumptions on the exposure. For example, it is assumed that workers would enter the Burning Grounds on a daily basis, and that there is no use of

personal protective equipment by workers. Because most of the exposure factors reflect conservative assumptions, the resulting risks are likely to considerably overestimate the actual risk.

2.5.3.3 Uncertainty Associated with Toxicity Assessment

In the development of RfDs, several uncertainty factors (UFs) were applied to extrapolate the lowest or no observed adverse effect levels from animal studies to humans. These UFs typically range between 10 to 1,000. Additional modification factors are also used based on the professional judgment of the Agency. Therefore, there is a high degree of protectiveness in the noncarcinogenic toxicity criteria, based on the available scientific data for each compound.

Cancer slope factors developed by USEPA represent upper bound estimates, and carcinogenic risks generated in this assessment should be regarded as an upper bound estimate on the potential carcinogenic risks rather than an accurate representation of carcinogenic risk. The uncertainty associated with cancer slope factors is related to the low dose extrapolation where carcinogenicity at low doses is assumed to be straight line responses (i.e. the only dose where cancer does not occur is zero dose). This is a conservative assumption, which introduces a high uncertainty into cancer risk estimates. The true carcinogenic risk is likely to be less than the predicted value, and could be as low as zero (EPA, 1989).

2.5.4 Summary of Risk Characterization

Characterization of health risks associated with chemical contaminants in soil in the Burning Grounds has been based on a series of conservative assumptions that tend to overstate rather than understate health risks. The results of the risk assessment, using these conservative approaches, is that contaminants in soil are highly unlikely to pose significant human health risks to receptors who may enter the Burning Grounds.

3.0 Human Health Risk Assessment for Continued Operations

3.1 Site Setting

The Burning Grounds is located in the northern section of the Plant 1 property immediately adjacent to the North Branch Potomac River. The area is predominantly grass covered and the current Burning Grounds area is surrounded by a chain-link fence. ABL is bordered on the north and west by the North Branch Potomac River. The eastern and southern boundaries of ABL lie in mountainous terrain. The property to the west of ABL is primarily bottomland and is used for raising crops. A small residential area and some woodlands lie directly north of ABL and are separated from ABL by the River and a railroad right of way. Additional cropland exists on the bottomland northeast of ABL. The area to the east and south of ABL is primarily mountainous woodland, although some cropland and livestock grazing pastures exist in this area. There are two abandoned limestone quarries east of ABL. Surface waters at ABL consist of several unnamed intermittent streams and stormwater drainage ditches that discharge directly to the River. Land on the eastern edge of the ABL facility is primarily mountainous woodland with a large section of cropland bordered by

ABL to the west and Route 956 to the south and east. There is some industry present on the adjacent properties (Baker Environmental, 1997).

Higher-density residential areas are located further from the Burning Grounds. These include Triple Lakes and BelAir, approximately 2 km (1.2 miles) to the west-northwest and Cresaptown, approximately 3.3 km (2 miles) to the northwest. Potential impacts from emissions to the air at these areas are likely to be much lower than for the residential areas located across the river from the Burning Grounds (SNL, 1996). Residents of the McKenzie Tower Road, Maple Tree Lane, and Pinto Road areas are located north of the Burning Grounds, across the North Branch Potomac River. These residences are within 1,000 feet of the Burning Grounds. The area is rural and many of the residences reportedly have vegetable gardens and orchards. Elsewhere, the land is reportedly used for grazing dairy and beef cattle (ATSDR, 1997).

3.2 Conceptual Model of Exposure Pathways

The conceptual model of exposure pathways is summarized in Figure 3-1, and is described below in further detail.

3.2.1 Release Sources

Releases to the environment occur from the combustion of energetic materials on the burn pans. Burning of these materials results in chemical emissions to the air and potential releases to surrounding soil.

3.2.2 Identification of Transport Media

Operations at the Burning Grounds (combustion of energetic materials from the burn pans) may result in the emissions of gases (hydrogen chloride, carbon monoxide, oxides of nitrogen, sulfur dioxide), VOCs, and particulates into the air. The emissions then can be dispersed in air and transported to offsite areas. The particulates suspended into the air may deposit onto soil, foliage, and surface water. SVOCs and metals adsorbed to deposited particulates may become incorporated into surface soil through mixing and desorption (i.e., leaching from the deposited particulates).

3.2.3 Identification of Potential Receptors

Potential receptors (human populations that could become exposed to chemicals released from the Burning Grounds) consist principally of offsite residents and workers at the ABL facility. The closest offsite residents are located across the North Branch Potomac River from the Burning Grounds. Other populations located further to the north of the Burning Grounds would be less likely to be exposed to emissions associated with Burning Grounds activities.

3.2.4 Identification of Exposure Media and Routes of Potential Exposure

Exposure media and potential routes of exposure to the three potential receptor populations are depicted on Figure 3-1, and are described below:

Surface water and sediment. Particulate emissions to the air from burning operations could deposit onto surface water and sediment. Flows in the river would likely dilute chemical concentrations in runoff, recharge, or deposited emissions to very low levels or non-detect.

While it is possible that offsite residents could have direct contact with surface water or sediment, it is unlikely that this would represent a significant route of exposure. Work activities are unlikely to bring other ABL workers into direct contact with surface water or sediment. Therefore, direct contact exposure pathways from surface water or sediment are not quantitatively evaluated in the HHRA.

Ingestion of biota (fish). Concentrations in surface water or sediment could accumulate in fish in the river. As described previously, flows in the river would likely dilute chemical concentrations in runoff or deposited emissions to very low levels or non-detect. While it is possible that offsite residents could be exposed to chemicals through fish caught from the river, it is unlikely that this would represent a significant route of exposure. However, to be conservative, fish ingestion exposure pathways are quantitatively evaluated in the risk assessment.

Offsite surface soil. Particulate emissions to the air from burning operations could deposit onto surface soil at offsite locations. Offsite residents and workers located outside of the Burning Grounds could have direct contact with the resulting concentrations in soil, with the potential routes of exposure being soil ingestion and absorption of chemicals in soil adhering to the skin (dermal exposure). These potential exposure pathways are included for quantitative evaluation in the HHRA.

Onsite surface soil. Particulate emissions to the air from burning operations could deposit onto onsite surface soil. The only human receptors of concern for potential exposure to chemicals deposited on onsite soils would be the Burning Grounds workers who prepare, ignite, and clean up energetic materials. These activities are conducted in accordance with an established safety procedure that also requires the use of personal protective equipment. As described previously, the Burning Grounds is fenced and access is restricted.

Ingestion of homegrown fruits and vegetables. Concentrations in surface soil resulting from particle deposition to offsite locations could become accumulated through root uptake into vegetation, such as fruits and vegetables grown in a backyard garden. Particles also could be deposited onto aboveground foliage. Offsite residents could become exposed to the resulting chemical concentrations in vegetation through the ingestion of homegrown fruits and vegetables. These pathways are included for quantitative evaluation in the HHRA.

Ingestion of animal products. Concentrations in surface soil and vegetation could become accumulated into livestock, including beef and dairy cattle, swine, chicken and eggs. Offsite residents that subsist on foods from animals raised on their property could potentially become exposed to the resulting chemical concentrations in meat, milk and eggs. These pathways are included for quantitative evaluation in the HHRA.

Ambient air. Emissions from operations at the Burning Grounds that become dispersed in air could be inhaled by offsite receptors. This pathway is included for quantitative evaluation in the HHRA.

3.3 Identification of Chemicals of Potential Concern

Historic information was used to provide an understanding of the nature, composition, and impact of the air emissions from the Burning Grounds activities and to identify chemicals of potential concern (COPCs). COPCs are those chemicals that potentially present the greatest

human health concerns (i.e., those present at the highest concentrations in emissions or have the highest mobility or the highest toxicity). The purpose of identifying COPCs is to focus the risk assessment on the most important chemicals at the site. The COPCs in the emissions are based principally on emissions test data presented in the *Allegany Ballistics Laboratory Open Burning Disposal Operations Air Pathway Health Risk Assessment* (SNL, 1996). The Sandia National Laboratory (SNL) measured emissions from the waste streams likely to be encountered at the ABL facility. The chemicals analyzed in emissions to the air from combustion of energetic materials include the criteria pollutants: carbon monoxide (CO), particulate matter less than 10 microns in aerodynamic equivalent diameter (PM_{10}), oxides of nitrogen (NO_x), sulfur dioxide (SO_2), and gaseous hydrochloric acid (HCl); and VOCs, selected classes of SVOCs (including polycyclic aromatic hydrocarbons (PAHs), dinitrotoluenes, and trinitrobenzene, and phenolics and nitrosamines), and metals (i.e., aluminum, copper, iron and lead). The following sections describe the development of the target analyte list used in SNL's emissions testing program, the chemicals detected in the testing, and the resulting COPC list used in the risk assessment.

3.3.1 Target Analyte List Used in Emissions Testing

According to SNL, (SNL, 1996), much of the list is based on SNL testing and other testing done as part of a technical steering committee for the U.S. Army (AMCCOM, 1992, as cited in SNL, 1996). The US Army testing included an initial study in which chamber testing methods were introduced as a means of estimating pollutant emission factors for materials slated for disposal by open burning and detonation methods. The list includes a variety of potentially toxic gas and aerosol species likely to be encountered during energetic materials combustion, and according to SNL, has been informally adopted by many state agencies and consultants as a logical starting point in the risk assessment process. This list, developed in consultation with ATK and considered to be appropriate based on current ABL waste streams, formed the basis for a target analyte list used for air emissions testing of representative samples of the various waste forms encountered at the ABL facility, as conducted by SNL (SNL, 1996). According to SNL, this target analyte list was included in a project work plan that was submitted to the State of West Virginia, Office of Air Quality, for its review and approval. That target analyte list, and identification of the species measured in SNL's emissions testing program is presented in tables 3-1 through 3-4.

3.3.2 Emissions Testing Approach

The purpose for emissions testing was to provide a pollutant source term that was based directly on measurements of emissions characteristics for the spectrum of chemicals likely to be encountered during burning operations. This approach was intended to provide pollutant emissions measured under controlled conditions which could be used to develop pollutant emission factors[1] that could be used in air dispersion models to estimate concentrations in air at off-site receptor locations. Emissions testing was performed on pure energetic materials and P/E-contaminated waste:

- Pure Energetic Materials:
  - Al-Composite Propellant

[1] An emissions factor is the mass of a pollutant released per unit mass of starting material. The emissions factor is expressed as a unitless ratio, for example grams of pollutant released per gram of material consumed.

- Composite Propellant
- Double Base Propellant
- PBX Explosive

- P/E-Contaminated Waste:
  - P/E Mix No. 1 (double base propellant + acetone + sawdust)
  - P/E Mix No. 2 (PBX explosive + acetone/sawdust mixture + miscellaneous wood and plastic materials)

The chemicals detected in these different waste categories in SNL's emissions testing are listed on Table 3-5. Note that all of the emissions chemicals in Table 3-5 were evaluated in the risk assessment, though several of these were not detected in most or all of the waste categories tested.

3.3.3 Uncertainties in COPC Identification

The emissions chemicals tested in SNL's testing program (see Table 3-5) were evaluated in the risk assessment. Emission factors were developed using these analytical results, as described in the *ABL Open Burning Modeling Protocol, August 31, 2001*. In cases where a constituent was reported as not detected in SNL's testing program, the emission factors was derived assuming that the constituent was present at one half of the detection limit.

Evaluation of the uncertainties associated with the identification of COPCs considered in the risk assessment indicates that inclusion of the entire list of chemicals tested in SNL's emissions estimating program potentially overstates risks associated with continued operation of the Burning Grounds. Some of the materials tested in the SNL study to describe the nature of Burning Grounds emissions are no longer combusted on-site. In particular, the miscellaneous contaminated materials such as contaminated personnel protective equipment, drum pallets, etc. (represented by P/E Mix No. 2) are reportedly no longer burned on-site.

The existing published database of open burning of energetic materials (Mitchell and Suggs, 1998) reports that that SVOCs are rarely detected (the five reportedly detected in that database are phenol, acenaphthylene and fluoranthene, 2-chlorophenol and diethylphthalate). There is uncertainty in the identification of dioxin/furan congeners in the emissions. The SNL testing data report only "dioxin," providing no information regarding speciation of individual congeners. However, the published database reports that only five isomers (octochlorinated dibenzo-p-furan [OCDF]; 1,2,3,4,6,7,8-HpCDF, 1,2,3,4,7,8,9-HpCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8 HxCDF; and octochlorinated dibenzo-p-dioxin) were detected during the burning of ammonium perchlorate (AP) propellant, aluminized AP propellant and AP-waste.

3.3.4 Summary of COPCs

The COPCs evaluated in the risk assessment are summarized in Table 3-6. In general, the chemicals that were analyzed in SNL's emissions testing program were included as COPCs in the risk assessment. Note that in several cases, these chemicals were not detected in emissions from the burning of propellant and energetic materials. Therefore, including non-

detected chemicals in the risk assessment potentially overstates risks associated with Burning Ground emissions.

3.4 Emissions Estimation

Emissions estimates were calculated using emission factors developed from a range of source tests conducted for open burning operations. A database of emission factors applicable to the open burning (in burn pans) routinely used to destroy surplus or unserviceable energetic materials has been constructed and validated using emissions data from 16 energetic materials which were burned in a 930 m^3 chamber called a BangBox (Mitchell and Suggs, 1998). Additionally, emission factors were developed from an emissions test using waste streams intended to be characteristic of ABL Burning Ground Activities, as part of the SNL 1996 air pathway risk assessment (SNL, 1996).

3.4.1 SNL Emissions Testing

Emissions data presented in the SNL (1996) report were collected from test burns conducted in the SNL Air Emissions Test Chamber. The test chamber consists of a large, air-supported plastic-coated fabric dome, 15 meters in diameter. Positive pressure is maintained within the dome by a continuously operating electrical blower. Emission products from combusted materials are sampled and analyzed by various instruments, as described below. Mixing fans are positioned in the chamber so that the emissions products are thoroughly mixed in air. Because the chamber volume and dilution rates are known, the quantities of emitted chemicals from waste combustion can be quantified and used to calculate emission factors.

Hydrogen chloride concentrations were measured with both open-path Fourier transform infrared spectroscopy (FTIR), and sampling with a filter/bubbler collection train followed by wet chemical analysis for total chloride. VOCs were sampled using SUMMA evacuated stainless steel canisters and analyzed using gas chromatography-mass spectroscopy (GC-MS) with EPA Method TO-14. SVOCs were sampled using quartz filters and XAD-2 resin and analyzed using GC-MS. A "dioxin screening analysis" was carried out, also using GC-MS methods. Metals were sampled using Teflon filters and analyzed using x-ray fluorescence and inductively-coupled plasma atomic absorption spectroscopy.

Emission factors were calculated as ratio of the total mass of pollutant in air to the total mass of waste material burned. The emission factors reported were the highest values of two measurements made of each waste material. The variability in test results were not reported in SNL (1996). Dioxin/furan were analyzed using a screening approach, and speciation data are available. SNL noted that high acetone background in P/E contaminated mix #1 resulted in elevated detection limits for VOCs.

The emission factors from SNL's studies are summarized in tables 3-7 (pure energetic materials) and 3-8 (P/E mixtures).

3.4.2 Published Emissions Test Data

A validated database of pollutant emission factors applicable to the disposal of energetic-containing materials through open-air burning (in burn pans) and unconfined detonation processes (OB/OD) has been published (Mitchell and Suggs, 1998). The emission factors in the database were compiled using data from studies, which measured the quantities of

particles, SVOCs, polychlorinated dibenzo-p-dioxins and furans, toxic metals, VOCs, and inorganic gases released when different types of energetic materials, including composite and double base materials, were burned in a 930 m^3 chamber, called the BangBox. Air samples from the chamber were analyzed for over 275 analytes. This report also documents the actions taken in validating the database along with a description of the minimum quantification limits for each pollutant measurement system.

The principal differences between this database and SNL's is in the larger number of tests captured, which provides a better identification of COPCs, the relative absence of SVOCs detected in emissions, and the presence of speciation dioxin/furan data. Further discussion of these dioxin/furan data are presented below.

3.4.3 Evaluation of Dioxin/Furan Emissions

Dioxin/furan data were collected during four burns (AP propellant, aluminized AP propellant, AP-waste and diesel fuel and dunnage) (Mitchell and Suggs, 1998). Furans were detected only in the emissions from the AP waste burn. The five isomers detected were octochlorodibenzofuran (OCDF), 1,2,3,4,6,7,8-heptachlorodibenzofuran (HpCDF), 1,2,3,4,6,7,9-HpCDF, 1,2,3,4,7,8-hexachlorodibenzofuran (HxCDF) and 1,2,3,6,7,8-HxCDF (Mitchell and Suggs, 1998). SNL performed a dioxin screen of the aerosol component of the various emissions. Dioxin emissions for most of the wastes were reported as not detected, though SNL states that detection limits may not have been sufficiently low to detect risk-based levels. SNL cites in their report previous emissions tests of polybutadiene propellants (AMCCOM, 1992, cited in SNL, 1996), where dioxins were not detected. The range of emission factors from these studies is summarized in Table 3-9. As a point of departure, the emission factors based on the minimum detection limit from Mitchell and Suggs (1998), expressed as 2,3,7,8-TCDD equivalent, was used to evaluate potential emissions of dioxin/furans from open burning operations at ABL. These values were not corrected to one-half detection limit, as was done with the other emissions estimates based on analytical results that are less than detection.

3.4.4 Summary of Emission Rates

Emission rates used to evaluate potential concentrations in air of toxic emissions were calculated assuming that the maximum annual rate of waste treatment at the Burning Grounds could consist of each waste type. For example, the maximum annual waste treatment rate (all waste types combined) is 300,000 lbs/year. For purposes of estimating emissions, it was assumed that 300,000 lbs/year of each waste type could be burned at the burning grounds. The annual emissions of each pollutant emitted from each waste type was calculated as the product of 300,000 lbs/year and the emission factors. The maximum emission rate from any waste type was used to estimate concentrations in air associated with open burning operations. These emission rates are summarized in Table 3-10.

3.5 Dispersion Modeling

The most recent version of the Open Burn/Open Detonation Model (OBOD-M) (Bjorklund et al., 1998) was used to characterize the air quality impacts from OB events at the ABL Burning Grounds. OBOD-M is intended for use in evaluating the potential air quality impacts of the open burning and open detonation (OB/OD) of obsolete munitions and solid propellants. OBOD-M uses cloud/plume rise, dispersion and deposition algorithms taken

from existing models for instantaneous and quasi-continuous sources to predict the downwind transport and dispersion of pollutants released by OB/OD operations. Although there is no preferred model for application to the open burning of obsolete or unsafe munitions, OBOD-M is specifically designed to predict the buoyant rise and dispersion of emissions from short-term quasi-continuous (open burn) releases when a refined model is needed. Specific data inputs to the model are described in ABL Open Burning Modeling Protocol (CH2M HILL, 2001).

3.5.1 Modeling Concentrations in Air

For each given pollutant, the dispersion modeling results provide a ground-level concentration of each pollutant expressed in units of ug/m^3. The concentration in air per unit emission rate (i.e. ug/m^3 per g/s) based on dispersion modeling was multiplied by the maximum emission rate (in g/s) to provide the annual average pollutant concentrations in air. Calculations of the concentration in air per unit emission rate at specific receptor locations that are evaluated in the HHRA are presented in Table 3-11.

3.5.2 Deposition Modeling

The OBOD-M model is not specifically designed to simulate wet and dry deposition of particulate emissions. Therefore, for purposes of the HHRA, an alternate approach was developed to estimate particle deposition onto soil and vegetation. Combined wet and dry deposition was estimated assuming a point estimate deposition velocity of 1 cm/s. Mass deposition fluxes were then calculated as the product of the deposition velocity and the concentration in air, with no correction for plume depletion. This approach may either understate or overstate potential deposition fluxes (understating deposition by not specifically accounting for wet deposition; overstating by inflating dry deposition fluxes and not correcting for plume depletion). The value of 1 cm/s corresponds to the dry deposition of unit density (i.e., 1 g/cm^3) particulates approximately 30 um in diameter (Sehmel, 1980). This represent an older deposition methodology, prior to development of the Industrial Source Complex – Short Term, Version 3 (ISCST3) dispersion model, which has been used to accommodate the OBOD-M model.

Deposition fluxes estimated with this methodology agree to within a factor of 2 when compared with available estimates calculating using ISCST3. The values developed with ISCST3 were obtained from an analysis of indirect pathway exposure from hazardous waste combustion (RTI, 1996).

3.6 Exposure Assessment

Exposure refers to the potential contact of an individual with a chemical. Exposure assessment is the estimation of the magnitude, frequency, duration, and routes of exposure to a chemical. Human exposure to chemicals is typically evaluated by estimating the amount of a chemical which could come into contact with the lungs, gastrointestinal tract, or skin during a specified period of time. This exposure assessment is based on scenarios that define human populations potentially exposed to chemicals of potential concern (COPCs) that may originate from air, soil or biota. The potential pathways of exposure, frequency and duration of potential exposures, rates of contact with air and soil and the concentrations of chemicals are considered in the exposure assessment. Chemical intakes and associated risks have been quantified for all exposure pathways considered potentially complete. This

section describes the assumptions, data, and methods used to evaluate the potential for human exposure to COPCs and involves the following steps:

- Identification of potentially exposed populations
- Identification of potential exposure pathways and selection of complete exposure pathways
- Evaluation of the environmental fate and transport of chemicals in soil and estimation of exposure point concentrations used to quantify chemical intakes
- Quantification of chemical intakes for each exposure pathway

The information developed through these steps was then used to develop exposure scenarios. An exposure scenario considers the sources of the chemical substances that could come into contact with the subject population. Exposure prediction models based on the fate and transport of the chemical substances are then used to evaluate the pathways from the sources to subject population.

3.6.1 Identification of Potentially Exposed Populations

The closest offsite residents are located across the North Branch Potomac River from the Burning Grounds. Other populations located in communities further to the north of the Burning Grounds would be less likely to be exposed to emissions associated with Burning Grounds activities. The highest concentrations associated with facility emissions fall immediately outside the facility fenceline. The location of the closest resident, assumed to be 300 meters to the north of the fenceline of the Burning Grounds, is used as the maximum exposed individual for purposes of evaluating site risks.

3.6.2 Identification of Potential Exposure Pathways

Potential exposure pathways are identified for three different populations that may be located at the point of the maximum exposed individual. These pathways are shown in Table 3-12 and are summarized below.

Offsite Resident. The offsite resident is assumed to be exposed via inhalation to constituent concentrations in air; from direct contact with soil that has received deposited emissions chemicals; and through ingestion of homegrown fruits and vegetables that have accumulated chemicals from soil.

Offsite Resident – Subsistence Farmer. This individual is assumed to be exposed through the same pathways as the offsite resident, and is also potentially exposed through ingestion of meat and milk products from livestock raised at his or her residence. Livestock are assumed to accumulate chemicals from hay and forage that have accumulated chemicals from soil. A child receptor is also evaluated for the subsistence farmer scenario.

Subsistence Fisher. The subsistence fisher is assumed to be exposed via ingestion of fish caught from the Potomac River. A significant portion of this individual's diet consists of fish from the river. Airborne particulate is assumed to deposit on the river, producing constituent concentrations in water. These chemicals are accumulated into fish that are ingested by this receptor.

3.6.3 Environmental Fate and Transport Analysis

Emissions from combustion activities occur in the environment in either the vapor or particle phase. Determining the extent of human exposure to residual amounts of pollutants from these activities is based on knowledge of chemical concentrations at actual and reasonable future exposure locations from dispersion and deposition and evaluating potential pathways of exposure. Dispersion and deposition modeling results were used to evaluate the rate at which chemicals enter a given medium and pathway processes that affect chemical concentration in that medium. The OBOD-M model is used to estimate ground-level chemical concentrations based on transport through dispersion.

Potential pathways of exposure may arise from particle deposition onto soil. The deposition flux onto the soil was estimated from the modeled ground-level concentrations using the selected 1 cm/s deposition velocity. Transport pathways to be addressed in this evaluation are:

- Dispersion in air for chemicals emitted to the air during burning (Summarized in Table 3-13)
- Deposition of particulate emissions onto soil, vegetation or surface water
- Runoff from surface soil into surface water
- Leaching, degradation and mixing of deposited chemicals in the soil by precipitation and mechanical mixing
- Uptake by vegetation (i.e., fruits and vegetables) from surface soil
- Uptake from ingestion of vegetation and soil into livestock (beef and dairy cattle, swine, and chicken)
- Uptake from water into fish

These fate and transport pathways are depicted in Figure 3-2. Concentrations in environmental media from emissions were estimated using the methodology, equations and standard default exposure assumptions provided in the *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Peer Review Draft* (USEPA 1998a), with modifications needed to use a point estimate deposition velocity. The media concentrations estimated using this methodology are summarized as follows:

- Concentrations estimated in air, soil, vegetation and livestock products (meat, milk and eggs) at the maximum exposed individual location are summarized in Table 3-14. Assumptions and parameters used in calculating these concentrations are presented in Table 3-15.
- Concentrations estimated in soil (the surrounding watershed), surface water, and fish in the North Branch Potomac River are summarized in Table 3-16. Assumptions and parameters used in calculating these concentrations are presented in Table 3-17.

Chemical-specific parameters used in the fate and transport analysis are presented in Table 3-18.

3.6.4 Quantification of Intakes

This section describes the methods for calculating potential chemical intakes for the populations and exposure pathways selected for quantitative evaluation. The intakes calculated in this section are expressed as the amount of chemical at the exchange boundary (i.e., lungs or gut) and available for absorption. Estimates of chemical intakes in this appendix are based on the equations presented in *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Peer Review Draft* (USEPA 1998a). Chemical intakes were estimated for populations and exposure pathways presented in Section 3.6.3. The intake rates estimated using this methodology are summarized as follows:

- Intakes estimated from inhalation and ingestion of soil, vegetation and livestock products (meat, milk and eggs) at the maximum exposed individual location are summarized in Table 3-19. Assumptions and parameters used in calculating these intake rates are presented in Table 3-20.
- Intakes estimated from ingestion of fish in the North Branch Potomac River are summarized in Table 3-21. Assumptions and parameters used in calculating these concentrations are presented in Table 3-22.

3.7 Toxicity Assessment

Toxicity values (cancer slope factors and Reference Doses) used in the risk assessment were obtained from the same sources described in Section 2.4. The available toxicity values are summarized in Table 3-23.

3.7.1 Assessment of Chemicals Without Existing Toxicity Values

Several of the COPCs in the emissions have no toxicity values available from USEPA. These include the nitroarene compounds (1-nitropyrene, 1,6-dinitropyrene), 2,5-diphenyloxazole, methylnaphthalenes, 2-nitronaphthalene, di-n-propyl adipate, resorcinol, thianaphthene, triacetin, and zirconium. Therefore, quantitative risk estimates could not be developed for these chemicals. Not including these chemicals in the risk assessment potentially understates health risks. This potential underestimation is discussed further in Section 3.8.3 of the risk characterization section.

Toxicity factors are not available for lead. Therefore, consistent with U.S. EPA risk management guidelines for hazardous waste combustion (USEPA, 1998c) the potential for adverse health effects associated with exposure to lead was characterized through a direct comparison with media-specific health-based levels. Specifically, U.S. EPA Region VI (USEPA, 1998c) recommends target levels for lead in soil and air of 100 mg/kg and 0.2 Fg/m , respectively. The soil target level of 100 mg/kg is based on U.S. EPA guidance that indicates that soil lead levels less than 400 mg/kg, based on lead concentrations in blood as discussed below, are not of concern for remediation purposes. U.S. EPA Region VI has incorporated a margin of safety into the risk assessment process by allowing only 25 percent of the remediation threshold lead level to be attributable to operation of a hazardous waste combustion unit. Similarly, the protective air standard of 0.2 ug/m^3 is based on 25 percent of the National Ambient Air Quality Standard (NAAQS) quarterly average air concentration of 1.5 ug/m^3 (40 CFR Part 50.12) translated to an annual-basis value.

3.8 Risk Characterization

Risk characterization involves estimating the magnitude of the potential adverse health effects under study. This is accomplished by combining the results of the dose-response and exposure assessments to provide numerical estimates of potential health effects. These values represent comparisons of exposure levels with appropriate RfDs and estimates of excess cancer risk. Risk characterization also considers the nature of and weight of evidence supporting these estimates, as well as the magnitude of uncertainty surrounding such estimates.

Although the risk assessment produces numerical estimates of risk, these numbers do not predict actual health outcomes. The estimates are calculated to overestimate risk, and thus any actual risks are likely to be lower than these estimates, and may even be zero.

3.8.1 Risk Management Thresholds

In order to evaluate potential health risks, USEPA has established targets within which the Agency strives to manage risks. To evaluate potential carcinogenic risks, the Agency generally uses a risk range of 10^{-4} to 10^{-6}, and to evaluate the potential for non-cancer health effects, the Agency generally uses a hazard index/quotient of 1.0. However, for purposes of RCRA combustion permitting decisions, USEPA Region VI has modified the target levels to reflect the contribution of background levels of contamination. For the purposes of RCRA permitting decisions, the total individual risk associated with exposures to potential carcinogens released from a single facility should not exceed 1×10^{-5}. As described above for risks, for the purposes of RCRA permitting decisions, a modified target hazard level, to account for background contributions, should be set at a HQ or HI value of 0.25 (USEPA, 1998c).

The results of the risk assessment for all of the scenarios examined are lower than these thresholds.

3.8.2 Numerical Results

Potential health risks associated with exposure to noncarcinogenic compounds were evaluated by calculating a HQ. The potential hazard quotient was calculated as the ratio of the intake to the RfD, as follows:

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

If the estimated daily intake for any single chemical is greater than its reference dose, the hazard quotient will exceed unity. A hazard quotient that exceeds unity indicates that there is a potential for adverse health effects associated with exposure to that chemical. For purposes of evaluating noncancer risks from hazardous waste combustion units, a hazard quotient of 0.25 is used as an indication of potential for adverse noncancer health effects (USEPA, 1998c).

An HI is calculated to assess the potential for noncarcinogenic effects posed by more than one chemical. The hazard index approach assumes that simultaneous subthreshold exposures to several chemicals could result in an adverse health effect. It also assumes that the magnitude of the adverse effect will be proportional to the sum of the ratios of the

subthreshold exposures to the acceptable exposure (the RfD). The hazard index is equal to the sum of the hazard quotients, and is calculated as follows:

$$HI = \frac{E_1}{RfD_1} + \frac{E_2}{RfD_2} + \cdot \cdot \cdot + \frac{E_i}{RfD_i}$$

where E_i is the exposure level (or intake) for the ith chemical, and RfD_i is the reference dose for the ith chemical. E and RfD are expressed in the same units (mg/kg-day), and represent the same exposure period (i.e. chronic, subchronic or short-term).

Individual cancer risk was calculated as the product of exposure to a chemical (in mg/kg-day) and the SF for that chemical (in mg/kg-day)$^{-1}$, as follows:

$$Risk = Intake \times SF$$

Cancer risks from exposure to multiple carcinogens and multiple pathways were assumed to be additive, based on the EPA carcinogen risk assessment guidelines (EPA, 1986; 1999).

3.8.2.1 Offsite Resident (Maximum Exposed Individual)

The offsite resident is assumed to be located approximately 300 meters north of the facility fenceline and is potentially exposed through inhalation, soil ingestion, and ingestion of home-grown fruits and vegetables. The total excess lifetime cancer risks for this exposure scenario is 1.5×10^{-7}. Inhalation of VOCs (1,3-butadiene and benzene) provide the largest contribution to estimated cancer risks. The noncancer hazard quotients for all emissions chemicals fell below 0.25; the cumulative hazard index also fell below 0.25. The quantitative results for this scenario are presented in Table 3-24.

3.8.2.2 Offsite Subsistence Farmer (Maximum Exposed Individual)

The offsite subsistence farmer is also assumed to be located approximately 300 meters north of the facility fenceline and is potentially exposed through inhalation, soil ingestion, ingestion of home-grown fruits and vegetables, and ingestion of livestock products (beef, milk, pork, chicken and eggs). The total excess lifetime cancer risks for this exposure scenario is 6×10^{-6}. Total excess lifetime cancer risks for a child receptor with the offsite subsistence farmer exposure assumptions is 8.7×10^{-6}. Intake of dioxins/furans and carcinogenic polycyclic aromatic hydrocarbons (PAHs) through ingestion of meat and milk products provides the largest contribution to estimated cancer risks. The noncancer hazard quotients for all emissions chemicals fell below 0.25; the cumulative hazard index also fell below 0.25. The quantitative results for this scenario are presented in Table 3-25.

3.8.2.3 Offsite Subsistence Fisher

The offsite subsistence fisher is assumed to fish from the North Branch Potomac River, adjacent to the facility, and is potentially exposed through fish ingestion. The total excess lifetime cancer risk for this exposure scenario is 1×10^{-7}. Intake of dioxins/furans provides the largest contribution to estimated cancer risks. The noncancer hazard quotients for all emissions chemicals fell below 0.25; the cumulative hazard index also fell below 0.25. The quantitative results for this scenario are presented in Table 3-26.

3.8.2.4 Characterization of Lead Risks

Lead concentrations in air and soil (shown in Table 3-14) fall below the risk management thresholds described in USEPA, 1998c.

3.8.3 Discussion of Uncertainties

Full characterization of health risks means that the numerical estimates of health risks must be accompanied by a discussion of the uncertainties inherent in the assumptions used in estimating these risks. Uncertainties in the risk estimation process may result in the numerical estimates either understating or overstating health risks associated with the emissions from the Burning Grounds. These uncertainties and their influences on the risk estimates are summarized in Table 3-27, and are briefly discussed below.

The emissions estimates are based on available source testing information that may or may not approximate typical operating conditions at the Burning Grounds; therefore, in general the emissions estimates used in the risk assessment may result in risks being either understated or overstated. Many of the chemicals contributing to estimated risks were not detected in emissions testing, and including these at one-half the detection limit potential overstates health risks. The emissions estimates were based on the assumption that each of the waste types could be burned at the annual maximum emissions limit for all waste types that would be burned at the Burning Grounds. This assumption potentially overstates emissions from the facility, and potentially overstates risks. Dioxin/furan emissions from open burning operations in general are uncertain, because there is a limited amount of emissions data available, and the emission factors selected for the risk assessment could either overstate or understate health risks.

The exposure scenarios used to evaluate the risk assessment in general overstate the risks associated with the facility. It is unlikely that the full set of exposure pathways considered for the subsistence farmer would be present at the offsite point of maximum impact; the offsite resident scenario provides a more reasonable estimate of the potential risks associated with facility emissions. While there may be higher concentrations in offsite air (directly at the facility fenceline), it is highly unlikely that there will be a resident at that location in the future. While calculated health risks associated with fenceline concentrations could be higher than presented in this risk assessment, it is reasonable that residential exposures at a fenceline location would be zero (i.e., a residential receptor would not be located at that point).

As discussed in Section 3.7.1, toxicity values were not available for some constituents in the emissions. Therefore, quantitative risks were not estimated for those chemicals. In general, not including these chemicals should have relatively little effect on the risk assessment conclusions. However, numerically, not including these chemicals potentially understates health risks. For example, while there is some evidence that nitroarenes are mutagenic, evidence of their carcinogenicity is considered inadequate. Resorcinol is a phenolic compound, and therefore probably resembles phenol in terms of magnitude of health effect. Methylnaphthalene risks were characterized assuming that these were equally as toxic as naphthalene (i.e., the naphthalene RfDs were used to characterize risks for these chemicals). Zirconium is generally considered to have low to moderate toxicity in laboratory animals, and under certain conditions, has been a skin irritant in humans.

3.8.4 Risk Conclusions

A human health risk assessment has been conducted for emissions associated with continued operations of the Burning Grounds. This risk assessment was conducted in accordance with appropriate regulatory guidelines, and was based on health-conservative assumptions and methods. Potential health risks associated with potential future emissions to offsite residents that may be located at the point of highest impact associated with burning operations fall below conservative regulatory thresholds, indicating that emissions from this facility should not pose a significant risk to human health.

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Tables

TABLE 2-1
Exposure Scenarios Evaluated in the Human Health Risk Assessment – Current Conditions
Allegany Ballistics Laboratory Burning Grounds

Risk Assessment Element	Media	Receptors	Potential Routes of Exposure
Evaluation of Current Risks	Onsite Soil	Burning Grounds Workers	Incidental Ingestion of Soil
			Inhalation of Volatiles
			Inhalation of Wind-blown Soil
			Dermal Contact with Soil

Table 2-2

Occurrence, Distribution, and Selection of Chemicals of Potential Concern in Surface Soil

Burning Grounds, Allegany Ballistics Laboratory

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Screening [3] Toxicity Value		COPC Flag	Rationale for [4] Contaminant Deletion or Selection
67-64-1	Acetone	0.005	J	0.016		MG/KG	AS01-SS06-R01X	4/20	0.006 - 0.006	0.016	782	N	NO	BSL
79-01-6	Trichloroethene	0.003	J	0.028		MG/KG	AS01-SS02-R01X	3/20	0.006 - 0.006	0.028	46.9	NI	NO	BSL
92-52-4	1,1-Biphenyl	0.02	J	0.02	J	MG/KG	AS01-SS19-R01X	1/20	0.34 - 0.42	0.02	391	N	NO	BSL
56-55-3	Benzo(a)anthracene	0.024	J	0.066	J	MG/KG	AS01-SS01-R01X	6/20	0.34 - 0.42	0.066	0.875	C	NO	BSL
50-32-8	Benzo(a)pyrene	0.023	J	0.054	J	MG/KG	AS01-SS01-R01X	7/20	0.34 - 0.42	0.054	0.0875	C	NO	BSL
218-01-9	Chrysene	0.024	J	0.11	J	MG/KG	AS01-SS01-R01X	14/20	0.34 - 0.42	0.11	87.5	C	NO	BSL
84-66-2	Diethylphthalate	0.16	J	0.16	J	MG/KG	AS01-SS02-R01X	1/20	0.34 - 0.42	0.16	6,257	N	NO	BSL
131-11-3	Dimethyl phthalate	1.1		2.3		MG/KG	AS01-SS02-R01X	3/20	0.34 - 0.42	2.3	78,214	N	NO	BSL
91-20-3	Naphthalene	0.04	J	0.04	J	MG/KG	AS01-SS01-R01X	1/20	0.34 - 0.42	0.04	156	N	NO	BSL
85-01-8	Phenanthrene	0.031	J	0.14	J	MG/KG	AS01-SS01-R01X	14/20	0.34 - 0.42	0.14	235	N	NO	BSL
117-81-7	bis(2-Ethylhexyl)phthalate	0.074	J	1.3		MG/KG	AS01-SS03-R01X	8/20	0.34 - 0.42	1.3	45.6	C	NO	BSL
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	5.40E-05	J	5.60E-05	J	MG/KG	AS01-SS02-R01X	2/20	0.000012 - 0.000795	0.000056	4.26E-04	C	NO	BSL
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	3.90E-05		3.90E-05		MG/KG	AS01-SS02-R01X	1/20	0.000015 - 0.000389	0.000039	4.26E-04	C	NO	BSL
	Total octachlorodibenzo-p-dioxin	9.00E-05		7.22E-04		MG/KG	AS01-SS01-R01X	20/20	0.000025 - 0.001184	0.000722	4.26E-02		NO	BSL
	Total octachlorodibenzofuran	2.30E-05	J	8.00E-05		MG/KG	AS01-SS02-R01X	2/20	0.000049 - 0.000709	0.00008	4.26E-02		NO	BSL
2691-41-0	HMX	0.123	J	2.4		MG/KG	AS01-SS03-R01X	9/20	0.417 - 0.476	2.4	391	N	NO	BSL
	Perchlorate	0.068		0.88		MG/KG	AS01-SS05-R01X	5/20	0.056 - 0.066	0.88	[redacted]		YES	ASL
121-82-4	RDX	0.735		0.784		MG/KG	AS01-SS05-R01X	2/20	0.417 - 0.476	0.784	5.81	C	NO	BSL
7429-90-5	Aluminum	4,680		10,400		MG/KG	AS01-SS13-R01X	20/20	0.66 - 0.77	10400	7,821	N	YES	ASL
7440-36-0	Antimony	0.25	L	1.9	L	MG/KG	AS01-SS12-R01X	19/20	0.22 - 0.26	1.9	3.13	N	NO	BSL
7440-38-2	Arsenic	5		9.5		MG/KG	AS01-SS01-R01X	20/20	0.22 - 0.26	9.5	0.426	C	YES	ASL
7440-39-3	Barium	77.6		239		MG/KG	AS01-SS09P-R01X	20/20	0.22 - 0.26	239	548	N	NO	BSL
7440-41-7	Beryllium	0.54	K	1.2	K	MG/KG	AS01-SS01-R01X AS01-SS13-R01X	20/20	0.11 - 0.13	1.2	15.6	N	NO	BSL
7440-43-9	Cadmium	0.56	J	10.9		MG/KG	AS01-SS15-R01X	20/20	0.11 - 0.13	10.9	3.91	N	YES	ASL
7440-47-3	Chromium	8.8		23.8		MG/KG	AS01-SS07-R01X	20/20	0.11 - 0.13	23.8	23.5	N	YES	ASL
7440-48-4	Cobalt	6.9		16.5	K	MG/KG	AS01-SS13-R01X	20/20	0.11 - 0.13	16.5	469	N	NO	BSL
7440-50-8	Copper	17		29		MG/KG	AS01-SS14-R01X	20/20	0.11 - 0.13	29	313	N	NO	BSL
57-12-5	Cyanide	0.19	J	0.54	J	MG/KG	AS01-SS05-R01X	19/20	0.05 - 0.06	0.54	156	N	NO	BSL
7439-89-6	Iron	15,800		33,200		MG/KG	AS01-SS11-R01X AS01-SS13-R01X	20/20	8.3 - 16.7	33200	2,346	N	YES	ASL
7439-92-1	Lead	25		1,730		MG/KG	AS01-SS02-R01X	20/20	0.11 - 0.13	1730	400		YES	ASL
7439-96-5	Manganese	419		1,120		MG/KG	AS01-SS12-R01X	20/20	0.11 - 0.13	1120	156	N	YES	ASL
7439-97-6	Mercury	0.04		0.38		MG/KG	AS01-SS18-R01X	20/20	0.02 - 0.02	0.38	2.35	N	NO	BSL

Table 2-2

Occurrence, Distribution, and Selection of Chemicals of Potential Concern in Surface Soil

Burning Grounds, Allegany Ballistics Laboratory

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Screening [3] Toxicity Value		COPC Flag	Rationale for [4] Contaminant Deletion or Selection
7440-02-0	Nickel	16	K	33.4		MG/KG	AS01-SS11-R01X	20/20	0.11 - 0.13	33.4	156	N	NO	BSL
7782-49-2	Selenium	0.37	J	0.55	J	MG/KG	AS01-SS15-R01X	6/20	0.33 - 0.39	0.55	39.1	N	NO	BSL
7440-22-4	Silver	0.23	J	0.54	J	MG/KG	AS01-SS02-R01X	6/20	0.11 - 0.13	0.54	39.1	N	NO	BSL
7440-28-0	Thallium	0.29	J	1.1	J	MG/KG	AS01-SS11-R01X	17/20	0.22 - 0.26	1.1	0.548	N	YES	ASL
7440-31-5	Tin	4.1	J	8.4	J	MG/KG	AS01-SS14-R01X	20/20	2.6 - 3.1	8.4	4,693	N	NO	BSL
7440-62-2	Vanadium	14.6		36.7		MG/KG	AS01-SS19-R01X	20/20	0.11 - 0.13	36.7	54.8	N	NO	BSL
7440-66-6	Zinc	65.5	K	271	K	MG/KG	AS01-SS02-R01X	20/20	0.33 - 0.39	271	2,346	N	NO	BSL
14797-55-8	Nitrate	1.5		9.9		MG/KG	AS01-SS20-R01X	14/20	1.1 - 1.3	9.9	12,514	N	NO	BSL

[1] Minimum/Maximum detected concentration.

[2] Maximum concentration is used for screening.

[3] Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III, Jennifer Hubbard.
Ambient air RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1).
RBC value for Chromium VI used for total chromium.
RBC value for pyrene used as surrogate for phenanthrene.
Lead screening toxicity value is 400 mg/kg, the EPA residential soil screening level for lead.

[4] Rationale Codes
ASL = "Above Screening Level." Chemical is a COPC.
BSL = "Below Screening Level." Chemical is NOT a COPC.

Table 2-3

Occurrence, Distribution, and Selection of Chemicals of Potential Concern in Subsurface Soil

Burning Grounds, Allegany Ballistics Laboratory

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Screening [3] Toxicity Value		COPC Flag	Rationale for [4] Contaminant Deletion or Selection
79-01-6	Trichloroethene	0.005	J	0.005	J	MG/KG	AS01-SB16-R01X	1/7	4.53253394829436E-04 - 0.000803	0.005	46.9	NI	NO	BSL
	Total octachlorodibenzo-p-dioxin	4.80E-05		1.92E-04		MG/KG	AS01-SB19-R01X	7/7	0.000803 - 8.95551844120125E-04	0.000192	4.26E-02		NO	BSL
2691-41-0	HMX	0.34	J	0.34	J	MG/KG	AS01-SB14P-R01X	1/7	6.47619365115161E-04 - 0.000803	0.34	391	N	NO	BSL
	Perchlorate	0.062		2.5		MG/KG	AS01-SB17-R01X	3/7	4.79581574025057E-04 - 0.000803	2.5			YES	ASL
7429-90-5	Aluminum	9,120		10,200		MG/KG	AS01-SB17-R01X AS01-SB20-R01X	7/7	0.803 - 0.820730945139212	10200	7,821	N	YES	ASL
7440-36-0	Antimony	1.3	L	2.1	L	MG/KG	AS01-SB14-R01X	5/7	0.803 - 0.90740905734465	2.1	3.13	N	NO	BSL
7440-38-2	Arsenic	6.6		7.6		MG/KG	AS01-SB19-R01X	7/7	0.803 - 0.915608097237597	7.6	0.426	C	YES	ASL
7440-39-3	Barium	154		207		MG/KG	AS01-SB16-R01X	7/7	0.803 - 0.825014623538297	207	548	N	NO	BSL
7440-41-7	Beryllium	1.1		1.3		MG/KG	AS01-SB18-R01X	7/7	0.803 - 0.840549555087357	1.3	15.6	N	NO	BSL
7440-47-3	Chromium	14.8	J	16.1	J	MG/KG	AS01-SB19-R01X	7/7	0.803 - 0.980984204204003	16.1	23.5	N	NO	BSL
7440-48-4	Cobalt	14.7		16.4		MG/KG	AS01-SB18-R01X	7/7	0.803 - 0.943776894852616	16.4	469	N	NO	BSL
7440-50-8	Copper	16.2		18.6		MG/KG	AS01-SB19-R01X	7/7	0.803 - 0.960724130791004	18.6	313	N	NO	BSL
7439-89-6	Iron	31,600		33,500		MG/KG	AS01-SB20-R01X	7/7	0.803 - 0.954699480621475	33500	2,346	N	YES	ASL
7439-92-1	Lead	15.9	K	25	K	MG/KG	AS01-SB19-R01X	7/7	0.803 - 0.839748378478619	25	400		NO	BSL
7439-96-5	Manganese	926		1,170		MG/KG	AS01-SB18-R01X	7/7	0.803 - 0.981425222916952	1170	156	N	YES	ASL
7440-02-0	Nickel	23.7	J	27.1	J	MG/KG	AS01-SB18-R01X	7/7	0.803 - 0.941818094056082	27.1	156	N	NO	BSL
7782-49-2	Selenium	0.98	K	1.4	K	MG/KG	AS01-SB14-R01X AS01-SB19-R01X	7/7	0.803 - 0.828346337566781	1.4	39.1	N	NO	BSL
7440-28-0	Thallium	1.5		2.1		MG/KG	AS01-SB19-R01X	7/7	0.803 - 0.885966920404371	2.1	0.548	N	YES	ASL
7440-62-2	Vanadium	21.1		24.8		MG/KG	AS01-SB19-R01X	7/7	0.803 - 0.954115221062372	24.8	54.8	N	NO	BSL
7440-66-6	Zinc	66.3		78.7		MG/KG	AS01-SB20-R01X	7/7	0.803 - 0.978726026943706	78.7	2,346	N	NO	BSL
-	Total organic carbon (TOC)	8,940		12,300		MG/KG	AS01-SB19-R01X	7/7	0.803 - 0.878355193486262	12300			YES	ASL
-	pH	7.1		7.6		MG/KG	AS01-SB20-R01X	7/7	0.803 - 0.967116390896679	7.6			YES	ASL

[1] Minimum/Maximum detected concentration.

[2] Maximum concentration is used for screening.

[3] Risk-Based Concentration Table, October 27, 1999, U.S. EPA Region III, Jennifer Hubbard.
Ambient air RBC (Cancer benchmark value = 1E-06, adjusted HQ=0.1).
RBC value for Chromium VI used for total chromium.
RBC value for pyrene used as surrogate for phenanthrene.
Lead screening toxicity value is 400 mg/kg, the EPA residential soil screening level for lead.

[4] Rationale Codes
ASL = "Above Screening Level." Chemical is a COPC.
BSL = "Below Screening Level." Chemical is NOT a COPC.

Table 2-4
Risk-Based Concentrations for Screening Soil Data
Burning Grounds, Allegany Ballistics Laboratory

Chemical Name	Residential Adjusted RBC[a]		Basis
Volatile Organic Compounds (UG/KG)			
Acetone	780,000	b	Non-cancer endpoint.
Trichloroethene	47,000		Non-cancer endpoint.
Semi-volatile Organic Compounds (UG/KG)			
1,1-Biphenyl	390,000	b	Non-cancer endpoint.
Benzo(a)anthracene	870	b	Cancer endpoint.
Benzo(a)pyrene	87	b	Cancer endpoint.
Chrysene	87,000	b	Cancer endpoint.
Diethylphthalate	6,300,000	b	Non-cancer endpoint.
Dimethyl phthalate	78,000,000	b	Non-cancer endpoint.
Naphthalene	160,000	b	Non-cancer endpoint.
Phenanthrene	--		Value not available
bis(2-Ethylhexyl)phthalate	46,000	b	Cancer endpoint.
Dioxin/Furans (UG/KG)			
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.43	b	Cancer endpoint. Value is for 2,3,7,8-tetrachlorodibenzodioxin (0.0043 ug/kg), modified with a TEF=100.
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.43	b	Cancer endpoint. Value is for 2,3,7,8-tetrachlorodibenzodioxin (0.0043 ug/kg), modified with a TEF=100.
Total octachlorodibenzo-p-dioxin	43		Cancer endpoint. Value is for 2,3,7,8-tetrachlorodibenzodioxin (0.0043 ug/kg), modified with a TEF=10000.
Total octachlorodibenzofuran	43		Cancer endpoint. Value is for 2,3,7,8-tetrachlorodibenzodioxin (0.0043 ug/kg), modified with a TEF=10000.
Explosives (UG/KG)			
HMX	390,000	b	Non-cancer endpoint.
Perchlorate	--		Value not available
RDX	5,800	b	Cancer endpoint.
Total Metals (MG/KG)			
Aluminum	7,800	b	Non-cancer endpoint.
Antimony	3.1	b	Non-cancer endpoint.
Arsenic	0.43	b	Cancer endpoint.
Barium	550	b	Non-cancer endpoint.
Beryllium	16	b	Non-cancer endpoint.
Cadmium	3.9	b	Non-cancer endpoint. Value is for exposure to cadmium through ingestion of water.
Chromium	23	b	Non-cancer endpoint. Value is for hexavalent chromium.
Cobalt	160	b	Non-cancer endpoint.
Copper	310	b	Non-cancer endpoint.
Cyanide	160	b	Non-cancer endpoint.
Iron	4,700	b	Non-cancer endpoint.
Lead	400		Non-cancer endpoint.
Manganese	160	b	Non-cancer endpoint. Value is the non-food value.
Mercury	2.3	b	Non-cancer endpoint. Value is for mecuric chloride.
Nickel	160	b	Non-cancer endpoint.
Selenium	39	b	Non-cancer endpoint.

Table 2-4
Risk-Based Concentrations for Screening Soil Data
Burning Grounds, Allegany Ballistics Laboratory

Chemical Name	Residential Adjusted RBC[a]		Basis
Silver	39	b	Non-cancer endpoint.
Thallium	0.55	b	Non-cancer endpoint.
Tin	4,700	b	Non-cancer endpoint.
Vanadium	55	b	Non-cancer endpoint.
Zinc	2,300	b	Non-cancer endpoint.
Wet Chemistry (MG/KG)			
Nitrate	13,000	b	Non-cancer endpoint.

Notes
[a] RBCs for non-cancer endpoints were modified by changing the target hazard quotient from 1.0 to 0.1 to account for possible cumulative effects.
[b] Value from USEPA, Region III (verified 9/25/2001).

Table 2-5

Chemicals of Potential Concern (COPCs) in Surface and Subsurface Soil

Burning Grounds, Allegany Ballistics Laboratory

CAS Number	COPC
Surface Soil	
	Perchlorate
7429-90-5	Aluminum
7440-38-2	Arsenic
7440-43-9	Cadmium
7440-47-3	Chromium
7439-89-6	Iron
7439-92-1	Lead
7439-96-5	Manganese
7440-28-0	Thallium
Subsurface Soil	
	Perchlorate
7429-90-5	Aluminum
7440-38-2	Arsenic
7439-96-5	Manganese
7440-28-0	Thallium

Table 2-6
Summary of Exposure Point Concentrations in Soil
Burning Grounds, Allegany Ballistics Laboratory

Analyte Name	EPC (soil)	Statistic
Surface Soil		
Organics (UG/KG)		
Perchlorate	880	Max
Total Metals (MG/KG)		
Aluminum	8,522	95% UCL (Ln)
Arsenic	7.3	95% UCL (Ln)
Cadmium	23.8	Max
Chromium	16.5	Max
Iron	29,476	95% UCL (Norm)
Lead	1,730	Max
Manganese	945	95% UCL (Norm)
Thallium	0.65	95% UCL (Norm)
Subsurface Soil		
Organics (UG/KG)		
Perchlorate	2,500	Max
Total Metals (MG/KG)		
Aluminum	10,119	95% UCL (Ln)
Arsenic	7.3	95% UCL (Ln)
Manganese	1117	95% UCL (Ln)
Thallium	2.0	95% UCL (Ln)

Table 2-7
Standard Default Exposure Assumptions
Burning Grounds, Allegany Ballistics Laboratory

Exposure Factor	Description	Default Value	Units	Source
EPC_{soil}	Exposure point concentration of contaminant in soil	Site and chemical specific	mg/kg	--
EF_o	Exposure frequency for occupational receptor	250	d/y	USEPA Region III (USEPA, 1999)
ED_o	Exposure duration for occupational receptor	25	y	USEPA Region III (USEPA, 1999)
BW_a	Body weight for an adult	70	kg	USEPA Region III (USEPA, 1999)
AT_n	Averaging time for noncarcinogen	9,125	d	USEPA Region III (USEPA, 1999)
AT_c	Averaging time for carcinogen	25,550	d	USEPA Region III (USEPA, 1999)
IRA_a	Inhalation rate for adult	20	m^3/d	USEPA Region III (USEPA, 1999)
PEF	Particulate emission factor	1.32E+09	m^3/kg	USEPA Region IX (USEPA, 2000)
IRS_a	Rate of incidental ingestion of soil for an adult	100	mg/d	USEPA Region III (USEPA, 1999)
FC	Fraction of contaminated soil ingested	0.5	unitless	USEPA Region III (USEPA, 1999)
SA_a	Skin surface area exposed in an occupational setting	3,300	cm^2/d	USEPA Region IX (USEPA, 2000)
AF	Skin adherence factor	0.2	mg/cm^2	USEPA Region IX (USEPA, 2000)
ABS	Dermal absorption factor	Chemical specific	unitless	--

Table 2-8
Dermal Absorption Factors for COPCs
Burning Grounds, Allegany Ballistics Laboratory

Chemical	ABS[a]
Perchlorate	--
Aluminum	--
Arsenic	0.03
Cadmium	--
Chromium	--
Iron	--
Lead	--
Manganese	--
Thallium	--

[a]Values from USEPA (2000), as cited in USEPA Region IX PRG Technical Support Documentation.

"--" Indicates that no value is recommended in USEPA (2000). Dermal exposure is not estimated for these chemicals.

Table 2-9
Noncarcinogenic Hazards and Cancer Risks from Surface Soil
Burning Grounds, Allegany Ballistics Laboratory

Analyte Name	EPC (mg/kg)[a]	Noncarcinogenic Effects RFDo (mg/kg-d)	Noncarcinogenic Effects RFDI (mg/kg-d)	ADI_{SI} (mg/kg-d)	ADI_{Derm} (mg/kg-d)	ADI_{Inh} (mg/kg-d)	HQ_{SI}	HQ_{Derm}	HQ_{Inh}	Chemical Specific Total HQ	Carcinogenic Effects CSFo (mg/kg-d)$^{-1}$	Carcinogenic Effects CSFI (mg/kg-d)$^{-1}$	ADI_{SI} (mg/kg-d)	ADI_{Derm} (mg/kg-d)	ADI_{Inh} (mg/kg-d)	Cancer Risk-oral	Cancer Risk-dermal	Cancer Risk-Inhalation	Chemical Specific Total Risk
Surface Soil																			
Aluminum	8.52E+03	1.00E+00 c	1.00E-03 c	4.17E-03	--	6.34E-07	4.17E-03	--	6.34E-04	4.80E-03	nc	nc							
Arsenic	7.32E+00	3.00E-04 b	na b	3.58E-06	7.09E-07	5.44E-10	1.19E-02	2.36E-03	1.81E-06	1.43E-02	1.50E+00 b	1.51E+01 e	1.28E-06	2.53E-07	1.94E-10	1.92E-06	3.80E-07	2.94E-09	2.30E-06
Cadmium	2.38E+01	5.00E-04 b	5.7E-05 c	1.16E-05	--	1.77E-09	2.33E-02	--	3.10E-05	2.33E-02	na b	6.30E+00 e			6.32E-10			3.98E-09	3.98E-09
Chromium	1.65E+01	3.00E-03 b	3.00E-05 e	8.07E-06	--	1.23E-09	2.69E-03	--	4.09E-05	2.73E-03	nc b	4.10E+01 f			4.38E-10			1.80E-08	1.80E-08
Iron	2.95E+04	3.00E-01 c	na c	1.44E-02	--	2.19E-06	4.81E-02	--	7.31E-06	4.81E-02	nc b	nc b							
Manganese	9.45E+02	1.40E-01 b	5.00E-05 b	4.62E-04	--	7.02E-08	3.30E-03	--	1.40E-03	4.71E-03	nc b	nc b							
Thallium	6.51E-01	7.00E-05 d	na	3.19E-07	--	4.84E-11	4.55E-03	--	6.92E-07	4.55E-03	nc b	nc b							
															Route-specific cancer risk	1.92E-06	3.80E-07	2.49E-08	
																		Total cancer risk	**2.32E-06**

[a]Concentrations from EPC table; concentrations in UG/KG converted to MG/KG by multiplying by 0.001.
[b]IRIS, (8/2/2001)
[c]NCEA, cited in USEPA Region III RBC table
[d]Source is "other" as provided in USEPA Region III RBC table
[e]IRIS, cited in USEPA Region III RBC table
[f]HEAST, cited in USEPA Region III RBC table

Table 2-10
Noncarcinogenic Hazards and Cancer Risks from Subsurface Soil
Burning Grounds, Allegany Ballistics Laboratory

		Noncarcinogenic Effects									Carcinogenic Effects								
Analyte Name	EPC (mg/kg)[a]	RFDo (mg/kg-d)	RFDi (mg/kg-d)	ADI_{SI} (mg/kg-d)	ADI_{Derm} (mg/kg-d)	ADI_{Inh} (mg/kg-d)	HQ_{SI}	HQ_{Derm}	HQ_{Inh}	Chemical Specific Total HQ	CSFo $(mg/kg-d)^{-1}$	CSFI $(mg/kg-d)^{-1}$	ADI_{SI} (mg/kg-d)	ADI_{Derm} (mg/kg-d)	ADI_{Inh} (mg/kg-d)	Cancer Risk-oral	Cancer Risk-dermal	Cancer Risk-Inhalation	Chemical Specific Total Risk
Surface Soil																			
Aluminum	1.01E+04	1.00E+00 c	1.00E-03 c	4.95E-03	--	7.52E-07	4.95E-03	--	7.52E-04	5.70E-03	nc	nc							
Arsenic	7.28E+00	3.00E-04 b	na b	3.56E-06	7.05E-07	5.41E-10	1.19E-02	2.35E-03	1.80E-06	1.42E-02	1.50E+00 b	1.51E+01 e	1.27E-06	2.52E-07	1.93E-10	1.91E-06	3.78E-07	2.92E-09	2.29E-06
Manganese	1.12E+03	1.40E-01 b	5.00E-05 b	5.47E-04	--	8.31E-08	3.90E-03	--	1.66E-03	5.57E-03	nc b	nc b							
Thallium	1.98E+00	7.00E-05 d	na	9.67E-07	--	1.47E-10	1.38E-02	--	2.10E-06	1.38E-02	nc b	nc b							
													Route-specific cancer risk			1.91E-06	3.78E-07	2.92E-09	
																		Total cancer risk	2.29E-06

[a]Concentrations from EPC table; concentrations in UG/KG converted to MG/KG by multiplying by 0.001.
[b]IRIS, (8/2/2001)
[c]NCEA, cited in USEPA Region III RBC table
[d]Source is "other" as provided in USEPA Region III RBC table
[e]IRIS, cited in USEPA Region III RBC table

Table 3-1
Target Analyte Gases
Air Pathway Human Health Risk Assessment, Burning Grounds
Burning Grounds, Allegany Ballistics Laboratory

Species	Measured in SNL Testing Program?
Carbon Monoxide	yes
Sulfur Dioxide	yes
Nitrogen Dioxide	yes
Hydrogen Chloride	yes
Hydrogen Cyanide	yes
Ammonia	yes

Source: SNL, 1996

Table 3-2
Target Analyte Non-Carcinogenic Volatile and Semi-Volatile Organic Compounds
Air Pathway Human Health Risk Assessment, Burning Grounds
Burning Grounds, Allegany Ballistics Laboratory

Species	Measured in SNL Testing Program?
biphenyl	yes
di-n-propyladipate	yes
diethylenetriamine	yes
1,6-dinitropyrene	yes
2-6 dinitrotoluene	yes
dioctyl sebacate	yes
diphenylamine	yes
2,5 diphenyloxazole	yes
5-ethyl-1,3-diglycidyl-5-methylhydantoin diepoxide	no (See Note 2)
isophorone di-isocyanate	no (See Note 3)
2,2-methylenebis(methyl)-6-t-butylphenol	no (See Note 3)
1-methylnaphthalene	yes
2-methylnaphthalene	yes
naphthalene	yes
2-nitrophenylamine	yes
4-nitrophenylamine	yes
nitroglycerin	no (See Note 2)
2-nitronaphthalene	yes
4-nitrophenol	yes
1-nitropyrene	yes
phenanthrene	yes
phenol	yes
phenyidi-isodecyl phosphite	no (See Note 3)
pyrene	yes
resorcinol	yes
salicyclic acid	no (See Note 2)
triacetine	yes
1,1,3-trimethyl-3-phenyllindane	no (See Note 3)
1,3,5 trinitrobenzene	yes

Table Notes:

Note 1: The element was not expected as an emission since it is not contained in any of the material raw ingredients.

Note 2: The compound is thermally labile and not suited for conventional GC-MS analysis. Alternative methods for determination were outside the scope of work on this project.

Note 3: The component is not an ingredient in the orginal mixture of materials, nor is to be produced during combustion. As a cost containment measure, analysis was not carried out.

Source: SNL, 1996

Table 3-3
Target Analyte Carcinogenic Metals, Volatile and Semi-volatile Organic Compounds
Air Pathway Human Health Risk Assessment, Burning Grounds
Burning Grounds, Allegany Ballistics Laboratory

Species	Measured in SNL Testing Program?
arsenic	No (See Note 1)
cadmium	No (See Note 1)
chromium (VI)	No (See Note 1)
nickel	yes
benz(a)anthracene	yes
benzene	yes
benzo(a)pyrene	yes
dibenz(a,h)anthracene	yes
dibenzofuran	yes
2,4-dinitrotoluene	yes
2-naphthylamine	yes
N-nitrosodiphenylamine	yes
4-nitrosodiphenylamine	yes

Table Notes:

Note 1: The element was not expected as an emission since it is not contained in any of the material raw ingredients.

Note 2: The compound is thermally labile and not suited for conventional GC-MS analysis. Alternative methods for determination were outside the scope of work on this project.

Note 3: The component is not an ingredient in the orginal mixture of materials, nor is to be produced during combustion. As a cost containment measure, analysis was not carried out

Table 3-4

Target Analyte Non-Carcinogenic Heavy Metals

Air Pathway Human Health Risk Assessment, Burning Grounds
Burning Grounds, Allegany Ballistics Laboratory

Target Species	Measured in SNL Testing Program?
aluminum	yes
antimony	No (See Note 1)
arsenic	No (See Note 1)
barium	No (See Note 1)
cadmium	No (See Note 1)
chromium	No (See Note 1)
copper	yes
iron	yes
lead	yes
nickel	yes

Table Notes:

Note 1: The element was not expected as an emission since it is not contained in any of the material raw ingredients.

Note 2: The compound is thermally labile and not suited for conventional GC-MS analysis. Alternative methods for determination were outside the scope of work on this project.

Note 3: The component is not an ingredient in the orginal mixture of materials, nor is to be produced during combustion. As a cost containment measure, analysis was not carried out

Source: SNL. 1996

Table 3-5

Constituents Detected in Emissions from Pure Energetic Materials and P/E Materials

Air Pathway Human Health Risk Assessment, Burning Grounds

Burning Grounds, Allegany Ballistics Laboratory

Emissions Constituent	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	Mix #1 - Double Base - Sawdust - Acetone	Mix #2 - PBX - Composite - Sawdust - Acetone - Misc. Waste
1,3-Butadiene	no	no	no	no	no	no
1,6-Dinitropyrene	no	no	no	no	no	no
1-Methylnaphthalene	yes	yes	yes	no	no	no
1-Nitropyrene	no	no	no	no	no	no
2,4-Dinitrotoluene	no	no	no	no	no	no
2,5-Diphenyloxazole	yes	yes	yes	yes	no	no
2,6-Dinitrotoluene	yes	yes	yes	yes	no	no
2-Methylnaphthalene	yes	yes	yes	no	no	no
2-Nitronaphthalene	no	yes	yes	yes	no	no
4-Nitrophenol	no	no	no	no	no	no
4-Nitrosodiphenylamine	no	no	no	no	no	no
Benzo[a]anthracene	no	yes	yes	no	no	no
Benzene	yes	yes	yes	no	no	no
Benzo[a]pyrene	no	no	no	no	no	no
Biphenyl	yes	yes	yes	yes	no	no
Dibenz[a,h]anthracene	no	no	no	no	no	no
Dibenzofuran	yes	yes	yes	yes	no	no
Di-n-propyl adipate	no	no	no	yes	no	no
Dioxin	no	no	no	no	no	yes
Diphenylamine	yes	no	no	yes	no	no
Mesitylene	yes	yes	yes	yes	no	no
Naphthalene	yes	yes	yes	yes	no	no
n-Hexane	no	no	no	no	no	no
N-Nitrosodiphenylamine	no	no	no	no	no	no
Phenanthrene	yes	yes	yes	yes	no	no
Phenol	no	yes	yes	yes	no	no
Pyrene	no	no	no	no	no	no
Resorcinol	yes	yes	yes	yes	no	no
Styrene	no	no	no	no	no	no
Thianaphthene	no	no	no	no	no	no
Toluene	yes	yes	no	no	no	yes
Tractin	no	no	no	no	no	no
Xylenes	no	yes	no	yes	no	yes
Aluminum	yes	NA	NA	NA	NA	NA
Lead	NA	NA	yes	NA	NA	NA
Zirconium	NA	yes	yes	NA	NA	NA
copper	NA	NA	NA	yes	NA	NA
Iron	NA	NA	NA	yes	NA	NA

Notes:

NA - reported as Not Analyzed in SNL, 1996.

Table 3-6
Summary of COPCs Evaluated in the Risk Assessment
Air Pathway Human Health Risk Assessment, Burning Grounds
Burning Grounds, Allegany Ballistics Laboratory

Chemical	CAS Number
1,3-Butadiene	106-99-0
1,6-Dinitropyrene	42397-64-8
1-Methylnaphthalene	90-12-0
1-Nitropyrene	5522-43-0
2,4-Dinitrotoluene	121-14-2
2,5-Diphenyloxazole	92-71-7
2,6-Dinitrotoluene	606-20-2
2-Methylnaphthalene	91-57-6
2-Nitronaphthalene	581-89-5
4-Nitrophenol	100-02-7
4-Nitrosodiphenylamine	156-10-5
Benzo[a]anthracene	56-55-3
Benzene	71-43-2
Benzo[a]pyrene	50-32-8
Biphenyl (1,1-Biphenyl)	92-52-4
Dibenz[a,h]anthracene	53-70-3
Dibenzofuran	132-64-9
Di-n-propyl adipate (Dipropyl adipate)	106-19-4
Dioxin	1746-01-6
Diphenylamine	122-39-4
Mesitylene (1,3,5-trimethylbenzene)	108-67-8
Naphthalene	91-20-3
n-Hexane	110-54-3
N-Nitrosodiphenylamine	86-30-6
Phenanthrene	85-01-8
Phenol	108-95-2
Pyrene	129-00-0
Resorcinol	108-46-3
Styrene	100-42-5
Thianaphthene (benzo[b]thiophene)	95-15-8
Toluene	108-88-3
Triacetin	102-76-1
Xylenes	106-42-3
Aluminum	7429-90-5
Lead	7439-92-1
Zirconium	7440-67-7
Copper	7440-50-8
Iron	7439-89-6

Table 3-7

Emissions Factors for Pure Propellant and Explosive Materials

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Constituent	Reported Values - SLN 1996 Emissions Test (g/kg)				Calculated Emission Factors (g/kg)				Calculated Emission Factors (g/g)			
	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive
1,3-Butadiene	< 1.60E-02	< 2.20E-02	< 4.50E-03	< 3.10E-03	8.00E-03	1.10E-02	2.25E-03	1.55E-03	8.00E-06	1.10E-05	2.25E-06	1.55E-06
1,6-Dinitropyrene	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
1-Methylnaphthalene	2.40E-03	9.00E-04	1.20E-04	< 4.80E-04	2.40E-03	9.00E-04	1.20E-04	2.40E-04	2.40E-06	9.00E-07	1.20E-07	2.40E-07
1-Nitropyrene	< 4.40E-03	< 8.50E-05	< 5.40E-05	< 4.90E-05	2.20E-03	4.25E-05	2.70E-05	2.45E-05	2.20E-06	4.25E-08	2.70E-08	2.45E-08
2,4-Dinitrotoluene	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
2,5-Diphenyloxazole	9.50E-04	4.30E-07	1.70E-04	2.50E-04	9.50E-04	4.30E-07	1.70E-04	2.50E-04	9.50E-07	4.30E-10	1.70E-07	2.50E-07
2,6-Dinitrotoluene	7.20E-06	5.80E-03	4.70E-03	5.40E-03	7.20E-06	5.80E-03	4.70E-03	5.40E-03	7.20E-09	5.80E-06	4.70E-06	5.40E-06
2-Methylnaphthalene	2.40E-03	9.00E-04	1.20E-04	< 4.80E-04	2.40E-03	9.00E-04	1.20E-04	2.40E-04	2.40E-06	9.00E-07	1.20E-07	2.40E-07
2-Nitronaphthalene	< 5.40E-04	1.70E-03	2.30E-04	3.80E-04	2.70E-04	1.70E-03	2.30E-04	3.80E-04	2.70E-07	1.70E-06	2.30E-07	3.80E-07
4-Nitrophenol	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
4-Nitrosodiphenylamine	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
Benzo[a]anthracene	< 9.00E-05	4.40E-03	3.30E-03	< 3.30E-03	4.50E-05	4.40E-03	3.30E-03	1.65E-03	4.50E-08	4.40E-06	3.30E-06	1.65E-06
Benzene	1.10E+00	1.50E-01	2.10E-02	< 3.10E-03	1.10E+00	1.50E-01	2.10E-02	1.55E-03	1.10E-03	1.50E-04	2.10E-05	1.55E-06
Benzo[a]pyrene	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
Biphenyl	4.70E-03	1.00E-03	1.90E-04	1.30E-03	4.70E-03	1.00E-03	1.90E-04	1.30E-03	4.70E-06	1.00E-06	1.90E-07	1.30E-06
Dibenz[a,h]anthracene	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
Dibenzofuran	1.00E-03	6.90E-04	1.70E-04	1.40E-04	1.00E-03	6.90E-04	1.70E-04	1.40E-04	1.00E-06	6.90E-07	1.70E-07	1.40E-07
Di-n-propyl adipate	< 2.70E-03	< 2.70E-03	< 9.50E-04	9.00E-04	1.35E-03	1.35E-03	4.75E-04	9.00E-04	1.35E-06	1.35E-06	4.75E-07	9.00E-07
Dioxin	< 6.50E-04	< 6.50E-04	< 4.90E-04	< 4.90E-04	3.25E-04	3.25E-04	2.45E-04	2.45E-04	2.60E-11	2.60E-11	2.60E-11	2.60E-11
Diphenylamine	1.90E-04	< 1.90E-04	< 1.40E-04	1.40E-04	1.90E-04	9.50E-05	7.00E-05	1.40E-04	1.90E-07	9.50E-08	7.00E-08	1.40E-07
Mesitylene	3.50E-05	5.90E-05	8.40E-05	3.00E-04	3.50E-05	5.90E-05	8.40E-05	3.00E-04	3.50E-08	5.90E-08	8.40E-08	3.00E-07
Naphthalene	1.10E-03	3.90E-03	7.10E-05	2.50E-04	1.10E-03	3.90E-03	7.10E-05	2.50E-04	1.10E-06	3.90E-06	7.10E-08	2.50E-07
n-Hexane	< 1.60E-02	< 2.20E-02	< 4.50E-03	< 3.10E-03	8.00E-03	1.10E-02	2.25E-03	1.55E-03	8.00E-06	1.10E-05	2.25E-06	1.55E-06
N-Nitrosodiphenylamine	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
Phenanthrene	2.00E-03	2.90E-04	3.50E-04	1.10E-04	2.00E-03	2.90E-04	3.50E-04	1.10E-04	2.00E-06	2.90E-07	3.50E-07	1.10E-07
Phenol	< 2.80E-03	2.80E-03	2.30E-04	6.20E-04	1.40E-03	2.80E-03	2.30E-04	6.20E-04	1.40E-06	2.80E-06	2.30E-07	6.20E-07
Pyrene	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
Resorcinol	5.50E-03	2.30E-03	6.00E-03	1.20E-03	5.50E-03	2.30E-03	6.00E-03	1.20E-03	5.50E-06	2.30E-06	6.00E-06	1.20E-06
Styrene	< 1.60E-02	< 2.20E-02	< 5.30E-03	< 3.10E-03	8.00E-03	1.10E-02	2.65E-03	1.55E-03	8.00E-06	1.10E-05	2.65E-06	1.55E-06
Thianaphthene	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
Toluene	1.60E-02	1.10E-01	< 5.30E-03	< 3.10E-03	1.60E-02	1.10E-01	2.65E-03	1.55E-03	1.60E-05	1.10E-04	2.65E-06	1.55E-06
Tractin	< 9.00E-05	< 8.50E-05	< 5.40E-05	< 4.90E-05	4.50E-05	4.25E-05	2.70E-05	2.45E-05	4.50E-08	4.25E-08	2.70E-08	2.45E-08
Xylenes	< 1.60E-02	8.60E-02	< 5.30E-03	6.20E-03	8.00E-03	8.60E-02	2.65E-03	6.20E-03	8.00E-06	8.60E-05	2.65E-06	6.20E-06
Aluminum	1.00E+02	NA	NA	NA	1.00E+02	NA	NA	NA	1.00E-01	NA	NA	NA
Lead	NA	NA	8.80E+00	NA	NA	NA	8.80E+00	NA	NA	NA	8.80E-03	NA
Zirconium	NA	8.80E+00	8.80E+00	NA	NA	8.80E+00	8.80E+00	NA	NA	8.80E-03	8.80E-03	NA
copper	NA	NA	NA	4.00E+01	NA	NA	NA	1.00E+00	NA	NA	NA	1.00E-03
Iron	NA	NA	NA	1.10E-02	NA	NA	NA	1.10E-02	NA	NA	NA	1.10E-05

Notes:

SNL - Sandia National Laboratory

Calculated emissions factors for nondetected constituents are based on the assumption that the constituent was present in emissions at 1/2 the detection limit.

Emission factor for dioxin based on SNL testing is uncertain. Speciated congeners were not reported such that toxic equivalents could not be calculated. Values were 3 to 4 orders of magnitude higher than emissions factors available in the literature (Mitchell and Suggs, 1998). Literature value was used for calculated dioxin emissions factor. See Table 6-3 and the narrative for further discussion.

Emission factor for copper exceeds mass of this constituent in PBX explosive (concentration of constituent in waste type is 0.1 percent or 1 g/kg). Emission factor is based on mass balance (1 g/kg), assuming that all of the constituent from waste burning is emitted into the air..

Table 3-8
Emissions Factors for P/E Contaminated Material
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Constituent	Reported Values - 1996 SNL Emissions Test (g/g)		Calculated Emissions Factors (g/g)	
	Type 1 P/E Waste	Type 2 P/E Waste	Type 1 P/E Waste	Type 2 P/E Waste
1,3-Butadiene	< 3.30E-04	< 4.80E-07	1.65E-04	2.40E-07
1,6-Dinitropyrene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
1-Methylnaphthalene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
1-Nitropyrene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
2,4-Dinitrotoluene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
2,5-Diphenyloxazole	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
2,6-Dinitrotoluene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
2-Methylnaphthalene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
2-Nitronaphthalene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
4-Nitrophenol	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
4-Nitrosodiphenylamine	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Benzo[a]anthracene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Benzene	< 3.30E-04	< 4.80E-07	1.65E-04	2.40E-07
Benzo[a]pyrene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Biphenyl	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Dibenz[a,h]anthracene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Dibenzofuran	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Di-n-propyl adipate	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Dioxin	< 5.50E-08	1.00E-07	2.60E-11	2.60E-11
Diphenylamine	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Mesitylene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Naphthalene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
n-Hexane	< 3.30E-04	< 4.80E-07	1.65E-04	2.40E-07
N-Nitrosodiphenylamine	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Phenanthrene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Phenol	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Pyrene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Resorcinol	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Styrene	< 3.30E-04	< 4.80E-07	1.65E-04	2.40E-07
Thianaphthene	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Toluene	< 3.30E-04	3.50E-03	1.65E-04	3.50E-03
Tractin	< 1.10E-08	< 1.80E-08	5.50E-09	9.00E-09
Xylenes	< 3.30E-04	9.40E-04	1.65E-04	9.40E-04

Notes:
SNL - Sandia National Laboratory
Calculated emissions factors for nondetected constituents are based on the assumption that the constituent was present in emissions at 1/2 the detection limit.

Emission factor for dioxin based on SNL testing is uncertain. Speciated congeners were not reported such that toxic equivalents could not be calculated. Values were 3 to 4 orders of magnitude higher than emissions factors available in the literature (Mitchell and Suggs, 1998). Literature value was used for calculated dioxin emissions factor. See Table 6-3 and the narrative for further discussion.

Table 3-9

Evaluation of Dioxin/Furan Emissions Factors

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Constituent	TEF	Emission Factor	Emission Factor - 2,3,7,8-Toxic Equivalent	Source
HpCDF	0.01	3.40E-08	3.40E-10	Mitchell and Suggs, 1998
HxCDF	0.1	2.10E-08	2.10E-09	Mitchell and Suggs, 1998
HpCDF	0.01	7.90E-09	7.90E-11	Mitchell and Suggs, 1998
HxCDF	0.1	9.50E-09	9.50E-10	Mitchell and Suggs, 1998
OCDD	0.0001	1.00E-11	1.00E-15	Mitchell and Suggs, 1998
OCDF	0.0001	4.00E-08	4.00E-12	Mitchell and Suggs, 1998
EF-MQL		2.60E-11		Mitchell and Suggs, 1998
Dioxin, not otherwise specified		<6.50E-07 to 1E-07		SNL, 1996
PCDDs, not otherwise specified		2.50E-15		AMCCOM, 1992 (cited in SNL, 1996)

Notes:

EF-MQL - Emission Factor based on minimum quantitation limit

TEF - 2,3,7,8-TCDD toxicity equivalent factor

Table 3-10
Calculated Annual Emissions Rates for Each Waste Type and Maximum Emission Rates
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Constituent	Calculated Annual Emission Rates from Each Waste Type (lbs/yr)							Annual Emissions Rates Used in Modeling	
	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	Type 1 P/E Waste	Type 2 P/E Waste	Maximum	Maximum Emission Rate (g/s)	Waste Type Associated with Maximum Emission Rate
1,3-Butadiene	2.4E+00	3.3E+00	6.8E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste
1,6-Dinitropyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
1-Methylnaphthalene	7.2E-01	2.7E-01	3.6E-02	7.2E-02	1.7E-03	2.7E-03	7.2E-01	1.0E-05	Al Composite Propellant
1-Nitropyrene	6.6E-01	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	6.6E-01	9.5E-06	Al Composite Propellant
2,4-Dinitrotoluene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
2,5-Diphenyloxazole	2.9E-01	1.3E-04	5.1E-02	7.5E-02	1.7E-03	2.7E-03	2.9E-01	4.1E-06	Al Composite Propellant
2,6-Dinitrotoluene	2.2E-03	1.7E+00	1.4E+00	1.6E+00	1.7E-03	2.7E-03	1.7E+00	2.5E-05	Composite Propellant
2-Methylnaphthalene	7.2E-01	2.7E-01	3.6E-02	7.2E-02	1.7E-03	2.7E-03	7.2E-01	1.0E-05	Al Composite Propellant
2-Nitroaphthalene	8.1E-02	5.1E-01	6.9E-02	1.1E-01	1.7E-03	2.7E-03	5.1E-01	7.4E-06	Composite Propellant
4-Nitrophenol	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
4-Nitrosodiphenylamine	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
Benzo[a]anthracene	1.4E-02	1.3E+00	9.9E-01	5.0E-01	1.7E-03	2.7E-03	1.3E+00	1.9E-05	Composite Propellant
Benzene	3.3E+02	4.5E+01	6.3E+00	4.7E-01	5.0E+01	7.2E-02	3.3E+02	4.8E-03	Al Composite Propellant
Benzo[a]pyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
Biphenyl	1.4E+00	3.0E-01	5.7E-02	3.9E-01	1.7E-03	2.7E-03	1.4E+00	2.0E-05	Al Composite Propellant
Dibenz[a,h]anthracene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
Dibenzofuran	3.0E-01	2.1E-01	5.1E-02	4.2E-02	1.7E-03	2.7E-03	3.0E-01	4.3E-06	Al Composite Propellant
Di-n-propyl adipate	4.1E-01	4.1E-01	1.4E-01	2.7E-01	1.7E-03	2.7E-03	4.1E-01	5.8E-06	Al Composite Propellant
Dioxin	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	1.1E-10	Al Composite Propellant
Diphenylamine	5.7E-02	2.9E-02	2.1E-02	4.2E-02	1.7E-03	2.7E-03	5.7E-02	8.2E-07	Al Composite Propellant
Mesitylene	1.1E-02	1.8E-02	2.5E-02	9.0E-02	1.7E-03	2.7E-03	9.0E-02	1.3E-06	PBX Explosive
Naphthalene	3.3E-01	1.2E+00	2.1E-02	7.5E-02	1.7E-03	2.7E-03	1.2E+00	1.7E-05	Composite Propellant
n-Hexane	2.4E+00	3.3E+00	6.8E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste
N-Nitrosodiphenylamine	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
Phenanthrene	6.0E-01	8.7E-02	1.1E-01	3.3E-02	1.7E-03	2.7E-03	6.0E-01	8.6E-06	Al Composite Propellant
Phenol	4.2E-01	8.4E-01	6.9E-02	1.9E-01	1.7E-03	2.7E-03	8.4E-01	1.2E-05	Composite Propellant
Pyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
Resorcinol	1.7E+00	6.9E-01	1.8E+00	3.6E-01	1.7E-03	2.7E-03	1.8E+00	2.6E-05	Double Base Propellant
Styrene	2.4E+00	3.3E+00	8.0E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste
Thianaphthene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
Toluene	4.8E+00	3.3E+01	8.0E-01	4.7E-01	5.0E+01	1.1E+03	1.1E+03	1.5E-02	Type 2 P/E Waste
Tractin	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant
Xylenes	2.4E+00	2.6E+01	8.0E-01	1.9E+00	5.0E+01	2.8E+02	2.8E+02	4.1E-03	Type 2 P/E Waste
Aluminum	3.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.0E+04	4.3E-01	Al Composite Propellant
Lead	0.0E+00	0.0E+00	2.6E+03	0.0E+00	0.0E+00	0.0E+00	2.6E+03	3.8E-02	Double Base Propellant
Zirconium	0.0E+00	2.6E+03	2.6E+03	0.0E+00	0.0E+00	0.0E+00	2.6E+03	3.8E-02	Composite Propellant
copper	0.0E+00	0.0E+00	0.0E+00	3.0E+02	0.0E+00	0.0E+00	3.0E+02	4.3E-03	PBX Explosive
Iron	0.0E+00	0.0E+00	0.0E+00	3.3E+00	0.0E+00	0.0E+00	3.3E+00	4.8E-05	PBX Explosive

Table 3-11
Dispersion Modeling Summary
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Summary of Modeling Assumption/Emission Rates Used in Modeling

Fuel Material	Number of Burns	Burn Times	Burn Pans used	Amount of Waste per Burn (lbs.)	Days Excluded from OB Activities (Based on the model runs)	Emission Factor (g/g)	Compound Used for Emission Factor Development	Annual Quantities of Fuel Material (lbs/year)	Compound Emission Rate (lbs/year)	Compound Emission Rate (g/s)
Aluminized Composite Propellant	1	900	all	1630	Weekends and days when wind is between 120-260 and >1m/s.	0.057	PM10	300000	17100	2.46E-01
Non-Aluminized Composite Propellant	1	900	all	1630	Weekends and days when wind is between 120-260 and >1m/s.	0.0286	HCl	300000	8580	1.24E-01
Double Base Propellant	1	900	all	1630	Weekends and days when wind is between 120-260 and >1m/s.	0.0088	Lead	300000	2640	3.80E-02
Plastic-Bonded Explosives	2	0900 and 1200	all	1630	none	0.0014	SO2	300000	420	6.05E-03
Mixed Waste	2	0900 and 1200	all	1630	none	0.083	CO	300000	24900	3.59E-01

Concentration at Receptor Location (ug/m^3), Based on OBODM Model Output

Receptor	UTM Coordinates		Aluminized Composite	Non-Aluminized Composite	Double Base	PBX	P/E Waste Type 1	P/E Waste Type 2
	X	Y	PM10 - annual	HCl - annual	Pb-annual	SOx-annual	CO - annual	CO - annual
Closest Offsite Resident	686046	4381966	5.61E-01	3.01E-01	9.40E-02	5.20E-02	4.07E+00	4.07E+00
Potomac River	684546	4380966	1.01E-01	5.34E-02	1.66E-02	9.20E-03	6.74E-01	6.74E-01
	685046	4382466	2.89E-01	1.50E-01	4.67E-02	1.56E-02	1.05E+00	1.05E+00
	685546	4382566	2.07E-01	1.08E-01	3.36E-02	1.30E-02	9.21E-01	9.21E-01
	687046	4380966	2.35E-01	1.27E-01	3.98E-02	1.64E-02	1.18E+00	1.18E+00
	687546	4380966	8.27E-02	4.39E-02	1.37E-02	6.95E-03	4.45E-01	4.45E-01
Maximum Concentration within Property Fenceline			1.53E+01	1.06E+01	3.56E+00	2.17E+00	3.52E+02	3.52E+02
Maximum Concentration outside of Fenceline	686146	4381666	1.75E+00	1.17E+00	4.19E-01	2.28E-01	3.85E+01	3.85E+01
Average Concentration Over River			1.83E-01	9.66E-02	3.01E-02	1.22E-02	8.55E-01	8.55E-01
Emission Rate (g/s)			2.46E-01	1.24E-01	3.80E-02	6.05E-03	3.59E-01	3.59E-01

Concentration per Unit Emission Rate (ug/m^2 per g/s)

Receptor	UTM Coordinates		Aluminized Composite	Non-Aluminized Composite	Double Base	PBX	P/E Waste Type 1	P/E Waste Type 2
Closest Offsite Resident	686046	4381966	2.28E+00	2.43E+00	2.47E+00	8.59E+00	1.14E+01	1.14E+01
Potomac River	684546	4380966	4.11E-01	4.32E-01	4.37E-01	1.52E+00	1.88E+00	1.88E+00
	685046	4382466	1.17E+00	1.22E+00	1.23E+00	2.58E+00	2.93E+00	2.93E+00
	685546	4382566	8.40E-01	8.74E-01	8.82E-01	2.14E+00	2.57E+00	2.57E+00
	687046	4380966	9.55E-01	1.03E+00	1.05E+00	2.72E+00	3.29E+00	3.29E+00
	687546	4380966	3.35E-01	3.55E-01	3.60E-01	1.15E+00	1.24E+00	1.24E+00
Maximum Concentration within Property Fenceline			6.22E+01	8.55E+01	9.35E+01	3.58E+02	9.82E+02	9.82E+02
Maximum Concentration outside of Fenceline	686146	4381666	7.11E+00	9.49E+00	1.10E+01	3.77E+01	1.07E+02	1.07E+02
Average Concentration Over River			7.43E-01	7.81E-01	7.91E-01	2.02E+00	2.38E+00	2.38E+00

Table 3-12
Identification of Exposure Pathways
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Receptors	Media	Potential Routes of Exposure
Offsite Resident	Offsite Soil	Incidental Ingestion of Soil
		Ingestion of Homegrown Fruits and Vegetables
	Ambient Air	Inhalation
Offsite Subsistance Farmer	Offsite Soil	Incidental Ingestion of Soil
		Ingestion of Homegrown Fruits and Vegetables
		Ingestion of Beef
		Ingestion of Milk
		Ingestion of Pork
		Ingestion of Chicken
		Ingestion of Eggs
	Ambient Air	Inhalation
Offsite Subsistance Fisher	Fish from the River	Ingestion of Fish

Table 3-13
Summary of Concentrations of Toxic Pollutants in Air
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Constituent	Waste Type (represents waste type providing highest emissions into the air)	Concentration Used in Risk Assessment (ug/m^3)		
		Maximum Exposed Individual (Closest Resident)	River	Concentration at Facility Fenceline
1,3-Butadiene	Type 1 P/E Waste	1.70E-04	3.57E-05	1.61E-03
1,6-Dinitropyrene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
1-Methylnaphthalene	Al Composite Propellant	2.33E-05	7.60E-06	7.62E-05
1-Nitropyrene	Al Composite Propellant	2.14E-05	6.97E-06	6.98E-05
2,4-Dinitrotoluene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
2,5-Diphenyloxazole	Al Composite Propellant	9.22E-06	3.01E-06	3.02E-05
2,6-Dinitrotoluene	Composite Propellant	1.28E-06	4.12E-07	5.00E-06
2-Methylnaphthalene	Al Composite Propellant	2.33E-05	7.60E-06	7.62E-05
2-Nitroaphthalene	Composite Propellant	3.76E-07	1.21E-07	1.47E-06
4-Nitrophenol	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
4-Nitrosodiphenylamine	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Benzo[a]anthracene	Composite Propellant	9.74E-07	3.12E-07	3.80E-06
Benzene	Al Composite Propellant	1.07E-02	3.48E-03	3.49E-02
Benzo[a]pyrene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Biphenyl	Al Composite Propellant	4.56E-05	1.49E-05	1.49E-04
Dibenz[a,h]anthracene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Dibenzofuran	Al Composite Propellant	9.71E-06	3.17E-06	3.17E-05
Di-n-propyl adipate	Al Composite Propellant	1.31E-05	4.27E-06	4.29E-05
Dioxin	Al Composite Propellant	2.52E-10	8.23E-11	8.25E-10
Diphenylamine	Al Composite Propellant	1.84E-06	6.02E-07	6.03E-06
Mesitylene	PBX Explosive	1.11E-05	2.60E-06	4.85E-05
Naphthalene	Composite Propellant	8.63E-07	2.77E-07	3.37E-06
n-Hexane	Type 1 P/E Waste	1.70E-04	3.57E-05	1.61E-03
N-Nitrosodiphenylamine	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Phenanthrene	Al Composite Propellant	1.94E-05	6.33E-06	6.35E-05
Phenol	Composite Propellant	6.20E-07	1.99E-07	2.42E-06
Pyrene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Resorcinol	Double Base Propellant	6.42E-05	2.05E-05	2.86E-04
Styrene	Type 1 P/E Waste	1.70E-04	3.57E-05	1.61E-03
Thianaphthene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Toluene	Type 2 P/E Waste	3.61E-03	7.56E-04	3.41E-02
Tractin	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Xylenes	Type 2 P/E Waste	9.68E-04	2.03E-04	9.16E-03
Aluminum	Al Composite Propellant	9.71E-01	3.17E-01	3.17E+00
Lead	Double Base Propellant	9.41E-02	3.01E-02	4.20E-01
Zirconium	Composite Propellant	1.95E-03	6.25E-04	7.59E-03
copper	PBX Explosive	3.69E-02	8.67E-03	1.62E-01
Iron	PBX Explosive	4.05E-04	9.54E-05	1.78E-03

Table 3-14

Summary of Concentrations in Environmental Media - maximum exposed individual (resident and subsistence farmer)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Annual Average Concentration in Air (ug/m3)	Average soil concentration over exposure duration - Cs (mg/kg)	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg)	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Concentration at the end of the facility operating life
1,3-Butadiene	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	4.37E-07	1.40E-07	1.41E-07	1.27E-06	1.27E-06	1.24E-08	1.25E-08	4.95E-09	5.01E-09	1.50E-05	1.50E-05
Methylnaphthalen	2.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.14E-05	1.85E-05	1.91E-05	6.25E-05	6.25E-05	8.53E-07	8.78E-07	5.22E-07	5.37E-07	7.36E-04	7.36E-04
2,4-Dinitrotoluene	4.37E-07	4.33E-10	4.33E-10	1.26E-06	1.26E-06	1 18E-09	1.18E-09	1.21E-08	1.21E-08	1.50E-05	1.50E-05
Diphenyloxazole	9.22E-06	4.85E-07	4.86E-07	2.67E-05	2.67E-05	3.75E-08	3.76E-08	7.20E-08	7.21E-08	3.17E-04	3.17E-04
2,6-Dinitrotoluene	6.10E-05	5.20E-08	5.20E-08	1.76E-04	1.76E-04	1.64E-07	1.64E-07	1.60E-06	1.60E-06	2.10E-03	2.10E-03
Methylnaphthalen	2.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitronaphthalene	1.79E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	4.37E-07	3.27E-10	3.27E-10	1.26E-06	1.26E-06	9.98E-10	9.98E-10	9.88E-09	9.89E-09	1.50E-05	1.50E-05
Nitrosodiphenyla	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ne	4.63E-05	7.27E-05	7.67E-05	1.35E-04	1.35E-04	1.47E-06	1.55E-06	1.53E-06	1.62E-06	1.59E-03	1.59E-03
Benzene	1.07E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	4.37E-07	7.87E-07	8.38E-07	1.27E-06	1.27E-06	8.74E-09	9.30E-09	9.92E-09	1.06E-08	1.50E-05	1.50E-05
Biphenyl)	4.56E-05	6.62E-07	6.62E-07	1.32E-04	1.32E-04	1.25E-07	1.25E-07	0.00E+00	0.00E+00	1.57E-03	1.57E-03
cene	4.37E-07	1.33E-06	1.49E-06	1.27E-06	1.27E-06	8.47E-09	9.50E-09	1.90E-08	2.14E-08	1.50E-05	1.50E-05
Dibenzofuran	9.71E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
adipate (Dipropyl adipate)	1.31E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TCDD)	2.52E-10	5.40E-10	5.83E-10	7.32E-10	7.32E-10	3.04E-12	3.28E-12	6.05E-12	6.53E-12	8.69E-09	8.69E-09
Diphenylamine	1.84E-06	1.93E-08	1.94E-08	5.33E-06	5.33E-06	7.30E-09	7.30E-09	3.10E-07	3.10E-07	6.35E-05	6.35E-05
Mesitylene (1,3,5-trimethylbenzene)	1.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	4.10E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrosodiphenyla	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.94E-05	4.48E-06	4.52E-06	5.65E-05	5.65E-05	4.07E-07	4.10E-07	1.60E-07	1.61E-07	6.68E-04	6.68E-04
Phenol	2.95E-05	1.59E-08	1.59E-08	8.52E-05	8.52E-05	8.60E-08	8.60E-08	6.85E-07	6.85E-07	1.01E-03	1.01E-03
Pyrene	4.37E-07	3.93E-07	4.05E-07	1.28E-06	1.28E-06	1.96E-08	2.02E-08	9.59E-09	9.88E-09	1.50E-05	1.51E-05
Resorcinol	6.42E-05	1.86E-08	1.86E-08	1.86E-04	1.86E-04	2.55E-07	2.55E-07	2.34E-06	2.34E-06	2.21E-03	2.21E-03
Styrene	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 3-14

Summary of Concentrations in Environmental Media - maximum exposed individual (resident and subsistence farmer)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Annual Average Concentration in Air (ug/m3)	Average soil concentration over exposure duration - Cs (mg/kg)	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg)	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Concentration at the end of the facility operating life
(benzo[b]thiophene)	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	3.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	4.37E-07	1.05E-10	1.05E-10	1.26E-06	1.26E-06	2.91E-09	2.91E-09	3.15E-08	3.15E-08	1.50E-05	1.50E-05
Xylenes	9.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	9.71E-01	2.08E+00	2.25E+00	2.81E+00	2.81E+00	8.33E-03	8.99E-03	1.35E-05	1.46E-05	3.34E+01	3.34E+01
Lead	9.41E-02	1.25E-01	1.31E-01	2.73E-01	2.74E-01	1.70E-03	1.78E-03	1.13E-05	1.18E-05	3.24E+00	3.24E+00
Zirconium	9.26E-02	3.66E-01	4.28E-01	2.68E-01	2.68E-01	7.32E-04	8.57E-04	1.83E-06	2.14E-06	3.19E+00	3.19E+00
copper	3.69E-02	3.26E-01	4.95E-01	2.37E-01	3.04E-01	1.31E-01	1.98E-01	8.16E-04	1.24E-03	1.40E+00	1.47E+00
Iron	4.05E-04	1.57E-05	1.57E-05	1.17E-03	1.17E-03	6.29E-08	6.29E-08	1.57E-10	1.57E-10	1.40E-02	1.40E-02

Table 3-14
Summary of Co
Air Pathway Hum
Allegany Ballistic

Chemical	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Beef (mg/kg FW) Average concentration over exposure duration	Concentration in Beef (mg/kg FW) Concentration at the end of the facility operating life	Concentration in Milk (mg/kg FW) - Average concentration over exposure duration	Concentration in Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Pork (mg/kg FW) Average concentration over exposure duration	Concentration in Pork (mg/kg FW) Concentration at the end of the facility operating life	Concentration in Chicken (mg/kg FW) - Average concentration over exposure duration	Concentration in Chicken (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	3.90E-06	3.90E-06	1.39E-07	1.39E-07	7.67E-08	7.67E-08	6.18E-08	6.18E-08	2.25E-09	2.25E-09	8.89E-07	8.89E-07
Methylnaphthalen	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	1.91E-04	1.91E-04	2.11E-05	2.11E-05	1.16E-05	1.16E-05	9.36E-06	9.36E-06	3.40E-07	3.40E-07	1.35E-04	1.35E-04
2,4-Dinitrotoluene	3.89E-06	3.89E-06	3.71E-10	3.71E-10	2.04E-10	2.04E-10	1.66E-10	1.66E-10	5.89E-12	5.89E-12	2.36E-09	2.36E-09
Diphenyloxazole	8.21E-05	8.21E-05	3.70E-06	3.70E-06	2.04E-06	2.04E-06	1.64E-06	1.64E-06	5.97E-08	5.97E-08	2.36E-05	2.36E-05
2,6-Dinitrotoluene	5.43E-04	5.43E-04	4.02E-08	4.02E-08	2.22E-08	2.22E-08	1.80E-08	1.80E-08	6.43E-10	6.43E-10	2.57E-07	2.57E-07
Methylnaphthalen	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	3.89E-06	3.89E-06	3.04E-10	3.04E-10	1.68E-10	1.68E-10	1.36E-10	1.36E-10	4.84E-12	4.84E-12	1.94E-09	1.94E-09
Nitrosodiphenyla	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ne	4.14E-04	4.14E-04	1.90E-04	1.90E-04	1.04E-04	1.04E-04	8.52E-05	8.53E-05	3.03E-06	3.03E-06	1.21E-03	1.22E-03
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	3.90E-06	3.90E-06	5.05E-06	5.06E-06	2.78E-06	2.78E-06	2.27E-06	2.28E-06	8.08E-08	8.08E-08	3.24E-05	3.24E-05
Biphenyl)	4.06E-04	4.06E-04	3.91E-06	3.91E-06	2.15E-06	2.15E-06	1.73E-06	1.73E-06	6.31E-08	6.31E-08	2.49E-05	2.49E-05
cene	3.90E-06	3.90E-06	1.33E-05	1.33E-05	7.28E-06	7.29E-06	5.97E-06	5.97E-06	2.13E-07	2.13E-07	8.50E-05	8.51E-05
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TCDD)	2.25E-09	2.25E-09	4.69E-09	4.69E-09	1.50E-09	1.50E-09	2.11E-09	2.11E-09	1.28E-10	1.28E-10	9.48E-11	9.49E-11
Diphenylamine	1.64E-05	1.64E-05	4.77E-08	4.77E-08	2.63E-08	2.63E-08	2.12E-08	2.12E-08	7.70E-10	7.70E-10	3.05E-07	3.05E-07
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nitrosodiphenyla	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.73E-04	1.73E-04	5.92E-06	5.92E-06	3.25E-06	3.25E-06	2.65E-06	2.65E-06	9.42E-08	9.42E-08	3.77E-05	3.77E-05
Phenol	2.62E-04	2.62E-04	7.58E-09	7.58E-09	4.16E-09	4.16E-09	3.39E-09	3.39E-09	1.21E-10	1.21E-10	4.83E-08	4.83E-08
Pyrene	3.91E-06	3.91E-06	3.77E-07	3.77E-07	2.07E-07	2.07E-07	1.69E-07	1.69E-07	6.01E-09	6.01E-09	2.41E-06	2.41E-06
Resorcinol	5.71E-04	5.71E-04	3.31E-09	3.31E-09	1.82E-09	1.82E-09	1.47E-09	1.47E-09	5.35E-11	5.35E-11	2.11E-08	2.11E-08
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 3-14
Summary of Co
Air Pathway Hum
Allegany Ballistic

Chemical	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Beef (mg/kg FW) - Average concentration over exposure duration	Concentration in Beef (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Milk (mg/kg FW) - Average concentration over exposure duration	Concentration in Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Pork (mg/kg FW) - Average concentration over exposure duration	Concentration in Pork (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Chicken (mg/kg FW) - Average concentration over exposure duration	Concentration in Chicken (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life
(benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	3.89E-06	3.89E-06	6.66E-12	6.66E-12	3.67E-12	3.67E-12	2.95E-12	2.95E-12	1.07E-13	1.07E-13	4.25E-11	4.25E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	8.65E+00	8.65E+00	4.99E-01	4.99E-01	1.16E-01	1.16E-01	2.22E-01	2.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	8.43E-01	8.44E-01	9.67E-03	9.68E-03	1.40E-02	1.40E-02	4.30E-03	4.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zirconium	8.25E-01	8.25E-01	1.75E-01	1.75E-01	1.65E-03	1.66E-03	7.82E-02	7.84E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
copper	4.59E-01	5.26E-01	1.43E-01	1.52E-01	3.70E-02	3.92E-02	6.51E-02	6.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	3.61E-03	3.61E-03	2.77E-03	2.77E-03	6.02E-05	6.02E-05	1.23E-03	1.23E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 3-15
Site-specific Parameters for Evaluating Environmental Fate and Transport - maximum exposed individual (offsite resident and subsistence farmer)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
Zs	2.0E+01	Soil mixing zone depth	cm	
BD	1.5E+00	Soil bulk density	g soil/cm^3 soil	
Vdv	1.0E-02	Deposition velocity	m/s	
T1	0.0E+00	Time period at the beginning of facility operation	yr	
tD	3.0E+01	Time period over which deposition occurs (time period of facility operation)	yr	Time period of facility operation is assumed to be same as residential exposure duration (30 years)
RO	5.1E+01	Average annual surface runoff from pervious areas	cm/yr	Annual runoff - Cumberland 1929-1994
θσω	0.2	Soil volumetric water content	mL water/cm^3 soil	
P	90	Average annual precipitation	cm/yr	Baes et al., 1984
I	25	Average annual irrigation	cm/yr	Baes et al., 1984
Ev	63	Average annual evapotranspiration	cm/yr	Baes et al., 1984
Rp	0.39	Interception fraction of the edible portion of plant	unitless	
Rp_forage	0.5	Interception fraction of the edible portion of plant - for livestock forage	unitless	
Rp_silage	0.46	Interception fraction of the edible portion of plant - for livestock silage	unitless	
kp	18	Plant surface loss coefficient	yr-1	
Tp	0.164	Length of plan exposure to depostion per harvest of the edible portion of the ith plant group	yr	Assumed to be 60 days
Tp_forage	0.16	Length of plan exposure to depostion per harvest of the edible portion of the ith plant group - for livestock forage	yr	
Tp_silage	0.12	Length of plan exposure to depostion per harvest of the edible portion of the ith plant group - for livestock silage	yr	
Yp	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	kg DW/m^2	
Yp_forage	0.24	Yield or standing crop biomass of the edible portion of the plant (productivity) - for livestock forage	kg DW/m^2	
Yp_silage	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity) - for livestock silage	kg DW/m^2	
ρα	1.2E+03	Density of Air	g/m^3	
Fiforage	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	
Fisilage	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage		

Table 3-15
Site-specific Parameters for Evaluating Environmental Fate and Transport - maximum exposed individual (offsite resident and subsistence farmer)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
Qpiforage	9.27	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Quantities for forage (8.8 kg/day) and grain (0.47 kg/day) are summed
Qpisilage	2.5	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day	
Qs	0.5	Quantity of soil ingested by animal	kg/day	
Fiforage_milk	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	contaminated soil). Concentrations in grain are assumed to be the same as concentrations in forage
Fisilage_milk	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage		
Qpiforage_milk	16.2	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Quantities for forage (13.2 kg/day) and grain (3 kg/day) are summed
Qpisilage_milk	4.1	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day	
Qs_milk	0.4	Quantity of soil ingested by animal	kg/day	
Fiforage_pork	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	
Fisilage_pork	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage		
Qpiforage_pork	3.3	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	the same. This represents grain consumption by swine.
Qpisilage_pork	1.4	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day	
Qs_pork	0.5	Quantity of soil ingested by animal	kg/day	
Fiforage_chicken	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	
Qpiforage_chicken	0.2	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	the same. This represents grain consumption by chickens
Qs_chicken	0.022	Quantity of soil ingested by animal	kg/day	

Table 3-16
Summary of Concentrations in Environmental Media - subsistence fisher scenario
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Annual Average Concentration in Air (ug/m^3)	Average soil concentration over exposure duration Cs (mg/kg)	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg)	Total Water Column Concentration (mg/L) - Average concentration over exposure duration	Total Water Column Concentration (mg/L) - Concentration at the end of the facility operating life	Dissolved Phase Water Concentration (mg/L) - Average concentration over exposure duration	Dissolved Phase Water Concentration (mg/L) - Concentration at the end of the facility operating life	Concentration in Sediment (mg/kg) - Average concentration over exposure duration	Concentration in Sediment (mg/kg) - Concentration at the end of the facility operating life	Concentration in Fish (mg/kg) - Average concentration over exposure duration	Concentration in Fish (mg/kg) - Concentration at the end of the facility operating life
1,3-Butadiene	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.42E-07	9.04E-06	1.02E-05	4.16E-10	4.64E-10	4.09E-10	4.57E-10	3.57E-07	3.99E-07	1.07E-06	1.20E-06
1-Methylnaphthalene	7.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	6.97E-06	6.44E-04	7.81E-04	1.71E-08	2.03E-08	1.63E-08	1.93E-08	4.24E-05	5.04E-05	2.15E-04	2.55E-04
2,4-Dinitrotoluene	1.42E-07	5.36E-08	5.36E-08	4.93E-10	4.93E-10	4.93E-10	4.93E-10	1.01E-09	1.01E-09	2.92E-09	2.92E-09
2,5-Diphenyloxazole	3.01E-06	6.58E-06	6.60E-06	1.51E-09	1.51E-09	1.50E-09	1.50E-09	3.73E-07	3.73E-07	5.00E-06	5.01E-06
2,6-Dinitrotoluene	4.12E-07	1.33E-07	1.34E-07	1.41E-09	1.41E-09	1.41E-09	1.41E-09	2.36E-09	2.36E-09	8.34E-09	8.34E-09
2-Methylnaphthalene	7.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	1.21E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.42E-07	1.11E-08	1.11E-08	1.42E-10	1.42E-10	1.42E-10	1.42E-10	2.48E-10	2.48E-10	2.37E-09	2.37E-09
4-Nitrosodiphenylamine	1.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	3.12E-07	1.56E-05	1.70E-05	3.53E-10	3.78E-10	2.95E-10	3.16E-10	3.07E-06	3.29E-06	1.50E-06	1.61E-06
Benzene	3.48E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.42E-07	5.79E-06	6.23E-06	1.39E-10	1.46E-10	8.05E-11	8.47E-11	3.12E-06	3.28E-06	8.01E-07	8.43E-07
Biphenyl (1,1-Biphenyl)	1.49E-05	8.22E-06	8.22E-06	6.45E-09	6.45E-09	6.44E-09	6.44E-09	4.81E-07	4.81E-07	2.81E-06	2.81E-06
Dibenz[a,h]anthracene	1.42E-07	9.68E-06	1.10E-05	2.12E-10	2.35E-10	9.04E-11	1.00E-10	6.47E-06	7.19E-06	1.16E-06	1.29E-06
Dibenzofuran	3.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	4.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.23E-11	3.71E-09	4.02E-09	9.21E-14	9.76E-14	3.05E-14	3.23E-14	3.28E-09	3.48E-09	5.17E-10	5.48E-10
Diphenylamine	6.02E-07	9.20E-07	9.22E-07	9.05E-10	9.07E-10	9.04E-10	9.06E-10	2.65E-08	2.66E-08	2.35E-07	2.36E-07
Mesitylene (1,3,5-trimethylbenzene)	2.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	2.77E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	1.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	6.33E-06	9.10E-05	9.32E-05	5.55E-09	5.65E-09	5.47E-09	5.56E-09	4.57E-06	4.65E-06	1.80E-05	1.83E-05
Phenol	1.99E-07	3.36E-08	3.36E-08	5.34E-10	5.34E-10	5.34E-10	5.34E-10	4.70E-10	4.70E-10	4.17E-09	4.17E-09
Pyrene	1.42E-07	1.33E-05	1.62E-05	3.47E-10	4.13E-10	3.30E-10	3.93E-10	8.98E-07	1.07E-06	3.93E-06	4.68E-06
Resorcinol	2.05E-05	1.75E-06	1.75E-06	4.63E-08	4.63E-08	4.63E-08	4.63E-08	1.06E-08	1.06E-08	1.07E-07	1.07E-07
Styrene	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	1.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	7.56E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.42E-07	1.32E-08	1.32E-08	3.95E-10	3.95E-10	3.95E-10	3.95E-10	3.50E-11	3.50E-11	3.60E-10	3.60E-10
Xylenes	2.03E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	3.17E-01	8.00E+01	1.43E+02	7.86E-04	1.34E-03	7.74E-04	1.32E-03	1.16E+00	1.99E+00	2.09E-03	3.57E-03
Lead	3.01E-02	6.67E+00	1.12E+01	8.42E-05	1.36E-04	8.34E-05	1.35E-04	7.51E-02	1.21E-01	6.68E-04	1.08E-03
Zirconium	6.25E-04	1.76E-01	3.32E-01	1.36E-06	2.43E-06	1.32E-06	2.36E-06	3.97E-03	7.08E-03	0.00E+00	0.00E+00
copper	8.67E-03	2.64E+00	5.19E+00	1.71E-05	3.13E-05	1.55E-05	2.85E-05	1.55E-01	2.85E-01	1.10E-02	2.02E-02
Iron	9.54E-05	1.40E-03	1.44E-03	3.68E-07	3.76E-07	3.67E-07	3.76E-07	9.19E-06	9.40E-06	0.00E+00	0.00E+00

Table 3-17

Site-specific Parameters for Evaluating Environmental Fate and Transport - subsistence fisher scenario

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
Zs	1.0E+00	Soil mixing zone depth	cm	
BD	1.5E+00	Soil bulk density	g soil/cm^3 soil	
Vdv	1.0E-02	Deposition velocity	m/s	
T1	0.0E+00	Time period at the beginning of facility operatior	yr	
tD	3.0E+01	Time period over which deposition occurs (time period of facility operation)	yr	Time period of facility operation is assumed to be same as residentia exposure duration (30 years)
RO	5.1E+01	Average annual surface runoff from pervious areas	cm/yr	Annual runoff - Cumberland 1929-1994
θσω	0.2	Soil volumetric water content	mL water/cm3 soil	
P	90	Average annual precipitatior	cm/yr	Baes et al., 1984
I	25	Average annual irrigatior	cm/yr	Baes et al , 1984
Ev	63	Average annual evapotranspiration	cm/yr	Baes et al., 1984
AW	4.78E+04	Water body surface area	m^2	
AI	5.80E+05	Impervious watershed surface area	m^2	
AL	9.66E+06	Total watershed area receiving COPC deposition	m^2	
R	8.2E-05	Universal gas constant	atm-m^3/mole-K	
Twk	3.0E+02	Water body temperature	K	
RF	1.8E+02	USLE rainfall (or erosivity) factor	yr-1	Site-specific (midpoint of the range)
K_	3.6E-01	USLE erodibility factor	ton/acre	Default - 0.36 @ 1% TOC
LS	1.5E+00	USLE length-slope factor	unitless	"Default" = 1.5
C	1.0E-01	USLE cover management factor	unitless	Default for dense vegetation cover
PF	1.0E+00	USLE supporting practice factor	unitless	"Default"
a	1.4E+00	Empirical intercept coefficient	unitless	Based on watershed area
b	1.3E-01	Empirical slope coefficient	unitless	Default value from Table B-4-14
TSS	1.0E+01	Total suspended solids concentration	mg/L	Default - close to limited river data
dwc	6.8E-01	Depth of water column	m	
dbs	3.0E-02	Depth of upper benthic sediment layer	m	
CBS	1.0E+00	Bed sediment concentration (or bed sediment bulk density)	g/cm^3 or kg/L	
θβσ	6.0E-01	Bed sediment porosity	Lwater/Lsediment	
Vfx	8.01E+08	Average volumetric flow rate through water body	m^3/yr	
θ	1.0E+00	Temperature correction factor	unitless	
u	6.3E-01	Current velocity	m/s	
Cd	1.1E-03	Drag coefficient	unitless	
W	3.9E+00	Average annual wind speec	m/s	
ρα	1.2E-03	Density of air	g/cm^3	
ρω	1.0E+00	Density of water	g/cm^3	
k	4.0E-01	von Karman's constant	unitless	
λζ	4.0E+00	Dimensionless viscous sublayer thickness	unitless	
μω	1.7E-02	Viscosity of water corresponding to water temperature	g/cm-s	
μα	1.81E-04	Viscosity of air	g/cm-s	

Table 3-18
Chemical-Specific Inputs - Fate and Transport Analysis
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	CAS Number	Chemical/Physical Properties													
		Molecular Weight (g/mole)	Tm (K)	Vp (atm)	S (mg/L)	H (atm-m3/mol)	Da (cm2/s)	Dw (cm2/s)	Kow (unitless)	Koc (mL/g)	Kds (mL/g)	Kdsw (L/kg)	Kdbs (mL/g)	ksg (year)-1	Fv (unitless)
1,3-Butadiene	106-99-0	5.41E+01	1.64E+02	2.77E+00	7.35E+02	6.30E-02	1.31E-01	1.52E-05	1.00E+02	1.20E+02	1.20E+00	9.02E+00	4.81E+00	9.01E+00	1
1,6-Dinitropyrene	42397-64-8	2.92E+02	5.73E+02	1.65E-07	5.86E+00	8.25E-06	4.23E-02	4.90E-06	3.72E+04	2.18E+04	2.18E+02	1.64E+03	8.73E+02	1.33E-01	0
1-Methylnaphthalene	90-12-0	1.42E+02	2.43E+02	8.82E-05	2.58E+01	2.60E-04	6.86E-02	7.94E-06	7.41E+03	4.57E+03	4.57E+01	3.43E+02	1.83E+02	2.53E+02	1
1-Nitropyrene	5522-43-0	2.47E+02	4.28E+02	4.20E-08	1.26E+00	8.25E-06	4.74E-02	5.48E-06	1.15E+05	6.52E+04	6.52E+02	4.89E+03	2.61E+03	1.33E-01	0
2,4-Dinitrotoluene	121-14-2	1.82E+02	3.44E+02	2.29E-07	2.85E+02	1.46E-07	3.09E-02	7.86E-06	9.90E+01	5.10E+01	5.10E-01	3.83E+00	2.04E+00	1.41E+00	0
2,5-Diphenyloxazole	92-71-7	2.21E+02	3.46E+02	2.43E-10	3.35E+00	1.60E-08	5.10E-02	5.91E-06	4.68E+04	6.22E+03	6.22E+01	4.66E+02	2.49E+02	9.01E+00	0
2,6-Dinitrotoluene	606-20-2	1.82E+02	3.39E+02	7.47E-07	1.05E+03	1.30E-07	3.11E-02	7.76E-06	7.70E+01	4.19E+01	4.19E-01	3.14E+00	1.68E+00	1.41E+00	0
2-Methylnaphthalene	91-57-6	1.42E+02	3.08E+02	7.24E-05	2.50E+01	5.20E-04	6.86E-02	7.94E-06	7.94E+03	7.94E+03	7.94E+01	5.96E+02	3.18E+02	1.10E+02	1
2-Nitronaphthalene	581-89-5	1.73E+02	3.52E+02	2.10E-03	1.43E+02	2.54E-03	6.01E-02	6.96E-06	1.74E+03	1.12E+03	1.12E+01	8.39E+01	4.48E+01	1.10E+02	1
4-Nitrophenol	100-02-7	1.39E+02	3.86E+02	1.32E-06	2.50E+04	7.32E-09	4.30E-02	9.61E-06	8.13E+01	4.37E+01	4.37E-01	3.28E+00	1.75E+00	2.09E+02	0
4-Nitrosodiphenylamine	156-10-5	1.98E+02	4.18E+02	1.63E-07	7.43E+00	4.35E-06	5.49E-02	6.36E-06	1.45E+03	4.13E+02	4.13E+00	3.10E+01	1.65E+01	1.39E+00	1
Benzo[a]anthracene	56-55-3	2.28E+02	4.33E+02	2.03E-10	1.28E-02	3.62E-06	2.47E-02	6.21E-06	4.77E+05	2.60E+05	2.60E+03	1.95E+04	1.04E+04	3.72E-01	0
Benzene	71-43-2	7.81E+01	2.79E+02	1.25E-01	1.78E+03	5.49E-03	1.17E-01	1.02E-05	1.37E+02	6.20E+01	6.20E-01	4.65E+00	2.48E+00	3.89E+00	1
Benzo[a]pyrene	50-32-8	2.52E+02	4.52E+02	6.43E-12	1.94E-03	8.36E-07	2.18E-02	5.85E-06	1.35E+06	9.69E+05	9.69E+03	7.27E+04	3.88E+04	4.77E-01	0
Biphenyl (1,1-Biphenyl)	92-52-4	1.54E+02	3.43E+02	4.94E-05	7.08E+00	3.39E-04	6.50E-02	7.52E-06	1.00E+04	1.87E+03	1.87E+01	1.40E+02	7.47E+01	3.61E+01	0
Dibenz[a,h]anthracene	53-70-3	2.78E+02	5.39E+02	2.70E-14	6.70E-04	1.12E-08	1.80E-02	6.01E-06	3.53E+06	1.79E+06	1.79E+04	1.34E+05	7.16E+04	2.69E-01	0
Dibenzofuran	132-64-9	1.68E+02	3.60E+02	2.37E-07	1.00E+01	1.30E-05	6.13E-02	7.10E-06	1.58E+04	1.01E+04	1.01E+02	7.59E+02	4.05E+02	9.01E+00	1
Di-n-propyl adipate (Dipropyl adipate)	106-19-4	2.30E+02	ND	6.71E-03	1.40E+02	1.11E-02	4.97E-02	5.75E-06	2.24E+03	5.81E+02	5.81E+00	4.36E+01	2.32E+01	3.16E+01	1
Dioxin (2,3,7,8-TCDD)	1746-01-6	3.22E+02	5.78E+02	9.74E-13	1.93E-05	1.60E-05	1.27E-02	6.81E-06	4.37E+06	2.69E+06	2.69E+04	2.02E+05	1.08E+05	4.29E-01	0
Diphenylamine	122-39-4	1.69E+02	3.25E+02	8.82E-07	3.60E+01	5.00E-07	6.10E-02	7.07E-06	3.02E+03	7.33E+02	7.33E+00	5.50E+01	2.93E+01	9.01E+00	0
Mesitylene (1,3,5-trimethylbenzene)	108-67-8	1.20E+02	2.88E+02	1.30E-03	2.00E+01	7.81E-03	6.48E-02	7.86E-06	2.63E+03	1.67E+03	1.67E+01	1.25E+02	6.68E+01	3.16E+01	1
Naphthalene	91-20-3	1.28E+02	3.53E+02	1.17E-04	3.11E+01	4.82E-04	5.26E-02	8.92E-06	2.36E+03	1.19E+03	1.19E+01	8.93E+01	4.76E+01	5.27E+00	1
n-Hexane	110-54-3	8.62E+01	1.78E+02	1.99E-01	1.19E+01	1.18E+00	9.59E-02	1.11E-05	1.00E+04	1.87E+03	1.87E+01	1.40E+02	7.47E+01	3.16E+01	1
N-Nitrosodiphenylamine	86-30-6	1.98E+02	3.40E+02	1.32E-04	3.74E+01	6.99E-04	3.12E-02	6.35E-06	1.06E+03	3.27E+02	3.27E+00	2.45E+01	1.31E+01	7.44E+00	1
Phenanthrene	85-01-8	1.78E+02	3.71E+02	1.45E-07	1.28E+00	2.30E-05	3.33E-02	7.47E-06	3.55E+04	2.09E+04	2.09E+02	1.57E+03	8.36E+02	1.26E+00	0
Phenol	108-95-2	9.41E+01	3.14E+02	5.74E-04	9.08E+04	5.95E-07	8.27E-02	1.03E-05	3.00E+01	2.20E+01	2.20E-01	1.65E+00	8.80E-01	2.53E+01	0
Pyrene	129-00-0	2.02E+02	4.29E+02	5.59E-09	1.37E-01	8.25E-06	2.72E-02	7.14E-06	1.00E+05	6.80E+04	6.80E+02	5.10E+03	2.72E+03	1.33E-01	0
Resorcinol	108-46-3	1.10E+02	3.83E+02	5.92E-07	1.00E+06	7.70E-09	8.14E-02	9.43E-06	6.03E+00	5.75E+00	5.75E-02	4.31E-01	2.30E-01	6.32E+01	0
Styrene	100-42-5	1.04E+02	2.43E+02	8.21E-03	2.57E+02	3.33E-03	7.73E-02	8.77E-06	8.49E+02	9.12E+02	9.12E+00	6.84E+01	3.65E+01	9.03E+00	1
Thianaphthene (benzo[b]thiophene)	95-15-8	1.34E+02	3.04E+02	1.53E-04	1.55E+02	1.33E-04	7.13E-02	8.26E-06	1.32E+03	3.84E+02	3.84E+00	2.88E+01	1.54E+01	2.53E+02	1
Toluene	108-88-3	9.21E+01	1.78E+02	3.71E-02	5.58E+02	6.13E-03	9.72E-02	9.23E-06	4.65E+02	1.40E+02	1.40E+00	1.05E+01	5.60E+00	1.15E+01	1
Triacetin	102-76-1	2.18E+02	1.95E+02	3.26E-06	5.80E+04	1.23E-08	5.15E-02	5.96E-06	1.78E+00	2.22E+00	2.22E-02	1.66E-01	8.87E-02	1.95E+00	0
Xylenes	106-42-3	1.06E+02	2.86E+02	1.06E-02	1.86E+02	6.05E-03	7.61E-02	8.50E-06	1.48E+03	3.11E+02	3.11E+00	2.33E+01	1.24E+01	9.03E+00	1
Aluminum	7429-90-5	2.70E+01	9.33E+02	0.00E+00	0.00E+00	0.00E+00	2.11E-01	2.44E-05	NA	NA	1.50E+03	1.50E+03	1.50E+03	0.00E+00	0
Lead	7439-92-1	2.07E+02	6.01E+02	0.00E+00	0.00E+00	0.00E+00	5.43E-02	6.28E-06	NA	NA	9.00E+02	9.00E+02	9.00E+02	0.00E+00	0
Zirconium	7440-67-7	9.12E+01	2.12E+03	0.00E+00	0.00E+00	0.00E+00	9.24E-02	1.07E-05	NA	NA	3.00E+03	3.00E+03	3.00E+03	0.00E+00	0
Copper	7440-50-8	6.36E+01	1.36E+03	0.00E+00	0.00E+00	0.00E+00	1.19E-01	1.38E-05	NA	NA	1.00E+04	1.00E+04	1.00E+04	0.00E+00	0
Iron	7439-89-6	5.58E+01	1.81E+03	0.00E+00	0.00E+00	0.00E+00	1.28E-01	1.49E-05	NA	NA	2.50E+01	2.50E+01	2.50E+01	0.00E+00	0

Table 3-18
Chemical-Specific Inputs - Fate and T
Air Pathway Human Health Risk Assess
Allegany Ballistics Laboratory

	Biotransfer Factors for Plants						Biotransfer Factors for Animals							
Chemical	RCF (ug/g DW plant)/ (ug/mL soil water)	Brrootveg (ug/g DW plant/ ug/g soil)	Brag (ug/g DW plant/ ug/g soil)	Brforage (ug/g DW plant/ ug/g soil)	Bvag (ug/g DW plant/ ug/g air)	Bvforage (ug/g DW plant/ ug/g air)	Bamilk (day/kg FW)	Babeef (day/kg FW)	Bapork (day/kg FW)	Baegg (day/kg FW)	Bachicken (day/kg FW)	BCFfish (L/kg FW tissue)	BAFfish (L/kg FW tissue)	BSAFfish (unitless)
1,3-Butadiene														
1,6-Dinitropyrene	7.74E+02	3.54E+00	8.84E-02	8.84E-02	4.98E+04	4.98E+04	2.95E-04	9.33E-04	1.12E-03	2.95E-01	7.47E-04	NA	2.63E+03	NA
1-Methylnaphthalene														
1-Nitropyrene	1.84E+03	2.82E+00	4.61E-02	4.61E-02	1.66E+05	1.66E+05	9.12E-04	2.88E-03	3.46E-03	9.12E-01	2.31E-03	NA	1.32E+04	NA
2,4-Dinitrotoluene	1.43E+01	2.80E+01	2.72E+00	2.72E+00	5.10E+01	5.10E+01	7.86E-07	2.49E-06	3.01E-06	7.86E-04	1.96E-06	5.92E+00	NA	NA
2,5-Diphenyloxazole	9.22E+02	1.48E+01	7.74E-02	7.74E-02	3.28E+07	3.28E+07	3.72E-04	1.17E-03	1.41E-03	3.72E-01	9.40E-04	NA	3.34E+03	NA
2,6-Dinitrotoluene	1.29E+01	3.08E+01	3.15E+00	3.15E+00	4.41E+01	4.41E+01	6.12E-07	1.93E-06	2.34E-06	6.12E-04	1.53E-06	5.92E+00	NA	NA
2-Methylnaphthalene														
2-Nitronaphthalene														
4-Nitrophenol	1.32E+01	3.02E+01	3.05E+00	3.05E+00	8.26E+02	8.26E+02	6.46E-07	2.04E-06	2.47E-06	6.46E-04	1.61E-06	1.67E+01	NA	NA
4-Nitrosodiphenylamine														
Benzo[a]anthracene	5.48E+03	2.11E+00	2.02E-02	2.02E-02	1.72E+04	1.72E+04	3.79E-03	1.20E-02	1.45E-02	3.79E+00	9.46E-03	NA	5.10E+03	NA
Benzene														
Benzo[a]pyrene	1.22E+04	1.26E+00	1.11E-02	1.11E-02	2.25E+05	2.25E+05	1.07E-02	3.38E-02	4.10E-02	1.07E+01	2.67E-02	NA	9.95E+03	NA
Biphenyl (1,1-Biphenyl)	2.86E+02	1.53E+01	1.89E-01	1.89E-01	3.00E+02	3.00E+02	7.94E-05	2.51E-04	3.01E-04	7.94E-02	2.01E-04	4.37E+02	NA	NA
Dibenz[a,h]anthracene	2.56E+04	1.43E+00	6.36E-03	6.36E-03	4.68E+07	4.68E+07	2.80E-02	8.86E-02	1.07E-01	2.80E+01	7.00E-02	NA	1.28E+04	NA
Dibenzofuran														
Di-n-propyl adipate (Dipropyl adipate)														
Dioxin (2,3,7,8-TCDD)	3.01E+04	1.12E+00	5.62E-03	5.62E-03	6.10E+04	6.10E+04	1.00E-02	5.43E-02	6.57E-02	5.42E-02	7.30E-02	NA	NA	9.00E-02
Diphenylamine	1.17E+02	1.60E+01	3.77E-01	3.77E-01	5.68E+04	5.68E+04	2.40E-05	7.59E-05	9.10E-05	2.40E-02	6.07E-05	2.60E+02	NA	NA
Mesitylene (1,3,5-trimethylbenzene)														
Naphthalene														
n-Hexane														
N-Nitrosodiphenylamine														
Phenanthrene	7.47E+02	3.57E+00	9.08E-02	9.08E-02	1.70E+04	1.70E+04	2.82E-04	8.92E-04	1.08E-03	2.82E-01	7.04E-04	NA	3.30E+03	NA
Phenol	9.50E+00	4.32E+01	5.42E+00	5.42E+00	3.52E+00	3.52E+00	2.38E-07	7.54E-07	9.12E-07	2.38E-04	5.95E-07	7.81E+00	NA	NA
Pyrene	1.66E+03	2.44E+00	4.98E-02	4.98E-02	1.43E+05	1.43E+05	7.98E-04	2.52E-03	3.06E-03	7.98E-01	1.99E-03	NA	1.19E+04	NA
Resorcinol	7.23E+00	1.26E+02	1.37E+01	1.37E+01	4.91E+03	4.91E+03	4.79E-08	1.51E-07	1.82E-07	4.79E-05	1.21E-07	2.31E+00	NA	NA
Styrene														
Thianaphthene (benzo[b]thiophene)														
Toluene														
Triacetin	6.67E+00	3.01E+02	2.78E+01	2.78E+01	8.38E+02	8.38E+02	1.41E-08	4.47E-08	5.36E-08	1.41E-05	3.57E-08	9.12E-01	NA	NA
Xylenes														
Aluminum	NA	6.50E-04	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.00E-04	1.50E-03	1.80E-03	0.00E+00	0.00E+00	2.70E+00	NA	NA
Lead	NA	9.00E-03	1.36E-02	4.50E-02	0.00E+00	0.00E+00	2.50E-04	3.00E-04	3.60E-04	0.00E+00	0.00E+00	NA	8.00E+00	NA
Zirconium	NA	5.00E-04	2.00E-03	2.00E-03	0.00E+00	0.00E+00	3.00E-05	5.50E-03	6.60E-03	0.00E+00	0.00E+00		NA	NA
Copper	NA	2.50E-01	4.00E-01	4.00E-01	0.00E+00	0.00E+00	1.50E-03	1.00E-02	1.20E-02	0.00E+00	0.00E+00	7.10E+02	NA	NA
Iron	NA	1.00E-03	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.50E-04	2.00E-02	2.40E-02	0.00E+00	0.00E+00		NA	NA

Table 3-19
Summary of Chemical Intake Rates - maximum exposed individual (offsite resident and subsistence farmer)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

	Intake based on average soil concentration over exposure duration (mg/kg-day) - used to assess cancer risks									Intake based on soil concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects								
Chemical	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-08
1,6-Dinitropyrene	2.00E-13	3.90E-10	1.59E-10	6.45E-10	3.27E-11	1.37E-12	5.51E-10	0.00E+00	5.17E-11	2.02E-13	3.90E-10	1.59E-10	6.45E-10	3.27E-11	1.37E-12	5.51E-10	0.00E+00	9.05E-11
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.82E-09
1-Nitropyrene	2.65E-11	1.93E-08	2.40E-08	9.76E-08	4.96E-09	2.08E-10	8.34E-08	0.00E+00	2.53E-09	2.72E-11	1.93E-08	2.40E-08	9.76E-08	4.96E-09	2.08E-10	8.34E-08	0.00E+00	4.42E-09
2,4-Dinitrotoluene	6.19E-16	3.81E-10	4.23E-13	1.72E-12	8.78E-14	3.59E-15	1.47E-12	0.00E+00	5.17E-11	6.19E-16	3.81E-10	4.23E-13	1.72E-12	8.78E-14	3.59E-15	1.47E-12	0.00E+00	9.05E-11
2,5-Diphenyloxazole	6.93E-13	8.03E-09	4.22E-09	1.71E-08	8.69E-10	3.64E-11	1.46E-08	0.00E+00	1.09E-09	6.94E-13	8.03E-09	4.22E-09	1.71E-08	8.69E-10	3.64E-11	1.46E-08	0.00E+00	1.91E-09
2,6-Dinitrotoluene	7.43E-14	5.32E-08	4.58E-11	1.87E-10	9.54E-12	3.92E-13	1.59E-10	0.00E+00	7.22E-09	7.43E-14	5.32E-08	4.58E-11	1.87E-10	9.54E-12	3.92E-13	1.59E-10	0.00E+00	1.26E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.82E-09
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.70E-09
4-Nitrophenol	4.67E-16	3.81E-10	3.47E-13	1.41E-12	7.21E-14	2.95E-15	1.20E-12	0.00E+00	5.17E-11	4.68E-16	3.81E-10	3.47E-13	1.41E-12	7.21E-14	2.95E-15	1.20E-12	0.00E+00	9.05E-11
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-11
Benzo[a]anthracene	1.04E-10	4.16E-08	2.17E-07	8.79E-07	4.52E-08	1.85E-09	7.53E-07	0.00E+00	5.48E-09	1.10E-10	4.17E-08	2.17E-07	8.79E-07	4.52E-08	1.85E-09	7.53E-07	0.00E+00	9.59E-09
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.21E-06
Benzo[a]pyrene	1.12E-12	3.87E-10	5.76E-09	2.34E-08	1.21E-09	4.93E-11	2.01E-08	0.00E+00	5.17E-11	1.20E-12	3.88E-10	5.76E-09	2.34E-08	1.21E-09	4.93E-11	2.01E-08	0.00E+00	9.05E-11
Biphenyl (1,1-Biphenyl)	9.46E-13	3.96E-08	4.46E-09	1.81E-08	9.19E-10	3.85E-11	1.55E-08	0.00E+00	5.40E-09	9.46E-13	3.96E-08	4.46E-09	1.81E-08	9.19E-10	3.85E-11	1.55E-08	0.00E+00	9.45E-09
Dibenz[a,h]anthracene	1.90E-12	3.88E-10	1.51E-08	6.13E-08	3.16E-09	1.30E-10	5.27E-08	0.00E+00	5.17E-11	2.13E-12	3.90E-10	1.51E-08	6.13E-08	3.17E-09	1.30E-10	5.28E-08	0.00E+00	9.05E-11
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-09
Di-n-propyl adipate (Diprop	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-09
Dioxin (2,3,7,8-TCDD)	7.72E-16	2.22E-13	5.35E-12	1.26E-11	1.12E-12	7.79E-14	5.88E-14	0.00E+00	2.99E-14	8.33E-16	2.22E-13	5.35E-12	1.26E-11	1.12E-12	7.79E-14	5.88E-14	0.00E+00	5.23E-14
Diphenylamine	2.76E-14	1.65E-09	5.44E-11	2.21E-10	1.12E-11	4.70E-13	1.89E-10	0.00E+00	2.18E-10	2.76E-14	1.65E-09	5.44E-11	2.21E-10	1.12E-11	4.70E-13	1.89E-10	0.00E+00	3.82E-10
Mesitylene (1,3,5-trimethylb	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-09
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.86E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.50E-09
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-08
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-11
Phenanthrene	6.41E-12	1.72E-08	6.74E-09	2.74E-08	1.40E-09	5.75E-11	2.34E-08	0.00E+00	2.30E-09	6.45E-12	1.72E-08	6.74E-09	2.74E-08	1.40E-09	5.75E-11	2.34E-08	0.00E+00	4.02E-09
Phenol	2.27E-14	2.57E-08	8.64E-12	3.51E-11	1.79E-12	7.36E-14	2.99E-11	0.00E+00	3.49E-09	2.27E-14	2.57E-08	8.64E-12	3.51E-11	1.79E-12	7.36E-14	2.99E-11	0.00E+00	6.10E-09
Pyrene	5.61E-13	3.97E-10	4.29E-10	1.75E-09	8.97E-11	3.66E-12	1.49E-09	0.00E+00	5.17E-11	5.78E-13	3.97E-10	4.29E-10	1.75E-09	8.97E-11	3.66E-12	1.49E-09	0.00E+00	9.05E-11
Resorcinol	2.65E-14	5.61E-08	3.78E-12	1.54E-11	7.79E-13	3.26E-14	1.31E-11	0.00E+00	7.59E-09	2.65E-14	5.61E-08	3.78E-12	1.54E-11	7.79E-13	3.26E-14	1.31E-11	0.00E+00	1.33E-08
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-08
Thianaphthene (benzo[b]th	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-11
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.47E-07
Triacetin	1.50E-16	3.85E-10	7.59E-15	3.09E-14	1.56E-15	6.55E-17	2.63E-14	0.00E+00	5.17E-11	1.50E-16	3.85E-10	7.59E-15	3.09E-14	1.56E-15	6.55E-17	2.63E-14	0.00E+00	9.05E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-07
Aluminum	2.98E-06	8.48E-04	5.68E-04	9.73E-04	1.18E-04	0.00E+00	0.00E+00	0.00E+00	1.15E-04	3.21E-06	8.49E-04	5.68E-04	9.73E-04	1.18E-04	0.00E+00	0.00E+00	0.00E+00	2.01E-04
Lead	1.79E-07	8.30E-05	1.10E-05	1.18E-04	2.28E-06	0.00E+00	0.00E+00	0.00E+00	1.11E-05	1.87E-07	8.31E-05	1.10E-05	1.18E-04	2.28E-06	0.00E+00	0.00E+00	0.00E+00	1.95E-05
Zirconium	5.23E-07	8.08E-05	1.99E-04	1.39E-05	4.15E-05	0.00E+00	0.00E+00	0.00E+00	1.10E-05	6.12E-07	8.10E-05	2.00E-04	1.39E-05	4.16E-05	0.00E+00	0.00E+00	0.00E+00	1.92E-05
copper	4.66E-07	1.46E-04	1.63E-04	3.12E-04	3.45E-05	0.00E+00	0.00E+00	0.00E+00	4.36E-06	7.07E-07	2.04E-04	1.73E-04	3.30E-04	3.70E-05	0.00E+00	0.00E+00	0.00E+00	7.63E-06
Iron	2.24E-11	3.51E-07	3.15E-06	5.07E-07	6.50E-07	0.00E+00	0.00E+00	0.00E+00	4.80E-08	2.25E-11	3.51E-07	3.15E-06	5.07E-07	6.50E-07	0.00E+00	0.00E+00	0.00E+00	8.40E-08

Table 3-20
Summary of Exposure Factors - maximum exposed individual (resident and subsistence farmer)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
Isoil	calculated	Soil ingestion rate	mg/kg-day	
Cs	calculated	Concentration in soil	mg/kg	
Crsoil	5.00E-05	Soil ingestion rate	kg/day	Adult soil ingestion rate - 50 mg/day; child soil ingestion
Fsoil	1	Fraction of soil that is contaminated	unitless	
BW	70	Body weight	kg	adult body weight - 70 kg; child body weight - 15 kg
Iag	calculated	Produce Intake Rate	mg/kg-day	
Pd	calculated	Concentration in aboveground exposed produce due to deposition	mg/kg DW	
Pv	calculated	Concentration in aboveground exposed produce due to air to plant transfer	mg/kg DW	
Pr	calculated	Concentration in aboveground exposed and protected produce due to root uptake	mg/kg DW	
Prbg	calculated	Concentration in belowground produce due to root uptake	mg/kg DW	
CRag	0.0003	Consumption rate of aboveground produce	kg/kg-day DW	Adult - 0.0003 Child - 0.00042
CRpp	0.00057	Consumption rate of aboveground protected produce	kg/kg-day DW	Adult - 0.00057 Child - 0.00077
CRbg	0.00014	Consumption rate of belowground produce	kg/kg-day DW	Adult - 0.00014 Child - 0.00022
Fag	1	Fraction of produce that is contaminated	Unitless	Adult or child resident - 0.25 Subsistance farmer, adult or child - 1
Ij	calculated	Intake from ingestion of animal tissue from animal j	mg/kg-day	
Abeef	calculated	Concentration in beef	mg/kg FW	
Amilk	calculated	Concentration in milk	mg/kg FW	
Apork	calculated	Concentration in pork	mg/kg FW	
Achicken	calculated	Concentration in chicken	mg/kg FW	
Aegg	calculated	Concentration in egg	mg/kg FW	
CRbeef	0.00114	Consumption rate of beef	kg/kg-day FW	Adult - 0.00114
CRmilk	0.00842	Consumption rate of milk	kg/kg-day FW	Adult - 0.00842
CRpork	0.00053	Consumption rate of pork	kg/kg-day FW	Adult - 0.00053
CRchicken	0.00061	Consumption rate of chicken	kg/kg-day FW	Adult - 0.00061
CRegg	0.00062	Consumption rate of egg	kg/kg-day FW	Adult - 0.00062
Fbeef	1	Fraction of beef consumed from contaminated sources	unitless	
Fmilk	1	Fraction of milk consumed from contaminated sources	unitless	
Fpork	1	Fraction of pork consumed from contaminated sources	unitless	
Fchicken	1	Fraction of chicken consumed from contaminated sources	unitless	
Fegg	1	Fraction of eggs consumed from contaminated sources	unitless	
IR	0.63	Inhalation rate	m3/hr	0.63 m3/hr for adults; 0.3 m3/hr for children
ET	24	Exposure time	hr/day	
EF	350	Exposure Frequency	days/yr	
ED	40	Exposure Duration	yr	Subsistance farmer - 40 Subsistance fisher - 30 Adult resident - 30 Child - 6
AT_c	70	Averaging time - carcinogens	yr	
AT_n	40	Averaging time - noncarcinogens		Set equal to ED

Table 3-21
Summary of Chemical Intake Rates - subsistence fisher scenario
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Intake based on average soil concentration over exposure duration (mg/kg-day) - used to assess cancer risks	Intake based on soil concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects
	Fish Ingestion	Fish Ingestion
1,3-Butadiene	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.26E-09	1.40E-09
1-Methylnaphthalene	0.00E+00	0.00E+00
1-Nitropyrene	2.51E-07	2.99E-07
2,4-Dinitrotoluene	3.41E-12	3.41E-12
2,5-Diphenyloxazole	5.85E-09	5.86E-09
2,6-Dinitrotoluene	9.76E-12	9.76E-12
2-Methylnaphthalene	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00
4-Nitrophenol	2.77E-12	2.77E-12
4-Nitrosodiphenylamine	0.00E+00	0.00E+00
Benzo[a]anthracene	1.76E-09	1.89E-09
Benzene	0.00E+00	0.00E+00
Benzo[a]pyrene	9.37E-10	9.86E-10
Biphenyl (1,1-Biphenyl)	3.29E-09	3.29E-09
Dibenz[a,h]anthracene	1.35E-09	1.50E-09
Dibenzofuran	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropy	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	6.05E-13	6.41E-13
Diphenylamine	2.75E-10	2.76E-10
Mesitylene (1,3,5-trimethylb	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00
Phenanthrene	2.11E-08	2.15E-08
Phenol	4.88E-12	4.88E-12
Pyrene	4.60E-09	5.48E-09
Resorcinol	1.25E-10	1.25E-10
Styrene	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thi	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00
Triacetin	4.21E-13	4.21E-13
Xylenes	0.00E+00	0.00E+00
Aluminum	2.45E-06	4.18E-06
Lead	7.81E-07	1.26E-06
Zirconium	0.00E+00	0.00E+00
copper	1.29E-05	2.36E-05
Iron	0.00E+00	0.00E+00

Table 3-22

Summary of Exposure Factors - subsistence fisher scenario

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
BW	70	Body weight	kg	adult body weight - 70 kg; child body
CR_{fish}	0.00117	Fish ingestion rate	kg/kg-day	Adult - 0.00117 kg/kg-day FW
F_{fish}	1	Fraction of fish ingested from contaminated source	unitless	
EF	350	Exposure Frequency	days/yr	
ED	30	Exposure Duration	yr	Subsistance farmer - 40 Subsistance fisher - 30 Adult resident - 30 Child - 6
AT_c	70	Averaging time - carcinogens	yr	
AT_n	30	Averaging time - noncarcinogens		Set equal to ED

Table 3-23
Summary of Toxicity Factors
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Oral Cancer Slope Factor 1/(mg/kg-day)	Inhalation Cancer Slope Factor 1/(mg/kg-day)	Oral Reference Dose (mg/kg-day)	Inhalation Reference Dose (mg/kg-day)
1,3-Butadiene	NA	1.8	NA	NA
1,6-Dinitropyrene	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	0.02	0.0009
1-Nitropyrene	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	0.002	NA
2,5-Diphenyloxazole	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	0.001	NA
2-Methylnaphthalene	NA	NA	0.02	NA
2-Nitronaphthalene	NA	NA	NA	NA
4-Nitrophenol	NA	NA	0.008	NA
4-Nitrosodiphenylamine	0.0049	NA	NA	NA
Benzo[a]anthracene	0.73	NA	NA	NA
Benzene	0.055	0.029	0.003	0.0017
Benzo[a]pyrene	7.3	3.1	NA	NA
Biphenyl (1,1-Biphenyl)	NA	NA	0.05	NA
Dibenz[a,h]anthracene	7.3	NA	NA	NA
Dibenzofuran	NA	NA	0.004	NA
Di-n-propyl adipate (Dipropyl adipate)	NA	NA	NA	NA
Dioxin (2,3,7,8-TCDD)	156000	156000	NA	NA
Diphenylamine	NA	NA	0.025	NA
Mesitylene (1,3,5-trimethylbenzene)	NA	NA	0.05	0.0017
Naphthalene	NA	NA	0.02	0.0009
n-Hexane	NA	NA	0.06	0.0571
N-Nitrosodiphenylamine	0.0049	NA	NA	NA
Phenanthrene	NA	NA	NA	NA
Phenol	NA	NA	0.6	NA
Pyrene	NA	NA	0.03	NA
Resorcinol	NA	NA	NA	NA
Styrene	NA	NA	0.2	0.286
Thianaphthene (benzo[b]thiophene)	NA	NA	NA	NA
Toluene	NA	NA	0.2	0.114
Triacetin	NA	NA	NA	NA
Xylenes	NA	NA	2	NA
Aluminum	NA	NA	1	0.0014
Lead	NA	NA	NA	NA
Zirconium	NA	NA	NA	NA
copper	NA	NA	0.04	NA
Iron	NA	NA	0.3	NA

Table 3-24
Summary of Estimated Health Risks - maximum exposed individual - offsite resident
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Estimated Lifetime Cancer Risk by Pathway			Total Excess Lifetime Cancer Risk	Contribution to Total Risk	Estimated Noncancer Hazard Quotients by Pathway			Total Hazard Quotient by Chemical	Hazard Quotient > 0.25?
	Soil Ingestion	Produce Ingestion	Inhalation			Soil Ingestion	Produce Ingestion	Inhalation		
1,3-Butadiene	0.00E+00	0.00E+00	3.62E-08	3.62E-08	24.37%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	5.36E-06	5.36E-06	no
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2,4-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	3.09E-13	1.91E-07	0.00E+00	1.91E-07	no
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2,6-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	7.43E-11	5.32E-05	0.00E+00	5.32E-05	no
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
4-Nitrophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	5.84E-14	4.76E-08	0.00E+00	4.76E-08	no
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Benzo[a]anthracene	7.58E-11	3.04E-08	0.00E+00	3.04E-08	20.49%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Benzene	0.00E+00	0.00E+00	3.66E-08	3.66E-08	24.67%	0.00E+00	0.00E+00	1.30E-03	1.30E-03	no
Benzo[a]pyrene	8.21E-12	2.83E-09	1.60E-10	3.00E-09	2.02%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	1.89E-11	7.93E-07	0.00E+00	7.93E-07	no
Dibenz[a,h]anthracene	1.39E-11	2.84E-09	0.00E+00	2.85E-09	1.92%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Dioxin (2,3,7,8-TCDD)	1.20E-10	3.46E-08	4.66E-09	3.94E-08	26.54%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Diphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	1.11E-12	6.59E-08	0.00E+00	6.59E-08	no
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	1.35E-06	1.35E-06	no
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	9.44E-06	9.44E-06	no
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	6.16E-07	6.16E-07	no
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Phenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	3.78E-14	4.28E-08	0.00E+00	4.28E-08	no
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	1.93E-11	1.32E-08	0.00E+00	1.33E-08	no
Resorcinol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	1.23E-07	1.23E-07	no
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	6.55E-06	6.55E-06	no
Triacetin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	3.21E-06	8.49E-04	1.44E-01	1.44E-01	no
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	1.77E-05	5.11E-03	0.00E+00	5.13E-03	no
Iron	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	7.49E-11	1.17E-06	0.00E+00	1.17E-06	no
			Total Risk	**1.49E-07**				**Total HI**	**1.51E-01**	

Table 3-25
Summary of Estimated Health Risks - subsistence farmer
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Estimated Lifetime Cancer Risk by Pathway								Total Excess Lifetime Cancer Risk	Contribution to Total Risk	Estimated Noncancer Hazard Quotients by Pathway								Total Hazard Quotient by Chemical	Hazard Quotient > 0.25?
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Inhalation			Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Inhalation		
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-08	3.62E-08	0.62%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.36E-06	5.36E-06	no
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2,4-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	3.09E-13	1.91E-07	2.12E-10	8.59E-10	4.39E-11	1.80E-12	7.33E-10	0.00E+00	1.92E-07	no
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2,6-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	7.43E-11	5.32E-05	4.58E-08	1.87E-07	9.54E-09	3.92E-10	1.59E-07	0.00E+00	5.36E-05	no
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
4-Nitrophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	5.84E-14	4.76E-08	4.33E-11	1.76E-10	9.01E-12	3.69E-13	1.51E-10	0.00E+00	4.80E-08	no
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Benzo[a]anthracene	7.58E-11	3.04E-08	1.58E-07	6.42E-07	3.30E-08	1.35E-09	5.50E-07	0.00E+00	1.41E-06	24.10%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.66E-08	3.66E-08	0.62%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-03	1.30E-03	no
Benzo[a]pyrene	8.21E-12	2.83E-09	4.21E-08	1.71E-07	8.80E-09	3.60E-10	1.46E-07	1.60E-10	3.72E-07	6.33%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	1.89E-11	7.93E-07	8.92E-08	3.62E-07	1.84E-08	7.70E-10	3.09E-07	0.00E+00	1.57E-06	no
Dibenz[a,h]anthracene	1.39E-11	2.84E-09	1.10E-07	4.48E-07	2.31E-08	9.47E-10	3.85E-07	0.00E+00	9.70E-07	16.52%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Dioxin (2,3,7,8-TCDD)	1.20E-10	3.46E-08	8.35E-07	1.97E-06	1.74E-07	1.22E-08	9.17E-09	4.66E-09	3.04E-06	51.81%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Diphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	1.11E-12	6.59E-08	2.18E-09	8.85E-09	4.49E-10	1.88E-11	7.55E-09	0.00E+00	8.49E-08	no
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-06	1.35E-06	no
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.44E-06	9.44E-06	no
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.16E-07	6.16E-07	no
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Phenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	3.78E-14	4.28E-08	1.44E-11	5.84E-11	2.99E-12	1.23E-13	4.99E-11	0.00E+00	4.29E-08	no
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	1.93E-11	1.32E-08	1.43E-08	5.82E-08	2.99E-09	1.22E-10	4.98E-08	0.00E+00	1.39E-07	no
Resorcinol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-07	1.23E-07	no
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.55E-06	6.55E-06	no
Triacetin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	3.21E-06	8.49E-04	5.68E-04	9.73E-04	1.18E-04	0.00E+00	0.00E+00	1.44E-01	1.46E-01	no
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	1.77E-05	5.11E-03	4.32E-03	8.24E-03	9.26E-04	0.00E+00	0.00E+00	0.00E+00	1.86E-02	no
Iron	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%	7.49E-11	1.17E-06	1.05E-05	1.69E-06	2.17E-06	0.00E+00	0.00E+00	0.00E+00	1.55E-05	no
								Total Risk	5.87E-06									Total HI	1.66E-01	

Table 3-26
Summary of Estimated Health Risks - subsistence fisher scenario
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Pathway Risk	Total Excess Lifetime Cancer Risk	Contribution to Total Risk		Total Hazard Quotient by Chemical	Hazard Quotient > 0.25?
	Fish Ingestion			Fish Ingestion		
1,3-Butadiene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
1-Nitropyrene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
2,4-Dinitrotoluene	0.00E+00	0.00E+00	0.00%	1.71E-09	1.71E-09	no
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
2,6-Dinitrotoluene	0.00E+00	0.00E+00	0.00%	9.76E-09	9.76E-09	no
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
4-Nitrophenol	0.00E+00	0.00E+00	0.00%	3.46E-10	3.46E-10	no
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Benzo[a]anthracene	1.28E-09	1.28E-09	1.14%	0.00E+00	0.00E+00	no
Benzene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Benzo[a]pyrene	6.84E-09	6.84E-09	6.09%	0.00E+00	0.00E+00	no
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	0.00%	6.58E-08	6.58E-08	no
Dibenz[a,h]anthracene	9.88E-09	9.88E-09	8.79%	0.00E+00	0.00E+00	no
Dibenzofuran	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Dioxin (2,3,7,8-TCDD)	9.44E-08	9.44E-08	83.97%	0.00E+00	0.00E+00	no
Diphenylamine	0.00E+00	0.00E+00	0.00%	1.10E-08	1.10E-08	no
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Naphthalene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
n-Hexane	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Phenanthrene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Phenol	0.00E+00	0.00E+00	0.00%	8.13E-12	8.13E-12	no
Pyrene	0.00E+00	0.00E+00	0.00%	1.83E-07	1.83E-07	no
Resorcinol	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Styrene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Toluene	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Triacetin	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Xylenes	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Aluminum	0.00E+00	0.00E+00	0.00%	4.18E-06	4.18E-06	no
Lead	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
Zirconium	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
copper	0.00E+00	0.00E+00	0.00%	5.91E-04	5.91E-04	no
Iron	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	no
	Total Risk	**1.12E-07**		**Total HI**	**5.95E-04**	

Table 3-27
Principal Sources of Uncertainty in the Human Health Risk Assessment
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Source of Uncertainty	Factors That Potentially Overstate Risks	Factors That Potentially Understate Risks
Emissions Estimates	Constituents that were not detected were included in risk estimates assuming they were present at one-half detection limit.	Dioxin emissions are uncertain and may be higher than projected in the risk assessment.
	Dioxin emissions are uncertain and may be lower than projected in the risk assessment.	
	Maximum quantities of emissions that could be burned at the Burning Grounds likely to exceed reasonable operational limits.	
Dispersion modeling	Modeled concentrations are based on the assumption that all of the burn pans will be in operation simultaneously.	
Deposition modeling	Deposition velocity probably overstates the magnitude of dry deposition	Wet deposition is included, but not explicitly modeled - could overstate or understate risks.
	Wet deposition is included, but not explicitly modeled - could overstate or understate risks.	
Exposure Assessment	Exposure scenarios assume that residents are located continuously at the point of maximum impact for 350 days/year, for 30 to 40 years. Actual frequency and duration of potential exposure likely to be lower.	Point of maximum air quality impact is located at the facility fenceline. If a resident lives directly outside of the facility fenceline for 350 days/year for 30 to 40 years (which is unlikely to occur), risks could be higher than projected in the risk assessment
	Subsistance farmer scenario assumes that all livestock products are locally produced, and that accumulation from soil and vegetation to these products occurs at the point of maximum impact.	
Toxicity Assessment	Cancer slope factors provide an upper bound estimate on risk. Actual cancer risks are likely to be lower and may even be zero.	Toxicity values are not available for all constituents, potentially resulting in slight understatement of risks presented in this assessment.

Figures

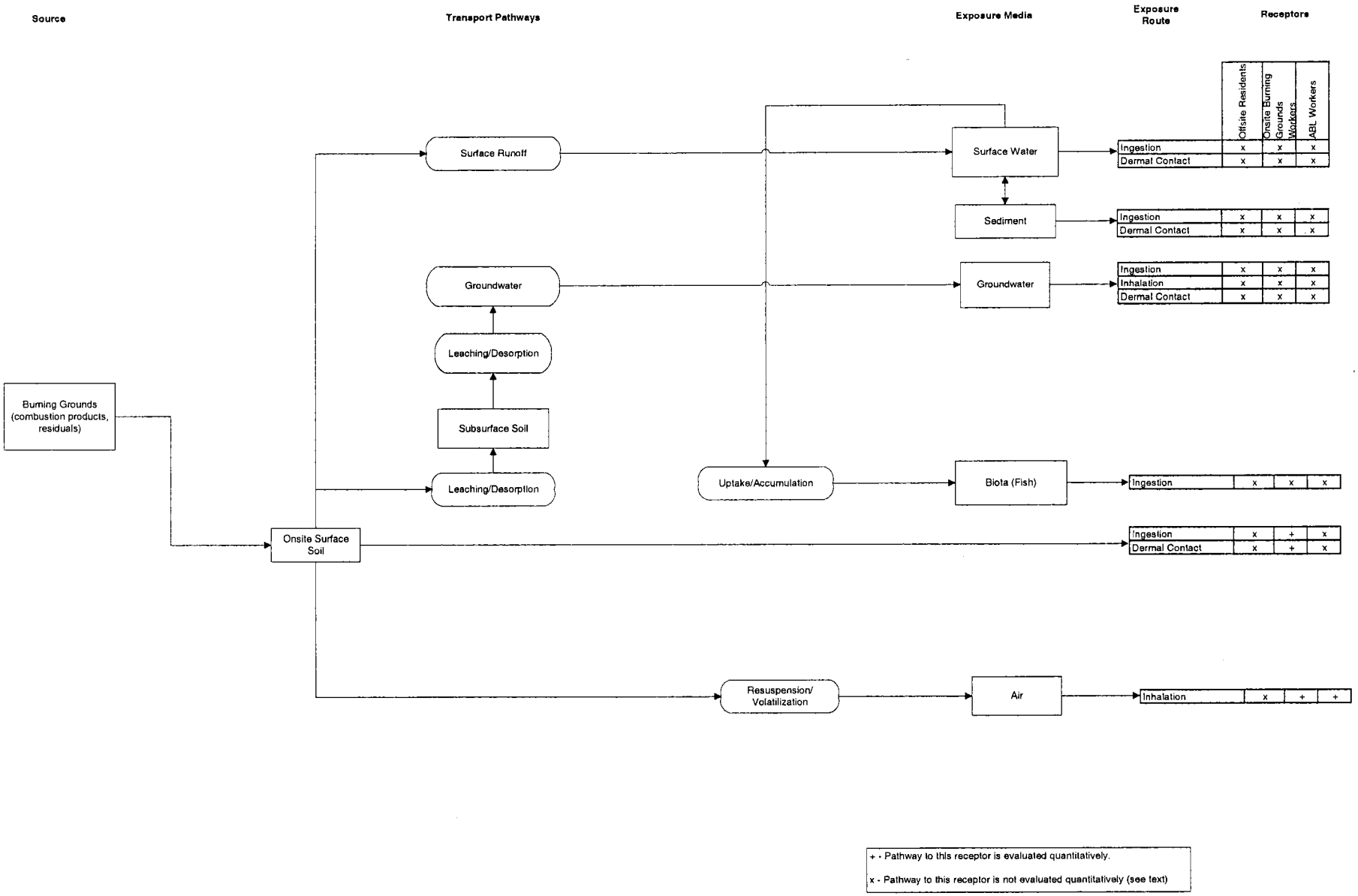

Figure 2-1. Conceptual Model of Human Exposure Pathways
ABL Open Burning Grounds
Evaluation of Current Site Conditions

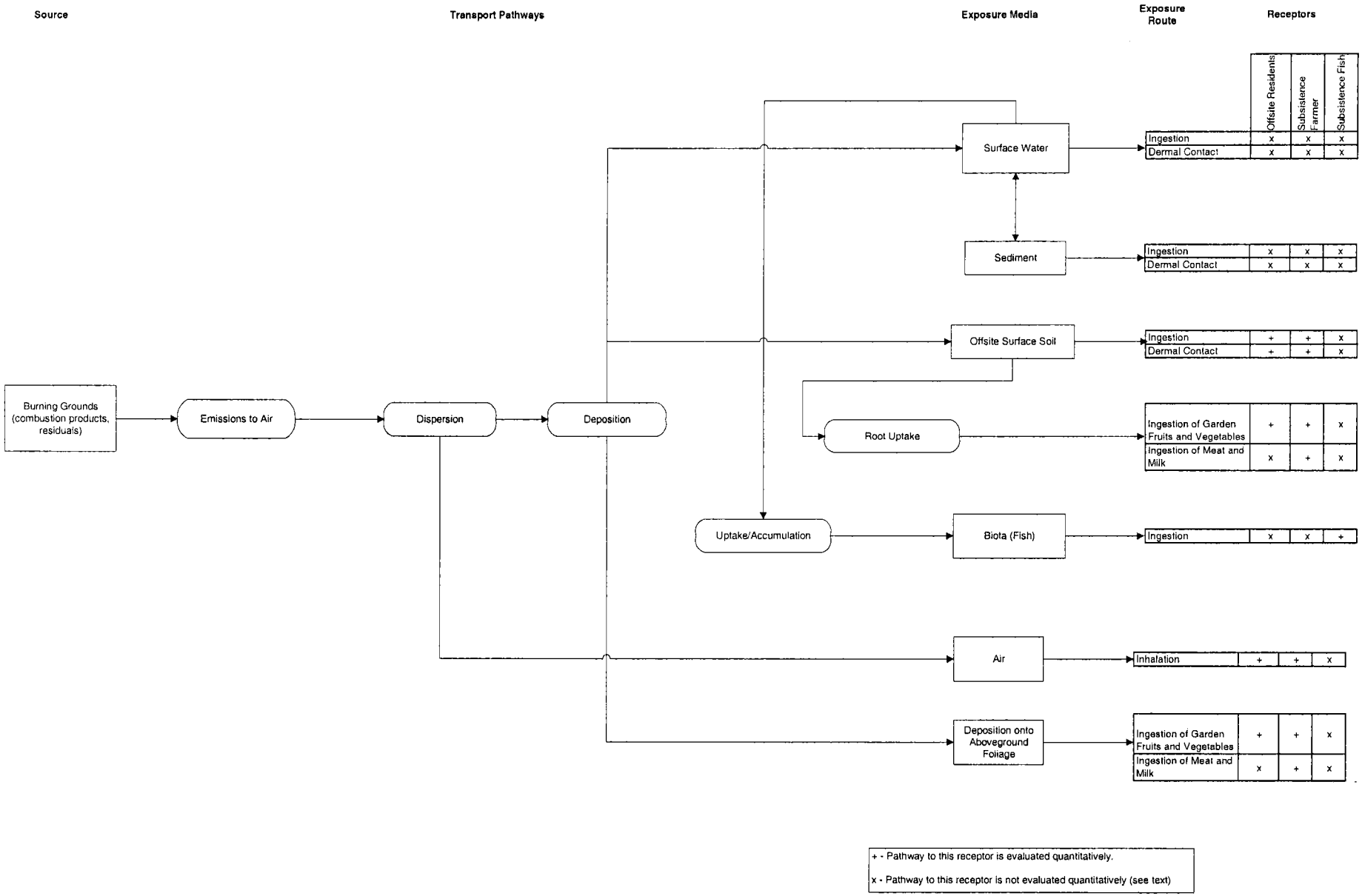

Figure 3-1. Conceptual Model of Human Exposure Pathways
ABL Open Burning Grounds
Potential Future Risks from Continued Operations

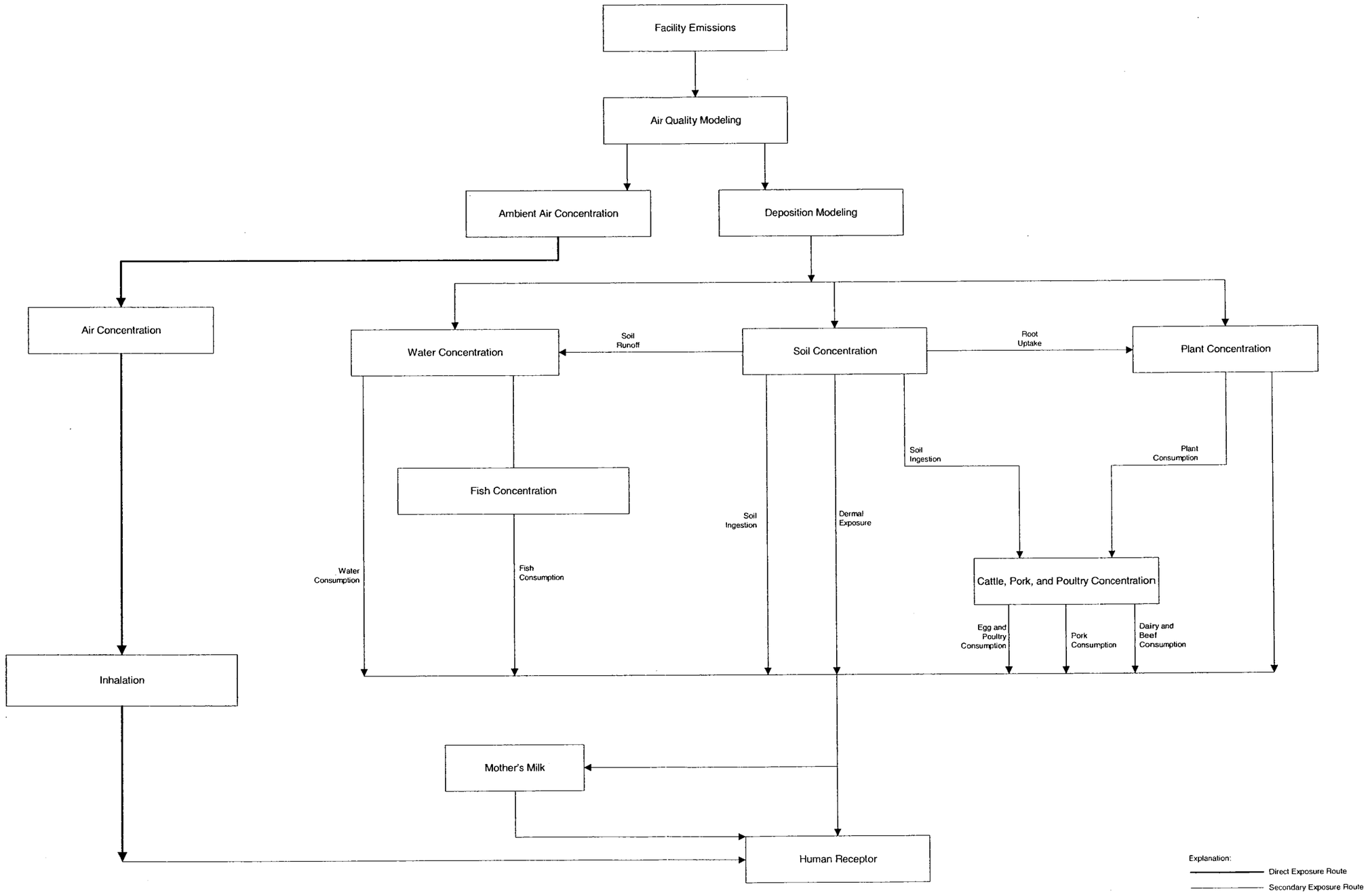

Figure 3-2. Fate and Transport Analysis
ABL Open Burning Grounds
Potential Future Risks from Continued Operations

Attachment B-1
Soil Samping Data

Attachment B-1

Soil Sampling Data

Table 1

COPCs in Surface Soil Samples

Station ID Sample ID Sample Date	AS01-SB01 AS01-SS01-R01X 02/21/01	AS01-SB02 AS01-SS02-R01X 02/21/01	AS01-SB03 AS01-SS03-R01X 02/21/01	AS01-SB04 AS01-SS04-R01X 02/21/01	AS01-SB05 AS01-SS05-R01X 02/21/01	AS01-SB06 AS01-SS06-R01X 02/21/01	AS01-SB07 AS01-SS07-R01X 02/22/01	AS01-SB08 AS01-SS08-R01X 02/21/01
Chemical Name								
Organics (UG/KG)								
Total octachlorodibenzo-p-dioxin	0.722	0.411	0.307	0.109	0.09	0.366	0.347	0.345
Total octachlorodibenzofuran	0.073 U	0.08	0.114 U	0.078 U	0.09 U	0.1 U	0.085 U	0.086 U
Perchlorate	66 U	56 U	68	96	880	95	58 U	63 U
Total Metals (MG/KG)								
Aluminum	7,800	4,680	7,490	7,540	7,590	7,410	6,280	7,320
Arsenic	9.5	5	7.6	6.8	7.2	7.6	6.1	6.9
Cadmium	0.71	0.7	0.57 J	0.56 J	1.3	0.63	0.79	0.63
Chromium	14.7	8.8	13.4	13.5	13.5	14.8	23.8	12.7
Iron	30,800	15,800	32,700	31,600	32,400	30,200	24,800	28,200
Lead	39.3	**1,730**	25.2	34.3	55.2	26.9	25.9	30
Manganese	954	419	912	797	1,010	928	783	982
Thallium	0.29 J	0.22 U	0.82 J	0.34 J	0.54 J	0.79 J	0.34 J	0.68 J

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated

R - Unreliable result
U - Analyte not detected
K - Reported value may be biased high
L - Reported value may be biased low

Attachment B-1
Soil Sampling Data
Table 1
COPCs in Surface Soil Samples

Station ID Sample ID Sample Date	AS01-SB09 AS01-SS09-R01X 02/22/01	AS01-SS09P-R01X 02/22/01	AS01-SB10 AS01-SS10-R01X 02/22/01	AS01-SB11 AS01-SS11-R01X 02/22/01	AS01-SB12 AS01-SS12-R01X 02/22/01	AS01-SB13 AS01-SS13-R01X 02/22/01	AS01-SB14 AS01-SS14-R01X 02/21/01	AS01-SB15 AS01-SS15-R01X 02/21/01
Chemical Name								
Organics (UG/KG)								
Total octachlorodibenzo-p-dioxin	0.427	0.402	0.39	0.1	0.284	0.414	0.354	0.215
Total octachlorodibenzofuran	0.066 U	0.092 U	0.069 U	0.049 U	0.07 U	0.073 U	0.023 J	0.063 U
Perchlorate	60 U	63 U	61 U	58 U	62 U	64 U	63 U	61 U
Total Metals (MG/KG)								
Aluminum	9,240	9,800	8,350	9,510	7,950	10,400	8,200	8,440
Arsenic	7.4	7.4	6.8	6.6	7.3	7.8	6.4	6.5
Cadmium	1	0.77	0.67	0.71	0.81	0.72	0.92	10.9
Chromium	14.6	15	13.2	15.7	14	16	13.5	13.6
Iron	28,900	29,200	30,100	33,200	30,700	33,200	24,600	24,800
Lead	38	31.3	29.5	96.9	53.4	25	101	75.8
Manganese	1,080	1,120	999	730	1,120	1,050	741	777
Thallium	0.68 J	0.46 J	0.78 J	1.1 J	0.24 U	0.88 J	0.37 J	0.45 J

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated

R - Unreliable result
U - Analyte not detected
K - Reported value may be biased high
L - Reported value may be biased low

Attachment B-1
Soil Sampling Data
Table 1
COPCs in Surface Soil Samples

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
Organics (UG/KG)						
Total octachlorodibenzo-p-dioxin	0.303	0.297	0.309	0.358	0.515	0.369
Total octachlorodibenzofuran	0.709 U	0.072 U	0.096 U	0.061 U	0.079 U	0.12 U
Perchlorate	59 U	59 U	220	62 U	62 U	63 U
Total Metals (MG/KG)						
Aluminum	7,530	6,700	6,350	8,960	8,760	8,130
Arsenic	6.4	6.5	6.4	6.5	6.7	7.6
Cadmium	0.62	0.73	0.65	0.72	0.84	0.74
Chromium	11.5	10.8	10.8	13	12.7	13.7
Iron	22,600	22,800	23,900	24,800	21,300	28,400
Lead	26.6	25.8	30.4	134	184	58.1
Manganese	672	712	813	915	674	1,090
Thallium	0.24 U	0.46 J	0.49 J	0.23 U	0.62 J	0.87 J

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated

R - Unreliable result
U - Analyte not detected
K - Reported value may be biased high
L - Reported value may be biased low

Attachment B-1

Soil Sampling Data

Table 2

COPCs in Subsurface Soil Samples

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
Organics (UG/KG)								
Perchlorate	120	92	61	62	2,500	61	60	59
Total Metals (MG/KG)								
Aluminum	9,160	9,280	9,330	9,120	10,200	10,200	9,820	10,200
Arsenic	6.5	6.6	7.2	7	6.9	7	7.6	7
Iron	31,300	32,300	31,600	32,700	32,700	32,800	33,100	33,500
Manganese	911	926	1,030	1,010	1,070	1,170	1,080	1,100
Thallium	1.9	2.1	1.7	1.6	1.5	1.7	2.1	1.8

Attachment B-1

Soil Sampling Data

Table 3

Statistical Evaluation of Surface Soil Data

AnalyteName	Detection Frequency	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Shapiro-Wilkes /DAgastino - Quantile (Norm)	Shapiro-Wilkes /DAgastino - Value (Norm)	Shapiro-Wilkes /DAgastino - Test (Norm)	Shapiro-Wilkes /DAgastino - Quantile (Ln)	Shapiro-Wilkes /DAgastino - Value (Ln)	Shapiro-Wilkes /DAgastino - Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Organics (UG/KG)															
Total octachlorodibenzo-p-dioxin	20 - 20	0.34	-1.20	0.14	0.53	0.91	0.91	TRUE	0.91	0.83	FALSE	1.73	2.03	0.39	0.45
Total octachlorodibenzofuran	2 - 20	0.06	-3.10	0.07	0.57	0.91	0.39	FALSE	0.91	0.74	FALSE	1.73	2.07	0.09	0.07
Perchlorate	5 - 20	90.98	3.84	191.16	0.88	0.91	0.36	FALSE	0.91	0.60	FALSE	1.73	2.43	164.88	113.05
Total Metals (MG/KG)															
Aluminum	20 - 20	7924.50	8.96	1286.68	0.18	0.91	0.96	TRUE	0.91	0.91	TRUE	1.73	1.77	8421.95	8521.73
Arsenic	20 - 20	6.96	1.93	0.88	0.13	0.91	0.91	TRUE	0.91	0.92	TRUE	1.73	1.74	7.30	7.32
Cadmium	20 - 20	1.27	-0.16	2.27	0.63	0.91	0.29	FALSE	0.91	0.50	FALSE	1.73	2.13	2.14	1.41
Chromium	20 - 20	13.90	2.61	2.85	0.19	0.91	0.78	FALSE	0.91	0.87	FALSE	1.73	1.77	15.00	15.00
Iron	20 - 20	27675.00	10.21	4658.09	0.19	0.91	0.92	TRUE	0.91	0.87	FALSE	1.73	1.77	29475.89	29922.77
Lead	20 - 20	140.98	4.02	376.41	1.01	0.91	0.32	FALSE	0.91	0.75	FALSE	1.73	2.61	286.50	170.04
Manganese	20 - 20	876.30	6.75	177.08	0.23	0.91	0.94	TRUE	0 91	0.87	FALSE	1.73	1.80	944.76	967.43
Thallium	17 - 20	0.54	-0.79	0.28	0.69	0.91	0.96	TRUE	0.91	0.88	FALSE	1.73	2.20	0.65	0.82

Attachment B-1

Soil Sampling Data

Table 4

Statistical Evaluation of Subsurface Soil Data

AnalyteName	Detection Frequency	Maximum Detected Concentration	Mean Value (Norm)	Mean Value (Ln)	Standard Deviation (Norm)	Standard Deviation (Ln)	Shapiro-Wilkes /DAgastino - Quantile (Norm)	Shapiro-Wilkes /DAgastino Value (Norm)	Shapiro-Wilkes /DAgastino Test (Norm)	Shapiro-Wilkes /DAgastino - Quantile (Ln)	Shapiro-Wilkes /DAgastino Value (Ln)	Shapiro-Wilkes /DAgastino Test (Ln)	T Value	H Value	95% UCL (Norm)	95% UCL (Ln)
Organics (UG/KG)																
Total octachlorodibenzo-p-dioxin	7 - 7	0.192	0.14	-2.04	0.05	0.47	0.80	0.90	TRUE	0.80	0.76	FALSE	1.94	2.41	0.17	0.23
Perchlorate	3 - 7	2500	400.36	4.34	926.45	1.63	0.80	0.48	FALSE	0.80	0.68	FALSE	1.94	5.59	1080.73	11751.44
Total Metals (MG/KG)																
Aluminum	7 - 7	10200	9735.71	9.18	483.94	0.05	0.80	0.82	TRUE	0.80	0.82	TRUE	1.94	1.89	10091.11	10119.08
Arsenic	7 - 7	7.6	7.04	1.95	0.30	0.04	0.80	0.92	TRUE	0.80	0.92	TRUE	1.94	1.89	7.27	7.28
Manganese	7 - 7	1170	1055.14	6.96	76.80	0.07	0.80	0.98	TRUE	0.80	0.97	TRUE	1.94	1.89	1111.54	1117.27
Thallium	7 - 7	2.1	1.79	0.57	0.23	0.13	0.80	0.89	TRUE	0.80	0.90	TRUE	1.94	1.92	1.96	1.98

Attachment B-2
Dispersion Modeling Information

Attachment B-2
Dispersion Modeling Information

Table 1
Summary of Concentrations of Toxic Pollutants in Air - Updated 10/19/01
Air Pathway Human Health Risk Assessment, Burning Grounds
Burning Grounds, Allegany Ballistics Laboratory

Constituent	Waste Type (represents waste type providing highest emissions into the air)	Concentration Used in Risk Assessment (ug/m^3)		
		Maximum Exposed Individual (Closest Resident)	River	Concentration at Facility Fenceline
1,3-Butadiene	Type 1 P/E Waste	1.70E-04	3.57E-05	1.61E-03
1,6-Dinitropyrene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
1-Methylnaphthalene	Al Composite Propellant	2.33E-05	7.60E-06	7.62E-05
1-Nitropyrene	Al Composite Propellant	2.14E-05	6.97E-06	6.98E-05
2,4-Dinitrotoluene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
2,5-Diphenyloxazole	Al Composite Propellant	9.22E-06	3.01E-06	3.02E-05
2,6-Dinitrotoluene	Composite Propellant	1.28E-06	4.12E-07	5.00E-06
2-Methylnaphthalene	Al Composite Propellant	2.33E-05	7.60E-06	7.62E-05
2-Nitroaphthalene	Composite Propellant	3.76E-07	1.21E-07	1.47E-06
4-Nitrophenol	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
4-Nitrosodiphenylamine	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Benzo[a]anthracene	Composite Propellant	9.74E-07	3.12E-07	3.80E-06
Benzene	Al Composite Propellant	1.07E-02	3.48E-03	3.49E-02
Benzo[a]pyrene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Biphenyl	Al Composite Propellant	4.56E-05	1.49E-05	1.49E-04
Dibenz[a,h]anthracene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Dibenzofuran	Al Composite Propellant	9.71E-06	3.17E-06	3.17E-05
Di-n-propyl adipate	Al Composite Propellant	1.31E-05	4.27E-06	4.29E-05
Dioxin	Al Composite Propellant	2.52E-10	8.23E-11	8.25E-10
Diphenylamine	Al Composite Propellant	1.84E-06	6.02E-07	6.03E-06
Mesitylene	PBX Explosive	1.11E-05	2.60E-06	4.85E-05
Naphthalene	Composite Propellant	8.63E-07	2.77E-07	3.37E-06
n-Hexane	Type 1 P/E Waste	1.70E-04	3.57E-05	1.61E-03
N-Nitrosodiphenylamine	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Phenanthrene	Al Composite Propellant	1.94E-05	6.33E-06	6.35E-05
Phenol	Composite Propellant	6.20E-07	1.99E-07	2.42E-06
Pyrene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Resorcinol	Double Base Propellant	6.42E-05	2.05E-05	2.86E-04
Styrene	Type 1 P/E Waste	1.70E-04	3.57E-05	1.61E-03
Thianaphthene	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Toluene	Type 2 P/E Waste	3.61E-03	7.56E-04	3.41E-02
Tractin	Al Composite Propellant	4.37E-07	1.42E-07	1.43E-06
Xylenes	Type 2 P/E Waste	9.68E-04	2.03E-04	9.16E-03
Aluminum	Al Composite Propellant	9.71E-01	3.17E-01	3.17E+00
Lead	Double Base Propellant	9.41E-02	3.01E-02	4.20E-01
Zirconium	Composite Propellant	1.95E-03	6.25E-04	7.59E-03
copper	PBX Explosive	3.69E-02	8.67E-03	1.62E-01
Iron	PBX Explosive	4.05E-04	9.54E-05	1.78E-03

Attachment B-2
Dispersion Modeling Information

Table 2

Concentrations of Toxic Pollutants in Air - Point of Maximum Impact (offsite resident)

Air Pathway Human Health Risk Assessment, Burning Grounds

Burning Grounds, Allegany Ballistics Laboratory

Constituents	Annual Emissions - Each Waste Type (lbs/year)						Maximum, lbs/year	Maximum g/s	Waste Type with Highest Toxics Emissions	Dispersion Factor (ug/m^3 per g/s) - see below	Concentration Used in HHRA (ug/m^3)
	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	Type 1 P/E Waste	Type 2 P/E Waste					
NO	1.1E+03	1.2E+03	6.9E+02	7.2E+02	7.2E+02	6.0E+02	1.2E+03	1.7E-02			
NO2	1.8E+02	1.8E+02	5.7E+01	9.3E+01	2.8E+02	3.3E+02	3.3E+02	4.8E-03			
SO2	1.2E+02	3.0E+01	1.2E+01	4.2E+02	5.1E+01	2.3E+02	4.2E+02	6.1E-03			
PM10	1.7E+04	1.4E+03	3.3E+03	1.6E+03	1.5E+03	2.2E+00	1.7E+04	2.5E-01			
VOC*(NMOC)	3.5E+02	1.2E+02	1.5E+01	8.2E+00	3.0E+02	1.3E+03	1.3E+03	1.9E-02			
CO	3.0E+01	3.6E+01	9.0E+02	8.7E+01	2.5E+04	2.5E+04	2.5E+04	3.6E-01			
HCl	7.3E+03	8.6E+03	0.0E+00	0.0E+00	0.0E+00	3.6E+02	8.6E+03	1.2E-01	Composite Propellant	5.12E-02	6.3E-03
1,3-Butadiene	2.4E+00	3.3E+00	6.8E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste	2.38E-01	1.7E-04
1,6-Dinitropyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
1-Methylnaphthalene	7.2E-01	2.7E-01	3.6E-02	7.2E-02	1.7E-03	2.7E-03	7.2E-01	1.0E-05	Al Composite Propellant	2.24E+00	2.3E-05
1-Nitropyrene	6.6E-01	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	6.6E-01	9.5E-06	Al Composite Propellant	2.24E+00	2.1E-05
2,4-Dinitrotoluene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
2,5-Diphenyloxazole	2.9E-01	1.3E-04	5.1E-02	7.5E-02	1.7E-03	2.7E-03	2.9E-01	4.1E-06	Al Composite Propellant	2.24E+00	9.2E-06
2,6-Dinitrotoluene	2.2E-03	1.7E+00	1.4E+00	1.6E+00	1.7E-03	2.7E-03	1.7E+00	2.5E-05	Composite Propellant	5.12E-02	1.3E-06
2-Methylnaphthalene	7.2E-01	2.7E-01	3.6E-02	7.2E-02	1.7E-03	2.7E-03	7.2E-01	1.0E-05	Al Composite Propellant	2.24E+00	2.3E-05
2-Nitroaphthalene	8.1E-02	5.1E-01	6.9E-02	1.1E-01	1.7E-03	2.7E-03	5.1E-01	7.4E-06	Composite Propellant	5.12E-02	3.8E-07
4-Nitrophenol	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
4-Nitrosodiphenylamine	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
Benzo[a]anthracene	1.4E-02	1.3E+00	9.9E-01	5.0E-01	1.7E-03	2.7E-03	1.3E+00	1.9E-05	Composite Propellant	5.12E-02	9.7E-07
Benzene	3.3E+02	4.5E+01	6.3E+00	4.7E-01	5.0E+01	7.2E-02	3.3E+02	4.8E-03	Al Composite Propellant	2.24E+00	1.1E-02
Benzo[a]pyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
Biphenyl	1.4E+00	3.0E-01	5.7E-02	3.9E-01	1.7E-03	2.7E-03	1.4E+00	2.0E-05	Al Composite Propellant	2.24E+00	4.6E-05
Dibenz[a,h]anthracene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
Dibenzofuran	3.0E-01	2.1E-01	5.1E-02	4.2E-02	1.7E-03	2.7E-03	3.0E-01	4.3E-06	Al Composite Propellant	2.24E+00	9.7E-06
Di-n-propyl adipate	4.1E-01	4.1E-01	1.4E-01	2.7E-01	1.7E-03	2.7E-03	4.1E-01	5.8E-06	Al Composite Propellant	2.24E+00	1.3E-05
Dioxin	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	1.1E-10	Al Composite Propellant	2.24E+00	2.5E-10
Diphenylamine	5.7E-02	2.9E-02	2.1E-02	4.2E-02	1.7E-03	2.7E-03	5.7E-02	8.2E-07	Al Composite Propellant	2.24E+00	1.8E-06
Mesitylene	1.1E-02	1.8E-02	2.5E-02	9.0E-02	1.7E-03	2.7E-03	9.0E-02	1.3E-06	PBX Explosive	8.52E+00	1.1E-05
Naphthalene	3.3E-01	1.2E+00	2.1E-02	7.5E-02	1.7E-03	2.7E-03	1.2E+00	1.7E-05	Composite Propellant	5.12E-02	8.6E-07
n-Hexane	2.4E+00	3.3E+00	6.8E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste	2.38E-01	1.7E-04
N-Nitrosodiphenylamine	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
Phenanthrene	6.0E-01	8.7E-02	1.1E-01	3.3E-02	1.7E-03	2.7E-03	6.0E-01	8.6E-06	Al Composite Propellant	2.24E+00	1.9E-05
Phenol	4.2E-01	8.4E-01	6.9E-02	1.9E-01	1.7E-03	2.7E-03	8.4E-01	1.2E-05	Composite Propellant	5.12E-02	6.2E-07
Pyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
Resorcinol	1.7E+00	6.9E-01	1.8E+00	3.6E-01	1.7E-03	2.7E-03	1.8E+00	2.6E-05	Double Base Propellant	2.47E+00	6.4E-05
Styrene	2.4E+00	3.3E+00	8.0E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste	2.38E-01	1.7E-04
Thianaphthene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
Toluene	4.8E+00	3.3E+01	8.0E-01	4.7E-01	5.0E+01	1.1E+03	1.1E+03	1.5E-02	Type 2 P/E Waste	2.38E-01	3.6E-03
Tractin	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	2.24E+00	4.4E-07
Xylenes	2.4E+00	2.6E+01	8.0E-01	1.9E+00	5.0E+01	2.8E+02	2.8E+02	4.1E-03	Type 2 P/E Waste	2.38E-01	9.7E-04
Aluminum	3.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.0E+04	4.3E-01	Al Composite Propellant	2.24E+00	9.7E-01
Lead	0.0E+00	0.0E+00	2.6E+03	0.0E+00	0.0E+00	0.0E+00	2.6E+03	3.8E-02	Double Base Propellant	2.47E+00	9.4E-02
Zirconium	0.0E+00	2.6E+03	2.6E+03	0.0E+00	0.0E+00	0.0E+00	2.6E+03	3.8E-02	Composite Propellant	5.12E-02	1.9E-03
copper	0.0E+00	0.0E+00	0.0E+00	3.0E+02	0.0E+00	0.0E+00	3.0E+02	4.3E-03	PBX Explosive	8.52E+00	3.7E-02
Iron	0.0E+00	0.0E+00	0.0E+00	3.3E+00	0.0E+00	0.0E+00	3.3E+00	4.8E-05	PBX Explosive	8.52E+00	4.1E-04

Dispersion Factors = Closest Resident					
Emission Type	Pollutant	Averaging Time	Concentration (ug/m^3)	Emission Rate (g/s)	concentration (ug/m^3 per g/s) - Annual Average for Toxics
Al Composite Propellant	PM10	Annual	0.56	0.25	2.24
Composite Propellant	HCl	Annual	0.30	5.88	0.05
Double Base Propellant	Lead	Annual	0.09	0.04	2.47
Explosive	SO2	Annual	0.05	0.0061	8.52
Type 1 P/E Waste	CO	Annual	4.07	17.10	0.24
Type 2 P/E Waste	CO	Annual	4.07	17.10	0.24

Attachment B-2
Dispersion Modeling Information

Table 3
Concentrations of Toxic Pollutants in Air - Over Potomac River
Air Pathway Human Health Risk Assessment, Burning Grounds
Burning Grounds, Allegany Ballistics Laboratory

Constituents	Annual Emissions - Each Waste Type (lbs/year)						Maximum, lbs/year	Maximum g/s	Waste Type with Highest Toxics Emissions	Dispersion Factor (ug/m^3 per g/s) - see below	Concentration Used in HHRA (ug/m^3)
	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	Type 1 P/E Waste	Type 2 P/E Waste					
NO	1.1E+03	1.2E+03	6.9E+02	7.2E+02	7.2E+02	6.0E+02	1.2E+03	1.7E-02			
NO2	1.8E+02	1.8E+02	5.7E+01	9.3E+01	2.8E+02	3.3E+02	3.3E+02	4.8E-03			
SO2	1.2E+02	3.0E+01	1.2E+01	4.2E+02	5.1E+01	2.3E+02	4.2E+02	6.1E-03			
PM10	1.7E+04	1.4E+03	3.3E+03	1.6E+03	1.5E+03	2.2E+00	1.7E+04	2.5E-01			
VOC*(NMOC)	3.5E+02	1.2E+02	1.5E+01	8.2E+00	3.0E+02	1.3E+03	1.3E+03	1.9E-02			
CO	3.0E+01	3.6E+01	9.0E+02	8.7E+01	2.5E+04	2.5E+04	2.5E+04	3.6E-01			
HCl	7.3E+03	8.6E+03	0.0E+00	0.0E+00	0.0E+00	3.6E+02	8.6E+03	1.2E-01	Composite Propellant	1.64E-02	2.0E-03
1,3-Butadiene	2.4E+00	3.3E+00	6.8E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste	5.00E-02	3.6E-05
1,6-Dinitropyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
1-Methylnaphthalene	7.2E-01	2.7E-01	3.6E-02	7.2E-02	1.7E-03	2.7E-03	7.2E-01	1.0E-05	Al Composite Propellant	7.32E-01	7.6E-06
1-Nitropyrene	6.6E-01	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	6.6E-01	9.5E-06	Al Composite Propellant	7.32E-01	7.0E-06
2,4-Dinitrotoluene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
2,5-Diphenyloxazole	2.9E-01	1.3E-04	5.1E-02	7.5E-02	1.7E-03	2.7E-03	2.9E-01	4.1E-06	Al Composite Propellant	7.32E-01	3.0E-06
2,6-Dinitrotoluene	2.2E-03	1.7E+00	1.4E+00	1.6E+00	1.7E-03	2.7E-03	1.7E+00	2.5E-05	Composite Propellant	1.64E-02	4.1E-07
2-Methylnaphthalene	7.2E-01	2.7E-01	3.6E-02	7.2E-02	1.7E-03	2.7E-03	7.2E-01	1.0E-05	Al Composite Propellant	7.32E-01	7.6E-06
2-Nitroaphthalene	8.1E-02	5.1E-01	6.9E-02	1.1E-01	1.7E-03	2.7E-03	5.1E-01	7.4E-06	Composite Propellant	1.64E-02	1.2E-07
4-Nitrophenol	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
4-Nitrosodiphenylamine	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
Benzo[a]anthracene	1.4E-02	1.3E+00	9.9E-01	5.0E-01	1.7E-03	2.7E-03	1.3E+00	1.9E-05	Composite Propellant	1.64E-02	3.1E-07
Benzene	3.3E+02	4.5E+01	6.3E+00	4.7E-01	5.0E+01	7.2E-02	3.3E+02	4.8E-03	Al Composite Propellant	7.32E-01	3.5E-03
Benzo[a]pyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
Biphenyl	1.4E+00	3.0E-01	5.7E-02	3.9E-01	1.7E-03	2.7E-03	1.4E+00	2.0E-05	Al Composite Propellant	7.32E-01	1.5E-05
Dibenz[a,h]anthracene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
Dibenzofuran	3.0E-01	2.1E-01	5.1E-02	4.2E-02	1.7E-03	2.7E-03	3.0E-01	4.3E-06	Al Composite Propellant	7.32E-01	3.2E-06
Di-n-propyl adipate	4.1E-01	4.1E-01	1.4E-01	2.7E-01	1.7E-03	2.7E-03	4.1E-01	5.8E-06	Al Composite Propellant	7.32E-01	4.3E-06
Dioxin	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	1.1E-10	Al Composite Propellant	7.32E-01	8.2E-11
Diphenylamine	5.7E-02	2.9E-02	2.1E-02	4.2E-02	1.7E-03	2.7E-03	5.7E-02	8.2E-07	Al Composite Propellant	7.32E-01	6.0E-07
Mesitylene	1.1E-02	1.8E-02	2.5E-02	9.0E-02	1.7E-03	2.7E-03	9.0E-02	1.3E-06	PBX Explosive	2.01E+00	2.6E-06
Naphthalene	3.3E-01	1.2E+00	2.1E-02	7.5E-02	1.7E-03	2.7E-03	1.2E+00	1.7E-05	Composite Propellant	1.64E-02	2.8E-07
n-Hexane	2.4E+00	3.3E+00	6.8E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste	5.00E-02	3.6E-05
N-Nitrosodiphenylamine	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
Phenanthrene	6.0E-01	8.7E-02	1.1E-01	3.3E-02	1.7E-03	2.7E-03	6.0E-01	8.6E-06	Al Composite Propellant	7.32E-01	6.3E-06
Phenol	4.2E-01	8.4E-01	6.9E-02	1.9E-01	1.7E-03	2.7E-03	8.4E-01	1.2E-05	Composite Propellant	1.64E-02	2.0E-07
Pyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
Resorcinol	1.7E+00	6.9E-01	1.8E+00	3.6E-01	1.7E-03	2.7E-03	1.8E+00	2.6E-05	Double Base Propellant	7.92E-01	2.1E-05
Styrene	2.4E+00	3.3E+00	8.0E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste	5.00E-02	3.6E-05
Thianaphthene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
Toluene	4.8E+00	3.3E+01	8.0E-01	4.7E-01	5.0E+01	1.1E+03	1.1E+03	1.5E-02	Type 2 P/E Waste	5.00E-02	7.6E-04
Tractin	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.32E-01	1.4E-07
Xylenes	2.4E+00	2.6E+01	8.0E-01	1.9E+00	5.0E+01	2.8E+02	2.8E+02	4.1E-03	Type 2 P/E Waste	5.00E-02	2.0E-04
Aluminum	3.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.0E+04	4.3E-01	Al Composite Propellant	7.32E-01	3.2E-01
Lead	0.0E+00	0.0E+00	2.6E+03	0.0E+00	0.0E+00	0.0E+00	2.6E+03	3.8E-02	Double Base Propellant	7.92E-01	3.0E-02
Zirconium	0.0E+00	2.6E+03	2.6E+03	0.0E+00	0.0E+00	0.0E+00	2.6E+03	3.8E-02	Composite Propellant	1.64E-02	6.2E-04
copper	0.0E+00	0.0E+00	0.0E+00	3.0E+02	0.0E+00	0.0E+00	3.0E+02	4.3E-03	PBX Explosive	2.01E+00	8.7E-03
Iron	0.0E+00	0.0E+00	0.0E+00	3.3E+00	0.0E+00	0.0E+00	3.3E+00	4.8E-05	PBX Explosive	2.01E+00	9.5E-05

Dispersion Factors = River

Emission Type	Pollutant	Averaging Time	Concentration (ug/m^3)	Emission Rate (g/s)	concentration (ug/m^3 per g/s) - Annual Average for Toxics Modeling
Al Composite Propellant	PM10	Annual	0.18	0.25	0.73
Composite Propellant	HCl	Annual	0.10	5.88	0.02
Double Base Propellant	Lead	Annual	0.03	0.04	0.79
Explosive	SO2	Annual	0.01	0.0061	2.01
Type 1 P/E Waste	CO	Annual	0.85	17.10	0.05
Type 2 P/E Waste	CO	Annual	0.85	17.10	0.05

Attachment B-2
Dispersion Modeling Information

Table 4
Concentrations of Toxic Pollutants in Air - Maximum Impact at Facility Fenceline
Air Pathway Human Health Risk Assessment, Burning Grounds
Burning Grounds, Allegany Ballistics Laboratory

Constituents	Annual Emissions - Each Waste Type (lbs/year)						Maximum, lbs/year	Maximum g/s	Waste Type with Highest Toxics Emissions	Dispersion Factor (ug/m^3 per g/s) - see below	Concentration Used in HHRA (ug/m^3)
	Al Composite Propellant	Composite Propellant	Double Base Propellant	PBX Explosive	Type 1 P/E Waste	Type 2 P/E Waste					
NO	1.1E+03	1.2E+03	6.9E+02	7.2E+02	7.2E+02	6.0E+02	1.2E+03	1.7E-02			
NO2	1.8E+02	1.8E+02	5.7E+01	9.3E+01	2.8E+02	3.3E+02	3.3E+02	4.8E-03			
SO2	1.2E+02	3.0E+01	1.2E+01	4.2E+02	5.1E+01	2.3E+02	4.2E+02	6.1E-03			
PM10	1.7E+04	1.4E+03	3.3E+03	1.6E+03	1.5E+03	2.2E+00	1.7E+04	2.5E-01			
VOC*(NMOC)	3.5E+02	1.2E+02	1.5E+01	8.2E+00	3.0E+02	1.3E+03	1.3E+03	1.9E-02			
CO	3.0E+01	3.6E+01	9.0E+02	8.7E+01	2.5E+04	2.5E+04	2.5E+04	3.6E-01			
HCl	7.3E+03	8.6E+03	0.0E+00	0.0E+00	0.0E+00	3.6E+02	8.6E+03	1.2E-01	Composite Propellant	2.00E-01	2.5E-02
1,3-Butadiene	2.4E+00	3.3E+00	6.8E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste	2.25E+00	1.6E-03
1,6-Dinitropyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
1-Methylnaphthalene	7.2E-01	2.7E-01	3.6E-02	7.2E-02	1.7E-03	2.7E-03	7.2E-01	1.0E-05	Al Composite Propellant	7.34E+00	7.6E-05
1-Nitropyrene	6.6E-01	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	6.6E-01	9.5E-06	Al Composite Propellant	7.34E+00	7.0E-05
2,4-Dinitrotoluene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
2,5-Diphenyloxazole	2.9E-01	1.3E-04	5.1E-02	7.5E-02	1.7E-03	2.7E-03	2.9E-01	4.1E-06	Al Composite Propellant	7.34E+00	3.0E-05
2,6-Dinitrotoluene	2.2E-03	1.7E+00	1.4E+00	1.6E+00	1.7E-03	2.7E-03	1.7E+00	2.5E-05	Composite Propellant	2.00E-01	5.0E-06
2-Methylnaphthalene	7.2E-01	2.7E-01	3.6E-02	7.2E-02	1.7E-03	2.7E-03	7.2E-01	1.0E-05	Al Composite Propellant	7.34E+00	7.6E-05
2-Nitronaphthalene	5.1E-01	5.1E-01	6.9E-02	1.1E-01	1.7E-03	2.7E-03	5.1E-01	7.4E-06	Composite Propellant	2.00E-01	1.5E-06
4-Nitrophenol	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
4-Nitrosodiphenylamine	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
Benzo[a]anthracene	1.4E-02	1.3E+00	9.9E-01	5.0E-01	1.7E-03	2.7E-03	1.3E+00	1.9E-05	Composite Propellant	2.00E-01	3.8E-06
Benzene	3.3E+02	4.5E+01	6.3E+00	4.7E-01	5.0E+01	7.2E-02	3.3E+02	4.8E-03	Al Composite Propellant	7.34E+00	3.5E-02
Benzo[a]pyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
Biphenyl	1.4E+00	3.0E-01	5.7E-02	3.9E-01	1.7E-03	2.7E-03	1.4E+00	2.0E-05	Al Composite Propellant	7.34E+00	1.5E-04
Dibenz[a,h]anthracene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
Dibenzofuran	3.0E-01	2.1E-01	5.1E-02	4.2E-02	1.7E-03	2.7E-03	3.0E-01	4.3E-06	Al Composite Propellant	7.34E+00	3.2E-05
Di-n-propyl adipate	4.1E-01	4.1E-01	1.4E-01	2.7E-01	1.7E-03	2.7E-03	4.1E-01	5.8E-06	Al Composite Propellant	7.34E+00	4.3E-05
Dioxin	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	7.8E-06	1.1E-10	Al Composite Propellant	7.34E+00	8.3E-10
Diphenylamine	5.7E-02	2.9E-02	2.1E-02	4.2E-02	1.7E-03	2.7E-03	5.7E-02	8.2E-07	Al Composite Propellant	7.34E+00	6.0E-06
Mesitylene	1.1E-02	1.8E-02	2.5E-02	9.0E-02	1.7E-03	2.7E-03	9.0E-02	1.3E-06	PBX Explosive	3.74E+01	4.9E-05
Naphthalene	3.3E-01	1.2E+00	2.1E-02	7.5E-02	1.7E-03	2.7E-03	1.2E+00	1.7E-05	Composite Propellant	2.00E-01	3.4E-06
n-Hexane	2.4E+00	3.3E+00	6.8E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste	2.25E+00	1.6E-03
N-Nitrosodiphenylamine	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
Phenanthrene	6.0E-01	8.7E-02	1.1E-01	3.3E-02	1.7E-03	2.7E-03	6.0E-01	8.6E-06	Al Composite Propellant	7.34E+00	6.3E-05
Phenol	4.2E-01	8.4E-01	6.9E-02	1.9E-01	1.7E-03	2.7E-03	8.4E-01	1.2E-05	Composite Propellant	2.00E-01	2.4E-06
Pyrene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
Resorcinol	1.7E+00	6.9E-01	1.8E+00	3.6E-01	1.7E-03	2.7E-03	1.8E+00	2.6E-05	Double Base Propellant	1.10E+01	2.9E-04
Styrene	2.4E+00	3.3E+00	8.0E-01	4.7E-01	5.0E+01	7.2E-02	5.0E+01	7.1E-04	Type 1 P/E Waste	2.25E+00	1.6E-03
Thianaphthene	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
Toluene	4.8E+00	3.3E+01	8.0E-01	4.7E-01	5.0E+01	1.1E+03	1.1E+03	1.5E-02	Type 2 P/E Waste	2.25E+00	3.4E-02
Tractin	1.4E-02	1.3E-02	8.1E-03	7.4E-03	1.7E-03	2.7E-03	1.4E-02	1.9E-07	Al Composite Propellant	7.34E+00	1.4E-06
Xylenes	2.4E+00	2.6E+01	8.0E-01	1.9E+00	5.0E+01	2.8E+02	2.8E+02	4.1E-03	Type 2 P/E Waste	2.25E+00	9.2E-03
Aluminum	3.0E+04	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.0E+04	4.3E-01	Al Composite Propellant	7.34E+00	3.2E+00
Lead	0.0E+00	0.0E+00	2.6E+03	0.0E+00	0.0E+00	0.0E+00	2.6E+03	3.8E-02	Double Base Propellant	1.10E+01	4.2E-01
Zirconium	0.0E+00	2.6E+03	2.6E+03	0.0E+00	0.0E+00	0.0E+00	2.6E+03	3.8E-02	Composite Propellant	2.00E-01	7.6E-03
copper	0.0E+00	0.0E+00	0.0E+00	3.0E+02	0.0E+00	0.0E+00	3.0E+02	4.3E-03	PBX Explosive	3.74E+01	1.6E-01
Iron	0.0E+00	0.0E+00	0.0E+00	3.3E+00	0.0E+00	0.0E+00	3.3E+00	4.8E-05	PBX Explosive	3.74E+01	1.8E-03

Dispersion Factors = Maximum Impact (Outside Fence)					
Waste Type	Pollutant Emitted	Averaging Time	Concentration (ug/m3)	Emission Rate (g/s)	Unit concentration (ug/m3 per g/s) - Annual Average for Toxics Modeling
Al Composite Propellant	PM10	Annual	1.84	0.25	7.34
Composite Propellant	HCl	Annual	1.17	5.88	0.20
Double Base Propellant	Lead	Annual	0.42	0.04	11.04
PBX Explosive	SO2	Annual	0.23	0.0061	37.40
Type 1 P/E Waste	CO	Annual	38.54	17.10	2.25
Type 2 P/E Waste	CO	Annual	38.54	17.10	2.25

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual, Offsite Resident, and Subsistence Farmer

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Annual Average Concentration in Air (ug/m^3)	Average soil concentration over exposure duration - Cs (mg/kg)	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg)	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life
1,3-Butadiene	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	4.37E-07	1.40E-07	1.41E-07	1.27E-06	1.27E-06	1.24E-08	1.25E-08	4.95E-09	5.01E-09
1-Methylnaphthalene	2.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.14E-05	1.85E-05	1.91E-05	6.25E-05	6.25E-05	8.53E-07	8.78E-07	5.22E-07	5.37E-07
2,4-Dinitrotoluene	4.37E-07	4.33E-10	4.33E-10	1.26E-06	1.26E-06	1.18E-09	1.18E-09	1.21E-08	1.21E-08
2,5-Diphenyloxazole	9.22E-06	4.85E-07	4.86E-07	2.67E-05	2.67E-05	3.75E-08	3.76E-08	7.20E-08	7.21E-08
2,6-Dinitrotoluene	6.10E-05	5.20E-08	5.20E-08	1.76E-04	1.76E-04	1.64E-07	1.64E-07	1.60E-06	1.60E-06
2-Methylnaphthalene	2.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	1.79E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	4.37E-07	3.27E-10	3.27E-10	1.26E-06	1.26E-06	9.98E-10	9.98E-10	9.88E-09	9.89E-09
4-Nitrosodiphenylamine	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	4.63E-05	7.27E-05	7.67E-05	1.35E-04	1.35E-04	1.47E-06	1.55E-06	1.53E-06	1.62E-06
Benzene	1.07E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	4.37E-07	7.87E-07	8.38E-07	1.27E-06	1.27E-06	8.74E-09	9.30E-09	9.92E-09	1.06E-08
Biphenyl (1,1-Biphenyl)	4.56E-05	6.62E-07	6.62E-07	1.32E-04	1.32E-04	1.25E-07	1.25E-07	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	4.37E-07	1.33E-06	1.49E-06	1.27E-06	1.27E-06	8.47E-09	9.50E-09	1.90E-08	2.14E-08
Dibenzofuran	9.71E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	1.31E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	2.52E-10	5.40E-10	5.83E-10	7.32E-10	7.32E-10	3.04E-12	3.28E-12	6.05E-12	6.53E-12
Diphenylamine	1.84E-06	1.93E-08	1.94E-08	5.33E-06	5.33E-06	7.30E-09	7.30E-09	3.10E-07	3.10E-07
Mesitylene (1,3,5-trimethylbenzene)	1.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	4.10E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.94E-05	4.48E-06	4.52E-06	5.65E-05	5.65E-05	4.07E-07	4.10E-07	1.60E-07	1.61E-07
Phenol	2.95E-05	1.59E-08	1.59E-08	8.52E-05	8.52E-05	8.60E-08	8.60E-08	6.85E-07	6.85E-07
Pyrene	4.37E-07	3.93E-07	4.05E-07	1.28E-06	1.28E-06	1.96E-08	2.02E-08	9.59E-09	9.88E-09
Resorcinol	6.42E-05	1.86E-08	1.86E-08	1.86E-04	1.86E-04	2.55E-07	2.55E-07	2.34E-06	2.34E-06
Styrene	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	3.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	4.37E-07	1.05E-10	1.05E-10	1.26E-06	1.26E-06	2.91E-09	2.91E-09	3.15E-08	3.15E-08
Xylenes	9.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	9.71E-01	2.08E+00	2.25E+00	2.81E+00	2.81E+00	8.33E-03	8.99E-03	1.35E-05	1.46E-05
Lead	9.41E-02	1.25E-01	1.31E-01	2.73E-01	2.74E-01	1.70E-03	1.78E-03	1.13E-05	1.18E-05
Zirconium	9.26E-02	3.66E-01	4.28E-01	2.68E-01	2.68E-01	7.32E-04	8.57E-04	1.83E-06	2.14E-06
copper	3.69E-02	3.26E-01	4.95E-01	2.37E-01	3.04E-01	1.31E-01	1.98E-01	8.16E-04	1.24E-03
Iron	4.05E-04	1.57E-05	1.57E-05	1.17E-03	1.17E-03	6.29E-08	6.29E-08	1.57E-10	1.57E-10

Notes:

Average concentration over exposure duration is used in human health risk assessment to calculate excess lifetime cancer risks

Concentration at end of the facility operating lifetime represents the peak concentration (particularly for chemicals that do not degrade readily) - this is used in the human health risk assessment to

Key assumptions in calculating concentrations in soil:

Mixing depth	20 cm
Facility lifetime	30 years
Deposition velocity	0.01 m/s

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 1
Summary of Concentrations in Environme
Air Pathway Human Health Risk Assessm
Allegany Ballistics Laboratory

Chemical	Concentration in Aboveground Produce Livestock Forage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Beef (mg/kg FW) - Average concentration over exposure duration	Concentration in Beef (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Milk (mg/kg FW) - Average concentration over exposure duration	Concentration in Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Pork (mg/kg FW) - Average concentration over exposure duration
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.39E-07	1.39E-07	7.67E-08	7.67E-08	6.18E-08
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	7.36E-04	7.36E-04	1.91E-04	1.91E-04	2.11E-05	2.11E-05	1.16E-05	1.16E-05	9.36E-06
2,4-Dinitrotoluene	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.71E-10	3.71E-10	2.04E-10	2.04E-10	1.66E-10
2,5-Diphenyloxazole	3.17E-04	3.17E-04	8.21E-05	8.21E-05	3.70E-06	3.70E-06	2.04E-06	2.04E-06	1.64E-06
2,6-Dinitrotoluene	2.10E-03	2.10E-03	5.43E-04	5.43E-04	4.02E-08	4.02E-08	2.22E-08	2.22E-08	1.80E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.04E-10	3.04E-10	1.68E-10	1.68E-10	1.36E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.59E-03	1.59E-03	4.14E-04	4.14E-04	1.90E-04	1.90E-04	1.04E-04	1.04E-04	8.52E-05
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	5.05E-06	5.06E-06	2.78E-06	2.78E-06	2.27E-06
Biphenyl (1,1-Biphenyl)	1.57E-03	1.57E-03	4.06E-04	4.06E-04	3.91E-06	3.91E-06	2.15E-06	2.15E-06	1.73E-06
Dibenz[a,h]anthracene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.33E-05	1.33E-05	7.28E-06	7.29E-06	5.97E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.69E-09	8.69E-09	2.25E-09	2.25E-09	4.69E-09	4.69E-09	1.50E-09	1.50E-09	2.11E-09
Diphenylamine	6.35E-05	6.35E-05	1.64E-05	1.64E-05	4.77E-08	4.77E-08	2.63E-08	2.63E-08	2.12E-08
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	6.68E-04	6.68E-04	1.73E-04	1.73E-04	5.92E-06	5.92E-06	3.25E-06	3.25E-06	2.65E-06
Phenol	1.01E-03	1.01E-03	2.62E-04	2.62E-04	7.58E-09	7.58E-09	4.16E-09	4.16E-09	3.39E-09
Pyrene	1.50E-05	1.51E-05	3.91E-06	3.91E-06	3.77E-07	3.77E-07	2.07E-07	2.07E-07	1.69E-07
Resorcinol	2.21E-03	2.21E-03	5.71E-04	5.71E-04	3.31E-09	3.31E-09	1.82E-09	1.82E-09	1.47E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.50E-05	1.50E-05	3.89E-06	3.89E-06	6.66E-12	6.66E-12	3.67E-12	3.67E-12	2.95E-12
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	3.34E+01	3.34E+01	8.65E+00	8.65E+00	4.99E-01	4.99E-01	1.16E-01	1.16E-01	2.22E-01
Lead	3.24E+00	3.24E+00	8.43E-01	8.44E-01	9.67E-03	9.68E-03	1.40E-02	1.40E-02	4.30E-03
Zirconium	3.19E+00	3.19E+00	8.25E-01	8.25E-01	1.75E-01	1.75E-01	1.65E-03	1.66E-03	7.82E-02
copper	1.40E+00	1.47E+00	4.59E-01	5.26E-01	1.43E-01	1.52E-01	3.70E-02	3.92E-02	6.51E-02
Iron	1.40E-02	1.40E-02	3.61E-03	3.61E-03	2.77E-03	2.77E-03	6.02E-05	6.02E-05	1.23E-03

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 1
Summary of Concentrations in Environme
Air Pathway Human Health Risk Assessm
Allegany Ballistics Laboratory

Chemical	Concentration in Pork (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Chicken (mg/kg FW) - Average concentration over exposure duration	Concentration in Chicken (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	6.18E-08	2.25E-09	2.25E-09	8.89E-07	8.89E-07
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	9.36E-06	3.40E-07	3.40E-07	1.35E-04	1.35E-04
2,4-Dinitrotoluene	1.66E-10	5.89E-12	5.89E-12	2.36E-09	2.36E-09
2,5-Diphenyloxazole	1.64E-06	5.97E-08	5.97E-08	2.36E-05	2.36E-05
2,6-Dinitrotoluene	1.80E-08	6.43E-10	6.43E-10	2.57E-07	2.57E-07
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.36E-10	4.84E-12	4.84E-12	1.94E-09	1.94E-09
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	8.53E-05	3.03E-06	3.03E-06	1.21E-03	1.22E-03
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	2.28E-06	8.08E-08	8.08E-08	3.24E-05	3.24E-05
Biphenyl (1,1-Biphenyl)	1.73E-06	6.31E-08	6.31E-08	2.49E-05	2.49E-05
Dibenz[a,h]anthracene	5.97E-06	2.13E-07	2.13E-07	8.50E-05	8.51E-05
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	2.11E-09	1.28E-10	1.28E-10	9.48E-11	9.49E-11
Diphenylamine	2.12E-08	7.70E-10	7.70E-10	3.05E-07	3.05E-07
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	2.65E-06	9.42E-08	9.42E-08	3.77E-05	3.77E-05
Phenol	3.39E-09	1.21E-10	1.21E-10	4.83E-08	4.83E-08
Pyrene	1.69E-07	6.01E-09	6.01E-09	2.41E-06	2.41E-06
Resorcinol	1.47E-09	5.35E-11	5.35E-11	2.11E-08	2.11E-08
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	2.95E-12	1.07E-13	1.07E-13	4.25E-11	4.25E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	2.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	4.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zirconium	7.84E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
copper	6.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	1.23E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 2
Chemical-Specific Inputs
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

		Chemical/Physical Properties													
Chemical	CAS Number	Molecular Weight (g/mole)	T_m (K)	Vp (atm)	S (mg/L)	H (atm-m^3/mol)	D_a (cm^2/s)	D_w (cm^2/s)	K_{ow} (unitless)	K_{oc} (mL/g)	Kd_s (mL/g)	Kd_{sw} (L/kg)	Kd_{bs} (mL/g)	ksg $(year)^{-1}$	Fv (unitless)
1,3-Butadiene	106-99-0	5.41E+01	1.64E+02	2.77E+00	7.35E+02	6.30E-02	1.31E-01	1.52E-05	1.00E+02	1.20E+02	1.20E+00	9.02E+00	4.81E+00	9.01E+00	1
1,6-Dinitropyrene	42397-64-8	2.92E+02	5.73E+02	1.65E-07	5.86E+00	8.25E-06	4.23E-02	4.90E-06	3.72E+04	2.18E+04	2.18E+02	1.64E+03	8.73E+02	1.33E-01	0
1-Methylnaphthalene	90-12-0	1.42E+02	2.43E+02	8.82E-05	2.58E+01	2.60E-04	6.86E-02	7.94E-06	7.41E+03	4.57E+03	4.57E+01	3.43E+02	1.83E+02	2.53E+02	1
1-Nitropyrene	5522-43-0	2.47E+02	4.28E+02	4.20E-08	1.26E+00	8.25E-06	4.74E-02	5.48E-06	1.15E+05	6.52E+04	6.52E+02	4.89E+03	2.61E+03	1.33E-01	0
2,4-Dinitrotoluene	121-14-2	1.82E+02	3.44E+02	2.29E-07	2.85E+02	1.46E-07	3.09E-02	7.86E-06	9.90E+01	5.10E+01	5.10E-01	3.83E+00	2.04E+00	1.41E+00	0
2,5-Diphenyloxazole	92-71-7	2.21E+02	3.46E+02	2.43E-10	3.35E+00	1.60E-08	5.10E-02	5.91E-06	4.68E+04	6.22E+03	6.22E+01	4.66E+02	2.49E+02	9.01E+00	0
2,6-Dinitrotoluene	606-20-2	1.82E+02	3.39E+02	7.47E-07	1.05E+03	1.30E-07	3.11E-02	7.76E-06	7.70E+01	4.19E+01	4.19E-01	3.14E+00	1.68E+00	1.41E+00	0
2-Methylnaphthalene	91-57-6	1.42E+02	3.08E+02	7.24E-05	2.50E+01	5.20E-04	6.86E-02	7.94E-06	7.94E+03	7.94E+03	7.94E+01	5.96E+02	3.18E+02	1.10E+02	1
2-Nitronaphthalene	581-89-5	1.73E+02	3.52E+02	2.10E-03	1.43E+02	2.54E-03	6.01E-02	6.96E-06	1.74E+03	1.12E+03	1.12E+01	8.39E+01	4.48E+01	1.10E+02	1
4-Nitrophenol	100-02-7	1.39E+02	3.86E+02	1.32E-06	2.50E+04	7.32E-09	4.30E-02	9.61E-06	8.13E+01	4.37E+01	4.37E-01	3.28E+00	1.75E+00	2.09E+02	0
4-Nitrosodiphenylamine	156-10-5	1.98E+02	4.18E+02	1.63E-07	7.43E+00	4.35E-06	5.49E-02	6.36E-06	1.45E+03	4.13E+02	4.13E+00	3.10E+01	1.65E+01	1.39E+00	1
Benzo[a]anthracene	56-55-3	2.28E+02	4.33E+02	2.03E-10	1.28E-02	3.62E-06	2.47E-02	6.21E-06	4.77E+05	2.60E+05	2.60E+03	1.95E+04	1.04E+04	3.72E-01	0
Benzene	71-43-2	7.81E+01	2.79E+02	1.25E-01	1.78E+03	5.49E-03	1.17E-01	1.02E-05	1.37E+02	6.20E+01	6.20E-01	4.65E+00	2.48E+00	3.89E+00	1
Benzo[a]pyrene	50-32-8	2.52E+02	4.52E+02	6.43E-12	1.94E-03	8.36E-07	2.18E-02	5.85E-06	1.35E+06	9.69E+05	9.69E+03	7.27E+04	3.88E+04	4.77E-01	0
Biphenyl (1,1-Biphenyl)	92-52-4	1.54E+02	3.43E+02	4.94E-05	7.08E+00	3.39E-04	6.50E-02	7.52E-06	1.00E+04	1.87E+03	1.87E+01	1.40E+02	7.47E+01	3.61E+01	0
Dibenz[a,h]anthracene	53-70-3	2.78E+02	5.39E+02	2.70E-14	6.70E-04	1.12E-08	1.80E-02	6.01E-06	3.53E+06	1.79E+06	1.79E+04	1.34E+05	7.16E+04	2.69E-01	0
Dibenzofuran	132-64-9	1.68E+02	3.60E+02	2.37E-07	1.00E+01	1.30E-05	6.13E-02	7.10E-06	1.58E+04	1.01E+04	1.01E+02	7.59E+02	4.05E+02	9.01E+00	1
Di-n-propyl adipate (Dipropyl adipate)	106-19-4	2.30E+02	ND	6.71E-03	1.40E+02	1.11E-02	4.97E-02	5.75E-06	2.24E+03	5.81E+02	5.81E+00	4.36E+01	2.32E+01	3.16E+01	1
Dioxin (2,3,7,8-TCDD)	1746-01-6	3.22E+02	5.78E+02	9.74E-13	1.93E-05	1.60E-05	1.27E-02	6.81E-06	4.37E+06	2.69E+06	2.69E+04	2.02E+05	1.08E+05	4.29E-01	0
Diphenylamine	122-39-4	1.69E+02	3.25E+02	8.82E-07	3.60E+01	5.00E-07	6.10E-02	7.07E-06	3.02E+03	7.33E+02	7.33E+00	5.50E+01	2.93E+01	9.01E+00	0
Mesitylene (1,3,5-trimethylbenzene)	108-67-8	1.20E+02	2.88E+02	1.30E-03	2.00E+01	7.81E-03	6.48E-02	7.86E-06	2.63E+03	1.67E+03	1.67E+01	1.25E+02	6.68E+01	3.16E+01	1
Naphthalene	91-20-3	1.28E+02	3.53E+02	1.17E-04	3.11E+01	4.82E-04	5.26E-02	8.92E-06	2.36E+03	1.19E+03	1.19E+01	8.93E+01	4.76E+01	5.27E+00	1
n-Hexane	110-54-3	8.62E+01	1.78E+02	1.99E-01	1.19E+01	1.18E+00	9.59E-02	1.11E-05	1.00E+04	1.87E+03	1.87E+01	1.40E+02	7.47E+01	3.16E+01	1
N-Nitrosodiphenylamine	86-30-6	1.98E+02	3.40E+02	1.32E-04	3.74E+01	6.99E-04	3.12E-02	6.35E-06	1.06E+03	3.27E+02	3.27E+00	2.45E+01	1.31E+01	7.44E+00	1
Phenanthrene	85-01-8	1.78E+02	3.71E+02	1.45E-07	1.28E+00	2.30E-05	3.33E-02	7.47E-06	3.55E+04	2.09E+04	2.09E+02	1.57E+03	8.36E+02	1.26E+00	0
Phenol	108-95-2	9.41E+01	3.14E+02	5.74E-04	9.08E+04	5.95E-07	8.27E-02	1.03E-05	3.00E+01	2.20E+01	2.20E-01	1.65E+00	8.80E-01	2.53E+01	0
Pyrene	129-00-0	2.02E+02	4.29E+02	5.59E-09	1.37E-01	8.25E-06	2.72E-02	7.14E-06	1.00E+05	6.80E+04	6.80E+02	5.10E+03	2.72E+03	1.33E-01	0
Resorcinol	108-46-3	1.10E+02	3.83E+02	5.92E-07	1.00E+06	7.70E-09	8.14E-02	9.43E-06	6.03E+00	5.75E+00	5.75E-02	4.31E-01	2.30E-01	6.32E+01	0
Styrene	100-42-5	1.04E+02	2.43E+02	8.21E-03	2.57E+02	3.33E-03	7.73E-02	8.77E-06	8.49E+02	9.12E+02	9.12E+00	6.84E+01	3.65E+01	9.03E+00	1
Thianaphthene (benzo[b]thiophene)	95-15-8	1.34E+02	3.04E+02	1.53E-04	1.55E+02	1.33E-04	7.13E-02	8.26E-06	1.32E+03	3.84E+02	3.84E+00	2.88E+01	1.54E+01	2.53E+02	1
Toluene	108-88-3	9.21E+01	1.78E+02	3.71E-02	5.58E+02	6.13E-03	9.72E-02	9.23E-06	4.65E+02	1.40E+02	1.40E+00	1.05E+01	5.60E+00	1.15E+01	1
Triacetin	102-76-1	2.18E+02	1.95E+02	3.26E-06	5.80E+04	1.23E-08	5.15E-02	5.96E-06	1.78E+00	2.22E+00	2.22E-02	1.66E-01	8.87E-02	1.95E+00	0
Xylenes	106-42-3	1.06E+02	2.86E+02	1.06E-02	1.86E+02	6.05E-03	7.61E-02	8.50E-06	1.48E+03	3.11E+02	3.11E+00	2.33E+01	1.24E+01	9.03E+00	1
Aluminum	7429-90-5	2.70E+01	9.33E+02	0.00E+00	0.00E+00	0.00E+00	2.11E-01	2.44E-05	NA	NA	1.50E+03	1.50E+03	1.50E+03	0.00E+00	0
Lead	7439-92-1	2.07E+02	6.01E+02	0.00E+00	0.00E+00	0.00E+00	5.43E-02	6.28E-06	NA	NA	9.00E+02	9.00E+02	9.00E+02	0.00E+00	0
Zirconium	7440-67-7	9.12E+01	2.12E+03	0.00E+00	0.00E+00	0.00E+00	9.24E-02	1.07E-05	NA	NA	3.00E+03	3.00E+03	3.00E+03	0.00E+00	0
Copper	7440-50-8	6.36E+01	1.36E+03	0.00E+00	0.00E+00	0.00E+00	1.19E-01	1.38E-05	NA	NA	1.00E+04	1.00E+04	1.00E+04	0.00E+00	0
Iron	7439-89-6	5.58E+01	1.81E+03	0.00E+00	0.00E+00	0.00E+00	1.28E-01	1.49E-05	NA	NA	2.50E+01	2.50E+01	2.50E+01	0.00E+00	0

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 2
Chemical-Specific Inputs
Air Pathway Human Health Risk Assessmen
Allegany Ballistics Laboratory

	Biotransfer Factors for Plants						Biotransfer Factors for Animals							
Chemical	RCF (ug/g DW plant)/ (ug/mL soil water)	$Br_{rootveg}$ (ug/g DW plant/ ug/g soil)	Br_{ag} (ug/g DW plant/ ug/g soil)	Br_{forage} (ug/g DW plant/ ug/g soil)	Bv_{ag} (ug/g DW plant/ ug/g air)	Bv_{forage} (ug/g DW plant/ ug/g air)	Ba_{milk} (day/kg FW)	Ba_{beef} (day/kg FW)	Ba_{pork} (day/kg FW)	Ba_{egg} (day/kg FW)	$Ba_{chicken}$ (day/kg FW)	BCF_{fish} (L/kg FW tissue)	BAF_{fish} (L/kg FW tissue)	$BSAF_{fish}$ (unitless)
1,3-Butadiene														
1,6-Dinitropyrene	7.74E+02	3.54E+00	8.84E-02	8.84E-02	4.98E+04	4.98E+04	2.95E-04	9.33E-04	1.12E-03	2.95E-01	7.47E-04	NA	2.63E+03	NA
1-Methylnaphthalene														
1-Nitropyrene	1.84E+03	2.82E+00	4.61E-02	4.61E-02	1.66E+05	1.66E+05	9.12E-04	2.88E-03	3.46E-03	9.12E-01	2.31E-03	NA	1.32E+04	NA
2,4-Dinitrotoluene	1.43E+01	2.80E+01	2.72E+00	2.72E+00	5.10E+01	5.10E+01	7.86E-07	2.49E-06	3.01E-06	7.86E-04	1.96E-06	5.92E+00	NA	NA
2,5-Diphenyloxazole	9.22E+02	1.48E+01	7.74E-02	7.74E-02	3.28E+07	3.28E+07	3.72E-04	1.17E-03	1.41E-03	3.72E-01	9.40E-04	NA	3.34E+03	NA
2,6-Dinitrotoluene	1.29E+01	3.08E+01	3.15E+00	3.15E+00	4.41E+01	4.41E+01	6.12E-07	1.93E-06	2.34E-06	6.12E-04	1.53E-06	5.92E+00	NA	NA
2-Methylnaphthalene														
2-Nitronaphthalene														
4-Nitrophenol	1.32E+01	3.02E+01	3.05E+00	3.05E+00	8.26E+02	8.26E+02	6.46E-07	2.04E-06	2.47E-06	6.46E-04	1.61E-06	1.67E+01	NA	NA
4-Nitrosodiphenylamine														
Benzo[a]anthracene	5.48E+03	2.11E+00	2.02E-02	2.02E-02	1.72E+04	1.72E+04	3.79E-03	1.20E-02	1.45E-02	3.79E+00	9.46E-03	NA	5.10E+03	NA
Benzene														
Benzo[a]pyrene	1.22E+04	1.26E+00	1.11E-02	1.11E-02	2.25E+05	2.25E+05	1.07E-02	3.38E-02	4.10E-02	1.07E+01	2.67E-02	NA	9.95E+03	NA
Biphenyl (1,1-Biphenyl)	2.86E+02	1.53E+01	1.89E-01	1.89E-01	3.00E+02	3.00E+02	7.94E-05	2.51E-04	3.01E-04	7.94E-02	2.01E-04	4.37E+02	NA	NA
Dibenz[a,h]anthracene	2.56E+04	1.43E+00	6.36E-03	6.36E-03	4.68E+07	4.68E+07	2.80E-02	8.86E-02	1.07E-01	2.80E+01	7.00E-02	NA	1.28E+04	NA
Dibenzofuran														
Di-n-propyl adipate (Dipropyl adipate)														
Dioxin (2,3,7,8-TCDD)	3.01E+04	1.12E+00	5.62E-03	5.62E-03	6.10E+04	6.10E+04	1.00E-02	5.43E-02	6.57E-02	5.42E-02	7.30E-02	NA	NA	9.00E-02
Diphenylamine	1.17E+02	1.60E+01	3.77E-01	3.77E-01	5.68E+04	5.68E+04	2.40E-05	7.59E-05	9.10E-05	2.40E-02	6.07E-05	2.60E+02	NA	NA
Mesitylene (1,3,5-trimethylbenzene)														
Naphthalene														
n-Hexane														
N-Nitrosodiphenylamine														
Phenanthrene	7.47E+02	3.57E+00	9.08E-02	9.08E-02	1.70E+04	1.70E+04	2.82E-04	8.92E-04	1.08E-03	2.82E-01	7.04E-04	NA	3.30E+03	NA
Phenol	9.50E+00	4.32E+01	5.42E+00	5.42E+00	3.52E+00	3.52E+00	2.38E-07	7.54E-07	9.12E-07	2.38E-04	5.95E-07	7.81E+00	NA	NA
Pyrene	1.66E+03	2.44E+00	4.98E-02	4.98E-02	1.43E+05	1.43E+05	7.98E-04	2.52E-03	3.06E-03	7.98E-01	1.99E-03	NA	1.19E+04	NA
Resorcinol	7.23E+00	1.26E+02	1.37E+01	1.37E+01	4.91E+03	4.91E+03	4.79E-08	1.51E-07	1.82E-07	4.79E-05	1.21E-07	2.31E+00	NA	NA
Styrene														
Thianaphthene (benzo[b]thiophene)														
Toluene														
Triacetin	6.67E+00	3.01E+02	2.78E+01	2.78E+01	8.38E+02	8.38E+02	1.41E-08	4.47E-08	5.36E-08	1.41E-05	3.57E-08	9.12E-01	NA	NA
Xylenes														
Aluminum	NA	6.50E-04	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.00E-04	1.50E-03	1.80E-03	0.00E+00	0.00E+00	2.70E+00	NA	NA
Lead	NA	9.00E-03	1.36E-02	4.50E-02	0.00E+00	0.00E+00	2.50E-04	3.00E-04	3.60E-04	0.00E+00	0.00E+00	NA	8.00E+00	NA
Zirconium	NA	5.00E-04	2.00E-03	2.00E-03	0.00E+00	0.00E+00	3.00E-05	5.50E-03	6.60E-03	0.00E+00	0.00E+00		NA	NA
Copper	NA	2.50E-01	4.00E-01	4.00E-01	0.00E+00	0.00E+00	1.50E-03	1.00E-02	1.20E-02	0.00E+00	0.00E+00	7.10E+02	NA	NA
Iron	NA	1.00E-03	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.50E-04	2.00E-02	2.40E-02	0.00E+00	0.00E+00		NA	NA

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 3
Site-specific Inputs
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Zs	2.0E+01	Soil mixing zone depth	cm		Ca_Ds,ksr, ksl, LR
BD	1.5E+00	Soil bulk density	g soil/cm^3 soil		Ca_Ds, ksr, ksl, LE
Vdv	1.0E-02	Deposition velocity	m/s		Ca_Ds, Pd, Ldep, LRI
T1	0.0E+00	Time period at the beginning of facility operation	yr		Cs
tD	3.0E+01	Time period over which deposition occurs (time period of facility operation)	yr	Time period of facility operation is assumed to be same as residential exposure duration (30 years)	Cs
RO	5.1E+01	Average annual surface runoff from pervious areas	cm/yr	Annual runoff - Cumberland 1929-1994	ksr, ksl, LRI, LR
θ_{sw}	0.2	Soil volumetric water content	mL water/cm^3 soil		ksr, ksl, LRI, LR
P	90	Average annual precipitation	cm/yr	Baes et al., 1984	ksr, ksl, LR
I	25	Average annual irrigation	cm/yr	Baes et al., 1984	ksl
E_v	63	Average annual evapotranspiration	cm/yr	Baes et al., 1984	ksl
Rp	0.39	Interception fraction of the edible portion of plant	unitless	Value from Table B-2-7.	Pd
Rp_forage	0.5	Interception fraction of the edible portion of plant - for livestock forage	unitless	Value from Table B-3-7.	Pd
Rp_silage	0.46	Interception fraction of the edible portion of plant - for livestock silage	unitless	Value from Table B-3-7.	Pd
kp	18	Plant surface loss coefficient	yr^{-1}	Value from Table B-2-7.	Pd
Tp	0.164	Length of plan exposure to depostion per harvest of the edible portion of the *i*th plant group	yr	Assumed to be 60 days, according to Table B-2-7.	Pd
Tp_forage	0.16	Length of plan exposure to depostion per harvest of the edible portion of the *i*th plant group - for livestock forage	yr	Value from Table B-3-7.	Pd
Tp_silage	0.12	Length of plan exposure to depostion per harvest of the edible portion of the *i*th plant group - for livestock silage	yr	Value from Table B-3-7.	Pd
Yp	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	kg DW/m^2	Value from Table B-2-7.	Pd
Yp_forage	0.24	Yield or standing crop biomass of the edible portion of the plant (productivity) - for livestock forage	kg DW/m^2	Value from Table B-3-7.	Pd
Yp_silage	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity) - for livestock silage	kg DW/m^2	Value from Table B-3-7.	Pd
ρ_a	1.2E+03	Density of Air	g/m^3	See Table B-2-8	Pv
Fi_{forage}	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	contaminated soil). Concentrations in grain are assumed to be the same as concentrations in forage	A_beef
Fi_{silage}	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage			A_beef
Qpi_{forage}	9.27	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Quantities for forage (8.8 kg/day) and grain (0.47 kg/day) are summed	A_beef
Qpi_{silage}	2.5	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day		A_beef
Qs	0.5	Quantity of soil ingested by animal	kg/day		A_beef
Fiforage_milk	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	contaminated soil). Concentrations in grain are assumed to be the same as concentrations in forage	A_milk

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 3
Site-specific Inputs
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Fisilage_milk	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage			A_milk
Qpiforage_milk	16.2	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Quantities for forage (13.2 kg/day) and grain (3 kg/day) are summed	A_milk
Qpisilage_milk	4.1	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day		A_milk
Qs_milk	0.4	Quantity of soil ingested by animal	kg/day		A_milk
Fiforage_pork	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless		A_pork
Fisilage_pork	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage			A_pork
Qpiforage_pork	3.3	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	the same. This represents grain consumption by swine.	A_pork
Qpisilage_pork	1.4	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day		A_pork
Qs_pork	0.5	Quantity of soil ingested by animal	kg/day		A_pork
Fiforage_chicken	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless		A_chicken, A_egg
Qpiforage_chicken	0.2	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	the same. This represents grain consumption by chickens	A_chicken, A_egg
Qs_chicken	0.022	Quantity of soil ingested by animal	kg/day		A_chicken, A_egg
A_W	4.78E+04	Water body surface area	m^2		Ldep
A_I	5.80E+05	Impervious watershed surface area	m^2		LRI, LE
A_L	9.66E+06	Total watershed area receiving COPC deposition	m^2		LR, LE
R	8.2E-05	Universal gas constant	atm-m^3/K		Ldif
T_{wk}	3.0E+02	Water body temperature	K		Ldif
RF	1.8E+02	USLE rainfall (or erosivity) factor	yr^{-1}	Site-specific (midpoint of the range)	Xe
K_	3.6E-01	USLE erodibility factor	ton/acre	Default - 0.36 @ 1% TOC	Xe
LS	1.5E+00	USLE length-slope factor	unitless	"Default" = 1.5	Xe
C	1.0E-01	USLE cover management factor	unitless	Default for dense vegetation cover	Xe
PF	1.0E+00	USLE supporting practice factor	unitless	"Default"	Xe
a	1.4E+00	Empirical intercept coefficient	unitless	Based on watershed area	SD
b	1.3E-01	Empirical slope coefficient	unitless	Default value from Table B-4-14	SD
TSS	1.0E+01	Total suspended solids concentration	mg/L	Default - close to limited river data	fwc_fbs,Cdw
d_{wc}	6.8E-01	Depth of water column	m		fwc_fbs, Cwtot
d_{bs}	3.0E-02	Depth of upper benthic sediment layer	m		fwc_fbs, Cwtot
C_{BS}	1.0E+00	Bed sediment concentration (or bed sediment bulk density)	g/cm^3 or kg/L		fwc_fbs
θ_{bs}	6.0E-01	Bed sediment porosity	$L_{water}/L_{sediment}$		fwc_fbs
Vf_x	8.01E+08	Average volumetric flow rate through water body	m3/yr		Cwtot
θ	1.0E+00	Temperature correction factor	unitless		Kv

Attachment B-3

Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 3

Site-specific Inputs

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

u	6.3E-01	Current velocity	m/s		KL
C_d	1.1E-03	Drag coefficient	unitless		KL
W	3.9E+00	Average annual wind speed	m/s		KG
ρ_a	1.2E-03	Density of air	g/cm^3		KG
ρ_w	1.0E+00	Density of water	g/cm^3		KG
k	4.0E-01	von Karman's constant	unitless		KG
λ_z	4.0E+00	Dimensionless viscous sublayer thickness	unitless		KG
μ_w	1.7E-02	Viscosity of water corresponding to water temperature	g/cm-s		KG
μ_a	1.81E-04	Viscosity of air	g/cm-s		KG

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 4
Modeled Air Concentrations and Deposition Term (Ds) (Annual concentration in soil from deposition)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$Ds = \frac{Ca \times \left(Vdv \times 3.15\times10^{7}\ s/yr\right) \times (1 - Fv) \times mg/1{,}000\ ug}{\left(Zs \times m/100\ cm\right) \times BD \times kg/1{,}000\ g \times 10^{6}\ cm^{3}/m^{3}}$$

Symbol	Value	Description	Units	Notes
Ca	calculated	Annual Average Concentration in Air	ug/m^3	
Ds	calculated	Deposition term	mg/kg-yr	
Zs	20	Soil mixing zone depth	cm	
BD	1.5	Soil bulk density	g soil/cm^3 soil	
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	Values in Appendix A-3 tables
Vdv	0.01	Deposition velocity	m/s	

Chemical	Ca (ug/m^3 in air)	F_v	Ds (mg/kg-year in soil)	VOC?	Metal?
1,3-Butadiene	1.7E-04	1.0E+00	0.0E+00	Yes	No
1,6-Dinitropyrene	4.4E-07	0.0E+00	4.6E-07	No	No
1-Methylnaphthalene	2.3E-05	1.0E+00	0.0E+00	Yes	No
1-Nitropyrene	2.1E-05	0.0E+00	2.2E-05	No	No
2,4-Dinitrotoluene	4.4E-07	0.0E+00	4.6E-07	No	No
2,5-Diphenyloxazole	9.2E-06	0.0E+00	9.7E-06	No	No
2,6-Dinitrotoluene	6.1E-05	0.0E+00	6.4E-05	No	No
2-Methylnaphthalene	2.3E-05	1.0E+00	0.0E+00	Yes	No
2-Nitronaphthalene	1.8E-05	1.0E+00	0.0E+00	Yes	No
4-Nitrophenol	4.4E-07	0.0E+00	4.6E-07	No	No
4-Nitrosodiphenylamine	4.4E-07	1.0E+00	0.0E+00	Yes	No
Benzo[a]anthracene	4.6E-05	0.0E+00	4.9E-05	No	No
Benzene	1.1E-02	1.0E+00	0.0E+00	Yes	No
Benzo[a]pyrene	4.4E-07	0.0E+00	4.6E-07	No	No
Biphenyl (1,1-Biphenyl)	4.6E-05	0.0E+00	4.8E-05	No	No
Dibenz[a,h]anthracene	4.4E-07	0.0E+00	4.6E-07	No	No
Dibenzofuran	9.7E-06	1.0E+00	0.0E+00	Yes	No
Di-n-propyl adipate (Dipropyl adipate)	1.3E-05	1.0E+00	0.0E+00	Yes	No
Dioxin (2,3,7,8-TCDD)	2.5E-10	0.0E+00	2.6E-10	No	No
Diphenylamine	1.8E-06	0.0E+00	1.9E-06	No	No
Mesitylene (1,3,5-trimethylbenzene)	1.1E-05	1.0E+00	0.0E+00	Yes	No
Naphthalene	4.1E-05	1.0E+00	0.0E+00	Yes	No
n-Hexane	1.7E-04	1.0E+00	0.0E+00	Yes	No
N-Nitrosodiphenylamine	4.4E-07	1.0E+00	0.0E+00	Yes	No
Phenanthrene	1.9E-05	0.0E+00	2.0E-05	No	No
Phenol	2.9E-05	0.0E+00	3.1E-05	No	No
Pyrene	4.4E-07	0.0E+00	4.6E-07	No	No
Resorcinol	6.4E-05	0.0E+00	6.7E-05	No	No
Styrene	1.7E-04	1.0E+00	0.0E+00	Yes	No
Thianaphthene (benzo[b]thiophene)	4.4E-07	1.0E+00	0.0E+00	Yes	No
Toluene	3.6E-03	1.0E+00	0.0E+00	Yes	No
Triacetin	4.4E-07	0.0E+00	4.6E-07	No	No
Xylenes	9.7E-04	1.0E+00	0.0E+00	Yes	No
Aluminum	9.7E-01	0.0E+00	1.0E+00	No	Yes
Lead	9.4E-02	0.0E+00	9.9E-02	No	Yes
Zirconium	9.3E-02	0.0E+00	9.7E-02	No	Yes
Copper	3.7E-02	0.0E+00	3.9E-02	No	Yes
Iron	4.1E-04	0.0E+00	4.3E-04	No	Yes

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 5
Cumulative Concentrations in Soil (Source: Table B-1-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

For Carcinogens

$$Cs = \frac{Ds}{ks \times (tD - T_1)} \times \left[\left(tD + \frac{\exp(-ks \times tD)}{ks} \right) - \left(T_1 + \frac{\exp(-ks \times T_1)}{ks} \right) \right]$$

For Non-carcinogens

$$C_{S_{tD}} = \frac{Ds \times [1 - \exp(-ks \times tD)]}{ks}$$

Symbol	Value	Description	Units	Notes
Cs	calculated	Average soil concentration over exposure duration	mg/kg	Concentration used to estimate excess lifetime cancer risks or carcinogenic risks
CstD	calculated	Soil concentration at time tD (at the end of the facility operating life)	mg/kg	Concentration used to evaluate noncancer health risks or noncarcinogenic risks
Ds	calculated	Deposition term	mg/kg-yr	Calculated from sheet "Ca_Ds"
T1	0	Time period at the beginning of facility operation	yr	
ks	chemical-specific	Soil loss constant due to all processes - chemical-specific	yr^{-1}	See Table B-1-2 for derivation; value in this worksheet obtained from sheet "ks"
tD	30	Time period over which deposition occurs (time period of facility operation)	yr	Time period of facility operation is assumed to be same as residential exposure duration (30 years)

Attachment B-3

Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 5

Cumulative Concentrations in Soil (Source: Table B-1-1)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Ds (mg/kg-yr)	ks (yr-1)	Cs (mg/kg) - carcinogenic	CstD (mg/kg) - noncarcinogenic
1,3-Butadiene	0.0E+00	5.2E+02	0.0E+00	0.0E+00
1,6-Dinitropyrene	4.6E-07	3.2E+00	1.4E-07	1.4E-07
1-Methylnaphthalene	0.0E+00	2.7E+02	0.0E+00	0.0E+00
1-Nitropyrene	2.2E-05	1.2E+00	1.9E-05	1.9E-05
2,4-Dinitrotoluene	4.6E-07	1.1E+03	4.3E-10	4.3E-10
2,5-Diphenyloxazole	9.7E-06	2.0E+01	4.9E-07	4.9E-07
2,6-Dinitrotoluene	6.4E-05	1.2E+03	5.2E-08	5.2E-08
2-Methylnaphthalene	0.0E+00	1.2E+02	0.0E+00	0.0E+00
2-Nitronaphthalene	0.0E+00	1.7E+02	0.0E+00	0.0E+00
4-Nitrophenol	4.6E-07	1.4E+03	3.3E-10	3.3E-10
4-Nitrosodiphenylamine	0.0E+00	1.6E+02	0.0E+00	0.0E+00
Benzo[a]anthracene	4.9E-05	6.3E-01	7.3E-05	7.7E-05
Benzene	0.0E+00	9.1E+02	0.0E+00	0.0E+00
Benzo[a]pyrene	4.6E-07	5.5E-01	7.9E-07	8.4E-07
Biphenyl (1,1-Biphenyl)	4.8E-05	7.2E+01	6.6E-07	6.6E-07
Dibenz[a,h]anthracene	4.6E-07	3.1E-01	1.3E-06	1.5E-06
Dibenzofuran	0.0E+00	1.6E+01	0.0E+00	0.0E+00
Di-n-propyl adipate (Dipropyl adipate)	0.0E+00	1.5E+02	0.0E+00	0.0E+00
Dioxin (2,3,7,8-TCDD)	2.6E-10	4.5E-01	5.4E-10	5.8E-10
Diphenylamine	1.9E-06	1.0E+02	1.9E-08	1.9E-08
Mesitylene (1,3,5-trimethylbenzene)	0.0E+00	7.2E+01	0.0E+00	0.0E+00
Naphthalene	0.0E+00	6.2E+01	0.0E+00	0.0E+00
n-Hexane	0.0E+00	6.8E+01	0.0E+00	0.0E+00
N-Nitrosodiphenylamine	0.0E+00	2.1E+02	0.0E+00	0.0E+00
Phenanthrene	2.0E-05	4.5E+00	4.5E-06	4.5E-06
Phenol	3.1E-05	1.9E+03	1.6E-08	1.6E-08
Pyrene	4.6E-07	1.1E+00	3.9E-07	4.0E-07
Chemical	**Ds (mg/kg-yr)**	**ks (yr-1)**	**Cs (mg/kg) - carcinogenic**	**CstD (mg/kg) - noncarcinogenic**
Resorcinol	6.7E-05	3.6E+03	1.9E-08	1.9E-08
Styrene	0.0E+00	8.3E+01	0.0E+00	0.0E+00
Thianaphthene (benzo[b]thiophene)	0.0E+00	4.2E+02	0.0E+00	0.0E+00
Toluene	0.0E+00	4.6E+02	0.0E+00	0.0E+00
Triacetin	4.6E-07	4.4E+03	1.0E-10	1.0E-10
Xylenes	0.0E+00	2.2E+02	0.0E+00	0.0E+00
Aluminum	1.0E+00	4.5E-01	2.1E+00	2.2E+00
Lead	9.9E-02	7.6E-01	1.3E-01	1.3E-01
Zirconium	9.7E-02	2.3E-01	3.7E-01	4.3E-01
copper	3.9E-02	6.8E-02	3.3E-01	5.0E-01
Iron	4.3E-04	2.7E+01	1.6E-05	1.6E-05

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 6
Soil Loss Constant Due to All Processes (Source: Table B-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$ks = ksg + kse + ksr + ksl + ksv$$

Symbol	Value	Description	Units	Notes
ks	calculated	soil loss constant due to all process	yr^{-1}	This sheet captures values from sheets "kse", "ksr", "ksl" and "ksv"
ksg	chemical-specific	soil loss constant due to biotic and abiotic degradation	yr^{-1}	Data obtained from Appendix A-3 tables in combustion guidance; value in this sheet is imported from sheet titled "Appendix A-3 tables"
kse	chemical-specific	soil loss constant due to soil erosion	yr^{-1}	According to Table B-1-3, the default assumption is to set value of this constant to zero.
ksr	calculated	Soil loss constant fue to surface runoff	yr^{-1}	Table B-1-4
ksl	calculated	soil loss constant due to leaching	yr^{-1}	Table B-1-5
ksv	chemical-specific	soil loss constant due to volatilization	yr^{-1}	According to Table B-1-3, the default assumption is to set value of this constant to zero.

Chemical	ksg (yr^{-1})	kse (yr^{-1})	ksr (yr^{-1})	ksl (yr^{-1})	ksv(yr^{-1})	ks (yr^{-1})
1,3-Butadiene	9.0E+00	0.00E+00	5.1E+02	3.7E-02	0.00E+00	5.2E+02
1,6-Dinitropyrene	1.3E-01	0.00E+00	3.1E+00	2.3E-04	0.00E+00	3.2E+00
1-Methylnaphthalene	2.5E+02	0.00E+00	1.5E+01	1.1E-03	0.00E+00	2.7E+02
1-Nitropyrene	1.3E-01	0.00E+00	1.0E+00	7.7E-05	0.00E+00	1.2E+00
2,4-Dinitrotoluene	1.4E+00	0.00E+00	1.1E+03	7.8E-02	0.00E+00	1.1E+03
2,5-Diphenyloxazole	9.0E+00	0.00E+00	1.1E+01	8.0E-04	0.00E+00	2.0E+01
2,6-Dinitrotoluene	1.4E+00	0.00E+00	1.2E+03	9.1E-02	0.00E+00	1.2E+03
2-Methylnaphthalene	1.1E+02	0.00E+00	8.5E+00	6.3E-04	0.00E+00	1.2E+02
2-Nitronaphthalene	1.1E+02	0.00E+00	6.0E+01	4.4E-03	0.00E+00	1.7E+02
4-Nitrophenol	2.1E+02	0.00E+00	1.2E+03	8.8E-02	0.00E+00	1.4E+03
4-Nitrosodiphenylamine	1.4E+00	0.00E+00	1.6E+02	1.2E-02	0.00E+00	1.6E+02
Benzo[a]anthracene	3.7E-01	0.00E+00	2.6E-01	1.9E-05	0.00E+00	6.3E-01
Benzene	3.9E+00	0.00E+00	9.0E+02	6.6E-02	0.00E+00	9.1E+02
Benzo[a]pyrene	4.8E-01	0.00E+00	7.0E-02	5.2E-06	0.00E+00	5.5E-01
Biphenyl (1,1-Biphenyl)	3.6E+01	0.00E+00	3.6E+01	2.7E-03	0.00E+00	7.2E+01
Dibenz[a,h]anthracene	2.7E-01	0.00E+00	3.8E-02	2.8E-06	0.00E+00	3.1E-01
Dibenzofuran	9.0E+00	0.00E+00	6.7E+00	4.9E-04	0.00E+00	1.6E+01
Di-n-propyl adipate (Dipropyl adipate)	3.2E+01	0.00E+00	1.1E+02	8.4E-03	0.00E+00	1.5E+02
Dioxin (2,3,7,8-TCDD)	4.3E-01	0.00E+00	2.5E-02	1.9E-06	0.00E+00	4.5E-01
Diphenylamine	9.0E+00	0.00E+00	9.1E+01	6.7E-03	0.00E+00	1.0E+02
Mesitylene (1,3,5-trimethylbenzene)	3.2E+01	0.00E+00	4.0E+01	3.0E-03	0.00E+00	7.2E+01
Naphthalene	5.3E+00	0.00E+00	5.7E+01	4.2E-03	0.00E+00	6.2E+01
n-Hexane	3.2E+01	0.00E+00	3.6E+01	2.7E-03	0.00E+00	6.8E+01
N-Nitrosodiphenylamine	7.4E+00	0.00E+00	2.0E+02	1.5E-02	0.00E+00	2.1E+02
Phenanthrene	1.3E+00	0.00E+00	3.3E+00	2.4E-04	0.00E+00	4.5E+00
Phenol	2.5E+01	0.00E+00	1.9E+03	1.4E-01	0.00E+00	1.9E+03
Pyrene	1.3E-01	0.00E+00	1.0E+00	7.4E-05	0.00E+00	1.1E+00
Resorcinol	6.3E+01	0.00E+00	3.6E+03	2.6E-01	0.00E+00	3.6E+03
Styrene	9.0E+00	0.00E+00	7.3E+01	5.4E-03	0.00E+00	8.3E+01
Thianaphthene (benzo[b]thiophene)	2.5E+02	0.00E+00	1.7E+02	1.3E-02	0.00E+00	4.2E+02
Toluene	1.2E+01	0.00E+00	4.4E+02	3.3E-02	0.00E+00	4.6E+02
Triacetin	1.9E+00	0.00E+00	4.4E+03	3.2E-01	0.00E+00	4.4E+03
Xylenes	9.0E+00	0.00E+00	2.1E+02	1.5E-02	0.00E+00	2.2E+02
Aluminum	0.0E+00	0.00E+00	4.5E-01	3.3E-05	0.00E+00	4.5E-01
Lead	0.0E+00	0.00E+00	7.6E-01	5.6E-05	0.00E+00	7.6E-01
Zirconium	0.0E+00	0.00E+00	2.3E-01	1.7E-05	0.00E+00	2.3E-01
copper	0.0E+00	0.00E+00	6.8E-02	5.0E-06	0.00E+00	6.8E-02
Iron	0.0E+00	0.00E+00	2.7E+01	2.0E-03	0.00E+00	2.7E+01

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 7
Soil Loss Constant Due to Runoff (ksr) (Source: Table B-1-4)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$ksr = \frac{RO}{\theta_{sw} \times Z_s} \times \left(\frac{1}{1 + (Kd_s \times BD / \theta_{sw})} \right)$$

Symbol	Value	Description	Units	Notes
ksr	calculated	soil loss constant due to runoff	yr^{-1}	
RO	51	Average annual surfaced runoff from pervious areas	cm/yr	
θ_{sw}	0.2	Soil volumetric water content	mL water/cm^3 soil	
Z_s	2.0E+01	Soil mixing zone depth	cm	Same value as mixing depth in sheet "Ca_Ds" (input on this sheet is echoed from sheet "Ca_Ds")
Kd_s	Chemical-specific	Soil-water partition coefficient	cm^3 water/g soil	Appendix A-3
BD	1.5E+00	Soil bulk density	g soil/cm^3 soil	Same value as bulk density in sheet "Ca_Ds" (input on this sheet is echoed from sheet "Ca_Ds")

Chemical	Kd_s (cm^3/g)	ksr (yr^{-1})
1,3-Butadiene	1.2E+00	5.1E+02
1,6-Dinitropyrene	2.2E+02	3.1E+00
Methylnaphthalene	4.6E+01	1.5E+01
1-Nitropyrene	6.5E+02	1.0E+00
2,4-Dinitrotoluene	5.1E-01	1.1E+03
2,5-Diphenyloxazole	6.2E+01	1.1E+01
2,6-Dinitrotoluene	4.2E-01	1.2E+03
2-Methylnaphthalene	7.9E+01	8.5E+00
2-Nitronaphthalene	1.1E+01	6.0E+01
4-Nitrophenol	4.4E-01	1.2E+03
4-Nitrosodiphenylamin	4.1E+00	1.6E+02
Benzo[a]anthracene	2.6E+03	2.6E-01
Benzene	6.2E-01	9.0E+02
Benzo[a]pyrene	9.7E+03	7.0E-02
Biphenyl (1,1-Bipheny	1.9E+01	3.6E+01
Dibenz[a,h]anthracene	1.8E+04	3.8E-02
Dibenzofuran	1.0E+02	6.7E+00
Di-n-propyl adipate (D	5.8E+00	1.1E+02
Dioxin (2,3,7,8-TCDD)	2.7E+04	2.5E-02
Diphenylamine	7.3E+00	9.1E+01
Mesitylene (1,3,5-trime	1.7E+01	4.0E+01
Naphthalene	1.2E+01	5.7E+01
n-Hexane	1.9E+01	3.6E+01
N-Nitrosodiphenylamin	3.3E+00	2.0E+02
Phenanthrene	2.1E+02	3.3E+00
Phenol	2.2E-01	1.9E+03
Pyrene	6.8E+02	1.0E+00
Resorcinol	5.7E-02	3.6E+03
Styrene	9.1E+00	7.3E+01
Thianaphthene (benzo	3.8E+00	1.7E+02
Toluene	1.4E+00	4.4E+02
Triacetin	2.2E-02	4.4E+03
Xylenes	3.1E+00	2.1E+02
Aluminum	1.5E+03	4.5E-01
Lead	9.0E+02	7.6E-01
Zirconium	3.0E+03	2.3E-01
Copper	1.0E+04	6.8E-02
Iron	2.5E+01	2.7E+01

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 8
Soil Loss Constant Due to Leaching (ksl) (Source: Table B-1-5)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$ksl = \frac{P + I - RO - E_v}{\theta_{sw} \times Z_s \times [1.0 + (BD \times Kd_s / \theta_{sw})]}$$

Symbol	Value	Description	Units	Notes
ksl	calculated	COPC loss constant due to leaching	yr^{-1}	
P	90	Average annual precipitation	cm/yr	Site-specific (Range 18.06 to 164.19)
I	25	Average annual irrigation	cm/yr	Site-specific (Range 0 to 100)
RO	51	Average annual surface runoff from pervious areas	cm/yr	Site-specific
E_v	62.5	Average annual evapotranspiration	cm/yr	Site-specific (Range 35 to 100)
0_{sw}	0.2	Soil volumetric water content	mL water/cm^3 soil	
Z_s	20.0	Soil mixing zone depth	cm	
BD	1.5	Soil bulk density	g soil/cm^3 soil	
Kd_s	chemical-specific	Soil-water partition coefficient	cm^3 water/g soil	Appendix A-3

Chemical	Kd_s	ksl (yr^{-1})
1,3-Butadiene	1.2E+00	3.74E-02
1,6-Dinitropyrene	2.2E+02	2.29E-04
1-Methylnaphthalene	4.6E+01	1.09E-03
1-Nitropyrene	6.5E+02	7.67E-05
2,4-Dinitrotoluene	5.1E-01	7.77E-02
2,5-Diphenyloxazole	6.2E+01	8.02E-04
2,6-Dinitrotoluene	4.2E-01	9.05E-02
2-Methylnaphthalene	7.9E+01	6.28E-04
2-Nitronaphthalene	1.1E+01	4.42E-03
4-Nitrophenol	4.4E-01	8.77E-02
4-Nitrosodiphenylamine	4.1E+00	1.17E-02
Benzo[a]anthracene	2.6E+03	1.92E-05
Benzene	6.2E-01	6.64E-02
Benzo[a]pyrene	9.7E+03	5.16E-06
Biphenyl (1,1-Biphenyl)	1.9E+01	2.66E-03
Dibenz[a,h]anthracene	1.8E+04	2.79E-06
Dibenzofuran	1.0E+02	4.94E-04
Di-n-propyl adipate (Dipropyl adipate)	5.8E+00	8.42E-03
Dioxin (2,3,7,8-TCDD)	2.7E+04	1.86E-06
Diphenylamine	7.3E+00	6.69E-03
Mesitylene (1,3,5-trimethylbenzene)	1.7E+01	2.97E-03
Naphthalene	1.2E+01	4.16E-03
n-Hexane	1.9E+01	2.66E-03
N-Nitrosodiphenylamine	3.3E+00	1.47E-02
Phenanthrene	2.1E+02	2.39E-04
Phenol	2.2E-01	1.42E-01
Pyrene	6.8E+02	7.35E-05
Resorcinol	5.7E-02	2.62E-01
Styrene	9.1E+00	5.40E-03
Thianaphthene (benzo[b]thiophene)	3.8E+00	1.26E-02
Toluene	1.4E+00	3.26E-02
Triacetin	2.2E-02	3.22E-01
Xylenes	3.1E+00	1.54E-02
Aluminum	1.5E+03	3.33E-05
Lead	9.0E+02	5.55E-05
Zirconium	3.0E+03	1.67E-05
copper	1.0E+04	5.00E-06
Iron	2.5E+01	1.99E-03

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 9
Aboveground Produce Concentration Due to Direct Deposition (Pd) (Source: Equation 5-13; Table B-2-7, Table B-3-7)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$Pd = \frac{\left(Ca \times Vdv \times 3.15\times10^{7}\ {}^{s}/_{yr} \times (1 - Fv) \times {}^{mg}/_{1{,}000\,ug}\right) \times Rp \times [1 - \exp(-kp \times Tp)]}{Yp \times kp}$$

Symbol	Value	Description	Units	Notes
Pd	calculated	Plant (aboveground produce) concentration de to direct deposition	mg/kg DW	Concentration in vegetation is on a dry-weight basis. Intake also needs to be calculated on a dry weight basis for consistency.
Ca	calculated	Annual Average Concentration in Air	ug/m3	Input from sheet "Ca_Ds"
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	Appendix A-3 (Range 0 to 1)
Vdv	0.01	Deposition velocity	m/s	Input from sheet "Ca_Ds"
Rp	0.39	Interception fraction of the edible portion of plant	unitless	Value from Table B-2-7.
Rp_forage	0.5	Interception fraction of the edible portion of plant - for livestock forage	unitless	Value from Table B-3-7.
Rp_silage	0.46	Interception fraction of the edible portion of plant - for livestock silage	unitless	Value from Table B-3-7.
kp	18	Plant surface loss coefficient	yr^{-1}	Value from Table B-2-7.
Tp	0.164	Length of plan exposure to depostion per harvest of the edible portion of the *i*th plant group	yr	Assumed to be 60 days, according to Table B-2-7.

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 9
Aboveground Produce Concentration Due to Direct Deposition (Pd) (Source: Equation 5-13; Table B-2-7, Table B-3-7)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
Tp_forage	0.16	Length of plan exposure to depostion per harvest of the edible portion of the *i*th plant group - for livestock forage	yr	Value from Table B-3-7.
Tp_silage	0.12	Length of plan exposure to depostion per harvest of the edible portion of the *i*th plant group - for livestock silage	yr	Value from Table B-3-7.
Yp	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	kg DW/m^2	Value from Table B-2-7.
Yp_forage	0.24	Yield or standing crop biomass of the edible portion of the plant (productivity) - for livestock forage	kg DW/m^2	Value from Table B-3-7.
Yp_silage	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity) - for livestock silage	kg DW/m^2	Value from Table B-3-7.

Attachment B-3

Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 9

Aboveground Produce Concentration Due to Direct Deposition (Pd) (Source: Equation 5-13; Table B-2-7, Table B-3-7)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Ca (ug/m^3)	F_v	Pd (mg/kg DW) - organics	Pd (mg/kg DW) - metals	Pd (mg/kg DW) - selected value	Pd-forage (mg/kg DW) - organics	Pd-forage (mg/kg DW) - metals	Pd-forage (mg/kg DW) - selected value	Pd-silage (mg/kg DW) - organics	Pd-fsilage (mg/kg DW) - metals	Pd-silage (mg/kg DW) - selected value	VOC	Metal?
1,3-Butadiene	0.000169953	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
1,6-Dinitropyrene	4.36771E-07	0.0E+00	1.26E-06	1.26E-06	1.26E-06	1.50E-05	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.89E-06	No	No
1-Methylnaphthalene	2.32944E-05	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
1-Nitropyrene	2.13532E-05	0.0E+00	6.17E-05	6.17E-05	6.17E-05	7.35E-04	7.35E-04	7.35E-04	1.90E-04	1.90E-04	1.90E-04	No	No
2,4-Dinitrotoluene	4.36771E-07	0.0E+00	1.26E-06	1.26E-06	1.26E-06	1.50E-05	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.89E-06	No	No
2,5-Diphenyloxazole	9.22072E-06	0.0E+00	2.66E-05	2.66E-05	2.66E-05	3.17E-04	3.17E-04	3.17E-04	8.21E-05	8.21E-05	8.21E-05	No	No
2,6-Dinitrotoluene	6.10215E-05	0.0E+00	1.76E-04	1.76E-04	1.76E-04	2.10E-03	2.10E-03	2.10E-03	5.43E-04	5.43E-04	5.43E-04	No	No
2-Methylnaphthalene	2.32944E-05	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
2-Nitronaphthalene	1.78856E-05	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
4-Nitrophenol	4.36771E-07	0.0E+00	1.26E-06	1.26E-06	1.26E-06	1.50E-05	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.89E-06	No	No
4-Nitrosodiphenylamine	4.36771E-07	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Benzo[a]anthracene	4.62922E-05	0.0E+00	1.34E-04	1.34E-04	1.34E-04	1.59E-03	1.59E-03	1.59E-03	4.12E-04	4.12E-04	4.12E-04	No	No
Benzene	0.01067662	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Benzo[a]pyrene	4.36771E-07	0.0E+00	1.26E-06	1.26E-06	1.26E-06	1.50E-05	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.89E-06	No	No
Biphenyl (1,1-Biphenyl)	4.56183E-05	0.0E+00	1.32E-04	1.32E-04	1.32E-04	1.57E-03	1.57E-03	1.57E-03	4.06E-04	4.06E-04	4.06E-04	No	No
Dibenz[a,h]anthracene	4.36771E-07	0.0E+00	1.26E-06	1.26E-06	1.26E-06	1.50E-05	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.89E-06	No	No
Dibenzofuran	9.70602E-06	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Di-n-propyl adipate (Dipropyl	1.31031E-05	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Dioxin (2,3,7,8-TCDD)	2.52356E-10	0.0E+00	7.29E-10	7.29E-10	7.29E-10	8.68E-09	8.68E-09	8.68E-09	2.25E-09	2.25E-09	2.25E-09	No	No
Diphenylamine	1.84414E-06	0.0E+00	5.33E-06	5.33E-06	5.33E-06	6.35E-05	6.35E-05	6.35E-05	1.64E-05	1.64E-05	1.64E-05	No	No
Mesitylene (1,3,5-trimethylber	1.10571E-05	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Naphthalene	4.10317E-05	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
n-Hexane	0.000169953	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
N-Nitrosodiphenylamine	4.36771E-07	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Phenanthrene	1.9412E-05	0.0E+00	5.61E-05	5.61E-05	5.61E-05	6.68E-04	6.68E-04	6.68E-04	1.73E-04	1.73E-04	1.73E-04	No	No
Phenol	2.94586E-05	0.0E+00	8.51E-05	8.51E-05	8.51E-05	1.01E-03	1.01E-03	1.01E-03	2.62E-04	2.62E-04	2.62E-04	No	No
Pyrene	4.36771E-07	0.0E+00	1.26E-06	1.26E-06	1.26E-06	1.50E-05	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.89E-06	No	No
Resorcinol	6.41677E-05	0.0E+00	1.85E-04	1.85E-04	1.85E-04	2.21E-03	2.21E-03	2.21E-03	5.71E-04	5.71E-04	5.71E-04	No	No
Styrene	0.000169953	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Thianaphthene (benzo[b]thiop	4.36771E-07	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Toluene	0.003605061	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Triacetin	4.36771E-07	0.0E+00	1.26E-06	1.26E-06	1.26E-06	1.50E-05	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.89E-06	No	No
Xylenes	0.000968216	1.0E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	Yes	No
Aluminum	0.970601844	0.0E+00	2.80E+00	2.80E+00	2.80E+00	3.34E+01	3.34E+01	3.34E+01	8.64E+00	8.64E+00	8.64E+00	No	Yes
Lead	0.094112593	0.0E+00	2.72E-01	2.72E-01	2.72E-01	3.24E+00	3.24E+00	3.24E+00	8.38E-01	8.38E-01	8.38E-01	No	Yes
Zirconium	0.092584308	0.0E+00	2.67E-01	2.67E-01	2.67E-01	3.19E+00	3.19E+00	3.19E+00	8.24E-01	8.24E-01	8.24E-01	No	Yes
copper	0.036856932	0.0E+00	1.06E-01	1.06E-01	1.06E-01	1.27E+00	1.27E+00	1.27E+00	3.28E-01	3.28E-01	3.28E-01	No	Yes
Iron	0.000405426	0.0E+00	1.17E-03	1.17E-03	1.17E-03	1.40E-02	1.40E-02	1.40E-02	3.61E-03	3.61E-03	3.61E-03	No	Yes

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 10
Abveground Produce Concentration Due to Air-to-Plant Transfer (Pv) (Source: TABLE B-2-8)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$Pv = \frac{Ca \times {}^{mg}/_{1{,}000\ ug} \times Fv \times Bv_{ag} \times V_{ag}}{\rho_a}$$

Symbol	Value	Description	Units	Notes
Pv	calculated	Concentration of COPC in aboveground produce due to air-to-plant transfer	mg/kg DW	Concentration in vegetation is on a dry-weight basis. Intake also needs to be calculated on a dry weight basis for consistency.
Ca	calculated	Annual Average Concentration in Air	ug/m^3	Input from sheet "Ca_Ds"
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	Appendix A-3 (Range 0 to 1)
Bv_{ag}	chemical-specific	COPC air-to-plant biotransfer factor for aboveground produce	mg/g DW per mg/g air	Appendix A-3
Bv_{forage}	chemical-specific	COPC air-to-plant biotransfer factor for aboveground produce - for livestock forage and silage	mg/g DW per mg/g air	Appendix A-3
V_{ag}	chemical-specific	Empirical correction factor for aboveground produce	unitless	value is 0.01 for chemicals with log Kow > 4 (>10,000); value is 1 for chemicals with log Kow < r (<10,000); see Table B-2-8
ρ_a	1200	Density of Air	g/m^3	See Table B-2-8

Chemical	Ca (ug/m^3)	F_v	Bv_{ag}	Bv_{forage}	V_{ag}	Pv (mg/kg DW)	Pv-forage (mg/kg DW)	Pv-silage (mg/kg DW)
1,3-Butadiene	1.7E-04	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
1,6-Dinitropyrene	4.4E-07	0.0E+00	5.0E+04	5.0E+04	1.0E-02	0.0E+00	0.0E+00	0.0E+00
1-Methylnaphthalene	2.3E-05	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
1-Nitropyrene	2.1E-05	0.0E+00	1.7E+05	1.7E+05	1.0E-02	0.0E+00	0.0E+00	0.0E+00
2,4-Dinitrotoluene	4.4E-07	0.0E+00	5.1E+01	5.1E+01	1.0E+00	0.0E+00	0.0E+00	0.0E+00
2,5-Diphenyloxazole	9.2E-06	0.0E+00	3.3E+07	3.3E+07	1.0E-02	0.0E+00	0.0E+00	0.0E+00
2,6-Dinitrotoluene	6.1E-05	0.0E+00	4.4E+01	4.4E+01	1.0E+00	0.0E+00	0.0E+00	0.0E+00
2-Methylnaphthalene	2.3E-05	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
2-Nitronaphthalene	1.8E-05	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
4-Nitrophenol	4.4E-07	0.0E+00	8.3E+02	8.3E+02	1.0E+00	0.0E+00	0.0E+00	0.0E+00
4-Nitrosodiphenylamine	4.4E-07	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Benzo[a]anthracene	4.6E-05	0.0E+00	1.7E+04	1.7E+04	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Benzene	1.1E-02	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Benzo[a]pyrene	4.4E-07	0.0E+00	2.3E+05	2.3E+05	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Biphenyl (1,1-Biphenyl)	4.6E-05	0.0E+00	3.0E+02	3.0E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Dibenz[a,h]anthracene	4.4E-07	0.0E+00	4.7E+07	4.7E+07	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Dibenzofuran	9.7E-06	1.0E+00	0.0E+00	0.0E+00	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Di-n-propyl adipate (Dipropyl adipate)	1.3E-05	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Dioxin (2,3,7,8-TCDD)	2.5E-10	0.0E+00	6.1E+04	6.1E+04	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Diphenylamine	1.8E-06	0.0E+00	5.7E+04	5.7E+04	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Mesitylene (1,3,5-trimethylbenzene)	1.1E-05	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Naphthalene	4.1E-05	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
n-Hexane	1.7E-04	1.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
N-Nitrosodiphenylamine	4.4E-07	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Phenanthrene	1.9E-05	0.0E+00	1.7E+04	1.7E+04	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Phenol	2.9E-05	0.0E+00	3.5E+00	3.5E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Pyrene	4.4E-07	0.0E+00	1.4E+05	1.4E+05	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Resorcinol	6.4E-05	0.0E+00	4.9E+03	4.9E+03	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Styrene	1.7E-04	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Thianaphthene (benzo[b]thiophene)	4.4E-07	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Toluene	3.6E-03	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Triacetin	4.4E-07	0.0E+00	8.4E+02	8.4E+02	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Xylenes	9.7E-04	1.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00
Aluminum	9.7E-01	0.0E+00	0.0E+00	0.0E+00	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Lead	9.4E-02	0.0E+00	0.0E+00	0.0E+00	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Zirconium	9.3E-02	0.0E+00	0.0E+00	0.0E+00	1.0E-02	0.0E+00	0.0E+00	0.0E+00
copper	3.7E-02	0.0E+00	0.0E+00	0.0E+00	1.0E-02	0.0E+00	0.0E+00	0.0E+00
Iron	4.1E-04	0.0E+00	0.0E+00	0.0E+00	1.0E-02	0.0E+00	0.0E+00	0.0E+00

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 11
Aboveground Produce Concentration Due to Root Uptake (Prag) (Source: TABLE B-2-9, B-3-9)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$\mathrm{Pr}_{ag} = Cs \times Br_{ag}$$

Symbol	Value	Description	Units	Notes
Cs	calculated	Average soil concentration over exposure duration	mg/kg	Concentration used to estimate excess lifetime cancer risks; input from sheet "Cs"
CstD	calculated	Soil concentration at time tD (at the end of the facility operating life)	mg/kg	Concentration used to evaluate noncancer health risks; input from sheet "Cs"
Prag	chemical-specific	Concentration in aboveground produce due to root uptake	mg/kg DW	Concentration in vegetation is on a dry-weight basis. Intake also needs to be calculated on a dry weight basis for consistency.
Br_{ag}	chemical-specific	Plant-soil bioconcentration factor for aboveground produce	unitless	Appendix A-3
Br_{forage}	chemical-specific	Plant-soil bioconcentration factor for aboveground produce - livestock foage and silage	unitless	Appendix A-3

Attachment B-3

Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 11

Aboveground Produce Concentration Due to Root Uptake (Prag) (Source: TABLE B-2-9, B-3-9)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Cs (mg/kg)	Cstd (mg/kg)	Br_{ag}	Br_{forage}	Pr_{ag} - carcinogenic chemicals (mg/kg DW)	Pr_{ag} - noncarcinogenic chemicals (mg/kg DW)	Pr_{ag} - forage carcinogenic chemicals (mg/kg DW)	Pr_{ag} - forage noncarcinogenic chemicals (mg/kg DW)	Pr_{ag} - silage carcinogenic chemicals (mg/kg DW)	Pr_{ag} - silage noncarcinogenic chemicals (mg/kg DW)
1,3-Butadiene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,6-Dinitropyrene	1.4E-07	1.4E-07	8.8E-02	8.8E-02	1.2E-08	1.2E-08	1.2E-08	1.2E-08	1.2E-08	1.2E-08
1-Methylnaphthalene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1-Nitropyrene	1.9E-05	1.9E-05	4.6E-02	4.6E-02	8.5E-07	8.8E-07	8.5E-07	8.8E-07	8.5E-07	8.8E-07
2,4-Dinitrotoluene	4.3E-10	4.3E-10	2.7E+00	2.7E+00	1.2E-09	1.2E-09	1.2E-09	1.2E-09	1.2E-09	1.2E-09
2,5-Diphenyloxazole	4.9E-07	4.9E-07	7.7E-02	7.7E-02	3.8E-08	3.8E-08	3.8E-08	3.8E-08	3.8E-08	3.8E-08
2,6-Dinitrotoluene	5.2E-08	5.2E-08	3.2E+00	3.2E+00	1.6E-07	1.6E-07	1.6E-07	1.6E-07	1.6E-07	1.6E-07
2-Methylnaphthalene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2-Nitronaphthalene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4-Nitrophenol	3.3E-10	3.3E-10	3.1E+00	3.1E+00	1.0E-09	1.0E-09	1.0E-09	1.0E-09	1.0E-09	1.0E-09
4-Nitrosodiphenylamine	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Benzo[a]anthracene	7.3E-05	7.7E-05	2.0E-02	2.0E-02	1.5E-06	1.5E-06	1.5E-06	1.5E-06	1.5E-06	1.5E-06
Benzene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Benzo[a]pyrene	7.9E-07	8.4E-07	1.1E-02	1.1E-02	8.7E-09	9.3E-09	8.7E-09	9.3E-09	8.7E-09	9.3E-09
Biphenyl (1,1-Biphenyl)	6.6E-07	6.6E-07	1.9E-01	1.9E-01	1.2E-07	1.3E-07	1.2E-07	1.3E-07	1.2E-07	1.3E-07
Dibenz[a,h]anthracene	1.3E-06	1.5E-06	6.4E-03	6.4E-03	8.5E-09	9.5E-09	8.5E-09	9.5E-09	8.5E-09	9.5E-09
Dibenzofuran	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Di-n-propyl adipate (Dipropyl adipate)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Dioxin (2,3,7,8-TCDD)	5.4E-10	5.8E-10	5.6E-03	5.6E-03	3.0E-12	3.3E-12	3.0E-12	3.3E-12	3.0E-12	3.3E-12
Diphenylamine	1.9E-08	1.9E-08	3.8E-01	3.8E-01	7.3E-09	7.3E-09	7.3E-09	7.3E-09	7.3E-09	7.3E-09
Mesitylene (1,3,5-trimethylbenzene)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Naphthalene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
n-Hexane	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
N-Nitrosodiphenylamine	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Phenanthrene	4.5E-06	4.5E-06	9.1E-02	9.1E-02	4.1E-07	4.1E-07	4.1E-07	4.1E-07	4.1E-07	4.1E-07
Phenol	1.6E-08	1.6E-08	5.4E+00	5.4E+00	8.6E-08	8.6E-08	8.6E-08	8.6E-08	8.6E-08	8.6E-08
Pyrene	3.9E-07	4.0E-07	5.0E-02	5.0E-02	2.0E-08	2.0E-08	2.0E-08	2.0E-08	2.0E-08	2.0E-08
Resorcinol	1.9E-08	1.9E-08	1.4E+01	1.4E+01	2.5E-07	2.5E-07	2.5E-07	2.5E-07	2.5E-07	2.5E-07
Styrene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Thianaphthene (benzo[b]thiophene)	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Toluene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Triacetin	1.0E-10	1.0E-10	2.8E+01	2.8E+01	2.9E-09	2.9E-09	2.9E-09	2.9E-09	2.9E-09	2.9E-09
Xylenes	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Aluminum	2.1E+00	2.2E+00	4.0E-03	4.0E-03	8.3E-03	9.0E-03	8.3E-03	9.0E-03	8.3E-03	9.0E-03
Lead	1.3E-01	1.3E-01	1.4E-02	4.5E-02	1.7E-03	1.8E-03	5.6E-03	5.9E-03	5.6E-03	5.9E-03
Zirconium	3.7E-01	4.3E-01	2.0E-03	2.0E-03	7.3E-04	8.6E-04	7.3E-04	8.6E-04	7.3E-04	8.6E-04
copper	3.3E-01	5.0E-01	4.0E-01	4.0E-01	1.3E-01	2.0E-01	1.3E-01	2.0E-01	1.3E-01	2.0E-01
Iron	1.6E-05	1.6E-05	4.0E-03	4.0E-03	6.3E-08	6.3E-08	6.3E-08	6.3E-08	6.3E-08	6.3E-08

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 12
Belowground Produce Concentration Due to Root Uptake (Prbg) (Source: TABLE B-2-10)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$Pr_{bg} = Cs \times Br_{rootveg} \times VG_{rootveg}$$

Symbol	Value	Description	Units	Notes
Prbg	calculated	Concentration of COPC in belowground produce due to root uptake	mg COPC/kg DW	Concentration in vegetation is on a dry-weight basis. Intake also needs to be calculated on a dry weight basis for consistency.
Cs	calculated	Average soil concentration over exposure duration	mg/kg	Concentration used to estimate excess lifetime cancer risks; input from sheet "Cs"
CstD	calculated	Soil concentration at time tD (at the end of the facility operating life)	mg/kg	Concentration used to evaluate noncancer health risks; input from sheet "Cs"
$Br_{rootveg}$	chemical-specific	Plant-soil bioconcentration factor for belowground produce	unitless	Appendix A-3
$VG_{rootveg}$	chemical-specific	Empirical correction factor for belowground produce	unitless	value is 0.01 for chemicals with log Kow > 4 (>10,000); value is 1 for chemicals with log Kow < 4 (<10,000)

Chemical	Cs (mg/kg in soil)	Cstd (mg/kg in soil)	$Br_{rootveg}$	$VG_{rootveg}$	Pr_{bg} - carcinogenic chemicals (mg/kg)	Pr_{bg} - noncarcinogenic chemicals (mg/kg)
1,3-Butadiene	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
1,6-Dinitropyrene	1.40E-07	1.4E-07	3.5E+00	1.0E-02	5.0E-09	5.0E-09
1-Methylnaphthalene	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
1-Nitropyrene	1.85E-05	1.9E-05	2.8E+00	1.0E-02	5.2E-07	5.4E-07
2,4-Dinitrotoluene	4.33E-10	4.3E-10	2.8E+01	1.0E+00	1.2E-08	1.2E-08
2,5-Diphenyloxazole	4.85E-07	4.9E-07	1.5E+01	1.0E-02	7.2E-08	7.2E-08
2,6-Dinitrotoluene	5.20E-08	5.2E-08	3.1E+01	1.0E+00	1.6E-06	1.6E-06
2-Methylnaphthalene	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
2-Nitronaphthalene	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
4-Nitrophenol	3.27E-10	3.3E-10	3.0E+01	1.0E+00	9.9E-09	9.9E-09
4-Nitrosodiphenylamine	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Benzo[a]anthracene	7.27E-05	7.7E-05	2.1E+00	1.0E-02	1.5E-06	1.6E-06
Benzene	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Benzo[a]pyrene	7.87E-07	8.4E-07	1.3E+00	1.0E-02	9.9E-09	1.1E-08
Biphenyl (1,1-Biphenyl)	6.62E-07	6.6E-07	1.5E+01	0.0E+00	0.0E+00	0.0E+00
Dibenz[a,h]anthracene	1.33E-06	1.5E-06	1.4E+00	1.0E-02	1.9E-08	2.1E-08
Dibenzofuran	0.00E+00	0.0E+00	0.0E+00	1.0E-02	0.0E+00	0.0E+00
Di-n-propyl adipate (Dipro	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Dioxin (2,3,7,8-TCDD)	5.40E-10	5.8E-10	1.1E+00	1.0E-02	6.1E-12	6.5E-12
Diphenylamine	1.93E-08	1.9E-08	1.6E+01	1.0E+00	3.1E-07	3.1E-07
Mesitylene (1,3,5-trimethy	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Naphthalene	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
n-Hexane	0.00E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
N-Nitrosodiphenylamine	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Phenanthrene	4.48E-06	4.5E-06	3.6E+00	1.0E-02	1.6E-07	1.6E-07
Phenol	1.59E-08	1.6E-08	4.3E+01	1.0E+00	6.9E-07	6.9E-07
Pyrene	3.93E-07	4.0E-07	2.4E+00	1.0E-02	9.6E-09	9.9E-09
Resorcinol	1.86E-08	1.9E-08	1.3E+02	1.0E+00	2.3E-06	2.3E-06
Styrene	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Thianaphthene (benzo[b]t	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Toluene	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Triacetin	1.05E-10	1.0E-10	3.0E+02	1.0E+00	3.2E-08	3.2E-08
Xylenes	0.00E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00
Aluminum	2.08E+00	2.2E+00	6.5E-04	1.0E-02	1.4E-05	1.5E-05
Lead	1.25E-01	1.3E-01	9.0E-03	1.0E-02	1.1E-05	1.2E-05
Zirconium	3.66E-01	4.3E-01	5.0E-04	1.0E-02	1.8E-06	2.1E-06
copper	3.26E-01	5.0E-01	2.5E-01	1.0E-02	8.2E-04	1.2E-03
Iron	1.57E-05	1.6E-05	1.0E-03	1.0E-02	1.6E-10	1.6E-10

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 13
Beef Concentration Due to Plant and Soil Ingestion (see Table B-3-10)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$A_{beef} = \left(\sum\left(F_i \times Qp_i \times P_i\right) + Qs \times Cs \times Bs\right) \times Ba_{beef} \times MF$$

Symbol	Value	Description	Units	Notes
A_{beef}	calculated	Concentration in beef	mg/kg FW	
Fi_{forage}	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	Default value is 1 (100 percent grown/ingested on contaminated soil). Concentrations in grain are assumed to be the same as concentrations in forage (forage and grain intake rates are summed).
Fi_{silage}	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage		
Qpi_{forage}	9.27	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Quantities for forage (8.8 kg/day) and grain (0.47 kg/day) are summed
Qpi_{silage}	2.5	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day	
Pi	calculated - chemical-specific	Concentration in plant type ingested by animal	mg/kg DW	Summed from concentrations calculated from sheets "Pd", "Pv" and "Pr_ag" - two values calculated: "average concentration over exposure duration", used to calculate excess lifetime cancer risks; "concentration at end of facility operation", used to calculated noncancer hazard indices.
Qs	0.5	Quantity of soil ingested by animal	kg/day	
Cs	calculated	Concentration in soil	mg/kg	Two values calculated: "average concentration over exposure duration", used to calculate excess lifetime cancer risks; "concentration at end of facility operation", used to calculate noncancer hazard indices. Obtained from sheet "Cs"
Bs	chemical-specific	Soil bioavailability factor	unitless	Set to one for all chemicals
Ba_{beef}	chemical-specific	Biotransfer factor for beef	day/kg FW	See Appendix A-3
MF	chemical-specific	Metabolism factor	unitless	Assumed to be 1 for all chemicals

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 13
Beef Concentration Due to Plant and Soil Ingestion (see Table B-3-10)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Pi - forage, carcinogenic (mg/kg DW)	Pi - forage, noncarcinogenic (mg/kg DW)	Pi - silage, carcinogenic (mg/kg DW)	Pi - silage, noncarcinogenic (mg/kg DW)	Cs (mg/kg) - carcinogenic	CstD (mg/kg) - noncarcinogenic	Bs	Ba_{beef} (day/kg FW)	MF	A_{beef} - carcinogenic (mg/kg FW)	A_{beef} - noncarcinogenic (mg/kg FW)
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.40E-07	1.41E-07	1	9.33E-04	1	1.39E-07	1.39E-07
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
1-Nitropyrene	7.36E-04	7.36E-04	1.91E-04	1.91E-04	1.85E-05	1.91E-05	1	2.88E-03	1	2.11E-05	2.11E-05
2,4-Dinitrotoluene	1.50E-05	1.50E-05	3.89E-06	3.89E-06	4.33E-10	4.33E-10	1	2.49E-06	1	3.71E-10	3.71E-10
2,5-Diphenyloxazole	3.17E-04	3.17E-04	8.21E-05	8.21E-05	4.85E-07	4.86E-07	1	1.17E-03	1	3.70E-06	3.70E-06
2,6-Dinitrotoluene	2.10E-03	2.10E-03	5.43E-04	5.43E-04	5.20E-08	5.20E-08	1	1.93E-06	1	4.02E-08	4.02E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
4-Nitrophenol	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.27E-10	3.27E-10	1	2.04E-06	1	3.04E-10	3.04E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Benzo[a]anthracene	1.59E-03	1.59E-03	4.14E-04	4.14E-04	7.27E-05	7.67E-05	1	1.20E-02	1	1.90E-04	1.90E-04
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Benzo[a]pyrene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	7.87E-07	8.38E-07	1	3.38E-02	1	5.05E-06	5.06E-06
Biphenyl (1,1-Biphenyl)	1.57E-03	1.57E-03	4.06E-04	4.06E-04	6.62E-07	6.62E-07	1	2.51E-04	1	3.91E-06	3.91E-06
Dibenz[a,h]anthracene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.33E-06	1.49E-06	1	8.86E-02	1	1.33E-05	1.33E-05
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.69E-09	8.69E-09	2.25E-09	2.25E-09	5.40E-10	5.83E-10	1	5.43E-02	1	4.69E-09	4.69E-09
Diphenylamine	6.35E-05	6.35E-05	1.64E-05	1.64E-05	1.93E-08	1.94E-08	1	7.59E-05	1	4.77E-08	4.77E-08
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Phenanthrene	6.68E-04	6.68E-04	1.73E-04	1.73E-04	4.48E-06	4.52E-06	1	8.92E-04	1	5.92E-06	5.92E-06
Phenol	1.01E-03	1.01E-03	2.62E-04	2.62E-04	1.59E-08	1.59E-08	1	7.54E-07	1	7.58E-09	7.58E-09
Pyrene	1.50E-05	1.51E-05	3.91E-06	3.91E-06	3.93E-07	4.05E-07	1	2.52E-03	1	3.77E-07	3.77E-07
Resorcinol	2.21E-03	2.21E-03	5.71E-04	5.71E-04	1.86E-08	1.86E-08	1	1.51E-07	1	3.31E-09	3.31E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Triacetin	1.50E-05	1.50E-05	3.89E-06	3.89E-06	1.05E-10	1.05E-10	1	4.47E-08	1	6.66E-12	6.66E-12
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Aluminum	3.34E+01	3.34E+01	8.65E+00	8.65E+00	2.08E+00	2.25E+00	1	1.50E-03	1	4.99E-01	4.99E-01
Lead	3.24E+00	3.24E+00	8.43E-01	8.44E-01	1.25E-01	1.31E-01	1	3.00E-04	1	9.67E-03	9.68E-03
Zirconium	3.19E+00	3.19E+00	8.25E-01	8.25E-01	3.66E-01	4.28E-01	1	5.50E-03	1	1.75E-01	1.75E-01
copper	1.40E+00	1.47E+00	4.59E-01	5.26E-01	3.26E-01	4.95E-01	1	1.00E-02	1	1.43E-01	1.52E-01
Iron	1.40E-02	1.40E-02	3.61E-03	3.61E-03	1.57E-05	1.57E-05	1	2.00E-02	1	2.77E-03	2.77E-03

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 14
Milk Concentration Due to Plant and Soil Ingestion (see Table B-3-11)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$A_{milk} = \left(\sum\left(F_i \times Qp_i \times P_i\right) + Qs \times Cs \times Bs\right) \times Ba_{milk} \times MF$$

Symbol	Value	Description	Units	Notes
Amilk	calculated	Concentration in milk	mg/kg FW	
Fiforage_milk	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	Default value is 1 (100 percent grown/ingested on contaminated soil). Concentrations in grain are assumed to be the same as concentrations in forage (forage and grain intake rates are summed).
Fisilage_milk	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage		
Qpiforage_milk	16.2	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Quantities for forage (13.2 kg/day) and grain (3 kg/day) are summed
Qpisilage_milk	4.1	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day	
Pi	calculated - chemical-specific	Concentration in plant type ingested by animal	mg/kg DW	Concentrations are the same as used for calculating concentrations in beef. Inputs comes from sheet "A_beef".
Qs_milk	0.4	Quantity of soil ingested by animal	kg/day	
Cs	calculated	Concentration in soil	mg/kg	Concentrations are the same as used for calculating concentrations in beef. Inputs comes from sheet "A_beef".
Bs	chemical-specific	Soil bioavailability factor	unitless	Set to one for all chemicals
Ba_{milk}	chemical-specific	Biotransfer factor for milk	day/kg FW	See Appendix A-3
MF	chemical-specific	Metabolism factor	unitless	Assumed to be 1 for all chemicals

Attachment B-3

Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 14

Milk Concentration Due to Plant and Soil Ingestion (see Table B-3-11)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	PI - forage, carcinogenic (mg/kg DW)	PI - forage, noncarcinogenic (mg/kg DW)	PI - silage, carcinogenic (mg/kg DW)	PI - silage, noncarcinogenic (mg/kg DW)	Cs (mg/kg) - carcinogenic	CstD (mg/kg) - noncarcinogenic	Bs	Ba_{milk} (day/kg FW)	MF	A_{milk} - carcinogenic (mg/kg FW)	A_{milk} - noncarcinogenic (mg/kg FW)
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.40E-07	1.41E-07	1	2.95E-04	1	7.67E-08	7.67E-08
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
1-Nitropyrene	7.36E-04	7.36E-04	1.91E-04	1.91E-04	1.85E-05	1.91E-05	1	9.12E-04	1	1.16E-05	1.16E-05
2,4-Dinitrotoluene	1.50E-05	1.50E-05	3.89E-06	3.89E-06	4.33E-10	4.33E-10	1	7.86E-07	1	2.04E-10	2.04E-10
2,5-Diphenyloxazole	3.17E-04	3.17E-04	8.21E-05	8.21E-05	4.85E-07	4.86E-07	1	3.72E-04	1	2.04E-06	2.04E-06
2,6-Dinitrotoluene	2.10E-03	2.10E-03	5.43E-04	5.43E-04	5.20E-08	5.20E-08	1	6.12E-07	1	2.22E-08	2.22E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
4-Nitrophenol	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.27E-10	3.27E-10	1	6.46E-07	1	1.68E-10	1.68E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Benzo[a]anthracene	1.59E-03	1.59E-03	4.14E-04	4.14E-04	7.27E-05	7.67E-05	1	3.79E-03	1	1.04E-04	1.04E-04
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Benzo[a]pyrene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	7.87E-07	8.38E-07	1	1.07E-02	1	2.78E-06	2.78E-06
Biphenyl (1,1-Biphenyl)	1.57E-03	1.57E-03	4.06E-04	4.06E-04	6.62E-07	6.62E-07	1	7.94E-05	1	2.15E-06	2.15E-06
Dibenz[a,h]anthracene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.33E-06	1.49E-06	1	2.80E-02	1	7.28E-06	7.29E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Di-n-propyl adipate (Diprd	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.69E-09	8.69E-09	2.25E-09	2.25E-09	5.40E-10	5.83E-10	1	1.00E-02	1	1.50E-09	1.50E-09
Diphenylamine	6.35E-05	6.35E-05	1.64E-05	1.64E-05	1.93E-08	1.94E-08	1	2.40E-05	1	2.63E-08	2.63E-08
Mesitylene (1,3,5-trimethy	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Phenanthrene	6.68E-04	6.68E-04	1.73E-04	1.73E-04	4.48E-06	4.52E-06	1	2.82E-04	1	3.25E-06	3.25E-06
Phenol	1.01E-03	1.01E-03	2.62E-04	2.62E-04	1.59E-08	1.59E-08	1	2.38E-07	1	4.16E-09	4.16E-09
Pyrene	1.50E-05	1.51E-05	3.91E-06	3.91E-06	3.93E-07	4.05E-07	1	7.98E-04	1	2.07E-07	2.07E-07
Resorcinol	2.21E-03	2.21E-03	5.71E-04	5.71E-04	1.86E-08	1.86E-08	1	4.79E-08	1	1.82E-09	1.82E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Thianaphthene (benzo[b]t	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Triacetin	1.50E-05	1.50E-05	3.89E-06	3.89E-06	1.05E-10	1.05E-10	1	1.41E-08	1	3.67E-12	3.67E-12
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Aluminum	3.34E+01	3.34E+01	8.65E+00	8.65E+00	2.08E+00	2.25E+00	1	2.00E-04	1	1.16E-01	1.16E-01
Lead	3.24E+00	3.24E+00	8.43E-01	8.44E-01	1.25E-01	1.31E-01	1	2.50E-04	1	1.40E-02	1.40E-02
Zirconium	3.19E+00	3.19E+00	8.25E-01	8.25E-01	3.66E-01	4.28E-01	1	3.00E-05	1	1.65E-03	1.66E-03
copper	1.40E+00	1.47E+00	4.59E-01	5.26E-01	3.26E-01	4.95E-01	1	1.50E-03	1	3.70E-02	3.92E-02
Iron	1.40E-02	1.40E-02	3.61E-03	3.61E-03	1.57E-05	1.57E-05	1	2.50E-04	1	6.02E-05	6.02E-05

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 15
Pork Concentration Due to Plant and Soil Ingestion (see Table B-3-12)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$A_{pork} = \left(\sum\left(F_i \times Qp_i \times P_i\right) + Qs \times Cs \times Bs\right) \times Ba_{pork} \times MF$$

Symbol	Value	Description	Units	Notes
Apork	calculated	Concentration in pork	mg/kg FW	
Fiforage_pork	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	
Fisilage_pork	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage		
Qpiforage_pork	3.3	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Forage and grain concentrations are assumed to be the same. This represents grain consumption by swine.
Qpisilage_pork	1.4	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day	
Pi	calculated - chemical-specific	Concentration in plant type ingested by animal	mg/kg DW	
Qs_pork	0.5	Quantity of soil ingested by animal	kg/day	
Cs	calculated	Concentration in soil	mg/kg	
Bs	chemical-specific	Soil bioavailability factor	unitless	
Bapork	chemical-specific	Biotransfer factor for pork	day/kg FW	
MF	chemical-specific	Metabolism factor	unitless	

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 15
Pork Concentration Due to Plant and Soil Ingestion (see Table B-3-12)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Pi - forage, carcinogenic (mg/kg DW)	Pi - forage, noncarcinogenic (mg/kg DW)	Pi - silage, carcinogenic (mg/kg DW)	Pi - silage, noncarcinogenic (mg/kg DW)	Cs (mg/kg) - carcinogenic	CstD (mg/kg) - noncarcinogenic	Bs	Ba_{pork} (day/kg FW)	MF	A_{pork} - carcinogenic (mg/kg FW)	A_{pork} - noncarcinogenic (mg/kg FW)
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.40E-07	1.41E-07	1	1.12E-03	1	6.18E-08	6.18E-08
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
1-Nitropyrene	7.36E-04	7.36E-04	1.91E-04	1.91E-04	1.85E-05	1.91E-05	1	3.46E-03	1	9.36E-06	9.36E-06
2,4-Dinitrotoluene	1.50E-05	1.50E-05	3.89E-06	3.89E-06	4.33E-10	4.33E-10	1	3.01E-06	1	1.66E-10	1.66E-10
2,5-Diphenyloxazole	3.17E-04	3.17E-04	8.21E-05	8.21E-05	4.85E-07	4.86E-07	1	1.41E-03	1	1.64E-06	1.64E-06
2,6-Dinitrotoluene	2.10E-03	2.10E-03	5.43E-04	5.43E-04	5.20E-08	5.20E-08	1	2.34E-06	1	1.80E-08	1.80E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
4-Nitrophenol	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.27E-10	3.27E-10	1	2.47E-06	1	1.36E-10	1.36E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Benzo[a]anthracene	1.59E-03	1.59E-03	4.14E-04	4.14E-04	7.27E-05	7.67E-05	1	1.45E-02	1	8.52E-05	8.53E-05
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Benzo[a]pyrene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	7.87E-07	8.38E-07	1	4.10E-02	1	2.27E-06	2.28E-06
Biphenyl (1,1-Biphenyl)	1.57E-03	1.57E-03	4.06E-04	4.06E-04	6.62E-07	6.62E-07	1	3.01E-04	1	1.73E-06	1.73E-06
Dibenz[a,h]anthracene	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.33E-06	1.49E-06	1	1.07E-01	1	5.97E-06	5.97E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.69E-09	8.69E-09	2.25E-09	2.25E-09	5.40E-10	5.83E-10	1	6.57E-02	1	2.11E-09	2.11E-09
Diphenylamine	6.35E-05	6.35E-05	1.64E-05	1.64E-05	1.93E-08	1.94E-08	1	9.10E-05	1	2.12E-08	2.12E-08
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Phenanthrene	6.68E-04	6.68E-04	1.73E-04	1.73E-04	4.48E-06	4.52E-06	1	1.08E-03	1	2.65E-06	2.65E-06
Phenol	1.01E-03	1.01E-03	2.62E-04	2.62E-04	1.59E-08	1.59E-08	1	9.12E-07	1	3.39E-09	3.39E-09
Pyrene	1.50E-05	1.51E-05	3.91E-06	3.91E-06	3.93E-07	4.05E-07	1	3.06E-03	1	1.69E-07	1.69E-07
Resorcinol	2.21E-03	2.21E-03	5.71E-04	5.71E-04	1.86E-08	1.86E-08	1	1.82E-07	1	1.47E-09	1.47E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Triacetin	1.50E-05	1.50E-05	3.89E-06	3.89E-06	1.05E-10	1.05E-10	1	5.36E-08	1	2.95E-12	2.95E-12
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	1	0.00E+00	0.00E+00
Aluminum	3.34E+01	3.34E+01	8.65E+00	8.65E+00	2.08E+00	2.25E+00	1	1.80E-03	1	2.22E-01	2.22E-01
Lead	3.24E+00	3.24E+00	8.43E-01	8.44E-01	1.25E-01	1.31E-01	1	3.60E-04	1	4.30E-03	4.30E-03
Zirconium	3.19E+00	3.19E+00	8.25E-01	8.25E-01	3.66E-01	4.28E-01	1	6.60E-03	1	7.82E-02	7.84E-02
copper	1.40E+00	1.47E+00	4.59E-01	5.26E-01	3.26E-01	4.95E-01	1	1.20E-02	1	6.51E-02	6.99E-02
Iron	1.40E-02	1.40E-02	3.61E-03	3.61E-03	1.57E-05	1.57E-05	1	2.40E-02	1	1.23E-03	1.23E-03

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 16
Chicken Concentration Due to Plant and Soil Ingestion (see Table B-3-14)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$A_{chicken} = \left(\sum\left(F_i \times Qp_i \times P_i\right) + Qs \times Cs \times Bs\right) \times Ba_{chicken}$$

Symbol	Value	Description	Units	Notes
Achicken	calculated	Concentration in chicken	mg/kg FW	
Fiforage_chicken	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	
Qpiforage_chicken	0.2	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Forage and grain concentrations are assumed to be the same. This represents grain consumption by chickens
Pi	calculated - chemical-specific	Concentration in plant type ingested by animal	mg/kg DW	
Qs_chicken	0.022	Quantity of soil ingested by animal	kg/day	
Cs	calculated	Concentration in soil	mg/kg	
Bs	chemical-specific	Soil bioavailability factor	unitless	
Bachicken	chemical-specific	Biotransfer factor for chicken	day/kg FW	

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 16
Chicken Concentration Due to Plant and Soil Ingestion (see Table B-3-14)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Pi - forage, carcinogenic (mg/kg DW)	Pi - forage, noncarcinogenic (mg/kg DW)	Cs (mg/kg) - carcinogenic	CstD (mg/kg) - noncarcinogenic	Bs	$Ba_{chicken}$ (day/kg FW)	$A_{chicken}$ - carcinogenic (mg/kg FW)	$A_{chicken}$ - noncarcinogenic (mg/kg FW)
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.50E-05	1.50E-05	1.40E-07	1.41E-07	1	7.47E-04	2.25E-09	2.25E-09
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	7.36E-04	7.36E-04	1.85E-05	1.91E-05	1	2.31E-03	3.40E-07	3.40E-07
2,4-Dinitrotoluene	1.50E-05	1.50E-05	4.33E-10	4.33E-10	1	1.96E-06	5.89E-12	5.89E-12
2,5-Diphenyloxazole	3.17E-04	3.17E-04	4.85E-07	4.86E-07	1	9.40E-04	5.97E-08	5.97E-08
2,6-Dinitrotoluene	2.10E-03	2.10E-03	5.20E-08	5.20E-08	1	1.53E-06	6.43E-10	6.43E-10
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.50E-05	1.50E-05	3.27E-10	3.27E-10	1	1.61E-06	4.84E-12	4.84E-12
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.59E-03	1.59E-03	7.27E-05	7.67E-05	1	9.46E-03	3.03E-06	3.03E-06
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.50E-05	1.50E-05	7.87E-07	8.38E-07	1	2.67E-02	8.08E-08	8.08E-08
Biphenyl (1,1-Biphenyl)	1.57E-03	1.57E-03	6.62E-07	6.62E-07	1	2.01E-04	6.31E-08	6.31E-08
Dibenz[a,h]anthracene	1.50E-05	1.50E-05	1.33E-06	1.49E-06	1	7.00E-02	2.13E-07	2.13E-07
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl a	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.69E-09	8.69E-09	5.40E-10	5.83E-10	1	7.30E-02	1.28E-10	1.28E-10
Diphenylamine	6.35E-05	6.35E-05	1.93E-08	1.94E-08	1	6.07E-05	7.70E-10	7.70E-10
Mesitylene (1,3,5-trimethylber	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	6.68E-04	6.68E-04	4.48E-06	4.52E-06	1	7.04E-04	9.42E-08	9.42E-08
Phenol	1.01E-03	1.01E-03	1.59E-08	1.59E-08	1	5.95E-07	1.21E-10	1.21E-10
Pyrene	1.50E-05	1.51E-05	3.93E-07	4.05E-07	1	1.99E-03	6.01E-09	6.01E-09
Resorcinol	2.21E-03	2.21E-03	1.86E-08	1.86E-08	1	1.21E-07	5.35E-11	5.35E-11
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiop	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.50E-05	1.50E-05	1.05E-10	1.05E-10	1	3.57E-08	1.07E-13	1.07E-13
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Aluminum	3.34E+01	3.34E+01	2.08E+00	2.25E+00	1	0.00E+00	0.00E+00	0.00E+00
Lead	3.24E+00	3.24E+00	1.25E-01	1.31E-01	1	0.00E+00	0.00E+00	0.00E+00
Zirconium	3.19E+00	3.19E+00	3.66E-01	4.28E-01	1	0.00E+00	0.00E+00	0.00E+00
copper	1.40E+00	1.47E+00	3.26E-01	4.95E-01	1	0.00E+00	0.00E+00	0.00E+00
Iron	1.40E-02	1.40E-02	1.57E-05	1.57E-05	1	0.00E+00	0.00E+00	0.00E+00

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 17
Egg Concentration Due to Plant and Soil Ingestion (see Table B-3-13)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$A_{egg} = \left(\sum\left(F_i \times Qp_i \times P_i\right) + Qs \times Cs \times Bs\right) \times Ba_{egg}$$

Symbol	Value	Description	Units	Notes
Achicken	calculated	Concentration in chicken	mg/kg FW	
Fiforage_chicken	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	
Qpiforage_chicken	0.2	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	
Pi	calculated - chemical-specific	Concentration in plant type ingested by animal	mg/kg DW	
Qs_chicken	0.022	Quantity of soil ingested by animal	kg/day	
Cs	calculated	Concentration in soil	mg/kg	
Bs	chemical-specific	Soil bioavailability factor	unitless	
Baegg	chemical-specific	Biotransfer factor for egg	day/kg FW	

Attachment B-3
Concentrations in Environmental Media, Maximum Exposed Individual - Offsite, Resident and Subsistence Farmer

Table 17
Egg Concentration Due to Plant and Soil Ingestion (see Table B-3-13)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Pi - forage, carcinogenic (mg/kg DW)	Pi - forage, noncarcinogenic (mg/kg DW)	Cs (mg/kg) - carcinogenic	CstD (mg/kg) - noncarcinogenic	Bs	Ba_{egg} (day/kg FW)	A_{egg} - carcinogenic (mg/kg FW)	A_{egg} - noncarcinogenic (mg/kg FW)
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.50E-05	1.50E-05	1.40E-07	1.41E-07	1	2.95E-01	8.89E-07	8.89E-07
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	7.36E-04	7.36E-04	1.85E-05	1.91E-05	1	9.12E-01	1.35E-04	1.35E-04
2,4-Dinitrotoluene	1.50E-05	1.50E-05	4.33E-10	4.33E-10	1	7.86E-04	2.36E-09	2.36E-09
2,5-Diphenyloxazole	3.17E-04	3.17E-04	4.85E-07	4.86E-07	1	3.72E-01	2.36E-05	2.36E-05
2,6-Dinitrotoluene	2.10E-03	2.10E-03	5.20E-08	5.20E-08	1	6.12E-04	2.57E-07	2.57E-07
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.50E-05	1.50E-05	3.27E-10	3.27E-10	1	6.46E-04	1.94E-09	1.94E-09
4-Nitrosodiphenylamin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.59E-03	1.59E-03	7.27E-05	7.67E-05	1	3.79E+00	1.21E-03	1.22E-03
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.50E-05	1.50E-05	7.87E-07	8.38E-07	1	1.07E+01	3.24E-05	3.24E-05
Biphenyl (1,1-Bipheny	1.57E-03	1.57E-03	6.62E-07	6.62E-07	1	7.94E-02	2.49E-05	2.49E-05
Dibenz[a,h]anthracene	1.50E-05	1.50E-05	1.33E-06	1.49E-06	1	2.80E+01	8.50E-05	8.51E-05
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.69E-09	8.69E-09	5.40E-10	5.83E-10	1	5.42E-02	9.48E-11	9.49E-11
Diphenylamine	6.35E-05	6.35E-05	1.93E-08	1.94E-08	1	2.40E-02	3.05E-07	3.05E-07
Mesitylene (1,3,5-trime	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	6.68E-04	6.68E-04	4.48E-06	4.52E-06	1	2.82E-01	3.77E-05	3.77E-05
Phenol	1.01E-03	1.01E-03	1.59E-08	1.59E-08	1	2.38E-04	4.83E-08	4.83E-08
Pyrene	1.50E-05	1.51E-05	3.93E-07	4.05E-07	1	7.98E-01	2.41E-06	2.41E-06
Resorcinol	2.21E-03	2.21E-03	1.86E-08	1.86E-08	1	4.79E-05	2.11E-08	2.11E-08
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.50E-05	1.50E-05	1.05E-10	1.05E-10	1	1.41E-05	4.25E-11	4.25E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1	0.00E+00	0.00E+00	0.00E+00
Aluminum	3.34E+01	3.34E+01	2.08E+00	2.25E+00	1	0.00E+00	0.00E+00	0.00E+00
Lead	3.24E+00	3.24E+00	1.25E-01	1.31E-01	1	0.00E+00	0.00E+00	0.00E+00
Zirconium	3.19E+00	3.19E+00	3.66E-01	4.28E-01	1	0.00E+00	0.00E+00	0.00E+00
copper	1.40E+00	1.47E+00	3.26E-01	4.95E-01	1	0.00E+00	0.00E+00	0.00E+00
Iron	1.40E-02	1.40E-02	1.57E-05	1.57E-05	1	0.00E+00	0.00E+00	0.00E+00

Attachment B-4
Intake and Risks – Maximum Exposed Individual, Offsite Resident, and Subsistence Farmer Scenario

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 1

Summary of Concentrations in Environmental Media

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Annual Average Concentration in Air (ug/m^3)	Average soil concentration over exposure duration - Cs (mg/kg)	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg)	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life
1,3-Butadiene	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	4.37E-07	1.40E-07	1.41E-07	1.27E-06	1.27E-06	1.24E-08	1.25E-08
1-Methylnaphthalene	2.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.14E-05	1.85E-05	1.91E-05	6.25E-05	6.25E-05	8.53E-07	8.78E-07
2,4-Dinitrotoluene	4.37E-07	4.33E-10	4.33E-10	1.26E-06	1.26E-06	1.18E-09	1.18E-09
2,5-Diphenyloxazole	9.22E-06	4.85E-07	4.86E-07	2.67E-05	2.67E-05	3.75E-08	3.76E-08
2,6-Dinitrotoluene	6.10E-05	5.20E-08	5.20E-08	1.76E-04	1.76E-04	1.64E-07	1.64E-07
2-Methylnaphthalene	2.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	1.79E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	4.37E-07	3.27E-10	3.27E-10	1.26E-06	1.26E-06	9.98E-10	9.98E-10
4-Nitrosodiphenylamine	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	4.63E-05	7.27E-05	7.67E-05	1.35E-04	1.35E-04	1.47E-06	1.55E-06
Benzene	1.07E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	4.37E-07	7.87E-07	8.38E-07	1.27E-06	1.27E-06	8.74E-09	9.30E-09
Biphenyl (1,1-Biphenyl)	4.56E-05	6.62E-07	6.62E-07	1.32E-04	1.32E-04	1.25E-07	1.25E-07
Dibenz[a,h]anthracene	4.37E-07	1.33E-06	1.49E-06	1.27E-06	1.27E-06	8.47E-09	9.50E-09
Dibenzofuran	9.71E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	1.31E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	2.52E-10	5.40E-10	5.83E-10	7.32E-10	7.32E-10	3.04E-12	3.28E-12
Diphenylamine	1.84E-06	1.93E-08	1.94E-08	5.33E-06	5.33E-06	7.30E-09	7.30E-09
Mesitylene (1,3,5-trimethylbenzene)	1.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	4.10E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.94E-05	4.48E-06	4.52E-06	5.65E-05	5.65E-05	4.07E-07	4.10E-07
Phenol	2.95E-05	1.59E-08	1.59E-08	8.52E-05	8.52E-05	8.60E-08	8.60E-08
Pyrene	4.37E-07	3.93E-07	4.05E-07	1.28E-06	1.28E-06	1.96E-08	2.02E-08
Resorcinol	6.42E-05	1.86E-08	1.86E-08	1.86E-04	1.86E-04	2.55E-07	2.55E-07
Styrene	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	3.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	4.37E-07	1.05E-10	1.05E-10	1.26E-06	1.26E-06	2.91E-09	2.91E-09
Xylenes	9.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	9.71E-01	2.08E+00	2.25E+00	2.81E+00	2.81E+00	8.33E-03	8.99E-03
Lead	9.41E-02	1.25E-01	1.31E-01	2.73E-01	2.74E-01	1.70E-03	1.78E-03
Zirconium	9.26E-02	3.66E-01	4.28E-01	2.68E-01	2.68E-01	7.32E-04	8.57E-04
copper	3.69E-02	3.26E-01	4.95E-01	2.37E-01	3.04E-01	1.31E-01	1.98E-01
Iron	4.05E-04	1.57E-05	1.57E-05	1.17E-03	1.17E-03	6.29E-08	6.29E-08

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Beef (mg/kg FW) - Average concentration over exposure duration
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	4.95E-09	5.01E-09	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.39E-07
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	5.22E-07	5.37E-07	7.36E-04	7.36E-04	1.91E-04	1.91E-04	2.11E-05
2,4-Dinitrotoluene	1.21E-08	1.21E-08	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.71E-10
2,5-Diphenyloxazole	7.20E-08	7.21E-08	3.17E-04	3.17E-04	8.21E-05	8.21E-05	3.70E-06
2,6-Dinitrotoluene	1.60E-06	1.60E-06	2.10E-03	2.10E-03	5.43E-04	5.43E-04	4.02E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	9.88E-09	9.89E-09	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.04E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.53E-06	1.62E-06	1.59E-03	1.59E-03	4.14E-04	4.14E-04	1.90E-04
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	9.92E-09	1.06E-08	1.50E-05	1.50E-05	3.90E-06	3.90E-06	5.05E-06
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	1.57E-03	1.57E-03	4.06E-04	4.06E-04	3.91E-06
Dibenz[a,h]anthracene	1.90E-08	2.14E-08	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.33E-05
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	6.05E-12	6.53E-12	8.69E-09	8.69E-09	2.25E-09	2.25E-09	4.69E-09
Diphenylamine	3.10E-07	3.10E-07	6.35E-05	6.35E-05	1.64E-05	1.64E-05	4.77E-08
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.60E-07	1.61E-07	6.68E-04	6.68E-04	1.73E-04	1.73E-04	5.92E-06
Phenol	6.85E-07	6.85E-07	1.01E-03	1.01E-03	2.62E-04	2.62E-04	7.58E-09
Pyrene	9.59E-09	9.88E-09	1.50E-05	1.51E-05	3.91E-06	3.91E-06	3.77E-07
Resorcinol	2.34E-06	2.34E-06	2.21E-03	2.21E-03	5.71E-04	5.71E-04	3.31E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	3.15E-08	3.15E-08	1.50E-05	1.50E-05	3.89E-06	3.89E-06	6.66E-12
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	1.35E-05	1.46E-05	3.34E+01	3.34E+01	8.65E+00	8.65E+00	4.99E-01
Lead	1.13E-05	1.18E-05	3.24E+00	3.24E+00	8.43E-01	8.44E-01	9.67E-03
Zirconium	1.83E-06	2.14E-06	3.19E+00	3.19E+00	8.25E-01	8.25E-01	1.75E-01
copper	8.16E-04	1.24E-03	1.40E+00	1.47E+00	4.59E-01	5.26E-01	1.43E-01
Iron	1.57E-10	1.57E-10	1.40E-02	1.40E-02	3.61E-03	3.61E-03	2.77E-03

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Beef (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Milk (mg/kg FW) - Average concentration over exposure duration	Concentration in Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Pork (mg/kg FW) - Average concentration over exposure duration	Concentration in Pork (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Chicken (mg/kg FW) - Average concentration over exposure duration	Concentration in Chicken (mg/kg FW) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.39E-07	7.67E-08	7.67E-08	6.18E-08	6.18E-08	2.25E-09	2.25E-09
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.11E-05	1.16E-05	1.16E-05	9.36E-06	9.36E-06	3.40E-07	3.40E-07
2,4-Dinitrotoluene	3.71E-10	2.04E-10	2.04E-10	1.66E-10	1.66E-10	5.89E-12	5.89E-12
2,5-Diphenyloxazole	3.70E-06	2.04E-06	2.04E-06	1.64E-06	1.64E-06	5.97E-08	5.97E-08
2,6-Dinitrotoluene	4.02E-08	2.22E-08	2.22E-08	1.80E-08	1.80E-08	6.43E-10	6.43E-10
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	3.04E-10	1.68E-10	1.68E-10	1.36E-10	1.36E-10	4.84E-12	4.84E-12
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.90E-04	1.04E-04	1.04E-04	8.52E-05	8.53E-05	3.03E-06	3.03E-06
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	5.06E-06	2.78E-06	2.78E-06	2.27E-06	2.28E-06	8.08E-08	8.08E-08
Biphenyl (1,1-Biphenyl)	3.91E-06	2.15E-06	2.15E-06	1.73E-06	1.73E-06	6.31E-08	6.31E-08
Dibenz[a,h]anthracene	1.33E-05	7.28E-06	7.29E-06	5.97E-06	5.97E-06	2.13E-07	2.13E-07
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	4.69E-09	1.50E-09	1.50E-09	2.11E-09	2.11E-09	1.28E-10	1.28E-10
Diphenylamine	4.77E-08	2.63E-08	2.63E-08	2.12E-08	2.12E-08	7.70E-10	7.70E-10
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	5.92E-06	3.25E-06	3.25E-06	2.65E-06	2.65E-06	9.42E-08	9.42E-08
Phenol	7.58E-09	4.16E-09	4.16E-09	3.39E-09	3.39E-09	1.21E-10	1.21E-10
Pyrene	3.77E-07	2.07E-07	2.07E-07	1.69E-07	1.69E-07	6.01E-09	6.01E-09
Resorcinol	3.31E-09	1.82E-09	1.82E-09	1.47E-09	1.47E-09	5.35E-11	5.35E-11
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	6.66E-12	3.67E-12	3.67E-12	2.95E-12	2.95E-12	1.07E-13	1.07E-13
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	4.99E-01	1.16E-01	1.16E-01	2.22E-01	2.22E-01	0.00E+00	0.00E+00
Lead	9.68E-03	1.40E-02	1.40E-02	4.30E-03	4.30E-03	0.00E+00	0.00E+00
Zirconium	1.75E-01	1.65E-03	1.66E-03	7.82E-02	7.84E-02	0.00E+00	0.00E+00
copper	1.52E-01	3.70E-02	3.92E-02	6.51E-02	6.99E-02	0.00E+00	0.00E+00
Iron	2.77E-03	6.02E-05	6.02E-05	1.23E-03	1.23E-03	0.00E+00	0.00E+00

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00
1,6-Dinitropyrene	8.89E-07	8.89E-07
1-Methylnaphthalene	0.00E+00	0.00E+00
1-Nitropyrene	1.35E-04	1.35E-04
2,4-Dinitrotoluene	2.36E-09	2.36E-09
2,5-Diphenyloxazole	2.36E-05	2.36E-05
2,6-Dinitrotoluene	2.57E-07	2.57E-07
2-Methylnaphthalene	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00
4-Nitrophenol	1.94E-09	1.94E-09
4-Nitrosodiphenylamine	0.00E+00	0.00E+00
Benzo[a]anthracene	1.21E-03	1.22E-03
Benzene	0.00E+00	0.00E+00
Benzo[a]pyrene	3.24E-05	3.24E-05
Biphenyl (1,1-Biphenyl)	2.49E-05	2.49E-05
Dibenz[a,h]anthracene	8.50E-05	8.51E-05
Dibenzofuran	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	9.48E-11	9.49E-11
Diphenylamine	3.05E-07	3.05E-07
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00
Phenanthrene	3.77E-05	3.77E-05
Phenol	4.83E-08	4.83E-08
Pyrene	2.41E-06	2.41E-06
Resorcinol	2.11E-08	2.11E-08
Styrene	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00
Triacetin	4.25E-11	4.25E-11
Xylenes	0.00E+00	0.00E+00
Aluminum	0.00E+00	0.00E+00
Lead	0.00E+00	0.00E+00
Zirconium	0.00E+00	0.00E+00
copper	0.00E+00	0.00E+00
Iron	0.00E+00	0.00E+00

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 2
Summary of Exposure Factors
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
Isoil	calculated	Soil ingestion rate	mg/kg-day	
Cs	calculated	Concentration in soil	mg/kg	Calculated from Equations presented in Table B-1-1
Crsoil	1.00E-04	Soil ingestion rate	kg/day	Adult soil ingestion rate - 100 mg/day; child soil ingestion rate - 200 mg/day
Fsoil	1	Fraction of soil that is contaminated	unitless	
BW	70	Body weight	kg	adult body weight - 70 kg; child body weight - 15 kg
Iag	calculated	Produce Intake Rate	mg/kg-day	
Pd	calculated	Concentration in aboveground exposed produce due to deposition	mg/kg DW	Calculated from equation in Tables B-2-7 and B-3-7
Pv	calculated	Concentration in aboveground exposed produce due to air to plant transfer	mg/kg DW	Calculated from equation in Table B-2-8
Pr	calculated	Concentration in aboveground exposed and protected produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-9, B 3-9
Pr_{bg}	calculated	Concentration in belowground produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-10
CR_{ag}	0.0003	Consumption rate of aboveground produce	kg/kg-day DW	Adult - 0.0003 Child - 0.00042
CR_{pp}	0.00057	Consumption rate of aboveground protected produce	kg/kg-day DW	Adult - 0.00057 Child - 0.00077
CR_{bg}	0.00014	Consumption rate of belowground produce	kg/kg-day DW	Adult - 0.00014 Child - 0.00022
F_{ag}	1	Fraction of produce that is contaminated	Unitless	Adult or child resident - 0.25 Subsistance farmer, adult or child - 1 Subsistance fisher, adult or child - 0.25
I_j	calculated	Intake from ingestion of animal tissue from animal *j*	mg/kg-day	
A_{beef}	calculated	Concentration in beef	mg/kg FW	Calculated using equations presented in Table B-3-10
A_{milk}	calculated	Concentration in milk	mg/kg FW	Calculated using equations presented in Table B-3-11
A_{pork}	calculated	Concentration in pork	mg/kg FW	Calculated using equations presented in Table B-3-12
$A_{chicken}$	calculated	Concentration in chicken	mg/kg FW	Calculated using equations presented in Table B-3-13

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 2
Summary of Exposure Factors
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

A_{egg}	calculated	Concentration in egg	mg/kg FW	Calculated using equations presented in Table B-3-14
CR_{beef}	0.00114	Consumption rate of beef	kg/kg-day FW	Adult - 0.00114 Child - 0.00051
CR_{milk}	0.00842	Consumption rate of milk	kg/kg-day FW	Adult - 0.00842 Child - 0.01857
CR_{pork}	0.00053	Consumption rate of pork	kg/kg-day FW	Adult - 0.00053 Child - 0.000398
$CR_{chicken}$	0.00061	Consumption rate of chicken	kg/kg-day FW	Adult - 0.00061 Child - 0.000425
CR_{egg}	0.00062	Consumption rate of egg	kg/kg-day FW	Adult - 0.00062 Child - 0.000438
F_{beef}	1	Fraction of beef consumed from contaminated sources	unitless	
F_{milk}	1	Fraction of milk consumed from contaminated sources	unitless	
F_{pork}	1	Fraction of pork consumed from contaminated sources	unitless	
$F_{chicken}$	1	Fraction of chicken consumed from contaminated sources	unitless	
F_{egg}	1	Fraction of eggs consumed from contaminated sources	unitless	
CR_{fish}	0.00117	Fish ingestion rate	kg/kg-day	Adult - 0.00117 kg/kg-day FW Child - 0.000759 kg/kg-day FW
F_{fish}	0	Fraction of fish ingested from contaminated source	unitless	
IR	0.63	Inhalation rate	m^3/hr	0.63 m^3/hr for adults; 0.3 m^3/hr for children
ET	24	Exposure time	hr/day	
EF	350	Exposure Frequency	days/yr	
ED	40	Exposure Duration	yr	Subsistance farmer - 40 Subsistance fisher - 30 Adult resident - 30 Child - 6
AT_c	70	Averaging time - carcinogens	yr	
AT_n	40	Averaging time - noncarcinogens		Set equal to ED

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 3
Summary of Toxicity Factors
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Oral Cancer Slope Factor 1/(mg/kg-day)	Inhalation Cancer Slope Factor 1/(mg/kg-day)	Oral Reference Dose (mg/kg-day)	Inhalation Reference Dose (mg/kg-day)
1,3-Butadiene	NA	1.8	NA	NA
1,6-Dinitropyrene	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	0.02	0.0009
1-Nitropyrene	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	0.002	NA
2,5-Diphenyloxazole	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	0.001	NA
2-Methylnaphthalene	NA	NA	0.02	NA
2-Nitronaphthalene	NA	NA	NA	NA
4-Nitrophenol	NA	NA	0.008	NA
4-Nitrosodiphenylamine	0.0049	NA	NA	NA
Benzo[a]anthracene	0.73	NA	NA	NA
Benzene	0.055	0.029	0.003	0.0017
Benzo[a]pyrene	7.3	3.1	NA	NA
Biphenyl (1,1-Biphenyl)	NA	NA	0.05	NA
Dibenz[a,h]anthracene	7.3	NA	NA	NA
Dibenzofuran	NA	NA	0.004	NA
Di-n-propyl adipate (Dipropyl adipate)	NA	NA	NA	NA
Dioxin (2,3,7,8-TCDD)	156000	156000	NA	NA
Diphenylamine	NA	NA	0.025	NA
Mesitylene (1,3,5-trimethylbenzene)	NA	NA	0.05	0.0017
Naphthalene	NA	NA	0.02	0.0009
n-Hexane	NA	NA	0.06	0.0571
N-Nitrosodiphenylamine	0.0049	NA	NA	NA
Phenanthrene	NA	NA	NA	NA
Phenol	NA	NA	0.6	NA
Pyrene	NA	NA	0.03	NA
Resorcinol	NA	NA	NA	NA
Styrene	NA	NA	0.2	0.286
Thianaphthene (benzo[b]thiophene)	NA	NA	NA	NA
Toluene	NA	NA	0.2	0.114
Triacetin	NA	NA	NA	NA
Xylenes	NA	NA	2	NA
Aluminum	NA	NA	1	0.0014
Lead	NA	NA	NA	NA
Zirconium	NA	NA	NA	NA
copper	NA	NA	0.04	NA
Iron	NA	NA	0.3	NA

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 4
Intake and Health Risk From Soil Ingestion (Table C-1-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_{soil} = \frac{Cs \times CR_{soil} \times F_{soil}}{BW}$$

Symbol	Value	Description	Units	Notes
Isoil	calculated	Soil ingestion rate	mg/kg-day	
Cs	calculated	Concentration in soil	mg/kg	Calculated from Equations presented in Table B-1-1
Crsoil	1.00E-04	Soil ingestion rate	kg/day	Adult soil ingestion rate - 50 mg/day; child soil ingestion rate - 100 mg/day
Fsoil	1	Fraction of soil that is contaminated	unitless	
BW	70	Body weight	kg	adult body weight - 70 kg; child body weight - 15 kg

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 4
Intake and Health Risk From Soil Ingestion (Table C-1-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Average soil concentration over exposure duration - Cs (mg/kg) - Cancer Risk	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg) - Noncancer Effects	Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	Oral Reference Dose (mg/kg-day)	Intake based on average soil concentration over exposure duration (mg/kg-day) - used to assess cancer risks	Intake based on soil concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
1,3-Butadiene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.40E-07	1.41E-07	0	0	2.00E-13	2.02E-13	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	1.85E-05	1.91E-05	0	0	2.65E-11	2.72E-11	0.00E+00	0.00E+00
2,4-Dinitrotoluene	4.33E-10	4.33E-10	0	0.002	6.19E-16	6.19E-16	0.00E+00	3.09E-13
2,5-Diphenyloxazole	4.85E-07	4.86E-07	0	0	6.93E-13	6.94E-13	0.00E+00	0.00E+00
2,6-Dinitrotoluene	5.20E-08	5.20E-08	0	0.001	7.43E-14	7.43E-14	0.00E+00	7.43E-11
2-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	3.27E-10	3.27E-10	0	0.008	4.67E-16	4.68E-16	0.00E+00	5.84E-14
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	7.27E-05	7.67E-05	0.73	0	1.04E-10	1.10E-10	7.58E-11	0.00E+00
Benzene	0.00E+00	0.00E+00	0.055	0.003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	7.87E-07	8.38E-07	7.3	0	1.12E-12	1.20E-12	8.21E-12	0.00E+00
Biphenyl (1,1-Biphenyl)	6.62E-07	6.62E-07	0	0.05	9.46E-13	9.46E-13	0.00E+00	1.89E-11
Dibenz[a,h]anthracene	1.33E-06	1.49E-06	7.3	0	1.90E-12	2.13E-12	1.39E-11	0.00E+00
Dibenzofuran	0.00E+00	0.00E+00	0	0.004	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	5.40E-10	5.83E-10	156000	0	7.72E-16	8.33E-16	1.20E-10	0.00E+00
Diphenylamine	1.93E-08	1.94E-08	0	0.025	2.76E-14	2.76E-14	0.00E+00	1.11E-12
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0	0.06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	4.48E-06	4.52E-06	0	0	6.41E-12	6.45E-12	0.00E+00	0.00E+00
Phenol	1.59E-08	1.59E-08	0	0.6	2.27E-14	2.27E-14	0.00E+00	3.78E-14
Pyrene	3.93E-07	4.05E-07	0	0.03	5.61E-13	5.78E-13	0.00E+00	1.93E-11
Resorcinol	1.86E-08	1.86E-08	0	0	2.65E-14	2.65E-14	0.00E+00	0.00E+00
Styrene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.05E-10	1.05E-10	0	0	1.50E-16	1.50E-16	0.00E+00	0.00E+00
Xylenes	0.00E+00	0.00E+00	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	2.08E+00	2.25E+00	0	1	2.98E-06	3.21E-06	0.00E+00	3.21E-06
Lead	1.25E-01	1.31E-01	0	0	1.79E-07	1.87E-07	0.00E+00	0.00E+00
Zirconium	3.66E-01	4.28E-01	0	0	5.23E-07	6.12E-07	0.00E+00	0.00E+00
copper	3.26E-01	4.95E-01	0	0.04	4.66E-07	7.07E-07	0.00E+00	1.77E-05
Iron	1.57E-05	1.57E-05	0	0.3	2.24E-11	2.25E-11	0.00E+00	7.49E-11

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 5
Intake and Health Risk From Produce Ingestion (Table C-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_{ag} = \left[\left((Pd + Pv + \mathrm{Pr}) \times CR_{ag}\right) + \left(\mathrm{Pr} \times CR_{pp}\right) + \left(\mathrm{Pr}_{bg} \times CR_{bg}\right)\right] \times F_{ag}$$

Symbol	Value	Description	Units	Notes
Iag	calculated	Produce Intake Rate	mg/kg-day	
Pd	calculated	Concentration in aboveground exposed produce due to deposition	mg/kg DW	Calculated from equation in Tables B-2-7 and B-3-7
Pv	calculated	Concentration in aboveground exposed produce due to air to plant transfer	mg/kg DW	Calculated from equation in Table B-2-8
Pr	calculated	Concentration in aboveground exposed and protected produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-9, B-3-9
Pr_{bg}	calculated	Concentration in belowground produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-10
CR_{ag}	0.0003	Consumption rate of aboveground produce	kg/kg-day DW	
CR_{pp}	0.00057	Consumption rate of aboveground protected produce	kg/kg-day DW	
CR_{bg}	0.00014	Consumption rate of belowground produce	kg/kg-day DW	
F_{ag}	1	Fraction of produce that is contaminated	Unitless	Subsistance farmer, adult or child - 1 Subsistance fisher, adult or child - 0.25

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 5
Intake and Health Risk From Produce Ingestion (Table C-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.27E-06	1.27E-06	1.24E-08	1.25E-08	4.95E-09	5.01E-09
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	6.25E-05	6.25E-05	8.53E-07	8.78E-07	5.22E-07	5.37E-07
2,4-Dinitrotoluene	1.26E-06	1.26E-06	1.18E-09	1.18E-09	1.21E-08	1.21E-08
2,5-Diphenyloxazole	2.67E-05	2.67E-05	3.75E-08	3.76E-08	7.20E-08	7.21E-08
2,6-Dinitrotoluene	1.76E-04	1.76E-04	1.64E-07	1.64E-07	1.60E-06	1.60E-06
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.26E-06	1.26E-06	9.98E-10	9.98E-10	9.88E-09	9.89E-09
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.35E-04	1.35E-04	1.47E-06	1.55E-06	1.53E-06	1.62E-06
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.27E-06	1.27E-06	8.74E-09	9.30E-09	9.92E-09	1.06E-08
Biphenyl (1,1-Biphenyl)	1.32E-04	1.32E-04	1.25E-07	1.25E-07	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	1.27E-06	1.27E-06	8.47E-09	9.50E-09	1.90E-08	2.14E-08
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	7.32E-10	7.32E-10	3.04E-12	3.28E-12	6.05E-12	6.53E-12
Diphenylamine	5.33E-06	5.33E-06	7.30E-09	7.30E-09	3.10E-07	3.10E-07
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	5.65E-05	5.65E-05	4.07E-07	4.10E-07	1.60E-07	1.61E-07
Phenol	8.52E-05	8.52E-05	8.60E-08	8.60E-08	6.85E-07	6.85E-07
Pyrene	1.28E-06	1.28E-06	1.96E-08	2.02E-08	9.59E-09	9.88E-09
Resorcinol	1.86E-04	1.86E-04	2.55E-07	2.55E-07	2.34E-06	2.34E-06
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.26E-06	1.26E-06	2.91E-09	2.91E-09	3.15E-08	3.15E-08
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	2.81E+00	2.81E+00	8.33E-03	8.99E-03	1.35E-05	1.46E-05
Lead	2.73E-01	2.74E-01	1.70E-03	1.78E-03	1.13E-05	1.18E-05
Zirconium	2.68E-01	2.68E-01	7.32E-04	8.57E-04	1.83E-06	2.14E-06
copper	2.37E-01	3.04E-01	1.31E-01	1.98E-01	8.16E-04	1.24E-03
Iron	1.17E-03	1.17E-03	6.29E-08	6.29E-08	1.57E-10	1.57E-10

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 5
Intake and Health Risk From Produce Ingestion (Table C-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	Oral Reference Dose (mg/kg-day)	Produce Intake Rate - carcinogenic risk (mg/kg)	Produce Intake Rate - noncancer effects (mg/kg)	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	3.90E-10	3.90E-10	0.00E+00	0.00E+00
0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	1.93E-08	1.93E-08	0.00E+00	0.00E+00
0	0.002	3.81E-10	3.81E-10	0.00E+00	1.91E-07
0	0	8.03E-09	8.03E-09	0.00E+00	0.00E+00
0	0.001	5.32E-08	5.32E-08	0.00E+00	5.32E-05
0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.008	3.81E-10	3.81E-10	0.00E+00	4.76E-08
0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.73	0	4.16E-08	4.17E-08	3.04E-08	0.00E+00
0.055	0.003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.3	0	3.87E-10	3.88E-10	2.83E-09	0.00E+00
0	0.05	3.96E-08	3.96E-08	0.00E+00	7.93E-07
7.3	0	3.88E-10	3.90E-10	2.84E-09	0.00E+00
0	0.004	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
156000	0	2.22E-13	2.22E-13	3.46E-08	0.00E+00
0	0.025	1.65E-09	1.65E-09	0.00E+00	6.59E-08
0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	1.72E-08	1.72E-08	0.00E+00	0.00E+00
0	0.6	2.57E-08	2.57E-08	0.00E+00	4.28E-08
0	0.03	3.97E-10	3.97E-10	0.00E+00	1.32E-08
0	0	5.61E-08	5.61E-08	0.00E+00	0.00E+00
0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	3.85E-10	3.85E-10	0.00E+00	0.00E+00
0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	1	8.48E-04	8.49E-04	0.00E+00	8.49E-04
0	0	8.30E-05	8.31E-05	0.00E+00	0.00E+00
0	0	8.08E-05	8.10E-05	0.00E+00	0.00E+00
0	0.04	1.46E-04	2.04E-04	0.00E+00	5.11E-03
0	0.3	3.51E-07	3.51E-07	0.00E+00	1.17E-06

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 6
Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_j = A_j \times CR_j \times F_j$$

Symbol	Value	Description	Units	Notes
I_j	calculated	Intake from ingestion of animal tissue from animal *j*	mg/kg-day	
A_{beef}	calculated	Concentration in beef	mg/kg FW	Calculated using equations presented in Table B-3-10
A_{milk}	calculated	Concentration in milk	mg/kg FW	Calculated using equations presented in Table B-3-11
A_{pork}	calculated	Concentration in pork	mg/kg FW	Calculated using equations presented in Table B-3-12
$A_{chicken}$	calculated	Concentration in chicker	mg/kg FW	Calculated using equations presented in Table B-3-13
A_{egg}	calculated	Concentration in egg	mg/kg FW	Calculated using equations presented in Table B-3-14
CR_{beef}	0.00114	Consumption rate of beef	kg/kg-day FW	Adult - 0.00114 Child - 0.00051
CR_{milk}	0.00842	Consumption rate of milk	kg/kg-day FW	Adult - 0.00842 Child - 0.01857
CR_{pork}	0.00053	Consumption rate of pork	kg/kg-day FW	Adult - 0.00053
$CR_{chicken}$	0.00061	Consumption rate of chicken	kg/kg-day FW	Adult - 0.00061 Child - 0.000425
CR_{egg}	0.00062	Consumption rate of egg	kg/kg-day FW	Adult - 0.00062 Child - 0.000438
F_{beef}	1	Fraction of beef consumed from contaminated sources		
F_{milk}	1	Fraction of milk consumed from contaminated sources		
F_{pork}	1	Fraction of pork consumed from contaminated sources		
$F_{chicken}$	1	Fraction of chicken consumed from contaminated sources		
F_{egg}	1	Fraction of eggs consumed from contaminated sources		

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 6
Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration In Beef (mg/kg FW) - Average concentration over exposure duration	Concentration In Beef (mg/kg FW) - Concentration at the end of the facility operating life	Concentration In Milk (mg/kg FW) - Average concentration over exposure duration	Concentration In Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration In Pork (mg/kg FW) - Average concentration over exposure duration	Concentration In Pork (mg/kg FW) - Concentration at the end of the facility operating life	Concentration In Chicken (mg/kg FW) - Average concentration over exposure duration
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.39E-07	1.39E-07	7.67E-08	7.67E-08	6.18E-08	6.18E-08	2.25E-09
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.11E-05	2.11E-05	1.16E-05	1.16E-05	9.36E-06	9.36E-06	3.40E-07
2,4-Dinitrotoluene	3.71E-10	3.71E-10	2.04E-10	2.04E-10	1.66E-10	1.66E-10	5.89E-12
2,5-Diphenyloxazole	3.70E-06	3.70E-06	2.04E-06	2.04E-06	1.64E-06	1.64E-06	5.97E-08
2,6-Dinitrotoluene	4.02E-08	4.02E-08	2.22E-08	2.22E-08	1.80E-08	1.80E-08	6.43E-10
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	3.04E-10	3.04E-10	1.68E-10	1.68E-10	1.36E-10	1.36E-10	4.84E-12
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.90E-04	1.90E-04	1.04E-04	1.04E-04	8.52E-05	8.53E-05	3.03E-06
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	5.05E-06	5.06E-06	2.78E-06	2.78E-06	2.27E-06	2.28E-06	8.08E-08
Biphenyl (1,1-Biphenyl)	3.91E-06	3.91E-06	2.15E-06	2.15E-06	1.73E-06	1.73E-06	6.31E-08
Dibenz[a,h]anthracene	1.33E-05	1.33E-05	7.28E-06	7.29E-06	5.97E-06	5.97E-06	2.13E-07
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	4.69E-09	4.69E-09	1.50E-09	1.50E-09	2.11E-09	2.11E-09	1.28E-10
Diphenylamine	4.77E-08	4.77E-08	2.63E-08	2.63E-08	2.12E-08	2.12E-08	7.70E-10
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	5.92E-06	5.92E-06	3.25E-06	3.25E-06	2.65E-06	2.65E-06	9.42E-08
Phenol	7.58E-09	7.58E-09	4.16E-09	4.16E-09	3.39E-09	3.39E-09	1.21E-10
Pyrene	3.77E-07	3.77E-07	2.07E-07	2.07E-07	1.69E-07	1.69E-07	6.01E-09
Resorcinol	3.31E-09	3.31E-09	1.82E-09	1.82E-09	1.47E-09	1.47E-09	5.35E-11
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	6.66E-12	6.66E-12	3.67E-12	3.67E-12	2.95E-12	2.95E-12	1.07E-13
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	4.99E-01	4.99E-01	1.16E-01	1.16E-01	2.22E-01	2.22E-01	0.00E+00
Lead	9.67E-03	9.68E-03	1.40E-02	1.40E-02	4.30E-03	4.30E-03	0.00E+00
Zirconium	1.75E-01	1.75E-01	1.65E-03	1.66E-03	7.82E-02	7.84E-02	0.00E+00
copper	1.43E-01	1.52E-01	3.70E-02	3.92E-02	6.51E-02	6.99E-02	0.00E+00
Iron	2.77E-03	2.77E-03	6.02E-05	6.02E-05	1.23E-03	1.23E-03	0.00E+00

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 6

Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Concentration in Chicken (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Oral Reference Dose (mg/kg-day)	Beef Intake Rate - carcinogenic risk (mg/kg)	Beef Intake Rate - noncancer effects (mg/kg)	Milk Intake Rate - carcinogenic risk (mg/kg)
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00
2.25E-09	8.89E-07	8.89E-07	0	0	1.59E-10	1.59E-10	6.45E-10
0.00E+00	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00
3.40E-07	1.35E-04	1.35E-04	0	0	2.40E-08	2.40E-08	9.76E-08
5.89E-12	2.36E-09	2.36E-09	0	0.002	4.23E-13	4.23E-13	1.72E-12
5.97E-08	2.36E-05	2.36E-05	0	0	4.22E-09	4.22E-09	1.71E-08
6.43E-10	2.57E-07	2.57E-07	0	0.001	4.58E-11	4.58E-11	1.87E-10
0.00E+00	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00
4.84E-12	1.94E-09	1.94E-09	0	0.008	3.47E-13	3.47E-13	1.41E-12
0.00E+00	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00
3.03E-06	1.21E-03	1.22E-03	0.73	0	2.17E-07	2.17E-07	8.79E-07
0.00E+00	0.00E+00	0.00E+00	0.055	0.003	0.00E+00	0.00E+00	0.00E+00
8.08E-08	3.24E-05	3.24E-05	7.3	0	5.76E-09	5.76E-09	2.34E-08
6.31E-08	2.49E-05	2.49E-05	0	0.05	4.46E-09	4.46E-09	1.81E-08
2.13E-07	8.50E-05	8.51E-05	7.3	0	1.51E-08	1.51E-08	6.13E-08
0.00E+00	0.00E+00	0.00E+00	0	0.004	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00
1.28E-10	9.48E-11	9.49E-11	156000	0	5.35E-12	5.35E-12	1.26E-11
7.70E-10	3.05E-07	3.05E-07	0	0.025	5.44E-11	5.44E-11	2.21E-10
0.00E+00	0.00E+00	0.00E+00	0	0.05	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.06	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00
9.42E-08	3.77E-05	3.77E-05	0	0	6.74E-09	6.74E-09	2.74E-08
1.21E-10	4.83E-08	4.83E-08	0	0.6	8.64E-12	8.64E-12	3.51E-11
6.01E-09	2.41E-06	2.41E-06	0	0.03	4.29E-10	4.29E-10	1.75E-09
5.35E-11	2.11E-08	2.11E-08	0	0	3.78E-12	3.78E-12	1.54E-11
0.00E+00	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00
1.07E-13	4.25E-11	4.25E-11	0	0	7.59E-15	7.59E-15	3.09E-14
0.00E+00	0.00E+00	0.00E+00	0	2	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	1	5.68E-04	5.68E-04	9.73E-04
0.00E+00	0.00E+00	0.00E+00	0	0	1.10E-05	1.10E-05	1.18E-04
0.00E+00	0.00E+00	0.00E+00	0	0	1.99E-04	2.00E-04	1.39E-05
0.00E+00	0.00E+00	0.00E+00	0	0.04	1.63E-04	1.73E-04	3.12E-04
0.00E+00	0.00E+00	0.00E+00	0	0.3	3.15E-06	3.15E-06	5.07E-07

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 6

Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Milk Intake Rate - noncancer effects (mg/kg)	Pork Intake Rate - carcinogenic risk (mg/kg)	Pork Intake Rate - noncancer effects (mg/kg)	Chicken Intake Rate - carcinogenic risk (mg/kg)	Chicken Intake Rate - noncancer effects (mg/kg)	Egg Intake Rate - carcinogenic risk (mg/kg)	Egg Intake Rate - noncancer effects (mg/kg)	Excess Lifetime Cancer Risk - Beef Intake
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.45E-10	3.27E-11	3.27E-11	1.37E-12	1.37E-12	5.51E-10	5.51E-10	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9.76E-08	4.96E-09	4.96E-09	2.08E-10	2.08E-10	8.34E-08	8.34E-08	0.00E+00
1.72E-12	8.78E-14	8.78E-14	3.59E-15	3.59E-15	1.47E-12	1.47E-12	0.00E+00
1.71E-08	8.69E-10	8.69E-10	3.64E-11	3.64E-11	1.46E-08	1.46E-08	0.00E+00
1.87E-10	9.54E-12	9.54E-12	3.92E-13	3.92E-13	1.59E-10	1.59E-10	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.41E-12	7.21E-14	7.21E-14	2.95E-15	2.95E-15	1.20E-12	1.20E-12	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.79E-07	4.52E-08	4.52E-08	1.85E-09	1.85E-09	7.53E-07	7.53E-07	1.58E-07
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.34E-08	1.21E-09	1.21E-09	4.93E-11	4.93E-11	2.01E-08	2.01E-08	4.21E-08
1.81E-08	9.19E-10	9.19E-10	3.85E-11	3.85E-11	1.55E-08	1.55E-08	0.00E+00
6.13E-08	3.16E-09	3.17E-09	1.30E-10	1.30E-10	5.27E-08	5.28E-08	1.10E-07
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.26E-11	1.12E-12	1.12E-12	7.79E-14	7.79E-14	5.88E-14	5.88E-14	8.35E-07
2.21E-10	1.12E-11	1.12E-11	4.70E-13	4.70E-13	1.89E-10	1.89E-10	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.74E-08	1.40E-09	1.40E-09	5.75E-11	5.75E-11	2.34E-08	2.34E-08	0.00E+00
3.51E-11	1.79E-12	1.79E-12	7.36E-14	7.36E-14	2.99E-11	2.99E-11	0.00E+00
1.75E-09	8.97E-11	8.97E-11	3.66E-12	3.66E-12	1.49E-09	1.49E-09	0.00E+00
1.54E-11	7.79E-13	7.79E-13	3.26E-14	3.26E-14	1.31E-11	1.31E-11	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.09E-14	1.56E-15	1.56E-15	6.55E-17	6.55E-17	2.63E-14	2.63E-14	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9.73E-04	1.18E-04	1.18E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.18E-04	2.28E-06	2.28E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.39E-05	4.15E-05	4.16E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.30E-04	3.45E-05	3.70E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.07E-07	6.50E-07	6.50E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 6

Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Noncancer Hazard Quotient - Beef Intake	Excess Lifetime Cancer Risk - Milk Intake	Noncancer Hazard Quotient - Milk Intake	Excess Lifetime Cancer Risk - Pork Intake	Noncancer Hazard Quotient - Pork Intake	Excess Lifetime Cancer Risk - Chicken Intake	Noncancer Hazard Quotient - Chicken Intake	Excess Lifetime Cancer Risk - Egg Intake
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.12E-10	0.00E+00	8.59E-10	0.00E+00	4.39E-11	0.00E+00	1.80E-12	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.58E-08	0.00E+00	1.87E-07	0.00E+00	9.54E-09	0.00E+00	3.92E-10	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.33E-11	0.00E+00	1.76E-10	0.00E+00	9.01E-12	0.00E+00	3.69E-13	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	6.42E-07	0.00E+00	3.30E-08	0.00E+00	1.35E-09	0.00E+00	5.50E-07
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	1.71E-07	0.00E+00	8.80E-09	0.00E+00	3.60E-10	0.00E+00	1.46E-07
8.92E-08	0.00E+00	3.62E-07	0.00E+00	1.84E-08	0.00E+00	7.70E-10	0.00E+00
0.00E+00	4.48E-07	0.00E+00	2.31E-08	0.00E+00	9.47E-10	0.00E+00	3.85E-07
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	1.97E-06	0.00E+00	1.74E-07	0.00E+00	1.22E-08	0.00E+00	9.17E-09
2.18E-09	0.00E+00	8.85E-09	0.00E+00	4.49E-10	0.00E+00	1.88E-11	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.44E-11	0.00E+00	5.84E-11	0.00E+00	2.99E-12	0.00E+00	1.23E-13	0.00E+00
1.43E-08	0.00E+00	5.82E-08	0.00E+00	2.99E-09	0.00E+00	1.22E-10	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.68E-04	0.00E+00	9.73E-04	0.00E+00	1.18E-04	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.32E-03	0.00E+00	8.24E-03	0.00E+00	9.26E-04	0.00E+00	0.00E+00	0.00E+00
1.05E-05	0.00E+00	1.69E-06	0.00E+00	2.17E-06	0.00E+00	0.00E+00	0.00E+00

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite **Resident, Subsistence Farmer Scenario**

Table 6

Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Noncancer Hazard Quotient - Egg Intake	Excess Lifetime Cancer Risk - Total Animal Products Consumption	Noncancer Hazard Quotient - Total Animal Products Consumption
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
7.33E-10	0.00E+00	1.85E-09
0.00E+00	0.00E+00	0.00E+00
1.59E-07	0.00E+00	4.02E-07
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
1.51E-10	0.00E+00	3.80E-10
0.00E+00	0.00E+00	0.00E+00
0.00E+00	1.38E-06	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	3.69E-07	0.00E+00
3.09E-07	0.00E+00	7.80E-07
0.00E+00	9.67E-07	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	3.00E-06	0.00E+00
7.55E-09	0.00E+00	1.90E-08
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
4.99E-11	0.00E+00	1.26E-10
4.98E-08	0.00E+00	1.25E-07
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	1.66E-03
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	1.35E-02
0.00E+00	0.00E+00	1.44E-05

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 7
Intake and Health Risk From Ingestion of Fish (Table C-1-4)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_{fish} = C_{fish} \times CR_{fish} \times F_{fish}$$

Symbol	Value	Description	Units	Notes
I_{fish}	calculated	Daily intake from fish ingestion	mg/kg-day	
C_{fish}	calculated	Concentration in fish	mg/kg	Calculated using equations presented in Table B-4-26.
CR_{fish}	0.00117	Fish ingestion rate	kg/kg-day	Adult - 0.00117 kg/kg-day FW Child - 0.000759 kg/kg-day FW
F_{fish}	1	Fraction of fish ingested from contaminated source	unitless	

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 7
Intake and Health Risk From Ingestion of Fish (Table C-1-4)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Fish (mg/kg) - Average concentration over exposure duration	Concentration in Fish (mg/kg) Concentration at the end of the facility operating life	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Oral Reference Dose (mg/kg-day)	Intake based on average fish concentration over exposure duration (mg/kg day) - used to assess cancer risks	Intake based on fish concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
1,3-Butadiene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	3.07E-07	3.07E-07	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	7.57E-05	7.59E-05	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrotoluene	6.88E-10	6.88E-10	0	0.002	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,5-Diphenyloxazole	8.08E-06	8.08E-06	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,6-Dinitrotoluene	9.61E-08	9.61E-08	0	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.93E-09	1.93E-09	0	0.008	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	5.88E-05	5.91E-05	0.73	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	0.00E+00	0.00E+00	0.055	0.003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	8.15E-07	8.20E-07	7.3	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl (1,1-Biphenyl)	5.12E-06	5.12E-06	0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	8.64E-07	8.79E-07	7.3	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dibenzofuran	0.00E+00	0.00E+00	0	0.004	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	5.06E-10	5.11E-10	156000	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Diphenylamine	1.28E-07	1.28E-07	0	0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0	0.06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.69E-05	1.69E-05	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	6.11E-08	6.11E-08	0	0.6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	1.40E-06	1.40E-06	0	0.03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Resorcinol	3.91E-08	3.91E-08	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.05E-10	1.05E-10	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xylenes	0.00E+00	0.00E+00	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	7.20E-04	7.24E-04	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	2.05E-04	2.05E-04	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zirconium	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
copper	7.63E-03	8.23E-03	0	0.04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	0.00E+00	0.00E+00	0	0.3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 8
Intake and Health Risk From Inhalation (Table C-2-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$Risk_{inh} = ADI \times CSF_{inh}$$

$$ADI = \frac{C_{air} \times IR \times ET \times EF \times ED \times 0.001 mg/ug}{BW \times AT\_c \times 365 days/year}$$

Symbol	Value	Description	Units	Notes
ADIinh	calculated	Average daily intake - inhalation	mg/kg-day	
Ca	calculated	Concentration in Air	ug/m^3	
CSFinh	tabulated	Inhalation cancer slope factor	1/(mg/kg-day)	
RfDinh	tabulated	Inhalation Reference Dose	mg/kg-day	
IR	0.63	Inhalation rate	m3/hr	0.63 m^3/hr for adults; 0.3 m^3/hr for children
ET	24	Exposure time	hr/day	
EF	350	Exposure Frequency	days/yr	
ED	350	Exposure Duration	yr	Subsistance farmer - 40 Subsistance fisher - 30 Adult resident - 30 Child - 6
BW	70	Body weight	kg	70 - adult; 15 - child
AT_c	70	Averaging time - carcinogens	yr	
AT_n	40	Averaging time - noncarcinogens	yr	Set equal to ED

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 8
Intake and Health Risk From Inhalation (Table C-2-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Air (ug/m^3)	Average Daily Intake - carcinogenic (mg/kg-day)	Average Daily Intake - noncarcinogenic (mg/kg-day)	CSF 1/(mg/kg-day)	RfD (mg/kg-day)	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
1,3-Butadiene	1.70E-04	2.01E-08	3.52E-08	1.8	0	3.62E-08	0.00E+00
1,6-Dinitropyrene	4.37E-07	5.17E-11	9.05E-11	0	0	0.00E+00	0.00E+00
1-Methylnaphthalene	2.33E-05	2.76E-09	4.82E-09	0	0.0009	0.00E+00	5.36E-06
1-Nitropyrene	2.14E-05	2.53E-09	4.42E-09	0	0	0.00E+00	0.00E+00
2,4-Dinitrotoluene	4.37E-07	5.17E-11	9.05E-11	0	0	0.00E+00	0.00E+00
2,5-Diphenyloxazole	9.22E-06	1.09E-09	1.91E-09	0	0	0.00E+00	0.00E+00
2,6-Dinitrotoluene	6.10E-05	7.22E-09	1.26E-08	0	0	0.00E+00	0.00E+00
2-Methylnaphthalene	2.33E-05	2.76E-09	4.82E-09	0	0	0.00E+00	0.00E+00
2-Nitronaphthalene	1.79E-05	2.12E-09	3.70E-09	0	0	0.00E+00	0.00E+00
4-Nitrophenol	4.37E-07	5.17E-11	9.05E-11	0	0	0.00E+00	0.00E+00
4-Nitrosodiphenylamine	4.37E-07	5.17E-11	9.05E-11	0	0	0.00E+00	0.00E+00
Benzo[a]anthracene	4.63E-05	5.48E-09	9.59E-09	0	0	0.00E+00	0.00E+00
Benzene	1.07E-02	1.26E-06	2.21E-06	0.029	0.0017	3.66E-08	1.30E-03
Benzo[a]pyrene	4.37E-07	5.17E-11	9.05E-11	3.1	0	1.60E-10	0.00E+00
Biphenyl (1,1-Biphenyl)	4.56E-05	5.40E-09	9.45E-09	0	0	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	4.37E-07	5.17E-11	9.05E-11	0	0	0.00E+00	0.00E+00
Dibenzofuran	9.71E-06	1.15E-09	2.01E-09	0	0	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adip	1.31E-05	1.55E-09	2.71E-09	0	0	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	2.52E-10	2.99E-14	5.23E-14	156000	0	4.66E-09	0.00E+00
Diphenylamine	1.84E-06	2.18E-10	3.82E-10	0	0	0.00E+00	0.00E+00
Mesitylene (1,3,5-trimethylbenzer	1.11E-05	1.31E-09	2.29E-09	0	0.0017	0.00E+00	1.35E-06
Naphthalene	4.10E-05	4.86E-09	8.50E-09	0	0.0009	0.00E+00	9.44E-06
n-Hexane	1.70E-04	2.01E-08	3.52E-08	0	0.0571	0.00E+00	6.16E-07
N-Nitrosodiphenylamine	4.37E-07	5.17E-11	9.05E-11	0	0	0.00E+00	0.00E+00
Phenanthrene	1.94E-05	2.30E-09	4.02E-09	0	0	0.00E+00	0.00E+00
Phenol	2.95E-05	3.49E-09	6.10E-09	0	0	0.00E+00	0.00E+00
Pyrene	4.37E-07	5.17E-11	9.05E-11	0	0	0.00E+00	0.00E+00
Resorcinol	6.42E-05	7.59E-09	1.33E-08	0	0	0.00E+00	0.00E+00
Styrene	1.70E-04	2.01E-08	3.52E-08	0	0.286	0.00E+00	1.23E-07
Thianaphthene (benzo[b]thiopher	4.37E-07	5.17E-11	9.05E-11	0	0	0.00E+00	0.00E+00
Toluene	3.61E-03	4.27E-07	7.47E-07	0	0.114	0.00E+00	6.55E-06
Triacetin	4.37E-07	5.17E-11	9.05E-11	0	0	0.00E+00	0.00E+00
Xylenes	9.68E-04	1.15E-07	2.01E-07	0	0	0.00E+00	0.00E+00
Aluminum	9.71E-01	1.15E-04	2.01E-04	0	0.0014	0.00E+00	1.44E-01
Lead	9.41E-02	1.11E-05	1.95E-05	0	0	0.00E+00	0.00E+00
Zirconium	9.26E-02	1.10E-05	1.92E-05	0	0	0.00E+00	0.00E+00
copper	3.69E-02	4.36E-06	7.63E-06	0	0	0.00E+00	0.00E+00
Iron	4.05E-04	4.80E-08	8.40E-08	0	0	0.00E+00	0.00E+00

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 9

Summary of Chemical Intake Rates

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Intake based on average soil concentration over exposure duration (mg/kg-day) - used to assess cancer risks								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-08
1,6-Dinitropyrene	2.00E-13	3.90E-10	1.59E-10	6.45E-10	3.27E-11	1.37E-12	5.51E-10	0.00E+00	5.17E-11
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-09
1-Nitropyrene	2.65E-11	1.93E-08	2.40E-08	9.76E-08	4.96E-09	2.08E-10	8.34E-08	0.00E+00	2.53E-09
2,4-Dinitrotoluene	6.19E-16	3.81E-10	4.23E-13	1.72E-12	8.78E-14	3.59E-15	1.47E-12	0.00E+00	5.17E-11
2,5-Diphenyloxazole	6.93E-13	8.03E-09	4.22E-09	1.71E-08	8.69E-10	3.64E-11	1.46E-08	0.00E+00	1.09E-09
2,6-Dinitrotoluene	7.43E-14	5.32E-08	4.58E-11	1.87E-10	9.54E-12	3.92E-13	1.59E-10	0.00E+00	7.22E-09
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-09
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-09
4-Nitrophenol	4.67E-16	3.81E-10	3.47E-13	1.41E-12	7.21E-14	2.95E-15	1.20E-12	0.00E+00	5.17E-11
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-11
Benzo[a]anthracene	1.04E-10	4.16E-08	2.17E-07	8.79E-07	4.52E-08	1.85E-09	7.53E-07	0.00E+00	5.48E-09
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-06
Benzo[a]pyrene	1.12E-12	3.87E-10	5.76E-09	2.34E-08	1.21E-09	4.93E-11	2.01E-08	0.00E+00	5.17E-11
Biphenyl (1,1-Biphenyl)	9.46E-13	3.96E-08	4.46E-09	1.81E-08	9.19E-10	3.85E-11	1.55E-08	0.00E+00	5.40E-09
Dibenz[a,h]anthracene	1.90E-12	3.88E-10	1.51E-08	6.13E-08	3.16E-09	1.30E-10	5.27E-08	0.00E+00	5.17E-11
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-09
Di-n-propyl adipate (Dipropyl adip	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-09
Dioxin (2,3,7,8-TCDD)	7.72E-16	2.22E-13	5.35E-12	1.26E-11	1.12E-12	7.79E-14	5.88E-14	0.00E+00	2.99E-14
Diphenylamine	2.76E-14	1.65E-09	5.44E-11	2.21E-10	1.12E-11	4.70E-13	1.89E-10	0.00E+00	2.18E-10
Mesitylene (1,3,5-trimethylbenzer	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-09
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.86E-09
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-08
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-11
Phenanthrene	6.41E-12	1.72E-08	6.74E-09	2.74E-08	1.40E-09	5.75E-11	2.34E-08	0.00E+00	2.30E-09
Phenol	2.27E-14	2.57E-08	8.64E-12	3.51E-11	1.79E-12	7.36E-14	2.99E-11	0.00E+00	3.49E-09
Pyrene	5.61E-13	3.97E-10	4.29E-10	1.75E-09	8.97E-11	3.66E-12	1.49E-09	0.00E+00	5.17E-11
Resorcinol	2.65E-14	5.61E-08	3.78E-12	1.54E-11	7.79E-13	3.26E-14	1.31E-11	0.00E+00	7.59E-09

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 9

Summary of Chemical Intake Rates

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Intake based on average soil concentration over exposure duration (mg/kg-day) - used to assess cancer risks								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-08
Thianaphthene (benzo[b]thiopher	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-11
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.27E-07
Triacetin	1.50E-16	3.85E-10	7.59E-15	3.09E-14	1.56E-15	6.55E-17	2.63E-14	0.00E+00	5.17E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.15E-07
Aluminum	2.98E-06	8.48E-04	5.68E-04	9.73E-04	1.18E-04	0.00E+00	0.00E+00	0.00E+00	1.15E-04
Lead	1.79E-07	8.30E-05	1.10E-05	1.18E-04	2.28E-06	0.00E+00	0.00E+00	0.00E+00	1.11E-05
Zirconium	5.23E-07	8.08E-05	1.99E-04	1.39E-05	4.15E-05	0.00E+00	0.00E+00	0.00E+00	1.10E-05
copper	4.66E-07	1.46E-04	1.63E-04	3.12E-04	3.45E-05	0.00E+00	0.00E+00	0.00E+00	4.36E-06
Iron	2.24E-11	3.51E-07	3.15E-06	5.07E-07	6.50E-07	0.00E+00	0.00E+00	0.00E+00	4.80E-08

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 9

Summary of Chemical Intake Rat

Air Pathway Human Health Risk A

Allegany Ballistics Laboratory

Chemical	Intake based on soil concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-08
1,6-Dinitropyrene	2.02E-13	3.90E-10	1.59E-10	6.45E-10	3.27E-11	1.37E-12	5.51E-10	0.00E+00	9.05E-11
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.82E-09
1-Nitropyrene	2.72E-11	1.93E-08	2.40E-08	9.76E-08	4.96E-09	2.08E-10	8.34E-08	0.00E+00	4.42E-09
2,4-Dinitrotoluene	6.19E-16	3.81E-10	4.23E-13	1.72E-12	8.78E-14	3.59E-15	1.47E-12	0.00E+00	9.05E-11
2,5-Diphenyloxazole	6.94E-13	8.03E-09	4.22E-09	1.71E-08	8.69E-10	3.64E-11	1.46E-08	0.00E+00	1.91E-09
2,6-Dinitrotoluene	7.43E-14	5.32E-08	4.58E-11	1.87E-10	9.54E-12	3.92E-13	1.59E-10	0.00E+00	1.26E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.82E-09
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.70E-09
4-Nitrophenol	4.68E-16	3.81E-10	3.47E-13	1.41E-12	7.21E-14	2.95E-15	1.20E-12	0.00E+00	9.05E-11
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-11
Benzo[a]anthracene	1.10E-10	4.17E-08	2.17E-07	8.79E-07	4.52E-08	1.85E-09	7.53E-07	0.00E+00	9.59E-09
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.21E-06
Benzo[a]pyrene	1.20E-12	3.88E-10	5.76E-09	2.34E-08	1.21E-09	4.93E-11	2.01E-08	0.00E+00	9.05E-11
Biphenyl (1,1-Biphenyl)	9.46E-13	3.96E-08	4.46E-09	1.81E-08	9.19E-10	3.85E-11	1.55E-08	0.00E+00	9.45E-09
Dibenz[a,h]anthracene	2.13E-12	3.90E-10	1.51E-08	6.13E-08	3.17E-09	1.30E-10	5.28E-08	0.00E+00	9.05E-11
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-09
Di-n-propyl adipate (Dipropyl adip	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E-09
Dioxin (2,3,7,8-TCDD)	8.33E-16	2.22E-13	5.35E-12	1.26E-11	1.12E-12	7.79E-14	5.88E-14	0.00E+00	5.23E-14
Diphenylamine	2.76E-14	1.65E-09	5.44E-11	2.21E-10	1.12E-11	4.70E-13	1.89E-10	0.00E+00	3.82E-10
Mesitylene (1,3,5-trimethylbenzer	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-09
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.50E-09
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-08
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-11
Phenanthrene	6.45E-12	1.72E-08	6.74E-09	2.74E-08	1.40E-09	5.75E-11	2.34E-08	0.00E+00	4.02E-09
Phenol	2.27E-14	2.57E-08	8.64E-12	3.51E-11	1.79E-12	7.36E-14	2.99E-11	0.00E+00	6.10E-09
Pyrene	5.78E-13	3.97E-10	4.29E-10	1.75E-09	8.97E-11	3.66E-12	1.49E-09	0.00E+00	9.05E-11
Resorcinol	2.65E-14	5.61E-08	3.78E-12	1.54E-11	7.79E-13	3.26E-14	1.31E-11	0.00E+00	1.33E-08

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 9

Summary of Chemical Intake Rat

Air Pathway Human Health Risk A

Allegany Ballistics Laboratory

Chemical	Intake based on soil concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.52E-08
Thianaphthene (benzo[b]thiopher	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-11
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.47E-07
Triacetin	1.50E-16	3.85E-10	7.59E-15	3.09E-14	1.56E-15	6.55E-17	2.63E-14	0.00E+00	9.05E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-07
Aluminum	3.21E-06	8.49E-04	5.68E-04	9.73E-04	1.18E-04	0.00E+00	0.00E+00	0.00E+00	2.01E-04
Lead	1.87E-07	8.31E-05	1.10E-05	1.18E-04	2.28E-06	0.00E+00	0.00E+00	0.00E+00	1.95E-05
Zirconium	6.12E-07	8.10E-05	2.00E-04	1.39E-05	4.16E-05	0.00E+00	0.00E+00	0.00E+00	1.92E-05
copper	7.07E-07	2.04E-04	1.73E-04	3.30E-04	3.70E-05	0.00E+00	0.00E+00	0.00E+00	7.63E-06
Iron	2.25E-11	3.51E-07	3.15E-06	5.07E-07	6.50E-07	0.00E+00	0.00E+00	0.00E+00	8.40E-08

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Estimated Lifetime Cancer Risk by Pathway									Total Excess Lifetime Cancer Risk	Contribution to Total Risk
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation		
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-08	3.62E-08	0.62%
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2,4-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2,6-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
4-Nitrophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Benzo[a]anthracene	7.58E-11	3.04E-08	1.58E-07	6.42E-07	3.30E-08	1.35E-09	5.50E-07	0.00E+00	0.00E+00	1.41E-06	24.10%
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.66E-08	3.66E-08	0.62%
Benzo[a]pyrene	8.21E-12	2.83E-09	4.21E-08	1.71E-07	8.80E-09	3.60E-10	1.46E-07	0.00E+00	1.60E-10	3.72E-07	6.33%
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Dibenz[a,h]anthracene	1.39E-11	2.84E-09	1.10E-07	4.48E-07	2.31E-08	9.47E-10	3.85E-07	0.00E+00	0.00E+00	9.70E-07	16.52%
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Dioxin (2,3,7,8-TCDD)	1.20E-10	3.46E-08	8.35E-07	1.97E-06	1.74E-07	1.22E-08	9.17E-09	0.00E+00	4.66E-09	3.04E-06	51.81%
Diphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Phenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Resorcinol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Thianaphthene (benzo(b)thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Triacetin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Iron	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
									Total Risk	**5.87E-06**	

Attachment B-4

Intake and Risks Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessr
Allegany Ballistics Laboratory

Chemical	Estimated Noncancer Hazard Quotients by Pathway									Total Hazard Quotient by Chemical	Hazard Quotient > 0.25?
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation		
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.36E-06	5.36E-06	no
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2,4-Dinitrotoluene	3.09E-13	1.91E-07	2.12E-10	8.59E-10	4.39E-11	1.80E-12	7.33E-10	0.00E+00	0.00E+00	1.92E-07	no
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2,6-Dinitrotoluene	7.43E-11	5.32E-05	4.58E-08	1.87E-07	9.54E-09	3.92E-10	1.59E-07	0.00E+00	0.00E+00	5.36E-05	no
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
4-Nitrophenol	5.84E-14	4.76E-08	4.33E-11	1.76E-10	9.01E-12	3.69E-13	1.51E-10	0.00E+00	0.00E+00	4.80E-08	no
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Benzo[a]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.30E-03	1.30E-03	no
Benzo[a]pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Biphenyl (1,1-Biphenyl)	1.89E-11	7.93E-07	8.92E-08	3.62E-07	1.84E-08	7.70E-10	3.09E-07	0.00E+00	0.00E+00	1.57E-06	no
Dibenz[a,h]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Dioxin (2,3,7,8-TCDD)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Diphenylamine	1.11E-12	6.59E-08	2.18E-09	8.85E-09	4.49E-10	1.88E-11	7.55E-09	0.00E+00	0.00E+00	8.49E-08	no
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-06	1.35E-06	no
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.44E-06	9.44E-06	no
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.16E-07	6.16E-07	no
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Phenol	3.78E-14	4.28E-08	1.44E-11	5.84E-11	2.99E-12	1.23E-13	4.99E-11	0.00E+00	0.00E+00	4.29E-08	no
Pyrene	1.93E-11	1.32E-08	1.43E-08	5.82E-08	2.99E-09	1.22E-10	4.98E-08	0.00E+00	0.00E+00	1.39E-07	no
Resorcinol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-07	1.23E-07	no
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.55E-06	6.55E-06	no
Triacetin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Aluminum	3.21E-06	8.49E-04	5.68E-04	9.73E-04	1.18E-04	0.00E+00	0.00E+00	0.00E+00	1.44E-01	1.46E-01	no
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
copper	1.77E-05	5.11E-03	4.32E-03	8.24E-03	9.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E-02	no
Iron	7.49E-11	1.17E-06	1.05E-05	1.69E-06	2.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-05	no
									Total HI	**1.66E-01**	

Attachment B-5
Intake and Risks – Maximum Exposed Individual, Offsite Resident, and Subsistence Farmer Scenario – Child Receptor

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Annual Average Concentration in Air (ug/m^3)	Average soil concentration over exposure duration - Cs (mg/kg)	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg)	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life
1,3-Butadiene	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	4.37E-07	1.40E-07	1.41E-07	1.27E-06	1.27E-06	1.24E-08	1.25E-08
1-Methylnaphthalene	2.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.14E-05	1.85E-05	1.91E-05	6.25E-05	6.25E-05	8.53E-07	8.78E-07
2,4-Dinitrotoluene	4.37E-07	4.33E-10	4.33E-10	1.26E-06	1.26E-06	1.18E-09	1.18E-09
2,5-Diphenyloxazole	9.22E-06	4.85E-07	4.86E-07	2.67E-05	2.67E-05	3.75E-08	3.76E-08
2,6-Dinitrotoluene	6.10E-05	5.20E-08	5.20E-08	1.76E-04	1.76E-04	1.64E-07	1.64E-07
2-Methylnaphthalene	2.33E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	1.79E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	4.37E-07	3.27E-10	3.27E-10	1.26E-06	1.26E-06	9.98E-10	9.98E-10
4-Nitrosodiphenylamine	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	4.63E-05	7.27E-05	7.67E-05	1.35E-04	1.35E-04	1.47E-06	1.55E-06
Benzene	1.07E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	4.37E-07	7.87E-07	8.38E-07	1.27E-06	1.27E-06	8.74E-09	9.30E-09
Biphenyl (1,1-Biphenyl)	4.56E-05	6.62E-07	6.62E-07	1.32E-04	1.32E-04	1.25E-07	1.25E-07
Dibenz[a,h]anthracene	4.37E-07	1.33E-06	1.49E-06	1.27E-06	1.27E-06	8.47E-09	9.50E-09
Dibenzofuran	9.71E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	1.31E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	2.52E-10	5.40E-10	5.83E-10	7.32E-10	7.32E-10	3.04E-12	3.28E-12
Diphenylamine	1.84E-06	1.93E-08	1.94E-08	5.33E-06	5.33E-06	7.30E-09	7.30E-09
Mesitylene (1,3,5-trimethylbenzene)	1.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	4.10E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.94E-05	4.48E-06	4.52E-06	5.65E-05	5.65E-05	4.07E-07	4.10E-07
Phenol	2.95E-05	1.59E-08	1.59E-08	8.52E-05	8.52E-05	8.60E-08	8.60E-08
Pyrene	4.37E-07	3.93E-07	4.05E-07	1.28E-06	1.28E-06	1.96E-08	2.02E-08
Resorcinol	6.42E-05	1.86E-08	1.86E-08	1.86E-04	1.86E-04	2.55E-07	2.55E-07
Styrene	1.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	4.37E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	3.61E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	4.37E-07	1.05E-10	1.05E-10	1.26E-06	1.26E-06	2.91E-09	2.91E-09
Xylenes	9.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	9.71E-01	2.08E+00	2.25E+00	2.81E+00	2.81E+00	8.33E-03	8.99E-03
Lead	9.41E-02	1.25E-01	1.31E-01	2.73E-01	2.74E-01	1.70E-03	1.78E-03
Zirconium	9.26E-02	3.66E-01	4.28E-01	2.68E-01	2.68E-01	7.32E-04	8.57E-04
copper	3.69E-02	3.26E-01	4.95E-01	2.37E-01	3.04E-01	1.31E-01	1.98E-01
Iron	4.05E-04	1.57E-05	1.57E-05	1.17E-03	1.17E-03	6.29E-08	6.29E-08

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Beef (mg/kg FW) - Average concentration over exposure duration
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	4.95E-09	5.01E-09	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.39E-07
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	5.22E-07	5.37E-07	7.36E-04	7.36E-04	1.91E-04	1.91E-04	2.11E-05
2,4-Dinitrotoluene	1.21E-08	1.21E-08	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.71E-10
2,5-Diphenyloxazole	7.20E-08	7.21E-08	3.17E-04	3.17E-04	8.21E-05	8.21E-05	3.70E-06
2,6-Dinitrotoluene	1.60E-06	1.60E-06	2.10E-03	2.10E-03	5.43E-04	5.43E-04	4.02E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	9.88E-09	9.89E-09	1.50E-05	1.50E-05	3.89E-06	3.89E-06	3.04E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.53E-06	1.62E-06	1.59E-03	1.59E-03	4.14E-04	4.14E-04	1.90E-04
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	9.92E-09	1.06E-08	1.50E-05	1.50E-05	3.90E-06	3.90E-06	5.05E-06
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	1.57E-03	1.57E-03	4.06E-04	4.06E-04	3.91E-06
Dibenz[a,h]anthracene	1.90E-08	2.14E-08	1.50E-05	1.50E-05	3.90E-06	3.90E-06	1.33E-05
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	6.05E-12	6.53E-12	8.69E-09	8.69E-09	2.25E-09	2.25E-09	4.69E-09
Diphenylamine	3.10E-07	3.10E-07	6.35E-05	6.35E-05	1.64E-05	1.64E-05	4.77E-08
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.60E-07	1.61E-07	6.68E-04	6.68E-04	1.73E-04	1.73E-04	5.92E-06
Phenol	6.85E-07	6.85E-07	1.01E-03	1.01E-03	2.62E-04	2.62E-04	7.58E-09
Pyrene	9.59E-09	9.88E-09	1.50E-05	1.51E-05	3.91E-06	3.91E-06	3.77E-07
Resorcinol	2.34E-06	2.34E-06	2.21E-03	2.21E-03	5.71E-04	5.71E-04	3.31E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	3.15E-08	3.15E-08	1.50E-05	1.50E-05	3.89E-06	3.89E-06	6.66E-12
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	1.35E-05	1.46E-05	3.34E+01	3.34E+01	8.65E+00	8.65E+00	4.99E-01
Lead	1.13E-05	1.18E-05	3.24E+00	3.24E+00	8.43E-01	8.44E-01	9.67E-03
Zirconium	1.83E-06	2.14E-06	3.19E+00	3.19E+00	8.25E-01	8.25E-01	1.75E-01
copper	8.16E-04	1.24E-03	1.40E+00	1.47E+00	4.59E-01	5.26E-01	1.43E-01
Iron	1.57E-10	1.57E-10	1.40E-02	1.40E-02	3.61E-03	3.61E-03	2.77E-03

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Beef (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Milk (mg/kg FW) - Average concentration over exposure duration	Concentration in Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Pork (mg/kg FW) - Average concentration over exposure duration	Concentration in Pork (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Chicken (mg/kg FW) - Average concentration over exposure duration	Concentration in Chicken (mg/kg FW) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.39E-07	7.67E-08	7.67E-08	6.18E-08	6.18E-08	2.25E-09	2.25E-09
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.11E-05	1.16E-05	1.16E-05	9.36E-06	9.36E-06	3.40E-07	3.40E-07
2,4-Dinitrotoluene	3.71E-10	2.04E-10	2.04E-10	1.66E-10	1.66E-10	5.89E-12	5.89E-12
2,5-Diphenyloxazole	3.70E-06	2.04E-06	2.04E-06	1.64E-06	1.64E-06	5.97E-08	5.97E-08
2,6-Dinitrotoluene	4.02E-08	2.22E-08	2.22E-08	1.80E-08	1.80E-08	6.43E-10	6.43E-10
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	3.04E-10	1.68E-10	1.68E-10	1.36E-10	1.36E-10	4.84E-12	4.84E-12
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.90E-04	1.04E-04	1.04E-04	8.52E-05	8.53E-05	3.03E-06	3.03E-06
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	5.06E-06	2.78E-06	2.78E-06	2.27E-06	2.28E-06	8.08E-08	8.08E-08
Biphenyl (1,1-Biphenyl)	3.91E-06	2.15E-06	2.15E-06	1.73E-06	1.73E-06	6.31E-08	6.31E-08
Dibenz[a,h]anthracene	1.33E-05	7.28E-06	7.29E-06	5.97E-06	5.97E-06	2.13E-07	2.13E-07
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	4.69E-09	1.50E-09	1.50E-09	2.11E-09	2.11E-09	1.28E-10	1.28E-10
Diphenylamine	4.77E-08	2.63E-08	2.63E-08	2.12E-08	2.12E-08	7.70E-10	7.70E-10
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	5.92E-06	3.25E-06	3.25E-06	2.65E-06	2.65E-06	9.42E-08	9.42E-08
Phenol	7.58E-09	4.16E-09	4.16E-09	3.39E-09	3.39E-09	1.21E-10	1.21E-10
Pyrene	3.77E-07	2.07E-07	2.07E-07	1.69E-07	1.69E-07	6.01E-09	6.01E-09
Resorcinol	3.31E-09	1.82E-09	1.82E-09	1.47E-09	1.47E-09	5.35E-11	5.35E-11
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	6.66E-12	3.67E-12	3.67E-12	2.95E-12	2.95E-12	1.07E-13	1.07E-13
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	4.99E-01	1.16E-01	1.16E-01	2.22E-01	2.22E-01	0.00E+00	0.00E+00
Lead	9.68E-03	1.40E-02	1.40E-02	4.30E-03	4.30E-03	0.00E+00	0.00E+00
Zirconium	1.75E-01	1.65E-03	1.66E-03	7.82E-02	7.84E-02	0.00E+00	0.00E+00
copper	1.52E-01	3.70E-02	3.92E-02	6.51E-02	6.99E-02	0.00E+00	0.00E+00
Iron	2.77E-03	6.02E-05	6.02E-05	1.23E-03	1.23E-03	0.00E+00	0.00E+00

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life	Total Water Column Concentration (mg/L) - Average concentration over exposure duration	Total Water Column Concentration (mg/L) - Concentration at the end of the facility operating life	Dissolved Phase Water Concentration (mg/L) - Average concentration over exposure duration	Dissolved Phase Water Concentration (mg/L) - Concentration at the end of the facility operating life	Concentration in Sediment (mg/kg) - Average concentration over exposure duration
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	8.89E-07	8.89E-07	1.19E-10	1.19E-10	1.17E-10	1.17E-10	1.02E-07
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	1.35E-04	1.35E-04	6.01E-09	6.03E-09	5.73E-09	5.75E-09	1.50E-05
2,4-Dinitrotoluene	2.36E-09	2.36E-09	1.16E-10	1.16E-10	1.16E-10	1.16E-10	2.37E-10
2,5-Diphenyloxazole	2.36E-05	2.36E-05	2.43E-09	2.43E-09	2.42E-09	2.42E-09	6.02E-07
2,6-Dinitrotoluene	2.57E-07	2.57E-07	1.62E-08	1.62E-08	1.62E-08	1.62E-08	2.72E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.94E-09	1.94E-09	1.16E-10	1.16E-10	1.16E-10	1.16E-10	2.02E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.21E-03	1.22E-03	1.38E-08	1.38E-08	1.15E-08	1.16E-08	1.20E-04
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	3.24E-05	3.24E-05	1.41E-10	1.42E-10	8.19E-11	8.24E-11	3.17E-06
Biphenyl (1,1-Biphenyl)	2.49E-05	2.49E-05	1.17E-08	1.17E-08	1.17E-08	1.17E-08	8.75E-07
Dibenz[a,h]anthracene	8.50E-05	8.51E-05	1.58E-10	1.61E-10	6.75E-11	6.87E-11	4.83E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	9.48E-11	9.49E-11	9.02E-14	9.09E-14	2.99E-14	3.01E-14	3.22E-09
Diphenylamine	3.05E-07	3.05E-07	4.91E-10	4.91E-10	4.91E-10	4.91E-10	1.44E-08
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	3.77E-05	3.77E-05	5.21E-09	5.21E-09	5.13E-09	5.13E-09	4.29E-06
Phenol	4.83E-08	4.83E-08	7.82E-09	7.82E-09	7.82E-09	7.82E-09	6.88E-09
Pyrene	2.41E-06	2.41E-06	1.23E-10	1.24E-10	1.17E-10	1.18E-10	3.19E-07
Resorcinol	2.11E-08	2.11E-08	1.70E-08	1.70E-08	1.70E-08	1.70E-08	3.90E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	4.25E-11	4.25E-11	1.15E-10	1.15E-10	1.15E-10	1.15E-10	1.02E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	0.00E+00	0.00E+00	2.71E-04	2.72E-04	2.67E-04	2.68E-04	4.00E-01
Lead	0.00E+00	0.00E+00	2.58E-05	2.59E-05	2.56E-05	2.56E-05	2.30E-02
Zirconium	0.00E+00	0.00E+00	2.67E-05	2.72E-05	2.60E-05	2.64E-05	7.79E-02
copper	0.00E+00	0.00E+00	1.18E-05	1.28E-05	1.07E-05	1.16E-05	1.07E-01
Iron	0.00E+00	0.00E+00	1.08E-07	1.08E-07	1.08E-07	1.08E-07	2.71E-06

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Sediment (mg/kg) - Concentration at the end of the facility operating life	Concentration in Fish (mg/kg) - Average concentration over exposure duration	Concentration in Fish (mg/kg) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.02E-07	3.07E-07	3.07E-07
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	1.50E-05	7.57E-05	7.59E-05
2,4-Dinitrotoluene	2.37E-10	6.88E-10	6.88E-10
2,5-Diphenyloxazole	6.03E-07	8.08E-06	8.08E-06
2,6-Dinitrotoluene	2.72E-08	9.61E-08	9.61E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	2.02E-10	1.93E-09	1.93E-09
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.20E-04	5.88E-05	5.91E-05
Benzene	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	3.19E-06	8.15E-07	8.20E-07
Biphenyl (1,1-Biphenyl)	8.75E-07	5.12E-06	5.12E-06
Dibenz[a,h]anthracene	4.92E-06	8.64E-07	8.79E-07
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	3.24E-09	5.06E-10	5.11E-10
Diphenylamine	1.44E-08	1.28E-07	1.28E-07
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	4.29E-06	1.69E-05	1.69E-05
Phenol	6.88E-09	6.11E-08	6.11E-08
Pyrene	3.20E-07	1.40E-06	1.40E-06
Resorcinol	3.90E-09	3.91E-08	3.91E-08
Styrene	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.02E-11	1.05E-10	1.05E-10
Xylenes	0.00E+00	0.00E+00	0.00E+00
Aluminum	4.02E-01	7.20E-04	7.24E-04
Lead	2.31E-02	2.05E-04	2.05E-04
Zirconium	7.91E-02	0.00E+00	0.00E+00
copper	1.16E-01	7.63E-03	8.23E-03
Iron	2.71E-06	0.00E+00	0.00E+00

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 2
Summary of Exposure Factors
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
Isoil	calculated	Soil ingestion rate	mg/kg-day	
Cs	calculated	Concentration in soil	mg/kg	Calculated from Equations presented in Table B-1-1
Crsoil	2.00E-04	Soil ingestion rate	kg/day	Adult soil ingestion rate - 100 mg/day; child soil ingestion rate - 200 mg/day
Fsoil	1	Fraction of soil that is contaminated	unitless	
BW	15	Body weight	kg	adult body weight - 70 kg; child body weight - 15 kg
Iag	calculated	Produce Intake Rate	mg/kg-day	
Pd	calculated	Concentration in aboveground exposed produce due to deposition	mg/kg DW	Calculated from equation in Tables B-2-7 and B-3-7
Pv	calculated	Concentration in aboveground exposed produce due to air to plant transfer	mg/kg DW	Calculated from equation in Table B-2-8
Pr	calculated	Concentration in aboveground exposed and protected produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-9, B-3-9
Pr_{bg}	calculated	Concentration in belowground produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-10
CR_{ag}	0.00042	Consumption rate of aboveground produce	kg/kg-day DW	Adult - 0.0003 Child - 0.00042
CR_{pp}	0.00077	Consumption rate of aboveground protected produce	kg/kg-day DW	Adult - 0.00057 Child - 0.00077
CR_{bg}	0.00022	Consumption rate of belowground produce	kg/kg-day DW	Adult - 0.00014 Child - 0.00022
F_{ag}	1	Fraction of produce that is contaminated	Unitless	Adult or child resident - 0.25 Subsistance farmer, adult or child - 1 Subsistance fisher, adult or child - 0.25
I_j	calculated	Intake from ingestion of animal tissue from animal *j*	mg/kg-day	
A_{beef}	calculated	Concentration in beef	mg/kg FW	Calculated using equations presented in Table B-3-10
A_{milk}	calculated	Concentration in milk	mg/kg FW	Calculated using equations presented in Table B-3-11
A_{pork}	calculated	Concentration in pork	mg/kg FW	Calculated using equations presented in Table B-3-12
$A_{chicken}$	calculated	Concentration in chicken	mg/kg FW	Calculated using equations presented in Table B-3-13

Table 2
Summary of Exposure Factors
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

A_{egg}	calculated	Concentration in egg	mg/kg FW	Calculated using equations presented in Table B-3-14
CR_{beef}	0.00051	Consumption rate of beef	kg/kg-day FW	Adult - 0.00114 Child - 0.00051
CR_{milk}	0.01857	Consumption rate of milk	kg/kg-day FW	Adult - 0.00842 Child - 0.01857
CR_{pork}	0.000398	Consumption rate of pork	kg/kg-day FW	Adult - 0.00053 Child - 0.000398
$CR_{chicken}$	0.000425	Consumption rate of chicken	kg/kg-day FW	Adult - 0.00061 Child - 0.000425
CR_{egg}	0.000438	Consumption rate of egg	kg/kg-day FW	Adult - 0.00062 Child - 0.000438
F_{beef}	1	Fraction of beef consumed from contaminated sources	unitless	
F_{milk}	1	Fraction of milk consumed from contaminated sources	unitless	
F_{pork}	1	Fraction of pork consumed from contaminated sources	unitless	
$F_{chicken}$	1	Fraction of chicken consumed from contaminated sources	unitless	
F_{egg}	1	Fraction of eggs consumed from contaminated sources	unitless	
CR_{fish}	0.00117	Fish ingestion rate	kg/kg-day	Adult - 0.00117 kg/kg-day FW Child - 0.000759 kg/kg-day FW
F_{fish}	0	Fraction of fish ingested from contaminated source	unitless	
IR	0.3	Inhalation rate	m^3/hr	0.63 m^3/hr for adults; 0.3 m^3/hr for
ET	24	Exposure time	hr/day	
EF	350	Exposure Frequency	days/yr	
ED	6	Exposure Duration	yr	Subsistance farmer - 40 Subsistance fisher - 30 Adult resident - 30 Child - 6
AT_c	70	Averaging time - carcinogens	yr	
AT_n	6	Averaging time - noncarcinogens		Set equal to ED

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 3

Summary of Toxicity Factors

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Oral Cancer Slope Factor 1/(mg/kg-day)	Inhalation Cancer Slope Factor 1/(mg/kg-day)	Oral Reference Dose (mg/kg-day)	Inhalation Reference Dose (mg/kg-day)
1,3-Butadiene	NA	1.8	NA	NA
1,6-Dinitropyrene	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	0.02	0.0009
1-Nitropyrene	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	0.002	NA
2,5-Diphenyloxazole	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	0.001	NA
2-Methylnaphthalene	NA	NA	0.02	NA
2-Nitronaphthalene	NA	NA	NA	NA
4-Nitrophenol	NA	NA	0.008	NA
4-Nitrosodiphenylamine	0.0049	NA	NA	NA
Benzo[a]anthracene	0.73	NA	NA	NA
Benzene	0.055	0.029	0.003	0.0017
Benzo[a]pyrene	7.3	3.1	NA	NA
Biphenyl (1,1-Biphenyl)	NA	NA	0.05	NA
Dibenz[a,h]anthracene	7.3	NA	NA	NA
Dibenzofuran	NA	NA	0.004	NA
Di-n-propyl adipate (Dipropyl adipate)	NA	NA	NA	NA
Dioxin (2,3,7,8-TCDD)	156000	156000	NA	NA
Diphenylamine	NA	NA	0.025	NA
Mesitylene (1,3,5-trimethylbenzene)	NA	NA	0.05	0.0017
Naphthalene	NA	NA	0.02	0.0009
n-Hexane	NA	NA	0.06	0.0571
N-Nitrosodiphenylamine	0.0049	NA	NA	NA
Phenanthrene	NA	NA	NA	NA
Phenol	NA	NA	0.6	NA
Pyrene	NA	NA	0.03	NA
Resorcinol	NA	NA	NA	NA
Styrene	NA	NA	0.2	0.286
Thianaphthene (benzo[b]thiophene)	NA	NA	NA	NA
Toluene	NA	NA	0.2	0.114
Triacetin	NA	NA	NA	NA
Xylenes	NA	NA	2	NA
Aluminum	NA	NA	1	0.0014
Lead	NA	NA	NA	NA
Zirconium	NA	NA	NA	NA
copper	NA	NA	0.04	NA
Iron	NA	NA	0.3	NA

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 4

Intake and Health Risk From Soil Ingestion (Table C-1-1)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

$$I_{soil} = \frac{Cs \times CR_{soil} \times F_{soil}}{BW}$$

Symbol	Value	Description	Units	Notes
Isoil	calculated	Soil ingestion rate	mg/kg-day	
Cs	calculated	Concentration in soil	mg/kg	Calculated from Equations presented in Table B-1-1
Crsoil	2.00E-04	Soil ingestion rate	kg/day	Adult soil ingestion rate - 50 mg/day; child soil ingestion rate - 100 mg/day
Fsoil	1	Fraction of soil that is contaminated	unitless	
BW	15	Body weight	kg	adult body weight - 70 kg; child body weight - 15 kg

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 4
Intake and Health Risk From Soil Ingestion (Table C-1-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Average soil concentration over exposure duration - Cs (mg/kg) - Cancer Risk	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg) - Noncancer Effects	Oral Cancer Slope Factor (mg/kg-day)[-1]	Oral Reference Dose (mg/kg-day)	Intake based on average soil concentration over exposure duration (mg/kg-day) - used to assess cancer risks	Intake based on soil concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
1,3-Butadiene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.40E-07	1.41E-07	0	0	1.86E-12	1.88E-12	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	1.85E-05	1.91E-05	0	0	2.47E-10	2.54E-10	0.00E+00	0.00E+00
2,4-Dinitrotoluene	4.33E-10	4.33E-10	0	0.002	5.78E-15	5.78E-15	0.00E+00	2.89E-12
2,5-Diphenyloxazole	4.85E-07	4.86E-07	0	0	6.47E-12	6.48E-12	0.00E+00	0.00E+00
2,6-Dinitrotoluene	5.20E-08	5.20E-08	0	0.001	6.93E-13	6.93E-13	0.00E+00	6.93E-10
2-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	3.27E-10	3.27E-10	0	0.008	4.36E-15	4.36E-15	0.00E+00	5.45E-13
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	7.27E-05	7.67E-05	0.73	0	9.69E-10	1.02E-09	7.07E-10	0.00E+00
Benzene	0.00E+00	0.00E+00	0.055	0.003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	7.87E-07	8.38E-07	7.3	0	1.05E-11	1.12E-11	7.66E-11	0.00E+00
Biphenyl (1,1-Biphenyl)	6.62E-07	6.62E-07	0	0.05	8.83E-12	8.83E-12	0.00E+00	1.77E-10
Dibenz[a,h]anthracene	1.33E-06	1.49E-06	7.3	0	1.78E-11	1.99E-11	1.30E-10	0.00E+00
Dibenzofuran	0.00E+00	0.00E+00	0	0.004	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	5.40E-10	5.83E-10	156000	0	7.21E-15	7.78E-15	1.12E-09	0.00E+00
Diphenylamine	1.93E-08	1.94E-08	0	0.025	2.58E-13	2.58E-13	0.00E+00	1.03E-11
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0	0.06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	4.48E-06	4.52E-06	0	0	5.98E-11	6.02E-11	0.00E+00	0.00E+00
Phenol	1.59E-08	1.59E-08	0	0.6	2.11E-13	2.12E-13	0.00E+00	3.53E-13
Pyrene	3.93E-07	4.05E-07	0	0.03	5.24E-12	5.40E-12	0.00E+00	1.80E-10
Resorcinol	1.86E-08	1.86E-08	0	0	2.48E-13	2.48E-13	0.00E+00	0.00E+00
Styrene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.05E-10	1.05E-10	0	0	1.40E-15	1.40E-15	0.00E+00	0.00E+00
Xylenes	0.00E+00	0.00E+00	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	2.08E+00	2.25E+00	0	1	2.78E-05	3.00E-05	0.00E+00	3.00E-05
Lead	1.25E-01	1.31E-01	0	0	1.67E-06	1.74E-06	0.00E+00	0.00E+00
Zirconium	3.66E-01	4.28E-01	0	0	4.88E-06	5.71E-06	0.00E+00	0.00E+00
copper	3.26E-01	4.95E-01	0	0.04	4.35E-06	6.60E-06	0.00E+00	1.65E-04
Iron	1.57E-05	1.57E-05	0	0.3	2.10E-10	2.10E-10	0.00E+00	6.99E-10

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 5
Intake and Health Risk From Produce Ingestion (Table C-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_{ag} = \left[\left((Pd + Pv + Pr) \times CR_{ag}\right) + \left(Pr \times CR_{pp}\right) + \left(Pr_{bg} \times CR_{bg}\right)\right] \times F_{ag}$$

Symbol	Value	Description	Units	Notes
Iag	calculated	Produce Intake Rate	mg/kg-day	
Pd	calculated	Concentration in aboveground exposed produce due to deposition	mg/kg DW	Calculated from equation in Tables B-2-7 and B-3-7
Pv	calculated	Concentration in aboveground exposed produce due to air to plant transfer	mg/kg DW	Calculated from equation in Table B-2-8
Pr	calculated	Concentration in aboveground exposed and protected produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-9, B-3-9
Pr_{bg}	calculated	Concentration in belowground produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-10
CR_{ag}	0.00042	Consumption rate of aboveground produce	kg/kg-day DW	
CR_{pp}	0.00077	Consumption rate of aboveground protected produce	kg/kg-day DW	
CR_{bg}	0.00022	Consumption rate of belowground produce	kg/kg-day DW	
F_{ag}	1	Fraction of produce that is contaminated	Unitless	Adult or child resident - 0.25 Subsistance farmer, adult or child - 1

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 5

Intake and Health Risk From Produce Ingestion (Table C-1-2)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
1,6-Dinitropyrene	1.27E-06	1.27E-06	1.24E-08	1.25E-08	4.95E-09	5.01E-09	0
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
1-Nitropyrene	6.25E-05	6.25E-05	8.53E-07	8.78E-07	5.22E-07	5.37E-07	0
2,4-Dinitrotoluene	1.26E-06	1.26E-06	1.18E-09	1.18E-09	1.21E-08	1.21E-08	0
2,5-Diphenyloxazole	2.67E-05	2.67E-05	3.75E-08	3.76E-08	7.20E-08	7.21E-08	0
2,6-Dinitrotoluene	1.76E-04	1.76E-04	1.64E-07	1.64E-07	1.60E-06	1.60E-06	0
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
4-Nitrophenol	1.26E-06	1.26E-06	9.98E-10	9.98E-10	9.88E-09	9.89E-09	0
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0049
Benzo[a]anthracene	1.35E-04	1.35E-04	1.47E-06	1.55E-06	1.53E-06	1.62E-06	0.73
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.055
Benzo[a]pyrene	1.27E-06	1.27E-06	8.74E-09	9.30E-09	9.92E-09	1.06E-08	7.3
Biphenyl (1,1-Biphenyl)	1.32E-04	1.32E-04	1.25E-07	1.25E-07	0.00E+00	0.00E+00	0
Dibenz[a,h]anthracene	1.27E-06	1.27E-06	8.47E-09	9.50E-09	1.90E-08	2.14E-08	7.3
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Dioxin (2,3,7,8-TCDD)	7.32E-10	7.32E-10	3.04E-12	3.28E-12	6.05E-12	6.53E-12	156000
Diphenylamine	5.33E-06	5.33E-06	7.30E-09	7.30E-09	3.10E-07	3.10E-07	0
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0049
Phenanthrene	5.65E-05	5.65E-05	4.07E-07	4.10E-07	1.60E-07	1.61E-07	0
Phenol	8.52E-05	8.52E-05	8.60E-08	8.60E-08	6.85E-07	6.85E-07	0
Pyrene	1.28E-06	1.28E-06	1.96E-08	2.02E-08	9.59E-09	9.88E-09	0
Resorcinol	1.86E-04	1.86E-04	2.55E-07	2.55E-07	2.34E-06	2.34E-06	0
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Triacetin	1.26E-06	1.26E-06	2.91E-09	2.91E-09	3.15E-08	3.15E-08	0
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0
Aluminum	2.81E+00	2.81E+00	8.33E-03	8.99E-03	1.35E-05	1.46E-05	0
Lead	2.73E-01	2.74E-01	1.70E-03	1.78E-03	1.13E-05	1.18E-05	0
Zirconium	2.68E-01	2.68E-01	7.32E-04	8.57E-04	1.83E-06	2.14E-06	0
copper	2.37E-01	3.04E-01	1.31E-01	1.98E-01	8.16E-04	1.24E-03	0
Iron	1.17E-03	1.17E-03	6.29E-08	6.29E-08	1.57E-10	1.57E-10	0

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 5
Intake and Health Risk From Produce Ingestion (Table C-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Oral Reference Dose (mg/kg-day)	Produce Intake Rate - carcinogenic risk (mg/kg)	Produce Intake Rate - noncancer effects (mg/kg)	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	5.46E-10	5.46E-10	0.00E+00	0.00E+00
0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	2.70E-08	2.71E-08	0.00E+00	0.00E+00
0.002	5.34E-10	5.34E-10	0.00E+00	2.67E-07
0	1.12E-08	1.12E-08	0.00E+00	0.00E+00
0.001	7.46E-08	7.46E-08	0.00E+00	7.46E-05
0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.008	5.33E-10	5.33E-10	0.00E+00	6.66E-08
0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	5.82E-08	5.83E-08	4.25E-08	0.00E+00
0.003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	5.42E-10	5.43E-10	3.96E-09	0.00E+00
0.05	5.55E-08	5.55E-08	0.00E+00	1.11E-06
0	5.44E-10	5.46E-10	3.97E-09	0.00E+00
0.004	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	3.11E-13	3.11E-13	4.85E-08	0.00E+00
0.025	2.31E-09	2.31E-09	0.00E+00	9.25E-08
0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	2.41E-08	2.41E-08	0.00E+00	0.00E+00
0.6	3.60E-08	3.60E-08	0.00E+00	6.00E-08
0.03	5.55E-10	5.56E-10	0.00E+00	1.85E-08
0	7.86E-08	7.86E-08	0.00E+00	0.00E+00
0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	5.40E-10	5.40E-10	0.00E+00	0.00E+00
2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	1.19E-03	1.19E-03	0.00E+00	1.19E-03
0	1.16E-04	1.16E-04	0.00E+00	0.00E+00
0	1.13E-04	1.13E-04	0.00E+00	0.00E+00
0.04	2.00E-04	2.81E-04	0.00E+00	7.02E-03
0.3	4.92E-07	4.92E-07	0.00E+00	1.64E-06

Attachment B-5
Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 6
Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_j = A_j \times CR_j \times F_j$$

Symbol	Value	Description	Units	Notes
I_j	calculated	Intake from ingestion of animal tissue from animal *j*	mg/kg-day	
A_{beef}	calculated	Concentration in beef	mg/kg FW	Calculated using equations presented in Table B-3-10
A_{milk}	calculated	Concentration in milk	mg/kg FW	Calculated using equations presented in Table B-3-11
A_{pork}	calculated	Concentration in pork	mg/kg FW	Calculated using equations presented in Table B-3-12
$A_{chicken}$	calculated	Concentration in chicken	mg/kg FW	Calculated using equations presented in Table B-3-13
A_{egg}	calculated	Concentration in egg	mg/kg FW	Calculated using equations presented in Table B-3-14
CR_{beef}	0.00051	Consumption rate of beef	kg/kg-day FW	Adult - 0.00114 Child - 0.00051
CR_{milk}	0.01857	Consumption rate of milk	kg/kg-day FW	Adult - 0.00842 Child - 0.01857
CR_{pork}	0.000398	Consumption rate of pork	kg/kg-day FW	Adult - 0.00053
$CR_{chicken}$	0.000425	Consumption rate of chicken	kg/kg-day FW	Adult - 0.00061 Child - 0.000425
CR_{egg}	0.000438	Consumption rate of egg	kg/kg-day FW	Adult - 0.00062 Child - 0.000438
F_{beef}	1	Fraction of beef consumed from contaminated sources		
F_{milk}	1	Fraction of milk consumed from contaminated sources		
F_{pork}	1	Fraction of pork consumed from contaminated sources		
$F_{chicken}$	1	Fraction of chicken consumed from contaminated sources		
F_{egg}	1	Fraction of eggs consumed from contaminated sources		

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 6

Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Concentration in Beef (mg/kg FW) - Average concentration over exposure duration	Concentration in Beef (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Milk (mg/kg FW) - Average concentration over exposure duration	Concentration in Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Pork (mg/kg FW) - Average concentration over exposure duration	Concentration in Pork (mg/kg FW) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.39E-07	1.39E-07	7.67E-08	7.67E-08	6.18E-08	6.18E-08
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.11E-05	2.11E-05	1.16E-05	1.16E-05	9.36E-06	9.36E-06
2,4-Dinitrotoluene	3.71E-10	3.71E-10	2.04E-10	2.04E-10	1.66E-10	1.66E-10
2,5-Diphenyloxazole	3.70E-06	3.70E-06	2.04E-06	2.04E-06	1.64E-06	1.64E-06
2,6-Dinitrotoluene	4.02E-08	4.02E-08	2.22E-08	2.22E-08	1.80E-08	1.80E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	3.04E-10	3.04E-10	1.68E-10	1.68E-10	1.36E-10	1.36E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.90E-04	1.90E-04	1.04E-04	1.04E-04	8.52E-05	8.53E-05
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	5.05E-06	5.06E-06	2.78E-06	2.78E-06	2.27E-06	2.28E-06
Biphenyl (1,1-Biphenyl)	3.91E-06	3.91E-06	2.15E-06	2.15E-06	1.73E-06	1.73E-06
Dibenz[a,h]anthracene	1.33E-05	1.33E-05	7.28E-06	7.29E-06	5.97E-06	5.97E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	4.69E-09	4.69E-09	1.50E-09	1.50E-09	2.11E-09	2.11E-09
Diphenylamine	4.77E-08	4.77E-08	2.63E-08	2.63E-08	2.12E-08	2.12E-08
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	5.92E-06	5.92E-06	3.25E-06	3.25E-06	2.65E-06	2.65E-06
Phenol	7.58E-09	7.58E-09	4.16E-09	4.16E-09	3.39E-09	3.39E-09
Pyrene	3.77E-07	3.77E-07	2.07E-07	2.07E-07	1.69E-07	1.69E-07
Resorcinol	3.31E-09	3.31E-09	1.82E-09	1.82E-09	1.47E-09	1.47E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	6.66E-12	6.66E-12	3.67E-12	3.67E-12	2.95E-12	2.95E-12
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	4.99E-01	4.99E-01	1.16E-01	1.16E-01	2.22E-01	2.22E-01
Lead	9.67E-03	9.68E-03	1.40E-02	1.40E-02	4.30E-03	4.30E-03
Zirconium	1.75E-01	1.75E-01	1.65E-03	1.66E-03	7.82E-02	7.84E-02
copper	1.43E-01	1.52E-01	3.70E-02	3.92E-02	6.51E-02	6.99E-02
Iron	2.77E-03	2.77E-03	6.02E-05	6.02E-05	1.23E-03	1.23E-03

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 6

Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Concentration in Chicken (mg/kg FW) - Average concentration over exposure duration	Concentration in Chicken (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Oral Reference Dose (mg/kg-day)	Beef Intake Rate - carcinogenic risk (mg/kg)
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00
2.25E-09	2.25E-09	8.89E-07	8.89E-07	0	0	7.10E-11
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.02	0.00E+00
3.40E-07	3.40E-07	1.35E-04	1.35E-04	0	0	1.07E-08
5.89E-12	5.89E-12	2.36E-09	2.36E-09	0	0.002	1.89E-13
5.97E-08	5.97E-08	2.36E-05	2.36E-05	0	0	1.89E-09
6.43E-10	6.43E-10	2.57E-07	2.57E-07	0	0.001	2.05E-11
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.02	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00
4.84E-12	4.84E-12	1.94E-09	1.94E-09	0	0.008	1.55E-13
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0049	0	0.00E+00
3.03E-06	3.03E-06	1.21E-03	1.22E-03	0.73	0	9.70E-08
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.055	0.003	0.00E+00
8.08E-08	8.08E-08	3.24E-05	3.24E-05	7.3	0	2.58E-09
6.31E-08	6.31E-08	2.49E-05	2.49E-05	0	0.05	1.99E-09
2.13E-07	2.13E-07	8.50E-05	8.51E-05	7.3	0	6.77E-09
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.004	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00
1.28E-10	1.28E-10	9.48E-11	9.49E-11	156000	0	2.39E-12
7.70E-10	7.70E-10	3.05E-07	3.05E-07	0	0.025	2.44E-11
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.05	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.02	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.06	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.0049	0	0.00E+00
9.42E-08	9.42E-08	3.77E-05	3.77E-05	0	0	3.02E-09
1.21E-10	1.21E-10	4.83E-08	4.83E-08	0	0.6	3.87E-12
6.01E-09	6.01E-09	2.41E-06	2.41E-06	0	0.03	1.92E-10
5.35E-11	5.35E-11	2.11E-08	2.11E-08	0	0	1.69E-12
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.2	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.2	0.00E+00
1.07E-13	1.07E-13	4.25E-11	4.25E-11	0	0	3.40E-15
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	2	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	1	2.54E-04
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.93E-06
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	8.92E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.04	7.28E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.3	1.41E-06

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 6

Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Beef Intake Rate - noncancer effects (mg/kg)	Milk Intake Rate - carcinogenic risk (mg/kg)	Milk Intake Rate - noncancer effects (mg/kg)	Pork Intake Rate - carcinogenic risk (mg/kg)	Pork Intake Rate - noncancer effects (mg/kg)	Chicken Intake Rate - carcinogenic risk (mg/kg)	Chicken Intake Rate - noncancer effects (mg/kg)
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.10E-11	1.42E-09	1.42E-09	2.46E-11	2.46E-11	9.56E-13	9.56E-13
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.07E-08	2.15E-07	2.15E-07	3.72E-09	3.73E-09	1.45E-10	1.45E-10
1.89E-13	3.79E-12	3.79E-12	6.59E-14	6.59E-14	2.50E-15	2.50E-15
1.89E-09	3.78E-08	3.78E-08	6.52E-10	6.52E-10	2.54E-11	2.54E-11
2.05E-11	4.12E-10	4.12E-10	7.16E-12	7.16E-12	2.73E-13	2.73E-13
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.55E-13	3.11E-12	3.11E-12	5.41E-14	5.41E-14	2.06E-15	2.06E-15
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9.70E-08	1.94E-06	1.94E-06	3.39E-08	3.39E-08	1.29E-09	1.29E-09
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.58E-09	5.16E-08	5.17E-08	9.05E-10	9.06E-10	3.43E-11	3.43E-11
1.99E-09	4.00E-08	4.00E-08	6.90E-10	6.90E-10	2.68E-11	2.68E-11
6.77E-09	1.35E-07	1.35E-07	2.37E-09	2.38E-09	9.04E-11	9.05E-11
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.39E-12	2.79E-11	2.79E-11	8.39E-13	8.40E-13	5.43E-14	5.43E-14
2.44E-11	4.88E-10	4.88E-10	8.42E-12	8.42E-12	3.27E-13	3.27E-13
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.02E-09	6.04E-08	6.04E-08	1.05E-09	1.05E-09	4.00E-11	4.00E-11
3.87E-12	7.73E-11	7.73E-11	1.35E-12	1.35E-12	5.13E-14	5.13E-14
1.92E-10	3.85E-09	3.85E-09	6.74E-11	6.74E-11	2.55E-12	2.55E-12
1.69E-12	3.39E-11	3.39E-11	5.85E-13	5.85E-13	2.27E-14	2.27E-14
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.40E-15	6.81E-14	6.81E-14	1.17E-15	1.17E-15	4.57E-17	4.57E-17
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.54E-04	2.14E-03	2.15E-03	8.84E-05	8.85E-05	0.00E+00	0.00E+00
4.93E-06	2.60E-04	2.60E-04	1.71E-06	1.71E-06	0.00E+00	0.00E+00
8.93E-05	3.07E-05	3.07E-05	3.11E-05	3.12E-05	0.00E+00	0.00E+00
7.73E-05	6.87E-04	7.27E-04	2.59E-05	2.78E-05	0.00E+00	0.00E+00
1.41E-06	1.12E-06	1.12E-06	4.88E-07	4.88E-07	0.00E+00	0.00E+00

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 6

Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Egg Intake Rate - carcinogenic risk (mg/kg)	Egg Intake Rate - noncancer effects (mg/kg)	Excess Lifetime Cancer Risk - Beef Intake	Noncancer Hazard Quotient - Beef Intake	Excess Lifetime Cancer Risk - Milk Intake	Noncancer Hazard Quotient - Milk Intake	Excess Lifetime Cancer Risk - Pork Intake
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.89E-10	3.89E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.89E-08	5.89E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.03E-12	1.03E-12	0.00E+00	9.46E-11	0.00E+00	1.89E-09	0.00E+00
1.03E-08	1.03E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.13E-10	1.13E-10	0.00E+00	2.05E-08	0.00E+00	4.12E-07	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.51E-13	8.51E-13	0.00E+00	1.94E-11	0.00E+00	3.89E-10	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5.32E-07	5.32E-07	7.08E-08	0.00E+00	1.42E-06	0.00E+00	2.48E-08
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.42E-08	1.42E-08	1.88E-08	0.00E+00	3.77E-07	0.00E+00	6.61E-09
1.09E-08	1.09E-08	0.00E+00	3.99E-08	0.00E+00	7.99E-07	0.00E+00
3.72E-08	3.73E-08	4.94E-08	0.00E+00	9.87E-07	0.00E+00	1.73E-08
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4.15E-14	4.16E-14	3.73E-07	0.00E+00	4.35E-06	0.00E+00	1.31E-07
1.33E-10	1.33E-10	0.00E+00	9.74E-10	0.00E+00	1.95E-08	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.65E-08	1.65E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.11E-11	2.11E-11	0.00E+00	6.44E-12	0.00E+00	1.29E-10	0.00E+00
1.06E-09	1.06E-09	0.00E+00	6.40E-09	0.00E+00	1.28E-07	0.00E+00
9.26E-12	9.26E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.86E-14	1.86E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	2.54E-04	0.00E+00	2.15E-03	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	1.93E-03	0.00E+00	1.82E-02	0.00E+00
0.00E+00	0.00E+00	0.00E+00	4.70E-06	0.00E+00	3.73E-06	0.00E+00

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 6

Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Noncancer Hazard Quotient - Pork Intake	Excess Lifetime Cancer Risk - Chicken Intake	Noncancer Hazard Quotient - Chicken Intake	Excess Lifetime Cancer Risk - Egg Intake	Noncancer Hazard Quotient - Egg Intake	Excess Lifetime Cancer Risk - Total Animal Products Consumption	Noncancer Hazard Quotient - Total Animal Products Consumption
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3.30E-11	0.00E+00	1.25E-12	0.00E+00	5.17E-10	0.00E+00	2.54E-09
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.16E-09	0.00E+00	2.73E-10	0.00E+00	1.13E-07	0.00E+00	5.52E-07
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.76E-12	0.00E+00	2.57E-13	0.00E+00	1.06E-10	0.00E+00	5.22E-10
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	9.41E-10	0.00E+00	3.88E-07	0.00E+00	1.90E-06	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	2.51E-10	0.00E+00	1.03E-07	0.00E+00	5.06E-07	0.00E+00
1.38E-08	0.00E+00	5.36E-10	0.00E+00	2.18E-07	0.00E+00	1.07E-06
0.00E+00	6.60E-10	0.00E+00	2.72E-07	0.00E+00	1.33E-06	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	8.47E-09	0.00E+00	6.48E-09	0.00E+00	4.87E-06	0.00E+00
3.37E-10	0.00E+00	1.31E-11	0.00E+00	5.33E-09	0.00E+00	2.62E-08
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2.25E-12	0.00E+00	8.55E-14	0.00E+00	3.52E-11	0.00E+00	1.73E-10
2.25E-09	0.00E+00	8.51E-11	0.00E+00	3.52E-08	0.00E+00	1.72E-07
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.85E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-03
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.95E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-02
1.63E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-05

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 7
Intake and Health Risk From Ingestion of Fish (Table C-1-4)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_{fish} = C_{fish} \times CR_{fish} \times F_{fish}$$

Symbol	Value	Description	Units	Notes
I_{fish}	calculated	Daily intake from fish ingestion	mg/kg-day	
C_{fish}	calculated	Concentration in fish	mg/kg	Calculated using equations presented in Table B-4-26.
CR_{fish}	0.00117	Fish ingestion rate	kg/kg-day	Adult - 0.00117 kg/kg-day FW Child - 0.000759 kg/kg-day FW
F_{fish}	1	Fraction of fish ingested from contaminated source	unitless	

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 7
Intake and Health Risk From Ingestion of Fish (Table C-1-4)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Fish (mg/kg) - Average concentration over exposure duration	Concentration in Fish (mg/kg) Concentration at the end of the facility operating life	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Oral Reference Dose (mg/kg-day)	Intake based on average fish concentration over exposure duration (mg/kg-day) - used to assess cancer risks	Intake based on fish concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
1,3-Butadiene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	3.07E-07	3.07E-07	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	7.57E-05	7.59E-05	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrotoluene	6.88E-10	6.88E-10	0	0.002	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,5-Diphenyloxazole	8.08E-06	8.08E-06	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,6-Dinitrotoluene	9.61E-08	9.61E-08	0	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.93E-09	1.93E-09	0	0.008	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	5.88E-05	5.91E-05	0.73	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	0.00E+00	0.00E+00	0.055	0.003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	8.15E-07	8.20E-07	7.3	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl (1,1-Biphenyl)	5.12E-06	5.12E-06	0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	8.64E-07	8.79E-07	7.3	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dibenzofuran	0.00E+00	0.00E+00	0	0.004	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	5.06E-10	5.11E-10	156000	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Diphenylamine	1.28E-07	1.28E-07	0	0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0	0.06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.69E-05	1.69E-05	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	6.11E-08	6.11E-08	0	0.6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	1.40E-06	1.40E-06	0	0.03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Resorcinol	3.91E-08	3.91E-08	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.05E-10	1.05E-10	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xylenes	0.00E+00	0.00E+00	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	7.20E-04	7.24E-04	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	2.05E-04	2.05E-04	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zirconium	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
copper	7.63E-03	8.23E-03	0	0.04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	0.00E+00	0.00E+00	0	0.3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 8
Intake and Health Risk From Inhalation (Table C-2-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$Risk_{inh} = ADI \times CSF_{inh}$$

$$ADI = \frac{C_{air} \times IR \times ET \times EF \times ED \times 0.001 mg/ug}{BW \times AT\_c \times 365 days/year}$$

Symbol	Value	Description	Units	Notes
ADIinh	calculated	Average daily intake - inhalation	mg/kg-day	
Ca	calculated	Concentration in Air	ug/m^3	
CSFinh	tabulated	Inhalation cancer slope factor	1/(mg/kg-day)	
RfDinh	tabulated	Inhalation Reference Dose	mg/kg-day	
IR	0.3	Inhalation rate	m3/hr	0.63 m^3/hr for adults; 0.3 m^3/hr for children
ET	24	Exposure time	hr/day	
EF	350	Exposure Frequency	days/yr	
ED	350	Exposure Duration	yr	Subsistance farmer - 40 Subsistance fisher - 30 Adult resident - 30 Child - 6
BW	15	Body weight	kg	70 - adult; 15 - child
AT_c	70	Averaging time - carcinogens	yr	
AT_n	6	Averaging time - noncarcinogens	yr	Set equal to ED

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 8
Intake and Health Risk From Inhalation (Table C-2-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Air (ug/m^3)	Average Daily Intake - carcinogenic (mg/kg-day)	Average Daily Intake - noncarcinogenic (mg/kg day)	CSF 1/(mg/kg-day)	RfD (mg/kg-day)	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
1,3-Butadiene	1.70E-04	6.70E-09	7.82E-08	1.8	0	1.21E-08	0.00E+00
1,6-Dinitropyrene	4.37E-07	1.72E-11	2.01E-10	0	0	0.00E+00	0.00E+00
1-Methylnaphthalene	2.33E-05	9.19E-10	1.07E-08	0	0.0009	0.00E+00	1.19E-05
1-Nitropyrene	2.14E-05	8.42E-10	9.83E-09	0	0	0.00E+00	0.00E+00
2,4-Dinitrotoluene	4.37E-07	1.72E-11	2.01E-10	0	0	0.00E+00	0.00E+00
2,5-Diphenyloxazole	9.22E-06	3.64E-10	4.24E-09	0	0	0.00E+00	0.00E+00
2,6-Dinitrotoluene	6.10E-05	2.41E-09	2.81E-08	0	0	0.00E+00	0.00E+00
2-Methylnaphthalene	2.33E-05	9.19E-10	1.07E-08	0	0	0.00E+00	0.00E+00
2-Nitronaphthalene	1.79E-05	7.06E-10	8.23E-09	0	0	0.00E+00	0.00E+00
4-Nitrophenol	4.37E-07	1.72E-11	2.01E-10	0	0	0.00E+00	0.00E+00
4-Nitrosodiphenylamine	4.37E-07	1.72E-11	2.01E-10	0	0	0.00E+00	0.00E+00
Benzo[a]anthracene	4.63E-05	1.83E-09	2.13E-08	0	0	0.00E+00	0.00E+00
Benzene	1.07E-02	4.21E-07	4.91E-06	0.029	0.0017	1.22E-08	2.89E-03
Benzo[a]pyrene	4.37E-07	1.72E-11	2.01E-10	3.1	0	5.34E-11	0.00E+00
Biphenyl (1,1-Biphenyl)	4.56E-05	1.80E-09	2.10E-08	0	0	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	4.37E-07	1.72E-11	2.01E-10	0	0	0.00E+00	0.00E+00
Dibenzofuran	9.71E-06	3.83E-10	4.47E-09	0	0	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipa	1.31E-05	5.17E-10	6.03E-09	0	0	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	2.52E-10	9.96E-15	1.16E-13	156000	0	1.55E-09	0.00E+00
Diphenylamine	1.84E-06	7.28E-11	8.49E-10	0	0	0.00E+00	0.00E+00
Mesitylene (1,3,5-trimethylbenzen	1.11E-05	4.36E-10	5.09E-09	0	0.0017	0.00E+00	2.99E-06
Naphthalene	4.10E-05	1.62E-09	1.89E-08	0	0.0009	0.00E+00	2.10E-05
n-Hexane	1.70E-04	6.70E-09	7.82E-08	0	0.0571	0.00E+00	1.37E-06
N-Nitrosodiphenylamine	4.37E-07	1.72E-11	2.01E-10	0	0	0.00E+00	0.00E+00
Phenanthrene	1.94E-05	7.66E-10	8.93E-09	0	0	0.00E+00	0.00E+00
Phenol	2.95E-05	1.16E-09	1.36E-08	0	0	0.00E+00	0.00E+00
Pyrene	4.37E-07	1.72E-11	2.01E-10	0	0	0.00E+00	0.00E+00
Resorcinol	6.42E-05	2.53E-09	2.95E-08	0	0	0.00E+00	0.00E+00
Styrene	1.70E-04	6.70E-09	7.82E-08	0	0.286	0.00E+00	2.74E-07
Thianaphthene (benzo[b]thiophen	4.37E-07	1.72E-11	2.01E-10	0	0	0.00E+00	0.00E+00
Toluene	3.61E-03	1.42E-07	1.66E-06	0	0.114	0.00E+00	1.46E-05
Triacetin	4.37E-07	1.72E-11	2.01E-10	0	0	0.00E+00	0.00E+00
Xylenes	9.68E-04	3.82E-08	4.46E-07	0	0	0.00E+00	0.00E+00
Aluminum	9.71E-01	3.83E-05	4.47E-04	0	0.0014	0.00E+00	3.19E-01
Lead	9.41E-02	3.71E-06	4.33E-05	0	0	0.00E+00	0.00E+00
Zirconium	9.26E-02	3.65E-06	4.26E-05	0	0	0.00E+00	0.00E+00
copper	3.69E-02	1.45E-06	1.70E-05	0	0	0.00E+00	0.00E+00
Iron	4.05E-04	1.60E-08	1.87E-07	0	0	0.00E+00	0.00E+00

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 9

Summary of Chemical Intake Rates

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Intake based on average soil concentration over exposure duration (mg/kg-day) - used to assess cancer risks								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-09
1,6-Dinitropyrene	1.86E-12	5.46E-10	7.10E-11	1.42E-09	2.46E-11	9.56E-13	3.89E-10	0.00E+00	1.72E-11
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.19E-10
1-Nitropyrene	2.47E-10	2.70E-08	1.07E-08	2.15E-07	3.72E-09	1.45E-10	5.89E-08	0.00E+00	8.42E-10
2,4-Dinitrotoluene	5.78E-15	5.34E-10	1.89E-13	3.79E-12	6.59E-14	2.50E-15	1.03E-12	0.00E+00	1.72E-11
2,5-Diphenyloxazole	6.47E-12	1.12E-08	1.89E-09	3.78E-08	6.52E-10	2.54E-11	1.03E-08	0.00E+00	3.64E-10
2,6-Dinitrotoluene	6.93E-13	7.46E-08	2.05E-11	4.12E-10	7.16E-12	2.73E-13	1.13E-10	0.00E+00	2.41E-09
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.19E-10
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.06E-10
4-Nitrophenol	4.36E-15	5.33E-10	1.55E-13	3.11E-12	5.41E-14	2.06E-15	8.51E-13	0.00E+00	1.72E-11
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-11
Benzo[a]anthracene	9.69E-10	5.82E-08	9.70E-08	1.94E-06	3.39E-08	1.29E-09	5.32E-07	0.00E+00	1.83E-09
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-07
Benzo[a]pyrene	1.05E-11	5.42E-10	2.58E-09	5.16E-08	9.05E-10	3.43E-11	1.42E-08	0.00E+00	1.72E-11
Biphenyl (1,1-Biphenyl)	8.83E-12	5.55E-08	1.99E-09	4.00E-08	6.90E-10	2.68E-11	1.09E-08	0.00E+00	1.80E-09
Dibenz[a,h]anthracene	1.78E-11	5.44E-10	6.77E-09	1.35E-07	2.37E-09	9.04E-11	3.72E-08	0.00E+00	1.72E-11
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.83E-10
Di-n-propyl adipate (Diprop	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-10
Dioxin (2,3,7,8-TCDD)	7.21E-15	3.11E-13	2.39E-12	2.79E-11	8.39E-13	5.43E-14	4.15E-14	0.00E+00	9.96E-15
Diphenylamine	2.58E-13	2.31E-09	2.44E-11	4.88E-10	8.42E-12	3.27E-13	1.33E-10	0.00E+00	7.28E-11
Mesitylene (1,3,5-trimethylb	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.36E-10
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-09
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-09
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-11
Phenanthrene	5.98E-11	2.41E-08	3.02E-09	6.04E-08	1.05E-09	4.00E-11	1.65E-08	0.00E+00	7.66E-10
Phenol	2.11E-13	3.60E-08	3.87E-12	7.73E-11	1.35E-12	5.13E-14	2.11E-11	0.00E+00	1.16E-09
Pyrene	5.24E-12	5.55E-10	1.92E-10	3.85E-09	6.74E-11	2.55E-12	1.06E-09	0.00E+00	1.72E-11
Resorcinol	2.48E-13	7.86E-08	1.69E-12	3.39E-11	5.85E-13	2.27E-14	9.26E-12	0.00E+00	2.53E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-09
Thianaphthene (benzo[b]thi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.72E-11
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-07
Triacetin	1.40E-15	5.40E-10	3.40E-15	6.81E-14	1.17E-15	4.57E-17	1.86E-14	0.00E+00	1.72E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.82E-08
Aluminum	2.78E-05	1.19E-03	2.54E-04	2.14E-03	8.84E-05	0.00E+00	0.00E+00	0.00E+00	3.83E-05
Lead	1.67E-06	1.16E-04	4.93E-06	2.60E-04	1.71E-06	0.00E+00	0.00E+00	0.00E+00	3.71E-06
Zirconium	4.88E-06	1.13E-04	8.92E-05	3.07E-05	3.11E-05	0.00E+00	0.00E+00	0.00E+00	3.65E-06
copper	4.35E-06	2.00E-04	7.28E-05	6.87E-04	2.59E-05	0.00E+00	0.00E+00	0.00E+00	1.45E-06
Iron	2.10E-10	4.92E-07	1.41E-06	1.12E-06	4.88E-07	0.00E+00	0.00E+00	0.00E+00	1.60E-08

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 9

Summary of Chemical Intak

Air Pathway Human Health

Allegany Ballistics Laborato

Chemical	Intake based on soil concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.82E-08
1,6-Dinitropyrene	1.88E-12	5.46E-10	7.10E-11	1.42E-09	2.46E-11	9.56E-13	3.89E-10	0.00E+00	2.01E-10
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-08
1-Nitropyrene	2.54E-10	2.71E-08	1.07E-08	2.15E-07	3.73E-09	1.45E-10	5.89E-08	0.00E+00	9.83E-09
2,4-Dinitrotoluene	5.78E-15	5.34E-10	1.89E-13	3.79E-12	6.59E-14	2.50E-15	1.03E-12	0.00E+00	2.01E-10
2,5-Diphenyloxazole	6.48E-12	1.12E-08	1.89E-09	3.78E-08	6.52E-10	2.54E-11	1.03E-08	0.00E+00	4.24E-09
2,6-Dinitrotoluene	6.93E-13	7.46E-08	2.05E-11	4.12E-10	7.16E-12	2.73E-13	1.13E-10	0.00E+00	2.81E-08
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-08
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.23E-09
4-Nitrophenol	4.36E-15	5.33E-10	1.55E-13	3.11E-12	5.41E-14	2.06E-15	8.51E-13	0.00E+00	2.01E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-10
Benzo[a]anthracene	1.02E-09	5.83E-08	9.70E-08	1.94E-06	3.39E-08	1.29E-09	5.32E-07	0.00E+00	2.13E-08
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.91E-06
Benzo[a]pyrene	1.12E-11	5.43E-10	2.58E-09	5.17E-08	9.06E-10	3.43E-11	1.42E-08	0.00E+00	2.01E-10
Biphenyl (1,1-Biphenyl)	8.83E-12	5.55E-08	1.99E-09	4.00E-08	6.90E-10	2.68E-11	1.09E-08	0.00E+00	2.10E-08
Dibenz[a,h]anthracene	1.99E-11	5.46E-10	6.77E-09	1.35E-07	2.38E-09	9.05E-11	3.73E-08	0.00E+00	2.01E-10
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.47E-09
Di-n-propyl adipate (Diprop	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.03E-09
Dioxin (2,3,7,8-TCDD)	7.78E-15	3.11E-13	2.39E-12	2.79E-11	8.40E-13	5.43E-14	4.16E-14	0.00E+00	1.16E-13
Diphenylamine	2.58E-13	2.31E-09	2.44E-11	4.88E-10	8.42E-12	3.27E-13	1.33E-10	0.00E+00	8.49E-10
Mesitylene (1,3,5-trimethylb	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.09E-09
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-08
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.82E-08
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-10
Phenanthrene	6.02E-11	2.41E-08	3.02E-09	6.04E-08	1.05E-09	4.00E-11	1.65E-08	0.00E+00	8.93E-09
Phenol	2.12E-13	3.60E-08	3.87E-12	7.73E-11	1.35E-12	5.13E-14	2.11E-11	0.00E+00	1.36E-08
Pyrene	5.40E-12	5.56E-10	1.92E-10	3.85E-09	6.74E-11	2.55E-12	1.06E-09	0.00E+00	2.01E-10
Resorcinol	2.48E-13	7.86E-08	1.69E-12	3.39E-11	5.85E-13	2.27E-14	9.26E-12	0.00E+00	2.95E-08
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.82E-08
Thianaphthene (benzo[b]thi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-10
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-06
Triacetin	1.40E-15	5.40E-10	3.40E-15	6.81E-14	1.17E-15	4.57E-17	1.86E-14	0.00E+00	2.01E-10
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.46E-07
Aluminum	3.00E-05	1.19E-03	2.54E-04	2.15E-03	8.85E-05	0.00E+00	0.00E+00	0.00E+00	4.47E-04
Lead	1.74E-06	1.16E-04	4.93E-06	2.60E-04	1.71E-06	0.00E+00	0.00E+00	0.00E+00	4.33E-05
Zirconium	5.71E-06	1.13E-04	8.93E-05	3.07E-05	3.12E-05	0.00E+00	0.00E+00	0.00E+00	4.26E-05
copper	6.60E-06	2.81E-04	7.73E-05	7.27E-04	2.78E-05	0.00E+00	0.00E+00	0.00E+00	1.70E-05
Iron	2.10E-10	4.92E-07	1.41E-06	1.12E-06	4.88E-07	0.00E+00	0.00E+00	0.00E+00	1.87E-07

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Estimated Lifetime Cancer Risk by Pathway								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-08
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,6-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	7.07E-10	4.25E-08	7.08E-08	1.42E-06	2.48E-08	9.41E-10	3.88E-07	0.00E+00	0.00E+00
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-08
Benzo[a]pyrene	7.66E-11	3.96E-09	1.88E-08	3.77E-07	6.61E-09	2.51E-10	1.03E-07	0.00E+00	5.34E-11
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	1.30E-10	3.97E-09	4.94E-08	9.87E-07	1.73E-08	6.60E-10	2.72E-07	0.00E+00	0.00E+00
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	1.12E-09	4.85E-08	3.73E-07	4.35E-06	1.31E-07	8.47E-09	6.48E-09	0.00E+00	1.55E-09
Diphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Resorcinol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Estimated Lifetime Cancer Risk by Pathway								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
Triacetin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
									Total Risk

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessment, E
Allegany Ballistics Laboratory

Chemical	Total Excess Lifetime Cancer Risk	Contribution to Total Risk	Estimated Noncancer Hazard Quotients by Pathway						
			Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion
1,3-Butadiene	1.21E-08	0.14%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrotoluene	0.00E+00	0.00%	2.89E-12	2.67E-07	9.46E-11	1.89E-09	3.30E-11	1.25E-12	5.17E-10
2,5-Diphenyloxazole	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,6-Dinitrotoluene	0.00E+00	0.00%	6.93E-10	7.46E-05	2.05E-08	4.12E-07	7.16E-09	2.73E-10	1.13E-07
2-Methylnaphthalene	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	0.00E+00	0.00%	5.45E-13	6.66E-08	1.94E-11	3.89E-10	6.76E-12	2.57E-13	1.06E-10
4-Nitrosodiphenylamine	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.94E-06	22.27%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	1.22E-08	0.14%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	5.10E-07	5.85%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00%	1.77E-10	1.11E-06	3.99E-08	7.99E-07	1.38E-08	5.36E-10	2.18E-07
Dibenz[a,h]anthracene	1.33E-06	15.24%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dibenzofuran	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	4.92E-06	56.37%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Diphenylamine	0.00E+00	0.00%	1.03E-11	9.25E-08	9.74E-10	1.95E-08	3.37E-10	1.31E-11	5.33E-09
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	0.00E+00	0.00%	3.53E-13	6.00E-08	6.44E-12	1.29E-10	2.25E-12	8.55E-14	3.52E-11
Pyrene	0.00E+00	0.00%	1.80E-10	1.85E-08	6.40E-09	1.28E-07	2.25E-09	8.51E-11	3.52E-08
Resorcinol	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessment, E
Allegany Ballistics Laboratory

Chemical	Total Excess Lifetime Cancer Risk	Contribution to Total Risk	Estimated Noncancer Hazard Quotients by Pathway						
			Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion
Triacetin	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xylenes	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	0.00E+00	0.00%	3.00E-05	1.19E-03	2.54E-04	2.15E-03	8.85E-05	0.00E+00	0.00E+00
Lead	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zirconium	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
copper	0.00E+00	0.00%	1.65E-04	7.02E-03	1.93E-03	1.82E-02	6.95E-04	0.00E+00	0.00E+00
Iron	0.00E+00	0.00%	6.99E-10	1.64E-06	4.70E-06	3.73E-06	1.63E-06	0.00E+00	0.00E+00
	8.73E-06								

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessment, E
Allegany Ballistics Laboratory

Chemical			Total Hazard Quotient by Chemical	Hazard Quotient > 0.25?
	Fish Ingestion	Inhalation		
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	no
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	no
1-Methylnaphthalene	0.00E+00	1.19E-05	1.19E-05	no
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	no
2,4-Dinitrotoluene	0.00E+00	0.00E+00	2.69E-07	no
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	no
2,6-Dinitrotoluene	0.00E+00	0.00E+00	7.51E-05	no
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	no
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	no
4-Nitrophenol	0.00E+00	0.00E+00	6.72E-08	no
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	no
Benzo[a]anthracene	0.00E+00	0.00E+00	0.00E+00	no
Benzene	0.00E+00	2.89E-03	2.89E-03	no
Benzo[a]pyrene	0.00E+00	0.00E+00	0.00E+00	no
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	2.18E-06	no
Dibenz[a,h]anthracene	0.00E+00	0.00E+00	0.00E+00	no
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	no
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	no
Dioxin (2,3,7,8-TCDD)	0.00E+00	0.00E+00	0.00E+00	no
Diphenylamine	0.00E+00	0.00E+00	1.19E-07	no
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	2.99E-06	2.99E-06	no
Naphthalene	0.00E+00	2.10E-05	2.10E-05	no
n-Hexane	0.00E+00	1.37E-06	1.37E-06	no
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	no
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	no
Phenol	0.00E+00	0.00E+00	6.01E-08	no
Pyrene	0.00E+00	0.00E+00	1.91E-07	no
Resorcinol	0.00E+00	0.00E+00	0.00E+00	no
Styrene	0.00E+00	2.74E-07	2.74E-07	no
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	no
Toluene	0.00E+00	1.46E-05	1.46E-05	no

Attachment B-5

Intakes and Risks - Maximum Exposed Individual - Offsite Resident, Subsistence Farmer Scenario - Child Receptor

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessment, E
Allegany Ballistics Laboratory

Chemical			Total Hazard Quotient by Chemical	Hazard Quotient > 0.25?
	Fish Ingestion	Inhalation		
Triacetin	0.00E+00	0.00E+00	0.00E+00	no
Xylenes	0.00E+00	0.00E+00	0.00E+00	no
Aluminum	0.00E+00	3.19E-01	3.23E-01	yes
Lead	0.00E+00	0.00E+00	0.00E+00	no
Zirconium	0.00E+00	0.00E+00	0.00E+00	no
copper	0.00E+00	0.00E+00	2.80E-02	no
Iron	0.00E+00	0.00E+00	1.17E-05	no
		Total HI	**3.54E-01**	

Attachment B-6
Concentrations in River and Fish, Subsistence Fisher

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Annual Average Concentration in Air (ug/m^3)	Average soil concentration over exposure duration - Cs (mg/kg)	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg)	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration
1,3-Butadiene	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.42E-07	9.04E-06	1.02E-05	1.21E-06	1.31E-06	7.99E-07	9.02E-07	3.21E-07
1-Methylnaphthalene	7.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	6.97E-06	6.44E-04	7.81E-04	4.98E-05	5.61E-05	2.97E-05	3.60E-05	1.81E-05
2,4-Dinitrotoluene	1.42E-07	5.36E-08	5.36E-08	5.57E-07	5.57E-07	1.46E-07	1.46E-07	1.50E-06
2,5-Diphenyloxazole	3.01E-06	6.58E-06	6.60E-06	9.19E-06	9.20E-06	5.09E-07	5.11E-07	9.76E-07
2,6-Dinitrotoluene	4.12E-07	1.33E-07	1.34E-07	1.61E-06	1.61E-06	4.20E-07	4.21E-07	4.11E-06
2-Methylnaphthalene	7.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	1.21E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.42E-07	1.11E-08	1.11E-08	4.45E-07	4.45E-07	3.37E-08	3.38E-08	3.34E-07
4-Nitrosodiphenylamine	1.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	3.12E-07	1.56E-05	1.70E-05	1.22E-06	1.25E-06	3.14E-07	3.44E-07	3.28E-07
Benzene	3.48E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.42E-07	5.79E-06	6.23E-06	4.76E-07	4.81E-07	6.43E-08	6.91E-08	7.30E-08
Biphenyl (1,1-Biphenyl)	1.49E-05	8.22E-06	8.22E-06	4.45E-05	4.45E-05	1.55E-06	1.55E-06	0.00E+00
Dibenz[a,h]anthracene	1.42E-07	9.68E-06	1.10E-05	4.73E-07	4.82E-07	6.16E-08	7.02E-08	1.38E-07
Dibenzofuran	3.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	4.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.23E-11	3.71E-09	4.02E-09	2.59E-10	2.60E-10	2.08E-11	2.26E-11	4.15E-11
Diphenylamine	6.02E-07	9.20E-07	9.22E-07	2.08E-06	2.08E-06	3.47E-07	3.48E-07	1.47E-05
Mesitylene (1,3,5-trimethylbenzene)	2.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	2.77E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	1.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	6.33E-06	9.10E-05	9.32E-05	2.65E-05	2.67E-05	8.26E-06	8.46E-06	3.25E-06
Phenol	1.99E-07	3.36E-08	3.36E-08	7.56E-07	7.56E-07	1.82E-07	1.82E-07	1.45E-06
Pyrene	1.42E-07	1.33E-05	1.62E-05	1.07E-06	1.22E-06	6.62E-07	8.05E-07	3.25E-07
Resorcinol	2.05E-05	1.75E-06	1.75E-06	8.33E-05	8.33E-05	2.40E-05	2.40E-05	2.20E-04
Styrene	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	1.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	7.56E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.42E-07	1.32E-08	1.32E-08	7.77E-07	7.77E-07	3.66E-07	3.66E-07	3.96E-06
Xylenes	2.03E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	3.17E-01	8.00E+01	1.43E+02	1.23E+00	1.49E+00	3.20E-01	5.74E-01	5.20E-04
Lead	3.01E-02	6.67E+00	1.12E+01	1.78E-01	2.39E-01	9.07E-02	1.52E-01	6.00E-04
Zirconium	6.25E-04	1.76E-01	3.32E-01	2.16E-03	2.47E-03	3.52E-04	6.64E-04	8.79E-07
copper	8.67E-03	2.64E+00	5.19E+00	1.08E+00	2.10E+00	1.06E+00	2.07E+00	6.60E-03
Iron	9.54E-05	1.40E-03	1.44E-03	2.81E-04	2.81E-04	5.62E-06	5.75E-06	1.40E-08

Notes:
Average concentration over exposure duration is used in human health risk assessment to calculate excess lifetime cancer risks
Concentration at end of the facility operating lifetime represents the peak concentration (particularly for chemicals that do not degrade readily) - this is used in the human health risk assessment to calculate noncancer risks.
Key assumptions in calculating concentrations in soil:

Mixing depth	1 cm
Facility lifetime	30 years
Deposition velocity	0.01 m/s

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 1
Summary of Concentrations in Environme
Air Pathway Human Health Risk Assessn
Allegany Ballistics Laboratory

Chemical	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Beef (mg/kg FW) - Average concentration over exposure duration	Concentration in Beef (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Milk (mg/kg FW) - Average concentration over exposure duration
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	3.62E-07	5.70E-06	5.80E-06	2.07E-06	2.17E-06	5.84E-08	6.00E-08	3.08E-08
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.20E-05	2.69E-04	2.76E-04	9.17E-05	9.80E-05	8.79E-06	9.20E-06	4.56E-06
2,4-Dinitrotoluene	1.50E-06	5.05E-06	5.05E-06	1.41E-06	1.41E-06	1.25E-10	1.25E-10	6.89E-11
2,5-Diphenyloxazole	9.79E-07	1.04E-04	1.04E-04	2.73E-05	2.73E-05	1.22E-06	1.22E-06	6.69E-07
2,6-Dinitrotoluene	4.11E-06	1.46E-05	1.46E-05	4.09E-06	4.09E-06	2.81E-10	2.81E-10	1.55E-10
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	3.34E-07	4.94E-06	4.94E-06	1.30E-06	1.30E-06	1.00E-10	1.00E-10	5.51E-11
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	3.59E-07	1.11E-05	1.11E-05	3.10E-06	3.13E-06	1.42E-06	1.43E-06	7.51E-07
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	7.84E-08	4.97E-06	4.97E-06	1.33E-06	1.34E-06	1.77E-06	1.78E-06	9.44E-07
Biphenyl (1,1-Biphenyl)	0.00E+00	5.14E-04	5.14E-04	1.34E-04	1.34E-04	1.28E-06	1.28E-06	7.05E-07
Dibenz[a,h]anthracene	1.58E-07	4.96E-06	4.97E-06	1.33E-06	1.34E-06	4.80E-06	4.87E-06	2.51E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	4.50E-11	2.85E-09	2.86E-09	7.54E-10	7.55E-10	1.64E-09	1.65E-09	5.08E-10
Diphenylamine	1.48E-05	2.10E-05	2.10E-05	5.70E-06	5.70E-06	1.59E-08	1.59E-08	8.75E-09
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	3.33E-06	2.26E-04	2.26E-04	6.46E-05	6.48E-05	2.05E-06	2.06E-06	1.12E-06
Phenol	1.45E-06	7.02E-06	7.02E-06	1.95E-06	1.95E-06	5.28E-11	5.28E-11	2.90E-11
Pyrene	3.94E-07	5.56E-06	5.71E-06	1.93E-06	2.07E-06	1.59E-07	1.67E-07	8.25E-08
Resorcinol	2.20E-04	7.31E-04	7.31E-04	2.07E-04	2.07E-04	1.10E-09	1.10E-09	6.07E-10
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	3.96E-06	5.27E-06	5.27E-06	1.63E-06	1.63E-06	2.36E-12	2.36E-12	1.30E-12
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	9.32E-04	1.12E+01	1.15E+01	3.14E+00	3.39E+00	2.28E-01	2.80E-01	4.53E-02
Lead	1.01E-03	1.34E+00	1.54E+00	5.68E-01	7.72E-01	5.14E-03	6.54E-03	6.66E-03
Zirconium	1.66E-06	2.19E-02	2.22E-02	5.91E-03	6.23E-03	1.68E-03	2.13E-03	1.35E-05
copper	1.30E-02	1.35E+00	2.37E+00	1.13E+00	2.15E+00	1.67E-01	3.00E-01	4.15E-02
Iron	1.44E-08	3.29E-03	3.29E-03	8.55E-04	8.55E-04	6.66E-04	6.67E-04	1.43E-05

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 1
Summary of Concentrations in Environme
Air Pathway Human Health Risk Assessn
Allegany Ballistics Laboratory

Chemical	Concentration in Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Pork (mg/kg FW) - Average concentration over exposure duration	Concentration in Pork (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Chicken (mg/kg FW) Average concentration over exposure duration	Concentration in Chicken (mg/kg FW) Concentration at the end of the facility operating life	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life	Total Water Column Concentration (mg/L) - Average concentration over exposure duration	Total Water Column Concentration (mg/L) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	3.16E-08	2.94E-08	3.06E-08	1.00E-09	1.03E-09	3.95E-07	4.09E-07	4.16E-10	4.64E-10
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	4.72E-06	4.63E-06	4.97E-06	1.57E-07	1.67E-07	6.21E-05	6.59E-05	1.71E-08	2.03E-08
2,4-Dinitrotoluene	6.89E-11	5.62E-11	5.62E-11	1.98E-12	1.98E-12	7.95E-10	7.95E-10	4.93E-10	4.93E-10
2,5-Diphenyloxazole	6.69E-07	5.42E-07	5.42E-07	1.97E-08	1.97E-08	7.78E-06	7.78E-06	1.51E-09	1.51E-09
2,6-Dinitrotoluene	1.55E-10	1.26E-10	1.26E-10	4.47E-12	4.47E-12	1.79E-09	1.79E-09	1.41E-09	1.41E-09
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	5.51E-11	4.48E-11	4.48E-11	1.59E-12	1.59E-12	6.38E-10	6.38E-10	1.42E-10	1.42E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	7.56E-07	7.05E-07	7.18E-07	2.42E-08	2.45E-08	9.68E-06	9.83E-06	3.53E-10	3.78E-10
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	9.47E-07	8.67E-07	8.77E-07	2.99E-08	3.02E-08	1.20E-05	1.21E-05	1.39E-10	1.46E-10
Biphenyl (1,1-Biphenyl)	7.05E-07	5.69E-07	5.69E-07	2.07E-08	2.07E-08	8.17E-06	8.17E-06	6.45E-09	6.45E-09
Dibenz[a,h]anthracene	2.53E-06	2.47E-06	2.55E-06	8.44E-08	8.66E-08	3.38E-05	3.46E-05	2.12E-10	2.35E-10
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	5.10E-10	8.10E-10	8.20E-10	4.76E-11	4.81E-11	3.54E-11	3.57E-11	9.21E-14	9.76E-14
Diphenylamine	8.75E-09	7.09E-09	7.09E-09	2.57E-10	2.57E-10	1.01E-07	1.01E-07	9.05E-10	9.07E-10
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.12E-06	9.53E-07	9.55E-07	3.33E-08	3.33E-08	1.33E-05	1.33E-05	5.55E-09	5.65E-09
Phenol	2.90E-11	2.36E-11	2.36E-11	8.36E-13	8.36E-13	3.35E-10	3.35E-10	5.34E-10	5.34E-10
Pyrene	8.57E-08	8.48E-08	9.12E-08	2.80E-09	2.98E-09	1.12E-06	1.19E-06	3.47E-10	4.13E-10
Resorcinol	6.07E-10	4.91E-10	4.91E-10	1.77E-11	1.77E-11	7.00E-09	7.00E-09	4.63E-08	4.63E-08
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.30E-12	1.05E-12	1.05E-12	3.77E-14	3.77E-14	1.49E-11	1.49E-11	3.95E-10	3.95E-10
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	5.14E-02	1.47E-01	2.06E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.86E-04	1.34E-03
Lead	8.15E-03	3.07E-03	4.24E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E-05	1.36E-04
Zirconium	1.55E-05	1.11E-03	1.64E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-06	2.43E-06
copper	7.40E-02	8.85E-02	1.61E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-05	3.13E-05
Iron	1.43E-05	3.06E-04	3.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E-07	3.76E-07

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 1
Summary of Concentrations in Environm
Air Pathway Human Health Risk Assessn
Allegany Ballistics Laboratory

Chemical	Dissolved Phase Water Concentration (mg/L) - Average concentration over exposure duration	Dissolved Phase Water Concentration (mg/L) - Concentration at the end of the facility operating life	Concentration in Sediment (mg/kg) - Average concentration over exposure duration	Concentration in Sediment (mg/kg) - Concentration at the end of the facility operating life	Concentration in Fish (mg/kg) - Average concentration over exposure duration	Concentration in Fish (mg/kg) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	4.09E-10	4.57E-10	3.57E-07	3.99E-07	1.07E-06	1.20E-06
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	1.63E-08	1.93E-08	4.24E-05	5.04E-05	2.15E-04	2.55E-04
2,4-Dinitrotoluene	4.93E-10	4.93E-10	1.01E-09	1.01E-09	2.92E-09	2.92E-09
2,5-Diphenyloxazole	1.50E-09	1.50E-09	3.73E-07	3.73E-07	5.00E-06	5.01E-06
2,6-Dinitrotoluene	1.41E-09	1.41E-09	2.36E-09	2.36E-09	8.34E-09	8.34E-09
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.42E-10	1.42E-10	2.48E-10	2.48E-10	2.37E-09	2.37E-09
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	2.95E-10	3.16E-10	3.07E-06	3.29E-06	1.50E-06	1.61E-06
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	8.05E-11	8.47E-11	3.12E-06	3.28E-06	8.01E-07	8.43E-07
Biphenyl (1,1-Biphenyl)	6.44E-09	6.44E-09	4.81E-07	4.81E-07	2.81E-06	2.81E-06
Dibenz[a,h]anthracene	9.04E-11	1.00E-10	6.47E-06	7.19E-06	1.16E-06	1.29E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	3.05E-14	3.23E-14	3.28E-09	3.48E-09	5.17E-10	5.48E-10
Diphenylamine	9.04E-10	9.06E-10	2.65E-08	2.66E-08	2.35E-07	2.36E-07
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	5.47E-09	5.56E-09	4.57E-06	4.65E-06	1.80E-05	1.83E-05
Phenol	5.34E-10	5.34E-10	4.70E-10	4.70E-10	4.17E-09	4.17E-09
Pyrene	3.30E-10	3.93E-10	8.98E-07	1.07E-06	3.93E-06	4.68E-06
Resorcinol	4.63E-08	4.63E-08	1.06E-08	1.06E-08	1.07E-07	1.07E-07
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	3.95E-10	3.95E-10	3.50E-11	3.50E-11	3.60E-10	3.60E-10
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	7.74E-04	1.32E-03	1.16E+00	1.99E+00	2.09E-03	3.57E-03
Lead	8.34E-05	1.35E-04	7.51E-02	1.21E-01	6.68E-04	1.08E-03
Zirconium	1.32E-06	2.36E-06	3.97E-03	7.08E-03	0.00E+00	0.00E+00
copper	1.55E-05	2.85E-05	1.55E-01	2.85E-01	1.10E-02	2.02E-02
Iron	3.67E-07	3.76E-07	9.19E-06	9.40E-06	0.00E+00	0.00E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 2
Chemical-Specific Inputs
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

		Chemical/Physical Properties													
Chemical	CAS Number	Molecular Weight (g/mole)	T_m (K)	Vp (atm)	S (mg/L)	H (atm-m^3/mol)	D_a (cm^2/s)	D_w (cm^2/s)	K_{ow} (unitless)	K_{oc} (mL/g)	Kd_s (mL/g)	Kd_{sw} (L/kg)	Kd_{bs} (mL/g)	ksg $(year)^{-1}$	Fv (unitless)
1,3-Butadiene	106-99-0	5.41E+01	1.64E+02	2.77E+00	7.35E+02	6.30E-02	1.31E-01	1.52E-05	1.00E+02	1.20E+02	1.20E+00	9.02E+00	4.81E+00	9.01E+00	1
1,6-Dinitropyrene	42397-64-8	2.92E+02	5.73E+02	1.65E-07	5.86E+00	8.25E-06	4.23E-02	4.90E-06	3.72E+04	2.18E+04	2.18E+02	1.64E+03	8.73E+02	1.33E-01	0
1-Methylnaphthalene	90-12-0	1.42E+02	2.43E+02	8.82E-05	2.58E+01	2.60E-04	6.86E-02	7.94E-06	7.41E+03	4.57E+03	4.57E+01	3.43E+02	1.83E+02	2.53E+02	1
1-Nitropyrene	5522-43-0	2.47E+02	4.28E+02	4.20E-08	1.26E+00	8.25E-06	4.74E-02	5.48E-06	1.15E+05	6.52E+04	6.52E+02	4.89E+03	2.61E+03	1.33E-01	0
2,4-Dinitrotoluene	121-14-2	1.82E+02	3.44E+02	2.29E-07	2.85E+02	1.46E-07	3.09E-02	7.86E-06	9.90E+01	5.10E+01	5.10E-01	3.83E+00	2.04E+00	1.41E+00	0
2,5-Diphenyloxazole	92-71-7	2.21E+02	3.46E+02	2.43E-10	3.35E+00	1.60E-08	5.10E-02	5.91E-06	4.68E+04	6.22E+03	6.22E+01	4.66E+02	2.49E+02	9.01E+00	0
2,6-Dinitrotoluene	606-20-2	1.82E+02	3.39E+02	7.47E-07	1.05E+03	1.30E-07	3.11E-02	7.76E-06	7.70E+01	4.19E+01	4.19E-01	3.14E+00	1.68E+00	1.41E+00	0
2-Methylnaphthalene	91-57-6	1.42E+02	3.08E+02	7.24E-05	2.50E+01	5.20E-04	6.86E-02	7.94E-06	7.94E+03	7.94E+03	7.94E+01	5.96E+02	3.18E+02	1.10E+02	1
2-Nitronaphthalene	581-89-5	1.73E+02	3.52E+02	2.10E-03	1.43E+02	2.54E-03	6.01E-02	6.96E-06	1.74E+03	1.12E+03	1.12E+01	8.39E+01	4.48E+01	1.10E+02	1
4-Nitrophenol	100-02-7	1.39E+02	3.86E+02	1.32E-06	2.50E+04	7.32E-09	4.30E-02	9.61E-06	8.13E+01	4.37E+01	4.37E-01	3.28E+00	1.75E+00	2.09E+02	0
4-Nitrosodiphenylamine	156-10-5	1.98E+02	4.18E+02	1.63E-07	7.43E+00	4.35E-06	5.49E-02	6.36E-06	1.45E+03	4.13E+02	4.13E+00	3.10E+01	1.65E+01	1.39E+00	1
Benzo[a]anthracene	56-55-3	2.28E+02	4.33E+02	2.03E-10	1.28E-02	3.62E-06	2.47E-02	6.21E-06	4.77E+05	2.60E+05	2.60E+03	1.95E+04	1.04E+04	3.72E-01	0
Benzene	71-43-2	7.81E+01	2.79E+02	1.25E-01	1.78E+03	5.49E-03	1.17E-01	1.02E-05	1.37E+02	6.20E+01	6.20E-01	4.65E+00	2.48E+00	3.89E+00	1
Benzo[a]pyrene	50-32-8	2.52E+02	4.52E+02	6.43E-12	1.94E-03	8.36E-07	2.18E-02	5.85E-06	1.35E+06	9.69E+05	9.69E+03	7.27E+04	3.88E+04	4.77E-01	0
Biphenyl (1,1-Biphenyl)	92-52-4	1.54E+02	3.43E+02	4.94E-05	7.08E+00	3.39E-04	6.50E-02	7.52E-06	1.00E+04	1.87E+03	1.87E+01	1.40E+02	7.47E+01	3.61E+01	0
Dibenz[a,h]anthracene	53-70-3	2.78E+02	5.39E+02	2.70E-14	6.70E-04	1.12E-08	1.80E-02	6.01E-06	3.53E+06	1.79E+06	1.79E+04	1.34E+05	7.16E+04	2.69E-01	0
Dibenzofuran	132-64-9	1.68E+02	3.60E+02	2.37E-07	1.00E+01	1.30E-05	6.13E-02	7.10E-06	1.58E+04	1.01E+04	1.01E+02	7.59E+02	4.05E+02	9.01E+00	1
Di-n-propyl adipate (Dipropyl adipate)	106-19-4	2.30E+02	ND	6.71E-03	1.40E+02	1.11E-02	4.97E-02	5.75E-06	2.24E+03	5.81E+02	5.81E+00	4.36E+01	2.32E+01	3.16E+01	1
Dioxin (2,3,7,8-TCDD)	1746-01-6	3.22E+02	5.78E+02	9.74E-13	1.93E-05	1.60E-05	1.27E-02	6.81E-06	4.37E+06	2.69E+06	2.69E+04	2.02E+05	1.08E+05	4.29E-01	0
Diphenylamine	122-39-4	1.69E+02	3.25E+02	8.82E-07	3.60E+01	5.00E-07	6.10E-02	7.07E-06	3.02E+03	7.33E+02	7.33E+00	5.50E+01	2.93E+01	9.01E+00	0
Mesitylene (1,3,5-trimethylbenzene)	108-67-8	1.20E+02	2.88E+02	1.30E-03	2.00E+01	7.81E-03	6.48E-02	7.86E-06	2.63E+03	1.67E+03	1.67E+01	1.25E+02	6.68E+01	3.16E+01	1
Naphthalene	91-20-3	1.28E+02	3.53E+02	1.17E-04	3.11E+01	4.82E-04	5.26E-02	8.92E-06	2.36E+03	1.19E+03	1.19E+01	8.93E+01	4.76E+01	5.27E+00	1
n-Hexane	110-54-3	8.62E+01	1.78E+02	1.99E-01	1.19E+01	1.18E+00	9.59E-02	1.11E-05	1.00E+04	1.87E+03	1.87E+01	1.40E+02	7.47E+01	3.16E+01	1
N-Nitrosodiphenylamine	86-30-6	1.98E+02	3.40E+02	1.32E-04	3.74E+01	6.99E-04	3.12E-02	6.35E-06	1.06E+03	3.27E+02	3.27E+00	2.45E+01	1.31E+01	7.44E+00	1
Phenanthrene	85-01-8	1.78E+02	3.71E+02	1.45E-07	1.28E+00	2.30E-05	3.33E-02	7.47E-06	3.55E+04	2.09E+04	2.09E+02	1.57E+03	8.36E+02	1.26E+00	0
Phenol	108-95-2	9.41E+01	3.14E+02	5.74E-04	9.08E+04	5.95E-07	8.27E-02	1.03E-05	3.00E+01	2.20E+01	2.20E-01	1.65E+00	8.80E-01	2.53E+01	0
Pyrene	129-00-0	2.02E+02	4.29E+02	5.59E-09	1.37E-01	8.25E-06	2.72E-02	7.14E-06	1.00E+05	6.80E+04	6.80E+02	5.10E+03	2.72E+03	1.33E-01	0
Resorcinol	108-46-3	1.10E+02	3.83E+02	5.92E-07	1.00E+06	7.70E-09	8.14E-02	9.43E-06	6.03E+00	5.75E+00	5.75E-02	4.31E-01	2.30E-01	6.32E+01	0
Styrene	100-42-5	1.04E+02	2.43E+02	8.21E-03	2.57E+02	3.33E-03	7.73E-02	8.77E-06	8.49E+02	9.12E+02	9.12E+00	6.84E+01	3.65E+01	9.03E+00	1
Thianaphthene (benzo[b]thiophene)	95-15-8	1.34E+02	3.04E+02	1.53E-04	1.55E+02	1.33E-04	7.13E-02	8.26E-06	1.32E+03	3.84E+02	3.84E+00	2.88E+01	1.54E+01	2.53E+02	1
Toluene	108-88-3	9.21E+01	1.78E+02	3.71E-02	5.58E+02	6.13E-03	9.72E-02	9.23E-06	4.65E+02	1.40E+02	1.40E+00	1.05E+01	5.60E+00	1.15E+01	1
Triacetin	102-76-1	2.18E+02	1.95E+02	3.26E-06	5.80E+04	1.23E-08	5.15E-02	5.96E-06	1.78E+00	2.22E+00	2.22E-02	1.66E-01	8.87E-02	1.95E+00	0
Xylenes	106-42-3	1.06E+02	2.86E+02	1.06E-02	1.86E+02	6.05E-03	7.61E-02	8.50E-06	1.48E+03	3.11E+02	3.11E+00	2.33E+01	1.24E+01	9.03E+00	1
Aluminum	7429-90-5	2.70E+01	9.33E+02	0.00E+00	0.00E+00	0.00E+00	2.11E-01	2.44E-05	NA	NA	1.50E+03	1.50E+03	1.50E+03	0.00E+00	0
Lead	7439-92-1	2.07E+02	6.01E+02	0.00E+00	0.00E+00	0.00E+00	5.43E-02	6.28E-06	NA	NA	9.00E+02	9.00E+02	9.00E+02	0.00E+00	0
Zirconium	7440-67-7	9.12E+01	2.12E+03	0.00E+00	0.00E+00	0.00E+00	9.24E-02	1.07E-05	NA	NA	3.00E+03	3.00E+03	3.00E+03	0.00E+00	0
Copper	7440-50-8	6.36E+01	1.36E+03	0.00E+00	0.00E+00	0.00E+00	1.19E-01	1.38E-05	NA	NA	1.00E+04	1.00E+04	1.00E+04	0.00E+00	0
Iron	7439-89-6	5.58E+01	1.81E+03	0.00E+00	0.00E+00	0.00E+00	1.28E-01	1.49E-05	NA	NA	2.50E+01	2.50E+01	2.50E+01	0.00E+00	0

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 2
Chemical-Specific Inputs
Air Pathway Human Health Risk Assessme
Allegany Ballistics Laboratory

	Biotransfer Factors for Plants						Biotransfer Factors for Animals							
Chemical	RCF (ug/g DW plant)/ (ug/mL soil water)	$Br_{rootveg}$ (ug/g DW plant/ ug/g soil)	Br_{ag} (ug/g DW plant/ ug/g soil)	Br_{forage} (ug/g DW plant/ ug/g soil)	Bv_{ag} (ug/g DW plant/ ug/g air)	Bv_{forage} (ug/g DW plant/ ug/g air)	Ba_{milk} (day/kg FW)	Ba_{beef} (day/kg FW)	Ba_{pork} (day/kg FW)	Ba_{egg} (day/kg FW)	$Ba_{chicken}$ (day/kg FW)	BCF_{fish} (L/kg FW tissue)	BAF_{fish} (L/kg FW tissue)	$BSAF_{fish}$ (unitless)
1,3-Butadiene														
1,6-Dinitropyrene	7.74E+02	3.54E+00	8.84E-02	8.84E-02	4.98E+04	4.98E+04	2.95E-04	9.33E-04	1.12E-03	2.95E-01	7.47E-04	NA	2.63E+03	NA
1-Methylnaphthalene														
1-Nitropyrene	1.84E+03	2.82E+00	4.61E-02	4.61E-02	1.66E+05	1.66E+05	9.12E-04	2.88E-03	3.46E-03	9.12E-01	2.31E-03	NA	1.32E+04	NA
2,4-Dinitrotoluene	1.43E+01	2.80E+01	2.72E+00	2.72E+00	5.10E+01	5.10E+01	7.86E-07	2.49E-06	3.01E-06	7.86E-04	1.96E-06	5.92E+00	NA	NA
2,5-Diphenyloxazole	9.22E+02	1.48E+01	7.74E-02	7.74E-02	3.28E+07	3.28E+07	3.72E-04	1.17E-03	1.41E-03	3.72E-01	9.40E-04	NA	3.34E+03	NA
2,6-Dinitrotoluene	1.29E+01	3.08E+01	3.15E+00	3.15E+00	4.41E+01	4.41E+01	6.12E-07	1.93E-06	2.34E-06	6.12E-04	1.53E-06	5.92E+00	NA	NA
2-Methylnaphthalene														
2-Nitronaphthalene														
4-Nitrophenol	1.32E+01	3.02E+01	3.05E+00	3.05E+00	8.26E+02	8.26E+02	6.46E-07	2.04E-06	2.47E-06	6.46E-04	1.61E-06	1.67E+01	NA	NA
4-Nitrosodiphenylamine														
Benzo[a]anthracene	5.48E+03	2.11E+00	2.02E-02	2.02E-02	1.72E+04	1.72E+04	3.79E-03	1.20E-02	1.45E-02	3.79E+00	9.46E-03	NA	5.10E+03	NA
Benzene														
Benzo[a]pyrene	1.22E+04	1.26E+00	1.11E-02	1.11E-02	2.25E+05	2.25E+05	1.07E-02	3.38E-02	4.10E-02	1.07E+01	2.67E-02	NA	9.95E+03	NA
Biphenyl (1,1-Biphenyl)	2.86E+02	1.53E+01	1.89E-01	1.89E-01	3.00E+02	3.00E+02	7.94E-05	2.51E-04	3.01E-04	7.94E-02	2.01E-04	4.37E+02	NA	NA
Dibenz[a,h]anthracene	2.56E+04	1.43E+00	6.36E-03	6.36E-03	4.68E+07	4.68E+07	2.80E-02	8.86E-02	1.07E-01	2.80E+01	7.00E-02	NA	1.28E+04	NA
Dibenzofuran														
Di-n-propyl adipate (Dipropyl adipate)														
Dioxin (2,3,7,8-TCDD)	3.01E+04	1.12E+00	5.62E-03	5.62E-03	6.10E+04	6.10E+04	1.00E-02	5.43E-02	6.57E-02	5.42E-02	7.30E-02	NA	NA	9.00E-02
Diphenylamine	1.17E+02	1.60E+01	3.77E-01	3.77E-01	5.68E+04	5.68E+04	2.40E-05	7.59E-05	9.10E-05	2.40E-02	6.07E-05	2.60E+02	NA	NA
Mesitylene (1,3,5-trimethylbenzene)														
Naphthalene														
n-Hexane														
N-Nitrosodiphenylamine														
Phenanthrene	7.47E+02	3.57E+00	9.08E-02	9.08E-02	1.70E+04	1.70E+04	2.82E-04	8.92E-04	1.08E-03	2.82E-01	7.04E-04	NA	3.30E+03	NA
Phenol	9.50E+00	4.32E+01	5.42E+00	5.42E+00	3.52E+00	3.52E+00	2.38E-07	7.54E-07	9.12E-07	2.38E-04	5.95E-07	7.81E+00	NA	NA
Pyrene	1.66E+03	2.44E+00	4.98E-02	4.98E-02	1.43E+05	1.43E+05	7.98E-04	2.52E-03	3.06E-03	7.98E-01	1.99E-03	NA	1.19E+04	NA
Resorcinol	7.23E+00	1.26E+02	1.37E+01	1.37E+01	4.91E+03	4.91E+03	4.79E-08	1.51E-07	1.82E-07	4.79E-05	1.21E-07	2.31E+00	NA	NA
Styrene														
Thianaphthene (benzo[b]thiophene)														
Toluene														
Triacetin	6.67E+00	3.01E+02	2.78E+01	2.78E+01	8.38E+02	8.38E+02	1.41E-08	4.47E-08	5.36E-08	1.41E-05	3.57E-08	9.12E-01	NA	NA
Xylenes														
Aluminum	NA	6.50E-04	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.00E-04	1.50E-03	1.80E-03	0.00E+00	0.00E+00	2.70E+00	NA	NA
Lead	NA	9.00E-03	1.36E-02	4.50E-02	0.00E+00	0.00E+00	2.50E-04	3.00E-04	3.60E-04	0.00E+00	0.00E+00	NA	8.00E+00	NA
Zirconium	NA	5.00E-04	2.00E-03	2.00E-03	0.00E+00	0.00E+00	3.00E-05	5.50E-03	6.60E-03	0.00E+00	0.00E+00		NA	NA
Copper	NA	2.50E-01	4.00E-01	4.00E-01	0.00E+00	0.00E+00	1.50E-03	1.00E-02	1.20E-02	0.00E+00	0.00E+00	7.10E+02	NA	NA
Iron	NA	1.00E-03	4.00E-03	4.00E-03	0.00E+00	0.00E+00	2.50E-04	2.00E-02	2.40E-02	0.00E+00	0.00E+00		NA	NA

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 3
Site-specific Inputs
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes	Appears in Sheet
Zs	1.0E+00	Soil mixing zone depth	cm		Ca_Ds,ksr, ksl, LR
BD	1.5E+00	Soil bulk density	g soil/cm^3 soil		Ca_Ds, ksr, ksl, LE
Vdv	1.0E-02	Deposition velocity	m/s		Ca_Ds, Pd, Ldep, LRI
T1	0.0E+00	Time period at the beginning of facility operation	yr		Cs
tD	3.0E+01	Time period over which deposition occurs (time period of facility operation)	yr	Time period of facility operation is assumed to be same as residential exposure duration (30 years)	Cs
RO	5.1E+01	Average annual surface runoff from pervious areas	cm/yr	Annual runoff - Cumberland 1929-1994	ksr, ksl, LRI, LR
θ_{ew}	0.2	Soil volumetric water content	mL water/cm^3 soil		ksr, ksl, LRI, LR
P	90	Average annual precipitation	cm/yr	Baes et al., 1984	ksr, ksl, LR
I	25	Average annual irrigation	cm/yr	Baes et al., 1984	ksl
E_v	63	Average annual evapotranspiration	cm/yr	Baes et al., 1984	ksl
Rp	0.39	Interception fraction of the edible portion of plant	unitless	Value from Table B-2-7.	Pd
Rp_forage	0.5	Interception fraction of the edible portion of plant - for livestock forage	unitless	Value from Table B-3-7.	Pd
Rp_silage	0.46	Interception fraction of the edible portion of plant - for livestock silage	unitless	Value from Table B-3-7.	Pd
kp	18	Plant surface loss coefficient	yr^{-1}	Value from Table B-2-7.	Pd
Tp	0.164	Length of plan exposure to depostion per harvest of the edible portion of the *i*th plant group	yr	Assumed to be 60 days, according to Table B-2-7.	Pd
Tp_forage	0.16	Length of plan exposure to depostion per harvest of the edible portion of the *i*th plant group - for livestock forage	yr	Value from Table B-3-7.	Pd
Tp_silage	0.12	Length of plan exposure to depostion per harvest of the edible portion of the *i*th plant group - for livestock silage	yr	Value from Table B-3-7.	Pd
Yp	2.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	kg DW/m^2	Value from Table B-2-7.	Pd
Yp_forage	0.24	Yield or standing crop biomass of the edible portion of the plant (productivity) - for livestock forage	kg DW/m^2	Value from Table B-3-7.	Pd
Yp_silage	0.8	Yield or standing crop biomass of the edible portion of the plant (productivity) - for livestock silage	kg DW/m^2	Value from Table B-3-7.	Pd
ρ_a	1.2E+03	Density of Air	g/m^3	See Table B-2-8	Pv
Fi_{forage}	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	contaminated soil). Concentrations in grain are assumed to be the same as concentrations in	A_beef
Fi_{silage}	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage			A_beef
Qpi_{forage}	9.27	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Quantities for forage (8.8 kg/day) and grain (0.47 kg/day) are summed	A_beef
Qpi_{silage}	2.5	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day		A_beef
Qs	0.5	Quantity of soil ingested by animal	kg/day		A_beef
Fiforage_milk	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless	contaminated soil). Concentrations in grain are assumed to be the same as concentrations in	A_milk
Fisilage_milk	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage			A_milk
Qpiforage_milk	16.2	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	Quantities for forage (13.2 kg/day) and grain (3 kg/day) are summed	A_milk
Qpisilage_milk	4.1	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day		A_milk
Qs_milk	0.4	Quantity of soil ingested by animal	kg/day		A_milk
Fiforage_pork	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless		A_pork
Fisilage_pork	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock silage			A_pork
Qpiforage_pork	3.3	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	the same. This represents grain consumption by swine.	A_pork
Qpisilage_pork	1.4	Quanty of plant type (i) ingested by animal per day - silage.	kg DW/day		A_pork
Qs_pork	0.5	Quantity of soil ingested by animal	kg/day		A_pork
Fiforage_chicken	1	Fraction of plant type (i) grown on contaminated soil and ingested by animal - livestock forage (and grain)	unitless		A_chicken, A_egg
Qpiforage_chicken	0.2	Quanty of plant type (i) ingested by animal per day - forage and grain.	kg DW/day	the same. This represents grain consumption by chickens	A_chicken, A_egg

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 3
Site-specific Inputs
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes	Appears in Sheet
Qs_chicken	0.022	Quantity of soil ingested by animal	kg/day		A_chicken, A_egg
A_w	4.78E+04	Water body surface area	m^2		Ldep
A_i	5.80E+05	Impervious watershed surface area	m^2		LRI, LE
A_t	9.66E+06	Total watershed area receiving COPC deposition	m^2		LR, LE
R	8.2E-05	Universal gas constant	atm-m^3/K		Ldif
T_{wk}	3.0E+02	Water body temperature	K		Ldif
RF	1.8E+02	USLE rainfall (or erosivity) factor	yr^{-1}	Site-specific (midpoint of the range)	Xe
K_	3.6E-01	USLE erodibility factor	ton/acre	Default - 0.36 @ 1% TOC	Xe
LS	1.5E+00	USLE length-slope factor	unitless	"Default" = 1.5	Xe
C	1.0E-01	USLE cover management factor	unitless	Default for dense vegetation cover	Xe
PF	1.0E+00	USLE supporting practice factor	unitless	"Default"	Xe
a	1.4E+00	Empirical intercept coefficient	unitless	Based on watershed area	SD
b	1.3E-01	Empirical slope coefficient	unitless	Default value from Table B-4-14	SD
TSS	1.0E+01	Total suspended solids concentration	mg/L	Default - close to limited river data	fwc_fbs,Cdw
d_{wc}	6.8E-01	Depth of water column	m		fwc_fbs, Cwtot
d_{bs}	3.0E-02	Depth of upper benthic sediment layer	m		fwc_fbs, Cwtot
C_{BS}	1.0E+00	Bed sediment concentration (or bed sediment bulk density)	g/cm^3 or kg/L		fwc_fbs
θ_{bs}	6.0E-01	Bed sediment porosity	$L_{water}/L_{sediment}$		fwc_fbs
Vf_x	8.01E+08	Average volumetric flow rate through water body	m3/yr		Cwtot
θ	1.0E+00	Temperature correction factor	unitless		Kv
u	6.3E-01	Current velocity	m/s		KL
C_d	1.1E-03	Drag coefficient	unitless		KL
W	3.9E+00	Average annual wind speed	m/s		KG
ρ_a	1.2E-03	Density of air	g/cm^3		KG
ρ_w	1.0E+00	Density of water	g/cm^3		KG
k	4.0E-01	von Karman's constant	unitless		KG
λ_z	4.0E+00	Dimensionless viscous sublayer thickness	unitless		KG
μ_w	1.7E-02	Viscosity of water corresponding to water temperature	g/cm-s		KG
μ_a	1.81E-04	Viscosity of air	g/cm-s		KG

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 4
Modeled Air Concentrations and Deposition Term (Ds) (Annual concentration in soil from deposition)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$Ds = \frac{Ca \times \left(Vdv \times 3.15 \times 10^{7} \, {}^{s}/_{yr} \right) \times (1 - Fv) \times {}^{mg}/_{1{,}000 \, ug}}{\left(Zs \times {}^{m}/_{100 \, cm} \right) \times BD \times {}^{kg}/_{1{,}000 \, g} \times {}^{10^{6} \, cm^{3}}/_{m^{3}}}$$

Symbol	Value	Description	Units	Notes
Ca	calculated	Annual Average Concentration in Air	ug/m^3	
Ds	calculated	Deposition term	mg/kg-yr	
Zs	1	Soil mixing zone depth	cm	
BD	1.5	Soil bulk density	g soil/cm^3 soil	
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	Values in Appendix A-3 tables
Vdv	0.01	Deposition velocity	m/s	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 4
Modeled Air Concentrations and Deposition Term (Ds) (Annual concentration in soil from deposition)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Ca (ug/m^3 in air)	F_v	Ds (mg/kg-year in soil)	VOC?	Metal?
1,3-Butadiene	3.6E-05	1.0E+00	0.0E+00	Yes	No
1,6-Dinitropyrene	1.4E-07	0.0E+00	3.0E-06	No	No
1-Methylnaphthalene	7.6E-06	1.0E+00	0.0E+00	Yes	No
1-Nitropyrene	7.0E-06	0.0E+00	1.5E-04	No	No
2,4-Dinitrotoluene	1.4E-07	0.0E+00	3.0E-06	No	No
2,5-Diphenyloxazole	3.0E-06	0.0E+00	6.3E-05	No	No
2,6-Dinitrotoluene	4.1E-07	0.0E+00	8.6E-06	No	No
2-Methylnaphthalene	7.6E-06	1.0E+00	0.0E+00	Yes	No
2-Nitronaphthalene	1.2E-07	1.0E+00	0.0E+00	Yes	No
4-Nitrophenol	1.4E-07	0.0E+00	3.0E-06	No	No
4-Nitrosodiphenylamine	1.4E-07	1.0E+00	0.0E+00	Yes	No
Benzo[a]anthracene	3.1E-07	0.0E+00	6.6E-06	No	No
Benzene	3.5E-03	1.0E+00	0.0E+00	Yes	No
Benzo[a]pyrene	1.4E-07	0.0E+00	3.0E-06	No	No
Biphenyl (1,1-Biphenyl)	1.5E-05	0.0E+00	3.1E-04	No	No
Dibenz[a,h]anthracene	1.4E-07	0.0E+00	3.0E-06	No	No
Dibenzofuran	3.2E-06	1.0E+00	0.0E+00	Yes	No
Di-n-propyl adipate (Dipropyl adipate)	4.3E-06	1.0E+00	0.0E+00	Yes	No
Dioxin (2,3,7,8-TCDD)	8.2E-11	0.0E+00	1.7E-09	No	No
Diphenylamine	6.0E-07	0.0E+00	1.3E-05	No	No
Mesitylene (1,3,5-trimethylbenzene)	2.6E-06	1.0E+00	0.0E+00	Yes	No
Naphthalene	2.8E-07	1.0E+00	0.0E+00	Yes	No
n-Hexane	3.6E-05	1.0E+00	0.0E+00	Yes	No
N-Nitrosodiphenylamine	1.4E-07	1.0E+00	0.0E+00	Yes	No
Phenanthrene	6.3E-06	0.0E+00	1.3E-04	No	No
Phenol	2.0E-07	0.0E+00	4.2E-06	No	No
Pyrene	1.4E-07	0.0E+00	3.0E-06	No	No
Resorcinol	2.1E-05	0.0E+00	4.3E-04	No	No
Styrene	3.6E-05	1.0E+00	0.0E+00	Yes	No
Thianaphthene (benzo[b]thiophene)	1.4E-07	1.0E+00	0.0E+00	Yes	No
Toluene	7.6E-04	1.0E+00	0.0E+00	Yes	No
Triacetin	1.4E-07	0.0E+00	3.0E-06	No	No
Xylenes	2.0E-04	1.0E+00	0.0E+00	Yes	No
Aluminum	3.2E-01	0.0E+00	6.6E+00	No	Yes
Lead	3.0E-02	0.0E+00	6.3E-01	No	Yes
Zirconium	6.2E-04	0.0E+00	1.3E-02	No	Yes
copper	8.7E-03	0.0E+00	1.8E-01	No	Yes
Iron	9.5E-05	0.0E+00	2.0E-03	No	Yes

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 5
Cumulative Concentrations in Soil (Source: Table B-1-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

For Carcinogens

$$Cs = \frac{Ds}{ks \times (tD - T_1)} \times \left[\left(tD + \frac{\exp(-ks \times tD)}{ks} \right) - \left(T_1 + \frac{\exp(-ks \times T_1)}{ks} \right) \right]$$

For Non-carcinogens

$$Cs_D = \frac{Ds \times [1 - \exp(-ks \times tD)]}{ks}$$

Symbol	Value	Description	Units	Notes
Cs	calculated	Average soil concentration over exposure duration	mg/kg	Concentration used to estimate excess lifetime cancer risks or carcinogenic risks
CstD	calculated	Soil concentration at time tD (at the end of the facility operating life)	mg/kg	Concentration used to evaluate noncancer health risks or noncarcinogenic risks
Ds	calculated	Deposition term	mg/kg-yr	Calculated from sheet "Ca_Ds"
T1	0	Time period at the beginning of facility operation	yr	
ks	chemical-specific	Soil loss constant due to all processes - chemical-specific	yr^{-1}	See Table B-1-2 for derivation; value in this worksheet obtained from sheet "ks"
tD	30	Time period over which deposition occurs (time period of facility operation)	yr	Time period of facility operation is assumed to be same as residential exposure duration (30 years)

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 5
Cumulative Concentrations in Soil (Source: Table B-1-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Ds (mg/kg-yr)	ks (yr-1)	Cs (mg/kg) - carcinogenic	CstD (mg/kg) - noncarcinogenic
1,3-Butadiene	0.0E+00	3.5E+01	0.0E+00	0.0E+00
1,6-Dinitropyrene	3.0E-06	2.9E-01	9.0E-06	1.0E-05
1-Methylnaphthalene	0.0E+00	2.5E+02	0.0E+00	0.0E+00
1-Nitropyrene	1.5E-04	1.9E-01	6.4E-04	7.8E-04
2,4-Dinitrotoluene	3.0E-06	5.6E+01	5.4E-08	5.4E-08
2,5-Diphenyloxazole	6.3E-05	9.6E+00	6.6E-06	6.6E-06
2,6-Dinitrotoluene	8.6E-06	6.5E+01	1.3E-07	1.3E-07
2-Methylnaphthalene	0.0E+00	1.1E+02	0.0E+00	0.0E+00
2-Nitronaphthalene	0.0E+00	1.1E+02	0.0E+00	0.0E+00
4-Nitrophenol	3.0E-06	2.7E+02	1.1E-08	1.1E-08
4-Nitrosodiphenylamine	0.0E+00	9.6E+00	0.0E+00	0.0E+00
Benzo[a]anthracene	6.6E-06	3.9E-01	1.6E-05	1.7E-05
Benzene	0.0E+00	5.0E+01	0.0E+00	0.0E+00
Benzo[a]pyrene	3.0E-06	4.8E-01	5.8E-06	6.2E-06
Biphenyl (1,1-Biphenyl)	3.1E-04	3.8E+01	8.2E-06	8.2E-06
Dibenz[a,h]anthracene	3.0E-06	2.7E-01	9.7E-06	1.1E-05
Dibenzofuran	0.0E+00	9.4E+00	0.0E+00	0.0E+00
Di-n-propyl adipate (Dipropyl adipate)	0.0E+00	3.8E+01	0.0E+00	0.0E+00
Dioxin (2,3,7,8-TCDD)	1.7E-09	4.3E-01	3.7E-09	4.0E-09
Diphenylamine	1.3E-05	1.4E+01	9.2E-07	9.2E-07
Mesitylene (1,3,5-trimethylbenzene)	0.0E+00	3.4E+01	0.0E+00	0.0E+00
Naphthalene	0.0E+00	8.2E+00	0.0E+00	0.0E+00
n-Hexane	0.0E+00	3.3E+01	0.0E+00	0.0E+00
N-Nitrosodiphenylamine	0.0E+00	1.8E+01	0.0E+00	0.0E+00
Phenanthrene	1.3E-04	1.4E+00	9.1E-05	9.3E-05
Phenol	4.2E-06	1.2E+02	3.4E-08	3.4E-08
Pyrene	3.0E-06	1.8E-01	1.3E-05	1.6E-05
Resorcinol	4.3E-04	2.5E+02	1.7E-06	1.7E-06
Styrene	0.0E+00	1.3E+01	0.0E+00	0.0E+00
Thianaphthene (benzo[b]thiophene)	0.0E+00	2.6E+02	0.0E+00	0.0E+00
Toluene	0.0E+00	3.4E+01	0.0E+00	0.0E+00
Triacetin	3.0E-06	2.3E+02	1.3E-08	1.3E-08
Xylenes	0.0E+00	2.0E+01	0.0E+00	0.0E+00
Aluminum	6.6E+00	2.3E-02	8.0E+01	1.4E+02
Lead	6.3E-01	3.9E-02	6.7E+00	1.1E+01
Zirconium	1.3E-02	1.2E-02	1.8E-01	3.3E-01
copper	1.8E-01	3.5E-03	2.6E+00	5.2E+00
Iron	2.0E-03	1.4E+00	1.4E-03	1.4E-03

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 6
Soil Loss Constant Due to All Processes (Source: Table B-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$ks = ksg + kse + ksr + ksl + ksv$$

Symbol	Value	Description	Units	Notes
ks	calculated	soil loss constant due to all process	yr^{-1}	This sheet captures values from sheets "kse", "ksr", "ksl" and "ksv"
ksg	chemical-specific	soil loss constant due to biotic and abiotic degradation	yr^{-1}	Data obtained from Appendix A-3 tables in combustion guidance; value in this sheet is imported from sheet titled "Appendix A-3 tables"
kse	chemical-specific	soil loss constant due to soil erosion	yr^{-1}	According to Table B-1-3, the default assumption is to set value of this constant to zero.
ksr	calculated	Soil loss constant fue to surface runoff	yr^{-1}	Table B-1-4
ksl	calculated	soil loss constant due to leaching	yr^{-1}	Table B-1-5
ksv	chemical-specific	soil loss constant due to volatilization	yr^{-1}	According to Table B-1-3, the default assumption is to set value of this constant to zero.

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 6
Soil Loss Constant Due to All Processes (Source: Table B-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	ksg (yr^{-1})	kse (yr^{-1})	ksr (yr^{-1})	ksl (yr^{-1})	ksv(yr^{-1})	ks (yr^{-1})
1,3-Butadiene	9.0E+00	0.00E+00	2.5E+01	7.5E-01	0.00E+00	3.5E+01
1,6-Dinitropyrene	1.3E-01	0.00E+00	1.6E-01	4.6E-03	0.00E+00	2.9E-01
1-Methylnaphthalene	2.5E+02	0.00E+00	7.4E-01	2.2E-02	0.00E+00	2.5E+02
1-Nitropyrene	1.3E-01	0.00E+00	5.2E-02	1.5E-03	0.00E+00	1.9E-01
2,4-Dinitrotoluene	1.4E+00	0.00E+00	5.3E+01	1.6E+00	0.00E+00	5.6E+01
2,5-Diphenyloxazole	9.0E+00	0.00E+00	5.5E-01	1.6E-02	0.00E+00	9.6E+00
2,6-Dinitrotoluene	1.4E+00	0.00E+00	6.2E+01	1.8E+00	0.00E+00	6.5E+01
2-Methylnaphthalene	1.1E+02	0.00E+00	4.3E-01	1.3E-02	0.00E+00	1.1E+02
2-Nitronaphthalene	1.1E+02	0.00E+00	3.0E+00	8.8E-02	0.00E+00	1.1E+02
4-Nitrophenol	2.1E+02	0.00E+00	6.0E+01	1.8E+00	0.00E+00	2.7E+02
4-Nitrosodiphenylamine	1.4E+00	0.00E+00	8.0E+00	2.3E-01	0.00E+00	9.6E+00
Benzo[a]anthracene	3.7E-01	0.00E+00	1.3E-02	3.8E-04	0.00E+00	3.9E-01
Benzene	3.9E+00	0.00E+00	4.5E+01	1.3E+00	0.00E+00	5.0E+01
Benzo[a]pyrene	4.8E-01	0.00E+00	3.5E-03	1.0E-04	0.00E+00	4.8E-01
Biphenyl (1,1-Biphenyl)	3.6E+01	0.00E+00	1.8E+00	5.3E-02	0.00E+00	3.8E+01
Dibenz[a,h]anthracene	2.7E-01	0.00E+00	1.9E-03	5.6E-05	0.00E+00	2.7E-01
Dibenzofuran	9.0E+00	0.00E+00	3.4E-01	9.9E-03	0.00E+00	9.4E+00
Di-n-propyl adipate (Dipropyl adipate)	3.2E+01	0.00E+00	5.7E+00	1.7E-01	0.00E+00	3.8E+01
Dioxin (2,3,7,8-TCDD)	4.3E-01	0.00E+00	1.3E-03	3.7E-05	0.00E+00	4.3E-01
Diphenylamine	9.0E+00	0.00E+00	4.6E+00	1.3E-01	0.00E+00	1.4E+01
Mesitylene (1,3,5-trimethylbenzene)	3.2E+01	0.00E+00	2.0E+00	5.9E-02	0.00E+00	3.4E+01
Naphthalene	5.3E+00	0.00E+00	2.8E+00	8.3E-02	0.00E+00	8.2E+00
n-Hexane	3.2E+01	0.00E+00	1.8E+00	5.3E-02	0.00E+00	3.3E+01
N-Nitrosodiphenylamine	7.4E+00	0.00E+00	1.0E+01	2.9E-01	0.00E+00	1.8E+01
Phenanthrene	1.3E+00	0.00E+00	1.6E-01	4.8E-03	0.00E+00	1.4E+00
Phenol	2.5E+01	0.00E+00	9.6E+01	2.8E+00	0.00E+00	1.2E+02
Pyrene	1.3E-01	0.00E+00	5.0E-02	1.5E-03	0.00E+00	1.8E-01
Resorcinol	6.3E+01	0.00E+00	1.8E+02	5.2E+00	0.00E+00	2.5E+02
Styrene	9.0E+00	0.00E+00	3.7E+00	1.1E-01	0.00E+00	1.3E+01
Thianaphthene (benzo[b]thiophene)	2.5E+02	0.00E+00	8.6E+00	2.5E-01	0.00E+00	2.6E+02
Toluene	1.2E+01	0.00E+00	2.2E+01	6.5E-01	0.00E+00	3.4E+01
Triacetin	1.9E+00	0.00E+00	2.2E+02	6.4E+00	0.00E+00	2.3E+02
Xylenes	9.0E+00	0.00E+00	1.0E+01	3.1E-01	0.00E+00	2.0E+01
Aluminum	0.0E+00	0.00E+00	2.3E-02	6.7E-04	0.00E+00	2.3E-02
Lead	0.0E+00	0.00E+00	3.8E-02	1.1E-03	0.00E+00	3.9E-02
Zirconium	0.0E+00	0.00E+00	1.1E-02	3.3E-04	0.00E+00	1.2E-02
copper	0.0E+00	0.00E+00	3.4E-03	1.0E-04	0.00E+00	3.5E-03
Iron	0.0E+00	0.00E+00	1.4E+00	4.0E-02	0.00E+00	1.4E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 7
Soil Loss Constant Due to Runoff (ksr) (Source: Table B-1-4)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$ksr = \frac{RO}{\theta_{sw} \times Z_s} \times \left(\frac{1}{1 + (Kd_s \times BD / \theta_{sw})} \right)$$

Symbol	Value	Description	Units	Notes
ksr	calculated	soil loss constant due to runoff	yr^{-1}	
RO	51	Average annual surfaced runoff from pervious areas	cm/yr	
θ_{sw}	0.2	Soil volumetric water content	mL water/cm^3 soil	
Z_s	1.0E+00	Soil mixing zone depth	cm	Same value as mixing depth in sheet "Ca_Ds" (input on this sheet is echoed from sheet "Ca_Ds")
Kd_s	Chemical-specific	Soil-water partition coefficient	cm^3 water/g soil	Appendix A-3
BD	1.5E+00	Soil bulk density	g soil/cm^3 soil	Same value as bulk density in sheet "Ca_Ds" (input on this sheet is echoed from sheet "Ca_Ds")

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 7
Soil Loss Constant Due to Runoff (ksr) (Source: Table B-1-4)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Kd_s (cm^3/g)	ksr (yr^{-1})
1,3-Butadiene	1.2E+00	2.5E+01
1,6-Dinitropyrene	2.2E+02	1.6E-01
1-Methylnaphthalene	4.6E+01	7.4E-01
1-Nitropyrene	6.5E+02	5.2E-02
2,4-Dinitrotoluene	5.1E-01	5.3E+01
2,5-Diphenyloxazole	6.2E+01	5.5E-01
2,6-Dinitrotoluene	4.2E-01	6.2E+01
2-Methylnaphthalene	7.9E+01	4.3E-01
2-Nitronaphthalene	1.1E+01	3.0E+00
4-Nitrophenol	4.4E-01	6.0E+01
4-Nitrosodiphenylamin	4.1E+00	8.0E+00
Benzo[a]anthracene	2.6E+03	1.3E-02
Benzene	6.2E-01	4.5E+01
Benzo[a]pyrene	9.7E+03	3.5E-03
Biphenyl (1,1-Biphenyl	1.9E+01	1.8E+00
Dibenz[a,h]anthracene	1.8E+04	1.9E-03
Dibenzofuran	1.0E+02	3.4E-01
Di-n-propyl adipate (Di	5.8E+00	5.7E+00
Dioxin (2,3,7,8-TCDD)	2.7E+04	1.3E-03
Diphenylamine	7.3E+00	4.6E+00
Mesitylene (1,3,5-trime	1.7E+01	2.0E+00
Naphthalene	1.2E+01	2.8E+00
n-Hexane	1.9E+01	1.8E+00
N-Nitrosodiphenylamin	3.3E+00	1.0E+01
Phenanthrene	2.1E+02	1.6E-01
Phenol	2.2E-01	9.6E+01
Pyrene	6.8E+02	5.0E-02
Resorcinol	5.7E-02	1.8E+02
Styrene	9.1E+00	3.7E+00
Thianaphthene (benzo	3.8E+00	8.6E+00
Toluene	1.4E+00	2.2E+01
Triacetin	2.2E-02	2.2E+02
Xylenes	3.1E+00	1.0E+01
Aluminum	1.5E+03	2.3E-02
Lead	9.0E+02	3.8E-02
Zirconium	3.0E+03	1.1E-02
copper	1.0E+04	3.4E-03
Iron	2.5E+01	1.4E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 8
Soil Loss Constant Due to Leaching (ksl) (Source: Table B-1-5)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$ksl = \frac{P + I - RO - E_v}{\theta_{sw} \times Z_s \times [1.0 + (BD \times Kd_s / \theta_{sw})]}$$

Symbol	Value	Description	Units	Notes
ksl	calculated	COPC loss constant due to leaching	yr^{-1}	
P	90	Average annual precipitation	cm/yr	Site-specific (Range 18.06 to 164.19)
I	25	Average annual irrigation	cm/yr	Site-specific (Range 0 to 100)
RO	51	Average annual surface runoff from pervious areas	cm/yr	Site-specific
E_v	62.5	Average annual evapotranspiration	cm/yr	Site-specific (Range 35 to 100)
0_{sw}	0.2	Soil volumetric water content	mL water/cm^3 soil	
Z_s	1.0	Soil mixing zone depth	cm	
BD	1.5	Soil bulk density	g soil/cm^3 soil	
Kd_s	chemical-specific	Soil-water partition coefficient	cm^3 water/g soil	Appendix A-3

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 8
Soil Loss Constant Due to Leaching (ksl) (Source: Table B-1-5)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Kd_s	ksl (yr^{-1})
1,3-Butadiene	1.2E+00	7.49E-01
1,6-Dinitropyrene	2.2E+02	4.58E-03
1-Methylnaphthalene	4.6E+01	2.18E-02
1-Nitropyrene	6.5E+02	1.53E-03
2,4-Dinitrotoluene	5.1E-01	1.55E+00
2,5-Diphenyloxazole	6.2E+01	1.60E-02
2,6-Dinitrotoluene	4.2E-01	1.81E+00
2-Methylnaphthalene	7.9E+01	1.26E-02
2-Nitronaphthalene	1.1E+01	8.83E-02
4-Nitrophenol	4.4E-01	1.75E+00
4-Nitrosodiphenylamine	4.1E+00	2.35E-01
Benzo[a]anthracene	2.6E+03	3.85E-04
Benzene	6.2E-01	1.33E+00
Benzo[a]pyrene	9.7E+03	1.03E-04
Biphenyl (1,1-Biphenyl)	1.9E+01	5.32E-02
Dibenz[a,h]anthracene	1.8E+04	5.59E-05
Dibenzofuran	1.0E+02	9.87E-03
Di-n-propyl adipate (Dipropyl adipate)	5.8E+00	1.68E-01
Dioxin (2,3,7,8-TCDD)	2.7E+04	3.72E-05
Diphenylamine	7.3E+00	1.34E-01
Mesitylene (1,3,5-trimethylbenzene)	1.7E+01	5.94E-02
Naphthalene	1.2E+01	8.31E-02
n-Hexane	1.9E+01	5.32E-02
N-Nitrosodiphenylamine	3.3E+00	2.94E-01
Phenanthrene	2.1E+02	4.78E-03
Phenol	2.2E-01	2.83E+00
Pyrene	6.8E+02	1.47E-03
Resorcinol	5.7E-02	5.24E+00
Styrene	9.1E+00	1.08E-01
Thianaphthene (benzo[b]thiophene)	3.8E+00	2.52E-01
Toluene	1.4E+00	6.52E-01
Triacetin	2.2E-02	6.43E+00
Xylenes	3.1E+00	3.08E-01
Aluminum	1.5E+03	6.67E-04
Lead	9.0E+02	1.11E-03
Zirconium	3.0E+03	3.33E-04
copper	1.0E+04	1.00E-04
Iron	2.5E+01	3.98E-02

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 18
Total Water Body Load (LT) (Source: TABLE B-4-7)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$L_T = L_{DEP} + L_{dif} + L_{RI} + L_R + L_E$$

Symbol	Value	Description	Units	Notes
LT	see below	Total chemical load to the water body	g/yr	
LDEP	see below	Total direct deposition load to water body	g/yr	See Table B-4-8; input from sheet "Ldep"
Ldif	see below	Vapor phase COPC diffusion load to water body	g/yr	Deposition or indirect pathways are not evaluated for VOCs. Ldif is set to zero
LRI	see below	Runoff load from impervious surfaces	g/yr	See Table B-4-9; input from sheet "LRI"
LR	see below	Runoff load from pervious surfaces	g/yr	See Table B-4-10; input from sheet " LR"
LE	see below	Soil erosion load	g/yr	See Table B-4-11; input from sheet "LE"

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 18
Total Water Body Load (LT) (Source: TABLE B-4-7)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	L_{DEP} (g/yr)	L_{dif} (g/yr)	L_{RI} (g/yr)	L_R - carcinogenic chemicals (g/yr)	L_E - carcinogenic chemicals (g/yr)	L_T - carcinogenic chemicals (g/yr)		L_{DEP} (g/yr)	L_{dif} (g/yr)	L_{RI} (g/yr)	L_R - noncarcinogenic chemicals (g/yr)	L_E - noncarcinogenic chemicals (g/yr)	L_T - noncarcinogenic chemicals (g/yr)
1,3-Butadiene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,6-Dinitropyrene	2.1E-03	0.0E+00	2.6E-02	1.9E-01	9.8E-02	3.2E-01		2.1E-03	0.0E+00	2.6E-02	2.2E-01	1.1E-01	3.5E-01
1-Methylnaphthalen	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1-Nitropyrene	1.0E-01	0.0E+00	1.3E+00	4.6E+00	7.0E+00	1.3E+01		1.0E-01	0.0E+00	1.3E+00	5.5E+00	8.4E+00	1.5E+01
2,4-Dinitrotoluene	2.1E-03	0.0E+00	2.6E-02	3.5E-01	4.2E-04	3.8E-01		2.1E-03	0.0E+00	2.6E-02	3.5E-01	4.2E-04	3.8E-01
2,5-Diphenyloxazole	4.5E-02	0.0E+00	5.5E-01	4.9E-01	7.1E-02	1.2E+00		4.5E-02	0.0E+00	5.5E-01	4.9E-01	7.1E-02	1.2E+00
2,6-Dinitrotoluene	6.2E-03	0.0E+00	7.5E-02	1.0E+00	9.8E-04	1.1E+00		6.2E-03	0.0E+00	7.5E-02	1.0E+00	9.8E-04	1.1E+00
2-Methylnaphthalen	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2-Nitronaphthalene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4-Nitrophenol	2.1E-03	0.0E+00	2.6E-02	8.0E-02	8.2E-05	1.1E-01		2.1E-03	0.0E+00	2.6E-02	8.0E-02	8.2E-05	1.1E-01
4-Nitrosodiphenylan	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Benzo[a]anthracene	4.7E-03	0.0E+00	5.7E-02	2.8E-02	1.7E-01	2.6E-01		4.7E-03	0.0E+00	5.7E-02	3.0E-02	1.8E-01	2.8E-01
Benzene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Benzo[a]pyrene	2.1E-03	0.0E+00	2.6E-02	2.8E-03	6.3E-02	9.4E-02		2.1E-03	0.0E+00	2.6E-02	3.0E-03	6.7E-02	9.8E-02
Biphenyl (1,1-Biphe	2.2E-01	0.0E+00	2.7E+00	2.0E+00	8.8E-02	5.0E+00		2.2E-01	0.0E+00	2.7E+00	2.0E+00	8.8E-02	5.0E+00
Dibenz[a,h]anthrace	2.1E-03	0.0E+00	2.6E-02	2.5E-03	1.0E-01	1.4E-01		2.1E-03	0.0E+00	2.6E-02	2.9E-03	1.2E-01	1.5E-01
Dibenzofuran	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Di-n-propyl adipate	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Dioxin (2,3,7,8-TCD	1.2E-06	0.0E+00	1.5E-05	6.4E-07	4.0E-05	5.7E-05		1.2E-06	0.0E+00	1.5E-05	6.9E-07	4.3E-05	6.0E-05
Diphenylamine	9.1E-03	0.0E+00	1.1E-01	5.7E-01	9.7E-03	6.9E-01		9.1E-03	0.0E+00	1.1E-01	5.7E-01	9.7E-03	7.0E-01
Mesitylene (1,3,5-tri	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Naphthalene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
n-Hexane	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
N-Nitrosodiphenylan	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Phenanthrene	9.5E-02	0.0E+00	1.2E+00	2.0E+00	9.8E-01	4.2E+00		9.5E-02	0.0E+00	1.2E+00	2.1E+00	1.0E+00	4.3E+00
Phenol	3.0E-03	0.0E+00	3.6E-02	3.7E-01	1.9E-04	4.1E-01		3.0E-03	0.0E+00	3.6E-02	3.7E-01	1.9E-04	4.1E-01
Pyrene	2.1E-03	0.0E+00	2.6E-02	9.1E-02	1.4E-01	2.6E-01		2.1E-03	0.0E+00	2.6E-02	1.1E-01	1.7E-01	3.1E-01
Resorcinol	3.1E-01	0.0E+00	3.8E+00	3.1E+01	4.2E-03	3.6E+01		3.1E-01	0.0E+00	3.8E+00	3.1E+01	4.2E-03	3.6E+01
Styrene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Thianaphthene (ben	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Toluene	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Triacetin	2.1E-03	0.0E+00	2.6E-02	2.7E-01	1.4E-05	3.0E-01		2.1E-03	0.0E+00	2.6E-02	2.7E-01	1.4E-05	3.0E-01
Xylenes	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00		0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Aluminum	4.8E+03	0.0E+00	5.8E+04	2.5E+05	2.9E+05	6.0E+05		4.8E+03	0.0E+00	5.8E+04	4.4E+05	5.2E+05	1.0E+06
Lead	4.5E+02	0.0E+00	5.5E+03	3.4E+04	2.4E+04	6.4E+04		4.5E+02	0.0E+00	5.5E+03	5.8E+04	4.0E+04	1.0E+05
Zirconium	9.4E+00	0.0E+00	1.1E+02	2.7E+02	6.3E+02	1.0E+03		9.4E+00	0.0E+00	1.1E+02	5.1E+02	1.2E+03	1.8E+03
copper	1.3E+02	0.0E+00	1.6E+03	1.2E+03	9.5E+03	1.2E+04		1.3E+02	0.0E+00	1.6E+03	2.4E+03	1.9E+04	2.3E+04
Iron	1.4E+00	0.0E+00	1.7E+01	2.6E+02	5.0E+00	2.8E+02		1.4E+00	0.0E+00	1.7E+01	2.6E+02	5.1E+00	2.9E+02

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 19
Deposition to Water Body (L_{DEP})
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$L_{dep} = Ca \times {}^{g}/_{10^{6}\,ug} \times (1-Fv) \times Vdv \times {}^{3.15\times10^{7}\,s}/_{yr} \times A_{w}$$

Symbol	Value	Description	Units	Notes
L_{DEP}		Total direct deposition load to water body	g/yr	
Ca	calculated	Annual Average Concentration in Air	ug/m3	Input from sheet "Ca_Ds"
F_v		Fraction of COPC air concentration in vapor phase	unitless	Appendix A-3 (Range 0 to 1)
Vdv	0.01	Deposition velocity	m/s	Input from sheet "Ca_Ds"
A_W	47800	Water body surface area	m^2	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 19
Deposition to Water Body (L_{DEP})
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Ca (ug/m3)	Fv	L_{DEP} (g/yr)	VOC?
1,3-Butadiene	3.6E-05	1.0E+00	0.0E+00	Yes
1,6-Dinitropyrene	1.4E-07	0.0E+00	2.1E-03	No
1-Methylnaphthalene	7.6E-06	1.0E+00	0.0E+00	Yes
1-Nitropyrene	7.0E-06	0.0E+00	1.0E-01	No
2,4-Dinitrotoluene	1.4E-07	0.0E+00	2.1E-03	No
2,5-Diphenyloxazole	3.0E-06	0.0E+00	4.5E-02	No
2,6-Dinitrotoluene	4.1E-07	0.0E+00	6.2E-03	No
2-Methylnaphthalene	7.6E-06	1.0E+00	0.0E+00	Yes
2-Nitronaphthalene	1.2E-07	1.0E+00	0.0E+00	Yes
4-Nitrophenol	1.4E-07	0.0E+00	2.1E-03	No
4-Nitrosodiphenylamine	1.4E-07	1.0E+00	0.0E+00	Yes
Benzo[a]anthracene	3.1E-07	0.0E+00	4.7E-03	No
Benzene	3.5E-03	1.0E+00	0.0E+00	Yes
Benzo[a]pyrene	1.4E-07	0.0E+00	2.1E-03	No
Biphenyl (1,1-Biphenyl)	1.5E-05	0.0E+00	2.2E-01	No
Dibenz[a,h]anthracene	1.4E-07	0.0E+00	2.1E-03	No
Dibenzofuran	3.2E-06	1.0E+00	0.0E+00	Yes
Di-n-propyl adipate (Diprop	4.3E-06	1.0E+00	0.0E+00	Yes
Dioxin (2,3,7,8-TCDD)	8.2E-11	0.0E+00	1.2E-06	No
Diphenylamine	6.0E-07	0.0E+00	9.1E-03	No
Mesitylene (1,3,5-trimethylb	2.6E-06	1.0E+00	0.0E+00	Yes
Naphthalene	2.8E-07	1.0E+00	0.0E+00	Yes
n-Hexane	3.6E-05	1.0E+00	0.0E+00	Yes
N-Nitrosodiphenylamine	1.4E-07	1.0E+00	0.0E+00	Yes
Phenanthrene	6.3E-06	0.0E+00	9.5E-02	No
Phenol	2.0E-07	0.0E+00	3.0E-03	No
Pyrene	1.4E-07	0.0E+00	2.1E-03	No
Resorcinol	2.1E-05	0.0E+00	3.1E-01	No
Styrene	3.6E-05	1.0E+00	0.0E+00	Yes
Thianaphthene (benzo[b]th	1.4E-07	1.0E+00	0.0E+00	Yes
Toluene	7.6E-04	1.0E+00	0.0E+00	Yes
Triacetin	1.4E-07	0.0E+00	2.1E-03	No
Xylenes	2.0E-04	1.0E+00	0.0E+00	Yes
Aluminum	3.2E-01	0.0E+00	4.8E+03	No
Lead	3.0E-02	0.0E+00	4.5E+02	No
Zirconium	6.2E-04	0.0E+00	9.4E+00	No
copper	8.7E-03	0.0E+00	1.3E+02	No
Iron	9.5E-05	0.0E+00	1.4E+00	No

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 20
Impervious Runoff Load to Water Body (L_{RI})
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$L_{RI} = Ca \times {}^{g}/_{10^6\ ug} \times (1-Fv) \times Vdv \times {}^{3.15\times10^7\ s}/_{yr} \times A_I$$

Symbol	Value	Description	Units	Notes
L_{RI}	calculated	Runoff load from impervious surfaces	g/yr	
Ca	calculated	Annual Average Concentration in Air	ug/m^3	Input from sheet "Ca_Ds"
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	Appendix A-3 (Range 0 to 1)
Vdv	0.01	Deposition velocity	m/s	Input from sheet "Ca_Ds"
A_I	580000	Impervious watershed surface area	m^2	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 20
Impervious Runoff Load to Water Body (L_{RI})
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Ca (ug/m^3)	Fv	L_{RI} (g/yr)	VOC?
1,3-Butadiene	3.6E-05	1.0E+00	0.0E+00	Yes
1,6-Dinitropyrene	1.4E-07	0.0E+00	2.6E-02	No
1-Methylnaphthalene	7.6E-06	1.0E+00	0.0E+00	Yes
1-Nitropyrene	7.0E-06	0.0E+00	1.3E+00	No
2,4-Dinitrotoluene	1.4E-07	0.0E+00	2.6E-02	No
2,5-Diphenyloxazole	3.0E-06	0.0E+00	5.5E-01	No
2,6-Dinitrotoluene	4.1E-07	0.0E+00	7.5E-02	No
2-Methylnaphthalene	7.6E-06	1.0E+00	0.0E+00	Yes
2-Nitronaphthalene	1.2E-07	1.0E+00	0.0E+00	Yes
4-Nitrophenol	1.4E-07	0.0E+00	2.6E-02	No
4-Nitrosodiphenylamine	1.4E-07	1.0E+00	0.0E+00	Yes
Benzo[a]anthracene	3.1E-07	0.0E+00	5.7E-02	No
Benzene	3.5E-03	1.0E+00	0.0E+00	Yes
Benzo[a]pyrene	1.4E-07	0.0E+00	2.6E-02	No
Biphenyl (1,1-Biphenyl)	1.5E-05	0.0E+00	2.7E+00	No
Dibenz[a,h]anthracene	1.4E-07	0.0E+00	2.6E-02	No
Dibenzofuran	3.2E-06	1.0E+00	0.0E+00	Yes
Di-n-propyl adipate (Diprop	4.3E-06	1.0E+00	0.0E+00	Yes
Dioxin (2,3,7,8-TCDD)	8.2E-11	0.0E+00	1.5E-05	No
Diphenylamine	6.0E-07	0.0E+00	1.1E-01	No
Mesitylene (1,3,5-trimethylb	2.6E-06	1.0E+00	0.0E+00	Yes
Naphthalene	2.8E-07	1.0E+00	0.0E+00	Yes
n-Hexane	3.6E-05	1.0E+00	0.0E+00	Yes
N-Nitrosodiphenylamine	1.4E-07	1.0E+00	0.0E+00	Yes
Phenanthrene	6.3E-06	0.0E+00	1.2E+00	No
Phenol	2.0E-07	0.0E+00	3.6E-02	No
Pyrene	1.4E-07	0.0E+00	2.6E-02	No
Resorcinol	2.1E-05	0.0E+00	3.8E+00	No
Styrene	3.6E-05	1.0E+00	0.0E+00	Yes
Thianaphthene (benzo[b]th	1.4E-07	1.0E+00	0.0E+00	Yes
Toluene	7.6E-04	1.0E+00	0.0E+00	Yes
Triacetin	1.4E-07	0.0E+00	2.6E-02	No
Xylenes	2.0E-04	1.0E+00	0.0E+00	Yes
Aluminum	3.2E-01	0.0E+00	5.8E+04	No
Lead	3.0E-02	0.0E+00	5.5E+03	No
Zirconium	6.2E-04	0.0E+00	1.1E+02	No
copper	8.7E-03	0.0E+00	1.6E+03	No
Iron	9.5E-05	0.0E+00	1.7E+01	No

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 21
Runoff Load from Pervious Surfaces (L_R) (Source: TABLE B-4-10)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$L_R = RO \times (A_L - A_I) \times \frac{Cs \times BD}{\theta_{sw} + Kd_s \times BD} \times 0.01$$

Symbol	Value	Description	Units	Notes
L_R		Runoff load from pervious surfaces	g/yr	
Cs	calculated	Average soil concentration over exposure duration	mg/kg	Concentration used to estimate excess lifetime cancer risks; input from sheet "Cs"
CstD	calculated	Soil concentration at time tD (at the end of the facility operating life)	mg/kg	Concentration used to evaluate noncancer health risks; input from sheet "Cs"
RO	51	Average annual surface runoff from pervious areas	cm/yr	
A_L	9660000	Total watershed area receiving COPC deposition	m^2	
A_I	580000	Impervious watershed area receiving COPC deposition	m^2	input from sheet "LRI"
BD	1.5	Soil bulk density	g soil/cm^3 soil	
θ_{sw}	0.2	Soil volumetric water content	mL water/cm^3 soil	
Kd_s	chemical-specific	Soil-water partition coefficient	cm^3 water/g soil	Appendix A-3
0.01		Units conversion factor	kg-cm^2/mg-m^2	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 21
Runoff Load from Pervious Surfaces (L_R) (Source: TABLE B-4-10)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Cs (mg/kg)	Cstd (mg/kg)	Kd_s	L_R - carcinogenic chemicals (g/yr)	L_R - noncarcinogenic chemicals (g/yr)	VOC?
1,3-Butadiene	0.0E+00	0.0E+00	1.2E+00	0.0E+00	0.0E+00	Yes
1,6-Dinitropyrene	9.0E-06	1.0E-05	2.2E+02	1.9E-01	2.2E-01	No
1-Methylnaphthalene	0.0E+00	0.0E+00	4.6E+01	0.0E+00	0.0E+00	Yes
1-Nitropyrene	6.4E-04	7.8E-04	6.5E+02	4.6E+00	5.5E+00	No
2,4-Dinitrotoluene	5.4E-08	5.4E-08	5.1E-01	3.5E-01	3.5E-01	No
2,5-Diphenyloxazole	6.6E-06	6.6E-06	6.2E+01	4.9E-01	4.9E-01	No
2,6-Dinitrotoluene	1.3E-07	1.3E-07	4.2E-01	1.0E+00	1.0E+00	No
2-Methylnaphthalene	0.0E+00	0.0E+00	7.9E+01	0.0E+00	0.0E+00	Yes
2-Nitronaphthalene	0.0E+00	0.0E+00	1.1E+01	0.0E+00	0.0E+00	Yes
4-Nitrophenol	1.1E-08	1.1E-08	4.4E-01	8.0E-02	8.0E-02	No
4-Nitrosodiphenylamine	0.0E+00	0.0E+00	4.1E+00	0.0E+00	0.0E+00	Yes
Benzo[a]anthracene	1.6E-05	1.7E-05	2.6E+03	2.8E-02	3.0E-02	No
Benzene	0.0E+00	0.0E+00	6.2E-01	0.0E+00	0.0E+00	Yes
Benzo[a]pyrene	5.8E-06	6.2E-06	9.7E+03	2.8E-03	3.0E-03	No
Biphenyl (1,1-Biphenyl)	8.2E-06	8.2E-06	1.9E+01	2.0E+00	2.0E+00	No
Dibenz[a,h]anthracene	9.7E-06	1.1E-05	1.8E+04	2.5E-03	2.9E-03	No
Dibenzofuran	0.0E+00	0.0E+00	1.0E+02	0.0E+00	0.0E+00	Yes
Di-n-propyl adipate (Dip	0.0E+00	0.0E+00	5.8E+00	0.0E+00	0.0E+00	Yes
Dioxin (2,3,7,8-TCDD)	3.7E-09	4.0E-09	2.7E+04	6.4E-07	6.9E-07	No
Diphenylamine	9.2E-07	9.2E-07	7.3E+00	5.7E-01	5.7E-01	No
Mesitylene (1,3,5-trimetl	0.0E+00	0.0E+00	1.7E+01	0.0E+00	0.0E+00	Yes
Naphthalene	0.0E+00	0.0E+00	1.2E+01	0.0E+00	0.0E+00	Yes
n-Hexane	0.0E+00	0.0E+00	1.9E+01	0.0E+00	0.0E+00	Yes
N-Nitrosodiphenylamine	0.0E+00	0.0E+00	3.3E+00	0.0E+00	0.0E+00	Yes
Phenanthrene	9.1E-05	9.3E-05	2.1E+02	2.0E+00	2.1E+00	No
Phenol	3.4E-08	3.4E-08	2.2E-01	3.7E-01	3.7E-01	No
Pyrene	1.3E-05	1.6E-05	6.8E+02	9.1E-02	1.1E-01	No
Resorcinol	1.7E-06	1.7E-06	5.7E-02	3.1E+01	3.1E+01	No
Styrene	0.0E+00	0.0E+00	9.1E+00	0.0E+00	0.0E+00	Yes
Thianaphthene (benzo[b	0.0E+00	0.0E+00	3.8E+00	0.0E+00	0.0E+00	Yes
Toluene	0.0E+00	0.0E+00	1.4E+00	0.0E+00	0.0E+00	Yes
Triacetin	1.3E-08	1.3E-08	2.2E-02	2.7E-01	2.7E-01	No
Xylenes	0.0E+00	0.0E+00	3.1E+00	0.0E+00	0.0E+00	Yes
Aluminum	8.0E+01	1.4E+02	1.5E+03	2.5E+05	4.4E+05	No
Lead	6.7E+00	1.1E+01	9.0E+02	3.4E+04	5.8E+04	No
Zirconium	1.8E-01	3.3E-01	3.0E+03	2.7E+02	5.1E+02	No
copper	2.6E+00	5.2E+00	1.0E+04	1.2E+03	2.4E+03	No
Iron	1.4E-03	1.4E-03	2.5E+01	2.6E+02	2.6E+02	No

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 22
Erosion Load to Water Body (L_E) (Source: TABLE B-4-11)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$L_E = X_e \times (A_L - A_I) \times SD \times ER \times \frac{Cs \times Kd_s \times BD}{\theta_{sw} + Kd_s\ BD} \times 0.001$$

Symbol	Value	Description	Units	Notes
L_E		Soil erosion load	g/yr	
X_e	2.1E+00	Unit soil loss	kg/m^2-yr	Table B-4-13; input from sheet "Xe"
Cs	calculated	Average soil concentration over exposure duration	mg/kg	Concentration used to estimate excess lifetime cancer risks; input from sheet "Cs"
CstD	calculated	Soil concentration at time tD (at the end of the facility operating life)	mg/kg	Concentration used to evaluate noncancer health risks; input from sheet "Cs"
A_L	9.7E+06	Total watershed area (evaluated) receiving COPC desposition	m^2	
A_I	5.8E+05	Impervious watershed area receiving COPC deposition	m^2	
SD	1.9E-01	Sediment delivery ratio (watershed)	unitless	Table B-4-14; input from sheet "SD"
ER	chemical-specific	Soil enrichment ratio	unitless	1 for inorganics; 3 for organics
Kd_s	chemical-specific	Soil-water partition coefficient	mL water/g soil	Appendix A-3
BD	1.5E+00	Soil bulk density	g soil/cm^3 soil	
θ_{sw}	2.0E-01	Soil volumetric water content	mL water/g soil	
0.001		Units conversion factor	k-cm^2/mg-m^2	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 22
Erosion Load to Water Body (L_E) (Source: TABLE B-4-11)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Cs (mg/kg)	Cstd (mg/kg)	K_d,	ER	L_E - carcinogenic chemicals (g/yr)	L_E - noncarcinogenic chemicals (g/yr)	VOC?	Inorganic/Organic?
1,3-Butadiene	0.0E+00	0.0E+00	1.2E+00	3	0.0E+00	0.0E+00	Yes	Organic
1,6-Dinitropyrene	9.0E-06	1.0E-05	2.2E+02	3	9.8E-02	1.1E-01	No	Organic
1-Methylnaphthalene	0.0E+00	0.0E+00	4.6E+01	3	0.0E+00	0.0E+00	Yes	Organic
1-Nitropyrene	6.4E-04	7.8E-04	6.5E+02	3	7.0E+00	8.4E+00	No	Organic
2,4-Dinitrotoluene	5.4E-08	5.4E-08	5.1E-01	3	4.2E-04	4.2E-04	No	Organic
2,5-Diphenyloxazole	6.6E-06	6.6E-06	6.2E+01	3	7.1E-02	7.1E-02	No	Organic
2,6-Dinitrotoluene	1.3E-07	1.3E-07	4.2E-01	3	9.8E-04	9.8E-04	No	Organic
2-Methylnaphthalene	0.0E+00	0.0E+00	7.9E+01	3	0.0E+00	0.0E+00	Yes	Organic
2-Nitronaphthalene	0.0E+00	0.0E+00	1.1E+01	3	0.0E+00	0.0E+00	Yes	Organic
4-Nitrophenol	1.1E-08	1.1E-08	4.4E-01	3	8.2E-05	8.2E-05	No	Organic
4-Nitrosodiphenylamine	0.0E+00	0.0E+00	4.1E+00	3	0.0E+00	0.0E+00	Yes	Organic
Benzo[a]anthracene	1.6E-05	1.7E-05	2.6E+03	3	1.7E-01	1.8E-01	No	Organic
Benzene	0.0E+00	0.0E+00	6.2E-01	3	0.0E+00	0.0E+00	Yes	Organic
Benzo[a]pyrene	5.8E-06	6.2E-06	9.7E+03	3	6.3E-02	6.7E-02	No	Organic
Biphenyl (1,1-Biphenyl)	8.2E-06	8.2E-06	1.9E+01	3	8.8E-02	8.8E-02	No	Organic
Dibenz[a,h]anthracene	9.7E-06	1.1E-05	1.8E+04	3	1.0E-01	1.2E-01	No	Organic
Dibenzofuran	0.0E+00	0.0E+00	1.0E+02	3	0.0E+00	0.0E+00	Yes	Organic
Di-n-propyl adipate (Dipropyl adi	0.0E+00	0.0E+00	5.8E+00	3	0.0E+00	0.0E+00	Yes	Organic
Dioxin (2,3,7,8-TCDD)	3.7E-09	4.0E-09	2.7E+04	3	4.0E-05	4.3E-05	No	Organic
Diphenylamine	9.2E-07	9.2E-07	7.3E+00	3	9.7E-03	9.7E-03	No	Organic
Mesitylene (1,3,5-trimethylbenze	0.0E+00	0.0E+00	1.7E+01	3	0.0E+00	0.0E+00	Yes	Organic
Naphthalene	0.0E+00	0.0E+00	1.2E+01	3	0.0E+00	0.0E+00	Yes	Organic
n-Hexane	0.0E+00	0.0E+00	1.9E+01	3	0.0E+00	0.0E+00	Yes	Organic
N-Nitrosodiphenylamine	0.0E+00	0.0E+00	3.3E+00	3	0.0E+00	0.0E+00	Yes	Organic
Phenanthrene	9.1E-05	9.3E-05	2.1E+02	3	9.8E-01	1.0E+00	No	Organic
Phenol	3.4E-08	3.4E-08	2.2E-01	3	1.9E-04	1.9E-04	No	Organic
Pyrene	1.3E-05	1.6E-05	6.8E+02	3	1.4E-01	1.7E-01	No	Organic
Resorcinol	1.7E-06	1.7E-06	5.7E-02	3	4.2E-03	4.2E-03	No	Organic
Styrene	0.0E+00	0.0E+00	9.1E+00	3	0.0E+00	0.0E+00	Yes	Organic
Thianaphthene (benzo[b]thiophe	0.0E+00	0.0E+00	3.8E+00	3	0.0E+00	0.0E+00	Yes	Organic
Toluene	0.0E+00	0.0E+00	1.4E+00	3	0.0E+00	0.0E+00	Yes	Organic
Triacetin	1.3E-08	1.3E-08	2.2E-02	3	1.4E-05	1.4E-05	No	Organic
Xylenes	0.0E+00	0.0E+00	3.1E+00	3	0.0E+00	0.0E+00	Yes	Organic
Aluminum	8.0E+01	1.4E+02	1.5E+03	1	2.9E+05	5.2E+05	No	Inorganic
Lead	6.7E+00	1.1E+01	9.0E+02	1	2.4E+04	4.0E+04	No	Inorganic
Zirconium	1.8E-01	3.3E-01	3.0E+03	1	6.3E+02	1.2E+03	No	Inorganic
copper	2.6E+00	5.2E+00	1.0E+04	1	9.5E+03	1.9E+04	No	Inorganic
Iron	1.4E-03	1.4E-03	2.5E+01	1	5.0E+00	5.1E+00	No	Inorganic

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 23
Universal Soil Loss Equation (Xe) (Source: TABLE B-4-13)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$X_e = RF \bullet K \bullet LS \bullet C \bullet PF \bullet \frac{907.18}{4047}$$

Symbol	Value	Description	Units	Notes
X_e		Unit soil loss	kg/m^2-yr	
RF	175	USLE rainfall (or erosivity) factor	yr^{-1}	Site-specific (Range 50 to 300)
K_	0.36	USLE erodibility factor	ton/acre	
LS	1.5	USLE length-slope factor	unitless	
C_	0.1	USLE cover management factor	unitless	
PF	1	USLE supporting practice factor	unitless	
907.18		Units conversion factor	kg/ton	
4047		Units conversion factor	m^2/acre	

X_e
2.1E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 24
Sediment Delivery Ratio (SD) (Source: TABLE B-4-14)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$SD = a \bullet \left(A_L\right)^{-b}$$

Symbol	Value	Description	Units	Notes
SD		Watershed sediment delivery ratio	unitless	
a	1.4	Empirical intercept coefficient	unitless	
AL	9.7E+06	Total watershed area (evaluated) receiving COPC deposition	m^2	
b	0.125	Empirical slope coefficient	unitless	Default value from Table B-4-14

SD
1.9E-01

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 25
Fraction in Water Column (f_{wc}) and Benthic Sediment (f_{bs}) (Source: TABLE B-4-16)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$f_{wc} = \frac{\left(1 + Kd_{sw} \times TSS \times 1 \times 10^{-6}\right) \times d_{wc}/d_z}{\left(1 + Kd_{sw} \times TSS \times 1 \times 10^{-6}\right) d_{wc}/d_z + \left(\theta_{bs} + Kd_{bs} \times C_{BS}\right) d_{bs}/d_z}$$

$$f_{bs} = 1 - f_{wc}$$

Symbol	Value	Description	Units	Notes
f_{wc}	calculated	Fraction of total water body COPC concentration in the water column	unitless	
f_{bs}	calculated	Fraction of total water body COPC concentration in benthic sediment	unitless	
Kd_{sw}	chemical-specific	Suspended sediments/surface water partition coefficient	L water/kg suspended sediment	Appendix A-3
TSS	10	Total suspended solids concentration	mg/L	Site-specific (Range 2 to 300)
1×10^{-6}		Units conversion factor	kg/mg	
d_{wc}	0.68	Depth of water column	m	
d_{bs}	0.03	Depth of upper benthic sediment layer	m	
d_z	7.1E-01	Total water body depth	mg/L	
C_{BS}	1	Bed sediment concentration (or bed sediment bulk density)	g/cm^3 or kg/L	
θ_{bs}	0.6	Bed sediment porosity	$L_{water}/L_{sediment}$	
Kd_{bs}	chemical-specific	Bed sediment/sediment pore water partition coefficient	L water/kg bottom sediment	Appendix A-3

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 25
Fraction in Water Column (f_{wc}) and Benthic Sediment (f_{bs}) (Source: TABLE B-4-16)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Kd_{sw}	Kd_{bs}	f_{wc}	f_{bs}
1,3-Butadiene	9.0E+00	4.8E+00	8.07E-01	1.93E-01
1,6-Dinitropyrene	1.6E+03	8.7E+02	2.57E-02	9.74E-01
1-Methylnaphthaler	3.4E+02	1.8E+02	1.10E-01	8.90E-01
1-Nitropyrene	4.9E+03	2.6E+03	9.03E-03	9.91E-01
2,4-Dinitrotoluene	3.8E+00	2.0E+00	8.96E-01	1.04E-01
2,5-Diphenyloxazol	4.7E+02	2.5E+02	8.37E-02	9.16E-01
2,6-Dinitrotoluene	3.1E+00	1.7E+00	9.09E-01	9.12E-02
2-Methylnaphthaler	6.0E+02	3.2E+02	6.68E-02	9.33E-01
2-Nitronaphthalene	8.4E+01	4.5E+01	3.33E-01	6.67E-01
4-Nitrophenol	3.3E+00	1.7E+00	9.06E-01	9.39E-02
4-Nitrosodiphenylar	3.1E+01	1.7E+01	5.70E-01	4.30E-01
Benzo[a]anthracen	2.0E+04	1.0E+04	2.60E-03	9.97E-01
Benzene	4.7E+00	2.5E+00	8.80E-01	1.20E-01
Benzo[a]pyrene	7.3E+04	3.9E+04	1.01E-03	9.99E-01
Biphenyl (1,1-Biphe	1.4E+02	7.5E+01	2.32E-01	7.68E-01
Dibenz[a,h]anthrac	1.3E+05	7.2E+04	7.41E-04	9.99E-01
Dibenzofuran	7.6E+02	4.0E+02	5.34E-02	9.47E-01
Di-n-propyl adipate	4.4E+01	2.3E+01	4.88E-01	5.12E-01
Dioxin (2,3,7,8-TCD	2.0E+05	1.1E+05	6.35E-04	9.99E-01
Diphenylamine	5.5E+01	2.9E+01	4.31E-01	5.69E-01
Mesitylene (1,3,5-tr	1.3E+02	6.7E+01	2.52E-01	7.48E-01
Naphthalene	8.9E+01	4.8E+01	3.20E-01	6.80E-01
n-Hexane	1.4E+02	7.5E+01	2.32E-01	7.68E-01
N-Nitrosodiphenyla	2.5E+01	1.3E+01	6.24E-01	3.76E-01
Phenanthrene	1.6E+03	8.4E+02	2.68E-02	9.73E-01
Phenol	1.7E+00	8.8E-01	9.39E-01	6.13E-02
Pyrene	5.1E+03	2.7E+03	8.68E-03	9.91E-01
Resorcinol	4.3E-01	2.3E-01	9.65E-01	3.53E-02
Styrene	6.8E+01	3.6E+01	3.80E-01	6.20E-01
Thianaphthene (be	2.9E+01	1.5E+01	5.87E-01	4.13E-01
Toluene	1.1E+01	5.6E+00	7.85E-01	2.15E-01
Triacetin	1.7E-01	8.9E-02	9.71E-01	2.95E-02
Xylenes	2.3E+01	1.2E+01	6.35E-01	3.65E-01
Aluminum	1.5E+03	1.5E+03	1.51E-02	9.85E-01
Lead	9.0E+02	9.0E+02	2.48E-02	9.75E-01
Zirconium	3.0E+03	3.0E+03	7.72E-03	9.92E-01
copper	1.0E+04	1.0E+04	2.49E-03	9.98E-01
Iron	2.5E+01	2.5E+01	4.70E-01	5.30E-01

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 26
Total Water Body Concentration (Cwtot) (Source: TABLE B-4-15)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$C_{wtot} = \frac{L_T}{Vf_x \times f_{wc} + k_{wt} \times A_w \times (d_{wc} + d_{bs})}$$

Symbol	Value	Description	Units	Notes
C_{wtot}	calculated	Total water body COPC concentration, including water column and bed sediment	g/m3 water body	
L_T	chemical-specific	Total COPC lopad to the water body, including deposition, runoff, and erosion	g/yr	Table B-4-7; input from sheet "LT"
Vf_x	801000000	Average volumetric flow rate through water body	m3/yr	
f_{wc}	chemical-specific	Fraction of total water body COPC concentration in the water column	unitless	Table B-4-16 (Range 0 to 1); input from sheet "fwc_fbs"
k_{wt}	chemical-specific	Overall total water body dissipation rate constant	yr-1	Table B-4-17
A_w	47800	Water body surface area	m2	
d_{wc}	0.68	Depth of water column	m	Site-specific (average for entire year)
d_{bs}	0.03	Depth of upper benthic sediment layer	m	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 26
Total Water Body Concentration (Cwtot) (Source: TABLE B-4-15)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	L_T - carcinogenic chemicals (g/yr)	L_T - noncarcinogenic chemicals (g/yr)	f_{wc}	k_{wt}	C_{wtot} (g/m^3) - carcinogenic chemicals	C_{wtot} (mg/L) - carcinogenic chemicals	C_{wtot} (g/m^3) - noncarcinogenic chemicals	C_{wtot} (mg/L) - noncarcinogenic chemicals
1,3-Butadiene	0.0E+00	0.0E+00	8.1E-01	1.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1,6-Dinitropyrene	3.2E-01	3.5E-01	2.6E-02	-2.3E+00	1.5E-08	1.5E-08	1.7E-08	1.7E-08
1-Methylnaphthalene	0.0E+00	0.0E+00	1.1E-01	4.4E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
1-Nitropyrene	1.3E+01	1.5E+01	9.0E-03	-2.7E+00	1.8E-06	1.8E-06	2.2E-06	2.2E-06
2,4-Dinitrotoluene	3.8E-01	3.8E-01	9.0E-01	9.1E-03	5.3E-10	5.3E-10	5.3E-10	5.3E-10
2,5-Diphenyloxazole	1.2E+00	1.2E+00	8.4E-02	-2.7E+00	1.7E-08	1.7E-08	1.7E-08	1.7E-08
2,6-Dinitrotoluene	1.1E+00	1.1E+00	9.1E-01	1.7E-02	1.5E-09	1.5E-09	1.5E-09	1.5E-09
2-Methylnaphthalene	0.0E+00	0.0E+00	6.7E-02	4.0E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
2-Nitronaphthalene	0.0E+00	0.0E+00	3.3E-01	3.4E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
4-Nitrophenol	1.1E-01	1.1E-01	9.1E-01	-2.6E-01	1.5E-10	1.5E-10	1.5E-10	1.5E-10
4-Nitrosodiphenylam	0.0E+00	0.0E+00	5.7E-01	4.6E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Benzo[a]anthracene	2.6E-01	2.8E-01	2.6E-03	-2.9E+00	1.3E-07	1.3E-07	1.4E-07	1.4E-07
Benzene	0.0E+00	0.0E+00	8.8E-01	1.2E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Benzo[a]pyrene	9.4E-02	9.8E-02	1.0E-03	-2.9E+00	1.3E-07	1.3E-07	1.4E-07	1.4E-07
Biphenyl (1,1-Bipher	5.0E+00	5.0E+00	2.3E-01	1.1E+02	2.7E-08	2.7E-08	2.7E-08	2.7E-08
Dibenz[a,h]anthracer	1.4E-01	1.5E-01	7.4E-04	-2.9E+00	2.7E-07	2.7E-07	3.0E-07	3.0E-07
Dibenzofuran	0.0E+00	0.0E+00	5.3E-02	-1.1E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Di-n-propyl adipate (	0.0E+00	0.0E+00	4.9E-01	5.3E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Dioxin (2,3,7,8-TCDI	5.7E-05	6.0E-05	6.4E-04	-2.9E+00	1.4E-10	1.4E-10	1.5E-10	1.5E-10
Diphenylamine	6.9E-01	7.0E-01	4.3E-01	-1.1E+00	2.0E-09	2.0E-09	2.0E-09	2.0E-09
Mesitylene (1,3,5-trir	0.0E+00	0.0E+00	2.5E-01	3.1E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Naphthalene	0.0E+00	0.0E+00	3.2E-01	2.0E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
n-Hexane	0.0E+00	0.0E+00	2.3E-01	3.6E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
N-Nitrosodiphenylam	0.0E+00	0.0E+00	6.2E-01	4.3E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Phenanthrene	4.2E+00	4.3E+00	2.7E-02	-1.4E+00	2.0E-07	2.0E-07	2.0E-07	2.0E-07
Phenol	4.1E-01	4.1E-01	9.4E-01	1.2E+00	5.4E-10	5.4E-10	5.4E-10	5.4E-10
Pyrene	2.6E-01	3.1E-01	8.7E-03	-2.7E+00	3.8E-08	3.8E-08	4.6E-08	4.6E-08
Resorcinol	3.6E+01	3.6E+01	9.6E-01	-8.5E-02	4.6E-08	4.6E-08	4.6E-08	4.6E-08
Styrene	0.0E+00	0.0E+00	3.8E-01	4.5E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Thianaphthene (ben:	0.0E+00	0.0E+00	5.9E-01	1.5E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Toluene	0.0E+00	0.0E+00	7.9E-01	1.0E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Triacetin	3.0E-01	3.0E-01	9.7E-01	-5.7E-02	3.9E-10	3.9E-10	3.9E-10	3.9E-10
Xylenes	0.0E+00	0.0E+00	6.3E-01	8.0E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Aluminum	6.0E+05	1.0E+06	1.5E-02	-2.9E+00	5.0E-02	5.0E-02	8.5E-02	8.5E-02
Lead	6.4E+04	1.0E+05	2.5E-02	-2.8E+00	3.3E-03	3.3E-03	5.3E-03	5.3E-03
Zirconium	1.0E+03	1.8E+03	7.7E-03	-2.9E+00	1.7E-04	1.7E-04	3.0E-04	3.0E-04
copper	1.2E+04	2.3E+04	2.5E-03	-2.9E+00	6.6E-03	6.6E-03	1.2E-02	1.2E-02
Iron	2.8E+02	2.9E+02	4.7E-01	-1.5E+00	7.5E-07	7.5E-07	7.7E-07	7.7E-07

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 27
Overall Total Water Body Dissipation Rate Constant (kwt) (Source: TABLE B-4-17)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$k_{wt} = f_{wc} \times k_v + f_{bs} \times k_b$$

Symbol	Value	Description	Units	Notes
k_{wt}	calculated	Overall total water body dissipation rate constant	yr-1	
f_{wc}	calculated	Fraction of total water body COPC concentration in the water column	unitless	Table B-4-16; input from sheet "fwc_fbs"
k_v	calculated	Water column volatilization rate constant	yr-1	Table B-4-18; input from sheet "kv"
f_{bs}	calculated	Fraction of total water body COPC concentration in benthic sediment	unitless	Table B-4-16; input from sheet "fwc_fbs"
k_b	-2.91E+00	Benthic burial rate constant	yr-1	Table B-4-22; input from sheet "'kb"

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 27
Overall Total Water Body Dissipation Rate Constant (kwt) (Source: TABLE B-4-17)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	f_{wc}	k_v	f_{be}	k_{wt}
1,3-Butadiene	8.1E-01	1.8E+03	1.93E-01	1.48E+03
1,6-Dinitropyrene	2.6E-02	1.9E+01	9.74E-01	-2.34E+00
1-Methylnaphthalene	1.1E-01	4.2E+02	8.90E-01	4.43E+01
1-Nitropyrene	9.0E-03	1.9E+01	9.91E-01	-2.71E+00
2,4-Dinitrotoluene	9.0E-01	3.5E-01	1.04E-01	9.13E-03
2,5-Diphenyloxazole	8.4E-02	3.8E-02	9.16E-01	-2.66E+00
2,6-Dinitrotoluene	9.1E-01	3.1E-01	9.12E-02	1.70E-02
2-Methylnaphthalene	6.7E-02	6.4E+02	9.33E-01	4.04E+01
2-Nitronaphthalene	3.3E-01	1.0E+03	6.67E-01	3.45E+02
4-Nitrophenol	9.1E-01	1.8E-02	9.39E-02	-2.57E-01
4-Nitrosodiphenylamin	5.7E-01	1.0E+01	4.30E-01	4.63E+00
Benzo[a]anthracene	2.6E-03	8.4E+00	9.97E-01	-2.88E+00
Benzene	8.8E-01	1.4E+03	1.20E-01	1.20E+03
Benzo[a]pyrene	1.0E-03	1.8E+00	9.99E-01	-2.91E+00
Biphenyl (1,1-Biphenyl	2.3E-01	5.0E+02	7.68E-01	1.14E+02
Dibenz[a,h]anthracene	7.4E-04	2.3E-02	9.99E-01	-2.91E+00
Dibenzofuran	5.3E-02	3.0E+01	9.47E-01	-1.14E+00
Di-n-propyl adipate (Di	4.9E-01	1.1E+03	5.12E-01	5.32E+02
Dioxin (2,3,7,8-TCDD)	6.4E-04	2.9E+01	9.99E-01	-2.89E+00
Diphenylamine	4.3E-01	1.2E+00	5.69E-01	-1.14E+00
Mesitylene (1,3,5-trime	2.5E-01	1.2E+03	7.48E-01	3.11E+02
Naphthalene	3.2E-01	6.4E+02	6.80E-01	2.02E+02
n-Hexane	2.3E-01	1.6E+03	7.68E-01	3.65E+02
N-Nitrosodiphenylamin	6.2E-01	7.0E+02	3.76E-01	4.34E+02
Phenanthrene	2.7E-02	5.3E+01	9.73E-01	-1.42E+00
Phenol	9.4E-01	1.4E+00	6.13E-02	1.16E+00
Pyrene	8.7E-03	1.9E+01	9.91E-01	-2.72E+00
Resorcinol	9.6E-01	1.8E-02	3.53E-02	-8.50E-02
Styrene	3.8E-01	1.2E+03	6.20E-01	4.52E+02
Thianaphthene (benzo	5.9E-01	2.6E+02	4.13E-01	1.50E+02
Toluene	7.9E-01	1.3E+03	2.15E-01	1.03E+03
Triacetin	9.7E-01	2.9E-02	2.95E-02	-5.73E-02
Xylenes	6.3E-01	1.3E+03	3.65E-01	8.02E+02
Aluminum	1.5E-02	0.0E+00	9.85E-01	-2.87E+00
Lead	2.5E-02	0.0E+00	9.75E-01	-2.84E+00
Zirconium	7.7E-03	0.0E+00	9.92E-01	-2.89E+00
copper	2.5E-03	0.0E+00	9.98E-01	-2.90E+00
Iron	4.7E-01	0.0E+00	5.30E-01	-1.54E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 28
Water Column Volatilization Loss Rate Constant (kv) (Source: TABLE B-4-18)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$k_v = \frac{K_v}{d_z \times \left(1 + Kd_{sw} \times TSS \times 10^{-6}\right)}$$

Symbol	Value	Description	Units	Notes
k_v	calculated	Water column volatilization rate constant	yr^{-1}	
K_v	chemical-specific	Overall COPC transfer rate coefficient	m/yr	Table B-4-19
d_z	0.71	Total water body depth	m	input from worksheet "fwc_fbs"
Kd_{sw}	chemical-specific	Suspended sediments/surface water partition coefficient	L water/kg suspended sediment	Appendix A-3
TSS	10	Total suspended solids concentration	mg/L	Site-specific (Range 2 to 300)
1 x 10-6		Units conversion factor	kg/mg	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 28
Water Column Volatilization Loss Rate Constant (kv) (Source: TABLE B-4-18)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	K_v	Kd_{ew}	k_v
1,3-Butadiene	1.3E+03	1.2E+00	1.8E+03
1,6-Dinitropyrene	1.4E+01	2.2E+02	1.9E+01
1-Methylnaphthalene	3.0E+02	4.6E+01	4.2E+02
1-Nitropyrene	1.4E+01	6.5E+02	1.9E+01
2,4-Dinitrotoluene	2.5E-01	5.1E-01	3.5E-01
2,5-Diphenyloxazole	2.7E-02	6.2E+01	3.8E-02
2,6-Dinitrotoluene	2.2E-01	4.2E-01	3.1E-01
2-Methylnaphthalene	4.6E+02	7.9E+01	6.4E+02
2-Nitronaphthalene	7.4E+02	1.1E+01	1.0E+03
4-Nitrophenol	1.2E-02	4.4E-01	1.8E-02
4-Nitrosodiphenylami	7.3E+00	4.1E+00	1.0E+01
Benzo[a]anthracene	6.1E+00	2.6E+03	8.4E+00
Benzene	9.7E+02	6.2E-01	1.4E+03
Benzo[a]pyrene	1.4E+00	9.7E+03	1.8E+00
Biphenyl (1,1-Biphen	3.5E+02	1.9E+01	5.0E+02
Dibenz[a,h]anthracen	1.9E-02	1.8E+04	2.3E-02
Dibenzofuran	2.2E+01	1.0E+02	3.0E+01
Di-n-propyl adipate (D	7.8E+02	5.8E+00	1.1E+03
Dioxin (2,3,7,8-TCDD	2.6E+01	2.7E+04	2.9E+01
Diphenylamine	8.5E-01	7.3E+00	1.2E+00
Mesitylene (1,3,5-trim	8.8E+02	1.7E+01	1.2E+03
Naphthalene	4.5E+02	1.2E+01	6.4E+02
n-Hexane	1.1E+03	1.9E+01	1.6E+03
N-Nitrosodiphenylam	5.0E+02	3.3E+00	7.0E+02
Phenanthrene	3.7E+01	2.1E+02	5.3E+01
Phenol	1.0E+00	2.2E-01	1.4E+00
Pyrene	1.4E+01	6.8E+02	1.9E+01
Resorcinol	1.3E-02	5.7E-02	1.8E-02
Styrene	8.5E+02	9.1E+00	1.2E+03
Thianaphthene (benz	1.8E+02	3.8E+00	2.6E+02
Toluene	9.3E+02	1.4E+00	1.3E+03
Triacetin	2.1E-02	2.2E-02	2.9E-02
Xylenes	9.0E+02	3.1E+00	1.3E+03
Aluminum	0.0E+00	1.5E+03	0.0E+00
Lead	0.0E+00	9.0E+02	0.0E+00
Zirconium	0.0E+00	3.0E+03	0.0E+00
copper	0.0E+00	1.0E+04	0.0E+00
Iron	0.0E+00	2.5E+01	0.0E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 29
Overall COPC Transfer Rate Coefficient (K_v) (TABLE B-4-19)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$K_v = \left[K_L^{-1} + \left(K_G \times \frac{H}{R \times T_{wk}} \right)^{-1} \right]^{-1} \times \theta^{(T_{wk} - 293)}$$

Symbol	Value	Description	Units	Notes
K_v	calculated	Overall COPC transfer rate coefficient	m/yr	
K_L	chemical-specific	Liquid phase transfer coefficient	m/yr	Table B-4-20
K_G	chemical-specific	Gas phase transfer coefficient	m/yr	Table B-4-21
H	chemical-specific	Henry's Law constant	atm-m^3/mol	Appendix A-3
R	8.2E-05	Universal gas constant	atm-m^3/mol-K	
T_{wk}	3.0E+02	Water body temperature	K	
θ	1.026	Temperature correction factor	unitless	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 29
Overall COPC Transfer Rate Coefficient (K_v) (TABLE B-4-19)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

	Flowing Water				Quiescent Water or Ponds			
Chemical	K_L	K_G	H	K_v	K_L	K_G	H	K_v
1,3-Butadiene	1.2E+03	3.7E+04	6.3E-02	1.3E+03	2.4E+02	6.9E+05	6.3E-02	2.7E+02
1,6-Dinitropyrene	6.6E+02	3.7E+04	8.3E-06	1.4E+01	1.1E+02	3.2E+05	8.3E-06	6.3E+01
1-Methylnaphthalene	8.4E+02	3.7E+04	2.6E-04	3.0E+02	1.5E+02	4.4E+05	2.6E-04	1.7E+02
1-Nitropyrene	7.0E+02	3.7E+04	8.3E-06	1.4E+01	1.2E+02	3.5E+05	8.3E-06	6.7E+01
2,4-Dinitrotoluene	8.3E+02	3.7E+04	1.5E-07	2.5E-01	1.5E+02	2.6E+05	1.5E-07	1.8E+00
2,5-Diphenyloxazole	7.2E+02	3.7E+04	1.6E-08	2.7E-02	1.3E+02	3.6E+05	1.6E-08	2.7E-01
2,6-Dinitrotoluene	8.3E+02	3.7E+04	1.3E-07	2.2E-01	1.5E+02	2.6E+05	1.3E-07	1.6E+00
2-Methylnaphthalene	8.4E+02	3.7E+04	5.2E-04	4.6E+02	1.5E+02	4.4E+05	5.2E-04	1.7E+02
2-Nitronaphthalene	7.8E+02	3.7E+04	2.5E-03	7.4E+02	1.4E+02	4.1E+05	2.5E-03	1.6E+02
4-Nitrophenol	9.2E+02	3.7E+04	7.3E-09	1.2E-02	1.7E+02	3.3E+05	7.3E-09	1.1E-01
4-Nitrosodiphenylamine	7.5E+02	3.7E+04	4.4E-06	7.3E+00	1.3E+02	3.8E+05	4.4E-06	5.1E+01
Benzo[a]anthracene	7.4E+02	3.7E+04	3.6E-06	6.1E+00	1.3E+02	2.2E+05	3.6E-06	3.0E+01
Benzene	9.5E+02	3.7E+04	5.5E-03	9.7E+02	1.8E+02	6.4E+05	5.5E-03	2.1E+02
Benzo[a]pyrene	7.2E+02	3.7E+04	8.4E-07	1.4E+00	1.3E+02	2.1E+05	8.4E-07	7.6E+00
Biphenyl (1,1-Biphenyl)	8.1E+02	3.7E+04	3.4E-04	3.5E+02	1.5E+02	4.3E+05	3.4E-04	1.6E+02
Dibenz[a,h]anthracene	7.3E+02	3.7E+04	1.1E-08	1.9E-02	1.3E+02	1.8E+05	1.1E-08	9.5E-02
Dibenzofuran	7.9E+02	3.7E+04	1.3E-05	2.2E+01	1.4E+02	4.1E+05	1.3E-05	9.8E+01
Di-n-propyl adipate (Diprop	7.1E+02	3.7E+04	1.1E-02	7.8E+02	1.2E+02	3.6E+05	1.1E-02	1.4E+02
Dioxin (2,3,7,8-TCDD)	7.8E+02	3.7E+04	1.6E-05	2.6E+01	1.4E+02	1.4E+05	1.6E-05	6.4E+01
Diphenylamine	7.9E+02	3.7E+04	5.0E-07	8.5E-01	1.4E+02	4.1E+05	5.0E-07	9.0E+00
Mesitylene (1,3,5-trimethyl	8.3E+02	3.7E+04	7.8E-03	8.8E+02	1.5E+02	4.3E+05	7.8E-03	1.7E+02
Naphthalene	8.9E+02	3.7E+04	4.8E-04	4.5E+02	1.7E+02	3.7E+05	4.8E-04	1.9E+02
n-Hexane	9.9E+02	3.7E+04	1.2E+00	1.1E+03	1.9E+02	5.6E+05	1.2E+00	2.2E+02
N-Nitrosodiphenylamine	7.5E+02	3.7E+04	7.0E-04	5.0E+02	1.3E+02	2.6E+05	7.0E-04	1.5E+02
Phenanthrene	8.1E+02	3.7E+04	2.3E-05	3.7E+01	1.5E+02	2.7E+05	2.3E-05	1.1E+02
Phenol	9.5E+02	3.7E+04	6.0E-07	1.0E+00	1.8E+02	5.0E+05	6.0E-07	1.3E+01
Pyrene	7.9E+02	3.7E+04	8.3E-06	1.4E+01	1.4E+02	2.4E+05	8.3E-06	5.9E+01
Resorcinol	9.1E+02	3.7E+04	7.7E-09	1.3E-02	1.7E+02	5.0E+05	7.7E-09	1.8E-01
Styrene	8.8E+02	3.7E+04	3.3E-03	8.5E+02	1.6E+02	4.8E+05	3.3E-03	1.9E+02
Thianaphthene (benzo[b]th	8.5E+02	3.7E+04	1.3E-04	1.8E+02	1.6E+02	4.6E+05	1.3E-04	1.7E+02
Toluene	9.0E+02	3.7E+04	6.1E-03	9.3E+02	1.7E+02	5.6E+05	6.1E-03	1.9E+02
Triacetin	7.3E+02	3.7E+04	1.2E-08	2.1E-02	1.3E+02	3.7E+05	1.2E-08	2.1E-01
Xylenes	8.7E+02	3.7E+04	6.1E-03	9.0E+02	1.6E+02	4.8E+05	6.1E-03	1.8E+02
Aluminum	1.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Lead	7.4E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Zirconium	9.7E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
copper	1.1E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Iron	1.1E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 30
Liquid Phase Transfer Coefficient (K_L) (Source: TABLE B-4-20)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

For flowing streams or rivers:

$$K_L = \sqrt{\frac{\left(1x10^{-4}\right) \bullet D_w \bullet u}{d_z}} \bullet 3.1536x10^7$$

For quiescent lakes or ponds:

$$K_L = \left(C_d{}^{0.5} \bullet W\right) \bullet \left(\frac{\rho_a}{\rho_w}\right)^{0.5} \bullet \frac{k^{0.33}}{\lambda_z} \bullet \left(\frac{\mu_w}{\rho_w \bullet D_w}\right)^{-0.67} \bullet 3.1536x10^7$$

Symbol	Value	Description	Units	Notes
K_L		Liquid phase transfer coefficient	m/yr	
D_w	chemical-specific	Diffusivity of COPC in water	cm^2/s	Appendix A-3
u	0.63	Current velocity	m/s	
d_z	7.1E-01	Total water body depth	m	
3.1536×10^7		Units conversion factor	s/yr	
C_d	0.0011	Drag coefficient	unitless	
W	3.9	Average annual wind speed	m/s	
ρ_a	0.0012	Density of air	g/cm^3	
ρ_w	1	Density of water	g/cm^3	
k	0.4	von Karman's constant	unitless	
λ_z	4	Dimensionless viscous sublayer thickness	unitless	
μ_w	0.0169	Viscosity of water corresponding to water temperature	g/cm-s	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 30
Liquid Phase Transfer Coefficient (K_L) (Source: TABLE B-4-20)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

		For flowing streams or rivers:	For quiescent lakes or ponds:	Metal
Chemical	**D_w**	**K_L**	**K_L**	
1,3-Butadiene	1.5E-05	1.2E+03	2.4E+02	No
1,6-Dinitropyrene	4.9E-06	6.6E+02	1.1E+02	No
1-Methylnaphthalene	7.9E-06	8.4E+02	1.5E+02	No
1-Nitropyrene	5.5E-06	7.0E+02	1.2E+02	No
2,4-Dinitrotoluene	7.9E-06	8.3E+02	1.5E+02	No
2,5-Diphenyloxazole	5.9E-06	7.2E+02	1.3E+02	No
2,6-Dinitrotoluene	7.8E-06	8.3E+02	1.5E+02	No
2-Methylnaphthalene	7.9E-06	8.4E+02	1.5E+02	No
2-Nitronaphthalene	7.0E-06	7.8E+02	1.4E+02	No
4-Nitrophenol	9.6E-06	9.2E+02	1.7E+02	No
4-Nitrosodiphenylamine	6.4E-06	7.5E+02	1.3E+02	No
Benzo[a]anthracene	6.2E-06	7.4E+02	1.3E+02	No
Benzene	1.0E-05	9.5E+02	1.8E+02	No
Benzo[a]pyrene	5.9E-06	7.2E+02	1.3E+02	No
Biphenyl (1,1-Biphenyl)	7.5E-06	8.1E+02	1.5E+02	No
Dibenz[a,h]anthracene	6.0E-06	7.3E+02	1.3E+02	No
Dibenzofuran	7.1E-06	7.9E+02	1.4E+02	No
Di-n-propyl adipate (Dipropyl adipate)	5.8E-06	7.1E+02	1.2E+02	No
Dioxin (2,3,7,8-TCDD)	6.8E-06	7.8E+02	1.4E+02	No
Diphenylamine	7.1E-06	7.9E+02	1.4E+02	No
Mesitylene (1,3,5-trimethylbenzene)	7.9E-06	8.3E+02	1.5E+02	No
Naphthalene	8.9E-06	8.9E+02	1.7E+02	No
n-Hexane	1.1E-05	9.9E+02	1.9E+02	No
N-Nitrosodiphenylamine	6.4E-06	7.5E+02	1.3E+02	No
Phenanthrene	7.5E-06	8.1E+02	1.5E+02	No
Phenol	1.0E-05	9.5E+02	1.8E+02	No
Pyrene	7.1E-06	7.9E+02	1.4E+02	No
Resorcinol	9.4E-06	9.1E+02	1.7E+02	No
Styrene	8.8E-06	8.8E+02	1.6E+02	No
Thianaphthene (benzo[b]thiophene)	8.3E-06	8.5E+02	1.6E+02	No
Toluene	9.2E-06	9.0E+02	1.7E+02	No
Triacetin	6.0E-06	7.3E+02	1.3E+02	No
Xylenes	8.5E-06	8.7E+02	1.6E+02	No
Aluminum	2.4E-05	1.5E+03	0.0E+00	Yes
Lead	6.3E-06	7.4E+02	0.0E+00	Yes
Zirconium	1.1E-05	9.7E+02	0.0E+00	Yes
copper	1.4E-05	1.1E+03	0.0E+00	Yes
Iron	1.5E-05	1.1E+03	0.0E+00	Yes

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 31
Gas Phase Transfer Coefficient (K_G) (Source: TABLE B-4-21)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

For flowing streams or rivers:

$$K_G = 36500 m/yr$$

For quiescent lakes or ponds:

$$K_G = \left(C_d{}^{05} \bullet W\right) \bullet \frac{k^{0.33}}{\lambda_z} \bullet \left(\frac{\mu_a}{\rho_a \bullet D_a}\right)^{-0.67} \bullet 3.1536x10^7$$

Symbol	Value	Description	Units	Notes
K_G		Gas phase transfer coefficient	m/yr	
C_d	1.1E-03	Drag coefficient	unitless	
W	3.9E+00	Average annual wind velocity	m/s	
k	4.0E-01	von Karman's constant	unitless	
λ_z	4.0E+00	Dimensionless viscous sublayer thickness	unitless	
μ_a	0.000181	Viscosity of air	g/cm-s	
ρ_a	1.2E-03	Density of air	g/cm^3	
D_a	chemical-specific	Diffusivity of COPC in air	cm^2/s	Appendix A-3
3.1536×10^7		Units conversion factor	s/yr	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 31
Gas Phase Transfer Coefficient (K_G) (Source: TABLE B-4-21)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

		For flowing streams or rivers:	For quiescent lakes or ponds:	Metal
Chemical	D_a	K_G	K_G	
1,3-Butadiene	1.3E-01	36500	6.9E+05	No
1,6-Dinitropyrene	4.2E-02	36500	3.2E+05	No
1-Methylnaphthalene	6.9E-02	36500	4.4E+05	No
1-Nitropyrene	4.7E-02	36500	3.5E+05	No
2,4-Dinitrotoluene	3.1E-02	36500	2.6E+05	No
2,5-Diphenyloxazole	5.1E-02	36500	3.6E+05	No
2,6-Dinitrotoluene	3.1E-02	36500	2.6E+05	No
2-Methylnaphthalene	6.9E-02	36500	4.4E+05	No
2-Nitronaphthalene	6.0E-02	36500	4.1E+05	No
4-Nitrophenol	4.3E-02	36500	3.3E+05	No
4-Nitrosodiphenylamine	5.5E-02	36500	3.8E+05	No
Benzo[a]anthracene	2.5E-02	36500	2.2E+05	No
Benzene	1.2E-01	36500	6.4E+05	No
Benzo[a]pyrene	2.2E-02	36500	2.1E+05	No
Biphenyl (1,1-Biphenyl)	6.5E-02	36500	4.3E+05	No
Dibenz[a,h]anthracene	1.8E-02	36500	1.8E+05	No
Dibenzofuran	6.1E-02	36500	4.1E+05	No
Di-n-propyl adipate (Dipr	5.0E-02	36500	3.6E+05	No
Dioxin (2,3,7,8-TCDD)	1.3E-02	36500	1.4E+05	No
Diphenylamine	6.1E-02	36500	4.1E+05	No
Mesitylene (1,3,5-trimeth	6.5E-02	36500	4.3E+05	No
Naphthalene	5.3E-02	36500	3.7E+05	No
n-Hexane	9.6E-02	36500	6.6E+05	No
N-Nitrosodiphenylamine	3.1E-02	36500	2.6E+05	No
Phenanthrene	3.3E-02	36500	2.7E+05	No
Phenol	8.3E-02	36500	5.0E+05	No
Pyrene	2.7E-02	36500	2.4E+05	No
Resorcinol	8.1E-02	36500	5.0E+05	No
Styrene	7.7E-02	36500	4.8E+05	No
Thianaphthene (benzo[b]	7.1E-02	36500	4.6E+05	No
Toluene	9.7E-02	36500	5.6E+05	No
Triacetin	5.1E-02	36500	3.7E+05	No
Xylenes	7.6E-02	36500	4.8E+05	No
Aluminum	2.1E-01	0	0.0E+00	Yes
Lead	5.4E-02	0	0.0E+00	Yes
Zirconium	9.2E-02	0	0.0E+00	Yes
copper	1.2E-01	0	0.0E+00	Yes
Iron	1.3E-01	0	0.0E+00	Yes

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 32
Benthic Burial Rate Constant (k_b) (Source: TABLE B-4-22)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$k_b = \left(\frac{X_e \bullet A_L \bullet SD \bullet 1 \times 10^3 - Vf_x \bullet TSS}{A_W \bullet TSS} \right) \bullet \left(\frac{TSS \bullet 1 \times 10^{-6}}{C_{BS} \bullet d_{bs}} \right)$$

Symbol	Value	Description	Units	Notes
k_b		Benthic burial rate constant	yr^{-1}	
X_e	2.1E+00	Unit soil loss	kg/m^2-yr	Table B-4-13
A_L	9.7E+06	Total watershed area (evaluated) receiving deposition	m^2	
SD	1.9E-01	Sediment delivery ratio (watershed)	unitless	Table B-4-14
$1x10^3$		Units conversion factor	g/kg	
Vf_x	8.0E+08	Average volumertric flow rate through water body	m^3/yr	
TSS	1.0E+01	Total suspended solids concentration	mg/L	Site-specific (Range 2 to 300)
A_W	4.8E+04	Water body surface area	m^2	
$1x10^{-6}$		Units conversion factor	kg/mg	
C_{BS}	1.0E+00	Bed Sediment concentration	g/cm^3	
d_{bs}	3.0E-02	Depth of upper benthic sediment layer	m	

k_b
-2.9E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 33
Total Water Column Concentration (Cwctot) (Source: TABLE B-4-23)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$C_{wctot} = f_{wc} \times C_{wtot} \times \frac{d_{wc} + d_{bs}}{d_{wc}}$$

Symbol	Value	Description	Units	Notes
C_{wctot}	calculated	Total COPC concentration in water column	mg/L	
f_{wc}	calculated	Fraction of total water body COPC concentration in the water column	unitless	Table B-4-16; input from sheet "fwc_fbs"
C_{wtot}	calculated	Total waterbody COPC concentration including water column and bed sediment	mg/L	Table B-4-15; input from sheet "Cwtot"
d_{wc}	0.68	Depth of water column	m	
d_{bs}	0.03	Depth of upper benthic sediment layer	m	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 33
Total Water Column Concentration (Cwctot) (Source: TABLE B-4-23)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	f_{wc}	C_{wtot} (mg/L) - carcinogenic chemicals	C_{wtot} (mg/L) - noncarcinogenic chemicals	C_{wctot} - (mg/L) - carcinogenic chemicals	C_{wctot} - (mg/L) - noncarcinogenic chemicals
1,3-Butadiene	8.1E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
1,6-Dinitropyrene	2.6E-02	1.5E-08	1.73E-08	4.2E-10	4.6E-10
1-Methylnaphthalene	1.1E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
1-Nitropyrene	9.0E-03	1.8E-06	2.15E-06	1.7E-08	2.0E-08
2,4-Dinitrotoluene	9.0E-01	5.3E-10	5.27E-10	4.9E-10	4.9E-10
2,5-Diphenyloxazole	8.4E-02	1.7E-08	1.73E-08	1.5E-09	1.5E-09
2,6-Dinitrotoluene	9.1E-01	1.5E-09	1.49E-09	1.4E-09	1.4E-09
2-Methylnaphthalene	6.7E-02	0.0E+00	0.00E+00	0.0E+00	0.0E+00
2-Nitronaphthalene	3.3E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
4-Nitrophenol	9.1E-01	1.5E-10	1.50E-10	1.4E-10	1.4E-10
4-Nitrosodiphenylamine	5.7E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Benzo[a]anthracene	2.6E-03	1.3E-07	1.39E-07	3.5E-10	3.8E-10
Benzene	8.8E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Benzo[a]pyrene	1.0E-03	1.3E-07	1.39E-07	1.4E-10	1.5E-10
Biphenyl (1,1-Biphenyl)	2.3E-01	2.7E-08	2.67E-08	6.4E-09	6.4E-09
Dibenz[a,h]anthracene	7.4E-04	2.7E-07	3.04E-07	2.1E-10	2.4E-10
Dibenzofuran	5.3E-02	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Di-n-propyl adipate (Dipr	4.9E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Dioxin (2,3,7,8-TCDD)	6.4E-04	1.4E-10	1.47E-10	9.2E-14	9.8E-14
Diphenylamine	4.3E-01	2.0E-09	2.01E-09	9.0E-10	9.1E-10
Mesitylene (1,3,5-trimeth	2.5E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Naphthalene	3.2E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
n-Hexane	2.3E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
N-Nitrosodiphenylamine	6.2E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Phenanthrene	2.7E-02	2.0E-07	2.02E-07	5.6E-09	5.6E-09
Phenol	9.4E-01	5.4E-10	5.45E-10	5.3E-10	5.3E-10
Pyrene	8.7E-03	3.8E-08	4.56E-08	3.5E-10	4.1E-10
Resorcinol	9.6E-01	4.6E-08	4.60E-08	4.6E-08	4.6E-08
Styrene	3.8E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Thianaphthene (benzo[b	5.9E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Toluene	7.9E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Triacetin	9.7E-01	3.9E-10	3.90E-10	3.9E-10	3.9E-10
Xylenes	6.3E-01	0.0E+00	0.00E+00	0.0E+00	0.0E+00
Aluminum	1.5E-02	5.0E-02	8.52E-02	7.9E-04	1.3E-03
Lead	2.5E-02	3.3E-03	5.27E-03	8.4E-05	1.4E-04
Zirconium	7.7E-03	1.7E-04	3.01E-04	1.4E-06	2.4E-06
copper	2.5E-03	6.6E-03	1.21E-02	1.7E-05	3.1E-05
Iron	4.7E-01	7.5E-07	7.67E-07	3.7E-07	3.8E-07

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 34
Dissolved Phase Water Concentration (C_{dw}) (Source: TABLE B-4-24)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$C_{dw} = \frac{C_{wctot}}{1 + Kd_{sw} \bullet TSS \bullet 1 \times 10^{-6}}$$

Symbol	Value	Description	Units	Notes
C_{dw}	calculated	Dissolved phase water concentration	mg/L water	
C_{wctot}	calculated	Total COPC concentration in water column	mg/L	Table B-4-23; input from sheet "Cwctot"
Kd_{sw}	chemical-specific	Suspended sediments/surface water partition coefficient	L water/kg suspended sediment	Appendix A-3
TSS	1.0E+01	Total suspended solids concentration	mg/L	Site-specific (Range 2 to 300)
$1x10^{-6}$		Units conversion factor	kg/mg	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 34
Dissolved Phase Water Concentration (C_{dw}) (Source: TABLE B-4-24)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	C_{wctot} - (mg/L) - carcinogenic chemicals	C_{wctot} - (mg/L) - noncarcinogenic chemicals	Kd_{sw}	C_{dw} (mg/L) - carcinogenic chemicals	C_{dw} (mg/L) - noncarcinogenic chemicals
1,3-Butadiene	0.0E+00	0.0E+00	9.0E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	4.2E-10	4.6E-10	1.6E+03	4.09E-10	4.57E-10
1-Methylnaphthalene	0.0E+00	0.0E+00	3.4E+02	0.00E+00	0.00E+00
1-Nitropyrene	1.7E-08	2.0E-08	4.9E+03	1.63E-08	1.93E-08
2,4-Dinitrotoluene	4.9E-10	4.9E-10	3.8E+00	4.93E-10	4.93E-10
2,5-Diphenyloxazole	1.5E-09	1.5E-09	4.7E+02	1.50E-09	1.50E-09
2,6-Dinitrotoluene	1.4E-09	1.4E-09	3.1E+00	1.41E-09	1.41E-09
2-Methylnaphthalene	0.0E+00	0.0E+00	6.0E+02	0.00E+00	0.00E+00
2-Nitronaphthalene	0.0E+00	0.0E+00	8.4E+01	0.00E+00	0.00E+00
4-Nitrophenol	1.4E-10	1.4E-10	3.3E+00	1.42E-10	1.42E-10
4-Nitrosodiphenylamine	0.0E+00	0.0E+00	3.1E+01	0.00E+00	0.00E+00
Benzo[a]anthracene	3.5E-10	3.8E-10	2.0E+04	2.95E-10	3.16E-10
Benzene	0.0E+00	0.0E+00	4.7E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.4E-10	1.5E-10	7.3E+04	8.05E-11	8.47E-11
Biphenyl (1,1-Biphenyl)	6.4E-09	6.4E-09	1.4E+02	6.44E-09	6.44E-09
Dibenz[a,h]anthracene	2.1E-10	2.4E-10	1.3E+05	9.04E-11	1.00E-10
Dibenzofuran	0.0E+00	0.0E+00	7.6E+02	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropy	0.0E+00	0.0E+00	4.4E+01	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	9.2E-14	9.8E-14	2.0E+05	3.05E-14	3.23E-14
Diphenylamine	9.0E-10	9.1E-10	5.5E+01	9.04E-10	9.06E-10
Mesitylene (1,3,5-trimethylb	0.0E+00	0.0E+00	1.3E+02	0.00E+00	0.00E+00
Naphthalene	0.0E+00	0.0E+00	8.9E+01	0.00E+00	0.00E+00
n-Hexane	0.0E+00	0.0E+00	1.4E+02	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.0E+00	0.0E+00	2.5E+01	0.00E+00	0.00E+00
Phenanthrene	5.6E-09	5.6E-09	1.6E+03	5.47E-09	5.56E-09
Phenol	5.3E-10	5.3E-10	1.7E+00	5.34E-10	5.34E-10
Pyrene	3.5E-10	4.1E-10	5.1E+03	3.30E-10	3.93E-10
Resorcinol	4.6E-08	4.6E-08	4.3E-01	4.63E-08	4.63E-08
Styrene	0.0E+00	0.0E+00	6.8E+01	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thi	0.0E+00	0.0E+00	2.9E+01	0.00E+00	0.00E+00
Toluene	0.0E+00	0.0E+00	1.1E+01	0.00E+00	0.00E+00
Triacetin	3.9E-10	3.9E-10	1.7E-01	3.95E-10	3.95E-10
Xylenes	0.0E+00	0.0E+00	2.3E+01	0.00E+00	0.00E+00
Aluminum	7.9E-04	1.3E-03	1.5E+03	7.74E-04	1.32E-03
Lead	8.4E-05	1.4E-04	9.0E+02	8.34E-05	1.35E-04
Zirconium	1.4E-06	2.4E-06	3.0E+03	1.32E-06	2.36E-06
copper	1.7E-05	3.1E-05	1.0E+04	1.55E-05	2.85E-05
Iron	3.7E-07	3.8E-07	2.5E+01	3.67E-07	3.76E-07

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 35
COPC Concentration Sorbed to Bed Sediment (C_{sb}) (Source:TABLE B-4-25)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$C_{sb} = f_{bs} \bullet C_{wtot} \bullet \left(\frac{Kd_{bs}}{\theta_{bs} + Kd_{bs} \bullet C_{BS}} \right) \bullet \left(\frac{d_{wc} + d_{bs}}{d_{bs}} \right)$$

Symbol	Value	Description	Units	Notes
C_{sb}	calculated	COPC Concentration sorbed to bed sediment	mg/kg	
f_{bs}	calculated	Fraction of total water body COPC concentration in benthic sediment	unitless	input from sheet "fwc_fbs"
C_{wtot}	calculated	Total water body COPC cencentration, including wter column and bed sediment	mg/L	input from sheet "Cwtot"
Kd_{bs}	chemical-specific	Bed sediment/sediment pore water partition coefficient	L/kg	
θ_{bs}	6.0E-01	Bed sediment porosity	L pore water/L sediment	
C_{BS}	1.0E+00	Bed sediment concentration	g/cm^3	
d_{wc}	6.8E-01	Depth of water column	m	
d_{bs}	3.0E-02	Depth of upper benthic sediment layer	m	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 35
COPC Concentration Sorbed to Bed Sediment (C_{sb}) (Source:TABLE B-4-25)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	f_{bs}	C_{wtot} (mg/L) - carcinogenic chemicals	C_{wtot} (mg/L) - noncarcinogenic chemicals	Kd_{bs}	C_{sb} (mg/kg) - carcinogenic chemicals	C_{sb} (mg/kg) - noncarcinogenic chemicals
1,3-Butadiene	1.93E-01	0.0E+00	0.00E+00	4.8E+00	0.0E+00	0.0E+00
1,6-Dinitropyrene	9.74E-01	1.5E-08	1.73E-08	8.7E+02	3.6E-07	4.0E-07
1-Methylnaphthalene	8.90E-01	0.0E+00	0.00E+00	1.8E+02	0.0E+00	0.0E+00
1-Nitropyrene	9.91E-01	1.8E-06	2.15E-06	2.6E+03	4.2E-05	5.0E-05
2,4-Dinitrotoluene	1.04E-01	5.3E-10	5.27E-10	2.0E+00	1.0E-09	1.0E-09
2,5-Diphenyloxazole	9.16E-01	1.7E-08	1.73E-08	2.5E+02	3.7E-07	3.7E-07
2,6-Dinitrotoluene	9.12E-02	1.5E-09	1.49E-09	1.7E+00	2.4E-09	2.4E-09
2-Methylnaphthalene	9.33E-01	0.0E+00	0.00E+00	3.2E+02	0.0E+00	0.0E+00
2-Nitronaphthalene	6.67E-01	0.0E+00	0.00E+00	4.5E+01	0.0E+00	0.0E+00
4-Nitrophenol	9.39E-02	1.5E-10	1.50E-10	1.7E+00	2.5E-10	2.5E-10
4-Nitrosodiphenylamin	4.30E-01	0.0E+00	0.00E+00	1.7E+01	0.0E+00	0.0E+00
Benzo[a]anthracene	9.97E-01	1.3E-07	1.39E-07	1.0E+04	3.1E-06	3.3E-06
Benzene	1.20E-01	0.0E+00	0.00E+00	2.5E+00	0.0E+00	0.0E+00
Benzo[a]pyrene	9.99E-01	1.3E-07	1.39E-07	3.9E+04	3.1E-06	3.3E-06
Biphenyl (1,1-Biphenyl)	7.68E-01	2.7E-08	2.67E-08	7.5E+01	4.8E-07	4.8E-07
Dibenz[a,h]anthracene	9.99E-01	2.7E-07	3.04E-07	7.2E+04	6.5E-06	7.2E-06
Dibenzofuran	9.47E-01	0.0E+00	0.00E+00	4.0E+02	0.0E+00	0.0E+00
Di-n-propyl adipate (Di	5.12E-01	0.0E+00	0.00E+00	2.3E+01	0.0E+00	0.0E+00
Dioxin (2,3,7,8-TCDD)	9.99E-01	1.4E-10	1.47E-10	1.1E+05	3.3E-09	3.5E-09
Diphenylamine	5.69E-01	2.0E-09	2.01E-09	2.9E+01	2.7E-08	2.7E-08
Mesitylene (1,3,5-trime	7.48E-01	0.0E+00	0.00E+00	6.7E+01	0.0E+00	0.0E+00
Naphthalene	6.80E-01	0.0E+00	0.00E+00	4.8E+01	0.0E+00	0.0E+00
n-Hexane	7.68E-01	0.0E+00	0.00E+00	7.5E+01	0.0E+00	0.0E+00
N-Nitrosodiphenylamin	3.76E-01	0.0E+00	0.00E+00	1.3E+01	0.0E+00	0.0E+00
Phenanthrene	9.73E-01	2.0E-07	2.02E-07	8.4E+02	4.6E-06	4.6E-06
Phenol	6.13E-02	5.4E-10	5.45E-10	8.8E-01	4.7E-10	4.7E-10
Pyrene	9.91E-01	3.8E-08	4.56E-08	2.7E+03	9.0E-07	1.1E-06
Resorcinol	3.53E-02	4.6E-08	4.60E-08	2.3E-01	1.1E-08	1.1E-08
Styrene	6.20E-01	0.0E+00	0.00E+00	3.6E+01	0.0E+00	0.0E+00
Thianaphthene (benzo	4.13E-01	0.0E+00	0.00E+00	1.5E+01	0.0E+00	0.0E+00
Toluene	2.15E-01	0.0E+00	0.00E+00	5.6E+00	0.0E+00	0.0E+00
Triacetin	2.95E-02	3.9E-10	3.90E-10	8.9E-02	3.5E-11	3.5E-11
Xylenes	3.65E-01	0.0E+00	0.00E+00	1.2E+01	0.0E+00	0.0E+00
Aluminum	9.85E-01	5.0E-02	8.52E-02	1.5E+03	1.2E+00	2.0E+00
Lead	9.75E-01	3.3E-03	5.27E-03	9.0E+02	7.5E-02	1.2E-01
Zirconium	9.92E-01	1.7E-04	3.01E-04	3.0E+03	4.0E-03	7.1E-03
copper	9.98E-01	6.6E-03	1.21E-02	1.0E+04	1.6E-01	2.8E-01
Iron	5.30E-01	7.5E-07	7.67E-07	2.5E+01	9.2E-06	9.4E-06

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 36
Fish Concentrations From Dissolved Water Concentrations Using Bioconcentration Factors (Source:TABLE B-4-26)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$C_{fish} = C_{dw} \times BCF_{fish}$$

Symbol	Value	Description	Units	Notes
C_{fish}	calculated	Concentration in fish	mg/kg FW	
C_{dw}	calculated	Dissolved phase water concentration	mg/L water	Calculated from sheet "Cdw"
BCF_{fish}	chemical-specific	Bioconcentration factor in fish	L/kg	See Appendix A-3

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 36

Fish Concentrations From Dissolved Water Concentrations Using Bioconcentration Factors (Source:TABLE B-4-26)

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	BCF (L/kg)	C_{dw} (mg/L) - carcinogenic chemicals	C_{dw} (mg/L) - noncarcinogenic chemicals	C_{fish} - carcinogenic chemicals (mg/kg)	C_{fish} - noncarcinogenic chemicals (mg/kg)
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	0.00E+00	4.09E-10	4.57E-10	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	0.00E+00	1.63E-08	1.93E-08	0.00E+00	0.00E+00
2,4-Dinitrotoluene	5.92E+00	4.93E-10	4.93E-10	2.92E-09	2.92E-09
2,5-Diphenyloxazole	0.00E+00	1.50E-09	1.50E-09	0.00E+00	0.00E+00
2,6-Dinitrotoluene	5.92E+00	1.41E-09	1.41E-09	8.34E-09	8.34E-09
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.67E+01	1.42E-10	1.42E-10	2.37E-09	2.37E-09
4-Nitrosodiphenylamin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	0.00E+00	2.95E-10	3.16E-10	0.00E+00	0.00E+00
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	0.00E+00	8.05E-11	8.47E-11	0.00E+00	0.00E+00
Biphenyl (1,1-Bipheny	4.37E+02	6.44E-09	6.44E-09	2.81E-06	2.81E-06
Dibenz[a,h]anthracene	0.00E+00	9.04E-11	1.00E-10	0.00E+00	0.00E+00
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	0.00E+00	3.05E-14	3.23E-14	0.00E+00	0.00E+00
Diphenylamine	2.60E+02	9.04E-10	9.06E-10	2.35E-07	2.36E-07
Mesitylene (1,3,5-trime	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	0.00E+00	5.47E-09	5.56E-09	0.00E+00	0.00E+00
Phenol	7.81E+00	5.34E-10	5.34E-10	4.17E-09	4.17E-09
Pyrene	0.00E+00	3.30E-10	3.93E-10	0.00E+00	0.00E+00
Resorcinol	2.31E+00	4.63E-08	4.63E-08	1.07E-07	1.07E-07
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	9.12E-01	3.95E-10	3.95E-10	3.60E-10	3.60E-10
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	2.70E+00	7.74E-04	1.32E-03	2.09E-03	3.57E-03
Lead	0.00E+00	8.34E-05	1.35E-04	0.00E+00	0.00E+00
Zirconium	0.00E+00	1.32E-06	2.36E-06	0.00E+00	0.00E+00
copper	7.10E+02	1.55E-05	2.85E-05	1.10E-02	2.02E-02
Iron	0.00E+00	3.67E-07	3.76E-07	0.00E+00	0.00E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 37
Fish Concentrations From Dissolved Water Concentrations Using Bioaccumulation Factors (Source:TABLE B-4-27)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$C_{fish} = C_{dw} \times BAF_{fish}$$

Symbol	Value	Description	Units	Notes
C_{fish}	calculated	Concentration in fish	mg/kg FW	
C_{dw}	calculated	Dissolved phase water concentration	mg/L water	Calculated from sheet "Cdw"
BCF_{fish}	chemical-specific	Bioconcentration factor in fish	L/kg	See Appendix A-3

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 37
Fish Concentrations From Dissolved Water Concentrations Using Bioaccumulation Factors (Source:TABLE B-4-27)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	BAF (L/kg)	C_{dw} (mg/L) - carcinogenic chemicals	C_{dw} (mg/L) - noncarcinogenic chemicals	C_{fish} - carcinogenic chemicals (mg/kg)	C_{fish} - noncarcinogenic chemicals (mg/kg)
1,3-Butadiene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	2625.979063	4.09E-10	4.57E-10	1.07E-06	1.20E-06
1-Methylnaphthalene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	13205.35188	1.63E-08	1.93E-08	2.15E-04	2.55E-04
2,4-Dinitrotoluene	0	4.93E-10	4.93E-10	0.00E+00	0.00E+00
2,5-Diphenyloxazole	3336.721676	1.50E-09	1.50E-09	5.00E-06	5.01E-06
2,6-Dinitrotoluene	0	1.41E-09	1.41E-09	0.00E+00	0.00E+00
2-Methylnaphthalene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	0	1.42E-10	1.42E-10	0.00E+00	0.00E+00
4-Nitrosodiphenylamine	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	5100	2.95E-10	3.16E-10	1.50E-06	1.61E-06
Benzene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	9950	8.05E-11	8.47E-11	8.01E-07	8.43E-07
Biphenyl (1,1-Biphenyl)	0	6.44E-09	6.44E-09	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	12800	9.04E-11	1.00E-10	1.16E-06	1.29E-06
Dibenzofuran	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropy	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	0	3.05E-14	3.23E-14	0.00E+00	0.00E+00
Diphenylamine	0	9.04E-10	9.06E-10	0.00E+00	0.00E+00
Mesitylene (1,3,5-trimethylbe	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	3300	5.47E-09	5.56E-09	1.80E-05	1.83E-05
Phenol	0	5.34E-10	5.34E-10	0.00E+00	0.00E+00
Pyrene	11900	3.30E-10	3.93E-10	3.93E-06	4.68E-06
Resorcinol	0	4.63E-08	4.63E-08	0.00E+00	0.00E+00
Styrene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thic	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	0	3.95E-10	3.95E-10	0.00E+00	0.00E+00
Xylenes	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	0	7.74E-04	1.32E-03	0.00E+00	0.00E+00
Lead	8	8.34E-05	1.35E-04	6.68E-04	1.08E-03
Zirconium	0	1.32E-06	2.36E-06	0.00E+00	0.00E+00
copper	0	1.55E-05	2.85E-05	0.00E+00	0.00E+00
Iron	0	3.67E-07	3.76E-07	0.00E+00	0.00E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 38
Fish Concentrations From Sediment Concentrations Using Biota-Sediment Accumulation Factors (Source:TABLE B-4-28)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$C_{fish} = \frac{C_{sb} \times f_{lipid} \times BSAF}{OC_{sed}}$$

Symbol	Value	Description	Units	Notes
C_{fish}	calculated	Concentration in fish	mg/kg FW	
C_{sb}	calculated	Concentration in bed sediment	mg/kg	Calculated from sheet "Csb"
f_{lipid}	7.0E-02	Fish lipid content	unitless	
BSAF	chemical-specific	Biota-sediment accumulation fator	unitless	See Appendix A-3
OC_{sed}	0.04	Fraction of organic carbon in bottom sediment	unitless	

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 38
Fish Concentrations From Sediment Concentrations Using Biota-Sediment Accumulation Factors (Source:TABLE B-4-28)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	BSAF	Csb (mg/kg) - carcinogenic chemicals	C_{sb} (mg/kg) - noncarcinogenic chemicals	C_{fish} - carcinogenic chemicals (mg/kg)	C_{fish} - noncarcinogenic chemicals (mg/kg)
1,3-Butadiene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	0	3.57E-07	3.99E-07	0.00E+00	0.00E+00
1-Methylnaphthalene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	0	4.24E-05	5.04E-05	0.00E+00	0.00E+00
2,4-Dinitrotoluene	0	1.01E-09	1.01E-09	0.00E+00	0.00E+00
2,5-Diphenyloxazole	0	3.73E-07	3.73E-07	0.00E+00	0.00E+00
2,6-Dinitrotoluene	0	2.36E-09	2.36E-09	0.00E+00	0.00E+00
2-Methylnaphthalene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	0	2.48E-10	2.48E-10	0.00E+00	0.00E+00
4-Nitrosodiphenylamine	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	0	3.07E-06	3.29E-06	0.00E+00	0.00E+00
Benzene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	0	3.12E-06	3.28E-06	0.00E+00	0.00E+00
Biphenyl (1,1-Biphenyl)	0	4.81E-07	4.81E-07	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	0	6.47E-06	7.19E-06	0.00E+00	0.00E+00
Dibenzofuran	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dip	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	0.09	3.28E-09	3.48E-09	5.17E-10	5.48E-10
Diphenylamine	0	2.65E-08	2.66E-08	0.00E+00	0.00E+00
Mesitylene (1,3,5-trimeth	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	0	4.57E-06	4.65E-06	0.00E+00	0.00E+00
Phenol	0	4.70E-10	4.70E-10	0.00E+00	0.00E+00
Pyrene	0	8.98E-07	1.07E-06	0.00E+00	0.00E+00
Resorcinol	0	1.06E-08	1.06E-08	0.00E+00	0.00E+00
Styrene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	0	3.50E-11	3.50E-11	0.00E+00	0.00E+00
Xylenes	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	0	1.16E+00	1.99E+00	0.00E+00	0.00E+00
Lead	0	7.51E-02	1.21E-01	0.00E+00	0.00E+00
Zirconium	0	3.97E-03	7.08E-03	0.00E+00	0.00E+00
copper	0	1.55E-01	2.85E-01	0.00E+00	0.00E+00
Iron	0	9.19E-06	9.40E-06	0.00E+00	0.00E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 39
Summary of Fish Concentrations From Dissolved Water or Sediment Concentrations
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Fish from Dissolved Water Concentration Using BCF (mg/kg FW)		Concentration in Fish from Dissolved Water Concentration Using BAF (mg/kg FW)		Concentration in Fish from Sediment Concentration Using BSAF (mg/kg FW)		Exposure Point Concentration in Fish (mg/kg FW)	
	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	0.00E+00	0.00E+00	1.07E-06	1.20E-06	0.00E+00	0.00E+00	1.07E-06	1.20E-06
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	0.00E+00	0.00E+00	2.15E-04	2.55E-04	0.00E+00	0.00E+00	2.15E-04	2.55E-04
2,4-Dinitrotoluene	2.92E-09	2.92E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.92E-09	2.92E-09
2,5-Diphenyloxazole	0.00E+00	0.00E+00	5.00E-06	5.01E-06	0.00E+00	0.00E+00	5.00E-06	5.01E-06
2,6-Dinitrotoluene	8.34E-09	8.34E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.34E-09	8.34E-09
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	2.37E-09	2.37E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.37E-09	2.37E-09
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	0.00E+00	0.00E+00	1.50E-06	1.61E-06	0.00E+00	0.00E+00	1.50E-06	1.61E-06
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	0.00E+00	0.00E+00	8.01E-07	8.43E-07	0.00E+00	0.00E+00	8.01E-07	8.43E-07
Biphenyl (1,1-Biphenyl)	2.81E-06	2.81E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-06	2.81E-06
Dibenz[a,h]anthracene	0.00E+00	0.00E+00	1.16E-06	1.29E-06	0.00E+00	0.00E+00	1.16E-06	1.29E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dip	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.17E-10	5.48E-10	5.17E-10	5.48E-10
Diphenylamine	2.35E-07	2.36E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-07	2.36E-07
Mesitylene (1,3,5-trimet	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	0.00E+00	0.00E+00	1.80E-05	1.83E-05	0.00E+00	0.00E+00	1.80E-05	1.83E-05
Phenol	4.17E-09	4.17E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-09	4.17E-09
Pyrene	0.00E+00	0.00E+00	3.93E-06	4.68E-06	0.00E+00	0.00E+00	3.93E-06	4.68E-06
Resorcinol	1.07E-07	1.07E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-07	1.07E-07
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	3.60E-10	3.60E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.60E-10	3.60E-10
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	2.09E-03	3.57E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-03	3.57E-03
Lead	0.00E+00	0.00E+00	6.68E-04	1.08E-03	0.00E+00	0.00E+00	6.68E-04	1.08E-03
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
copper	1.10E-02	2.02E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-02	2.02E-02
Iron	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-6
Concentrations in the River and Fish - Subsistence Fisher Scenario

Table 39
Summary of Fish Concentrations From Dissolved Water or Sediment Concentrations
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	0.00E+00	0.00E+00	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#REF!	#REF!	#REF!	#REF!
0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#REF!	#REF!	#REF!	#REF!
0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	#REF!	#REF!	#REF!	#REF!

Attachment B-7
Intake and Risks – Subsistence Fisher

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Annual Average Concentration in Air (ug/m^3)	Average soil concentration over exposure duration - Cs (mg/kg)	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg)	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration
1,3-Butadiene	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.42E-07	9.04E-06	1.02E-05	1.21E-06	1.31E-06	7.99E-07	9.02E-07	3.21E-07
1-Methylnaphthalene	7.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	6.97E-06	6.44E-04	7.81E-04	4.98E-05	5.61E-05	2.97E-05	3.60E-05	1.81E-05
2,4-Dinitrotoluene	1.42E-07	5.36E-08	5.36E-08	5.57E-07	5.57E-07	1.46E-07	1.46E-07	1.50E-06
2,5-Diphenyloxazole	3.01E-06	6.58E-06	6.60E-06	9.19E-06	9.20E-06	5.09E-07	5.11E-07	9.76E-07
2,6-Dinitrotoluene	4.12E-07	1.33E-07	1.34E-07	1.61E-06	1.61E-06	4.20E-07	4.21E-07	4.11E-06
2-Methylnaphthalene	7.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	1.21E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.42E-07	1.11E-08	1.11E-08	4.45E-07	4.45E-07	3.37E-08	3.38E-08	3.34E-07
4-Nitrosodiphenylamine	1.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	3.12E-07	1.56E-05	1.70E-05	1.22E-06	1.25E-06	3.14E-07	3.44E-07	3.28E-07
Benzene	3.48E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.42E-07	5.79E-06	6.23E-06	4.76E-07	4.81E-07	6.43E-08	6.91E-08	7.30E-08
Biphenyl (1,1-Biphenyl)	1.49E-05	8.22E-06	8.22E-06	4.45E-05	4.45E-05	1.55E-06	1.55E-06	0.00E+00
Dibenz[a,h]anthracene	1.42E-07	9.68E-06	1.10E-05	4.73E-07	4.82E-07	6.16E-08	7.02E-08	1.38E-07
Dibenzofuran	3.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	4.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.23E-11	3.71E-09	4.02E-09	2.59E-10	2.60E-10	2.08E-11	2.26E-11	4.15E-11
Diphenylamine	6.02E-07	9.20E-07	9.22E-07	2.08E-06	2.08E-06	3.47E-07	3.48E-07	1.47E-05
Mesitylene (1,3,5-trimethylbenzene)	2.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	2.77E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	1.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	6.33E-06	9.10E-05	9.32E-05	2.65E-05	2.67E-05	8.26E-06	8.46E-06	3.25E-06
Phenol	1.99E-07	3.36E-08	3.36E-08	7.56E-07	7.56E-07	1.82E-07	1.82E-07	1.45E-06
Pyrene	1.42E-07	1.33E-05	1.62E-05	1.07E-06	1.22E-06	6.62E-07	8.05E-07	3.25E-07
Resorcinol	2.05E-05	1.75E-06	1.75E-06	8.33E-05	8.33E-05	2.40E-05	2.40E-05	2.20E-04
Styrene	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	1.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	7.56E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.42E-07	1.32E-08	1.32E-08	7.77E-07	7.77E-07	3.66E-07	3.66E-07	3.96E-06
Xylenes	2.03E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	3.17E-01	8.00E+01	1.43E+02	1.23E+00	1.49E+00	3.20E-01	5.74E-01	5.20E-04
Lead	3.01E-02	6.67E+00	1.12E+01	1.78E-01	2.39E-01	9.07E-02	1.52E-01	6.00E-04
Zirconium	6.25E-04	1.76E-01	3.32E-01	2.16E-03	2.47E-03	3.52E-04	6.64E-04	8.79E-07
copper	8.67E-03	2.64E+00	5.19E+00	1.08E+00	2.10E+00	1.06E+00	2.07E+00	6.60E-03
Iron	9.54E-05	1.40E-03	1.44E-03	2.81E-04	2.81E-04	5.62E-06	5.75E-06	1.40E-08

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Forage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce - Livestock Silage (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Beef (mg/kg FW) - Average concentration over exposure duration	Concentration in Beef (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Milk (mg/kg FW) - Average concentration over exposure duration
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	3.62E-07	5.70E-06	5.80E-06	2.07E-06	2.17E-06	5.84E-08	6.00E-08	3.08E-08
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.20E-05	2.69E-04	2.76E-04	9.17E-05	9.80E-05	8.79E-06	9.20E-06	4.56E-06
2,4-Dinitrotoluene	1.50E-06	5.05E-06	5.05E-06	1.41E-06	1.41E-06	1.25E-10	1.25E-10	6.89E-11
2,5-Diphenyloxazole	9.79E-07	1.04E-04	1.04E-04	2.73E-05	2.73E-05	1.22E-06	1.22E-06	6.69E-07
2,6-Dinitrotoluene	4.11E-06	1.46E-05	1.46E-05	4.09E-06	4.09E-06	2.81E-10	2.81E-10	1.55E-10
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	3.34E-07	4.94E-06	4.94E-06	1.30E-06	1.30E-06	1.00E-10	1.00E-10	5.51E-11
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	3.59E-07	1.11E-05	1.11E-05	3.10E-06	3.13E-06	1.42E-06	1.43E-06	7.51E-07
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	7.84E-08	4.97E-06	4.97E-06	1.33E-06	1.34E-06	1.77E-06	1.78E-06	9.44E-07
Biphenyl (1,1-Biphenyl)	0.00E+00	5.14E-04	5.14E-04	1.34E-04	1.34E-04	1.28E-06	1.28E-06	7.05E-07
Dibenz[a,h]anthracene	1.58E-07	4.96E-06	4.97E-06	1.33E-06	1.34E-06	4.80E-06	4.87E-06	2.51E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	4.50E-11	2.85E-09	2.86E-09	7.54E-10	7.55E-10	1.64E-09	1.65E-09	5.08E-10
Diphenylamine	1.48E-05	2.10E-05	2.10E-05	5.70E-06	5.70E-06	1.59E-08	1.59E-08	8.75E-09
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	3.33E-06	2.26E-04	2.26E-04	6.46E-05	6.48E-05	2.05E-06	2.06E-06	1.12E-06
Phenol	1.45E-06	7.02E-06	7.02E-06	1.95E-06	1.95E-06	5.28E-11	5.28E-11	2.90E-11
Pyrene	3.94E-07	5.56E-06	5.71E-06	1.93E-06	2.07E-06	1.59E-07	1.67E-07	8.25E-08
Resorcinol	2.20E-04	7.31E-04	7.31E-04	2.07E-04	2.07E-04	1.10E-09	1.10E-09	6.07E-10
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	3.96E-06	5.27E-06	5.27E-06	1.63E-06	1.63E-06	2.36E-12	2.36E-12	1.30E-12
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	9.32E-04	1.12E+01	1.15E+01	3.14E+00	3.39E+00	2.28E-01	2.80E-01	4.53E-02
Lead	1.01E-03	1.34E+00	1.54E+00	5.68E-01	7.72E-01	5.14E-03	6.54E-03	6.66E-03
Zirconium	1.66E-06	2.19E-02	2.22E-02	5.91E-03	6.23E-03	1.68E-03	2.13E-03	1.35E-05
copper	1.30E-02	1.35E+00	2.37E+00	1.13E+00	2.15E+00	1.67E-01	3.00E-01	4.15E-02
Iron	1.44E-08	3.29E-03	3.29E-03	8.55E-04	8.55E-04	6.66E-04	6.67E-04	1.43E-05

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Pork (mg/kg FW) - Average concentration over exposure duration	Concentration in Pork (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Chicken (mg/kg FW) - Average concentration over exposure duration	Concentration in Chicken (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life	Total Water Column Concentration (mg/L) - Average concentration over exposure duration
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	3.16E-08	2.94E-08	3.06E-08	1.00E-09	1.03E-09	3.95E-07	4.09E-07	4.16E-10
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	4.72E-06	4.63E-06	4.97E-06	1.57E-07	1.67E-07	6.21E-05	6.59E-05	1.71E-08
2,4-Dinitrotoluene	6.89E-11	5.62E-11	5.62E-11	1.98E-12	1.98E-12	7.95E-10	7.95E-10	4.93E-10
2,5-Diphenyloxazole	6.69E-07	5.42E-07	5.42E-07	1.97E-08	1.97E-08	7.78E-06	7.78E-06	1.51E-09
2,6-Dinitrotoluene	1.55E-10	1.26E-10	1.26E-10	4.47E-12	4.47E-12	1.79E-09	1.79E-09	1.41E-09
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	5.51E-11	4.48E-11	4.48E-11	1.59E-12	1.59E-12	6.38E-10	6.38E-10	1.42E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	7.56E-07	7.05E-07	7.18E-07	2.42E-08	2.45E-08	9.68E-06	9.83E-06	3.53E-10
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	9.47E-07	8.67E-07	8.77E-07	2.99E-08	3.02E-08	1.20E-05	1.21E-05	1.39E-10
Biphenyl (1,1-Biphenyl)	7.05E-07	5.69E-07	5.69E-07	2.07E-08	2.07E-08	8.17E-06	8.17E-06	6.45E-09
Dibenz[a,h]anthracene	2.53E-06	2.47E-06	2.55E-06	8.44E-08	8.66E-08	3.38E-05	3.46E-05	2.12E-10
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	5.10E-10	8.10E-10	8.20E-10	4.76E-11	4.81E-11	3.54E-11	3.57E-11	9.21E-14
Diphenylamine	8.75E-09	7.09E-09	7.09E-09	2.57E-10	2.57E-10	1.01E-07	1.01E-07	9.05E-10
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.12E-06	9.53E-07	9.55E-07	3.33E-08	3.33E-08	1.33E-05	1.33E-05	5.55E-09
Phenol	2.90E-11	2.36E-11	2.36E-11	8.36E-13	8.36E-13	3.35E-10	3.35E-10	5.34E-10
Pyrene	8.57E-08	8.48E-08	9.12E-08	2.80E-09	2.98E-09	1.12E-06	1.19E-06	3.47E-10
Resorcinol	6.07E-10	4.91E-10	4.91E-10	1.77E-11	1.77E-11	7.00E-09	7.00E-09	4.63E-08
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.30E-12	1.05E-12	1.05E-12	3.77E-14	3.77E-14	1.49E-11	1.49E-11	3.95E-10
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	5.14E-02	1.47E-01	2.06E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.86E-04
Lead	8.15E-03	3.07E-03	4.24E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E-05
Zirconium	1.55E-05	1.11E-03	1.64E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.36E-06
copper	7.40E-02	8.85E-02	1.61E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-05
Iron	1.43E-05	3.06E-04	3.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.68E-07

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 1
Summary of Concentrations in Environmental Media
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Total Water Column Concentration (mg/L) - Concentration at the end of the facility operating life	Dissolved Phase Water Concentration (mg/L) - Average concentration over exposure duration	Dissolved Phase Water Concentration (mg/L) - Concentration at the end of the facility operating life	Concentration in Sediment (mg/kg) - Average concentration over exposure duration	Concentration in Sediment (mg/kg) - Concentration at the end of the facility operating life	Concentration in Fish (mg/kg) - Average concentration over exposure duration	Concentration in Fish (mg/kg) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	4.64E-10	4.09E-10	4.57E-10	3.57E-07	3.99E-07	1.07E-06	1.20E-06
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.03E-08	1.63E-08	1.93E-08	4.24E-05	5.04E-05	2.15E-04	2.55E-04
2,4-Dinitrotoluene	4.93E-10	4.93E-10	4.93E-10	1.01E-09	1.01E-09	2.92E-09	2.92E-09
2,5-Diphenyloxazole	1.51E-09	1.50E-09	1.50E-09	3.73E-07	3.73E-07	5.00E-06	5.01E-06
2,6-Dinitrotoluene	1.41E-09	1.41E-09	1.41E-09	2.36E-09	2.36E-09	8.34E-09	8.34E-09
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.42E-10	1.42E-10	1.42E-10	2.48E-10	2.48E-10	2.37E-09	2.37E-09
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	3.78E-10	2.95E-10	3.16E-10	3.07E-06	3.29E-06	1.50E-06	1.61E-06
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.46E-10	8.05E-11	8.47E-11	3.12E-06	3.28E-06	8.01E-07	8.43E-07
Biphenyl (1,1-Biphenyl)	6.45E-09	6.44E-09	6.44E-09	4.81E-07	4.81E-07	2.81E-06	2.81E-06
Dibenz[a,h]anthracene	2.35E-10	9.04E-11	1.00E-10	6.47E-06	7.19E-06	1.16E-06	1.29E-06
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	9.76E-14	3.05E-14	3.23E-14	3.28E-09	3.48E-09	5.17E-10	5.48E-10
Diphenylamine	9.07E-10	9.04E-10	9.06E-10	2.65E-08	2.66E-08	2.35E-07	2.36E-07
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	5.65E-09	5.47E-09	5.56E-09	4.57E-06	4.65E-06	1.80E-05	1.83E-05
Phenol	5.34E-10	5.34E-10	5.34E-10	4.70E-10	4.70E-10	4.17E-09	4.17E-09
Pyrene	4.13E-10	3.30E-10	3.93E-10	8.98E-07	1.07E-06	3.93E-06	4.68E-06
Resorcinol	4.63E-08	4.63E-08	4.63E-08	1.06E-08	1.06E-08	1.07E-07	1.07E-07
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	3.95E-10	3.95E-10	3.95E-10	3.50E-11	3.50E-11	3.60E-10	3.60E-10
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	1.34E-03	7.74E-04	1.32E-03	1.16E+00	1.99E+00	2.09E-03	3.57E-03
Lead	1.36E-04	8.34E-05	1.35E-04	7.51E-02	1.21E-01	6.68E-04	1.08E-03
Zirconium	2.43E-06	1.32E-06	2.36E-06	3.97E-03	7.08E-03	0.00E+00	0.00E+00
copper	3.13E-05	1.55E-05	2.85E-05	1.55E-01	2.85E-01	1.10E-02	2.02E-02
Iron	3.76E-07	3.67E-07	3.76E-07	9.19E-06	9.40E-06	0.00E+00	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 2
Summary of Exposure Factors
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
Isoil	calculated	Soil ingestion rate	mg/kg-day	
Cs	calculated	Concentration in soil	mg/kg	Calculated from Equations presented in Table B-1-1
Crsoil	2.00E-04	Soil ingestion rate	kg/day	Adult soil ingestion rate - 100 mg/day; child soil ingestion rate - 200 mg/day
Fsoil	0	Fraction of soil that is contaminated	unitless	
BW	70	Body weight	kg	adult body weight - 70 kg; child body weight - 15 kg
Iag	calculated	Produce Intake Rate	mg/kg-day	
Pd	calculated	Concentration in aboveground exposed produce due to deposition	mg/kg DW	Calculated from equation in Tables B-2-7 and B-3-7
Pv	calculated	Concentration in aboveground exposed produce due to air to plant transfer	mg/kg DW	Calculated from equation in Table B-2-8
Pr	calculated	Concentration in aboveground exposed and protected produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-9, B 3-9
Pr_{bg}	calculated	Concentration in belowground produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-10
CR_{ag}	0.00042	Consumption rate of aboveground produce	kg/kg-day DW	Adult - 0.0003 Child - 0.00042
CR_{pp}	0.00077	Consumption rate of aboveground protected produce	kg/kg-day DW	Adult - 0.00057 Child - 0.00077
CR_{bg}	0.00022	Consumption rate of belowground produce	kg/kg-day DW	Adult - 0.00014 Child - 0.00022
F_{ag}	0	Fraction of produce that is contaminated	Unitless	Adult or child resident - 0.25 Subsistance farmer, adult or child - 1 Subsistance fisher, adult or child - 0.25
I_j	calculated	Intake from ingestion of animal tissue from animal *j*	mg/kg-day	
A_{beef}	calculated	Concentration in beef	mg/kg FW	Calculated using equations presented in Table B-3-10
A_{milk}	calculated	Concentration in milk	mg/kg FW	Calculated using equations presented in Table B-3-11
A_{pork}	calculated	Concentration in pork	mg/kg FW	Calculated using equations presented in Table B-3-12

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 2
Summary of Exposure Factors
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Symbol	Value	Description	Units	Notes
$A_{chicken}$	calculated	Concentration in chicken	mg/kg FW	Calculated using equations presented in Table B-3-13
A_{egg}	calculated	Concentration in egg	mg/kg FW	Calculated using equations presented in Table B-3-14
CR_{beef}	0.00051	Consumption rate of beef	kg/kg-day FW	Adult - 0.00114 Child - 0.00051
CR_{milk}	0.01857	Consumption rate of milk	kg/kg-day FW	Adult - 0.00842 Child - 0.01857
CR_{pork}	0.000398	Consumption rate of pork	kg/kg-day FW	Adult - 0.00053 Child - 0.000398
$CR_{chicken}$	0.000425	Consumption rate of chicken	kg/kg-day FW	Adult - 0.00061 Child - 0.000425
CR_{egg}	0.000438	Consumption rate of egg	kg/kg-day FW	Adult - 0.00062 Child - 0.000438
F_{beef}	0	Fraction of beef consumed from contaminated sources	unitless	
F_{milk}	0	Fraction of milk consumed from contaminated sources	unitless	
F_{pork}	0	Fraction of pork consumed from contaminated sources	unitless	
$F_{chicken}$	0	Fraction of chicken consumed from contaminated sources	unitless	
F_{egg}	0	Fraction of eggs consumed from contaminated sources	unitless	
CR_{fish}	0.00117	Fish ingestion rate	kg/kg-day	Adult - 0.00117 kg/kg-day FW Child - 0.000759 kg/kg-day FW
F_{fish}	1	Fraction of fish ingested from contaminated source	unitless	
IR	0.63	Inhalation rate	m^3/hr	0.63 m^3/hr for adults; 0.3 m^3/hr for children
ET	24	Exposure time	hr/day	
EF	350	Exposure Frequency	days/yr	
ED	30	Exposure Duration	yr	Subsistance fisher - 30 Adult resident - 30
AT_c	70	Averaging time - carcinogens	yr	
AT_n	30	Averaging time - noncarcinogens		Set equal to ED

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 3
Summary of Toxicity Factors
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Oral Cancer Slope Factor 1/(mg/kg-day)	Inhalation Cancer Slope Factor 1/(mg/kg-day)	Oral Reference Dose (mg/kg-day)	Inhalation Reference Dose (mg/kg-day)
1,3-Butadiene	NA	1.8	NA	NA
1,6-Dinitropyrene	NA	NA	NA	NA
1-Methylnaphthalene	NA	NA	0.02	0.0009
1-Nitropyrene	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	0.002	NA
2,5-Diphenyloxazole	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	0.001	NA
2-Methylnaphthalene	NA	NA	0.02	NA
2-Nitronaphthalene	NA	NA	NA	NA
4-Nitrophenol	NA	NA	0.008	NA
4-Nitrosodiphenylamine	0.0049	NA	NA	NA
Benzo[a]anthracene	0.73	NA	NA	NA
Benzene	0.055	0.029	0.003	0.0017
Benzo[a]pyrene	7.3	3.1	NA	NA
Biphenyl (1,1-Biphenyl)	NA	NA	0.05	NA
Dibenz[a,h]anthracene	7.3	NA	NA	NA
Dibenzofuran	NA	NA	0.004	NA
Di-n-propyl adipate (Dipropyl adipate)	NA	NA	NA	NA
Dioxin (2,3,7,8-TCDD)	156000	156000	NA	NA
Diphenylamine	NA	NA	0.025	NA
Mesitylene (1,3,5-trimethylbenzene)	NA	NA	0.05	0.0017
Naphthalene	NA	NA	0.02	0.0009
n-Hexane	NA	NA	0.06	0.0571
N-Nitrosodiphenylamine	0.0049	NA	NA	NA
Phenanthrene	NA	NA	NA	NA
Phenol	NA	NA	0.6	NA
Pyrene	NA	NA	0.03	NA
Resorcinol	NA	NA	NA	NA
Styrene	NA	NA	0.2	0.286
Thianaphthene (benzo[b]thiophene)	NA	NA	NA	NA
Toluene	NA	NA	0.2	0.114
Triacetin	NA	NA	NA	NA
Xylenes	NA	NA	2	NA
Aluminum	NA	NA	1	0.0014
Lead	NA	NA	NA	NA
Zirconium	NA	NA	NA	NA
copper	NA	NA	0.04	NA
Iron	NA	NA	0.3	NA

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 4
Intake and Health Risk From Soil Ingestion (Table C-1-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_{soil} = \frac{Cs \times CR_{soil} \times F_{soil}}{BW}$$

Symbol	Value	Description	Units	Notes
Isoil	calculated	Soil ingestion rate	mg/kg-day	
Cs	calculated	Concentration in soil	mg/kg	Calculated from Equations presented in Table B-1-1
Crsoil	2.00E-04	Soil ingestion rate	kg/day	Adult soil ingestion rate - 50 mg/day; child soil ingestion rate - 100 mg/day
Fsoil	0	Fraction of soil that is contaminated	unitless	
BW	70	Body weight	kg	adult body weight - 70 kg; child body weight - 15 kg

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 4
Intake and Health Risk From Soil Ingestion (Table C-1-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Average soil concentration over exposure duration - Cs (mg/kg) - Cancer Risk	Soil concentration at time tD (at the end of the facility operating life) - CstD (mg/kg) - Noncancer Effects	Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	Oral Reference Dose (mg/kg-day)	Intake based on average soil concentration over exposure duration (mg/kg-day) - used to assess cancer risks	Intake based on soil concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
1,3-Butadiene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	9.04E-06	1.02E-05	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	6.44E-04	7.81E-04	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,4-Dinitrotoluene	5.36E-08	5.36E-08	0	0.002	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,5-Diphenyloxazole	6.58E-06	6.60E-06	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2,6-Dinitrotoluene	1.33E-07	1.34E-07	0	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.11E-08	1.11E-08	0	0.008	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.56E-05	1.70E-05	0.73	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzene	0.00E+00	0.00E+00	0.055	0.003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	5.79E-06	6.23E-06	7.3	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biphenyl (1,1-Biphenyl)	8.22E-06	8.22E-06	0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	9.68E-06	1.10E-05	7.3	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dibenzofuran	0.00E+00	0.00E+00	0	0.004	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	3.71E-09	4.02E-09	156000	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Diphenylamine	9.20E-07	9.22E-07	0	0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0	0.06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	9.10E-05	9.32E-05	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenol	3.36E-08	3.36E-08	0	0.6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pyrene	1.33E-05	1.62E-05	0	0.03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Resorcinol	1.75E-06	1.75E-06	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Styrene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	1.32E-08	1.32E-08	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xylenes	0.00E+00	0.00E+00	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	8.00E+01	1.43E+02	0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	6.67E+00	1.12E+01	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zirconium	1.76E-01	3.32E-01	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
copper	2.64E+00	5.19E+00	0	0.04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Iron	1.40E-03	1.44E-03	0	0.3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 5
Intake and Health Risk From Produce Ingestion (Table C-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_{ag} = \left[\left((Pd + Pv + \mathrm{Pr}) \times CR_{ag}\right) + \left(\mathrm{Pr} \times CR_{pp}\right) + \left(\mathrm{Pr}_{bg} \times CR_{bg}\right)\right] \times F_{ag}$$

Symbol	Value	Description	Units	Notes
Iag	calculated	Produce Intake Rate	mg/kg-day	
Pd	calculated	Concentration in aboveground exposed produce due to deposition	mg/kg DW	Calculated from equation in Tables B-2-7 and B-3-7
Pv	calculated	Concentration in aboveground exposed produce due to air to plant transfer	mg/kg DW	Calculated from equation in Table B-2-8
Pr	calculated	Concentration in aboveground exposed and protected produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-9, B-3-9
Pr_{bg}	calculated	Concentration in belowground produce due to root uptake	mg/kg DW	Calculated from equation in Table B-2-10
CR_{ag}	0.00042	Consumption rate of aboveground produce	kg/kg-day DW	
CR_{pp}	0.00077	Consumption rate of aboveground protected produce	kg/kg-day DW	
CR_{bg}	0.00022	Consumption rate of belowground produce	kg/kg-day DW	
F_{ag}	0	Fraction of produce that is contaminated	Unitless	Subsistance farmer, adult or child - 1 Subsistance fisher, adult or child - 0.25

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 5
Intake and Health Risk From Produce Ingestion (Table C-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Aboveground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Aboveground Protected Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Aboveground Protected Produce (mg/kg DW) - Concentration at the end of the facility operating life	Concentration in Belowground Produce (mg/kg DW) - Average concentration over exposure duration	Concentration in Belowground Produce (mg/kg DW) - Concentration at the end of the facility operating life
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.21E-06	1.31E-06	7.99E-07	9.02E-07	3.21E-07	3.62E-07
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	4.98E-05	5.61E-05	2.97E-05	3.60E-05	1.81E-05	2.20E-05
2,4-Dinitrotoluene	5.57E-07	5.57E-07	1.46E-07	1.46E-07	1.50E-06	1.50E-06
2,5-Diphenyloxazole	9.19E-06	9.20E-06	5.09E-07	5.11E-07	9.76E-07	9.79E-07
2,6-Dinitrotoluene	1.61E-06	1.61E-06	4.20E-07	4.21E-07	4.11E-06	4.11E-06
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	4.45E-07	4.45E-07	3.37E-08	3.38E-08	3.34E-07	3.34E-07
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.22E-06	1.25E-06	3.14E-07	3.44E-07	3.28E-07	3.59E-07
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	4.76E-07	4.81E-07	6.43E-08	6.91E-08	7.30E-08	7.84E-08
Biphenyl (1,1-Biphenyl)	4.45E-05	4.45E-05	1.55E-06	1.55E-06	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	4.73E-07	4.82E-07	6.16E-08	7.02E-08	1.38E-07	1.58E-07
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	2.59E-10	2.60E-10	2.08E-11	2.26E-11	4.15E-11	4.50E-11
Diphenylamine	2.08E-06	2.08E-06	3.47E-07	3.48E-07	1.47E-05	1.48E-05
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	2.65E-05	2.67E-05	8.26E-06	8.46E-06	3.25E-06	3.33E-06
Phenol	7.56E-07	7.56E-07	1.82E-07	1.82E-07	1.45E-06	1.45E-06
Pyrene	1.07E-06	1.22E-06	6.62E-07	8.05E-07	3.25E-07	3.94E-07
Resorcinol	8.33E-05	8.33E-05	2.40E-05	2.40E-05	2.20E-04	2.20E-04
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	7.77E-07	7.77E-07	3.66E-07	3.66E-07	3.96E-06	3.96E-06
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	1.23E+00	1.49E+00	3.20E-01	5.74E-01	5.20E-04	9.32E-04
Lead	1.78E-01	2.39E-01	9.07E-02	1.52E-01	6.00E-04	1.01E-03
Zirconium	2.16E-03	2.47E-03	3.52E-04	6.64E-04	8.79E-07	1.66E-06
copper	1.08E+00	2.10E+00	1.06E+00	2.07E+00	6.60E-03	1.30E-02
Iron	2.81E-04	2.81E-04	5.62E-06	5.75E-06	1.40E-08	1.44E-08

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 5
Intake and Health Risk From Produce Ingestion (Table C-1-2)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Oral Cancer Slope Factor (mg/kg-day)$^{-1}$	Oral Reference Dose (mg/kg-day)	Produce Intake Rate - carcinogenic risk (mg/kg)	Produce Intake Rate - noncancer effects (mg/kg)	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.002	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.001	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.008	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.73	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.055	0.003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.3	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7.3	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.004	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
156000	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.025	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.6	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0	0.3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 6
Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_j = A_j \times CR_j \times F_j$$

Symbol	Value	Description	Units	Notes
I_j	calculated	Intake from ingestion of animal tissue from animal *j*	mg/kg-day	
A_{beef}	calculated	Concentration in beef	mg/kg FW	Calculated using equations presented in Table B-3-10
A_{milk}	calculated	Concentration in milk	mg/kg FW	Calculated using equations presented in Table B-3-11
A_{pork}	calculated	Concentration in pork	mg/kg FW	Calculated using equations presented in Table B-3-12
$A_{chicken}$	calculated	Concentration in chicker	mg/kg FW	Calculated using equations presented in Table B-3-13
A_{egg}	calculated	Concentration in egg	mg/kg FW	Calculated using equations presented in Table B-3-14
CR_{beef}	0.00051	Consumption rate of beef	kg/kg-day FW	Adult - 0.00114 Child - 0.00051
CR_{milk}	0.01857	Consumption rate of milk	kg/kg-day FW	Adult - 0.00842 Child - 0.01857
CR_{pork}	0.000398	Consumption rate of pork	kg/kg-day FW	Adult - 0.00053
$CR_{chicken}$	0.000425	Consumption rate of chicken	kg/kg-day FW	Adult - 0.00061 Child - 0.000425
CR_{egg}	0.000438	Consumption rate of egg	kg/kg-day FW	Adult - 0.00062 Child - 0.000438
F_{beef}	0	Fraction of beef consumed from contaminated sources		
F_{milk}	0	Fraction of milk consumed from contaminated sources		
F_{pork}	0	Fraction of pork consumed from contaminated sources		
$F_{chicken}$	0	Fraction of chicken consumed from contaminated sources		
F_{egg}	0	Fraction of eggs consumed from contaminated sources		

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 6
Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Beef (mg/kg FW) - Average concentration over exposure duration	Concentration in Beef (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Milk (mg/kg FW) - Average concentration over exposure duration	Concentration in Milk (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Pork (mg/kg FW) - Average concentration over exposure duration	Concentration in Pork (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Chicken (mg/kg FW) - Average concentration over exposure duration
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	5.84E-08	6.00E-08	3.08E-08	3.16E-08	2.94E-08	3.06E-08	1.00E-09
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	8.79E-06	9.20E-06	4.56E-06	4.72E-06	4.63E-06	4.97E-06	1.57E-07
2,4-Dinitrotoluene	1.25E-10	1.25E-10	6.89E-11	6.89E-11	5.62E-11	5.62E-11	1.98E-12
2,5-Diphenyloxazole	1.22E-06	1.22E-06	6.69E-07	6.69E-07	5.42E-07	5.42E-07	1.97E-08
2,6-Dinitrotoluene	2.81E-10	2.81E-10	1.55E-10	1.55E-10	1.26E-10	1.26E-10	4.47E-12
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	1.00E-10	1.00E-10	5.51E-11	5.51E-11	4.48E-11	4.48E-11	1.59E-12
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.42E-06	1.43E-06	7.51E-07	7.56E-07	7.05E-07	7.18E-07	2.42E-08
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	1.77E-06	1.78E-06	9.44E-07	9.47E-07	8.67E-07	8.77E-07	2.99E-08
Biphenyl (1,1-Biphenyl)	1.28E-06	1.28E-06	7.05E-07	7.05E-07	5.69E-07	5.69E-07	2.07E-08
Dibenz[a,h]anthracene	4.80E-06	4.87E-06	2.51E-06	2.53E-06	2.47E-06	2.55E-06	8.44E-08
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	1.64E-09	1.65E-09	5.08E-10	5.10E-10	8.10E-10	8.20E-10	4.76E-11
Diphenylamine	1.59E-08	1.59E-08	8.75E-09	8.75E-09	7.09E-09	7.09E-09	2.57E-10
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	2.05E-06	2.06E-06	1.12E-06	1.12E-06	9.53E-07	9.55E-07	3.33E-08
Phenol	5.28E-11	5.28E-11	2.90E-11	2.90E-11	2.36E-11	2.36E-11	8.36E-13
Pyrene	1.59E-07	1.67E-07	8.25E-08	8.57E-08	8.48E-08	9.12E-08	2.80E-09
Resorcinol	1.10E-09	1.10E-09	6.07E-10	6.07E-10	4.91E-10	4.91E-10	1.77E-11
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	2.36E-12	2.36E-12	1.30E-12	1.30E-12	1.05E-12	1.05E-12	3.77E-14
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	2.28E-01	2.80E-01	4.53E-02	5.14E-02	1.47E-01	2.06E-01	0.00E+00
Lead	5.14E-03	6.54E-03	6.66E-03	8.15E-03	3.07E-03	4.24E-03	0.00E+00
Zirconium	1.68E-03	2.13E-03	1.35E-05	1.55E-05	1.11E-03	1.64E-03	0.00E+00
copper	1.67E-01	3.00E-01	4.15E-02	7.40E-02	8.85E-02	1.61E-01	0.00E+00
Iron	6.66E-04	6.67E-04	1.43E-05	1.43E-05	3.06E-04	3.06E-04	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 6
Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Concentration in Chicken (mg/kg FW) - Concentration at the end of the facility operating life	Concentration in Egg (mg/kg FW) - Average concentration over exposure duration	Concentration in Egg (mg/kg FW) - Concentration at the end of the facility operating life	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Oral Reference Dose (mg/kg-day)	Beef Intake Rate - carcinogenic risk (mg/kg)	Beef Intake Rate - noncancer effects (mg/kg)
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
1.03E-09	3.95E-07	4.09E-07	0	0	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00
1.67E-07	6.21E-05	6.59E-05	0	0	0.00E+00	0.00E+00
1.98E-12	7.95E-10	7.95E-10	0	0.002	0.00E+00	0.00E+00
1.97E-08	7.78E-06	7.78E-06	0	0	0.00E+00	0.00E+00
4.47E-12	1.79E-09	1.79E-09	0	0.001	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
1.59E-12	6.38E-10	6.38E-10	0	0.008	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00
2.45E-08	9.68E-06	9.83E-06	0.73	0	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.055	0.003	0.00E+00	0.00E+00
3.02E-08	1.20E-05	1.21E-05	7.3	0	0.00E+00	0.00E+00
2.07E-08	8.17E-06	8.17E-06	0	0.05	0.00E+00	0.00E+00
8.66E-08	3.38E-05	3.46E-05	7.3	0	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.004	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
4.81E-11	3.54E-11	3.57E-11	156000	0	0.00E+00	0.00E+00
2.57E-10	1.01E-07	1.01E-07	0	0.025	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.05	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.06	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00
3.33E-08	1.33E-05	1.33E-05	0	0	0.00E+00	0.00E+00
8.36E-13	3.35E-10	3.35E-10	0	0.6	0.00E+00	0.00E+00
2.98E-09	1.12E-06	1.19E-06	0	0.03	0.00E+00	0.00E+00
1.77E-11	7.00E-09	7.00E-09	0	0	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00
3.77E-14	1.49E-11	1.49E-11	0	0	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	2	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	1	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.04	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0	0.3	0.00E+00	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 6
Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Milk Intake Rate - carcinogenic risk (mg/kg)	Milk Intake Rate - noncancer effects (mg/kg)	Pork Intake Rate - carcinogenic risk (mg/kg)	Pork Intake Rate - noncancer effects (mg/kg)	Chicken Intake Rate - carcinogenic risk (mg/kg)	Chicken Intake Rate - noncancer effects (mg/kg)	Egg Intake Rate - carcinogenic risk (mg/kg)
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 6
Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Egg Intake Rate - noncancer effects (mg/kg)	Excess Lifetime Cancer Risk - Beef Intake	Noncancer Hazard Quotient - Beef Intake	Excess Lifetime Cancer Risk - Milk Intake	Noncancer Hazard Quotient - Milk Intake	Excess Lifetime Cancer Risk - Pork Intake	Noncancer Hazard Quotient - Pork Intake
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 6
Intake and Health Risk From Ingestion of Beef, Milk, Pork, Poultry and Eggs (Table C-1-3)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Excess Lifetime Cancer Risk - Chicken Intake	Noncancer Hazard Quotient - Chicken Intake	Excess Lifetime Cancer Risk - Egg Intake	Noncancer Hazard Quotient - Egg Intake	Excess Lifetime Cancer Risk - Total Animal Products Consumption	Noncancer Hazard Quotient - Total Animal Products Consumption
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 7
Intake and Health Risk From Ingestion of Fish (Table C-1-4)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$I_{fish} = C_{fish} \times CR_{fish} \times F_{fish}$$

Symbol	Value	Description	Units	Notes
I_{fish}	calculated	Daily intake from fish ingestion	mg/kg-day	
C_{fish}	calculated	Concentration in fish	mg/kg	Calculated using equations presented in Table B-4-26.
CR_{fish}	0.00117	Fish ingestion rate	kg/kg-day	Adult - 0.00117 kg/kg-day FW Child - 0.000759 kg/kg-day FW
F_{fish}	1	Fraction of fish ingested from contaminated source	unitless	

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 7
Intake and Health Risk From Ingestion of Fish (Table C-1-4)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration in Fish (mg/kg) - Average concentration over exposure duration	Concentration in Fish (mg/kg) Concentration at the end of the facility operating life	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Oral Reference Dose (mg/kg-day)	Intake based on average fish concentration over exposure duration (mg/kg-day) - used to assess cancer risks	Intake based on fish concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
1,3-Butadiene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1,6-Dinitropyrene	1.07E-06	1.20E-06	0	0	1.26E-09	1.40E-09	0.00E+00	0.00E+00
1-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1-Nitropyrene	2.15E-04	2.55E-04	0	0	2.51E-07	2.99E-07	0.00E+00	0.00E+00
2,4-Dinitrotoluene	2.92E-09	2.92E-09	0	0.002	3.41E-12	3.41E-12	0.00E+00	1.71E-09
2,5-Diphenyloxazole	5.00E-06	5.01E-06	0	0	5.85E-09	5.86E-09	0.00E+00	0.00E+00
2,6-Dinitrotoluene	8.34E-09	8.34E-09	0	0.001	9.76E-12	9.76E-12	0.00E+00	9.76E-09
2-Methylnaphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-Nitronaphthalene	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4-Nitrophenol	2.37E-09	2.37E-09	0	0.008	2.77E-12	2.77E-12	0.00E+00	3.46E-10
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]anthracene	1.50E-06	1.61E-06	0.73	0	1.76E-09	1.89E-09	1.28E-09	0.00E+00
Benzene	0.00E+00	0.00E+00	0.055	0.003	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Benzo[a]pyrene	8.01E-07	8.43E-07	7.3	0	9.37E-10	9.86E-10	6.84E-09	0.00E+00
Biphenyl (1,1-Biphenyl)	2.81E-06	2.81E-06	0	0.05	3.29E-09	3.29E-09	0.00E+00	6.58E-08
Dibenz[a,h]anthracene	1.16E-06	1.29E-06	7.3	0	1.35E-09	1.50E-09	9.88E-09	0.00E+00
Dibenzofuran	0.00E+00	0.00E+00	0	0.004	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	5.17E-10	5.48E-10	156000	0	6.05E-13	6.41E-13	9.44E-08	0.00E+00
Diphenylamine	2.35E-07	2.36E-07	0	0.025	2.75E-10	2.76E-10	0.00E+00	1.10E-08
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0	0.05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Naphthalene	0.00E+00	0.00E+00	0	0.02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
n-Hexane	0.00E+00	0.00E+00	0	0.06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.0049	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Phenanthrene	1.80E-05	1.83E-05	0	0	2.11E-08	2.15E-08	0.00E+00	0.00E+00
Phenol	4.17E-09	4.17E-09	0	0.6	4.88E-12	4.88E-12	0.00E+00	8.13E-12
Pyrene	3.93E-06	4.68E-06	0	0.03	4.60E-09	5.48E-09	0.00E+00	1.83E-07
Resorcinol	1.07E-07	1.07E-07	0	0	1.25E-10	1.25E-10	0.00E+00	0.00E+00
Styrene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toluene	0.00E+00	0.00E+00	0	0.2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Triacetin	3.60E-10	3.60E-10	0	0	4.21E-13	4.21E-13	0.00E+00	0.00E+00
Xylenes	0.00E+00	0.00E+00	0	2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	2.09E-03	3.57E-03	0	1	2.45E-06	4.18E-06	0.00E+00	4.18E-06
Lead	6.68E-04	1.08E-03	0	0	7.81E-07	1.26E-06	0.00E+00	0.00E+00
Zirconium	0.00E+00	0.00E+00	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
copper	1.10E-02	2.02E-02	0	0.04	1.29E-05	2.36E-05	0.00E+00	5.91E-04
Iron	0.00E+00	0.00E+00	0	0.3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 8
Intake and Health Risk From Inhalation (Table C-2-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

$$Risk_{inh} = ADI \times CSF_{inh}$$

$$ADI = \frac{C_{air} \times IR \times ET \times EF \times ED \times 0.001 mg/ug}{BW \times AT\_c \times 365 days/year}$$

Symbol	Value	Description	Units	Notes
ADIinh	calculated	Average daily intake - inhalation	mg/kg-day	
Ca	calculated	Concentration in Air	ug/m^3	
CSFinh	tabulated	Inhalation cancer slope factor	1/(mg/kg-day)	
RfDinh	tabulated	Inhalation Reference Dose	mg/kg-day	
IR	0.63	Inhalation rate	m3/hr	0.63 m^3/hr for adults; 0.3 m^3/hr for children
ET	24	Exposure time	hr/day	
EF	350	Exposure Frequency	days/yr	
ED	350	Exposure Duration	yr	Subsistance farmer - 40 Subsistance fisher - 30 Adult resident - 30 Child - 6
BW	70	Body weight	kg	70 - adult; 15 - child
AT_c	70	Averaging time - carcinogens	yr	
AT_n	30	Averaging time - noncarcinogens	yr	Set equal to ED

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 8
Intake and Health Risk From Inhalation (Table C-2-1)
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Concentration In Air (ug/m^3)	Average Daily Intake - carcinogenic (mg/kg-day)	Average Daily Intake - noncarcinogenic (mg/kg day)	CSF 1/(mg/kg-day)	RfD (mg/kg-day)	Excess Lifetime Cancer Risk	Noncancer Hazard Quotient
1,3-Butadiene	3.57E-05	3.16E-09	7.38E-09	1.8	0	5.70E-09	0.00E+00
1,6-Dinitropyrene	1.42E-07	1.26E-11	2.95E-11	0	0	0.00E+00	0.00E+00
1-Methylnaphthalene	7.60E-06	6.74E-10	1.57E-09	0	0.0009	0.00E+00	1.75E-06
1-Nitropyrene	6.97E-06	6.18E-10	1.44E-09	0	0	0.00E+00	0.00E+00
2,4-Dinitrotoluene	1.42E-07	1.26E-11	2.95E-11	0	0	0.00E+00	0.00E+00
2,5-Diphenyloxazole	3.01E-06	2.67E-10	6.23E-10	0	0	0.00E+00	0.00E+00
2,6-Dinitrotoluene	4.12E-07	3.66E-11	8.53E-11	0	0	0.00E+00	0.00E+00
2-Methylnaphthalene	7.60E-06	6.74E-10	1.57E-09	0	0	0.00E+00	0.00E+00
2-Nitronaphthalene	1.21E-07	1.07E-11	2.50E-11	0	0	0.00E+00	0.00E+00
4-Nitrophenol	1.42E-07	1.26E-11	2.95E-11	0	0	0.00E+00	0.00E+00
4-Nitrosodiphenylamine	1.42E-07	1.26E-11	2.95E-11	0	0	0.00E+00	0.00E+00
Benzo[a]anthracene	3.12E-07	2.77E-11	6.47E-11	0	0	0.00E+00	0.00E+00
Benzene	3.48E-03	3.09E-07	7.21E-07	0.029	0.0017	8.96E-09	4.24E-04
Benzo[a]pyrene	1.42E-07	1.26E-11	2.95E-11	3.1	0	3.92E-11	0.00E+00
Biphenyl (1,1-Biphenyl)	1.49E-05	1.32E-09	3.08E-09	0	0	0.00E+00	0.00E+00
Dibenz[a,h]anthracene	1.42E-07	1.26E-11	2.95E-11	0	0	0.00E+00	0.00E+00
Dibenzofuran	3.17E-06	2.81E-10	6.56E-10	0	0	0.00E+00	0.00E+00
Di-n-propyl adipate (Dipropyl adip	4.27E-06	3.79E-10	8.85E-10	0	0	0.00E+00	0.00E+00
Dioxin (2,3,7,8-TCDD)	8.23E-11	7.31E-15	1.70E-14	156000	0	1.14E-09	0.00E+00
Diphenylamine	6.02E-07	5.34E-11	1.25E-10	0	0	0.00E+00	0.00E+00
Mesitylene (1,3,5-trimethylbenzen	2.60E-06	2.31E-10	5.39E-10	0	0.0017	0.00E+00	3.17E-07
Naphthalene	2.77E-07	2.46E-11	5.74E-11	0	0.0009	0.00E+00	6.37E-08
n-Hexane	3.57E-05	3.16E-09	7.38E-09	0	0.0571	0.00E+00	1.29E-07
N-Nitrosodiphenylamine	1.42E-07	1.26E-11	2.95E-11	0	0	0.00E+00	0.00E+00
Phenanthrene	6.33E-06	5.62E-10	1.31E-09	0	0	0.00E+00	0.00E+00
Phenol	1.99E-07	1.76E-11	4.12E-11	0	0	0.00E+00	0.00E+00
Pyrene	1.42E-07	1.26E-11	2.95E-11	0	0	0.00E+00	0.00E+00
Resorcinol	2.05E-05	1.82E-09	4.25E-09	0	0	0.00E+00	0.00E+00
Styrene	3.57E-05	3.16E-09	7.38E-09	0	0.286	0.00E+00	2.58E-08
Thianaphthene (benzo[b]thiophen	1.42E-07	1.26E-11	2.95E-11	0	0	0.00E+00	0.00E+00
Toluene	7.56E-04	6.71E-08	1.57E-07	0	0.114	0.00E+00	1.37E-06
Triacetin	1.42E-07	1.26E-11	2.95E-11	0	0	0.00E+00	0.00E+00
Xylenes	2.03E-04	1.80E-08	4.21E-08	0	0	0.00E+00	0.00E+00
Aluminum	3.17E-01	2.81E-05	6.56E-05	0	0.0014	0.00E+00	4.68E-02
Lead	3.01E-02	2.67E-06	6.24E-06	0	0	0.00E+00	0.00E+00
Zirconium	6.25E-04	5.55E-08	1.29E-07	0	0	0.00E+00	0.00E+00
copper	8.67E-03	7.70E-07	1.80E-06	0	0	0.00E+00	0.00E+00
Iron	9.54E-05	8.47E-09	1.98E-08	0	0	0.00E+00	0.00E+00

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 9

Summary of Chemical Intake Rates

Air Pathway Human Health Risk Assessment, Burning Grounds

Allegany Ballistics Laboratory

Chemical	Intake based on average soil concentration over exposure duration (mg/kg-day) - used to assess cancer risks								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-09
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-09	1.26E-11
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.74E-10
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.51E-07	6.18E-10
2,4-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.41E-12	1.26E-11
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.85E-09	2.67E-10
2,6-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.76E-12	3.66E-11
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.74E-10
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-11
4-Nitrophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-12	1.26E-11
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-11
Benzo[a]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-09	2.77E-11
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.09E-07
Benzo[a]pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.37E-10	1.26E-11
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-09	1.32E-09
Dibenz[a,h]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-09	1.26E-11
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-10
Di-n-propyl adipate (Dipropy	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.79E-10
Dioxin (2,3,7,8-TCDD)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.05E-13	7.31E-15
Diphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.75E-10	5.34E-11
Mesitylene (1,3,5-trimethylb	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-10
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-11
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-09
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-11
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-08	5.62E-10
Phenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.88E-12	1.76E-11
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.60E-09	1.26E-11
Resorcinol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-10	1.82E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-09
Thianaphthene (benzo[b]thi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-11
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E-08
Triacetin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-13	1.26E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-08
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-06	2.81E-05
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.81E-07	2.67E-06
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.55E-08
copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-05	7.70E-07
Iron	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.47E-09

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 9

Summary of Chemical Intake

Air Pathway Human Health I

Allegany Ballistics Laborator

Chemical	Intake based on soil concentration at the end of the facility operating life (mg/kg-day) - used to assess noncancer effects								
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.38E-09
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-09	2.95E-11
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-09
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.99E-07	1.44E-09
2,4-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.41E-12	2.95E-11
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.86E-09	6.23E-10
2,6-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.76E-12	8.53E-11
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-09
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-11
4-Nitrophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-12	2.95E-11
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-11
Benzo[a]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-09	6.47E-11
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.21E-07
Benzo[a]pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.86E-10	2.95E-11
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-09	3.08E-09
Dibenz[a,h]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-09	2.95E-11
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E-10
Di-n-propyl adipate (Dipropy	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.85E-10
Dioxin (2,3,7,8-TCDD)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.41E-13	1.70E-14
Diphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.76E-10	1.25E-10
Mesitylene (1,3,5-trimethylb	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.39E-10
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.74E-11
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.38E-09
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-11
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.15E-08	1.31E-09
Phenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.88E-12	4.12E-11
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-09	2.95E-11
Resorcinol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-10	4.25E-09
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.38E-09
Thianaphthene (benzo[b]thi	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-11
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-07
Triacetin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-13	2.95E-11
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.21E-08
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.18E-06	6.56E-05
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-06	6.24E-06
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-07
copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-05	1.80E-06
Iron	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-08

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessment, Burning Grounds
Allegany Ballistics Laboratory

Chemical	Estimated Lifetime Cancer Risk by Pathway									Total Excess Lifetime Cancer Risk	Contribution to Total Risk
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation		
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.70E-09	5.70E-09	4.44%
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2,4-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2,6-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
4-Nitrophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Benzo[a]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-09	1.28E-09	1.00%
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.96E-09	8.96E-09	6.99%
Benzo[a]pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-09	3.92E-11	6.88E-09	5.37%
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Dibenz[a,h]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.88E-09	0.00E+00	9.88E-09	7.71%
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Dioxin (2,3,7,8-TCDD)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.44E-08	1.14E-09	9.55E-08	74.49%
Diphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Phenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Resorcinol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Triacetin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
Iron	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00%
									Total Risk	**1.28E-07**	

Attachment B-7
Intakes and Risks, Maximum Exposed Individual, Subsistence Fisher

Table 10
Summary of Estimated Health Risks
Air Pathway Human Health Risk Assessment, B
Allegany Ballistics Laboratory

Chemical	Estimated Noncancer Hazard Quotients by Pathway									Total Hazard Quotient by Chemical	Hazard Quotient > 0.25?
	Soil Ingestion	Produce Ingestion	Beef Ingestion	Milk Ingestion	Pork Ingestion	Chicken Ingestion	Egg Ingestion	Fish Ingestion	Inhalation		
1,3-Butadiene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
1,6-Dinitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
1-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-06	1.75E-06	no
1-Nitropyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2,4-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-09	0.00E+00	1.71E-09	no
2,5-Diphenyloxazole	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2,6-Dinitrotoluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.76E-09	0.00E+00	9.76E-09	no
2-Methylnaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
2-Nitronaphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
4-Nitrophenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-10	0.00E+00	3.46E-10	no
4-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Benzo[a]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Benzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-04	4.24E-04	no
Benzo[a]pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Biphenyl (1,1-Biphenyl)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.58E-08	0.00E+00	6.58E-08	no
Dibenz[a,h]anthracene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Dibenzofuran	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Di-n-propyl adipate (Dipropyl adipate)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Dioxin (2,3,7,8-TCDD)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Diphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-08	0.00E+00	1.10E-08	no
Mesitylene (1,3,5-trimethylbenzene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E-07	3.17E-07	no
Naphthalene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.37E-08	6.37E-08	no
n-Hexane	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.29E-07	1.29E-07	no
N-Nitrosodiphenylamine	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Phenanthrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Phenol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.13E-12	0.00E+00	8.13E-12	no
Pyrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-07	0.00E+00	1.83E-07	no
Resorcinol	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Styrene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.58E-08	2.58E-08	no
Thianaphthene (benzo[b]thiophene)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Toluene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-06	1.37E-06	no
Triacetin	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Xylenes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.18E-06	4.68E-02	4.68E-02	no
Lead	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
Zirconium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-04	0.00E+00	5.91E-04	no
Iron	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	no
									Total HI	**4.79E-02**	

Appendix C
Ecological Risk Assessment

DRAFT

Ecological Risk Assessment Report for the Burning Grounds

Allegany Ballistics Laboratory (ABL) Rocket Center, West Virginia

Contract Task Order 0175

January 2002

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN II Program
Contract No. N62470-95-D-6007

Prepared by

Herndon, Virginia

Contents

Acronyms and Abbreviations ix

Ecological Risk Assessment C-1

Executive Summary C-1

1.0 Introduction C-3

1.1 Objectives and Overall Approach C-4

2.0 Description of the Facility C-4

2.1 Previous Ecological Risk Assessments C-5

3.0 Problem Formulation C-6

3.1 Environmental Setting C-6

3.2 Available Analytical Data C-17

3.3 Conceptual Model C-17

4.0 Approach and Methodology C-21

4.1 Exposure Assessment C-21

4.2 Effects Assessment C-34

4.3 Risk Characterization C-37

4.4 Uncertainties C-38

5.0 Continued Operations C-38

5.1 Problem Formulation C-38

5.2 Exposure Estimate C-40

5.3 Effects Evaluation C-40

5.4 Risk Characterization C-41

5.5 Risk Evaluation and Conclusions C-43

6.0 Current Conditions C-43

6.1 Problem Formulation C-44

6.2 Exposure Estimate C-47

6.3 Effects Evaluation C-47

6.4 Risk Characterization C-47

6.5 Risk Evaluation and Conclusions C-49

7.0 Uncertainties C-50

8.0 Conclusions C-53

8.1 Continued Operations C-53

8.2 Current Conditions C-53

9.0 References C-54

Attachments

C-1 Analytical Data - Burning Grounds - Surface Soil

C-2 Analytical Data - Burning Grounds - Subsurface Soil

C-3 Deposition Modeling

Tables (located at the end of Appendix C)

3-1 Plant Species Within the Burning Grounds
3-2 Plant Species in Areas Adjacent to the Burning Grounds
3-3 Wildlife Species Observed at the Burning Grounds and Surrounding Areas
3-4 Breeding Bird Atlas Data From the Site Vicinity
3-5 Christmas Bird Count Data (1995-2000), Allegany County, MD/WV Census Plot
3-6 Amphibian and Reptile Species Known to Occur in Mineral County, West Virginia
3-7 Fish Catch Per Unit Effort (Individuals/Hr) at Station 5 (Upstream), Station 6 (Pinto) and Station 7 (Downstream) from Site 1 and the Burning Grounds
3-8 Results of Benthic Invertebrate Sampling in the North Branch Potomac River - July 1994
3-9 Results of Benthic Invertebrate Sampling (Hester-Dendy) in the North Branch Potomac River - July 1998
3-10 Results of Benthic Invertebrate Sampling (Hester-Dendy) in the North Branch Potomac River - July 2000
3-11 Rare, Threatened, and Endangered Species From Mineral County, West Virginia
3-12 Rare, Threatened, and Endangered Species From Maryland
3-13 Assessment and Measurement Endpoints - Continued Operations Exposure Scenario
3-14 Assessment and Measurement Endpoints - Current Conditions Exposure Scenario

4-1 Chemicals to be Evaluated in the ERA
4-2 Physical and Chemical Properties
4-3 Plant Biotransfer Factors
4-4 Soil Invertebrate Bioaccumulation Factors
4-5 Soil Bioaccumulation Factors for Small Mammals
4-6 Sediment Bioaccumulation Factors for Benthic Invertebrates
4-7 Water/Sediment Bioaccumulation Factors for Fish
4-8 Exposure Parameters for Upper Trophic Level Ecological Receptors
4-9 Chronic TRVs for Animals - Ground-Level Ambient Air
4-10 Surface Water TRVs
4-11 Sediment TRVs
4-12 Surface Soil TRVs
4-13 Background Soils Data Summary
4-14 Ingestion TRVs for Mammals
4-15 Ingestion TRVs for Birds
4-16 Toxicity Equivalency Factors for Dioxin and Furan Congeners

5-1 Screening Statistics - Air - Maximum Point
5-2 Screening Statistics - Soil - Maximum Point
5-3 Screening Statistics - Soil - Fenceline Average (5 Grid Locations)
5-4 Hazard Quotients for Upper Trophic Level Terrestrial Receptors - Screening (Maximum Point)
5-5 Hazard Quotients for Upper Trophic Level Terrestrial Receptors - Baseline (Maximum Point)
5-6 Hazard Quotients for Upper Trophic Level Terrestrial Receptors - Baseline (Fenceline Average)
5-7 Screening Statistics - Surface Water - North Branch Potomac River
5-8 Screening Statistics - Sediment - North Branch Potomac River

5-9 Hazard Quotients for Upper Trophic Level Aquatic Receptors - Screening - North Branch Potomac River
5-10 Screening Statistics - Surface Water - Wetland
5-11 Screening Statistics - Sediment - Wetland
5-12 Hazard Quotients for Upper Trophic Level Aquatic Receptors - Screening - Wetland
5-13 Screening Statistics - Surface Water - Pond
5-14 Screening Statistics - Sediment - Pond
5-15 Hazard Quotients for Upper Trophic Level Aquatic Receptors - Screening - Pond

6-1 Summary Statistics for Detected Chemicals - Burning Grounds - Surface Soil
6-2 Summary Statistics for Detected Chemicals - Burning Grounds - Subsurface Soil
6-3 Background Comparison - Burning Grounds - Subsurface Soil
6-4 Comparison of Surface and Subsurface Soils
6-5 Evaluation of Depressional Area Surface Soil Samples
6-6 Screening Statistics - Burning Grounds - Surface Soil
6-7 Hazard Quotients for Upper Trophic Level Receptors - Screening
6-8 Hazard Quotients for Upper Trophic Level Receptors - Baseline

Figures (located at the end of Appendix C) [NOTE: Figures are actually labeled 1-8**]**

2-1 Layout of the Burning Grounds/IR Site 1 and Locations of Biota Sampling in the North Branch Potomac River
2-2 Wetland Areas Within 3 Kilometers of the Burning Grounds
2-3 Burning Grounds Layout

3-1 Concentration Isopleths (µg/m3) for Particulates (PM10 - Annual)
3-2 Concentration Isopleths (µg/m3) for Vapors (HCL - Annual)
3-3 Ecological Conceptual Model for Continued Operations
3-4 Ecological Conceptual Model for Current Conditions

5-1 Soil Sampling Locations

Acronyms and Abbreviations

ABL	Allegany Ballistics Laboratory
ATK	ATK Tactical Systems Company LLC
amsl	Above Mean Sea Level
BAF	Bioaccumulation Factor
BCF	Bioconcentration Factor
BERA	Baseline Ecological Risk Assessment
CBC	Christmas Bird Count
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COPC	Chemical of Potential Concern
CPOM	Coarse Particulate Organic Matter
ERA	Ecological Risk Assessment
ft	Feet
ft^3	Cubic Feet
HI	Hazard Index
HQ	Hazard Quotient
IR	Installation Restoration
LOAEL	Lowest Observed Adverse Effect Level
LOEC	Lowest Observed Effect Concentration
mg/L	Milligrams per Liter
MDNR	Maryland Department of Natural Resources
NOAEL	No Observed Adverse Effect Level
NOEC	No Observed Effect Concentration
OBOD-M	Open Burn/Open Detonation Dispersion Model
P/E	Propellant and Explosives
PAH	Polycyclic Aromatic Hydrocarbon
PPE	Personnel Protective Equipment
RCRA	Resource Conservation and Recovery Act
SERA	Screening Ecological Risk Assessment
SLC	Screening Level Concentration

SVOC	Semivolatile Organic Compound
TRV	Toxicity Reference Value
UF	Uncertainty Factor
UPRCWTP	Upper Potomac River Commission Wastewater Treatment Plant
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound
WVDEP	West Virginia Department of Environmental Protection

APPENDIX C

Ecological Risk Assessment

Executive Summary

This appendix presents the ecological risk assessment (ERA) for the Burning Grounds, Allegany Ballistics Laboratory (ABL), Rocket Center, West Virginia. The ABL facility has been used primarily for research, development, testing, and the manufacture of solid propellant rocket motors, gas generators, warheads, and laser initiation systems for the Department of Defense. Excess or waste propellant and explosives are treated by open burning at the Burning Grounds facility.

This ERA was conducted in accordance with applicable U.S. Environmental Protection Agency and Navy ERA guidance (USEPA 1997a, 1998a, 1999a; CNO 1999; NAVFAC 2001). The overall objective of the ERA was to evaluate potential risks to ecological receptors associated with the operation of the Burning Grounds in support of a RCRA Part B, Subpart X permit application for open burning and container storage at the site. The ERA evaluated the current and potential future ecological risks of burning-related chemicals in ecologically relevant media (air, surface water, sediment, and surface soil) as determined from site-specific surface soil sampling data, as well as from air dispersion and deposition modeling. The characterization of ecological risks involved identifying the potential exposures of ecological receptors and evaluating the potential effects associated with such exposures.

The main focus of the ERA was to quantify potential future risks associated with continued operations of the Burning Grounds facility. The evaluation of potential future risks from continued operations relied on modeled exposure estimates (i.e., concentrations in relevant media as determined from air dispersion and deposition modeling) based on the new design of the burn pads and pans. The spatial extent of this evaluation encompassed areas outside of the Burning Grounds based on the results of the air dispersion modeling. The objective of this portion of the ERA was to evaluate any potential risks to ecological receptors from continued burning operations so that measures could be taken (if necessary) to reduce any identified risks to acceptable levels through modifications to the design, engineering controls, or other appropriate mechanisms.

The ERA also quantified potential risks associated with current conditions within the boundaries of the Burning Grounds. The evaluation of current risks relied on analytical data (surface soils) collected on the Burning Grounds in February 2001, although the potential for off-site transport via groundwater and surface runoff was also qualitatively evaluated (to determine if they were complete and significant pathways). The objective of this portion of the ERA was to evaluate any current risks within the Burning Grounds to determine if any actions would be required to address these risks prior to construction of the new burn pads, and to support any required future closure plan for the unit.

Continued Operations

There were no exceedences of inhalation-based toxicity reference values (TRVs) from exposure to facility-related chemicals in ground-level air. Low-magnitude exceedences of soil TRVs and background concentrations occurred for copper and lead, but only under the most conservative exposure assumptions (e.g., 1-cm soil mixing depth, maximum point of deposition, screening inputs). Risk estimates based on more realistic exposures indicated low to negligible risks.

The evaluation of the portion of the North Branch Potomac River directly adjacent to the facility indicated negligible risks to wetland and aquatic receptors, even using the most conservative exposure assumptions. For a nearby pond and wetland, there were low-magnitude exceedences of surface water TRVs for aluminum (pond - hazard quotient [HQ] of 1.22) and lead (pond - HQ of 3.37; wetland - HQ of 2.48) based on a very conservative soil mixing depth of 1-cm. Risk estimates based on more realistic soil mixing depths indicated low to negligible risks. Risks to upper trophic level receptors at both the pond and wetland were negligible.

The ERA indicated that risks to ecological receptors inhabiting the habitats surrounding the Burning Grounds are expected to be negligible from the continued operation of the Burning Grounds facility.

Current Conditions

Baseline risk estimates using site-wide average surface soil concentrations indicated low to negligible risks to upper trophic level receptors. Other than dioxins/furans, only arsenic had a HQ exceeding one (1.68), although surface soil concentrations for arsenic were consistent with background concentrations. Exceedences for dioxins/furans were heavily influenced by non-detected congeners (representing the more toxic congeners) in a few samples and estimates based solely on detected congeners (representing the least toxic congeners) indicated negligible risk.

Widespread, high-magnitude exceedences of both surface soil TRVs and background concentrations were not apparent based on the existing surface soil data. Except for lead, background exceedences were generally infrequent and of relatively low magnitude. Lead, which is attributable at least in part to deposition from burning activities, was elevated in two areas. The first was in the southwestern corner of the Burning Grounds (surface soil samples SS-02 and SS-14) where the site maximum of 1,730 mg/kg occurred. The second area was in the east-central portion of the Burning Grounds (surface soil samples SS-11, SS-18, and SS-19). Given the limited habitat quality of the Burning Grounds, these relatively small areas of elevated lead concentrations are not likely to result in adverse impacts to populations of ecological receptors.

Except for chromium, most exceedences were of plant TRVs. Manganese and vanadium, each with a relatively high frequency of exceedence for soil fauna TRVs, were consistent with background. Lead, mercury, and zinc exceeded soil fauna TRVs in one, one, and two samples, respectively (mean HQs were all less than one). The site is covered in periodically-mowed grasses and other herbaceous plants, providing habitat of limited diversity and quality. Except for unpaved roads and the areas immediately around some of the active burn pans, areas of bare soil are uncommon and no obvious phytotoxic effects (e.g., large

areas of bare soil, dead or dying plants) were observed. This suggests limited potential for adverse effects to ecological receptors at the Burning Grounds.

Based on the results of the ERA, the risk estimates do not warrant any remedial actions be taken prior to the construction of the new burn pads. The relatively small areas with potentially elevated lead concentrations could be evaluated further in the future closure plan for the unit since they are not likely to be adversely affecting receptor populations at the current time under current land uses.

1.0 Introduction

This appendix presents the ecological risk assessment (ERA) for the Burning Grounds at the Allegany Ballistics Laboratory (ABL), Rocket Center, West Virginia. ABL is operated by ATK Tactical Systems Company LLC (ATK), has been used primarily for research, development, testing, and the manufacture of solid propellant rocket motors, gas generators, warheads, and laser initiation systems for the Department of Defense. Excess or waste propellant and explosives are treated by open burning at the Burning Grounds. In accordance with West Virginia regulatory requirements, Part A and B permit applications under Subpart X of the Resource Conservation and Recovery Act (RCRA) are being submitted to the West Virginia Department of Environmental Protection (WVDEP).

As described in U.S. Environmental Protection Agency (USEPA) and Navy ERA guidance (USEPA 1997a, 1998a, 1999a; CNO, 1999; NAVFAC, 2001), an ERA consists of three main components: (1) problem formulation, (2) analysis, and (3) risk characterization. Problem formulation involves: (1) compiling and reviewing existing information on the habitats and biota potentially present on the site and in the site vicinity; (2) developing exposure scenarios; (3) developing a conceptual model that identifies and evaluates potential source areas, transport pathways, fate and transport mechanisms, exposure media, exposure routes, and receptors; and (4) developing assessment and measurement endpoints for all complete exposure pathways. The problem formulation for the ERA is provided in Section 3 of this document.

The approach and methodology for the two remaining components of the ERA, analysis and risk characterization, are described in Section 4. The analysis portion of the ERA is divided into two main parts, exposure assessment and effects assessment. The exposure assessment involves estimating exposures to potential ecological receptors for the exposure scenarios identified in the problem formulation. The principal activity associated with the exposure assessment is the estimation of chemical concentrations in applicable media to which the receptors may be exposed. Data from air dispersion and deposition modeling are used to estimate ecological exposures for continued (future) operations of the Burning Grounds (assuming an additional 30-year active life). Data from soil sampling conducted at the Burning Grounds in February 2001 are used to estimate ecological exposures for current (existing) conditions. Standard models from the literature are used to estimate chemical concentrations in air, surface soil, surface water, sediment, and biological tissues (for use in direct and/or food web exposure modeling) as applicable to each exposure scenario evaluated (see Section 4). The principal activity associated with the effects assessment is the development of chemical exposure levels that represent conservative thresholds for adverse ecological effects.

The risk characterization portion of the ERA uses the information generated during the two previous parts of the ERA (problem formulation and analysis) to estimate potential risks to ecological receptors for the exposure scenarios evaluated. Also included is an evaluation of the uncertainties associated with the models, assumptions, and methods used in the ERA, and their potential effects on the conclusions of the assessment. The risk characterization for the continued operations exposure scenario is included in Section 5 of this document, the risk characterization for the current conditions exposure scenario is contained in Section 6, and the evaluation of uncertainties is included in Section 7.

1.1 Objectives and Overall Approach

The overall objective of the ERA is to evaluate current and future potential risks to ecological receptors associated with the operation of the Burning Grounds in support of a RCRA Part B, Subpart X permit application for open burning at ABL. The ERA evaluates the current and potential future ecological risks of burning-related chemicals in ecologically relevant media (air, surface water, sediment, and surface soil) as determined from site-specific surface soil sampling data (current), as well as from air dispersion and deposition modeling (future). The characterization of ecological risks involves identifying the potential exposures of ecological receptors and evaluating the potential effects associated with such exposures.

The main focus of the ERA is to quantify potential future risks associated with continued operations of the Burning Grounds facility. The evaluation of potential future risks from continued operations relies on modeled exposure estimates (i.e., concentrations in relevant media as determined from air dispersion and deposition modeling) based on the new design configuration of the burn pads and pans. The spatial extent of this evaluation encompasses areas outside of the Burning Grounds (RCRA unit) based on the results of the air dispersion modeling. The objective of this portion of the ERA is to evaluate any potential risks to ecological receptors from continued burning operations so that measures can be taken (if necessary) to reduce any identified risks to acceptable levels through modifications to the design, engineering controls, or other appropriate mechanisms.

The ERA also quantifies potential risks associated with current conditions within the boundaries of the RCRA unit. The evaluation of current risks relies on analytical data (surface soil) collected within the RCRA unit in February 2001, although the potential for off-site transport via groundwater and surface runoff is also qualitatively evaluated (to determine if they are complete and significant pathways). The objective of this portion of the ERA is to evaluate any current risks within the unit to determine if any actions are required to address these risks prior to construction of the new burn pads, and to support any required future closure plan for the unit.

2.0 Description of the Facility

ABL is a government-owned, contractor-operated facility located in Mineral County, West Virginia, approximately 10 miles southwest of Cumberland, Maryland. The ABL facility lies between the North Branch Potomac River (on the north and west) and Knobly Mountain (on the south and east) and consists of two plants. Plant 1 is owned by the Navy and operated by ATK. Plant 1 occupies about 1,600 acres. The northern portion of Plant 1 (approximately 400 acres in size) is almost entirely developed; much of this 400-acre area is

situated within the 500-year floodplain of the river. Installation restoration (IR) IR Site 1, currently being addressed under CERCLA, is located within this northern portion of Plant 1 (Figure 2-1); the Burning Grounds (a RCRA unit) are located entirely within IR Site 1. The remaining portion of Plant 1 (about 1,200 acres) is situated on forested, mountainous land that is largely undeveloped. Plant 2 occupies 56 acres along the east bank of the North Branch Potomac River and is located south and west of Plant 1 (Figure 2-2). All of Plant 2 occurs within the 500-year floodplain of the river (CH2M HILL, 1996). Plant 2 is owned and operated by ATK.

Since the early 1940s, IR Site 1 has been used for various types of waste burning and disposal activities. IR Site 1 contains inert and open waste burning areas; two landfills; a former drum storage area; and three inactive solvent disposal pits. A fenced area in the central portion of IR Site 1 contains the Burning Grounds (the subject of this ERA) as well as the three solvent disposal pits (addressed under the CERCLA program – Figure 2-1); all other waste management units are outside the Burning Grounds. This fenced area is about 8 acres in size. Propellants and ordnance-related wastes are currently burned in metal burn pans placed on gravel burn pads at the Burning Grounds. A total of eight burn pads were present, historically, but only six (five of which are used) are currently in place (Figure 2-3). Historically, wastes were burned directly on the ground at the pads. The pads currently consist of a metal burn pan filled with soil, which sits atop a layer of gravel on the ground. The five burn pads (and the associated burn pans) currently in use are being redesigned as part of the RCRA Part B permit application. Burning at the site is currently conducted under an Open Burn Management Plan (and a Consent Order) which restricts burning to periods with certain meteorological conditions to limit the dispersion of smoke toward the river and the inhabited areas north of the river.

ABL has been used since 1943 primarily for research, development, testing, and production of solid propellants and motors for ammunition, rockets, and other armaments.

2.1 Previous Ecological Risk Assessments

Two previous ERAs have been conducted for the area in and around the Burning Grounds. CH2M HILL (1995) conducted an ERA of IR Site 1 (which includes the Burning Grounds) as part of the remedial investigation for this site conducted under the CERCLA program. This ERA included a site assessment which characterized the habitats and biota at IR Site 1 and the adjacent portions of the North Branch Potomac River. Because this ERA was conducted under the CERCLA program, only potential ecological risks from contamination associated with the former solvent disposal pits, two former landfills, and the former drum storage area were assessed. Potential ecological risks related to the past, current, or future operations of the Burning Grounds (a RCRA unit) were not specifically evaluated in this assessment.

As part of a consent agreement between WVDEP and ABL, ERM (1996) conducted a screening-level ERA of the Burning Grounds that evaluated potential ecological risks specifically associated with the burn pad operations. The 1996 ERA focused on the potential future ecological risks associated with air emissions and deposition from the Burning Grounds for a 30-year period beginning in May 1996; potential ecological risks associated with past burning operations were not evaluated. As part of the 1996 ERA, habitats and biota were characterized on, and within a three-kilometer (km) radius of, the Burning Grounds. The 1996 ERA focused on three Chemicals of Potential Concern (COPCs):

aluminum, copper, and lead. Exposure concentrations were estimated from an air dispersion and deposition model, uptake models, and a food web model. The 1996 ERA predicted that insignificant ecological risks would be associated with future operations at the Burning Grounds.

These two previous ERAs are used primarily as information sources to help characterize the environmental setting (habitats and biota) of the Burning Grounds and surrounding area. The risk conclusions from these two previous assessments are not directly considered because the 1995 ERA did not specifically address the Burning Grounds and the 1996 ERA was not based on the new facility design. And neither include an appropriate suite of constituents.

3.0 Problem Formulation

Problem formulation establishes the goals, scope, and focus of the ERA. As part of problem formulation, the environmental setting of a site is characterized in terms of the habitats and biota known or likely to be present, and the types and concentrations of chemicals that are present in ecologically relevant media. A conceptual model is developed for the site that describes potential sources, potential transport pathways, potential exposure pathways and routes, and potential receptors. Assessment and measurement endpoints are then selected to evaluate those receptors for which complete and potentially significant exposure pathways are likely to exist for the exposure scenarios evaluated. The fate, transport, and toxicological properties of the chemicals present at a site are also considered during this process.

3.1 Environmental Setting

The environmental setting of the assessment area, encompassing the Burning Grounds and surrounding areas, is characterized using available information compiled from literature review, existing documents, and site visits. Two field surveys and one site visit have been conducted: (1) as part of the ERA for IR Site 1 on 11-13 June 1994 (CH2M HILL, 1995); (2) during the previous ERA for the Burning Grounds and surrounding area on 3-6 June 1996 (ERM, 1996); and (3) for this ERA on 22 August 2000 (site visit).

The characterization of the environmental setting is important in identifying potential receptors (habitats and biota) for the ERA, as well as in identifying potentially complete transport and exposure pathways from source areas to these receptors. The major components of the site characterization are described in the following subsections.

3.1.1 Delineation of the Assessment Area

The ERA combustion guidance document (USEPA, 1999a; Page 4-2) recommends that the geographical extent of the assessment area be defined as the area surrounding the facility that may be impacted by facility emissions as predicted by air dispersion modeling. As described in CH2M HILL (2001a), the air dispersion model used for the assessment is the Open Burn/Open Detonation Dispersion Model (OBOD-M). OBOD-M is a dispersion model intended for use in evaluating the potential air quality impacts of open burning and open detonation of obsolete or unsafe munitions and propellants. The results of the air dispersion modeling indicate that dispersion (and subsequent deposition) of burning-related chemicals (in both vapor and particulate forms) will essentially be confined to an

area well within 3 kilometers of the Burning Grounds (figures 3-1 and 3-2). Thus, the assessment area used in the ERA is defined as the area within a 3-km radius of the Burning Grounds.

3.1.2 Physiographic Features

The major physiographic features of the assessment area are described in the following subsections.

3.1.2.1 Climate

Data on the climate of the region were reported from Cumberland, Maryland (about 10 miles northeast of ABL) and Elkins, West Virginia (approximately 70 miles southwest) (A.T. Kearney, 1993). The weather is this area is characterized by warm summers and cold winters with a fairly even distribution of precipitation throughout the year. The mean annual temperature is approximately 53°F, with an average minimum daily temperature (January) of 20°F and an average daily maximum temperature (July) of 87°F. Average annual precipitation is about 33 inches and average annual snowfall is 28.1 inches. Prevailing winds are generally from the northwest at an average speed of 6.2 miles per hour (mph).

3.1.2.2 Topography

The 400-acre developed portion of Plant 1 (including IR Site 1 and the Burning Grounds) and the entire area of Plant 2 are nearly level, and most of this area occurs within the 500-year floodplain of the North Branch Potomac River at an elevation of approximately 675 feet (ft) above mean sea level (msl). A small area along the northern facility boundary (including parts of IR Site 1 and the Burning Grounds, but not the burn pan areas) are within the 100-year floodplain (Figure 2-3). The elevation of the river in this area of Plant 1 averages about 10 ft below the 100-year floodplain.

The remaining portion of Plant 1 (undeveloped area) lies on the northwestern slope of Knobly Mountain. Elevations in this heavily forested terrain range from 675 to 1,600 ft amsl (A.T. Kearney, 1993).

3.1.2.3 Geology/Soils

Geologically, ABL is situated within the Valley and Ridge Physiographic Province. This province is characterized by folded and faulted layers of sedimentary rock (predominantly Devonian and Silurian sandstone, shale, and limestone). The ridges in this province are generally underlain by Silurian sandstone while the lowlands (valleys) are generally underlain by shale and soluble limestone. At ABL, Plant 1 is immediately underlain by alluvial floodplain deposits, with shale and limestone bedrock beneath (CH2M HILL, 1996).

3.1.2.4 Hydrology

The predominant hydrologic feature at ABL is the North Branch Potomac River which borders the western and northern sides of the facility. The elevation of the river ranges from about 645 ft amsl at the eastern end of Plant 1 to about 655 ft amsl in the vicinity of Site 5 (located on the western border of ABL; Figure 2-1). Thus, the river flows in a west to east direction adjacent to the Burning Grounds. Average annual river flow is about 886 cubic feet (ft^3) per second as measured at the Pinto gauging station, located just upriver from the Burning Ground (USGS, 2001).

A series of drainage ditches, which hold standing water intermittently during and immediately following rain events, collect storm water from the developed portion of the ABL facility and discharge it to the North Branch Potomac River through a number of outfalls along the northern and western facility boundaries. No drainage ditches occur within the Burning Grounds. Due to the flat topography, precipitation may pond in this area until it infiltrates into the ground or is lost through evaporation. Within IR Site 1, drainage ditches occur both east and west of the Burning Grounds, eventually discharging to the river. As described in Section 3.1.2.2, all of IR Site 1 and the Burning Grounds are within the 500-year floodplain of the river and portions of these areas are also within the 100-year floodplain (Figure 2-3).

3.1.2.5 Hydrogeology

Groundwater flow throughout the northern portion of Plant 1 is generally in a northerly direction toward the North Branch Potomac River, with groundwater from the shallow aquifer discharging to the river. However, extraction wells situated along the northern perimeter of IR Site 1 currently intercept shallow groundwater in this area, preventing its discharge to the river. The captured groundwater is currently treated and used as feed water for the boiler at the steam plant located on the ABL facility. Excess water not needed as feed water is discharged to the river through a regulated outfall located near the eastern edge of IR Site 1. During periods of heavy precipitation, the groundwater table under IR Site 1 may rise several feet (A.T. Kearney, 1993). It is likely that groundwater in the bedrock aquifer also discharges to the North Branch Potomac River based on water levels measured in the bedrock aquifer compared to the river water levels, and the fact that the bedrock aquifer comprise folded and faulted limestone that is porous and fissured (CH2M HILL, 1996).

3.1.3 Habitats

The habitats occurring on the Burning Grounds, immediately adjacent areas (remainder of IR Site 1), and areas surrounding IR Site 1 (rest of assessment area) are described in the following subsections.

3.1.3.1 Burning Grounds

The Burning Grounds consist of maintained (periodically mowed) grasses and other herbaceous plants, and is enclosed by a six-foot chain-link perimeter fence. The maintained grassy area within the fence is approximately eight acres in size. The dominant plant species in this area are listed in Table 3-1. Most of these plants are non-native (alien) species characteristic of disturbed habitats. No wetlands or other surface drainage features occur within the boundaries of the Burning Grounds (figures 2-1 and 2-2).

3.1.3.2 Adjacent Areas

The area along a railroad right-of-way (inactive), which is near the southern perimeter of IR Site 1 and the Burning Grounds, is not currently mowed or otherwise maintained. This area is about 2,400 ft in length and 50 ft in width (approximately 2.75 acres). Plant species observed in this area are presented in Table 3-2 and include a variety of grasses, other herbaceous plants, shrubs, and small trees.

The northern perimeter of IR Site 1 and the Burning Grounds consists of forested floodplain along the southern bank of the North Branch Potomac River. The forested floodplain

extends from the river bank to near the IR Site 1/Burning Grounds perimeter fence. This floodplain area adjacent to IR Site 1 covers approximately 14 acres. A narrow strip, about 4 ft in width, along the northern edge of the perimeter fence is mowed. Silver maple is the dominant canopy species in this area with canopy heights of about 40 to 50 ft. American sycamore also commonly occurs near the edge of the river bank and black locust commonly occurs near the perimeter fence. Shrubs and saplings are generally scattered throughout the forested area. Cinnamon fern, eulalia, white snakeroot, rough-stemmed goldenrod, and common bog nettle are common ground cover species. Japanese knotweed occurs in dense stands. St. John's wort and false nettle are found near the perimeter fence (Table 3-2).

The portion of IR Site 1 west of the Burning Grounds is approximately two acres and includes a pile of soil fill approximately 20 ft in height. The side slopes of the fill disposal area are covered with quackgrass. Most of the top of the fill area is sparsely vegetated. The slopes are vegetated with a variety of grasses and other herbaceous species (Table 3-2), and a few black locust trees. Several sycamore trees are located on the west side of the roadway that leads to the former drum storage area (just north and west of the fill area). A small portion of the 100-year floodplain occurs in this area. A narrow ditch is located along the western edge of the fill area. The ditch carries storm water flow and ultimately discharges to the North Branch Potomac River (some of the ditch is jurisdictional wetland). Broad-leaf cattail is present within portions of the ditch. The portion of IR Site 1 east of the Burning Grounds consists of maintained grass and has similar plant species as described in Section 3.1.3.1 for the Burning Grounds.

3.1.3.3 Assessment Area

The land surrounding ABL (3-km radius) is primarily composed of woodland and cropland (A.T. Kearney, 1993). Across the river from ABL (in Maryland), cropland lies to the northeast and west, and a small residential area and woodlands lie to the north. The area south and east of ABL are composed largely of mountainous woodlands with some cropland and pastureland also present. Two limestone quarries occur south and east of the facility (A.T. Kearney, 1993). The quarry located to the southeast of Plant 1 has been inactive since 1989. The second quarry is located south of the facility on Route 956 (Baker, 1997). A large paper mill, a regional publicly-owned treatment works, and sources of acid mine drainage are located upstream of the ABL facility. Discharges from these sources are known to have historically impacted water quality and aquatic life in the North Branch Potomac River (ERM, 1996).

ERM (1996) has described the habitats present within the assessment area (within a 3-km radius of the Burning Grounds). These habitat descriptions are provided below.

Terrestrial Habitats. The following terrestrial habitat types occur on or within a 3-km radius of the Burning Grounds (ERM, 1996):

- **Upland Forest**. This is the major terrestrial habitat type that occurs on the ABL facility (southern portion of Plant 1) and within the assessment area. The dominant plant species in the overstory include white oak, scarlet oak, chestnut oak, black oak, red maple, sugar maple, pignut hickory, sassafras, Virginia pine, and pitch pine. Other species that are present in the overstory include tulip poplar, hackberry, white ash, black cherry, and basswood. The understory (higher elevations) is composed of woody shrubs including mountain laurel, azalea, striped maple, flowering dogwood, redbud,

witch-hazel, wild grape, and lowbush blueberry. Woody shrubs and vines present at lower elevations include blackberry, poison ivy, multiflora rose, and Japanese honeysuckle. Ground cover plant species include ferns, mosses, violets, rue amenome, and twinleaf.

- **Successional Thicket/Forest**. This habitat type was observed by ERM at two locations: (1) within ABL on hillsides just west of Route 956, and (2) near the town of MacKenzie. These areas were formerly cleared land that are now dominated by woody shrubs and small trees. The dominant tree species include Virginia pine, scarlet oak, red maple, black walnut, black cherry, and black locust. Shrub species include hawthorn, hackberry, red cedar, flowering dogwood, and Virginia rose. Vines and ground cover species include wild grape, poison ivy, Virginia creeper, trailing pine, springcress, and redtop.

- **Successional Field/Thicket**. This habitat type was observed by ERM in two areas on the Maryland side of the North Branch Potomac River. These areas appear to be recently abandoned farmland that consists of a mixture of herbaceous plants and woody shrubs. Dominant herbaceous species include red clover, foxtail, orchard grass, Queen Anne's lace, yellow and white sweet clover, spreading dogbane, milkweed, goldenrod, wild onion, violet, springcress, and poison ivy. Shrub species include hawthorne, multiflora rose, and blackberry.

- **Agricultural Fields.** This habitat type encompasses agricultural fields that are currently farmed or are currently fallow. These fields are scattered throughout the assessment area but are more common in the flatter areas on or near the river floodplain. Cropland includes corn, sorghum, barley, oats, wheat, buckwheat, cowpeas, alfalfa, and clover. Pastureland and fallow fields may contain bluegrass, other tall grass species, orchard grass, foxtail, redtop, brome sedge, crown vetch, wild onion, red clover, corn speedwell, henbit, bull thistle, pokeweed, mile-a-minute weed, goldenrod, evening primrose, teasel, daisy fleabane, Queen Anne's lace, yellow sweet clover, spreading dogbane, and milkweed.

- **Rock Outcrop.** Rock outcrops exist along portions of Knobly Mountain and along parts of the North Branch Potomac River. These areas consist of exposed rock that are either unvegetated or are vegetated with lichens, mosses, and other pioneering species. Caves and small caverns are scattered throughout this habitat type.

- **Quarry.** One active limestone quarry operation occurs near the top of Knobly Mountain just off of Route 956. This habitat type has minimal habitat value.

- **Developed (Vegetated).** This habitat type is scattered within the developed areas of Plants 1 and 2 (including the Burning Grounds) and also occurs in surrounding residential areas. It is composed of a combination of buildings, other structures, roads, and maintained grass lawns. Mowing frequency varies by area, with some areas only infrequently mowed. Infrequent mowing allows other herbaceous species such as orchard grass, least hop clover, redtop, yellow hawkweed, English plantain, goatsbeard, wild onion, fescue, cheatgrass, heal-all, yellow and white sweet clover, yarrow, deer tongue grass, ox-eye daisy, curled dock, and switchgrass to become established.

- **Developed (Unvegetated).** This habitat type includes larger areas occupied by buildings, other structures, and parking lots. Large portions of Plant 1 (northern area) and Plant 2 are composed of this habitat type. The habitat value of these areas is limited due to the lack of vegetation but some urban-adapted species (e.g., rock doves) and species which nest on structures (e.g., barn swallows) may utilize these areas.

Wetland and Aquatic Habitats. Other than the North Branch Potomac River and its associated floodplain, wetland areas are relatively uncommon in the vicinity of the Burning Grounds. The distribution of wetlands (based on 1979 aerial photographs) from National Wetland Inventory mapping of the area is shown on Figure 2-2. The following wetland and aquatic habitat types occur within the site vicinity:

- **Riparian Forest.** This is the dominant wetland habitat type within the assessment area and is associated with the floodplain of the North Branch Potomac River (PFO; Figure 2-2). This habitat type is dominated by American sycamore, American elm, black walnut, silver maple, river birch, black willow, slippery elm, eastern cottonwood, and boxelder in the overstory, and wild grape, common spicebush, multiflora rose, Japanese knotweed, jewelweed, springcress, garlic mustard, and smartweed in the shrub and ground layers.

- **Non-Forested Vegetated Wetlands.** These habitat types include scrub-shrub (PSS) and emergent (PEM) wetlands. These wetland types are relatively uncommon within the assessment area (Figure 2-2). Typical plant species in these wetlands include pin oak, red maple, silver maple, and black willow saplings; buttonbush; swamp dewberry; multi-flora rose; soft rush; broad-leaved cattail; fox sedge; tussock sedge; shallow sedge; redtop; forget-me-not; smartweed; jewelweed; and horsetail. Water depths are typically one foot or less in these wetlands.

- **Open Water.** Open water habitats include the North Branch Potomac River (R2OW), several small intermittent streams, and storm water retention and agricultural ponds (POW) (Figure 2-2). The latter two wetland types are relatively uncommon in the assessment area. The river in the vicinity of the ABL facility has an average annual flow of about 900 ft^3 per second (cfs) and a seven consecutive day low flow (7Q10) of 61.6 cfs based on data from the Pinto gauging station, located just upriver of IR Site 1 (USGS, 2001; ERM, 1996). The river typically does not contain any submerged aquatic vegetation, perhaps due to the turbid and discolored nature of the water. The water is relatively hard (average hardness of 158 mg/L in 14 samples collected from the river adjacent to IR Site 1 in Spring 2001).

  CH2M HILL (1995, 1996) has described the river habitat in detail at four locations (STN1 - STN4; Figure 2-1) used for biological sampling in July 1994. In general, the river in the vicinity of IR Site 1 consists of interspersed shallow riffle areas (composed of large rocks, cobbles, and gravel) and deeper pools (composed of sand and gravel). Submerged logs and other detritus occur throughout the river channel. This river reach is partially shaded by the canopy of trees occurring along the river bank and is considered warm water habitat. The pH is near neutral although the water and sediments both had a distinct pulp and paper odor. Waters are typically turbid and discolored from upriver discharges. Detailed descriptions of the four stations are as follows:

- **Station 1.** Flow was very slow at this location (<1.0 feet per second [fps] estimate). Canopy cover partially shaded the river. The sediment had a distinct pulp and paper odor to it (as did the water) and there was a fine layer of silt covering most of the substrate. The underside of some stone substrate material was blackened, suggesting anaerobic activity or low dissolved oxygen. Although the inorganic substrate was composed largely of cobble-sized material, this station also had a large boulder component (approximately 20 percent). Most of the organic component of the substrate consisted of coarse particulate organic matter (CPOM). The river type was considered warm water in this reach. The water was very turbid, carrying a sediment load, and discolored, with some foam. Conductivity was 420 µmhos/cm, pH 6.23, and the temperature 21 to 22°C.

  Although the bottom substrate was largely rubble/gravel with some submerged logs, the low flow, coupled with a fine layer of silt covering bottom material, reduced available habitat for aquatic life. The deposit of fine silt and the lack of adequate riffle/bend habitat contributed to a restricted aquatic community. Bank stability was considered adequate for reducing erosional forces.

- **Station 2.** Flow was very slow at this station (<1.0 fps estimate). The river was partially shaded within this reach. The sediment had a distinct pulp and paper odor to it (as did the water). Sediment deposits were largely sand along with leaf litter and woody debris. A fine layer of silt covered most of the substrate. Inorganic substrate material was composed largely of sand (50 percent) and gravel (40 percent). Extensive sand flats were present within this reach, producing more of a pool-type habitat. Some boulder and cobble material were present and covered with a fine layer of silt. Most of the organic substrate component was detrital (CPOM) in composition. The river type was still considered warm water. The water was very turbid, carrying a sediment load, and discolored, with some foam. Conductivity was 470 µmhos/cm, pH 7.35, and the temperature 24 to 25°C.

  Extensive sand flats and increased embeddedness of existing cobble and gravel, along with reduced flow, made the habitat less desirable to aquatic life. The river channel in this reach was essentially straight with no riffles or bends. There also was increased evidence of bank erosion.

- **Station 3.** The flow velocity was estimated to be less than 1.0 fps. The river in this reach was partially shaded by the existing canopy cover. The sediment had a distinct pulp and paper odor to it (as did the water). Sediment deposits were composed of leaf litter and woody debris. A fine silt layer was present on all available substrates. The underside of some of the gravel and cobble material was blackened, indicating potential anaerobic activity. The bottom inorganic substrate was composed of cobble (80 percent), boulders (5 percent), gravel (5 percent), sand (5 percent), and silt (5 percent). Organic components were largely detritus (CPOM). The river type was considered warm water. No water surface oils were noted, but some foam was present. The water continued to be very turbid and discolored. Conductivity was 410 µmhos/cm, pH 7.43, and the temperature 19 to 21°C.

  The water was deeper at this station, when compared to the upstream stations. The bottom substrate material was largely cobble and gravel. Substrate material was less

than 25 percent embedded, but was covered with a fine silt layer. Flow was <1.0 fps (estimated). Little channel alteration was noted, with no more than 30 percent of the river bed subject to scour. The river is essentially a straight channel in this reach, providing little habitat. Bank stability was moderately unstable with several erosional areas and side slopes up to 60 percent. Bank vegetation was present in most areas, dominated by shrubs.

- **Station 4.** This reach was partly shaded by canopy cover. The sediment still had a distinct pulp and paper odor to it (as did the water). Sediment deposits were composed of leaf litter and woody debris. A fine silt layer still covered much of the bottom substrate. Inorganic substrate components were largely cobble (80 percent), gravel (15 percent), and sand (5 percent). Organic substrate components were mainly detritus (CPOM). The river type was still warm water. No surface oils were noted, however, some foam was present on the water surface. The river remained very turbid due to a high sediment load. Water chemistry for this reach was as follows: dissolved oxygen - 8 mg/L; conductivity - 500 µmhos/cm; pH - 6.53; and temperature - 24°C.

  Bottom substrate and available cover were greater than 50 percent cobble, gravel, and submerged logs, providing stable habitat. Substrate material was more embedded (25 to 50 percent) at this station than at the upstream stations. A change in gradient helped produce increased flow. No channel alteration was noted with only 5 to 30 percent of the river bed affected by scour. Occasional riffle/bends helped improve habitat over upstream locations. Bank stability was again moderately unstable with some evidence of erosion. At least 80 percent of the river bank was covered by vegetation in the form of trees.

Special Habitats. There are no wilderness areas, wildlife refuges, or wild and scenic rivers in the immediate vicinity of ABL. Dan's Mountain Wildlife Management Area is located about 5 km southeast of the Burning Grounds and Dan's Mountain State Park is located approximately 9 km southeast of the Burning Grounds (ERM, 1996). Both areas are owned and maintained by the State of Maryland.

3.1.4 Biota

A general description of the biota present on the Burning Grounds and in surrounding areas was compiled from literature review, existing documents, and site visits. Two field surveys and one site visit have been conducted: (1) as part of the ERA for IR Site 1 on 11-13 June 1994 (CH2M HILL, 1995); (2) during the previous ERA for the Burning Grounds on 3-6 June 1996 (ERM, 1996); and (3) for this ERA on 22 August 2000 (site visit). The biota known or expected to occur in the site vicinity are discussed by major taxonomic group in the following subsections.

3.1.4.1 Birds

Bird species which have been observed at ABL or in the vicinity are listed in Table 3-3; 40 bird species were observed during the two field surveys and one site visit. The bird species observed during the surveys were generally typical of those expected based on the geographic area, the time of year, weather conditions, and the habitats present.

The West Virginia and Maryland Breeding Bird Atlas projects were six-year (1984-1989) and five-year (1983-1987) projects, respectively, to map the distribution of all bird species nesting in the two states (Buckelew and Hall, 1994; Robbins and Blom ,1996). Based on data from both of these surveys, 103 bird species are known or suspected of breeding in the survey blocks that encompass the facility and immediate vicinity. This includes 53 species listed as confirmed breeders, 39 species listed as probable breeders, and 11 species listed as possible breeders (Table 3-4). One additional species (great blue heron) is listed as "observed," meaning that the species was observed during the atlas project but breeding status could not be ascertained in these survey blocks.

To characterize winter bird usage in the site vicinity, Christmas Bird Count (CBC) data from 1995 to 2000 were used (BirdSource, 2000). CBCs are one-day counts conducted annually by the National Audubon Society using volunteer observers during the months of December or January within a circle with a diameter of 15 miles. Birds seen or heard are enumerated during these counts. The nearest CBC plot is centered approximately 8 miles east/northeast of ABL near Spring Gap, Maryland.

Table 3-5 lists the number of birds, by species, observed during the five CBC surveys conducted from 1995 to 2000 for the Allegany County census plot; a total of 88 species were observed during this period. Based upon five-year mean values, the five most commonly observed bird species during the winter period are: (1) European starling; (2) rock dove; (3) American crow; (4) dark-eyed junco; and (5) Canada goose. Because this census plot encompasses a much larger area and more diverse habitats, many of the species listed in Table 3-5 may not actually occur on ABL.

3.1.4.2 Mammals

Mammalian species which have been observed on ABL or in the vicinity are listed in Table 3-3; nine mammalian species were observed during the two field surveys and one site visit. The mammalian species observed during the surveys were generally typical of those expected based on the geographic area, the time of year, weather conditions, and the habitats present.

3.1.4.3 Reptiles and Amphibians

Amphibian and reptile species which have been observed on ABL or in the vicinity are listed in Table 3-3; only two reptiles and one amphibian were observed during the two field surveys and one site visit. This is likely due to the difficulty in observing these species during these types of field surveys. Table 3-6 provides a list of amphibians and reptiles known to occur within Mineral County, West Virginia. Not all of the species listed in Table 3-6 are likely to occur on the facility, or in the immediate vicinity, due to habitat preferences. However, Table 3-6 does provide a better indication of the types of reptiles and amphibians that may occur within suitable habitats in the area of interest.

3.1.4.4 Aquatic Organisms

The watershed of the North Branch Potomac River has a history of anthropogenic impacts dating back to the turn of the century. Forests were clearcut and burned, and acid mine drainage from unregulated coal extraction created biological "dead zones" in the main stem and in many tributaries. More recently, discharges of effluent from the Upper Potomac River Commission Wastewater Treatment Plant (UPRCWTP) at Westernport, Maryland have created highly discolored and turbid conditions in the North Branch Potomac River,

which persist for many miles downstream. A paper mill is responsible for approximately 98 percent of the discharge from the wastewater treatment plant. Although the UPRCWTP discharge is over 21 miles upstream of Pinto, Maryland it still influences water quality and aquatic communities in the reaches of the river adjacent to ABL (CH2M HILL, 1995).

Fish. Beginning in 1988, the Maryland Department of Natural Resources (MDNR) began characterizing the freshwater fishery in the North Branch Potomac River. Surveys of water quality, benthic macroinvertebrate communities, and fish have were conducted in 1989, 1990, 1992, and 1993. These data have been summarized by CH2M HILL (1995). One of the MDNR stations is located at Pinto (Station 6), which is adjacent to the southwestern corner of IR Site 1. Table 3-7 lists the fish species collected, reported as catch per unit effort (individuals per hour from electroshocking surveys), at Station 6, as well as at the next upstream station (Station 5, approximately 20 miles upstream of ABL) and at the next downstream station (Station 7, about 11 miles downstream of ABL).

Macroinvertebrates. A macroinvertebrate survey was conducted in the North Branch Potomac River in July 1994 as part of the IR Site 1 ERA (CH2M HILL, 1995). Four sampling stations (STN 1-4; Figure 2-1) were selected based on proximity to potential source areas. Two quantitative benthic macroinvertebrate samples were collected at each station using a Surber sampler. Qualitative samples was also collected using a kick net to assist in the characterization of invertebrate community structure. The data are summarized in Table 3-8.

The aquatic biota at Station 1 were quite limited. Some attached epiphytes were present, but little in the way of filamentous algae, macrophytes, and fish. Although no slimes were noted, most of the substrate was covered with a fine layer of silt. Kick net samples for benthic macroinvertebrates within the sampling area produced a restricted community structure. The most abundant components were the aquatic worms from the family Tubificidae. Crayfish (Decapoda) of the genus *Orconectes* were common as well as several midge (Chironomidae) species. Mayflies (Ephemeroptera) of the family Heptageniidae were also common. Specimens from the family Sialidae (alderflies) and Corydalidae (dobsonflies) were also noted.

Mayflies (Ephemeroptera) of the family Heptageniidae were abundant at Station 2, as were crayfish. Amphipods (scuds and sideswimmers) were quite common and associated with leaf litter. Aquatic worms (principally tubificids), riffle beetles, (Elimidae), alderflies (Salidae), and dobsonflies (Corydalidae) also were noted. In general, the benthic macro-invertebrate diversity was quite low at this station.

Some epiphytes, such as diatoms and attached filamentous algae, were present at Station 3. No aquatic plants, slimes, or fish were noted. Crayfish (Decapoda) and mayflies (Ephemeroptera) were the main constituents of the benthic macroinvertebrate community. The available substrate material was covered with a fine layer of silt, which limited invertebrate community structure.

Macroinvertebrate community structure, based on qualitative observations, indicated an abundance of crayfish (Decapoda) at Station 4. Mayflies (Ephemeroptera), principally from the family Heptageniidae, and caddisflies (Trichoptera) of the family Hydropsychidae, were most common. Adult damselflies (Zygoptera) also were noted in the area. Periphytic growth on cobble substrates (probably diatoms) were noted. Some filamentous green algae

also was present. Macrophytes were not observed in this reach. A fine layer of silt was present on substrate materials. Several fish, possibly creek chubs, were observed in the area.

Macroinvertebrates are also being sampled in the North Branch Potomac River as part of a long-term monitoring program at IR Site 1 (conducted as part of CERCLA activities at this site). Macroinvertebrates are collected at six stations (BIOTA 1 through BIOTA 6; Figure 2-1) using Hester-Dendy plate samplers, which are left in place for a 6-week period. To date, two sampling events (July 1998 and July 2000) have occurred. The results (number of individual taxa from three sample replicates) are summarized in tables 3-9 and 3-10.

The number of organisms and taxa were relatively consistent among stations in July 1998. Organisms from the family Chironomidae were numerically dominant at all stations. The density of organisms at the most downstream station (Station 6) was low relative to the other stations in July 2000, although the number of taxa was relatively consistent among stations. Chironomids and oligochaetes dominated at most stations, although insects from the two orders Ephemeroptera and Trichoptera were relatively common at all stations except Station 5.

3.1.4.5 Threatened and Endangered Species

The West Virginia Department of Natural Resources, Natural Heritage Program completed a detailed field study of ABL in 1993 to document the occurrence of rare, threatened, and endangered species (McDonald, 1993). Based on Natural Heritage Database records, 41 species of rare, threatened, or endangered plants or animals were known to occur in Mineral County, nine of which could occur on ABL based on habitat preferences. These 41 species (plus an additional species found during the 1993 survey and three federally listed species included in the report) are listed in Table 3-11 along with their current (June 2000) status. One of the original 41 species (flatleaf rush) is no longer listed. Of the three federally listed species addressed in the 1993 report, the peregrine falcon has since been delisted (25 August 1999), the bald eagle has been downlisted to threatened and is proposed for delisting (6 July 1999), and the loggerhead shrike is no longer on the list of "candidate" species. Consultation with the U.S. Fish and Wildlife Service, conducted as part of the 1995 ERA of IR Site 1 (CH2M HILL, 1995), revealed no known occurrences of federally listed species (except for occasional transients) in the area.

Five of the species addressed in the 1993 report, four plants and one mammal, were found to occur on ABL (Table 3-11). Four of these species are currently ranked S3 (somewhat vulnerable to extinction; the lowest of the listing categories) and one is ranked S2 (very rare). All of these species were located in the extreme southern portion of ABL, well away from developed areas and several miles from the Burning Grounds (i.e., outside of the assessment area).

As part of the ERA for IR Site 1 conducted in 1995 (CH2M HILL, 1995), the State of Maryland was contacted regarding potential occurrences of rare species in the site vicinity. Six species were identified (Table 3-12). The sora (*Porzana carolina*) inhabits densely vegetated freshwater and salt marshes as well as damp meadows. Maryland represents the southern limits of its breeding range. This species is extremely unlikely to occur at ABL because the ABL property does not provide suitable habitat.

The eastern small-footed bat (*Myotis leibii*) occurs in the Appalachian Mountains of western Maryland, Virginia, and North Carolina. The bat is found most often near caves. Little is

known about the bat's habitat requirements, although roosts usually are found in hemlock forests. It roosts during the fall and winter in inconspicuous places such as under boulders, in crevices in rock falls and quarries, or around the entrances to caves and mines. It may frequent buildings in the summer. No caves have been observed on ABL. Directly across the river in Pinto, Maryland, however, several limestone caves have been reported.

Side-oats grama (*Boutelouca curtipendula*) occurs in plains, prairies, and rocky hills from Maine and Ontario to Montana south to Virginia, Alabama, Texas, and Arizona. It is most abundant in fine-textured soils, seldom grows in coarse-textured soils, and is better adapted to calcareous and moderately alkaline soils than to neutral or acid soils. This species is known to occur in the extreme southern portion of the ABL facility (McDonald, 1993).

Harebell (*Campanula rotundifolia*) is a member of the bluebell family that occurs along rocky banks and shores and in meadows. Virginia mountain mint (*Pycnanthemum virginianum*) prefers dry woods, meadows, fields, and thickets. Cliff stonetop (*Sedum glaucophyllum*) prefers damp calcareous rocks. None of these species is known to occur on the site or in the immediate site vicinity nor are they expected to based on habitat preferences.

3.2 Available Analytical Data

Existing chemical concentrations in surface and subsurface soil (see attachments C-1 and C-2) at the Burning Grounds were characterized in February 2001 as part of a sampling program developed in support of the Subpart X permit application (see CH2M HILL, 2001b). These soil data are used in the ERA to characterize potential risks associated with current conditions (see Section 6).

3.3 Conceptual Model

Figures 3-3 and 3-4 illustrate ecological conceptual models for the two principal exposure scenarios evaluated in the ERA. Important components of these conceptual models are the identification of exposure scenarios, potential source areas, transport pathways, exposure media, potential exposure routes, and potential receptor groups. Each of these components is discussed in the following subsections.

3.3.1 Sources and Exposure Scenarios

The principal source addressed in this ERA is emissions from the burn pans on the Burning Grounds. These emissions are addressed through an evaluation of two principal scenarios: (1) exposures from continued (future) operations (Figure 3-3), and (2) exposures associated with current conditions (past deposition; Figure 3-4). Source areas related to other past activities at IR Site 1 (e.g., inactive solvent disposal pits) are not directly evaluated.

As discussed in Section 1.1, the main focus of the ERA is to quantify potential future risks associated with continued operations. The evaluation of potential future risks from continued operations relies primarily on exposure estimates based on modeled chemical concentrations in air, surface soil, surface water, and sediment. These predicted exposure estimates/chemical concentrations are based on the results of air dispersion and deposition modeling that was conducted as part of the Subpart X permit application. The air modeling accounts for the new burn pad facility design.

The ERA also quantifies potential risks associated with current conditions within the boundaries of the Burning Grounds (the fenced portion of IR Site 1). The evaluation of current risks uses surface soil analytical data collected from within the RCRA unit in February 2001. This analysis was limited to terrestrial habitats/media because there are no surface water bodies, wetlands, or other surface drainage features located within the boundaries of the Burning Grounds (see Section 3.1). Thus, there are no complete exposure pathways to surface water, sediment, or aquatic biota for the current conditions exposure scenario. The site is relatively flat and significant surface runoff is not likely. However, this potential transport pathway (surface runoff) was evaluated based on the three surface soil samples collected in the most obvious drainage feature present, a shallow depression located just south of the Burning Grounds fence line. Most precipitation falling on the Burning Grounds is thought to be lost to evapo-transpiration processes or to infiltrate the soil to reach groundwater. Groundwater flow at the Burning Grounds is toward the North Branch Potomac River. However, groundwater at the Burning Grounds does not currently discharge directly to the river due to the presence of extraction wells associated with CERCLA activities in the area. The RCRA permit contains a groundwater Corrective Action Monitoring program for the Burning Grounds.

3.3.2 Transport Pathways and Exposure Media

A transport pathway describes the mechanisms whereby site-related chemicals, once released, may be transported from a source to ecologically relevant media (such as surface soil) where exposures may occur. These transport pathways are shown on figures 3-3 (continued operations scenario) and 7 (current conditions scenario).

Chemicals (either uncombusted materials or combustion products) released to the air during burning may be transported by prevailing winds to surrounding areas where they may contact receptors directly (inhalation or foliar contact). Site-related chemicals deposited on surface soil may be transported via surface runoff to downgradient surface water bodies or may be deposited directly on the surface water body itself. Site-related chemicals in surface soil may also leach to subsurface soil and groundwater, and then discharge to downgradient water bodies. Chemicals which enter surface water bodies either directly (through deposition from air) or indirectly (via surface runoff or ground-water discharge) may remain suspended in the water column and/or may be transported to sediments. Site-related chemicals in surface soil, sediment, and surface water may be taken up and accumulated in the tissue of biota, and thus be transported to upper trophic level receptors via food webs.

3.3.3 Exposure Pathways and Routes

An exposure pathway links a source with one or more receptors through exposure via one or more media and exposure routes. Exposure, and thus potential risk, can only occur if complete exposure pathways exist. Figures 3-3 and 3-4 show the potentially complete and significant exposure pathways to ecological receptors for the two exposure scenarios evaluated.

An exposure route describes the specific mechanism(s) by which a receptor is exposed to a chemical present in an environmental medium. Terrestrial plants may be exposed through their root surfaces during water and nutrient uptake to chemicals present in surface soil.

They may also be exposed to airborne chemicals through gaseous uptake or via deposition to leaf surfaces.

Unrooted, floating aquatic plants, and rooted submerged vascular aquatic plants and algae, may be exposed to chemicals directly from the water column or (for rooted plants) from sediments.

Animals may be exposed to chemicals through: (1) the inhalation of gaseous chemicals or of chemicals adhered to airborne particulate matter; (2) the incidental ingestion of contaminated abiotic media (e.g., soil or sediment) during feeding activities; (3) the ingestion of contaminated water; (4) the ingestion of contaminated plant and/or animal tissues for chemicals which have entered food webs; and/or (5) dermal contact with contaminated abiotic media. These exposure routes, where applicable, are depicted on figures 3-3 and 3-4.

Dermal exposures are not evaluated in the ERA due to the limitation of available data (USEPA, 1999a). Based on the general fate properties (e.g., relatively high adsorption to solids) of the chemicals associated with open burning (e.g., metals and PAHs) and the protection offered by hair or feathers, dermal exposures following deposition to soil for upper trophic level receptor species are not likely to be significant relative to ingestion exposures. Incidental ingestion of soil or sediment during feeding activities is, however, considered in the risk estimates. Direct contact is considered for lower trophic level receptors (e.g., invertebrates). Although available data on inhalation exposures are also limited for many chemicals (USEPA, 1999a), these exposures are evaluated in the ERA where available data permit. However, inhalation exposures are only considered for the continued operations scenario. Ingestion exposures are considered for both exposure scenarios.

3.3.4 Receptor Species

Because of the complexity of natural systems, it is generally not possible to directly assess the potential impacts to all ecological receptors present within an area. Therefore, specific receptor species (e.g., belted kingfisher) or species groups (e.g., fish) are often selected as surrogates to evaluate potential risks to larger components of the ecological community (guilds, such as piscivorous birds) used to represent the assessment endpoints (e.g., survival and reproduction of piscivorous birds). Selection criteria typically include those species that:

- Are known to occur, or are likely to occur, at the site
- Have a particular ecological, economic, or aesthetic value
- Are representative of taxonomic groups, life history traits, and/or trophic levels in the habitats present at the site for which complete exposure pathways are likely to exist
- Can, because of toxicological sensitivity or potential exposure magnitude, be expected to represent potentially sensitive populations at the site
- Have sufficient ecotoxicological information available on which to base an evaluation

The following upper trophic level receptor species have been chosen for exposure modeling based on the criteria listed above, the general guidelines presented in USEPA (1991), and the assessment endpoints discussed in the following section:

- Short-tailed shrew (*Blarina brevicauda*) - terrestrial mammalian insectivore
- Meadow vole (*Microtus pennsylvanicus*) - terrestrial mammalian herbivore
- Mink (*Mustela vison*) - semi-aquatic mammalian piscivore
- Red fox (*Vulpes vulpes*) - terrestrial mammalian carnivore
- American robin (*Turdus migratorius*) - terrestrial avian insectivore/omnivore
- American kestrel (*Falco sparverius*) - terrestrial avian insectivore/carnivore
- Red-tailed hawk (*Buteo jamaicensis*) - terrestrial avian carnivore
- Great blue heron (*Ardea herodias*) - wetland/aquatic avian piscivore
- Belted kingfisher (*Ceryle alcyon*) - aquatic avian piscivore/insectivore

Lower trophic level receptor species were evaluated based on those taxonomic groupings for which medium-specific toxicity reference values (TRVs) have been developed; these groupings and TRVs are used in most ecological risk assessments. As such, specific species of aquatic biota (e.g., fish and macroinvertebrates) were not chosen as receptor species; aquatic biota were addressed on a community level via a comparison to surface water and sediment TRVs. Similarly, terrestrial plants and soil invertebrates (earthworms are the standard surrogate) were evaluated using soil TRVs developed specifically for these groups.

Upper trophic level receptor species quantitatively evaluated in the ERA were limited to birds and mammals, the taxonomic groups with the most available information regarding exposure and toxicological effects. Individual species of amphibians and reptiles were not selected for evaluation because of the general lack of available toxicological information for these taxonomic groups. Potential risks to amphibians and reptiles from exposure via the food web were evaluated using other fauna (birds and mammals) as surrogates. Potential risks to amphibians and reptiles from direct exposures to soil, sediment, and surface water were evaluated using medium-specific TRVs (described above) that were developed using data from other taxonomic groups (such as soil invertebrates and fish).

Terrestrial receptors were evaluated for both exposure scenarios. Wetland and aquatic receptors were evaluated only for the continued operations exposure scenario because no surface water bodies occur on the Burning Grounds. As discussed in Section 3.1.4.5, no known occurrences of special status species occur within the boundaries of the Burning Grounds or in close proximity.

3.3.5 Assessment and Measurement Endpoints

The conclusion of the problem formulation includes the selection of ecological endpoints, which are based on the conceptual model. Two types of endpoints, assessment endpoints and measurement endpoints, are defined as part of the ERA process (USEPA, 1992, 1997a, 1998a). An assessment endpoint is an explicit expression of the environmental component or value that is to be protected. A measurement endpoint is a measurable ecological characteristic that is related to the component or value chosen as the assessment endpoint. The considerations for selecting assessment and measurement endpoints are summarized in USEPA (1992, 1997a) and discussed in detail in Suter (1989, 1990, 1993).

Endpoints in the ERA define ecological attributes that are to be protected (assessment endpoints) and a measurable characteristic of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur. Assessment endpoints most often relate to attributes of biological populations or communities, and are intended to focus the risk assessment on particular components of the ecosystem that could be adversely affected by chemicals attributable to the site (USEPA, 1997a). Assessment endpoints contain an entity (e.g., muskrat population) and an attribute of that entity (e.g., survival rate). Individual assessment endpoints usually encompass a group of species or populations (the receptor) with some common characteristic, such as specific exposure route or contaminant sensitivity, with the receptor then used to represent the assessment endpoint in the risk evaluation.

Assessment and measurement endpoints may involve ecological components from any level of biological organization, from individual organisms to the ecosystem itself (USEPA, 1992). Effects on individuals are important for some receptors, such as rare and endangered species (none are known to regularly occur within the assessment area); population- and community-level effects are typically more relevant to ecosystems. Population- and community-level effects are usually difficult to evaluate directly without long-term and extensive study. However, measurement endpoint evaluations at the individual level, such as an evaluation of the effects of chemical exposure on reproduction, can be used to predict effects on an assessment endpoint at the population or community level. In addition, use of criteria values designed to protect the vast majority (e.g., 95 percent) of the components of a community (e.g., Ambient Water Quality Criteria for the Protection of Aquatic Life) can be useful in evaluating potential community- and/or population-level effects.

Tables 3-13 and 3-14 summarize the assessment and measurement endpoints selected in the ERA for the continued operations and current conditions exposure scenarios, respectively.

4.0 Approach and Methodology

This section describes the approach and methodology used in the analysis portion of the ERA. The analysis portion of an ERA is divided into two main parts, exposure assessment and effects assessment. Exposure assessment involves estimating exposures of ecological receptors to site-related chemical constituents for the exposure scenarios identified in the problem formulation. In the effects assessment, chemical-specific TRVs are developed (as part of the measurement endpoints used to evaluate each assessment endpoint).

4.1 Exposure Assessment

The principal activity associated with the exposure assessment is the estimation of chemical concentrations in applicable media to which the receptors may be exposed. Results from the air dispersion and deposition modeling were used to estimate ecological exposures for continued (future) operations of the Burning Grounds (assuming an additional 30-year active life) and data from soil sampling conducted at the Burning Grounds in February 2001 were used to estimate ecological exposures for current (existing) conditions. Standard models from the literature were used to estimate chemical concentrations in air, surface soil, surface water, sediment, and biological tissues (for use in direct and/or food web exposure modeling) as applicable to each exposure scenario evaluated. These methods and models are outlined in Sections 4.1.7 and 4.1.8.

4.1.1 Exposure Scenarios

As described in the problem formulation (Section 3), the principal source addressed in this ERA is emissions from the burn pans on the Burning Grounds. These emissions were addressed through an evaluation of two principal exposure scenarios: (1) continued (future) operations of the Burning Grounds (assuming an additional 30-year active life), and (2) current (existing) conditions. Source areas associated with CERCLA-related activities at IR Site 1 (e.g., solvent disposal pits) were not directly evaluated in this ERA.

4.1.1.1 Continued Operations

The main focus of the ERA is to quantify potential future risks associated with continued operations of the Burning Grounds. The evaluation of potential future risks from continued operations relies on modeled exposure estimates (i.e., concentrations in relevant media as determined from air dispersion and deposition modeling) based on the new design of the burn pads and pans. The spatial extent of this evaluation encompasses areas outside of the Burning Grounds (RCRA unit) based on the results of the air dispersion modeling.

Consistent with applicable USEPA and Navy ERA guidance (USEPA, 1997a, 1998a, 1999a; CNO 1999; NAVFAC 2001), potential ecological risks for the continued operations exposure scenario are evaluated in a tiered manner. The first tier of evaluation constitutes the screening ERA and corresponds to Steps 1 and 2 of the ERA process (as described in USEPA, 1997a; CNO 1999; NAVFAC 2001). The screening ERA is conducted using intentionally conservative assumptions, approaches, and parameter values. Its purpose is to provide an upper-bound estimate of potential risks. For the continued operations exposure scenario, the conservative assumptions applied are:

- **Estimation of Exposure Point Concentrations.** The first (screening) tier uses very conservative (i.e., "worst-case") estimates for exposure point concentrations. Potential ecological risks are first evaluated at the predicted points of maximum impact for ground-level air and total deposition based on the initial results of air dispersion and deposition modeling (using worst-case assumptions). For this initial risk estimate, it was assumed that all applicable terrestrial and aquatic habitat types occur at these maximum points.

- **Exposure Parameters.** The screening tier also includes the use of very conservative (i.e., maximum or high-end) estimates for parameters, such as bioaccumulation factors and receptor ingestion rates, used to estimate exposure doses.

If the screening risk estimates suggest potential risk, more realistic exposure estimates are developed in the second (baseline) tier of evaluation. The first step of a baseline ERA (i.e., Step 3A of the ERA process; CNO, 1999) entails refining media concentration and exposure estimates using more realistic assumptions and approaches relative to those used in the screening tier, which is intended to be an extremely conservative assessment. These more realistic assumptions and approaches are:

- Modeling actual receptor points for specific habitat types (such as wetlands) rather than using the default locations of maximum impact.

- Reevaluating conservative model assumptions (such as soil mixing depth).

- Using central tendency estimates (rather than maximums or minimums) for exposure parameters such as bioaccumulation factors, receptor ingestion rates, and receptor body weights. The use of central tendency values for these parameters provides a more representative estimate of potential exposures and risks to receptor populations (the focus of the selected assessment endpoints).

Air dispersion modeling was used to characterize potential air quality impacts of open burning at the Burning Grounds for this exposure scenario. The air dispersion model selected for use is the most recent version of the Open Burn/Open Detonation Dispersion Model (OBOD-M). OBOD-M is a dispersion model intended for use in evaluating the potential air quality impacts of open burning and open detonation of obsolete or unsafe munitions and propellants. Further explanation of the emission estimates, model selection, model parameters, and emission scenarios used as inputs into the model are provided in Appendix A (CH2M HILL, 2001a). Attachment C-3 provides the model input and deposition equations.

The dispersion model estimates the 1-hr, 8-hr, 24-hr, and annual average concentrations at selected receptor locations. The ERA utilizes the annual average concentration estimates when calculating exposures because these estimates are most applicable to chronic exposures.

4.1.1.2 Current Conditions

The ERA also quantifies potential risks associated with current conditions within the boundaries of the Burning Grounds. The evaluation of current risks relies on surface soil data collected at the Burning Grounds in February 2001 and was also done in a tiered (screening and baseline) manner. As discussed in the problem formulation (Section 3), the evaluation for this exposure scenario was limited to terrestrial habitats and media because there are no surface water bodies, wetlands, or other surface drainage features located within the boundaries of the Burning Grounds. Thus, there are no complete exposure pathways to surface water, sediment, or aquatic biota for the current conditions exposure scenario. However, the potential for transport via groundwater and surface runoff to off-site water bodies was qualitatively evaluated (to determine if they are complete and significant pathways). The objective of this portion of the ERA is to evaluate any current risks within the unit to determine if any actions are required to address these risks prior to construction of the new burn pads, and to support any required future closure plan for the unit.

4.1.2 Selection of Chemicals for Evaluation

This section describes the process used to develop lists of chemicals evaluated (termed Chemicals of Potential Concern or COPCs) for each of the exposure scenarios.

4.1.2.1 Continued Operations

The chemicals evaluated in this exposure scenario were derived using data from the air modeling protocol in (CH2M HILL, 2001a), which considered data generated as part of the facility-specific waste characterization study (CH2M HILL, 2000a) and a combustion study conducted by Sandia National Laboratories (SNL) (Einfeld and Morrison, 1996). The SNL study measured emissions from materials likely to be encountered in the waste stream at ABL, with the results intended to support risk assessments.

Emissions Testing. The constituents analyzed for in air emissions from the combustion of energetic materials in the SNL study included:

- Criteria pollutants such as carbon monoxide (CO), particulate matter less than 10 microns in aerodynamic equivalent diameter (PM_{10}), oxides of nitrogen (NO_x), and sulfur dioxide (SO_2)
- Gaseous hydrochloric acid (HCl)
- Volatile organic compounds (VOCs) such as benzene and xylenes
- Selected classes of semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs), dinitrotoluenes, phenolics, and nitrosamines
- Dioxins/furans
- Metals such as aluminum, copper, iron, and lead

Much of the target analyte list used in the SNL emissions testing was based on studies done as part of a technical steering committee for the U.S. Army. During these studies, chamber testing methods were introduced as a means of estimating pollutant emission factors for materials slated for disposal by open burning and detonation methods. The list of pollutants evaluated in these studies included a variety of potentially toxic gas and aerosol species likely to be encountered during energetic materials combustion and, according to SNL, has been informally adopted by many state agencies and consultants as a logical starting point in the risk assessment process. This pollutant list formed the basis for the target analyte list used by SNL for air emissions testing of representative samples of the various waste forms encountered at the ABL facility. According to SNL, this target analyte list was included in a project work plan that was submitted to the State of West Virginia, Office of Air Quality, for its review and approval.

The purpose of the emissions testing was to provide a pollutant source term that was based on direct measurements of emissions characteristics for the spectrum of chemicals likely to be encountered during open burning operations. This approach was intended to provide estimates of pollutant emissions measured under controlled conditions which could then be used to develop pollutant emissions factors for use in air dispersion models to estimate concentrations in air at off-site receptor locations. Emissions testing was performed on pure energetic (P/E) materials and P/E-contaminated waste including:

- **Pure Energetic Materials.** Aluminum-composite propellant, composite propellant, double base propellant, and PBX explosive
- **P/E-Contaminated Waste**. P/E Mix No. 1 (double base propellant + acetone + sawdust) and P/E Mix No. 2 (PBX explosive + acetone/sawdust mixture + miscellaneous wood and plastic materials)

Except for the criteria pollutants (CO, PM_{10}, NO_x, and SO_2) and HCl, all of the constituents for which SNL provided emission estimates were evaluated for inhalation exposures in the ERA (Table 4-1). Non-volatile chemicals were also evaluated in surface soil, surface water, and sediment based on estimated deposition. See Section 4.1.8 for a discussion of the chemicals evaluated for exposures via food webs.

It should be noted that several of the SNL constituents were not detected in most or all of the waste categories tested. Emissions factors were developed using these analytical results, as described in the air modeling protocol in (CH2M HILL, 2001a). In cases where a constituent was reported as not detected in SNL's testing program, the emission factor was derived assuming that the constituent was present at one half of the detection limit.

The criteria pollutants are evaluated as part of the dispersion modeling analysis relative to national ambient air quality standards. It was assumed that meeting air quality standards is also protective of ecological receptors. HCl was not evaluated in the ERA because of the high concentrations needed to produce observable effects in ecological receptors (USEPA, 1999a).

Inclusion of the entire list of constituents tested in SNL's emissions estimating program potentially overstates risks associated with continued operations of the Burning Grounds. Some of the materials tested in the SNL study are no longer combusted on-site. In particular, miscellaneous contaminated materials, such as contaminated Personnel Protective Equipment (PPE) and drum pallets (represented by P/E Mix No. 2), are reportedly no longer burned.

There is also uncertainty in the identification of dioxin/furan congeners in the emissions. The SNL testing data reports only "dioxin," presumably the unweighted sum of all dioxin and furan congeners. However, the existing published database of open burning of energetic materials (Mitchell and Suggs, 1998) from the BangBox test data reports that only six dioxin and furan congeners (OCDF; 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8 HxCDF; and OCDD) were detected during the burning of ammonium perchlorate (AP) propellant, aluminized AP propellant, and AP-waste. In addition, only hepta- and octa- congeners were detected in on-site soil samples (see Section 6).

Comparison to Draft USEPA ERA Combustion Guidance COPC List. The draft ERA combustion guidance (USEPA, 1999a) contains an extensive discussion of the COPC selection process. However, this guidance document is designed specifically for the evaluation of hazardous waste combustion facilities (i.e., incinerators, and boilers and industrial furnaces co-firing hazardous waste). The characteristics of the ABL unit (open burning of propellants and explosive wastes) differ substantially from a hazardous waste incinerator. The combustion guidance does not specifically address emissions from open burning operations, such as the ABL unit. Thus, not all of the specific components of the ERA combustion guidance, including the selection of COPCs, are applicable to this ERA. Some components needed to be adapted to address the characteristics of an open burning unit in order to focus on using the most appropriate methods and approaches in the ERA relative to open burning operations.

In terms of potential COPCs, the list provided in the USEPA (1999a) guidance is a "typical" list of compounds or chemical classes that have been identified for evaluation in ERAs at combustion facilities (primarily hazardous waste incinerators). As stated in the ERA combustion guidance (USEPA, 1999a; Page 2-33), this list of chemicals was compiled based on professional experience and is not intended to be either limiting or inclusive for a specific facility. While some of the listed chemicals or chemical groups (such as dioxin/furans and PAHs) are applicable to the ABL unit, others (such as PCBs and mercury) are not. The ERA combustion guidance (USEPA, 1999a) identifies the following classes of COPCs for consideration in an ERA:

- **Dioxins and Furans.** USEPA (1999a) recommends that the 17 dioxin and furan congeners with chlorine molecules substituted in the 2, 3, 7, and 8 positions always be included in a combustion source ERA. Total dioxins and furans are evaluated in this ERA for this exposure scenario (Table 4-1).

- **Polycyclic Aromatic Hydrocarbons (PAHs).** USEPA (1999a) recommends that PAHs always be addressed in a combustion source ERA. PAHs are well represented on the list of chemicals evaluated for this exposure scenario (Table 4-1).

- **Polychlorinated Biphenyls (PCBs).** PCBs are not known to be present in the waste stream nor are they likely to be formed as combustion products based on the materials burned. Thus, PCBs are not applicable to this ERA.

- **Pesticides.** Pesticides or pesticide-contaminated materials are not known to be present in the waste stream nor are they likely to be formed as combustion products based on the materials burned. Thus, pesticides are not applicable to this ERA.

- **Nitroaromatics.** This chemical class is associated with explosives and other highly nitrogenated hazardous wastes. USEPA (1999a) recommends that these chemicals be evaluated if they are present in the waste stream (as is the case at the Burning Grounds. Therefore, chemicals from this class (2,4-dinitrotoluene and 2,6-dinitrotoluene) are included in this evaluation (Table 4-1).

- **Phthalates.** USEPA (1999a) recommends that phthalates be considered if the facility burns significant quantities of plastics or materials containing plasticizers. Because this is not the case at ABL, phthalates are not evaluated.

- **Hexachlorobenzene (HCB) and Pentachlorophenol (PCP).** USEPA (1999a) states that these chemicals should be included as COPCs for facilities burning waste known to contain HCB or PCP, such as wood perservatives and some pesticides. Because this is not the case at ABL, HCB and PCP are not evaluated.

- **Metals.** USEPA (1999a) recommends that the following metals be evaluated in the ERA: aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium (Cr+6), copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. Based on the SNL emissions testing, three of these metals (aluminum, copper, and lead), plus iron and zirconium, are included in this evaluation (Table 4-1). With the exception of nickel, none of the other metals were considered by SNL to be present at significant enough levels in the waste stream to warrant consideration. Nickel was identified by SNL as a target analyte but no emissions results were reported; this is treated as an uncertainty in the ERA.

- **VOCs.** These are briefly mentioned in the ERA combustion guidance but are not discussed. VOCs (e.g., benzene) are well represented on the list of chemicals evaluated (Table 4-1).

4.1.2.2 Current Conditions

The chemicals evaluated for this exposure scenario comprise those detected in on-site surface soil samples collected from the site in February 2001 as part of the sampling program developed in support of the Subpart X permit application. These chemicals are listed in Table 4-1.

4.1.3 Fate and Transport Mechanisms

The transport and partitioning of chemicals into particular environmental compartments, and their ultimate fate in those compartments, can be predicted from key physico-chemical characteristics. The physico-chemical characteristics that are most relevant for deposition and exposure modeling in this ERA comprise molecular weight, melting point temperature, volatility, water solubility, diffusivity in air and water, adsorption to solids, octanol-water partitioning, and degradability. These parameters are defined below and the corresponding numeric values for each relevant chemical are included in Table 4-2.

Molecular weight (g/mole) is defined as the sum of all atomic weights for all atoms in the compound's molecule.

The melting point temperature (T_m) is defined as the temperature (in °K) at which the solid state of a compound undergoes a phase change to a liquid form.

Volatility describes how readily a chemical will evaporate into the air from water, sediment, or surface soil. Volatilization of a chemical from water to air is dependent upon its physical properties but can be approximated by Henry's Law Constant (H), which is calculated by dividing the vapor pressure (V_p; in atmospheres) by the water solubility (in moles/m^3). Chemicals with H values greater than 1×10^{-3} can be expected to volatilize rapidly from water, while those chemicals with H values less than 1×10^{-3} volatilize less readily (Howard, 1991). Chemicals with H values less than 1×10^{-7} volatilize less readily than water so that the chemical concentration in water can increase as the water evaporates at a higher rate than the chemical (Howard, 1991). Volatility from soil or sediment is usually expressed qualitatively (e.g., low, moderate, rapid) (Howard, 1991).

Water solubility (S; mg/L) is defined as the saturated concentration of a compound in water at a given temperature and pressure (USEPA, 1999a). The water solubility influences how a chemical will behave in aqueous media. Highly water soluble chemicals tend to remain dissolved in the water column rather than partitioning to sediment (Howard, 1991). Also, chemicals with high water solubility generally exhibit a lower tendency to bioconcentrate in aquatic organisms and a greater likelihood of biodegradation (Howard, 1991). Diffusivity in air (D_a) and water (D_w) is used to calculate the liquid or gas phase transfer of a chemical into a water body (USEPA, 1999a).

Adsorption is a measure of a chemical's affinity for binding to solids, such as soil (Kd_s), suspended sediment (Kd_{sw}), and bottom sediment (Kd_{bs}). Adsorption is expressed in terms of partitioning, either K_d (adsorption coefficient; a unitless expression of the equilibrium concentration in the solid phase versus the water phase) or as K_{oc} (K_d normalized to the organic carbon content of the solid phase; again unitless) (Howard, 1991). The higher the K_{oc} or K_d value, the greater the tendency for the chemical to adhere strongly to soil or sediment particles. K_{oc} values can be measured directly or can be estimated from either water solubility or the octanol-water partitioning coefficient using one of several available regression equations (Howard, 1991).

Octanol-water partitioning can be used to approximate the degree to which a chemical is hydrophilic or hydrophobic. The octanol-water partitioning coefficient (K_{ow}) expresses the relative partitioning of a chemical between octanol (lipids) and water. A high affinity for lipids equates to a high K_{ow} and vice versa. K_{ow} has been shown to correlate well with bioconcentration factors in aquatic organisms, adsorption to soil or sediment particles, and

the potential to bioaccumulate in the food chain (Howard, 1991). Typically expressed as log K_{ow}, a value less than 3.5 to 4.0 generally indicates that the chemical will not bioaccumulate to a significant degree (USEPA, 1999a, 2000a). For aquatic species (the receptor group with the most available data), log BCF (bioconcentration factor) can be related to log K_{ow} (for values less than 6) using the following formula (USEPA, 1995a):

$$log\ BCF = (0.79)\ (log\ K_{ow}) - 0.40$$

Thus, a log K_{ow} of 3.5 equates to a BCF value of approximately 250.

Degradability is an important factor in determining whether there will be significant loss of mass or change in the form of a chemical over time in the environment. The half-life of a compound is typically used to describe losses from either degradation (biological or abiotic) or from transfer from one compartment to another (e.g., volatilization from surface soil to air). The half-life is the time required for one-half of the mass of a chemical to undergo the loss or degradation process. For the deposition models used in this ERA, degradation is used to estimate the parameter ksg which is the soil loss constant due to degradation.

4.1.4 Transport Pathways and Exposure Media

A transport pathway describes the mechanisms whereby site-related chemicals, once released, may be transported from a source to ecologically relevant media (such as surface soils) where exposures may occur. As discussed in the problem formulation (Section 3.3.2), the primary mechanisms for chemical transport from the source area (burn pans) may include:

- Transport via prevailing winds for chemicals released to the air during burning, followed by deposition to terrestrial, wetland, and aquatic habitats
- Leaching of deposited chemicals from the soil by precipitation and transport by surface runoff to surface water bodies
- Leaching of deposited chemicals from the soil by infiltrating precipitation and transport to surface water bodies via groundwater
- Uptake by biota from surface soil, sediment, and/or surface water and trophic transfer to upper trophic level receptors

4.1.5 Exposure Pathways and Routes

Exposure pathways and routes are discussed in Section 3.3.3.

4.1.6 Receptors

Receptors used in the ERA are discussed in Section 3.3.4.

4.1.7 Exposure Point Concentrations

For the continued operations exposure scenario, concentrations in ground-level ambient air, surface soil, surface water, and sediment were estimated at the point of maximum air concentrations and maximum total deposition based on the results of the air dispersion and deposition modeling using the methods described in the following subsections. For the current conditions exposure scenario, measured surface soil concentrations from within the

Burning Grounds were used. Concentrations in biota were then estimated from these media concentrations as described in Section 4.1.7.4.

4.1.7.1 Air Concentrations

As part of the air modeling, chemical-specific emission rates and a maximum annual dispersion factor were generated. Ground-level ambient air concentrations (annual average) are calculated for each chemical as follows:

$$C_a = (ER)(DF)$$

where: C_a = Air concentration ($\mu g/m^3$)

ER = Emission Rate (g/sec)

DF = Dispersion Factor ($\mu g/m^3$ per g/sec emission rate)

As discussed previously, the initial risk estimates are based on the maximum estimated air concentration at the predicted point of maximum impact.

4.1.7.2 Surface Soil Concentrations

Emissions from open burning will result in the deposition of chemicals onto surface soil in areas on, and surrounding, the Burning Grounds. The soil concentrations resulting from the deposition of airborne chemicals were estimated based on the total deposition rate, average soil density, soil mixing depth, and the duration of emissions. The total deposition rate was derived from the deposition model. A deposition velocity of 1 cm/s, soil mixing depths of 1, 10, and 20 cm (USEPA, 1999a), a soil bulk density of 1.50 g/cm^3 (USEPA, 1999a), and an emission duration of 30 years were used.

Initially, surface soil concentrations were conservatively estimated at the point of maximum projected total deposition. These concentrations were then adjusted by the application of a soil loss constant, which considers losses due to leaching, erosion, surface runoff, degradation (both abiotic and biotic), and volatilization (USEPA, 1999a).

4.1.7.3 Surface Water and Sediment Concentrations

Chemical constituents emitted during open burning may also reach surrounding water bodies via direct deposition onto the surface water and from runoff/erosion of chemicals deposited within the watershed. Direct deposition onto the surface water and surface runoff from the watershed were modeled for three water bodies:

- The reach of the North Branch Potomac River located directly adjacent to the Burning Grounds (approximately 4,000 linear feet)
- A pond located approximately 1-km west-northwest of the Burning Grounds (Figure 3-1)
- An emergent wetland located approximately 1-km north of the Burning Grounds (Figure 3-1)

The latter two water bodies represent the nearest lentic water bodies of any significant size to the Burning Grounds (see Figure 2-2). Initially, it was assumed that both of these lentic water bodies were located at the point of maximum deposition (the portion of the river evaluated is known to be located near the maximum deposition point; Figure 3-1). If this

worst-case assumption indicated potential risk for either or both of these lentic water bodies, risk estimates were refined based on location-specific deposition estimates.

The deposition model estimates the mass balance between chemicals entering the water body and the amounts that are dissolved in the water column, adhered to suspended particles in the water column, and deposited to bottom sediments. The model also considers losses from such factors as benthic burial and volatilization from the water column (USEPA, 1999a).

The model requires some water body-specific inputs for certain parameters including:

- Surface area (m^2) - estimated from available mapping for the river (4.78E+04 m^2), pond (3.62E+04 m^2), and wetland (3.09E+04 m^2)
- Watershed area (m^2) - estimated from topographic mapping using a Geographical Information System (GIS) for the river (9.66E+06 m^2), pond (4.97E+04 m^2), and wetland (2.56E+05 m^2)
- Current velocity (m/s) - estimated for the river (0.63 m/s) using USGS data collected at the Pinto gauging station, located just upstream from the Burning Grounds
- Flow rate (m^3/year) - calculated for the river (8.01E+08 m^3/yr) based on USGS data collected at the Pinto gauging station. For the pond (5.42E+04 m^3/yr) and wetland (9.26E+03 m^3/yr), flow rate was calculated by multiplying the water depth by the surface area, that is, total turn-over once each year was assumed
- Depth of the water column (m) - estimated for the river (0.68 m) using USGS data collected at the Pinto gauging station, and for the pond (1.5 m) and wetland (0.3 m) based on data collected by ERM (1996) during its site characterization
- Depth of the sediment layer (cm) - assumed to be 3 cm for all three water bodies, the default value in USEPA (1999a)

4.1.7.4 Tissue Concentrations

Dietary items for which tissue concentrations were modeled include terrestrial plants, soil invertebrates (earthworms), small mammals, benthic invertebrates, and fish. The methods used for calculating these tissue calculations are outlined below.

For the screening (high-end) risk estimates, the uptake of chemicals from the abiotic media into these food items was based on conservative (e.g., 90th percentile) bioconcentration factors (BCFs) or bioaccumulation factors (BAFs) from the literature, when available. BCFs and BAFs used for baseline (central tendency) risk estimates were based on, or modeled from, central tendency estimates (e.g., median or mean). For mean values, arithmetic means were only used for normally distributed parameters; when the distribution was log-normal, the geometric mean was used. Default factors of 1.0 were used only when data were not available for a chemical in the literature.

Terrestrial Plants. Tissue concentrations in the above-ground vegetative portion of terrestrial plants were estimated by calculating and summing uptake from three primary mechanisms: (1) direct deposition of particulates to leaf surfaces; (2) air (vapor) transfer; and (3) root uptake. The models used for each of these mechanisms are outlined in USEPA

(1999a). Default factors (USEPA, 1999a) were used for four model parameters required to estimate total concentrations in plants:

- Interception fraction of the edible portion of the plant (Rp) - 0.50 (unitless)
- Plant surface loss coefficient (kp) - 18 ($year^{-1}$)
- Length of plant exposure (Tp) - 0.12 (year)
- Yield or standing crop biomass (Yp) - 0.24 (kg/m^2)

Total concentrations in plants were estimated on a dry weight basis (conversions to dry weight, when necessary, were made using an estimated solids content of 12 percent [USEPA, 1999a]). The air-to-plant and soil-to-plant biotransfer factors for the chemicals evaluated in food webs in the ERA are shown in Table 4-3. For the current conditions exposure scenario, only root uptake was evaluated.

Earthworms. Tissue concentrations in soil invertebrates (earthworms) were estimated by multiplying the measured (current conditions exposure scenario) or modeled (continued operations exposure scenario) surface soil concentration for each chemical by chemical-specific BCFs or bioaccumulation factors (BAFs) obtained from the literature. BCFs are calculated by dividing the concentration of a chemical in the tissues of an organism by the concentration of that same chemical in the surrounding environmental medium (in this case, soil) without accounting for uptake via the diet. BAFs consider both direct exposure to soil and exposure via the diet. Because earthworms consume soil, BAFs are more appropriate values and were used when available. BAFs based on depurated analyses (soil was purged from the gut of the earthworm prior to analysis) were given preference over undepurated analyses when selecting BAF values because direct ingestion of soil was accounted for separately in the food web model.

The BAF values used were based on the ratio between dry-weight soil and dry-weight earthworm tissue. Literature values based on the ratio between dry-weight soil and wet-weight earthworm tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for earthworms (16 percent [0.16]; USEPA, 1993a). For chemicals without available measured BAFs, an earthworm BAF was estimated using available regression equations from the literature, was estimated using data for similar chemicals, or a BAF of 1.0 was assumed. The soil-to-earthworm BAFs are shown in Table 4-4.

Small Mammals. Whole-body tissue concentrations in small mammals (shrews, voles, and/or mice) were estimated using one of two methodologies. For chemicals with literature-based soil-to-small mammal BAFs, the small mammal tissue concentration was calculated by multiplying the measured or estimated surface soil concentration for each chemical by a chemical-specific soil-to-small mammal BAF obtained from the literature. The BAF values used were based on the ratio between dry-weight soil and whole-body dry-weight tissue. Literature values based on the ratio between dry-weight soil and wet-weight tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for small mammals (32 percent [0.32]; USEPA, 1993a). BAFs for shrews are those reported in Sample et al. (1998b) for insectivores (or for general small mammals if insectivore values were unavailable), for voles are those reported for herbivores, and for mice are those reported for omnivores. The soil-to-small mammal BAFs are shown in Table 4-5.

For chemicals without soil-to-small mammal BAF values, an alternate approach was used to estimate whole-body tissue concentrations. Because most chemical exposure for these small mammals is via the diet, it was assumed that the concentration of each chemical in the small mammal's tissues is equal to the chemical concentration in its diet, that is, a diet to whole-body BAF (wet-weight basis) of one was assumed. The use of a diet to whole-body BAF of one is likely to result in a conservative estimate of chemical concentrations for chemicals that are not known to biomagnify in terrestrial food webs (e.g., PAHs) based on reported literature values for chemicals that are known to biomagnify in food webs. For example, a maximum BAF (wet weight) value of 1.0 was reported by Simmons and McKee (1992) for PCBs based on laboratory studies with white-footed mice. Menzie et al. (1992) reported BAF values (wet-weight) for DDT of 0.3 for voles and 0.2 for short-tailed shrews. Reported BAF (wet-weight) values for dioxin were only slightly above one (1.4) for the deer mouse (USEPA, 1990). Resulting tissue concentrations (wet-weight) were converted to a dry-weight basis using an estimated solids content of 32 percent (see above).

Benthic Invertebrates. Tissue concentrations in benthic invertebrates were estimated by multiplying the estimated sediment concentration for each chemical by chemical-specific sediment-to-invertebrate BAFs obtained from the literature. The BAF values used were based on the ratio between dry-weight sediment and dry-weight invertebrate tissue. BAFs based on depurated analyses (sediment was purged from the gut of the organism prior to analysis) were given preference over undepurated analyses when selecting BAF values because direct ingestion of sediment was accounted for separately in the food web model.

Literature values based on the ratio between dry-weight sediment and wet-weight invertebrate tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for benthic invertebrates (21 percent [0.21]; USEPA, 1993a). For chemicals without available measured BAFs, a BAF was estimated using available regression equations from the literature, was estimated using data for similar chemicals, or a BAF of 1.0 was assumed. The sediment-to-invertebrate BAFs are shown in Table 4-6.

Fish. Except for dioxin, tissue concentrations in whole-body fish were estimated using water-to-fish BCFs or BAFs from the literature for applicable freshwater fish species. BCF values were converted to BAF values by multiplying the BCF by a food chain multiplier (USEPA, 1995b, 1999a). Food chain multipliers for organic chemicals were calculated using chemical-specific log K_{ow} values and were based on the consumption of trophic level 3 fish. Trophic level 3 was used because the piscivorous receptors (belted kingfisher, great blue heron, and mink) used in the ERA consume fish from this trophic level. A food chain multiplier of one is applicable to all metals except mercury (USEPA, 1995b).

Resulting BAF values were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for fish (25 percent [0.25]; USEPA, 1993a). For chemicals without available measured BCFs or BAFs, a BAF was estimated using available regression equations from the literature or was estimated using data for similar chemicals. The water-to-fish BAFs are shown in Table 4-7.

For dioxin, tissue concentrations in whole-body fish were estimated by multiplying the sediment concentration by a sediment-to-fish BAF obtained from the literature. The BAF value used was based on the ratio between dry-weight sediment and dry-weight fish tissue. Literature values based on the ratio between dry-weight sediment and wet-weight fish tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the

estimated solids content for fish (25 percent [0.25]; USEPA, 1993a). The sediment-to-fish BAF used for dioxin in the ERA is shown in Table 4-7.

4.1.8 Dietary Intakes

Upper trophic level receptor exposures (via the food web) to chemicals in surface soil, surface water, and sediment were determined by estimating the chemical concentrations in each relevant dietary component for each receptor. Incidental ingestion of soil or sediment, and ingestion of drinking water, was included when calculating the total exposure as appropriate to each exposure scenario.

Not all chemicals were modeled for food web exposures; only those chemicals with the potential to bioaccumulate to a significant extent were evaluated. Bioaccumulating organic chemicals are generally those with a log K_{ow} value of $\geq$ 3.5 to 4.0 (USEPA, 1999a; 2000a). USEPA (2000a) also provides a list of bioaccumulating metals that includes arsenic, cadmium, chromium (Cr+6), copper, lead, mercury (methyl), nick0el, selenium, silver, tin (tributyltin oxide), and zinc. Those metals for which emission factors were calculated (continued operations exposure scenario), or which have been detected in on-site surface soil samples (current conditions exposure scenario), and which are on this list were evaluated for exposures via the food web (see Table 4-1).

Dietary intakes for each upper trophic level receptor species were calculated using the following formula (modified from USEPA [1993a]):

$$DI_x = \frac{[[\sum_i (FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)]]}{BW}$$

where:

DI_x	=	Dietary intake for chemical x (mg chemical/kg body weight/day)
FIR	=	Food ingestion rate (kg/day, dry-weight)
FC_{xi}	=	Concentration of chemical x in food item i (mg/kg, dry weight)
PDF_i	=	Proportion of diet composed of food item i (dry weight basis)
SC_x	=	Concentration of chemical x in soil/sediment (mg/kg, dry weight)
PDS	=	Proportion of diet composed of soil/sediment (dry weight basis)
WIR	=	Water ingestion rate (l/day)
WC_x	=	Concentration of chemical x in water (mg/l)
BW	=	Body weight (kg, wet weight)

Note that soil/sediment ingestion is modeled as a dietary component (rather than using a separate soil ingestion rate). As noted previously, ingestion of drinking water was not evaluated for the current conditions exposure scenario due to the lack of drinking water sources within the boundaries of the Burning Grounds.

Receptor-specific values used as inputs to this equation for the screening risk estimates are provided in Table 4-8 (high-end). Consistent with the conservative approach used in a screening ERA, the minimum body weight and maximum food and water ingestion rates from the scientific literature were used for each receptor. In addition, exclusive diets (i.e., all intake was assumed to be from a single prey item for each receptor, plus any applicable soil, sediment, and water ingestion) were used when calculating screening risk estimates per USEPA (1999a). Central tendency estimates (e.g., mean or median) for body weight and ingestion rates (Table 4-8) were used for the baseline risk estimates, as were mixed (versus exclusive) dietary compositions as appropriate to each receptor. Central tendency estimates for these exposure parameters are more relevant for a baseline ERA because they better represent the characteristics of the population. Populations or communities (rather than individual organisms) were emphasized when developing the assessment endpoints used in this ERA because there are no known occurrences of special status species on or near the Burning Grounds. For both screening and baseline risk estimates (and both exposure scenarios), it was assumed that chemicals are 100 percent bioavailable to the receptor and it was also assumed that each receptor spends 100 percent of its time on the site or at the dispersion model grid location evaluated (i.e., an area use factor [AUF] of 1.0 was assumed).

4.2 Effects Assessment

The principal activity associated with the effects assessment is the development of chemical exposure levels (TRVs) that represent conservative thresholds for adverse ecological effects. These chemical-specific TRVs are included as part of the measurement endpoints developed to evaluate each of the assessment endpoints.

4.2.1 Uncertainty Factors

The TRVs used in the ERA were based on chronic no-effect levels. When chronic No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Level (NOAEL) toxicity values were not available, estimates were derived or extrapolated from subchronic NOEC/NOAEL values, chronic or subchronic Lowest Observed Effect Concentration (LOEC)/Lowest Observed Adverse Effect Level (LOAEL) values, or acute values as follows (USEPA, 1999a):

- A chronic LOAEL (or LOEC) was multiplied by an uncertainty factor (UF) of 0.1 to convert it to a chronic NOAEL (or NOEC)
- A subchronic NOAEL (or NOEC) was multiplied by a UF of 0.1 to convert it to a chronic NOAEL (or NOEC)
- An acute lethal value (LC_{50} or LD_{50}) was multiplied by a UF of 0.01 to convert it to a chronic NOAEL (or NOEC)

Exposure duration was defined as follows (USEPA, 1999a; Sample et al., 1996):

- Fish, mammals, and birds:
  - Chronic - > 90 days or during a critical life stage
  - Subchronic - 14 to 90 days
  - Acute - < 14 days

- Plants and invertebrates:
  - Chronic - > 20 days or during a critical life stage
  - Subchronic - 3 to 20 days
  - Acute - < 3 days

4.2.2 Medium-Specific TRVs

Chemical-specific TRVs were developed for air, surface soil, surface water, and sediment. As discussed in Sections 3.3.4 and 3.3.5, these TRVs are intended to evaluate receptor groups (communities) and not individual organisms or species. These TRVs were developed based on regulatory criteria, such as Ambient Water Quality Criteria (AWQC), or on values described in the literature. When a specific chemical lacked an available TRV for a particular medium, data from other chemicals with similar chemical structure and mode of action were used to estimate a TRV. TRVs, or the data used to construct them, were selected using best professional judgement considering such factors as study design, study methodology, study duration, study endpoint, exposure route, life stage, and test species (USEPA, 1999a).

4.2.2.1 Air

TRVs for inhalation exposures to animals (e.g., birds and mammals) of gaseous chemicals or chemicals adhered to airborne particulates were developed where available data allowed. Most of the available data are from inhalation exposures to mammals (such as mice) under laboratory conditions and many chemicals lack useable data on which to develop TRVs. Table 4-9 lists the inhalation-based TRVs for the applicable chemicals listed in Table 4-1.

4.2.2.2 Surface Water

Principal sources of surface water TRVs for freshwater included:

- Federal Ambient Water Quality Criteria (USEPA, 1994; 1999b)
- State Water Quality Standards
- USEPA Ecotox Thresholds (USEPA, 1996b)
- Scientific literature, such as the AQUIRE database, Buchman (1999), and Suter and Tsao (1996)

Surface water TRVs for several divalent metals require site-specific adjustment based on water hardness. The mean measured hardness value (158 mg/L) from 14 river samples collected near the Burning Grounds in June 2001 (as part of CERCLA-related activities) was used for this adjustment.

For chemicals known to bioaccumulate in aquatic food chains, TRVs were based on the final chronic value (rather than the final residue value) as per USEPA (1996b) and Suter and Tsao (1996). The use of final chronic values is intended to protect ecological receptors from direct exposures to chemicals in surface water, rather than from exposure via the food chain. Potential risks to upper trophic level receptors from food chain exposures (tissue residues) were evaluated separately (see Section 4.2.3). Table 4-10 lists the surface water TRVs for the applicable chemicals listed in Table 4-1.

4.2.2.3 Sediment

Sediment TRVs for inorganics were obtained primarily from Buchman (1999), USEPA (1996b), and OME (1993). These TRVs are typically based on studies that correlate chemical concentrations in sediments with some measure of benthic community impairment; this approach is known as the Screening Level Concentration (SLC) approach. SLC-based TRVs cannot be adjusted to account for site-specific bioavailability. Because these TRVs correlate adverse effects observed in a particular sample to each individual chemical present, without attempting to discern which chemical or group of chemicals is actually responsible for the observed effects, their use tends to result in a very conservative estimate of risk. However, approaches such as equilibrium partitioning are not yet considered applicable for deriving sediment TRVs for inorganic chemicals.

Sediment TRVs for organic chemicals were obtained primarily from OME (1993), USEPA (1996b), and Jones et al. (1997). For non-polar organic chemicals, some TRVs were based on the equilibrium partitioning approach (USEPA, 1996b; USEPA, 1999a), calculated using the following formula:

$$TRV = (f_{oc})\,(K_{oc})\,(FCV)$$

where:

	TRV	=	Toxicity Reference Value (µg/kg)
	f_{oc}	=	Total organic carbon content (percent, as a fraction)
	K_{oc}	=	Normalized adsorption coefficient (l/kg)
	FCV	=	Chronic AWQC or its equivalent (µg/l)

To be consistent with deposition modeling, the default value of four percent (USEPA, 1999a) was used in this equation for total organic carbon. This default value is very similar to mean measured values for total organic carbon (3.7 percent) from river samples collected as part of CERLCA-related activities in June 2001. The K_{oc} values used in this equation were derived from the literature and are shown in Table 4-2.

The equilibrium partitioning approach is the recommended approach in USEPA (1996b, 1999a) for deriving sediment TRVs for non-polar organic chemicals. Table 4-11 provides the sediment TRVs for the applicable chemicals listed in Table 4-1.

4.2.2.4 Surface Soil

Widely accepted and comprehensive TRVs for surface soils are currently limited. While many sources have identified "safe" contaminant levels in surface soils from a human health perspective, only a few, such as Efroymson et al. (1997a, 1997b), MHSPE (1994), and USEPA (2000b), have developed soil TRVs with protection of ecological receptors as a goal.

TRVs are most widely available for terrestrial plants and soil invertebrates (earthworms). Table 4-12 lists the soil-based TRVs that were used in the ERA for the applicable chemicals listed in Table 4-1. In addition, site-specific background soil concentrations developed for ABL as part of CERCLA activities were also considered during the ecological risk evaluation (Table 4-13).

4.2.3 Ingestion TRVs

Ingestion-based TRVs for dietary exposures were derived for each avian and mammalian receptor species (Section 3.3.4) and bioaccumulative chemical (Section 4.1.8; Table 4-1) evaluated in the ERA. Toxicological information from the literature for wildlife species most closely related to the receptor species was used, where available, but was supplemented by laboratory studies of non-wildlife species (e.g., laboratory mice) where necessary. The ingestion-based TRVs are expressed as milligrams of the chemical per kilogram body weight of the receptor per day (mg/kg-BW/day).

Growth and reproduction were emphasized as assessment endpoints because they are the most relevant, ecologically, to maintaining viable populations and because they are generally the most studied chronic toxicological endpoints for ecological receptors. If several chronic toxicity studies were available from the literature, the most appropriate study was selected for each receptor species based on study design, study methodology, study duration, study endpoint, and test species. Ingestion-based TRVs for mammals and birds are summarized in Tables 4-14 and 4-15, respectively.

4.3 Risk Characterization

The risk characterization portion of the ERA uses the information generated during the two previous parts of the ERA (problem formulation and analysis) to estimate potential risks to ecological receptors for the exposure scenarios evaluated. Also included is an evaluation of the uncertainties associated with the models, assumptions, and methods used in the ERA, and their potential effects on the conclusions of the assessment.

As part of risk characterization, the exposure concentrations (abiotic media) or exposure doses (upper trophic level receptor species) are compared with the corresponding TRVs to derive risk estimates using the hazard quotient (HQ) method. HQs are calculated by dividing the chemical concentration in the medium being evaluated by the corresponding medium-specific TRV or by dividing the exposure dose by the corresponding ingestion-based TRV.

HQs equaling or exceeding one indicate the potential for unacceptable risk because the chemical concentration or dose (exposure) equals or exceeds the TRV (effect). However, TRVs and screening exposure estimates were derived using intentionally conservative assumptions such that HQs greater than or equal to one do not necessarily indicate that risks are present or impacts are occurring. Rather, it identifies chemical-pathway-receptor combinations requiring further evaluation using more realistic exposure scenarios and assumptions. Following the same reasoning, HQs less than one indicate that risks are unlikely, enabling a conclusion of negligible risk to be reached with high confidence.

USEPA ERA combustion guidance (USEPA, 1999a) also suggests calculating Hazard Indices (HIs); a HI is the sum of the HQs for a particular set of chemicals for a particular exposure pathway. In this ERA, the calculation of HIs was considered for specific chemical groups with similar modes of action where sufficient information was available to document additive effects. Alternatively, certain chemical groups were evaluated based on the sum total concentrations of all individual chemicals in a particular group (e.g., PAHs). Dioxins and furans were evaluated as a single group using the toxicity equivalency quotient approach and the toxicity equivalency factors listed in Table 4-16.

4.4 Uncertainties

Uncertainties are present in all risk assessments because of the limitations of the available data and the need to make certain assumptions and extrapolations based on incomplete information. In addition, the use of various models (e.g., for air dispersion, deposition, uptake, and food web exposures) carries with it some associated uncertainties as to how well the model reflects actual conditions. Because conservative assumptions were generally used in the exposure and effects assessments, these uncertainties are more likely to result in an overestimation rather than an underestimation of the likelihood and magnitude of risks to ecological receptors. The sources of uncertainty, and their potential effects on the conclusions of the risk assessment, are discussed in Section 7.

5.0 Continued Operations

This section of the ERA evaluates potential ecological risks associated with the continued operation of the Burning Grounds facility. As discussed in Section 1, the objective of this portion of the ERA is to evaluate any potential risks to ecological receptors from continued burning operations so that measures can be taken (if necessary) to reduce any identified risks to acceptable levels through modifications to the facility design, engineering controls, or other appropriate mechanisms. As for the current conditions exposure scenario, the continued operations exposure scenario is evaluated in a tiered manner (see Sections 4.1.1.1 and 6.0).

5.1 Problem Formulation

As described in Section 3, in problem formulation:

- The environmental setting of a site is characterized in terms of the habitats and biota known or likely to be present
- The types and concentrations of chemicals that are present in ecologically relevant media are characterized
- A conceptual model is developed for the site that describes potential sources, potential transport pathways, potential exposure pathways and routes, and potential receptors
- Assessment and measurement endpoints are selected to evaluate those receptors for which complete and potentially significant exposure pathways are likely to exist

In addition, the fate, transport, and toxicological properties of the chemicals present at a site are considered during the problem formulation process.

5.1.1 Environmental Setting

The environmental setting is described in Section 3.1.

5.1.2 Summary of Available Analytical Data

The continued operations exposure scenario relies on modeled exposure estimates (i.e., concentrations in relevant environmental media as determined from air dispersion and deposition modeling) based on the new design of the burn pads and pans. These media

concentrations are presented in Section 5.4 for the chemicals selected in Section 4.1.2.1. Also, see Attachment C-3.

5.1.3 Conceptual Model

The conceptual model is described in Section 3.3 and is shown on Figure 3-3.

5.1.3.1 Source Areas

The source area at the Burning Grounds is the current burn pans (Figure 5-1).

5.1.3.2 Transport Pathways and Exposure Media

As depicted on Figure 3-3, possible mechanisms for contaminant transport due to continued operations may include:

- Transport by prevailing winds of uncombusted materials and/or combustion products to surrounding areas where they may contact receptors directly via inhalation (animals) or foliar contact (plants)
- Transport by prevailing winds of uncombusted materials and/or combustion products to surrounding areas where they may deposit to surface soils and surface water bodies
- Leaching of deposited chemicals from the soil by infiltrating precipitation and transport to surface water bodies via groundwater
- Leaching of deposited chemicals from the soil by precipitation and transport by surface runoff to surface water bodies
- Uptake by biota from air, surface soil, surface water, and/or sediment and trophic transfer to upper trophic level receptors via the food web

5.1.3.3 Exposure Pathways

An exposure pathway links a source of contamination with one or more receptors through exposure via one or more media and exposure routes. Exposure, and thus potential risk, can only occur if complete exposure pathways exist. Based on the conceptual model (Figure 3-3), complete exposure pathways exist to ground-level ambient air and surface soil (terrestrial habitats) in areas surrounding the Burning Grounds. Complete exposure pathways also exist to surface water and sediments in surface water bodies located adjacent to (North Branch Potomac River) and near (ponds and wetlands) the Burning Grounds (see Figure 3-1). Complete exposure pathways also exist to upper trophic level receptors that may feed on prey items in these terrestrial, aquatic, and wetland habitats.

5.1.3.4 Receptors

Receptor species were selected based on the complete exposure pathways identified in the conceptual model (Figure 3-3), the habitat types present in the assessment area, and the biota known or likely to occur within these habitats. As discussed in Section 3.1.4.5, there are no known occurrences of special status species on or near the Burning Grounds. Receptor selection was discussed in Section 3.3.4. The following upper trophic level receptor species are used for this exposure scenario:

- Short-tailed shrew (*Blarina brevicauda*) - terrestrial mammalian insectivore
- Meadow vole (*Microtus pennsylvanicus*) - terrestrial mammalian herbivore

- Mink (*Mustela vison*) - semi-aquatic mammalian piscivore
- Red fox (*Vulpes vulpes*) - terrestrial mammalian carnivore
- American robin (*Turdus migratorius*) - terrestrial avian insectivore/omnivore
- Red-tailed hawk (*Buteo jamaicensis*) - terrestrial avian carnivore
- Great blue heron (*Ardea herodias*) - wetland/aquatic avian piscivore
- Belted kingfisher (*Ceryle alcyon*) - aquatic avian piscivore/insectivore

As discussed in Section 3.3.4, the upper trophic level receptor species quantitatively evaluated in the ERA were limited to birds and mammals, the taxonomic groups with the most available information regarding exposure and toxicological effects. Lower trophic level receptors were evaluated in the risk assessment based on those taxonomic groupings for which toxicity reference values (TRVs) have been developed. For this exposure scenario, these groupings include terrestrial plants, soil invertebrates, and aquatic biota (e.g., fish and macroinvertebrates).

5.1.3.5 Assessment and Measurement Endpoints

Endpoints for this exposure scenario were selected in Section 3.3.5.

5.2 Exposure Estimate

Modeled concentrations in ground-level air, surface soil, surface water, and sediment were used to estimate potential chemical exposures for ecological receptors. Exposures for upper trophic level receptor species via the food web were determined by estimating the chemical-specific concentrations in each dietary component using uptake and food web models (see Section 4.1.7.4). Incidental ingestion of soil or sediment (as appropriate to each receptor) and ingestion of drinking water were included when calculating the total level of exposure.

5.2.1 Exposure Point Concentrations

Modeled media concentrations (for air, surface soil, surface water, and sediment) were used as exposure point concentrations for exposure estimation and/or food web modeling. As discussed in Section 4.1.7.3, chemical concentrations in surface water and sediment were modeled for three water bodies: (1) the portion of the North Branch Potomac River directly adjacent to the Burning Grounds; (2) a pond located approximately 1-km west-northwest of the Burning Grounds; and (3) an emergent wetland located approximately 1-km north of the Burning Grounds.

The tissue concentrations for prey items (plants, soil invertebrates, small mammals, benthic invertebrates, and fish) consumed by upper trophic level receptors were estimated using bioaccumulation models and modeled media concentrations. The methodology and models used to derive these estimates are described in Section 4.1.7.4.

5.2.2 Dietary Intakes

Dietary intakes were calculated for each upper trophic level receptor species using the methods discussed in Section 4.1.8.

5.3 Effects Evaluation

The purpose of the effects evaluation is to establish chemical exposure levels (Toxicity Reference Values; TRVs) that represent thresholds for adverse ecological effects. The

medium-specific TRVs used in the evaluation of this exposure scenario are described in Section 4.2.

5.4 Risk Characterization

Risk characterization includes an estimate (calculation) of potential risks and a discussion of the uncertainties associated with the risk estimates. The risk calculation is provided below. Uncertainties are discussed in Section 7.

5.4.1 Risk Calculation

Risk calculation compares the modeled exposure concentrations in air, surface soil, surface water, and sediment with the corresponding TRVs to derive risk estimates using the hazard quotient (HQ) method (see Section 4.3). These comparisons are conducted for the chemicals selected in Section 4.1.2.1 and listed in Table 4-1.

5.4.1.1 Ground-Level Air

Concentrations in ground-level air (based on modeled annual average concentrations at the estimated point of maximum impact on or outside of the facility boundary) are compared to inhalation-based TRVs in Table 5-1. None of the COPCs exceeded an inhalation-based TRV, although about half (21 of 38) of the COPCs lacked inhalation-based TRVs.

5.4.1.2 Terrestrial Habitats (Surface Soil)

The comparison of chemical concentrations in surface soil (at the estimated point of maximum deposition on or outside of the facility boundary) with TRVs and background concentrations is presented in Table 5-2. Comparisons were based on soil concentrations estimated using three soil mixing depths (1, 10, and 20 cm). The 1-cm soil mixing depth was used to provide a very conservative bounding estimate since natural mixing of soil by plant roots and soil fauna will occur to much deeper depths, especially over the 30-year period of deposition used in the modeling. The 10 and 20-cm soil mixing depths provide more reasonable (yet still conservative) estimates of expected chemical concentrations in soil and correspond to typical surface soil sampling depths (generally 0 to 15 cm) used in most surface soil sampling programs.

None of the organic COPCs exceeded a TRV for any soil mixing depth at the maximum point (Table 5-2). However, a number (7 of 17) of organic chemicals lacked TRV values for both flora and soil fauna.

Copper and lead exceeded soil TRVs (HQs of 1.93 and 3.12, respectively) and background concentrations (ratios of 3.02 and 3.76, respectively) for the 1-cm soil mixing depth at the maximum point of deposition (Table 5-2). There were no TRV or background exceedences for the 10 and 20-cm soil mixing depths. Iron and zirconium lacked soil TRVs, although a background value was available for iron (and was not exceeded).

Because of the spatially restricted nature of the copper and lead exceedences (at a single point and at a very shallow soil depth), soil concentrations were also estimated at the five locations along the northern boundary of the facility (between the fence and the river) established as part of the dispersion modeling. The dispersion model includes a receptor grid placed over the facility and surrounding area, and utilizes the grid intersection points (nodes) in calculating dispersion factors and resulting air concentrations. Grid spacing is

500 meters (coarse grid) and 100 meters (fine grid). The five locations used here are the grid nodes that fell along the northern facility boundary based on the coarse grid; these nodes were selected since the concentration isopleths from the dispersion model (e.g., Figure 3-1) indicated that this general area had the highest estimated air concentrations (and thus the highest deposition). The average soil concentrations from these five points are compared to TRVs and background in Table 5-3. Based on this comparison, there are no exceedences for copper or lead for any soil mixing depth.

Screening and baseline exposure dose estimates (at the maximum point of deposition on or outside of the facility boundary) for each terrestrial upper trophic level receptor species are compared to ingestion TRVs in Tables 5-4 and 5-5, respectively. Based on the conservative screening estimates, HQs exceeded one for copper (short-tailed shrew) and lead (short-tailed shrew, meadow vole, and American robin) but only at the 1-cm soil mixing depths (Table 5-4). There was only one low-magnitude exceedence of a NOAEL-based TRV (HQ of 1.36 for lead [American robin]) based on baseline estimates at the maximum point of deposition, again only at the 1-cm soil mixing depth (Table 5-5). HQs based on average soil concentrations along the facility fence line were all below one for all soil mixing depths (Table 5-6).

5.4.1.3 Wetland and Aquatic Habitats (Surface Water/Sediment)

As discussed in Sections 4.1.7.3 and 5.2.1, potential ecological risks were evaluated for three water bodies located near the Burning Grounds. Because the deposition model considers surface runoff when deriving the estimates of chemical concentrations in surface water and sediment, the concentrations in these two media were calculated using the three soil mixing depths (1, 10, and 20 cm) discussed in Section 5.1.4.2.

North Branch Potomac River. The comparison of chemical concentrations in surface water and sediment (assuming that the river is located at the point of maximum deposition on or outside of the facility boundary) with TRVs is presented in Tables 5-7 and 5-8, respectively. There were no exceedences of TRVs based on these comparisons. Two organic chemicals (2,5-diphenyloxazole and triacetin) lacked both surface water and sediment TRVs and zirconium lacked a sediment TRV.

Screening exposure dose estimates for each wetland/aquatic upper trophic level receptor species are compared to ingestion TRVs in Table 5-9. There were no exceedences based on these conservative screening estimates.

Wetland. The comparison of chemical concentrations in wetland surface water and sediment (modeled at the actual location since there were exceedences assuming that the wetland was located at the maximum point of deposition) with TRVs is presented in Tables 5-10 and 5-11, respectively. There was one low-magnitude exceedence for lead in surface water (HQ of 2.48) using the 1-cm soil mixing depth. HQs were less than one based on the 10 and 20-cm soil mixing depths (Table 5-10). There were no exceedences of sediment TRVs (Table 5-11). Two organic chemicals (2,5-diphenyloxazole and triacetin) lacked both surface water and sediment TRVs and zirconium lacked a sediment TRV.

Screening exposure dose estimates for each wetland/aquatic upper trophic level receptor species are compared to ingestion TRVs in Table 5-12. There were no exceedences based on these conservative screening estimates.

Pond. The comparison of chemical concentrations in pond surface water and sediment (modeled at the actual location since there were exceedences assuming that the pond was located at the maximum point of deposition) with TRVs is presented in Tables 5-13 and 5-14, respectively. There were low-magnitude exceedences for aluminum and lead in surface water (HQs of 1.22 and 3.37, respectively) using the 1-cm soil mixing depth. HQs were less than one based on the 10 and 20-cm soil mixing depths (Table 5-13). There were no exceedences of sediment TRVs (Table 5-14). Two organic chemicals (2,5-diphenyloxazole and triacetin) lacked both surface water and sediment TRVs and zirconium lacked a sediment TRV.

Screening exposure dose estimates for each wetland/aquatic upper trophic level receptor species are compared to ingestion TRVs in Table 5-15. There were no exceedences based on these conservative screening estimates.

5.5 Risk Evaluation and Conclusions

5.5.1 Terrestrial Habitats

There were no exceedences of inhalation-based TRVs from exposure to facility-related chemicals in ground-level air. Low-magnitude exceedences of soil TRVs and background concentrations occurred for copper and lead but only under the most conservative exposure assumptions (e.g., 1-cm soil mixing depth, maximum point of deposition, screening inputs). Risk estimates based on more realistic exposures indicated low to negligible risks.

5.5.2 Wetland and Aquatic Habitats

The evaluation of the portion of the North Branch Potomac River indicated negligible risks to wetland and aquatic receptors, even using the most conservative exposure assumptions. For the pond and wetland, there were low-magnitude exceedences of surface water TRVs for aluminum (pond - HQ of 1.22) and lead (pond - HQ of 3.37; wetland - HQ of 2.48) based on a very conservative soil mixing depth of 1-cm. Risk estimates based on more realistic soil mixing depths indicated low to negligible risks. Risks to upper trophic level receptors at both the pond and wetland were negligible.

5.5.3 Conclusions

Based on the evaluation contained in this section, risks to ecological receptors inhabiting the habitats surrounding the Burning Grounds are expected to be negligible from the continued operation of the Burning Grounds using the proposed burn pan layout.

6.0 Current Conditions

This section of the ERA evaluates potential ecological risks associated with current conditions within the boundaries of the Burning Grounds (RCRA unit). As discussed in Section 1, the objective of this portion of the ERA is to evaluate any current risks within the unit to determine if any actions are required to address these risks prior to construction of the new burn pads, and to support any required future closure plan for the unit.

Consistent with applicable USEPA and Navy ERA guidance (USEPA, 1997a, 1998a, 1999a; CNO, 1999; NAVFAC, 2001), the current conditions exposure scenario is evaluated in a tiered manner. The screening ERA (SERA), which constitutes the first tier of evaluation and

corresponds to Steps 1 and 2 of the ERA process (USEPA, 1997a; CNO, 1999; NAVFAC, 2001), is conducted using intentionally conservative assumptions. If no complete exposure pathways exist, the ERA process terminates at Step 1. If complete exposure pathways exist and the results of the SERA indicate that risks are negligible, the ERA process terminates at Step 2. If complete exposure pathways exist and the results of the SERA indicate that risks are possible, the site continues on to Step 3, the first step in the baseline ERA (BERA).

The first portion of Step 3 (Step 3A) consists of a refined evaluation of media concentrations and exposure estimates conducted using more realistic assumptions and additional methodologies relative to those used in the SERA, which is intended to be an extremely conservative assessment. Examples of more realistic exposure assumptions include using central tendency estimates (rather than maximums or minimums) for media concentrations, bioaccumulation factors, and exposure parameters. The use of central tendency values for these parameters provides a more representative estimate of potential exposures and risks to receptor populations (the focus of the selected assessment endpoints). Examples of additional methodologies include consideration of background concentrations, detection frequency, and bioavailability (CNO, 1999; NAVFAC, 2001), as appropriate.

6.1 Problem Formulation

As described in Section 3, in problem formulation:

- The environmental setting of a site is characterized in terms of the habitats and biota known or likely to be present
- The types and concentrations of chemicals that are present in ecologically relevant media are characterized
- A conceptual model is developed for the site that describes potential sources, potential transport pathways, potential exposure pathways and routes, and potential receptors
- Assessment and measurement endpoints are selected to evaluate those receptors for which complete and potentially significant exposure pathways are likely to exist

In addition, the fate, transport, and toxicological properties of the chemicals present at a site are considered during the problem formulation process.

6.1.1 Environmental Setting

The environmental setting is described in Section 3.1.

6.1.2 Summary of Available Analytical Data

Chemical concentrations in surface (20 locations) and subsurface (7 locations) soil at the Burning Grounds were characterized in February 2001 as part of the sampling program developed in support of the Subpart X permit application. Figure 5-1 shows the sampling locations. The surface and subsurface soil data (for detected chemicals) are summarized in tables 6-1 and 6-2, respectively. The complete data sets for these two media are provided in attachments C-1 (surface soil) and C-2 (subsurface soil).

6.1.3 Conceptual Model

The conceptual model was described in Section 3.3 and is shown on Figure 3-4.

6.1.3.1 Source Areas

The source area at the Burning Grounds are the current and historical burn pans (Figure 5-1).

6.1.3.2 Transport Pathways and Exposure Media

As depicted on Figure 3-4, possible mechanisms for contaminant transport due to past deposition may include:

- Uptake by biota from surface soil and trophic transfer to upper trophic level receptors
- Historic leaching of chemicals from the soil by infiltrating precipitation and transport to surface water bodies via groundwater
- Historic leaching of chemicals from the soil by precipitation and transport by surface runoff to surface water bodies

The first of these potential pathways is known to be complete at the site. The remaining two pathways are evaluated qualitatively, below, to determine if they are likely to be complete and significant.

As described in the environmental setting (Section 3.1), there are no surface water bodies, wetlands, or other surface drainage features located within the boundaries of the Burning Grounds. The North Branch Potomac River is located just north of the Burning Grounds. The entire area of the Burning Grounds is within the 500-year floodplain of the river and a portion of the Burning Grounds is within the 100-year floodplain.

Precipitation falling on the Burning Grounds is thought to be lost to evapo-transpiration processes or to infiltrate the soil to reach groundwater. Groundwater flow at the site is toward the North Branch Potomac River. However, groundwater at the Burning Grounds does not currently discharge directly to the river due to the presence of extraction wells associated with CERCLA activities in the area. The RCRA permit contains a groundwater Corrective Action Monitoring program for the Burning Grounds.

Only four organic chemicals were detected in subsurface soil samples collected from the Burning Grounds (Table 6-2). HMX, perchlorate, and trichloroethene (TCE) may be attributable, at least in part, to historical activities at the site (i.e., solvent disposal pits) not directly related to the Burning Grounds (and which are being addressed under CERCLA) because detected concentrations for these three chemicals were in the vicinity of the former solvent disposal pits. Solvents, including TCE, contaminated with perchlorate and explosives are known to have been disposed of in these pits. Octachlorodibenzo-p-dioxin is likely attributable to deposition onto surface soil from burning activities. Their presence in subsurface soil suggests that some transport from surface layers may be occurring. Because dioxins strongly adsorb to soil particles and soil organic matter (total organic carbon concentrations averaged 3.4 percent in on-site surface soil; Table 6-1), mechanisms (such as translocation by plants and soil mixing by soil invertebrates) other than leaching are likely to be primarily responsible.

All detected inorganic chemicals in subsurface soil were consistent with site-specific background concentrations, suggesting minimal leaching of these chemicals from surface layers (Table 6-3). Relative to surface soil, only selenium, thallium, and perchlorate were

notably higher in subsurface soil (Table 6-4). Selenium and thallium concentrations were consistent with background in both surface and subsurface soil.

The site is relatively flat, contains no drainage features (such as ditches), and is completely covered with periodically mowed grasses and other herbaceous plants (except on a few unpaved roads and in the area immediately surrounding a few of the active burn pans). Thus, significant surface runoff is not likely to occur even during flood events. However, this potential transport pathway was evaluated based on the three surface soil samples collected in the most obvious drainage feature present, a shallow depression located just south of the Burning Grounds fence line that may collect water from a small portion of the Burning Grounds (Figure 5-1). The site maximum for six metals occurred within this set of three samples (Table 6-5) although only chromium was elevated (in one of the three samples) relative to background. While the site maximum for all detected PAHs occurred in one of these three samples (SS-01), concentrations were low (maximum concentration was 140 µg/kg for phenanthrene; Table 6-5). The site maximum for total dioxin (consisting of hepta and octa congeners) also occurred at SS-01 (Table 6-5) although the most commonly occurring dioxin and furan congeners (octa) were fairly uniformly distributed over the site. Based on the available soil data, there does not appear to be any systematic contaminant transport via surface runoff to this low area south of the Burning Grounds. In addition, this depressional area does not outlet to the North Branch Potomac River. Water that collects in this area likely evaporates or infiltrates over time into the alluvial aquifer, where it is captured by the extraction wells.

Based on this qualitative analysis, contaminant transport to off-site water bodies via surface runoff and groundwater is not a complete and/or significant pathway. As reflected on Figure 3-4, this pathway will not be evaluated further for this exposure scenario.

6.1.3.3 Exposure Pathways

An exposure pathway links a source of contamination with one or more receptors through exposure via one or more media and exposure routes. Exposure, and thus potential risk, can only occur if complete exposure pathways exist. Based on the conceptual model (Figure 3-4), complete exposure pathways in terrestrial habitats exist to surface soils within the Burning Grounds. Complete exposure pathways also exist to upper trophic level receptors that may feed on prey items in on-site terrestrial habitats. There are no surface water bodies, wetlands, or other surface drainage features located within the boundaries of the Burning Grounds. Thus, there are no complete exposure pathways to surface water, sediment, or aquatic biota for the current conditions exposure scenario.

6.1.3.4 Receptors

Receptor species were selected based on the complete exposure pathways identified in the conceptual model (Figure 3-4), the specific habitats present on the site, and the biota known or likely to occur on the site. As discussed in Section 3.1.4.5, there are no known occurrences of special status species on or near the Burning Grounds. Receptor selection was discussed in Section 3.3.4. The following upper trophic level receptor species are used for this exposure scenario:

- Short-tailed shrew (*Blarina brevicauda*) - terrestrial mammalian insectivore
- Meadow vole (*Microtus pennsylvanicus*) - terrestrial mammalian herbivore

- American robin (*Turdus migratorius*) - terrestrial avian insectivore/omnivore
- American kestrel (*Falco sparverius*) - terrestrial avian insectivore/carnivore

As discussed in Section 3.3.4, the upper trophic level receptor species quantitatively evaluated in the ERA were limited to birds and mammals, the taxonomic groups with the most available information regarding exposure and toxicological effects. Lower trophic level receptors were evaluated in the risk assessment based on those taxonomic groupings for which TRVs have been developed. For this exposure scenario, these groupings include terrestrial plants and soil invertebrates.

6.1.3.5 Assessment and Measurement Endpoints

Endpoints for this exposure scenario were selected in Section 3.3.5.

6.2 Exposure Estimate

Maximum and mean concentrations in surface soil were used to estimate potential chemical exposures for ecological receptors. Exposures for upper trophic level receptor species via the food web were determined by estimating the chemical-specific concentrations in each dietary component using uptake and food web models (see Section 4.1.7.4). Incidental ingestion of soil was included when calculating the total level of exposure. Because there are no water bodies on the site, exposure via drinking water was not included in the exposure estimates.

6.2.1 Exposure Point Concentrations

The maximum (screening) and mean (baseline) surface soil concentrations were used as exposure point concentrations for exposure estimation and/or food web modeling. Dietary concentrations (concentrations in plants, soil invertebrates, and small mammals) for terrestrial consumers were estimated using bioaccumulation models and measured media concentrations. The methodology and models used to derive these estimates are described in Section 4.1.7.4.

6.2.2 Dietary Intakes

Dietary intakes were calculated for each upper trophic level receptor species using the methods discussed in Section 4.1.8.

6.3 Effects Evaluation

The purpose of the effects evaluation is to establish chemical exposure levels (TRVs) that represent thresholds for adverse ecological effects. The medium-specific TRVs used in the evaluation of this exposure scenario are described in Section 4.2.

6.4 Risk Characterization

Risk characterization includes an estimate (calculation) of potential risks and a discussion of the uncertainties associated with the risk estimates. The risk calculation is provided below. Uncertainties are discussed in Section 7.

6.4.1 Risk Calculation

Risk calculation compares the exposure concentrations in Burning Grounds surface soil with the corresponding TRVs to derive screening risk estimates using the HQ method (see Section 4.3). Chemicals with HQs greater than or equal to 1.0 were identified as COPCs unless concentrations were consistent with site-specific background concentrations.

6.4.1.1 Surface Soil

The comparison of chemical concentrations in surface soil with TRVs and background concentrations is presented in Table 6-6. None of the detected organic chemicals exceeded a TRV. However, a number of organic chemicals lacked TRV values for both flora and soil fauna:

- Naphthalene and phenanthrene lacked soil TRVs but concentrations of these two chemicals were considerably less than the TRVs for the high molecular weight PAHs (e.g., benzo[a]pyrene) evaluated
- Acetone lacked soil TRVs although maximum concentrations were low (16 µg/kg) and this chemical is known to be of low toxicity to other biota, such as mammals (Sample et al., 1996) and fish (Suter and Tsao, 1996)
- All detected dioxin and furan congeners lacked congener-specific TRVs and were evaluated relative to TRVs for 2,3,7,8-TCDD based on toxic equivalents. The HQ was less than one based on this comparison (Table 6-6)
- There were no TRVs available for perchlorate; this is treated as an uncertainty (see Section 7)

Nine metals exceeded TRVs in one or more surface soil samples and one metal (iron) lacked a soil TRV (Table 6-6). For three of these metals (manganese, thallium, and vanadium), all surface soil sample concentrations were less than background concentrations. The maximum background ratio for iron was only 1.16 (i.e., the maximum detected value was 16 percent above the background value) although the mean (site-wide) ratio was less than one.

Most of the other six metals had spatially limited, low magnitude exceedences of TRVs and/or background. For nickel, there was only one (plant) TRV exceedence (HQ of 1.11), although the mean (site-wide) HQ was less than one; the maximum background ratio was only 1.21 (the mean ratio was less than one). A single mercury surface soil sample exceeded both a plant (HQ of 1.27) and soil fauna (HQ of 3.80) TRV, and the maximum background ratio was 2.24. Mean HQs and mean background ratios were all less than one for mercury (Table 6-6). Cadmium had a single exceedence of a (plant) TRV (HQ of 2.73), although the mean HQ was well below one. The maximum background ratio for cadmium was 4.54, although the mean ratio was less than one (Table 6-6). Although all 20 chromium samples exceeded plant and soil fauna TRVs, only six of the samples exceeded background and the maximum background ratio was only 1.66; the mean background ratio was less than one. Similarly, for zinc, all 20 samples exceeded plant TRVs (maximum HQ of 5.42), although there were only two exceedences of the soil fauna TRV (maximum HQ of 1.36; mean HQ less than one). The maximum background ratio for zinc was 2.28 and the mean background ratio was less than one (Table 6-6).

The exceedences for lead were driven by a high maximum concentration (1,730 mg/kg) in sample SS-02. If this sample is removed from the analysis, the maximum and mean plant HQs decrease to 3.68 and 1.15, respectively (from 34.6 and 2.82), there are no soil fauna TRV exceedences, and the maximum and mean background ratios decrease to 4.43 and 1.38, respectively (from 41.7 and 3.40).

6.4.1.2 Food Web Exposures

Maximum and mean exposure doses for each upper trophic level receptor species are compared to ingestion TRVs in tables 6-7 and 6-8, respectively. Based on mean surface soil concentrations and NOAELs (Table 6-8), HQs exceeded one only for the short-tailed shrew and arsenic (HQ of 1.68). Risk estimates for dioxins/furans were complicated by relatively high detection limits for some congeners in a few samples. This resulted in inflated TEQ-based surface soil concentrations (when one-half of the detection limit was used for non-detects to calculate the soil concentration) and thus ingestion-based risk estimates. This is especially relevant because only the least toxic congeners (the heptas and octas) were detected in surface soil. Risk estimates based on using one-half of the detection limit for undetected congeners (Table 6-8 - "all") resulted in exceedences of LOAEL-based TRVs for the short-tailed shrew (HQ of 3.84), and NOAEL-based TRVs for the short-tailed shrew (38.4), American robin (1.44), and American kestrel (1.62). However, if only detects are considered in the risk estimates (Table 6-8 - "hits"), all HQs are less than one (Table 6-8).

6.5 Risk Evaluation and Conclusions

Baseline risk estimates using site-wide averages indicate low to negligible risks to upper trophic level receptors. Other than dioxins/furans, only arsenic had a NOAEL-based HQ exceeding one (1.68; Table 6-8), but surface soil concentrations for arsenic were consistent with background concentrations (Table 6-6). Exceedences for dioxins/furans were heavily influenced by non-detected congeners (representing the more toxic congeners) in a few samples and estimates based solely on detected congeners (representing the least toxic congeners) indicate negligible risk.

Widespread, high-magnitude exceedences of both surface soil TRVs and background concentrations were not apparent based on the existing surface soil data. Except for lead, background exceedences were generally infrequent and of relatively low magnitude. Lead, which is attributable at least in part to deposition from burning activities, was elevated in two areas. The first was in the southwestern corner of the Burning Grounds (surface soil samples SS-02 and SS-14; Figure 5-1) where the site maximum of 1,730 mg/kg occurred. The second area was in the east-central portion of the Burning Grounds (surface soil samples SS-11, SS-18, and SS-19). Given the limited habitat quality of the Burning Grounds, these relatively small areas of elevated lead concentrations are not likely to result in adverse impacts to populations of ecological receptors.

Except for chromium, most exceedences were of plant TRVs. Manganese and vanadium, each with a relatively high frequency of exceedence for soil fauna TRVs, were consistent with background. Lead, mercury, and zinc exceeded soil fauna TRVs in one, one, and two samples, respectively (mean HQs were all less than one). The site is covered in periodically-mowed grasses and other herbaceous plants, providing habitat of limited diversity and quality. Except for unpaved roads and the areas immediately around some of the active burn pans, areas of bare soil are uncommon and no obvious phytotoxic effects (e.g., large

areas of bare soil, dead or dying plants) were observed. This suggests limited potential for adverse effects to ecological receptors at the Burning Grounds.

Based on the evaluation contained in this section, the risk estimates do not warrant any remedial actions be taken prior to the construction of the new burn pads. The relatively small areas with potentially elevated lead concentrations will be addressed during closure activities for the unit when initiated, as the levels are not likely to be adversely affecting receptor populations at the current time under current land uses.

7.0 Uncertainties

Uncertainties are present in all risk assessments because of the limitations of the available data and the need to make certain assumptions and extrapolations based on incomplete information. The uncertainty in this ERA is mainly attributable to the following factors:

- **Selection of Emission Factors** - Only limited data are available for estimating emissions for chemicals emitted during the open burning of specific waste types at facilities such as the ABL Burning Grounds. Emission factors define the quantities of pollutants released per unit mass of material burned. While the best available and most applicable data from the literature were used to estimate facility-specific emissions, use of these emission factors at the ABL facility introduces some uncertainty. For conservatism, chemical-specific emission factors were estimated for each of the five major waste types treated at the facility and the highest of the five values was selected. These selected values were then applied to the entire total waste volume treated at the facility (on an annual basis), regardless of waste type. Thus, the chemical-specific emission estimates used in the ERA were very conservative because they assumed the highest possible emissions per quantity of waste treated.

- **Selection of Chemicals for Evaluation** - The chemicals selected for evaluation in the continued operations exposure scenario were based on the best available information from the literature for the types of waste treated at the ABL Burning Grounds and the method of treatment (open burning). While all of the major chemical classes expected to be emitted from the facility were represented by one or more of the chemicals evaluated in the ERA, there is some uncertainty that the list of chemicals evaluated included all potentially relevant chemicals. In particular, nickel was a potentially relevant chemical but it lacked emission results on which to base an evaluation (see Section 4.1.2.1).

  For the current conditions exposure scenario, all of the chemicals detected in surface soil samples collected from the Burning Grounds were evaluated. This approach assumed that the detection limits for undetected chemicals were adequate.

- **Detection Limits in Surface Soil Samples** - Detection limits were elevated in some surface soil samples for individual dioxin and furan congeners. This resulted in Toxicity Equivalency Factor-weighted surface soil concentrations for total dioxin/furans (based on one-half the detection limit for undetected congeners) to be biased high.

- **Dispersion Modeling** - While the most applicable dispersion model (OBOD-M) and best available input data were used in the dispersion modeling, the resulting outputs of relevance to the ERA (e.g., chemical concentrations in air, dispersion factors used in deposition modeling, and the identification of the points of maximum impact) must be

considered best estimates. OBOD-M calculates the downwind transport and dispersion of the pollutants using cloud rise and dispersion model algorithms. Appendix D to the application (Air Modeling Report) provides details on the specific uncertainties associated with the dispersion modeling.

- **Deposition Modeling** - For the continued operations exposure scenario, exposure point concentrations in surface soil, surface water, and sediment were estimated using models and parameter values from the literature (primarily USEPA [1999a, 1998b]). Although site-specific input parameter values were used in these models when available, the use of default values for many parameters introduces some uncertainty into the deposition estimates. Because most default values are selected to be conservative estimates, this tends to result in overestimating exposure concentrations and thus risks. One example is the default soil mixing depth of 1-cm for untilled soils. Although deposition will occur only on the soil surface, natural mechanisms (such as the activity of plant roots and soil fauna) will result in mixing to much deeper depths that 1-cm over the period of time evaluated by the model (30 years).

  For simplicity, the deposition model applied individual point estimates (e.g., the point of maximum deposition outside of the facility fence line) to much larger areas (such as entire watersheds for surface water bodies). This results in overestimating deposition to surface water bodies from surface runoff (as does the use of a 1-cm soil mixing depth).

- **Food Web Exposure Modeling** - Chemical concentrations in terrestrial and aquatic food items (plants, soil invertebrates, small mammals, benthic invertebrates, and fish) were modeled from measured (current conditions) or modeled (continued operations) media concentrations and were not directly measured. The use of generic, literature-derived exposure models and bioaccumulation factors introduces some uncertainty into the resulting estimates. The values selected and methodology employed were intended to provide a conservative (screening) or reasonable (baseline) estimate of potential food web exposure concentrations.

  Another source of uncertainty is the use of default assumptions for exposure parameters such as bioconcentration and bioaccumulation factors (BCFs/BAFs). Although BCFs or BAFs for many bioaccumulative chemicals were readily available from the literature and were used in the ERA, the use of a default factor of 1.0 to estimate the concentration of some chemicals in receptor prey items is a source of uncertainty.

  Area use factors were assumed to equal one. This is a conservative assumption because a significant percentage of each upper trophic level receptor species time could be spent foraging in unimpacted areas or areas where chemical concentrations are expected to be significantly lower.

- **Exposure Assumptions** - The use of default exposure assumptions such as chemicals being 100 percent bioavailable and 100 percent absorbed from food overestimates potential exposures.

- **Chemicals Without Medium-Specific TRVs** - A number of chemicals lacked medium-specific TRVs, particularly for air and to a lesser extent soil. This introduces some uncertainty to the assessment because these chemicals could not be quantitatively evaluated for all potentially significant exposure pathways.

- **Sediment Screening Values** - Many of the sediment TRVs used in the ERA do not consider site-specific bioavailability to ecological receptors and are typically based on correlational studies (termed the Screening Level Concentration approach). These factors tend to make the resulting values very conservative and likely overestimate potential risk.

- **Ingestion Screening Values** - Data on the toxicity of many chemicals to the receptor species were sparse or lacking, requiring the extrapolation of data from other wildlife species or from laboratory studies with non-wildlife species. This is a typical limitation and extrapolation for ecological risk assessments because so few wildlife species have been tested directly for most chemicals. The uncertainties associated with toxicity extrapolation were minimized through the selection of the most appropriate test species for which suitable toxicity data were available. The factors considered in selecting a test species to represent a receptor species included taxonomic relatedness, trophic level, foraging method, and similarity of diet.

  A second source of uncertainty relates to the derivation of ingestion screening values for metals. Most of the toxicological studies on which the ingestion screening values for metals were based used forms of the metal (such as salts) that have high water solubility and high bioavailability to receptors. Because the analytical samples on which site-specific exposure estimates were based measured total metal, regardless of form, and these highly bioavailable forms are expected to compose only a fraction of the total metal concentration, this is likely to result in an overestimation of potential risks for these chemicals.

  A third source of uncertainty associated with the derivation of ingestion screening values concerns the use of uncertainty factors. For example, NOAELs were extrapolated to LOAELs using an uncertainty factor of ten. This approach is likely to be conservative because Dourson and Stara (1983) determined that 96 percent of the chemicals included in a data review had LOAEL to NOAEL ratios of five or less. The use of an uncertainty factor of 10, although potentially conservative, also serves to counter some of the uncertainty associated with interspecies extrapolations, for which a specific uncertainty factor was not used.

- **Chemical Mixtures** - Information on the ecotoxicological effects of chemical interactions is lacking for most chemicals, which generally required (as is standard for ecological risk assessments) that the chemicals be evaluated on a compound-by-compound basis during the comparison to TRVs. This approach could result in an underestimation of risk (if there are additive or synergistic effects among chemicals) or an overestimation of risks (if there are antagonistic effects among chemicals). Although the use of HIs is one possible way to account for potential additive effects, it does not account for antagonistic effects. Similarly, HIs are only appropriate for chemicals with the same mode of action. With the exception of PAHs and dioxin/furans, there are no obvious chemical groupings with similar modes of action among those evaluated. HIs were not calculated for total PAHs because the individual risk estimates for individual PAHs were so low that calculating a HI was not necessary. Individual dioxin and furan congeners were evaluated as a group using the toxicity equivalency approach due to the general lack of toxicological data for most congeners other than 2,3,7,8-TCDD. Some information is available on interactions among the key metal COPCs (aluminum,

copper, and lead). Aluminum is not known to interact significantly with either copper or lead (ATSDR, 1999a). Interactions between copper and lead appear to be largely antagonistic (ATSDR, 1999d). Thus, calculation of a HI for metals does not appear to be justified.

- **Receptor Species Selection** - Reptiles and amphibians were selected as receptors in the ERA but were not evaluated quantitatively. Reptiles and amphibians were evaluated using other fauna as surrogates due to the general lack of taxon-specific toxicological data. This represents an uncertainty in the risk assessment.

  It was also assumed that any reptiles and amphibians present in the assessment area were not exposed to significantly higher concentrations of COPCs and were not more sensitive to COPCs than other receptor species evaluated in the ERA. This assumption was a source of uncertainty. In addition, there is some uncertainty associated with the use of specific receptor species to represent larger groups of organisms (e.g., guilds).

8.0 Conclusions

The conclusions of the ERA are outlined, by exposure scenario, in this section.

8.1 Continued Operations

There were no exceedences of inhalation-based TRVs from exposure to facility-related chemicals in ground-level air. Low-magnitude exceedences of soil TRVs and background concentrations occurred for copper and lead but only under the most conservative exposure assumptions (e.g., 1-cm soil mixing depth, maximum point of deposition, screening inputs). Risk estimates based on more realistic exposures indicated low to negligible risks.

The evaluation of the reach of the North Branch Potomac River indicated negligible risks to wetland and aquatic receptors, even using the most conservative exposure assumptions. For the pond and wetland, there were low-magnitude exceedences of surface water TRVs for aluminum (pond - HQ of 1.22) and lead (pond - HQ of 3.37; wetland - HQ of 2.48) based on a very conservative soil mixing depth of 1-cm. Risk estimates based on more realistic soil mixing depths indicated low to negligible risks. Risks to upper trophic level receptors at both the pond and wetland were negligible.

Based on the evaluation contained in this ERA, risks to ecological receptors inhabiting the habitats surrounding the Burning Grounds are expected to be negligible from the continued operation of the Burning Grounds using the new pan pad configuration.

8.2 Current Conditions

Baseline risk estimates using site-wide averages indicate low to negligible risks to upper trophic level receptors. Other than dioxins/furans, only arsenic had a NOAEL-based HQ exceeding one (1.68; Table 6-8), although surface soil concentrations for arsenic were consistent with background concentrations (Table 6-6). Exceedences for dioxins/furans were heavily influenced by non-detected congeners (representing the more toxic congeners) in a few samples and estimates based solely on detected congeners (representing the least toxic congeners) indicate negligible risk.

Widespread, high-magnitude exceedences of both surface soil TRVs and background concentrations were not apparent based on the existing surface soil data. Except for lead, background exceedences were generally infrequent and of relatively low magnitude. Lead, which is believed attributable at least in part to deposition from burning activities, was elevated in two areas. The first was in the southwestern corner of the Burning Grounds (surface soil samples SS-02 and SS-14; Figure 5-1) where the site maximum of 1,730 mg/kg occurred. The second area was in the east-central portion of the Burning Grounds (surface soil samples SS-11, SS-18, and SS-19). Given the limited habitat quality of the Burning Grounds, these relatively small areas of elevated lead concentrations are not likely to result in adverse impacts to populations of ecological receptors.

Except for chromium, most exceedences were of plant TRVs. Manganese and vanadium, each with a relatively high frequency of exceedence for soil fauna TRVs, were consistent with background. Lead, mercury, and zinc exceeded soil fauna TRVs in one, one, and two samples, respectively (mean HQs were all less than one). The site is covered in periodically-mowed grasses and other herbaceous plants, providing habitat of limited diversity and quality. Except for unpaved roads and the areas immediately around some of the active burn pans, areas of bare soil are uncommon and no obvious phytotoxic effects (e.g., large areas of bare soil, dead or dying plants) were observed. This suggests limited potential for adverse effects to ecological receptors at the Burning Grounds.

Based on the evaluation contained in this ERA, the risk estimates do not warrant any remedial actions be taken prior to the construction of the new burn pads. The relatively small areas with potentially elevated lead concentrations will be addressed during the closure activities for the unit, when initiated, since they are not likely to be adversely affecting receptor populations at the current time under current land uses.

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Tables

Table 3-1 Plant Species Within the Burning Grounds *Allegany Ballistics Laboratory, Mineral County, WV*	
Common Name	**Scientific Name**
Crown vetch	*Coronilla varia*
Deptford pink	*Dianthus armeria*
English plantain	*Plantago lanceolata*
Fescue	*Festuca spp.*
Field garlic	*Allium vineale*
Henbit	*Lamium amplexicaule*
Horse nettle	*Solanum carolinense*
Least hop clover	*Trifolium dubium*
Orchard grass	*Dactylis glomerata*
Ox-eye daisy	*Chrysanthemum leucanthemum*
Red top	*Agrostis alba*
Timothy	*Phleum pratense*
Yarrow	*Achillea millefolium*

Table 3-2
Plant Species In Areas Adjacent to the Burning Grounds
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	Wetland Status[a]	South	North	West
Herbaceous Plants					
Broad-leaf cattail	*Typha latifolia*	OBL			X
Catnip	*Nepeta cataria*	FACU	X		
Cinnamon fern	*Osmunda cinnamomea*	FACW		X	
Common bog nettle	*Stachys tenuifolia*	FACW+		X	
Common mullein	*Verbascum thapsus*	UPL	X		
Crown vetch	*Coronilla varia*	UPL			X
Deertongue grass	*Dichanthelium clandestinum*	FAC+	X		
Downy chess	*Bromus tectorum*	UPL	X		
Dwarf St. John's Wort	*Hypericum mutilum*	FACW		X	
English plantain	*Plantago lanceolata*	UPL	X		X
Eulalia	*Microstegium vimineum*	FAC		X	X
False nettle	*Boehmeria cylindrica*	FACW+		X	
Field garlic	*Allium vineale*	FACU-	X		X
Goldenrod	*Solidago spp.*	---	X		X
Horse balm	*Collinsonia canadensis*	FAC+		X	
Japanese knotweed	*Polygonum cuspidaum*	FACU-		X	
Orchard grass	*Dactylis glomerata*	FACU	X		X
Oxeye	*Heliopsis helianthoides*	UPL	X		
Purple milkweed	*Asclepias purpurascens*	FACU	X		
Quackgrass	*Agropyron repens*	FACU-			X
Red fescue	*Festuca rubra*	FACU	X		X
Rough-stemmed goldenrod	*Solidago rugosa*	FAC		X	
White campion	*Lychnis alba*	UPL	X		
White snakeroot	*Eupatorium rugosum*	FACU-		X	
Yarrow	*Achillea millefolium*	FACU			X
Woody Plants					
Ailanthus	*Ailanthus altissima*	FACU		X	
American sycamore	*Platanus accidentalis*	FACW-		X	X
Black cherry	*Prunus serotina*	FACU		X	

Table 3-2
Plant Species In Areas Adjacent to the Burning Grounds
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	Wetland Status[a]	South	North	West
Black locust	*Robinia pseudoacacia*	FACU-		X	X
Boxelder	*Acer negundo*	FAC+		X	
Eastern cottonwood	*Populus deltoides*	FAC		X	
Green ash	*Fraxinus pennsylvanica*	FACW		X	
Red raspberry	*Rubus allegheniensis*	FACU-	X		
Silver maple	*Acer saccharinum*	FACW		X	X
Spicebush	*Lindera benzoin*	FACW-		X	

[a]OBL - Obligate wetland (>99% probability of occurring in wetlands); FACW - Facultative Wetland (67-99%); FAC - Facultative (34-66%); FACU - Facultative Upland (1-33%); UPL - Obligate Upland (<1%); Minus sign - tends to lower end of range; Plus sign - tends to higher end of range (Reed 1988).

Table 3-3
Wildlife Species Observed at the Burning Grounds and Surrounding Areas
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name
Birds	
American crow	*Corvus brachyrhynchos*
American goldfinch	*Carduelis tristis*
American kestrel	*Falco sparverius*
American robin	*Turdus migratorius*
Barn swallow	*Hirundo rustica*
Belted kingfisher	*Ceryle alcyon*
Black-capped chickadee	*Poecile atricapillus*
Black-crowned night-heron	*Nycticorax nycticorax*
Brown-headed cowbird	*Molothrus ater*
Chipping sparrow	*Spizella passerina*
Common grackle	*Quiscalus quiscula*
Eastern kingbird	*Tyrannus tyrannus*
Eastern meadowlark	*Sturnella magna*
Eastern phoebe	*Sayornis phoebe*
Eastern towhee	*Pipilo erythrophthalmus*
European starling	*Sturnus vulgaris*
Field sparrow	*Spizella pusilla*
Great blue heron	*Ardea herodias*
House sparrow	*Passer domesticus*
Indigo bunting	*Passerina cyanea*
Killdeer	*Charadrius vociferus*
Mallard	*Anas platyrhynchos*
Mourning dove	*Zenaida macroura*
Northern cardinal	*Cardinalis cardinalis*
Northern flicker	*Colaptes auratus*
Northern mockingbird	*Mimus polyglottos*
Pileated woodpecker	*Dryocopus pileatus*
Red-bellied woodpecker	*Melanerpes carolinus*
Red-tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Rock dove	*Columba livia*
Song sparrow	*Melospiza melodia*
Tree swallow	*Tachycineta bicolor*
Tufted titmouse	*Parus bicolor*
Turkey vulture	*Cathartes aura*
White-throated sparrow	*Zonotrichia albicollis*
Wild turkey	*Meleagris gallopavo*
Wood duck	*Aix sponsa*
Wood thrush	*Hylocichla mustelina*
Yellow warbler	*Dendroica petechia*
Mammals	
Eastern chipmunk	*Tamias striatus*
Eastern cottontail	*Sylvilagus floridanus*
Eastern fox squirrel	*Sciurus niger*

Table 3-3 Wildlife Species Observed at the Burning Grounds and Surrounding Areas *Allegany Ballistics Laboratory, Mineral County, WV*	
Common Name	**Scientific Name**
Eastern harvest mouse	*Reithrodontomys humulis*
Gray squirrel	*Sciurus carolinensis*
Meadow vole	*Microtus pennsylvanicus*
Raccoon	*Procyon lotor*
White-tailed deer	*Odocoileus virginianus*
Woodchuck	*Marmota monax*
Reptiles/Amphibians	
Black rat snake	*Elaphe o. obsoleta*
Bullfrog	*Rana catesbeiana*
Corn snake	*Elaphe g. guttata*

Table 3-4
Breeding Bird Atlas Data From the Site Vicinity
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	Breeding Status[a]
Great blue heron	*Ardea herodias*	Ob
Green heron	*Butorides virescens*	Pr
Wood duck	*Aix sponsa*	C
American black duck	*Anas rubripes*	C
Mallard	*Anas platyrhynchos*	C
Turkey vulture	*Cathartes aura*	Pr
Cooper's hawk	*Accipiter cooperii*	C
Red-shouldered hawk	*Buteo lineatus*	C
Broad-winged hawk	*Buteo platypterus*	C
Red-tailed hawk	*Buteo jamaicensus*	Pr
American kestrel	*Falco sparverius*	C
Wild turkey	*Meleagris gallopavo*	C
Northern bobwhite	*Colinus virginianus*	Pr
Virginia rail	*Rallus limicola*	C
Sora	*Porzana carolina*	C
Killdeer	*Charadrius vociferus*	C
Spotted sandpiper	*Actitis macularia*	Po
American woodcock	*Scolopax minor*	Po
Rock dove	*Columba livia*	C
Mourning dove	*Zenaida macroura*	C
Yellow-billed cuckoo	*Coccyzus americanus*	Pr
Barn owl	*Tyto alba*	C
Eastern screech-owl	*Otus asio*	C
Great horned owl	*Bubo virginianus*	Po
Barred owl	*Strix varia*	Po
Common nighthawk	*Chordeiles minor*	Po
Whip-poor-will	*Caprimulgus vociferus*	Pr
Chimney swift	*Chaetura pelagica*	Pr
Ruby-throated hummingbird	*Archilochus colubris*	Pr
Belted kingfisher	*Ceryle alcyon*	Pr
Red-bellied woodpecker	*Melanerpes carolinus*	C
Downy woodpecker	*Picoides pubescens*	C
Hairy woodpecker	*Picoides villosus*	Po
Northern flicker	*Colaptes auratus*	C
Pileated woodpecker	*Dryocopus pileatus*	Pr
Eastern wood-pewee	*Contopus virens*	Pr
Acadian flycatcher	*Empidonax virescens*	Pr
Willow flycatcher	*Empidonax traillii*	Pr
Eastern phoebe	*Sayornis phoebe*	C
Great crested flycatcher	*Myiarchus crinitus*	Pr
Eastern kingbird	*Tyrannus tyrannus*	C
Tree swallow	*Tachycineta bicolor*	C
Northern rough-winged swallow	*Stelgidopteryx serripennis*	Pr
Barn swallow	*Hirundo rustica*	C

Table 3-4
Breeding Bird Atlas Data From the Site Vicinity
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	Breeding Status[a]
Blue jay	*Cyanocitta cristata*	C
American crow	*Corvus brachyrhynchos*	C
Fish crow	*Corvus ossifragus*	Pr
Common raven	*Corvus corax*	C
Black-capped chickadee	*Parus atricapillus*	Pr
Tufted titmouse	*Parus bicolor*	C
White-breasted nuthatch	*Sitta carolinensis*	C
Carolina wren	*Thryothorus ludovicianus*	C
House wren	*Troglodytes aedon*	Pr
Blue-gray gnatcatcher	*Polioptila caerulea*	C
Eastern bluebird	*Sialia sialis*	C
Wood thrush	*Hylocichla mustelina*	Pr
American robin	*Turdus migratorius*	C
Gray catbird	*Dumetella carolinensis*	Pr
Northern mockingbird	*Mimus polyglottos*	Pr
Brown thrasher	*Toxostoma rufum*	C
Cedar waxwing	*Bombycilla cedrorum*	C
European starling	*Sturnus vulgaris*	C
White-eyed vireo	*Vireo griseus*	C
Solitary vireo	*Vireo solitarius*	Po
Yellow-throated vireo	*Vireo flavifrons*	Pr
Warbling vireo	*Vireo gilvus*	Pr
Red-eyed vireo	*Vireo olivaceus*	Pr
Blue-winged warbler	*Vermivora pinus*	Po
Golden-winged warbler	*Vermivora chrysoptera*	Pr
Nashville warbler	*Vermivora ruficapilla*	Po
Northern parula	*Parula americana*	Pr
Yellow warbler	*Dendroica petechia*	Pr
Prairie warbler	*Dendroica discolor*	Pr
Cerulean warbler	*Dendroica cerulea*	Pr
American redstart	*Setophaga ruticilla*	Pr
Worm-eating warbler	*Helmitheros vermivorus*	Pr
Ovenbird	*Seiurus aurocapillus*	Pr
Louisiana waterthrush	*Seiurus motacilla*	C
Kentucky warbler	*Oporornis formosus*	Pr
Common yellowthroat	*Geothlypis trichas*	C
Yellow-breasted chat	*Icteria virens*	C
Scarlet tanager	*Piranga olivacea*	C
Northern cardinal	*Cardinalis cardinalis*	C
Rose-breasted grosbeak	*Pheucticus ludovicianus*	Po
Blue grosbeak	*Guiraca caerulea*	C
Indigo bunting	*Passerina cyanea*	C
Eastern towhee	*Pipilo erythrophthalmus*	Pr
Chipping sparrow	*Spizella passerina*	C

Table 3-4
Breeding Bird Atlas Data From the Site Vicinity
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	Breeding Status[a]
Field sparrow	*Spizella pusilla*	Pr
Vesper sparrow	*Pooecetes gramineus*	Pr
Savannah sparrow	*Passerculus sandwichensis*	C
Grasshopper sparrow	*Ammodramus savannarum*	Pr
Henslow's sparrow	*Ammodramus henslowii*	Po
Song sparrow	*Melospiza melodia*	C
Swamp sparrow	*Melospiza georgiana*	C
Red-winged blackbird	*Agelaius phoeniceus*	C
Eastern meadowlark	*Sturnella magna*	Pr
Common grackle	*Quiscalus quiscula*	C
Brown-headed cowbird	*Molothrus ater*	C
Orchard oriole	*Icterus spurius*	Pr
Northern oriole	*Icterus galbula*	C
House finch	*Carpodacus mexicanus*	C
American goldfinch	*Carduelis tristis*	C
House sparrow	*Passer domesticus*	C

[a]C - Confirmed breeding; Pr - Probable breeding; Po - Possible breeding; Ob - Observed
Source: Buckelew and Hall (1994); Robbins and Blom (1996).

Table 3-5
Christmas Bird Count Data (1995-2000), Allegany County, MD/WV Census Plot
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	Average
European starling	*Sturnus vulgaris*	1,416	668	1,337	543	907	974.2
Rock dove	*Columba livia*	1,017	823	1,584	444	975	968.6
American crow	*Corvus brachyrhynchos*	885	343	405	239	380	450.4
Dark-eyed junco	*Junco hyemalis*	351	531	505	497	242	425.2
Canada goose	*Branta canadensis*	475	165	815	410	243	421.6
Mallard	*Anas platyrhynchos*	532	278	726	197	185	383.6
Northern cardinal	*Cardinalis cardinalis*	190	165	193	165	205	183.6
Mourning dove	*Zenaida macroura*	168	92	146	255	172	166.6
House sparrow	*Passer domesticus*	138	156	211	110	106	144.2
Black-capped chickadee	*Parus atricapillus*	124	75	170	177	147	138.6
Tufted titmouse	*Parus bicolor*	118	122	141	148	102	126.2
American goldfinch	*Carduelis tristis*	103	57	92	163	205	124.0
Blue jay	*Cyanocitta cristata*	210	110	56	111	80	113.4
House finch	*Carpodacus mexicanus*	140	40	47	118	198	108.6
White-throated sparrow	*Zonotrichia albicollis*	106	86	90	103	92	95.4
Song sparrow	*Melospiza melodia*	51	58	67	131	73	76.0
Eastern bluebird	*Sialia sialis*	92	38	48	66	106	70.0
Downy woodpecker	*Picoides pubescens*	66	54	82	60	71	66.6
White-breasted nuthatch	*Sitta carolinensis*	59	36	74	46	75	58.0
Carolina wren	*Thryothorus ludovicianus*	37	32	69	82	68	57.6
American tree sparrow	*Spizella arborea*	27	43	74	68	42	50.8
Northern mockingbird	*Mimus polyglottos*	79	40	34	31	51	47.0
Cedar waxwing	*Bombycilla cedrorum*	35	36	2	122	11	41.2
Red-bellied woodpecker	*Melanerpes carolinus*	27	29	35	41	45	35.4
Northern flicker	*Colaptes auratus*	59	18	23	42	26	33.6
Yellow-rumped warbler	*Dendroica coronata*	97	1	9	43	14	32.8
Wild turkey	*Meleagris gallopavo*	1	80	18	25	36	32.0
Pileated woodpecker	*Dryocopus pileatus*	23	16	22	31	26	23.6
Golden-crowned kinglet	*Regulus satrapa*	17	33	9	33	7	19.8
Red-winged blackbird	*Agelaius phoeniceus*	5	0	18	35	35	18.6
White-crowned sparrow	*Zonoteichia leucophrys*	20	9	19	10	25	16.6
Red-tailed hawk	*Buteo jamaicensis*	23	15	17	4	23	16.4
American robin	*Turdus migratorius*	1	0	2	70	4	15.4
Ruddy duck	*Oxyura jamaicensis*	5	0	10	3	52	14.0

Table 3-5
Christmas Bird Count Data (1995-2000), Allegany County, MD/WV Census Plot
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	Average
Hairy woodpecker	*Picoides villosus*	7	7	23	22	7	13.2
Winter wren	*Troglodytes troglodytes*	10	6	11	13	18	11.6
Killdeer	*Charadrius vociferus*	10	2	14	9	21	11.2
Hooded merganser	*Lophodytes cucullatus*	0	16	11	5	19	10.2
Brown creeper	*Certhia americana*	7	8	13	13	8	9.8
Brown-headed cowbird	*Molothrus ater*	41	0	0	4	0	9.0
Purple finch	*Carpodacus purpureus*	1	1	6	18	12	7.6
Field sparrow	*Spizella pusilla*	12	8	6	6	4	7.2
American coot	*Fulica americana*	0	0	8	7	20	7.0
Ruby-crowned kinglet	*Regulus calendula*	9	2	10	7	5	6.6
Black vulture	*Coragyps atratus*	3	0	3	0	24	6.0
Hermit thrush	*Catharus guttatus*	3	6	1	16	4	6.0
Pine siskin	*Carduelis pinus*	0	0	0	0	30	6.0
Common raven	*Corvus corax*	2	1	5	12	9	5.8
Great blue heron	*Ardea herodias*	7	2	9	3	7	5.6
American black duck	*Anas rubripes*	10	1	12	1	3	5.4
Belted kingfisher	*Ceryle alcyon*	8	3	2	9	5	5.4
Yellow-bellied sapsucker	*Sphyrapicus varius*	3	3	7	8	5	5.2
Chipping sparrow	*Spizella passerina*	0	5	2	5	5	3.4
Swamp sparrow	*Melospiza georgiana*	4	1	3	5	4	3.4
Red-shouldered hawk	*Buteo lineatus*	3	0	6	2	4	3.0
Pied-billed grebe	*Podilymbus podiceps*	4	1	0	4	5	2.8
Ruffed grouse	*Bonasa umbellus*	2	0	2	1	8	2.6
Common grackle	*Quiscalus quiscula*	10	0	2	0	0	2.4
Cooper's hawk	*Accipiter cooperii*	3	3	1	2	3	2.4
Eastern phoebe	*Sayornis phoebe*	6	1	1	2	2	2.4
Sharp-shinned hawk	*Accipiter striatus*	2	4	2	2	2	2.4
Common goldeneye	*Bucephala clangula*	1	1	0	0	8	2.0
American green-winged teal	*Anas crecca*	2	0	0	3	4	1.8
Eastern towhee	*Pipilo erythrophthalmus*	3	0	1	3	2	1.8
Bufflehead	*Bucephala albeola*	1	0	0	0	7	1.6
Eastern screech-owl	*Otus asio*	1	1	1	2	2	1.4
Red-breasted nuthatch	*Sitta canadensis*	6	0	1	0	0	1.4
Evening grosbeak	*Hesperiphona vespertina*	6	0	0	0	0	1.2

Table 3-5
Christmas Bird Count Data (1995-2000), Allegany County, MD/WV Census Plot
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	Average
Ring-billed gull	*Larus delawarensis*	1	1	1	3	0	1.2
Thrush spp.	*Catharus spp*	0	0	1	5	0	1.2
Horned grebe	*Podiceps auritus*	0	0	0	5	0	1.0
Loggerhead shrike	*Lanius ludovicianus*	2	1	1	1	0	1.0
Wood duck	*Aix sponsa*	3	1	0	1	0	1.0
American kestrel	*Falco sparverius*	7	7	8	5	8	7.0
House wren	*Troglodytes aedon*	2	0	0	2	0	0.8
Tundra swan	*Cygnus columbianus*	0	0	1	1	2	0.8
Bonaparte's gull	*Larus philadelphia*	1	0	0	0	2	0.6
Common redpoll	*Carduelis flammea*	2	0	0	0	0	0.4
Great horned owl	*Bubo virginianus*	0	1	0	0	1	0.4
Northern harrier	*Circus cyaneus*	0	2	0	0	0	0.4
Rusty blackbird	*Euphagus carolinus*	0	0	0	2	0	0.4
Turkey vulture	*Cathartes aura*	0	0	0	0	3	0.6
Common merganser	*Mergus merganser*	0	1	0	0	0	0.2
Eastern meadowlark	*Sturnella magna*	0	0	1	0	0	0.2
Gray catbird	*Dumetella carolinensis*	0	0	0	1	0	0.2
Lesser scaup	*Aythya affinis*	0	0	0	1	0	0.2
Merlin	*Falco columbarius*	0	0	1	0	0	0.2
Palm warbler	*Dendroica palmarum*	1	0	0	0	0	0.2
Rough-legged hawk	*Buteo lagopus*	1	0	0	0	0	0.2
Total Species		73	60	67	71	69	68
Total Individuals		6,904	4,346	7,327	4,834	5,302	5,743

Table 3-6
Amphibian and Reptile Species Known to Occur in Mineral County, West Virginia
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name
Amphibians	
Appalachian seal salamander	*Desmognathus m. monticola*
Bullfrog	*Rana catesbeiana*
Eastern American toad	*Bufo a. americanus*
Eastern newt	*Notophthalmus v. viridescens*
Four-toed salamander	*Hemidactylium scutatum*
Fowler's toad	*Bufo woodhousei fowleri*
Gray treefrog	*Hyla chrysoscelis*
Green frog	*Rana clamitans melanota*
Jefferson salamander	*Ambystoma jeffersonianum*
Longtail salamander	*Eurycea l. longicauda*
Mountain dusky salamander	*Desmognathus ochrophaeus*
Northern cricket frog	*Acris c. crepitans*
Northern dusky salamander	*Desmognathus f. fuscus*
Northern red salamander	*Pseudotriton r. ruber*
Northern spring peeper	*Pseudacris c. crucifer*
Northern spring salamander	*Gyrinophilus p. porphyriticus*
N. two-lined salamander	*Eurycea b. bislineata*
Pickerel frog	*Rana palustris*
Redback salamander	*Plethodon cinereus*
Slimy salamander	*Plethodon g. glutinosus*
Spotted salamander	*Ambystoma maculatum*
Upland chorus frog	*Pseudacris triseriata feriarum*
Valley and ridge salamander	*Plethodon hoffmani*
Wood frog	*Rana sylvatica*
Reptiles	
Black rat snake	*Elaphe o. obsoleta*
Common musk turtle	*Sternotherus odoratus*
Common snapping turtle	*Chelydra s. serpentina*
Eastern box turtle	*Terrapene c. carolina*
Eastern earth snake	*Virginia v. valeriae*
Eastern garter snake	*Thamnophis s. sirtalis*
Eastern hognose snake	*Heterodon platirhinos*
Eastern milk snake	*Lampropeltis t. triangulum*
Eastern painted turtle	*Chrysemys p. picta*
Eastern smooth green snake	*Opheodrys v. vernalis*
Eastern worm snake	*Carphophis a. amoenus*
Five-lined skink	*Eumeces fasciatus*
Northern black racer	*Coluber c. constrictor*
Northern brown snake	*Storeria d. dekayi*
Northern copperhead	*Agkistrodon contortrix mokasen*
Northern fence lizard	*Sceloporus undulatus hyacinthinus*
Northern redbelly snake	*Storeria o. occipitomaculata*
Northern ringneck snake	*Diadophis punctatus edwardsii*
Northern water snake	*Nerodia s. sipedon*

Table 3-6 Amphibian and Reptile Species Known to Occur in Mineral County, West Virginia *Allegany Ballistics Laboratory, Mineral County, WV*	
Common Name	**Scientific Name**
Timber rattlesnake	*Crotalus horridus*
Wood turtle	*Clemmys insculpta*
Source: Green and Pauley (1987).	

Table 3-7

Fish Catch Per Unit Effort (Individuals/Hr) at Station 5 (Upstream), Station 6 (Pinto) and Station 7 (Downstream) from Site 1 and the Burning Grounds

North Branch Potomac River

Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	1988			1989			1990			1992			1993		
		5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
American eel	*Anguilla rostrata*	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0
Chain pickerel	*Esox niger*	0	0	1.5	0	0	0	0	0	1	0	0	0	0	0	0
Carp	*Cyprinus carpio*	0	0	A	0	30	0	0	0	44	0	0	51	0	23.8	0
Cutlips minnow	*Exoglossum maxillingua*	0	0	0	2	0	0	1	0	0	0	1	0	0	0	0
Golden shiner	*Notomigonous crysoleucas*	2.5	45.9	A	0	44	7	0	44	7	0	3	1	0	16.8	1.4
River chub	*Nocomis micropogon*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Common shiner	*Notropis cornutus*	0	0	A	6	0	0	3	0	1	0	0	2	0	2.2	0
Spotfin shiner	*Notropis spilopterus*	0	0	0	0	0	0	0	0	79	0	0	0	0	0	0
Rosyface shiner	*Notropis rubellus*	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0
Spottail shiner	*Notropis hudsonius*	0	33.5	A	0	0	25	0	0	0	0	0	0	0	0	0
Bluntnose minnow	*Pimephales promelas*	0	0	0	0	30	0	0	10	0	0	48	0	0	35	0
Blacknose dace	*Rhinichthys atratulus*	42	2.5	0	244	0	0	47	1	0	4	41	0	21	22	142
Longnose dace	*Rinichthys cataractae*	14	0	0	10	0	0	1	0	0	20	6	0	6	17	0
Creek chub	*Semotilus atromaculatus*	56	19.9	0	80	40	0	31	15	0	54	43	0	30	44	0
Fallfish	*Semotilus corporalis*	0	0	16.3	0	0	9	0	0	10	0	0	26	0	0	2.8
White sucker	*Catostomus commersoni*	84	176.3	1.5	58	97	106	47	165	110	70	95	3	165	121	4.2
Creek chubsucker	*Erimyzon oblongus*	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1.4
Northern hogsucker	*Hypentilium nigricans*	0	0	3	0	0	2	0	0	1	0	0	0	0	0	0
Golden redhorse	*Moxostoma erythrum*	0	0	A	0	0	107	0	0	101	0	0	23	0	0	8.4
Yellow bullhead	*Ictalurus natilis*	0.7	0	1.5	0	0	1	0	1	3	0	2	2	0	0	2.8
Brown bullhead	*Ictalurus nebulosus*	0	0	3	0	2	2	0	3	6	0	0	1	0	2	2.8
Channel catfish	*Ictalurus punctatus*	0	0	1.5	0	0	3	0	0	0	0	0	2	0	0	4.2
Rock bass	*Amblopites rupestris*	1.3	0	22.3	4	0	26	3	0	21	0	0	8	0	0	32
Redbreast sunfish	*Lepomis auritus*	0	1.2	47.5	0	0	38	0	0	47	0	2	22	0	0.7	8.4
Green sunfish	*Lepomis cyanellus*	0	0	0	8	0	6	0	2	0	0	0	0	0	0	0
Pumpkinseed	*Lepomis gibbosus*	25.5	34.8	8.9	2	23	15	5	20	19	2	3	7	1.5	82	22
Bluegill	*Lepomis macrochirus*	0	0	31.2	0	0	17	0	1	15	0	0	18	0	1.3	20
Smallmouth bass	*Micropterus dolomieui*	0	0	23.7	0	0	19	0	0	5	0	0	10	0	0.7	5.6
Largemouth bass	*Micropterus salmoides*	0	0	19.3	0	0	16	0	0	3	0	0	10	4.5	21	7

Table 3-7

Fish Catch Per Unit Effort (Individuals/Hr) at Station 5 (Upstream), Station 6 (Pinto) and Station 7 (Downstream) from Site 1 and the Burning Grounds
North Branch Potomac River
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	1988			1989			1990			1992			1993		
		5	6	7	5	6	7	5	6	7	5	6	7	5	6	7
Yellow perch	*Perca flavescens*	0	0	1.5	0	0	0	0	0	0	0	0	0	0	0	0
Walleye	*Stizostedion vitreum*	0	0	5.9	0	0	5	0	0	0	0	0	3	0	0	2.8
Greenside darter	*Etheostoma blenniodes*	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0
Tesselated darter	*Etheostoma olmstedi*	0	0	0	0	0	1	0	0	0	0	3	1	0	7.3	0

Note: A = Abundant
Source: CH2M HILL (1995, 1996).

Table 3-8
Results of Benthic Invertebrate Sampling in the North Branch Potomac River - July 1994
Allegany Ballistics Laboratory, Mineral County, WV

Taxa	Station 1 (STN1)			Station 2 (STN2)			Station 3 (STN3)			Station 4 (STN4)		
	A	B	Total	A	B	Total	A	B	Total	A	B	Total
Annelida												
Oligochaeta												
Tubificidae w.o.h.c.	4	2	6	1	0	1	2	5	7	0	0	0
Limnodrilus sp.	0	0	0	1	0	1	0	0	0	0	0	0
Limnodrilus hoffmeisteri	0	0	0	0	2	2	0	1	1	0	0	0
Arthropoda												
Crustacea												
Orconectes sp.	0	0	0	1	0	1	0	2	2	1	7	8
Insecta												
Ephemeroptera												
Stenacron sp.	1	0	1	0	0	0	1	0	1	0	0	0
Odonata												
Gomphidae												
Gomphus sp.	0	0	0	0	0	0	0	0	0	0	1	1
Megaloptera												
Corydalidae												
Nigronia serricornis	0	1	1	0	0	0	0	0	0	0	0	0
Sialidae												
Sialis sp.	0	0	0	0	0	0	0	1	1	0	0	0
Trichloptera												
Hydropsychidae												
Ceratopsyche morosa	0	0	0	0	0	0	0	0	0	0	3	3
Cheumatopsyche sp.	0	0	0	0	0	0	0	0	0	0	5	5
Diptera												
Chironomidae	0	0	0	0	0	0	0	0	0	1	0	1
Conchapelopia sp.	0	0	0	0	0	0	0	0	0	1	0	1
Cricotopus sp.	0	0	0	0	0	0	0	0	0	0	5	5
Procladius sp.	0	0	0	0	0	0	0	1	1	0	0	0

Table 3-8
Results of Benthic Invertebrate Sampling in the North Branch Potomac River - July 1994
Allegany Ballistics Laboratory, Mineral County, WV

Taxa	Station 1 (STN1)			Station 2 (STN2)			Station 3 (STN3)			Station 4 (STN4)		
	A	B	Total	A	B	Total	A	B	Total	A	B	Total
Mollusca												
Gastropoda												
Ferrissia sp.	1	0	1	0	4	4	0	0	0	0	13	13
Total No. of Organisms	6	3	9	3	6	9	3	10	13	3	34	37
Total No. Of Taxa	3	2	4	3	2	5	2	5	6	3	6	8

Note: A, B = two replicates at each station.

Table 3-9
Results of Benthic Invertebrate Sampling (Hester-Dendy) in the North Branch Potomac River - July 1998
Allegany Ballistics Laboratory, Mineral County, WV

Taxa	Station[a]					
	BIOTA 1	BIOTA 2	BIOTA 3	BIOTA 4	BIOTA 5	BIOTA 6
MOLLUSCA	0	0	0	0	0	0
Gastropoda	0	0	0	0	0	0
Basommatophora	0	0	0	0	0	0
Ancylidae	0	0	0	0	0	0
Ferrissia rivularis	3	6	7	13	12	10
ANNELIDA	0	0	0	0	0	0
Oligochaeta	0	0	0	0	0	0
Haplotaxida	0	0	0	0	0	0
Enchytraeidae	0	0	2	0	1	0
Lumbricidae	0	0	0	0	0	0
Naididae	4	1	10	1	1	5
Nais behningi	2	1	0	0	0	2
Nais bretscheri	0	4	0	0	0	0
Nais communis	10	4	6	1	0	1
Slavina appendiculata	0	0	0	2	0	0
Tubificidae w.o.h.c.	1	0	1	0	2	3
Lumbriculida	0	0	0	0	0	0
Lumbriculidae	0	0	0	0	0	0
Lumbriculus sp.	0	0	2	0	0	0
ARTHROPODA	0	0	0	0	0	0
Insecta	0	0	0	0	0	0
Ephemeroptera	0	0	0	0	0	0
Heptageniidae	4	2	5	1	2	0
Stenacron interpunctatum	8	2	1	2	1	0
Stenonema sp.	0	0	1	0	0	0
Megaloptera	0	0	0	0	0	0
Sialidae	0	0	0	0	0	0
Nigronia serricornis	2	0	5	3	15	12
Sialis sp.	0	2	2	2	1	2
Trichoptera	0	0	0	0	0	0
Brachycentridae	0	0	0	0	0	0

Table 3-9
Results of Benthic Invertebrate Sampling (Hester-Dendy) in the North Branch Potomac River - July 1998
Allegany Ballistics Laboratory, Mineral County, WV

Taxa	Station[a]					
	BIOTA 1	BIOTA 2	BIOTA 3	BIOTA 4	BIOTA 5	BIOTA 6
Brachycentrus sp.	0	0	0	0	0	1
Hydropsychidae	11	5	33	1	18	25
Ceratopsyche morosa	10	2	33	4	23	32
Cheumatopsyche sp.	18	7	54	9	30	30
Hydropsyche sp.	0	0	0	0	3	1
Hydropsyche betteni	0	0	0	0	1	0
Psychomyiidae	0	0	0	2	0	0
Lype diversa	2	0	0	0	0	0
Coleoptera	0	0	0	0	0	0
Gyrinidae	0	0	0	0	0	0
Gyrinus sp.	1	0	0	0	0	0
Diptera	0	0	0	0	0	0
Athericidae	0	0	0	0	0	0
Atherix lantha	1	0	1	0	0	0
Chironomidae	13	4	16	8	7	11
Ablabesmyia mallochi	0	6	0	4	0	0
Brillia flavifrons	3	2	1	2	0	0
Chironomus sp.	0	0	0	0	0	1
Cricotopus sp.	43	42	29	8	45	79
Cricotopus bicinctus	0	0	0	0	0	1
Cricotopus tremulus	10	11	3	0	4	7
Diamesa sp.	0	0	0	0	0	1
Labrundinia sp.	0	0	0	0	0	1
Nanocladius sp.	15	3	20	6	11	19
Parakiefferiella sp.	0	0	0	0	0	2
Paratendipes sp.	0	0	1	1	0	0
Phaenopsectra sp.	3	2	5	5	5	1
Polypedilum sp.	0	4	2	0	1	0
Polypedilum fallax	5	7	5	9	4	13
Polypedilum halterale	120	272	94	226	88	107
Rheocricotopus robacki	98	48	77	38	67	66

Table 3-9
Results of Benthic Invertebrate Sampling (Hester-Dendy) in the North Branch Potomac River - July 1998
Allegany Ballistics Laboratory, Mineral County, WV

Taxa	Station[a]					
	BIOTA 1	BIOTA 2	BIOTA 3	BIOTA 4	BIOTA 5	BIOTA 6
Rheotanytarsus sp.	122	31	55	42	102	66
Robackia demeijerei	0	0	1	0	0	0
Tanytarsus sp.	1	0	0	0	0	0
Thienemannimyia gp.	39	42	19	31	42	58
Xylotopus par	0	0	1	0	0	0
Empididae	0	0	1	0	0	0
Hemerodromia sp.	3	1	0	0	5	8
TOTAL NUMBER OF ORGANISMS	**552**	**511**	**493**	**421**	**491**	**565**
TOTAL NUMBER OF TAXA	**27**	**25**	**31**	**24**	**25**	**28**

[a]Total of 3 replicates

Table 3-10
Results of Benthic Invertebrate Sampling (Hester-Dendy) in the North Branch Potomac River - July 2000
Allegany Ballistics Laboratory, Mineral County, WV

Taxa	Station[a]					
	BIOTA 1	BIOTA 2	BIOTA 3	BIOTA 4	BIOTA 5	BIOTA 6
PLATYHELMINTHES	0	0	0	0	0	0
Turbellaria	0	0	0	0	0	0
Tricladida	0	0	0	0	0	0
Planariidae	0	0	0	0	0	0
Dugesia tigrina	10	0	0	0	0	1
MOLLUSCA	0	0	0	0	0	0
Bivalvia	0	0	0	0	0	0
Veneroida	0	0	0	0	0	0
Sphaeriidae	0	0	1	0	0	0
Gastropoda	0	0	0	0	0	0
Basommatophora	0	0	0	0	0	0
Ancylidae	0	0	0	0	0	0
Ferrissia rivularis	51	19	56	90	11	2
Planorbidae	0	0	0	0	0	0
Menetus dilatatus	5	1	0	0	0	0
Physidae	0	0	0	0	0	0
Physella sp.	0	2	1	0	0	3
ANNELIDA	0	0	0	0	0	0
Oligochaeta	0	0	0	0	0	0
Haplotaxida	0	0	0	0	0	0
Lumbricidae	0	0	0	0	0	0
Naididae	5	174	112	24	33	2
Nais sp.	3	1	18	0	0	0
Nais communis	3	0	0	0	0	2
Pristina sp.	0	0	0	38	0	0
Pristina leidyi	58	265	643	155	239	4
Slavina appendiculata	2	2	3	1	43	13
Stylaria lacustris	1	1	0	0	0	2
Tubificidae w.o.h.c.	0	0	0	1	0	0
Hirudinea	0	0	6	0	0	0

Table 3-10
Results of Benthic Invertebrate Sampling (Hester-Dendy) in the North Branch Potomac River - July 2000
Allegany Ballistics Laboratory, Mineral County, WV

Taxa	Station[a]					
	BIOTA 1	BIOTA 2	BIOTA 3	BIOTA 4	BIOTA 5	BIOTA 6
ARTHROPODA	0	0	0	0	0	0
Insecta	0	0	0	0	0	0
Collembola	0	0	0	0	0	0
Isotomidae	0	0	0	0	1	1
Ephemeroptera	0	0	0	0	0	0
Baetidae	0	0	1	0	0	0
Baetis intercalaris	0	0	1	0	0	0
Heptageniidae	4	0	2	0	0	1
Stenacron interpunctatum	152	2	17	18	3	35
Leptophlebiidae	0	0	0	0	0	0
Paraleptophlebia sp.	0	0	2	0	0	0
Odonata	0	0	0	0	0	0
Aeshnidae	0	0	0	0	0	0
Boyeria vinosa	0	0	0	0	0	1
Calopterygidae	0	0	0	0	0	2
Calopteryx sp.	0	1	0	0	0	0
Plecoptera	0	0	0	0	0	0
Pteronarcidae	0	0	0	0	0	0
Pteronarcys dorsata	0	0	0	0	0	1
Hemiptera	0	0	0	0	0	0
Corixidae	1	0	0	0	0	0
Veliidae	0	0	0	0	0	0
Rhagovelia obesa	0	0	0	0	0	1
Megaloptera	0	0	0	0	0	0
Corydalidae	0	0	1	0	0	0
Corydalus cornutus	0	0	1	1	0	0
Nigronia serricornis	7	18	21	15	12	1
Sialidae	0	0	0	0	0	0
Sialis sp.	0	0	0	0	1	0
Trichoptera	0	0	0	0	0	0

Table 3-10
Results of Benthic Invertebrate Sampling (Hester-Dendy) in the North Branch Potomac River - July 2000
Allegany Ballistics Laboratory, Mineral County, WV

Taxa	Station[a]					
	BIOTA 1	BIOTA 2	BIOTA 3	BIOTA 4	BIOTA 5	BIOTA 6
Hydropsychidae	55	3	100	21	0	0
Cheumatopsyche sp.	94	19	115	48	1	0
Hydropsyche sp.	0	1	11	9	0	0
Hydropsyche betteni	0	0	15	3	0	1
Hydropsyche venularis	51	2	157	28	1	0
Polycentropodidae	0	0	0	1	0	0
Polycentropus sp.	8	3	2	0	6	1
Coleoptera	0	0	0	0	0	0
Elmidae	0	0	1	0	0	0
Gyrinidae	0	0	0	0	0	0
Dineutus sp.	1	0	0	0	0	0
Diptera	0	0	0	0	0	0
Athericidae	0	0	0	0	0	0
Atherix lantha	1	0	0	0	0	0
Ceratopogonidae	0	0	0	0	0	0
Bezzia/Palpomyia gp.	1	1	0	1	0	0
Chironomidae	32	38	60	36	27	18
Ablabesmyia mallochi	0	2	10	2	12	21
Chironomus sp.	0	3	0	0	0	0
Cricotopus sp.	3	57	21	9	34	3
Cricotopus bicinctus	0	3	0	0	15	1
Cryptochironomus fulvus	0	0	0	2	0	0
Dicrotendipes sp.	0	0	0	0	0	1
Nanocladius sp.	0	0	5	6	0	2
Nilotanypus sp.	0	3	10	2	9	0
Phaenopsectra sp.	0	0	0	0	4	10
Polypedilum fallax	0	0	4	11	11	0
Polypedilum halterale	412	182	437	376	280	58
Polypedilum illinoense	0	123	23	0	71	137
Procladius sp.	0	0	0	0	0	1

Table 3-10
Results of Benthic Invertebrate Sampling (Hester-Dendy) in the North Branch Potomac River - July 2000
Allegany Ballistics Laboratory, Mineral County, WV

Taxa	Station[a]					
	BIOTA 1	BIOTA 2	BIOTA 3	BIOTA 4	BIOTA 5	BIOTA 6
Rheocricotopus robacki	263	328	611	164	286	40
Rheotanytarsus sp.	31	16	58	32	4	0
Stenochironomus sp.	10	3	56	7	0	0
Synorthocladius semivirens	0	10	0	0	0	0
Tanytarsus sp.	0	3	0	0	0	0
Thienemannimyia gp.	114	101	110	83	132	24
Empididae	0	1	0	0	0	0
Hemerodromia sp.	0	0	2	0	0	0
Muscidae	0	0	0	0	0	1
TOTAL NUMBER OF ORGANISMS	**1,378**	**1,388**	**2,694**	**1,184**	**1,236**	**391**
TOTAL NUMBER OF TAXA	**27**	**32**	**36**	**28**	**23**	**31**

[a]Total of 3 replicates

Table 3-11
Rare, Threatened, and Endangered Species From Mineral County, West Virginia
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	Taxa	State Rank[a]	Federal Status	Comments
Eastern cricket frog	*Acris c. crepitans*	Amphibian	S2	--	
Jefferson salamander	*Ambystoma jeffersonianum*	Amphibian	S3	--	
Lesser snakeroot	*Ageratine aromaticum var aromaticum*	Plant	S1	--	
Bent milk-vetch	*Astragalus distortus*	Plant	S2	--	
Side-oats grama	*Bouteloua curtipendula*	Plant	S3	--	Found on ABL
Northern metalmark	*Calephelis boarealis*	Butterfly	S2	--	
American harebell (Bluebell)	*Campanula rotundifolia*	Plant	S2	--	Found on ABL
Hoary sedge	*Carex canescens*	Plant	S3	--	
Ebony sedge	*Carex eburnea*	Plant	S3	--	Found on ABL
Troublesome sedge	*Carex molesta*	Plant	S1	--	
Necklace sedge	*Carex projecta*	Plant	S1	--	
Goldthread	*Coptis trifolia groenlandica*	Plant	S2	--	
Roundleaf dogwood	*Cornus rugosa*	Plant	S1	--	
Beaked dodder	*Cuscuta rostrata*	Plant	S2	--	
Reflexed flatsedge	*Cyperus refractus*	Plant	S2	--	
Tall larkspur	*Delphinium exaltatum*	Plant	S2	--	
Nuttall waterweed	*Elodea nuttallii*	Plant	S1	--	
Columbine duskywing	*Erynnis lucilius*	Butterfly	S2	--	
Olympia marble	*Euchloe olympia*	Butterfly	S2/S3	--	
Peregrine falcon	*Falco peregrinus*	Bird	S1B/S2N	--	Removed from federal list 8/25/99
Blue ash	*Fraxinus quadrangulata*	Plant	S1	--	
Flatleaf rush	*Juncus platyphyllus*	Plant	Not listed	--	
Torrey's rush	*Juncus torreyi*	Plant	S1	--	
Loggerhead shrike	*Lanius ludovicians*	Bird	S1B/S1N	--	State rank for *migrans* subspecies
Bald eagle	*Lhaliaeetus leucocephalus*	Bird	S2B/S2N	Threatened	Proposed for delisting (7/6/99)
False pimpernel	*Lindernai dubia var anagallidea*	Plant	SH	--	
Allegheny woodrat	*Noetoma magister*	Mammal	S3	--	Found on ABL
Shale barren evening primrose	*Oenothera argillicola*	Plant	S3	--	
Black-fruit mountain ricegrass	*Oryzopsis racemosa*	Plant	S2	--	
Canby's mountain-lover	*Paxistima canbyi*	Plant	S2	--	

Table 3-11
Rare, Threatened, and Endangered Species From Mineral County, West Virginia
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	Taxa	State Rank[a]	Federal Status	Comments
Jacobs ladder	*Polemonium vanbruntiae*	Plant	S2	--	
Allegheny plum	*Prunus alleghaniensis*	Plant	S3	--	Found on ABL
Basil mountain-mint	*Pycnanthemum clinopodioides*	Plant	SH	--	
Grizzled skipper	*Pyrgus wyanpot*	Butterfly	S1	--	
Bristly black currant	*Ribes lacustre*	Plant	S1	--	
Swamp red currant	*Ribes triste*	Plant	SH	--	
Glaucous willow	*Salix discolor*	Plant	S2	--	
Swamp saxifrage	*Saxifraga pensylvanica*	Plant	S2	--	
Balsam squaw-weed	*Senecio pauperculus*	Plant	S1	--	
Poison sumac	*Toxicodendron vernix*	Plant	S2	--	
Kates mountain clover	*Trifolium virginicum*	Plant	S3	--	
Marsh speedwell	*Veronica scutellata*	Plant	S1	--	
Netted chainfern	*Woodwardia areolata*	Plant	S1	--	
Meadow jumping mouse	*Zapus hudsonius*	Mammal	S3	--	
Oceanorous	*Zigadenus leimanthoides*	Plant	S2	--	

[a]State rank (June 2000): S1 - Extremely rare; S2 - Very rare; S3 - Somewhat vulnerable to extirpation; SH - Historical. B - Breeding populations; N - Non-breeding populations.

Table 3-12
Rare, Threatened, and Endangered Species From Maryland
Allegany Ballistics Laboratory, Mineral County, WV

Common Name	Scientific Name	Taxa	State Rank[a]	State Status[b]	Federal Status	Comments
Side-oats grama	*Bouteloua curtipendula*	Plant	S2	--	--	
Harebell	*Campanula rotundifolia*	Plant	S2	--	--	
Eastern small-footed bat	*Myotis leibii*	Mammal	S1B	I	--	No longer federal candidate
Sora	*Porzana carolina*	Bird	S1B	--	--	
Virginia mountain mint	*Pycnanthemum virginianum*	Plant	S2	--	--	
Cliff stonecrop	*Sedum glaucophyllum*	Plant	S1B	E	--	

[a]State rank (October 1997 [animals]; December 1996 [plants]): S1 - Highly rare; S2 - Rare. B - Breeding populations.

[b]E - Endangered; I - In need of conservation.

Table 3-13
Assessment and Measurement Endpoints - Continued Operations Exposure Scenario
Allegany Ballistics Laboratory, Mineral County, WV

Assessment Endpoint	Measurement Endpoint	Receptor
Terrestrial Habitats		
Survival, growth, and reproduction of terrestrial soil invertebrate communities	Comparison of predicted chemical concentrations in surface soil (from air dispersion and deposition modeling) with toxicity reference values for soil invertebrates	Soil invertebrates (earthworms)
Survival, growth, and reproduction of terrestrial plant communities	Comparison of predicted chemical concentrations in surface soil (from air dispersion and deposition modeling) with toxicity reference values for plants	Terrestrial plants
Survival, growth, and reproduction of vertebrate species	Comparison of predicted chemical concentrations in ground-level ambient air (from air dispersion modeling) with literature-derived chronic toxicity reference values for upper trophic level vertebrate species from inhalation exposures	Upper trophic level vertebrates (e.g., mammals)
Survival, growth, and reproduction of avian terrestrial insectivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on predicted surface soil concentrations (from air dispersion and deposition modeling)	American robin
Survival, growth, and reproduction of avian terrestrial carnivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on predicted surface soil concentrations (from air dispersion and deposition modeling)	Red-tailed hawk
Survival, growth, and reproduction of mammalian terrestrial insectivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on predicted surface soil concentrations (from air dispersion and deposition modeling)	Short-tailed shrew
Survival, growth, and reproduction of mammalian terrestrial herbivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on predicted surface soil concentrations (from air dispersion and deposition modeling)	Meadow vole
Survival, growth, and reproduction of mammalian terrestrial carnivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on predicted surface soil concentrations (from air dispersion and deposition modeling)	Red fox
Survival, growth, and reproduction of terrestrial reptiles	Evidence of potential risk to other upper trophic level terrestrial receptors evaluated in the ERA	--
Wetland and Aquatic Habitats		
Survival, growth, and reproduction of benthic and aquatic invertebrate communities	Comparison of predicted chemical concentrations in surface water and sediment (from air dispersion and deposition modeling) with medium-specific toxicity reference values	Benthic/aquatic invertebrates
Survival, growth, and reproduction of aquatic and wetland plant communities	Comparison of predicted chemical concentrations in surface water and sediment (from air dispersion and deposition modeling) with medium-specific toxicity reference values	Aquatic/wetland plants

Table 3-13
Assessment and Measurement Endpoints - Continued Operations Exposure Scenario
Allegany Ballistics Laboratory, Mineral County, WV

Assessment Endpoint	Measurement Endpoint	Receptor
Survival, growth, and reproduction of fish communities	Comparison of predicted chemical concentrations in surface water and sediment (from air dispersion and deposition modeling) with medium-specific toxicity reference values	Fish
Survival, growth, and reproduction of amphibian communities	Comparison of predicted chemical concentrations in surface water and sediment (from air dispersion and deposition modeling) with medium-specific toxicity reference values	Amphibians
Survival, growth, and reproduction of avian aquatic/wetland piscivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on predicted surface water and sediment concentrations (from air dispersion and deposition modeling)	Great blue heron Belted kingfisher
Survival, growth, and reproduction of mammalian aquatic/wetland piscivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on predicted surface water and sediment concentrations (from air dispersion and deposition modeling)	Mink
Survival, growth, and reproduction of aquatic and wetland reptiles	Evidence of potential risk to other upper trophic level aquatic and wetland receptors evaluated in the ERA	--
Survival, growth, and reproduction of amphibians	Evidence of potential risk to other upper trophic level aquatic and wetland receptors evaluated in the ERA	--

Table 3-14
Assessment and Measurement Endpoints - Current Conditions Exposure Scenario
Allegany Ballistics Laboratory, Mineral County, WV

Assessment Endpoint	Measurement Endpoint	Receptor
Terrestrial Habitats		
Survival, growth, and reproduction of terrestrial soil invertebrate communities	Comparison of measured chemical concentrations in surface soil with toxicity reference values for soil invertebrates	Soil invertebrates (earthworms)
Survival, growth, and reproduction of terrestrial plant communities	Comparison of measured chemical concentrations in surface soil with toxicity reference values for plants	Terrestrial plants
Survival, growth, and reproduction of avian terrestrial insectivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on measured surface soil concentrations	American robin
Survival, growth, and reproduction of avian terrestrial carnivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on measured surface soil concentrations	American kestrel
Survival, growth, and reproduction of mammalian terrestrial insectivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on measured surface soil concentrations	Short-tailed shrew
Survival, growth, and reproduction of mammalian terrestrial herbivores	Comparison of literature-derived chronic No Observed Adverse Effect Level (NOAEL) values for survival, growth, and/or reproductive effects with modeled dietary exposure doses based on measured surface soil concentrations	Meadow vole
Survival, growth, and reproduction of terrestrial reptiles	Evidence of potential risk to other upper trophic level terrestrial receptors evaluated in the ERA	--

Table 4-1
Chemicals To Be Evaluated in the ERA
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Continued Operations				Current Conditions			
	Air	Surface Water/ Sediment	Surface Soil	Food Web	Air	Surface Water/ Sediment	Surface Soil	Food Web
Inorganics								
Aluminum	X	X	X				X	
Antimony							X	
Arsenic							X	X
Barium							X	
Beryllium							X	
Cadmium							X	X
Chromium							X	X
Cobalt							X	
Copper	X	X	X	X			X	X
Cyanide							X	
Iron	X	X	X				X	
Lead	X	X	X	X			X	X
Manganese							X	
Mercury							X	X
Nickel							X	X
Selenium							X	X
Silver							X	X
Thallium							X	
Tin							X	X
Vanadium							X	
Zinc							X	X
Zirconium	X	X	X					
Organics								
1,3-Butadiene	X							
1,6-Dinitropyrene	X	X	X	X				
1-Methylnaphthalene	X							
1-Nitropyrene	X	X	X	X				
2,4-Dinitrotoluene	X	X	X					

Table 4-1
Chemicals To Be Evaluated in the ERA
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Continued Operations				Current Conditions			
	Air	Surface Water/ Sediment	Surface Soil	Food Web	Air	Surface Water/ Sediment	Surface Soil	Food Web
2,5-Diphenyloxazole	X	X	X					
2,6-Dinitrotoluene	X	X	X					
2-Methylnaphthalene	X							
2-Nitronaphthalene	X							
4-Nitrophenol	X	X	X					
4-Nitrosodiphenylamine	X							
Acetone							X	
Benzo[a]anthracene	X	X	X	X			X	X
Benzene	X							
Benzo[a]pyrene	X	X	X	X			X	X
Biphenyl (1,1-Biphenyl)	X	X	X				X	
bis(2-ethylhexyl)phthalate							X	
Chrysene							X	X
Dibenz[a,h]anthracene	X	X	X	X				
Dibenzofuran	X							
Diethylphthalate							X	
Dimethylphthalate							X	
Di-n-propyl adipate (Dipropyl adipate)	X							
Dioxin (2,3,7,8-TCDD)	X	X	X	X			X	X
Diphenylamine	X	X	X					
HMX							X	
Mesitylene (1,3,5-trimethylbenzene)	X							
Naphthalene	X						X	
n-Hexane	X							
N-Nitrosodiphenylamine	X							
Perchlorate							X	
Phenanthrene	X	X	X	X			X	X
Phenol	X	X	X					
Pyrene	X	X	X	X				

Table 4-1
Chemicals To Be Evaluated in the ERA
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Continued Operations				Current Conditions			
	Air	Surface Water/ Sediment	Surface Soil	Food Web	Air	Surface Water/ Sediment	Surface Soil	Food Web
RDX							X	
Resorcinol	X	X	X					
Styrene	X							
Thianaphthene (benzo[b]thiophene)	X							
Toluene	X							
Triacetin	X	X	X					
Trichloroethene							X	
Xylenes	X							

Table 4-2
Physical and Chemical Properties
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Molecular Weight (g/mole)		T_m (K)		Vp (atm)		S (mg/L)		H (atm-m^3/mol)		D_a (cm^2/s)		D_w (cm^2/s)	
Inorganics														
Aluminum	2.70E+01	a	9.33E+02	a	0.00E+00	a	0.00E+00	a	0.00E+00	a	2.11E-01	a	2.44E-05	a
Copper	6.36E+01	a	1.36E+03	a	0.00E+00	a	0.00E+00	a	0.00E+00	a	1.19E-01	a	1.38E-05	a
Iron	5.58E+01	c	1.81E+03	c	0.00E+00	a	0.00E+00	a	0.00E+00	a	1.28E-01	d	1.49E-05	d
Lead	2.07E+02	a	6.01E+02	a	0.00E+00	a	0.00E+00	a	0.00E+00	a	5.43E-02	a	6.28E-06	a
Zirconium	9.12E+01	c	2.12E+03	c	0.00E+00	a	0.00E+00	a	0.00E+00	a	9.24E-02	d	1.07E-05	d
Organics														
1,3-Butadiene	5.41E+01	e	1.64E+02	e	2.77E+00	e	7.35E+02	e	6.30E-02	e	1.31E-01	d	1.52E-05	d
1,6-Dinitropyrene	2.92E+02	c	5.73E+02	c	1.65E-07	d	5.86E+00	h	8.25E-06	i	4.23E-02	d	4.90E-06	d
1-Methylnaphthalene	1.42E+02	k	2.43E+02	k	8.82E-05	k	2.58E+01	k	2.60E-04	k	6.86E-02	d	7.94E-06	d
1-Nitropyrene	2.47E+02	c	4.28E+02	c	4.20E-08	d	1.26E+00	h	8.25E-06	i	4.74E-02	d	5.48E-06	d
2,4-Dinitrotoluene	1.82E+02	a	3.44E+02	a	2.29E-07	a	2.85E+02	a	1.46E-07	a	3.09E-02	a	7.86E-06	a
2,5-Diphenyloxazole	2.21E+02	c	3.46E+02	c	2.43E-10	m	3.35E+00	h	1.60E-08	d	5.10E-02	d	5.91E-06	d
2,6-Dinitrotoluene	1.82E+02	a	3.39E+02	a	7.47E-07	a	1.05E+03	a	1.30E-07	a	3.11E-02	a	7.76E-06	a
2-Methylnaphthalene	1.42E+02	o	3.08E+02	o	7.24E-05	f	2.50E+01	o	5.20E-04	f	6.86E-02	d	7.94E-06	d
2-Nitronaphthalene	1.73E+02	c	3.52E+02	c	2.10E-03	m	1.43E+02	h	2.54E-03	d	6.01E-02	d	6.96E-06	d
4-Nitrophenol	1.39E+02	a	3.86E+02	a	1.32E-06	a	2.50E+04	a	7.32E-09	a	4.30E-02	a	9.61E-06	a
4-Nitrosodiphenylamine	1.98E+02	k	4.18E+02	k	1.63E-07	k	7.43E+00	k	4.35E-06	k	5.49E-02	d	6.36E-06	d
Benzo[a]anthracene	2.28E+02	a	4.33E+02	a	2.03E-10	a	1.28E-02	a	3.62E-06	a	2.47E-02	a	6.21E-06	a
Benzene	7.81E+01	a	2.79E+02	a	1.25E-01	a	1.78E+03	a	5.49E-03	a	1.17E-01	a	1.02E-05	a
Benzo[a]pyrene	2.52E+02	a	4.52E+02	a	6.43E-12	a	1.94E-03	a	8.36E-07	a	2.18E-02	a	5.85E-06	a
Biphenyl (1,1-Biphenyl)	1.54E+02	e	3.43E+02	e	4.94E-05	e	7.08E+00	e	3.39E-04	e	6.50E-02	d	7.52E-06	d
Chrysene	NA		NA		NA		NA		NA		NA		NA	
Dibenz[a,h]anthracene	2.78E+02	a	5.39E+02	a	2.70E-14	a	6.70E-04	a	1.12E-08	a	1.80E-02	a	6.01E-06	a
Dibenzofuran	1.68E+02	o	3.60E+02	o	2.37E-07	f	1.00E+01	o	1.30E-05	f	6.13E-02	d	7.10E-06	d
Di-n-propyl adipate (Dipropyl adipate)	2.30E+02	c	ND		6.71E-03	m	1.40E+02	h	1.11E-02	d	4.97E-02	d	5.75E-06	d
Dioxin (2,3,7,8-TCDD)	3.22E+02	a	5.78E+02	a	9.74E-13	a	1.93E-05	a	1.60E-05	a	1.27E-02	a	6.81E-06	a
Diphenylamine	1.69E+02	c	3.25E+02	c	8.82E-07	f	3.60E+01	f	5.00E-07	f	6.10E-02	d	7.07E-06	d
Mesitylene (1,3,5-trimethylbenzene)	1.20E+02	a	2.88E+02	a	1.30E-03	a	2.00E+01	a	7.81E-03	a	6.48E-02	a	7.86E-06	a

Table 4-2
Physical and Chemical Properties
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Molecular Weight (g/mole)	T_m (K)	Vp (atm)	S (mg/L)	H (atm-m^3/mol)	D_a (cm^2/s)	D_w (cm^2/s)
Naphthalene	1.28E+02 a	3.53E+02 a	1.17E-04 a	3.11E+01 a	4.82E-04 a	5.26E-02 a	8.92E-06 a
n-Hexane	8.62E+01 e	1.78E+02 e	1.99E-01 e	1.19E+01 e	1.18E+00 e	9.59E-02 d	1.11E-05 d
N-Nitrosodiphenylamine	1.98E+02 a	3.40E+02 a	1.32E-04 a	3.74E+01 a	6.99E-04 a	3.12E-02 a	6.35E-06 a
Phenanthrene	1.78E+02 a	3.71E+02 a	1.45E-07 f	1.28E+00 a	2.30E-05 f	3.33E-02 a	7.47E-06 a
Phenol	9.41E+01 a	3.14E+02 a	5.74E-04 a	9.08E+04 a	5.95E-07 a	8.27E-02 a	1.03E-05 a
Pyrene	2.02E+02 a	4.29E+02 a	5.59E-09 a	1.37E-01 a	8.25E-06 a	2.72E-02 a	7.14E-06 a
Resorcinol	1.10E+02 c	3.83E+02 c	5.92E-07 f	1.00E+06 f	7.70E-09 f	8.14E-02 d	9.43E-06 d
Styrene	1.04E+02 a	2.43E+02 a	8.21E-03 a	2.57E+02 a	3.33E-03 a	7.73E-02 a	8.77E-06 a
Thianaphthene (benzo[b]thiophene)	1.34E+02 c	3.04E+02 c	1.53E-04 m	1.55E+02 h	1.33E-04 d	7.13E-02 d	8.26E-06 d
Toluene	9.21E+01 a	1.78E+02 a	3.71E-02 a	5.58E+02 a	6.13E-03 a	9.72E-02 a	9.23E-06 a
Triacetin	2.18E+02 u	1.95E+02 u	3.26E-06 u	5.80E+04 u	1.23E-08 d	5.15E-02 d	5.96E-06 d
Xylenes	1.06E+02 a	2.86E+02 a	1.06E-02 a	1.86E+02 a	6.05E-03 a	7.61E-02 a	8.50E-06 a

NA - Not Applicable
ND - No Data
a - USEPA 1999a; 1998b
b - Baes et al. 1984
c - ChemFinder 2001
d - Calculated per USEPA 1999a; 1998b
e - Montgomery 1991
f - USEPA 1996a
g - Calculated per USEPA 1999a; 1998b using data from Howard et al. 1991
h - Calculated per Lyman et al. 1990
i - Pyrene value used
j - SRC 2001
k - ChemFate 2001
l - Calculated per USEPA 1999a; 1998b using data from ChemFate 2001
m - Calculated per Lyman et al. 1982
n - Diphenylamine value used
o - Montgomery and Welkom 1990
p - Calculated per USEPA 1999a; 1998b using data from USEPA 1996a
q - 2-Methylnaphthalene value used
r - Hexane value used
s - USEPA 1995c
t - Calculated per USEPA 1999a; 1998b using data from HSDB 2001
u - HSDB 2001

Table 4-2
Physical and Chemical Properties
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	log Kow (unitless)		K_{oc} (mL/g)		Kd_s (mL/g)		Kd_{sw} (L/kg)		Kd_{bs} (mL/g)		ksg $(year)^{-1}$	
Inorganics												
Aluminum	NA	a	NA	a	1.50E+03	b	1.50E+03	b	1.50E+03	b	0.00E+00	a
Copper	NA	a	NA	a	1.00E+04	a	1.00E+04	a	1.00E+04	a	0.00E+00	a
Iron	NA	a	NA	a	2.50E+01	b	2.50E+01	b	2.50E+01	b	0.00E+00	a
Lead	NA	a	NA	a	9.00E+02	a	9.00E+02	a	9.00E+02	a	0.00E+00	a
Zirconium	NA	a	NA	a	3.00E+03	b	3.00E+03	b	3.00E+03	b	0.00E+00	a
Organics												
1,3-Butadiene	2.00	f	1.20E+02	e	1.20E+00	d	9.02E+00	d	4.81E+00	d	9.01E+00	g
1,6-Dinitropyrene	4.57	j	2.18E+04	d	2.18E+02	d	1.64E+03	d	8.73E+02	d	1.33E-01	i
1-Methylnaphthalene	3.87	j	4.57E+03	d	4.57E+01	d	3.43E+02	d	1.83E+02	d	2.53E+02	l
1-Nitropyrene	5.06	j	6.52E+04	d	6.52E+02	d	4.89E+03	d	2.61E+03	d	1.33E-01	i
2,4-Dinitrotoluene	2.00	a	5.10E+01	a	5.10E-01	a	3.83E+00	a	2.04E+00	a	1.41E+00	a
2,5-Diphenyloxazole	4.67	j	6.22E+03	d	6.22E+01	d	4.66E+02	d	2.49E+02	d	9.01E+00	n
2,6-Dinitrotoluene	1.89	a	4.19E+01	a	4.19E-01	a	3.14E+00	a	1.68E+00	a	1.41E+00	a
2-Methylnaphthalene	3.90	f	7.94E+03	o	7.94E+01	d	5.96E+02	d	3.18E+02	d	1.10E+02	p
2-Nitronaphthalene	3.24	j	1.12E+03	d	1.12E+01	d	8.39E+01	d	4.48E+01	d	1.10E+02	q
4-Nitrophenol	1.91	a	4.37E+01	a	4.37E-01	a	3.28E+00	a	1.75E+00	a	2.09E+02	a
4-Nitrosodiphenylamine	3.16	j	4.13E+02	d	4.13E+00	d	3.10E+01	d	1.65E+01	d	1.39E+00	g
Benzo[a]anthracene	5.68	a	2.60E+05	a	2.60E+03	a	1.95E+04	a	1.04E+04	a	3.72E-01	a
Benzene	2.14	a	6.20E+01	a	6.20E-01	a	4.65E+00	a	2.48E+00	a	3.89E+00	a
Benzo[a]pyrene	6.13	a	9.69E+05	a	9.69E+03	a	7.27E+04	a	3.88E+04	a	4.77E-01	a
Biphenyl (1,1-Biphenyl)	4.00	f	1.87E+03	d	1.87E+01	d	1.40E+02	d	7.47E+01	d	3.61E+01	g
Chrysene	5.70	s	NA		NA		NA		NA		NA	
Dibenz[a,h]anthracene	6.55	a	1.79E+06	a	1.79E+04	a	1.34E+05	a	7.16E+04	a	2.69E-01	a
Dibenzofuran	4.20	f	1.01E+04	o	1.01E+02	d	7.59E+02	d	4.05E+02	d	9.01E+00	g
Di-n-propyl adipate (Dipropyl adipate)	3.35	j	5.81E+02	d	5.81E+00	d	4.36E+01	d	2.32E+01	d	3.16E+01	r
Dioxin (2,3,7,8-TCDD)	6.64	a	2.69E+06	a	2.69E+04	a	2.02E+05	a	1.08E+05	a	4.29E-01	a
Diphenylamine	3.48	s	7.33E+02	d	7.33E+00	d	5.50E+01	d	2.93E+01	d	9.01E+00	g
Mesitylene (1,3,5-trimethylbenzene)	3.42	a	1.67E+03	a	1.67E+01	a	1.25E+02	a	6.68E+01	a	3.16E+01	a

Table 4-2
Physical and Chemical Properties
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	log Kow (unitless)		K_{oc} (mL/g)		Kd_s (mL/g)		Kd_{sw} (L/kg)		Kd_{bs} (mL/g)		ksg $(year)^{-1}$	
Naphthalene	3.37	a	1.19E+03	a	1.19E+01	a	8.93E+01	a	4.76E+01	a	5.27E+00	a
n-Hexane	4.00	f	1.87E+03	d	1.87E+01	d	1.40E+02	d	7.47E+01	d	3.16E+01	t
N-Nitrosodiphenylamine	3.03	a	3.27E+02	a	3.27E+00	a	2.45E+01	a	1.31E+01	a	7.44E+00	a
Phenanthrene	4.55	a	2.09E+04	a	2.09E+02	a	1.57E+03	a	8.36E+02	a	1.26E+00	a
Phenol	1.48	a	2.20E+01	a	2.20E-01	a	1.65E+00	a	8.80E-01	a	2.53E+01	a
Pyrene	5.00	a	6.80E+04	a	6.80E+02	a	5.10E+03	a	2.72E+03	a	1.33E-01	a
Resorcinol	0.78	f	5.75E+00	d	5.75E-02	d	4.31E-01	d	2.30E-01	d	6.32E+01	t
Styrene	2.93	a	9.12E+02	a	9.12E+00	a	6.84E+01	a	3.65E+01	a	9.03E+00	a
Thianaphthene (benzo[b]thiophene)	3.12	j	3.84E+02	d	3.84E+00	d	2.88E+01	d	1.54E+01	d	2.53E+02	l
Toluene	2.67	a	1.40E+02	a	1.40E+00	a	1.05E+01	a	5.60E+00	a	1.15E+01	a
Triacetin	0.25	j	2.22E+00	d	2.22E-02	d	1.66E-01	d	8.87E-02	d	1.95E+00	t
Xylenes	3.17	a	3.11E+02	a	3.11E+00	a	2.33E+01	a	1.24E+01	a	9.03E+00	a

NA - Not Applicable
ND - No Data
a - USEPA 1999a; 1998b
b - Baes et al. 1984
c - ChemFinder 2001
d - Calculated per USEPA 1999a; 1998b
e - Montgomery 1991
f - USEPA 1996a
g - Calculated per USEPA 1999a; 1998b using data from Howard et al. 1991
h - Calculated per Lyman et al. 1990
i - Pyrene value used
j - SRC 2001
k - ChemFate 2001
l - Calculated per USEPA 1999a; 1998b using data from ChemFate 2001
m - Calculated per Lyman et al. 1982
n - Diphenylamine value used
o - Montgomery and Welkom 1990
p - Calculated per USEPA 1999a; 1998b using data from USEPA 1996a
q - 2-Methylnaphthalene value used
r - Hexane value used
s - USEPA 1995c
t - Calculated per USEPA 1999a; 1998b using data from HSDB 2001
u - HSDB 2001

Table 4-3
Plant Biotransfer Factors
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Soil-Plant BCF (dry weight)				Air-Plant Bv (dry weight)	
	High-End		Central Tendency			
inorganics						
Arsenic	1.10E+00	b1	3.71E-02	b2	NA	
Cadmium	3.25E+00	b1	5.14E-01	b2	NA	
Chromium	7.50E-03	c	7.50E-03	c	NA	
Copper	6.25E-01	b1	1.23E-01	b2	0.00E+00	a
Lead	4.68E-01	b1	3.77E-02	b2	0.00E+00	a
Mercury	5.00E+00	b1	3.44E-01	b2	NA	
Nickel	1.41E+00	b1	3.42E-02	b2	NA	
Selenium	3.01E+00	b1	5.67E-01	b2	NA	
Silver	4.00E-01	c	4.00E-01	c	NA	
Tin	3.00E-02	c	3.00E-02	c	NA	
Zinc	1.82E+00	b1	3.58E-01	b2	NA	
Organics						
1,6-Dinitropyrene	8.84E-02	d	8.84E-02	d	4.98E+04	d
1-Nitropyrene	4.61E-02	d	4.61E-02	d	1.66E+05	d
Benzo[a]anthracene	2.02E-02	a	2.02E-02	a	1.72E+04	a
Benzo[a]pyrene	1.11E-02	a	1.11E-02	a	2.25E+05	a
Chrysene	1.97E-02	d	1.97E-02	d	NA	
Dibenz[a,h]anthracene	6.36E-03	a	6.36E-03	a	4.68E+07	a
Dioxin (2,3,7,8-TCDD)	5.62E-03	a	5.62E-03	a	6.10E+04	a
Phenanthrene	9.08E-02	a	9.08E-02	a	1.70E+04	d
Pyrene	4.99E-02	a	4.99E-02	a	1.43E+05	d

a - USEPA 1999a; 1998b
b - Bechtel Jacobs 1998a
c - Baes et al. 1984
d - Calculated per USEPA 1999a; 1998b

NA - Not Applicable
1 - 90th percentile value
2 - Mean of ln-transformed values

Table 4-4
Soil Invertebrate Bioaccumulation Factors
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Soil-Invertebrate BAF (dry weight)			
	High-End		Central Tendency	
Inorganics				
Arsenic	5.23E-01	a1	2.58E-01	a2
Cadmium	4.07E+01	a1	7.66E+00	a3
Chromium	3.16E+00	a1	3.20E-01	a3
Copper	1.53E+00	a1	4.68E-01	a3
Lead	1.52E+00	a1	3.07E-01	a3
Mercury	2.06E+01	a1	1.19E+00	a3
Nickel	4.73E+00	a1	1.66E+00	a2
Selenium	1.34E+00	a1	9.82E-01	a3
Silver	1.00E+00	b	1.00E+00	b
Tin	1.00E+00	b	1.00E+00	b
Zinc	1.29E+01	a	2.48E+00	a3
Organics				
1,6-Dinitropyrene	3.90E-01	d	3.90E-01	d
1-Nitropyrene	3.90E-01	d	3.90E-01	d
Benzo[a]anthracene	2.70E-01	c4	2.70E-01	c4
Benzo[a]pyrene	3.40E-01	c4	3.40E-01	c4
Chrysene	4.40E-01	c4	4.40E-01	c4
Dibenz[a,h]anthracene	4.90E-01	c4	4.90E-01	c4
Dioxin (2,3,7,8-TCDD)	2.22E+01	a1	8.27E+00	a3
Phenanthrene	2.80E-01	c4	2.80E-01	c4
Pyrene	3.90E-01	c4	3.90E-01	c4

a - Sample et al 1998a, 1999
b - No data; assumed value
c - Beyer and Stafford 1993
d - Pyrene value used

1 - 90th percentile value
2 - Arithmetic mean
3 - Mean of ln-transformed values
4 - Median value

Table 4-5
Soil Bioaccumulation Factors For Small Mammals
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Soil-Mouse BAF (dry weight)				Soil-Vole BAF (dry weight)				Soil-Shrew BAF (dry weight)			
	High-End		Central Tendency		High-End		Central Tendency		High-End		Central Tendency	
Inorganics												
Arsenic	1.40E-02	a1	3.30E-03	a3	1.60E-02	a1	5.40E-03	a3	1.49E-02	a1	3.90E-03	a3
Cadmium	4.62E-01	a1	1.44E-01	a3	4.48E-01	a1	1.34E-01	a3	7.02E+00	a1	2.21E+00	a3
Chromium	3.49E-01	a1	9.20E-02	a3	3.09E-01	a1	1.25E-01	a2	3.33E-01	a1	9.39E-02	a3
Copper	5.54E-01	a1	1.11E-01	a3	1.29E+00	a1	1.09E-01	a3	1.12E+00	a1	5.02E-01	a3
Lead	2.86E-01	a1	5.48E-02	a3	1.87E-01	a1	4.06E-02	a3	3.39E-01	a1	1.48E-01	a3
Mercury	1.30E-01	a1	7.31E-02	a2	1.92E-01	a1	6.72E-02	a3	1.92E-01	a1	6.72E-02	a3
Nickel	5.89E-01	a1	2.59E-01	a2	8.98E-01	a1	2.63E-01	a3	5.78E-01	a1	3.49E-01	a2
Selenium	1.26E+00	a1	2.58E-01	a3	1.55E-01	a1	2.21E-02	a2	1.19E+00	a1	2.73E-01	a3
Silver	--	b	--	b	--	b	--	b	--	b	--	b
Tin	--	b	--	b	--	b	--	b	--	b	--	b
Zinc	2.78E+00	a1	5.09E-01	a3	2.32E+00	a1	2.93E-01	a3	2.90E+00	a1	8.62E-01	a3
Organics												
1,6-Dinitropyrene	--	b	--	b	--	b	--	b	--	b	--	b
1-Nitropyrene	--	b	--	b	--	b	--	b	--	b	--	b
Benzo[a]anthracene	--	b	--	b	--	b	--	b	--	b	--	b
Benzo[a]pyrene	--	b	--	b	--	b	--	b	--	b	--	b
Chrysene	--	b	--	b	--	b	--	b	--	b	--	b
Dibenz[a,h]anthracene	--	b	--	b	--	b	--	b	--	b	--	b
Dioxin (2,3,7,8-TCDD)	2.20E+00	a1	1.02E+00	a2	2.20E+00	a1	1.07E+00	a2	2.20E+00	a1	1.07E+00	a2
Phenanthrene	--	b	--	b	--	b	--	b	--	b	--	b
Pyrene	--	b	--	b	--	b	--	b	--	b	--	b

a - Sample et al. 1998b
b - see text

1 - 90th percentile value
2 - Arithmetic mean
3 - Mean of ln-transformed values

Table 4-6
Sediment Bioaccumulation Factors For Benthic Invertebrates
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Sediment-Invertebrate BAF (dry weight)			
	High-End		Central Tendency	
Inorganics				
Copper	7.96E+00	a1	9.19E-01	a3
Lead	5.03E-01	a2	3.38E-01	a3
Organics				
1,6-Dinitropyrene	8.03E-01	d	4.35E-01	d
1-Nitropyrene	8.03E-01	d	4.35E-01	d
Benzo[a]anthracene	1.40E+00	b	3.58E-01	b
Benzo[a]pyrene	1.91E-01	b	1.27E-01	b
Dibenz[a,h]anthracene	1.40E+00	e	3.58E-01	e
Dioxin (2,3,7,8-TCDD)	3.60E-01	f	3.60E-01	f
Phenanthrene	6.52E-01	b	2.94E-01	b
Pyrene	8.03E-01	b	4.35E-01	b

a - Bechtel Jacobs 1998b
b - Maruya et al. 1997
c - No data; assumed value
d - Pyrene value used
e - Benzo[a]anthracene value used
f - USEPA 1993b

1 - 90th percentile value
2 - Maximum
3 - Mean of ln-transformed values

Table 4-7
Water/Sediment Bioaccumulation Factors For Fish
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	BCF (wet weight)	Reference	Food Chain Multiplier (TL3)	Percent Solids	BAF (dry weight)
Water BAFs					
1,6-Dinitropyrene	5.00E+02	USEPA 1999a	2.0	0.25	4.00E+03
1-Nitropyrene	5.00E+02	USEPA 1999a	3.6	0.25	7.20E+03
Benzo[a]anthracene	5.00E+02	USEPA 1999a	8.0	0.25	1.60E+04
Benzo[a]pyrene	5.00E+02	USEPA 1999a	11	0.25	2.20E+04
Copper	2.90E+02	USEPA 1985	1.0	0.25	1.16E+03
Dibenz[a,h]anthracene	5.00E+02	USEPA 1999a	14	0.25	2.80E+04
Lead	1.60E+02	AQUIRE 2001	1.0	0.25	6.40E+02
Phenanthrene	2.16E+03	USEPA 1999a	2.0	0.25	1.73E+04
Pyrene	5.00E+02	USEPA 1999a	3.2	0.25	6.40E+03
Sediment BAFs					
Dioxin (2,3,7,8-TCDD)	9.67E-02	USEPA 1990	--	0.25	3.87E-01

Table 4-8
Exposure Parameters for Upper Trophic Level Ecological Receptors
Allegany Ballistics Laboratory, Mineral County, WV

Receptor	Body Weight (kg)				Water Ingestion Rate (L/day)				Food Ingestion Rate (kg/day - dry)			
	High-End		Central Tendency		High-End		Central Tendency		High-End		Central Tendency	
Birds												
American kestrel	8.30E-02	a1	1.14E-01	b6	1.69E-02	h	1.38E-02	i	1.19E-02	b	8.82E-03	b
American robin	6.35E-02	b2	7.73E-02	b7	1.29E-02	h	1.06E-02	i	7.35E-03	j	5.52E-03	j
Belted kingfisher	1.25E-01	c1	1.48E-01	c8	2.11E-02	h	1.64E-02	i	2.45E-02	b	1.80E-02	b
Great blue heron	2.10E+00	d1	2.23E+00	f8	1.09E-01	h	1.01E-01	i	4.39E-01	h	3.93E-01	i
Red-tailed hawk	9.57E-01	b1	1.13E+00	g8	6.80E-02	h	6.39E-02	i	3.95E-02	g	3.60E-02	g
Mammals												
Meadow vole	3.00E-02	e3	4.28E-02	e9	1.33E-02	b	8.99E-03	b	3.10E-03	b	2.09E-03	b
Mink	7.26E-01	e4	7.77E-01	e10	2.86E-02	b	2.18E-02	b	3.40E-02	b	2.66E-02	b
Red fox	3.17E+00	e5	4.06E+00	e10	4.12E-01	h	3.49E-01	i	1.48E-01	g	1.23E-01	g
Short-tailed shrew	1.33E-02	b2	1.69E-02	b7	4.75E-03	b	3.76E-03	b	1.89E-03	b	1.49E-03	b

a - Palmer 1988
b - USEPA 1993a
c - Dunning 1993
d - Butler 1992
e - Silva and Downing 1995
f - Quinney 1982
g - Sample and Suter 1994
h - Allometric equation (max body weight)
i - Allometric equation (mean body weight)
j - Levey and Karasov 1989
k - Martin et al. 1951
l - Quinney and Smith 1980
m - Assumed based on diet
n - Beyer et al. 1994

1 - Average of minimums for males and females
2 - Average of minimums for males and females (Pennsylvania)
3 - Average of minimums for males and females (Virginia)
4 - Average of minimums for males and females (Indiana)
5 - Average of minimums for males and females (Maryland)
6 - Average of means for males and females (Michigan/Pennsylvania)
7 - Average of means for males and females (Pennsylvania)
8 - Average of means for males and females
9 - Average of means for males and females (Virginia)
10 - Average of means for males and females (Maryland)

Table 4-8
Exposure Parameters for Upper Trophic Level Ecological Receptors
Allegany Ballistics Laboratory, Mineral County, WV

Receptor	Dietary Composition (percent)						Soil/ Sediment Ingestion	
	Terrestrial Plants	Soil Invertebrates	Small Mammals	Benthic Invertebrates	Fish	Reference	Value	Reference
Birds								
American kestrel	0	38	60	0	0	b	2.0	m
American robin	51.6	43.6	0	0	0	k	4.8	g
Belted kingfisher	0	0	0	16	84	b	0	g
Great blue heron	0	0	0	0	100	bl	0	g
Red-tailed hawk	0	0	100	0	0	bg	0	g
Mammals								
Meadow vole	95.6	2.0	0	0	0	b	2.4	n
Mink	0	0	0	0	100	b	0	g
Red fox	7.0	2.8	87.4	0	0	b	2.8	n
Short-tailed shrew	4.7	82.3	0	0	0	bg	13	g

Shaded cells indicate prey item used for screening analyses using exclusive diets

a - Palmer 1988
b - USEPA 1993a
c - Dunning 1993
d - Butler 1992
e - Silva and Downing 1995
f - Quinney 1982
g - Sample and Suter 1994
h - Allometric equation (max body weight)
i - Allometric equation (mean body weight)
j - Levey and Karasov 1989
k - Martin et al. 1951
l - Quinney and Smith 1980
m - Assumed based on diet
n - Beyer et al. 1994

Table 4-9
Chronic TRVs for Animals - Ground-Level Ambient Air
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	TRV		Units	Reference
Inorganics				
Aluminum	2.45E+03		ug/m^3	ATSDR 1999a
Copper	6.00E+01	c	ug/m^3	ATSDR 1990a
Iron	ND			--
Lead	2.46E+00		ug/m^3	Eisler 1988
Zirconium	ND			--
Organics				
1,3-Butadiene	1.41E+03	a	ug/m^3	ATSDR 1992a
1,6-Dinitropyrene	ND			--
1-Methylnaphthalene	ND			--
1-Nitropyrene	ND			--
2,4-Dinitrotoluene	ND			--
2,5-Diphenyloxazole	ND			--
2,6-Dinitrotoluene	2.40E+03	b	ug/m^3	HSDB 2001
2-Methylnaphthalene	ND			--
2-Nitronaphthalene	ND			--
4-Nitrophenol	3.00E+03	c	ug/m^3	ATSDR 1992b
4-Nitrosodiphenylamine	ND			--
Benzo[a]anthracene	ND			--
Benzene	9.57E+04		ug/m^3	ATSDR 1997
Benzo[a]pyrene	ND			--
Biphenyl (1,1-Biphenyl)	1.58E+04	a	ug/m^3	HSDB 2001
Dibenz[a,h]anthracene	ND			--
Dibenzofuran	ND			--
Di-n-propyl adipate (Dipropyl adipate)	ND			--
Dioxin (2,3,7,8-TCDD)	ND			--
Diphenylamine	ND			--
Mesitylene (1,3,5-trimethylbenzene)	1.18E+05	b	ug/m^3	HSDB 2001
Naphthalene	1.57E+05		ug/m^3	ATSDR 1995a
n-Hexane	1.79E+06		ug/m^3	ATSDR 1999b
N-Nitrosodiphenylamine	ND			--
Phenanthrene	ND			--
Phenol	1.93E+04		ug/m^3	ATSDR 1998
Pyrene	ND			--
Resorcinol	3.40E+03	c	ug/m^3	HSDB 2001
Styrene	2.13E+04	a	ug/m^3	HSDB 2001
Thianaphthene (benzo[b]thiophene)	ND			--
Toluene	1.51E+05	c	ug/m^3	ATSDR 1994a
Triacetin	2.23E+06		ug/m^3	HSDB 2001
Xylenes	8.68E+04	a	ug/m^3	ATSDR 1995b

a - Chronic LOEC to chronic NOEC UF of 10 applied
b - LC50 to chronic NOEC UF of 100 applied
c - Subchronic to chronic UF of 10 applied
ND - No Data

Table 4-10
Surface Water TRVs
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	TRV		Units	Reference	Hardness (mg/L)
Inorganics					
Aluminum	8.70E+01		ug/L	USEPA 1999a; 1999b	
Copper	1.32E+01		ug/L	USEPA 1999a; 1999b	158
Iron	1.00E+03		ug/L	USEPA 1999b	
Lead	4.13E+00		ug/L	USEPA 1999a; 1999b	158
Zirconium	1.70E+01		ug/L	Suter and Tsao 1996	
Organics					
1,6-Dinitropyrene	4.00E-02	d	ug/L	--	
1-Nitropyrene	4.00E-02	d	ug/L	--	
2,4-Dinitrotoluene	2.30E+01	a	ug/L	USEPA 1994; 1999a	
2,5-Diphenyloxazole	ND		ug/L	--	
2,6-Dinitrotoluene	6.00E+01		ug/L	USEPA 1999a	
4-Nitrophenol	3.00E+02		ug/L	Suter and Tsao 1996	
Benzo[a]anthracene	2.70E-02		ug/L	Suter and Tsao 1996	
Benzo[a]pyrene	1.40E-02		ug/L	USEPA 1996b; Suter and Tsao 1996	
Biphenyl (1,1-Biphenyl)	1.40E+01		ug/L	USEPA 1996b; Suter and Tsao 1996	
Dibenz[a,h]anthracene	4.00E-03	b	ug/L	AQUIRE 2001	
Dioxin (2,3,7,8-TCDD)	3.80E-06	a	ug/L	USEPA 1999a	
Diphenylamine	3.79E+01	b	ug/L	AQUIRE 2001	
Phenanthrene	6.30E+00		ug/L	USEPA 1994; 1996b	
Phenol	1.10E+02		ug/L	Suter and Tsao 1996	
Pyrene	4.00E-02	b	ug/L	AQUIRE 2001	
Resorcinol	6.82E+02	b	ug/L	AQUIRE 2001	
Triacetin	ND		ug/L	--	

a - Chronic LOEC to chronic NOEC UF of 10 applied
b - LC50 to chronic NOEC UF of 100 applied
c - Subchronic to chronic UF of 10 applied
d - Pyrene value used
ND - No Data

Table 4-11
Sediment TRVs
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	TRV		Units	Reference	TOC (%)
Inorganics					
Aluminum	2.55E+04		mg/kg	Buchman 1999	
Copper	1.60E+01		mg/kg	OME 1993; USEPA 1999a	
Iron	2.00E+04		mg/kg	OME 1993	
Lead	3.10E+01		mg/kg	OME 1993; USEPA 1999a	
Zirconium	ND		mg/kg	--	
Organics					
1,6-Dinitropyrene	3.49E+01	a	ug/kg	--	4
1-Nitropyrene	1.04E+02	a	ug/kg	--	4
2,4-Dinitrotoluene	4.69E+01	a	ug/kg	--	4
2,5-Diphenyloxazole	ND		ug/kg	--	
2,6-Dinitrotoluene	1.01E+02	a	ug/kg	--	4
4-Nitrophenol	5.24E+02	a	ug/kg	--	4
Benzo[a]anthracene	3.20E+02		ug/kg	OME 1993	
Benzo[a]pyrene	3.70E+02		ug/kg	OME 1993	
Biphenyl (1,1-Biphenyl)	4.40E+03		ug/kg	USEPA 1996b; Jones et al. 1997	4
Dibenz[a,h]anthracene	6.00E+01		ug/kg	OME 1993	
Dioxin (2,3,7,8-TCDD)	4.09E-01	a	ug/kg	--	4
Diphenylamine	1.11E+03	a	ug/kg	--	4
Phenanthrene	5.60E+02		ug/kg	OME 1993	
Phenol	1.24E+02		ug/kg	Jones et al. 1997	4
Pyrene	4.90E+02		ug/kg	OME 1993	
Resorcinol	1.57E+02	a	ug/kg	--	4
Triacetin	ND		ug/kg	--	

a - Calculated using the equilibrium partitioning approach (see text)
ND - No Data

Table 4-12
Surface Soil TRVs
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Flora			Fauna		
	TRV	Units	Reference	TRV	Units	Reference
Inorganics						
Aluminum	pH < 5.5	--	USEPA 2000b	pH < 5.5	--	USEPA 2000b
Antimony	5.00E+00	mg/kg	Efroymson et al. 1997a	ND	mg/kg	--
Arsenic	1.00E+01	mg/kg	Efroymson et al. 1997a	6.00E+01	mg/kg	Efroymson et al. 1997b
Barium	5.00E+02	mg/kg	Efroymson et al. 1997a	3.00E+03	mg/kg	Efroymson et al. 1997b
Beryllium	1.00E+01	mg/kg	Efroymson et al. 1997a	ND	mg/kg	--
Cadmium	4.00E+00	mg/kg	Efroymson et al. 1997a	2.00E+01	mg/kg	Efroymson et al. 1997b
Chromium	1.00E+00	mg/kg	Efroymson et al. 1997a	4.00E-01	mg/kg	Efroymson et al. 1997b
Cobalt	2.00E+01	mg/kg	Efroymson et al. 1997a	1.00E+03	mg/kg	Efroymson et al. 1997b
Copper	1.00E+02	mg/kg	Efroymson et al. 1997a	5.00E+01	mg/kg	Efroymson et al. 1997b
Cyanide	2.75E+01	mg/kg	MHSPE 1994	2.75E+01	mg/kg	MHSPE 1994
Iron	ND	mg/kg	--	ND	mg/kg	--
Lead	5.00E+01	mg/kg	Efroymson et al. 1997a	5.00E+02	mg/kg	Efroymson et al. 1997b
Manganese	5.00E+02	mg/kg	Efroymson et al. 1997a	1.00E+02	mg/kg	Efroymson et al. 1997b
Mercury	3.00E-01	mg/kg	Efroymson et al. 1997a	1.00E-01	mg/kg	Efroymson et al. 1997b
Nickel	3.00E+01	mg/kg	Efroymson et al. 1997a	2.00E+02	mg/kg	Efroymson et al. 1997b
Selenium	1.00E+00	mg/kg	Efroymson et al. 1997a	7.00E+01	mg/kg	Efroymson et al. 1997b
Silver	2.00E+00	mg/kg	Efroymson et al. 1997a	5.00E+01	mg/kg	Efroymson et al. 1997b
Thallium	1.00E+00	mg/kg	Efroymson et al. 1997a	ND	mg/kg	--
Tin	5.00E+01	mg/kg	Efroymson et al. 1997a	2.00E+02	mg/kg	Efroymson et al. 1997b
Vanadium	2.00E+00	mg/kg	Efroymson et al. 1997a	2.00E+01	mg/kg	Efroymson et al. 1997b
Zinc	5.00E+01	mg/kg	Efroymson et al. 1997a	2.00E+02	mg/kg	Efroymson et al. 1997b
Zirconium	ND	mg/kg	--	ND	mg/kg	--
Organics						
1,6-Dinitropyrene	1.20E+03 d	ug/kg	--	2.50E+04 d	ug/kg	--
1-Nitropyrene	1.20E+03 d	ug/kg	--	2.50E+04 d	ug/kg	--
2,4-Dinitrotoluene	ND	ug/kg	--	ND	ug/kg	--
2,5-Diphenyloxazole	ND	ug/kg	--	ND	ug/kg	--
2,6-Dinitrotoluene	ND	ug/kg	--	ND	ug/kg	--
4-Nitrophenol	ND	ug/kg	--	3.80E+02 b	ug/kg	Efroymson et al. 1997b

Table 4-12
Surface Soil TRVs
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Flora				Fauna			
	TRV		Units	Reference	TRV		Units	Reference
Acetone	ND		ug/kg	--	ND		ug/kg	--
Benzo[a]anthracene	1.20E+03		ug/kg	USEPA 1999a	2.50E+04		ug/kg	USEPA 1999a
Benzo[a]pyrene	1.20E+03		ug/kg	USEPA 1999a	2.50E+04		ug/kg	USEPA 1999a
Biphenyl (1,1-Biphenyl)	6.80E+03	a	ug/kg	Efroymson et al. 1997a	ND		ug/kg	--
bis(2-Ethylhexyl)phthalate	1.00E+04	c	ug/kg	IPCS 1992	ND		ug/kg	--
Chrysene	1.20E+03		ug/kg	USEPA 1999a	2.50E+04		ug/kg	USEPA 1999a
Dibenz[a,h]anthracene	1.20E+03		ug/kg	USEPA 1999a	2.50E+04		ug/kg	USEPA 1999a
Diethylphthalate	1.34E+04	a	ug/kg	Efroymson et al. 1997a	ND		ug/kg	--
Dimethyl phthalate	ND		ug/kg	--	1.06E+04	b	ug/kg	Efroymson et al. 1997b
Dioxin (2,3,7,8-TCDD)	ND		ug/kg	--	5.00E+02		ug/kg	USEPA 1999a
Diphenylamine	ND		ug/kg	--	ND		ug/kg	--
HMX	ND		ug/kg	--	5.00E+03	c	ug/kg	Talmage et al. 1999
Naphthalene	ND		ug/kg	--	ND		ug/kg	--
PAH, total	2.05E+04		ug/kg	MHSPE 1994	2.05E+04		ug/kg	MHSPE 1994
Perchlorate	ND		ug/kg	--	ND		ug/kg	--
Phenanthrene	ND		ug/kg	--	ND		ug/kg	--
Phenol	7.90E+03	a	ug/kg	Efroymson et al. 1997a	1.88E+03	b	ug/kg	Efroymson et al. 1997b
Pyrene	1.20E+03	d	ug/kg	--	2.50E+04	d	ug/kg	--
RDX	1.00E+03	ac	ug/kg	Talmage et al. 1999	5.00E+03	c	ug/kg	Talmage et al. 1999
Resorcinol	ND		ug/kg	--	ND		ug/kg	--
Triacetin	ND		ug/kg	--	ND		ug/kg	--
Trichloroethene	6.00E+03		ug/kg	MHSPE 1994	6.00E+03		ug/kg	MHSPE 1994

a - Chronic LOEC to chronic NOEC UF of 10 applied
b - LC50 to chronic NOEC UF of 100 applied
c - Subchronic to chronic UF of 10 applied
d - Benzo(a)pyrene value used

ND - No Data

Table 4-13
Background Soils Data Summary
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Surface Soil (mg/kg)					Subsurface Soil (mg/kg)				
	Minimum	Maximum	Mean	SD	UTL	Minimum	Maximum	Mean	SD	UTL
Separate Estimates										
Aluminum	1,850	11,250	7,334	3,483	17,891	8,220	22,500	13,128	4,307	22,500
Antimony	9.90	17.5	9.36	5.54	33.0	2.90	3.00	2.26	0.37	5.70
Beryllium	0.65	1.20	0.44	0.33	1.20	0.90	1.50	0.85	0.53	1.50
Chromium	2.80	14.3	10.7	4.61	14.3	12.3	24.0	16.4	3.85	24.0
Copper	7.50	24.4	17.8	4.82	32.0	19.6	31.6	24.6	4.02	35.3
Cyanide	(0.60)	(0.70)	0.65	0.04	0.65	--	--	--	--	--
Iron	4,160	28,700	19,726	9,142	28,700	17,500	41,300	30,215	5,990	46,212
Pooled Estimates										
Arsenic	1.70	13.1	7.36	2.85	14.5	1.70	13.1	7.36	2.85	14.5
Barium	43.3	220	92.8	55.0	231	43.3	220	92.8	55.0	231
Cadmium	0.95	2.40	0.65	0.63	2.40	0.95	2.40	0.65	0.63	2.40
Cobalt	7.20	22.0	11.6	5.60	25.7	7.20	22.0	11.6	5.60	25.7
Lead	6.60	41.5	20.0	10.6	41.5	6.60	41.5	20.0	10.6	41.5
Managanese	76.2	1,240	559	395	1,240	76.2	1,240	559	395	1,240
Mercury	0.17	0.17	0.04	0.03	0.17	0.17	0.17	0.04	0.03	0.17
Nickel	4.00	27.0	20.3	6.26	27.6	4.00	27.0	20.3	6.26	27.6
Selenium	0.45	2.40	0.45	0.45	2.40	0.45	2.40	0.45	0.45	2.40
Silver	0.48	2.10	0.61	0.50	2.10	0.48	2.10	0.61	0.50	2.10
Thallium	1.50	2.90	1.07	0.98	2.90	1.50	2.90	1.07	0.98	2.90
Vanadium	13.1	33.4	19.5	7.58	38.6	13.1	33.4	19.5	7.58	38.6
Zinc	24.6	107	58.0	24.2	119	24.6	107	58.0	24.2	119

SD - Standard Deviation
UTL - Upper Tolerance Limit
( ) - Not Detected; Values Based on Detection Limits

Table 4-14
Ingestion TRVs for Mammals
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Test Organism	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	NOAEL (mg/kg/d)	Reference	Shrew	Vole	Mink	Fox
Inorganics											
Arsenic	mouse	3 generations	oral in water	reproduction	1.26E+00	1.26E-01 a	Sample et al. 1996	X	X		
Arsenic	dog	2 years	oral	--	1.25E+01	1.25E+00	USEPA 1999a			X	X
Cadmium	rat	6 weeks	oral (gavage)	reproduction	1.00E+01	1.00E+00	Sample et al. 1996	X	X		
Cadmium	dog	3 months	oral	reproduction	7.50E+00	7.50E-01	ATSDR 1999c			X	X
Chromium	rat	3 months	oral in water	mortality	1.31E+02	1.31E+01 a	Sample et al. 1996	X	X	X	X
Copper	mink	357 days	oral in diet	reproduction	1.51E+01	1.17E+01	Sample et al. 1996	X	X	X	X
Lead	rat	3 generations	oral in diet	reproduction	8.00E+01	8.00E+00	Sample et al. 1996	X	X	X	X
Mercury	mouse	6 months	oral in diet	reproduction	1.32E+02	1.32E+01	Sample et al. 1996	X	X		
Mercury	mink	93 days	oral in diet	mortality/weight loss	2.50E-01	1.50E-01	Sample et al. 1996			X	X
Nickel	rat	3 generations	oral in diet	reproduction	8.00E+01	4.00E+01	Sample et al. 1996	X	X	X	X
Selenium	rat	1 year	oral in water	reproduction	3.30E-01	2.00E-01	Sample et al. 1996	X	X	X	X
Silver	rat	2 weeks	oral in water	mortality	1.81E+02	1.81E+01 c	ATSDR 1990b	X	X	X	X
Tin	mouse	GD 6-15	oral (intubation)	reproduction	3.50E+01	2.34E+01	Sample et al. 1996	X	X	X	X
Zinc	rat	GD 1-16	oral in diet	reproduction	3.20E+02	1.60E+02	Sample et al. 1996	X	X		
Zinc	mink	25 weeks	oral	reproduction	2.08E+02	2.08E+01	ATSDR 1994b			X	X
Organics											
1,6-Dinitropyrene	mouse	GD 7-16	oral (intubation)	reproduction	1.00E+01 b	1.00E+00 b	Sample et al. 1996	X	X	X	X
1-Nitropyrene	mouse	GD 7-16	oral (intubation)	reproduction	1.00E+01 b	1.00E+00 b	Sample et al. 1996	X	X	X	X
Benzo(a)anthracene	mouse	GD 7-16	oral (intubation)	reproduction	1.00E+01 b	1.00E+00 b	Sample et al. 1996	X	X	X	X
Benzo(a)pyrene	mouse	GD 7-16	oral (intubation)	reproduction	1.00E+01	1.00E+00	Sample et al. 1996	X	X	X	X
Chrysene	mouse	GD 7-16	oral (intubation)	reproduction	1.00E+01 b	1.00E+00 b	Sample et al. 1996	X	X	X	X
Dibenz(a,h)anthracene	mouse	GD 7-16	oral (intubation)	reproduction	1.00E+01 b	1.00E+00 b	Sample et al. 1996	X	X	X	X
Dioxin (2,3,7,8-TCDD)	rat	3 generations	oral in diet	reproduction	1.00E-05	1.00E-06	Sample et al. 1996	X	X	X	X
Phenanthrene	mouse	GD 7-16	oral (intubation)	reproduction	1.00E+01 b	1.00E+00 b	Sample et al. 1996	X	X	X	X
Pyrene	mouse	GD 7-16	oral (intubation)	reproduction	1.00E+01 b	1.00E+00 b	Sample et al. 1996	X	X	X	X

a - Chronic LOAEL to chronic NOAEL UF of 10 applied
b - Benzo(a)pyrene value used
c - Subchronic to chronic UF of 10 applied

Table 4-15
Ingestion TRVs for Birds
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Test Organism	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	NOAEL (mg/kg/d)	Reference	Robin	Kestrel	Hawk	Heron	Kingfisher
Inorganics												
Arsenic	cowbird	7 months	oral in diet	mortality	7.38E+00	2.46E+00	Sample et al. 1996	X	X	X		
Arsenic	mallard	128 days	oral in diet	mortality	1.28E+01	5.14E+00	Sample et al. 1996				X	X
Cadmium	mallard	90 days	oral in diet	reproduction	2.00E+01	1.45E+00	Sample et al. 1996	X	X	X	X	X
Chromium	black duck	10 months	oral in diet	reproduction	5.00E+00	1.00E+00	Sample et al. 1996	X	X	X	X	X
Copper	chicks	10 weeks	oral in diet	growth/mortality	6.17E+01	4.70E+01	Sample et al. 1996	X	X	X	X	X
Lead	American kestrel	7 months	oral in diet	reproduction	3.85E+01	3.85E+00	Sample et al. 1996	X	X	X	X	X
Mercury	Japanese quail	1 year	oral in diet	reproduction	9.00E-01	4.50E-01	Sample et al. 1996	X	X	X		
Mercury, methyl	mallard	3 generations	oral in diet	reproduction	7.80E-02	2.60E-02	USEPA 1997b				X	X
Nickel	mallard	90 days	oral in diet	growth/mortality	1.07E+02	7.74E+01	Sample et al. 1996	X	X	X	X	X
Selenium	mallard	100 days	oral in diet	reproduction	8.00E-01	4.00E-01	Sample et al. 1996				X	X
Selenium	screech owl	14 weeks	oral in diet	reproduction	1.50E+00	4.40E-01	Sample et al. 1996	X	X	X		
Silver	mallard	14 days	oral	--	1.78E+03	1.78E+02 c	USEPA 1999a	X	X	X	X	X
Tin	Japanese quail	6 weeks	oral in diet	reproduction	1.69E+01	6.76E+00	Sample et al. 1996	X	X	X	X	X
Zinc	chicken	44 weeks	oral in diet	reproduction	1.31E+02	1.45E+01	Sample et al. 1996	X	X	X	X	X
Organics												
1,6-Dinitropyrene	chicken	34 days	oral in diet	reproduction	3.95E+01 b	3.95E+00 b	Rigdon and Neal 1963	X	X	X	X	X
1-Nitropyrene	chicken	34 days	oral in diet	reproduction	3.95E+01 b	3.95E+00 b	Rigdon and Neal 1963	X	X	X	X	X
Benzo(a)anthracene	chicken	34 days	oral in diet	reproduction	3.95E+01 b	3.95E+00 b	Rigdon and Neal 1963	X	X	X	X	X
Benzo(a)pyrene	chicken	34 days	oral in diet	reproduction	3.95E+01	3.95E+00 c	Rigdon and Neal 1963	X	X	X	X	X
Chrysene	chicken	34 days	oral in diet	reproduction	3.95E+01 b	3.95E+00 b	Rigdon and Neal 1963	X	X	X	X	X
Dibenz(a,h)anthracene	chicken	34 days	oral in diet	reproduction	3.95E+01 b	3.95E+00 b	Rigdon and Neal 1963	X	X	X	X	X
Dioxin (2,3,7,8-TCDD)	pheasant	10 weeks	injection	reproduction	1.40E-04	1.40E-05	Sample et al. 1996	X	X	X	X	X
Phenanthrene	chicken	34 days	oral in diet	reproduction	3.95E+01 b	3.95E+00 b	Rigdon and Neal 1963	X	X	X	X	X
Pyrene	chicken	34 days	oral in diet	reproduction	3.95E+01 b	3.95E+00 b	Rigdon and Neal 1963	X	X	X	X	X

a - Chronic LOAEL to chronic NOAEL UF of 10 applied
b - Benzo(a)pyrene value used
c - Subchronic to chronic UF of 10 applied

Table 4-16
Toxicity Equivalency Factors for Dioxin and Furan Congeners
Allegany Ballistics Laboratory, Mineral County, WV

Congener	Fish TEF	Mammal TEF	Bird TEF
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.001	0.01	0.001
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.01	0.01	0.01
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01	0.01	0.01
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.5	0.1	0.05
1,2,3,4,7,8-Hexachlorodibenzofuran	0.1	0.1	0.1
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.01	0.1	0.01
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1	0.1	0.1
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.01	0.1	0.1
1,2,3,7,8,9-Hexachlorodibenzofuran	0.1	0.1	0.1
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	1.0	1.0	1.0
1,2,3,7,8-Pentachlorodibenzofuran	0.05	0.05	0.1
2,3,4,6,7,8-Hexachlorodibenzofuran	0.1	0.1	0.1
2,3,4,7,8-Pentachlorodibenzofuran	0.5	0.5	1.0
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.0	1.0	1.0
2,3,7,8-Tetrachlorodibenzofuran	0.05	0.1	1.0
Total octachlorodibenzo-p-dioxin	0.0001	0.0001	0.0001
Total octachlorodibenzofuran	0.0001	0.0001	0.0001

ND - No Data

Table 5-1 Screening Statistics - Air - Maximum Point *Allegany Ballistics Laboratory, Mineral County, WV*			
Chemical	**Annual Average Concentration in Ground-Level Air (ug/m^3)**	**TRV (ug/m^3)**	**Hazard Quotient**
Inorganics			
Aluminum	3.17E+00	2.45E+03	1.30E-03
Copper	1.62E-01	6.00E+01	2.70E-03
Iron	1.78E-03	ND	--
Lead	4.20E-01	2.46E+00	1.71E-01
Zirconium	7.59E-03	ND	--
Organics			
1,3-Butadiene	1.61E-03	1.41E+03	1.14E-06
1,6-Dinitropyrene	1.43E-06	ND	--
1-Methylnaphthalene	7.62E-05	ND	--
1-Nitropyrene	6.98E-05	ND	--
2,4-Dinitrotoluene	1.43E-06	ND	--
2,5-Diphenyloxazole	3.02E-05	ND	--
2,6-Dinitrotoluene	5.00E-06	2.40E+03	2.09E-09
2-Methylnaphthalene	7.62E-05	ND	--
2-Nitronaphthalene	1.47E-06	ND	--
4-Nitrophenol	1.43E-06	3.00E+03	4.76E-10
4-Nitrosodiphenylamine	1.43E-06	ND	--
Benzo[a]anthracene	3.80E-06	ND	--
Benzene	3.49E-02	9.57E+04	3.65E-07
Benzo[a]pyrene	1.43E-06	ND	--
Biphenyl (1,1-Biphenyl)	1.49E-04	1.58E+04	9.46E-09
Dibenz[a,h]anthracene	1.43E-06	ND	--
Dibenzofuran	3.17E-05	ND	--
Di-n-propyl adipate (Dipropyl adipate)	4.29E-05	ND	--
Dioxin (2,3,7,8-TCDD)	8.25E-10	ND	--
Diphenylamine	6.03E-06	ND	--
Mesitylene (1,3,5-trimethylbenzene)	4.85E-05	1.18E+05	4.11E-10
Naphthalene	3.37E-06	1.57E+05	2.14E-11
n-Hexane	1.61E-03	1.79E+06	8.98E-10
N-Nitrosodiphenylamine	1.43E-06	ND	--
Phenanthrene	6.35E-05	ND	--
Phenol	2.42E-06	1.93E+04	1.26E-10
Pyrene	1.43E-06	ND	--
Resorcinol	2.86E-04	3.40E+03	8.42E-08
Styrene	1.61E-03	2.13E+04	7.55E-08
Thianaphthene (benzo[b]thiophene)	1.43E-06	ND	--
Toluene	3.41E-02	1.51E+05	2.26E-07
Triacetin	1.43E-06	2.23E+06	6.40E-13
Xylenes	9.16E-03	8.68E+04	1.06E-07
ND - No Data			

Table 5-2
Screening Statistics - Soil - Maximum Point
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Soil Concentration (mg/kg)			Flora				Soil Fauna				Background			
	1 cm	10 cm	20 cm	TRV (mg/kg)	HQ 1 cm	HQ 10 cm	HQ 20 cm	TRV (mg/kg)	HQ 1 cm	HQ 10 cm	HQ 20 cm	Value	Ratio 1 cm	Ratio 10 cm	Ratio 20 cm
Inorganics															
Aluminum	1.44E+03	2.94E+01	7.35E+00	pH < 5.5	OK	OK	OK	pH < 5.5	OK	OK	OK	1.79E+04	8.04E-02	1.64E-03	4.11E-04
Copper	9.67E+01	6.39E+00	2.17E+00	1.00E+02	9.67E-01	6.39E-02	2.17E-02	5.00E+01	1.93E+00	1.28E-01	4.34E-02	3.20E+01	3.02E+00	2.00E-01	6.79E-02
Iron	2.68E-02	2.76E-04	6.90E-05	ND	--	--	--	ND	--	--	--	2.87E+04	9.35E-07	9.62E-09	2.41E-09
Lead	1.56E+02	2.33E+00	5.84E-01	5.00E+01	3.12E+00	4.67E-02	1.17E-02	5.00E+02	3.12E-01	4.67E-03	1.17E-03	4.15E+01	3.76E+00	5.62E-02	1.41E-02
Zirconium	4.04E+00	1.36E-01	3.51E-02	ND	--	--	--	ND	--	--	--	ND	--	--	--
Organics															
1,6-Dinitropyrene	1.02E-04	1.77E-06	4.62E-07	1.20E+00	8.52E-05	1.48E-06	3.85E-07	2.50E+01	4.09E-06	7.10E-08	1.85E-08	--	--	--	--
1-Nitropyrene	7.83E-03	2.24E-04	6.24E-05	1.20E+00	6.52E-03	1.87E-04	5.20E-05	2.50E+01	3.13E-04	8.96E-06	2.49E-06	--	--	--	--
2,4-Dinitrotoluene	5.37E-07	5.66E-09	1.42E-09	ND	--	--	--	ND	--	--	--	--	--	--	--
2,5-Diphenyloxazole	6.62E-05	4.38E-06	1.59E-06	ND	--	--	--	ND	--	--	--	--	--	--	--
2,6-Dinitrotoluene	1.62E-06	1.70E-08	4.26E-09	ND	--	--	--	ND	--	--	--	--	--	--	--
4-Nitrophenol	1.11E-07	3.72E-09	1.07E-09	ND	--	--	--	3.80E-01	2.92E-07	9.80E-09	2.82E-09	--	--	--	--
Benzo[a]anthracene	2.07E-04	1.59E-05	6.29E-06	1.20E+00	1.72E-04	1.32E-05	5.24E-06	2.50E+01	8.27E-06	6.34E-07	2.52E-07	--	--	--	--
Benzo[a]pyrene	6.24E-05	5.86E-06	2.74E-06	1.20E+00	5.20E-05	4.88E-06	2.28E-06	2.50E+01	2.50E-06	2.34E-07	1.10E-07	--	--	--	--
Biphenyl (1,1-Biphenyl)	8.25E-05	5.78E-06	2.17E-06	6.80E+00	1.21E-05	8.50E-07	3.19E-07	ND	--	--	--	--	--	--	--
Dibenz[a,h]anthracene	1.11E-04	1.04E-05	4.88E-06	1.20E+00	9.22E-05	8.68E-06	4.07E-06	2.50E+01	4.43E-06	4.17E-07	1.95E-07	--	--	--	--
Dioxin (2,3,7,8-TCDD)	4.03E-08	3.92E-09	1.91E-09	ND	--	--	--	5.00E-01	8.06E-08	7.85E-09	3.81E-09	--	--	--	--
Diphenylamine	9.25E-06	2.32E-07	6.33E-08	ND	--	--	--	ND	--	--	--	--	--	--	--
Phenanthrene	9.34E-04	4.62E-05	1.48E-05	ND	--	--	--	ND	--	--	--	--	--	--	--
Phenol	4.08E-07	5.14E-09	1.30E-09	7.90E+00	5.16E-08	6.50E-10	1.65E-10	1.88E+00	2.17E-07	2.73E-09	6.92E-10	--	--	--	--
Pyrene	1.62E-04	4.74E-06	1.32E-06	1.20E+00	1.35E-04	3.95E-06	1.10E-06	2.50E+01	6.48E-06	1.90E-07	5.30E-08	--	--	--	--
Resorcinol	2.44E-05	3.26E-07	8.29E-08	ND	--	--	--	ND	--	--	--	--	--	--	--
Triacetin	1.32E-07	1.37E-09	3.43E-10	ND	--	--	--	ND	--	--	--	--	--	--	--

ND - No Data
HQ = Hazard Quotient

Table 5-3
Screening Statistics - Soil - Fenceline Average (5 Grid Locations)
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Soil Concentration (mg/kg)			Flora				Soil Fauna				Background			
	1 cm	10 cm	20 cm	TRV (mg/kg)	HQ 1 cm	HQ 10 cm	HQ 20 cm	TRV (mg/kg)	HQ 1 cm	HQ 10 cm	HQ 20 cm	Value	Ratio 1 cm	Ratio 10 cm	Ratio 20 cm
Inorganics															
Aluminum	1.43E+02	2.93E+00	7.33E-01	pH < 5.5	OK	OK	OK	pH < 5.5	OK	OK	OK	1.79E+04	8.02E-03	1.64E-04	4.10E-05
Copper	5.19E+00	3.42E-01	1.17E-01	1.00E+02	5.19E-02	3.42E-03	1.17E-03	5.00E+01	1.04E-01	6.85E-03	2.33E-03	3.20E+01	1.62E-01	1.07E-02	3.64E-03
Iron	1.44E-03	1.48E-05	3.70E-06	ND	--	--	--	ND	--	--	--	2.87E+04	5.01E-08	5.16E-10	1.29E-10
Lead	1.12E+01	1.67E-01	4.19E-02	5.00E+01	2.24E-01	3.35E-03	8.37E-04	5.00E+02	2.24E-02	3.35E-04	8.37E-05	4.15E+01	2.70E-01	4.03E-03	1.01E-03
Zirconium	3.32E-01	1.12E-02	2.89E-03	ND	--	--	--	ND	--	--	--	ND	--	--	--
Organics															
1,6-Dinitropyrene	1.02E-05	1.77E-07	4.61E-08	1.20E+00	8.50E-06	1.47E-07	3.84E-08	2.50E+01	4.08E-07	7.08E-09	1.84E-09	--	--	--	--
1-Nitropyrene	7.81E-04	2.23E-05	6.22E-06	1.20E+00	6.51E-04	1.86E-05	5.18E-06	2.50E+01	3.12E-05	8.94E-07	2.49E-07	--	--	--	--
2,4-Dinitrotoluene	5.36E-08	5.64E-10	1.41E-10	ND	--	--	--	ND	--	--	--	--	--	--	--
2,5-Diphenyloxazole	6.60E-06	4.37E-07	1.59E-07	ND	--	--	--	ND	--	--	--	--	--	--	--
2,6-Dinitrotoluene	1.34E-07	1.40E-09	3.51E-10	ND	--	--	--	ND	--	--	--	--	--	--	--
4-Nitrophenol	1.11E-08	3.72E-10	1.07E-10	ND	--	--	--	3.80E-01	2.91E-08	9.78E-10	2.81E-10	--	--	--	--
Benzo[a]anthracene	1.70E-05	1.30E-06	5.18E-07	1.20E+00	1.42E-05	1.09E-06	4.32E-07	2.50E+01	6.81E-07	5.22E-08	2.07E-08	--	--	--	--
Benzo[a]pyrene	6.23E-06	5.84E-07	2.73E-07	1.20E+00	5.19E-06	4.87E-07	2.28E-07	2.50E+01	2.49E-07	2.34E-08	1.09E-08	--	--	--	--
Biphenyl (1,1-Biphenyl)	8.22E-06	5.76E-07	2.16E-07	6.80E+00	1.21E-06	8.47E-08	3.18E-08	ND	--	--	--	--	--	--	--
Dibenz[a,h]anthracene	1.10E-05	1.04E-06	4.87E-07	1.20E+00	9.20E-06	8.66E-07	4.06E-07	2.50E+01	4.42E-07	4.15E-08	1.95E-08	--	--	--	--
Dioxin (2,3,7,8-TCDD)	4.02E-09	3.91E-10	1.90E-10	ND	--	--	--	5.00E-01	8.03E-09	7.83E-10	3.81E-10	--	--	--	--
Diphenylamine	9.22E-07	2.32E-08	6.31E-09	ND	--	--	--	ND	--	--	--	--	--	--	--
Phenanthrene	9.32E-05	4.61E-06	1.47E-06	ND	--	--	--	ND	--	--	--	--	--	--	--
Phenol	3.36E-08	4.23E-10	1.07E-10	7.90E+00	4.25E-09	5.35E-11	1.36E-11	1.88E+00	1.79E-08	2.25E-10	5.69E-11	--	--	--	--
Pyrene	1.62E-05	4.73E-07	1.32E-07	1.20E+00	1.35E-05	3.94E-07	1.10E-07	2.50E+01	6.46E-07	1.89E-08	5.28E-09	--	--	--	--
Resorcinol	1.75E-06	2.34E-08	5.94E-09	ND	--	--	--	ND	--	--	--	--	--	--	--
Triacetin	1.32E-08	1.37E-10	3.42E-11	ND	--	--	--	ND	--	--	--	--	--	--	--

ND - No Data
HQ = Hazard Quotient

Table 5-4
Hazard Quotients for Upper Trophic Level Terrestrial Receptors - Screening (Maximum Point)
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Short-tailed shrew		Meadow vole		Red fox		American robin		Red-tailed hawk	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
1 cm Soil Mixing Depth										
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	1.72	1.33	0.59	0.45	0.40	0.31	0.25	0.19	0.08	0.06
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	0.11	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	4.04	0.40	1.14	0.11	0.28	0.03	4.88	0.49	0.45	0.04
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10 cm Soil Mixing Depth										
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	0.11	0.09	0.08	0.06	0.03	0.02	0.02	0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.06	<0.01	0.18	0.02	<0.01	<0.01	0.07	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20 cm Soil Mixing Depth										
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	0.04	0.03	0.06	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.02	<0.01	0.17	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 5-5
Hazard Quotients for Upper Trophic Level Terrestrial Receptors - Baseline (Maximum Point)
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Short-tailed shrew		Meadow vole		Red fox		American robin		Red-tailed hawk	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
1 cm Soil Mixing Depth										
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	0.40	0.31	0.28	0.21	0.07	0.06	0.09	0.07	0.01	0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.71	0.07	0.53	0.05	0.09	<0.01	1.36	0.14	0.10	0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10 cm Soil Mixing Depth										
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	0.03	0.02	0.04	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.02	<0.01	0.09	<0.01	<0.01	<0.01	0.15	0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20 cm Soil Mixing Depth										
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	0.01	<0.01	0.03	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	0.08	<0.01	<0.01	<0.01	0.13	0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 5-6
Hazard Quotients for Upper Trophic Level Terrestrial Receptors - Baseline (Fenceline Average)
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Short-tailed shrew		Meadow vole		Red fox		American robin		Red-tailed hawk	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
1 cm Soil Mixing Depth										
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	0.02	0.02	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.05	<0.01	0.04	<0.01	<0.01	<0.01	0.10	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10 cm Soil Mixing Depth										
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20 cm Soil Mixing Depth										
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 5-7
Screening Statistics - Surface Water - North Branch Potomac River
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Water Concentration (mg/L)			TRV (mg/L)	Hazard Quotient		
	1 cm Soil	10 cm Soil	20 cm Soil		1 cm	10 cm	20 cm
Inorganics							
Aluminum	1.33E-02	1.07E-03	8.75E-04	8.70E-02	1.53E-01	1.23E-02	1.01E-02
Copper	5.30E-04	7.22E-05	5.08E-05	1.32E-02	4.01E-02	5.45E-03	3.84E-03
Iron	7.02E-06	5.26E-07	4.75E-07	1.00E+00	7.02E-06	5.26E-07	4.75E-07
Lead	1.88E-03	1.34E-04	1.14E-04	4.13E-03	4.56E-01	3.25E-02	2.77E-02
Zirconium	2.86E-05	2.83E-06	2.16E-06	1.70E-02	1.69E-03	1.66E-04	1.27E-04
Organics							
1,6-Dinitropyrene	4.58E-09	4.36E-10	3.82E-10	4.00E-05	1.14E-04	1.09E-05	9.56E-06
1-Nitropyrene	1.94E-07	2.24E-08	1.88E-08	4.00E-05	4.85E-03	5.60E-04	4.69E-04
2,4-Dinitrotoluene	5.41E-09	4.21E-10	3.81E-10	2.30E-02	2.35E-07	1.83E-08	1.66E-08
2,5-Diphenyloxazole	1.51E-08	8.22E-09	7.91E-09	ND	--	--	--
2,6-Dinitrotoluene	1.90E-08	1.47E-09	1.34E-09	6.00E-02	3.17E-07	2.46E-08	2.23E-08
4-Nitrophenol	1.54E-09	4.07E-10	3.79E-10	3.00E-01	5.14E-09	1.36E-09	1.26E-09
Benzo[a]anthracene	3.84E-09	1.09E-09	9.49E-10	2.70E-05	1.42E-04	4.03E-05	3.52E-05
Benzo[a]pyrene	8.49E-10	3.00E-10	2.69E-10	1.40E-05	6.06E-05	2.14E-05	1.92E-05
Biphenyl (1,1-Biphenyl)	6.46E-08	3.95E-08	3.83E-08	1.40E-02	4.61E-06	2.82E-06	2.74E-06
Dibenz[a,h]anthracene	1.01E-09	2.65E-10	2.24E-10	4.00E-06	2.52E-04	6.63E-05	5.61E-05
Dioxin (2,3,7,8-TCDD)	3.24E-13	1.10E-13	9.86E-14	3.80E-09	8.54E-05	2.91E-05	2.59E-05
Diphenylamine	9.15E-09	1.74E-09	1.60E-09	3.79E-02	2.41E-07	4.60E-08	4.23E-08
Phenanthrene	5.57E-08	1.81E-08	1.68E-08	6.30E-03	8.84E-06	2.87E-06	2.66E-06
Phenol	7.59E-09	7.10E-10	6.44E-10	1.10E-01	6.90E-08	6.45E-09	5.86E-09
Pyrene	3.94E-09	4.60E-10	3.84E-10	4.00E-05	9.85E-05	1.15E-05	9.60E-06
Resorcinol	8.45E-07	8.40E-08	7.63E-08	6.82E-01	1.24E-06	1.23E-07	1.12E-07
Triacetin	5.49E-09	4.21E-10	3.81E-10	ND	--	--	--

ND - No Data

Table 5-8
Screening Statistics - Sediment - North Branch Potomac River
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Sediment Concentration (mg/kg)			TRV (mg/kg)	Hazard Quotient		
	1 cm Soil	10 cm Soil	20 cm Soil		1 cm	10 cm	20 cm
Inorganics							
Aluminum	1.99E+01	1.60E+00	1.31E+00	2.55E+04	7.81E-04	6.27E-05	5.15E-05
Copper	5.30E+00	7.22E-01	5.08E-01	1.60E+01	3.31E-01	4.51E-02	3.18E-02
Iron	1.76E-04	1.31E-05	1.19E-05	2.00E+04	8.78E-09	6.57E-10	5.94E-10
Lead	1.69E+00	1.21E-01	1.03E-01	3.10E+01	5.46E-02	3.90E-03	3.32E-03
Zirconium	8.59E-02	8.49E-03	6.48E-03	ND	--	--	--
Organics							
1,6-Dinitropyrene	4.00E-06	3.81E-07	3.34E-07	3.49E-02	1.14E-04	1.09E-05	9.56E-06
1-Nitropyrene	5.05E-04	5.85E-05	4.89E-05	1.04E-01	4.85E-03	5.60E-04	4.69E-04
2,4-Dinitrotoluene	1.10E-08	8.59E-10	7.77E-10	4.69E-02	2.35E-07	1.83E-08	1.66E-08
2,5-Diphenyloxazole	3.74E-06	2.05E-06	1.97E-06	ND	--	--	--
2,6-Dinitrotoluene	3.19E-08	2.47E-09	2.24E-09	1.01E-01	3.17E-07	2.46E-08	2.23E-08
4-Nitrophenol	2.70E-09	7.12E-10	6.63E-10	5.24E-01	5.14E-09	1.36E-09	1.26E-09
Benzo[a]anthracene	3.99E-05	1.13E-05	9.87E-06	3.20E-01	1.25E-04	3.53E-05	3.09E-05
Benzo[a]pyrene	3.29E-05	1.16E-05	1.04E-05	3.70E-01	8.89E-05	3.14E-05	2.82E-05
Biphenyl (1,1-Biphenyl)	4.82E-06	2.95E-06	2.86E-06	4.40E+00	1.10E-06	6.70E-07	6.50E-07
Dibenz[a,h]anthracene	7.21E-05	1.90E-05	1.61E-05	6.00E-02	1.20E-03	3.17E-04	2.68E-04
Dioxin (2,3,7,8-TCDD)	3.49E-08	1.19E-08	1.06E-08	4.09E-04	8.54E-05	2.91E-05	2.59E-05
Diphenylamine	2.68E-07	5.11E-08	4.71E-08	1.11E+00	2.41E-07	4.60E-08	4.23E-08
Phenanthrene	4.66E-05	1.51E-05	1.40E-05	5.60E-01	8.32E-05	2.70E-05	2.50E-05
Phenol	6.68E-09	6.25E-10	5.67E-10	1.24E-01	5.39E-08	5.04E-09	4.57E-09
Pyrene	1.07E-05	1.25E-06	1.04E-06	4.90E-01	2.19E-05	2.55E-06	2.13E-06
Resorcinol	1.94E-07	1.93E-08	1.75E-08	1.57E-01	1.24E-06	1.23E-07	1.12E-07
Triacetin	4.88E-10	3.74E-11	3.38E-11	ND	--	--	--

ND - No Data

Table 5-9
Hazard Quotients for Upper Trophic Level Aquatic Receptors - Screening - North Branch Potomac River
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Mink		Belted kingfisher		Great blue heron	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
1 cm Soil Mixing Depth						
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.16	0.12	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	0.04	<0.01	0.07	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10 cm Soil Mixing Depth						
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.02	0.02	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20 cm Soil Mixing Depth						
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.02	0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 5-10
Screening Statistics - Surface Water - Wetland
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Water Concentration (mg/L)			TRV (mg/L)	Hazard Quotient		
	1 cm Soil	10 cm Soil	20 cm Soil		1 cm	10 cm	20 cm
Inorganics							
Aluminum	6.80E-02	6.15E-03	5.19E-03	8.70E-02	7.82E-01	7.07E-02	5.96E-02
Copper	4.56E-04	6.06E-05	4.22E-05	1.32E-02	3.45E-02	4.58E-03	3.18E-03
Iron	4.87E-04	6.05E-05	5.72E-05	1.00E+00	4.87E-04	6.05E-05	5.72E-05
Lead	1.02E-02	8.89E-04	7.83E-04	4.13E-03	2.48E+00	2.16E-01	1.90E-01
Zirconium	6.77E-05	6.93E-06	5.36E-06	1.70E-02	3.98E-03	4.08E-04	3.15E-04
Organics							
1,6-Dinitropyrene	3.54E-09	4.31E-10	3.90E-10	4.00E-05	8.85E-05	1.08E-05	9.75E-06
1-Nitropyrene	1.45E-07	1.83E-08	1.56E-08	4.00E-05	3.63E-03	4.57E-04	3.89E-04
2,4-Dinitrotoluene	1.04E-07	1.36E-08	1.29E-08	2.30E-02	4.50E-06	5.90E-07	5.59E-07
2,5-Diphenyloxazole	3.45E-07	2.28E-07	2.23E-07	ND	--	--	--
2,6-Dinitrotoluene	3.27E-07	4.27E-08	4.04E-08	6.00E-02	5.45E-06	7.11E-07	6.74E-07
4-Nitrophenol	1.63E-07	6.44E-08	6.19E-08	3.00E-01	5.44E-07	2.15E-07	2.06E-07
Benzo[a]anthracene	2.35E-09	6.52E-10	5.67E-10	2.70E-05	8.70E-05	2.41E-05	2.10E-05
Benzo[a]pyrene	3.16E-10	1.06E-10	9.48E-11	1.40E-05	2.26E-05	7.60E-06	6.77E-06
Biphenyl (1,1-Biphenyl)	2.30E-08	1.70E-08	1.67E-08	1.40E-02	1.64E-06	1.21E-06	1.19E-06
Dibenz[a,h]anthracene	2.73E-10	6.83E-11	5.70E-11	4.00E-06	6.83E-05	1.71E-05	1.42E-05
Dioxin (2,3,7,8-TCDD)	6.75E-14	2.17E-14	1.92E-14	3.80E-09	1.78E-05	5.72E-06	5.05E-06
Diphenylamine	4.18E-08	1.23E-08	1.18E-08	3.79E-02	1.10E-06	3.25E-07	3.10E-07
Phenanthrene	2.83E-08	1.11E-08	1.05E-08	6.30E-03	4.50E-06	1.77E-06	1.67E-06
Phenol	1.86E-08	2.90E-09	2.75E-09	1.10E-01	1.69E-07	2.64E-08	2.50E-08
Pyrene	3.27E-09	4.12E-10	3.50E-10	4.00E-05	8.16E-05	1.03E-05	8.76E-06
Resorcinol	4.97E-05	8.22E-06	7.80E-06	6.82E-01	7.29E-05	1.21E-05	1.14E-05
Triacetin	4.22E-07	5.46E-08	5.17E-08	ND	--	--	--

ND - No Data

Table 5-11
Screening Statistics - Sediment - Wetland
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Sediment Concentration (mg/kg)			TRV (mg/kg)	Hazard Quotient		
	1 cm Soil	10 cm Soil	20 cm Soil		1 cm	10 cm	20 cm
Inorganics							
Aluminum	1.02E+02	9.23E+00	7.78E+00	2.55E+04	4.00E-03	3.62E-04	3.05E-04
Copper	4.56E+00	6.06E-01	4.22E-01	1.60E+01	2.85E-01	3.79E-02	2.63E-02
Iron	1.22E-02	1.51E-03	1.43E-03	2.00E+04	6.09E-07	7.57E-08	7.15E-08
Lead	9.21E+00	8.00E-01	7.05E-01	3.10E+01	2.97E-01	2.58E-02	2.27E-02
Zirconium	2.03E-01	2.08E-02	1.61E-02	ND	--	--	--
Organics							
1,6-Dinitropyrene	3.09E-06	3.76E-07	3.40E-07	3.49E-02	8.85E-05	1.08E-05	9.75E-06
1-Nitropyrene	3.79E-04	4.77E-05	4.06E-05	1.04E-01	3.63E-03	4.57E-04	3.89E-04
2,4-Dinitrotoluene	2.11E-07	2.77E-08	2.62E-08	4.69E-02	4.50E-06	5.90E-07	5.59E-07
2,5-Diphenyloxazole	8.58E-05	5.68E-05	5.55E-05	ND	--	--	--
2,6-Dinitrotoluene	5.48E-07	7.15E-08	6.78E-08	1.01E-01	5.45E-06	7.11E-07	6.74E-07
4-Nitrophenol	2.85E-07	1.13E-07	1.08E-07	5.24E-01	5.44E-07	2.15E-07	2.06E-07
Benzo[a]anthracene	2.44E-05	6.78E-06	5.89E-06	3.20E-01	7.64E-05	2.12E-05	1.84E-05
Benzo[a]pyrene	1.23E-05	4.12E-06	3.68E-06	3.70E-01	3.32E-05	1.11E-05	9.93E-06
Biphenyl (1,1-Biphenyl)	1.72E-06	1.27E-06	1.24E-06	4.40E+00	3.91E-07	2.88E-07	2.83E-07
Dibenz[a,h]anthracene	1.96E-05	4.89E-06	4.08E-06	6.00E-02	3.26E-04	8.15E-05	6.80E-05
Dioxin (2,3,7,8-TCDD)	7.26E-09	2.34E-09	2.07E-09	4.09E-04	1.78E-05	5.72E-06	5.05E-06
Diphenylamine	1.23E-06	3.61E-07	3.45E-07	1.11E+00	1.10E-06	3.25E-07	3.10E-07
Phenanthrene	2.37E-05	9.30E-06	8.79E-06	5.60E-01	4.23E-05	1.66E-05	1.57E-05
Phenol	1.64E-08	2.55E-09	2.42E-09	1.24E-01	1.32E-07	2.06E-08	1.95E-08
Pyrene	8.88E-06	1.12E-06	9.53E-07	4.90E-01	1.81E-05	2.29E-06	1.94E-06
Resorcinol	1.14E-05	1.89E-06	1.79E-06	1.57E-01	7.29E-05	1.21E-05	1.14E-05
Triacetin	3.75E-08	4.85E-09	4.59E-09	ND	--	--	--

ND - No Data

Table 5-12
Hazard Quotients for Upper Trophic Level Aquatic Receptors - Screening - Wetland
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Mink		Belted kingfisher		Great blue heron	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
1 cm Soil Mixing Depth						
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.14	0.11	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.04	<0.01	0.22	0.02	0.36	0.04
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10 cm Soil Mixing Depth						
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.02	0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	0.02	<0.01	0.03	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20 cm Soil Mixing Depth						
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	0.02	<0.01	0.03	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 5-13
Screening Statistics - Surface Water - Pond
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Water Concentration (mg/L)			TRV (mg/L)	Hazard Quotient		
	1 cm Soil	10 cm Soil	20 cm Soil		1 cm	10 cm	20 cm
Inorganics							
Aluminum	1.06E-01	2.95E-02	2.83E-02	8.70E-02	1.22E+00	3.39E-01	3.25E-01
Copper	1.08E-03	3.23E-04	2.88E-04	1.32E-02	8.13E-02	2.44E-02	2.17E-02
Iron	7.96E-05	3.44E-05	3.41E-05	1.00E+00	7.96E-05	3.44E-05	3.41E-05
Lead	1.39E-02	3.96E-03	3.84E-03	4.13E-03	3.37E+00	9.59E-01	9.31E-01
Zirconium	1.42E-04	3.98E-05	3.71E-05	1.70E-02	8.35E-03	2.34E-03	2.18E-03
Organics							
1,6-Dinitropyrene	2.05E-09	7.75E-10	7.59E-10	4.00E-05	5.13E-05	1.94E-05	1.90E-05
1-Nitropyrene	9.80E-08	3.48E-08	3.34E-08	4.00E-05	2.45E-03	8.70E-04	8.36E-04
2,4-Dinitrotoluene	3.40E-08	1.53E-08	1.52E-08	2.30E-02	1.48E-06	6.66E-07	6.60E-07
2,5-Diphenyloxazole	5.28E-07	4.81E-07	4.79E-07	ND	--	--	--
2,6-Dinitrotoluene	1.11E-07	4.99E-08	4.94E-08	6.00E-02	1.85E-06	8.32E-07	8.24E-07
4-Nitrophenol	3.93E-08	3.08E-08	3.06E-08	3.00E-01	1.31E-07	1.03E-07	1.02E-07
Benzo[a]anthracene	4.33E-09	2.52E-09	2.43E-09	2.70E-05	1.60E-04	9.32E-05	8.99E-05
Benzo[a]pyrene	1.12E-09	7.23E-10	7.01E-10	1.40E-05	7.98E-05	5.17E-05	5.01E-05
Biphenyl (1,1-Biphenyl)	3.31E-08	3.11E-08	3.10E-08	1.40E-02	2.37E-06	2.22E-06	2.21E-06
Dibenz[a,h]anthracene	8.85E-10	4.61E-10	4.38E-10	4.00E-06	2.21E-04	1.15E-04	1.09E-04
Dioxin (2,3,7,8-TCDD)	2.02E-13	1.27E-13	1.22E-13	3.80E-09	5.31E-05	3.33E-05	3.22E-05
Diphenylamine	2.87E-08	1.99E-08	1.97E-08	3.79E-02	7.56E-07	5.25E-07	5.20E-07
Phenanthrene	2.72E-08	2.03E-08	2.01E-08	6.30E-03	4.31E-06	3.23E-06	3.19E-06
Phenol	1.01E-08	5.08E-09	5.03E-09	1.10E-01	9.19E-08	4.62E-08	4.57E-08
Pyrene	2.27E-09	8.06E-10	7.74E-10	4.00E-05	5.68E-05	2.02E-05	1.94E-05
Resorcinol	8.88E-06	4.62E-06	4.58E-06	6.82E-01	1.30E-05	6.77E-06	6.71E-06
Triacetin	6.51E-08	2.92E-08	2.89E-08	ND	--	--	--

ND - No Data

Table 5-14
Screening Statistics - Sediment - Pond
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Sediment Concentration (mg/kg)			TRV (mg/kg)	Hazard Quotient		
	1 cm Soil	10 cm Soil	20 cm Soil		1 cm	10 cm	20 cm
Inorganics							
Aluminum	1.60E+02	4.42E+01	4.24E+01	2.55E+04	6.26E-03	1.74E-03	1.66E-03
Copper	1.08E+01	3.23E+00	2.88E+00	1.60E+01	6.73E-01	2.02E-01	1.80E-01
Iron	1.99E-03	8.60E-04	8.52E-04	2.00E+04	9.95E-08	4.30E-08	4.26E-08
Lead	1.25E+01	3.56E+00	3.46E+00	3.10E+01	4.04E-01	1.15E-01	1.12E-01
Zirconium	4.26E-01	1.19E-01	1.11E-01	ND	--	--	--
Organics							
1,6-Dinitropyrene	1.79E-06	6.77E-07	6.62E-07	3.49E-02	5.13E-05	1.94E-05	1.90E-05
1-Nitropyrene	2.55E-04	9.07E-05	8.72E-05	1.04E-01	2.45E-03	8.70E-04	8.36E-04
2,4-Dinitrotoluene	6.93E-08	3.13E-08	3.10E-08	4.69E-02	1.48E-06	6.66E-07	6.60E-07
2,5-Diphenyloxazole	1.31E-04	1.20E-04	1.19E-04	ND	--	--	--
2,6-Dinitrotoluene	1.86E-07	8.37E-08	8.29E-08	1.01E-01	1.85E-06	8.32E-07	8.24E-07
4-Nitrophenol	6.88E-08	5.38E-08	5.35E-08	5.24E-01	1.31E-07	1.03E-07	1.02E-07
Benzo[a]anthracene	4.50E-05	2.62E-05	2.52E-05	3.20E-01	1.41E-04	8.18E-05	7.89E-05
Benzo[a]pyrene	4.33E-05	2.80E-05	2.72E-05	3.70E-01	1.17E-04	7.58E-05	7.35E-05
Biphenyl (1,1-Biphenyl)	2.47E-06	2.32E-06	2.31E-06	4.40E+00	5.62E-07	5.28E-07	5.26E-07
Dibenz[a,h]anthracene	6.34E-05	3.30E-05	3.13E-05	6.00E-02	1.06E-03	5.50E-04	5.22E-04
Dioxin (2,3,7,8-TCDD)	2.17E-08	1.36E-08	1.32E-08	4.09E-04	5.31E-05	3.33E-05	3.22E-05
Diphenylamine	8.41E-07	5.83E-07	5.79E-07	1.11E+00	7.56E-07	5.25E-07	5.20E-07
Phenanthrene	2.27E-05	1.70E-05	1.68E-05	5.60E-01	4.06E-05	3.03E-05	3.00E-05
Phenol	8.90E-09	4.47E-09	4.43E-09	1.24E-01	7.18E-08	3.60E-08	3.57E-08
Pyrene	6.18E-06	2.19E-06	2.11E-06	4.90E-01	1.26E-05	4.47E-06	4.30E-06
Resorcinol	2.04E-06	1.06E-06	1.05E-06	1.57E-01	1.30E-05	6.77E-06	6.71E-06
Triacetin	5.78E-09	2.59E-09	2.56E-09	ND	--	--	--

ND - No Data

Table 5-15
Hazard Quotients for Upper Trophic Level Aquatic Receptors - Screening - Pond
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Mink		Belted kingfisher		Great blue heron	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
1 cm Soil Mixing Depth						
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.33	0.25	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.05	<0.01	0.30	0.03	0.48	0.05
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10 cm Soil Mixing Depth						
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.10	0.08	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.02	<0.01	0.08	<0.01	0.14	0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20 cm Soil Mixing Depth						
1,6-Dinitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1-Nitropyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.09	0.07	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin (2,3,7,8-TCDD)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.01	<0.01	0.08	<0.01	0.13	0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 6-1
Summary Statistics For Detected Chemicals - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Reporting Limit Range	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Concentration	Arithmetic Mean[1]	Standard Deviation of Mean
Inorganics (MG/KG)						
Aluminum	0.66 - 0.77	20 / 20	10,400	AS01-SS13-R01X	7,925	1,287
Antimony	0.22 - 0.26	19 / 20	1.90	AS01-SS12-R01X	1.05	0.47
Arsenic	0.22 - 0.26	20 / 20	9.50	AS01-SS01-R01X	6.96	0.88
Barium	0.22 - 0.26	20 / 20	239	AS01-SS09-R01X	165	36.5
Beryllium	0.11 - 0.13	20 / 20	1.20	AS01-SS01-R01X	1.01	0.16
Cadmium	0.11 - 0.13	20 / 20	10.9	AS01-SS15-R01X	1.27	2.27
Chromium	0.11 - 0.13	20 / 20	23.8	AS01-SS07-R01X	13.9	2.85
Cobalt	0.11 - 0.13	20 / 20	16.5	AS01-SS13-R01X	13.1	2.35
Copper	0.11 - 0.13	20 / 20	29.0	AS01-SS14-R01X	21.0	3.46
Cyanide	0.05 - 0.06	19 / 20	0.54	AS01-SS05-R01X	0.30	0.11
Iron	8.30 - 16.7	20 / 20	33,200	AS01-SS11-R01X	27,675	4,658
Lead	0.11 - 0.13	20 / 20	1,730	AS01-SS02-R01X	141	376
Manganese	0.11 - 0.13	20 / 20	1,120	AS01-SS09-R01X	876	177
Mercury	0.02 - 0.02	20 / 20	0.38	AS01-SS18-R01X	0.08	0.07
Nickel	0.11 - 0.13	20 / 20	33.4	AS01-SS11-R01X	22.7	3.55
Selenium	0.33 - 0.39	6 / 20	0.55	AS01-SS15-R01X	0.26	0.13
Silver	0.11 - 0.13	6 / 20	0.54	AS01-SS02-R01X	0.14	0.14
Thallium	0.22 - 0.26	17 / 20	1.10	AS01-SS11-R01X	0.54	0.28
Tin	2.60 - 3.10	20 / 20	8.40	AS01-SS14-R01X	5.46	1.25
Vanadium	0.11 - 0.13	20 / 20	36.7	AS01-SS19-R01X	23.4	5.29
Zinc	0.33 - 0.39	20 / 20	271	AS01-SS02-R01X	106	51.3
Semivolatile Organic Compounds (UG/KG)						
1,1-Biphenyl	340 - 420	1 / 20	20.0	AS01-SS19-R01X	186	40.2
Benzo(a)anthracene	340 - 420	6 / 20	66.0	AS01-SS01-R01X	145	73.4
Benzo(a)pyrene	340 - 420	7 / 20	54.0	AS01-SS01-R01X	135	78.4
Chrysene	340 - 420	14 / 20	110	AS01-SS01-R01X	87.9	68.7
Diethylphthalate	340 - 420	1 / 20	160	AS01-SS02-R01X	194	11.5
Dimethylphthalate	340 - 420	3 / 20	2,300	AS01-SS02-R01X	416	574

1 - One-half of the reporting limit was used for non-detected samples when calculating the mean

Table 6-1
Summary Statistics For Detected Chemicals - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Reporting Limit Range	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Concentration	Arithmetic Mean[1]	Standard Deviation of Mean
Naphthalene	340 - 420	1 / 20	40.0	AS01-SS01-R01X	186	35.6
Phenanthrene	340 - 420	14 / 20	140	AS01-SS01-R01X	98.1	64.5
bis(2-Ethylhexyl)phthalate	340 - 420	8 / 20	1,300	AS01-SS03-R01X	314	345
Explosives (UG/KG)						
HMX	417 - 476	9 / 20	2,400	AS01-SS03-R01X	485	670
Perchlorate	56.0 - 66.0	5 / 20	880	AS01-SS05-R01X	91.0	191
RDX	417 - 476	2 / 20	784	AS01-SS05-R01X	276	166
Volatile Organic Compounds (UG/KG)						
Acetone	6.00 - 6.00	4 / 20	16.0	AS01-SS06-R01X	4.90	3.60
Trichloroethene	6.00 - 6.00	3 / 20	28.0	AS01-SS02-R01X	4.55	5.68
Dioxin/Furans (UG/KG)						
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.012 - 0.80	2 / 20	0.056	AS01-SS02-R01X	0.0642	0.0790
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.015 - 0.39	1 / 20	0.039	AS01-SS02-R01X	0.0318	0.0388
Total heptachlorodibenzo-p-dioxin	0.012 - 0.80	1 / 20	0.056	AS01-SS02-R01X	0.0618	0.0800
Total heptachlorodibenzofuran	0.015 - 0.39	1 / 20	0.039	AS01-SS02-R01X	0.0320	0.0388
Total octachlorodibenzo-p-dioxin	0.025 - 1.18	20 / 20	0.722	AS01-SS01-R01X	0.3368	0.1441
Total octachlorodibenzofuran	0.049 - 0.71	2 / 20	0.080	AS01-SS02-R01X	0.0578	0.0710
Other Parameters (MG/KG)						
Nitrate	1.10 - 1.30	14 / 20	9.90	AS01-SS20-R01X	2.51	2.25
Total organic carbon (TOC)	566 - 658	20 / 20	78,400	AS01-SS01-R01X	34,066	14,310
Other Parameters (unitless)						
pH	0.10 - 0.10	20 / 20	7.90	AS01-SS16-R01X	7.20	0.54

1 - One-half of the reporting limit was used for non-detected samples when calculating the mean

Table 6-2
Summary Statistics For Detected Chemicals - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Reporting Limit Range	Frequency of Detection	Maximum Concentration Detected	Sample ID of Maximum Concentration	Arithmetic Mean[1]	Standard Deviation of Mean
Inorganics (MG/KG)						
Aluminum	0.68 - 0.73	7 / 7	10,200	AS01-SB17-R01X	9,736	484
Antimony	0.23 - 0.24	5 / 7	2.10	AS01-SB14-R01X	1.39	0.72
Arsenic	0.23 - 0.24	7 / 7	7.60	AS01-SB19-R01X	7.04	0.30
Barium	0.23 - 0.24	7 / 7	207	AS01-SB16-R01X	190	17.7
Beryllium	0.11 - 0.12	7 / 7	1.30	AS01-SB18-R01X	1.19	0.07
Chromium	0.11 - 0.12	7 / 7	16.1	AS01-SB19-R01X	15.5	0.43
Cobalt	0.11 - 0.12	7 / 7	16.4	AS01-SB18-R01X	15.7	0.56
Copper	0.11 - 0.12	7 / 7	18.6	AS01-SB19-R01X	17.2	0.76
Iron	0.80 - 0.85	7 / 7	33,500	AS01-SB20-R01X	32,671	602
Lead	0.11 - 0.12	7 / 7	25.0	AS01-SB19-R01X	18.9	3.57
Manganese	0.11 - 0.12	7 / 7	1,170	AS01-SB18-R01X	1,055	76.8
Nickel	0.11 - 0.12	7 / 7	27.1	AS01-SB18-R01X	25.1	1.19
Selenium	0.34 - 0.36	7 / 7	1.40	AS01-SB14-R01X	1.27	0.14
Thallium	0.23 - 0.24	7 / 7	2.10	AS01-SB14-R01X	1.79	0.23
Vanadium	0.11 - 0.12	7 / 7	24.8	AS01-SB19-R01X	22.7	1.31
Zinc	0.34 - 0.36	7 / 7	78.7	AS01-SB20-R01X	72.2	3.99
Explosives (UG/KG)						
HMX	417 - 476	1 / 7	340	AS01-SB14-R01X	241	44.7
Perchlorate	59.0 - 61.0	3 / 7	2,500	AS01-SB17-R01X	400	926
Volatile Organic Compounds (UG/KG)						
Trichloroethene	6.00 - 6.00	1 / 7	5.00	AS01-SB16-R01X	3.29	0.76
Dioxin/Furans (UG/KG)						
Total octachlorodibenzo-p-dioxin	0.09 - 0.16	7 / 7	0.19	AS01-SB19-R01X	0.14	0.05
Other Parameters (MG/KG)						
Total organic carbon (TOC)	588 - 614	7 / 7	12,300	AS01-SB19-R01X	10,464	1,368
pH	0.10 - 0.10	7 / 7	7.60	AS01-SB20-R01X	7.37	0.16

1 - One-half of the reporting limit was used for non-detected samples when calculating the mean

Table 6-3
Background Comparison - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Frequency of Detection	Maximum Concentration Detected	Arithmetic Mean	Background Concentration	Frequency of Exceedance	Maximum Ratio	Mean Ratio
Inorganics (MG/KG)							
Aluminum	7 / 7	10,200	9,736	22,500	0 / 7	0.45	0.43
Antimony	5 / 7	2.10	1.39	5.70	0 / 7	0.37	0.24
Arsenic	7 / 7	7.60	7.04	14.5	0 / 7	0.52	0.49
Barium	7 / 7	207	190	231	0 / 7	0.90	0.82
Beryllium	7 / 7	1.30	1.19	1.50	0 / 7	0.87	0.79
Chromium	7 / 7	16.1	15.5	24.0	0 / 7	0.67	0.65
Cobalt	7 / 7	16.4	15.7	25.7	0 / 7	0.64	0.61
Copper	7 / 7	18.6	17.2	35.3	0 / 7	0.53	0.49
Iron	7 / 7	33,500	32,671	46,212	0 / 7	0.72	0.71
Lead	7 / 7	25.0	18.9	41.5	0 / 7	0.60	0.46
Manganese	7 / 7	1,170	1,055	1,240	0 / 7	0.94	0.85
Nickel	7 / 7	27.1	25.1	27.6	0 / 7	0.98	0.91
Selenium	7 / 7	1.40	1.27	2.40	0 / 7	0.58	0.53
Thallium	7 / 7	2.10	1.79	2.90	0 / 7	0.72	0.62
Vanadium	7 / 7	24.8	22.7	38.6	0 / 7	0.64	0.59
Zinc	7 / 7	78.7	72.2	119	0 / 7	0.66	0.61
Explosives (UG/KG)							
HMX	1 / 7	340	241	--	-- / --	--	--
Perchlorate	3 / 7	2,500	400	--	-- / --	--	--
Volatile Organic Compounds (UG/KG)							
Trichloroethene	1 / 7	5.00	3.29	--	-- / --	--	--
Dioxin/Furans (UG/KG)							
Total octachlorodibenzo-p-dioxin	7 / 7	0.19	0.14	--	-- / --	--	--

Table 6-4
Comparison of Surface and Subsurface Soils
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Subsurface Soils			Surface Soils		
	Frequency of Detection	Maximum Concentration Detected	Arithmetic Mean	Frequency of Detection	Maximum Concentration Detected	Arithmetic Mean
Inorganics (MG/KG)						
Aluminum	7 / 7	10,200	9,736	20 / 20	10,400	7,925
Antimony	5 / 7	2.10	1.39	19 / 20	1.90	1.05
Arsenic	7 / 7	7.60	7.04	20 / 20	9.50	6.96
Barium	7 / 7	207	190	20 / 20	239	165
Beryllium	7 / 7	1.30	1.19	20 / 20	1.20	1.01
Chromium	7 / 7	16.1	15.5	20 / 20	23.8	13.9
Cobalt	7 / 7	16.4	15.7	20 / 20	16.5	13.1
Copper	7 / 7	18.6	17.2	20 / 20	29.0	21.0
Iron	7 / 7	33,500	32,671	20 / 20	33,200	27,675
Lead	7 / 7	25.0	18.9	20 / 20	1,730	141
Manganese	7 / 7	1,170	1,055	20 / 20	1,120	876
Nickel	7 / 7	27.1	25.1	20 / 20	33.4	22.7
Selenium	7 / 7	1.40	1.27	6 / 20	0.55	0.26
Thallium	7 / 7	2.10	1.79	17 / 20	1.10	0.54
Vanadium	7 / 7	24.8	22.7	20 / 20	36.7	23.4
Zinc	7 / 7	78.7	72.2	20 / 20	271	106
Explosives (UG/KG)						
HMX	1 / 7	340	241	9 / 20	2,400	485
Perchlorate	3 / 7	2,500	400	5 / 20	880	91.0
Volatile Organic Compounds (UG/KG)						
Trichloroethene	1 / 7	5.00	3.29	3 / 20	28.0	4.55
Dioxin/Furans (UG/KG)						
Total octachlorodibenzo-p-dioxin	7 / 7	0.192	0.1400	20 / 20	0.722	0.3368

Table 6-5
Evaluation of Depressional Area Surface Soil Samples
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	AS01-SS01-R01X	AS01-SS07-R01X	AS01-SS13-R01X	Background	Site Maximum	Site Mean
Inorganics (MG/KG)						
Aluminum	7,800	6,280	10,400	17,891	10,400	7,925
Antimony	1.70 L	0.49 L	0.82 L	33.0	1.90	1.05
Arsenic	9.50	6.10	7.80	14.5	9.50	6.96
Barium	165	136	181	231	239	165
Beryllium	1.20 K	0.88 K	1.20 K	1.20	1.20	1.01
Cadmium	0.71	0.79	0.72	2.40	10.9	1.27
Chromium	14.7	23.8	16.0	14.3	23.8	13.9
Cobalt	15.1	11.5	16.5 K	25.7	16.5	13.1
Copper	27.5	20.5	20.7	32.0	29.0	21.0
Cyanide	0.26 J	0.24 J	0.23 J	0.65	0.54	0.30
Iron	30,800	24,800	33,200	28,700	33,200	27,675
Lead	39.3	25.9	25.0	41.5	1,730	141
Manganese	954	783	1,050	1,240	1,120	876
Mercury	0.090	0.050	0.060	0.17	0.38	0.08
Nickel	24.1 K	20.8 K	28.1	27.6	33.4	22.7
Selenium	0.47 J	0.33 U	0.38 U	2.40	0.55	0.26
Silver	0.23 J	0.11 U	0.13 U	2.10	0.54	0.14
Thallium	0.29 J	0.34 J	0.88 J	2.90	1.10	0.54
Tin	8.00 J	4.70 J	4.90 J	--	8.40	5.46
Vanadium	22.1	21.9	33.1	38.6	36.7	23.4
Zinc	108 K	86.3 K	93.4 K	119	271	106
Semivolatile Organic Compounds (UG/KG)						
Benzo(a)anthracene	66.0 J	380 U	410 U	--	66.0	145
Benzo(a)pyrene	54.0 J	380 U	410 U	--	54.0	135
Chrysene	110 J	33.0 J	37.0 J	--	110	87.9
Naphthalene	40.0 J	380 U	410 U	--	40.0	186
Phenanthrene	140 J	50.0 J	52.0 J	--	140	98.1
bis(2-Ethylhexyl)phthalate	420 U	150 J	410 U	--	1,300	314
Dioxin/Furans (UG/KG)						
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.054 J	0.095 U	0.074 U	--	0.056	0.0642
Total octachlorodibenzo-p-dioxin	0.722	0.347	0.414	--	0.722	0.3368

Table 6-6
Screening Statistics - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Soil Concentration			Flora				Soil Fauna				Background			
	FOD	Maximum	Mean	TRV	FOE	Maximum HQ	Mean HQ	TRV	FOE	Maximum HQ	Mean HQ	Value	FOE	Maximum Ratio	Mean Ratio
Inorganics (MG/KG)															
Aluminum	20 / 20	10,400	7,925	pH < 5.5	0 / 20	--	--	pH < 5.5	0 / 20	--	--	17,891	0 / 20	0.58	0.44
Antimony	19 / 20	1.90	1.05	5.00	0 / 20	0.38	0.21	NSV	-- / --	NSV	NSV	33.0	0 / 20	0.06	0.03
Arsenic	20 / 20	9.50	6.96	10.0	0 / 20	0.95	0.70	60.0	0 / 20	0.16	0.12	14.5	0 / 20	0.66	0.48
Barium	20 / 20	239	165	500	0 / 20	0.48	0.33	3,000	0 / 20	0.08	0.05	231	1 / 20	1.03	0.71
Beryllium	20 / 20	1.20	1.01	10.0	0 / 20	0.12	0.10	NSV	-- / --	NSV	NSV	1.20	0 / 20	1.00	0.84
Cadmium	20 / 20	10.9	1.27	4.00	1 / 20	2.73	0.32	20.0	0 / 20	0.55	0.06	2.40	1 / 20	4.54	0.53
Chromium	20 / 20	23.8	13.9	1.00	20 / 20	23.8	13.9	0.40	20 / 20	59.5	34.7	14.3	6 / 20	1.66	0.97
Cobalt	20 / 20	16.5	13.1	20.0	0 / 20	0.83	0.66	1,000	0 / 20	0.02	0.01	25.7	0 / 20	0.64	0.51
Copper	20 / 20	29.0	21.0	100	0 / 20	0.29	0.21	50.0	0 / 20	0.58	0.42	32.0	0 / 20	0.91	0.65
Cyanide	19 / 20	0.54	0.30	27.5	0 / 20	0.02	0.01	27.5	0 / 20	0.02	0.01	0.65	0 / 20	0.83	0.47
Iron	20 / 20	33,200	27,675	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	28,700	10 / 20	1.16	0.96
Lead	20 / 20	1,730	141	50.0	9 / 20	34.6	2.82	500	1 / 20	3.46	0.28	41.5	9 / 20	41.7	3.40
Manganese	20 / 20	1,120	876	500	19 / 20	2.24	1.75	100	20 / 20	11.2	8.76	1,240	0 / 20	0.90	0.71
Mercury	20 / 20	0.38	0.08	0.30	1 / 20	1.27	0.25	0.10	1 / 20	3.80	0.76	0.17	1 / 20	2.24	0.44
Nickel	20 / 20	33.4	22.7	30.0	1 / 20	1.11	0.76	200	0 / 20	0.17	0.11	27.6	2 / 20	1.21	0.82
Selenium	6 / 20	0.55	0.26	1.00	0 / 20	0.55	0.26	70.0	0 / 20	0.01	0.004	2.40	0 / 20	0.23	0.11
Silver	6 / 20	0.54	0.14	2.00	0 / 20	0.27	0.07	50.0	0 / 20	0.01	0.003	2.10	0 / 20	0.26	0.07
Thallium	17 / 20	1.10	0.54	1.00	1 / 20	1.10	0.54	NSV	-- / --	NSV	NSV	2.90	0 / 20	0.38	0.19
Tin	20 / 20	8.40	5.46	50.0	0 / 20	0.17	0.11	200	0 / 20	0.04	0.03	--	-- / --	--	--
Vanadium	20 / 20	36.7	23.4	2.00	20 / 20	18.4	11.7	20.0	15 / 20	1.84	1.17	38.6	0 / 20	0.95	0.61
Zinc	20 / 20	271	106	50.0	20 / 20	5.42	2.13	200	2 / 20	1.36	0.53	119	3 / 20	2.28	0.89
Semivolatile Organic Compounds (UG/KG)															
1,1-Biphenyl	1 / 20	20.0	186	6,800	0 / 20	0.003	--	NSV	-- / --	NSV	NSV	--	-- / --	--	--
Benzo(a)anthracene	6 / 20	66.0	145	1,200	0 / 20	0.06	--	25,000	0 / 20	0.003	--	--	-- / --	--	--
Benzo(a)pyrene	7 / 20	54.0	135	1,200	0 / 20	0.05	--	25,000	0 / 20	0.002	--	--	-- / --	--	--
Chrysene	14 / 20	110	87.9	1,200	0 / 20	0.09	0.07	25,000	0 / 20	0.004	--	--	-- / --	--	--
Diethylphthalate	1 / 20	160	194	13,400	0 / 20	0.01	--	NSV	-- / --	NSV	NSV	--	-- / --	--	--
Dimethylphthalate	3 / 20	2,300	416	NSV	-- / --	NSV	NSV	10,640	0 / 20	0.22	0.04	--	-- / --	--	--
Naphthalene	1 / 20	40.0	186	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
Phenanthrene	14 / 20	140	98.1	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
bis(2-Ethylhexyl)phthalate	8 / 20	1,300	314	10,000	0 / 20	0.13	0.03	NSV	-- / --	NSV	NSV	--	-- / --	--	--

FOD - Frequency of Detection
FOE - Frequency of Exceedence
NSV - No Screening Value

Table 6-6
Screening Statistics - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Soil Concentration			Flora				Soil Fauna				Background			
	FOD	Maximum	Mean	TRV	FOE	Maximum HQ	Mean HQ	TRV	FOE	Maximum HQ	Mean HQ	Value	FOE	Maximum Ratio	Mean Ratio
Explosives (UG/KG)															
HMX	9 / 20	2,400	485	NSV	-- / --	NSV	NSV	5,000	0 / 20	0.48	0.10	--	-- / --	--	--
Perchlorate	5 / 20	880	91.0	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
RDX	2 / 20	784	276	1,000	0 / 20	0.78	0.28	5,000	0 / 20	0.16	0.06	--	-- / --	--	--
Volatile Organic Compounds (UG/KG)															
Acetone	4 / 20	16.0	4.90	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
Trichloroethene	3 / 20	28.0	4.55	6,000	0 / 20	0.005	0.001	6,000	0 / 20	0.005	0.001	--	-- / --	--	--
Dioxin/Furans (UG/KG)															
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	2 / 20	0.0560	0.0642	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1 / 20	0.0390	0.0318	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
Total heptachlorodibenzo-p-dioxin	1 / 20	0.0560	0.0618	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
Total heptachlorodibenzofuran	1 / 20	0.0390	0.0320	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
Total octachlorodibenzo-p-dioxin	20 / 20	0.7220	0.3368	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
Total octachlorodibenzofuran	2 / 20	0.0800	0.0578	NSV	-- / --	NSV	NSV	NSV	-- / --	NSV	NSV	--	-- / --	--	--
Total dioxin/furan (TEQ)	20 / 20	0.0010	0.0009	NSV	-- / --	NSV	NSV	500	-- / --	0.000002	0.000002	--	-- / --	--	--

FOD - Frequency of Detection
FOE - Frequency of Exceedence
NSV - N[illegible]reening Value

Table 6-7
Hazard Quotients for Upper Trophic Level Receptors - Screening
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Short-tailed shrew		Meadow vole		American robin		American kestrel	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Inorganics								
Arsenic	6.27	0.63	8.56	0.86	0.17	0.06	0.02	<0.01
Cadmium	55.1	5.51	3.59	0.36	23.5	1.70	3.44	0.25
Chromium	0.74	0.07	<0.01	<0.01	5.86	1.17	1.46	0.29
Copper	0.52	0.40	0.16	0.13	0.07	0.06	0.11	0.08
Lead	44.7	4.47	10.7	1.07	54.1	5.41	22.8	2.28
Mercury	0.07	<0.01	0.01	<0.01	1.34	0.67	0.03	0.01
Nickel	0.50	0.25	0.12	0.06	0.16	0.11	0.05	0.04
Selenium	0.51	0.31	0.84	0.51	0.13	0.04	0.19	0.06
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	0.05	0.03	<0.01	<0.01	0.10	0.04	0.07	0.03
Zinc	2.73	1.37	0.31	0.16	18.5	2.05	8.76	0.97
Organics								
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin/Furans								
Total dioxin/furan - All	798	79.8	0.88	0.09	44.6	4.46	10.1	1.01
Total dioxin/furan - Hits	2.85	0.29	<0.01	<0.01	0.06	<0.01	0.01	<0.01

Table 6-8
Hazard Quotients for Upper Trophic Level Receptors - Baseline
Allegany Ballistics Laboratory, Mineral County, WV

Chemical	Short-tailed shrew		Meadow vole		American robin		American kestrel	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Inorganics								
Arsenic	1.68	0.17	0.17	0.02	0.04	0.01	0.03	<0.01
Cadmium	0.72	0.07	0.04	<0.01	0.23	0.02	0.23	0.02
Chromium	0.04	<0.01	<0.01	<0.01	0.19	0.04	0.22	0.04
Copper	0.08	0.06	0.01	0.01	0.01	<0.01	0.01	<0.01
Lead	0.60	0.06	0.06	<0.01	0.53	0.05	0.53	0.05
Mercury	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	0.07	0.04	<0.01	<0.01	0.02	0.01	0.02	0.01
Selenium	0.11	0.07	0.04	0.02	0.03	<0.01	0.02	<0.01
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tin	0.02	0.01	<0.01	<0.01	0.03	0.01	0.03	0.01
Zinc	0.13	0.06	0.01	<0.01	0.69	0.08	0.74	0.08
Organics								
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dioxin/Furans								
Total dioxin/furan - All	38.4	3.84	0.59	0.06	1.44	0.14	1.62	0.16
Total dioxin/furan - Hits	0.56	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Figures

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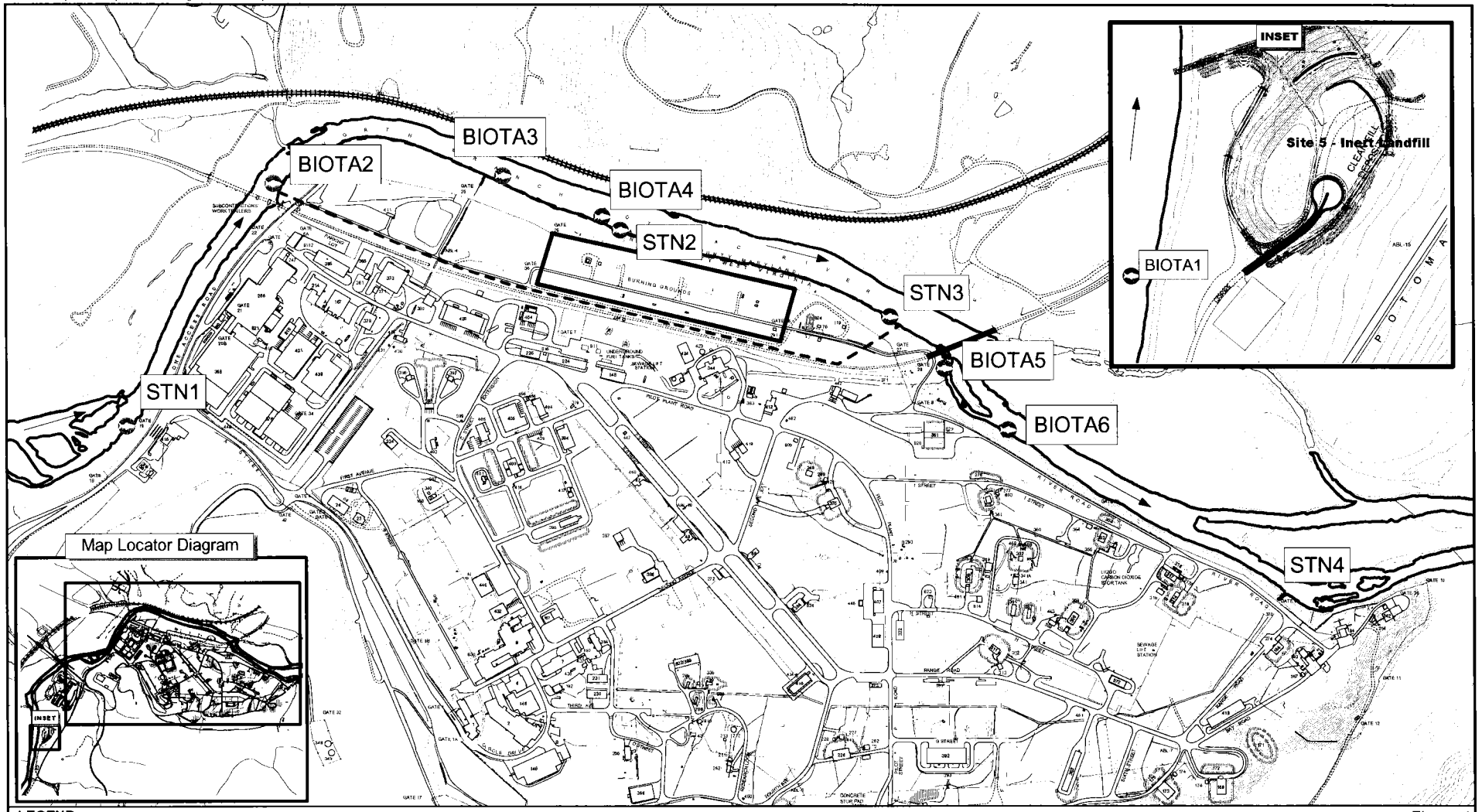

LEGEND

- Biota 1-6 (July 1998; July 2000)
- Stn 1-4 (July 1994)
- Boundary of Burning Grounds
- Boundary of IR Site 1
- Flow Direction

N

200 0 200 400 Feet

Figure 1
Layout of the Burning Grounds/ IR Site 1 and Locations of Biota Sampling in the North Branch Potomac River
Allegany Ballistics Laboratory

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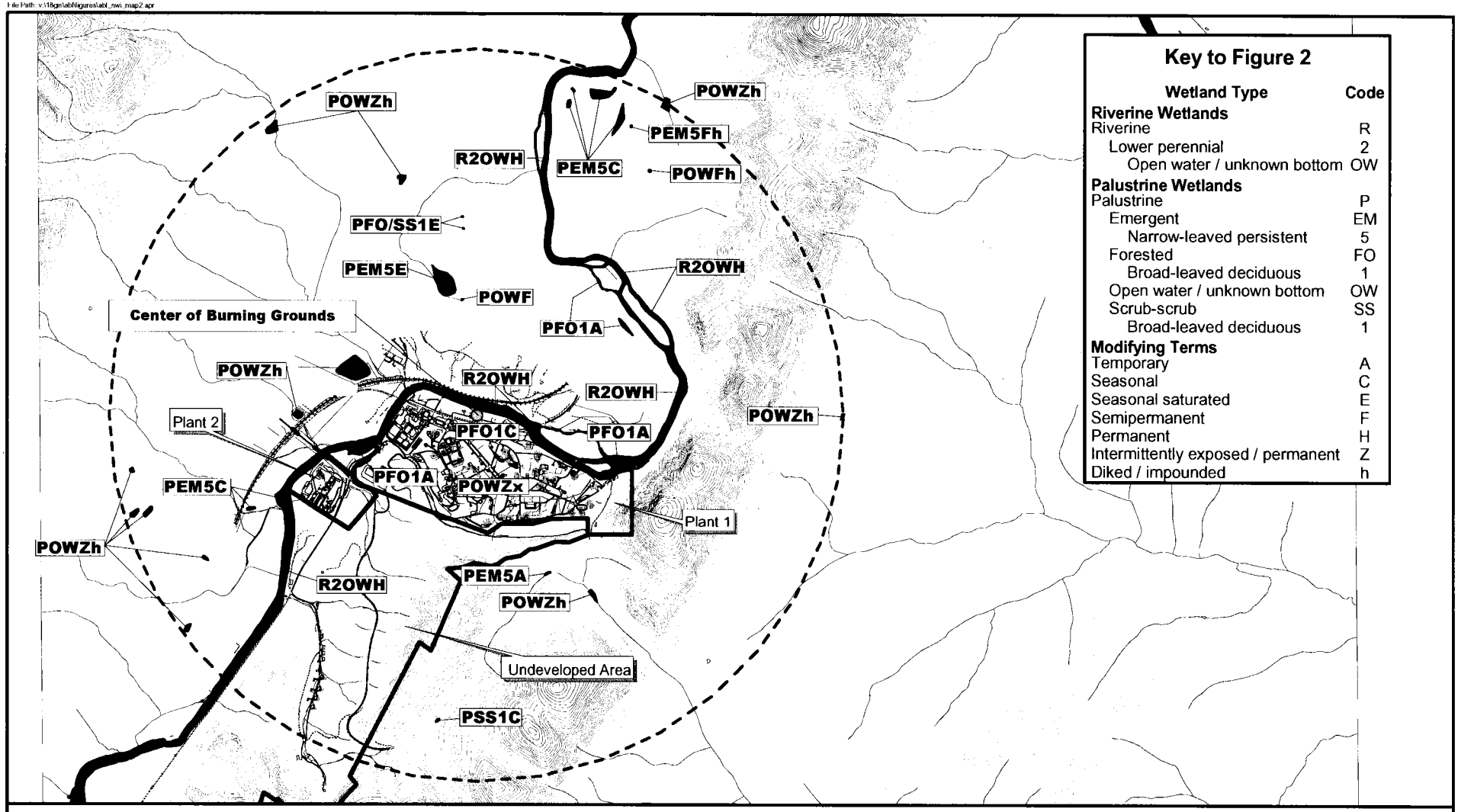

Figure 2
Wetland Areas
Within 3 Kilometers
of the Burning Grounds
Allegany Ballistics Laboratory

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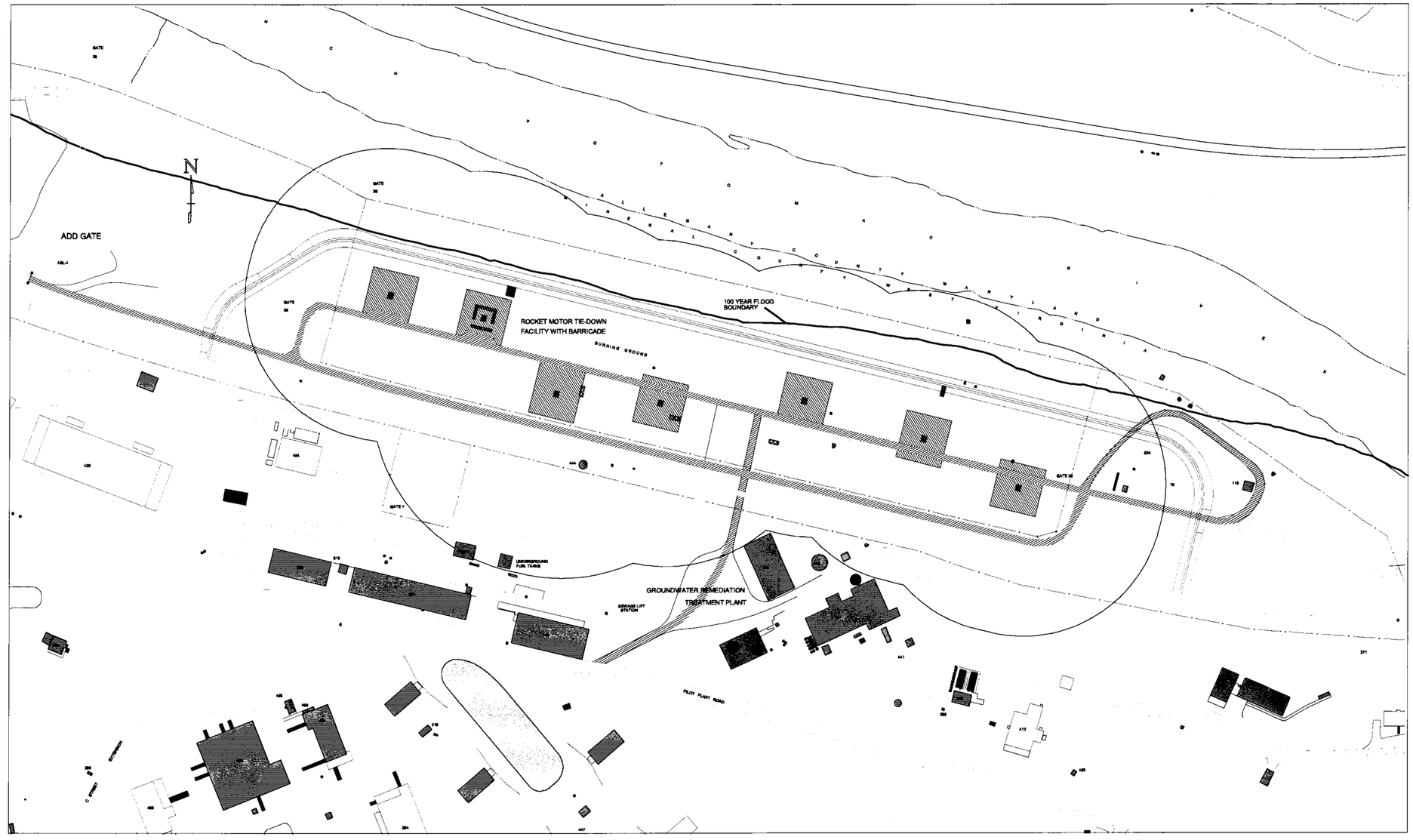

BURNING GROUND PAN LIMITS	
PAN	1998 MODIFICATION
A'	200
A	200
B	155
C	275
D	400
E	200
F	200
TOTAL	1630

PROPOSED PAN LOCATIONS		
PAN	LONGITUDE	LATITUDE
A'	78° 49' 52.7"	39°33' 52.3"
A	78° 49' 54.7"	39°33' 53.1"
B	78° 49' 57.2"	39°33' 53.8"
C	78° 50' 00.3"	39°33' 53.7"
D	78° 50' 02.5"	39°33' 53.9"
E	78° 50' 04.1"	39°33' 55.2"
F	78° 50' 06.1"	39°33' 55.5"

LEGEND

- SITING PLAN
- EXISTING BURNING PAN
- PROPOSED BURNING PAN
- BURNING PAD SITE PAVING (TYP)

Figure 3
Burning Grounds Layout

GRAPHIC SCALE

80' 0 80' 160' 240' 320' 400'

1"= 80'-0"

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ENG MGR	

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ALLEGANY BALLISTICS LABORATORY
210 STATE ROUTE 956
ROCKET CENTER, WV 26726-3548

ABL Rocket Center, WV

ATK Alliant Techsystems

BURNING GROUNDS PAVING PLAN CONCEPT

INTERPRET THIS DRAWING IN ACCORDANCE WITH DOD-STD-100

CAGE CODE 70272	SIZE: D
SCALE: 1" - 80.0'	
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ENVR	RCRA
CONTRACTOR DRAWING NO.	REV.
22301	-

C-1

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$$time$$

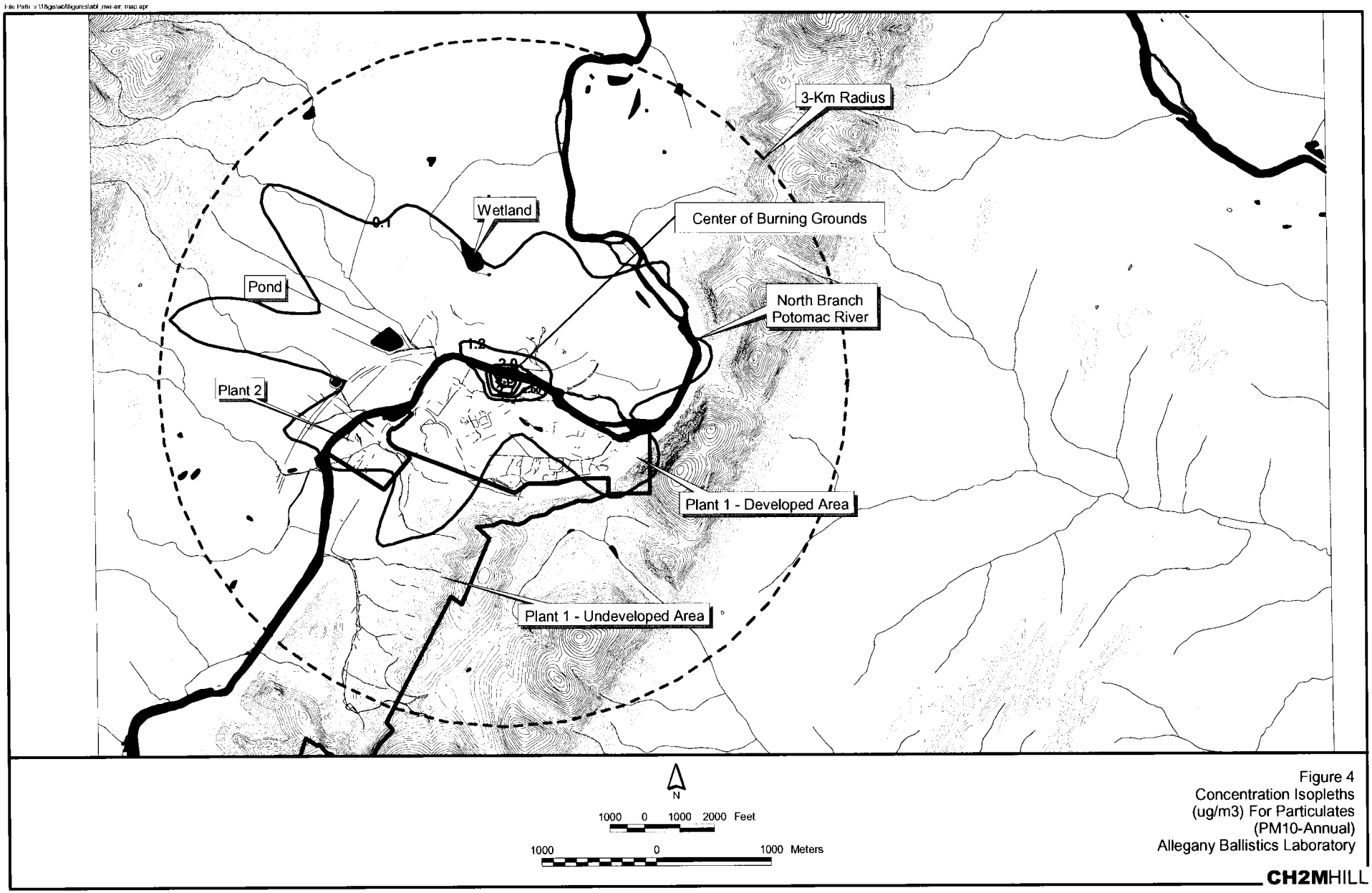

Figure 4
Concentration Isopleths
(ug/m3) For Particulates
(PM10-Annual)
Allegany Ballistics Laboratory

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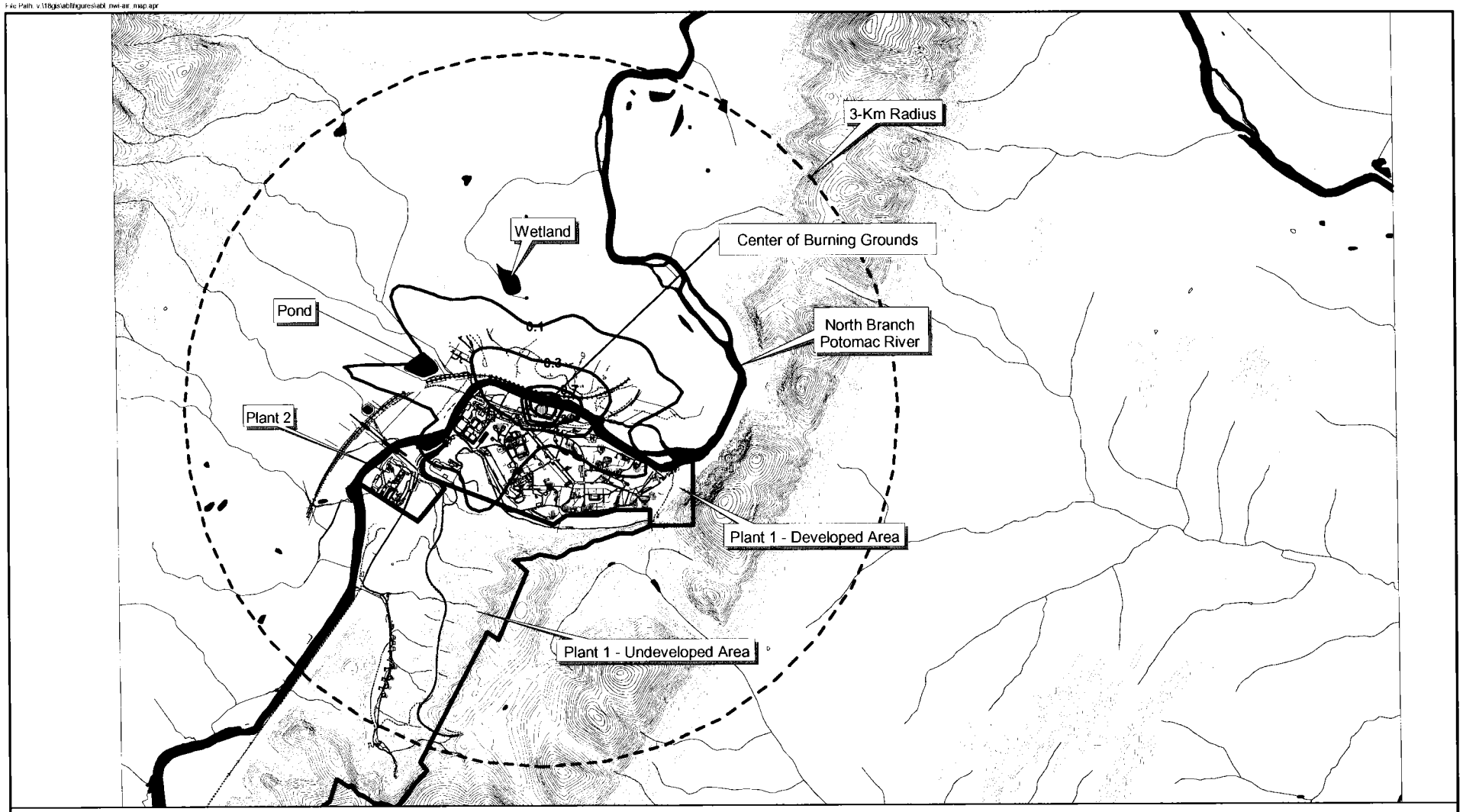

Figure 5
Concentration Isopleths
(ug/m3) For Vapors
(HCL - Annual)
Allegany Ballistics Laboratory

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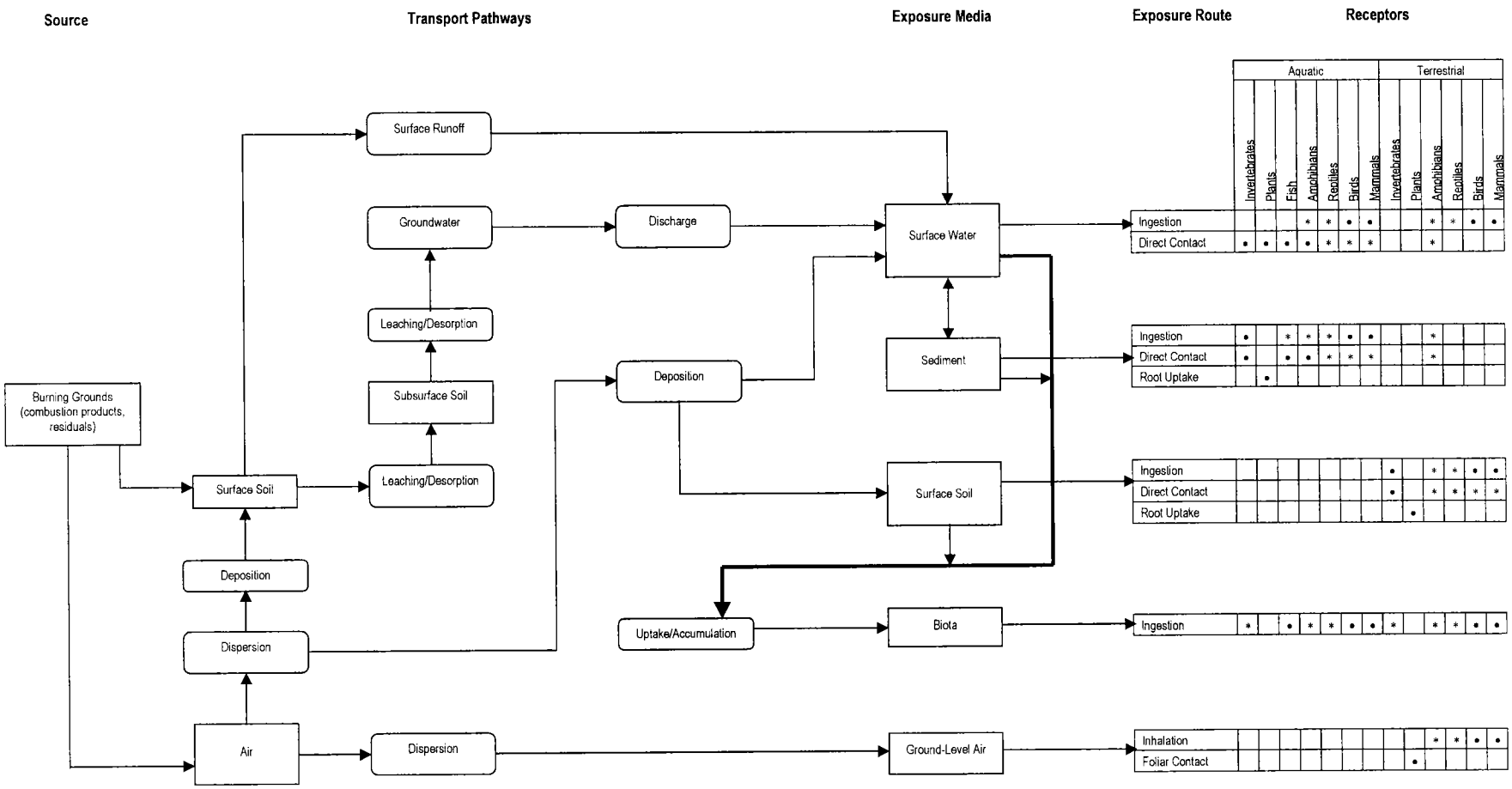


FIGURE 6. ECOLOGICAL CONCEPTUAL MODEL FOR CONTINUED OPERATIONS ABL BURNING GROUNDS

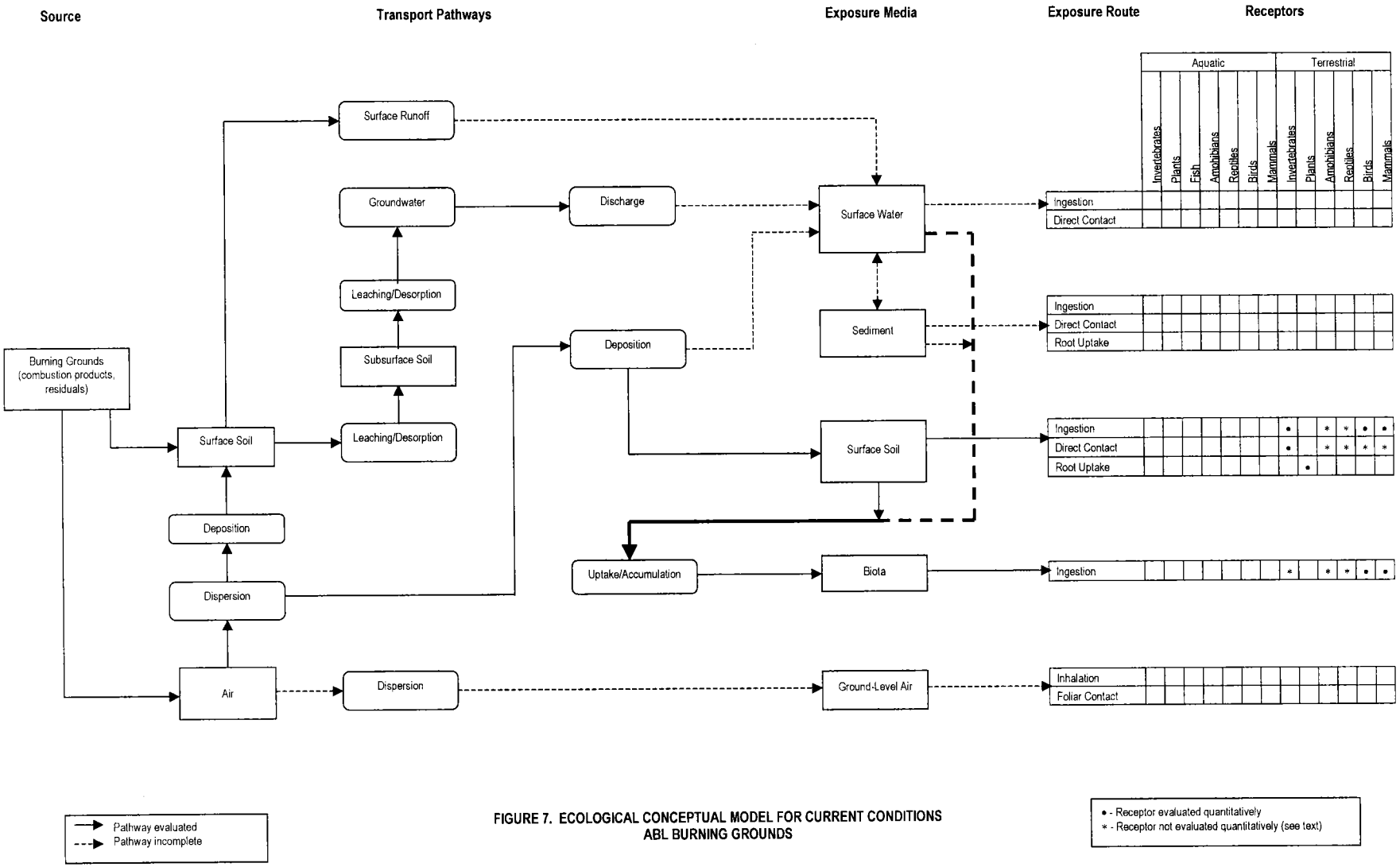
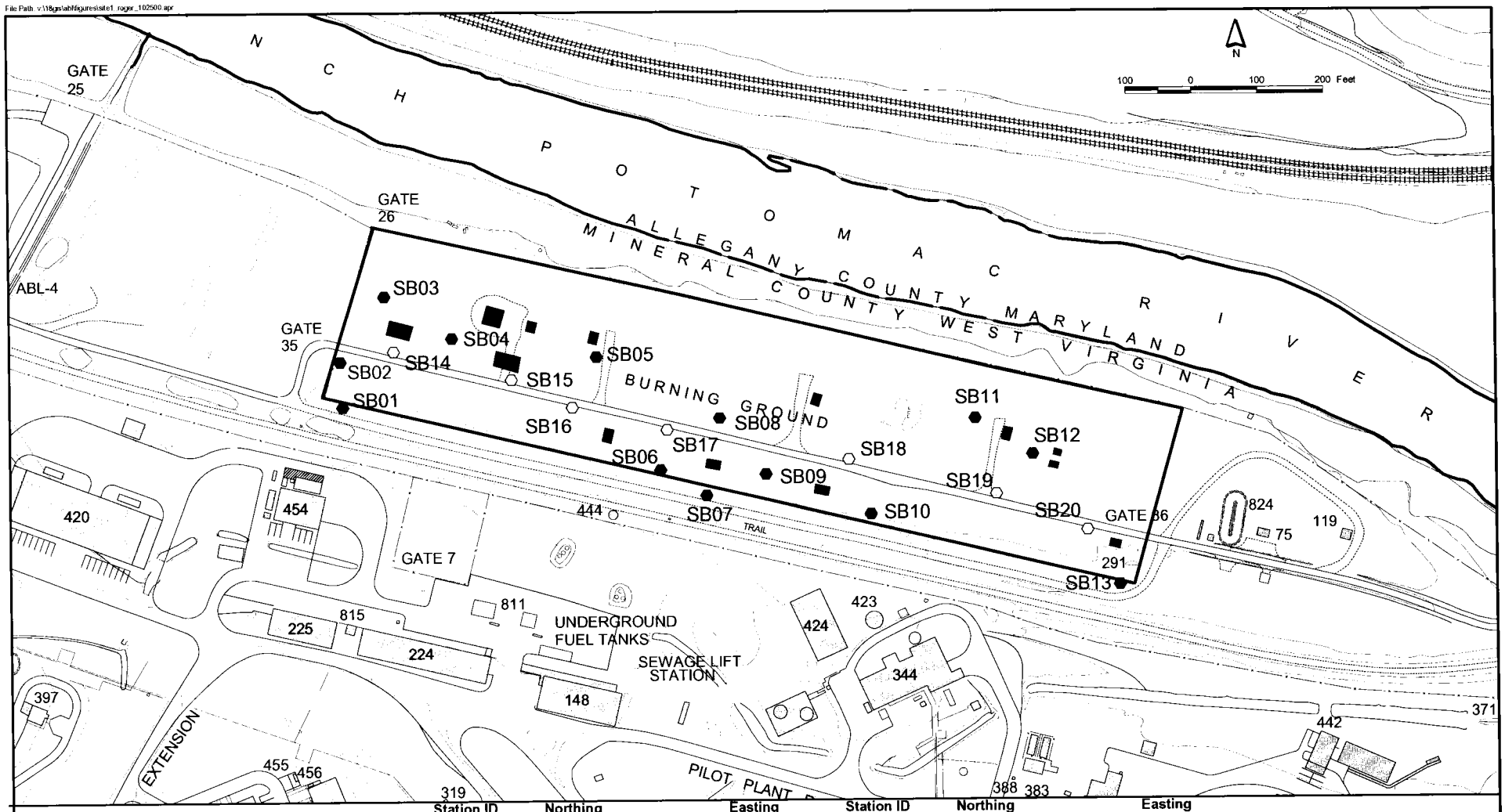


FIGURE 7. ECOLOGICAL CONCEPTUAL MODEL FOR CURRENT CONDITIONS
ABL BURNING GROUNDS



LEGEND

- Surface Soil Sample Locations
- Surface Soil and Subsurface Soil Sample Locations
- Existing and Historic Burn Pan Locations
- Burning Unit Boundary

Station ID	Northing			Easting			Station ID	Northing			Easting		
	Degree	Minute	Second	Degree	Minute	Second		Degree	Minute	Second	Degree	Minute	Second
SB01	39	33	54.3960	-78	50	7.1880	*SB11*	39	33	54.1440	-78	49	54.8760
SB02	39	33	55.0800	-78	50	7.2240	*SB12*	39	33	53.5680	-78	49	53.7960
SB03	39	33	56.0880	-78	50	6.3600	*SB13*	39	33	51.5880	-78	49	52.1400
SB04	39	33	55.4400	-78	50	5.0280	*SB14*	39	33	55.2240	-78	50	6.1800
SB05	39	33	55.1160	-78	50	2.2200	*SB15*	39	33	54.7920	-78	50	3.8760
SB06	39	33	53.3880	-78	50	1.0320	*SB16*	39	33	54.3600	-78	50	2.7240
SB07	39	33	53.0280	-78	50	0.1320	*SB17*	39	33	54.0000	-78	50	0.8880
SB08	39	33	54.1800	-78	49	59.8440	*SB18*	39	33	53.5320	-78	49	57.3600
SB09	39	33	53.3160	-78	49	58.9800	*SB19*	39	33	52.9920	-78	49	54.4800
SB10	39	33	52.7040	-78	49	56.9280	*SB20*	39	33	52.4160	-78	49	52.7520

Figure 8
Soil Sampling Locations
Allegany Ballistics Laboratory

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Attachment C-1
Analytical Data – Burning Grounds – Surface Soil

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01
Inorganics (MG/KG)						
Aluminum	7,800	4,680	7,490	7,540	7,690	7,410
Antimony	1.70 L	1.20 L	0.98 L	1.30 L	1.40 L	1.10 L
Arsenic	9.50	5.00	7.60	6.80	7.20	7.60
Barium	165	77.6	154	134	176	153
Beryllium	1.20 K	0.54 K	1.10 K	1.00 K	1.10 K	1.00 K
Cadmium	0.71	0.70	0.57 J	0.56 J	1.30	0.63
Chromium	14.7	8.80	13.4	13.5	13.5	14.8
Cobalt	15.1	6.90	15.0	14.1	15.0	14.7
Copper	27.5	22.5	22.4	19.2	19.3	19.3
Cyanide	0.26 J	0.19 J	0.46 J	0.19 J	0.54 J	0.28 J
Iron	30,800	15,800	32,700	31,600	32,400	30,200
Lead	39.3	1,730	25.2	34.3	55.2	26.9
Manganese	954	419	912	797	1,010	928
Mercury	0.090	0.080	0.050	0.050	0.040	0.050
Nickel	24.1 K	16.0 K	20.9 K	20.6 K	22.0 K	23.1 K
Selenium	0.47 J	0.33 U	0.35 U	0.36 U	0.33 U	0.44 J
Silver	0.23 J	0.54 J	0.12 U	0.12 U	0.11 U	0.12 U
Thallium	0.29 J	0.22 U	0.82 J	0.34 J	0.54 J	0.79 J
Tin	8.00 J	7.60 J	4.40 J	5.60 J	4.50 J	5.60 J
Vanadium	22.1	14.6	19.8	20.2	19.9	23.5
Zinc	108 K	271 K	73.6 K	100 K	75.6 K	98.9 K
Semivolatile Organic Compounds (UG/KG)						
1,1-Biphenyl	420 U	340 U	370 U	400 U	370 U	410 U
1,2,4,5-Tetrachlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U
1,4-Naphthoquinone	420 U	340 U	370 U	400 U	370 U	410 U
1-Naphthylamine	420 U	340 U	370 U	400 U	370 U	410 U
2,2'-Oxybis(1-chloropropane)	420 U	340 U	370 U	400 U	370 U	410 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01
2,3,4,6-Tetrachlorophenol	420 U	340 U	370 U	400 U	370 U	410 U
2,4,5-Trichlorophenol	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U
2,4,6-Trichlorophenol	420 U	340 U	370 U	400 U	370 U	410 U
2,4-Dichlorophenol	420 U	340 U	370 U	400 U	370 U	410 U
2,4-Dimethylphenol	420 U	340 U	370 U	400 U	370 U	410 U
2,4-Dinitrophenol	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U
2,4-Dinitrotoluene	420 U	340 U	370 U	400 U	370 U	410 U
2,6-Dichlorophenol	420 U	340 U	370 U	400 U	370 U	410 U
2,6-Dinitrotoluene	420 U	340 U	370 U	400 U	370 U	410 U
2-Acetylaminofluorene	420 U	340 UJ	370 U	400 U	370 U	410 U
2-Chloronaphthalene	420 U	340 U	370 U	400 U	370 U	410 U
2-Chlorophenol	420 U	340 U	370 U	400 U	370 U	410 U
2-Methyl-5-nitroaniline	420 U	340 U	370 U	400 U	370 U	410 U
2-Methylaniline	420 U	340 U	370 U	400 U	370 U	410 U
2-Methylnaphthalene	420 U	340 U	370 U	400 U	370 U	410 U
2-Methylphenol	420 U	340 U	370 U	400 U	370 U	410 U
2-Naphthylamine	420 U	340 U	370 U	400 U	370 U	410 U
2-Nitroaniline	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U
2-Nitrophenol	420 U	340 U	370 U	400 U	370 U	410 U
2-Picoline	420 U	340 U	370 U	400 U	370 U	410 U
3,3'-Dichlorobenzidine	420 U	340 UJ	370 U	400 U	370 U	410 U
3,3'-Dimethylbenzidine	420 U	340 UJ	370 U	400 U	370 U	410 U
3-Methylcholanthrene	420 U	340 U	370 U	400 U	370 U	410 U
3-Methylphenol	420 U	340 U	370 U	400 U	370 U	410 U
3-Nitroaniline	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U
4,6-Dinitro-2-methylphenol	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U
4-Aminobiphenyl	420 U	340 UJ	370 U	400 U	370 U	410 U
4-Bromophenyl-phenylether	420 U	340 UJ	370 U	400 U	370 U	410 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01
4-Chloro-3-methylphenol	420 U	340 U	370 U	400 U	370 U	410 U
4-Chloroaniline	420 U	340 U	370 U	400 U	370 U	410 U
4-Chlorophenyl-phenylether	420 U	340 U	370 U	400 U	370 U	410 U
4-Methylphenol	420 U	340 U	370 U	400 U	370 U	410 U
4-Nitroaniline	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U
4-Nitrophenol	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U
4-Nitroquinoline-1-oxide	1,000 R	860 R	920 U	1,000 U	920 U	1,000 U
7,12-Dimethylbenz(a)anthracene	420 U	340 U	370 U	400 U	370 U	410 U
Acenaphthene	420 U	340 U	370 U	400 U	370 U	410 U
Acenaphthylene	420 U	340 U	370 U	400 U	370 U	410 U
Acetophenone	420 U	340 U	370 U	400 U	370 U	410 U
Aniline	330 U	330 U	330 U	330 U	330 U	330 U
Anthracene	420 U	340 UJ	370 U	400 U	370 U	410 U
Aramite	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U
Benzo(a)anthracene	66.0 J	340 UJ	370 U	400 U	370 U	24.0 J
Benzo(a)pyrene	54.0 J	340 U	370 U	400 U	370 U	23.0 J
Benzo(b)fluoranthene	420 U	340 U	370 U	400 U	370 U	410 U
Benzo(g,h,i)perylene	420 U	340 U	370 U	400 U	370 U	410 U
Benzo(k)fluoranthene	420 U	340 U	370 U	400 U	370 U	410 U
Benzoic acid	200 B	860 U	920 U	1,000 U	920 U	1,000 U
Benzyl alcohol	420 U	340 U	370 U	400 U	370 U	410 U
Butylbenzylphthalate	420 U	340 UJ	370 U	400 U	370 U	410 U
Carbazole	330 U	330 U	330 U	330 U	330 U	330 U
Chlorobenzilate	420 R	340 R	370 U	400 U	370 U	410 U
Chrysene	110 J	340 UJ	26.0 J	400 U	370 U	43.0 J
Di-n-butylphthalate	420 U	340 UJ	370 U	400 U	370 U	410 U
Di-n-octylphthalate	420 U	340 U	370 U	400 U	370 U	410 U
Diallate	420 U	340 UJ	370 U	400 U	370 U	410 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01
Dibenz(a,h)anthracene	420 U	340 U	370 U	400 U	370 U	410 U
Dibenzofuran	420 U	340 U	370 U	400 U	370 U	410 U
Diethylphthalate	420 U	160 J	370 U	400 U	370 U	410 U
Dimethoate	420 U	340 UJ	370 U	400 U	370 U	410 U
Dimethyl phthalate	420 U	2,300	370 U	400 U	370 U	410 U
Dinoseb	420 U	340 U	370 U	400 U	370 U	410 U
Diphenylamine	420 U	340 U	370 U	400 U	370 U	410 U
Disulfoton	420 U	340 UJ	370 U	400 U	370 U	410 U
Ethyl methanesulfonate	420 U	340 U	370 U	400 U	370 U	410 U
Famphur	420 U	340 UJ	370 U	400 U	370 U	410 U
Fluoranthene	420 U	340 UJ	370 U	400 U	370 U	410 U
Fluorene	420 U	340 U	370 U	400 U	370 U	410 U
Hexachlorobenzene	420 U	340 UJ	370 U	400 U	370 U	410 U
Hexachlorobutadiene	420 U	340 U	370 U	400 U	370 U	410 U
Hexachlorocyclopentadiene	420 U	340 U	370 U	400 U	370 U	410 U
Hexachloroethane	420 U	340 U	370 U	400 U	370 U	410 U
Hexachlorophene	17,000 U	14,000 U	15,000 U	16,000 U	15,000 U	16,000 U
Hexachloropropene	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U
Indeno(1,2,3-cd)pyrene	420 U	340 U	370 U	400 U	370 U	410 U
Isodrin	420 U	340 UJ	370 U	400 U	370 U	410 U
Isophorone	420 U	340 U	370 U	400 U	370 U	410 U
Isosafrole	420 U	340 U	370 U	400 U	370 U	410 U
Kepone	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U
Methapyrilene	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U
Methyl parathion	420 U	340 UJ	370 U	400 U	370 U	410 U
N-Nitrosomorpholine	420 U	340 U	370 U	400 U	370 U	410 U
N-Nitrosopiperidine	420 U	340 U	370 U	400 U	370 U	410 U
Naphthalene	46 J	340 U	370 U	400 U	370 U	410 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01
O,O,O-Triethyl phosphorothioate	420 U	340 U	370 U	400 U	370 U	410 U
Parathion	420 U	340 UJ	370 U	400 U	370 U	410 U
Pentachlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U
Pentachloronitrobenzene	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U
Pentachlorophenol	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U
Phenacetin	420 U	340 UJ	370 U	400 U	370 U	410 U
Phenanthrene	140 J	340 UJ	39.0 J	400 U	370 U	60.0 J
Phenol	420 U	340 U	370 U	400 U	370 U	410 U
Phorate	420 U	340 UJ	370 U	400 U	370 U	410 U
Pronamide	420 U	340 UJ	370 U	400 U	370 U	410 U
Pyrene	420 U	340 UJ	370 U	400 U	370 U	410 U
Pyridine	420 U	340 U	370 U	400 U	370 U	410 U
Safrole	420 U	340 U	370 U	400 U	370 U	410 U
Sulfotepp	420 U	340 UJ	370 U	400 U	370 U	410 U
Thionazin	420 U	340 U	370 U	400 U	370 U	410 U
a,a-Dimethylphenethylamine	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U
bis(2-Chloroethoxy)methane	420 U	340 U	370 U	400 U	370 U	410 U
bis(2-Chloroethyl)ether	420 U	340 U	370 U	400 U	370 U	410 U
bis(2-Ethylhexyl)phthalate	420 U	97.0 J	1,300	400 U	370 U	74.0 J
n-Nitroso-di-n-butylamine	420 U	340 U	370 U	400 U	370 U	410 U
n-Nitroso-di-n-propylamine	420 U	340 U	370 U	400 U	370 U	410 U
n-Nitroso-n-methylethylamine	420 U	340 U	370 U	400 U	370 U	410 U
n-Nitrosodiethylamine	420 U	340 U	370 U	400 U	370 U	410 U
n-Nitrosodimethylamine	420 U	340 U	370 U	400 U	370 U	410 U
n-Nitrosodiphenylamine	420 U	340 UJ	370 U	400 U	370 U	410 U
n-Nitrosopyrrolidine	420 U	340 U	370 U	400 U	370 U	410 U
p-Dimethylaminoazobenzene	420 U	340 UJ	370 U	400 U	370 U	410 U
p-Phenylenediamine	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01
Explosives (UG/KG)						
1,3,5-Trinitrobenzene	420 U	340 U	476 R	454 R	454 R	476 R
1,3-Dinitrobenzene	420 U	340 U	370 U	400 U	370 U	410 U
2,4,6-Trinitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U
2-Amino-4,6-dinitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U
2-Nitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U
3-Nitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U
4-Amino-2,6-dinitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U
4-Nitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U
HMX	454 U	1,190	2,400	454 U	2,250	476 U
Nitrobenzene	420 U	340 U	370 U	400 U	370 U	410 U
Nitroglycerin	454 U	476 U	476 U	476 U	454 U	454 U
Perchlorate	66.0 U	56.0 U	68.0	96.0	880	95.0
RDX	454 U	735	476 U	454 U	784	476 U
Tetryl	454 U	454 U	476 U	454 U	454 U	476 U
Volatile Organic Compounds (UG/KG)						
1,1,1,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,1-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1-Dichloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2,3-Trichloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2,4-Trichlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U
1,2-Dibromo-3-chloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dibromoethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U
1,2-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01
1,2-Dichloroethene (total)	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,3-Dichlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U
1,4-Dichlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U
1,4-Dioxane	660 U	570 R	610 R	620 R	590 R	620 R
2-Butanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloro-1,3-butadiene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloroethyl vinyl ether	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Hexanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
4-Methyl-2-pentanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Acetone	6.00 U	6.00 U	6.00 U	5.00 J	10.0	16.0
Acetonitrile	260 U	230 U	240 U	250 U	240 U	250 U
Acrolein	66.0 U	57.0 R	61.0 R	62.0 R	59.0 R	62.0 R
Acrylonitrile	66.0 U	57.0 U	61.0 U	62.0 U	59.0 U	62.0 U
Allyl chloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Benzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromodichloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromoform	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Carbon disulfide	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Carbon tetrachloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chlorobenzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloroform	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dibromochloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dibromomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dichlorodifluoromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01
Ethyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Ethylbenzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Iodomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Isobutanol	260 U	230 R	240 R	250 R	240 R	250 R
Methacrylonitrile	130 U	110 U	120 U	120 U	120 U	120 U
Methyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Methyl methanesulfonate	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U
Methylene chloride	3.00 B	4.00 B	4.00 B	5.00 B	9.00 B	2.00 B
Pentachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Propionitrile	130 U	110 R	120 R	120 R	120 R	120 R
Styrene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Tetrachloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Toluene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Trichloroethene	6.00 U	28.0	6.00 U	9.00	6.00 U	6.00 U
Trichlorofluoromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl acetate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl chloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Xylene, total	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
cis-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,4-Dichloro-2-butene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dioxin/Furans (UG/KG)						
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.054 J	0.056 J	0.12 U	0.13 U	0.11 U	0.12 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.046 U	0.039	0.062 U	0.064 U	0.039 U	0.056 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.056 U	0.018 U	0.074 U	0.077 U	0.047 U	0.068 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.13 U	0.17 U	0.14 U	0.10 U	0.087 U	0.13 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.023 U	0.028 U	0.032 U	0.032 U	0.019 U	0.012 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.12 U	0.15 U	0.12 U	0.091 U	0.076 U	0.11 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01
1,2,3,6,7,8-Hexachlorodibenzofuran	0.020 U	0.024 U	0.028 U	0.027 U	0.016 U	0.010 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.11 U	0.15 U	0.11 U	0.12 U	0.10 U	0.11 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.023 U	0.028 U	0.030 U	0.031 U	0.019 U	0.013 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.074 U	0.088 U	0.066 U	0.068 U	0.089 U	0.069 U
1,2,3,7,8-Pentachlorodibenzofuran	0.082 U	0.10 U	0.068 U	0.078 U	0.074 U	0.077 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.023 U	0.028 U	0.030 U	0.032 U	0.019 U	0.013 U
2,3,4,7,8-Pentachlorodibenzofuran	0.071 U	0.088 U	0.059 U	0.068 U	0.065 U	0.067 U
2,3,7,8-TCDD (dioxin)	0.0080 U	0.010 U	0.0070 U	0.0080 U	0.0070 U	0.0080 U
2,3,7,8-Tetrachlorodibenzofuran	0.0070 U	0.0080 U	0.0050 U	0.0060 U	0.0060 U	0.0060 U
Total heptachlorodibenzo-p-dioxin	0.012 U	0.056	0.12 U	0.13 U	0.11 U	0.12 U
Total heptachlorodibenzofuran	0.046 U	0.039	0.067 U	0.064 U	0.039 U	0.056 U
Total hexachlorodibenzo-p-dioxin	0.12 U	0.15 U	0.12 U	0.091 U	0.076 U	0.11 U
Total hexachlorodibenzofuran	0.020 U	0.024 U	0.028 U	0.027 U	0.016 U	0.010 U
Total octachlorodibenzo-p-dioxin	0.72	0.41	0.31	0.11	0.090	0.37
Total octachlorodibenzofuran	0.073 U	0.080	0.11 U	0.078 U	0.090 U	0.10 U
Other Parameters (MG/KG)						
Nitrate	3.50	1.10 U	1.20 U	1.50	4.50	1.20 U
Nitrite	1.30 U	1.10 U	1.20 U	1.20 U	1.20 U	1.20 U
Total organic carbon (TOC)	78,400	35,300	23,400	21,200	19,000	42,100
pH	7.30	7.50	7.10	6.30	7.10	5.70

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB07	AS01-SB08	AS01-SB09		AS01-SB10	AS01-SB11
Sample ID	AS01-SS07-R01X	AS01-SS08-R01X	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X
Sample Date	02/22/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01
Inorganics (MG/KG)						
Aluminum	6,280	7,320	9,240	9,800	8,350	9,510
Antimony	0.49 L	0.96 L	1.10 L	0.87 L	1.40 L	0.81 L
Arsenic	6.10	6.90	7.40	7.40	6.80	6.60
Barium	136	185	219	239	208	161
Beryllium	0.88 K	1.10 K	1.20 K	1.20 K	1.10 K	0.99 K
Cadmium	0.79	0.63	1.00	0.77	0.67	0.71
Chromium	23.8	12.7	14.6	15.0	13.2	15.7
Cobalt	11.5	13.6	14.5 K	14.4 K	15.0 K	15.0 K
Copper	20.5	18.1	21.5	21.6	17.9	17.6
Cyanide	0.24 J	0.37 J	0.26 J	0.35 J	0.35 J	0.060 U
Iron	24,800	28,200	28,900	29,200	30,100	33,200
Lead	25.9	30.0	38.0	31.3	29.5	96.9
Manganese	783	982	1,080	1,120	999	730
Mercury	0.050	0.050	0.070	0.080	0.050	0.040
Nickel	20.8 K	21.1 K	25.0	25.6	22.3	33.4
Selenium	0.33 U	0.37 J	0.36 U	0.38 U	0.36 U	0.33 U
Silver	0.11 U	0.12 U	0.12 U	0.13 U	0.12 U	0.26 J
Thallium	0.34 J	0.68 J	0.68 J	0.46 J	0.78 J	1.10 J
Tin	4.70 J	4.70 J	5.60 J	6.00 J	4.30 J	4.10 J
Vanadium	12.9	19.7	24.6	25.0	22.5	21.4
Zinc	86.3 K	74.8 K	116 K	103 K	78.0 K	92.5 K
Semivolatile Organic Compounds (UG/KG)						
1,1-Biphenyl	380 U	400 U	390 U	410 U	400 U	360 U
1,2,4,5-Tetrachlorobenzene	380 U	400 U	390 U	410 U	400 U	360 U
1,4-Naphthoquinone	380 U	400 U	390 U	410 U	400 U	360 U
1-Naphthylamine	380 U	400 U	390 U	410 U	400 U	360 U
2,2'-Oxybis(1-chloropropane)	380 U	400 U	390 U	410 U	400 U	360 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB07	AS01-SB08	AS01-SB09		AS01-SB10	AS01-SB11
Sample ID	AS01-SS07-R01X	AS01-SS08-R01X	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X
Sample Date	02/22/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01
2,3,4,6-Tetrachlorophenol	380 U	400 U	390 U	410 U	400 U	360 U
2,4,5-Trichlorophenol	960 U	1,000 U	970 U	1,000 U	990 U	890 U
2,4,6-Trichlorophenol	380 U	400 U	390 U	410 U	400 U	360 U
2,4-Dichlorophenol	380 U	400 U	390 U	410 U	400 U	360 U
2,4-Dimethylphenol	380 U	400 U	390 U	410 U	400 U	360 U
2,4-Dinitrophenol	960 U	1,000 U	970 U	1,000 U	990 U	890 U
2,4-Dinitrotoluene	380 U	400 U	390 U	410 U	400 U	360 U
2,6-Dichlorophenol	380 U	400 U	390 U	410 U	400 U	360 U
2,6-Dinitrotoluene	380 U	400 U	390 U	410 U	400 U	360 U
2-Acetylaminofluorene	380 U	400 U	390 U	410 U	400 U	360 U
2-Chloronaphthalene	380 U	400 U	390 U	410 U	400 U	360 U
2-Chlorophenol	380 U	400 U	390 U	410 U	400 U	360 U
2-Methyl-5-nitroaniline	380 U	400 U	390 U	410 U	400 U	360 U
2-Methylaniline	380 U	400 U	390 U	410 U	400 U	360 U
2-Methylnaphthalene	380 U	400 U	390 U	410 U	400 U	360 U
2-Methylphenol	380 U	400 U	390 U	410 U	400 U	360 U
2-Naphthylamine	380 U	400 U	390 U	410 U	400 U	360 U
2-Nitroaniline	960 U	1,000 U	970 U	1,000 U	990 U	890 U
2-Nitrophenol	380 U	400 U	390 U	410 U	400 U	360 U
2-Picoline	380 U	400 U	390 U	410 U	400 U	360 U
3,3'-Dichlorobenzidine	380 U	400 U	390 U	410 U	400 U	360 U
3,3'-Dimethylbenzidine	380 U	400 U	390 U	410 U	400 U	360 U
3-Methylcholanthrene	380 U	400 U	390 U	410 U	400 U	360 U
3-Methylphenol	380 U	400 U	390 U	410 U	400 U	360 U
3-Nitroaniline	960 U	1,000 U	970 U	1,000 U	990 U	890 U
4,6-Dinitro-2-methylphenol	960 U	1,000 U	970 U	1,000 U	990 U	890 U
4-Aminobiphenyl	380 U	400 U	390 U	410 U	400 U	360 U
4-Bromophenyl-phenylether	380 U	400 U	390 U	410 U	400 U	360 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB07	AS01-SB08	AS01-SB09		AS01-SB10	AS01-SB11
Sample ID	AS01-SS07-R01X	AS01-SS08-R01X	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X
Sample Date	02/22/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01
4-Chloro-3-methylphenol	380 U	400 U	390 U	410 U	400 U	360 U
4-Chloroaniline	380 U	400 U	390 U	410 U	400 U	360 U
4-Chlorophenyl-phenylether	380 U	400 U	390 U	410 U	400 U	360 U
4-Methylphenol	380 U	400 U	390 U	410 U	400 U	360 U
4-Nitroaniline	960 U	1,000 U	970 U	1,000 U	990 U	890 U
4-Nitrophenol	960 U	1,000 U	970 U	1,000 U	990 U	890 U
4-Nitroquinoline-1-oxide	960 U	1,000 U	970 U	1,000 U	990 U	890 U
7,12-Dimethylbenz(a)anthracene	380 U	400 U	390 U	410 U	400 U	360 U
Acenaphthene	380 U	400 U	390 U	410 U	400 U	360 U
Acenaphthylene	380 U	400 U	390 U	410 U	400 U	360 U
Acetophenone	380 U	400 U	390 U	410 U	400 U	360 U
Aniline	330 U	330 U	330 U	330 U	330 U	330 U
Anthracene	380 U	400 U	390 U	410 U	400 U	360 U
Aramite	960 U	1,000 U	970 U	1,000 U	990 U	890 U
Benzo(a)anthracene	380 U	400 U	390 U	24.0 J	400 U	360 U
Benzo(a)pyrene	380 U	400 U	24.0 J	410 U	400 U	360 U
Benzo(b)fluoranthene	380 U	400 U	390 U	410 U	400 U	360 U
Benzo(g,h,i)perylene	380 U	400 U	390 U	410 U	400 U	360 U
Benzo(k)fluoranthene	380 U	400 U	390 U	410 U	400 U	360 U
Benzoic acid	960 U	1,000 U	970 U	1,000 U	990 U	890 U
Benzyl alcohol	380 U	400 U	390 U	410 U	400 U	360 U
Butylbenzylphthalate	380 U	400 U	390 U	410 U	400 U	360 U
Carbazole	330 U	330 U	330 U	330 U	330 U	330 U
Chlorobenzilate	380 U	400 U	390 U	410 U	400 U	360 U
Chrysene	33.0 J	24.0 J	47.0 J	43.0 J	42.0 J	360 U
Di-n-butylphthalate	380 U	400 U	390 U	410 U	400 U	360 U
Di-n-octylphthalate	380 U	400 U	390 U	410 U	400 U	360 U
Diallate	380 U	400 U	390 U	410 U	400 U	360 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB07	AS01-SB08	AS01-SB09		AS01-SB10	AS01-SB11
Sample ID	AS01-SS07-R01X	AS01-SS08-R01X	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X
Sample Date	02/22/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01
Dibenz(a,h)anthracene	380 U	400 U	390 U	410 U	400 U	360 U
Dibenzofuran	380 U	400 U	390 U	410 U	400 U	360 U
Diethylphthalate	380 U	400 U	390 U	410 U	400 U	360 U
Dimethoate	380 U	400 U	390 U	410 U	400 U	360 U
Dimethyl phthalate	380 U	400 U	1,100	410 U	400 U	360 U
Dinoseb	380 U	400 U	390 U	410 U	400 U	360 U
Diphenylamine	380 U	400 U	390 U	410 U	400 U	360 U
Disulfoton	380 U	400 U	390 U	410 U	400 U	360 U
Ethyl methanesulfonate	380 U	400 U	390 U	410 U	400 U	360 U
Famphur	380 U	400 U	390 U	410 U	400 U	360 U
Fluoranthene	380 U	400 U	390 U	410 U	400 U	360 U
Fluorene	380 U	400 U	390 U	410 U	400 U	360 U
Hexachlorobenzene	380 U	400 U	390 U	410 U	400 U	360 U
Hexachlorobutadiene	380 U	400 U	390 U	410 U	400 U	360 U
Hexachlorocyclopentadiene	380 U	400 U	390 U	410 U	400 U	360 U
Hexachloroethane	380 U	400 U	390 U	410 U	400 U	360 U
Hexachlorophene	15,000 U	16,000 U	15,000 U	16,000 U	16,000 U	14,000 U
Hexachloropropene	960 U	1,000 U	970 U	1,000 U	990 U	890 U
Indeno(1,2,3-cd)pyrene	380 U	400 U	390 U	410 U	400 U	360 U
Isodrin	380 U	400 U	390 U	410 U	400 U	360 U
Isophorone	380 U	400 U	390 U	410 U	400 U	360 U
Isosafrole	380 U	400 U	390 U	410 U	400 U	360 U
Kepone	960 U	1,000 U	970 U	1,000 U	990 U	890 U
Methapyrilene	960 U	1,000 U	970 U	1,000 U	990 U	890 U
Methyl parathion	380 U	400 U	390 U	410 U	400 U	360 U
N-Nitrosomorpholine	380 U	400 U	390 U	410 U	400 U	360 U
N-Nitrosopiperidine	380 U	400 U	390 U	410 U	400 U	360 U
Naphthalene	380 U	400 U	390 U	410 U	400 U	360 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB07	AS01-SB08	AS01-SB09		AS01-SB10	AS01-SB11
Sample ID	AS01-SS07-R01X	AS01-SS08-R01X	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X
Sample Date	02/22/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01
O,O,O-Triethyl phosphorothioate	380 U	400 U	390 U	410 U	400 U	360 U
Parathion	380 U	400 U	390 U	410 U	400 U	360 U
Pentachlorobenzene	380 U	400 U	390 U	410 U	400 U	360 U
Pentachloronitrobenzene	960 U	1,000 U	970 U	1,000 U	990 U	890 U
Pentachlorophenol	960 U	1,000 U	970 U	1,000 U	990 U	890 U
Phenacetin	380 U	400 U	390 U	410 U	400 U	360 U
Phenanthrene	50.0 J	31.0 J	57.0 J	58.0 J	48.0 J	360 U
Phenol	380 U	400 U	390 U	410 U	400 U	360 U
Phorate	380 U	400 U	390 U	410 U	400 U	360 U
Pronamide	380 U	400 U	390 U	410 U	400 U	360 U
Pyrene	380 U	400 U	390 U	410 U	400 U	360 U
Pyridine	380 U	400 U	390 U	410 U	400 U	360 U
Safrole	380 U	400 U	390 U	410 U	400 U	360 U
Sulfotepp	380 U	400 U	390 U	410 U	400 U	360 U
Thionazin	380 U	400 U	390 U	410 U	400 U	360 U
a,a-Dimethylphenethylamine	960 U	1,000 U	970 U	1,000 U	990 U	890 U
bis(2-Chloroethoxy)methane	380 U	400 U	390 U	410 U	400 U	360 U
bis(2-Chloroethyl)ether	380 U	400 U	390 U	410 U	400 U	360 U
bis(2-Ethylhexyl)phthalate	150 J	400 U	390 U	410 U	400 U	360 U
n-Nitroso-di-n-butylamine	380 U	400 U	390 U	410 U	400 U	360 U
n-Nitroso-di-n-propylamine	380 U	400 U	390 U	410 U	400 U	360 U
n-Nitroso-n-methylethylamine	380 U	400 U	390 U	410 U	400 U	360 U
n-Nitrosodiethylamine	380 U	400 U	390 U	410 U	400 U	360 U
n-Nitrosodimethylamine	380 U	400 U	390 U	410 U	400 U	360 U
n-Nitrosodiphenylamine	380 U	400 U	390 U	410 U	400 U	360 U
n-Nitrosopyrrolidine	380 U	400 U	390 U	410 U	400 U	360 U
p-Dimethylaminoazobenzene	380 U	400 U	390 U	410 U	400 U	360 U
p-Phenylenediamine	960 U	1,000 U	970 U	1,000 U	990 U	890 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB07	AS01-SB08	AS01-SB09		AS01-SB10	AS01-SB11
Sample ID	AS01-SS07-R01X	AS01-SS08-R01X	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X
Sample Date	02/22/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01
Explosives (UG/KG)						
1,3,5-Trinitrobenzene	417 R	435 R	417 R	454 R	417 R	417 R
1,3-Dinitrobenzene	380 U	400 U	390 U	410 U	400 U	360 U
2,4,6-Trinitrotoluene	417 U	435 U	417 U	454 U	417 U	417 U
2-Amino-4,6-dinitrotoluene	417 U	435 U	417 U	454 U	417 U	417 U
2-Nitrotoluene	417 U	435 U	417 U	454 U	417 U	417 U
3-Nitrotoluene	417 U	435 U	417 U	454 U	417 U	417 U
4-Amino-2,6-dinitrotoluene	417 U	435 U	417 U	454 U	417 U	417 U
4-Nitrotoluene	417 U	435 U	417 U	454 U	417 U	417 U
HMX	417 U	258 J	417 U	454 U	124 J	506
Nitrobenzene	380 U	400 U	390 U	410 U	400 U	360 U
Nitroglycerin	435 U	454 U	417 U	476 U	435 U	435 U
Perchlorate	58.0 U	63.0 U	60.0 U	63.0 U	61.0 U	58.0 U
RDX	417 U	435 U	417 U	454 U	417 U	417 U
Tetryl	417 U	435 U	417 U	454 U	417 U	417 U
Volatile Organic Compounds (UG/KG)						
1,1,1,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,1-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1-Dichloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2,3-Trichloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2,4-Trichlorobenzene	380 U	400 U	390 U	410 U	400 U	360 U
1,2-Dibromo-3-chloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dibromoethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichlorobenzene	380 U	400 U	390 U	410 U	400 U	360 U
1,2-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB07	AS01-SB08	AS01-SB09		AS01-SB10	AS01-SB11
Sample ID	AS01-SS07-R01X	AS01-SS08-R01X	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X
Sample Date	02/22/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01
1,2-Dichloroethene (total)	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,3-Dichlorobenzene	380 U	400 U	390 U	410 U	400 U	360 U
1,4-Dichlorobenzene	380 U	400 U	390 U	410 U	400 U	360 U
1,4-Dioxane	580 R	630 R	600 R	630 R	610 R	590 R
2-Butanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloro-1,3-butadiene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloroethyl vinyl ether	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Hexanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
4-Methyl-2-pentanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Acetone	6.00 U	12.0	12.0 B	6.00 U	8.00 B	6.00 B
Acetonitrile	230 U	250 U	240 U	250 U	240 U	240 U
Acrolein	58.0 R	63.0 R	60.0 R	63.0 R	61.0 R	59.0 R
Acrylonitrile	58.0 U	63.0 U	60.0 U	63.0 U	61.0 U	59.0 U
Allyl chloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Benzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromodichloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromoform	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Carbon disulfide	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Carbon tetrachloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chlorobenzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloroform	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dibromochloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dibromomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dichlorodifluoromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB07	AS01-SB08	AS01-SB09		AS01-SB10	AS01-SB11
Sample ID	AS01-SS07-R01X	AS01-SS08-R01X	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X
Sample Date	02/22/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01
Ethyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Ethylbenzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Iodomethane	6.00 UL	6.00 U	6.00 UL	6.00 UL	6.00 UL	6.00 UL
Isobutanol	230 R	250 R	240 R	250 R	240 R	240 R
Methacrylonitrile	120 U	130 U	120 U	130 U	120 U	120 U
Methyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Methyl methanesulfonate	960 U	1,000 U	970 U	1,000 U	990 U	890 U
Methylene chloride	6.00 B	9.00 B	8.00 B	9.00 B	4.00 B	15.0 B
Pentachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Propionitrile	120 R	130 R	120 R	130 R	120 R	120 R
Styrene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Tetrachloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Toluene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Trichloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	3.00 J
Trichlorofluoromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl acetate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl chloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Xylene, total	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
cis-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,4-Dichloro-2-butene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dioxin/Furans (UG/KG)						
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.095 U	0.10 U	0.066 U	0.085 U	0.070 U	0.076 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.040 U	0.051 U	0.030 U	0.049 U	0.033 U	0.034 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.047 U	0.061 U	0.035 U	0.057 U	0.038 U	0.040 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.11 U	0.12 U	0.051 U	0.080 U	0.081 U	0.087 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.021 U	0.010 U	0.015 U	0.025 U	0.018 U	0.0090 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.099 U	0.10 U	0.046 U	0.073 U	0.073 U	0.079 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB07	AS01-SB08	AS01-SB09		AS01-SB10	AS01-SB11
Sample ID	AS01-SS07-R01X	AS01-SS08-R01X	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X
Sample Date	02/22/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01
1,2,3,6,7,8-Hexachlorodibenzofuran	0.018 U	0.0090 U	0.013 U	0.022 U	0.015 U	0.0080 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.093 U	0.099 U	0.066 U	0.081 U	0.071 U	0.076 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.019 U	0.010 U	0.014 U	0.024 U	0.016 U	0.0090 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.033 U	0.032 U	0.044 U	0.048 U	0.047 U	0.026 U
1,2,3,7,8-Pentachlorodibenzofuran	0.074 U	0.068 U	0.037 U	0.033 U	0.049 U	0.054 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.020 U	0.010 U	0.015 U	0.024 U	0.017 U	0.0090 U
2,3,4,7,8-Pentachlorodibenzofuran	0.064 U	0.059 U	0.031 U	0.029 U	0.042 U	0.046 U
2,3,7,8-TCDD (dioxin)	0.0070 U	0.0070 U	0.0050 U	0.0060 U	0.0050 U	0.0060 U
2,3,7,8-Tetrachlorodibenzofuran	0.0060 U	0.0080 U	0.0070 U	0.0060 U	0.0050 U	0.0040 U
Total heptachlorodibenzo-p-dioxin	0.095 U	0.10 U	0.066 U	0.085 U	0.070 U	0.076 U
Total heptachlorodibenzofuran	0.040 U	0.051 U	0.030 U	0.049 U	0.033 U	0.034 U
Total hexachlorodibenzo-p-dioxin	0.099 U	0.10 U	0.046 U	0.073 U	0.073 U	0.079 U
Total hexachlorodibenzofuran	0.018 U	0.0090 U	0.013 U	0.022 U	0.015 U	0.0080 U
Total octachlorodibenzo-p-dioxin	0.35	0.35	0.43	0.40	0.39	0.10
Total octachlorodibenzofuran	0.085 U	0.086 U	0.066 U	0.092 U	0.069 U	0.049 U
Other Parameters (MG/KG)						
Nitrate	1.20 U	1.30 U	1.50	1.30 U	4.20	1.20 U
Nitrite	1.20 U	1.30 U	1.20 U	1.30 U	1.20 U	1.20 U
Total organic carbon (TOC)	32,700	31,300	42,800	42,800	30,400	7,420
pH	7.50	6.50	7.00	6.80	7.60	6.90

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15	AS01-SB16	
Sample ID	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X	AS01-SS16-R01X	AS01-SS16P-R01X
Sample Date	02/22/01	02/22/01	02/21/01	02/21/01	02/22/01	02/22/01
Inorganics (MG/KG)						
Aluminum	7,950	10,400	8,200	8,440	7,530	6,700
Antimony	1.90 L	0.82 L	1.60 L	2.20 L	0.50 L	0.45 L
Arsenic	7.30	7.80	6.40	6.50	6.40	6.50
Barium	213	181	144	161	134	136
Beryllium	1.10 K	1.20 K	0.90 K	0.98 K	0.89 K	0.89 K
Cadmium	0.81	0.72	0.92	1.0	0.62	0.73
Chromium	14.0	16.0	13.5	13.6	11.5	10.8
Cobalt	14.6	16.5 K	11.6 K	11.7 K	10.6 K	10.7 K
Copper	19.7	20.7	29.0	27.2	17.3	17.4
Cyanide	0.33 J	0.23 J	0.34 J	0.31 U	0.27 J	0.21 J
Iron	30,700	33,200	24,600	24,800	22,600	22,800
Lead	53.4	25.0	101	75.8	26.6	25.8
Manganese	1,120	1,050	741	777	672	712
Mercury	0.050	0.060	0.060	0.060	0.040 J	0.040
Nickel	22.8 K	28.1	22.1	22.7	21.0	17.6
Selenium	0.60 J	0.38 U	0.37 U	0.55 J	0.35 U	0.36 U
Silver	0.12 U	0.13 U	0.33 J	0.33 J	0.12 U	0.12 U
Thallium	0.24 U	0.88 J	0.37 J	0.45 J	0.24 U	0.46 J
Tin	4.70 J	4.90 J	8.40 J	5.80 J	5.50 J	5.50 J
Vanadium	20.1	33.1	26.6	31.2	17.2	16.1
Zinc	83.3 K	98.4 K	223 K	121 K	65.5 K	64.0 K
Semivolatile Organic Compounds (UG/KG)						
1,1-Biphenyl	380 U	410 U	410 U	380 UJ	380 U	380 U
1,2,4,5-Tetrachlorobenzene	380 U	410 U	410 U	380 U	380 U	380 U
1,4-Naphthoquinone	380 U	410 U	410 U	380 U	380 U	380 U
1-Naphthylamine	380 U	410 U	410 U	380 U	380 U	380 U
2,2'-Oxybis(1-chloropropane)	380 U	410 U	410 U	380 U	380 U	380 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15	AS01-SB16	
Sample ID	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X	AS01-SS16-R01X	AS01-SS16P-R01X
Sample Date	02/22/01	02/22/01	02/21/01	02/21/01	02/22/01	02/22/01
2,3,4,6-Tetrachlorophenol	380 U	410 U	410 U	380 U	380 U	380 U
2,4,5-Trichlorophenol	950 U	1,000 U	1,000 U	960 U	940 U	950 U
2,4,6-Trichlorophenol	380 U	410 U	410 U	380 U	380 U	380 U
2,4-Dichlorophenol	380 U	410 U	410 U	380 U	380 U	380 U
2,4-Dimethylphenol	380 U	410 U	410 U	380 U	380 U	380 U
2,4-Dinitrophenol	950 U	1,000 U	1,000 U	960 U	940 U	950 U
2,4-Dinitrotoluene	380 U	410 U	410 U	380 U	380 U	380 U
2,6-Dichlorophenol	380 U	410 U	410 U	380 U	380 U	380 U
2,6-Dinitrotoluene	380 U	410 U	410 U	380 U	380 U	380 U
2-Acetylaminofluorene	380 U	410 U	410 UJ	380 UJ	380 U	380 U
2-Chloronaphthalene	380 U	410 U	410 U	380 U	380 U	380 U
2-Chlorophenol	380 U	410 U	410 U	380 U	380 U	380 U
2-Methyl-5-nitroaniline	380 U	410 U	410 U	380 U	380 U	380 U
2-Methylaniline	380 U	410 U	410 U	380 U	380 U	380 U
2-Methylnaphthalene	380 U	410 U	410 U	380 U	380 U	380 U
2-Methylphenol	380 U	410 U	410 U	380 U	380 U	380 U
2-Naphthylamine	380 U	410 U	410 U	380 U	380 U	380 U
2-Nitroaniline	950 U	1,000 U	1,000 U	960 U	940 U	950 U
2-Nitrophenol	380 U	410 U	410 U	380 U	380 U	380 U
2-Picoline	380 U	410 U	410 U	380 U	380 U	380 U
3,3'-Dichlorobenzidine	380 U	410 U	410 UJ	380 UJ	380 U	380 U
3,3'-Dimethylbenzidine	380 U	410 U	410 UJ	380 UJ	380 U	380 U
3-Methylcholanthrene	380 U	410 U	410 UJ	380 UJ	380 UJ	380 U
3-Methylphenol	380 U	410 U	410 U	380 U	380 U	380 U
3-Nitroaniline	950 U	1,000 U	1,000 U	960 U	940 U	950 U
4,6-Dinitro-2-methylphenol	950 U	1,000 U	1,000 UJ	960 UJ	940 U	950 U
4-Aminobiphenyl	380 U	410 U	410 UJ	380 UJ	380 U	380 U
4-Bromophenyl-phenylether	380 U	410 U	410 UJ	380 UJ	380 U	380 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15	AS01-SB16	
Sample ID	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X	AS01-SS16-R01X	AS01-SS16P-R01X
Sample Date	02/22/01	02/22/01	02/21/01	02/21/01	02/22/01	02/22/01
4-Chloro-3-methylphenol	380 U	410 U	410 U	380 U	380 U	380 U
4-Chloroaniline	380 U	410 U	410 U	380 U	380 U	380 U
4-Chlorophenyl-phenylether	380 U	410 U	410 U	380 U	380 U	380 U
4-Methylphenol	380 U	410 U	410 U	380 U	380 U	380 U
4-Nitroaniline	950 U	1,000 U	1,000 U	960 U	940 U	950 U
4-Nitrophenol	950 U	1,000 U	1,000 U	960 U	940 U	950 U
4-Nitroquinoline-1-oxide	950 U	1,000 U	1,000 R	960 R	940 U	950 U
7,12-Dimethylbenz(a)anthracene	380 U	410 U	410 UJ	380 UJ	380 UJ	380 U
Acenaphthene	380 U	410 U	410 U	380 U	380 U	380 U
Acenaphthylene	380 U	410 U	410 U	380 U	380 U	380 U
Acetophenone	380 U	410 U	410 U	380 U	380 U	380 U
Aniline	330 U	330 U	330 U	330 U	330 U	330 U
Anthracene	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Aramite	950 U	1,000 U	1,000 UJ	960 UJ	940 U	950 U
Benzo(a)anthracene	380 U	410 U	30.0 J	380 UJ	29.0 J	380 U
Benzo(a)pyrene	380 U	410 U	27.0 J	380 UJ	29.0 J	24.0 J
Benzo(b)fluoranthene	380 U	410 U	410 UJ	380 UJ	380 UJ	380 U
Benzo(g,h,i)perylene	380 U	410 U	410 UJ	380 UJ	380 UJ	380 U
Benzo(k)fluoranthene	380 U	410 U	410 UJ	380 UJ	380 UJ	380 U
Benzoic acid	950 U	1,000 U	1,000 U	960 U	940 U	950 U
Benzyl alcohol	380 U	410 U	410 U	380 U	380 U	380 U
Butylbenzylphthalate	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Carbazole	330 U	330 U	330 U	330 U	330 U	330 U
Chlorobenzilate	380 U	410 U	410 R	380 R	380 U	380 U
Chrysene	26.0 J	37.0 J	51.0 J	38.0 J	47.0 J	40.0 J
Di-n-butylphthalate	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Di-n-octylphthalate	380 U	410 U	410 UJ	380 UJ	380 UJ	380 U
Diallate	380 U	410 U	410 UJ	380 UJ	380 U	380 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15	AS01-SB16	
Sample ID	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X	AS01-SS16-R01X	AS01-SS16P-R01X
Sample Date	02/22/01	02/22/01	02/21/01	02/21/01	02/22/01	02/22/01
Dibenz(a,h)anthracene	380 U	410 U	410 UJ	380 UJ	380 UJ	380 U
Dibenzofuran	380 U	410 U	410 U	380 U	380 U	380 U
Diethylphthalate	380 U	410 U	410 U	380 U	380 U	380 U
Dimethoate	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Dimethyl phthalate	380 U	410 U	1,600	380 U	380 U	380 U
Dinoseb	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Diphenylamine	380 U	410 U	410 U	380 U	380 U	380 U
Disulfoton	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Ethyl methanesulfonate	380 U	410 U	410 U	380 U	380 U	380 U
Famphur	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Fluoranthene	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Fluorene	380 U	410 U	410 U	380 U	380 U	380 U
Hexachlorobenzene	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Hexachlorobutadiene	380 U	410 U	410 U	380 U	380 U	380 U
Hexachlorocyclopentadiene	380 U	410 U	410 U	380 U	380 U	380 U
Hexachloroethane	380 U	410 U	410 U	380 U	380 U	380 U
Hexachlorophene	15,000 U	16,000 U	16,000 UJ	15,000 UJ	15,000 UJ	15,000 U
Hexachloropropene	950 U	1,000 U	1,000 U	960 U	940 U	950 U
Indeno(1,2,3-cd)pyrene	380 U	410 U	410 UJ	380 UJ	380 UJ	380 U
Isodrin	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Isophorone	380 U	410 U	410 U	380 U	380 U	380 U
Isosafrole	380 U	410 U	410 U	380 U	380 U	380 U
Kepone	950 U	1,000 U	1,000 UJ	960 UJ	940 U	950 U
Methapyrilene	950 U	1,000 U	1,000 UJ	960 UJ	940 U	950 U
Methyl parathion	380 U	410 U	410 UJ	380 UJ	380 U	380 U
N-Nitrosomorpholine	380 U	410 U	410 U	380 U	380 U	380 U
N-Nitrosopiperidine	380 U	410 U	410 U	380 U	380 U	380 U
Naphthalene	380 U	410 U	410 U	380 U	380 U	380 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15	AS01-SB16	
Sample ID	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X	AS01-SS16-R01X	AS01-SS16P-R01X
Sample Date	02/22/01	02/22/01	02/21/01	02/21/01	02/22/01	02/22/01
O,O,O-Triethyl phosphorothioate	380 U	410 U	410 U	380 U	380 U	380 U
Parathion	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Pentachlorobenzene	380 U	410 U	410 U	380 U	380 U	380 U
Pentachloronitrobenzene	950 U	1,000 U	1,000 UJ	960 UJ	940 U	950 U
Pentachlorophenol	950 U	1,000 U	1,000 UJ	960 UJ	940 U	950 U
Phenacetin	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Phenanthrene	39.0 J	52.0 J	53.0 J	45.0 J	62.0 J	49.0 J
Phenol	380 U	410 U	410 U	380 U	380 U	380 U
Phorate	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Pronamide	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Pyrene	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Pyridine	380 U	410 U	410 U	380 U	380 U	380 U
Safrole	380 U	410 U	410 U	380 U	380 U	380 U
Sulfotepp	380 U	410 U	410 UJ	380 UJ	380 U	380 U
Thionazin	380 U	410 U	410 U	380 U	380 U	380 U
a,a-Dimethylphenethylamine	950 U	1,000 U	1,000 U	960 U	940 U	950 U
bis(2-Chloroethoxy)methane	380 U	410 U	410 U	380 U	380 U	380 U
bis(2-Chloroethyl)ether	380 U	410 U	410 U	380 U	380 U	380 U
bis(2-Ethylhexyl)phthalate	380 U	410 U	870 J	74.0 J	250 J	380 U
n-Nitroso-di-n-butylamine	380 U	410 U	410 U	380 U	380 U	380 U
n-Nitroso-di-n-propylamine	380 U	410 U	410 U	380 U	380 U	380 U
n-Nitroso-n-methylethylamine	380 U	410 U	410 U	380 U	380 U	380 U
n-Nitrosodiethylamine	380 U	410 U	410 U	380 U	380 U	380 U
n-Nitrosodimethylamine	380 U	410 U	410 U	380 U	380 U	380 U
n-Nitrosodiphenylamine	380 U	410 U	410 UJ	380 UJ	380 U	380 U
n-Nitrosopyrrolidine	380 U	410 U	410 U	380 U	380 U	380 U
p-Dimethylaminoazobenzene	380 U	410 U	410 UJ	380 UJ	380 U	380 U
p-Phenylenediamine	950 U	1,000 U	1,000 U	960 U	940 U	950 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15	AS01-SB16	
Sample ID	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X	AS01-SS16-R01X	AS01-SS16P-R01X
Sample Date	02/22/01	02/22/01	02/21/01	02/21/01	02/22/01	02/22/01
Explosives (UG/KG)						
1,3,5-Trinitrobenzene	454 R	417 R	410 U	380 UJ	417 R	454 R
1,3-Dinitrobenzene	380 U	410 U	410 U	380 U	380 U	380 U
2,4,6-Trinitrotoluene	454 U	417 U	454 U	454 U	417 U	454 U
2-Amino-4,6-dinitrotoluene	454 U	417 U	454 U	454 U	417 U	454 U
2-Nitrotoluene	454 U	417 U	454 U	454 U	417 U	454 U
3-Nitrotoluene	454 U	417 U	454 U	454 U	417 U	454 U
4-Amino-2,6-dinitrotoluene	454 U	417 U	454 U	454 U	417 U	454 U
4-Nitrotoluene	454 U	417 U	454 U	454 U	417 U	454 U
HMX	130 J	417 U	454 U	454 U	417 U	454 U
Nitrobenzene	380 U	410 U	410 U	380 U	380 U	380 U
Nitroglycerin	435 U	417 U	454 U	435 U	476 U	454 U
Perchlorate	62.0 U	64.0 U	63.0 U	61.0 U	59.0 U	59.0 U
RDX	454 U	417 U	454 U	454 U	417 U	454 U
Tetryl	454 U	417 U	454 U	454 U	417 U	454 U
Volatile Organic Compounds (UG/KG)						
1,1,1,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,1-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1-Dichloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2,3-Trichloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2,4-Trichlorobenzene	380 U	410 U	410 U	380 U	380 U	380 U
1,2-Dibromo-3-chloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dibromoethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichlorobenzene	380 U	410 U	410 U	380 U	380 UL	380 U
1,2-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15	AS01-SB16	
Sample ID	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X	AS01-SS16-R01X	AS01-SS16P-R01X
Sample Date	02/22/01	02/22/01	02/21/01	02/21/01	02/22/01	02/22/01
1,2-Dichloroethene (total)	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,3-Dichlorobenzene	380 U	410 U	410 U	380 U	380 UL	380 U
1,4-Dichlorobenzene	380 U	410 U	410 U	380 U	380 UL	380 U
1,4-Dioxane	620 R	630 R	620 R	600 R	590 R	600 R
2-Butanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloro-1,3-butadiene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloroethyl vinyl ether	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Hexanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
4-Methyl-2-pentanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Acetone	6.00 U	6.00 U	8.00 B	6.00 U	6.00 U	6.00 U
Acetonitrile	250 U	250 U	250 U	240 U	240 U	240 U
Acrolein	62.0 R	63.0 R	62.0 R	60.0 R	59.0 R	60.0 R
Acrylonitrile	62.0 U	63.0 U	62.0 U	60.0 U	59.0 U	60.0 U
Allyl chloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Benzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromodichloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromoform	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Carbon disulfide	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Carbon tetrachloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chlorobenzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloroform	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dibromochloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dibromomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dichlorodifluoromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15	AS01-SB16	
Sample ID	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X	AS01-SS16-R01X	AS01-SS16P-R01X
Sample Date	02/22/01	02/22/01	02/21/01	02/21/01	02/22/01	02/22/01
Ethyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Ethylbenzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Iodomethane	6.00 UL	6.00 UL	6.00 UL	6.00 UL	6.00 UL	6.00 UL
Isobutanol	250 R	250 R	250 R	240 R	240 R	240 R
Methacrylonitrile	120 U	130 U	120 U	120 U	120 U	120 U
Methyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 R	6.00 U
Methyl methanesulfonate	950 U	1,000 U	1,000 U	960 U	940 UL	950 U
Methylene chloride	10.0 B	3.00 B	6.00 B	3.00 B	5.00 B	8.00 B
Pentachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Propionitrile	120 R	130 R	120 R	120 R	120 R	120 R
Styrene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Tetrachloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Toluene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Trichloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Trichlorofluoromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl acetate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl chloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Xylene, total	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
cis-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,4-Dichloro-2-butene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dioxin/Furans (UG/KG)						
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.087 U	0.074 U	0.071 U	0.098 U	0.80 U	0.076 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.033 U	0.036 U	0.038 U	0.053 U	0.39 U	0.043 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.039 U	0.042 U	0.044 U	0.061 U	0.46 U	0.050 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.068 U	0.055 U	0.078 U	0.11 U	0.67 U	0.072 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.0090 U	0.0080 U	0.019 U	0.011 U	0.21 U	0.022 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.062 U	0.050 U	0.070 U	0.095 U	0.60 U	0.064 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15	AS01-SB16	
Sample ID	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X	AS01-SS16-R01X	AS01-SS16P-R01X
Sample Date	02/22/01	02/22/01	02/21/01	02/21/01	02/22/01	02/22/01
1,2,3,6,7,8-Hexachlorodibenzofuran	0.0080 U	0.0070 U	0.017 U	0.010 U	0.18 U	0.019 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.086 U	0.072 U	0.068 U	0.093 U	0.76 U	0.060 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.016 U	0.017 U	0.019 U	0.026 U	0.19 U	0.021 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.035 U	0.026 U	0.048 U	0.034 U	0.26 U	0.025 U
1,2,3,7,8-Pentachlorodibenzofuran	0.073 U	0.031 U	0.031 U	0.054 U	0.39 U	0.051 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.017 U	0.018 U	0.019 U	0.027 U	0.20 U	0.022 U
2,3,4,7,8-Pentachlorodibenzofuran	0.063 U	0.027 U	0.027 U	0.047 U	0.34 U	0.044 U
2,3,7,8-TCDD (dioxin)	0.0070 U	0.0060 U	0.0050 U	0.0070 U	0.059 U	0.0060 U
2,3,7,8-Tetrachlorodibenzofuran	0.0060 U	0.0060 U	0.0050 U	0.0060 U	0.045 U	0.0060 U
Total heptachlorodibenzo-p-dioxin	0.087 U	0.074 U	0.071 U	0.098 U	0.80 U	0.076 U
Total heptachlorodibenzofuran	0.033 U	0.036 U	0.038 U	0.053 U	0.39 U	0.043 U
Total hexachlorodibenzo-p-dioxin	0.062 U	0.050 U	0.070 U	0.095 U	0.60 U	0.064 U
Total hexachlorodibenzofuran	0.0080 U	0.0070 U	0.017 U	0.010 U	0.18 U	0.019 U
Total octachlorodibenzo-p-dioxin	0.28	0.41	0.35	0.22	0.30	0.30
Total octachlorodibenzofuran	0.070 U	0.073 U	0.023 J	0.063 U	0.71 U	0.072 U
Other Parameters (MG/KG)						
Nitrate	1.60	1.70	4.20	4.70	1.70	1.40
Nitrite	1.20 U	1.30 U	1.20 U	1.20 U	1.20 U	1.20 U
Total organic carbon (TOC)	29,300	23,900	41,400	42,700	19,300	24,300
pH	6.90	7.50	7.50	7.60	7.80	7.90

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01
Inorganics (MG/KG)				
Aluminum	6,350	8,960	8,760	8,180
Antimony	0.23 UL	0.88 L	0.25 L	1.80 L
Arsenic	6.40	6.50	6.70	7.60
Barium	147	187	129	208
Beryllium	0.91 K	1.00 K	0.85 K	1.10 K
Cadmium	0.65	0.72	0.84	0.74
Chromium	10.8	13.0	12.7	13.7
Cobalt	11.4 K	11.4 K	10.0 K	13.7
Copper	17.0	18.7	22.8	20.7
Cyanide	0.30 J	0.35 J	0.41 J	0.29 J
Iron	23,900	24,800	21,300	28,400
Lead	30.4	34	184	58.1
Manganese	813	915	674	1,090
Mercury	0.060	0.38	0.090	0.080
Nickel	18.5	21.3	22.8 K	24.3 K
Selenium	0.35 U	0.35 U	0.37 U	0.37 J
Silver	0.12 U	0.12 U	0.29 J	0.12 U
Thallium	0.49 J	0.23 U	0.62 J	0.87 J
Tin	4.30 J	4.90 J	6.00 J	5.10 J
Vanadium	24.9	24.4	36.7	29.7
Zinc	68.8 K	97.0 K	116 K	85.6 K
Semivolatile Organic Compounds (UG/KG)				
1,1-Biphenyl	380 U	380 UL	20.0 J	400 UJ
1,2,4,5-Tetrachlorobenzene	380 U	380 UL	400 U	400 U
1,4-Naphthoquinone	380 U	380 UL	400 UJ	400 U
1-Naphthylamine	380 U	380 UL	400 UJ	400 U
2,2'-Oxybis(1-chloropropane)	380 U	380 U	400 U	400 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01
2,3,4,6-Tetrachlorophenol	380 U	380 U	400 UJ	400 U
2,4,5-Trichlorophenol	960 U	950 U	990 UJ	1,000 U
2,4,6-Trichlorophenol	380 U	380 U	400 UJ	400 U
2,4-Dichlorophenol	380 U	380 U	400 U	400 U
2,4-Dimethylphenol	380 U	380 U	400 U	400 U
2,4-Dinitrophenol	960 U	950 U	990 UJ	1,000 U
2,4-Dinitrotoluene	380 U	380 U	400 UJ	400 U
2,6-Dichlorophenol	380 U	380 U	400 U	400 U
2,6-Dinitrotoluene	380 U	380 U	400 UJ	400 U
2-Acetylaminofluorene	380 U	380 U	400 UJ	400 UJ
2-Chloronaphthalene	380 U	380 UL	400 UJ	400 U
2-Chlorophenol	380 U	380 U	400 U	400 U
2-Methyl-5-nitroaniline	380 U	380 U	400 U	400 U
2-Methylaniline	380 U	380 U	400 U	400 U
2-Methylnaphthalene	380 U	380 UL	400 U	400 U
2-Methylphenol	380 U	380 U	400 U	400 U
2-Naphthylamine	380 U	380 UL	400 UJ	400 U
2-Nitroaniline	960 U	950 UL	990 UJ	1,000 U
2-Nitrophenol	380 U	380 U	400 U	400 U
2-Picoline	380 U	380 U	400 U	400 U
3,3'-Dichlorobenzidine	380 U	380 UL	400 UJ	400 UJ
3,3'-Dimethylbenzidine	380 U	380 UL	400 UJ	400 UJ
3-Methylcholanthrene	380 U	380 UL	400 UJ	400 UJ
3-Methylphenol	380 U	380 U	400 U	400 U
3-Nitroaniline	960 U	950 UL	990 UJ	1,000 U
4,6-Dinitro-2-methylphenol	960 U	950 U	990 UJ	1,000 U
4-Aminobiphenyl	380 U	380 U	400 UJ	400 U
4-Bromophenyl-phenylether	380 U	380 U	400 UJ	400 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01
4-Chloro-3-methylphenol	380 U	380 U	400 U	400 U
4-Chloroaniline	380 U	380 U	400 U	400 U
4-Chlorophenyl-phenylether	380 U	380 U	400 UJ	400 U
4-Methylphenol	380 U	380 U	400 U	400 U
4-Nitroaniline	960 U	950 UL	990 UJ	1,000 U
4-Nitrophenol	960 U	950 U	990 UJ	1,000 U
4-Nitroquinoline-1-oxide	960 U	950 UL	990 R	1,000 R
7,12-Dimethylbenz(a)anthracene	380 U	380 UL	400 UJ	400 UJ
Acenaphthene	380 U	380 UL	400 UJ	400 U
Acenaphthylene	380 U	380 UL	400 UJ	400 U
Acetophenone	380 U	380 U	400 U	400 U
Aniline	330 U	330 UL	330 U	330 U
Anthracene	380 U	380 UL	400 UJ	400 U
Aramite	960 U	950 U	990 UJ	1,000 UJ
Benzo(a)anthracene	380 U	380 U	49.0 J	400 UJ
Benzo(a)pyrene	380 U	380 UL	40.0 J	230 J
Benzo(b)fluoranthene	380 U	380 UL	400 UJ	400 UJ
Benzo(g,h,i)perylene	380 U	380 UL	400 UJ	400 UJ
Benzo(k)fluoranthene	380 U	380 UL	400 UJ	400 UJ
Benzoic acid	960 U	950 U	990 U	1,000 U
Benzyl alcohol	380 U	380 U	400 U	400 U
Butylbenzylphthalate	380 U	380 U	400 UJ	400 UJ
Carbazole	330 U	330 U	330 U	330 U
Chlorobenzilate	380 U	380 UL	400 R	400 R
Chrysene	380 U	380 U	78.0 J	40.0 J
Di-n-butylphthalate	380 U	380 U	400 UJ	400 U
Di-n-octylphthalate	380 U	380 U	400 UJ	400 UJ
Diallate	380 U	380 U	400 UJ	400 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01
Dibenz(a,h)anthracene	380 U	380 UL	400 UJ	400 UJ
Dibenzofuran	380 U	380 UL	400 UJ	400 U
Diethylphthalate	380 U	380 U	400 UJ	400 U
Dimethoate	380 U	380 U	400 UJ	400 U
Dimethyl phthalate	380 U	380 U	400 UJ	400 U
Dinoseb	380 U	380 U	400 UJ	400 U
Diphenylamine	380 U	380 UL	400 UJ	400 U
Disulfoton	380 U	380 UL	400 UJ	400 U
Ethyl methanesulfonate	380 U	380 U	400 U	400 U
Famphur	380 U	380 UL	400 UJ	400 UJ
Fluoranthene	380 U	380 UL	400 UJ	400 U
Fluorene	380 U	380 UL	400 UJ	400 U
Hexachlorobenzene	380 U	380 UL	400 UJ	400 U
Hexachlorobutadiene	380 U	380 UL	400 U	400 U
Hexachlorocyclopentadiene	380 U	380 UL	400 UJ	400 U
Hexachloroethane	380 U	380 U	400 U	400 U
Hexachlorophene	15,000 U	15,000 UL	16,000 UJ	16,000 UJ
Hexachloropropene	960 U	950 UL	990 UJ	1,000 U
Indeno(1,2,3-cd)pyrene	380 U	380 UL	400 UJ	400 UJ
Isodrin	380 U	380 UL	400 UJ	400 U
Isophorone	380 U	380 U	400 U	400 U
Isosafrole	380 U	380 UL	400 U	400 U
Kepone	960 U	950 UL	990 UJ	1,000 UJ
Methapyrilene	960 U	950 UL	990 U	1,000 U
Methyl parathion	380 U	380 U	400 UJ	400 U
N-Nitrosomorpholine	380 U	380 U	400 U	400 U
N-Nitrosopiperidine	380 U	380 UL	400 U	400 U
Naphthalene	380 U	380 UL	400 U	400 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01
O,O,O-Triethyl phosphorothioate	380 U	380 U	400 U	400 U
Parathion	380 U	380 U	400 UJ	400 U
Pentachlorobenzene	380 U	380 UL	400 UJ	400 U
Pentachloronitrobenzene	960 U	950 UL	990 UJ	1,000 U
Pentachlorophenol	960 U	950 U	990 UJ	1,000 U
Phenacetin	380 U	380 UL	400 UJ	400 U
Phenanthrene	380 U	380 UL	120 J	490 J
Phenol	380 U	380 U	400 U	400 U
Phorate	380 U	380 U	400 UJ	400 U
Pronamide	380 U	380 UL	400 UJ	400 U
Pyrene	380 U	380 U	400 UJ	400 UJ
Pyridine	380 U	380 U	400 U	400 U
Safrole	380 U	380 UL	400 UJ	400 U
Sulfotepp	380 U	380 UL	400 UJ	400 U
Thionazin	380 U	380 UL	400 UJ	400 U
a,a-Dimethylphenethylamine	960 U	950 UL	990 U	1,000 U
bis(2-Chloroethoxy)methane	380 U	380 U	400 U	400 U
bis(2-Chloroethyl)ether	380 U	380 U	400 U	400 U
bis(2-Ethylhexyl)phthalate	380 U	380 U	1,100 J	400 UJ
n-Nitroso-di-n-butylamine	380 U	380 UL	400 U	400 U
n-Nitroso-di-n-propylamine	380 U	380 UL	400 U	400 U
n-Nitroso-n-methylethylamine	380 U	380 UL	400 U	400 U
n-Nitrosodiethylamine	380 U	380 UL	400 U	400 U
n-Nitrosodimethylamine	380 U	380 UL	400 U	400 U
n-Nitrosodiphenylamine	380 U	380 UL	400 UJ	400 U
n-Nitrosopyrrolidine	380 U	380 U	400 U	400 U
p-Dimethylaminoazobenzene	380 U	380 UL	400 UJ	400 UJ
p-Phenylenediamine	960 U	950 UL	990 U	1,000 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01
Explosives (UG/KG)				
1,3,5-Trinitrobenzene	417 R	476 R	400 U	400 U
1,3-Dinitrobenzene	380 U	380 U	400 U	400 U
2,4,6-Trinitrotoluene	417 U	476 U	435 U	435 U
2-Amino-4,6-dinitrotoluene	417 U	476 U	435 U	435 U
2-Nitrotoluene	417 U	476 U	435 U	435 U
3-Nitrotoluene	417 U	476 U	435 U	435 U
4-Amino-2,6-dinitrotoluene	417 U	476 U	435 U	435 U
4-Nitrotoluene	417 U	476 U	435 U	435 U
HMX	417 U	269 J	123 J	435 U
Nitrobenzene	380 U	380 U	400 U	400 U
Nitroglycerin	454 U	417 U	417 U	454 U
Perchlorate	220	62.0 U	62.0 U	63.0 U
RDX	417 U	476 U	435 U	435 U
Tetryl	417 U	476 U	435 U	435 U
Volatile Organic Compounds (UG/KG)				
1,1,1,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U
1,1,1-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U
1,1-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U
1,1-Dichloroethene	6.00 U	6.00 U	6.00 U	6.00 U
1,2,3-Trichloropropane	6.00 U	6.00 U	6.00 U	6.00 U
1,2,4-Trichlorobenzene	380 U	380 UL	400 U	400 U
1,2-Dibromo-3-chloropropane	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dibromoethane	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichlorobenzene	380 U	380 U	400 U	400 U
1,2-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01
1,2-Dichloroethene (total)	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichloropropane	6.00 U	6.00 U	6.00 U	6.00 U
1,3-Dichlorobenzene	380 U	380 U	400 U	400 U
1,4-Dichlorobenzene	380 U	380 U	400 U	400 U
1,4-Dioxane	610 R	620 R	620 R	620 R
2-Butanone	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloro-1,3-butadiene	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloroethyl vinyl ether	6.00 U	6.00 U	6.00 U	6.00 U
2-Hexanone	6.00 U	6.00 U	6.00 U	6.00 U
4-Methyl-2-pentanone	6.00 U	6.00 U	6.00 U	6.00 U
Acetone	6.00 U	6.00 U	6.00 U	10.0 B
Acetonitrile	240 U	250 U	250 U	250 U
Acrolein	61.0 R	62.0 R	62.0 R	62.0 R
Acrylonitrile	61.0 U	62.0 U	62.0 U	62.0 U
Allyl chloride	6.00 U	6.00 U	6.00 U	6.00 U
Benzene	6.00 U	6.00 U	6.00 U	6.00 U
Bromodichloromethane	6.00 U	6.00 U	6.00 U	6.00 U
Bromoform	6.00 U	6.00 U	6.00 U	6.00 U
Bromomethane	6.00 U	6.00 U	6.00 U	6.00 U
Carbon disulfide	6.00 U	6.00 U	6.00 U	6.00 U
Carbon tetrachloride	6.00 U	6.00 U	6.00 U	6.00 U
Chlorobenzene	6.00 U	6.00 U	6.00 U	6.00 U
Chloroethane	6.00 U	6.00 U	6.00 U	6.00 U
Chloroform	6.00 U	6.00 U	6.00 U	6.00 U
Chloromethane	6.00 U	6.00 U	6.00 U	6.00 U
Dibromochloromethane	6.00 U	6.00 U	6.00 U	6.00 U
Dibromomethane	6.00 U	6.00 U	6.00 U	6.00 U
Dichlorodifluoromethane	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01
Ethyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U
Ethylbenzene	6.00 U	6.00 U	6.00 U	6.00 U
Iodomethane	6.00 UL	6.00 UL	6.00 UL	6.00 UL
Isobutanol	240 R	250 R	250 R	250 R
Methacrylonitrile	120 U	120 U	120 U	120 U
Methyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U
Methyl methanesulfonate	960 U	950 U	990 U	1,000 U
Methylene chloride	6.00 B	4.00 B	5.00 B	2.00 B
Pentachloroethane	6.00 U	6.00 U	6.00 U	6.00 U
Propionitrile	120 R	120 R	120 R	120 R
Styrene	6.00 U	6.00 U	6.00 U	6.00 U
Tetrachloroethene	6.00 U	6.00 U	6.00 U	6.00 U
Toluene	6.00 U	6.00 U	6.00 U	6.00 U
Trichloroethene	6.00 U	6.00 U	6.00 U	6.00 U
Trichlorofluoromethane	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl acetate	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl chloride	6.00 U	6.00 U	6.00 U	6.00 U
Xylene, total	6.00 U	6.00 U	6.00 U	6.00 U
cis-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,4-Dichloro-2-butene	6.00 U	6.00 U	6.00 U	6.00 U
Dioxin/Furans (UG/KG)				
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.081 U	0.073 U	0.072 U	0.10 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.047 U	0.037 U	0.035 U	0.053 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.055 U	0.044 U	0.041 U	0.062 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.063 U	0.083 U	0.069 U	0.18 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.024 U	0.0090 U	0.019 U	0.027 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.058 U	0.074 U	0.062 U	0.16 U

Attachment C-1
Analytical Data - Burning Grounds - Surface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01
1,2,3,6,7,8-Hexachlorodibenzofuran	0.021 U	0.0080 U	0.016 U	0.023 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.082 U	0.072 U	0.049 U	0.15 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.023 U	0.018 U	0.017 U	0.026 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.049 U	0.050 U	0.028 U	0.13 U
1,2,3,7,8-Pentachlorodibenzofuran	0.051 U	0.048 U	0.030 U	0.086 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.024 U	0.019 U	0.018 U	0.027 U
2,3,4,7,8-Pentachlorodibenzofuran	0.044 U	0.041 U	0.026 U	0.074 U
2,3,7,8-TCDD (dioxin)	0.0060 U	0.0060 U	0.011 U	0.0060 U
2,3,7,8-Tetrachlorodibenzofuran	0.0040 U	0.0040 U	0.0050 U	0.0090 U
Total heptachlorodibenzo-p-dioxin	0.081 U	0.073 U	0.072 U	0.10 U
Total heptachlorodibenzofuran	0.047 U	0.037 U	0.035 U	0.053 U
Total hexachlorodibenzo-p-dioxin	0.058 U	0.074 U	0.062 U	0.16 U
Total hexachlorodibenzofuran	0.021 U	0.0080 U	0.016 U	0.023 U
Total octachlorodibenzo-p-dioxin	0.31	0.36	0.52	0.37
Total octachlorodibenzofuran	0.096 U	0.061 U	0.079 U	0.12 U
Other Parameters (MG/KG)				
Nitrate	3.00	2.10	2.50	9.90
Nitrite	1.20 U	1.20 U	1.20 U	1.20 U
Total organic carbon (TOC)	35,000	38,100	35,300	47,300
pH	7.60	7.70	7.60	7.20

Attachment C-2
Analytical Data – Burning Grounds – Subsurface Soil

Attachment C-2
Analytical Data - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Inorganics (MG/KG)								
Aluminum	9,160	9,280	9,330	9,120	10,200	10,200	9,820	10,200
Antimony	2.10 L	1.30 L	1.50 L	1.60 B	1.90 L	1.30 L	0.24 UL	2.00 L
Arsenic	6.50	6.60	7.20	7.00	6.90	7.00	7.60	7.00
Barium	151	154	183	207	195	203	194	196
Beryllium	1.10	1.10	1.20	1.10	1.20	1.30	1.20	1.20
Cadmium	0.23 U	0.23 U	0.24 U	0.23 U	0.22 U	0.24 U	0.24 U	0.23 U
Chromium	14.5 J	14.8 J	15.6 J	15.3 J	15.7 J	15.2 J	16.1 J	15.8 J
Cobalt	14.3	14.7	15.2	15.6	15.9	16.4	15.9	16.0
Copper	15.5	16.2	17.1	17.5	16.8	16.9	18.6	17.6
Cyanide	0.15 B	0.24 B	0.19 B	0.22 B	0.12 B	0.30 B	0.28 B	0.14 B
Iron	31,300	32,300	31,600	32,700	32,700	32,800	33,100	33,500
Lead	14.9 K	15.9 K	20.1 K	16.0 K	16.7 K	22.1 K	25.0 K	16.6 K
Manganese	911	926	1,030	1,010	1,070	1,170	1,080	1,100
Mercury	0.030 B	0.040 B	0.040 B	0.030 B	0.030 B	0.040 B	0.040 B	0.030 B
Nickel	22.4 J	23.7 J	24.2 J	24.1 J	25.1 J	27.1 J	25.3 J	25.9 J
Selenium	1.40 K	1.20 K	1.30 K	1.30 K	1.20 K	1.30 K	1.40 K	0.96 K
Silver	0.12 U	0.12 U	0.12 U	0.11 U	0.12 U	0.12 U	0.12 U	0.12 U
Thallium	1.90	2.10	1.70	1.60	1.50	1.70	2.10	1.80
Tin	4.00 B	3.90 B	4.10 B	3.90 B	4.00 B	4.00 B	3.80 B	4.00 B
Vanadium	20.9	21.1	22.0	21.4	23.0	23.3	24.8	23.5
Zinc	66.3	65.6	71.3	70.5	70.2	73.5	75.2	78.7
Semivolatile Organic Compounds (UG/KG)								
1,1-Biphenyl	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,2,4,5-Tetrachlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,4-Naphthoquinone	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1-Naphthylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,2'-Oxybis(1-chloropropane)	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,3,4,6-Tetrachlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,4,5-Trichlorophenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
2,4,6-Trichlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,4-Dichlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U

Attachment C-2
Analytical Data - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
2,4-Dimethylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,4-Dinitrophenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
2,4-Dinitrotoluene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,6-Dichlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,6-Dinitrotoluene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Acetylaminofluorene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
2-Chloronaphthalene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Chlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Methyl-5-nitroaniline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Methylaniline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Methylnaphthalene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Methylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Naphthylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Nitroaniline	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
2-Nitrophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Picoline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
3,3'-Dichlorobenzidine	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
3,3'-Dimethylbenzidine	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
3-Methylcholanthrene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
3-Methylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
3-Nitroaniline	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
4,6-Dinitro-2-methylphenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
4-Aminobiphenyl	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Bromophenyl-phenylether	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Chloro-3-methylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Chloroaniline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Chlorophenyl-phenylether	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Methylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Nitroaniline	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
4-Nitrophenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
4-Nitroquinoline-1-oxide	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
7,12-Dimethylbenz(a)anthracene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U

Attachment C-2
Analytical Data - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Acenaphthene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Acenaphthylene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Acetophenone	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Aniline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Anthracene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Aramite	960 U	990 U	980 U	980 U	930 UJ	1,000 U	960 U	960 U
Benzo(a)anthracene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Benzo(a)pyrene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Benzo(b)fluoranthene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Benzo(g,h,i)perylene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Benzo(k)fluoranthene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Benzoic acid	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Benzyl alcohol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Butylbenzylphthalate	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Chlorobenzilate	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Chrysene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Di-n-butylphthalate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Di-n-octylphthalate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Diallate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dibenz(a,h)anthracene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dibenzofuran	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Diethylphthalate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dimethoate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dimethyl phthalate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dinoseb	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Diphenylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Disulfoton	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Ethyl methanesulfonate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Famphur	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Fluoranthene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Fluorene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Hexachlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U

Attachment C-2
Analytical Data - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Hexachlorobutadiene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Hexachlorocyclopentadiene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Hexachloroethane	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Hexachlorophene	15,000 U	16,000 U	16,000 U	16,000 U	15,000 U	16,000 U	15,000 U	15,000 U
Hexachloropropene	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Indeno(1,2,3-cd)pyrene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Isodrin	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Isophorone	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Isosafrole	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Kepone	960 U	990 U	980 U	980 U	930 UJ	1,000 U	960 U	960 U
Methapyrilene	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Methyl parathion	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
N-Nitrosomorpholine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
N-Nitrosopiperidine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Naphthalene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
O,O,O-Triethyl phosphorothioate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Parathion	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Pentachlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Pentachloronitrobenzene	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Pentachlorophenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Phenacetin	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Phenanthrene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Phenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Phorate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Pronamide	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Pyrene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Pyridine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Safrole	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Sulfotepp	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Thionazin	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
a,a-Dimethylphenethylamine	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
bis(2-Chloroethoxy)methane	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U

Attachment C-2
Analytical Data - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
bis(2-Chloroethyl)ether	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
bis(2-Ethylhexyl)phthalate	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
n-Nitroso-di-n-butylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitroso-di-n-propylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitroso-n-methylethylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitrosodiethylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitrosodimethylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitrosodiphenylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitrosopyrrolidine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
p-Dimethylaminoazobenzene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
p-Phenylenediamine	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Explosives (UG/KG)								
1,3,5-Trinitrobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,3-Dinitrobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,4,6-Trinitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
2-Amino-4,6-dinitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
2-Nitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
3-Nitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
4-Amino-2,6-dinitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
4-Nitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
HMX	276 J	340 J	454 U	454 U	454 U	476 U	435 U	417 U
Nitrobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Nitroglycerin	435 U	454 U	454 U	476 U	476 U	454 U	435 U	454 U
Perchlorate	120	92.0	61.0 U	62.0	2,500	61.0 U	60.0 U	59.0 U
RDX	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
Tetryl	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
Volatile Organic Compounds (UG/KG)								
1,1,1,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,1-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2,2-Tetrachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1,2-Trichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,1-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-2
Analytical Data - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
1,1-Dichloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2,3-Trichloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2,4-Trichlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,2-Dibromo-3-chloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dibromoethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,2-Dichloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichloroethene (total)	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,2-Dichloropropane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
1,3-Dichlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,4-Dichlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,4-Dioxane	600 R	600 R	620 R	600 R	590 R	610 R	600 R	600 R
2-Butanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloro-1,3-butadiene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Chloroethyl vinyl ether	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
2-Hexanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
4-Methyl-2-pentanone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Acetone	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Acetonitrile	240 U	240 U	250 U	240 U	240 U	240 U	240 U	240 U
Acrolein	60.0 R	60.0 R	62.0 R	60.0 R	59.0 R	61.0 R	60.0 R	60.0 R
Acrylonitrile	60.0 U	60.0 U	62.0 U	60.0 U	59.0 U	61.0 U	60.0 U	60.0 U
Allyl chloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Benzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromodichloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromoform	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Bromomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Carbon disulfide	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Carbon tetrachloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chlorobenzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloroform	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Chloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U

Attachment C-2
Analytical Data - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Dibromochloromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dibromomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dichlorodifluoromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Ethyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Ethylbenzene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Iodomethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Isobutanol	240 R	240 R	250 R	240 R	240 R	240 R	240 R	240 R
Methacrylonitrile	120 U	120 U	120 U	120 U	120 U	120 U	120 U	120 U
Methyl methacrylate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Methyl methanesulfonate	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Methylene chloride	3.00 B	6.00 B	4.00 B	4.00 B	6.00 B	9.00 B	10.0 B	5.00 B
Pentachloroethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Propionitrile	120 R	120 R	120 R	120 R	120 R	120 R	120 R	120 R
Styrene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Tetrachloroethene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Toluene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Trichloroethene	6.00 U	6.00 U	6.00 U	5.00 J	6.00 U	6.00 U	6.00 U	6.00 U
Trichlorofluoromethane	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl acetate	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Vinyl chloride	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Xylene, total	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
cis-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,3-Dichloropropene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
trans-1,4-Dichloro-2-butene	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Dioxin/Furans (UG/KG)								
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.29 U	0.084 U	0.36 U	0.32 U	0.40 U	0.32 U	0.36 U	0.089 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.15 U	0.044 U	0.20 U	0.16 U	0.20 U	0.17 U	0.17 U	0.048 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.19 U	0.051 U	0.26 U	0.21 U	0.26 U	0.22 U	0.23 U	0.056 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.29 U	0.079 U	0.37 U	0.33 U	0.41 U	0.32 U	0.36 U	0.033 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.069 U	0.024 U	0.093 U	0.074 U	0.091 U	0.079 U	0.082 U	0.010 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.25 U	0.071 U	0.33 U	0.29 U	0.36 U	0.28 U	0.31 U	0.030 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.059 U	0.020 U	0.080 U	0.064 U	0.078 U	0.068 U	0.070 U	0.0090 U

Attachment C-2
Analytical Data - Burning Grounds - Subsurface Soil
Allegany Ballistics Laboratory, Mineral County, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.27 U	0.069 U	0.34 U	0.30 U	0.38 U	0.30 U	0.33 U	0.055 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.075 U	0.022 U	0.10 U	0.081 U	0.10 U	0.086 U	0.089 U	0.024 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.20 U	0.073 U	0.22 U	0.21 U	0.24 U	0.19 U	0.11 U	0.035 U
1,2,3,7,8-Pentachlorodibenzofuran	0.14 U	0.052 U	0.15 U	0.15 U	0.18 U	0.13 U	0.16 U	0.050 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.070 U	0.022 U	0.095 U	0.075 U	0.092 U	0.080 U	0.083 U	0.025 U
2,3,4,7,8-Pentachlorodibenzofuran	0.12 U	0.045 U	0.13 U	0.13 U	0.16 U	0.11 U	0.14 U	0.043 U
2,3,7,8-TCDD (dioxin)	0.014 U	0.0060 U	0.015 U	0.015 U	0.017 U	0.014 U	0.015 U	0.0060 U
2,3,7,8-Tetrachlorodibenzofuran	0.0090 U	0.0040 U	0.010 U	0.010 U	0.012 U	0.0080 U	0.011 U	0.0040 U
Total heptachlorodibenzo-p-dioxin	0.29 U	0.084 U	0.36 U	0.32 U	0.40 U	0.32 U	0.36 U	0.089 U
Total heptachlorodibenzofuran	0.15 U	0.044 U	0.20 U	0.16 U	0.20 U	0.17 U	0.17 U	0.048 U
Total hexachlorodibenzo-p-dioxin	0.25 U	0.071 U	0.33 U	0.29 U	0.36 U	0.28 U	0.31 U	0.030 U
Total hexachlorodibenzofuran	0.059 U	0.020 U	0.080 U	0.064 U	0.078 U	0.068 U	0.070 U	0.0090 U
Total octachlorodibenzo-p-dioxin	0.16	0.035 U	0.17	0.13	0.12	0.16	0.19	0.048
Total octachlorodibenzofuran	0.27 U	0.077 U	0.13 U	0.31 U	0.44 U	0.32 U	0.39 U	0.086 U
Other Parameters (MG/KG)								
Nitrate	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U
Nitrite	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U	1.20 U
Total organic carbon (TOC)	9,050	9,370	9,930	9,410	8,940	11,900	12,300	11,400
pH	7.00	7.10	7.30	7.30	7.50	7.40	7.40	7.60

Attachment C-3
Deposition Modeling

Attachment C-3, Table 1
Model Input Values

Symbol	Value				Description	Units
	General	River	Pond	Wetland		
Zs	1, 10, and 20				Soil mixing zone depth	cm
BD	1.50E+00				Soil bulk density	g soil/cm^3
Vdv	1.00E-02				Deposition velocity	m/s
tD	3.00E+01				Time period over which deposition occurs (time period of facility operation)	yr
RO	5.10E+01				Average annual surface runoff	cm/yr
θ_{sw}	2.00E-01				Soil volumetric water content	mL water/cm^3 soil
P	9.00E+01				Average annual precipitation	cm/yr
I	2.50E+01				Average annual irrigation	cm/yr
E_v	6.25E+01				Average annual evapotranspiration	cm/yr
Rp	5.00E-01				Interception fraction of the edible portion of plant	unitless
kp	1.80E+01				Plant surface loss coefficient	yr^{-1}
Tp	1.20E-01				Length of plant exposure to deposition per harvest of the edible portion of the plant	yr
Yp	2.40E-01				Yield or standing crop biomass of the edible portion of the plant (productivity)	kg DW/m^2
ρ_a	1.20E+03				Density of air	kg/m^3
A_W		4.78E+04	3.62E+04	3.09E+04	Water body surface area	m^2
A_I		5.80E+05	9.94E+02	2.56E+03	Impervious watershed surface area	m^2
A_L		9.66E+06	4.97E+04	2.56E+05	Total watershed area receiving COPC deposition	m^2
R	8.21E-05				Universal gas constant	atm-m^3/mol-K
T_{wk}	2.98E+02				Water body temperature	K
RF	1.75E+02				USLE rainfall (or erosivity) factor	yr^{-1}
K_	3.60E-01				USLE erodibility factor	ton/acre
LS	1.50E+00				USLE length-slope factor	unitless
C	1.00E-01				USLE cover management factor	unitless
PF	1.00E+00				USLE supporting practice factor	unitless
a		1.40E+00	2.10E+00	1.90E+00	Empirical intercept coefficient	unitless
b	1.25E-01				Empirical slope coefficient	unitless
TSS	1.00E+01				Total suspended solids concentration	mg/L
d_{wc}		6.76E-01	1.50E+00	3.00E-01	Depth of water column	m
d_{bs}	3.00E-02				Depth of upper benthic sediment layer	m
C_{BS}	1.00E+00				Bed sediment concentration (or bed sediment bulk density)	g/cm^3 or kg/L
θ_{bs}	6.00E-01				Bed sediment porosity	$L_{water}/L_{sediment}$
Vf_x		8.01E+08	5.42E+04	9.26E+03	Average volumetric flow rate through water body	m3/yr
θ	1.03E+00				Temperature correction factor	unitless
u		6.32E-01	0.00E+00	0.00E+00	Current velocity	m/s

Attachment C-3, Table 1
Model Input Values

Symbol	Value				Description	Units
	General	River	Pond	Wetland		
C_d	1.10E-03				Drag coefficient	unitless
W	3.90E+00				Average annual wind speed	m/s
ρ_a	1.20E-03				Density of air	g/cm^3
ρ_w	1.00E+00				Density of water	g/cm^3
k	4.00E-01				von Karman's constant	unitless
λ_z	4.00E+00				Dimensionless viscous sublayer thickness	unitless
μ_w	1.69E-02				Viscosity of water corresponding to water temperature	g/cm-s
μ_a	1.81E-04				Viscosity of air	g/cm-s

Attachment C-3, Table 2
Modeled Air Concentrations and Deposition Term (Ds) (Annual concentration in soil from deposition)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$Ds = \frac{Ca \times \left(Vdv \times 3.15 \times 10^{7} \, {}^{s}/_{yr} \right) \times \left(1 - Fv\right) \times {}^{mg}/_{1{,}000 \, ug}}{\left(Zs \times {}^{m}/_{100 \, cm} \right) \times BD \times {}^{kg}/_{1{,}000 \, g} \times {}^{10^{6} \, cm^{3}}/_{m^{3}}}$$

Symbol	Value	Description	Units	Notes
Ca	calculated	Annual average concentration in air	ug/m^3	Chemical-specific inputs
Ds	calculated	Deposition term	mg/kg-yr	
Zs	1, 10, and 20	Soil mixing zone depth	cm	
BD	1.5	Soil bulk density	g soil/cm^3 soil	
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	
Vdv	0.01	Deposition velocity	m/s	

Attachment C-3, Table 3
Cumulative Concentrations in Soil
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$Cs = \frac{Ds \times [1 - \exp(-ks \times tD)]}{ks}$$

Symbol	Value	Description	Units	Notes
Cs	calculated	Soil concentration at time tD (at the end of the facility operating life)	mg/kg	
Ds	calculated	Deposition term	mg/kg-yr	From Table 2
ks	chemical-specific	Soil loss constant due to all processes	yr^{-1}	From Table 4
tD	30	Time period over which deposition occurs (time period of facility operation)	yr	

Attachment C-3, Table 4
Soil Loss Constant Due to All Processes
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$ks = ksg + kse + ksr + ksl + ksv$$

Symbol	Value	Description	Units	Notes
ks	calculated	Soil loss constant due to all process	yr^{-1}	
ksg	chemical-specific	Soil loss constant due to biotic and abiotic degradation	yr^{-1}	
kse	0.0	Soil loss constant due to soil erosion	yr^{-1}	Set to zero per combustion guidance
ksr	calculated	Soil loss constant due to surface runoff	yr^{-1}	Table 5
ksl	calculated	Soil loss constant due to leaching	yr^{-1}	Table 6
ksv	0.0	Soil loss constant due to volatilization	yr^{-1}	Set to zero per combustion guidance

Attachment C-3, Table 5
Soil Loss Constant Due to Runoff (ksr)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$ksr = \frac{RO}{\theta_{sw} \times Z_s} \times \left(\frac{1}{1 + \left(Kd_s \times BD / \theta_{sw} \right)} \right)$$

Symbol	Value	Description	Units	Notes
ksr	calculated	Soil loss constant due to runoff	yr^{-1}	
RO	51	Average annual surface runoff	cm/yr	
θ_{sw}	0.20	Soil volumetric water content	mL water/cm^3 soil	
Z_s	1, 10, and 20	Soil mixing zone depth	cm	
Kd_s	chemical-specific	Soil-water partition coefficient	cm^3 water/g soil	
BD	1.50	Soil bulk density	g soil/cm^3 soil	

Attachment C-3, Table 6
Soil Loss Constant Due to Leaching (ksl)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$ksl = \frac{P + I - RO - E_v}{\theta_{sw} \times Z_s \times \left[1.0 + \left(BD \times Kd_s / \theta_{sw} \right)\right]}$$

Symbol	Value	Description	Units	Notes
ksl	calculated	COPC loss constant due to leaching	yr^{-1}	
P	90	Average annual precipitation	cm/yr	
I	25	Average annual irrigation	cm/yr	
RO	51	Average annual surface runoff	cm/yr	
E_v	62.5	Average annual evapotranspiration	cm/yr	
0_{sw}	0.20	Soil volumetric water content	mL water/cm^3 soil	
Z_s	1, 10, and 20	Soil mixing zone depth	cm	
BD	1.50	Soil bulk density	g soil/cm^3 soil	
Kd_s	chemical-specific	Soil-water partition coefficient	cm^3 water/g soil	

Attachment C-3, Table 7
Total Water Body Load (LT)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$L_T = L_{DEP} + L_{Dif} + L_{RI} + L_R + L_E$$

Symbol	Value	Description	Units	Notes
LT	calculated	Total chemical load to the water body	g/yr	
L_{DEP}	calculated	Total direct deposition load to water body	g/yr	Table 8
L_{dif}	calculated	Vapor phase COPC diffusion load to water body	g/yr	Table 9
L_{RI}	calculated	Runoff load from impervious surfaces	g/yr	Table 10
L_R	calculated	Runoff load from pervious surfaces	g/yr	Table 11
L_E	calculated	Soil erosion load	g/yr	Table 12

Attachment C-3, Table 8
Deposition to Water Body (L_{DEP})
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$L_{DEP} = Ca \times {}^{g}/_{10^6\ ug} \times (1-Fv) \times Vdv \times {}^{3.15\times10^7\ s}/_{yr} \times A_w$$

Symbol	Value	Description	Units	Notes
L_{DEP}	calculated	Total direct deposition load to water body	g/yr	
Ca	calculated	Annual average concentration in air	ug/m3	Table 2
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	
Vdv	0.01	Deposition velocity	m/s	Table 2
A_W	waterbody-specific	Water body surface area	m^2	

Attachment C-3, Table 9
Diffusion Load to Water Body (L_{Dif})
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$L_{Dif} = \frac{K_v \times Ca \times {}^{g}/_{1\times10^{6}\ ug} \times Vdv \times {}^{3.15\times10^{7}\ s}/_{yr} \times F_v \times A_w}{\frac{H}{RT_{wk}}}$$

Symbol	Value	Description	Units	Notes
L_{Dif}	calculated	Dry vapor phase diffusion load to water body	g/yr	
K_v	calculated	Overall transfer rate coefficient	m/yr	Table 19
Ca	calculated	Annual average concentration in air	ug/m^3	Table 2
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	
Vdv	0.01	Deposition velocity	m/s	Table 2
A_w	waterbody-specific	Water body surface area	m^2	
H	chemical-specific	Henry's Law Constant	atm-m^3/mol	
R	8.21E-05	Universal gas constant	atm-m^3/mol-K	
T_{wk}	2.98E+02	Water body temperature	K	

Attachment C-3, Table 10
Impervious Runoff Load to Water Body (L_{RI})
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$L_{RI} = Ca \times {}^{g}/_{10^6\ ug} \times (1-Fv) \times Vdv \times {}^{3.15\times10^7\ s}/_{yr} \times A_I$$

Symbol	Value	Description	Units	Notes
L_{RI}	calculated	Runoff load from impervious surfaces	g/yr	
Ca	calculated	Annual average concentration in air	ug/m^3	Table 2
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	
Vdv	0.01	Deposition velocity	m/s	Table 2
A_I	waterbody-specific	Impervious watershed surface area	m^2	

Attachment C-3, Table 11
Runoff Load from Pervious Surfaces (L_R)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$L_R = RO \times (A_L - A_I) \times \frac{Cs \times BD}{\theta_{sw} + Kd_s \times BD} \times 0.01$$

Symbol	Value	Description	Units	Notes
L_R	calculated	Runoff load from pervious surfaces	g/yr	
Cs	calculated	Soil concentration at time tD (at the end of the facility operating life)	mg/kg	Table 3
RO	51	Average annual surface runoff from pervious areas	cm/yr	
A_L	waterbody-specific	Total watershed area receiving COPC deposition	m^2	
A_I	waterbody-specific	Impervious watershed area receiving COPC deposition	m^2	
BD	1.50	Soil bulk density	g soil/cm^3 soil	
θ_{sw}	0.20	Soil volumetric water content	mL water/cm^3 soil	
Kd_s	chemical-specific	Soil-water partition coefficient	cm^3 water/g soil	
	0.01	Units conversion factor	kg-cm^2/mg-m^2	

Attachment C-3, Table 12
Erosion Load to Water Body (L_E)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$L_E = X_e \times (A_L - A_I) \times SD \times ER \times \frac{Cs \times Kd_s \times BD}{\theta_{sw} + Kd_s x\, BD} \times 0.001$$

Symbol	Value	Description	Units	Notes
L_E	calculated	Soil erosion load	g/yr	
X_e	calculated	Unit soil loss	kg/m^2-yr	Table 13
Cs	calculated	Soil concentration at time tD (at the end of the facility operating life)	mg/kg	Table 3
A_L	waterbody-specific	Total watershed area (evaluated) receiving COPC deposition	m^2	
A_I	waterbody-specific	Impervious watershed area receiving COPC deposition	m^2	
SD	calculated	Sediment delivery ratio (watershed)	unitless	Table 14
ER	chemical-specific	Soil enrichment ratio	unitless	1 for inorganics; 3 for organics
Kd_s	chemical-specific	Soil-water partition coefficient	mL water/g soil	
BD	1.50	Soil bulk density	g soil/cm^3 soil	
θ_{sw}	0.20	Soil volumetric water content	mL water/g soil	
	0.001	Units conversion factor	g/mg	

Attachment C-3, Table 13
Universal Soil Loss Equation (Xe)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$X_e = RF \bullet K \bullet LS \bullet C \bullet PF \bullet \frac{907.18}{4047}$$

Symbol	Value	Description	Units	Notes
X_e	calculated	Unit soil loss	kg/m^2-yr	
RF	175	USLE rainfall (or erosivity) factor	yr^{-1}	
K_	0.36	USLE erodibility factor	ton/acre	
LS	1.50	USLE length-slope factor	unitless	
C_	0.10	USLE cover management factor	unitless	
PF	1.00	USLE supporting practice factor	unitless	
	907.18	Units conversion factor	kg/ton	
	4047	Units conversion factor	m^2/acre	

Attachment C-3, Table 14
Sediment Delivery Ratio (SD)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$SD = a \bullet \left(A_L\right)^{-b}$$

Symbol	Value	Description	Units	Notes
SD	calculated	Watershed sediment delivery ratio	unitless	
a	waterbody-specific	Empirical intercept coefficient	unitless	
A_L	waterbody-specific	Total watershed area (evaluated) receiving COPC deposition	m^2	
b	0.125	Empirical slope coefficient	unitless	

Attachment C-3, Table 15
Total Water Body Concentration (Cwtot)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$C_{wtot} = \frac{L_T}{Vf_x \times f_{wc} + k_{wt} \times A_w \times (d_{wc} + d_{bs})}$$

Symbol	Value	Description	Units	Notes
C_{wtot}	calculated	Total water body COPC concentration, including water column and bed sediment	g/m^3 (mg/L)	
L_T	chemical-specific	Total COPC load to the water body, including deposition, runoff, and erosion	g/yr	Table 7
Vf_x	waterbody-specific	Average volumetric flow rate through water body	m^3/yr	
f_{wc}	chemical-specific	Fraction of total water body COPC concentration in the water column	unitless	Table 16
k_{wt}	chemical-specific	Overall total water body dissipation rate constant	yr^{-1}	Table 17
A_w	waterbody-specific	Water body surface area	m^2	
d_{wc}	waterbody-specific	Depth of water column	m	
d_{bs}	0.03	Depth of upper benthic sediment layer	m	

Attachment C-3, Table 16
Fraction in Water Column (f_{wc}) and Benthic Sediment (f_{bs})
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$f_{wc} = \frac{\left(1 + Kd_{sw} \times TSS \times 10^{-6}\right) \times d_{wc} / d_z}{\left(1 + Kd_{sw} \times TSS \times 10^{-6}\right) x\ d_{wc} / d_z + \left(\theta_{bs} + Kd_{bs} \times C_{BS}\right) x\, d_{bs} / d_z}$$

$$f_{bs} = 1 - f_{wc}$$

Symbol	Value	Description	Units	Notes
f_{wc}	calculated	Fraction of total water body COPC concentration in the water column	unitless	
f_{bs}	calculated	Fraction of total water body COPC concentration in benthic sediment	unitless	
Kd_{sw}	chemical-specific	Suspended sediments/surface water partition coefficient	L water/kg suspended sediment	
TSS	10	Total suspended solids concentration	mg/L	
	1×10^{-6}	Units conversion factor	kg/mg	
d_{wc}	waterbody-specific	Depth of water column	m	
d_{bs}	0.03	Depth of upper benthic sediment layer	m	
d_z	waterbody-specific	Total water body depth	mg/L	
C_{BS}	1.00	Bed sediment concentration (or bed sediment bulk density)	g/cm^3 or kg/L	
θ_{bs}	0.60	Bed sediment porosity	$L_{water}/L_{sediment}$	
Kd_{bs}	chemical-specific	Bed sediment/sediment pore water partition coefficient	L water/kg bottom sediment	

Attachment C-3, Table 17
Overall Total Water Body Dissipation Rate Constant (kwt)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$k_{wt} = f_{wc} \times k_v + f_{bs} \times k_b$$

Symbol	Value	Description	Units	Notes
k_{wt}	calculated	Overall total water body dissipation rate constant	yr^{-1}	
f_{wc}	calculated	Fraction of total water body COPC concentration in the water column	unitless	Table 16
k_v	calculated	Water column volatilization rate constant	yr^{-1}	Table 18
f_{bs}	calculated	Fraction of total water body COPC concentration in benthic sediment	unitless	Table 16
k_b	calculated	Benthic burial rate constant	yr^{-1}	Table 22

Attachment C-3, Table 18
Water Column Volatilization Loss Rate Constant (kv)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$k_v = \frac{K_v}{d_z \times \left(1 + Kd_{sw} \times TSS \times 10^{-6}\right)}$$

Symbol	Value	Description	Units	Notes
k_v	calculated	Water column volatilization rate constant	yr^{-1}	
K_v	calculated	Overall COPC transfer rate coefficient	m/yr	Table 19
d_z	waterbody-specific	Total water body depth	m	
Kd_{sw}	chemical-specific	Suspended sediments/surface water partition coefficient	L water/kg suspended sediment	
TSS	10	Total suspended solids concentration	mg/L	
	1×10^{-6}	Units conversion factor	kg/mg	

Attachment C-3, Table 19
Overall COPC Transfer Rate Coefficient (K_v)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$K_v = \left[K_L^{-1} + \left(K_G \times \frac{H}{R \times T_{wk}} \right)^{-1} \right]^{-1} \times \theta^{(T_{wk} - 293)}$$

Symbol	Value	Description	Units	Notes
K_v	calculated	Overall COPC transfer rate coefficient	m/yr	
K_L	calculated	Liquid phase transfer coefficient	m/yr	Table 20
K_G	calculated	Gas phase transfer coefficient	m/yr	Table 21
H	chemical-specific	Henry's Law constant	atm-m^3/mol	
R	8.21E-05	Universal gas constant	atm-m^3/mol-K	
T_{wk}	2.98E+02	Water body temperature	K	
θ	1.026	Temperature correction factor	unitless	

Attachment C-3, Table 20
Liquid Phase Transfer Coefficient (K_L)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

For flowing streams or rivers:

$$K_L = \sqrt{\frac{\left(1x10^{-4}\right) \bullet D_w \bullet u}{d_z}} \bullet 3.1536x10^7$$

For quiescent lakes or ponds:

$$K_L = \left(C_d^{\ 05} \bullet W\right) \bullet \left(\frac{\rho_a}{\rho_w}\right)^{0.5} \bullet \left(\frac{k^{0.33}}{\lambda_z}\right) \bullet \left(\frac{\mu_w}{\rho_w \bullet D_w}\right)^{-0.67} \bullet 3.1536x10^7$$

Symbol	Value	Description	Units	Notes
K_L	calculated	Liquid phase transfer coefficient	m/yr	
D_w	chemical-specific	Diffusivity of COPC in water	cm^2/s	
u	waterbody-specific	Current velocity	m/s	
d_z	waterbody-specific	Total water body depth	m	
	3.1536×10^7	Units conversion factor	s/yr	
C_d	0.0011	Drag coefficient	unitless	
W	3.90	Average annual wind speed	m/s	
ρ_a	0.0012	Density of air	g/cm^3	
ρ_w	1.00	Density of water	g/cm^3	
k	0.40	von Karman's constant	unitless	
λ_z	4.00	Dimensionless viscous sublayer thickness	unitless	
μ_w	0.0169	Viscosity of water corresponding to water temperature	g/cm-s	

Attachment C-3, Table 21
Gas Phase Transfer Coefficient (K_G)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

For flowing streams or rivers:

$$K_G = 36500 m / yr$$

For quiescent lakes or ponds:

$$K_G = \left(C_d^{\ 05} \bullet W\right) \bullet \left(\frac{k^{0.33}}{\lambda_z}\right) \bullet \left(\frac{\mu_a}{\rho_a \bullet D_a}\right)^{-0.67} \bullet 3.1536 x 10^7$$

Symbol	Value	Description	Units	Notes
K_G	calculated	Gas phase transfer coefficient	m/yr	
C_d	1.10E-03	Drag coefficient	unitless	
W	3.90E+00	Average annual wind velocity	m/s	
k	4.00E-01	von Karman's constant	unitless	
λ_z	4.00E+00	Dimensionless viscous sublayer thickness	unitless	
μ_a	1.81E-04	Viscosity of air	g/cm-s	
ρ_a	1.20E-03	Density of air	g/cm^3	
D_a	chemical-specific	Diffusivity of COPC in air	cm^2/s	
	3.1536 x 10^7	Units conversion factor	s/yr	

Attachment C-3, Table 22
Benthic Burial Rate Constant (k_b)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$k_b = \left(\frac{X_e \bullet A_L \bullet SD \bullet 10^3 - Vf_x \bullet TSS}{A_W \bullet TSS} \right) \bullet \left(\frac{TSS \bullet 10^{-6}}{C_{BS} \bullet d_{bs}} \right)$$

Symbol	Value	Description	Units	Notes
k_b	calculated	Benthic burial rate constant	yr^{-1}	
X_e	calculated	Unit soil loss	kg/m^2-yr	Table 13
A_L	waterbody-specific	Total watershed area (evaluated) receiving deposition	m^2	
SD	calculated	Sediment delivery ratio (watershed)	unitless	Table 14
	$1x10^3$	Units conversion factor	g/kg	
Vf_x	0.00E+00	Average volumertric flow rate through water body	m^3/yr	
TSS	1.00E+01	Total suspended solids concentration	mg/L	
A_W	0.00E+00	Water body surface area	m^2	
	$1x10^{-6}$	Units conversion factor	kg/mg	
C_{BS}	1.00E+00	Bed Sediment concentration	g/cm^3	
d_{bs}	3.00E-02	Depth of upper benthic sediment layer	m	

Attachment C-3, Table 23
Total Water Column Concentration (Cwctot)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$C_{wctot} = f_{wc} \times C_{wtot} \times \frac{d_{wc} + d_{bs}}{d_{wc}}$$

Symbol	Value	Description	Units	Notes
C_{wctot}	calculated	Total COPC concentration in water column	mg/L	
f_{wc}	calculated	Fraction of total water body COPC concentration in the water column	unitless	Table 16
C_{wtot}	calculated	Total waterbody COPC concentration including water column and bed sediment	mg/L	Table 15
d_{wc}	waterbody-specific	Depth of water column	m	
d_{bs}	0.03	Depth of upper benthic sediment layer	m	

Attachment C-3, Table 24
Dissolved Phase Water Concentration (C_{dw})
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$C_{dw} = \frac{C_{wctot}}{1 + Kd_{sw} \bullet TSS \bullet 10^{-6}}$$

Symbol	Value	Description	Units	Notes
C_{dw}	calculated	Dissolved phase water concentration	mg/L	
C_{wctot}	calculated	Total COPC concentration in water column	mg/L	Table 23
Kd_{sw}	chemical-specific	Suspended sediments/surface water partition coefficient	L water/kg suspended sediment	
TSS	1.00E+01	Total suspended solids concentration	mg/L	
	$1x10^{-6}$	Units conversion factor	kg/mg	

Attachment C-3, Table 25
COPC Concentration Sorbed to Bed Sediment (C_{sb})
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$C_{sb} = f_{bs} \bullet C_{wtot} \bullet \left(\frac{Kd_{bs}}{\theta_{bs} + Kd_{bs} \bullet C_{BS}} \right) \bullet \left(\frac{d_{wc} + d_{bs}}{d_{bs}} \right)$$

Symbol	Value	Description	Units	Notes
C_{sb}	calculated	COPC concentration sorbed to bed sediment	mg/kg	
f_{bs}	calculated	Fraction of total water body COPC concentration in benthic sediment	unitless	Table 16
C_{wtot}	calculated	Total water body COPC cencentration, including water column and bed sediment	mg/L	Table 15
Kd_{bs}	chemical-specific	Bed sediment/sediment pore water partition coefficient	L/kg	
θ_{bs}	6.00E-01	Bed sediment porosity	L pore water/L sediment	
C_{BS}	1.00E+00	Bed sediment concentration	g/cm^3	
d_{wc}	waterbody-specific	Depth of water column	m	
d_{bs}	3.00E-02	Depth of upper benthic sediment layer	m	

Attachment C-3, Table 26
Plant Concentration Due to Direct Deposition (Pd)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$Pd = \frac{\left(Ca \times Vdv \times {}^{3.15\times10^{7}\ s}/_{yr} \times (1 - Fv) \times {}^{mg}/_{1{,}000\,ug}\right) \times Rp \times [1 - \exp(-kp \times Tp)]}{Yp \times kp}$$

Symbol	Value	Description	Units	Notes
Pd	calculated	Plant concentration due to direct deposition	mg/kg DW	
Ca	calculated	Annual average concentration in air	ug/m^3	Table 2
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	
Vdv	0.01	Deposition velocity	m/s	Table 2
Rp	0.50	Interception fraction of the edible portion of plant	unitless	
kp	18	Plant surface loss coefficient	yr^{-1}	
Tp	0.12	Length of plant exposure to deposition per harvest of the edible portion of the plant	yr	
Yp	0.24	Yield or standing crop biomass of the edible portion of the plant (productivity)	$kg\ DW/m^2$	

Attachment C-3, Table 27
Plant Concentration Due to Air-to-Plant Transfer (Pv)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$Pv = \frac{Ca \times {}^{mg}/_{1{,}000\ ug} \times Fv \times Bv \times V}{\rho_a}$$

Symbol	Value	Description	Units	Notes
Pv	calculated	Concentration of COPC in aboveground produce due to air-to plant transfer	mg/kg DW	
Ca	calculated	Annual average concentration in air	ug/m^3	Table 2
F_v	chemical-specific	Fraction of COPC air concentration in vapor phase	unitless	
Bv	chemical-specific	COPC air-to-plant biotransfer factor for aboveground produce	ug/g DW per ug/g air	
V	chemical-specific	Empirical correction factor for aboveground produce	unitless	Value is 0.01 for chemicals with log Kow > 4 (>10,000); value is 1 for chemicals with log Kow < 4 (<10,000)
ρ_a	1200	Density of Air	kg/m^3	

Attachment C-3, Table 28
Plant Concentration Due to Root Uptake (Pr)
Continued Operations Exposure Scenario, Burning Grounds
Allegany Ballistics Laboratory

$$\mathrm{Pr} = Cs \times BCFr$$

Symbol	Value	Description	Units	Notes
Pr	calculated	Concentration in plants due to root uptake	mg/kg DW	
Cs	calculated	Average soil concentration over exposure duration	mg/kg	Table 3
BCFr	chemical-specific	Plant-soil bioconcentration factor	unitless	

Appendix D-1
Soil Investigation Results

Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
Volatile Organic Compounds (UG/KG)								
1,1,1,2-Tetrachloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1,1-Trichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1,2,2-Tetrachloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1,2-Trichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1-Dichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1-Dichloroethene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2,3-Trichloropropane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2,4-Trichlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
1,2-Dibromo-3-chloropropane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dibromoethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
1,2-Dichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloropropane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,3-Dichlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
1,4-Dichlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
1,4-Dioxane	660 U	570 R	610 R	620 R	590 R	620 R	580 R	630 R
2-Butanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Chloro-1,3-butadiene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Chloroethyl vinyl ether	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Hexanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
4-Methyl-2-pentanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Acetone	6 U	6 U	6 U	5 J	10	16	6 U	12
Acetonitrile	260 U	230 U	240 U	250 U	240 U	250 U	230 U	250 U
Acrolein	66 U	57 R	61 R	62 R	59 R	62 R	58 R	63 R
Acrylonitrile	66 U	57 U	61 U	62 U	59 U	62 U	58 U	63 U
Allyl chloride	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Benzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Bromodichloromethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Bromoform	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Bromomethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Carbon disulfide	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Carbon tetrachloride	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U

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L - Reported value may be biased low

R - Unreliable result
U - Analyte not detected

Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
Chlorobenzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chloroform	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chloromethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Dibromochloromethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Dibromomethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Dichlorodifluoromethane(Freon-12)	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Ethyl methacrylate	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Ethylbenzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Iodomethane	6 U	6 U	6 U	6 U	6 U	6 U	6 UL	6 U
Isobutanol	260 U	230 R	240 R	250 R	240 R	250 R	230 R	250 R
Methacrylonitrile	130 U	110 U	120 U	120 U	120 U	120 U	120 U	130 U
Methyl methacrylate	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Methyl methanesulfonate	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
Methylene chloride	3 B	4 B	4 B	5 B	9 B	2 B	6 B	9 B
Pentachloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Propionitrile	130 U	110 R	120 R	120 R	120 R	120 R	120 R	130 R
Styrene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Tetrachloroethene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Toluene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Trichloroethene	6 U	26	6 U	9	6 U	6 U	6 U	6 U
Trichlorofluoromethane(Freon-11)	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Vinyl acetate	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Vinyl chloride	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Xylene, total	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
cis-1,3-Dichloropropene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
trans-1,3-Dichloropropene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
trans-1,4-Dichloro-2-butene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Semi-volatile Organic Compounds (UG/KG)								
1,1-Biphenyl	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
1,2,4,5-Tetrachlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
1,4-Naphthoquinone	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
1-Naphthylamine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U

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Rocket Center, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
2,2'-Oxybis(1-chloropropane)	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2,3,4,6-Tetrachlorophenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2,4,5-Trichlorophenol	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
2,4,6-Trichlorophenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2,4-Dichlorophenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2,4-Dimethylphenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2,4-Dinitrophenol	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
2,4-Dinitrotoluene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2,6-Dichlorophenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2,6-Dinitrotoluene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2-Acetylaminofluorene	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
2-Chloronaphthalene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2-Chlorophenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2-Methyl-5-nitroaniline	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2-Methylaniline	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2-Methylnaphthalene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2-Methylphenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2-Naphthylamine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2-Nitroaniline	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
2-Nitrophenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2-Picoline	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
3,3'-Dichlorobenzidine	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
3,3'-Dimethylbenzidine	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
3-Methylcholanthrene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
3-Methylphenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
3-Nitroaniline	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
4,6-Dinitro-2-methylphenol	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
4-Aminobiphenyl	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
4-Bromophenyl-phenylether	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
4-Chloro-3-methylphenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
4-Chloroaniline	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
4-Chlorophenyl-phenylether	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
4-Methylphenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
4-Nitroaniline	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U

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Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
4-Nitrophenol	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
4-Nitroquinoline-1-oxide	1,000 R	860 R	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
7,12-Dimethylbenz(a)anthracene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Acenaphthene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Acenaphthylene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Acetophenone	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Aniline	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U
Anthracene	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Aramite	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
Benzo(a)anthracene	66 J	340 UJ	370 U	400 U	370 U	24 J	380 U	400 U
Benzo(a)pyrene	54 J	340 U	370 U	400 U	370 U	26 J	380 U	400 U
Benzo(b)fluoranthene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Benzo(g,h,i)perylene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Benzo(k)fluoranthene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Benzoic acid	200 B	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
Benzyl alcohol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Butylbenzylphthalate	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Carbazole	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U
Chlorobenzilate	420 R	340 R	370 U	400 U	370 U	410 U	380 U	400 U
Chrysene	110 J	340 UJ	26 J	400 U	370 U	43 J	33 J	24 J
Di-n-butylphthalate	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Di-n-octylphthalate	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Diallate	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Dibenz(a,h)anthracene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Dibenzofuran	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Diethylphthalate	420 U	160 J	370 U	400 U	370 U	410 U	380 U	400 U
Dimethoate	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Dimethyl phthalate	420 U	2,300	370 U	400 U	370 U	410 U	380 U	400 U
Dinoseb	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Diphenylamine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Disulfoton	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Ethyl methanesulfonate	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Famphur	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Fluoranthene	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U

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Table 1
Analytical Results of Constituents in Surface Soil Samples
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Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
Fluorene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Hexachlorobenzene	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Hexachlorobutadiene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Hexachlorocyclopentadiene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Hexachloroethane	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Hexachlorophene	17,000 U	14,000 U	15,000 U	16,000 U	15,000 U	16,000 U	15,000 U	16,000 U
Hexachloropropene	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
Indeno(1,2,3-cd)pyrene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Isodrin	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Isophorone	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Isosafrole	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Kepone	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
Methapyrilene	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
Methyl parathion	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
N-Nitrosomorpholine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
N-Nitrosopiperidine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Naphthalene	40 J	340 U	370 U	400 U	370 U	410 U	380 U	400 U
O,O,O-Triethyl phosphorothioate	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Parathion	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Pentachlorobenzene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Pentachloronitrobenzene	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
Pentachlorophenol	1,000 U	860 UJ	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
Phenacetin	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Phenanthrene	140 J	340 UJ	39 J	400 U	370 U	60 J	50 J	31 J
Phenol	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Phorate	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Pronamide	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Pyrene	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Pyridine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Safrole	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Sulfotepp	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
Thionazin	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
a,a-Dimethylphenethylamine	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
bis(2-Chloroethoxy)methane	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U

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Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
bis(2-Chloroethyl)ether	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
bis(2-Ethylhexyl)phthalate	420 U	97 J	1,300	400 U	370 U	74 J	150 J	400 U
n-Nitroso-di-n-butylamine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
n-Nitroso-di-n-propylamine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
n-Nitroso-n-methylethylamine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
n-Nitrosodiethylamine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
n-Nitrosodimethylamine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
n-Nitrosodiphenylamine	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
n-Nitrosopyrrolidine	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
p-Dimethylaminoazobenzene	420 U	340 UJ	370 U	400 U	370 U	410 U	380 U	400 U
p-Phenylenediamine	1,000 U	860 U	920 U	1,000 U	920 U	1,000 U	960 U	1,000 U
Dioxin/Furans (UG/KG)								
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.054 U	0.056 J	0.121 U	0.126 U	0.105 U	0.116 U	0.095 U	0.102 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.046 U	0.039	0.062 U	0.064 U	0.039 U	0.056 U	0.04 U	0.051 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.056 U	0.018 U	0.074 U	0.077 U	0.047 U	0.068 U	0.047 U	0.061 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.132 U	0.168 U	0.136 U	0.104 U	0.087 U	0.127 U	0.11 U	0.115 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.023 U	0.028 U	0.032 U	0.032 U	0.019 U	0.012 U	0.021 U	0.01 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.116 U	0.147 U	0.119 U	0.091 U	0.076 U	0.111 U	0.099 U	0.1 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.02 U	0.024 U	0.028 U	0.027 U	0.016 U	0.01 U	0.018 U	0.009 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.111 U	0.146 U	0.114 U	0.123 U	0.103 U	0.106 U	0.093 U	0.099 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.023 U	0.028 U	0.03 U	0.031 U	0.019 U	0.013 U	0.019 U	0.01 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.074 U	0.088 U	0.066 U	0.068 U	0.089 U	0.069 U	0.033 U	0.032 U
1,2,3,7,8-Pentachlorodibenzofuran	0.082 U	0.102 U	0.068 U	0.078 U	0.074 U	0.077 U	0.074 U	0.068 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.023 U	0.028 U	0.03 U	0.032 U	0.019 U	0.013 U	0.02 U	0.01 U
2,3,4,7,8-Pentachlorodibenzofuran	0.071 U	0.088 U	0.059 U	0.068 U	0.065 U	0.067 U	0.064 U	0.059 U
2,3,7,8-TCDD (dioxin)	0.008 U	0.01 U	0.007 U	0.008 U	0.007 U	0.008 U	0.007 U	0.007 U
2,3,7,8-Tetrachlorodibenzofuran	0.007 U	0.008 U	0.005 U	0.006 U	0.006 U	0.006 U	0.006 U	0.008 U
Total heptachlorodibenzo-p-dioxin	0.012 U	0.056	0.121 U	0.126 U	0.105 U	0.116 U	0.095 U	0.102 U
Total heptachlorodibenzofuran	0.046 U	0.039	0.067 U	0.064 U	0.039 U	0.056 U	0.04 U	0.051 U
Total hexachlorodibenzo-p-dioxin	0.116 U	0.147 U	0.119 U	0.091 U	0.076 U	0.111 U	0.099 U	0.1 U
Total hexachlorodibenzofuran	0.02 U	0.024 U	0.028 U	0.027 U	0.016 U	0.01 U	0.018 U	0.009 U
Total octachlorodibenzo-p-dioxin	0.722	0.411	0.307	0.109	0.09	0.366	0.347	0.345
Total octachlorodibenzofuran	0.073 U	0.08	0.114 U	0.078 U	0.09 U	0.1 U	0.085 U	0.086 U

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Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
Explosives (UG/KG)								
1,3,5-Trinitrobenzene	420 U	340 U	476 R	454 R	454 R	476 R	417 R	435 R
1,3-Dinitrobenzene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
2,4,6-Trinitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U	417 U	435 U
2-Amino-4,6-dinitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U	417 U	435 U
2-Nitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U	417 U	435 U
3-Nitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U	417 U	435 U
4-Amino-2,6-dinitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U	417 U	435 U
4-Nitrotoluene	454 U	454 U	476 U	454 U	454 U	476 U	417 U	435 U
HMX	454 U	1,190	2,400	454 U	2,250	476 U	417 U	258 J
Nitrobenzene	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Nitroglycerin	454 U	476 U	476 U	476 U	454 U	454 U	435 U	454 U
Perchlorate	66 U	56 U	68	96	880	95	58 U	63 U
RDX	454 U	735	476 U	454 U	784	476 U	417 U	435 U
Tetryl	454 U	454 U	476 U	454 U	454 U	476 U	417 U	435 U
Total Metals (MG/KG)								
Aluminum	7,800	4,680	7,490	7,540	7,590	7,410	6,280	7,320
Antimony	1.7 L	1.2 L	0.98 L	1.3 L	1.4 L	1.1 L	0.49 L	0.96 L
Arsenic	9.5	5	7.6	6.8	7.2	7.6	6.1	6.9
Barium	165	77.6	154	134	176	153	136	185
Beryllium	1.2 K	0.54 K	1.1 K	1 K	1.1 K	1 K	0.88 K	1.1 K
Cadmium	0.71	0.7	0.57 J	0.56 J	1.3	0.63	0.79	0.63
Chromium	14.7	8.8	13.4	13.5	13.5	14.8	23.8	12.7
Cobalt	15.1	6.9	15	14.1	15	14.7	11.5	13.6
Copper	27.5	22.5	22.4	19.2	19.3	19.3	20.5	18.1
Cyanide	0.26 J	0.19 J	0.46 J	0.19 J	0.54 J	0.28 J	0.24 J	0.37 J
Iron	30,800	15,800	32,700	31,600	32,400	30,200	24,800	28,200
Lead	39.3	1,730	25.2	34.3	55.2	26.9	25.9	30
Manganese	954	419	912	797	1,010	928	783	982
Mercury	0.09	0.08	0.05	0.05	0.04	0.05	0.05	0.05
Nickel	24.1 K	16 K	20.9 K	20.6 K	22 K	23.1 K	20.8 K	21.1 K
Selenium	0.47 J	0.33 U	0.35 U	0.36 U	0.33 U	0.44 J	0.33 U	0.37 J

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Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
Silver	0.23 J	0.54 J	0.12 U	0.12 U	0.11 U	0.12 U	0.11 U	0.12 U
Thallium	0.29 J	0.22 U	0.82 J	0.34 J	0.54 J	0.79 J	0.34 J	0.68 J
Tin	8 J	7.6 J	4.4 J	5.6 J	4.5 J	5.6 J	4.7 J	4.7 J
Vanadium	22.1	14.6	19.8	20.2	19.9	23.5	21.9	19.7
Zinc	108 K	271 K	73.6 K	100 K	75.6 K	98.9 K	86.3 K	74.8 K
Wet Chemistry (MG/KG)								
Nitrate	3.5	1.1 U	1.2 U	1.5	4.5	1.2 U	1.2 U	1.3 U
Nitrite	1.3 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.3 U
Total organic carbon (TOC)	78,400	35,300	23,400	21,200	19,000	42,100	32,700	31,300
pH	7.3	7.5	7.1	6.3	7.1	5.7	7.5	6.5

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Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
Volatile Organic Compounds (UG/KG)								
1,1,1,2-Tetrachloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1,1-Trichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1,2,2-Tetrachloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1,2-Trichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1-Dichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1-Dichloroethene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2,3-Trichloropropane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2,4-Trichlorobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
1,2-Dibromo-3-chloropropane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dibromoethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichlorobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
1,2-Dichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloropropane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,3-Dichlorobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
1,4-Dichlorobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
1,4-Dioxane	600 R	630 R	610 R	590 R	620 R	630 R	620 R	600 R
2-Butanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Chloro-1,3-butadiene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Chloroethyl vinyl ether	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Hexanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
4-Methyl-2-pentanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Acetone	12 B	6 U	8 B	6 B	6 U	6 U	8 B	6 U
Acetonitrile	240 U	250 U	240 U	240 U	250 U	250 U	250 U	240 U
Acrolein	60 R	63 R	61 R	59 R	62 R	63 R	62 R	60 R
Acrylonitrile	60 U	63 U	61 U	59 U	62 U	63 U	62 U	60 U
Allyl chloride	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Benzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Bromodichloromethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Bromoform	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Bromomethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Carbon disulfide	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Carbon tetrachloride	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U

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Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
Chlorobenzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chloroform	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chloromethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Dibromochloromethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Dibromomethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Dichlorodifluoromethane(Freon-12)	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Ethyl methacrylate	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Ethylbenzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Iodomethane	6 UL	6 UL	6 UL	6 UL	6 UL	6 UL	6 UL	6 UL
Isobutanol	240 R	250 R	240 R	240 R	250 R	250 R	250 R	240 R
Methacrylonitrile	120 U	130 U	120 U	120 U	120 U	130 U	120 U	120 U
Methyl methacrylate	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Methyl methanesulfonate	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
Methylene chloride	8 B	9 B	4 B	15 B	10 B	3 B	6 B	3 B
Pentachloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Propionitrile	120 R	130 R	120 R	120 R	120 R	130 R	120 R	120 R
Styrene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Tetrachloroethene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Toluene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Trichloroethene	6 U	6 U	6 U	3 J	6 U	6 U	6 U	6 U
Trichlorofluoromethane(Freon-11)	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Vinyl acetate	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Vinyl chloride	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Xylene, total	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
cis-1,3-Dichloropropene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
trans-1,3-Dichloropropene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
trans-1,4-Dichloro-2-butene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Semi-volatile Organic Compounds (UG/KG)								
1,1-Biphenyl	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 UJ
1,2,4,5-Tetrachlorobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
1,4-Naphthoquinone	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
1-Naphthylamine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U

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Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
2,2'-Oxybis(1-chloropropane)	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2,3,4,6-Tetrachlorophenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2,4,5-Trichlorophenol	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
2,4,6-Trichlorophenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2,4-Dichlorophenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2,4-Dimethylphenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2,4-Dinitrophenol	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
2,4-Dinitrotoluene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2,6-Dichlorophenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2,6-Dinitrotoluene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2-Acetylaminofluorene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
2-Chloronaphthalene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2-Chlorophenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2-Methyl-5-nitroaniline	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2-Methylaniline	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2-Methylnaphthalene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2-Methylphenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2-Naphthylamine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2-Nitroaniline	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
2-Nitrophenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2-Picoline	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
3,3'-Dichlorobenzidine	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
3,3'-Dimethylbenzidine	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
3-Methylcholanthrene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
3-Methylphenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
3-Nitroaniline	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
4,6-Dinitro-2-methylphenol	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 UJ	960 UJ
4-Aminobiphenyl	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
4-Bromophenyl-phenylether	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
4-Chloro-3-methylphenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
4-Chloroaniline	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
4-Chlorophenyl-phenylether	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
4-Methylphenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
4-Nitroaniline	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U

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Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
4-Nitrophenol	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
4-Nitroquinoline-1-oxide	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 R	960 R
7,12-Dimethylbenz(a)anthracene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Acenaphthene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Acenaphthylene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Acetophenone	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Aniline	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U
Anthracene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Aramite	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 UJ	960 UJ
Benzo(a)anthracene	390 U	24 J	400 U	360 U	380 U	410 U	30 J	380 UJ
Benzo(a)pyrene	24 J	410 U	400 U	360 U	380 U	410 U	27 J	380 UJ
Benzo(b)fluoranthene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Benzo(g,h,i)perylene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Benzo(k)fluoranthene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Benzoic acid	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
Benzyl alcohol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Butylbenzylphthalate	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Carbazole	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U
Chlorobenzilate	390 U	410 U	400 U	360 U	380 U	410 U	410 R	380 R
Chrysene	47 J	43 J	42 J	360 U	26 J	37 J	51 J	38 J
Di-n-butylphthalate	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Di-n-octylphthalate	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Diallate	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Dibenz(a,h)anthracene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Dibenzofuran	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Diethylphthalate	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Dimethoate	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Dimethyl phthalate	1,100	410 U	400 U	360 U	380 U	410 U	1,600	380 U
Dinoseb	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Diphenylamine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Disulfoton	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Ethyl methanesulfonate	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Famphur	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Fluoranthene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ

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Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
Fluorene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Hexachlorobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Hexachlorobutadiene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Hexachlorocyclopentadiene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Hexachloroethane	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Hexachlorophene	15,000 U	16,000 U	16,000 U	14,000 U	15,000 U	16,000 U	16,000 UJ	15,000 UJ
Hexachloropropene	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
Indeno(1,2,3-cd)pyrene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Isodrin	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Isophorone	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Isosafrole	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Kepone	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 UJ	960 UJ
Methapyrilene	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 UJ	960 UJ
Methyl parathion	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
N-Nitrosomorpholine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
N-Nitrosopiperidine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Naphthalene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
O,O,O-Triethyl phosphorothioate	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Parathion	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Pentachlorobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Pentachloronitrobenzene	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 UJ	960 UJ
Pentachlorophenol	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 UJ	960 UJ
Phenacetin	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Phenanthrene	57 J	58 J	48 J	360 U	39 J	52 J	53 J	45 J
Phenol	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Phorate	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Pronamide	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Pyrene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Pyridine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Safrole	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Sulfotepp	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
Thionazin	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
a,a-Dimethylphenethylamine	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
bis(2-Chloroethoxy)methane	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U

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Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
bis(2-Chloroethyl)ether	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
bis(2-Ethylhexyl)phthalate	390 U	410 U	400 U	360 U	380 U	410 U	870 J	74 J
n-Nitroso-di-n-butylamine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
n-Nitroso-di-n-propylamine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
n-Nitroso-n-methylethylamine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
n-Nitrosodiethylamine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
n-Nitrosodimethylamine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
n-Nitrosodiphenylamine	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
n-Nitrosopyrrolidine	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
p-Dimethylaminoazobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 UJ	380 UJ
p-Phenylenediamine	970 U	1,000 U	990 U	890 U	950 U	1,000 U	1,000 U	960 U
Dioxin/Furans (UG/KG)								
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.066 U	0.085 U	0.07 U	0.076 U	0.087 U	0.074 U	0.071 U	0.098 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.03 U	0.049 U	0.033 U	0.034 U	0.033 U	0.036 U	0.038 U	0.053 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.035 U	0.057 U	0.038 U	0.04 U	0.039 U	0.042 U	0.044 U	0.061 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.051 U	0.08 U	0.081 U	0.087 U	0.068 U	0.055 U	0.078 U	0.106 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.015 U	0.025 U	0.018 U	0.009 U	0.009 U	0.008 U	0.019 U	0.011 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.046 U	0.073 U	0.073 U	0.079 U	0.062 U	0.05 U	0.07 U	0.095 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.013 U	0.022 U	0.015 U	0.008 U	0.008 U	0.007 U	0.017 U	0.01 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.066 U	0.081 U	0.071 U	0.076 U	0.086 U	0.072 U	0.068 U	0.093 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.014 U	0.024 U	0.016 U	0.009 U	0.016 U	0.017 U	0.019 U	0.026 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.044 U	0.048 U	0.047 U	0.026 U	0.035 U	0.026 U	0.048 U	0.034 U
1,2,3,7,8-Pentachlorodibenzofuran	0.037 U	0.033 U	0.049 U	0.054 U	0.073 U	0.031 U	0.031 U	0.054 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.015 U	0.024 U	0.017 U	0.009 U	0.017 U	0.018 U	0.019 U	0.027 U
2,3,4,7,8-Pentachlorodibenzofuran	0.031 U	0.029 U	0.042 U	0.046 U	0.063 U	0.027 U	0.027 U	0.047 U
2,3,7,8-TCDD (dioxin)	0.005 U	0.006 U	0.005 U	0.006 U	0.007 U	0.006 U	0.005 U	0.007 U
2,3,7,8-Tetrachlorodibenzofuran	0.007 U	0.006 U	0.005 U	0.004 U	0.006 U	0.006 U	0.005 U	0.006 U
Total heptachlorodibenzo-p-dioxin	0.066 U	0.085 U	0.07 U	0.076 U	0.087 U	0.074 U	0.071 U	0.098 U
Total heptachlorodibenzofuran	0.03 U	0.049 U	0.033 U	0.034 U	0.033 U	0.036 U	0.038 U	0.053 U
Total hexachlorodibenzo-p-dioxin	0.046 U	0.073 U	0.073 U	0.079 U	0.062 U	0.05 U	0.07 U	0.095 U
Total hexachlorodibenzofuran	0.013 U	0.022 U	0.015 U	0.008 U	0.008 U	0.007 U	0.017 U	0.01 U
Total octachlorodibenzo-p-dioxin	0.427	0.402	0.39	0.1	0.284	0.414	0.354	0.215
Total octachlorodibenzofuran	0.066 U	0.092 U	0.069 U	0.049 U	0.07 U	0.073 U	0.028 J	0.063 U

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Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
Explosives (UG/KG)								
1,3,5-Trinitrobenzene	417 R	454 R	417 R	417 R	454 R	417 R	410 U	380 UJ
1,3-Dinitrobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
2,4,6-Trinitrotoluene	417 U	454 U	417 U	417 U	454 U	417 U	454 U	454 U
2-Amino-4,6-dinitrotoluene	417 U	454 U	417 U	417 U	454 U	417 U	454 U	454 U
2-Nitrotoluene	417 U	454 U	417 U	417 U	454 U	417 U	454 U	454 U
3-Nitrotoluene	417 U	454 U	417 U	417 U	454 U	417 U	454 U	454 U
4-Amino-2,6-dinitrotoluene	417 U	454 U	417 U	417 U	454 U	417 U	454 U	454 U
4-Nitrotoluene	417 U	454 U	417 U	417 U	454 U	417 U	454 U	454 U
HMX	417 U	454 U	124 J	506	130 J	417 U	454 U	454 U
Nitrobenzene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Nitroglycerin	417 U	476 U	435 U	435 U	435 U	417 U	454 U	435 U
Perchlorate	60 U	63 U	61 U	58 U	62 U	64 U	63 U	61 U
RDX	417 U	454 U	417 U	417 U	454 U	417 U	454 U	454 U
Tetryl	417 U	454 U	417 U	417 U	454 U	417 U	454 U	454 U
Total Metals (MG/KG)								
Aluminum	9,240	9,800	8,350	9,510	7,950	10,400	8,200	8,440
Antimony	1.1 L	0.87 L	1.4 L	0.81 L	1.9 L	0.82 L	1.6 L	1.2 L
Arsenic	7.4	7.4	6.8	6.6	7.3	7.8	6.4	6.5
Barium	219	239	208	161	213	181	144	161
Beryllium	1.2 K	1.2 K	1.1 K	0.99 K	1.1 K	1.2 K	0.9 K	0.98 K
Cadmium	1	0.77	0.67	0.71	0.81	0.72	0.92	10.9
Chromium	14.6	15	13.2	15.7	14	16	13.5	13.6
Cobalt	14.5 K	14.4 K	15 K	15 K	14.6	16.5 K	11.6 K	11.7 K
Copper	21.5	21.6	17.9	17.6	19.7	20.7	29	27.2
Cyanide	0.26 J	0.35 J	0.35 J	0.06 U	0.33 J	0.23 J	0.34 J	0.31 J
Iron	28,900	29,200	30,100	33,200	30,700	33,200	24,600	24,800
Lead	38	31.3	29.5	96.9	53.4	25	101	75.8
Manganese	1,080	1,120	999	730	1,120	1,050	741	777
Mercury	0.07	0.08	0.05	0.04	0.05	0.06	0.06	0.06
Nickel	25	25.6	22.3	33.4	22.8 K	28.1	22.1	22.7
Selenium	0.36 U	0.38 U	0.36 U	0.33 U	0.5 J	0.38 U	0.37 U	0.55 J

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Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
Silver	0.12 U	0.13 U	0.12 U	0.26 J	0.12 U	0.13 U	0.33 J	0.33 J
Thallium	0.68 J	0.46 J	0.78 J	1.1 J	0.24 U	0.68 J	0.37 J	0.45 J
Tin	5.6 J	6 J	4.3 J	4.1 J	4.7 J	4.9 J	8.4 J	5.8 J
Vanadium	24.6	25	22.5	21.4	20.1	33.1	26.6	31.2
Zinc	116 K	103 K	78 K	92.5 K	83.3 K	93.4 K	223 K	121 K
Wet Chemistry (MG/KG)								
Nitrate	1.5	1.3 U	4.2	1.2 U	1.6	1.7	4.2	4.7
Nitrite	1.2 U	1.3 U	1.2 U	1.2 U	1.2 U	1.3 U	1.2 U	1.2 U
Total organic carbon (TOC)	42,800	42,800	30,400	7,420	29,300	23,900	41,400	42,700
pH	7	6.8	7.6	6.9	6.9	7.5	7.5	7.6

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Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
Volatile Organic Compounds (UG/KG)						
1,1,1,2-Tetrachloroethane	6 U	6 U	6 U	6 U	6 U	6 U
1,1,1-Trichloroethane	6 U	6 U	6 U	6 U	6 U	6 U
1,1,2,2-Tetrachloroethane	6 U	6 U	6 U	6 U	6 U	6 U
1,1,2-Trichloroethane	6 U	6 U	6 U	6 U	6 U	6 U
1,1-Dichloroethane	6 U	6 U	6 U	6 U	6 U	6 U
1,1-Dichloroethene	6 U	6 U	6 U	6 U	6 U	6 U
1,2,3-Trichloropropane	6 U	6 U	6 U	6 U	6 U	6 U
1,2,4-Trichlorobenzene	380 U	380 U	380 U	380 UL	400 U	400 U
1,2-Dibromo-3-chloropropane	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dibromoethane	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichlorobenzene	380 UL	380 U	380 U	380 U	400 U	400 U
1,2-Dichloroethane	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloropropane	6 U	6 U	6 U	6 U	6 U	6 U
1,3-Dichlorobenzene	380 UL	380 U	380 U	380 U	400 U	400 U
1,4-Dichlorobenzene	380 UL	380 U	380 U	380 U	400 U	400 U
1,4-Dioxane	590 R	600 R	610 R	620 R	620 R	620 R
2-Butanone	6 U	6 U	6 U	6 U	6 U	6 U
2-Chloro-1,3-butadiene	6 U	6 U	6 U	6 U	6 U	6 U
2-Chloroethyl vinyl ether	6 U	6 U	6 U	6 U	6 U	6 U
2-Hexanone	6 U	6 U	6 U	6 U	6 U	6 U
4-Methyl-2-pentanone	6 U	6 U	6 U	6 U	6 U	6 U
Acetone	6 U	6 U	6 U	6 U	6 U	10 B
Acetonitrile	240 U	240 U	240 U	250 U	250 U	250 U
Acrolein	59 R	60 R	61 R	62 R	62 R	62 R
Acrylonitrile	59 U	60 U	61 U	62 U	62 U	62 U
Allyl chloride	6 U	6 U	6 U	6 U	6 U	6 U
Benzene	6 U	6 U	6 U	6 U	6 U	6 U
Bromodichloromethane	6 U	6 U	6 U	6 U	6 U	6 U
Bromoform	6 U	6 U	6 U	6 U	6 U	6 U
Bromomethane	6 U	6 U	6 U	6 U	6 U	6 U
Carbon disulfide	6 U	6 U	6 U	6 U	6 U	6 U
Carbon tetrachloride	6 U	6 U	6 U	6 U	6 U	6 U

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Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
Chlorobenzene	6 U	6 U	6 U	6 U	6 U	6 U
Chloroethane	6 U	6 U	6 U	6 U	6 U	6 U
Chloroform	6 U	6 U	6 U	6 U	6 U	6 U
Chloromethane	6 U	6 U	6 U	6 U	6 U	6 U
Dibromochloromethane	6 U	6 U	6 U	6 U	6 U	6 U
Dibromomethane	6 U	6 U	6 U	6 U	6 U	6 U
Dichlorodifluoromethane(Freon-12)	6 U	6 U	6 U	6 U	6 U	6 U
Ethyl methacrylate	6 U	6 U	6 U	6 U	6 U	6 U
Ethylbenzene	6 U	6 U	6 U	6 U	6 U	6 U
Iodomethane	6 UL	6 UL	6 UL	6 UL	6 UL	6 UL
Isobutanol	240 R	240 R	240 R	250 R	250 R	250 R
Methacrylonitrile	120 U	120 U	120 U	120 U	120 U	120 U
Methyl methacrylate	6 R	6 U	6 U	6 U	6 U	6 U
Methyl methanesulfonate	940 UL	950 U	960 U	950 U	990 U	1,000 U
Methylene chloride	5 B	8 B	6 B	4 B	5 B	2 B
Pentachloroethane	6 U	6 U	6 U	6 U	6 U	6 U
Propionitrile	120 R	120 R	120 R	120 R	120 R	120 R
Styrene	6 U	6 U	6 U	6 U	6 U	6 U
Tetrachloroethene	6 U	6 U	6 U	6 U	6 U	6 U
Toluene	6 U	6 U	6 U	6 U	6 U	6 U
Trichloroethene	6 U	6 U	6 U	6 U	6 U	6 U
Trichlorofluoromethane(Freon-11)	6 U	6 U	6 U	6 U	6 U	6 U
Vinyl acetate	6 U	6 U	6 U	6 U	6 U	6 U
Vinyl chloride	6 U	6 U	6 U	6 U	6 U	6 U
Xylene, total	6 U	6 U	6 U	6 U	6 U	6 U
cis-1,3-Dichloropropene	6 U	6 U	6 U	6 U	6 U	6 U
trans-1,3-Dichloropropene	6 U	6 U	6 U	6 U	6 U	6 U
trans-1,4-Dichloro-2-butene	6 U	6 U	6 U	6 U	6 U	6 U
Semi-volatile Organic Compounds (UG/KG)						
1,1-Biphenyl	380 U	380 U	380 U	380 UL	20 J	400 UJ
1,2,4,5-Tetrachlorobenzene	380 U	380 U	380 U	380 UL	400 U	400 U
1,4-Naphthoquinone	380 U	380 U	380 U	380 UL	400 UJ	400 U
1-Naphthylamine	380 U	380 U	380 U	380 UL	400 UJ	400 U

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Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
2,2'-Oxybis(1-chloropropane)	380 U	380 U	380 U	380 U	400 U	400 U
2,3,4,6-Tetrachlorophenol	380 U	380 U	380 U	380 U	400 UJ	400 U
2,4,5-Trichlorophenol	940 U	950 U	960 U	950 U	990 UJ	1,000 U
2,4,6-Trichlorophenol	380 U	380 U	380 U	380 U	400 UJ	400 U
2,4-Dichlorophenol	380 U	380 U	380 U	380 U	400 U	400 U
2,4-Dimethylphenol	380 U	380 U	380 U	380 U	400 U	400 U
2,4-Dinitrophenol	940 U	950 U	960 U	950 U	990 UJ	1,000 U
2,4-Dinitrotoluene	380 U	380 U	380 U	380 U	400 UJ	400 U
2,6-Dichlorophenol	380 U	380 U	380 U	380 U	400 U	400 U
2,6-Dinitrotoluene	380 U	380 U	380 U	380 U	400 UJ	400 U
2-Acetylaminofluorene	380 U	380 U	380 U	380 U	400 UJ	400 UJ
2-Chloronaphthalene	380 U	380 U	380 U	380 UL	400 UJ	400 U
2-Chlorophenol	380 U	380 U	380 U	380 U	400 U	400 U
2-Methyl-5-nitroaniline	380 U	380 U	380 U	380 U	400 U	400 U
2-Methylaniline	380 U	380 U	380 U	380 U	400 U	400 U
2-Methylnaphthalene	380 U	380 U	380 U	380 UL	400 U	400 U
2-Methylphenol	380 U	380 U	380 U	380 U	400 U	400 U
2-Naphthylamine	380 U	380 U	380 U	380 UL	400 UJ	400 U
2-Nitroaniline	940 U	950 U	960 U	950 UL	990 UJ	1,000 U
2-Nitrophenol	380 U	380 U	380 U	380 U	400 U	400 U
2-Picoline	380 U	380 U	380 U	380 U	400 U	400 U
3,3'-Dichlorobenzidine	380 U	380 U	380 U	380 UL	400 UJ	400 UJ
3,3'-Dimethylbenzidine	380 U	380 U	380 U	380 UL	400 UJ	400 UJ
3-Methylcholanthrene	380 UJ	380 U	380 U	380 UL	400 UJ	400 UJ
3-Methylphenol	380 U	380 U	380 U	380 U	400 U	400 U
3-Nitroaniline	940 U	950 U	960 U	950 UL	990 UJ	1,000 U
4,6-Dinitro-2-methylphenol	940 U	950 U	960 U	950 U	990 UJ	1,000 U
4-Aminobiphenyl	380 U	380 U	380 U	380 U	400 UJ	400 U
4-Bromophenyl-phenylether	380 U	380 U	380 U	380 U	400 UJ	400 U
4-Chloro-3-methylphenol	380 U	380 U	380 U	380 U	400 U	400 U
4-Chloroaniline	380 U	380 U	380 U	380 U	400 U	400 U
4-Chlorophenyl-phenylether	380 U	380 U	380 U	380 U	400 UJ	400 U
4-Methylphenol	380 U	380 U	380 U	380 U	400 U	400 U
4-Nitroaniline	940 U	950 U	960 U	950 UL	990 UJ	1,000 U

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Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
4-Nitrophenol	940 U	950 U	960 U	950 U	990 UJ	1,000 U
4-Nitroquinoline-1-oxide	940 U	950 U	960 U	950 UL	990 R	1,000 R
7,12-Dimethylbenz(a)anthracene	380 UJ	380 U	380 U	380 UL	400 UJ	400 UJ
Acenaphthene	380 U	380 U	380 U	380 UL	400 UJ	400 U
Acenaphthylene	380 U	380 U	380 U	380 UL	400 UJ	400 U
Acetophenone	380 U	380 U	380 U	380 U	400 U	400 U
Aniline	330 U	330 U	330 U	330 UL	330 U	330 U
Anthracene	380 U	380 U	380 U	380 UL	400 UJ	400 U
Aramite	940 U	950 U	960 U	950 U	990 UJ	1,000 UJ
Benzo(a)anthracene	29 J	380 U	380 U	380 U	49 J	400 UJ
Benzo(a)pyrene	29 J	24 J	380 U	380 UL	40 J	23 J
Benzo(b)fluoranthene	380 UJ	380 U	380 U	380 UL	400 UJ	400 UJ
Benzo(g,h,i)perylene	380 UJ	380 U	380 U	380 UL	400 UJ	400 UJ
Benzo(k)fluoranthene	380 UJ	380 U	380 U	380 UL	400 UJ	400 UJ
Benzoic acid	940 U	950 U	960 U	950 U	990 U	1,000 U
Benzyl alcohol	380 U	380 U	380 U	380 U	400 U	400 U
Butylbenzylphthalate	380 U	380 U	380 U	380 U	400 UJ	400 UJ
Carbazole	330 U	330 U	330 U	330 U	330 U	330 U
Chlorobenzilate	380 U	380 U	380 U	380 UL	400 R	400 R
Chrysene	47 J	40 J	380 U	380 U	78 J	40 J
Di-n-butylphthalate	380 U	380 U	380 U	380 U	400 UJ	400 U
Di-n-octylphthalate	380 UJ	380 U	380 U	380 U	400 UJ	400 UJ
Diallate	380 U	380 U	380 U	380 U	400 UJ	400 U
Dibenz(a,h)anthracene	380 UJ	380 U	380 U	380 UL	400 UJ	400 UJ
Dibenzofuran	380 U	380 U	380 U	380 UL	400 UJ	400 U
Diethylphthalate	380 U	380 U	380 U	380 U	400 UJ	400 U
Dimethoate	380 U	380 U	380 U	380 U	400 UJ	400 U
Dimethyl phthalate	380 U	380 U	380 U	380 U	400 UJ	400 U
Dinoseb	380 U	380 U	380 U	380 U	400 UJ	400 U
Diphenylamine	380 U	380 U	380 U	380 UL	400 UJ	400 U
Disulfoton	380 U	380 U	380 U	380 UL	400 UJ	400 U
Ethyl methanesulfonate	380 U	380 U	380 U	380 U	400 U	400 U
Famphur	380 U	380 U	380 U	380 UL	400 UJ	400 UJ
Fluoranthene	380 U	380 U	380 U	380 UL	400 UJ	400 U

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Analytical Results of Constituents in Surface Soil Samples
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Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
Fluorene	380 U	380 U	380 U	380 UL	400 UJ	400 U
Hexachlorobenzene	380 U	380 U	380 U	380 UL	400 UJ	400 U
Hexachlorobutadiene	380 U	380 U	380 U	380 UL	400 U	400 U
Hexachlorocyclopentadiene	380 U	380 U	380 U	380 UL	400 UJ	400 U
Hexachloroethane	380 U	380 U	380 U	380 U	400 U	400 U
Hexachlorophene	15,000 UJ	15,000 U	15,000 U	15,000 UL	16,000 UJ	16,000 UJ
Hexachloropropene	940 U	950 U	960 U	950 UL	990 UJ	1,000 U
Indeno(1,2,3-cd)pyrene	380 UJ	380 U	380 U	380 UL	400 UJ	400 UJ
Isodrin	380 U	380 U	380 U	380 UL	400 UJ	400 U
Isophorone	380 U	380 U	380 U	380 U	400 U	400 U
Isosafrole	380 U	380 U	380 U	380 UL	400 U	400 U
Kepone	940 U	950 U	960 U	950 UL	990 UJ	1,000 UJ
Methapyrilene	940 U	950 U	960 U	950 UL	990 U	1,000 U
Methyl parathion	380 U	380 U	380 U	380 U	400 UJ	400 U
N-Nitrosomorpholine	380 U	380 U	380 U	380 U	400 U	400 U
N-Nitrosopiperidine	380 U	380 U	380 U	380 UL	400 U	400 U
Naphthalene	380 U	380 U	380 U	380 UL	400 U	400 U
O,O,O-Triethyl phosphorothioate	380 U	380 U	380 U	380 U	400 U	400 U
Parathion	380 U	380 U	380 U	380 U	400 UJ	400 U
Pentachlorobenzene	380 U	380 U	380 U	380 UL	400 UJ	400 U
Pentachloronitrobenzene	940 U	950 U	960 U	950 UL	990 UJ	1,000 U
Pentachlorophenol	940 U	950 U	960 U	950 U	990 UJ	1,000 U
Phenacetin	380 U	380 U	380 U	380 UL	400 UJ	400 U
Phenanthrene	62 J	49 J	380 U	380 UL	120 J	49 J
Phenol	380 U	380 U	380 U	380 U	400 U	400 U
Phorate	380 U	380 U	380 U	380 U	400 UJ	400 U
Pronamide	380 U	380 U	380 U	380 UL	400 UJ	400 U
Pyrene	380 U	380 U	380 U	380 U	400 UJ	400 UJ
Pyridine	380 U	380 U	380 U	380 U	400 U	400 U
Safrole	380 U	380 U	380 U	380 UL	400 UJ	400 U
Sulfotepp	380 U	380 U	380 U	380 UL	400 UJ	400 U
Thionazin	380 U	380 U	380 U	380 UL	400 UJ	400 U
a,a-Dimethylphenethylamine	940 U	950 U	960 U	950 UL	990 U	1,000 U
bis(2-Chloroethoxy)methane	380 U	380 U	380 U	380 U	400 U	400 U

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Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
bis(2-Chloroethyl)ether	380 U	380 U	380 U	380 U	400 U	400 U
bis(2-Ethylhexyl)phthalate	250 J	380 U	380 U	380 U	1,100 J	400 UJ
n-Nitroso-di-n-butylamine	380 U	380 U	380 U	380 UL	400 U	400 U
n-Nitroso-di-n-propylamine	380 U	380 U	380 U	380 UL	400 U	400 U
n-Nitroso-n-methylethylamine	380 U	380 U	380 U	380 UL	400 U	400 U
n-Nitrosodiethylamine	380 U	380 U	380 U	380 UL	400 U	400 U
n-Nitrosodimethylamine	380 U	380 U	380 U	380 UL	400 U	400 U
n-Nitrosodiphenylamine	380 U	380 U	380 U	380 UL	400 UJ	400 U
n-Nitrosopyrrolidine	380 U	380 U	380 U	380 U	400 U	400 U
p-Dimethylaminoazobenzene	380 U	380 U	380 U	380 UL	400 UJ	400 UJ
p-Phenylenediamine	940 U	950 U	960 U	950 UL	990 U	1,000 U
Dioxin/Furans (UG/KG)						
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.795 U	0.076 U	0.081 U	0.073 U	0.072 U	0.102 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.389 U	0.043 U	0.047 U	0.037 U	0.035 U	0.053 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.455 U	0.05 U	0.055 U	0.044 U	0.041 U	0.062 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.665 U	0.072 U	0.063 U	0.083 U	0.069 U	0.179 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.208 U	0.022 U	0.024 U	0.009 U	0.019 U	0.027 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.595 U	0.064 U	0.058 U	0.074 U	0.062 U	0.162 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.18 U	0.019 U	0.021 U	0.008 U	0.016 U	0.023 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.764 U	0.06 U	0.082 U	0.072 U	0.049 U	0.152 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.19 U	0.021 U	0.023 U	0.018 U	0.017 U	0.026 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.264 U	0.025 U	0.049 U	0.05 U	0.028 U	0.129 U
1,2,3,7,8-Pentachlorodibenzofuran	0.393 U	0.051 U	0.051 U	0.048 U	0.03 U	0.086 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.196 U	0.022 U	0.024 U	0.019 U	0.018 U	0.027 U
2,3,4,7,8-Pentachlorodibenzofuran	0.339 U	0.044 U	0.044 U	0.041 U	0.026 U	0.074 U
2,3,7,8-TCDD (dioxin)	0.059 U	0.006 U	0.006 U	0.006 U	0.011 U	0.006 U
2,3,7,8-Tetrachlorodibenzofuran	0.045 U	0.006 U	0.004 U	0.004 U	0.005 U	0.009 U
Total heptachlorodibenzo-p-dioxin	0.795 U	0.076 U	0.081 U	0.073 U	0.072 U	0.102 U
Total heptachlorodibenzofuran	0.389 U	0.043 U	0.047 U	0.037 U	0.035 U	0.053 U
Total hexachlorodibenzo-p-dioxin	0.595 U	0.064 U	0.058 U	0.074 U	0.062 U	0.162 U
Total hexachlorodibenzofuran	0.18 U	0.019 U	0.021 U	0.008 U	0.016 U	0.023 U
Total octachlorodibenzo-p-dioxin	0.303	0.297	0.309	0.358	0.515	0.369
Total octachlorodibenzofuran	0.709 U	0.072 U	0.096 U	0.061 U	0.079 U	0.12 U

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Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
Explosives (UG/KG)						
1,3,5-Trinitrobenzene	417 R	454 R	417 R	476 R	400 U	400 U
1,3-Dinitrobenzene	380 U	380 U	380 U	380 U	400 U	400 U
2,4,6-Trinitrotoluene	417 U	454 U	417 U	476 U	435 U	435 U
2-Amino-4,6-dinitrotoluene	417 U	454 U	417 U	476 U	435 U	435 U
2-Nitrotoluene	417 U	454 U	417 U	476 U	435 U	435 U
3-Nitrotoluene	417 U	454 U	417 U	476 U	435 U	435 U
4-Amino-2,6-dinitrotoluene	417 U	454 U	417 U	476 U	435 U	435 U
4-Nitrotoluene	417 U	454 U	417 U	476 U	435 U	435 U
HMX	417 U	454 U	417 U	269 J	128 J	435 U
Nitrobenzene	380 U	380 U	380 U	380 U	400 U	400 U
Nitroglycerin	476 U	454 U	454 U	417 U	417 U	454 U
Perchlorate	59 U	59 U	220	62 U	62 U	63 U
RDX	417 U	454 U	417 U	476 U	435 U	435 U
Tetryl	417 U	454 U	417 U	476 U	435 U	435 U
Total Metals (MG/KG)						
Aluminum	7,530	6,700	6,350	8,960	8,760	8,130
Antimony	0.5 L	0.45 L	0.23 UL	0.88 L	0.25 L	1.3 L
Arsenic	6.4	6.5	6.4	6.5	6.7	7.6
Barium	134	136	147	167	129	208
Beryllium	0.89 K	0.89 K	0.91 K	1 K	0.85 K	1.1 K
Cadmium	0.62	0.73	0.65	0.72	0.84	0.74
Chromium	11.5	10.8	10.8	13	12.7	13.7
Cobalt	10.6 K	10.7 K	11.4 K	11.4 K	10	13.7
Copper	17.3	17.4	17	18.7	22.8	20.7
Cyanide	0.27 J	0.21 J	0.3 J	0.35 J	0.41 J	0.29 J
Iron	22,600	22,800	23,900	24,800	21,300	28,400
Lead	26.6	25.8	30.4	134	184	58.1
Manganese	672	712	813	915	674	1,090
Mercury	0.04 J	0.04	0.06	0.38	0.09	0.08
Nickel	21	17.6	18.5	21.3	22.8 K	24.3 K
Selenium	0.35 U	0.36 U	0.35 U	0.35 U	0.37 U	0.37 J

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L - Reported value may be biased low

R - Unreliable result
U - Analyte not detected

Table 1
Analytical Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
Silver	0.12 U	0.12 U	0.12 U	0.12 U	0.29 J	0.12 U
Thallium	0.24 U	0.46 J	0.49 J	0.23 U	0.62 J	0.87 J
Tin	5.5 J	5.5 J	4.3 J	4.9 J	6 J	5.1 J
Vanadium	17.2	16.1	24.9	24.4	36.7	23.7
Zinc	65.5 K	64 K	68.8 K	97 K	116 K	85.6 K
Wet Chemistry (MG/KG)						
Nitrate	1.7	1.4	3	2.1	2.5	9.9
Nitrite	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Total organic carbon (TOC)	19,300	24,300	35,000	38,100	35,300	47,300
pH	7.8	7.9	7.6	7.7	7.6	7.2

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Table 2
Analytical Results of Constituents in Subsurface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
Volatile Organic Compounds (UG/KG)								
1,1,1,2-Tetrachloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1,1-Trichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1,2,2-Tetrachloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1,2-Trichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1-Dichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,1-Dichloroethene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2,3-Trichloropropane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2,4-Trichlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,2-Dibromo-3-chloropropane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dibromoethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,2-Dichloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloroethene (total)	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,2-Dichloropropane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
1,3-Dichlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,4-Dichlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,4-Dioxane	600 R	600 R	620 R	600 R	590 R	610 R	600 R	600 R
2-Butanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Chloro-1,3-butadiene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Chloroethyl vinyl ether	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
2-Hexanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
4-Methyl-2-pentanone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Acetone	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Acetonitrile	240 U	240 U	250 U	240 U	240 U	240 U	240 U	240 U
Acrolein	60 R	60 R	62 R	60 R	59 R	61 R	60 R	60 R
Acrylonitrile	60 U	60 U	62 U	60 U	59 U	61 U	60 U	60 U
Allyl chloride	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Benzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Bromodichloromethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Bromoform	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Bromomethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Carbon disulfide	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Carbon tetrachloride	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U

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Table 2
Analytical Results of Constituents in Subsurface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
Chlorobenzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chloroform	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Chloromethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Dibromochloromethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Dibromomethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Dichlorodifluoromethane(Freon-12)	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Ethyl methacrylate	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Ethylbenzene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Iodomethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Isobutanol	240 R	240 R	250 R	240 R	240 R	240 R	240 R	240 R
Methacrylonitrile	120 U	120 U	120 U	120 U	120 U	120 U	120 U	120 U
Methyl methacrylate	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Methyl methanesulfonate	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Methylene chloride	3 B	6 B	4 B	4 B	6 B	9 B	10 B	5 B
Pentachloroethane	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Propionitrile	120 R	120 R	120 R	120 R	120 R	120 R	120 R	120 R
Styrene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Tetrachloroethene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Toluene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Trichloroethene	6 U	6 U	6 U	5 J	6 U	6 U	6 U	6 U
Trichlorofluoromethane(Freon-11)	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Vinyl acetate	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Vinyl chloride	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Xylene, total	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
cis-1,3-Dichloropropene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
trans-1,3-Dichloropropene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
trans-1,4-Dichloro-2-butene	6 U	6 U	6 U	6 U	6 U	6 U	6 U	6 U
Semi-volatile Organic Compounds (UG/KG)								
1,1-Biphenyl	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,2,4,5-Tetrachlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,4-Naphthoquinone	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1-Naphthylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U

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Table 2
Analytical Results of Constituents in Subsurface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
2,2'-Oxybis(1-chloropropane)	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,3,4,6-Tetrachlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,4,5-Trichlorophenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
2,4,6-Trichlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,4-Dichlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,4-Dimethylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,4-Dinitrophenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
2,4-Dinitrotoluene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,6-Dichlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,6-Dinitrotoluene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Acetylaminofluorene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
2-Chloronaphthalene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Chlorophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Methyl-5-nitroaniline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Methylaniline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Methylnaphthalene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Methylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Naphthylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Nitroaniline	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
2-Nitrophenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2-Picoline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
3,3'-Dichlorobenzidine	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
3,3'-Dimethylbenzidine	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
3-Methylcholanthrene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
3-Methylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
3-Nitroaniline	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
4,6-Dinitro-2-methylphenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
4-Aminobiphenyl	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Bromophenyl-phenylether	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Chloro-3-methylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Chloroaniline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Chlorophenyl-phenylether	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Methylphenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
4-Nitroaniline	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U

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Table 2
Analytical Results of Constituents in Subsurface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
4-Nitrophenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
4-Nitroquinoline-1-oxide	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
7,12-Dimethylbenz(a)anthracene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Acenaphthene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Acenaphthylene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Acetophenone	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Aniline	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Anthracene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Aramite	960 U	990 U	980 U	980 U	930 UJ	1,000 U	960 U	960 U
Benzo(a)anthracene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Benzo(a)pyrene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Benzo(b)fluoranthene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Benzo(g,h,i)perylene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Benzo(k)fluoranthene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Benzoic acid	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Benzyl alcohol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Butylbenzylphthalate	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Chlorobenzilate	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Chrysene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Di-n-butylphthalate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Di-n-octylphthalate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Diallate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dibenz(a,h)anthracene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dibenzofuran	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Diethylphthalate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dimethoate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dimethyl phthalate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Dinoseb	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Diphenylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Disulfoton	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Ethyl methanesulfonate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Famphur	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Fluoranthene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Fluorene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U

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Table 2
Analytical Results of Constituents in Subsurface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
Hexachlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Hexachlorobutadiene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Hexachlorocyclopentadiene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Hexachloroethane	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Hexachlorophene	15,000 U	16,000 U	16,000 U	16,000 U	15,000 U	16,000 U	15,000 U	15,000 U
Hexachloropropene	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Indeno(1,2,3-cd)pyrene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Isodrin	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Isophorone	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Isosafrole	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Kepone	960 U	990 U	980 U	980 U	930 UJ	1,000 U	960 U	960 U
Methapyrilene	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Methyl parathion	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
N-Nitrosomorpholine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
N-Nitrosopiperidine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Naphthalene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
O,O,O-Triethyl phosphorothioate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Parathion	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Pentachlorobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Pentachloronitrobenzene	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Pentachlorophenol	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Phenacetin	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Phenanthrene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Phenol	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Phorate	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Pronamide	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Pyrene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
Pyridine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Safrole	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Sulfotepp	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Thionazin	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
a,a-Dimethylphenethylamine	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
bis(2-Chloroethoxy)methane	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
bis(2-Chloroethyl)ether	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U

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Table 2
Analytical Results of Constituents in Subsurface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
bis(2-Ethylhexyl)phthalate	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
n-Nitroso-di-n-butylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitroso-di-n-propylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitroso-n-methylethylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitrosodiethylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitrosodimethylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitrosodiphenylamine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
n-Nitrosopyrrolidine	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
p-Dimethylaminoazobenzene	380 U	400 U	390 U	390 U	370 UJ	400 U	380 U	380 U
p-Phenylenediamine	960 U	990 U	980 U	980 U	930 U	1,000 U	960 U	960 U
Dioxin/Furans (UG/KG)								
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.292 U	0.084 U	0.356 U	0.321 U	0.395 U	0.317 U	0.359 U	0.089 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.145 U	0.044 U	0.2 U	0.159 U	0.196 U	0.169 U	0.172 U	0.048 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.189 U	0.051 U	0.262 U	0.208 U	0.256 U	0.221 U	0.225 U	0.056 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.289 U	0.079 U	0.373 U	0.327 U	0.414 U	0.322 U	0.356 U	0.033 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.069 U	0.024 U	0.093 U	0.074 U	0.091 U	0.079 U	0.082 U	0.01 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.254 U	0.071 U	0.328 U	0.288 U	0.364 U	0.284 U	0.313 U	0.03 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.059 U	0.02 U	0.08 U	0.064 U	0.078 U	0.068 U	0.07 U	0.009 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.266 U	0.069 U	0.343 U	0.301 U	0.38 U	0.296 U	0.327 U	0.055 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.075 U	0.022 U	0.102 U	0.081 U	0.1 U	0.086 U	0.089 U	0.024 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.196 U	0.073 U	0.215 U	0.211 U	0.241 U	0.194 U	0.113 U	0.035 U
1,2,3,7,8-Pentachlorodibenzofuran	0.137 U	0.052 U	0.147 U	0.147 U	0.177 U	0.126 U	0.16 U	0.05 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.07 U	0.022 U	0.095 U	0.075 U	0.092 U	0.08 U	0.083 U	0.025 U
2,3,4,7,8-Pentachlorodibenzofuran	0.123 U	0.045 U	0.131 U	0.132 U	0.158 U	0.112 U	0.143 U	0.043 U
2,3,7,8-TCDD (dioxin)	0.014 U	0.006 U	0.015 U	0.015 U	0.017 U	0.014 U	0.015 U	0.006 U
2,3,7,8-Tetrachlorodibenzofuran	0.009 U	0.004 U	0.01 U	0.01 U	0.012 U	0.008 U	0.011 U	0.004 U
Total heptachlorodibenzo-p-dioxin	0.292 U	0.084 U	0.356 U	0.321 U	0.395 U	0.317 U	0.359 U	0.089 U
Total heptachlorodibenzofuran	0.145 U	0.044 U	0.2 U	0.159 U	0.196 U	0.169 U	0.172 U	0.048 U
Total hexachlorodibenzo-p-dioxin	0.254 U	0.071 U	0.328 U	0.288 U	0.364 U	0.284 U	0.313 U	0.03 U
Total hexachlorodibenzofuran	0.059 U	0.02 U	0.08 U	0.064 U	0.078 U	0.068 U	0.07 U	0.009 U
Total octachlorodibenzo-p-dioxin	0.158	0.035 J	0.171	0.131	0.12	0.16	0.192	0.048
Total octachlorodibenzofuran	0.266 U	0.077 U	0.132 U	0.308 U	0.441 U	0.323 U	0.385 U	0.086 U

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
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L - Reported value may be biased low
R - Unreliable result
U - Analyte not detected

Table 2
Analytical Results of Constituents in Subsurface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
Explosives (UG/KG)								
1,3,5-Trinitrobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
1,3-Dinitrobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
2,4,6-Trinitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
2-Amino-4,6-dinitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
2-Nitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
3-Nitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
4-Amino-2,6-dinitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
4-Nitrotoluene	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
HMX	276 J	340 J	454 U	454 U	454 U	476 U	435 U	417 U
Nitrobenzene	380 U	400 U	390 U	390 U	370 U	400 U	380 U	380 U
Nitroglycerin	435 U	454 U	454 U	476 U	476 U	454 U	435 U	454 U
Perchlorate	120	92	61 U	62	2,500	61 U	60 U	59 U
RDX	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
Tetryl	454 U	435 U	454 U	454 U	454 U	476 U	435 U	417 U
Total Metals (MG/KG)								
Aluminum	9,160	9,280	9,330	9,120	10,200	10,200	9,820	10,200
Antimony	2.1 L	1.3 L	1.5 L	1.6 B	1.9 L	1.3 L	0.24 UL	2 L
Arsenic	6.5	6.6	7.2	7	6.9	7	7.6	7
Barium	151	154	183	207	195	203	194	196
Beryllium	1.1	1.1	1.2	1.1	1.2	1.3	1.2	1.2
Cadmium	0.23 U	0.23 U	0.24 U	0.23 U	0.22 U	0.24 U	0.24 U	0.23 U
Chromium	14.5 J	14.8 J	15.6 J	15.3 J	15.7 J	15.2 J	16.1 J	15.8 J
Cobalt	14.3	14.7	15.2	15.6	15.9	16.4	15.9	16
Copper	15.5	16.2	17.1	17.5	16.8	16.9	18.6	17.6
Cyanide	0.15 B	0.24 B	0.19 B	0.22 B	0.12 B	0.3 B	0.28 B	0.14 B
Iron	31,300	32,300	31,600	32,700	32,700	32,800	33,100	33,500
Lead	14.9 K	15.9 K	20.1 K	16 K	16.7 K	22.1 K	25 K	16.6 K
Manganese	911	926	1,030	1,010	1,070	1,170	1,080	1,100
Mercury	0.03 B	0.04 B	0.04 B	0.03 B	0.03 B	0.04 B	0.04 B	0.03 B
Nickel	22.4 J	23.7 J	24.2 J	24.1 J	25.1 J	27.1 J	25.8 J	25.9 J
Selenium	1.4 K	1.2 K	1.3 K	1.3 K	1.2 K	1.3 K	1.4 K	0.98 K
Silver	0.12 U	0.12 U	0.12 U	0.11 U	0.12 U	0.12 U	0.12 U	0.12 U

NA - Not analyzed
B - Analyte not detected above associated blank
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K - Reported value may be biased high
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U - Analyte not detected

Table 2
Analytical Results of Constituents in Subsurface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
Thallium	1.9	2.1	1.7	1.6	1.5	1.7	2.1	1.8
Tin	4 B	3.9 B	4.1 B	3.9 B	4 B	4 B	3.8 B	4 B
Vanadium	20.9	21.1	22	21.4	23	23.3	24.8	23.5
Zinc	66.3	65.6	71.8	70.5	70.2	73.5	75.2	78.7
Wet Chemistry (MG/KG)								
Nitrate	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Nitrite	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Total organic carbon (TOC)	9,050	9,370	9,930	9,410	8,940	11,900	12,300	11,400
pH	7	7.1	7.3	7.3	7.5	7.4	7.4	7.6

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B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
L - Reported value may be biased low
R - Unreliable result
U - Analyte not detected

Table 3
Detected Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
Volatile Organic Compounds (UG/KG)								
Acetone	6 U	6 U	6 U	5 J	10	16	6 U	12
Trichloroethene	6 U	28	6 U	9	6 U	6 U	6 U	6 U
Semi-volatile Organic Compounds (UG/KG)								
1,1-Biphenyl	420 U	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Benzo(a)anthracene	66 J	340 UJ	370 U	400 U	370 U	24 J	380 U	400 U
Benzo(a)pyrene	54 J	340 U	370 U	400 U	370 U	23 J	380 U	400 U
Chrysene	110 J	340 UJ	26 J	400 U	370 U	43 J	33 J	24 J
Diethylphthalate	420 U	160 J	370 U	400 U	370 U	410 U	380 U	400 U
Dimethyl phthalate	420 U	2,300	370 U	400 U	370 U	410 U	380 U	400 U
Naphthalene	40 J	340 U	370 U	400 U	370 U	410 U	380 U	400 U
Phenanthrene	140 J	340 UJ	39 J	400 U	370 U	60 J	50 J	31 J
bis(2-Ethylhexyl)phthalate	420 U	97 J	1,300	400 U	370 U	74 J	150 J	400 U
Dioxin/Furans (UG/KG)								
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.054 J	0.056 J	0.121 U	0.126 U	0.105 U	0.116 U	0.095 U	0.102 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.046 U	0.039	0.062 U	0.064 U	0.039 U	0.056 U	0.04 U	0.051 U
Total heptachlorodibenzo-p-dioxin	0.012 U	0.056	0.121 U	0.126 U	0.105 U	0.116 U	0.095 U	0.102 U
Total heptachlorodibenzofuran	0.046 U	0.039	0.067 U	0.064 U	0.039 U	0.056 U	0.04 U	0.051 U
Total octachlorodibenzo-p-dioxin	0.722	0.411	0.307	0.109	0.09	0.366	0.347	0.345
Total octachlorodibenzofuran	0.073 U	0.08	0.114 U	0.078 U	0.09 U	0.1 U	0.085 U	0.086 U
Explosives (UG/KG)								
HMX	454 U	1,190	2,400	454 U	2,250	476 U	417 U	258 J
Perchlorate	66 U	56 U	68	96	880	95	58 U	63 U
RDX	454 U	735	476 U	454 U	784	476 U	417 U	435 U
Total Metals (MG/KG)								
Aluminum	7,800	4,680	7,490	7,540	7,590	7,410	6,280	7,320
Antimony	1.7 L	1.2 L	0.98 L	1.3 L	1.4 L	1.1 L	0.49 L	0.96 L
Arsenic	9.5	5	7.6	6.8	7.2	7.6	6.1	6.9
Barium	165	77.6	154	134	176	153	136	185
Beryllium	1.2 K	0.54 K	1.1 K	1 K	1.1 K	1 K	0.88 K	1.1 K

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Table 3
Detected Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB01	AS01-SB02	AS01-SB03	AS01-SB04	AS01-SB05	AS01-SB06	AS01-SB07	AS01-SB08
Sample ID	AS01-SS01-R01X	AS01-SS02-R01X	AS01-SS03-R01X	AS01-SS04-R01X	AS01-SS05-R01X	AS01-SS06-R01X	AS01-SS07-R01X	AS01-SS08-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/21/01	02/22/01	02/21/01
Chemical Name								
Cadmium	0.71	0.7	0.57 J	0.56 J	1.3	0.63	0.79	0.63
Chromium	14.7	8.8	13.4	13.5	13.5	14.8	23.8	12.7
Cobalt	15.1	6.9	15	14.1	15	14.7	11.5	13.6
Copper	27.5	22.5	22.4	19.2	19.3	19.3	20.5	18.1
Cyanide	0.26 U	0.19 U	0.46 J	0.19 J	0.54 J	0.28 J	0.24 J	0.37 J
Iron	30,800	15,600	32,700	31,600	32,400	30,200	24,800	28,200
Lead	39.3	1,730	25.2	34.3	55.2	26.9	25.9	30
Manganese	954	419	912	797	1,010	928	783	982
Mercury	0.09	0.08	0.05	0.05	0.04	0.05	0.05	0.05
Nickel	24.1 K	16 K	20.9 K	20.6 K	22 K	23.1 K	20.8 K	21.1 K
Selenium	0.47 J	0.33 U	0.35 U	0.36 U	0.33 U	0.44 J	0.33 U	0.37 J
Silver	0.23 J	0.54 J	0.12 U	0.12 U	0.11 U	0.12 U	0.11 U	0.12 U
Thallium	0.29 J	0.22 U	0.82 J	0.34 J	0.54 J	0.79 J	0.34 J	0.68 J
Tin	8 J	7.6 J	4.4 J	5.6 J	4.5 J	5.6 J	4.7 J	4.7 J
Vanadium	22.1	14.6	19.8	20.2	19.9	23.5	21.9	19.7
Zinc	108 K	271 K	73.6 K	100 K	75.6 K	98.9 K	86.3 K	74.8 K
Wet Chemistry (MG/KG)								
Nitrate	3.5	1.1 U	1.2 U	1.5	4.5	1.2 U	1.2 U	1.3 U
Total organic carbon (TOC)	78,400	35,300	23,400	21,200	19,000	42,100	32,700	31,300
pH	7.3	7.5	7.1	6.3	7.1	5.7	7.5	6.5

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Table 3
Detected Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
Volatile Organic Compounds (UG/KG)								
Acetone	12 B	6 U	8 B	6 B	6 U	6 U	8 B	6 U
Trichloroethene	6 U	6 U	6 U	3 J	6 U	6 U	6 U	6 U
Semi-volatile Organic Compounds (UG/KG)								
1,1-Biphenyl	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 UJ
Benzo(a)anthracene	390 U	24 J	400 U	360 U	380 U	410 U	30 J	380 UJ
Benzo(a)pyrene	24 J	410 U	400 U	360 U	380 U	410 U	27 J	380 UJ
Chrysene	47 J	43 J	42 J	360 U	26 J	37 J	51 J	38 J
Diethylphthalate	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Dimethyl phthalate	1,100	410 U	400 U	360 U	380 U	410 U	1,600	380 U
Naphthalene	390 U	410 U	400 U	360 U	380 U	410 U	410 U	380 U
Phenanthrene	57 J	58 J	48 J	360 U	39 J	52 J	53 J	45 J
bis(2-Ethylhexyl)phthalate	390 U	410 U	400 U	360 U	380 U	410 U	870 J	74 J
Dioxin/Furans (UG/KG)								
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.066 U	0.085 U	0.07 U	0.076 U	0.087 U	0.074 U	0.071 U	0.098 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.03 U	0.049 U	0.033 U	0.034 U	0.033 U	0.036 U	0.038 U	0.053 U
Total heptachlorodibenzo-p-dioxin	0.066 U	0.085 U	0.07 U	0.076 U	0.087 U	0.074 U	0.071 U	0.098 U
Total heptachlorodibenzofuran	0.03 U	0.049 U	0.033 U	0.034 U	0.033 U	0.036 U	0.038 U	0.053 U
Total octachlorodibenzo-p-dioxin	0.427	0.402	0.39	0.1	0.264	0.414	0.354	0.215
Total octachlorodibenzofuran	0.066 U	0.092 U	0.069 U	0.049 U	0.07 U	0.073 U	0.023 J	0.063 U
Explosives (UG/KG)								
HMX	417 U	454 U	124 J	506	130 J	417 U	454 U	454 U
Perchlorate	60 U	63 U	61 U	58 U	62 U	64 U	63 U	61 U
RDX	417 U	454 U	417 U	417 U	454 U	417 U	454 U	454 U
Total Metals (MG/KG)								
Aluminum	9,240	9,800	8,350	9,510	7,950	10,400	8,200	8,440
Antimony	1.1 L	0.87 L	1.4 L	0.81 L	1.9 L	0.82 L	1.6 L	1.2 L
Arsenic	7.4	7.4	6.8	6.6	7.3	7.8	6.4	6.5
Barium	219	239	208	161	213	181	144	161
Beryllium	1.2 K	1.2 K	1.1 K	0.99 K	1.1 K	1.2 K	0.9 K	0.98 K

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Table 3
Detected Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB09		AS01-SB10	AS01-SB11	AS01-SB12	AS01-SB13	AS01-SB14	AS01-SB15
Sample ID	AS01-SS09-R01X	AS01-SS09P-R01X	AS01-SS10-R01X	AS01-SS11-R01X	AS01-SS12-R01X	AS01-SS13-R01X	AS01-SS14-R01X	AS01-SS15-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/21/01	02/21/01
Chemical Name								
Cadmium	1	0.77	0.67	0.71	0.81	0.72	0.92	10.9
Chromium	14.6	15	13.2	15.7	14	16	13.5	13.6
Cobalt	14.5 K	14.4 K	15 K	15 K	14.6	16.5 K	11.6 K	11.7 K
Copper	21.5	21.6	17.9	17.6	19.7	20.7	29	27.2
Cyanide	0.26 J	0.35 J	0.35 J	0.06 U	0.33 J	0.23 J	0.34 J	0.31 J
Iron	28,900	29,200	30,100	33,200	30,700	33,200	24,600	24,800
Lead	38	31.3	29.5	96.9	53.4	25	101	75.8
Manganese	1,080	1,120	999	730	1,120	1,050	741	777
Mercury	0.07	0.08	0.05	0.04	0.05	0.06	0.06	0.06
Nickel	25	25.6	22.3	33.4	22.8 K	28.1	22.1	22.7
Selenium	0.36 U	0.38 U	0.36 U	0.33 U	0.5 J	0.38 U	0.37 U	0.55 J
Silver	0.12 U	0.13 U	0.12 U	0.26 J	0.12 U	0.13 U	0.33 J	0.33 J
Thallium	0.68 J	0.46 J	0.78 J	1.1 J	0.24 U	0.88 J	0.37 J	0.45 J
Tin	5.6 J	6 J	4.3 J	4.1 J	4.7 J	4.9 J	8.4 J	5.8 J
Vanadium	24.6	25	22.5	21.4	20.1	33.1	26.6	31.2
Zinc	116 K	103 K	78 K	92.5 K	83.3 K	93.4 K	223 K	121 K
Wet Chemistry (MG/KG)								
Nitrate	1.5	1.3 U	4.2	1.2 U	1.6	1.7	4.2	4.7
Total organic carbon (TOC)	42,800	42,600	30,400	7,420	29,300	23,900	41,400	42,700
pH	7	6.8	7.6	6.9	6.9	7.5	7.5	7.6

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K - Reported value may be biased high
L - Reported value may be biased low
R - Unreliable result
U - Analyte not detected

Table 3
Detected Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
Volatile Organic Compounds (UG/KG)						
Acetone	6 U	6 U	6 U	6 U	6 U	10 B
Trichloroethene	6 U	6 U	6 U	6 U	6 U	6 U
Semi-volatile Organic Compounds (UG/KG)						
1,1-Biphenyl	380 U	380 U	380 U	380 UL	20 J	400 UJ
Benzo(a)anthracene	29 J	380 U	380 U	380 U	49 J	400 UJ
Benzo(a)pyrene	29 J	24 J	380 U	380 UL	40 J	23 J
Chrysene	47 J	40 J	380 U	380 U	78 J	40 J
Diethylphthalate	380 U	380 U	380 U	380 U	400 UJ	400 U
Dimethyl phthalate	380 U	380 U	380 U	380 U	400 UJ	400 U
Naphthalene	380 U	380 U	380 U	380 UL	400 U	400 U
Phenanthrene	62 J	49 J	380 U	380 UL	120 J	49 J
bis(2-Ethylhexyl)phthalate	250 J	380 U	380 U	380 U	1,100 J	400 UJ
Dioxin/Furans (UG/KG)						
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.795 U	0.076 U	0.081 U	0.073 U	0.072 U	0.102 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.389 U	0.043 U	0.047 U	0.037 U	0.035 U	0.053 U
Total heptachlorodibenzo-p-dioxin	0.795 U	0.076 U	0.081 U	0.073 U	0.072 U	0.102 U
Total heptachlorodibenzofuran	0.389 U	0.043 U	0.047 U	0.037 U	0.035 U	0.053 U
Total octachlorodibenzo-p-dioxin	0.303	0.297	0.309	0.358	0.515	0.369
Total octachlorodibenzofuran	0.709 U	0.072 U	0.096 U	0.061 U	0.079 U	0.12 U
Explosives (UG/KG)						
HMX	417 U	454 U	417 U	269 J	123 J	435 U
Perchlorate	59 U	59 U	220	62 U	62 U	63 U
RDX	417 U	454 U	417 U	476 U	435 U	435 U
Total Metals (MG/KG)						
Aluminum	7,530	6,700	6,350	8,960	8,760	8,130
Antimony	0.5 L	0.45 L	0.23 UL	0.88 L	0.25 L	1.3 L
Arsenic	6.4	6.5	6.4	6.5	6.7	7.6
Barium	134	136	147	187	129	208
Beryllium	0.89 K	0.89 K	0.91 K	1 K	0.85 K	1.1 K

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
L - Reported value may be biased low
R - Unreliable result
U - Analyte not detected

Table 3
Detected Results of Constituents in Surface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB16		AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SS16-R01X	AS01-SS16P-R01X	AS01-SS17-R01X	AS01-SS18-R01X	AS01-SS19-R01X	AS01-SS20-R01X
Sample Date	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name						
Cadmium	0.62	0.73	0.65	0.72	0.84	0.74
Chromium	11.5	10.8	10.8	13	12.7	13.7
Cobalt	10.6 K	10.7 K	11.4 K	11.4 K	10	13.7
Copper	17.3	17.4	17	18.7	22.8	20.7
Cyanide	0.27 J	0.21 J	0.3 J	0.35 J	0.41 J	0.29 J
Iron	22,600	22,800	23,900	24,800	21,300	28,400
Lead	26.6	25.8	30.4	134	184	58.1
Manganese	672	712	813	916	674	1,090
Mercury	0.04 J	0.04	0.06	0.38	0.09	0.08
Nickel	21	17.6	18.5	21.3	22.8 K	24.3 K
Selenium	0.35 U	0.36 U	0.35 U	0.35 U	0.37 U	0.37 J
Silver	0.12 U	0.12 U	0.12 U	0.12 U	0.29 J	0.12 U
Thallium	0.24 U	0.46 J	0.49 J	0.23 U	0.62 J	0.87 J
Tin	5.5 J	5.5 J	4.3 J	4.9 J	6 J	5.1 J
Vanadium	17.2	16.1	24.9	24.4	36.7	23.7
Zinc	65.5 K	64 K	68.8 K	97 K	116 K	85.6 K
Wet Chemistry (MG/KG)						
Nitrate	1.7	1.4	3	2.1	2.5	9.9
Total organic carbon (TOC)	19,300	24,300	35,000	38,100	35,300	47,300
pH	7.8	7.9	7.6	7.7	7.6	7.2

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
L - Reported value may be biased low
R - Unreliable result
U - Analyte not detected

Table 4
Detected Results of Constituents in Subsurface Soil Samples
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	AS01-SB14		AS01-SB15	AS01-SB16	AS01-SB17	AS01-SB18	AS01-SB19	AS01-SB20
Sample ID	AS01-SB14-R01X	AS01-SB14P-R01X	AS01-SB15-R01X	AS01-SB16-R01X	AS01-SB17-R01X	AS01-SB18-R01X	AS01-SB19-R01X	AS01-SB20-R01X
Sample Date	02/21/01	02/21/01	02/21/01	02/22/01	02/22/01	02/22/01	02/22/01	02/22/01
Chemical Name								
Volatile Organic Compounds (UG/KG)								
Trichloroethene	6 U	6 U	6 U	5 J	6 U	6 U	6 U	6 U
Semi-volatile Organic Compounds (UG/KG)								
No Detections								
Dioxin/Furans (UG/KG)								
Total octachlorodibenzo-p-dioxin	0.158	0.035 J	0.171	0.131	0.12	0.16	0.192	0.048
Explosives (UG/KG)								
HMX	276 J	340 J	454 U	454 U	454 U	476 U	435 U	417 U
Perchlorate	120	92	61 U	62	2,500	61 U	60 U	59 U
Total Metals (MG/KG)								
Aluminum	9,160	9,280	9,330	9,120	10,200	10,200	9,820	10,200
Antimony	2.1 L	1.3 L	1.5 L	1.6 B	1.9 L	1.3 L	0.24 UL	2 L
Arsenic	6.5	6.6	7.2	7	6.9	7	7.6	7
Barium	151	154	183	207	195	203	194	196
Beryllium	1.1	1.1	1.2	1.1	1.2	1.3	1.2	1.2
Chromium	14.5 J	14.8 J	15.6 J	15.3 J	15.7 J	15.2 J	16.1 J	15.8 J
Cobalt	14.3	14.7	15.2	15.6	15.9	16.4	15.9	16
Copper	15.5	16.2	17.1	17.5	16.8	16.9	18.6	17.6
Iron	31,300	32,300	31,600	32,700	32,700	32,800	33,100	33,500
Lead	14.9 K	15.9 K	20.1 K	16 K	16.7 K	22.1 K	25 K	16.6 K
Manganese	911	926	1,030	1,010	1,070	1,170	1,080	1,100
Nickel	22.4 J	23.7 J	24.2 J	24.1 J	25.1 J	27.1 J	25.3 J	25.9 J
Selenium	1.4 K	1.2 K	1.3 K	1.3 K	1.2 K	1.3 K	1.4 K	0.98 K
Thallium	1.9	2.1	1.7	1.6	1.5	1.7	2.1	1.8
Vanadium	20.9	21.1	22	21.4	23	23.3	24.8	23.5
Zinc	66.3	65.6	71.3	70.5	70.2	73.5	75.2	78.7
Wet Chemistry (MG/KG)								
Total organic carbon (TOC)	9,050	9,370	9,930	9,410	8,940	11,900	12,300	11,400
pH	7	7.1	7.3	7.3	7.5	7.4	7.4	7.6

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
L - Reported value may be biased low
R - Unreliable result
U - Analyte not detected

Appendix D-2
Field Investigation Project Plans

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Final

Field Investigation Project Plans for the Burning Grounds RCRA Subpart X Permit Application at the Allegany Ballistics Laboratory Rocket Center, West Virginia

Prepared for

Department of the Navy

Atlantic Division
Naval Facilities Engineering Command

Norfolk, Virginia

Contract No. N62470-95-D-6007
CTO-0175

February 2001

Prepared by

CH2MHILL

Baker
Environmental, Inc.

CDM
Federal Programs Corp.

SIGNATURE PAGE

FINAL

FIELD INVESTIGATION WORK PLAN

Burning Grounds RCRA Subpart X Permit Application

Allegany Ballistics Laboratory
Rocket Center, West Virginia

Contract Task Order Number — 0175
Contract Number N62470-95-D-6007
Navy CLEAN II Program

Prepared by
CH2M HILL

February 2000

Approved by: _____ Date: 2/16/01
Roger Azar, P.E.
Project Manager

Approved by: _____ FOR Date: 2/19/01
William Kappleman
Senior Reviewer

Approved by: _____ Date: 2/16/01
Brett Doerr
Senior Reviewer

Final

Field Investigation Work Plan
for the
Burning Grounds RCRA Subpart X Permit Application
at the
Allegany Ballistics Laboratory
Rocket Center, West Virginia

Contract Task Order 0175

February 2001

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN II Program
Contract N62470-95-D-6007

Prepared by

Herndon, Virginia

Table of Contents

Section			Page
Acronyms and Abbreviations			v
1 Introduction			**1-1**
	1.1	Objective	1-1
	1.2	Scope	1-1
2 Background Information			**2-1**
	2.1	General	2-1
	2.2	Geological Setting	2-6
	2.3	Selection of Analyte List for Field Investigation	2-6
3 Project Organization			**3-1**
	3.1	Project Schedule	3-4
	3.2	Field Investigation Activities	3-4
		3.2.1 General Field Operations	3-4
		3.2.2 Sample Handling	3-5
4 Data Evaluation and Reporting			**4-1**
	4.1	Data Management and Evaluation	4-1
		4.1.1 Data Management	4-1
		4.1.2 Data Evaluation	4-1
	4.2	Reporting	4-2
5 References			**5-1**

Table of Contents (Continued)

Tables **Page**

2-1 Summary of Detected Constituents at Existing Soil Sample Locations 2-2

3-1 Stakeholder Organizations and Responsible Person(s) for Technical Disciplines..... 3-2

3-2 Project Milestones 3-4

Figures

2-1 Burning Grounds, Site 1 2-9

2-2 Historic Surface Soil Samples 2-11

3-1 Project Organization Chart for The Field Investigation 3-3

3-2 Proposed Sample Locations 3-7

Acronyms and Abbreviations

ABL	Allegany Ballistics Laboratory
AMPC	Alliant Missile Products Company LLC.
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, xylene
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	Contract Laboratory Program
CoC	Chain-of-Custody
CTO	Contract Task Order
DO	dissolved oxygen
DQO	data quality objective
DRO	diesel range organics
DV	data validator
edd	electronic data deliverable
EnDat	Environmental Database
FSP	Field Sampling Plan
FTL	field team leader
GIS	geographic information system
GPS	global positioning system
GRO	gasoline range organics
HASP	Health and Safety Plan
IDWMP	Investigation-Derived Waste Management Plan
IR	Installation Restoration
LANTDIV	Atlantic Division, Naval Facilities Engineering Command
LC	low concentration
MCL	maximum contaminant level
MS	matrix spike
MSD	matrix spike duplicate
MWP	Master Work Plan
mg/Kg	milligram per kilogram
NAVSEA	Naval Sea Systems Command
NFESC	Naval Facilities Engineering Service Center
OVM	organic vapor monitor
PCB	polychlorinated biphenyl
P/E	propellants and explosives

Acronyms and Abbreviations (Continued)

PM	Project Manager
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
%R	percent recovery
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RSD	relative standard deviation
SCR	Site Characterization Report
SMP	Site Management Plan
SOP	standard operating procedure
SSP	Site Screening Process
SVOC	semivolatile organic compound
TCL	Target Compound List
TOC	total organic carbon
TPH	total petroleum hydrocarbon
U.S. EPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VOC	volatile organic compound
WP	Work Plan
WVDEP	West Virginia Division of Environmental Protection

SECTION 1

Introduction

1.1 Objective

This site-specific Field Investigation Work Plan (WP) has been prepared to detail the sampling of any existing conditions in the Burning Grounds interim status unit at Allegany Ballistics Laboratory (ABL), Rocket Center, West Virginia.

The field investigation activity will assist in determining the horizontal and vertical extent of any existing contamination at the open Burning Grounds. The data collected from the field investigation will be used to:

- Assess any existing risk to human health and the environment
- Develop the Burning Grounds closure plan
- Assist in defining any operational related monitoring
- As input to any pan/pad redesign activities
- To identify areas where action may be needed to reduce risk
- and to provide the baseline for assessment of compliance with the Environmental Performance Standards.

This WP defines the objectives and outlines the technical approach to be used during the field investigation. This WP was prepared in response to Contract Task Order (CTO) 0175 under the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract number N62470-95-D-6007.

The WP is organized in five sections. Section 1 provides an introduction that includes the objectives and scope of work. Section 2 provides site background information. Section 3 describes the field investigation program, including the technical approach for activities to be performed at the unit, general information on project management and staff organization, and a schedule of activities. Section 4 discusses data evaluation and reporting and Section 5 is a list of the references used in preparing this WP. Attached to this WP are a Field Sampling Plan (FSP), a Quality Assurance Project Plan (QAPP), a site-specific Health and Safety Plan (HASP), and an Investigation Derived Waste Management Plan (IDWMP).

1.2 Scope

Seventeen discrete surface soil samples and 7 subsurface soil samples will be collected from locations within the Burning Grounds. An additional 3 surface soil samples will be collected adjacent to the Burning Grounds. Surface soil samples will be collected to a depth of 6 inches, while subsurface samples will be collected from 18 to 24 inches below the ground surface (bgs).

The number and location of the proposed samples at the Burning Grounds were determined by reviewing existing soil data and by taking into consideration the historic locations, the existing locations, and the proposed locations of burn pads. The 3 proposed surface soil samples adjacent to the Burning Grounds are collected in a drainage ditch south of the Burning Grounds unit in order to determine if any chemicals have been transported off-site via surface-water runoff.

Soil samples will be analyzed for constituents discussed in Section 2.3 of this Work Plan (WP) and listed in the Field Sampling Plan (FSP).

SECTION 2

Background Information

2.1 General

Allegany Ballistics Laboratory (ABL) is a government-owned (Navy), contractor-operated (Alliant Missile Products Company LLC. [AMPC]) research, development, and production facility located in Mineral County, West Virginia. The facility consists of two plants. Plant 1, occupying approximately 1,572 acres, is owned by the Navy and operated by AMPC. Plant 2, a 56-acre area adjacent to Plant 1, is owned exclusively by AMPC.

Since 1943, the ABL facility has been used primarily for research, development, testing, and production of solid propellants and motors for ammunition, rockets, and armaments. Excess or waste propellant and explosives (P/E) are also generated during various production and testing operations at the facility. In addition, qualification batches of various energetic materials are periodically formulated for performance testing and other material qualification tests. Excess P/E material are treated by open burning at the Burning Grounds. The Burning Grounds is located in the northern section of Plant 1, immediately adjacent to the North Branch Potomac River (Figure 2-1), within Installation Restoration (IR) Site 1. Currently, the majority of the Burning Grounds is grass-covered and is surrounded by a locked 6-foot chain-link fence.

Six steel burn pans are located at the Burning Grounds, five of which are currently in use. Waste material is placed in the various burn pans and, under suitable meteorological conditions, is ignited by Burning Grounds personnel. The burning rates vary considerably and range from very high rates for the pure energetics to very slow rates for P/E waste that contains appreciable quantities of sawdust and other cellulosic material. Concerns over air emissions from the Burning Grounds operations led to a Consent Order between the Department of the Navy, Naval Sea Systems Command(NAVSEA), AMPC, and the State of West Virginia, Division of Environmental Protection (WVDEP). The Consent Order establishes the meteorological conditions under which open burning is allowed. In addition, it establishes the maximum mass of P/E waste material allowed at one time for open burning at the Burning Grounds.

Surface soil sampling activities were conducted in August 1992 and November 1994 in and around the Burning Grounds. VOCs, SVOCs, explosives, and metals were detected during this sampling. Figure 2-2 illustrates the location of existing surface soil samples in and around the Burning Grounds at ABL as well as the detected analyte groups found at each location. Table 2-1 provides a summary of the detected chemicals at each sample location.

TABLE 2-1
Summary of Detected Constituents at Existing Soil Sample Locations

Location	Chemical	Result	Qualifier	Unit	Analysis Group
BG-004/004S/005/039	Chlorobenzene	6	J	UG/KG	VOA
	Ethylbenzene	5	J	UG/KG	VOA
	Styrene	3	J	UG/KG	VOA
	Toluene	4	J	UG/KG	VOA
	Trichloroethene	93		UG/KG	VOA
	Xylene, total	15		UG/KG	VOA
BG-008/008S/009/038	Styrene	1	J	UG/KG	VOA
	Trichloroethene	57		UG/KG	VOA
BG-098/098S	Aluminum	9910		MG/KG	METAL
	Arsenic	16		MG/KG	METAL
	Barium	179		MG/KG	METAL
	Benzo(a)anthracene	110	J	UG/KG	SVOA
	Benzo(a)pyrene	71	J	UG/KG	SVOA
	Benzo(b)fluoranthene	99	J	UG/KG	SVOA
	Benzo(g,h,i)perylene	63	J	UG/KG	SVOA
	Benzo(k)fluoranthene	61	J	UG/KG	SVOA
	Beryllium	2		MG/KG	METAL
	Calcium	3800		MG/KG	METAL
	Chloromethane	370	J	UG/KG	VOA
	Chromium	24		MG/KG	METAL
	Chrysene	100	J	UG/KG	SVOA
	Cobalt	31		MG/KG	METAL
	Copper	76		MG/KG	METAL
	Fluoranthene	190	J	UG/KG	SVOA
	Indeno(1,2,3-cd)pyrene	59	J	UG/KG	SVOA
	Iron	38600		MG/KG	METAL
	Lead	53		MG/KG	METAL
	Magnesium	1230		MG/KG	METAL
	Manganese	1060		MG/KG	METAL
	Mercury	0		MG/KG	METAL
	Nickel	51		MG/KG	METAL
	Phenanthrene	140	J	UG/KG	SVOA
	Pyrene	130	J	UG/KG	SVOA
	Selenium	1		MG/KG	METAL
	Silver	3		MG/KG	METAL
	Trichloroethene	27000		UG/KG	VOA
	Vanadium	26		MG/KG	METAL
	Zinc	206		MG/KG	METAL

TABLE 2-1
Summary of Detected Constituents at Existing Soil Sample Locations

Location	Chemical	Result	Qualifier	Unit	Analysis Group
BG-102/102S	2-Methylnaphthalene	47	J	UG/KG	SVOA
	Aluminum	7800		MG/KG	METAL
	Arsenic	11		MG/KG	METAL
	Barium	120		MG/KG	METAL
	Benzo(a)anthracene	100	J	UG/KG	SVOA
	Benzo(a)pyrene	80	J	UG/KG	SVOA
	Benzo(b)fluoranthene	120	J	UG/KG	SVOA
	Benzo(g,h,i)perylene	67	J	UG/KG	SVOA
	Benzo(k)fluoranthene	46	J	UG/KG	SVOA
	Beryllium	2		MG/KG	METAL
	Calcium	2890		MG/KG	METAL
	Chromium	13		MG/KG	METAL
	Chrysene	130	J	UG/KG	SVOA
	Cobalt	39		MG/KG	METAL
	Copper	37		MG/KG	METAL
	Fluoranthene	230	J	UG/KG	SVOA
	Indeno(1,2,3-cd)pyrene	62	J	UG/KG	SVOA
	Iron	32600		MG/KG	METAL
	Lead	37		MG/KG	METAL
	Manganese	1080		MG/KG	METAL
	Mercury	0		MG/KG	METAL
	Nickel	59		MG/KG	METAL
	Phenanthrene	220	J	UG/KG	SVOA
	Pyrene	150	J	UG/KG	SVOA
	Tetrachloroethene	29	J	UG/KG	VOA
	Trichloroethene	890		UG/KG	VOA
	Vanadium	20		MG/KG	METAL
	Zinc	210		MG/KG	METAL

TABLE 2-1
Summary of Detected Constituents at Existing Soil Sample Locations

Location	Chemical	Result	Qualifier	Unit	Analysis Group
	1,2-Dichloroethene (total	16000		UG/KG	VOA
	Aluminum	6600		MG/KG	METAL
	Arsenic	10		MG/KG	METAL
	Barium	118		MG/KG	METAL
	Benzo(a)anthracene	85	J	UG/KG	SVOA
	Benzo(a)pyrene	61	J	UG/KG	SVOA
	Benzo(b)fluoranthene	84	J	UG/KG	SVOA
	Benzo(g,h,i)perylene	56	J	UG/KG	SVOA
	Benzo(k)fluoranthene	58	J	UG/KG	SVOA
	Beryllium	2		MG/KG	METAL
	Calcium	3230		MG/KG	METAL
	Chromium	12		MG/KG	METAL
	Chrysene	89	J	UG/KG	SVOA
BG-110/110S	Cobalt	55		MG/KG	METAL
	Copper	34		MG/KG	METAL
	Fluoranthene	160	J	UG/KG	SVOA
	Indeno(1,2,3-cd)pyrene	52	J	UG/KG	SVOA
	Iron	28700		MG/KG	METAL
	Lead	39		MG/KG	METAL
	Manganese	1820		MG/KG	METAL
	Mercury	0		MG/KG	METAL
	Nickel	76		MG/KG	METAL
	Phenanthrene	100	J	UG/KG	SVOA
	Pyrene	100	J	UG/KG	SVOA
	Trichloroethene	26000		UG/KG	VOA
	Vanadium	19		MG/KG	METAL
	Zinc	233		MG/KG	METAL

TABLE 2-1
Summary of Detected Constituents at Existing Soil Sample Locations

Location	Chemical	Result	Qualifier	Unit	Analysis Group
BG-113	Aluminum	7860		MG/KG	METAL
	Arsenic	13	J	MG/KG	METAL
	Barium	154		MG/KG	METAL
	Benzo(a)anthracene	100	J	UG/KG	SVOA
	Benzo(a)pyrene	85	J	UG/KG	SVOA
	Benzo(b)fluoranthene	150	J	UG/KG	SVOA
	Benzo(g,h,i)perylene	83	J	UG/KG	SVOA
	Benzo(k)fluoranthene	61	J	UG/KG	SVOA
	Beryllium	2		MG/KG	METAL
	Calcium	2820		MG/KG	METAL
	Chromium	15		MG/KG	METAL
	Chrysene	160	J	UG/KG	SVOA
	Cobalt	37		MG/KG	METAL
	Copper	48		MG/KG	METAL
	Dibenz(a,h)anthracene	57	J	UG/KG	SVOA
	Fluoranthene	210	J	UG/KG	SVOA
	Indeno(1,2,3-cd)pyrene	83	J	UG/KG	SVOA
	Iron	30400		MG/KG	METAL
	Lead	58		MG/KG	METAL
	Manganese	1460		MG/KG	METAL
	Mercury	0		MG/KG	METAL
	Nickel	53		MG/KG	METAL
	Phenanthrene	150	J	UG/KG	SVOA
	Pyrene	150	J	UG/KG	SVOA
	Silver	2	J	MG/KG	METAL
	Trichloroethene	8000		UG/KG	VOA
	Vanadium	23		MG/KG	METAL
	Zinc	192	J	MG/KG	METAL
BP-01	2,6-Dinitrotoluene	130	J	UG/KG	EXPLO
	bis(2-Ethylhexyl)phthalat	1600		UG/KG	SVOA
	HMX	8		MG/KG	EXPLO
	RDX	7		MG/KG	EXPLO
BP-02	Fluoranthene	42	J	UG/KG	SVOA
	HMX	5		MG/KG	EXPLO
	RDX	7		MG/KG	EXPLO
BP-03	RDX	3		MG/KG	EXPLO
BP-04	bis(2-Ethylhexyl)phthalat	59	J	UG/KG	SVOA
	HMX	2		MG/KG	EXPLO
	RDX	2		MG/KG	EXPLO
	RDX	2		MG/KG	EXPLO
BP-05	2-Nitroaniline	94	J	UG/KG	SVOA
	bis(2-Ethylhexyl)phthalate	290	J	UG/KG	SVOA
	Diethylphthalate	92	J	UG/KG	SVOA
	HMX	4		MG/KG	EXPLO
	RDX	5		MG/KG	EXPLO

TABLE 2-1
Summary of Detected Constituents at Existing Soil Sample Locations

Location	Chemical	Result	Qualifier	Unit	Analysis Group
BP-06	bis(2-Ethylhexyl)phthalat	41	J	UG/KG	SVOA
	HMX	14		MG/KG	EXPLO
	RDX	34		MG/KG	EXPLO
BP-07	1,3,5-Trinitrobenzene	30		MG/KG	EXPLO
	2-Nitroaniline	13000	J	UG/KG	SVOA
	bis(2-Ethylhexyl)phthalat	1400	J	UG/KG	SVOA
	HMX	12		MG/KG	EXPLO
	n-Nitrosodiphenylamine	3000	J	UG/KG	SVOA
	RDX	3		MG/KG	EXPLO
BP-08	RDX	3		MG/KG	EXPLO

VOA = Volatile Organic Compound
SVOA = Semi-Volatile Organic Compound

2.2 Geological Setting

The ABL facility is located in the Valley and Ridge Physiographic Province, near its western boundary with the Allegheny Plateau Province. The transition between these provinces is referred to as the Allegheny Structural Front. Approximately 400 acres of Plant 1 is in the floodplain of the North Branch Potomac River, with the remaining acreage on forested mountainous land. The Burning Grounds, which is located within the Plant 1 boundaries, is situated on a broad, flat floodplain of the North Branch Potomac River. A portion of the Burning Grounds is located within the 100-year floodplain of the North Branch Potomac River.

2.3 Selection of Analyte List for Field Investigation

This subsection describes the general process by which the list of analyses proposed for the Field Investigation was developed. The actual analytical parameters and protocol are presented in the FSP.

There are limited data and other information available from various DoD studies of energetic materials, including P/E constituents. These data sources include chemical combustion models such as POLU13 (developed at the U.S. Naval Surface Warfare Center at Indian Head, MD) and actual combustion testing such as those conducted at Sandia National Labs and Dugway Proving Grounds (Bang Box). Energetic materials tested there were similar to the wastes that may have been historically treated at the ABL Burning Grounds. For those wastes currently being treated, AMPC has used a combination of "knowledge of process" and analytical data to characterize the wastes.

Combustion testing of energetics is typically limited to small quantities. One of the consequences of the combustion testing of a small quantity of energetics is that compounds of combustion are produced at very low rates (as evidenced by a very small emission factor). Two outcomes of concern may result: First, products of combustion may be

produced at concentrations below detection levels and be undetectable in such a study, resulting in the inadvertent exclusion of a compound of concern in full-scale combustion. Another outcome is that compounds present in the test chamber at low concentrations (e.g., metals not in the energetics tested, but contained in the testing fixture) may be detected and incorrectly identified as products of combustion. Combustion models have been shown to be extremely accurate in predicting heat release and major product formation rates. The combustion models do not attempt to predict formation of products of incomplete combustion which may be produced at low rates. Mass balance analysis of test data indicates agreement between computer combustion models and combustion testing for the major species. Inconsistencies between the testing data and combustion model data are noted for products of incomplete combustion (e.g. SVOCs and VOCs) and potential trace constituents.

Combustion emissions and residues, including the major and minor products of combustion, have been included in the analyte list for the field investigation to the extent data are available. These data include test results from the Sandia National Labs Air Pathways Health Risk Assessment (December 1996), which was specific to ABL waste, and other military testing and treatment programs documenting emissions from similar activities. Much of this information has been presented at the annual NDIA Global Demil Symposiums (1992-2000) and published in reports from Sandia National Labs and Dugway Proving Grounds.

Without independent testing of both the waste and the treatment residues generated historically, it is not possible to categorically state that the developed analyte list includes all compounds or constituents that could possibly be present as a result of treatment. The technical limitations and extremely high cost of testing preclude obtaining better or more complete data in a cost effective manner. Historical knowledge and documentation of the types of materials treated at the Burning Grounds, knowledge of process, limited testing of ABL waste, and similar studies and investigations are relied upon to provide indicative data. The analyte list developed from this information, although perhaps not all inclusive, is considered representative and sufficient for purposes of site characterization and determination of the nature and extent of contamination. Additional analyte list constituents may be added or removed from the list depending on the results of the ongoing waste characterization and air modeling efforts. It should be noted that compounds unrelated to the waste management and treatment activities at the Burning Grounds have not been included. For example, pesticides and herbicides are not included as they were not managed as a hazardous waste at the site, although they may have been historically used at the site for their intended purpose.

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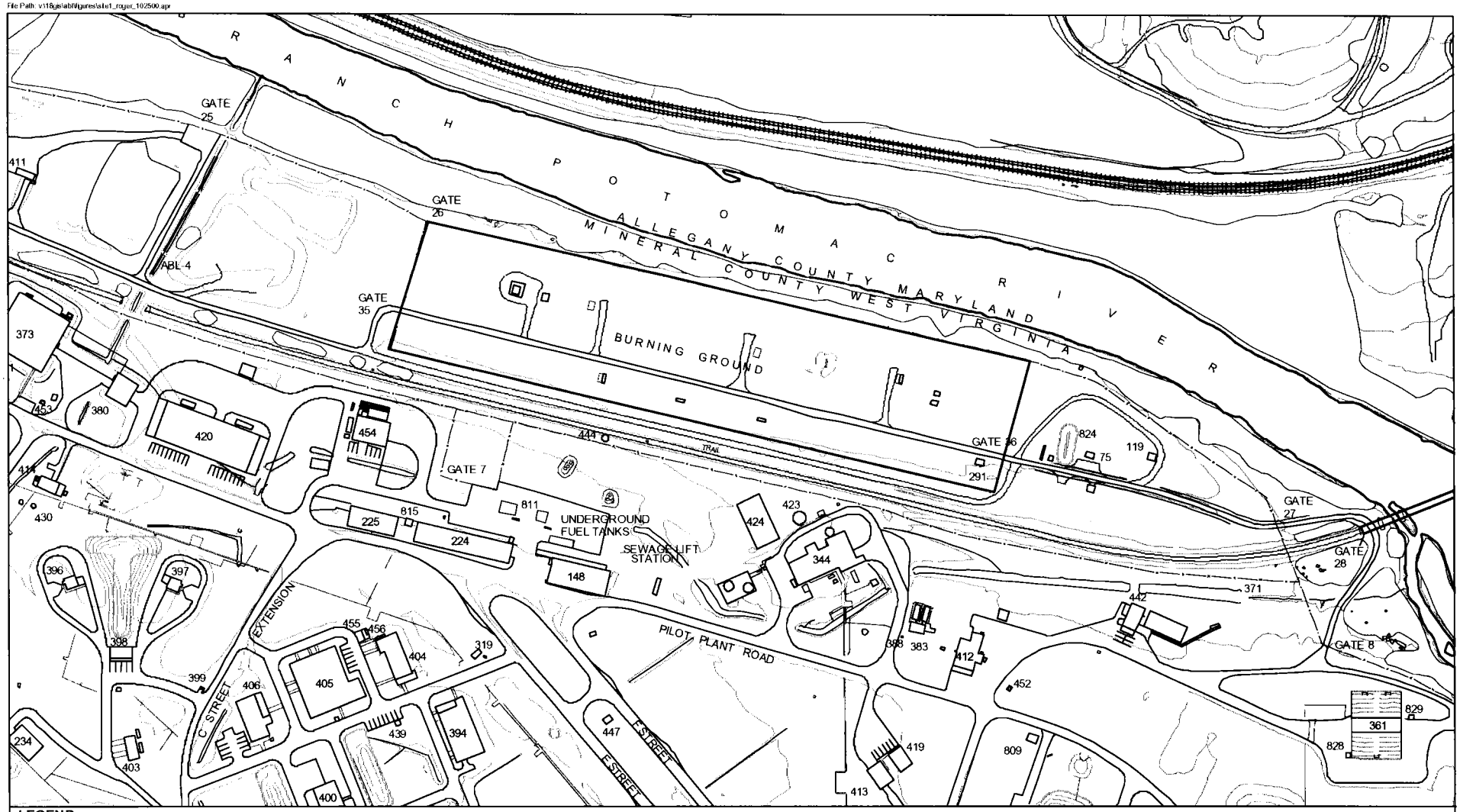

LEGEND

— Burning Unit Boundary

N

60 0 60 120 Feet

Figure 2-1
Burning Grounds, Site 1
Allegany Ballistics Laboratory

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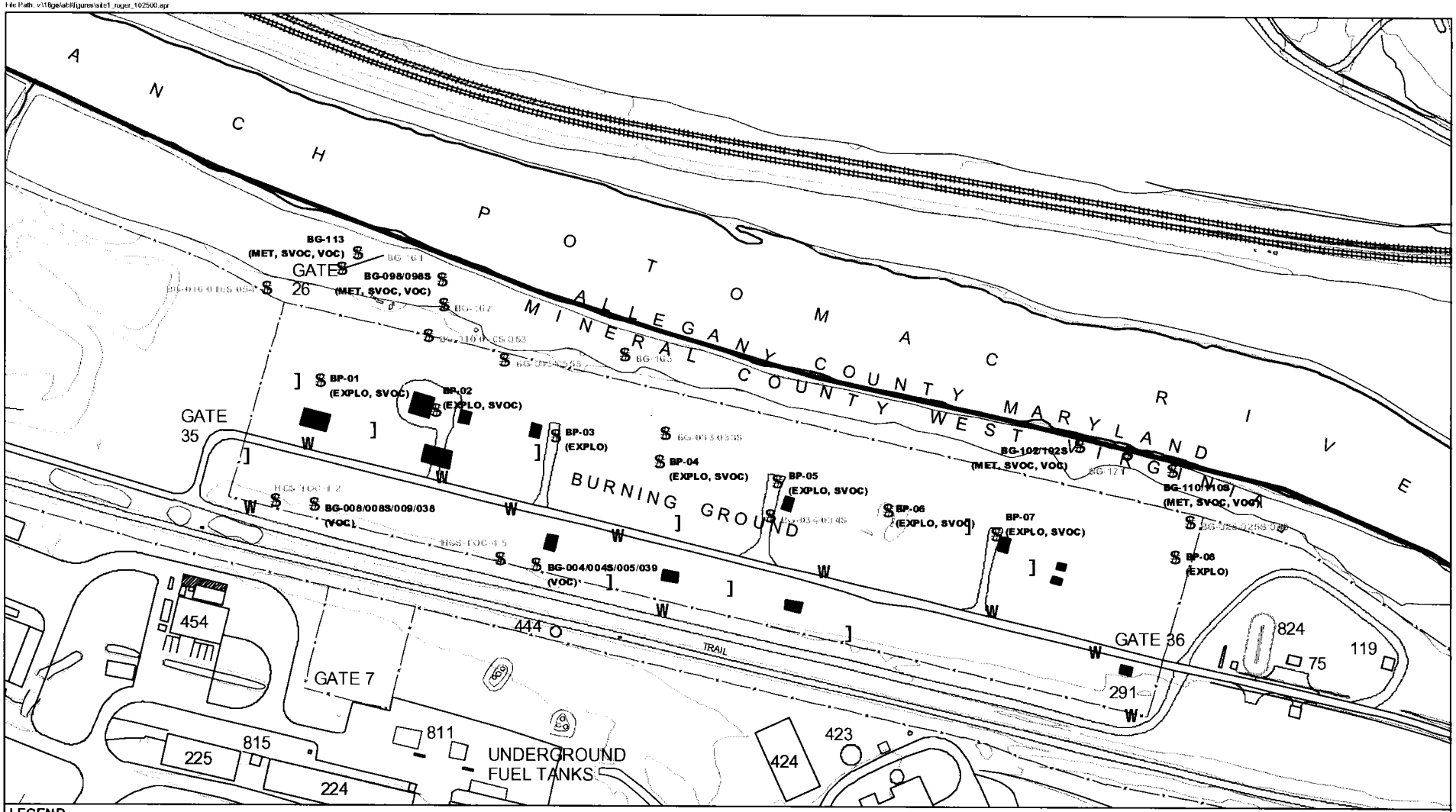

LEGEND

- Surface Soil Sample Location
- Sample Location Name
- BP-0 No Detection Values
- **BP-01** Confirmed Detection Values **(Detected Analysis Groups)**
  - EXPLO = Explosives
  - MET = Metals
  - SVOC = Semi-Volatile Organic Compounds
  - VOC = Volatile Organic Compounds
- 1999 Buildings
- Fences
- Existing and Historic Burn Pan Locations

N

100 0 100 200 Feet

Figure 2-2
Historic Surface Soil Samples
Burning Grounds, Site 1
Allegany Ballistics Laboratory

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SECTION 3

Project Organization

Figure 3-1 presents the core CH2M HILL project organization for the RCRA permitting project which includes this field investigation. Mr. Bob Blanz is the CH2M HILL project manager. He will report directly to Ms. Maritza Montegross, the Navy Technical Representative. Mr. Blanz will provide senior guidance and senior technical direction throughout the project duration. Mr. Syed Mahmood and Ms. Sana Hamady will be the assistant project managers for this project and will be responsible for daily technical support and oversight, budget and schedule tracking, personnel resources planning and allocation, and coordination with NAVSEA, Atlantic Division, Naval Facilities Engineering Command (LANTDIV), and AMPC.

A Technical Lead has been identified for each technical discipline of the project. The Technical Lead will provide direction and guidance to the project staff in their respective technical discipline. They will review work progress and ensure that the end product meets the data quality objectives of the project and is delivered within schedule and budget. The Technical Leads are as follows:

Technical Discipline	Technical Lead
Eco Risk Assessment	**Bill Kappleman**
Human Health Risk Assessment	**John Lowe**
Air Modeling	Mitch Lindsay
Groundwater Monitoring	Brett Doerr
Site Investigation	**Roger Azar**
Permit Application Preparation	Nelline Scheuer

In addition to the CH2M HILL staff, other members of the overall project team includes key staff of the stakeholder organizations. Because completion of many of the project tasks require timely review and input from the stakeholder organizations, it is imperative for the success of this project that all stakeholders maintain close communications. Table 3-1 indicates the technical discipline, the responsible person, and the stakeholder organizations. AMPC personnel, who are not identified in this table, will participate as needed.

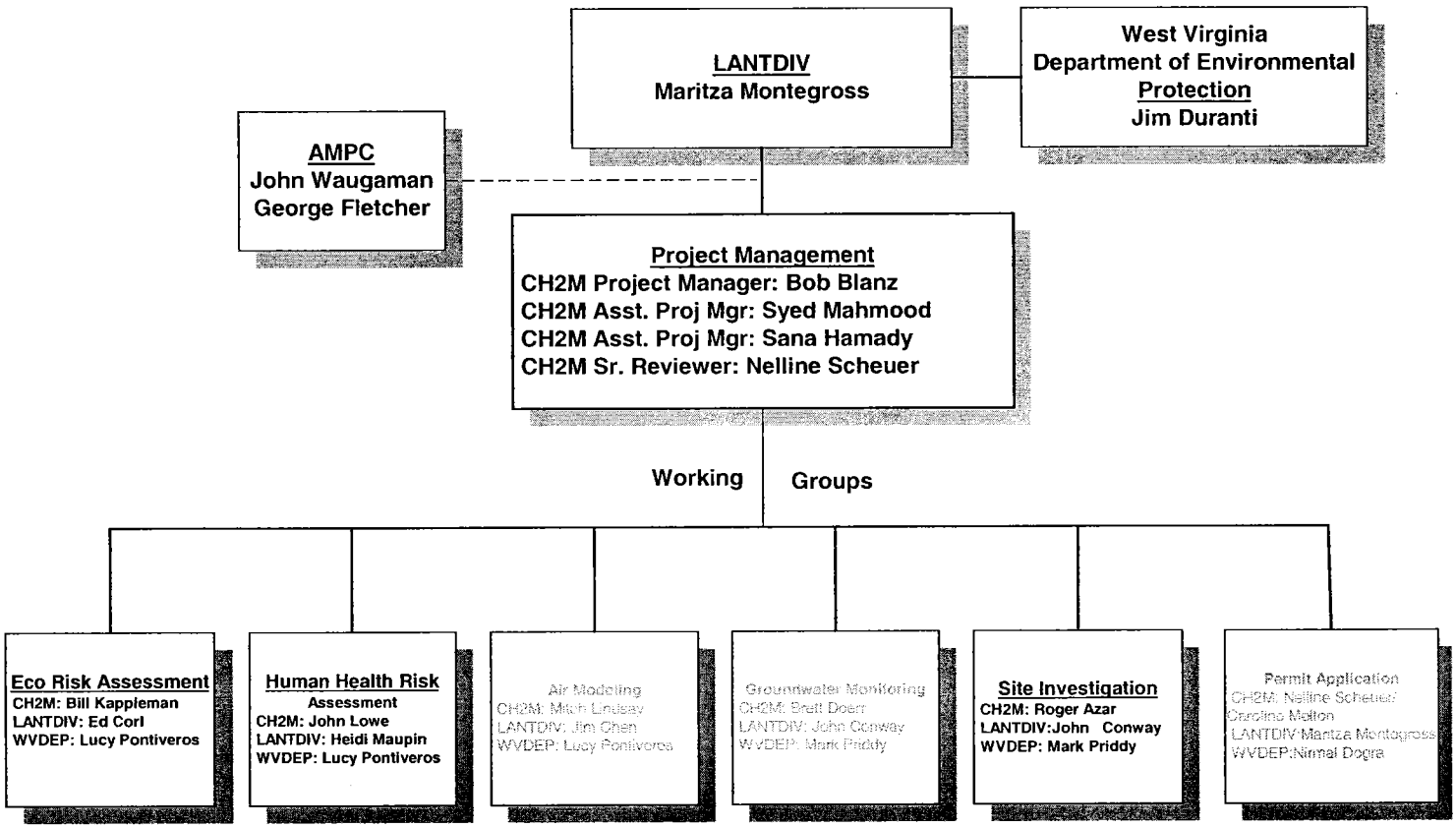
TABLE 3-1
Stakeholder Organizations and Responsible Person(s) for Technical Disciplines

Major Components	Stakeholder Organization	Responsible Person(s)
Project Management	***LANTDIV***	***Maritza Montegross***
	WVDEP	***Jim Duranti***
	AMPC	***John Waugaman/George Fletcher***
	CH2M HILL	***Bob Blanz***
	CH2M HILL	***Syed Mahmood / Sana Hamady***
Ecological Risk Assessment	***LANTDIV***	***Ed Corl***
	WVDEP	***Lucy Pontiveros***
	CH2M HILL	***Bill Kappleman***
Human Health Risk Assessment	***LANTDIV***	***Heidi Maupin***
	WVDEP	***Lucy Pontiveros***
	CH2M HILL	***John Lowe***
Air Modeling	LANTDIV	Jim Chen
	WVDEP	Lucy Pontiveros
	CH2M HILL	Mitch Lindsay
Groundwater Monitoring	LANTDIV	John Conway
	WVDEP	Mark Priddy
	CH2M HILL	Brett Doerr
Site Investigation	***LANTDIV***	***John Conway***
	WVDEP	***Mark Priddy***
	CH2M HILL	***Roger Azar***
Permit Application Preparation	LANTDIV	Maritza Montegross
	WVDEP	Nirmal Dogra
	CH2M HILL	Nelline Scheuer
	CH2M HILL	Caroline Melton

Bold/italicized items indicate the Stakeholder Organization/Responsible Person(s) directly related to the Site Investigation activity.

Figure 3-1

Project Organization Chart for The Field Investigation



3.1 Project Schedule

Table 3-2 presents a summary of project schedule milestones for executing the scope of work identified in this work plan. In order to complete the project within the proposed schedule, it is imperative that timely review and input be provided to the project team.

TABLE 3-2
Project Milestones
RCRA Subpart X Permit Application Field Investigation

Milestone	Duration	Start Date	End Date
Prepare Draft Field Investigation Work Plan	25 days	10/09/00	11/10/00
Submit Draft Field Investigation Work Plan	1 day	11/13/00	11/13/00
Review Period (LANTDIV, AMPC, NAVSEA)	10 days	11/14/00	11/27/00
Prepare Draft Final Field Investigation Work Plan	5 days	11/28/00	12/04/00
Submit Draft Final Field Investigation Work Plan	1 day	12/05/00	12/05/00
Review Period (WVDEP)	50 days	12/06/00	02/08/01
Prepare Final Field Investigation Work Plan	10 days	02/09/01	02/22/01
Submit Final Field Investigation Work Plan	1 day	02/23/01	02/23/01
Field Investigation	5 days	02/20/01	02/26/01
Sample Analysis and Data Validation	39 days	02/27/01	04/20/01
Subcontractor Procurement	10 days	12/04/00	12/15/00

3.2 Field Investigation Activities

3.2.1 General Field Operations

This section provides information on the general field operations and the basis for selection of the locations of the environmental sampling to be conducted.

3.2.1.1 Mobilization/Demobilization

The field crew will consist of a Field Team Leader (FTL) and qualified technicians. Prior to mobilization, all field team members will review the project documents, including the site specific HASP provided in this Work Plan.

The equipment required for field operations will be brought to the site by the CH2M HILL field team. All required sample containers will be shipped directly to ABL by the laboratory. Demobilization will comprise proper decontamination procedures for all site personnel and equipment and removal of equipment and personnel from the facility. All non-disposable sampling equipment will be decontaminated prior to beginning field sampling, between collection of each sample, and at the end of the sampling event.

Decontamination procedures are discussed in the FSP. The IDW is to be handled in accordance with attached IDWMP.

3.2.1.2 Field Sampling

The proposed sample locations are illustrated in Figure 3-2. However, it will be noted that field judgment may be used to adjust the location of certain sample locations to better meet the sampling objectives. The field team shall consider topography, erosion and seeps, changes in type of vegetation, discolorations, accessibility, and past sampling experiences when selecting the final sample location. In the event that a WVDEP representative accompanies the field team, that representative can confirm the final sample locations. Following collection, all sample locations will be surveyed using GPS.

The proposed field sample locations in Figure 3-2 are based on the evaluation of historical site data, engineering judgment, and proposed locations of the new burn pads. Duplication of previous sampling activities at the unit was limited to data verification where deemed necessary. The following criteria were considered in proposing sample locations.

- Historical use/cause of potential contamination
- Site layout, topography, and drainage characteristics
- Mobility of contaminants
- Potential off site transport pathways of contaminants

Seventeen discrete surface soil samples and 7 subsurface soil samples will be collected from locations within the Burning Grounds. An additional 3 surface soil samples will be collected adjacent to the Burning Grounds. Surface soil samples will be collected to a depth of 6 inches, while subsurface samples will be collected from 18 to 24 inches below the ground surface (bgs).

All soil samples will be analyzed for Appendix IX metals plus aluminum, cyanide, iron, and manganese, selected Appendix IX volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) plus biphenyl, dioxins and furans, explosives, nitroglycerin, perchlorate, ammonium nitrate, pH, and total organic carbon (TOC).

3.2.2 Sample Handling

Sample handling includes the field-related considerations regarding the selection of sample containers and preservatives, sample identification system, allowable holding times, and the analyses required. These topics are detailed in the attached FSP.

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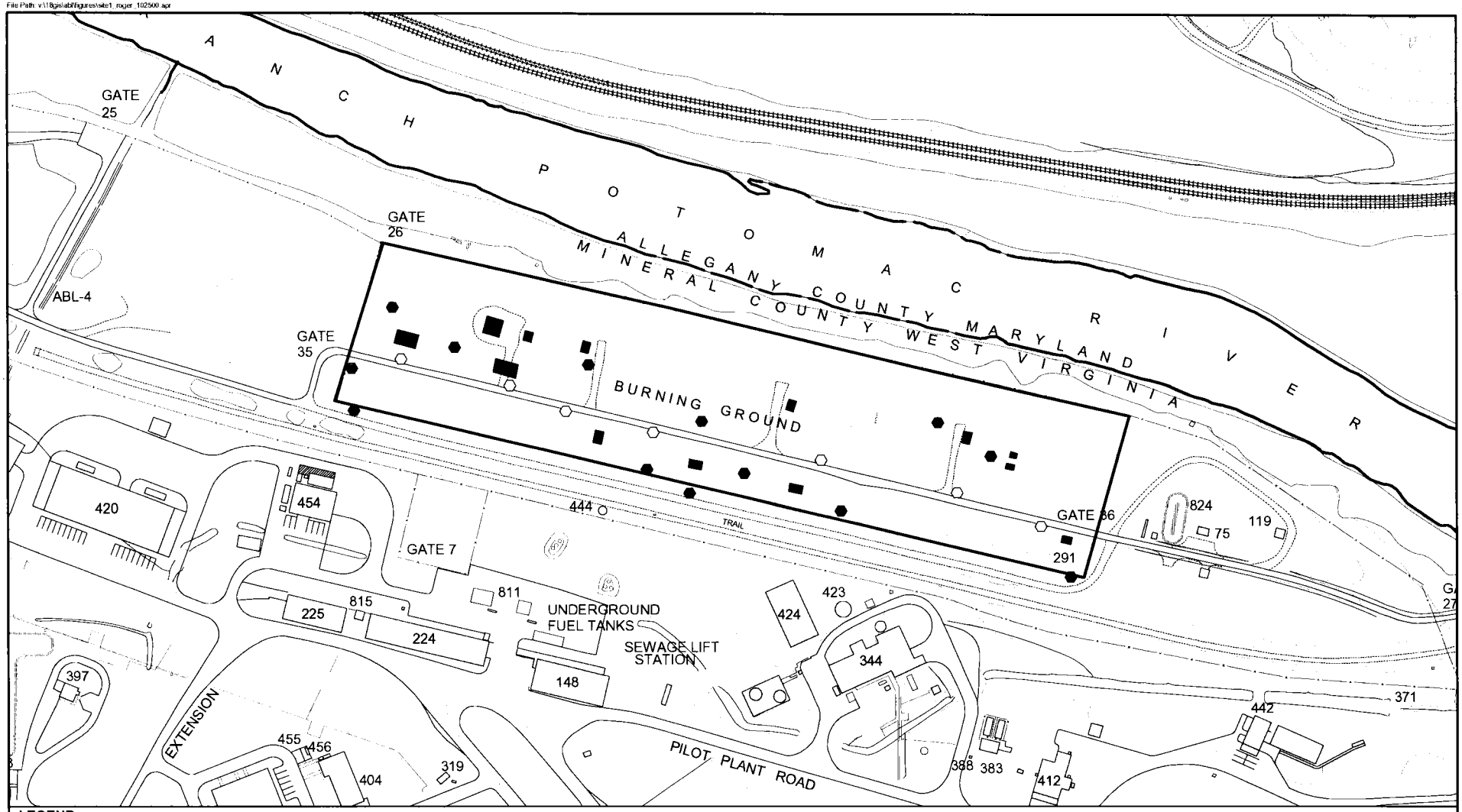

LEGEND

- Proposed Surface Soil Sample Locations
- Proposed Surface Soil and Sub-surface Soil Sample Locations
- Existing and Historic Burn Pan Locations
- Burning Unit Boundary

N

100 0 100 200 Feet

Figure 3-2
Proposed Sample Locations
Burning Grounds, Site 1
Allegany Ballistics Laboratory

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SECTION 4

Data Evaluation and Reporting

4.1 Data Management and Evaluation

4.1.1 Data Management

Data management procedures, database administration, and data integration into a geographic information system (GIS) are described in this section. The objective of the data management task is to organize investigation data, thereby facilitating their use for evaluating conditions at the Burning Grounds.

Data collected during the field investigation will be loaded into a database maintained for all Navy CLEAN projects. The database is named 'EnDat' (environmental database) and is created using Oracle 8. Standard tools have been developed by CH2M HILL to facilitate data loading and management. Information entered in the database includes station ID, site ID, station northing and easting (or latitude and longitude), sample type, and sampling method. Data loaded into EnDat will be queried to produce site-, medium-, or contaminant-specific tables and figures as part of data evaluation.

4.1.2 Data Evaluation

Data generated during the field investigation, sample analysis, and data validation tasks will be evaluated to determine the nature and extent of contaminants in soil at the Burning Grounds. Site characteristics that may influence contaminant movement and affect possible remedial alternatives will also be described. Data evaluation will include data reduction and tabulation (using EnDat), development of maps and figures (using the GIS), and environmental fate and transport evaluation of detected contaminants. Data will be integrated with existing data, as appropriate.

Sampling data will be summarized for each chemical to present frequency of detection, minimum and maximum detected values, mean concentrations, and reporting limit ranges. Contaminant concentrations may be plotted on maps and cross sections to indicate horizontal and vertical distribution. Analytical results for method, trip, field, and equipment rinsate blanks will be taken into consideration when evaluating the significance of constituents detected in environmental samples. Comparisons will also be made to inorganic constituent concentrations in background soil samples collected from the IR program at ABL.

Data will be further evaluated by correlating contaminants present at the Burning Grounds, concentrations detected, physical characteristics of the unit, behavior of contaminants in soil, migration potential, possible migration pathways, and other characteristics relevant to contaminant fate and transport.

4.2 Reporting

A Site Investigation Report will be developed to provide a summary and interpretation of all data gathered and define the nature and extent of contamination in Burning Grounds soil. The memorandum will document sample locations, sampling methods, and quality control data in addition to the soil analytical results. It will identify contaminants present, their concentrations, persistence, mobility, background concentrations, and potential migration pathways. Data will be clearly displayed in tabular or graphical formats. Specific figures may include maps portraying concentrations of chemical constituents identified in soil. Data validation reports will describe the quality of the analytical results presented by the laboratory.

The data collected from the field investigation will be used to assess the current potential risks to human health and the environment from exposure to the soil at the unit, to develop the closure plan, to assist in defining any operational related monitoring, as input to any pan/pad redesign activities, and to provide the baseline for assessment of compliance with the Environmental Performance Standards.

SECTION 5

References

1. Environmental Restoration Site Management Plan, NAVSEA, June 2000.
2. EPA Guidance for Quality Assurance Project Plans (EPA QA/G-5), February 1998.
3. EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5), November 1997.
4. Guidance for the Data Quality Objective Process (EPA QA/G-4), September 1994.
5. United States Environmental Protection Agency (USEPA). 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. Edison, NJ: Environmental Response Team Office of Emergency and Remedial Response.
6. Sandia National Labs Air Pathways Health Risk Assessment (December 1996)

Final

Field Sampling Plan (FSP)

for the

Burning Grounds RCRA Subpart X Permit Application

at the

Allegany Ballistics Laboratory
Rocket Center, West Virginia

Contract Task Order 0175

February 2001

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN II Program
Contract N62470-95-D-6007

Prepared by

CH2MHILL

Herndon, Virginia

Table of Contents

Section **Page**

Field Sampling Procedures 1
- 1.0 General Procedures 1
- 2.0 Soil Sampling Procedures 1
- 3.0 Sampling Frequency and Sample Handling 2
  - 3.1 Field QA/QC Samples 3
- 4.0 Decontamination Procedures 3
- 5.0 Sample Documentation 4
  - 5.1 Sample Numbering 5
  - 5.2 Sample Labels 6

Standard Operating Procedures 7

Tables

3-1 Summary of Required Containers, Preservatives, and Holding Times for Soil Samples, Field Investigation 2

3-2 Summary of Required Containers, Preservatives, and Holding Times for Liquid Samples, Field Investigation 3

Field Sampling Procedures

1.0 General Procedures

Prior to commencing any field sampling activities, the following general procedures will be carried out:

- Utilities clearances will be completed, at a minimum, the day before field sampling activities are scheduled to start. Alliant Missile Products Company LLC. (AMPC) will be contacted for utility clearances. All coordination for clearing utilities at the Burning Grounds will be made through Mr. George Fletcher.
- All Investigation Derived Waste (IDW) will be handled in accordance with the Investigation Derived Waste Management Plan (IDWMP).
- All sampling activities in or around the Burning Grounds will be coordinated with AMPC personnel such that sampling occur only during non-burning times. All coordination for sampling in the Burning Grounds will be made through Mr. George Fletcher.

2.0 Soil Sampling Procedures

Seventeen surface soil and 7 subsurface soil samples will be obtained from within the fenced Burning Grounds. An additional 3 surface soil samples will be collected adjacent to the Burning Grounds along a drainage ditch. Sample locations will be biased toward existing burning pans and the proposed locations for the new burning pads. Surface soil samples collected outside the Burning Grounds will target an adjacent ditch in order to address potential contaminant migration with stormwater run-off. Figure 3-2 of the WP illustrates the proposed sample locations.

Surface and subsurface soil samples will be analyzed for Appendix IX metals plus aluminum, cyanide, iron, and manganese, Appendix IX volatile organic compounds (VOCs), Appendix IX semi-volatile organic compounds (SVOCs) plus biphenyl, dioxins and furans, explosives, nitroglycerin, perchlorate, ammonium nitrate, pH, and total organic carbon (TOC).

Surface and subsurface soil samples will be collected in accordance with the attached SOPs for Shallow Soil Sampling. Soil samples will be collected manually with a hand held auger and trowels. Any excess soil from cuttings generated during the field activities will be disposed of in accordance with the Investigation Derived Waste Management Plan.

3.0 Sampling Frequency and Sample Handling

Table 3-1 and 3-2 list the sample containers, preservatives, and holding times required for the intended analyses. Table 3-1 pertains to the soil samples; Table 3-2 pertains to the liquid quality assurance/quality control (QA/QC) samples that will be collected during the field investigation.

TABLE 3-1
Summary of Required Containers, Preservatives, and Holding Times for Soil Samples
Field Investigation
Burning Grounds, Allegany Ballistics Laboratory, Rocket Center, WV

Parameter	Container Type	Preservation	Holding Time	Notes
Appendix IX metals plus aluminum, iron, and manganese	One 8-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 °C	6 Months; 28 Days for mercury	Fill Completely
Cyanide	One 8-oz glass wide-mouth jars with teflon-lined cap	Cool to 4 °C	14 Days	Fill Completely
Appendix IX VOCs	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 °C	14 Days	Fill Completely
Appendix IX SVOCs plus biphenyl	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 °C	14 Days to extraction; 40 Days to analysis	Fill Completely
Dioxins / Furans	Two 4-oz amber glass wide-mouth jars with teflon-lined cap	Cool to 4 °C	7 Days	Fill Completely
Explosives	One 4-oz amber glass wide-mouth jar with teflon-lined cap	Cool to 4 °C	7 Days	Fill Completely
Nitroglycerin	One 4-oz amber glass wide-mouth jar with teflon-lined cap	Cool to 4 °C	7 Days	Fill Completely
Perchlorate	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 °C	14 Days	Fill Completely
Ammonium Nitrate (Captured as Nitrate)	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 °C	None	Fill Completely
TOC	One 8-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 °C	28 Days	Fill Completely
pH	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 °C	Immediately	Fill Completely

TABLE 3-2
Summary of Required Containers, Preservatives, and Holding Times for Liquid Samples
Field Investigation
Burning Grounds, Allegany Ballistics Laboratory, Rocket Center, WV

Parameter	Container Type	Preservation	Holding Time	Notes
Appendix IX metals plus aluminum, iron, and manganese	One 1-liter polyethylene bottle	HNO_3 to pH<2; Cool to 4 °C	6 Months; 28 Days for mercury	Fill to shoulder
Cyanide	One 1-liter polyethylene bottle	NaOH to pH>12; Cool to 4 °C	14 days	Fill to shoulder
Appendix IX VOCs	Three 40-ml glass vials with Teflon-lined cap.	HCl to pH<2; Cool to 4 °C	14 days	Fill completely, no air bubbles
Appendix IX SVOCs plus biphenyl	Two 1-liter amber glass bottles	Cool to 4 °C	7 days to extraction; 40 days to analysis	Fill to shoulder
Dioxins / Furans	Two 1-liter amber glass bottles	Cool to 4 °C	30 days	Fill to shoulder
Explosives	One 1-liter amber glass bottle	Cool to 4 °C	7 days	Fill to shoulder
Nitroglycerin	One 1-liter amber glass bottle	Cool to 4 °C	7 days	Fill to shoulder
Perchlorate	One 500-ml polyethylene bottle	Cool to 4 °C	7 days	Fill to shoulder
Ammonium Nitrate (Captured as Nitrate)	One 250-ml polyethylene bottle	H_2SO_4 to pH<2; Cool to 4 °C	28 days	Fill to shoulder
TOC	One 500-ml amber glass bottle	H_2SO_4 to pH<2; Cool to 4 °C	28 days	Fill completely; no air bubbles
pH	None	None	None	None

3.1 Field QA/QC Samples

Field QA/QC samples will be collected at the frequency described in Section 10 of the Quality Assurance Project Plan (QAPP).

4.0 Decontamination Procedures

All non-disposable sample equipment (i.e., stainless-steel trowels, auger, bowls, and hammer) will be decontaminated prior to, and between, sampling locations. As much as possible, equipment decontamination will be accomplished by using a minimal amount of liquids. Trowels that are used to sample soil will be decontaminated using the following procedure:

- Detergent/tap water wash
- Distilled/de-ionized(DI) water rinse
- DI water rinse
- Methanol rinse
- Air dry

Use of these decontamination procedures will ensure that material transfer between sampling points is minimized and that cross-contamination will not occur. Equipment rinsate samples will be obtained to verify that no cross-contamination is occurring.

5.0 Sample Documentation

All pertinent sampling and field survey information shall be recorded in a logbook to facilitate reconstruction of events that occurred during the sampling activities. Logs will be kept in a waterproof bound notebook with numbered pages. All entries will be printed in waterproof ink. No pages will be removed and corrections will be made by drawing a single line through the incorrect data and initializing and dating the correction that was made to the side of the error. Entries in the logbook will contain, at a minimum, the following information:

- Location of sampling point (Using Geographic Positioning System)
- Name and address of field contact
- Type of sample and depth
- Number and volume of samples taken
- Purpose of sampling (i.e., closure activities, confirmation, etc.)
- Description of sampling point and sampling methodology
- Date and time of sample collection
- Sample identification number
- Method of transporting or shipment (i.e., name of laboratory, UPS, Fed Ex)
- Field observations
- Any field measurements made (photoionization detector (PID) readings)
- Signatures of personnel responsible for observations

This information is necessary to help track samples and identify the project, sampler, time of sampling, location of each sample obtained, procedures used, deviations from the work plan, and sample history.

Data, calibration, maintenance records, and Chain-of–custody (COC) records will be faxed to the Project Manager on a daily basis. COC records are necessary to document sample identity, as well as handling and shipping procedures.

Additional detail on documentation of field activities is included in the attached SOP, Chain of Custody. Sample packing and shipping is addressed in the SOP Packaging and Shipping Procedures.

5.1 Sample Numbering

Each sample will be identified by a unique sample number. The makeup of each sample number is described below:

First Segment of Sample Number	Second Segment of Sample Number	Third Segment of Sample Number		
Naval Installation Abbreviation	Site Number	Sample Type	Sample Location	Additional Qualifiers (sample depth, date)
A	ANN	AA	NN	NNNN

Symbol Definition:

"A" = Alphabetic
"N" = Numeric

Site Abbreviation:

A = One letter abbreviation identifying the Installation where the sample was collected. (i.e. Allegany Ballistics Laboratory = A)

Site Number:

ANN = One letter and two numbers identifying the site on the facility where the sample was collected (i.e. S01 = Burning Grounds)

Sample Type:

SS = Surface Soil Sample
SB = Subsurface Soil Sample
TB = Trip Blank
EB = Equipment Blank
FB = Field Blank

Sample Location:

NN = All other Samples - Unique 2-digit sample number.

Additional Qualifiers:

BDED = Surface Soil, Subsurface Soil – 2-digit begin depth and 2 -digit end depth

(i.e. 2′ – 2′ 6″ = 0203)

DDYY = QC Samples – 2-digit day and 2-digit year of sampling event

Examples of this numbering approach are:

AS01-SS04-0001	The 4th surface soil sample collected from 0ft to 1ft at the Burning Grounds
AS01-SB02-0102	The 2nd subsurface soil sample collected at the Burning Grounds from a depth of 1 or 1.5 to 2 feet

Examples of this numbering approach for QA/QC samples are:

AS01-FB100196	Field blank collected at the Burning Grounds on October 1, 1996
AS01-TB07299701	First trip blank collected at the Burning Grounds on July 29, 1997
AS01-EB080198	Equipment blank collected at the Burning Grounds on August 1, 1998

5.2 Sample Labels

The sample label will contain the following additional information:

- Sample number
- Date
- Time (military)
- Preservatives used
- Sampler's initials
- Number of containers
- Station Location

The sample description will note the sample type, e.g., and the depth at which the sample is obtained. Additional information included on sample labels is found in the attached SOP, Chain-of-Custody.

STANDARD OPERATING PROCEDURES

LIST OF STANDARD OPERATING PROCEDURES:

1. Equipment Blank and Field Blank Preparation
2. Chain-of-Custody
3. Decontamination of Personnel and Equipment
4. Packaging and Shipping Procedures
5. Shallow Soil Sampling

STANDARD OPERATING PROCEDURE

Equipment Blank and Field Blank Preparation

I. Purpose

To prepare blanks to determine whether decontamination procedures are adequate and whether any cross-contamination is occurring during sampling due to contaminated air and dust.

II. Scope

The general protocols for preparing the blanks are outlined. The actual equipment to be rinsed will depend on the requirements of the specific sampling procedure.

III. Equipment and Materials

- Blank liquid (use ASTM Type II grade water)
- Deionized water
- Sample bottles as appropriate
- Gloves
- Preservatives as appropriate

IV. Procedures and Guidelines

A. Decontaminate all sampling equipment that has come in contact with sample according to SOP *Decontamination of Personnel and Equipment.*

B. To collect an equipment blank for volatile analysis from the surfaces of sampling equipment other than pumps, pour blank water over one piece of equipment and into two 40-ml vials until there is a positive meniscus, then seal the vials. Note the sample number and associated piece of equipment in the field notebook as well as the type and lot number of the water used.

For non-volatiles analyses, one aliquot is to be used for equipment. For example, if a pan and trowel are used, place trowel in pan and pour blank fluid in pan such that pan and trowel surfaces which contacted the sample are contacted by the blank fluid. Pour blank fluid from pan into appropriate sample bottles.

Do not let the blank fluid come in contact with any equipment that has not been decontaminated.

C. When collecting an equipment blank from a pump, run an extra gallon of deionized water through the pump while collecting the pump outflow into

appropriate containers. Make sure the flow rate is low when sampling VOCs. If a Grundfos Redi-Flo2 pump with disposable tubing is used, remove the disposable tubing after sampling but before decon. When decon is complete, put a 3 to 5 foot segment of new tubing onto the pump to collect the equipment blank.

D. To collect a field blank, slowly pour ASTM Type II water directly into sample containers.

E. Document and ship samples in accordance with the procedures for other samples.

F. Collect next field sample.

V. Attachments

None.

VI. Key Checks and Items

- Wear gloves.
- Do not use any non-decontaminated equipment to prepare blank.
- Use ASTM-Type II grade water.

STANDARD OPERATING PROCEDURE

Chain-of-Custody

I Purpose

The purpose of this SOP is to provide information on chain-of-custody procedures to be used under the CLEAN Program.

II Scope

This procedure describes the steps necessary for transferring samples through the use of Chain-of-Custody Records. A Chain-of-Custody Record is required, without exception, for the tracking and recording of samples collected for on-site or off-site analysis (chemical or geotechnical) during program activities (except wellhead samples taken for measurement of field parameters). Use of the Chain-of-Custody Record Form creates an accurate written record that can be used to trace the possession and handling of the sample from the moment of its collection through analysis. This procedure identifies the necessary custody records and describes their completion. This procedure does not take precedence over region specific or site-specific requirements for chain-of-custody.

III Definitions

Chain-of-Custody Record Form - A Chain-of-Custody Record Form is a printed two-part form that accompanies a sample or group of samples as custody of the sample(s) is transferred from one custodian to another custodian. One copy of the form must be retained in the project file.

Custodian - The person responsible for the custody of samples at a particular time, until custody is transferred to another person (and so documented), who then becomes custodian. A sample is under one's custody if:

- It is in one's actual possession.
- It is in one's view, after being in one's physical possession.
- It was in one's physical possession and then he/she locked it up to prevent tampering.
- It is in a designated and identified secure area.

Sample - A sample is physical evidence collected from a facility or the environment, which is representative of conditions at the point and time that it was collected.

IV Responsibilities

Project Manager - The Project Manager is responsible for ensuring that project-specific plans are in accordance with these procedures, where applicable, or that other, approved procedures are developed. The Project Manager is responsible for development of documentation of procedures which deviate from those presented herein. The Project Manager is responsible for ensuring that chain-of-custody procedures are implemented. The Project Manager also is responsible for determining that custody procedures have been met by the analytical laboratory.

Field Team Leader - The Field Team Leader is responsible for determining that chain-of-custody procedures are implemented up to and including release to the shipper or laboratory. It is the responsibility of the Field Team Leader to ensure that these procedures are implemented in the field and to ensure that personnel performing sampling activities have been briefed and trained to execute these procedures.

Sample Personnel - It is the responsibility of the field sampling personnel to initiate chain-of-custody procedures, and maintain custody of samples until they are relinquished to another custodian, the sample shipper, or to a common carrier.

V Procedures

The term "chain-of-custody" refers to procedures which ensure that evidence presented in a court of law is valid. The chain-of-custody procedures track the evidence from the time and place it is first obtained to the courtroom, as well as providing security for the evidence as it is moved and/or passed from the custody of one individual to another.

Chain-of-custody procedures, recordkeeping, and documentation are an important part of the management control of samples. Regulatory agencies must be able to provide the chain-of-possession and custody of any samples that are offered for evidence, or that form the basis of analytical test results introduced as evidence. Written procedures must be available and followed whenever evidence samples are collected, transferred, stored, analyzed, or destroyed.

V.1 Sample Identification

The method of identification of a sample depends on the type of measurement or analysis performed. When in-situ measurements are made, the data are recorded directly in bound logbooks or other field data records with identifying information.

Information which shall be recorded in the field logbook, when in-situ measurements or samples for laboratory analysis are collected, includes:

- Field Sampler(s);
- CTO Number;
- Project Sample Number;
- Sample location or sampling station number;

- Date and time of sample collection and/or measurement;
- Field observations;
- Equipment used to collect samples and measurements; and,
- Calibration data for equipment used.

Measurements and observations shall be recorded using waterproof ink.

V.1.1 Sample Label

Samples, other than in-situ measurements, are removed and transported from the sample location to a laboratory or other location for analysis. Before removal, however, a sample is often divided into portions, depending upon the analyses to be performed. Each portion is preserved in accordance with the Sampling and Analysis Plan. Each sample container is identified by a sample label (see Attachment A). Sample labels are provided, along with sample containers, by the analytical laboratory. The information recorded on the sample label includes:

- Project - Contract Task Order (CTO) Number.
- Station Location - The unique sample number identifying this sample. (See FSP for details)
- Preservation - Type and quantity of preservation added.
- Analysis - VOA, BNAs, PCBs, pesticides, metals, cyanide, other.
- Sampled By - Printed name of the sampler.
- Remarks - Any pertinent additional information.

V.2 Chain-of-Custody Procedures

After collection, separation, identification, and preservation, the sample is maintained under chain-of-custody procedures until it is in the custody of the analytical laboratory and has been stored or disposed.

V.2.1 Field Custody Procedures

- Samples are collected as described in the site Sampling and Analysis Plan. Care must be taken to record precisely the sample location and to ensure that the sample number on the label matches the Chain-of-Custody Record exactly.
- The person undertaking the actual sampling in the field is responsible for the care and custody of the samples collected until they are properly transferred or dispatched.
- When photographs are taken of the sampling as part of the documentation procedure, the name of the photographer, date, time, site location, and site description are entered sequentially in the site logbook as photos are taken. Once developed, the photographic prints shall be serially numbered, corresponding to the logbook descriptions; photographs will be stored in the

project files. It is good practice to identify sample locations in photographs by including an easily read sign with the appropriate sample/location number.

- Sample labels shall be completed for each sample, using waterproof ink unless prohibited by weather conditions, e.g., a logbook notation would explain that a pencil was used to fill out the sample label if the pen would not function in freezing weather. If pre-printed labels are used to identify the sample, at least one member of the field sampling team must verify the correct label is being used. The sampler must sign/initial and date the label.

V.2.2 Transfer of Custody and Shipment

Samples are accompanied by a Chain-of-Custody Record Form. A Chain-of-Custody Record Form example is shown in Attachment B. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the Record. This Record documents sample custody transfer from the sampler, often through another person, to the analyst in the laboratory. The Chain-of-Custody Record is filled out as given below.

- Enter header information (CTO number, samplers, and project name).
- Enter sample specific information (sample number, media, sample analysis required and analytical method grab or composite, number and type of sample containers, and date/time sample was collected). One chain of custody must be completed for each cooler.
- Sign, date, and enter the time under "Relinquished by" entry.
- Have the person receiving the sample sign the "Received by" entry. If shipping samples by a common carrier, print the carrier to be used in this space (i.e., Federal Express).
- If a carrier is used, enter the airbill number under "Remarks," in the bottom right corner;
- Place the original (top, signed copy) of the Chain-of-Custody Record Form in a plastic zipper-type bag or other appropriate sample shipping package. Retain the copy with field records.
- Sign and date the custody seal, a 1- by 3-inch white paper label with black lettering and an adhesive backing. Attachment C is an example of a custody seal. The custody seal is part of the chain-of-custody process and is used to prevent tampering with samples after they have been collected in the field. Custody seals shall be provided by the analytical laboratory.
- Place the seal across the shipping container opening so that it would be broken if the container were to be opened.
- Complete other carrier-required shipping papers.

The custody record is completed using waterproof ink. Any corrections are made by drawing a line through and initialing and dating the change, then entering the correct information. Erasures are not permitted.

Common carriers will usually not accept responsibility for handling Chain-of-Custody Record Forms; this necessitates packing the record in the shipping container (enclosed with other documentation in a plastic zipper-type bag). As long as custody forms are sealed inside the shipping container and the custody seals are intact, commercial carriers are not required to sign the custody form.

The laboratory representative who accepts the incoming sample shipment signs and dates the Chain-of-Custody Record, completing the sample transfer process. It is then the laboratory's responsibility to maintain internal logbooks and custody records throughout sample preparation and analysis.

VI Quality Assurance Records

Once samples have been packaged and shipped, the Chain-of-Custody copy and airbill receipt become part of the quality assurance record.

VII Attachments

Sample Label
Chain of Custody Form
Custody Seal

VIII References

USEPA. *User's Guide to the Contract Laboratory Program.* Office of Emergency and Remedial Response, Washington, D.C. (EPA/540/P-91/002), January 1991.

Attachment A

Example Sample Label

I-CHEM

CLIENT/SOURCE	☐ GRAB ☐ COMPOSITE OTHER:
SITE NAME	DATE
SAMPLE #	TIME
ANALYSIS	PRESERVATIVE
	COLL. BY

Part No. 90002

Attachment B

Example Chain-of-Custody Record

CHAIN OF CUSTODY RECORD

Client:	Phone #					Preservative Used										
Contact:	Fax #															
Project:	Site:					Analysis Required										
Address:		PO #			No. of Containers											
Lab #	Sample Identification	Date	Time	Matrix												Remarks

Collected/Relinquished by: (1)	Date:	Time:	Received by:	Shipping Carrier:	Samples Received Cold (Circle) YES NO Temperature (C)
Collected/Relinquished by: (2)	Date:	Time:	Received by:	Shipping Ticket #	Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT
Collected/Relinquished by: (3)	Date:	Time:	Received by:	Requested Turnaround Time:	
Collected/Relinquished by: (4)	Date:	Time:	Received by:	Comments:	

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Attachment C

Example Custody Seal

CUSTODY SEAL

Date_____

Signature_____

Naige Nunc International

I-CHEM® Brand Products

90009

STANDARD OPERATING PROCEDURE

Decontamination of Personnel and Equipment

I. Purpose

To provide general guidelines for the decontamination of personnel, sampling equipment, and monitoring equipment used in potentially contaminated environments.

II. Scope

This is a general description of decontamination procedures.

III. Equipment and Materials

Demonstrated analyte-free, deionized ("DI") water (specifically, ASTM Type II water)

Distilled water

Potable water; must be from a municipal water supplier, otherwise an analysis must be run for appropriate volatile and semivolatile organic compounds and inorganic chemicals (e.g., Target Compound List and Target Analyte List chemicals)

2.5% (W/W) Alconox® and water solution

Concentrated (V/V) pesticide grade methanol (DO NOT USE ACETONE)

Large plastic pails or tubs for Alconox® and water, scrub brushes, squirt bottles for Alconox® solution, methanol and water, plastic bags and sheets

DOT approved 55-gallon drum for disposal of waste

Phthalate-free gloves

Decontamination pad and steam cleaner/high pressure cleaner for large equipment

IV. Procedures and Guidelines

A. PERSONNEL DECONTAMINATION

To be performed after completion of tasks whenever potential for contamination exists, and upon leaving the exclusion zone.

Wash boots in Alconox® solution, then rinse with water. If disposable latex booties are worn over boots in the work area, rinse with Alconox® solution, remove, and discard into DOT-approved 55-gallon drum.

Wash outer gloves in Alconox® solution, rinse, remove, and discard into DOT-approved 55-gallon drum.

Remove disposable coveralls ("Tyveks") and discard into DOT-approved 55-gallon drum.

Remove respirator (if worn).

Remove inner gloves and discard.

At the end of the work day, shower entire body, including hair, either at the work site or at home.

Sanitize respirator if worn.

B. SAMPLING EQUIPMENT DECONTAMINATION—GROUNDWATER SAMPLING PUMPS

Sampling pumps are decontaminated after each use as follows.

Don phthalate-free gloves.

Spread plastic on the ground to keep hoses from touching the ground

Turn off pump after sampling. Remove pump from well and place pump in decontamination tube, making sure that tubing does not touch the ground

Turn pump back on and pump 1 gallon of Alconox® solution through the sampling pump.

Rinse with 1 gallon of 10% methanol solution pumped through the pump. (DO NOT USE ACETONE).

Rinse with 1 gallon of tap water.

Rinse with 1 gallon of deionized water.

Keep decontaminated pump in decontamination tube or remove and wrap in aluminum foil or clean plastic sheeting.

Collect all rinsate and dispose of in a DOT-approved 55-gallon drum.

Decontamination materials (e.g., plastic sheeting, tubing, etc.) that have come in contact with used decontamination fluids or sampling equipment will be disposed of in DOT-approved 55-gallon drums.

C. SAMPLING EQUIPMENT DECONTAMINATION—OTHER EQUIPMENT

Reusable sampling equipment is decontaminated after each use as follows.

Don phthalate-free gloves.

Before entering the potentially contaminated zone, wrap soil contact points in aluminum foil (shiny side out).

Rinse and scrub with potable water.

Wash all equipment surfaces that contacted the potentially contaminated soil/water with Alconox® solution.

Rinse with potable water.

Rinse with distilled or potable water and methanol solution (DO NOT USE ACETONE).

Air dry.

Rinse with deionized water.

Completely air dry and wrap exposed areas with aluminum foil (shiny side out) for transport and handling if equipment will not be used immediately.

Collect all rinsate and dispose of in a DOT-approved 55-gallon drum.

Decontamination materials (e.g., plastic sheeting, tubing, etc.) that have come in contact with used decontamination fluids or sampling equipment will be disposed of in DOT-approved 55-gallon drums.

D. HEALTH AND SAFETY MONITORING EQUIPMENT DECONTAMINATION

Before use, wrap soil contact points in plastic to reduce need for subsequent cleaning.

Wipe all surfaces that had possible contact with contaminated materials with a paper towel wet with Alconox® solution, then a towel wet with methanol solution, and finally three times with a towel wet with distilled water. Dispose of all used paper towels in a DOT-approved 55-gallon drum.

E. SAMPLE CONTAINER DECONTAMINATION

The outsides of sample bottles or containers filled in the field may need to be decontaminated before being packed for shipment or handled by personnel without hand protection. The procedure is:

Wipe container with a paper towel dampened with Alconox® solution or immerse in the solution AFTER THE CONTAINERS HAVE BEEN SEALED. Repeat the above steps using potable water.

Dispose of all used paper towels in a DOT-approved 55-gallon drum.

F. HEAVY EQUIPMENT AND TOOLS

Heavy equipment such as drilling rigs, drilling rods/tools, and the backhoe will be decontaminated upon arrival at the site and between locations as follows:

Set up a decontamination pad in area designated by the Navy

Steam clean heavy equipment until no visible signs of dirt are observed. This may require wire or stiff brushes to dislodge dirt from some areas.

V. Attachments

None.

VI. Key Checks and Items

Clean with solutions of Alconox®, methanol, and distilled water.

Do not use acetone for decontamination.

Drum all contaminated rinsate and materials.

Decontaminate filled sample bottles before relinquishing them to anyone.

STANDARD OPERATING PROCEDURE

Packaging and Shipping Procedures

I. Low-Concentration Samples

A. Prepare coolers for shipment:

- Tape drains shut.
- Affix "This Side Up" labels on all four sides and "Fragile" labels on at least two sides of each cooler.
- Place mailing label with laboratory address on top of coolers.
- Fill bottom of coolers with about 3 inches of vermiculite.

B. Arrange decontaminated sample containers in groups by sample number. Consolidate VOC samples into one cooler to minimize the need for trip blanks.

C. Affix appropriate adhesive sample labels to each container. Protect with clear label protection tape.

D. Seal each sample bottle within a separate ziplock plastic bag or bubble wrap, if available. Tape the bag around bottle. Sample label should be visible through the bag.

E. Arrange sample bottles in coolers so that they do not touch.

F. If ice is required to preserve the samples, cubes should be repackaged in zip-lock bags and placed on and around the containers.

G. Fill remaining spaces with vermiculite.

H. Complete and sign chain-of-custody form (or obtain signature) and indicate the time and date it was relinquished to Federal Express or the courier.

I. Separate copies of forms. Seal proper copies (traffic reports, packing lists) along with a return address label within a large zip-lock bag and tape to inside lid of cooler.

J Close lid and latch.

K. Carefully peel custody seals from backings and place intact over lid openings (right front and left back). Cover seals with clear protection tape.

L. Tape cooler shut on both ends, making several complete revolutions with strapping tape. **Do not** cover custody seals.

M. Relinquish to Federal Express or to a courier arranged with the laboratory. Place airbill receipt inside the mailing envelope and send to the sample documentation coordinator along with the other documentation.

II. Medium- and High-Concentration Samples:

Medium- and high-concentration samples are packaged using the same techniques used to package low-concentration samples, with several additional restrictions. First, a special airbill including a Shipper's Certification for Restricted Articles is required. Second, "Flammable Liquid N.O.S." or "Flammable Solid N.O.S." (as appropriate) labels must be placed on at least two sides of the cooler. Third, sample containers are packaged in metal cans with lids before being placed in the cooler, as indicated below:

- Place approximately ½ inch of vermiculite in the bottom of the can.
- Position the sample jar in the zip-loc bag so that the sample tags can be read through the plastic bag.
- Place the jar in the can and fill the remaining volume with vermiculite.
- Close the can and secure the lid with metal clips.
- Write the traffic report number on the lid.
- Place "This Side Up" and "Flammable Liquid N.O.S." or "Flammable Solid N.O.S." (as appropriate) labels on the can.
- Place the cans in the cooler.
- For medium concentration samples, ship samples with ice or "blue ice" inside the coolers. (Double bag ice in zip-lock plastic bags.)

III. Special Instructions for Shipping Medium and High Concentration Samples by Federal Express

A. Label cooler as hazardous shipment:

- Write shipper's address on outside of cooler. If address is stenciled on, just write "shipper" above it.
- Write or affix sticker saying "This Side Up" on two adjacent sides.
- Write or affix sticker saying "ORM-E" with box around it on two adjacent sides. Below ORM-E, write NA#9188.
- Label cooler with "Hazardous Substance, N.O.S." and "liquid" or "solid," as applicable.

B. Complete the special shipping bill for restricted articles.

- Under Proper Shipping Name, write "Hazardous Substance, N.O.S." and "liquid" or "solid," as applicable.
- Under Class, write "ORM-E.
- "Under Identification No., write NA No. 9188.

C. For high concentration samples, ship samples with "blue ice" only inside coolers. If blue ice is used, bag the blue ice separately to prevent contamination.

STANDARD OPERATING PROCEDURE

Shallow Soil Sampling

I. Purpose

To provide general guidelines for the collection and handling of surface soil samples during field operations.

II. Scope

The method described for surface soil sampling is applicable for loosely packed earth and is used to collect disturbed-soil samples.

III. Equipment and Materials

- Sample jars.
- A hand auger or other device that can be used to remove the soil from the ground. Only stainless steel, teflon, or glass materials should be used. The only exception is split spoons, which are most commonly available in carbon steel; these are acceptable for use only if they are not rusty.
- A stainless steel spatula should be used to remove material from the sampling device.
- Unpainted wooden stakes or pin flags
- Vermiculite
- Fiberglass measuring tape (at least 200 feet in length)

IV. Procedures and Guidelines

A. Wear protective gear, as specified in the Health and Safety Plan.

B. To locate samples, identify the correct location using the pin flags or stakes. Proceed to collect a sample from the undisturbed soil adjacent to the marker following steps C and D. If markers are not present, the following procedures will be used.

1. For samples on a grid:
   a. Use measuring tape to locate each sampling point on the first grid line as prescribed in the sampling plan. As each point is located, drive a numbered stake in the ground and record its location on the site map and in the logbook.

   b. Proceed to sample the points on the grid line.

c. Measure to location where next grid line is to start and stake first sample. For subsequent samples on the line take two orthogonal measurements: one to the previous grid line, and one to the previous sample on the same grid line.

d. Proceed to sample the points on the grid line as described in Section C below.

e. Repeat 1c and 1d above until all samples are collected from the area.

2. For non-grid samples:

a. Use steel measuring tape to position sampling point at location described in the sampling plan by taking two measurements from fixed landmarks (e.g., corner of house and fence post).

b. Note measurements, landmarks, and sampling point on a sketch in the field notebook, and on a site location map.

c. Proceed to sample as described in Section C below.

d. Repeat 2a through 2c above until all samples are collected from the area.

C. To the extent possible, differentiate between fill and natural soil. If both are encountered at a boring location, sample both as prescribed in the field sampling plan. Do not locate samples in debris, tree roots, or standing water. In residential areas, do not sample in areas where residents' activities may impact the sample (e.g., barbecue areas, beneath eaves of rooves, driveways, garbage areas). If an obstacle prevents sampling at a measured grid point, move as close as possible, but up to a distance of one half the grid spacing in any direction to locate an appropriate sample. If an appropriate location cannot be found, consult with the Field Team Supervisor (FTS). If the FTS concurs, the sampling point will be deleted from the program. The FTS will contact the CH2M HILL project manager (PM) immediately. The PM and Navy Technical Representative (NTR) will discuss whether the point should be deleted from the program. If it is deleted, the PM will follow-up with the NTR in writing.

D. To collect samples:

1. Use a decontaminated stainless steel scoop/trowel to scrape away surficial organic material (grass, leaves, etc.) adjacent to the stake. New disposable scoops or trowels may also be used to reduce the need for equipment blanks.

2. If sampling:

a. Surface soil: Obtain soil sample by scooping soil using the augering scoop/trowel, starting from the surface and digging down to a depth of about 6 inches, or the depth specified in the workplan.

b. Subsurface soil. Obtain the subsurface soil sample using an auger down to the depths prescribed in the field sampling plan.

3. Take an OVM reading of the sampled soil and record the response in the field notebook. Also record lithologic description and any pertinent observations (such as discoloration) in the logbook.
4. Empty the contents of the scoop/trowel into a decontaminated stainless steel pan.
5. Repeat this procedure until sufficient soil is collected to meet volume requirements.
6. For TCL VOC and field GC aliquots, fill sample jars directly with the trowel/scoop and cap immediately upon filling. DO NOT HOMOGENIZE.
7. For TCL pesticides/PCBs and SVOCs, Appendix IX metals, and field XRF aliquots, homogenize cuttings in the pan using a decontaminated stainless steel utensil in accordance with SOP Decon.
8. Transfer sample for analysis into appropriate containers with a decontaminated utensil.
9. Backfill the hole with vermiculite. To the extent possible, replace topsoil and grass and attempt to return appearance of sampling area to its pre-sampled condition. For samples in non-residential, unmowed areas, mark the sample number on the stake and leave stake in place. In mowed areas, remove stake.

V. Attachments

None.

VI. Key Checks and Items

- Phthalate-free latex or surgical gloves and other personal protective equipment.
- Transfer volatiles first, avoid mixing.
- Decontaminate utensils before reuse, or use dedicated, disposable utensils.

Final

Quality Assurance Project Plan

for the

Burning Grounds RCRA Subpart X Permit Application

at the

Allegany Ballistics Laboratory
Rocket Center, West Virginia

Contract Task Order 0175

February 2001

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN II Program
Contract N62470-95-D-6007

Prepared by

CH2MHILL

Herndon, Virginia

Table of Contents

Section			Page
1 Introduction			**1-1**
2 Project Description			**2-1**
	2.1	General	2-1
3 Project Organization			**3-1**
4 Quality Assurance Objectives			**4-1**
5 Sample Collection			**5-1**
6 Sample Custody			**6-1**
	6.1	Field Custody	6-1
	6.2	Transfer of Custody	6-1
	6.3	Laboratory Custody	6-1
	6.4	Sample Disposal	6-1
7 Equipment Calibration			**7-1**
	7.1	Field Equipment Calibration	7-1
	7.2	Laboratory Calibration	7-1
8 Analytical Procedures			**8-1**
9 Data Reduction, Validation, and Reporting			**9-1**
	9.1	Data Reduction	9-1
		9.1.1 Definition	9-1
		9.1.2 Background Data	9-1
	9.2	Data Validation	9-1
	9.3	Records	9-1
10 Quality Control Checks			**10-1**
	10.1	Field Sampling Quality Control Procedures	10-1
	10.2	Laboratory Analytical Quality Control Procedures	10-2
11 Performance and Systems Audits			**11-1**
	11.1	Laboratory Performance and Systems Audits	11-1
	11.2	Field Team Performance and Systems Audits	11-1
12 Preventive Maintenance			**12-1**
13 Data Assessment Procedures			**13-1**
14 Corrective Actions			**14-1**
15 Quality Assurance Reports			**15-1**

Table of Contents (Continued)

List of Tables (located at the end of each section)

3-1 Stakeholder Organizations and Responsible Person(s) for Technical Disciplines

4-1 Precision, Accuracy, and Completeness Objectives Site Screening Process

7-1 Calibration Standards Field Investigation

8-1 Analytical Procedures for Field Investigation Samples

8-2 Summary of Required Containers, Preservatives, and Holding Times for Soil Samples Field Investigation

8-3 Summary of Required Containers, Preservatives, and Holding Times for Liquid Samples Field Investigation

10-1 Summary of QC Collection Frequencies

List of Figures (located at the end of each section)

3-1 Project Organization Chart for the Field Organization

11-1 Field Performance Audit Checklist

SECTION 1

Introduction

This plan describes the Quality Assurance and Quality Control (QA/QC) procedures to be used during the field investigation at the Burning Grounds located at the Allegany Ballistics Laboratory, Rocket Center, West Virginia.

SECTION 2

Project Description

2.1 General

For information regarding the general historical background, geological setting, and description of the Burning Grounds at the Allegany Ballistics Laboratory, please refer to Section 2 of the Field Investigation Work Plan.

SECTION 3

Project Organization

Figure 3-1 presents the core CH2M HILL project organization for the RCRA permitting project which includes this field investigation. Mr. Bob Blanz is the CH2M HILL project manager. He will report directly to Ms. Maritza Montegross, the Navy Technical Representative. Mr. Blanz will provide senior guidance and senior technical direction throughout the project duration. Mr. Syed Mahmood and Ms. Sana Hamady will be the assistant project managers for this project and will be responsible for daily technical support and oversight, budget and schedule tracking, personnel resources planning and allocation, and coordination with NAVSEA, Atlantic Division, Naval Facilities Engineering Command (LANTDIV), and AMPC.

A Technical Lead has been identified for each technical discipline of the project. The Technical Lead will provide direction and guidance to the project staff in their respective technical discipline. They will review work progress and ensure that the end product meets the data quality objectives of the project and is delivered within schedule and budget. The Technical Leads are as follows:

Technical Discipline	Technical Lead
Eco Risk Assessment	**Bill Kappleman**
Human Health Risk Assessment	**John Lowe**
Air Modeling	Mitch Lindsay
Groundwater Monitoring	Brett Doerr
Site Investigation	**Roger Azar**
Permit Application Preparation	Nelline Scheuer

In addition to the CH2M HILL staff, other members of the overall project team includes key staff of the stakeholder organizations. Because completion of many of the project tasks require timely review and input from the stakeholder organizations, it is imperative for the success of this project that all stakeholders maintain close communications. Table 3-1 indicates the technical discipline, the responsible person, and the stakeholder organizations. AMPC personnel, who are not identified in this table, will participate as needed.

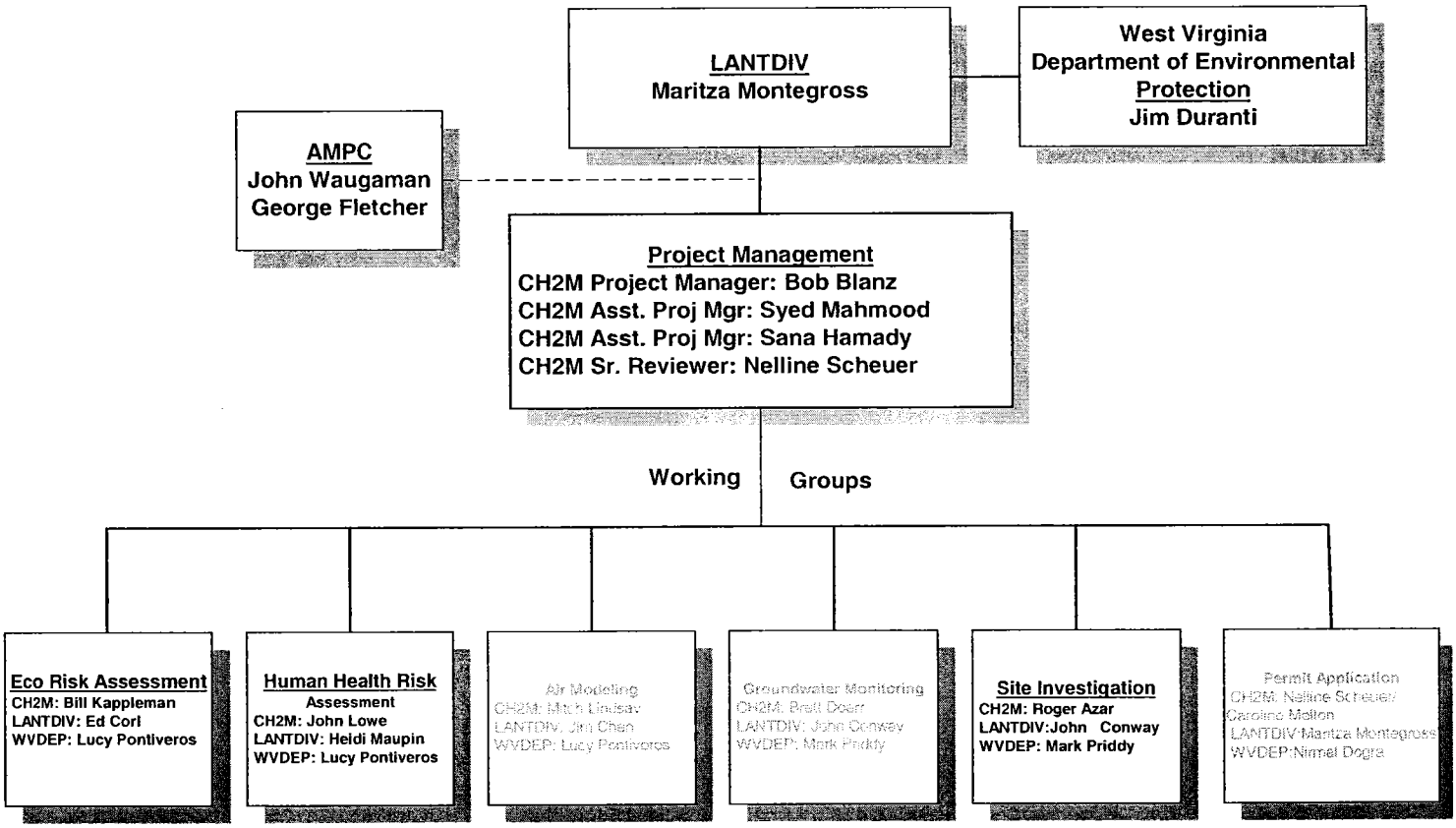
TABLE 3-1
Stakeholder Organizations and Responsible Person(s) for Technical Disciplines

Major Components	Stakeholder Organization	Responsible Person(s)
Project Management	***LANTDIV***	***Maritza Montegross***
	WVDEP	***Jim Duranti***
	AMPC	***John Waugaman/George Fletcher***
	CH2M HILL	***Bob Blanz***
	CH2M HILL	***Syed Mahmood / Sana Hamady***
Ecological Risk Assessment	***LANTDIV***	***Ed Corl***
	WVDEP	***Lucy Pontiveros***
	CH2M HILL	***Bill Kappleman***
Human Health Risk Assessment	***LANTDIV***	***Heidi Maupin***
	WVDEP	***Lucy Pontiveros***
	CH2M HILL	***John Lowe***
Air Modeling	LANTDIV	Jim Chen
	WVDEP	Lucy Pontiveros
	CH2M HILL	Mitch Lindsay
Groundwater Monitoring	LANTDIV	John Conway
	WVDEP	Mark Priddy
	CH2M HILL	Brett Doerr
Site Investigation	***LANTDIV***	***John Conway***
	WVDEP	***Mark Priddy***
	CH2M HILL	***Roger Azar***
Permit Application Preparation	LANTDIV	Maritza Montegross
	WVDEP	Nirmal Dogra
	CH2M HILL	Nelline Scheuer
	CH2M HILL	Caroline Melton

Bold/italicized items indicate the Stakeholder Organization/Responsible Person(s) directly related to the Site Investigation activity.

Figure 3-1

Project Organization Chart for The Field Investigation



SECTION 4

Quality Assurance Objectives

Data Quality Objectives (DQOs) will be established for each major sample collection effort as specified in the *EPA Guidance for Quality Assurance Project Plans (EPA QA/G5)*, February 1998, *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA QA/R-5), November 1997, and *Guidance for the Data Quality Objectives Process* (EPA QA/G-4), September 1994. DQOs are the quantitative and qualitative descriptions of the quality of data required to support an environmental decision or action. As target values for data quality, they are not necessarily criteria for acceptance or rejection of data. The data user develops DQOs for a specific purpose. Everyone from the data gatherer to the analytical laboratory is involved in the process from the beginning. The DQO development process involves three stages: (1) definition of the question or decision to be made, (2) clarification and precise identification of the information required, and (3) data collection program design.

For this project, the data will be used to determine the nature and extent of contamination in support of a human health and ecological risk assessment. All analytical results used in risk assessment must be of the highest quality and must be fully validated. Requirements for these high Data Quality Objectives (DQOs) will be met by using Contract Laboratory Program (CLP) analytical methods and validating by using Region III validation guidance. A CLP-like data package deliverable will be requested for all non-CLP parameters. Forms, instrument printouts, and other raw data will also be validated.

The project precision, accuracy, and completeness objectives for laboratory analysis are included in Table 4-1. Criteria used to measure these objectives are specified in Section 13, Data Assessment Procedures.

TABLE 4-1
Precision, Accuracy, and Completeness Objectives
Site Screening Process
Open Burning Unit, Allegany Ballistics Laboratory, Rocket Center, WV

Parameter	Precision (Relative Percent Difference)	Accuracy (% Spike Recovery)	Intended Data Use
SOIL			
Appendix IX metals plus aluminum, iron, and manganese	< ±35	75-125	Determine nature and extent of contamination; risk assessment.
Cyanide	< ±35	75-125	Determine nature and extent of contamination; risk assessment.
Appendix IX VOCs	< ±35	70-130	Determine nature and extent of contamination; risk assessment.
Appendix IX SVOCs plus biphenyl	< ±35	70-130	Determine nature and extent of contamination; risk assessment.
Dioxins/Furans	< ±35	70-130	Determine nature and extent of contamination; risk assessment.
Explosives	< ±35	70-130	Determine nature and extent of contamination; risk assessment.
Nitroglycerin	< ±35	70-130	Determine nature and extent of contamination; risk assessment.
Perchlorate	< ±35	70-130	Determine nature and extent of contamination; risk assessment.
Ammonium Nitrate (captured as Nitrate)	< ±35	75-125	Determine nature and extent of contamination; risk assessment.
TOC	< ±35	70-130	Determine nature and extent of contamination; risk assessment.
pH	< ±35	70-130	Determine nature and extent of contamination; risk assessment.

Notes: TOC = Total Organic Carbon

SECTION 5

Sample Collection

A detailed description of sampling procedures is provided in the FSP. Procedures are included that describe, at a minimum:

- Sample plan design considerations
- Sampling point selection
- Sample packing, handling, and shipment (including time considerations)
- Special conditions for sample container preparation and time requirements (tabulated)
- Preparation and use of trip blanks and field blanks
- Documentation of sampling activities

SECTION 6

Sample Custody

Essential to any sampling and analytical program is maintaining the integrity of the sample from collection to data reporting. This requires tracing the possession and handling of samples from the time of collection, through analysis, to final disposal. This documentation is referred to as chain-of-custody (COC). The essential components of this COC are described in the FSP and summarized below.

6.1 Field Custody

The sample coordinator is responsible for the care and custody of samples until they are shipped or otherwise delivered to the laboratory custodian.

6.2 Transfer of Custody

The COC form is to be completed before samples are shipped. The persons involved in relinquishing and receiving the samples will sign, date, and note the time of sample receipt on the COC form. The first such transfer may occur between the field sampler and the sample carrier. Another transfer may occur between the sample carrier and the laboratory sample custodian. Each sample shipment will be accompanied by a COC record that identifies the contents of the shipment.

6.3 Laboratory Custody

The laboratory custodian will verify that the custody seals on the sample shipment or the containers are intact and that the information on the COC matches the actual contents. The laboratory custodian will also note any anomalies, such as broken bottles, elevated temperatures, and missing labels. The project-specific procedures for sample custody are described in the FSP and the site-specific sampling instructions.

6.4 Sample Disposal

Unless otherwise instructed, the analytical laboratory will dispose of unused sample portions, according to Resource Conservation and Recovery Act (RCRA) regulations, after the analyses have been completed and any outstanding issues between the contractor and the laboratory have been resolved.

SECTION 7

Equipment Calibration

Various instruments will be used in the field and in the laboratory to collect data and monitor site conditions. Proper calibration, maintenance, and use of these instruments is important for collecting quality data. A record of calibration and maintenance activities is as important as the data record itself in order to verify the delivery of quality data.

7.1 Field Equipment Calibration

The field equipment to be used during this investigation that will also require calibration includes:

- Combustible Gas Indicator
- Organic Vapor Monitoring (OVM)

The combustible gas indicator and OVM will be calibrated before and during each day's use according to procedures and schedules outlined in the health and safety plan (HASP) and in the FSP. The standards which will be used to calibrate these instruments are shown in Table 7-1. Standards will be purchased as necessary from appropriate vendors.

If an individual suspects an equipment malfunction, the device shall be removed from service, tagged so that it is not inadvertently used, and the equipment manager notified so that a substitute piece of equipment can be obtained. Backup equipment will be available in the field for use in the event of a malfunction.

Equipment that fails calibration or becomes inoperable during use shall be removed from service and tagged so that it is not inadvertently used. Such equipment shall be repaired and satisfactorily recalibrated. Equipment that cannot be repaired will be replaced.

Results of activities performed using equipment that has failed recalibration shall be evaluated. If the results are adversely affected, the outcome of the evaluation will be documented and the PM notified.

7.2 Laboratory Calibration

The laboratory itself is responsible for equipment and instrument calibration and maintenance. Manufacturer's guidance shall be followed for general upkeep.

TABLE 7-1
Calibration Standards
Field Investigation
Open Burning Unit, Allegany Ballistics Laboratory, Rocket Center, WV

Instrument	Calibration Standard	Span	Reading	Method
OVM	100 ppm isobutylene	N/A	100 ppm	1.5 l/m regulator, T-tubing
Combustible Gas Indicator	0.75% pentane	N/A	50% LEL ± 5% LEL	1.5 l/m regulator, T-tubing

SECTION 8

Analytical Procedures

All laboratory analyses will be performed by a Navy-approved and a West Virginia certified laboratory. Laboratory methods to be used for the project are listed in Table 8-1. Table 8-2 presents a summary of the required sample containers, preservatives, and holding times for soil samples. Table 8-3 presents a summary of the required sample containers, preservatives, and holding times for water quality assurance/quality control (QA/QC) samples.

TABLE 8-1
Analytical Procedures for Field Investigation Samples
Open Burning Unit, Allegany Ballistics Laboratory, Rocket Center, WV

Analysis	Methodology
Appendix IX metals plus aluminum, iron, and manganese	SW-846 6010 B
Cyanide	SW-846 9012 A
Appendix IX VOCs	SW-846 8260 B
Appendix IX SVOCs plus biphenyl	SW-846 8270 C
Dioxins / Furans	SW-846 8290
Explosives[1]	SW-846 8330
Nitroglycerin	SW-846 8332
Perchlorate	EPA 300.0
Ammonium Nitrate (Captured as Nitrate)	EPA 352.1
TOC	Lloyd Kahn
PH	SW-846 9045 C

Notes:

1. Explosives include the nitro amines listed in the method.

TABLE 8-2
Summary of Required Containers, Preservatives, and Holding Times for Soil Samples
Field Investigation
Burning Grounds, Allegany Ballistics Laboratory, Rocket Center, WV

Parameter	Container Type	Preservation	Holding Time	Notes
Appendix IX metals plus aluminum, iron, and manganese	One 8-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 ° C	6 Months; 28 Days for mercury	Fill Completely
Cyanide	One 8-oz glass wide-mouth jars with teflon-lined cap	Cool to 4 ° C	14 Days	Fill Completely
Appendix IX VOCs	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 ° C	14 Days	Fill Completely
Appendix IX SVOCs plus biphenyl	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 ° C	14 Days to extraction; 40 Days to analysis	Fill Completely
Dioxins / Furans	Two 4-oz amber glass wide-mouth jars with teflon-lined cap	Cool to 4 ° C	7 Days	Fill Completely
Explosives	One 4-oz amber glass wide-mouth jar with teflon-lined cap	Cool to 4 ° C	7 Days	Fill Completely
Nitroglycerin	One 4-oz amber glass wide-mouth jar with teflon-lined cap	Cool to 4 ° C	7 Days	Fill Completely
Perchlorate	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 ° C	14 Days	Fill Completely
Ammonium Nitrate (Captured as Nitrate)	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 ° C	None	Fill Completely
TOC	One 8-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 ° C	28 Days	Fill Completely
pH	One 4-oz glass wide-mouth jar with teflon-lined cap	Cool to 4 ° C	Immediately	Fill Completely

TABLE 8-3
Summary of Required Containers, Preservatives, and Holding Times for Liquid Samples
Field Investigation
Burning Grounds, Allegany Ballistics Laboratory, Rocket Center, WV

Parameter	Container Type	Preservation	Holding Time	Notes
Appendix IX metals plus aluminum, iron, and manganese	One 1-liter polyethylene bottle	HNO_3 to pH<2; Cool to 4 °C	6 Months; 28 Days for mercury	Fill to shoulder
Cyanide	One 1-liter polyethylene bottle	NaOH to pH>12; Cool to 4 °C	14 days	Fill to shoulder
Appendix IX VOCs	Three 40-ml glass vials with Teflon-lined cap.	HCl to pH<2; Cool to 4 °C	14 days	Fill completely, no air bubbles
Appendix IX SVOCs plus biphenyl	Two 1-liter amber glass bottles	Cool to 4 °C	7 days to extraction; 40 days to analysis	Fill to shoulder
Dioxins / Furans	Two 1-liter amber glass bottles	Cool to 4 °C	30 days	Fill to shoulder
Explosives	One 1-liter amber glass bottle	Cool to 4 °C	7 days	Fill to shoulder
Nitroglycerin	One 1-liter amber glass bottle	Cool to 4 °C	7 days	Fill to shoulder
Perchlorate	One 500-ml polyethylene bottle	Cool to 4 °C	7 days	Fill to shoulder
Ammonium Nitrate (Captured as Nitrate)	One 250-ml polyethylene bottle	H_2SO_4 to pH<2; Cool to 4 °C	28 days	Fill to shoulder
TOC	One 500-ml amber glass bottle	H_2SO_4 to pH<2; Cool to 4 °C	28 days	Fill completely; no air bubbles
pH	None	None	None	None

SECTION 9

Data Reduction, Validation, and Reporting

Data reduction and reporting are steps in the overall management and use of both field and laboratory data.

9.1 Data Reduction

9.1.1 Definition

The laboratory will provide an electronic data deliverable (EDD) which will be checked against the hard copy forms by CH2M HILL and the data validator. Analytical data collected will be input into a computerized database. Field data will be entered and validated by spot-checking procedures. The sample manager will handle data entries that are unverified.

9.1.2 Background Data

Background data produced for internal records and not reported as part of the analytical data include the following: laboratory worksheets, laboratory notebooks, sample tracking system forms, maintenance records, calibration records, and associated quality control. These sources will be available for inspection and to determine the validity of data.

9.2 Data Validation

Data validation of analytical data will be subcontracted by CH2M HILL in accordance with Navy QA/QC requirements. The data validator will use EPA Region III guidance to validate the samples. The data validation personnel are familiar with the project, its objectives, and the intended use of the data.

9.3 Records

The following describes procedures for maintaining the project's records:

- The PM shall determine the records to be generated before the start of work. These records will be listed in the site-specific FSP or project instructions.
- Records of field activities that support the integrity of samples shall be entered on bound and numbered pages. Such records shall be dated and signed or otherwise authenticated on the day of entry.
- There shall be sufficient information in records to permit identification between the record and the item(s) or activity to which it applies. Identification of records will be by means that permit traceability.
- The records storage system shall provide for accurate retrieval of records without undue delay.

SECTION 10

Quality Control Checks

A number of QA/QC samples will be collected to check the adequacy of sample collection and analysis and to monitor laboratory performance.

Duplicates, blanks, and spiked samples are used to test whether the sampling technique affects the analytical results, to measure the internal consistency of the samples, and to estimate any variance or bias in the analytical process. The field and laboratory QA/QC sampling procedures are described below.

10.1 Field Sampling Quality Control Procedures

Quality control replicate (duplicate) samples and blanks are used to provide a measure of the internal consistency of the samples and an estimate of variance and bias. Table 10-1 shows the collection frequencies of the field QC samples.

One duplicate sample will be obtained for every 10 field samples collected. Each duplicate sample will be split evenly into two sample containers and submitted for analysis as two independent samples.

Matrix spike/matrix spike duplicates (MS/MSD) will be collected at the rate of one for every 20 field samples collected of each type of medium. If fewer than 20 samples are collected, an MS/MSD is still collected. MS/MSD samples give an indication of laboratory analysis accuracy and precision. MS/MSD analysis is not performed with low concentration methods; the laboratory uses a laboratory control sample and duplicate to measure accuracy and precision.

Aqueous blanks provide a measure of cross-contamination sources, decontamination efficiency, and other potential errors that can be introduced from sources other than the sample. Four types of blanks can be generated during sampling activities: trip blanks, field blanks, equipment (rinsate) blanks, and temperature blanks.

One trip blank will be included in each cooler containing volatile organic analysis (VOA) samples. The trip blanks will be prepared before each sampling event, shipped or transported by the laboratory to the field with the sampling bottles, and returned unopened for analysis. Trip blanks will indicate if there is any contamination during shipment to the field, from storage in the field, or from shipment from the field to the analytical laboratory.

One equipment blank, collected after decontamination of the equipment, will be obtained for each day of sampling with CH2M HILL equipment. Equipment blanks will give an indication of the efficiency of decontamination procedures.

One field blank will be collected for each week of sampling. Field blanks are exposed to the ambient air at the sample collection site and will reflect possible contamination from site conditions. For windy or dusty days, field blanks may need to be collected more frequently.

Field blanks are also used to determine the chemical quality of water used for such procedures as decontamination and blank collection.

One temperature blank will be included in each cooler of samples shipped to the laboratory. The temperature blank is not analyzed and therefore is not reported, but is used to determine the temperature of the cooler when the samples arrive at the laboratory.

10.2 Laboratory Analytical Quality Control Procedures

The analytical laboratory will use quality control elements including matrix spikes, matrix spike duplicates, and laboratory blanks as specified in the Naval Facilities Engineering Service Center (NFESC) guidance.

TABLE 10-1
Summary of QC Collection Frequencies

Type of QC Sample	Frequency Collected
Field Duplicate	One per 10 samples per matrix
Trip Blank	One per cooler containing samples for VOC analysis
Field Blank	One per sampling event, and at least one per week (if very windy or dusty, collect one per day)
Equipment Blank	One each day per matrix
Temperature Blank	One per cooler
Matrix Spike/Matrix Spike Duplicate	One per matrix for each group of up to 20 samples sent to a single laboratory

SECTION 11

Performance and Systems Audits

11.1 Laboratory Performance and Systems Audits

The analytical laboratory will conduct both internal and external quality control checks as indicated in the laboratory QA/QC Plan.

11.2 Field Team Performance and Systems Audits

A performance audit will be conducted on an as-needed basis by the project manager during the sampling activities to verify that proper sampling and documentation procedures presented in the QAPP and FSP are followed and that subsequent sample data are valid. The audit will focus on the details of the QA program. The audit checklist, which will serve as the guide for the performance audit for field procedures, is shown in Figure 11-1. The audit will evaluate the following:

- Project responsibilities
- Sample collection and preservation procedures
- Equipment decontamination procedure
- Field equipment calibration procedures
- Sample custody procedures
- Document control
- Sample identification system
- QC corrective action procedures

An audit report summarizing any results and corrections will be prepared and filed in the project files. Significant variances from established procedures will be reported to the Navy project manager.

Figure 11-1
FIELD PERFORMANCE AUDIT CHECKLIST

Project Responsibilities

Project No.: _____ Date: _____

Project Location: _____ Signature: _____

Team Members:

Yes __ No __ 1) Are the WP, FSP, HASP, QAPP, and IDWMP present at the site and used as references?
Comments _____

Yes __ No __ 2) Was a briefing held for project participants?
Comments _____

Yes __ No __ 3) Were additional instructions given to project participants?
Comments _____

Sample Collection

Yes __ No __ 1) Is there a written list of sampling locations and descriptions?
Comments _____

Yes __ No __ 2) Are samples collected as stated in the FSP?
Comments _____

Yes __ No __ 3) Are samples collected in the type of containers specified in the FSP?
Comments _____

Yes __ No __ 4) Are samples preserved as specified in the FSP?
Comments _____

Yes __ No __ 5) Are the number, frequency, and type of samples collected as specified in the FSP?
Comments _____

Yes __ No __ 6) Are quality assurance checks performed as specified in the FSP?
Comments _____

Yes __ No __ 7) Are photographs taken and documented as specified in the FSP?
Comments _____

Document Control

Yes __ No __ 1) Have any accountable documents been lost?
Comments _____

Yes __ No __ 2) Have any accountable documents been voided?
Comments _____

Yes __ No __ 3) Have any accountable documents been disposed of?
Comments _____

Yes __ No __ 4) Are the samples identified with sample tags?
Comments _____

Yes __ No __ 5) Are blank and duplicate samples properly identified?
Comments _____

Yes __ No __ 6) Are samples listed on a chain-of-custody record?
Comments _____

Yes __ No __ 7) Is chain-of-custody documented and maintained?
Comments _____

SECTION 12

Preventive Maintenance

Routine maintenance procedures and schedules for sampling equipment are described in the manufacturer's instruction manuals. All records of inspection and maintenance will be dated and documented in the field notebook.

Maintenance procedures and schedules for all field and laboratory analytical instruments will follow the recommendations of the equipment manufacturers. Routine laboratory equipment maintenance will be performed by laboratory personnel as needed. All records of inspection and maintenance will be dated and documented in laboratory record books.

Critical spare parts for the OVM should be included in the sampling kits to minimize downtime. Spare parts will be purchased from accepted vendors.

SECTION 13

Data Assessment Procedures

The data gathered will be evaluated for accuracy, precision, representativeness and completeness. The precision and accuracy of data will be routinely assessed to ensure that they meet the project requirements presented earlier in Table 4-1. If enough data are generated, the precision, accuracy, and completeness may be assessed using statistical procedures.

Precision is commonly determined from duplicate samples; thus precision is usually expressed as relative percent difference (RPD) or relative standard deviation (RSD). These quantities are defined as follows.

$$RPD = 100 \times 2\frac{|X_1 - X_2|}{(X_1 + X_2)}$$

$$RSD = 5\,(100 / \sqrt{2})\, x[2|X_1 - X_2|/(X_1 + x_2)]$$

where X_1 and X_2 are the reported concentrations for each duplicate sample

Accuracy is commonly presented as percent bias or percent recovery. Percent bias is a standardized average error; that is, the average error divided by the actual or spiked concentration and converted to a percentage. Percent bias is unitless so it allows the accuracy of analytical procedures to be compared easily.

Percent recovery provides the same information as percent bias. Accuracy is often determined from spiked samples. Percent recovery is defined as:

$$\% \ Recovery = \frac{SSR - SR}{SA} \ x \ 100$$

where SSR = spiked sample result

SR = sample reported

SA = spike added

Given this definition it can be shown that :

$$\% \ bias = \% \ recovery - 100$$

Representativeness is a measure of the degree to which sample data accurately and precisely represent parameter variations at a sampling point. It is also a measure of how closely the measured results reflect the actual distribution and concentration of certain chemical compounds in each of the matrices sampled. The FSP describes the procedures to collect the samples. This process will generate samples that are as representative as possible. Documentation of laboratory and field procedures, as described in the FSP, will establish that protocols have been followed and that sample identification and integrity have been maintained.

Completeness is defined as the percentage of analytical measurements made that are judged to be valid with validity being defined by the DQOs. Percent completeness is calculated as the number of valid analyses divided by the total number of analyses performed, multiplied by 100. The completeness objective has been set at 85 percent for the project.

Comparability is the term that describes the confidence with which one data set can be compared to another. Comparability refers to such issues as using standard field and analytical techniques and reprint data in the same units. This criterion becomes important if more than one field team is collecting samples or more than one laboratory is analyzing the samples.

SECTION 14

Corrective Actions

The PM is responsible for initiating corrective actions. Corrective action steps will include problem identification, investigation responsibility assignment, investigation, action to eliminate the problem, increased monitoring of the effectiveness of the corrective action, and verification that the problem has been eliminated.

Examples of corrective actions include, but are not limited to, correcting COC forms, analysis reruns (if holding time criteria permit), recalibration with fresh standards, replacement of sources of blank contamination, examination of calculation procedures, additional training in sample preparation and analysis, reassignment of analytical responsibilities using a different batch of containers, or recommending an audit of laboratory procedures. Additional approaches may include:

- Resampling and analyzing
- Evaluating and amending sampling and analytical procedures
- Accepting the data and acknowledging the level of uncertainty or inaccuracy by flagging the data and providing an explanation for the qualification

SECTION 15

Quality Assurance Reports

A QA report will be completed at the end of the field activity to summarize the QA/QC status of the project and any problems. The report will be an assessment of the measured QA parameters; for example, precision, accuracy, and results of performance audits; any reported non-conformance; and any significant QA problems and the recommended solutions. Any change in the QAPP will be summarized in a report or letter and sent to the Navy and distributed to the CH2M HILL project team.

Final

Health and Safety Plan (HASP)

for the

Burning Grounds RCRA Subpart X Permit Application

at the

Allegheny Ballistics Laboratory

Rocket Center, West Virginia

Contract Task Order 0175

February 2001

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN II Program
Contract N62470-95-D-6007

Prepared by

CH2MHILL

Herndon, Virginia

Table of Contents

Section		Page
1.0	**PROJECT INFORMATION AND DESCRIPTION**	**1**
2.0	**PROJECT ORGANIZATION AND TASKS TO BE PERFORMED UNDER THIS PLAN**	**3**
	2.1 PROJECT ORGANIZATION	3
	2.2 DESCRIPTION OF TASKS	3
	2.2.1 HAZWOPER-REGULATED TASKS	4
	2.3. NON-HAZWOPER-REGULATED TASKS	4
3.0	**HAZARD EVALUATION AND CONTROL**	**4**
	3.1 HEAT AND COLD STRESS (Reference CH2M HILL SOP HS-09, Heat and Cold Stress)	4
	3.1.1 PREVENTING HEAT STRESS	4
	3.1.2 SYMPTOMS AND TREATMENT OF HEAT STRESS	5
	3.1.3 HEAT-STRESS MONITORING	5
	3.1.4 PREVENTING COLD STRESS	5
	3.1.5 SYMPTOMS AND TREATMENT OF COLD STRESS	6
	3.2 PROCEDURES FOR LOCATING BURIED UTILITIES	6
	3.3 GENERAL PHYSICAL (SAFETY) HAZARDS AND CONTROLS	7
	3.4 BIOLOGICAL HAZARDS AND CONTROLS	8
	3.5 TICK BITES	9
	3.6 RADIOLOGICAL HAZARDS AND CONTROLS	9
	3.7 HAZARDS POSED BY CHEMICALS BROUGHT ON THE SITE	10
	3.7.1 HAZARD COMMUNICATION	10
	3.7.2 SHIPPING AND TRANSPORTATION OF CHEMICAL PRODUCTS	10
	3.8 CONTAMINANTS OF CONCERN (REFER TO PROJECT FILES FOR MORE-DETAILED CONTAMINANT INFORMATION)	11
	3.9 POTENTIAL ROUTES OF EXPOSURE	16
4.0	**PERSONNEL**	**17**
	4.1 CH2M HILL EMPLOYEE MEDICAL SURVEILLANCE AND TRAINING	17
	4.2 FIELD TEAM CHAIN OF COMMAND AND COMMUNICATION PROCEDURES	17
	4.2.1 CLIENT	17
	4.2.2 CH2M HILL	18
	4.2.3 SUBCONTRACTORS	18
	4.2.4 CONTRACTORS	19
5.0	**PERSONAL PROTECTIVE EQUIPMENT (PPE)**	**20**
	5.1 PPE SPECIFICATIONS a	20
	5.2 REASONS FOR UPGRADING OR DOWNGRADING LEVEL OF PROTECTION	21
6.0	**AIR MONITORING SPECIFICATIONS**	**22**
	6.1 CALIBRATION SPECIFICATIONS	23
	6.2 AIR SAMPLING	23
7.0	**DECONTAMINATION**	**24**

Table of Contents (Continued)

Section		Page
	7.1 DECONTAMINATION SPECIFICATIONS	24
	7.2 DIAGRAM OF PERSONNEL-DECONTAMINATION LINE	24
8.0	**SPILL-CONTAINMENT PROCEDURES**	**24**
9.0	**CONFINED-SPACE ENTRY**	**25**
10.0	**SITE-CONTROL PLAN**	**27**
	10.1 SITE-CONTROL PROCEDURES	27
	10.2 HAZWOPER COMPLIANCE PLAN	28
11.0	**RESPONSE PLAN (REFERENCE CH2M HILL SOP HS-12, EMERGENCY RESPONSE)**	**29**
	11.1 PRE-EMERGENCY PLANNING	29
	11.2 EMERGENCY EQUIPMENT AND SUPPLIES	30
	11.3 EMERGENCY MEDICAL TREATMENT	30
	11. 4 NONEMERGENCY PROCEDURES	31
	11.5 INCIDENT RESPONSE	31
	11.6 EVACUATION	31
	11.7 EVACUATION ROUTES AND ASSEMBLY POINTS	32
	11.8 EVACUATION SIGNALS	32
12.0	**EMERGENCY RESPONSE**	**33**
	12.1 EMERGENCY RESPONSE TELEPHONE NUMBERS	33
	12.2 GOVERNMENT AGENCIES INVOLVED IN PROJECT	33
13.0	**EMERGENCY CONTACTS**	**35**
14.0	**APPROVAL**	**36**
	14.1 ORIGINAL PLAN	36
	14.2 REVISIONS	36
15.0	**DISTRIBUTION**	**37**
16.0	**ATTACHMENTS**	**37**

Figures

1-1	Location Map	2
7-1	Personnel Decontamination Line	26
12-1	Hospital Route Map	34

CH2M HILL HEALTH AND SAFETY PLAN

(Reference CH2M HILL SOP 19, *Health and Safety Plans*)

This health and safety plan will be kept on the site during field activities and will be reviewed and updated as necessary. The plan adopts, by reference, the standards of practice (SOP) in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual,* and CH2M HILL's *Site safety Notebook* as appropriate. The site safety coordinator (SSC) is to be familiar with these SOPs and the content of this plan. Site personnel must sign Attachment 1. In addition, this plan adopts procedures in the work plan for the project.

1.0 PROJECT INFORMATION AND DESCRIPTION

CLIENT OR OWNER: Naval Facilities Engineering Command **PROJECT NO: 158263.PP.DR**

CH2M HILL PROJECT MANAGER: Roger Azar **OFFICE:** WDC

SITE NAME: Allegany Ballistics Laboratory

SITE ADDRESS: Rocket Center, West Virginia

DATE HEALTH AND SAFETY PLAN PREPARED: November 01, 2000

DATE(S) OF INITIAL VISIT: September, 2000

DATE(S) OF SITE WORK: February 2001

SITE ACCESS: Gate 5

SITE SIZE: 1,577 acres

SITE TOPOGRAPHY:
Approximately 400 acres at Plant 1 is in the flood plain of the North Branch Potomac River, with the remaining acreage on forested mountainous land.

PREVAILING WEATHER:
The climate is temperate and humid. The average summer temperature is 73°F, with daily highs in the mid 90's during July and August. December, January and February are the coldest months of the year, with an average daily temperature of 34°F. The average annual precipitation is 38 inches and it is fairly evenly distributed throughout the year.

SITE DESCRIPTION AND HISTORY:
ABL is a government-owned, contractor operated research, development, and production facility located in Mineral County, West Virginia. Since 1943, the facility has been used primarily for research, development, testing and production of solid propellant rocket motors for the Department of Defense and NASA. The facility consists of two plants. Plant 1, occupying approximately 1,577 acres, is owned by the Navy and operated by Alliant Missile Products Company LLC (AMPC). Plant 2, a 57-acre area adjacent to Plant 1 is owned by AMPC.

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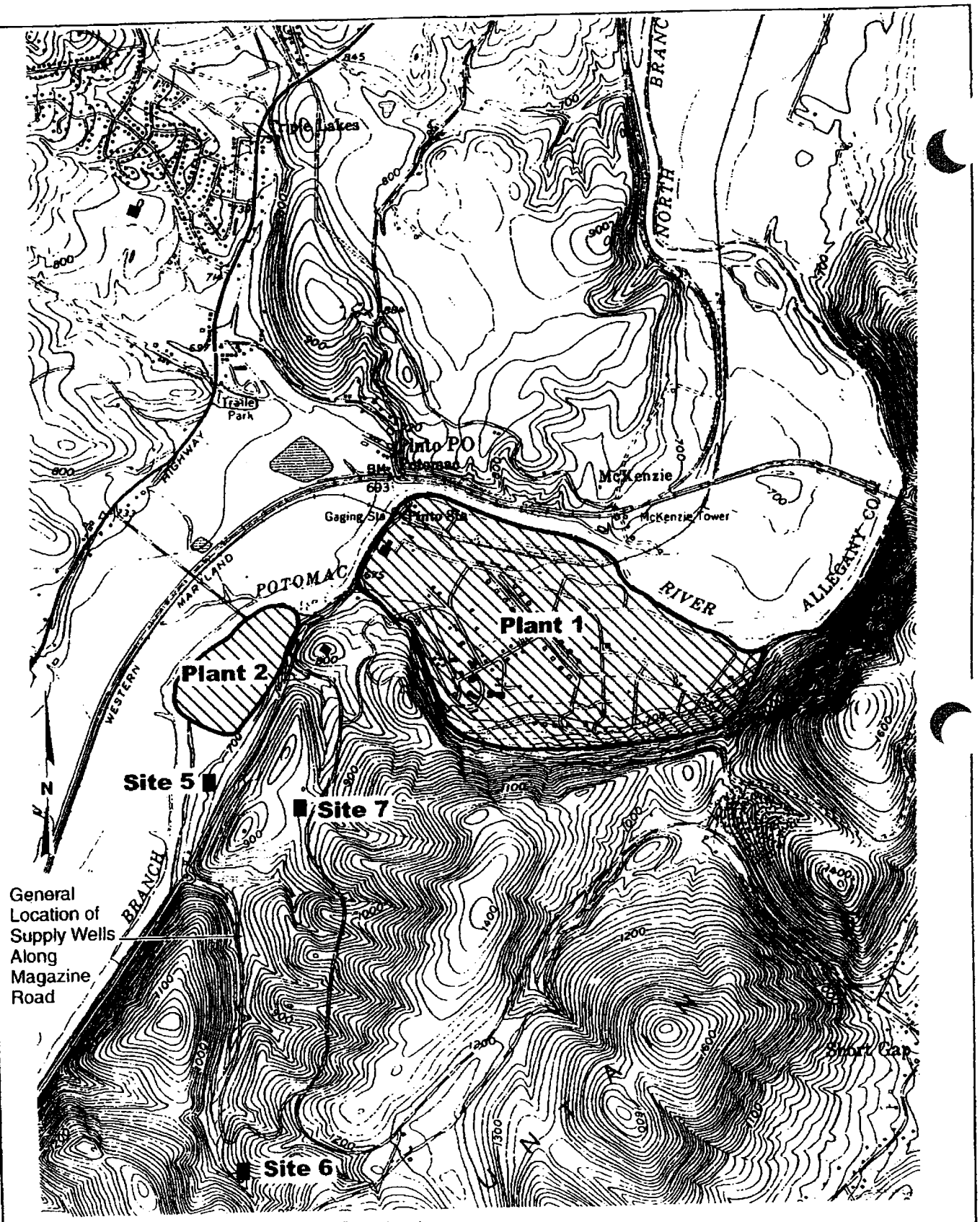


Source: USGS 7.5 minute Cresaptown, WV-MD quadrangle map.

0 1000 2000

Scale in Feet

Figure 1-1
LOCATION MAP
Site 1 Long-Term Monitoring Plan
Allegany Ballistics Laboratory

2.0 PROJECT ORGANIZATION AND TASKS TO BE PERFORMED UNDER THIS PLAN

2.1 PROJECT ORGANIZATION

CLIENT: Allegany Ballistics Laboratory

CH2M HILL:
Activity Manager: Brett Doerr/WDC
Project Manager: Roger Azar /WDC
Field Team Leader: Jack Zimmerman /WDC
Refer to Section 4 for field staff.

CONTRACTORS and SUBCONTRACTORS: Refer to Section 4.2.

2.2 DESCRIPTION OF TASKS

(Reference Section 1, "Field Activity Start-up Form," of Site Safety Notebook

Refer to project documents (i.e., work plan) for detailed task information. A health and safety risk analysis has been performed for each task and is incorporated in this plan through task-specific hazard controls and requirements for monitoring and protection. Tasks in addition to those listed below require an approved amendment to this plan before additional work begins. Refer to Section 10.2 for procedures related to tasks that do not involve hazardous waste operations and emergency response (Hazwoper).

The Field Investigation at the Burning Grounds will include the collection of soil samples at various locations in and around the Burning Grounds area. The soil sampling effort will be performed using a hand auger and trowels.

I. Soil Sampling

Collect soil samples using hand auger and/or trowels at twenty surface soil sample and ten subsurface soil sample locations, and analyze for Appendix IX metals plus aluminum, cyanide, iron, and manganese, Appendix IX VOCs and SVOCs plus biphenyl, dioxins/furans, nitroglycerin, perchlorate, ammonium nitrate, total organic carbon, pH, and various explosive compounds.

The Health and Safety Self-Assessment Checklist (Attachment 3) shall be completed by the SSC prior to start of site activities.

2.2.1 HAZWOPER-REGULATED TASKS

- Soil Sampling

2.3. NON-HAZWOPER-REGULATED TASKS

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Prior approval from the HSM is required before these tasks are conducted on regulated hazardous waste sites.**

TASK	RESTRICTIVE CONDITIONS
NONE	

3.0 HAZARD EVALUATION AND CONTROL

3.1 HEAT AND COLD STRESS (Reference CH2M HILL SOP HS-09, Heat and Cold Stress)

3.1.1 PREVENTING HEAT STRESS

- Drink 16 ounces of water before beginning work, such as in the morning or after lunch. Disposable (e.g., 4-ounce) cups and water maintained at 50° to 60°F should be available. Under severe conditions, drink 1 to 2 cups every 20 minutes, for a total of 1 to 2 gallons per day. Take regular breaks in a cool, preferably air-conditioned, area. Do not use alcohol in place of water or other nonalcoholic fluids. Decrease your intake of coffee and caffeinated soft drinks during working hours. Monitor for signs of heat stress.
- Acclimate to site work conditions by slowly increasing workloads; e.g., do not begin site work with extremely demanding activities.
- Use cooling devices, such as cooling vests, to aid natural body ventilation. The devices add weight, so their use should be balanced against efficiency.
- Use mobile showers or hose-down facilities to reduce body temperature and cool protective clothing.
- During hot weather, conduct field activities in the early morning or evening if possible.
- Provide adequate shelter to protect personnel against radiant heat (sun, flames, hot metal), which can decrease physical efficiency and increase the probability of heat stress.
- In hot weather, rotate shifts of workers.
- Maintain good hygiene standards by frequently changing clothing and by showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should consult medical personnel.

3.1.2 SYMPTOMS AND TREATMENT OF HEAT STRESS

	Heat Syncope	Heat Rash (*miliaria rubra*, "prickly heat")	Heat Cramps	Heat Exhaustion	Heat Stroke
Signs and Symptoms	Sluggishness or fainting while standing erect or immobile in heat.	Profuse tiny raised red blister-like vesicles on affected areas, along with prickling sensations during heat exposure.	Painful spasms in muscles used during work (arms, legs, or abdomen); onset during or after work hours.	Fatigue, nausea, headache, giddiness; skin clammy and moist; complexion pale, muddy, or flushed; may faint on standing; rapid thready pulse and low blood pressure; oral temperature normal or low	Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high oral temperature.
Treatment	Remove to cooler area. Rest lying down. Increase fluid intake. Recovery usually is prompt and complete.	Use mild drying lotions and powders, and keep skin clean for drying skin and preventing infection.	Remove to cooler area. Rest lying down. Increase fluid intake.	Remove to cooler area. Rest lying down, with head in low position. Administer fluids by mouth. Seek medical attention.	Cool rapidly by soaking in cool–but not cold–water. Call ambulance, and get medical attention immediately!

3.1.3 HEAT-STRESS MONITORING

For field activities part of ongoing site work activities in hot weather, the following procedures should be used to monitor the body's physiological response to heat and to estimate the work-cycle/rest-cycle when workers are performing moderate levels of work. These procedures should be considered when the ambient air temperature exceeds 70°F, the relative humidity is high (>50%), or when the workers exhibit symptoms of heat stress.

The heart rate should be measured by the radial pulse for 30 seconds, as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute, or 20 beats/minute above resting pulse. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats/minute at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 110 beats/minute, or 20 beats/minute above resting pulse.

3.1.4 PREVENTING COLD STRESS

- Be aware of the symptoms of cold-related disorders, and ***wear proper clothing for the anticipated fieldwork.***
- Consider monitoring the work conditions and adjusting the work schedule, using guidelines developed by the U.S. Army (wind-chill index) and the National Safety Council (NSC).
- ***Wind-Chill Index.*** This measure relates the dry bulb temperature and the wind velocity. It is used only to estimate the combined effect of wind and low air temperatures on exposed skin. The wind-chill index sometimes is limited in its usefulness because the index does not take into account the body part that is exposed, the level of activity, or the amount or type of clothing worn. For those reasons, it is used only as a guideline to warn workers when they are in a situation that can cause

cold-related illnesses. Used in conjunction with the NSC guidelines, the wind-chill index provides a starting point for adjusting work and warm-up schedules.

- *NSC Guidelines for Work and Warm-Up Schedules.* The cold-exposure limits recommended by the NSC can be used in conjunction with the wind-chill index to estimate work and warm-up schedules for fieldwork. The guidelines are not absolute; ***workers should be monitored for symptoms of cold-related illness.*** If symptoms are not observed, the work duration can be increased.
- The wind-chill index and the NSC guidelines are in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual,* SOP HS-09.

3.1.5 SYMPTOMS AND TREATMENT OF COLD STRESS

	Immersion (Trench) Foot	Frostbite	Hypothermia
Signs and Symptoms	Feet discolored and painful; infection and swelling present.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Treatment	Seek medical treatment immediately.	Remove victim to a warm place. Rewarm area quickly in warm–but **not** hot–water. Have victim drink warm fluids, but **not** coffee or alcohol. Do not break blisters. Elevate the injured area, and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids, but **not** coffee or alcohol. Get medical attention.

3.2 PROCEDURES FOR LOCATING BURIED UTILITIES

Local Utility Mark-Out Service
Name: Dave McBride/NAVSEA, Facility Contact
Phone: 304-726-5354

- Where available, obtain utility diagrams for the facility.
- Review locations of sanitary and storm sewers, electrical conduits, water supply lines, natural-gas lines, and fuel tanks and lines.
- Review proposed locations of intrusive work with facility personnel knowledgeable of locations of utilities. Check locations against information from utility mark-out service.
- Where necessary, clear locations with a utility-locating instrument (e.g., metal detector).
- Where necessary (e.g., uncertainty about utility locations), excavation or drilling of the upper depth interval should be performed manually.
- Monitor for signs of utilities during advancement of intrusive work (e.g., sudden change in advancement of auger or split spoon).
- When the client or other onsite party is responsible for determining the presence and locations of buried utilities, the SSC should confirm that arrangement.

3.3 GENERAL PHYSICAL (SAFETY) HAZARDS AND CONTROLS

.ngineering and administrative controls are to be implemented by the party in control of the site or the hazard (i.e., CH2M HILL, subcontractor, or contractor). CH2M HILL employees and subcontractors must, at a minimum, remain aware of hazards affecting them regardless of who is responsible for controlling the hazards. Specialty subcontractors are responsible for the safe operation of their equipment (e.g., drill rig, heavy equipment). CH2M HILL employees are not to operate, or assist in the operation of, any subcontractor or contractor equipment.

Tasks		
Hazard (Refer to SOP, or HSP Section)	**Engineering Controls, Administrative Controls, and Work Practices**	**Surface and Subsurface Soil Sampling**
Flying debris/objects (HS-07)	Provide shielding and PPE; maintain distance.	X
Electrical	• Make certain third wire is properly grounded. Do not tamper with electrical wiring unless qualified to do so. Ground as appropriate. • Project field sites should have ground fault circuit interrupters (GFCIs) installed for all wiring, including extension cords. • Heavy equipment (e.g., drill rig) should remain at least 15 feet from overhead power line for power lines of 50 kV or less. For each 10 kV > 50, increase distance by ½ foot. • Operate and maintain equipment according to manufacturer's instructions. • Use only extension cords that are three-wire grounded. Cords passing through work areas must be covered or elevated to protect from damage. • Use only electrical tools and equipment that are either effectively grounded or double-insulated UL approved. • Properly label switches, fuses, and circuit breakers. • Remove cord from an outlet by grasping the plug, not pulling the cord. • Protect all electrical equipment, tools, switches, etc., from elements. • Avoid physical contact with power circuit. • Only qualified electricians are to install and work on electrical circuits and equipment.	X
Buried utilities, drums, tanks, etc. (Section 3.3)	Locate buried utilities, drums, tanks, etc., before digging or drilling and mark location.	X
Slip, trip, fall hazards (e.g., wet/muddy surface, inadequate railing, unstable surface)	Provide slip-resistant surfaces, ropes, and/or other devices to be used. Brace and shore equipment	X
Back injury (HS-29)	Use proper lifting techniques, or provide mechanical lifting aids.	X
Confined space entry (Section 9.0)	Space must be evaluated by qualified person. Additional controls and monitoring, training, and an approved entry permit are generally required.	NA
Protruding objects	Flag visible objects.	X
Visible lightning	Stop work.	X
Fire prevention and control (HS-22)	• No spark sources are allowed within exclusion or decontamination zones. • Appropriate firefighting equipment must be available on the site. • Extinguishers are to be inspected visually every month and undergo an annual maintenance check. • Post "Exit" signs over exiting doors, and post "Fire Extinguisher" signs over extinguisher locations. Keep areas near exits and extinguishers clear. Open flames are prohibited in the vicinity of flammable materials. • Combustible materials stored outside should be at least 10 feet from the building. • Unnecessary combustible materials and flammable or combustible liquids must not be allowed to accumulate. • Flammable or combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.	X
Inadequate illumination	Site work will be performed during daylight hours whenever possible. Work conducted during hours of darkness will require enough illumination intensity "to read a newspaper without difficulty."	X

3.4 BIOLOGICAL HAZARDS AND CONTROLS

Hazard and Location	Control Measures
Snakes typically are found in underbrush and tall grassy areas.	If you encounter a snake, stay calm and look around; there may be other snakes. Turn around and walk away on the same path you used to approach the area. If a person is bitten by a snake, wash and immobilize the injured area, keeping it lower than the heart if possible. Seek medical attention immediately. **DO NOT** apply ice, cut the wound, or apply a tourniquet. Carry the victim or have him/her walk slowly if the victim must be moved. Try to identify the type of snake: note color, size, patterns, and markings.
Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas. They are more commonly found in moist areas or along the edges of wooded areas.	Become familiar with the identity of these plants. Wear protective clothing that covers exposed skin and clothes. Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately. If the reaction is severe or worsens, seek medical attention.
Exposure to **bloodborne pathogens** may occur when rendering first aid or CPR, or when coming into contact with medical or other potentially infectious material, or when coming into contact with landfill waste or waste streams containing such infectious material.	Training is required before a task involving potential exposure is performed. Exposure controls and personal protective equipment (PPE) are required as specified in CH2M HILL SOP HS-36, *Bloodborne Pathogens*. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.
Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic.	Watch for and avoid nests. Keep exposed skin to a minimum. Carry a kit if you have had allergic reactions in the past, and inform the SSC and/or the buddy. If a stinger is present, remove it carefully with tweezers. Wash and disinfect the wound, cover it, and apply ice. Watch for allergic reaction; seek medical attention if a reaction develops.

Other Potential Biological Hazards: None known

3.5 TICK BITES

(Reference CH2M HILL HS-03, *Tick Bites*)

Ticks typically are in wooded areas, bushes, tall grass, and brush. Ticks are black, black and red, or brown and can be up to one-quarter inch in size.

Prevention against tick bites includes avoiding tick areas; wearing tightly woven light-colored clothing with long sleeves and wearing pant legs tucked into boots or socks; spraying **only outside** of clothing with insect repellent containing permethrin or permanone, and spraying skin with DEET; and checking yourself frequently for ticks and showering as soon as possible. To prevent chemical repellents from interfering with sample analyses, exercise care while using repellents during the collection and handling of environmental samples.

If bitten by a tick, carefully remove the tick with tweezers, grasping the tick as close as possible to the point of attachment while being careful not to crush the tick. After removing the tick, wash your hands and disinfect and press the bite area. The removed tick should be saved. Report the bite to human resources personnel.

Look for symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF). Lyme: a rash that looks like a bullseye with a small welt in the center. RMSF: a rash of red spots under the skin 3 to 10 days after the tick bite. In both cases, chills, fever, headache, fatigue, stiff neck, bone pain may develop. If symptoms appear, seek medical attention.

3.6 RADIOLOGICAL HAZARDS AND CONTROLS

Refer to CH2M HILL's *Corporate Health and Safety Program, Program and Training Manual,* and *Corporate Health and Safety Program, Radiation Protection Program Manual,* for standards of practice for operating in contaminated areas.

Hazards	Controls
None Known	None Required

3.7 HAZARDS POSED BY CHEMICALS BROUGHT ON THE SITE

3.7.1 HAZARD COMMUNICATION

(Reference CH2M HILL *Hazard Communication Manual* and Section 5 of the *Site Safety Notebook*)

CH2M HILL's *Hazard Communication Program Manual,* which is available from area or regional offices and from the Corporate Human Resources Department in Denver. The project manager is to request Material Safety Data Sheets (MSDSs) from the client or from the contractors and the subcontractors for chemicals to which CH2M HILL employees potentially are exposed. The SSC is to do the following:

- Give employees required site-specific HAZCOM training.
- Confirm that the inventory of chemicals brought on the site by subcontractors is available.
- Before or as the chemicals arrive on the site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, if any.

The chemical products listed below will be used on the site. Refer to Attachment 2 for MSDSs.

Chemical	Quantity	Location
Hydrochloric Acid (sample preservative)	< 500 ml	Support/Exclusion Zone
Nitric Acid (sample preservative)	< 500 ml	Support/Exclusion Zone
Sulfuric Acid (sample preservative)	< 500 ml	Support/Exclusion Zone
Sodium Hydroxide (sample preservative)	< 500 ml	Support/Exclusion Zone
Methanol (decontamination solvent)	< 1 gallon	Support/Decontamination Zone
Alconox/Liquinox (detergent)	< 1 liter, powder/liquid	Support/Decontamination Zone

3.7.2 SHIPPING AND TRANSPORTATION OF CHEMICAL PRODUCTS

(Reference CH2M HILL's *Procedures for Shipping and Transporting Dangerous Goods*)

Nearly all chemicals brought to the site are considered hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive the CH2M HILL training in shipping dangerous goods. All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

3.8 CONTAMINANTS OF CONCERN (REFER TO PROJECT FILES FOR MORE-DETAILED CONTAMINANT INFORMATION)

Contaminant	Location and Highest [a] Concentration (ppm)	Exposure Limit [b]	IDLH [c]	Symptoms and Effects of Exposure	PIP [4] (eV)
1,2-Dichloroethene (total)	SOIL:	200 ppm	1,000	Irritation of the eyes and respiratory system; CNS depression	9.65
1,3,5-Trinitrobenzene	SOIL:	NL	NL	NL	UK
1,3-Dinitrobenzene (and other isomers)	SOIL:	1 mg/m^3	50 Skin	Anoxia; cyanosis; visual disturbance; bad taste; burning mouth; dry throat; thirst; yellowing hair, eyes and skin; anemia; liver damage	10.43 – 10.71
Tetryl	SOIL:	1.5 mg/m^3	750 Skin	Sensitization dermatitis; itching; erythema; edema on nasal folds, cheeks and neck; keratitis; sneezing; anemia; fatigue; cough; irritability; malaise; headache; insomnia; nausea; vomiting; liver and kidney damage	UK
Nitrobenzene	SOIL:	1 ppm	200 Skin	Irritation of the eyes and skin; anoxia; dermatitis; anemia; mehemoglobinemia	9.92
2,4,6-Trinitrotoluene	SOIL:	0.1 mg/m^3	500 Skin	Irritation of the skin and mucous membranes; liver damage; jaundice; cyanosis; sneezing; cough; sore throat; peripheral neuropathy; muscle pain; kidney damage; cataract; sensitization dermatitis; leukocytosis; anemia; cardiac irregularity	10.59
Nitrotoluene (all isomers)	SOIL:	2 ppm	200 Skin	Anoxia; cyanosis; headache; weakness; dizziness; ataxia; dyspnea; tachycardia; nausea; vomiting	9.43- 9.50
2,6-Dinitrotoluene	SOIL:	0.2 mg/m^3	50 Ca Skin	Anoxia; cyanosis; anemia; jaundice; reproductive effects; carcinogen	UK
2-Methylnaphthalene	SOIL:	NL	NL	Irritation of the eyes, skin and mucous membranes; may be absorbed through the skin	UK
2-Nitroaniline	SOIL:	NL	NL	NL	UK
Aluminum	SOIL:	5 mg/m^3 (respirable)	NL	Irritation of the eyes, skin and respiratory system	NA

3.8 CONTAMINANTS OF CONCERN (REFER TO PROJECT FILES FOR MORE-DETAILED CONTAMINANT INFORMATION)

Contaminant	Location and Highest [a] Concentration (ppm)	Exposure Limit [b]	IDLH [c]	Symptoms and Effects of Exposure	PIP [d] (eV)
Arsenic	SOIL:	0.01 mg/m^3	5 Ca	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation; carcinogen	NA
Barium	SOIL:	0.5 mg/m^3	NL	Irritation of the eyes, skin, and upper respiratory system; skin burns; GI disturbance; muscle toxin	NA
Benzo(a)anthracene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
Benzo(a)pyrene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
Benzo(b)fluoranthene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
Benzo(g,h,i)perylene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
Benzo(k)fluoranthene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
Beryllium	SOIL:	0.002 mg/m^3	4 Ca	Berylliosis (chronic exposure); anorexia; low-weight; weakness; chest pain; cough; clubbing of fingers; cyanosis; pulmonary insufficiency; irritation of the eyes; dermatitis; carcinogen	NA
bis(2-Ethylhexyl)phthalate	SOIL:	5 mg/m^3	5,000	Potential carcinogen, irritation of the eyes and mucous membranes	UK
Calcium	SOIL:	NL	NL	NL	NA
Chlorobenzene	SOIL:	10 ppm	1,000	Skin, eye, and nose irritation; drowsiness; uncoordination; CNS depression	9.07
Chloromethane (Methyl chloride)	SOIL:	50 ppm	2,000 Ca	Dizziness; nausea; vomiting; visual disturbance; slurred speech; convulsions; coma; liver and kidney damage	11.28

3.8 CONTAMINANTS OF CONCERN (REFER TO PROJECT FILES FOR MORE-DETAILED CONTAMINANT INFORMATION)

Contaminant	Location and Highest [a] Concentration (ppm)	Exposure Limit [b]	IDLH [c]	Symptoms and Effects of Exposure	PIP [4] (eV)
Chromium (as Cr(II) & Cr (III)	SOIL:	0.5 mg/m^3	25	Irritated eyes, sensitization dermatitis, histologic fibrosis of lungs	NA
Chromium (hexavalent)	SOIL:	0.01 mg/m^3	15 Ca	Irritated respiratory system, nasal septum perforation, liver and kidney damage, leukocytosis, leukopenia, monocytosis, eosinophilla, eye injury, conjunctivitis, skin ulcer, sensitization dermatitis; carcinogen	NA
Chrysene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
Cobalt (Metal, Dusts, and Fumes)	SOIL:	0.05 mg/m^3	20	Coughing, difficulty breathing, wheezing, decreased pulmonary function, diffuse nodule fibrosous, dermatitis, respiratory hypersensitivity, asthma	NA
Copper	SOIL:	1 mg/m^3 (dusts & mists)	100	Irritation of the eyes, nose and pharynx; nasal perforation; metallic taste; dermatitis	NA
Dibenz(a,h)anthracene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
Diethylphthalate	SOIL:	5 mg/m^3	NL	Irritation of the eyes, skin, nose and throat; headache; dizziness; nausea; possible polyneuropathy; numb, weak, spasms in arms and legs	UK
Ethylbenzene	SOIL:	100 ppm	800	Eye, skin and mucous membrane irritation; headache; dermatitis; narcotic; coma	8.76
Fluoranthene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
HMX	SOIL:	NL	NL	Eye, skin and respiratory system irritation; corneal injury; eczema; cardiovascular collapse	UK
Indeno(1,2,3-cd)pyrene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK

3.8 CONTAMINANTS OF CONCERN (REFER TO PROJECT FILES FOR MORE-DETAILED CONTAMINANT INFORMATION)

Contaminant	Location and Highest [a] Concentration (ppm)	Exposure Limit [b]	IDLH [c]	Symptoms and Effects of Exposure	PIP [4] (eV)
Iron	SOIL:	0.05 mg/m^3 (iron oxide dust and fume)	2,500	Benign pneumoconiosis	NA
Lead	SOIL:	0.05 mg/m^3	100	Weakness lassitude, facial pallor, pal eye, weight loss, malnutrition, abdominal pain, constipation, anemia, gingival lead line, tremors, paralysis of wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension	NA
Magnesium	SOIL:	10 mg/m^3 (magnesium oxide fume)	750	Irritation of the eyes and nose; metal fume fever; cough; chest pain/ flu-like fever	NA
Manganese	SOIL:	0.2 mg/m^3 (manganese compounds and fume)	500	Parkinson's; insomnia; mental confusion; metal fume fever; dry throat; cough; chest tightness; low-back pain; vomiting; malaise; fatigue; kidney damage.	NA
Mercury	SOIL:	0.05 mg/m^3	10 Skin	Skin and eye irritation, cough, chest pain, difficult breathing, bronchitis, pneumonitis, tremors, insomnia, irritability, indecision, headache, fatigue, weakness, GI disturbance	NA
Nickel	SOIL:	1 mg/m^3	10 Ca	Sensitization dermatitis; allergic asthma; pneumonitis; carcinogen	NA
n-Nitrosodiphenylamine	SOIL:	NL	NL	Moderate to severe eythema (redness) and moderate edema (raised skin); may be absorbed through the skin.	UK
Phenanthrene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
Pyrene	SOIL:	0.2 mg/m^3 [e]	80	Potential carcinogen; skin irritant; dermatitis. Photo-sensitization of skin occurs in the presence of sunlight	UK
RDX	SOIL:	0.5 mg/m^3	NL Skin	Irritation of the eyes and skin; headache; irritability; fatigue; weakness; tremor; nausea; dizziness; vomiting; insomnia; convulsions	UK

3.8 CONTAMINANTS OF CONCERN (REFER TO PROJECT FILES FOR MORE-DETAILED CONTAMINANT INFORMATION)

Contaminant	Location and Highest [a] Concentration (ppm)	Exposure Limit [b]	IDLH [c]	Symptoms and Effects of Exposure	PIP [4] (eV)
Selenium	SOIL:	0.2 mg/m^3	1	Irritation of the eyes, skin, nose and throat; visual disturbances; headache; chills; fever; dyspnea; bronchitis; metallic taste; garlic breath; GI disturbance; dermatitis; skin burns	NA
Silver	SOIL:	0.01 mg/m^3	10	Irritation of the nasal septum, throat and skin; blue-gray eyes; ulceration of the skin; GI disturbance	NA
Styrene	SOIL:	20 ppm	700	Irritation of the eyes, nose and respiratory system; headache; fatigue; dizziness; confusion; malaise; drowsiness; weakness; unsteady gait; narcosis; defatting dermatitis; possible liver injury and reproductive effects	8.40
Tetrachloroethene	SOIL:	25 ppm	150 Ca	Eye, nose, and throat irritation; nausea; flushed face and neck; vertigo; dizziness; sleepiness; skin redness; headache; liver damage; carcinogen	9.32
Toluene	SOIL:	50 ppm	500	Eye and nose irritation, fatigue, weakness, confusion, dizziness, headache, dilated pupils, excessive tearing, nervousness, muscle fatigue, paresthesia, dermatitis, liver and kidney damage	8.82
Trichloroethene	SOIL:	50 ppm	1,000 Ca	Headache, vertigo, visual disturbance, eye and skin irritation, fatigue, giddiness, tremors, sleepiness, nausea, vomiting, dermatitis, cardiac arrhythmia, paresthesia, liver injury, carcinogen	9.45
Vanadium	SOIL:	0.05 mg/m^3	35	Irritation of the eyes, skin and throat; green tongue; metallic taste eczema; cough; fine rales; wheezing; bronchitis; dyspnea	NA
Xylene, total	SOIL:	100 ppm	900	Irritated eyes, skin, nose, and throat; dizziness; excitement; drowsiness; incoherence; staggering gait; corneal vacuolization; anorexia; nausea; vomiting; abdominal pain; dermatitis	8.56
Zinc	SOIL:	0.5 mg/m^3 (zinc oxide respirable dust)	500	Metal fume fever; chills; muscle aches; nausea; fever; dry throat; cough; weakness; metallic taste; headache; blurred vision; low back pain; vomiting; fatigue; tight chest; dyspnea; rales; decreased pulmonary function	NA

3.8 CONTAMINANTS OF CONCERN (REFER TO PROJECT FILES FOR MORE-DETAILED CONTAMINANT INFORMATION)

Contaminant	Location and Highest [a] Concentration (ppm)	Exposure Limit [b]	IDLH [c]	Symptoms and Effects of Exposure	PIP [d] (eV)

Footnotes:

a: Specify sample-designation and media: SB (Soil Boring), A (Air), D (Drums), GW (Groundwater), L (Lagoon), TK (Tank), SS (Surface Soil), SL (Sludge), SW (Surface Water), SD (Sediment)

b: Appropriate value of PEL, REL, or TLV listed

c: IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant); NL = No limit found in reference materials; CA = Potential occupational carcinogen

d: PIP = photoionization potential; NA = Not applicable; UK = Unknown, "Skin" = Chemical can be absorbed through intact skin.

e: PEL is for coal tar pitch volatiles, benzene soluble fraction

3.9 POTENTIAL ROUTES OF EXPOSURE

DERMAL: Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 5.	**INHALATION:** Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in sections 5 and 6, respectively.	**OTHER:** Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before eating, drinking, or smoking).

4.0 PERSONNEL

4.1 CH2M HILL EMPLOYEE MEDICAL SURVEILLANCE AND TRAINING

(Reference CH2M HILL SOP HS-01, *Medical Surveillance*, and HS-02, *Health and Safety Training*)

The employees listed below are enrolled in the CH2M HILL Comprehensive Health and Safety Program and meet state and federal hazardous waste operations requirements for 40-hour initial training, 3-day on-the-job experience, and 8-hour annual refresher training. Employees designated "SSC" have received 8 hours of supervisor and instrument training and can serve as site safety coordinator (SSC) for the level of protection indicated. An SSC with a level designation (D, C, B) equal to or greater than the level of protection being used must be present during all tasks performed in exclusion or decontamination zones that involve the potential for exposure to health and safety hazards. Employees designated "FA-CPR" are currently certified by the American Red Cross, or equivalent, in first aid and CPR. At least one FA-CPR designated employee must be present during all tasks performed in exclusion or decontamination zones that involve the potential for exposure to health and safety hazards. The employees listed below are currently active in a medical surveillance program that meets state and federal regulatory requirements for hazardous waste operations. Certain tasks (e.g., confined-space entry) and contaminants (e.g., lead) may require additional training and medical monitoring.

Pregnant employees are to be informed of and are to follow the procedures in CH2M HILL's SOP HS-04, *Reproduction Protection*, including obtaining a physician's statement of the employee's ability to perform hazardous activities, before being assigned fieldwork.

Employee Name	Office	Responsibility	SSC/FA-CPR
Jack Zimmerman	WDC	Field Team Leader	Level D SSC
Don Martinson	WDC	Field Team Member	Level B SSC
Robert Pierpont	WDC	Field Team Member	Level C SSC; FA-CPR
Julie Kuper	WDC	Field Team Member	Level C SSC; FA-CPR
Edward Corack	WDC	Field Team Member	Level C SSC; FA
Brett Doerr	WDC	Activity Manager	None
Roger Azar	WDC	Project Manager	Level C SSC; FA-CPR

Note 1: This employee is not currently enrolled in the CH2M HILL Comprehensive Health and Safety Program, and will not be entering any exclusion or decontamination zones.

4.2 FIELD TEAM CHAIN OF COMMAND AND COMMUNICATION PROCEDURES

4.2.1 CLIENT

Contact Name: Maritza Montegross/ LANTDIV
Phone: 757-322-4796
Facility Contact Name: Dave McBride/NAVSEA
Phone: 304-726-5354

4.2.2 CH2M HILL

Activity Manager: Brett Doerr/WDC
Project Manager: Roger Azar/WDC
Health and Safety Manager: John Longo/NJO
Field Team Leader: Jack Zimmerman/WDC
Site Safety Coordinator: Jack Zimmerman/WDC

The SSC is responsible for contacting the field team leader and the project manager. In general, the project manager either will contact or will identify the client contact. The Health and Safety Manager (HSM) should be contacted as appropriate. The SSC or the project manager must notify the client and the HSM when a serious injury or a death occurs or when health and safety inspections by OSHA or other agencies are conducted. Refer to sections 10 through 12 for emergency procedures and phone numbers.

4.2.3 SUBCONTRACTORS

(Reference Section 3, *Corporate Health and Safety Program Manual)*

When specified in the project documents (e.g., contract), this plan may cover CH2M HILL subcontractors. However, this plan does not address hazards associated with tasks and equipment that the subcontractor has expertise in (e.g., operation of drill rig). Specialty subcontractors are responsible for health and safety procedures and plans specific to their work. Specialty subcontractors are to submit plans to CH2M HILL for review and approval before the start of fieldwork. Subcontractors must comply with the established health and safety plan(s). CH2M HILL must monitor and enforce compliance with the established plan(s).

Subcontractor: None
Subcontractor Contact:
Telephone:

General health and safety communication with subcontractors contracted with CH2M HILL and covered by this plan is to be conducted as follows:

- Request that the subcontractor, if a specialty subcontractor, submit a safety or health plan applicable to their expertise (e.g., drill-rig safety plan or nuclear density gauge [NDG] health plan); attach the reviewed plan.
- Supply subcontractors with a copy of this plan, and brief them on its provisions.
- Direct health and safety communication to the subcontractor-designated safety representative.
- Notify the subcontractor-designated representative if a violation of the plan(s) is observed. Specialty subcontractors are responsible for mitigating hazards in which they have expertise.
- If a hazard condition persists, inform the subcontractor. If the hazard is not mitigated, stop affected work as a last resort and notify the project manager.
- When an apparent imminent danger exists, promptly remove all affected personnel. Notify the project manager.
- Make clear that consistent violations of the health and safety plan by a subcontractor may result in termination of the subcontract.

4.2.4 CONTRACTORS

(Reference Section 3, *Corporate Health and Safety Program Manual*)

This plan does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for directing contractor personnel and is not to assume responsibility through their actions. When the contractor is in control of the site, ask the contractor to conduct a briefing of their health and safety practices and to describe how they apply to CH2M HILL's activities. Request a copy of the contractor's health and safety plan.

Contractor: None
Contact Name:
Telephone:

General health and safety communication with contractors *not* contracted with CH2M HILL is listed below. These procedures can also be applied to other third party communications (e.g., client personnel).

- Ask the contractor to brief CH2M HILL on the contractor's health and safety plan for how the plan affects CH2M HILL employees on the site.
- If acceptable to the client, communicate about health and safety directly with the contractor PM or other onsite contractor-designated representative. CH2M HILL employees are not to direct the details of the contractor's work or to advise on health and safety (e.g., how the contractor corrects unsafe conditions).
- If an observed hazard poses a risk to CH2M HILL personnel, notify the party controlling the work activity as soon as possible. Notify the project manager; the project manager will notify the client. Document oral notification in project records (i.e., the field logbook).
- If a hazardous condition endangering a CH2M HILL employee persists, inform the contractor and the project manager (the project manager will contact the client) that CH2M HILL cannot execute the assigned work until the hazard is mitigated.
- When an apparent imminent danger exists, orally warn the person(s) in danger and orally notify the contractor promptly. When an imminent danger involves a CH2M HILL employee, remove the employee and suspend CH2M HILL work immediately until the hazard has been mitigated. Inform the project manager and the contractor promptly.
- The SSC or the project manager must notify the client and CH2M HILL health and safety staff when (1) the contractor fails to remedy an unsafe condition affecting CH2M HILL personnel, (2) the contractor does not remedy the hazardous condition within a reasonable period of time, or (3) the contractor repeatedly creates the hazardous condition.

5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

(Reference CH2M HILL SOP HS-07, *Personal Protective Equipment*, HS-08, *Respiratory Protection*, Section 2 of the *Site Safety Notebook*)

5.1 PPE SPECIFICATIONS a

Task	Level	Body	Head	Respirator b
General work uniform when no chemical exposure is anticipated	D	Work clothes; steel-toe, steel-shank leather work boots; work gloves	Hardhat c Safety glasses Ear protection d	None required
Surface and subsurface soil sampling	Modified D	**COVERALLS:** Uncoated Tyvek® **BOOTS:** Steel-toe, steel-shank chemical-resistant boots OR steel-toe, steel-shank leather work boots with outer rubber boot covers **GLOVES:** Inner surgical-style nitrile glove AND outer chemical-resistant nitrile glove.	Hardhat c Splash shield c Safety glasses Ear protection d	None required
Tasks requiring upgrade per Section 5.2 or 6. **(Not Anticipated)**	C	**COVERALLS:** Polycoated Tyvek® **BOOTS:** Steel-toe, steel-shank chemical-resistant boots OR steel-toe, steel-shank leather work boots with outer rubber boot covers **GLOVES:** Inner surgical-style nitrile glove AND outer chemical-resistant nitrile glove.	Hardhat c Splash shield c Ear protection d Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with GME-He cartridges or equivalent
Not Approved	B	**COVERALLS:** Polycoated Tyvek® **BOOTS:** Steel toe, steel-shank chemical-resistant boots OR steel-toe, steel-shank leather work boots with outer rubber boot covers **GLOVES:** Inner surgical-style nitrile glove AND outer chemical-resistant nitrile glove.	Hardhat c Splash shield c Ear protection d Spectacle inserts	Positive-pressure demand self-contained breathing apparatus (SCBA): MSA Ultralite, or equivalent

a Modifications are as indicated. CH2M HILL will provide PPE to only CH2M HILL employees.
b No facial hair that would interfere with respirator fit is permitted.
c Hardhat and splash-shield areas are to determined by the SSC.
d Ear protection should be worn while working around drill rigs or other noise-producing equipment or when conversations cannot be held at
distances of 3 feet or less without shouting. Refer to Section 6 for other requirements.
E The GME-H cartridge is the new standard-issue cartridge. Available stock of the previously standard GMC-H cartridges may be used for tasks
Covered by this plan.

5.2 REASONS FOR UPGRADING OR DOWNGRADING LEVEL OF PROTECTION

Upgrade *	Downgrade
• Request from individual performing task. • Change in work task that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 6) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task that will reduce contact with hazardous materials.

* Performing a task that requires an upgrade to a higher level of protection (e.g., level D to level C) is permitted only when the PPE requirements have been specified in Section 5 and an SSC who meets the requirements specified in subsection 4.1 is present.

6.0 AIR MONITORING SPECIFICATIONS

(Reference CH2M HILL SOP HS-06, *Air Monitoring*, and Section 2 of the *Site Safety Notebook*)

Instrument	Tasks	Action Levels		Frequency [c]	Calibration
FID: TVA 1000 (PID may be substituted for FID)	Surface and subsurface soil sampling	0-5 ppm [a] 5-10 ppm [b] >10 ppm [b]	Level D Level C Stop work; re-evaluate	Initially and periodically during task	Daily
PID: OVM with 10.6 eV lamp or equivalent (FID may be substituted for PID)	Surface and subsurface soil sampling	0-5 ppm [a] 5-10 ppm [b] >10 ppm [b]	Level D Level C Stop work; re-evaluate	Initially and periodically during task	Daily

Note a: Action levels apply to sustained work area measurements above background.
Note b: Action levels apply to sustained breathing-zone measurements above background.
Note c: The exact frequency of monitoring depends on field conditions and is to be determined by the SSC; generally, every 5 to 15 minutes is acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time and measurement result, personnel monitored, and place/location where measurement is taken (e.g., "Breathing Zone/MW-3," "at surface/SB-2," etc.).

6.1 CALIBRATION SPECIFICATIONS

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: TVA 1000	100 ppm isobutylene	CF=0.55	55 ppm ± 5 ppm	1.5 lpm REG T-Tubing
PID: HNu, 10.2 eV probe	100 ppm isobutylene	9.8 ± 2.0	55 ppm	1.5 lpm reg T-tubing OR 0.25 lpm reg direct tubing
HNu, 11.7 eV probe		5.0 ± 2.0	68 ppm	
PID: OVM, 10.0 or 10.6 eV bulb	100 ppm isobutylene	RF = 0.55	55 ppm	1.5 lpm reg T-tubing
OVM, 11.8 eV bulb		RF = 0.68	68 ppm	
PID: MiniRAE, 10.6 eV Bulb	100 ppm isobutylene	CF=53	53 ppm ±5 ppm	1.5 lpm reg T-Tubing
FID: TVA 1000	100 ppm methane	NA	100 ppm	2.5 lpm reg T-tubing

6.2 AIR SAMPLING

Sampling may be required by other OSHA regulations where there may be exposure to certain contaminants. Air
sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain volatile organic compounds. Contact the HSM immediately if these contaminants are encountered.

Method Description: N/A

Personnel and Areas

Results must be sent immediately to the HSM. Regulations may require reporting to monitored personnel. Results reported to: N/A

HSM: John Longo/NJO
Other:

7.0 DECONTAMINATION

(REFERENCE CH2M HILL SOP HS-13, *DECONTAMINATION*)

The SSC must monitor the effectiveness of the decontamination procedures. Decontamination procedures found to be ineffective will be modified by the SSC.

7.1 DECONTAMINATION SPECIFICATIONS

Personnel

- Boot wash/rinse
- Glove wash/rinse
- Outer-glove removal
- Body-suit removal
- Inner-glove removal
- Respirator removal
- Hand wash/rinse
- Face wash/rinse
- Shower ASAP
- **PPE-disposal method:**
  Double bag and dispose of in dumpsters at site.
- **Water-disposal method:**
  Drum, test, dispose of offsite if hazardous, or at Site 1 groundwater treatment plant if nonhazardous.

Sample Equipment

- Wash/rinse equipment
- Solvent-rinse equipment
- **Solvent-disposal method:**
  Drum, test, dispose of off site if hazardous, or at Site 1 groundwater treatment plant if nonhazardous.

Heavy Equipment

- Power wash
- Steam clean
- **Water-disposal method:**
  Drum, test, dispose of off site if hazardous, or at Site 1 groundwater treatment plant if nonhazardous.

7.2 DIAGRAM OF PERSONNEL-DECONTAMINATION LINE

No eating, drinking, or smoking is permitted in contaminated areas and in exclusion or decontamination zones. The SSC should establish areas for eating, drinking, and smoking. Contact lenses are not permitted in exclusion or decontamination zones. Figure 7-1 illustrates a typical establishment of work zones, including the decontamination line. Work zones are to be modified by the SSC to accommodate task-specific requirements.

8.0 SPILL-CONTAINMENT PROCEDURES

Sorbent material will be maintained in the support zone. Incidental spills will be contained with sorbent and will be disposed of properly.

9.0 CONFINED-SPACE ENTRY

(Reference CH2M HILL SOP HS-17, *Confined Space Entry*)

No confined-space entry will be permitted. Confined-space entry requires additional health and safety procedures, training, and a permit. If conditions change such that confined-space entry is necessary, contact the HSM to develop the required entry permit.

When planned activities will not include confined-space entry, permit-required confined spaces accessible to CH2M HILL personnel are to be identified before the task begins. The SSC is to confirm that permit spaces are properly posted or that employees are informed of their locations and informed of their hazards.

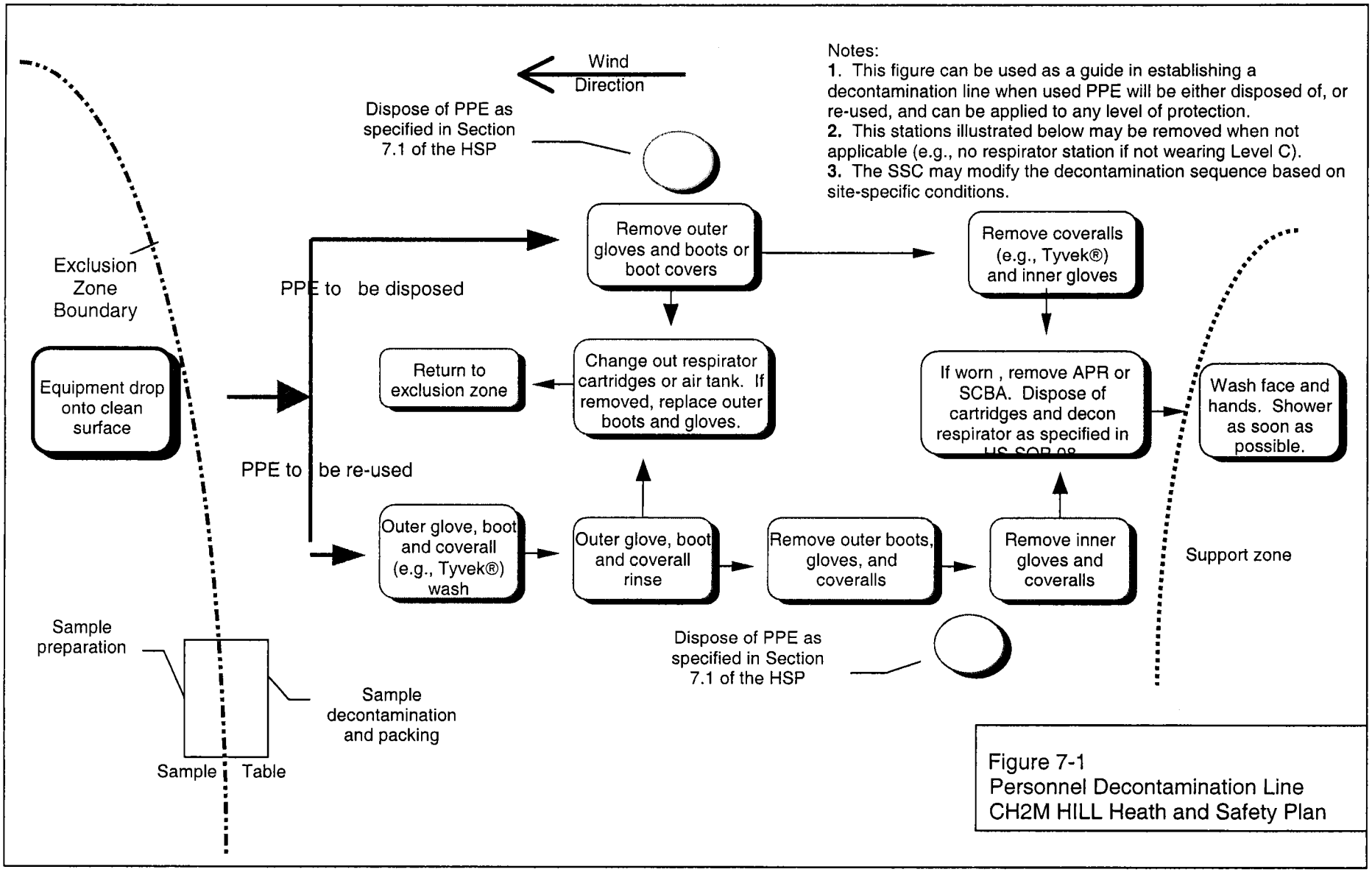


Figure 7-1
Personnel Decontamination Line
CH2M HILL Heath and Safety Plan

10.0 SITE-CONTROL PLAN

10.1 SITE-CONTROL PROCEDURES

- The site safety coordinator (SSC) will conduct a site safety briefing (see below) before starting field activities or as tasks and site conditions change.
- Topics for briefing on site safety: general discussion of health and safety plan, site-specific hazards, locations of work zones, PPE requirements, equipment, special procedures, emergencies. Refer to Section 8 of *Site Safety Notebook*.
- The SSC records attendance at safety briefings in a logbook and documents the topics discussed.
- Post the OSHA job-site poster in a central and conspicuous location at sites where project field offices, trailers, or equipment storage boxes are established. Posters can be obtained by calling either 800/548-4776 or 800/999-9111.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Determine wind direction.
- Establish work zones: support, decontamination, and exclusion zones. Delineate work zones with flags or cones as appropriate. Support zone should be upwind of the site.
- Establish decontamination procedures, including respirator-decontamination procedures, and test the procedures.
- Use access control at the entry and exit from each work zone.
- Store chemicals in appropriate containers.
- Make MSDSs available for onsite chemicals to which employees are exposed.
- Establish onsite communication consisting of the following:
  - Line-of-sight and hand signals
  - Air horn
  - Two-way radio or cellular telephone if available
- Establish offsite communication.
- Establish and maintain the "buddy system."
- Establish procedures for disposing of material generated on the site.
- Initial air monitoring is conducted by the SSC in appropriate level of protection.
- The SSC is to conduct periodic inspections of work practices to determine the effectiveness of this plan -- refer to CH2M HILL SOP 18, *Health and Safety* Checklist, or Section 4 of *Site Safety Notebook*. Deficiencies are to be noted, reported to the HSM, and corrected.

10.2 HAZWOPER COMPLIANCE PLAN

(Reference CH2M HILL SOP HS-17, *Health and Safety Plans*)

This section outlines procedures to be followed when certain activities do not require 24- or 40-hour training. ***Note, prior approval from the HSM is required before these tasks are conducted on regulated hazardous waste sites.***

- Certain parts of the site work may be covered by state or federal Hazwoper standards and therefore require training and medical monitoring. Anticipated tasks must be included in subsection 2.2.1.

- Air sampling must confirm that there is no exposure to gases or vapors before non-Hazwoper-trained personnel are allowed on the site. Other data (e.g., soil) also must document that there is no potential for exposure. The HSM must approve the interpretation of these data. Refer to subsections 3.8 and 6.2 for contaminant data and air sampling requirements, respectively.

- Non-Hazwoper-trained personnel must be informed of the nature of the existing contamination and its locations, the limits of their access, and the emergency action plan for the site. Non-Hazwoper-trained personnel also must be trained in accordance with all other state and federal OSHA requirements, including 29 CFR 1910.1200 (HAZCOM). Refer to subsection 3.7.1 for hazard communication requirements.

- Air monitoring with direct-reading instruments conducted during regulated tasks also should be used to ensure that non-Hazwoper-trained personnel (e.g., in an adjacent area) are not exposed to volatile contaminants. Non-Hazwoper-trained personnel should be monitored whenever the belief is that there may be a possibility of exposure (e.g., change in site conditions), or at some reasonable frequency to confirm that there is no exposure. Refer to Section 6.1 for air monitoring requirements.

- Treatment system start-ups: Once a treatment system begins to pump and treat contaminated media, the site is, for the purposes of applying the Hazwoper standard, considered a treatment, storage, and disposal facility (TSDF). Therefore, once the system begins operation, only Hazwoper-trained personnel (minimum of 24 hours of training) will be permitted to enter the site. All non-Hazwoper-trained personnel must leave the site.

If Hazwoper-regulated tasks are conducted concurrently with nonregulated tasks, non-Hazwoper-trained subcontractors must be removed from areas of exposure. If non-Hazwoper-trained personnel remain on the site while a Hazwoper-regulated task is conducted, the contaminant/exposure area (exclusion zone) must be posted, non-Hazwoper-trained personnel must be reminded of the locations of restricted areas and the limits of their access, and real-time monitoring must be conducted. Non-Hazwoper-trained personnel at risk of exposure must be removed from the site until it can be demonstrated that there is no longer a potential for exposure to health and safety hazards.

11.0 RESPONSE PLAN (REFERENCE CH2M HILL SOP HS-12, EMERGENCY RESPONSE)

11.1 PRE-EMERGENCY PLANNING

The SSC performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with the facility and local emergency-service providers as appropriate.

- Review the facility emergency and contingency plans where applicable.
- Locate the nearest telephone; determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Identify and communicate chemical, safety, radiological, and biological hazards.
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Post site map marked with locations of emergency equipment and supplies, and post OSHA job-site poster. The OSHA job-site poster is required at sites where project field offices, trailers, or equipment-storage boxes are established. Posters can be obtained by calling either 800/548-4776 or 800/999-9111.
- Field Trailers: Post "Exit" signs above exit doors, and post "Fire Extinguisher" signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Review changed site conditions, onsite operations, and personnel availability in relation to emergency response procedures.
- Evaluate capabilities of local response teams where applicable.
- Where appropriate and acceptable to the client, inform emergency room and ambulance and emergency response teams of anticipated types of site emergencies.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, chemical and vapor releases.
- Review notification procedures for contacting CH2M HILL's medical consultant and team member's occupational physician.
- Rehearse the emergency response plan once before site activities begin, including driving the route to the hospital.
- Brief new workers on the emergency response plan.
- The SSC will evaluate emergency response actions and initiate appropriate follow-up actions.

11.2 EMERGENCY EQUIPMENT AND SUPPLIES

The SSC should mark the locations of emergency equipment on the site map and should post the map.

Emergency Equipment and Supplies	Location
20 lb (or two 10-lb) fire extinguisher (A, B, and C classes)	In Field Vehicle
First aid kit	In Field Vehicle
Eye wash	In Field Vehicle
Potable water	In Field Vehicle
Bloodborne-pathogen kit	In Field Vehicle
Cellular Phone	In Field Vehicle
Additional equipment (specify)	

11.3 EMERGENCY MEDICAL TREATMENT

- Notify appropriate emergency response authorities listed in sections 12 and 13 (e.g., 911).
- During a time of no emergency, contact CH2M HILL's medical consultant for advice and guidance on medical treatment.
- The SSC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Perform decontamination where feasible; lifesaving and first aid or medical treatment take priority.
- Notify the field team leader and the project manager of the injury.
- Make certain that the injured person is accompanied to the emergency room.
- Notify the health and safety manager.
- Notify the injured person's human resources department within 24 hours.
- Prepare an incident report -- refer to CH2M HILL SOP 12, *Emergency Response and First Aid*, and Section 6 of *Site Safety Notebook*. Submit the report to the corporate director of health and safety and the corporate human resources department (COR) within 48 hours.
- When contacting the medical consultant, state that you are calling about a CH2M HILL matter, and give your name, your telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.

11. 4 NONEMERGENCY PROCEDURES

The procedures listed above may be applied to nonemergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CH2M HILL medical consultant.

- When contacting the medical consultant, state that the situation is a CH2M HILL matter, and give your name, your telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Follow these procedures as appropriate.

11.5 INCIDENT RESPONSE

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down CH2M HILL operations and evacuate the immediate work area.
- Account for personnel at the designated assembly area(s).
- Notify appropriate response personnel.
- Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled.

11.6 EVACUATION

- Evacuation routes will be designated by the SSC before work begins.
- Onsite and offsite assembly points will be designated before work begins.
- Personnel will leave the exclusion zone and assemble at the onsite assembly point upon hearing the emergency signal for evacuation.
- Personnel will assemble at the offsite point upon hearing the emergency signal for a site evacuation.
- The SSC and a "buddy" will remain on the site after the site has been evacuated (if possible) to assist local responders and advise them of the nature and location of the incident.
- The SSC accounts for all personnel in the onsite assembly zone.
- A person designated by the SSC before work begins will account for personnel at the offsite assembly area.
- The SSC will write up the incident as soon as possible after it occurs and will submit a report to the corporate director of health and safety.

11.7 EVACUATION ROUTES AND ASSEMBLY POINTS

Refer to the site map in Section 1. Evacuation routes and assembly areas (and alternative routes and assembly areas) are specified on the site map.

11.8 EVACUATION SIGNALS

Signal	Meaning
Grasping throat with hand	Emergency–help me.
Thumbs up	OK; understood.
Grasping buddy's wrist	Leave area now.
Continuous sounding of horn	Emergency; leave site now.
Client/Facility:	
Warble Sound	Test fire alarm. Signal given at rocket test area prior to each test firing. Entry to this area of the plant prohibited.
Wail Sound	Plant fire alarm. The "wail" sound indicates the fire alarm was activated
Alternating or Steady Sound	Emergency Alarm. Emergency conditions exist. Take cover (approximately 2 minutes)
Westminster Chimes	All clear signal (normal activity may resume)

12.0 EMERGENCY RESPONSE

12.1 EMERGENCY RESPONSE TELEPHONE NUMBERS

SITE ADDRESS:
State Route 956
Rocket Center, WV 96726

Phone: 304-726-5000
Cellular Phone:

Police: WV State Police — **Phone:** 911 *

Fire: Cresaptown Volunteer Fire Department — **Phone:** 911 *

Ambulance: Memorial Hospital — **Phone:** 911 * or 301-777-4000

Electric: Potomac Edison — **Phone:** 304-263-3700

* When using a cellular phone outside the telephone's normal calling area, exercise caution in relying on the cellular phone to activate 911. When the caller is outside the normal calling area, the cellular service carrier should connect the caller with emergency services in the area where the call originated, but this may not occur. Telephone numbers of backup emergency services should be provided if a cellular phone is relied on to activate 911.

Hospital: Memorial Hospital — **Phone:** 301-777-4000
Address: 600 Memorial Ave
Cumberland, MD 21502

Route to Hospital: (Refer to Figure 12-1)

12.2 GOVERNMENT AGENCIES INVOLVED IN PROJECT

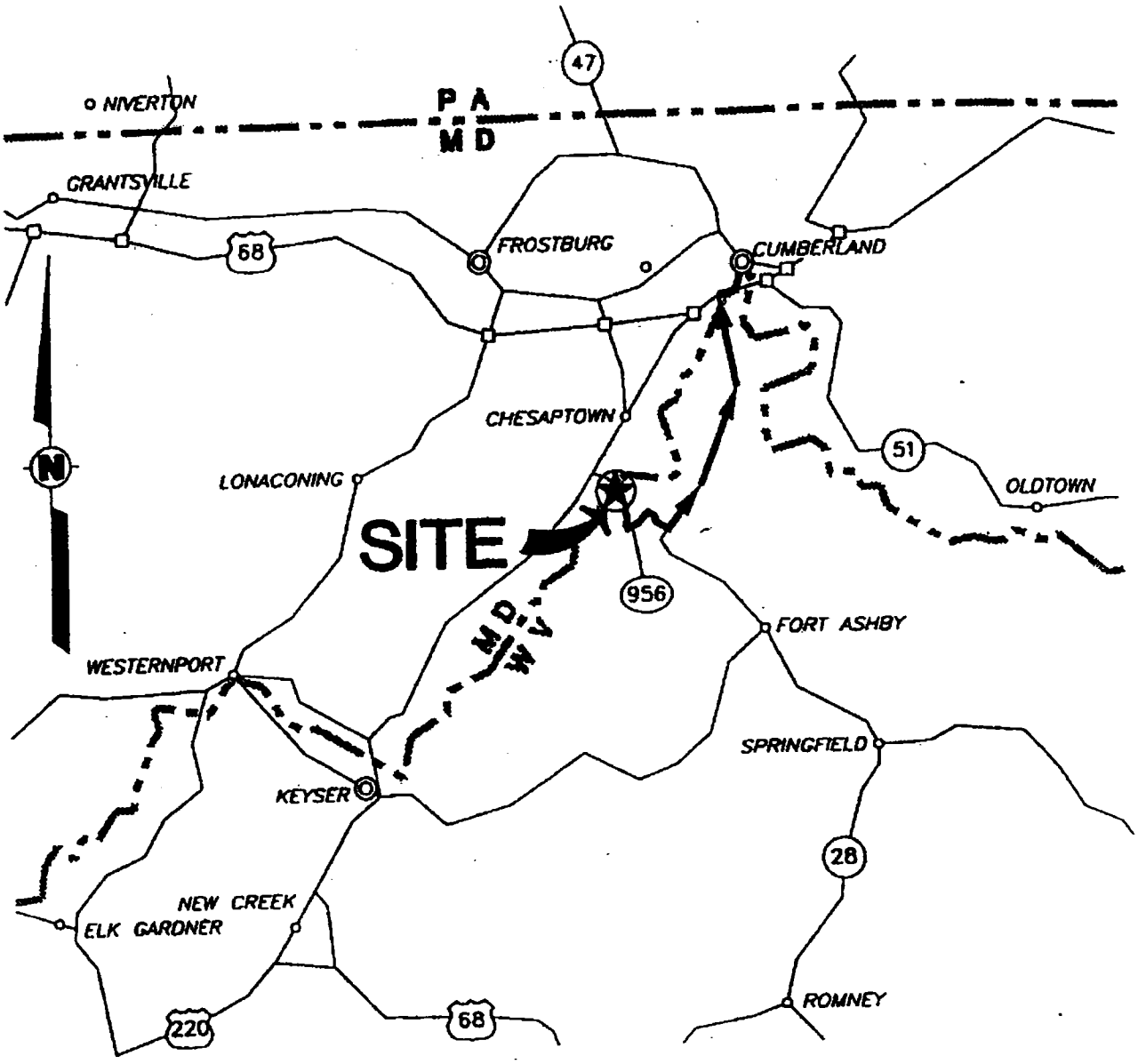
Federal Agency and Contact Name: Environmental Protection Agency
Phone: 215-567-9800

State Agency and Contact Name: West Virginia Department of Natural Resources
Phone: 800-642-6074

State Agency and contact Name: Maryland Department of Natural Resources
Phone: 800-628-9944

Contact the project manager. Generally, the project manager will contact relevant government agencies.

CAD File: 18875-A4



HOSPITAL NAME:

MEMORIAL HOSPITAL,MEMORIAL AVENUE, CUMBERLAND MARYLAND.

HOSPITAL DIRECTIONS:

PHONE NUMBER: (301) 777-4000
FOLLOW ROUTE 28 NORTH TO CUMBERLAND MD., IN CUMBERLAND MD. TURN RIGHT ON BALTIMORE STREET TO PARK AVENUE. TURN RIGHT ON PARK TO WINSTON STREET. TURN LEFT ON WINSTON STREET TO HILLTOP ROAD. TURN RIGHT ON DOUGLAS STREET. DOUGLAS BECOMES MEMORIAL; FOLLOW TO HOSPITAL.

SCALE
0 5 10 FEET

Plot Scale: 1 = 1

OHM Remediation Services Corp.
OHM Project No. 18875

Drawn By:	Checked By:	Approved By
M Warnick	J. Faison	D. Pringle
Date:	Scale:	Drawing No.
5/19/97	N.T.S.	18875-A4

Figure 12-1

HOSPITAL ROUTE MAP
SITE 5 - INERT LANDFILL ALLEGANY BALLISTICS LABORATORY
MINERAL COUNTY, WEST VIRGINIA
PREPARED FOR
DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION, NORFOLK, VIRGINIA

13.0 EMERGENCY CONTACTS

If an injury occurs, notify the injured person's personnel office as soon as possible after obtaining medical attention for the injured person. Notification MUST be made within 24 hours of the injury.

CH2M HILL Medical Consultant
Peter P. Greaney, M.D.
WorkCare, Inc.
333 S. Anita Drive
Orange, CA 92868
800/455-6155
This is a 24-hour coverage number. All after hour (6a.m.-6p.m. Pacific are regular working hours) calls will be answered in 20 minutes.

Occupational Physician (Regional or Local)

Dr. Laura Stanton
46440 Benedict Drive, Suite 108
Sterling, VA 22170
703-444-5656

Corporate Director Health and Safety

Name: Mollie Netherland/SEA
Phone: 425-453-5000 ext. 5342

Site Safety Coordinator (SSC)

Name: Jack Zimmerman
Phone: 703-461-4905

Medical and Training Manager

Name: Petra Scotti/SEA
Phone: 406-585-8389

Regional Manager

Name: Steve Guttenplan/WDC
Phone: 703-471-1441

Health and Safety Manager (HSM)
Name: John Longo/NJO
Phone: 973-316-9300

Project Manager
Name: Roger Azar/WDC
Phone: 703-471-1441

Radiation Health Manager (RHM)
Name: Dave McCormack/SEA
Phone: 425-453-5000 ext. 5417

Regional Human Resources Department
Name: Norm Fisher/WDC
Phone: 703-471-1441

Client
Contact Name: Maritza Montegross/ LANTDIV
Phone: 804-322-4796

Corporate Human Resources Department
Name: Julie Zimmerman/COR
Phone: 303-771-0900

Federal Express Dangerous Goods Shipping
Phone: 800/238-5355

CH2M HILL Emergency Number for Shipping Dangerous Goods
Phone: 800/255-3924

Worker's Compensation and Auto Claims

Worker's Compensation to Jill Colhern/Express Link:
Phone: 770-350-3380
Fax: 888-675-1648 (24-hour fax number)

Auto Claims to Sheri Clark/COR Central Reporting:
Phone: 800-204-0120
Fax: 303-770-3395

Report fatalities AND report vehicular accidents involving pedestrians, motorcycles, or more than two cars.

14.0 APPROVAL

This site-specific health and safety plan has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

14.1 ORIGINAL PLAN

WRITTEN BY: Roger Azar **DATE:** 11/01/2000

APPROVED BY: Lisa D. Martin **DATE:** 11/06/2000

14.2 REVISIONS

REVISIONS MADE BY: **DATE:**

REVISIONS TO PLAN:

REVISIONS APPROVED BY: **DATE:**

15.0 DISTRIBUTION

Name	Office	Responsibility	Number of Copies
Roger Azar	WDC	Project Manager	1
Syed Mahmood	WDC	Assistant Project Manager	1
Sana Hamady	WDC	Assistant Project Manager	1
John Longo	NJO	Health and Safety Manager/Approver	1
Brett Doerr	WDC	Activity Manager	1
Jack Zimmerman	WDC	Site Safety Coordinator/ Field Team Leader	1
Maritza Montegross	NA	Client Project Manager	1
Field Team Members	WDC Varied	Varied	1 each, as needed

16.0 ATTACHMENTS

Attachment 1: Employee Signoff
Attachment 2: Applicable Material Safety Data Sheet
Attachment 3: Health and Safety Assessment Checklist

Attachment 1
Employee Signoff

EMPLOYEE SIGNOFF

The employees listed below have been given a copy of this health and safety plan, have read and understood it, and agree to abide by its provisions.

EMPLOYEE NAME	EMPLOYEE SIGNATURE AND DATE

Attachment 2
Material Safety Data Sheets

Decontamination/Sample Preservation Materials

Alconox/Liquinox
Methanol

ALCONOX -- ALCONOX - DETERGENT, GENERAL PURPOSE
MATERIAL SAFETY DATA SHEET
NSN: 7930011986050
Manufacturer's CAGE: 17534
Part No. Indicator: A
Part Number/Trade Name: ALCONOX

General Information

Item Name: DETERGENT, GENERAL PURPOSE
Company's Name: ALCONOX INC.
Company's Street: 215 PARK AVE SOUTH
Company's City: NEW YORK
Company's State: NY
Company's Country: US
Company's Zip Code: 10003-1603
Company's Emerg Ph #: 212-473-1300
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SEU
Date MSDS Prepared: 01FEB91
Safety Data Review Date: 04DEC91
Supply Item Manager: CX
MSDS Serial Number: BLLFP
Hazard Characteristic Code: N1
Unit Of Issue: BX
Unit Of Issue Container Qty: 4.00 LBS
Type Of Container: BOX
Net Unit Weight: 4.00 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: THE MANUFACTURER STATES THAT NO HAZARDOUS INGREDIENTS ARE PRESENT IN THIS PRODUCT.
Ingredient Sequence Number: 01
Percent: N/A
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: NONE SPECIFIED

Physical/Chemical Characteristics

Appearance And Odor: WHITE POWDER INTERSPERSED WITH CREAM COLORED FLAKES, ODORLESS.
Boiling Point: N/A
Melting Point: N/A
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: N/A
Evaporation Rate And Ref: N/A
Solubility In Water: APPRECIABLE (>10%)
Percent Volatiles By Volume: N/A
pH: N/A

Fire and Explosion Hazard Data

Flash Point: NONE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: WATER, CARBON DIOXIDE, FOAM, SAND/EARTH.
Special Fire Fighting Proc: FOR FIRES INVOLVING THIS MATERIAL DO NOT ENTER

WITHOUT PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS.
Unusual Fire And Expl Hazrds: NONE

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE
Materials To Avoid: STRONG ACIDS.
Hazardous Decomp Products: MAY RELEASE CARBON DIOXIDE GAS ON BURNING.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT APPLICABLE

Health Hazard Data

LD50-LC50 Mixture: UNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: NO
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: INHALATION OF POWDER MAY PROVE LOCALLY IRRITATING TO MUCOUS MEMBRANES. INGESTION MAY CAUSE DISCOMFORT.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT APPLICABLE
Signs/Symptoms Of Overexp: INGESTION MAY CAUSE DIARRHEA.
Med Cond Aggravated By Exp: RESPIRATORY CONDITIONS.
Emergency/First Aid Proc: EYES: FLUSH WITH PLENTY OF WATER FOR 15 MIN. SKIN: FLUSH WITH PLENTY OF WATER. INGESTION: DRINK LARGE QUANTITIES OF WATER. GET MEDICAL ATTENTION FOR DISCOMFORT.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: MATERIAL FOAMS PROFUSELY. SHOVEL AND RECOVER AS MUCH AS POSSIBLE. RINSE REMAINDER TO SEWER. MATERIAL IS COMPLETELY BIODEGRADABLE.
Neutralizing Agent: NONE
Waste Disposal Method: SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER. LARGE QUANTITIES SHOULD BE DISPOSED OF ACCORDING TO LOCAL REQUIREMENTS FOR NON-HAZARDOUS DETERGENTS.
Precautions-Handling/Storing: STORE IN A DRY AREA TO PREVENT CAKING.
Other Precautions: NO SPECIAL REQUIREMENTS OTHER THAN THE GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES EMPOLYED WITH ANY INDUSTRIAL CHEMICAL.

Control Measures

Respiratory Protection: DUST MASK.
Ventilation: NORMAL LOCAL EXHAUST.
Protective Gloves: USEFUL BUT NOT REQUIRED.
Eye Protection: USEFUL BUT NOT REQUIRED.
Other Protective Equipment: NONE REQUIRED.
Work Hygienic Practices: NO SPECIAL PRACTICES REQUIRED.
Suppl. Safety & Health Data: NONE

Transportation Data

Trans Data Review Date: 91338
DOT PSN Code: ZZZ
DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI PSN Code: ZZZ
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

Additional Trans Data: NONE

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 04DEC91
Label Date: 04DEC91
Label Status: F
Common Name: ALCONOX
Chronic Hazard: NO
Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: INHALATION OF POWDER MAY PROVE LOCALLY IRRITATING TO MUCOUS MEMBRANES. INGESTION MAY CAUSE DISCOMFORT. STORE IN A DRY AREA TO PREVENT CAKING. FIRST AID: EYES: FLUSH WITH PLENTY OF WATER FOR 15 MIN. SKIN: FLUSH WITH PLENTY OF WATER. INGESTION: DRINK LARGE QUANTITIES OF WATER. GET MEDICAL ATTENTION FOR DISCOMFORT.
Protect Eye: Y
Protect Respiratory: Y
Label Name: ALCONOX INC.
Label Street: 215 PARK AVE SOUTH
Label City: NEW YORK
Label State: NY
Label Zip Code: 10003-1603
Label Country: US
Label Emergency Number: 212-473-1300

AMCO CHEMICAL -- METHANOL,TECHNICAL - METHANOL,TECHNICAL
MATERIAL SAFETY DATA SHEET
NSN: 6810005973608
Manufacturer's CAGE: 97984
Part No. Indicator: A
Part Number/Trade Name: METHANOL,TECHNICAL

General Information

Item Name: METHANOL,TECHNICAL
Company's Name: AMCO CHEMICAL CORP
Company's Street: 3RD - CYPRS
Company's P. O. Box: 208
Company's City: OAKLAND
Company's State: CA
Company's Country: US
Company's Zip Code: 94607
Company's Emerg Ph #: NOT IN BUSINESS! 911008P505A ???
Company's Info Ph #: NOT IN BUSINESS !
Record No. For Safety Entry: 018
Tot Safety Entries This Stk#: 018 *
Status: SD
Date MSDS Prepared: 06JUL93
Safety Data Review Date: 28FEB96
Supply Item Manager: CX
MSDS Preparer's Name: DGSC-SSH
Preparer's Company: DEFENSE GENERAL SUPPLY CENTER
Preparer's St Or P. O. Box: 8000 JEFF-DAVIS HWY.
Preparer's City: RICHMOND
Preparer's State: VA
Preparer's Zip Code: 23297-5680
MSDS Serial Number: BQYFL
Specification Number: O-M-232
Hazard Characteristic Code: F5
Unit Of Issue: CN
Unit Of Issue Container Qty: 1 GAL
Type Of Container: UNKNOWN
Net Unit Weight: 6.6 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: METHYL ALCOHOL (METHANOL) (SARA III)
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: PC1400000
CAS Number: 67-56-1
OSHA PEL: S,200PPM/250STEL
ACGIH TLV: S,200PPM/250STEL; 93
Other Recommended Limit: NOT ESTABLISHED

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID, SLIGHT ALCOHOL ODOR
Boiling Point: 148F,64.5C
Vapor Density (Air=1): 1.11
Specific Gravity: 0.7924
Solubility In Water: COMPLETE
Percent Volatiles By Volume: 100

Fire and Explosion Hazard Data

Flash Point: 54F,12C

Flash Point Method: TCC
Lower Explosive Limit: 6.0
Upper Explosive Limit: 36.5
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL OR WATER IN LARGE VOLUMES.
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS.USE WATER SPRAY TO COOL FIRE EXPOSED CONTAINERS.
Unusual Fire And Expl Hazrds: CONTAINERS MAY EXPLODE IN HEAT OF FIRE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): EXPOSURE TO SPARKS & FLAMES
Materials To Avoid: STRONG OXIDIZERS,ACTIVE METALS,ISO-CYANATES.
Hazardous Decomp Products: CARBON DIOXIDE,CARBON MONOXIDE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NONE

Health Hazard Data

LD50-LC50 Mixture: LD50 ORAL RAT=5628MG/KG RTECS 92-4
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: METHANOL IS A NEUROTOXIC MATERIEL WHICH CAUSES CENTRAL NERVOUS SYTEM DEPRESSION,DAMAGE TO THE OPTIC NERVE(FINALLY RESULTING IN BLINDNESS) AND KIDNEY DAMAGE.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT APPLICABLE
Signs/Symptoms Of Overexp: EYES:IRRITATION.SKIN:DEFATTING,IRRITATION. INHAL:HEADACHE,DROWSINESS,LASSITUDE,LOSS OF APPETITE,INABILITY TO CONCENTRATE.INGEST:GI IRRITATION,NAUSEA,VOMITING,DIARRHEA,CNS DEPRESSION.
Med Cond Aggravated By Exp: PERSONS WITH DISEASES AFFECTING THE SKIN, EYES OR RESPIRATORY SYSTEM,LIVER OR KIDNEY MAY BE AT INCREASED RISK FROM EXPOSURE.
Emergency/First Aid Proc: EYES:FLUSH WITH WATER FOR 15 MINUTES,WHILE HOLDING LIDS OPENED.SKIN:REMOVE CONTAMINATED CLOTHING;WASH WITH SOAP AND WATER.INHAL:REMOVE FROM EXPOSURE.RESTORE BREATHING IF NEEDED.CALL PHYSICIAN.INGEST:DO NOT INDUCE VOMITING.GIVE 2 GLASSES OF MILK OR WATER; CALL PHYSICIAN OR POISON CONTROL CENTER.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ELIMINATE SOURCES OF IGNITION.VENTILATE AREA.USE PROPER RESPIRATORY AND PROTECTIVE CLOTHING.CONTAIN SPILL.COLLECT WITH AN INERT ADSORBANT.PLACE IN AN APPROPRIATE CONTAINER FOR DISPOSAL.WASH AREA WITH WATER BEFORE READMITTING PERSONNEL.
Neutralizing Agent: NONE
Waste Disposal Method: KEEP IN COVERED DRUMS,PENDING DISPOSAL. HANDLE & DISPOSE IN FULL COMPLIANCE WITH ALL APPLICABLE FEDERAL,STATE &LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN A FLAMMABLE LIQUID STORAGE ROOM OR CABINET.KEEP CONTAINERS CLOSED;PROTECT THEM FROM PHYSICAL DAMAGE.
Other Precautions: EMPTY CONTAINERS MAY CONTAIN EXPLOSIVE VAPORS.

Control Measures

Respiratory Protection: NOT NEEDED IN NORMAL SERVICE.USE A NIOSH/MSHA APPROVED RESPIRATOR FOR ORGANIC VAPOR OR A SELF-CONTAINED BREATHING APPARATUS IN EMERGENCY SITUATIONS OR IN ENCLOSED SPACES.
Ventilation: MECHANICAL IS PREFERRED;LOCAL IS ACCEPTABLE.
Protective Gloves: PVA,NEOPRENE,NITRILE, OR PVC

Eye Protection: SAFETY GLASSES OR SPLASH GOGGLES.
Other Protective Equipment: EYE WASH STATION,SAFETY SHOWER,PROTECTIVE CLOTHING TO AVOID SKIN CONTACT.
Work Hygienic Practices: WASH HANDS.SEPERATE WORK CLOTHES FROM STREET CLOTHES.LAUNDER WORK CLOTHES BEFORE REUSE.KEEP FOOD OUT OF THE WORK AREA.
Suppl. Safety & Health Data: THIS MSDS WAS PREPARED BY DGSC-SSH FOR A TSR FROM SGT.GARY MACAFEE,ARMY NATL.GUARD ON 93187.

Transportation Data

Trans Data Review Date: 93187
DOT PSN Code: JEZ
DOT Proper Shipping Name: METHANOL, OR METHYL ALCOHOL
DOT Class: 3
DOT ID Number: UN1230
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID, POISON
IMO PSN Code: JQR
IMO Proper Shipping Name: METHYL ALCOHOL
IMO Regulations Page Number: SEE 3251
IMO UN Number: 1230
IMO UN Class: 3.2
IMO Subsidiary Risk Label: TOXIC
IATA PSN Code: QHQ
IATA UN ID Number: 1230
IATA Proper Shipping Name: METHANOL
IATA UN Class: 3
IATA Subsidiary Risk Class: 6.1
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: QHQ
AFI Prop. Shipping Name: METHANOL OR METHYL ALCOHOL
AFI Class: 3
AFI ID Number: UN1230
AFI Pack Group: II
AFI Label: 6.1
AFI Basic Pac Ref: 7-7
Additional Trans Data: IATA CLASS:SUBSIDARY HAZARD CLASS IS POISONOUS SUBSTANCE.

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: METHANOL,TECHNICAL
Special Hazard Precautions: METHANOL IS A NEUROTOXIC MATERIEL WHICH CAUSES CENTRAL NERVOUS SYTEM DEPRESSION,DAMAGE TO THE OPTIC NERVE(FINALLY DEFATTING,IRRITATION.INHAL:HEADACHE,DROWSINESS,LASSITUDE,LOSS OF APPETITE, INABILITY TO CONCENTRATE.INGEST:GI IRRITATION,NAUSEA,VOMITING,DIARRHEA,CNS DEPRESSION.
Label Name: AMCO CHEMICAL CORP
Label Street: 3RD - CYPRS
Label P.O. Box: 208
Label City: OAKLAND
Label State: CA
Label Zip Code: 94607
Label Country: US
Label Emergency Number: COMPANY OUT OF BUSINESS

Attachment 3
Health and Safety Assessment Checklist

CH2MHILL *JOBSITE SAFETY INSPECTION CHECKLIST*

Revision.: 03

STANDARD OF PRACTICE HS-18 - HEALTH AND SAFETY CHECKLIST

Date: 05/01/96

Note: The following jobsite safety inspection checklist is to be used only at locations where CH2M HILL controls the work. It is not to be used at locations where others control the work.

Project Name: _____ Project No.: _____

Location: _____ Project Manager: _____

Inspector: _____ Date: _____

This checklist has been divided into two sections. The first section (I through XXVI) are applicable to all projects. The second section (XXVII through XXIX) addresses specific situations such as hazardous waste, construction activities, and office trailers. There may be some duplication between the first and second sections.

If an item is not applicable, the column titled "N/A" should be checked. If an item is applicable but the auditor does not observe it during the inspection, the "N/O" column should be checked. For each deficiency noted, a Health and Safety Audit Finding Form must be completed. The Corporate Health and Safety Director must be copied on the results of all audits.

Check "Yes" for Items Completed	**Yes**	**No**	**N/A**	**N/O**
HAZARDOUS WASTE				
Certification and Training of CH2M HILL Personnel				
1. Medical exam within last 12 months	☐	☐	☐	☐
2. 40-hour initial training, 3 days supervised field activities, 8-hour annual refresher	☐	☐	☐	☐
3. First aid and CPR certification	☐	☐	☐	☐
4. Quantitatively fit tested (preferred method per NIOSH Publication 87-116, Appendix B.3)	☐	☐	☐	☐
5. Attend pre-entry safety meeting	☐	☐	☐	☐
6. Site Safety Coordinator with appropriate training	☐	☐	☐	☐
Certification and Training of Subcontractor Personnel				
1. Medical exam within last 12 months	☐	☐	☐	☐
2. 40-hour initial training, 3 days supervised field activities, 8-hour annual refresher	☐	☐	☐	☐
3. First aid and CPR certification	☐	☐	☐	☐
4. Quantitatively fit tested (preferred method per NIOSH Publication 87-116,	☐	☐	☐	☐

(Appendix B.3)

5. Attend pre-entry safety meeting ☐ ☐ ☐ ☐

Site Safety Documentation

1. Site safety plan (SSP) prepared and approved ☐ ☐ ☐ ☐
2. SSP onsite ☐ ☐ ☐ ☐
3. All personnel onsite identified in SSP ☐ ☐ ☐ ☐
4. Documentation of safety briefing ☐ ☐ ☐ ☐
5. Hospital map posted ☐ ☐ ☐ ☐
6. Phone numbers posted ☐ ☐ ☐ ☐
7. Emergency vehicle identified ☐ ☐ ☐ ☐
8. Material Safety Data Sheets (MSDSs) onsite ☐ ☐ ☐ ☐
9. Work zones delineated ☐ ☐ ☐ ☐
   (How? _____)
10. Wind direction flags in use ☐ ☐ ☐ ☐
11. Documentation of calibration of monitoring equipment in clean environment ☐ ☐ ☐ ☐
12. Monitoring conducted and recorded as specified in SSP ☐ ☐ ☐ ☐
    (Frequency? _____)
13. Monitoring for heat/cold stress ☐ ☐ ☐ ☐
14. Buddy system in use ☐ ☐ ☐ ☐
15. Decontamination procedures established as specified in SSP ☐ ☐ ☐ ☐
16. No eating, drinking, or smoking in exclusion and contamination reduction zones ☐ ☐ ☐ ☐
17. Toilet facilities provided ☐ ☐ ☐ ☐
18. 533 Forms completed ☐ ☐ ☐ ☐
19. No contact lenses ☐ ☐ ☐ ☐
20. Work conducted during daylight hours only ☐ ☐ ☐ ☐

Emergency equipment available as specified in SSP
(What?) _____

Safety Briefing

1. All personnel attended (including new personnel)	☐	☐	☐	☐
2. Documentation of meetings	☐	☐	☐	☐
3. Chemical hazards and toxicology reviewed	☐	☐	☐	☐
4. Physical hazards reviewed	☐	☐	☐	☐
5. Biological hazards reviewed	☐	☐	☐	☐
6. Heat/cold stress information reviewed	☐	☐	☐	☐
7. Air monitoring requirements	☐	☐	☐	☐
8. Levels of protection reviewed	☐	☐	☐	☐
9. Work zones reviewed	☐	☐	☐	☐
10. Decontamination procedures reviewed	☐	☐	☐	☐
11. Emergency response procedures reviewed	☐	☐	☐	☐
12. Site communications	☐	☐	☐	☐

Personal Protective Equipment (PPE)

1. Levels of protection being worn as specified in SSP	☐	☐	☐	☐
2. All appropriate PPE available onsite	☐	☐	☐	☐
3. Hard hats being worn	☐	☐	☐	☐
4. Appropriate hand protection being used	☐	☐	☐	☐
(What?) _____				
5. Appropriate body protection being used	☐	☐	☐	☐
(What?) _____				
6. Appropriate eye protection begin used	☐	☐	☐	☐
(What?) _____				
7. Appropriate ear protection being used	☐	☐	☐	☐
8. Appropriate respirator protection being used	☐	☐	☐	☐
9. Respirators donned correctly	☐	☐	☐	☐
10. TLD badges being used	☐	☐	☐	☐

11. If air purifying respirators (APRs) are being used, correct cartridges (Type?) _____ ☐ ☐ ☐ ☐

12. If self contained breathing apparatuses (SCBAs) are being used, is grade D air being used ☐ ☐ ☐ ☐

13. If SCBAs are being used, are cylinders stored correctly ☐ ☐ ☐ ☐

14. If personal protective equipment (PPE) is not onsite, prepared to halt work ☐ ☐ ☐ ☐

15. Disposal methods in place for disposable PPE ☐ ☐ ☐ ☐

Decontamination Procedures

1. Decontamination procedure established as specified in the SSP ☐ ☐ ☐ ☐

2. Decontamination zone clearly defined ☐ ☐ ☐ ☐

3. PPE properly decontaminated (How?) _____ ☐ ☐ ☐ ☐

4. Sampling equipment properly decontaminated (How?) _____ ☐ ☐ ☐ ☐

5. Monitoring equipment properly decontaminated (How?) _____ ☐ ☐ ☐ ☐

6. Heavy equipment properly decontaminated (How?) _____ ☐ ☐ ☐ ☐

7. Samples properly decontaminated (How?) _____ ☐ ☐ ☐ ☐

8. Decontamination fluids appropriately disposed of ☐ ☐ ☐ ☐

Final

Investigation-Derived Waste Management Plan (IDWMP) for the Burning Grounds RCRA Subpart X Permit Application at the Allegany Ballistics Laboratory Rocket Center, West Virginia

Contract Task Order 0175

February 2001

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN II Program
Contract N62470-95-D-6007

Prepared by

CH2MHILL

Herndon, Virginia

Table of Contents

Section			Page
Abbreviations and Acronyms			v
1.0	**Introduction**		**1-1**
2.0	**Sources and Deposition of IDW**		**2-1**
	2.1	IDW Solids	2-1
		2.1.1 Soils and Soil Cuttings	2-1
		2.1.2 Non-soil Solids	2-2
	2.2	IDW Liquids	2-2
3.0	**General Considerations**		**3-1**
	3.1	Labeling	3-1
		3.1.1 Storing IDW	3-1
		3.1.2 Disposal and Manifesting	3-1

Abbreviations and Acronyms

CFR	*Code of Federal Regulations*
EFACHES	Engineering Field Activity Chesapeake
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
IDW	investigation-derived waste
mg/kg	milligram per kilogram
NSWC	Naval Surface Warfare Center
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
SOP	Standard Operating Procedures
TCL	Target Compound List
TCLP	toxicity characteristic leaching procedure
VOCs	Volatile Organic Compounds

1.0 Introduction

The field investigation will produce very minimal amounts of investigation-derived waste (IDW). Generation of soil waste is not anticipated due to the minimal manual augering required to obtain samples. Water residuals from decontaminating field sampling equipment will require waste management and disposal in a manner that eliminates potential hazards. This investigation-derived waste management plan (IDWMP) documents the methodologies and procedures that CH2M HILL field personnel will implement to handle, manage, and dispose of all IDW. Disposal practices for personal protective equipment (PPE) and other general IDW considerations also are documented.

CH2M HILL will coordinate the disposal of the following IDW generated during the field investigation:

- Decontamination fluids generated during decontamination of equipment
- PPE, such as nitrile gloves and Tyvek suits, used during all phases of the investigation, and expendables used during sampling, such as tubing, filters, and sample containers.

2.0 Sources and Deposition of IDW

This section documents the proposed media handling procedures to be followed during the field investigation at and around the Burning Grounds.

2.1 IDW Solids

Solid media, including soils, soil cuttings, and non-soil residuals might be produced during field investigations. These types of solid IDW are discussed below.

2.1.1 Soils and Soil Cuttings

Soil cuttings generated during the field activities will be contained in a 5-gallon bucket. In addition, soil cuttings that accumulate in the decontamination buckets from the washing of equipment will also be placed in the 5-gallon bucket. All buckets with IDW solids will be sealed and labeled.

All containers of IDW solids will be secured and stored at a Navy-approved location until analytical results are obtained. At the conclusion of the field activities, one composite soil sample will be collected from all containers of IDW soil. This sample will be submitted to an offsite laboratory for a full Toxicity Characteristics Leachate Procedure (TCLP) and corrosivity, reactivity, and ignitability analysis.

After receiving the TCLP sampling results, CH2M HILL will formulate a preliminary assessment of any potential hazards posed by the IDW and submit waste management recommendations to the Navy. If the analytical results are below the limits listed in 40 Code of Federal Regulations (CFR) 261.24, as amended, the solids will be disposed of as solid waste at a permitted facility.

If the composite soil sample contains contaminant concentrations above Resource Conservation and Recovery Act (RCRA) characteristic hazardous waste criteria, or if the cuttings originate from an area known to contain a listed hazardous, the soil cuttings will be considered hazardous. This soil will be manifested, handled as hazardous waste, and shipped to a regulated hazardous waste landfill, treated, or stockpiled as appropriate and as directed by the Navy.

The proposed steps for accumulating and handling IDW soil are as follows:

1. Place soil cuttings directly into 5-gallon buckets. Label and seal/cover the containers.
2. Secure notification from the Navy that the media are not considered listed hazardous wastes.
3. Secure containers at a location designated by Navy personnel
4. Collect a composite sample from soil in the containers.

5. Send sample to an approved offsite laboratory for TCLP, corrosivity, reactivity, and ignitability analyses.
6. Secure the containers during the 30-day analysis period.
7. Receive analytical results from the laboratory and write a memorandum recommending to the Navy whether to handle the media as a hazardous or non-hazardous waste. Both analytical results and the applicable certification from the Navy will be considered in the recommendations.
8. If analysis indicates that the soil is non-hazardous, then once instructions from the Navy are received, transport the containers to a permitted non-hazardous waste landfill for disposal.
9. If the media is considered hazardous, upon receipt of concurrence by the Navy, the waste will be disposed of at a regulated hazardous waste landfill where it will either be treated or stockpiled, as designated by the Navy. The Navy will be responsible for signing all manifests. The waste will be disposed of within 90 days of determination that the soil is hazardous.

2.1.2 Non-soil Solids

The disposable PPE and disposable sampling equipment used by CH2M HILL field personnel and CH2M HILL's subcontractors will be bagged and placed in 55-gallon steel drums. Examples of equipment to be contained include nitrile gloves, Tyvek suits, rubber boots, filters, tubing, and respirator cartridges. Drums will be sealed and labeled appropriately.

The PPE will be bagged and labeled separately then placed in drums pending receipt of sampling analytical results. If the sampling analytical results indicate that the site's soil are non-hazardous, the PPE and sampling expendable items will be discarded in dumpsters. If sampling analytical results indicate that the site's soil are hazardous, the handling and disposal procedures of PPE and sampling expendable items will be identical to those that apply for hazardous soils and soil cuttings.

2.2 IDW Liquids

An estimated five gallons of liquid IDW will be produced during the process of decontaminating hand held tools.

All liquid IDW produced from the decontamination of tools will be temporarily stored in 5-gallon drums and transported to the on-site groundwater treatment plant for disposal.

3.0 General Considerations

General considerations pertinent to the generation and handling of IDW are documented below. These include the container labeling and storage, and disposal and manifesting protocol.

3.1 Labeling

Every 5-gallon bucket containing IDW will be labeled with the following information: the type of IDW (water, soil, or PPE), and the date the container was filled and sealed. An example of the information to be included on each container is:

Investigation Derived Waste
Decontamination Water
4-8-01
Do Not Handle - Analysis Pending

3.1.1 Storing IDW

The containers that contain IDW will be stockpiled at a site location or locations designated by Navy personnel, pending the receipt of analytical results. Other staging areas will be used as directed by Navy personnel, if necessary.

3.1.2 Disposal and Manifesting

After receiving test results, CH2M HILL will assess the potential hazards posed by the IDW, and submit waste management recommendations to the Navy for approval. If the test results and data indicate that the IDW is not a listed or characteristic hazardous waste, CH2M HILL will recommend that the water and soil be disposed of as non hazardous waste, and that the PPE be disposed of in a trash dumpster with other non-hazardous trash generated at the base.

Otherwise, the water, soil, and PPE will be manifested, handled, treated, and disposed of as a hazardous waste by a subcontractor. Personnel from Navy will be responsible for signing all manifests.

Appendix D-3
Data Validation Report

CH2M Rec'd 4/13/01

Environmental
Data Quality, Inc.

967 East Swedesford Road, Suite 401, Exton, Pennsylvania 19341
610-725-1770 610-725-1781 fax edqi@voicenet.com

April 12, 2001
Reference: 605.90.01

Julie Lovett
CH2M Hill
13921 Park Center Road
Suite 600
Herndon, VA 20171

TRANSMITTAL: Data Validation Report - ABL Burning Ground, CTO-175

Dear Julie:

Please find enclosed one copy of the above-referenced report. Files containing the final, validated results were forwarded to you previously via electronic mail.

Julie, thank you for considering Environmental Data Quality, Inc. for your data validation needs. Please contact me at (610) 725-1770 should you have questions concerning this report.

Sincerely,

Shawne M. Rodgers
President

Enclosures

Analytical Data Validation Report
ABL Burning Grounds
February 2001 Sampling
(CTO-175)

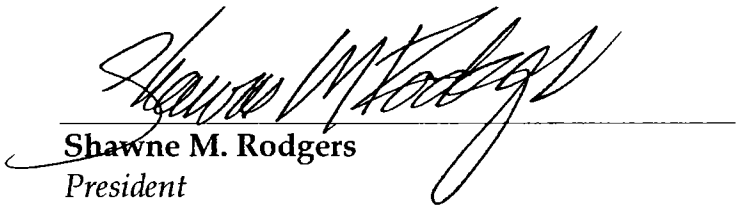
April 12, 2001

Environmental Data Quality, Inc.
967 East Swedesford Road Suite 404
Exton, Pennsylvania 19341

File No.: 605.90.01

Analytical Data Validation Report
ABL Burning Grounds
February 2001 Sampling
(CTO-175

April 12, 2001



Shawne M. Rodgers
President

Environmental Data Quality, Inc.
967 East Swedesford Road Suite 404
Exton, Pennsylvania 19341

File No.: 605.90.01

EXECUTIVE SUMMARY II

1.0 INTRODUCTION 1

2.0 DATA DELIVERABLE COMPLETENESS AND METHOD COMPLIANCE 2

2.1 DATA DELIVERABLE COMPLETENESS 2
2.1.1 Organic Analyses 2
2.1.2 Inorganic Analyses 2

2.2 METHOD COMPLIANCE 2
2.2.1 Organic Analyses 2
2.2.2 Inorganic Analyses 2

3.0 ORGANIC DATA 3

3.1 DATA QUALIFIERS 3
3.1.1 Subsurface Soil Samples 3
3.1.2 Surface Soil Samples 4
3.1.3 General Data Qualifiers 7

4.0 INORGANIC DATA 8

4.1 DATA QUALIFIERS 8
4.1.1 Subsurface Soil Samples 8
4.1.2 Surface Soil Samples 9
4.1.3 General Data Qualifiers 10

5.0 SUMMARY 11

ATTACHMENT 1 ANALYSIS RESULT FORMS

ATTACHMENT 2 METHODOLOGY REFERENCES

ATTACHMENT 3 CHAIN OF CUSTODY DOCUMENTATION

EXECUTIVE SUMMARY

This analytical data validation report is based on the review data generated for subsurface soil and surface soil samples collected at the ABL Burning Grounds. The sample locations, laboratory identification numbers, sample collection dates, sample matrix, and analyses performed are presented in Table 1-1. The samples are presented in order of collection date.

The samples were analyzed for Appendix IX volatile organic compounds, Appendix IX semivolatile organic compounds, explosives, polychlorinated dioxin/ polychlorinated dibenzofuran compounds (PCDD/PCDFs), Appendix IX metals plus aluminum, iron, and manganese, ammonium nitrate, perchlorate, cyanide, total organic carbon, sulfide, and pH, as specified in Table 1-1. Southwest Laboratories, Broken Arrow, Oklahoma, performed all analyses.

The sample analyses were performed in accordance with the procedures outlined in the OLM04 (and ILM04) USEPA Contract Laboratory Program (CLP) Statement of Work for Organic (and Inorganic) Analysis, "Test Methods for Evaluating Solid Wastes", SW-846, Third Edition, and "Methods for Chemical Analysis of Water and Wastewater", USEPA 600-79-020, March 1983. Results have been validated or qualified according to general guidance provided in the Region III modifications to "Laboratory Data Validation Functional Guidelines for Validating Organic (and Inorganic) Analyses", USEPA 9/94 (and 4/93), and "Standard Operating Procedure for Dioxin/Furan Data Validation", DRAFT, March 1999. These documents specify procedures for validating data generated for CLP analyses. The requirements specified in the method were also used to evaluate the non-CLP data.

The organic and inorganic analyses were performed acceptably, but required qualifying statements. The aspects of the data, which required qualification, are identified in this report.

Results for acetone, benzoic acid, methylene chloride and various metals for the samples were qualified due to the presence of these analytes in associated laboratory method and/or field blanks. Results for some volatile and semivolatile organic compounds were rejected due to poor response of the calibration standards. Other qualifications to the sample data were due primarily to the presence of matrix interferences, as evidenced by surrogate recoveries and internal standard, matrix spike, and serial dilution results.

Analysis result forms presenting the validated and qualified results for the samples are included in Attachment 1.

Table 1-1

Samples For Data Validation Review
ABL Burning Grounds Sampling
CTO-175
February 2001 Sampling

SAMPLE I.D.	LABORATORY I.D.	DATE COLLECTED	MATRIX	VOA	SVOA	DOXIN	EXPLO	NITROG	METAL	CYAN	PERC	TOC	MISC
ASX00-EB(022101)-R01	45902.12	2/22/01	Equipment Blank	X	X	X	X	X	X	X	X	X	X
ASX00-EB(022201)-R01	45902.15	2/22/01	Equipment Blank	X	X	X	X	X	X	X	X	X	X
ASX00-TB(022101)-R01	45902.13	2/21/01	Trip Blank	X									
ASX00-TB(022201)-R01	45902.16	2/22/01	Trip Blank	X									
ASX13-FB(022201)-R01	45902.14	2/22/01	Field Blank	X	X	X	X	X	X	X	X	X	X
ASX14A-SB0102P-R01	45902.02	2/21/01	Subsurface Soil	X	X	X	X	X	X	X	X	X	X
ASX14A-SB-0102-R01	45902.01	2/21/01	Subsurface Soil	X	X	X	X	X	X	X	X	X	X
ASX15A-SB0102-R01	45902.03	2/21/01	Subsurface Soil	X	X	X	X	X	X	X	X	X	X
ASX15-FB(022101)-R01	45902.11	2/22/01	Field Blank	X	X	X	X	X	X	X	X	X	X
ASX16A-SB0102-R01	45902.04	2/22/01	Subsurface Soil	X	X	X	X	X	X	X	X	X	X
ASX17A-SB0102-R01	45902.05	2/22/01	Subsurface Soil	X	X	X	X	X	X	X	X	X	X
ASX18A-SB0102-R01	45902.06	2/22/01	Subsurface Soil	X	X	X	X	X	X	X	X	X	X
ASX19A-SB0102-R01	45902.07	2/22/01	Subsurface Soil	X	X	X	X	X	X	X	X	X	X
ASX20A-SB0102-R01	45902.1	2/22/01	Subsurface Soil	X	X	X	X	X	X	X	X	X	X
ASX01-SS0001-R01	45903.01	2/21/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX02-SS0001-R01	45903.02	2/21/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX03-SS0001-R01	45903.03	2/21/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX04-SS0001-R01	45903.04	2/21/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX05-SS0001-R01	45903.05	2/21/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX06-SS0001-R01	45903.06	2/21/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX07-SS0001-R01	45903.09	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX08-SS0001-R01	45903.07	2/21/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX09-SS0001P-R01	45903.23	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX09-SS0001-R01	45903.15	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX10-SS0001-R01	45903.12	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX11-SS0001-R01	45903.16	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX12-SS0001-R01	45903.1	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX13-SS0001-R01	45903.17	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX14-SS0001-R01	45903.18	2/21/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX15-SS0001-R01	45903.19	2/21/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX16-SS0001P-R01	45903.22	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX16-SS0001-R01	45903.2	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX17-SS0001-R01	45903.24	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX18-SS0001-R01	45903.21	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX19-SS0001-R01	45903.11	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X
ASX20-SS0001-R01	45903.08	2/22/01	Surface Soil	X	X	X	X	X	X	X	X	X	X

VOA	APPENDIX IX VOLATILE ORGANIC COMPOUNDS
SVOA	APPENDIX IX SEMIVOLATILE ORGANIC COMPOUNDS
DIOXIN	POLYCHLORINATED DIBENZO DIOXIN/ POLYCHLORINATED DIBENZO FURAN
EXPLO	EXPLOSIVES
NITROG	NITROGLYCERIN
METAL	APPENDIX IX METALS, PLUS ALUMINUM, IRON, AND MANGANESE
CYAN	CYANDIE
PERC	TOTAL ORGANIC CARBON
TOC	TOTAL ORGANIC CARBON

1.0 INTRODUCTION

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The organic and inorganic analyses were performed acceptably, but required qualifying statements. The aspects of the data, which required qualification, are identified in this report.

Completeness of data deliverables for all samples and method compliance is discussed in Section 2.0. Analysis results forms presenting the validated and qualified results for the samples are included in Attachment 1.

2.0 DATA DELIVERABLE COMPLETENESS AND METHOD COMPLIANCE

During the course of the quality assurance data validation review, an evaluation of the completeness of the data deliverables provided by the laboratory and conformance to the specified methods was performed. Data deliverables that were determined to be either incomplete or incorrect were required to be resubmitted by the laboratory. Deviations from the protocols in the required analysis methods were evaluated to determine the impact, if any on the analysis results reported by the laboratory. Qualifications to the data resulting from method deviations are discussed fully for the samples receiving the validation review in Sections 3.0 and 4.0.

2.1 DATA DELIVERABLE COMPLETENESS

The following deliverables issues were identified during the data validation review.

2.1.1 Organic Analyses

The data deliverables were complete.

2.1.2 Inorganic Analyses

The data deliverables were complete.

2.2 METHOD COMPLIANCE

The following are considered to be deviations from the specified methods. Qualifications to affected samples are discussed in Section 3.0 and 4.0.

2.2.1 Organic Analyses

- Based on the deliverables reviewed, there were no deviations to the organic methodologies used for analysis.

2.2.2 Inorganic Analyses

- Based on the deliverables reviewed, there were no deviations to the inorganic methodologies used for analysis.

3.0 ORGANIC DATA

The samples were analyzed for volatile organic compounds, semivolatile organic compounds, explosive compounds, and PCDDs/PCDFs, as indicated in Table 1-1.

The findings offered in this report are based on a review of the analytical data reported according to a CLP-equivalent deliverable format.

The data validation included an assessment of the following items: chain of custody documentation, holding times, laboratory method, field, and trip blank results, surrogate recoveries, MS/MSD analysis results, field duplicate results, decafluorotriphenylphosphine (DFTPP) mass tuning results, initial and continuing calibrations, internal standard performance, chromatographic resolution, retention time windows, signal-to-noise ratios, PCDD/PCDF cleanup check sample results, qualitative identification, and quantitation of results.

The organic analyses were performed acceptably, but require qualifying statements. It is recommended that the data only be used with the qualifying statements presented below. Any data that are not discussed in this report should be considered qualitatively and quantitatively valid, based on the items evaluated. Validated and/or qualified results for the samples are provided in Attachment 1.

3.1 DATA QUALIFIERS

3.1.1 *Subsurface Soil Samples*

- Positive results reported for methylene chloride for the samples are qualitatively invalid due to the presence of this compound in associated laboratory method and/or field blanks. USEPA protocol requires positive results for common contaminants, such as methylene chloride, that are less than or equal to ten times the associated blank contamination level, to be considered qualitatively invalid. Placing "B" qualifiers next to these quantitative results for these samples has indicated this.
- Quantitation limits reported for acrolein, propionitrile, isobutyl alcohol, 1,4-dioxane, 1,3,5-trinitrobenzene, and 4-nitroquinoline-1-oxide for all of the samples have been rejected, and should be considered suspect. The relative response factors were below 0.05 for the associated calibration standards. The poor response indicates a lack of instrument sensitivity for these compounds. Placing "R" qualifiers next to the quantitation limits has indicated this.

- Positive results and quantitation limits for compounds quantitated using internal standards presented below for the sample presented below should be considered estimates. Low area counts were obtained for the semivolatile analysis of these samples. The laboratory re-analyzed the sample and confirmed the unacceptable area counts for the internal standards. Positive results for the associated compounds have been marked with "J" qualifiers to indicate that they are quantitative estimates. Quantitation limits are marked "UJ".

Affected Sample	Internal Standard	Reported Analysis
ASX17A-SB0102-R01	Acenaphtene-d_{10}, Perylene-d_{12}	Reanalysis
ASX17A-SB0102-R01RE	Chrysene-d_{12}	

- The result for OCDD for sample ASX14-SS0102 should be considered a quantitative estimate. The ion abundance ratio for this compound exceeded the method-specified criterion, but was within Region III expanded criterion of ± 25 percent. This substituted isomer is considered to be present, and are qualified "J".

3.1.2 *Surface Soil Samples*

- Positive results reported for acetone, methylene chloride and benzoic acid for the samples presented below are qualitatively invalid due to the presence of these compounds in associated laboratory method and/or field blanks. USEPA protocol requires positive results for common contaminants, such as acetone and methylene chloride, that are less than or equal to ten times the associated blank contamination level, to be considered qualitatively invalid. Results for uncommon contaminants, such as benzoic acid, that are less than five times the level found for an associated blank, are also invalid. Placing "B" qualifiers next to these quantitative results for these samples has indicated this.

Compound	Affected Samples
Acetone	ASX09-SS0001-R01, ASX10-SS0001-R01, ASX11-SS0001-R01, ASX14-SS0001-R01, ASX20-SS0001-R01
Benzoic Acid	ASX01-SS0001-R01
Methylene Chloride	All Samples

- The quantitation limits reported for acrolein, propionitrile, isobutyl alcohol, 1,4-dioxane, 1,3,5-trinitrobenzene, 4-nitroquinoline-1-oxide, 3-methylphenol, and chlorobenzilate, have been rejected, and should be considered suspect for the samples presented on page 5. The

Table 3-1 Field Duplicate Sample Results for Organic Analyses
Soil Duplicate Samples ASX14A-SB0102-R01 and ASX14A-SB0102P-R01

	ASX14A-SB0102-R01 (µg/Kg)		ASX14A-SB0102P-R01 (µg/Kg)		RPD	Comments
Methylene Chloride	3	B	6	B	NC	
HMX	276	J	340	J	NC	
OCDD	0.158		0.035	J	127.5	

relative response factors were below 0.05 for the associated calibration standards. The poor response indicates a lack of instrument sensitivity for these compounds. Placing "R" qualifiers next to the quantitation limits has indicated this.

Compound	Affected Samples
Acrolein	All Samples
Propionitrile	All Samples
Isobutyl alcohol	All Samples
1,4-Dioxane	All Samples
1,3,5-Trinitrobenzene	ASX03-SS0001-R01, ASX04-SS0001-R01, ASX05-SS0001-R01, ASX06-SS0001-R01, ASX07-SS0001-R01, ASX08-SS0001-R01, ASX09-SS0001-R01, ASX09-SS0001-R01P, ASX10-SS0001-R01, ASX11-SS0001-R01, ASX12-SS0001-R01, ASX13-SS0001-R01, ASX16-SS0001-R01, ASX16-SS0001-R01P, ASX17-SS0001-R01, ASX18-SS0001-R01
4-Nitroquinoline-1-oxide	ASX01-SS0001-R01, ASX02-SS0001-R01, ASX14-SS0001-R01, ASX15-SS0001-R01, ASX19-SS0001-R01, ASX20-SS0001-R01
Chlorobenzilate	ASX01-SS0001-R01, ASX02-SS0001-R01, ASX14-SS0001-R01, ASX15-SS0001-R01, ASX19-SS0001-R01, ASX20-SS0001-R01

- The positive results and/or quantitation limits for base neutral semivolatile organic compounds in ASX18-SS0001-R01 should be considered quantitative estimates. Low recoveries were obtained for the surrogate compounds, 2-Fluorobiphenyl and 1,2-Dichlorobenzene-d_4, for the semivolatile compounds in this sample. The laboratory did not re-extract the sample to determine whether the recovery was due to either a matrix interference or a laboratory problem. Positive results for base neutral semivolatile compounds have been marked with "L" qualifiers to indicate that they are biased low. Quantitation limits are marked with "UL".
- Quantitation limits for methyl iodide for samples ASX07-SS0001-R01, ASX09-SS0001-R01, ASX09-SS0001-R01P, ASX10-SS0001-R01, ASX11-SS0001-R01, ASX12-SS0001-R01, ASX13-SS0001-R01, ASX14-SS0001-R01, ASX15-SS0001-R01, ASX16-SS0001-R01, ASX16-SS0001-R01P, ASX17-SS0001-R01, ASX18-SS0001-R01, ASX19-SS0001-R01, and ASX20-SS0001-R01are biased low and may be higher than reported. The recoveries for these compounds for the associated laboratory control sample were below acceptance limits. The low recoveries indicate inefficiencies with the sample extraction and analytical processes. Quantitation limits for methyl iodide for these samples

have been marked with "UL" qualifiers to indicate that they are biased low.

- Positive results and quantitation limits for compounds quantitated using internal standards presented below for the associated samples should be considered estimates. Low area counts were obtained for the semivolatile analysis of these samples. The laboratory re-analyzed the samples and confirmed the unacceptable area counts for the internal standards. Positive results for the associated compounds have been marked with "J" qualifiers to indicate that they are quantitative estimates. Quantitation limits are marked "UJ".

Affected Sample	Internal Standard	Reported Analysis
ASX02-SS0001-R01	Chrysene-d_{12} and Phenanthrene-d_{10}	Initial
ASX14-SS0001-R01	Chrysene-d_{12}, Phenanthrene-d_{10} and, Perylene-d_{12}	Initial
ASX15-SS0001-R01	Chrysene-d_{12}, Phenanthrene-d_{10} and, Perylene-d_{12}	Re-analysis
ASX16-SS0001-R01	Perylene-d_{12}	Initial
ASX18-SS0001-R01	Perylene-d_{12}	Initial
ASX19-SS0001-R01	Acenaphthene- d_{10}, Chrysene-d_{12}, Phenanthrene-d_{10} and, Perylene-d_{12}	Initial
ASX20-SS0001-R01	Chrysene-d_{12} and Perylene-d_{12}	Initial

- Positive results reported for explosive compound HMX for samples ASX12-SS0001-R01 and ASX19-SS0001-R01 should be considered quantitative estimates. Poor precision was observed for these compounds on the dual chromatographic columns used for sample analysis. As required by USEPA protocol, the laboratory for reporting purposes used the lower concentration for these compounds. The results for this explosive compound have been marked with "J" qualifiers to indicate that they are quantitative estimates.
- The laboratory reported the higher concentration of 293 mg/Kg for explosive compound HMX, detected by the dual chromatographic columns used for analysis for sample ASX18-SS0001-R01. USEPA protocol requires the reporting of the lower concentration. EDQ has edited the Form I to reflect the lower concentration of 269 µg/Kg.
- Results for OCDD for samples ASX01-SS0001-R01, ASX02-SS0001-R01, and OCDF for sample ASX14-SS0001-R01 should be considered estimates. The ion abundance ratios for these compounds exceeded the method-specified criteria, but were within the Region III expanded criterion of ± 25 percent. These substituted isomers are considered to be present, and are qualified "J".

- Duplicate samples AXS09-SS0001-R01 and AXS09-SS0001P-R01, and AXS16-SS0001-R01 and AXS16-SS0001P-R01 were submitted to the laboratory to evaluate sampling and analytical precision for those organic compounds determined to be present. Results for these duplicate samples are presented in Table 3-2 and 3-3. Precision is evaluated by calculating the relative percent difference (%RPD) between duplicate pair results. There are no USEPA-established acceptance criteria for field duplicate samples. EDQ uses internal acceptance criteria of thirty percent for volatile detected compounds (and 40 percent for extractable compounds) to evaluate soil field duplicate samples.

3.1.3 *General Data Qualifiers*

- As required by CLP protocol, all semivolatile TICs have been reported with "J" qualifiers to indicate that they are quantitative estimates. EDQ has reported only those TIC results that have not been determined to be laboratory or field artifacts, and where possible has grouped TIC of similar classification.
- As required by CLP protocol, all compounds that, were qualitatively identified at concentrations below their respective Contract Required Quantitation Limits (CRQLs), have been marked with "J" qualifiers to indicate that they are quantitative estimates.

Table 3-2 Field Duplicate Sample Results for Organic Analyses
Soil Duplicate Samples AXS09-SS0001-R01 and AXS09-SS0001P-R01

	AXS09-SS0001-R01 (µg/Kg)		AXS09-SS0001P-R01 (µg/Kg)		RPD	Comments
Acetone	12	B	ND		NC	
Methylene Chloride	8	B	9	B	NC	
Dimethylphthalate	1100		ND		NC	
Phenanthrene	57	J	58	J	1.7	
Chrysene	47	J	43	J	8.9	
Benzo[a]pyrene	24	J	ND		NC	
Benzo[a]anthracene	ND		24	J	NC	

Table 3-3 Field Duplicate Sample Results for Organic Analyses
Soil Duplicate Samples AXS16-SS0001-R01 and AXS16-SS0001P-R01

	AXS16-SS0001-R01 (µg/Kg)		AXS16-SS0001P-R01 (µg/Kg)		RPD	Comments
Methylene Chloride	5	B	8	B	NC	
Phenanthrene	62	J	49	J	23.4	
Benzo[a]anthracene	29	J	ND		NC	
Chrysene	47	J	40	J	16.1	
Benzo[a]pyrene	29	J	24	J	18.9	

4.0 *INORGANIC DATA*

The samples were analyzed for total metals, dissolved metals, cyanide, total organic carbon, as indicated in Table 1-1.

The findings offered in this report are based on a review of the analytical data reported according to a CLP-equivalent deliverable format.

The data validation included an assessment of the following items: chain of custody documentation, holding times, equipment, field, and laboratory method blank results, initial and continuing calibrations, matrix spike analysis results, laboratory and field duplicate analysis results, Inductively Coupled Plasma (ICP) Emission Spectroscopy interference check sample results, ICP serial dilution results, laboratory control sample results, quantitation limit standard analysis results, qualitative identification, and quantitation of results.

The inorganic analyses were performed acceptably, but require qualifying statements. It is recommended that the data only be used with the qualifying statements presented below. Any data that are not discussed in this report should be considered qualitatively and quantitatively valid, based on the items evaluated. Validated and/or qualified results for the samples are provided in Attachment 1.

4.1 *DATA QUALIFIERS*

4.1.1 *Subsurface Soil Samples*

- The positive results reported for the metals and cyanide for the samples presented on page 9 are qualitatively invalid due to their presence in the associated field and laboratory method blanks. USEPA protocol requires positive results for elemental contaminants, that are less than or equal to five times the blank contamination level, to be considered qualitatively invalid. Placing "B" qualifiers next to the quantitative results for these metals in the samples has indicated this.

Analyte	Affected Samples
Antimony	ASX16A-SB0102-R01, ASX17A-SB0102-R01, ASX18A-SB0102-R01,
Cyanide	ASX14A-SB0102-R01, ASX14A-SB0102P-R01, ASX16A-SB0102P-R01, ASX17A-SB0102-R01, ASX18A-SB0102-R01, ASX19A-SB0102-R01, ASX20A-SB0102-R01
Mercury	ASX14A-SB0102-R01, ASX14A-SB0102P-R01, ASX15A-SB0102-R01
Tin	All Sample Results

- Positive results and detection limits for antimony for samples not previously qualified, are biased low quantitative estimates and may be higher than reported. The associated matrix spike recoveries were below the acceptance limit for this analyte. The low recoveries indicate the presence of interferences for this analyte for samples of similar matrix. Positive antimony results have been marked "L" to indicate that they are biased low. Detection limits are marked "UL".
- Selenium positive results for all of the samples are biased high quantitative estimates, and may be lower than reported. High recoveries for this analyte were obtained for the associated CRDL standard analyses. The high recoveries indicate nonlinearity of the ICP instrument in the range of the quantitation limit. The positive results for selenium for these samples have been marked with "K" qualifiers to indicate that they are biased high quantitative estimates.
- Positive lead results for the samples are biased high quantitative estimates and may be lower than reported. The associated matrix spike recovery was above the acceptance limit for this analyte. The high recovery indicates the presence of interferences for this analyte for samples of similar matrix. Positive results have been marked "K" to indicate that they are biased high.
- Positive chromium and nickel results for samples should be considered quantitative estimates. The ICP serial dilution criterion was exceeded for these analytes. The lack of precision may be due to the presence of interferences for samples of similar matrix. The chromium and nickel results have been marked with "J" qualifiers to indicate that they are quantitative estimates.

4.1.2 *Surface Soil Samples*

- Positive results for beryllium, cobalt, and nickel in the samples presented on page 10 are biased high quantitative estimates, and may be lower than reported. High recoveries for these analytes were

Table 4-1 Field Duplicate Sample Results for TAL Inorganics
Soil Duplicate Samples ASX14A-SB0102-R01 and ASX14A-SB0102P-R01

Analyte	Sample		Field Duplicate		RPD	FOOT NOTES
	ASX14A-SB0102-R01		ASX14A-SB0102P-R01			
Aluminum	9160		9280		1.3	
Antimony	2.1	L	1.3	L	47.1	Already Qualified
Arsenic	6.5		6.6		1.5	
Barium	151		154		2.0	
Beryllium	1.1		1.1		0.0	
Chromium	14.5	J	14.8	J	2.0	
Cobalt	14.3		14.7		2.8	
Copper	15.5		16.2		4.4	
Iron	31300		32300		3.1	
Lead	14.9	K	15.9	K	6.5	
Manganese	911		926		1.6	
Mercury	0.03	B	0.04	B	28.6	
Nickel	22.4	J	23.7	J	5.6	
Selenium	1.4	K	1.2	K	15.4	
Thallium	1.9		2.1		10.0	
Vanadium	20.9		21.1		1.0	
Zinc	66.3		65.6		1.1	
Tin	4.0	B	3.9	B	2.5	
Cyanide	0.15		0.24		46.2	
Total Organic Carbon	9050		9370		3.5	
Nitrate	ND		ND		NC	
Nitrate	ND		ND		NC	
Perchlorate	0.120		0.092		26.4	
pH	7.0		7.1		1.4	

obtained for the associated CRDL standard analyses. The high recoveries indicate nonlinearity of the ICP instrument in the range of the quantitation limit. The positive results for beryllium, cobalt, and nickel in these samples have been marked with "K" qualifiers to indicate that they are biased high quantitative estimates.

Analyte	Affected Samples
Beryllium	All samples
Cobalt	ASX09-SS0001-R01, ASX09-SS0001-R01P, ASX10-SS0001-R01, ASX11-SS0001-R01, ASX13-SS0001-R01, ASX14-SS0001-R01, ASX15-SS0001-R01, ASX16-SS0001-R01, ASX16-SS0001-R01P, ASX17-SS0001-R01, ASX18-SS0001-R01, ASX19-SS0001-R01
Nickel	ASX01-SS0001-R01, ASX02-SS0001-R01, ASX03-SS0001-R01, ASX04-SS0001-R01, ASX05-SS0001-R01, ASX06-SS0001-R01, ASX07-SS0001-R01, ASX08-SS0001-R01, ASX12-SS0001-R01, ASX19-SS0001-R01, ASX20-SS0001-R01

- Positive antimony results for all samples are biased low quantitative estimates and may be higher than reported. The associated matrix spike recoveries were below the acceptance limit for this analyte. The low recoveries indicate the presence of interferences for this analyte for samples of similar matrix. Positive results for these analytes have been marked "L" to indicate that they are biased low.
- Positive zinc results for all samples are biased high quantitative estimates and may be lower than reported. The associated matrix spike recovery was above the acceptance limit for this analyte. The high recovery indicates the presence of interferences for this analyte for samples of similar matrix. Positive results have been marked "K" to indicate that they are biased high.
- Duplicate sample pairs AXS09-SS0001-R01 and AXS09-SS0001P-R01, and AXS16-SS0001-R01 and AXS16-SS0001P-R01 were submitted to the laboratory evaluate sampling and analytical precision for those analytes determined to be present. Results for these duplicate samples are presented in Table 4-2 and 4-3. There are no USEPA-established acceptance criteria for field duplicate samples. EDQ uses internal acceptance criterion of 40 percent for values greater than five times the QL (or $\pm$ two times the QL for results less than five times the QL).

4.1.3 *General Data Qualifiers*

- The laboratory reported results for metals and cyanide detected in samples at concentrations greater than the instrument detection limit, but less than the CRDL with "B" flags. EDQ has flagged results for metals and cyanide below the CRDL with "J" qualifiers to indicate that they are quantitative estimates.

Table 4-2 Field Duplicate Sample Results for TAL Inorganics
Soil Duplicate Samples AXS09-SS0001-R01 and AXS09-SS0001P-R01

Analyte	Sample		Field Duplicate		RPD	FOOT NOTES
	AXS09-SS0001-R01		AXS09-SS0001P-R01			
Aluminum	9240.00		9800.00		5.9	
Antimony	1.10	L	0.87	L	23.4	
Arsenic	7.40		7.40		0.0	
Barium	219.00		239.00		8.7	
Beryllium	1.20	K	1.20	K	0.0	
Cadmium	1.00		0.77		26.0	
Chromium	14.60		15.00		2.7	
Cobalt	14.50	K	14.40	K	0.7	
Copper	21.50		21.60		0.5	
Iron	28900.00		29200.00		1.0	
Lead	38.00		31.30		19.3	
Manganese	1080.00		1120.00		3.6	
Mercury	0.07		0.08		13.3	
Nickel	25.00		25.60		2.4	
Thallium	0.68	J	0.46	J	38.6	
Vanadium	24.60		25.00		1.6	
Zinc	116.00	K	103.00	K	11.9	
Tin	5.60	J	6.00	J	6.9	
Cyanide	0.26	J	0.35	J	29.5	
TOC	42800.00		42800.00		0.0	
Nitrate	1.50		ND		NC	
Nitrite	ND		ND		NC	
Perchlorate	ND		ND		NC	
pH	7.00		6.80		2.9	

Table 4-3 Field Duplicate Sample Results for TAL Inorganics
Soil Duplicate Samples AXS16-SS0001-R01 and AXS16-SS0001P-R01

Analyte	Sample		Field Duplicate		RPD	FOOT NOTES
	AXS16-SS0001-R01		AXS16-SS0001P-R01			
Aluminum	7530.00		6700.00		11.7	
Antimony	0.50	L	0.45	L	10.5	
Arsenic	6.40		6.50		1.6	
Barium	134.00		136.00		1.5	
Beryllium	0.89	K	0.89	K	0.0	
Cadmium	0.62		0.73		16.3	
Chromium	11.50		10.80		6.3	
Cobalt	10.60	K	10.70	K	0.9	
Copper	17.30		17.40		0.6	
Iron	22600.00		22800.00		0.9	
Lead	26.60		25.80		3.1	
Manganese	672.00		712.00		5.8	
Mercury	0.04	J	0.04		0.0	
Nickel	21.00		17.60		17.6	
Thallium	ND		0.46	J	NC	
Vanadium	17.25		16.10		6.9	
Zinc	65.50	K	64.00	K	2.3	
Tin	5.50	J	5.50	J	0.0	
Cyanide	0.27	J	0.21	J	25.0	
TOC	19300.00		24300.00		22.9	
Nitrate	1.70		1.40		19.4	
Nitrite	ND		ND		NC	
Perchlorate	ND		ND		NC	
pH	7.80		7.90		1.3	

5.0 *SUMMARY*

The organic and inorganic analyses described in this analytical data validation report were performed acceptably, but required qualifying statements. The aspects of the data, which required qualification, are identified in this report.

Attachment 1
Analysis Result Forms

Data Validation Qualifier Code Glossary

B - The compound/analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

J - The positive result reported for this analyte is a quantitative estimate.

U - This compound/analyte was not detected in the sample. The numeric value represents the sample quantitation/detection limit.

UJ - This compound/analyte was not detected in the sample. The quantitation/detection should be considered estimated and may be inaccurate or imprecise.

R The result for this compound/analyte is unusable. The analyte may or may not be present.

K - The positive result reported for this analyte is a biased high quantitative estimate. The actual result may be lower than reported.

L - The positive result for this analyte is a biased low quantitative estimate. The actual result may be higher than reported.

UL - This compound/analyte was not detected in the sample. The actual quantitation/detection may be higher than reported.

I - A peak was present in the diphenyl ether channel. The presence of interferences is indicated.

Other Codes:

ND - There were no positive results for this analytical fraction.

NA - This parameter is not applicable to this sample.

NR - This analysis parameter was not required for this sample.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ASX14A-SB-0102-R01

ab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.01A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46756.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	60	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	240	U	
75-09-2	Methylene Chloride	3	~~B~~	B
107-13-1	Acrylonitrile	60	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	120	~~U~~	R
126-98-7	Methacrylonitrile	120	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	240	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	600	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

SMK 4/11/2001

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB-0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.01A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46756.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

smk 4/11/2001

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB0102P-R01

b Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.02A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46757.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	60	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	240	U	
75-09-2	Methylene Chloride	6	B	
107-13-1	Acrylonitrile	60	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	120	~~U~~	R
126-98-7	Methacrylonitrile	120	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	240	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	600	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

4/11/01

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB0102P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.02A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46757.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

4/11/2001

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.03A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46758.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	62	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	250	U	
75-09-2	Methylene Chloride	4	~~BU~~	B
107-13-1	Acrylonitrile	62	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	120	~~U~~	R
126-98-7	Methacrylonitrile	120	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	250	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	620	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

smk 4/11/2001

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.03A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46758.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

smk 4/11/01

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16A-SB0102-R01

ab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.04A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46759.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	60	~~UJ~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	4	~~BJ~~ B
107-13-1	Acrylonitrile	60	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~UJ~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~UJ~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	5	J
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	600	~~UJ~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

4/11/01

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.04A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46759.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46760.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 15 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	59	~~UJ~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	240	U	
75-09-2	Methylene Chloride	6	~~BJ~~	B
107-13-1	Acrylonitrile	59	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	120	~~UJ~~	R
126-98-7	Methacrylonitrile	120	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	240	~~UJ~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	590	~~UJ~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

4/11/01

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46760.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 15 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18A-SB0102-R01

ab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.06A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46761.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 18 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	61	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U ✓
75-09-2	Methylene Chloride	9	B ✓
107-13-1	Acrylonitrile	61	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	610	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

4/11/01

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.06A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46761.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 18 Date Analyzed: 03/02/01

GC Column: DB=624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.07A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46755.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 17 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	60	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	240	U	✓
75-09-2	Methylene Chloride	10	B	
107-13-1	Acrylonitrile	60	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	120	~~U~~	R
126-98-7	Methacrylonitrile	120	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	240	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	600	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ASX19A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.07A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46755.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 17 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

4/11/01

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20A-SB0102-R01

b Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.10A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46762.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	60	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	5	~~B~~ B
107-13-1	Acrylonitrile	60	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	600	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

4/11/2001

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.10A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46762.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-FB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.11

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15023.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5	U
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
75-69-4	Trichlorofluoromethane	5	U
107-02-8	Acrolein	50	U
75-35-4	1,1-Dichloroethene	5	U
67-64-1	Acetone	5	U
74-88-4	Methyl Iodide	5	U
75-15-0	Carbon Disulfide	5	U
107-05-1	Allyl chloride	5	U
75-05-8	Acetonitrile	200	U
75-09-2	Methylene Chloride	5	U
107-13-1	Acrylonitrile	50	U
75-34-3	1,1-Dichloroethane	5	U
108-05-4	Vinyl Acetate	5	U
126-99-8	Chloroprene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
78-93-3	2-Butanone	5	U
107-12-0	Propionitrile	100	U
126-98-7	Methacrylonitrile	100	U
67-66-3	Chloroform	3	J
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
71-43-2	Benzene	5	U
78-83-1	Isobutyl alcohol	200	U
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
123-91-1	1,4-Dioxane	500	U
80-62-6	Methyl methacrylate	5	U
75-27-4	Bromodichloromethane	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-FB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.11

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15023.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-10-1	4-Methyl-2-Pentanone	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
97-63-2	Ethyl methacrylate	5	U
79-00-5	1,1,2-Trichloroethane	5	U
106-93-4	1,2-Dibromoethane	5	U
127-18-4	Tetrachloroethene	5	U
591-78-6	2-Hexanone	5	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
110-57-6	trans-1,4-Dichloro-2-butene	5	U
76-01-7	Pentachloroethane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
96-18-4	1,2,3-Trichloropropane	5	U
96-12-8	1,2-Dibromo-3-chloropropane	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.12

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15024.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5	U
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
75-69-4	Trichlorofluoromethane	5	U
107-02-8	Acrolein	50	U
75-35-4	1,1-Dichloroethene	5	U
67-64-1	Acetone	5	U
74-88-4	Methyl Iodide	5	U
75-15-0	Carbon Disulfide	5	U
107-05-1	Allyl chloride	5	U
75-05-8	Acetonitrile	200	U
75-09-2	Methylene Chloride	5	U
107-13-1	Acrylonitrile	50	U
75-34-3	1,1-Dichloroethane	5	U
108-05-4	Vinyl Acetate	5	U
126-99-8	Chloroprene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
78-93-3	2-Butanone	5	U
107-12-0	Propionitrile	100	U
126-98-7	Methacrylonitrile	100	U
67-66-3	Chloroform	2	J
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
71-43-2	Benzene	5	U
78-83-1	Isobutyl alcohol	200	U
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
123-91-1	1,4-Dioxane	500	U
80-62-6	Methyl methacrylate	5	U
75-27-4	Bromodichloromethane	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.12

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15024.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-10-1	4-Methyl-2-Pentanone	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
97-63-2	Ethyl methacrylate	5	U
79-00-5	1,1,2-Trichloroethane	5	U
106-93-4	1,2-Dibromoethane	5	U
127-18-4	Tetrachloroethene	5	U
591-78-6	2-Hexanone	5	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
110-57-6	trans-1,4-Dichloro-2-butene	5	U
76-01-7	Pentachloroethane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
96-18-4	1,2,3-Trichloropropane	5	U
96-12-8	1,2-Dibromo-3-chloropropane	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ASX00-TB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.13

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15025.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5	U
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
75-69-4	Trichlorofluoromethane	5	U
107-02-8	Acrolein	50	U
75-35-4	1,1-Dichloroethene	5	U
67-64-1	Acetone	5	U
74-88-4	Methyl Iodide	5	U
75-15-0	Carbon Disulfide	5	U
107-05-1	Allyl chloride	5	U
75-05-8	Acetonitrile	200	U
75-09-2	Methylene Chloride	5	U
107-13-1	Acrylonitrile	50	U
75-34-3	1,1-Dichloroethane	5	U
108-05-4	Vinyl Acetate	5	U
126-99-8	Chloroprene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
78-93-3	2-Butanone	5	U
107-12-0	Propionitrile	100	U
126-98-7	Methacrylonitrile	100	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
71-43-2	Benzene	5	U
78-83-1	Isobutyl alcohol	200	U
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
123-91-1	1,4-Dioxane	500	U
80-62-6	Methyl methacrylate	5	U
75-27-4	Bromodichloromethane	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-TB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.13

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15025.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-10-1	4-Methyl-2-Pentanone	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
97-63-2	Ethyl methacrylate	5	U
79-00-5	1,1,2-Trichloroethane	5	U
106-93-4	1,2-Dibromoethane	5	U
127-18-4	Tetrachloroethene	5	U
591-78-6	2-Hexanone	5	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
110-57-6	trans-1,4-Dichloro-2-butene	5	U
76-01-7	Pentachloroethane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
96-18-4	1,2,3-Trichloropropane	5	U
96-12-8	1,2-Dibromo-3-chloropropane	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-FB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.14

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15026.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5	U
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
75-69-4	Trichlorofluoromethane	5	U
107-02-8	Acrolein	50	U
75-35-4	1,1-Dichloroethene	5	U
67-64-1	Acetone	5	U
74-88-4	Methyl Iodide	5	U
75-15-0	Carbon Disulfide	5	U
107-05-1	Allyl chloride	5	U
75-05-8	Acetonitrile	200	U
75-09-2	Methylene Chloride	5	U
107-13-1	Acrylonitrile	50	U
75-34-3	1,1-Dichloroethane	5	U
108-05-4	Vinyl Acetate	5	U
126-99-8	Chloroprene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
78-93-3	2-Butanone	5	U
107-12-0	Propionitrile	100	U
126-98-7	Methacrylonitrile	100	U
67-66-3	Chloroform	7	
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
71-43-2	Benzene	5	U
78-83-1	Isobutyl alcohol	200	U
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
123-91-1	1,4-Dioxane	500	U
80-62-6	Methyl methacrylate	5	U
75-27-4	Bromodichloromethane	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-FB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.14

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15026.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-10-1	4-Methyl-2-Pentanone	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
97-63-2	Ethyl methacrylate	5	U
79-00-5	1,1,2-Trichloroethane	5	U
106-93-4	1,2-Dibromoethane	5	U
127-18-4	Tetrachloroethene	5	U
591-78-6	2-Hexanone	5	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
110-57-6	trans-1,4-Dichloro-2-butene	5	U
76-01-7	Pentachloroethane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
96-18-4	1,2,3-Trichloropropane	5	U
96-12-8	1,2-Dibromo-3-chloropropane	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.15

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15027.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5	U
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
75-69-4	Trichlorofluoromethane	5	U
107-02-8	Acrolein	50	U
75-35-4	1,1-Dichloroethene	5	U
67-64-1	Acetone	5	U
74-88-4	Methyl Iodide	5	U
75-15-0	Carbon Disulfide	5	U
107-05-1	Allyl chloride	5	U
75-05-8	Acetonitrile	200	U
75-09-2	Methylene Chloride	5	U
107-13-1	Acrylonitrile	50	U
75-34-3	1,1-Dichloroethane	5	U
108-05-4	Vinyl Acetate	5	U
126-99-8	Chloroprene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
78-93-3	2-Butanone	5	U
107-12-0	Propionitrile	100	U
126-98-7	Methacrylonitrile	100	U
67-66-3	Chloroform	5	
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
71-43-2	Benzene	5	U
78-83-1	Isobutyl alcohol	200	U
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
123-91-1	1,4-Dioxane	500	U
80-62-6	Methyl methacrylate	5	U
75-27-4	Bromodichloromethane	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.15

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15027.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-10-1	4-Methyl-2-Pentanone	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
97-63-2	Ethyl methacrylate	5	U
79-00-5	1,1,2-Trichloroethane	5	U
106-93-4	1,2-Dibromoethane	5	U
127-18-4	Tetrachloroethene	5	U
591-78-6	2-Hexanone	5	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
110-57-6	trans-1,4-Dichloro-2-butene	5	U
76-01-7	Pentachloroethane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
96-18-4	1,2,3-Trichloropropane	5	U
96-12-8	1,2-Dibromo-3-chloropropane	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-TB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.16

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15028.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
75-71-8	Dichlorodifluoromethane	5	U
74-87-3	Chloromethane	5	U
75-01-4	Vinyl Chloride	5	U
74-83-9	Bromomethane	5	U
75-00-3	Chloroethane	5	U
75-69-4	Trichlorofluoromethane	5	U
107-02-8	Acrolein	50	U
75-35-4	1,1-Dichloroethene	5	U
67-64-1	Acetone	5	U
74-88-4	Methyl Iodide	5	U
75-15-0	Carbon Disulfide	5	U
107-05-1	Allyl chloride	5	U
75-05-8	Acetonitrile	200	U
75-09-2	Methylene Chloride	5	U
107-13-1	Acrylonitrile	50	U
75-34-3	1,1-Dichloroethane	5	U
108-05-4	Vinyl Acetate	5	U
126-99-8	Chloroprene	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
78-93-3	2-Butanone	5	U
107-12-0	Propionitrile	100	U
126-98-7	Methacrylonitrile	100	U
67-66-3	Chloroform	5	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
71-43-2	Benzene	5	U
78-83-1	Isobutyl alcohol	200	U
107-06-2	1,2-Dichloroethane	5	U
79-01-6	Trichloroethene	5	U
78-87-5	1,2-Dichloropropane	5	U
74-95-3	Dibromomethane	5	U
123-91-1	1,4-Dioxane	500	U
80-62-6	Methyl methacrylate	5	U
75-27-4	Bromodichloromethane	5	U
110-75-8	2-Chloroethyl vinyl ether	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-TB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.16

Sample wt/vol: 5 (g/mL) ML Lab File ID: UL15028.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. _____ Date Analyzed: 02/28/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-10-1	4-Methyl-2-Pentanone	5	U
108-88-3	Toluene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
97-63-2	Ethyl methacrylate	5	U
79-00-5	1,1,2-Trichloroethane	5	U
106-93-4	1,2-Dibromoethane	5	U
127-18-4	Tetrachloroethene	5	U
591-78-6	2-Hexanone	5	U
124-48-1	Dibromochloromethane	5	U
108-90-7	Chlorobenzene	5	U
630-20-6	1,1,1,2-Tetrachloroethane	5	U
100-41-4	Ethylbenzene	5	U
1330-20-7	Xylenes (total)	5	U
100-42-5	Styrene	5	U
75-25-2	Bromoform	5	U
110-57-6	trans-1,4-Dichloro-2-butene	5	U
76-01-7	Pentachloroethane	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
96-18-4	1,2,3-Trichloropropane	5	U
96-12-8	1,2-Dibromo-3-chloropropane	5	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB-0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.01

Sample wt/vol: 31.1 (g/mL) G Lab File ID: T1030716.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	960	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB-0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.01

Sample wt/vol: 31.1 (g/mL) G Lab File ID: T1030716.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U
98-95-3	Nitrobenzene	380	U
100-75-4	n-Nitrosopiperidine	380	U
78-59-1	Isophorone	380	U
126-68-1	o,o,o-Triethylphosphorothioate	380	U
924-16-3	n-Nitrosodibutylamine	380	U
120-58-1	Isosafrole	380	U
122-09-8	a,a-Dimethylphenethylamine	960	U
65-85-0	Benzoic acid	960	U
106-50-3	p-Phenylenediamine	960	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	960	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	960	U
131-11-3	Dimethylphthalate	380	U
208-96-8	Acenaphthylene	380	U
99-09-2	3-Nitroaniline	960	U
83-32-9	Acenaphthene	380	U
51-28-5	2,4-Dinitrophenol	960	U
100-02-7	4-Nitrophenol	960	U
132-64-9	Dibenzofuran	380	U
1888-71-7	Hexachloropropene	960	U
608-93-5	Pentachlorobenzene	380	U
58-90-2	2,3,4,6-Tetrachlorophenol	380	U
84-66-2	Diethylphthalate	380	U
7005-72-3	4-Chlorophenyl-phenylether	380	U
86-73-7	Fluorene	380	U
100-01-6	4-Nitroaniline	960	U
94-59-7	Safrole	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB-0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.01

Sample wt/vol: 31.1 (g/mL) G Lab File ID: T1030716.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	960	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	380	U
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	960	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	960	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	960	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	960	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB-0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.01

Sample wt/vol: 31.1 (g/mL) G Lab File ID: T1030716.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	380	U
129-00-0	Pyrene	380	U
85-68-7	Butylbenzylphthalate	380	U
56-55-3	Benzo(a)anthracene	380	U
218-01-9	Chrysene	380	U
117-81-7	bis(2-Ethylhexyl)phthalate	380	U
140-57-8	Aramite	960	U
60-11-7	Methyl Yellow	380	U
510-15-6	Chlorobenzilate	380	U
119-93-7	3,3'-Dimethylbenzidine	380	U
53-96-3	2-Acetylaminofluorene	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
143-50-0	Kepone	960	U
52-85-7	Famphur	380	U
117-84-0	Di-n-octylphthalate	380	U
205-99-2	Benzo(b)fluoranthene	380	U
207-08-9	Benzo(k)fluoranthene	380	U
50-32-8	Benzo(a)pyrene	380	U
193-39-5	Indeno(1,2,3-cd)pyrene	380	U
53-70-3	Dibenz(a,h)anthracene	380	U
191-24-2	Benzo(g,h,i)perylene	380	U
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U
56-49-5	3-Methylchloranthrene	380	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	380	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB0102P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.02

Sample wt/vol: 30.1 (g/mL) G Lab File ID: T1030717.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	400	U
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
100-51-6	Benzyl alcohol	400	U
95-50-1	1,2-Dichlorobenzene	400	U
108-60-1	bis(2-Chloroisopropyl)ether	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
110-86-1	Pyridine	400	U
62-75-9	N-Nitrosodimethylamine	400	U
109-06-8	2-Picoline	400	U
10595-95-6	n-Nitrosomethylethylamine	400	U
66-27-3	Methyl methanesulfonate	990	U
55-18-5	n-Nitrosodiethylamine	400	U
62-50-0	Ethyl methanesulfonate	400	U
98-86-2	Acetophenone	400	U
930-55-2	n-Nitrosopyrrolidine	400	U
59-89-2	n-Nitrosomorpholine	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
95-53-4	o-Toluidine	400	U
108-39-4	3-Methylphenol	400	U
106-44-5	4-Methylphenol	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	400	U
87-65-0	2,6-Dichlorophenol	400	U
106-47-8	4-Chloroaniline	400	U

4/11/2001

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB0102P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.02

Sample wt/vol: 30.1 (g/mL) G Lab File ID: T1030717.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-methylphenol	400	U
91-57-6	2-Methylnaphthalene	400	U
95-94-3	1,2,4,5-Tetrachlorobenzene	400	U
98-95-3	Nitrobenzene	400	U
100-75-4	n-Nitrosopiperidine	400	U
78-59-1	Isophorone	400	U
126-68-1	o,o,o-Triethylphosphorothioate	400	U
924-16-3	n-Nitrosodibutylamine	400	U
120-58-1	Isosafrole	400	U
122-09-8	a,a-Dimethylphenethylamine	990	U
65-85-0	Benzoic acid	990	U
106-50-3	p-Phenylenediamine	990	U
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	990	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	990	U
131-11-3	Dimethylphthalate	400	U
208-96-8	Acenaphthylene	400	U
99-09-2	3-Nitroaniline	990	U
83-32-9	Acenaphthene	400	U
51-28-5	2,4-Dinitrophenol	990	U
100-02-7	4-Nitrophenol	990	U
132-64-9	Dibenzofuran	400	U
1888-71-7	Hexachloropropene	990	U
608-93-5	Pentachlorobenzene	400	U
58-90-2	2,3,4,6-Tetrachlorophenol	400	U
84-66-2	Diethylphthalate	400	U
7005-72-3	4-Chlorophenyl-phenylether	400	U
86-73-7	Fluorene	400	U
100-01-6	4-Nitroaniline	990	U
94-59-7	Safrole	400	U

SMK 4/11/2001

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB0102P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.02

Sample wt/vol: 30.1 (g/mL) G Lab File ID: T1030717.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	400	U
99-65-0	1,3-Dinitrobenzene	400	U
606-20-2	2,6-Dinitrotoluene	400	U
134-32-7	1-Naphthylamine	400	U
121-14-2	2,4-Dinitrotoluene	400	U
91-59-8	2-Naphthylamine	400	U
99-55-8	2-Methyl-5-nitroaniline	400	U
297-97-2	Thionazin	400	U
122-39-4	Diphenylamine	400	U
534-52-1	4,6-Dinitro-2-methylphenol	990	U
101-55-3	4-Bromophenyl-phenylether	400	U
118-74-1	Hexachlorobenzene	400	U
85-01-8	Phenanthrene	400	U
120-12-7	Anthracene	400	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	400	U
84-74-2	Di-n-butylphthalate	400	U
206-44-0	Fluoranthene	400	U
87-86-5	Pentachlorophenol	990	U
86-30-6	N-Nitrosodiphenylamine	400	U
298-02-2	Phorate	400	U
62-44-2	Phenacetin	400	U
2303-16-4	Diallate	400	U
60-51-5	Dimethoate	400	U
92-67-1	4-Aminobiphenyl	400	U
82-68-8	Pentachloronitrobenzene	990	U
23950-58-5	Pronamide	400	U
298-04-4	Disulfoton	400	U
298-00-0	Methyl parathion	400	U
56-38-2	Parathion	400	U
91-80-5	Methapyrilene	990	U
465-73-6	Isodrin	400	U
3689-24-5	Sulfotep	400	U
56-57-5	4-Nitroquinoline-1-oxide	990	U

4/11/2001

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB0102P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.02

Sample wt/vol: 30.1 (g/mL) G Lab File ID: T1030717.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	400	U
129-00-0	Pyrene	400	U
85-68-7	Butylbenzylphthalate	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	400	U
117-81-7	bis(2-Ethylhexyl)phthalate	400	U
140-57-8	Aramite	990	U
60-11-7	Methyl Yellow	400	U
510-15-6	Chlorobenzilate	400	U
119-93-7	3,3'-Dimethylbenzidine	400	U
53-96-3	2-Acetylaminofluorene	400	U
91-94-1	3,3'-Dichlorobenzidine	400	U
143-50-0	Kepone	990	U
52-85-7	Famphur	400	U
117-84-0	Di-n-octylphthalate	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U
57-97-6	7,12-Dimethylbenz(a)anthracene	400	U
56-49-5	3-Methylchloranthrene	400	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	400	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.03

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030723.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	390	U
108-95-2	Phenol	390	U
111-44-4	bis(2-Chloroethyl)ether	390	U
95-57-8	2-Chlorophenol	390	U
541-73-1	1,3-Dichlorobenzene	390	U
106-46-7	1,4-Dichlorobenzene	390	U
100-51-6	Benzyl alcohol	390	U
95-50-1	1,2-Dichlorobenzene	390	U
108-60-1	bis(2-Chloroisopropyl)ether	390	U
95-48-7	2-Methylphenol	390	U
67-72-1	Hexachloroethane	390	U
110-86-1	Pyridine	390	U
62-75-9	N-Nitrosodimethylamine	390	U
109-06-8	2-Picoline	390	U
10595-95-6	n-Nitrosomethylethylamine	390	U
66-27-3	Methyl methanesulfonate	980	U
55-18-5	n-Nitrosodiethylamine	390	U
62-50-0	Ethyl methanesulfonate	390	U
98-86-2	Acetophenone	390	U
930-55-2	n-Nitrosopyrrolidine	390	U
59-89-2	n-Nitrosomorpholine	390	U
621-64-7	N-Nitroso-di-n-propylamine	390	U
95-53-4	o-Toluidine	390	U
108-39-4	3-Methylphenol	390	U
106-44-5	4-Methylphenol	390	U
88-75-5	2-Nitrophenol	390	U
105-67-9	2,4-Dimethylphenol	390	U
111-91-1	bis(2-Chloroethoxy)methane	390	U
120-83-2	2,4-Dichlorophenol	390	U
120-82-1	1,2,4-Trichlorobenzene	390	U
91-20-3	Naphthalene	390	U
87-65-0	2,6-Dichlorophenol	390	U
106-47-8	4-Chloroaniline	390	U

SMT 4/11/2001

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.03

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030723.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	390	U
59-50-7	4-Chloro-3-methylphenol	390	U
91-57-6	2-Methylnaphthalene	390	U
95-94-3	1,2,4,5-Tetrachlorobenzene	390	U
98-95-3	Nitrobenzene	390	U
100-75-4	n-Nitrosopiperidine	390	U
78-59-1	Isophorone	390	U
126-68-1	o,o,o-Triethylphosphorothioate	390	U
924-16-3	n-Nitrosodibutylamine	390	U
120-58-1	Isosafrole	390	U
122-09-8	a,a-Dimethylphenethylamine	980	U
65-85-0	Benzoic acid	980	U
106-50-3	p-Phenylenediamine	980	U
77-47-4	Hexachlorocyclopentadiene	390	U
88-06-2	2,4,6-Trichlorophenol	390	U
95-95-4	2,4,5-Trichlorophenol	980	U
91-58-7	2-Chloronaphthalene	390	U
88-74-4	2-Nitroaniline	980	U
131-11-3	Dimethylphthalate	390	U
208-96-8	Acenaphthylene	390	U
99-09-2	3-Nitroaniline	980	U
83-32-9	Acenaphthene	390	U
51-28-5	2,4-Dinitrophenol	980	U
100-02-7	4-Nitrophenol	980	U
132-64-9	Dibenzofuran	390	U
1888-71-7	Hexachloropropene	980	U
608-93-5	Pentachlorobenzene	390	U
58-90-2	2,3,4,6-Tetrachlorophenol	390	U
84-66-2	Diethylphthalate	390	U
7005-72-3	4-Chlorophenyl-phenylether	390	U
86-73-7	Fluorene	390	U
100-01-6	4-Nitroaniline	980	U
94-59-7	Safrole	390	U

SMK 4/17/2001

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.03

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030723.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	390	U
99-65-0	1,3-Dinitrobenzene	390	U
606-20-2	2,6-Dinitrotoluene	390	U
134-32-7	1-Naphthylamine	390	U
121-14-2	2,4-Dinitrotoluene	390	U
91-59-8	2-Naphthylamine	390	U
99-55-8	2-Methyl-5-nitroaniline	390	U
297-97-2	Thionazin	390	U
122-39-4	Diphenylamine	390	U
534-52-1	4,6-Dinitro-2-methylphenol	980	U
101-55-3	4-Bromophenyl-phenylether	390	U
118-74-1	Hexachlorobenzene	390	U
85-01-8	Phenanthrene	390	U
120-12-7	Anthracene	390	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	390	U
84-74-2	Di-n-butylphthalate	390	U
206-44-0	Fluoranthene	390	U
87-86-5	Pentachlorophenol	980	U
86-30-6	N-Nitrosodiphenylamine	390	U
298-02-2	Phorate	390	U
62-44-2	Phenacetin	390	U
2303-16-4	Diallate	390	U
60-51-5	Dimethoate	390	U
92-67-1	4-Aminobiphenyl	390	U
82-68-8	Pentachloronitrobenzene	980	U
23950-58-5	Pronamide	390	U
298-04-4	Disulfoton	390	U
298-00-0	Methyl parathion	390	U
56-38-2	Parathion	390	U
91-80-5	Methapyrilene	980	U
465-73-6	Isodrin	390	U
3689-24-5	Sulfotep	390	U
56-57-5	4-Nitroquinoline-1-oxide	980	U

smt 4/11/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.03

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030723.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	390	U
129-00-0	Pyrene	390	U
85-68-7	Butylbenzylphthalate	390	U
56-55-3	Benzo(a)anthracene	390	U
218-01-9	Chrysene	390	U
117-81-7	bis(2-Ethylhexyl)phthalate	390	U
140-57-8	Aramite	980	U
60-11-7	Methyl Yellow	390	U
510-15-6	Chlorobenzilate	390	U
119-93-7	3,3'-Dimethylbenzidine	390	U
53-96-3	2-Acetylaminofluorene	390	U
91-94-1	3,3'-Dichlorobenzidine	390	U
143-50-0	Kepone	980	U
52-85-7	Famphur	390	U
117-84-0	Di-n-octylphthalate	390	U
205-99-2	Benzo(b)fluoranthene	390	U
207-08-9	Benzo(k)fluoranthene	390	U
50-32-8	Benzo(a)pyrene	390	U
193-39-5	Indeno(1,2,3-cd)pyrene	390	U
53-70-3	Dibenz(a,h)anthracene	390	U
191-24-2	Benzo(g,h,i)perylene	390	U
57-97-6	7,12-Dimethylbenz(a)anthracene	390	U
56-49-5	3-Methylchloranthrene	390	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	390	U

4/11/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.04

Sample wt/vol: 30.4 (g/mL) G Lab File ID: T1030718.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	390	U
108-95-2	Phenol	390	U
111-44-4	bis(2-Chloroethyl)ether	390	U
95-57-8	2-Chlorophenol	390	U
541-73-1	1,3-Dichlorobenzene	390	U
106-46-7	1,4-Dichlorobenzene	390	U
100-51-6	Benzyl alcohol	390	U
95-50-1	1,2-Dichlorobenzene	390	U
108-60-1	bis(2-Chloroisopropyl)ether	390	U
95-48-7	2-Methylphenol	390	U
67-72-1	Hexachloroethane	390	U
110-86-1	Pyridine	390	U
62-75-9	N-Nitrosodimethylamine	390	U
109-06-8	2-Picoline	390	U
10595-95-6	n-Nitrosomethylethylamine	390	U
66-27-3	Methyl methanesulfonate	980	U
55-18-5	n-Nitrosodiethylamine	390	U
62-50-0	Ethyl methanesulfonate	390	U
98-86-2	Acetophenone	390	U
930-55-2	n-Nitrosopyrrolidine	390	U
59-89-2	n-Nitrosomorpholine	390	U
621-64-7	N-Nitroso-di-n-propylamine	390	U
95-53-4	o-Toluidine	390	U
108-39-4	3-Methylphenol	390	U
106-44-5	4-Methylphenol	390	U
88-75-5	2-Nitrophenol	390	U
105-67-9	2,4-Dimethylphenol	390	U
111-91-1	bis(2-Chloroethoxy)methane	390	U
120-83-2	2,4-Dichlorophenol	390	U
120-82-1	1,2,4-Trichlorobenzene	390	U
91-20-3	Naphthalene	390	U
87-65-0	2,6-Dichlorophenol	390	U
106-47-8	4-Chloroaniline	390	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.04

Sample wt/vol: 30.4 (g/mL) G Lab File ID: T1030718.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	390	U
59-50-7	4-Chloro-3-methylphenol	390	U
91-57-6	2-Methylnaphthalene	390	U
95-94-3	1,2,4,5-Tetrachlorobenzene	390	U
98-95-3	Nitrobenzene	390	U
100-75-4	n-Nitrosopiperidine	390	U
78-59-1	Isophorone	390	U
126-68-1	o,o,o-Triethylphosphorothioate	390	U
924-16-3	n-Nitrosodibutylamine	390	U
120-58-1	Isosafrole	390	U
122-09-8	a,a-Dimethylphenethylamine	980	U
65-85-0	Benzoic acid	980	U
106-50-3	p-Phenylenediamine	980	U
77-47-4	Hexachlorocyclopentadiene	390	U
88-06-2	2,4,6-Trichlorophenol	390	U
95-95-4	2,4,5-Trichlorophenol	980	U
91-58-7	2-Chloronaphthalene	390	U
88-74-4	2-Nitroaniline	980	U
131-11-3	Dimethylphthalate	390	U
208-96-8	Acenaphthylene	390	U
99-09-2	3-Nitroaniline	980	U
83-32-9	Acenaphthene	390	U
51-28-5	2,4-Dinitrophenol	980	U
100-02-7	4-Nitrophenol	980	U
132-64-9	Dibenzofuran	390	U
1888-71-7	Hexachloropropene	980	U
608-93-5	Pentachlorobenzene	390	U
58-90-2	2,3,4,6-Tetrachlorophenol	390	U
84-66-2	Diethylphthalate	390	U
7005-72-3	4-Chlorophenyl-phenylether	390	U
86-73-7	Fluorene	390	U
100-01-6	4-Nitroaniline	980	U
94-59-7	Safrole	390	U

smk 4/11/20

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.04

Sample wt/vol: 30.4 (g/mL) G Lab File ID: T1030718.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	390	U
99-65-0	1,3-Dinitrobenzene	390	U
606-20-2	2,6-Dinitrotoluene	390	U
134-32-7	1-Naphthylamine	390	U
121-14-2	2,4-Dinitrotoluene	390	U
91-59-8	2-Naphthylamine	390	U
99-55-8	2-Methyl-5-nitroaniline	390	U
297-97-2	Thionazin	390	U
122-39-4	Diphenylamine	390	U
534-52-1	4,6-Dinitro-2-methylphenol	980	U
101-55-3	4-Bromophenyl-phenylether	390	U
118-74-1	Hexachlorobenzene	390	U
85-01-8	Phenanthrene	390	U
120-12-7	Anthracene	390	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	390	U
84-74-2	Di-n-butylphthalate	390	U
206-44-0	Fluoranthene	390	U
87-86-5	Pentachlorophenol	980	U
86-30-6	N-Nitrosodiphenylamine	390	U
298-02-2	Phorate	390	U
62-44-2	Phenacetin	390	U
2303-16-4	Diallate	390	U
60-51-5	Dimethoate	390	U
92-67-1	4-Aminobiphenyl	390	U
82-68-8	Pentachloronitrobenzene	980	U
23950-58-5	Pronamide	390	U
298-04-4	Disulfoton	390	U
298-00-0	Methyl parathion	390	U
56-38-2	Parathion	390	U
91-80-5	Methapyrilene	980	U
465-73-6	Isodrin	390	U
3689-24-5	Sulfotep	390	U
56-57-5	4-Nitroquinoline-1-oxide	980	U

4/1/2001

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.04

Sample wt/vol: 30.4 (g/mL) G Lab File ID: T1030718.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	390	U
129-00-0	Pyrene	390	U
85-68-7	Butylbenzylphthalate	390	U
56-55-3	Benzo(a)anthracene	390	U
218-01-9	Chrysene	390	U
117-81-7	bis(2-Ethylhexyl)phthalate	390	U
140-57-8	Aramite	980	U
60-11-7	Methyl Yellow	390	U
510-15-6	Chlorobenzilate	390	U
119-93-7	3,3'-Dimethylbenzidine	390	U
53-96-3	2-Acetylaminofluorene	390	U
91-94-1	3,3'-Dichlorobenzidine	390	U
143-50-0	Kepone	980	U
52-85-7	Famphur	390	U
117-84-0	Di-n-octylphthalate	390	U
205-99-2	Benzo(b)fluoranthene	390	U
207-08-9	Benzo(k)fluoranthene	390	U
50-32-8	Benzo(a)pyrene	390	U
193-39-5	Indeno(1,2,3-cd)pyrene	390	U
53-70-3	Dibenz(a,h)anthracene	390	U
191-24-2	Benzo(g,h,i)perylene	390	U
57-97-6	7,12-Dimethylbenz(a)anthracene	390	U
56-49-5	3-Methylchloranthrene	390	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	390	U

4/11/2001

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030525.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/05/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	370	U
108-95-2	Phenol	370	U
111-44-4	bis(2-Chloroethyl)ether	370	U
95-57-8	2-Chlorophenol	370	U
541-73-1	1,3-Dichlorobenzene	370	U
106-46-7	1,4-Dichlorobenzene	370	U
100-51-6	Benzyl alcohol	370	U
95-50-1	1,2-Dichlorobenzene	370	U
108-60-1	bis(2-Chloroisopropyl)ether	370	U
95-48-7	2-Methylphenol	370	U
67-72-1	Hexachloroethane	370	U
110-86-1	Pyridine	370	U
62-75-9	N-Nitrosodimethylamine	370	U
109-06-8	2-Picoline	370	U
10595-95-6	n-Nitrosomethylethylamine	370	U
66-27-3	Methyl methanesulfonate	930	U
55-18-5	n-Nitrosodiethylamine	370	U
62-50-0	Ethyl methanesulfonate	370	U
98-86-2	Acetophenone	370	U
930-55-2	n-Nitrosopyrrolidine	370	U
59-89-2	n-Nitrosomorpholine	370	U
621-64-7	N-Nitroso-di-n-propylamine	370	U
95-53-4	o-Toluidine	370	U
108-39-4	3-Methylphenol	370	U
106-44-5	4-Methylphenol	370	U
88-75-5	2-Nitrophenol	370	U
105-67-9	2,4-Dimethylphenol	370	U
111-91-1	bis(2-Chloroethoxy)methane	370	U
120-83-2	2,4-Dichlorophenol	370	U
120-82-1	1,2,4-Trichlorobenzene	370	U
91-20-3	Naphthalene	370	U
87-65-0	2,6-Dichlorophenol	370	U
106-47-8	4-Chloroaniline	370	U

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3/9/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030525.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/05/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	370	U
59-50-7	4-Chloro-3-methylphenol	370	U
91-57-6	2-Methylnaphthalene	370	U
95-94-3	1,2,4,5-Tetrachlorobenzene	370	U
98-95-3	Nitrobenzene	370	U
100-75-4	n-Nitrosopiperidine	370	U
78-59-1	Isophorone	370	U
126-68-1	o,o,o-Triethylphosphorothioate	370	U
924-16-3	n-Nitrosodibutylamine	370	U
120-58-1	Isosafrole	370	U
122-09-8	a,a-Dimethylphenethylamine	930	U
65-85-0	Benzoic acid	930	U
106-50-3	p-Phenylenediamine	930	U
77-47-4	Hexachlorocyclopentadiene	370	U
88-06-2	2,4,6-Trichlorophenol	370	U
95-95-4	2,4,5-Trichlorophenol	930	U
91-58-7	2-Chloronaphthalene	370	U
88-74-4	2-Nitroaniline	930	U
131-11-3	Dimethylphthalate	370	U
208-96-8	Acenaphthylene	370	U
99-09-2	3-Nitroaniline	930	U
83-32-9	Acenaphthene	370	U
51-28-5	2,4-Dinitrophenol	930	U
100-02-7	4-Nitrophenol	930	U
132-64-9	Dibenzofuran	370	U
1888-71-7	Hexachloropropene	930	U
608-93-5	Pentachlorobenzene	370	U
58-90-2	2,3,4,6-Tetrachlorophenol	370	U
84-66-2	Diethylphthalate	370	U
7005-72-3	4-Chlorophenyl-phenylether	370	U
86-73-7	Fluorene	370	U
100-01-6	4-Nitroaniline	930	U
94-59-7	Safrole	370	U

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4/11/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030525.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/05/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	370	U
99-65-0	1,3-Dinitrobenzene	370	U
606-20-2	2,6-Dinitrotoluene	370	U
134-32-7	1-Naphthylamine	370	U
121-14-2	2,4-Dinitrotoluene	370	U
91-59-8	2-Naphthylamine	370	U
99-55-8	2-Methyl-5-nitroaniline	370	U
297-97-2	Thionazin	370	U
122-39-4	Diphenylamine	370	U
534-52-1	4,6-Dinitro-2-methylphenol	930	U
101-55-3	4-Bromophenyl-phenylether	370	U
118-74-1	Hexachlorobenzene	370	U
85-01-8	Phenanthrene	370	U
120-12-7	Anthracene	370	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	370	U
84-74-2	Di-n-butylphthalate	370	U
206-44-0	Fluoranthene	370	U
87-86-5	Pentachlorophenol	930	U
86-30-6	N-Nitrosodiphenylamine	370	U
298-02-2	Phorate	370	U
62-44-2	Phenacetin	370	U
2303-16-4	Diallate	370	U
60-51-5	Dimethoate	370	U
92-67-1	4-Aminobiphenyl	370	U
82-68-8	Pentachloronitrobenzene	930	U
23950-58-5	Pronamide	370	U
298-04-4	Disulfoton	370	U
298-00-0	Methyl parathion	370	U
56-38-2	Parathion	370	U
91-80-5	Methapyrilene	930	U
465-73-6	Isodrin	370	U
3689-24-5	Sulfotep	370	U
56-57-5	4-Nitroquinoline-1-oxide	930	U

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4/11/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030525.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/05/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	370	U
129-00-0	Pyrene	370	U
85-68-7	Butylbenzylphthalate	370	U
56-55-3	Benzo(a)anthracene	370	U
218-01-9	Chrysene	370	U
117-81-7	bis(2-Ethylhexyl)phthalate	370	U
140-57-8	Aramite	930	U
60-11-7	Methyl Yellow	370	U
510-15-6	Chlorobenzilate	370	U
119-93-7	3,3'-Dimethylbenzidine	370	U
53-96-3	2-Acetylaminofluorene	370	U
91-94-1	3,3'-Dichlorobenzidine	370	U
143-50-0	Kepone	930	U
52-85-7	Famphur	370	U
117-84-0	Di-n-octylphthalate	370	U
205-99-2	Benzo(b)fluoranthene	370	U
207-08-9	Benzo(k)fluoranthene	370	U
50-32-8	Benzo(a)pyrene	370	U
193-39-5	Indeno(1,2,3-cd)pyrene	370	U
53-70-3	Dibenz(a,h)anthracene	370	U
191-24-2	Benzo(g,h,i)perylene	370	U
57-97-6	7,12-Dimethylbenz(a)anthracene	370	U
56-49-5	3-Methylchloranthrene	370	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	370	U

4/11/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05RA

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030719.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	370	U
108-95-2	Phenol	370	U
111-44-4	bis(2-Chloroethyl)ether	370	U
95-57-8	2-Chlorophenol	370	U
541-73-1	1,3-Dichlorobenzene	370	U
106-46-7	1,4-Dichlorobenzene	370	U
100-51-6	Benzyl alcohol	370	U
95-50-1	1,2-Dichlorobenzene	370	U
108-60-1	bis(2-Chloroisopropyl)ether	370	U
95-48-7	2-Methylphenol	370	U
67-72-1	Hexachloroethane	370	U
110-86-1	Pyridine	370	U
62-75-9	N-Nitrosodimethylamine	370	U
109-06-8	2-Picoline	370	U
10595-95-6	n-Nitrosomethylethylamine	370	U
66-27-3	Methyl methanesulfonate	930	U
55-18-5	n-Nitrosodiethylamine	370	U
62-50-0	Ethyl methanesulfonate	370	U
98-86-2	Acetophenone	370	U
930-55-2	n-Nitrosopyrrolidine	370	U
59-89-2	n-Nitrosomorpholine	370	U
621-64-7	N-Nitroso-di-n-propylamine	370	U
95-53-4	o-Toluidine	370	U
108-39-4	3-Methylphenol	370	U
106-44-5	4-Methylphenol	370	U
88-75-5	2-Nitrophenol	370	U
105-67-9	2,4-Dimethylphenol	370	U
111-91-1	bis(2-Chloroethoxy)methane	370	U
120-83-2	2,4-Dichlorophenol	370	U
120-82-1	1,2,4-Trichlorobenzene	370	U
91-20-3	Naphthalene	370	U
87-65-0	2,6-Dichlorophenol	370	U
106-47-8	4-Chloroaniline	370	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05RA

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030719.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	370	U
59-50-7	4-Chloro-3-methylphenol	370	U
91-57-6	2-Methylnaphthalene	370	U
95-94-3	1,2,4,5-Tetrachlorobenzene	370	U
98-95-3	Nitrobenzene	370	U
100-75-4	n-Nitrosopiperidine	370	U
78-59-1	Isophorone	370	U
126-68-1	o,o,o-Triethylphosphorothioate	370	U
924-16-3	n-Nitrosodibutylamine	370	U
120-58-1	Isosafrole	370	U
122-09-8	a,a-Dimethylphenethylamine	930	U
65-85-0	Benzoic acid	930	U
106-50-3	p-Phenylenediamine	930	U
77-47-4	Hexachlorocyclopentadiene	370	U
88-06-2	2,4,6-Trichlorophenol	370	U
95-95-4	2,4,5-Trichlorophenol	930	U
91-58-7	2-Chloronaphthalene	370	U
88-74-4	2-Nitroaniline	930	U
131-11-3	Dimethylphthalate	370	U
208-96-8	Acenaphthylene	370	U
99-09-2	3-Nitroaniline	930	U
83-32-9	Acenaphthene	370	U
51-28-5	2,4-Dinitrophenol	930	U
100-02-7	4-Nitrophenol	930	U
132-64-9	Dibenzofuran	370	U
1888-71-7	Hexachloropropene	930	U
608-93-5	Pentachlorobenzene	370	U
58-90-2	2,3,4,6-Tetrachlorophenol	370	U
84-66-2	Diethylphthalate	370	U
7005-72-3	4-Chlorophenyl-phenylether	370	U
86-73-7	Fluorene	370	U
100-01-6	4-Nitroaniline	930	U
94-59-7	Safrole	370	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05RA

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030719.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	370	U
99-65-0	1,3-Dinitrobenzene	370	U
606-20-2	2,6-Dinitrotoluene	370	U
134-32-7	1-Naphthylamine	370	U
121-14-2	2,4-Dinitrotoluene	370	U
91-59-8	2-Naphthylamine	370	U
99-55-8	2-Methyl-5-nitroaniline	370	U
297-97-2	Thionazin	370	U
122-39-4	Diphenylamine	370	U
534-52-1	4,6-Dinitro-2-methylphenol	930	U
101-55-3	4-Bromophenyl-phenylether	370	U
118-74-1	Hexachlorobenzene	370	U
85-01-8	Phenanthrene	370	U
120-12-7	Anthracene	370	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	370	U
84-74-2	Di-n-butylphthalate	370	U
206-44-0	Fluoranthene	370	U
87-86-5	Pentachlorophenol	930	U
86-30-6	N-Nitrosodiphenylamine	370	U
298-02-2	Phorate	370	U
62-44-2	Phenacetin	370	U
2303-16-4	Diallate	370	U
60-51-5	Dimethoate	370	U
92-67-1	4-Aminobiphenyl	370	U
82-68-8	Pentachloronitrobenzene	930	U
23950-58-5	Pronamide	370	U
298-04-4	Disulfoton	370	U
298-00-0	Methyl parathion	370	U
56-38-2	Parathion	370	U
91-80-5	Methapyrilene	930	U
465-73-6	Isodrin	370	U
3689-24-5	Sulfotep	370	U
56-57-5	4-Nitroquinoline-1-oxide	930	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05RA

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030719.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	370	U
129-00-0	Pyrene	370	U
85-68-7	Butylbenzylphthalate	370	U
56-55-3	Benzo(a)anthracene	370	U
218-01-9	Chrysene	370	U
117-81-7	bis(2-Ethylhexyl)phthalate	370	U
140-57-8	Aramite	930	U
60-11-7	Methyl Yellow	370	U
510-15-6	Chlorobenzilate	370	U
119-93-7	3,3'-Dimethylbenzidine	370	U
53-96-3	2-Acetylaminofluorene	370	U
91-94-1	3,3'-Dichlorobenzidine	370	U
143-50-0	Kepone	930	U
52-85-7	Famphur	370	U
117-84-0	Di-n-octylphthalate	370	U
205-99-2	Benzo(b)fluoranthene	370	U
207-08-9	Benzo(k)fluoranthene	370	U
50-32-8	Benzo(a)pyrene	370	U
193-39-5	Indeno(1,2,3-cd)pyrene	370	U
53-70-3	Dibenz(a,h)anthracene	370	U
191-24-2	Benzo(g,h,i)perylene	370	U
57-97-6	7,12-Dimethylbenz(a)anthracene	370	U
56-49-5	3-Methylchloranthrene	370	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	370	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.06

Sample wt/vol: 30.4 (g/mL) G Lab File ID: T1030527.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/05/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	400	U
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
100-51-6	Benzyl alcohol	400	U
95-50-1	1,2-Dichlorobenzene	400	U
108-60-1	bis(2-Chloroisopropyl)ether	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
110-86-1	Pyridine	400	U
62-75-9	N-Nitrosodimethylamine	400	U
109-06-8	2-Picoline	400	U
10595-95-6	n-Nitrosomethylethylamine	400	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	400	U
62-50-0	Ethyl methanesulfonate	400	U
98-86-2	Acetophenone	400	U
930-55-2	n-Nitrosopyrrolidine	400	U
59-89-2	n-Nitrosomorpholine	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
95-53-4	o-Toluidine	400	U
108-39-4	3-Methylphenol	400	U
106-44-5	4-Methylphenol	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	400	U
87-65-0	2,6-Dichlorophenol	400	U
106-47-8	4-Chloroaniline	400	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.06

Sample wt/vol: 30.4 (g/mL) G Lab File ID: T1030527.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/05/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-methylphenol	400	U
91-57-6	2-Methylnaphthalene	400	U
95-94-3	1,2,4,5-Tetrachlorobenzene	400	U
98-95-3	Nitrobenzene	400	U
100-75-4	n-Nitrosopiperidine	400	U
78-59-1	Isophorone	400	U
126-68-1	o,o,o-Triethylphosphorothioate	400	U
924-16-3	n-Nitrosodibutylamine	400	U
120-58-1	Isosafrole	400	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	1000	U
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	400	U
208-96-8	Acenaphthylene	400	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	400	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	400	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	400	U
58-90-2	2,3,4,6-Tetrachlorophenol	400	U
84-66-2	Diethylphthalate	400	U
7005-72-3	4-Chlorophenyl-phenylether	400	U
86-73-7	Fluorene	400	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	400	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.06

Sample wt/vol: 30.4 (g/mL) G Lab File ID: T1030527.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/05/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	400	U
99-65-0	1,3-Dinitrobenzene	400	U
606-20-2	2,6-Dinitrotoluene	400	U
134-32-7	1-Naphthylamine	400	U
121-14-2	2,4-Dinitrotoluene	400	U
91-59-8	2-Naphthylamine	400	U
99-55-8	2-Methyl-5-nitroaniline	400	U
297-97-2	Thionazin	400	U
122-39-4	Diphenylamine	400	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
101-55-3	4-Bromophenyl-phenylether	400	U
118-74-1	Hexachlorobenzene	400	U
85-01-8	Phenanthrene	400	U
120-12-7	Anthracene	400	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	400	U
84-74-2	Di-n-butylphthalate	400	U
206-44-0	Fluoranthene	400	U
87-86-5	Pentachlorophenol	1000	U
86-30-6	N-Nitrosodiphenylamine	400	U
298-02-2	Phorate	400	U
62-44-2	Phenacetin	400	U
2303-16-4	Diallate	400	U
60-51-5	Dimethoate	400	U
92-67-1	4-Aminobiphenyl	400	U
82-68-8	Pentachloronitrobenzene	1000	U
23950-58-5	Pronamide	400	U
298-04-4	Disulfoton	400	U
298-00-0	Methyl parathion	400	U
56-38-2	Parathion	400	U
91-80-5	Methapyrilene	1000	U
465-73-6	Isodrin	400	U
3689-24-5	Sulfotep	400	U
56-57-5	4-Nitroquinoline-1-oxide	1000	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.06

Sample wt/vol: 30.4 (g/mL) G Lab File ID: T1030527.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/05/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	400	U
129-00-0	Pyrene	400	U
85-68-7	Butylbenzylphthalate	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	400	U
117-81-7	bis(2-Ethylhexyl)phthalate	400	U
140-57-8	Aramite	1000	U
60-11-7	Methyl Yellow	400	U
510-15-6	Chlorobenzilate	400	U
119-93-7	3,3'-Dimethylbenzidine	400	U
53-96-3	2-Acetylaminofluorene	400	U
91-94-1	3,3'-Dichlorobenzidine	400	U
143-50-0	Kepone	1000	U
52-85-7	Famphur	400	U
117-84-0	Di-n-octylphthalate	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U
57-97-6	7,12-Dimethylbenz(a)anthracene	400	U
56-49-5	3-Methylchloranthrene	400	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	400	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.07

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030724.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	960	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

4/11/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.07

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030724.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U
98-95-3	Nitrobenzene	380	U
100-75-4	n-Nitrosopiperidine	380	U
78-59-1	Isophorone	380	U
126-68-1	o,o,o-Triethylphosphorothioate	380	U
924-16-3	n-Nitrosodibutylamine	380	U
120-58-1	Isosafrole	380	U
122-09-8	a,a-Dimethylphenethylamine	960	U
65-85-0	Benzoic acid	960	U
106-50-3	p-Phenylenediamine	960	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	960	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	960	U
131-11-3	Dimethylphthalate	380	U
208-96-8	Acenaphthylene	380	U
99-09-2	3-Nitroaniline	960	U
83-32-9	Acenaphthene	380	U
51-28-5	2,4-Dinitrophenol	960	U
100-02-7	4-Nitrophenol	960	U
132-64-9	Dibenzofuran	380	U
1888-71-7	Hexachloropropene	960	U
608-93-5	Pentachlorobenzene	380	U
58-90-2	2,3,4,6-Tetrachlorophenol	380	U
84-66-2	Diethylphthalate	380	U
7005-72-3	4-Chlorophenyl-phenylether	380	U
86-73-7	Fluorene	380	U
100-01-6	4-Nitroaniline	960	U
94-59-7	Safrole	380	U

4/11/01

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.07

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030724.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	960	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	380	U
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	960	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	960	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	960	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	960	U

4/11/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.07

Sample wt/vol: 31.5 (g/mL) G Lab File ID: T1030724.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	380	U
129-00-0	Pyrene	380	U
85-68-7	Butylbenzylphthalate	380	U
56-55-3	Benzo(a)anthracene	380	U
218-01-9	Chrysene	380	U
117-81-7	bis(2-Ethylhexyl)phthalate	380	U
140-57-8	Aramite	960	U
60-11-7	Methyl Yellow	380	U
510-15-6	Chlorobenzilate	380	U
119-93-7	3,3'-Dimethylbenzidine	380	U
53-96-3	2-Acetylaminofluorene	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
143-50-0	Kepone	960	U
52-85-7	Famphur	380	U
117-84-0	Di-n-octylphthalate	380	U
205-99-2	Benzo(b)fluoranthene	380	U
207-08-9	Benzo(k)fluoranthene	380	U
50-32-8	Benzo(a)pyrene	380	U
193-39-5	Indeno(1,2,3-cd)pyrene	380	U
53-70-3	Dibenz(a,h)anthracene	380	U
191-24-2	Benzo(g,h,i)perylene	380	U
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U
56-49-5	3-Methylchloranthrene	380	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	380	U

4/11/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.10

Sample wt/vol: 30.9 (g/mL) G Lab File ID: T1030720.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	960	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.10

Sample wt/vol: 30.9 (g/mL) G Lab File ID: T1030720.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U
98-95-3	Nitrobenzene	380	U
100-75-4	n-Nitrosopiperidine	380	U
78-59-1	Isophorone	380	U
126-68-1	o,o,o-Triethylphosphorothioate	380	U
924-16-3	n-Nitrosodibutylamine	380	U
120-58-1	Isosafrole	380	U
122-09-8	a,a-Dimethylphenethylamine	960	U
65-85-0	Benzoic acid	960	U
106-50-3	p-Phenylenediamine	960	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	960	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	960	U
131-11-3	Dimethylphthalate	380	U
208-96-8	Acenaphthylene	380	U
99-09-2	3-Nitroaniline	960	U
83-32-9	Acenaphthene	380	U
51-28-5	2,4-Dinitrophenol	960	U
100-02-7	4-Nitrophenol	960	U
132-64-9	Dibenzofuran	380	U
1888-71-7	Hexachloropropene	960	U
608-93-5	Pentachlorobenzene	380	U
58-90-2	2,3,4,6-Tetrachlorophenol	380	U
84-66-2	Diethylphthalate	380	U
7005-72-3	4-Chlorophenyl-phenylether	380	U
86-73-7	Fluorene	380	U
100-01-6	4-Nitroaniline	960	U
94-59-7	Safrole	380	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.10

Sample wt/vol: 30.9 (g/mL) G Lab File ID: T1030720.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	960	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	380	U
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	960	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	960	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	960	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	960	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20A-SB0102-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.10

Sample wt/vol: 30.9 (g/mL) G Lab File ID: T1030720.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	380	U
129-00-0	Pyrene	380	U
85-68-7	Butylbenzylphthalate	380	U
56-55-3	Benzo(a)anthracene	380	U
218-01-9	Chrysene	380	U
117-81-7	bis(2-Ethylhexyl)phthalate	380	U
140-57-8	Aramite	960	U
60-11-7	Methyl Yellow	380	U
510-15-6	Chlorobenzilate	380	U
119-93-7	3,3'-Dimethylbenzidine	380	U
53-96-3	2-Acetylaminofluorene	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
143-50-0	Kepone	960	U
52-85-7	Famphur	380	U
117-84-0	Di-n-octylphthalate	380	U
205-99-2	Benzo(b)fluoranthene	380	U
207-08-9	Benzo(k)fluoranthene	380	U
50-32-8	Benzo(a)pyrene	380	U
193-39-5	Indeno(1,2,3-cd)pyrene	380	U
53-70-3	Dibenz(a,h)anthracene	380	U
191-24-2	Benzo(g,h,i)perylene	380	U
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U
56-49-5	3-Methylchloranthrene	380	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	380	U

smk 4/11/2001

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15FB022101R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.11

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031212.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
62-53-5	Aniline	10	U
108-95-2	Phenol	10	U
111-44-4	bis(2-Chloroethyl)ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
100-51-6	Benzyl alcohol	10	U
95-50-1	1,2-Dichlorobenzene	10	U
108-60-1	bis(2-Chloroisopropyl)ether	10	U
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
110-86-1	Pyridine	10	U
62-75-9	N-Nitrosodimethylamine	10	U
109-06-8	2-Picoline	10	U
10595-95-6	n-Nitrosomethylethylamine	10	U
66-27-3	Methyl methanesulfonate	25	U
55-18-5	n-Nitrosodiethylamine	10	U
62-50-0	Ethyl methanesulfonate	10	U
98-86-2	Acetophenone	10	U
930-55-2	n-Nitrosopyrrolidine	10	U
59-89-2	n-Nitrosomorpholine	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
95-53-4	o-Toluidine	10	U
108-39-4	3-Methylphenol	10	U
106-44-5	4-Methylphenol	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
87-65-0	2,6-Dichlorophenol	10	U
106-47-8	4-Chloroaniline	10	U

4/11/2001

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15FB022101R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.11

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031212.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
95-94-3	1,2,4,5-Tetrachlorobenzene	10	U
98-95-3	Nitrobenzene	10	U
100-75-4	n-Nitrosopiperidine	10	U
78-59-1	Isophorone	10	U
126-68-1	o,o,o-Triethylphosphorothioate	10	U
924-16-3	n-Nitrosodibutylamine	10	U
120-58-1	Isosafrole	10	U
122-09-8	a,a-Dimethylphenethylamine	25	U
65-85-0	Benzoic acid	25	U
106-50-3	p-Phenylenediamine	25	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	25	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	25	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
99-09-2	3-Nitroaniline	25	U
83-32-9	Acenaphthene	10	U
51-28-5	2,4-Dinitrophenol	25	U
100-02-7	4-Nitrophenol	25	U
132-64-9	Dibenzofuran	10	U
1888-71-7	Hexachloropropene	25	U
608-93-5	Pentachlorobenzene	10	U
58-90-2	2,3,4,6-Tetrachlorophenol	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	25	U
94-59-7	Safrole	10	U

SMK 4/11/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15FB022101R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.11

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031212.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
130-15-4	1,4-Naphthoquinone	10	U
99-65-0	1,3-Dinitrobenzene	10	U
606-20-2	2,6-Dinitrotoluene	10	U
134-32-7	1-Naphthylamine	10	U
121-14-2	2,4-Dinitrotoluene	10	U
91-59-8	2-Naphthylamine	10	U
99-55-8	2-Methyl-5-nitroaniline	10	U
297-97-2	Thionazin	10	U
122-39-4	Diphenylamine	10	U
534-52-1	4,6-Dinitro-2-methylphenol	25	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
87-86-5	Pentachlorophenol	25	U
86-30-6	N-Nitrosodiphenylamine	10	U
298-02-2	Phorate	10	U
62-44-2	Phenacetin	10	U
2303-16-4	Diallate	10	U
60-51-5	Dimethoate	10	U
92-67-1	4-Aminobiphenyl	10	U
82-68-8	Pentachloronitrobenzene	25	U
23950-58-5	Pronamide	10	U
298-04-4	Disulfoton	10	U
298-00-0	Methyl parathion	10	U
56-38-2	Parathion	10	U
91-80-5	Methapyrilene	25	U
465-73-6	Isodrin	10	U
3689-24-5	Sulfotep	10	U
56-57-5	4-Nitroquinoline-1-oxide	25	U

smk 4/17/2001

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15FB022101R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.11

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031212.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-35-4	1,3,5-Trinitrobenzene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
140-57-8	Aramite	25	U
60-11-7	Methyl Yellow	10	U
510-15-6	Chlorobenzilate	10	U
119-93-7	3,3'-Dimethylbenzidine	10	U
53-96-3	2-Acetylaminofluorene	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U
143-50-0	Kepone	25	U
52-85-7	Famphur	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U
57-97-6	7,12-Dimethylbenz(a)anthracene	10	U
56-49-5	3-Methylchloranthrene	10	U
70-30-4	Hexachlorophene	400	U
92-52-4	1,1'-Biphenyl	10	U

4/11/01

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.12

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031215.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
62-53-5	Aniline	10	U
108-95-2	Phenol	10	U
111-44-4	bis(2-Chloroethyl)ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
100-51-6	Benzyl alcohol	10	U
95-50-1	1,2-Dichlorobenzene	10	U
108-60-1	bis(2-Chloroisopropyl)ether	10	U
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
110-86-1	Pyridine	10	U
62-75-9	N-Nitrosodimethylamine	10	U
109-06-8	2-Picoline	10	U
10595-95-6	n-Nitrosomethylethylamine	10	U
66-27-3	Methyl methanesulfonate	25	U
55-18-5	n-Nitrosodiethylamine	10	U
62-50-0	Ethyl methanesulfonate	10	U
98-86-2	Acetophenone	10	U
930-55-2	n-Nitrosopyrrolidine	10	U
59-89-2	n-Nitrosomorpholine	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
95-53-4	o-Toluidine	10	U
108-39-4	3-Methylphenol	10	U
106-44-5	4-Methylphenol	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
87-65-0	2,6-Dichlorophenol	10	U
106-47-8	4-Chloroaniline	10	U

4/11/2001

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.12

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031215.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
95-94-3	1,2,4,5-Tetrachlorobenzene	10	U
98-95-3	Nitrobenzene	10	U
100-75-4	n-Nitrosopiperidine	10	U
78-59-1	Isophorone	10	U
126-68-1	o,o,o-Triethylphosphorothioate	10	U
924-16-3	n-Nitrosodibutylamine	10	U
120-58-1	Isosafrole	10	U
122-09-8	a,a-Dimethylphenethylamine	25	U
65-85-0	Benzoic acid	25	U
106-50-3	p-Phenylenediamine	25	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	25	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	25	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
99-09-2	3-Nitroaniline	25	U
83-32-9	Acenaphthene	10	U
51-28-5	2,4-Dinitrophenol	25	U
100-02-7	4-Nitrophenol	25	U
132-64-9	Dibenzofuran	10	U
1888-71-7	Hexachloropropene	25	U
608-93-5	Pentachlorobenzene	10	U
58-90-2	2,3,4,6-Tetrachlorophenol	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	25	U
94-59-7	Safrole	10	U

SM 4/11/01

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.12

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031215.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
130-15-4	1,4-Naphthoquinone	10	U
99-65-0	1,3-Dinitrobenzene	10	U
606-20-2	2,6-Dinitrotoluene	10	U
134-32-7	1-Naphthylamine	10	U
121-14-2	2,4-Dinitrotoluene	10	U
91-59-8	2-Naphthylamine	10	U
99-55-8	2-Methyl-5-nitroaniline	10	U
297-97-2	Thionazin	10	U
122-39-4	Diphenylamine	10	U
534-52-1	4,6-Dinitro-2-methylphenol	25	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
87-86-5	Pentachlorophenol	25	U
86-30-6	N-Nitrosodiphenylamine	10	U
298-02-2	Phorate	10	U
62-44-2	Phenacetin	10	U
2303-16-4	Diallate	10	U
60-51-5	Dimethoate	10	U
92-67-1	4-Aminobiphenyl	10	U
82-68-8	Pentachloronitrobenzene	25	U
23950-58-5	Pronamide	10	U
298-04-4	Disulfoton	10	U
298-00-0	Methyl parathion	10	U
56-38-2	Parathion	10	U
91-80-5	Methapyrilene	25	U
465-73-6	Isodrin	10	U
3689-24-5	Sulfotep	10	U
56-57-5	4-Nitroquinoline-1-oxide	25	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022101)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.12

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031215.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-35-4	1,3,5-Trinitrobenzene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
140-57-8	Aramite	25	U
60-11-7	Methyl Yellow	10	U
510-15-6	Chlorobenzilate	10	U
119-93-7	3,3'-Dimethylbenzidine	10	U
53-96-3	2-Acetylaminofluorene	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U
143-50-0	Kepone	25	U
52-85-7	Famphur	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U
57-97-6	7,12-Dimethylbenz(a)anthracene	10	U
56-49-5	3-Methylchloranthrene	10	U
70-30-4	Hexachlorophene	400	U
92-52-4	1,1'-Biphenyl	10	U

smt 4/11/01

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-FB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.14

Sample wt/vol: 970 (g/mL) ML Lab File ID: V1031216.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
62-53-5	Aniline	10	U
108-95-2	Phenol	10	U
111-44-4	bis(2-Chloroethyl)ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
100-51-6	Benzyl alcohol	10	U
95-50-1	1,2-Dichlorobenzene	10	U
108-60-1	bis(2-Chloroisopropyl)ether	10	U
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
110-86-1	Pyridine	10	U
62-75-9	N-Nitrosodimethylamine	10	U
109-06-8	2-Picoline	10	U
10595-95-6	n-Nitrosomethylethylamine	10	U
66-27-3	Methyl methanesulfonate	26	U
55-18-5	n-Nitrosodiethylamine	10	U
62-50-0	Ethyl methanesulfonate	10	U
98-86-2	Acetophenone	10	U
930-55-2	n-Nitrosopyrrolidine	10	U
59-89-2	n-Nitrosomorpholine	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
95-53-4	o-Toluidine	10	U
108-39-4	3-Methylphenol	10	U
106-44-5	4-Methylphenol	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
87-65-0	2,6-Dichlorophenol	10	U
106-47-8	4-Chloroaniline	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-FB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.14

Sample wt/vol: 970 (g/mL) ML Lab File ID: V1031216.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
95-94-3	1,2,4,5-Tetrachlorobenzene	10	U
98-95-3	Nitrobenzene	10	U
100-75-4	n-Nitrosopiperidine	10	U
78-59-1	Isophorone	10	U
126-68-1	o,o,o-Triethylphosphorothioate	10	U
924-16-3	n-Nitrosodibutylamine	10	U
120-58-1	Isosafrole	10	U
122-09-8	a,a-Dimethylphenethylamine	26	U
65-85-0	Benzoic acid	26	U
106-50-3	p-Phenylenediamine	26	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	26	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	26	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
99-09-2	3-Nitroaniline	26	U
83-32-9	Acenaphthene	10	U
51-28-5	2,4-Dinitrophenol	26	U
100-02-7	4-Nitrophenol	26	U
132-64-9	Dibenzofuran	10	U
1888-71-7	Hexachloropropene	26	U
608-93-5	Pentachlorobenzene	10	U
58-90-2	2,3,4,6-Tetrachlorophenol	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	26	U
94-59-7	Safrole	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-FB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.14

Sample wt/vol: 970 (g/mL) ML Lab File ID: V1031216.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
130-15-4	1,4-Naphthoquinone	10	U
99-65-0	1,3-Dinitrobenzene	10	U
606-20-2	2,6-Dinitrotoluene	10	U
134-32-7	1-Naphthylamine	10	U
121-14-2	2,4-Dinitrotoluene	10	U
91-59-8	2-Naphthylamine	10	U
99-55-8	2-Methyl-5-nitroaniline	10	U
297-97-2	Thionazin	10	U
122-39-4	Diphenylamine	10	U
534-52-1	4,6-Dinitro-2-methylphenol	26	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
87-86-5	Pentachlorophenol	26	U
86-30-6	N-Nitrosodiphenylamine	10	U
298-02-2	Phorate	10	U
62-44-2	Phenacetin	10	U
2303-16-4	Diallate	10	U
60-51-5	Dimethoate	10	U
92-67-1	4-Aminobiphenyl	10	U
82-68-8	Pentachloronitrobenzene	26	U
23950-58-5	Pronamide	10	U
298-04-4	Disulfoton	10	U
298-00-0	Methyl parathion	10	U
56-38-2	Parathion	10	U
91-80-5	Methapyrilene	26	U
465-73-6	Isodrin	10	U
3689-24-5	Sulfotep	10	U
56-57-5	4-Nitroquinoline-1-oxide	26	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-FB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.14

Sample wt/vol: 970 (g/mL) ML Lab File ID: V1031216.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-35-4	1,3,5-Trinitrobenzene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
140-57-8	Aramite	26	U
60-11-7	Methyl Yellow	10	U
510-15-6	Chlorobenzilate	10	U
119-93-7	3,3'-Dimethylbenzidine	10	U
53-96-3	2-Acetylaminofluorene	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U
143-50-0	Kepone	26	U
52-85-7	Famphur	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U
57-97-6	7,12-Dimethylbenz(a)anthracene	10	U
56-49-5	3-Methylchloranthrene	10	U
70-30-4	Hexachlorophene	410	U
92-52-4	1,1'-Biphenyl	10	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.15

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031217.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
62-53-5	Aniline	10	U
108-95-2	Phenol	10	U
111-44-4	bis(2-Chloroethyl)ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
100-51-6	Benzyl alcohol	10	U
95-50-1	1,2-Dichlorobenzene	10	U
108-60-1	bis(2-Chloroisopropyl)ether	10	U
95-48-7	2-Methylphenol	10	U
67-72-1	Hexachloroethane	10	U
110-86-1	Pyridine	10	U
62-75-9	N-Nitrosodimethylamine	10	U
109-06-8	2-Picoline	10	U
10595-95-6	n-Nitrosomethylethylamine	10	U
66-27-3	Methyl methanesulfonate	25	U
55-18-5	n-Nitrosodiethylamine	10	U
62-50-0	Ethyl methanesulfonate	10	U
98-86-2	Acetophenone	10	U
930-55-2	n-Nitrosopyrrolidine	10	U
59-89-2	n-Nitrosomorpholine	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
95-53-4	o-Toluidine	10	U
108-39-4	3-Methylphenol	10	U
106-44-5	4-Methylphenol	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
87-65-0	2,6-Dichlorophenol	10	U
106-47-8	4-Chloroaniline	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.15

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031217.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
95-94-3	1,2,4,5-Tetrachlorobenzene	10	U
98-95-3	Nitrobenzene	10	U
100-75-4	n-Nitrosopiperidine	10	U
78-59-1	Isophorone	10	U
126-68-1	o,o,o-Triethylphosphorothioate	10	U
924-16-3	n-Nitrosodibutylamine	10	U
120-58-1	Isosafrole	10	U
122-09-8	a,a-Dimethylphenethylamine	25	U
65-85-0	Benzoic acid	25	U
106-50-3	p-Phenylenediamine	25	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	25	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	25	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
99-09-2	3-Nitroaniline	25	U
83-32-9	Acenaphthene	10	U
51-28-5	2,4-Dinitrophenol	25	U
100-02-7	4-Nitrophenol	25	U
132-64-9	Dibenzofuran	10	U
1888-71-7	Hexachloropropene	25	U
608-93-5	Pentachlorobenzene	10	U
58-90-2	2,3,4,6-Tetrachlorophenol	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	25	U
94-59-7	Safrole	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.15

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031217.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
130-15-4	1,4-Naphthoquinone	10	U
99-65-0	1,3-Dinitrobenzene	10	U
606-20-2	2,6-Dinitrotoluene	10	U
134-32-7	1-Naphthylamine	10	U
121-14-2	2,4-Dinitrotoluene	10	U
91-59-8	2-Naphthylamine	10	U
99-55-8	2-Methyl-5-nitroaniline	10	U
297-97-2	Thionazin	10	U
122-39-4	Diphenylamine	10	U
534-52-1	4,6-Dinitro-2-methylphenol	25	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
87-86-5	Pentachlorophenol	25	U
86-30-6	N-Nitrosodiphenylamine	10	U
298-02-2	Phorate	10	U
62-44-2	Phenacetin	10	U
2303-16-4	Diallate	10	U
60-51-5	Dimethoate	10	U
92-67-1	4-Aminobiphenyl	10	U
82-68-8	Pentachloronitrobenzene	25	U
23950-58-5	Pronamide	10	U
298-04-4	Disulfoton	10	U
298-00-0	Methyl parathion	10	U
56-38-2	Parathion	10	U
91-80-5	Methapyrilene	25	U
465-73-6	Isodrin	10	U
3689-24-5	Sulfotep	10	U
56-57-5	4-Nitroquinoline-1-oxide	25	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022201)-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2MVA SAS No.: SDG No.: 45902

Matrix: (soil/water) WATER Lab Sample ID: 45902.15

Sample wt/vol: 1000 (g/mL) ML Lab File ID: V1031217.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: _____ decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
99-35-4	1,3,5-Trinitrobenzene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
140-57-8	Aramite	25	U
60-11-7	Methyl Yellow	10	U
510-15-6	Chlorobenzilate	10	U
119-93-7	3,3'-Dimethylbenzidine	10	U
53-96-3	2-Acetylaminofluorene	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U
143-50-0	Kepone	25	U
52-85-7	Famphur	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U
57-97-6	7,12-Dimethylbenz(a)anthracene	10	U
56-49-5	3-Methylchloranthrene	10	U
70-30-4	Hexachlorophene	400	U
92-52-4	1,1'-Biphenyl	10	U

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB-0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.01

Sample Amt: 2.2 G % Moisture: 15.9 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 03/11/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
2691-41-0	HMX	276	J
121-82-4	RDX	454	U
99-35-4	TNB	454	U
99-65-0	DNB	454	U
479-45-8	TETRYL	454	U
98-95-3	NB	454	U
118-96-7	TNT	454	U
1946-51-0	4ADNT	454	U
35572-78-2	2ADNT	454	U
606-20-2	26DNT	454	U
121-14-2	24DNT	454	U
88-72-2	2NT	454	U
99-99-0	4NT	454	U
99-08-1	3NT	454	U
	3,4-DNT surrogate spiked	7272.73	

smk 4/11/2001

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB0102P-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.02

Sample Amt: 2.3 G % Moisture: 15.6 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 03/08/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
2691-41-0	HMX	340	J
121-82-4	RDX	435	U
99-35-4	TNB	435	U
99-65-0	DNB	435	U
479-45-8	TETRYL	435	U
98-95-3	NB	435	U
118-96-7	TNT	435	U
1946-51-0	4ADNT	435	U
35572-78-2	2ADNT	435	U
606-20-2	26DNT	435	U
121-14-2	24DNT	435	U
88-72-2	2NT	435	U
99-99-0	4NT	435	U
99-08-1	3NT	435	U
3,4-DNT surrogate spiked		6956.52	

4/11/2001

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.03

Sample Amt: 2.2 G % Moisture: 18.6 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 03/08/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
2691-41-0	HMX	454	U
121-82-4	RDX	454	U
99-35-4	TNB	454	U
99-65-0	DNB	454	U
479-45-8	TETRYL	454	U
98-95-3	NB	454	U
118-96-7	TNT	454	U
1946-51-0	4ADNT	454	U
35572-78-2	2ADNT	454	U
606-20-2	26DNT	454	U
121-14-2	24DNT	454	U
88-72-2	2NT	454	U
99-99-0	4NT	454	U
99-08-1	3NT	454	U
3,4-DNT surrogate spiked		7272.73	

4/11/2001

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.04

Sample Amt: 2.2 G % Moisture: 15.8 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 03/09/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
2691-41-0	HMX	454	U
121-82-4	RDX	454	U
99-35-4	TNB	454	U
99-65-0	DNB	454	U
479-45-8	TETRYL	454	U
98-95-3	NB	454	U
118-96-7	TNT	454	U
1946-51-0	4ADNT	454	U
35572-78-2	2ADNT	454	U
606-20-2	26DNT	454	U
121-14-2	24DNT	454	U
88-72-2	2NT	454	U
99-99-0	4NT	454	U
99-08-1	3NT	454	U
3,4-DNT surrogate spiked		7272.73	

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05

Sample Amt: 2.2 G % Moisture: 15 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 03/09/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
2691-41-0	HMX	454	U
121-82-4	RDX	454	U
99-35-4	TNB	454	U
99-65-0	DNB	454	U
479-45-8	TETRYL	454	U
98-95-3	NB	454	U
118-96-7	TNT	454	U
1946-51-0	4ADNT	454	U
35572-78-2	2ADNT	454	U
606-20-2	26DNT	454	U
121-14-2	24DNT	454	U
88-72-2	2NT	454	U
99-99-0	4NT	454	U
99-08-1	3NT	454	U
3,4-DNT surrogate spiked		7272.73	

4/11/2001

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.06

Sample Amt: 2.1 G % Moisture: 17.6 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 03/09/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
2691-41-0	HMX	476	U
121-82-4	RDX	476	U
99-35-4	TNB	476	U
99-65-0	DNB	476	U
479-45-8	TETRYL	476	U
98-95-3	NB	476	U
118-96-7	TNT	476	U
1946-51-0	4ADNT	476	U
35572-78-2	2ADNT	476	U
606-20-2	26DNT	476	U
121-14-2	24DNT	476	U
88-72-2	2NT	476	U
99-99-0	4NT	476	U
99-08-1	3NT	476	U
	3,4-DNT surrogate spiked	7619.05	

4/11/01

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.07

Sample Amt: 2.3 G % Moisture: 17.4 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 03/10/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
2691-41-0	HMX	435	U
121-82-4	RDX	435	U
99-35-4	TNB	435	U
99-65-0	DNB	435	U
479-45-8	TETRYL	435	U
98-95-3	NB	435	U
118-96-7	TNT	435	U
1946-51-0	4ADNT	435	U
35572-78-2	2ADNT	435	U
606-20-2	26DNT	435	U
121-14-2	24DNT	435	U
88-72-2	2NT	435	U
99-99-0	4NT	435	U
99-08-1	3NT	435	U
3,4-DNT surrogate spiked		6956.52	

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902

Matrix: (soil/water) SOIL Lab Sample ID: 45902.10

Sample Amt: 2.4 G % Moisture: 15.8 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 03/07/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
2691-41-0	HMX	417	U
121-82-4	RDX	417	U
99-35-4	TNB	417	U
99-65-0	DNB	417	U
479-45-8	TETRYL	417	U
98-95-3	NB	417	U
118-96-7	TNT	417	U
1946-51-0	4ADNT	417	U
35572-78-2	2ADNT	417	U
606-20-2	26DNT	417	U
121-14-2	24DNT	417	U
88-72-2	2NT	417	U
99-99-0	4NT	417	U
99-08-1	3NT	417	U
3,4-DNT surrogate spiked		6666.67	

A

4/11/01

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-FB(022101)-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902-

Matrix: (soil/water) WATER Lab Sample ID: 45902.11

Sample Amt: 770 ML % Moisture: _____ Date Received: 02/26/01

Extraction Volume: 10 ML Date Extracted: 02/28/01

Extraction Method: SEP F Date Analyzed: 03/07/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/L	Q
2691-41-0	HMX	0.650	U
121-82-4	RDX	0.650	U
99-35-4	TNB	0.650	U
99-65-0	DNB	0.650	U
479-45-8	TETRYL	0.650	U
98-95-3	NB	0.650	U
118-96-7	TNT	0.650	U
1946-51-0	4ADNT	0.650	U
35572-78-2	2ADNT	0.650	U
606-20-2	26DNT	0.650	U
121-14-2	24DNT	0.650	U
88-72-2	2NT	0.650	U
99-99-0	4NT	0.650	U
99-08-1	3NT	0.650	U
	3,4-DNT surrogate spiked	10.39	

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022101)-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902-

Matrix: (soil/water) WATER Lab Sample ID: 45902.12

Sample Amt: 770 ML % Moisture: _____ Date Received: 02/26/01

Extraction Volume: 10 ML Date Extracted: 02/28/01

Extraction Method: SEP F Date Analyzed: 03/07/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/L	Q
2691-41-0	HMX	0.650	U
121-82-4	RDX	0.650	U
99-35-4	TNB	0.650	U
99-65-0	DNB	0.650	U
479-45-8	TETRYL	0.650	U
98-95-3	NB	0.650	U
118-96-7	TNT	0.650	U
1946-51-0	4ADNT	0.650	U
35572-78-2	2ADNT	0.650	U
606-20-2	26DNT	0.650	U
121-14-2	24DNT	0.650	U
88-72-2	2NT	0.650	U
99-99-0	4NT	0.650	U
99-08-1	3NT	0.650	U
	3,4-DNT surrogate spiked	10.39	

4/11/2001

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-FB(022201)-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902-

Matrix: (soil/water) WATER Lab Sample ID: 45902.14

Sample Amt: 770 ML % Moisture: _____ Date Received: 02/26/01

Extraction Volume: 10 ML Date Extracted: 02/28/01

Extraction Method: SEP F Date Analyzed: 03/07/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/L	Q
2691-41-0	HMX	0.650	U
121-82-4	RDX	0.650	U
99-35-4	TNB	0.650	U
99-65-0	DNB	0.650	U
479-45-8	TETRYL	0.650	U
98-95-3	NB	0.650	U
118-96-7	TNT	0.650	U
1946-51-0	4ADNT	0.650	U
35572-78-2	2ADNT	0.650	U
606-20-2	26DNT	0.650	U
121-14-2	24DNT	0.650	U
88-72-2	2NT	0.650	U
99-99-0	4NT	0.650	U
99-08-1	3NT	0.650	U
3,4-DNT surrogate spiked		10.39	

4/11/01

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022201)-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902-

Matrix: (soil/water) WATER Lab Sample ID: 45902.15

Sample Amt: 770 ML % Moisture: _____ Date Received: 02/26/01

Extraction Volume: 10 ML Date Extracted: 02/28/01

Extraction Method: SEP F Date Analyzed: 03/07/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/L	Q
2691-41-0	HMX	0.650	U
121-82-4	RDX	0.650	U
99-35-4	TNB	0.650	U
99-65-0	DNB	0.650	U
479-45-8	TETRYL	0.650	U
98-95-3	NB	0.650	U
118-96-7	TNT	0.650	U
1946-51-0	4ADNT	0.650	U
35572-78-2	2ADNT	0.650	U
606-20-2	26DNT	0.650	U
121-14-2	24DNT	0.650	U
88-72-2	2NT	0.650	U
99-99-0	4NT	0.650	U
99-08-1	3NT	0.650	U
3,4-DNT surrogate spiked		10.39	

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB-0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.01

Sample Amt: 2.3 G % Moisture: 15.9 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	435	U
	1,2-DNB surrogate spiked	3478.26	

4/11/2001

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14A-SB0102P-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.02

Sample Amt: 2.2 G % Moisture: 15.6 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	454	U
	1,2-DNB surrogate spiked	3636.36	

4/11/2001

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15A-SB0102-R01

ab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.03

Sample Amt: 2.2 G % Moisture: 18.6 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	454	U
	1,2-DNB surrogate spiked	3636.36	

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.04

Sample Amt: 2.1 G % Moisture: 15.8 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	476	U
	1,2-DNB surrogate spiked	3809.52	

4/11/2001

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.05

Sample Amt: 2.1 G % Moisture: 15 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	476	U
	1,2-DNB surrogate spiked	3809.52	

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.06

Sample Amt: 2.2 G % Moisture: 17.6 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	454	U
	1,2-DNB surrogate spiked	3636.36	

FORM I

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.07

Sample Amt: 2.3 G % Moisture: 17.4 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	435	U
	1,2-DNB surrogate spiked	3478.26	

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19A-SB0102-R01MS

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.08MS

Sample Amt: 2.3 G % Moisture: 16.8 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	6330	
	1,2-DNB surrogate spiked	3478.26	

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19A-SB0102-R01MSD

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.09MSD

Sample Amt: 2.3 G % Moisture: 17.3 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	6350	
	1,2-DNB surrogate spiked	3478.26	

4/11/01

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20A-SB0102-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) SOIL Lab Sample ID: 45902.10

Sample Amt: 2.2 G % Moisture: 15.8 Date Received: 02/26/01

Extraction Volume: 20 ML Date Extracted: 02/27/01

Extraction Method: SONC Date Analyzed: 02/28/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/KG	Q
55-63-0	NITROGLYCERIN	454	U
	1,2-DNB surrogate spiked	3636.36	

4/11/20

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-FB(022101)-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) WATER Lab Sample ID: 45902.11

Sample Amt: 5 ML % Moisture: _____ Date Received: 02/26/01

Extraction Volume: 10 ML Date Extracted: 02/28/01

Extraction Method: SHAKER Date Analyzed: 03/01/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/L	Q
55-63-0	NITROGLYCERIN	100	U
	1,2-DNB surrogate spiked	800.00	

SPK 4/11/01

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022101)-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) WATER Lab Sample ID: 45902.12

Sample Amt: 5 ML % Moisture: _____ Date Received: 02/26/01

Extraction Volume: 10 ML Date Extracted: 02/28/01

Extraction Method: SHAKER Date Analyzed: 03/01/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/L	Q
55-63-0	NITROGLYCERIN	100	U
	1,2-DNB surrogate spiked	800.00	

FORM I

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-FB(022201)-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) WATER Lab Sample ID: 45902.14

Sample Amt: 5 ML % Moisture: _____ Date Received: 02/26/01

Extraction Volume: 10 ML Date Extracted: 02/28/01

Extraction Method: SHAKER Date Analyzed: 03/01/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/L	Q
55-63-0	NITROGLYCERIN	100	U
	1,2-DNB surrogate spiked	800.00	

FORM I

1D

EXPLOSIVES ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX00-EB(022201)-R01

Lab Name: SWL-TULSA

Lab Code: SWOK Case No.: CH2M-VA SDG No.: 45902_

Matrix: (soil/water) WATER Lab Sample ID: 45902.15

Sample Amt: 5 ML % Moisture: _____ Date Received: 02/26/01

Extraction Volume: 10 ML Date Extracted: 02/28/01

Extraction Method: SHAKER Date Analyzed: 03/01/01

GPC Cleanup: (Y/N) N Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: UG/L	Q
55-63-0	NITROGLYCERIN	100	U
	1,2-DNB surrogate spiked	800.00	

FORM I

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX14A-SB-0102-R01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.01

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.06 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 6-MAR-01 Time: 06:12:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004724#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004721#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004720#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 15.88

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.014	U	*	*	0.81
1,2,3,7,8-PeCDD	*	0.196	U	*	*	1.05
1,2,3,4,7,8-HxCDD	*	0.289	U	*	*	0.77
1,2,3,6,7,8-HxCDD	*	0.254	U	*	*	0.88
1,2,3,7,8,9-HxCDD	*	0.266	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	*	0.292	U	*	*	0.77
OCDD	0.158	0.127	U	0.97	1.000	0.80
2,3,7,8-TCDF	*	0.009	U	*	*	0.98
1,2,3,7,8-PeCDF	*	0.137	U	*	*	1.20
2,3,4,7,8-PeCDF	*	0.123	U	*	*	1.35
1,2,3,4,7,8-HxCDF	*	0.069	U	*	*	1.15
1,2,3,6,7,8-HxCDF	*	0.059	U	*	*	1.34
1,2,3,7,8,9-HxCDF	*	0.075	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.070	U	*	*	1.14
1,2,3,4,6,7,8-HpCDF	*	0.145	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF	*	0.189	U	*	*	1.17
OCDF	*	0.266	U	*	*	1.26
Total Tetra-Dioxins	*	0.014	U			
Total Penta-Dioxins	*	0.196	U			
Total Hexa-Dioxins	*	0.254	U			
Total Hepta-Dioxins	*	0.292	U			
Total Tetra-Furans	*	0.009	U			
Total Penta-Furans	*	0.123	U			
Total Hexa-Furans	*	0.059	U			
Total Hepta-Furans	*	0.145	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/11/2001

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX14A-SB0102 R01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.02RE

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.04 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 03-16-01 Instrument ID: HP72E GC

Analysis Date: 19-MAR-01 Time: 18:07:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004828#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004827#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004825#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 15.59

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF	
2,3,7,8-TCDD	*	0.006	U	*	*	0.76	
1,2,3,7,8-PeCDD	*	0.073	U	*	*	1.17	
1,2,3,4,7,8-HxCDD	*	0.079	U	*	*	0.69	
1,2,3,6,7,8-HxCDD	*	0.071	U	*	*	0.77	
1,2,3,7,8,9-HxCDD	*	0.069	U	*	*	0.79	
1,2,3,4,6,7,8-HpCDD	*	0.084	U	*	*	0.75	
OCDD	0.035	0.128	~~U~~ J	1.09	1.000	0.71	Q1
2,3,7,8-TCDF	*	0.004	U	*	*	0.91	
1,2,3,7,8-PeCDF	*	0.052	U	*	*	1.22	
2,3,4,7,8-PeCDF	*	0.045	U	*	*	1.41	
1,2,3,4,7,8-HxCDF	*	0.024	U	*	*	0.99	
1,2,3,6,7,8-HxCDF	*	0.020	U	*	*	1.16	
1,2,3,7,8,9-HxCDF	*	0.022	U	*	*	1.03	
2,3,4,6,7,8-HxCDF	*	0.022	U	*	*	1.00	
1,2,3,4,6,7,8-HpCDF	*	0.044	U	*	*	1.47	
1,2,3,4,7,8,9-HpCDF	*	0.051	U	*	*	1.26	
OCDF	*	0.077	U	*	*	1.18	
Total Tetra-Dioxins	*	0.006	U				
Total Penta-Dioxins	*	0.073	U				
Total Hexa-Dioxins	*	0.071	U				
Total Hepta-Dioxins	*	0.084	U				
Total Tetra-Furans	*	0.004	U				
Total Penta-Furans	*	0.045	U				
Total Hexa-Furans	*	0.020	U				
Total Hepta-Furans	*	0.044	U				

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/12/2001

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX15A-SB0102-R01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.03

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.10 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 6-MAR-01 Time: 07:01:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004725#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004721#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004720#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 18.65

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.015	U	*	*	0.81
1,2,3,7,8-PeCDD	*	0.215	U	*	*	1.05
1,2,3,4,7,8-HxCDD	*	0.373	U	*	*	0.77
1,2,3,6,7,8-HxCDD	*	0.328	U	*	*	0.88
1,2,3,7,8,9-HxCDD	*	0.343	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	*	0.356	U	*	*	0.77
OCDD	0.171	0.155	U	0.93	1.000	0.80
2,3,7,8-TCDF	*	0.010	U	*	*	0.98
1,2,3,7,8-PeCDF	*	0.147	U	*	*	1.20
2,3,4,7,8-PeCDF	*	0.131	U	*	*	1.35
1,2,3,4,7,8-HxCDF	*	0.093	U	*	*	1.15
1,2,3,6,7,8-HxCDF	*	0.080	U	*	*	1.34
1,2,3,7,8,9-HxCDF	*	0.102	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.095	U	*	*	1.14
1,2,3,4,6,7,8-HpCDF	*	0.200	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF	*	0.262	U	*	*	1.17
OCDF	*	0.132	U	*	*	1.26
Total Tetra-Dioxins	*	0.015	U			
Total Penta-Dioxins	*	0.215	U			
Total Hexa-Dioxins	*	0.328	U			
Total Hepta-Dioxins	*	0.356	U			
Total Tetra-Furans	*	0.010	U			
Total Penta-Furans	*	0.131	U			
Total Hexa-Furans	*	0.080	U			
Total Hepta-Furans	*	0.200	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

SMT 4/12/2001

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX16A-SB0102E R01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.04

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.12 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 6-MAR-01 Time: 07:50:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004726#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004721#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004720#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 15.83

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.015	U	*	*	0.81
1,2,3,7,8-PeCDD	*	0.211	U	*	*	1.05
1,2,3,4,7,8-HxCDD	*	0.327	U	*	*	0.77
1,2,3,6,7,8-HxCDD	*	0.288	U	*	*	0.88
1,2,3,7,8,9-HxCDD	*	0.301	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	*	0.321	U	*	*	0.77
OCDD	0.131	0.094	U	0.95	1.000	0.80
2,3,7,8-TCDF	*	0.010	U	*	*	0.98
1,2,3,7,8-PeCDF	*	0.147	U	*	*	1.20
2,3,4,7,8-PeCDF	*	0.132	U	*	*	1.35
1,2,3,4,7,8-HxCDF	*	0.074	U	*	*	1.15
1,2,3,6,7,8-HxCDF	*	0.064	U	*	*	1.34
1,2,3,7,8,9-HxCDF	*	0.081	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.075	U	*	*	1.14
1,2,3,4,6,7,8-HpCDF	*	0.159	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF	*	0.208	U	*	*	1.17
OCDF	*	0.308	U	*	*	1.26
Total Tetra-Dioxins	*	0.015	U			
Total Penta-Dioxins	*	0.211	U			
Total Hexa-Dioxins	*	0.288	U			
Total Hepta-Dioxins	*	0.321	U			
Total Tetra-Furans	*	0.010	U			
Total Penta-Furans	*	0.132	U			
Total Hexa-Furans	*	0.064	U			
Total Hepta-Furans	*	0.159	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/16/01

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX17A-SB0102E RO1

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.05

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.35 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 6-MAR-01 Time: 08:39:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004727#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004721#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004720#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 14.95

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.017	U	*	*	0.81
1,2,3,7,8-PeCDD	*	0.241	U	*	*	1.05
1,2,3,4,7,8-HxCDD	*	0.414	U	*	*	0.77
1,2,3,6,7,8-HxCDD	*	0.364	U	*	*	0.88
1,2,3,7,8,9-HxCDD	*	0.380	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	*	0.395	U	*	*	0.77
OCDD	0.120	0.115	U	0.97	1.000	0.80
2,3,7,8-TCDF	*	0.012	U	*	*	0.98
1,2,3,7,8-PeCDF	*	0.177	U	*	*	1.20
2,3,4,7,8-PeCDF	*	0.158	U	*	*	1.35
1,2,3,4,7,8-HxCDF	*	0.091	U	*	*	1.15
1,2,3,6,7,8-HxCDF	*	0.078	U	*	*	1.34
1,2,3,7,8,9-HxCDF	*	0.100	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.092	U	*	*	1.14
1,2,3,4,6,7,8-HpCDF	*	0.196	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF	*	0.256	U	*	*	1.17
OCDF	*	0.441	U	*	*	1.26
Total Tetra-Dioxins	*	0.017	U			
Total Penta-Dioxins	*	0.241	U			
Total Hexa-Dioxins	*	0.364	U			
Total Hepta-Dioxins	*	0.395	U			
Total Tetra-Furans	*	0.012	U			
Total Penta-Furans	*	0.158	U			
Total Hexa-Furans	*	0.078	U			
Total Hepta-Furans	*	0.196	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX18A-SB01026R01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.06

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.34 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 6-MAR-01 Time: 09:28:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004728#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004721#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004720#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 17.60

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.014	U	*	*	0.81
1,2,3,7,8-PeCDD	*	0.194	U	*	*	1.05
1,2,3,4,7,8-HxCDD	*	0.322	U	*	*	0.77
1,2,3,6,7,8-HxCDD	*	0.284	U	*	*	0.88
1,2,3,7,8,9-HxCDD	*	0.296	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	*	0.317	U	*	*	0.77
OCDD	0.160	0.117	U	0.87	1.000	0.80
2,3,7,8-TCDF	*	0.008	U	*	*	0.98
1,2,3,7,8-PeCDF	*	0.126	U	*	*	1.20
2,3,4,7,8-PeCDF	*	0.112	U	*	*	1.35
1,2,3,4,7,8-HxCDF	*	0.079	U	*	*	1.15
1,2,3,6,7,8-HxCDF	*	0.068	U	*	*	1.34
1,2,3,7,8,9-HxCDF	*	0.086	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.080	U	*	*	1.14
1,2,3,4,6,7,8-HpCDF	*	0.169	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF	*	0.221	U	*	*	1.17
OCDF	*	0.323	U	*	*	1.26
Total Tetra-Dioxins	*	0.014	U			
Total Penta-Dioxins	*	0.194	U			
Total Hexa-Dioxins	*	0.284	U			
Total Hepta-Dioxins	*	0.317	U			
Total Tetra-Furans	*	0.008	U			
Total Penta-Furans	*	0.112	U			
Total Hexa-Furans	*	0.068	U			
Total Hepta-Furans	*	0.169	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX19A-SB01026 no1

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.07

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.09 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 6-MAR-01 Time: 10:17:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004729#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004721#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004720#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 17.40

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.015	U	*	*	0.81
,3,7,8-PeCDD	*	0.113	U	*	*	1.05
.,3,4,7,8-HxCDD	*	0.356	U	*	*	0.77
1,2,3,6,7,8-HxCDD	*	0.313	U	*	*	0.88
1,2,3,7,8,9-HxCDD	*	0.327	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	*	0.359	U	*	*	0.77
OCDD	0.192	0.094	U	0.79	1.000	0.80
2,3,7,8-TCDF	*	0.011	U	*	*	0.98
1,2,3,7,8-PeCDF	*	0.160	U	*	*	1.20
2,3,4,7,8-PeCDF	*	0.143	U	*	*	1.35
1,2,3,4,7,8-HxCDF	*	0.082	U	*	*	1.15
1,2,3,6,7,8-HxCDF	*	0.070	U	*	*	1.34
1,2,3,7,8,9-HxCDF	*	0.089	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.083	U	*	*	1.14
1,2,3,4,6,7,8-HpCDF	*	0.172	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF	*	0.225	U	*	*	1.17
OCDF	*	0.385	U	*	*	1.26
Total Tetra-Dioxins	*	0.015	U			
Total Penta-Dioxins	*	0.113	U			
Total Hexa-Dioxins	*	0.313	U			
Total Hepta-Dioxins	*	0.359	U			
Total Tetra-Furans	*	0.011	U			
Total Penta-Furans	*	0.143	U			
Total Hexa-Furans	*	0.070	U			
Total Hepta-Furans	*	0.172	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/11/01

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX20A-SB01026 RE1 MJ 3-20-01

Lab Name: Southwest Lab. of Oklahoma — Episode No.: 45902

Client Name: CH2M-VA — Lab Sample ID: 45902.10RE

Matrix (aqueous/solid/leachate): solid — Sample Wt/Vol: 15.15 g or mL: g

Sample Receipt Date: 02-26-01 — Initial Calibration Date: 01-10-01

Ext. Date: 03-16-01 — Instrument ID: HP72E GC

Analysis Date: 19-MAR-01 Time: 18:57:00 — GC Column:db5

Ext. Vol(ul): 100 — Sample Data Filename: E004829#1

Inj. Vol(ul): 2.0 — Blank Data Filename: E004827#1

Dilution Factor: 1 — Cal. Ver. Data Filename: E004825#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 15.79

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.006	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.035	U	*	*	1.17
1,2,3,4,7,8-HxCDD	*	0.033	U	*	*	0.69
1,2,3,6,7,8-HxCDD	*	0.030	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.055	U	*	*	0.79
1,2,3,4,6,7,8-HpCDD	*	0.089	U	*	*	0.75
OCDD	0.048	0.144		0.87	1.000	0.71
2,3,7,8-TCDF	*	0.004	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.050	U	*	*	1.22
2,3,4,7,8-PeCDF	*	0.043	U	*	*	1.41
1,2,3,4,7,8-HxCDF	*	0.010	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.009	U	*	*	1.16
1,2,3,7,8,9-HxCDF	*	0.024	U	*	*	1.03
2,3,4,6,7,8-HxCDF	*	0.025	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.048	U	*	*	1.47
1,2,3,4,7,8,9-HpCDF	*	0.056	U	*	*	1.26
OCDF	*	0.086	U	*	*	1.18
Total Tetra-Dioxins	*	0.006	U			
Total Penta-Dioxins	*	0.035	U			
Total Hexa-Dioxins	*	0.030	U			
Total Hepta-Dioxins	*	0.089	U			
Total Tetra-Furans	*	0.004	U			
Total Penta-Furans	*	0.043	U			
Total Hexa-Furans	*	0.009	U			
Total Hepta-Furans	*	0.048	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

3/21/01

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX15-FB(02210) - Lo-1

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.11

Matrix (aqueous/solid/leachate): aqueous Sample Wt/Vol: 1000 g or mL: mL

Sample Receipt Date: 02-26-01 Initial Calibration Date:

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 5-MAR-01 Time: 15:28:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004704#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004703#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004702#1

Concentration Units (ng/L or ug/Kg dry weight): ng/L % Moisture:

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.197	U	*	*	0.82
1,2,3,7,8-PeCDD	*	2.841	U	*	*	1.05
1,2,3,4,7,8-HxCDD	*	5.171	U	*	*	0.74
1,2,3,6,7,8-HxCDD	*	4.329	U	*	*	0.89
1,2,3,7,8,9-HxCDD	*	4.586	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	*	4.678	U	*	*	0.78
OCDD	*	10.410	U	*	*	0.79
2,3,7,8-TCDF	*	0.122	U	*	*	0.98
1,2,3,7,8-PeCDF	*	1.843	U	*	*	1.20
2,3,4,7,8-PeCDF	*	1.651	U	*	*	1.34
1,2,3,4,7,8-HxCDF	*	1.300	U	*	*	1.12
1,2,3,6,7,8-HxCDF	*	1.095	U	*	*	1.33
1,2,3,7,8,9-HxCDF	*	1.431	U	*	*	1.02
2,3,4,6,7,8-HxCDF	*	1.339	U	*	*	1.09
1,2,3,4,6,7,8-HpCDF	*	2.724	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF	*	3.656	U	*	*	1.13
OCDF	*	6.684	U	*	*	1.27
Total Tetra-Dioxins	*	0.197	U			
Total Penta-Dioxins	*	2.841	U			
Total Hexa-Dioxins	*	4.329	U			
Total Hepta-Dioxins	*	4.678	U			
Total Tetra-Furans	*	0.122	U			
Total Penta-Furans	*	1.651	U			
Total Hexa-Furans	*	1.095	U			
Total Hepta-Furans	*	2.724	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX00-EB(02210[illegible]-R01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.12

Matrix (aqueous/solid/leachate): aqueous Sample Wt/Vol: 1000 g or mL: mL

Sample Receipt Date: 02-26-01 Initial Calibration Date:

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 5-MAR-01 Time: 16:17:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004705#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004703#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004702#1

Concentration Units (ng/L or ug/Kg dry weight): ng/L % Moisture:

ANALYTE	CONCENTRATION FOUND		DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*		0.169	U	*	*	0.82
1,2,3,7,8-PeCDD	*		2.440	U	*	*	1.05
1,2,3,4,7,8-HxCDD	*		3.858	U	*	*	0.74
1,2,3,6,7,8-HxCDD	*		3.230	U	*	*	0.89
1,2,3,7,8,9-HxCDD	*		3.327	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	*		3.593	U	*	*	0.78
OCDD	*		6.125	U	*	*	0.79
2,3,7,8-TCDF	*		0.101	U	*	*	0.98
1,2,3,7,8-PeCDF	*		1.531	U	*	*	1.20
2,3,4,7,8-PeCDF	*		1.372	U	*	*	1.34
1,2,3,4,7,8-HxCDF	*		0.958	U	*	*	1.12
1,2,3,6,7,8-HxCDF	*		0.808	U	*	*	1.33
1,2,3,7,8,9-HxCDF	*		1.002	U	*	*	1.02
2,3,4,6,7,8-HxCDF	*		0.938	U	*	*	1.09
1,2,3,4,6,7,8-HpCDF	*		1.908	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF	*		2.561	U	*	*	1.13
OCDF	*		3.711	U	*	*	1.27
Total Tetra-Dioxins	*		0.169	U			
Total Penta-Dioxins	*		2.440	U			
Total Hexa-Dioxins	*		3.230	U			
Total Hepta-Dioxins	*		3.593	U			
Total Tetra-Furans	*		0.101	U			
Total Penta-Furans	*		1.372	U			
Total Hexa-Furans	*		0.808	U			
Total Hepta-Furans	*		1.908	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/11/2001

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX13-FB(022201-R01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.14

Matrix (aqueous/solid/leachate): aqueous Sample Wt/Vol: 950 g or mL: mL

Sample Receipt Date: 02-26-01 Initial Calibration Date:

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 5-MAR-01 Time: 17:06:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004706#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004703#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004702#1

Concentration Units (ng/L or ug/Kg dry weight): ng/L % Moisture:

ANALYTE	CONCENTRATION FOUND		DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*		0.186	U	*	*	0.82
,3,7,8-PeCDD	*		2.686	U	*	*	1.05
,3,4,7,8-HxCDD	*		3.963	U	*	*	0.74
1,2,3,6,7,8-HxCDD	*		3.318	U	*	*	0.89
1,2,3,7,8,9-HxCDD	*		3.417	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	*		3.585	U	*	*	0.78
OCDD	*		6.109	U	*	*	0.79
2,3,7,8-TCDF	*		0.113	U	*	*	0.98
1,2,3,7,8-PeCDF	*		1.705	U	*	*	1.20
2,3,4,7,8-PeCDF	*		1.527	U	*	*	1.34
1,2,3,4,7,8-HxCDF	*		0.936	U	*	*	1.12
1,2,3,6,7,8-HxCDF	*		0.789	U	*	*	1.33
1,2,3,7,8,9-HxCDF	*		1.030	U	*	*	1.02
2,3,4,6,7,8-HxCDF	*		0.964	U	*	*	1.09
1,2,3,4,6,7,8-HpCDF	*		1.925	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF	*		2.584	U	*	*	1.13
OCDF	*		3.810	U	*	*	1.27
Total Tetra-Dioxins	*		0.186	U			
Total Penta-Dioxins	*		2.686	U			
Total Hexa-Dioxins	*		3.318	U			
Total Hepta-Dioxins	*		3.585	U			
Total Tetra-Furans	*		0.113	U			
Total Penta-Furans	*		1.527	U			
Total Hexa-Furans	*		0.789	U			
Total Hepta-Furans	*		1.925	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/11/01

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX00-EB(02220)-no)

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.15

Matrix (aqueous/solid/leachate): aqueous Sample Wt/Vol: 1000 g or mL: mL

Sample Receipt Date: 02-26-01 Initial Calibration Date:

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 5-MAR-01 Time: 17:56:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004707#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004703#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004702#1

Concentration Units (ng/L or ug/Kg dry weight): ng/L % Moisture:

ANALYTE	CONCENTRATION FOUND		DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD		*	0.173	U	*	*	0.82
1,2,3,7,8-PeCDD		*	2.498	U	*	*	1.05
1,2,3,4,7,8-HxCDD		*	4.017	U	*	*	0.74
1,2,3,6,7,8-HxCDD		*	3.363	U	*	*	0.89
1,2,3,7,8,9-HxCDD		*	3.563	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD		*	3.741	U	*	*	0.78
OCDD		*	6.488	U	*	*	0.79
2,3,7,8-TCDF		*	0.105	U	*	*	0.98
1,2,3,7,8-PeCDF		*	1.590	U	*	*	1.20
2,3,4,7,8-PeCDF		*	1.424	U	*	*	1.34
1,2,3,4,7,8-HxCDF		*	0.949	U	*	*	1.12
1,2,3,6,7,8-HxCDF		*	0.799	U	*	*	1.33
1,2,3,7,8,9-HxCDF		*	1.044	U	*	*	1.02
2,3,4,6,7,8-HxCDF		*	0.977	U	*	*	1.09
1,2,3,4,6,7,8-HpCDF		*	1.988	U	*	*	1.52
1,2,3,4,7,8,9-HpCDF		*	2.668	U	*	*	1.13
OCDF		*	4.047	U	*	*	1.27
Total Tetra-Dioxins		*	0.173	U			
Total Penta-Dioxins		*	2.498	U			
Total Hexa-Dioxins		*	3.363	U			
Total Hepta-Dioxins		*	3.741	U			
Total Tetra-Furans		*	0.105	U			
Total Penta-Furans		*	1.424	U			
Total Hexa-Furans		*	0.799	U			
Total Hepta-Furans		*	1.988	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/12/01

AATS/SWL OK,INC. EPA SAMPLE NO.
Response Summary

ı #3 Filename E004601#1 Samp: 1 Inj: 1 Acquired: 10-JAN-01 03:28:00

ɔcessed: 10-Jan-01 18:45:49 Comments: ICAL CC3

Typ	Name	RT-1	Resp-1	RT-2	Resp-2	Ratio	Meet
Unk	2,3,7,8-TCDF	25:52	5.039e+04	25:52	6.646e+04	0.76	yes
Unk	1,2,3,7,8-PeCDF	32:01	7.631e+04	32:01	4.861e+04	1.57	yes
Unk	2,3,4,7,8-PeCDF	32:59	8.432e+04	32:59	5.437e+04	1.55	yes
Unk	1,2,3,4,7,8-HxCDF	36:18	1.122e+05	36:18	8.982e+04	1.25	yes
Unk	1,2,3,6,7,8-HxCDF	36:24	1.341e+05	36:24	1.086e+05	1.24	yes
Unk	2,3,4,6,7,8-HxCDF	36:59	1.073e+05	36:59	8.721e+04	1.23	yes
Unk	1,2,3,7,8,9-HxCDF	37:42	9.801e+04	37:42	7.873e+04	1.24	yes
Unk	1,2,3,4,6,7,8-HpCDF	39:16	1.270e+05	39:16	1.202e+05	1.06	yes
Unk	1,2,3,4,7,8,9-HpCDF	40:28	8.860e+04	40:28	8.388e+04	1.06	yes
Unk	OCDF	42:53	8.559e+04	42:53	9.603e+04	0.89	yes
Unk	2,3,7,8-TCDD	26:59	2.995e+04	26:59	3.963e+04	0.76	yes
Unk	1,2,3,7,8-PeCDD	33:27	4.645e+04	33:27	2.986e+04	1.56	yes
Unk	1,2,3,4,7,8-HxCDD	37:08	6.357e+04	37:08	5.040e+04	1.26	yes
Unk	1,2,3,6,7,8-HxCDD	37:13	7.311e+04	37:13	5.854e+04	1.25	yes
Unk	1,2,3,7,8,9-HxCDD	37:31	6.940e+04	37:31	5.565e+04	1.25	yes
Unk	1,2,3,4,6,7,8-HpCDD	40:08	5.241e+04	40:08	4.963e+04	1.06	yes
Unk	OCDD	42:47	5.222e+04	42:47	5.947e+04	0.88	yes
. RT	13C-2,3,7,8-TCDF	25:51	5.334e+04	25:51	6.561e+04	0.81	yes
IS	13C-1,2,3,4,6,7,8-HpCDF	39:16	6.620e+04	39:16	6.203e+04	1.07	yes
IS	13C-2,3,7,8-TCDD	26:59	3.641e+04	26:59	4.651e+04	0.78	yes
IS	13C-1,2,3,6,7,8-HxCDD	37:13	3.281e+04	37:13	2.656e+04	1.24	yes
IS	13C-OCDD	42:46	2.762e+04	42:46	2.995e+04	0.92	yes
RS	13C-1,2,3,4-TCDD	26:40	3.526e+04	26:40	4.410e+04	0.80	yes
RS/RT	13C-1,2,3,7,8,9-HxCDD	37:30	3.319e+04	37:30	2.658e+04	1.25	yes
C/Up	37Cl-2,3,7,8-TCDD	26:60	3.494e+04	26:60			

thwest laboratory of Oklahoma, Inc.
0 West Albany
ken Arrow, Ok 74012
ic 918)251-2858. Fax:(918)251-2599

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX19A-SB0102~~8~~-no1

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.08MS

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.19 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 6-MAR-01 Time: 11:06:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004730#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004721#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004720#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 17.40

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	2.802	0.014		0.74	1.001	0.81
1,2,3,7,8-PeCDD	11.917	0.106		1.48	1.241	1.05
1,2,3,4,7,8-HxCDD	*	0.271	U	*	*	0.77
1,2,3,6,7,8-HxCDD	5.333	0.238		1.28	1.000	0.88
1,2,3,7,8,9-HxCDD	*	0.249	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	5.385	0.258		1.06	1.079	0.77
OCDD	12.601	0.406		0.87	1.000	0.80
2,3,7,8-TCDF	2.649	0.014		0.78	1.001	0.98
1,2,3,7,8-PeCDF	7.171	0.145		1.56	1.239	1.20
2,3,4,7,8-PeCDF	*	0.129	U	*	*	1.35
1,2,3,4,7,8-HxCDF	*	0.064	U	*	*	1.15
1,2,3,6,7,8-HxCDF	4.669	0.055		1.20	0.928	1.34
1,2,3,7,8,9-HxCDF	*	0.070	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.065	U	*	*	1.14
1,2,3,4,6,7,8-HpCDF	5.846	0.138		1.04	1.000	1.52
1,2,3,4,7,8,9-HpCDF	*	0.180	U	*	*	1.17
OCDF	9.866	0.264		0.90	1.002	1.26
Total Tetra-Dioxins	2.802	0.014				
Total Penta-Dioxins	11.917	0.106				
Total Hexa-Dioxins	5.333	0.238				
Total Hepta-Dioxins	5.385	0.258				
Total Tetra-Furans	2.649	0.014				
Total Penta-Furans	7.171	0.129				
Total Hexa-Furans	4.669	0.055				
Total Hepta-Furans	5.846	0.138				

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX19A-SB0102-MD

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45902

Client Name: CH2M-VA Lab Sample ID: 45902.09MSD

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.12 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 6-MAR-01 Time: 11:55:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004731#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004721#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004720#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 17.40

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	2.837	0.013		0.75	1.001	0.81
1,2,3,7,8-PeCDD	11.497	0.185		1.56	1.241	1.05
1,2,3,4,7,8-HxCDD	*	0.230	U	*	*	0.77
1,2,3,6,7,8-HxCDD	5.333	0.202		1.28	1.000	0.88
1,2,3,7,8,9-HxCDD	*	0.211	U	*	*	0.84
1,2,3,4,6,7,8-HpCDD	5.503	0.232		1.06	1.079	0.77
OCDD	12.718	0.342		0.87	1.000	0.80
2,3,7,8-TCDF	2.625	0.008		0.76	1.001	0.98
1,2,3,7,8-PeCDF	6.730	0.123		1.58	1.239	1.20
2,3,4,7,8-PeCDF	*	0.110	U	*	*	1.35
1,2,3,4,7,8-HxCDF	*	0.057	U	*	*	1.15
1,2,3,6,7,8-HxCDF	4.586	0.049		1.21	0.928	1.34
1,2,3,7,8,9-HxCDF	*	0.062	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.058	U	*	*	1.14
1,2,3,4,6,7,8-HpCDF	5.925	0.123		1.05	1.000	1.52
1,2,3,4,7,8,9-HpCDF	*	0.160	U	*	*	1.17
OCDF	9.585	0.222		0.89	1.002	1.26
Total Tetra-Dioxins	**2.837**	**0.013**				
Total Penta-Dioxins	**11.497**	**0.185**				
Total Hexa-Dioxins	**5.333**	**0.202**				
Total Hepta-Dioxins	**5.503**	**0.232**				
Total Tetra-Furans	**2.625**	**0.008**				
Total Penta-Furans	**6.730**	**0.110**				
Total Hexa-Furans	**4.586**	**0.049**				
Total Hepta-Furans	**5.925**	**0.123**				

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID
14ASB0102

ab Name: SOUTHWEST_LAB_OF_OK Contract: CH2M-VA
ab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902A
atrix (soil/water): SOIL Lab Sample ID: 45902.01
evel (low/med): LOW Date Received: 02/26/01
Solids: 84.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	9160			P	
7440-36-0	Antimony	2.1	B	N	P	L
7440-38-2	Arsenic	6.5			P	
7440-39-3	Barium	151			P	
7440-41-7	Beryllium	1.1			P	
7440-43-9	Cadmium	0.23	U		P	
7440-47-3	Chromium	14.5		E	P	J
7440-48-4	Cobalt	14.3			P	
7440-50-8	Copper	15.5			P	
7439-89-6	Iron	31300			P	
7439-92-1	Lead	14.9	B	N*	P	K
7439-96-5	Manganese	911			P	
7439-97-6	Mercury	0.03	B		AV	B
7440-02-0	Nickel	22.4		E	P	J
7782-49-2	Selenium	1.4			P	K
7440-22-4	Silver	0.12	U	N*	P	
7440-28-0	Thallium	1.9			P	
7440-62-2	Vanadium	20.9			P	
7440-66-6	Zinc	66.3			P	
	Cyanide	0.15	B		AS	B
7440-31-5	Tin	4.0	B		P	B

olor Before: BROWN Clarity Before: Texture: MEDIUM
olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:
CLIENT_ID_=_ASX14A-SB-0102-R01

SMG 4/11/2001

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

14ASB0102P

ab Name: SOUTHWEST_LAB_OF_OK Contract:CH2M-VA
ab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902A
atrix (soil/water): SOIL Lab Sample ID: 45902.02
evel (low/med): LOW Date Received: 02/26/01
Solids: 84.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	9280			P	
7440-36-0	Antimony	1.3	B	N	P	L
7440-38-2	Arsenic	6.6			P	
7440-39-3	Barium	154			P	
7440-41-7	Beryllium	1.1			P	
7440-43-9	Cadmium	0.23	U		P	
7440-47-3	Chromium	14.8		E	P	J
7440-48-4	Cobalt	14.7			P	
7440-50-8	Copper	16.2			P	
7439-89-6	Iron	32300			P	
7439-92-1	Lead	15.9	B	N*	P	K
7439-96-5	Manganese	926			P	
7439-97-6	Mercury	0.04	B		AV	B
7440-02-0	Nickel	23.7		E	P	J
7782-49-2	Selenium	1.2			P	K
7440-22-4	Silver	0.12	U	N*	P	
7440-28-0	Thallium	2.1			P	
7440-62-2	Vanadium	21.1			P	
7440-66-6	Zinc	65.6			P	
	Cyanide	0.24	B		AS	B
7440-31-5	Tin	3.9	B		P	B

olor Before: BROWN Clarity Before: Texture: MEDIUM
olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:
CLIENT_ID_=_ASX14A-SB0102P-R01

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

15ASB0102

ab Name: SOUTHWEST_LAB_OF_OK Contract:CH2M-VA
ab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902A
atrix (soil/water): SOIL Lab Sample ID: 45902.03
evel (low/med): LOW Date Received: 02/26/01
Solids: 81.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	9330			P	
7440-36-0	Antimony	1.5	B	N	P	L
7440-38-2	Arsenic	7.2			P	
7440-39-3	Barium	183			P	
7440-41-7	Beryllium	1.2			P	
7440-43-9	Cadmium	0.24	U		P	
7440-47-3	Chromium	15.6		E	P	J
7440-48-4	Cobalt	15.2			P	
7440-50-8	Copper	17.1			P	
7439-89-6	Iron	31600			P	
7439-92-1	Lead	20.1	B	N*	P	K
7439-96-5	Manganese	1030			P	
7439-97-6	Mercury	0.04			AV	B
7440-02-0	Nickel	24.2		E	P	J
7782-49-2	Selenium	1.3			P	K
7440-22-4	Silver	0.12	U	N*	P	L
7440-28-0	Thallium	1.7			P	
7440-62-2	Vanadium	22.0			P	
7440-66-6	Zinc	71.3			P	
	Cyanide	0.19	B		AS	
7440-31-5	Tin	4.1	B		P	B

olor Before: BROWN Clarity Before: Texture: MEDIUM
olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:
CLIENT_ID_=_ASX15A-SB0102-R01

1

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

16ASB0102

ab Name: SOUTHWEST_LAB_OF_OK Contract:CH2M-VA
ab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902A
atrix (soil/water): SOIL Lab Sample ID: 45902.04
evel (low/med): LOW Date Received: 02/26/01
Solids: 84.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	9120			P	
7440-36-0	Antimony	1.6	B	N	P	B
7440-38-2	Arsenic	7.0			P	
7440-39-3	Barium	207			P	
7440-41-7	Beryllium	1.1			P	
7440-43-9	Cadmium	0.23	U		P	
7440-47-3	Chromium	15.3		E	P	J
7440-48-4	Cobalt	15.6			P	
7440-50-8	Copper	17.5			P	
7439-89-6	Iron	32700			P	
7439-92-1	Lead	16.0	B	N*	P	L
7439-96-5	Manganese	1010			P	
7439-97-6	Mercury	0.03	B		AV	
7440-02-0	Nickel	24.1		E	P	J
7782-49-2	Selenium	1.3			P	K
7440-22-4	Silver	0.11	U	N*	P	
7440-28-0	Thallium	1.6			P	
7440-62-2	Vanadium	21.4			P	
7440-66-6	Zinc	70.5			P	
	Cyanide	0.22	B		AS	B
7440-31-5	Tin	3.9	B		P	B

olor Before: BROWN Clarity Before: Texture: MEDIUM
olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:
CLIENT_ID_=_ASX16A-SB0102-R01

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID
17ASB0102

ab Name: SOUTHWEST_LAB_OF_OK Contract:CH2M-VA
ab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902A
atrix (soil/water): SOIL Lab Sample ID: 45902.05
evel (low/med): LOW Date Received: 02/26/01
Solids: 85.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	10200			P	
7440-36-0	Antimony	1.9	B	N	P	B
7440-38-2	Arsenic	6.9			P	
7440-39-3	Barium	195			P	
7440-41-7	Beryllium	1.2			P	
7440-43-9	Cadmium	0.22	U		P	
7440-47-3	Chromium	15.7		E	P	J
7440-48-4	Cobalt	15.9			P	
7440-50-8	Copper	16.8			P	
7439-89-6	Iron	32700			P	
7439-92-1	Lead	16.7	B	N*	P	K
7439-96-5	Manganese	1070			P	
7439-97-6	Mercury	0.03	B		AV	
7440-02-0	Nickel	25.1		E	P	J
7782-49-2	Selenium	1.2			P	K
7440-22-4	Silver	0.12	U	N*	P	
7440-28-0	Thallium	1.5			P	
7440-62-2	Vanadium	23.0			P	
7440-66-6	Zinc	70.2			P	
	Cyanide	0.12	B		AS	B
7440-31-5	Tin	4.0	B		P	B

olor Before: BROWN Clarity Before: Texture: MEDIUM
olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:
CLIENT_ID_=_ASX17A-SB0102-R01

U.S. EPA - CLP

008

1

CLIENT SAMPLE ID

INORGANIC ANALYSES DATA SHEET

18ASB0102

ab Name: SOUTHWEST_LAB_OF_OK Contract: CH2M-VA

ab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902A

atrix (soil/water): SOIL Lab Sample ID: 45902.06

evel (low/med): LOW Date Received: 02/26/01

Solids: 82.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	10200			P	
7440-36-0	Antimony	1.3	B	N	P	B
7440-38-2	Arsenic	7.0			P	
7440-39-3	Barium	203			P	
7440-41-7	Beryllium	1.3			P	
7440-43-9	Cadmium	0.24	U		P	
7440-47-3	Chromium	15.2		E	P	J
7440-48-4	Cobalt	16.4			P	
7440-50-8	Copper	16.9			P	
7439-89-6	Iron	32800			P	
7439-92-1	Lead	22.1	B	N*	P	K
7439-96-5	Manganese	1170			P	
7439-97-6	Mercury	0.04	B		AV	
7440-02-0	Nickel	27.1		E	P	J
7782-49-2	Selenium	1.3			P	K
7440-22-4	Silver	0.12	U	N*	P	
7440-28-0	Thallium	1.7			P	
7440-62-2	Vanadium	23.3			P	
7440-66-6	Zinc	73.5			P	
	Cyanide	0.30			AS	B
7440-31-5	Tin	4.0	B		P	B

olor Before: BROWN Clarity Before: Texture: MEDIUM

olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:

CLIENT_ID_=_ASX18A-SB0102-R01

U.S. EPA - CLP

009

1
INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

19ASB0102

ab Name: SOUTHWEST_LAB_OF_OK Contract: CH2M-VA
ab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902A
atrix (soil/water): SOIL Lab Sample ID: 45902.07
evel (low/med): LOW Date Received: 02/26/01
Solids: 82.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	9820			P	
7440-36-0	Antimony	0.24	U	N	P	L
7440-38-2	Arsenic	7.6			P	
7440-39-3	Barium	194			P	
7440-41-7	Beryllium	1.2			P	
7440-43-9	Cadmium	0.24	U		P	
7440-47-3	Chromium	16.1		E	P	J
7440-48-4	Cobalt	15.9			P	
7440-50-8	Copper	18.6			P	
7439-89-6	Iron	33100			P	
7439-92-1	Lead	25.0	B	N*	P	L
7439-96-5	Manganese	1080			P	
7439-97-6	Mercury	0.04	B		AV	J
7440-02-0	Nickel	25.3		E	P	J
7782-49-2	Selenium	1.4			P	K
7440-22-4	Silver	0.12	U	N*	P	
7440-28-0	Thallium	2.1			P	
7440-62-2	Vanadium	24.8			P	
7440-66-6	Zinc	75.2			P	
	Cyanide	0.28	B		AS	B
7440-31-5	Tin	3.8	B		P	B

olor Before: BROWN Clarity Before: Texture: MEDIUM
olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:
CLIENT_ID_=_ASX19A-SB0102-R01

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

20ASB0102

ab Name: SOUTHWEST_LAB_OF_OK Contract:CH2M-VA
ab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902A
atrix (soil/water): SOIL Lab Sample ID: 45902.10
evel (low/med): LOW Date Received: 02/26/01
Solids: 84.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	10200			P	
7440-36-0	Antimony	2.0	B	N	P	L
7440-38-2	Arsenic	7.0			P	
7440-39-3	Barium	196			P	
7440-41-7	Beryllium	1.2			P	
7440-43-9	Cadmium	0.23	U		P	
7440-47-3	Chromium	15.8		E	P	J
7440-48-4	Cobalt	16.0			P	
7440-50-8	Copper	17.6			P	
7439-89-6	Iron	33500			P	
7439-92-1	Lead	16.6	B	N*	P	K
7439-96-5	Manganese	1100			P	
7439-97-6	Mercury	0.03	B		AV	
7440-02-0	Nickel	25.9		E	P	J
7782-49-2	Selenium	0.98			P	K
7440-22-4	Silver	0.12	U	N*	P	
7440-28-0	Thallium	1.8			P	
7440-62-2	Vanadium	23.5			P	
7440-66-6	Zinc	78.7			P	
	Cyanide	0.14	B		AS	B
7440-31-5	Tin	4.0	B		P	B

olor Before: BROWN Clarity Before: Texture: MEDIUM
olor After: YELLOW Clarity After: CLEAR Artifacts:

omments:
CLIENT_ID_=_ASX20A-SB0102-R01

1

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

ASX00EB0221

Lab Name: SOUTHWEST_LABORATORIES___ Contract:CH2M-VA___
Lab Code: SWOK__ Case No.: 45902 SAS No.: _____ SDG No.: 45902B
Matrix (soil/water): WATER Lab Sample ID: 45902.12
Level (low/med): LOW__ Date Received: 02/26/01
% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15.0	U		P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.1	B	J	P
7440-48-4	Cobalt	2.0	U		P
7440-50-8	Copper	5.1	B	J	P
7439-89-6	Iron	37.6	B	J	P
7439-92-1	Lead	3.6			P
7439-96-5	Manganese	2.8	B	J	P
7439-97-6	Mercury	0.10	B	J	AV
7440-02-0	Nickel	2.0	U		P
7782-49-2	Selenium	5.0	U		P
7440-22-4	Silver	1.0	U		P
7440-28-0	Thallium	6.0	U		P
7440-62-2	Vanadium	1.0	U		P
7440-66-6	Zinc	5.3	B	J	P
	Cyanide	3.2	B	J	AS
7440-31-5	Tin	6.0	U		P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:
CLIENT_ID_=_ASX00-EB(022101)-R01

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

ASX13FB0222

ab Name: SOUTHWEST_LABORATORIES Contract:CH2M-VA
ab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902B
atrix (soil/water): WATER Lab Sample ID: 45902.14
evel (low/med): LOW Date Received: 02/26/01
Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15.0	U		P
7440-36-0	Antimony	3.5	B	J	P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	2.0	U		P
7440-50-8	Copper	4.9	B	J	P
7439-89-6	Iron	18.0	U		P
7439-92-1	Lead	2.0	U		P
7439-96-5	Manganese	2.0	U		P
7439-97-6	Mercury	0.10	U		AV
7440-02-0	Nickel	2.0	U		P
7782-49-2	Selenium	5.0	U		P
7440-22-4	Silver	1.0	U		P
7440-28-0	Thallium	6.0	U		P
7440-62-2	Vanadium	1.0	U		P
7440-66-6	Zinc	5.6	B	J	P
	Cyanide	4.2	B	J	AS
7440-31-5	Tin	6.0	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:
Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:
CLIENT_ID_=_ASX13-FB(022201)-R01

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

ASX00EB0222

Lab Name: SOUTHWEST_LABORATORIES Contract: CH2M-VA
Lab Code: SWOK Case No.: 45902 SAS No.: SDG No.: 45902B
Matrix (soil/water): WATER Lab Sample ID: 45902.15
Level (low/med): LOW Date Received: 02/26/01
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15.0	U		P
7440-36-0	Antimony	3.3	B	J	P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	1.0	U		P
7440-41-7	Beryllium	1.0	U		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	B	J	P
7440-48-4	Cobalt	2.0	U		P
7440-50-8	Copper	4.9	B	J	P
7439-89-6	Iron	18.0	U		P
7439-92-1	Lead	2.5	B	J	P
7439-96-5	Manganese	2.1	B	J	P
7439-97-6	Mercury	0.10	U		AV
7440-02-0	Nickel	2.0	U		P
7782-49-2	Selenium	5.0	U		P
7440-22-4	Silver	1.0	U		P
7440-28-0	Thallium	6.0	U		P
7440-62-2	Vanadium	1.0	U		P
7440-66-6	Zinc	10.7	B	J	P
	Cyanide	2.9	B	J	AS
7440-31-5	Tin	6.0	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:
Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:
CLIENT_ID_=_ASX00-EB(022201)-R01

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE ID

ASX15FB0221

ab Name: SOUTHWEST_LABORATORIES___ Contract:CH2M-VA___
ab Code: SWOK__ Case No.: 45902 SAS No.: _____ SDG No.: 45902B
atrix (soil/water): WATER Lab Sample ID: 45902.11
evel (low/med): LOW__ Date Received: 02/26/01
Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	15.0	U		P	
7440-36-0	Antimony	3.0	U		P	
7440-38-2	Arsenic	3.0	U		P	
7440-39-3	Barium	1.0	U		P	
7440-41-7	Beryllium	1.0	U		P	
7440-43-9	Cadmium	1.0	U		P	
7440-47-3	Chromium	1.0	U		P	
7440-48-4	Cobalt	2.0	U		P	
7440-50-8	Copper	4.6	B		P	J
7439-89-6	Iron	18.0	U		P	
7439-92-1	Lead	2.0	U		P	
7439-96-5	Manganese	2.0	U		P	
7439-97-6	Mercury	0.10	U		AV	
7440-02-0	Nickel	2.0	U		P	
7782-49-2	Selenium	5.0	U		P	
7440-22-4	Silver	1.0	U		P	
7440-28-0	Thallium	6.0	U		P	
7440-62-2	Vanadium	1.0	U		P	
7440-66-6	Zinc	11.0	B		P	J
	Cyanide	2.0	U		AS	
7440-31-5	Tin	6.0	U		P	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _____
Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _____

Comments:
CLIENT_ID_=_ASX15-FB(022101)-R01

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.01

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.01
SAMPLE #: ASX14A-SB-0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/21/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.9

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T L ORGANIC CARBON	594	mg/kg	9050	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
Ph	0.10	s.u.	7.0	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.059	mg/kg	0.12	03/12/2001 15:11	DT	EPA 314.0

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.01

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.01
SAMPLE #: ASX14A-SB-0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/21/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.9

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	ND	03/07/2001 14:36	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	ND	03/07/2001 14:36	DT	EPA 300.0/SW 9056

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

smk 4/11/2001

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.02

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.02
SAMPLE #: ASX14A-SB0102P-R01
LOCATION: Rocket Cen

SAMPLED : 02/21/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.6

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T , ORGANIC CARBON	592	mg/kg	9370	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
Ph	0.10	s.u.	7.1	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.059	mg/kg	0.092	03/12/2001 15:11	DT	EPA 314.0

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

4/11/2001

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.02

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.02
SAMPLE #: ASX14A-SB0102P-R01
LOCATION: Rocket Cen

SAMPLED : 02/21/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.6

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	ND	03/07/2001 14:52	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	ND	03/07/2001 14:52	DT	EPA 300.0/SW 9056

smk 4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

07

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.03

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.03
SAMPLE #: ASX15A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/21/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 18.6

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
TC ORGANIC CARBON	614	mg/kg	9930	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
Ph	0.10	s.u.	7.3	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.061	mg/kg	ND	03/12/2001 15:11	DT	EPA 314.0

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SMK 4/11/2001

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

08

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.03

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.03
SAMPLE #: ASX15A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/21/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 18.6

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	ND	03/07/2001 15:08	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	ND	03/07/2001 15:08	DT	EPA 300.0/SW 9056

4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.04

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.04
SAMPLE #: ASX16A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.8

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T L ORGANIC CARBON	594	mg/kg	9410	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
Ph	0.10	s.u.	7.3	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.059	mg/kg	0.062	03/12/2001 15:11	DT	EPA 314.0

smt 4/11/2001

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.04

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.04
SAMPLE #: ASX16A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.8

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	ND	03/07/2001 15:24	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	ND	03/07/2001 15:24	DT	EPA 300.0/SW 9056

4/11/01

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
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LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.05

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.05
SAMPLE #: ASX17A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.0

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T[illegible] ORGANIC CARBON	588	mg/kg	8940	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
Ph	0.10	s.u.	7.5	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.059	mg/kg	2.5	03/12/2001 15:11	DT	EPA 314.0

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

4/11/2001

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

1-2

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.05

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.05
SAMPLE #: ASX17A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.0

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	ND	03/07/2001 15:41	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	ND	03/07/2001 15:41	DT	EPA 300.0/SW 9056

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

4/11/2001

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.06

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.06
SAMPLE #: ASX18A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 17.6

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T L ORGANIC CARBON	607	mg/kg	11900	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
Pn	0.10	s.u.	7.4	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.061	mg/kg	ND	03/12/2001 15:11	DT	EPA 314.0

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

4/11/2001

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.06

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.06
SAMPLE #: ASX18A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 17.6

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	ND	03/07/2001 15:57	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	ND	03/07/2001 15:57	DT	EPA 300.0/SW 9056

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

smw 4/11/2001

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

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LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.07

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.07 N1
SAMPLE #: ASX19A-SB0102-R01 N1
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 17.4

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T[illegible] ORGANIC CARBON	605	mg/kg	12300	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
PH-	0.10	s.u.	7.4	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.060	mg/kg	ND	03/12/2001 15:11	DT	EPA 314.0

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

smk 4/17/2001

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LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.07

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.07 N1
SAMPLE #: ASX19A-SB0102-R01 N1
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 17.4

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	ND	03/07/2001 16:20	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	ND	03/07/2001 16:20	DT	EPA 300.0/SW 9056

4/11/200

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

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LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.08

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.08 MS1
SAMPLE #: ASX19A-SB0102-R01 MS1
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 16.8

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T[illegible] ORGANIC CARBON	601	mg/kg	127000	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
PH*	0.10	s.u.	7.5	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.060	mg/kg	0.61	03/12/2001 15:11	DT	EPA 314.0

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

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LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.08

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.08 MS1
SAMPLE #: ASX19A-SB0102-R01 MS1
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 16.8

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	13.8	03/07/2001 17:08	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	14.4	03/07/2001 17:08	DT	EPA 300.0/SW 9056

4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.09

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.09 SD1
SAMPLE #: ASX19A-SB0102-R01 SD1
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 17.3

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
TOTAL ORGANIC CARBON	604	mg/kg	133000	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
PH*	0.10	s.u.	7.5	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.060	mg/kg	0.62	03/12/2001 15:11	DT	EPA 314.0

4/11/2001

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.09

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.09 SD1
SAMPLE #: ASX19A-SB0102-R01 SD1
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 17.3

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	13.9	03/07/2001 17:24	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	14.7	03/07/2001 17:24	DT	EPA 300.0/SW 9056

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.
1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.10

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.10
SAMPLE #: ASX20A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.8

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T ORGANIC CARBON	594	mg/kg	11400	03/15/2001 15:00	SLB	EPA 415.1/SW 9060
PH*	0.10	s.u.	7.6	03/13/2001 10:30	SB	SM 9040-5/EPA 150.1
PERCHLORATE	0.059	mg/kg	ND	03/12/2001 15:11	DT	EPA 314.0

4/11/2001

COMPOUND* = RESULTS REPORTED AS RECEIVED
ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

2

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.10

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.10
SAMPLE #: ASX20A-SB0102-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Soil

%MOISTURE: 15.8

METAL PARAMETERS
REPORTED ON A DRY WEIGHT BASIS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
NITRATE	1.2	mg/kg	ND	03/07/2001 17:41	DT	EPA 300.0/SW 9056
NITRITE	1.2	mg/kg	ND	03/07/2001 17:41	DT	EPA 300.0/SW 9056

3/17/20

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.11

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.11
SAMPLE #: ASX15-FB(022101)-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Water

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T , ORGANIC CARBON	1.0	mg/l	ND	03/01/2001 10:40	SP	EPA 415.1/SW 9060
PH	0.10	s.u.	5.8	02/26/2001 16:30	KAL	SM 9040-5/EPA 150.1
PERCHLORATE	5.0	ug/l	ND	02/28/2001 15:33	DT	EPA 314.0

4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.11

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.11
SAMPLE #: ASX15-FB(022101)-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Water

METAL PARAMETERS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
Nitrate	0.10	mg/l	ND	02/26/2001 17:08	DT	EPA 300.0/SW 9056
NITRITE	0.10	mg/l	ND	02/26/2001 17:08	DT	EPA 300.0/SW 9056

4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.12

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.12
SAMPLE #: ASX00-EB(022101)-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Water

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T[illegible]L ORGANIC CARBON	1.0	mg/l	ND	03/01/2001 10:40	SP	EPA 415.1/SW 9060
PH	0.10	s.u.	5.9	02/26/2001 16:30	KAL	SM 9040-5/EPA 150.1
PERCHLORATE	5.0	ug/l	ND	02/28/2001 15:33	DT	EPA 314.0

smk 4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.12

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.12
SAMPLE #: ASX00-EB(022101)-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Water

METAL PARAMETERS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
Nitrate	0.10	mg/l	ND	02/26/2001 17:24	DT	EPA 300.0/SW 9056
NITRITE	0.10	mg/l	ND	02/26/2001 17:24	DT	EPA 300.0/SW 9056

4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.14

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.14
SAMPLE #: ASX13-FB(022201)-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Water

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
T ORGANIC CARBON	1.0	mg/l	ND	03/01/2001 10:40	SP	EPA 415.1/SW 9060
Ph	0.10	s.u.	5.7	02/26/2001 16:30	KAL	SM 9040-5/EPA 150.1
PERCHLORATE	5.0	ug/l	ND	02/28/2001 15:33	DT	EPA 314.0

4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.14

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.14
SAMPLE #: ASX13-FB(022201)-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Water

METAL PARAMETERS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
Nitrate	0.10	mg/l	ND	02/26/2001 17:40	DT	EPA 300.0/SW 9056
NITRITE	0.10	mg/l	ND	02/26/2001 17:40	DT	EPA 300.0/SW 9056

4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
HERNDON, VA 22070

Attn: ANN WEST

REPORT : 45902.15

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.15
SAMPLE #: ASX00-EB(022201)-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Water

MISCELLANEOUS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
TOTAL ORGANIC CARBON	1.0	mg/l	ND	03/01/2001 10:40	SP	EPA 415.1/SW 9060
P	0.10	s.u.	5.3	02/26/2001 16:30	KAL	SM 9040-5/EPA 150.1
PERCHLORATE	5.0	ug/l	ND	02/28/2001 15:33	DT	EPA 314.0

4/11/2001

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE
METHODOLOGY: SM = STANDARD METHODS 19TH EDITION 1995

SOUTHWEST LABORATORY OF OKLAHOMA, INC.

1700 West Albany Broken Arrow, Oklahoma 74012 Office (918) 251-2858 Fax (918) 251-2599

LABORATORY RESULTS

CH2M HILL
625 HERNDON PARKWAY
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Attn: ANN WEST

REPORT : 45902.15

REPORTED : 03/16/2001

PROJECT : CTO-175
LAB# : 45902.15
SAMPLE #: ASX00-EB(022201)-R01
LOCATION: Rocket Cen

SAMPLED : 02/22/2001
SUBMITTED: 02/26/2001

MATRIX : Water

METAL PARAMETERS

PARAMETER	REPORTING LIMIT	UNITS	RESULTS	DATE/TIME ANALYZED	ANALYST	METHOD REFERENCE
Nitrate	0.10	mg/l	ND	02/26/2001 17:57	DT	EPA 300.0/SW 9056
NITRITE	0.10	mg/l	ND	02/26/2001 17:57	DT	EPA 300.0/SW 9056

ND = NOT DETECTED ABOVE QUANTITATION LIMIT
* = SURROGATE RECOVERY OUTSIDE OF QC LIMITS
N/A = NOT APPLICABLE
METHODOLOGY: SM = STANDARD METHODS 19TH EDITION, 1995

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX01-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.01A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46763.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 24 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	66	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	260	U	
75-09-2	Methylene Chloride	3	~~BJ~~	/ B
107-13-1	Acrylonitrile	66	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	130	~~U~~	R
126-98-7	Methacrylonitrile	130	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	260	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	660	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX01-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.01A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46763.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 24 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46764.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 12 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	57	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	230	U	
75-09-2	Methylene Chloride	4	~~U~~ J	B
107-13-1	Acrylonitrile	57	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	110	~~U~~	R
126-98-7	Methacrylonitrile	110	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	230	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	28		
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	570	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

4/2/01

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46764.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 12 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX03-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.03A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46765.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 18 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	61	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	4	~~BU~~ / B
107-13-1	Acrylonitrile	61	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	610	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX03-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.03A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46765.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 18 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG		Q
108-10-1	4-Methyl-2-Pentanone		6	U
108-88-3	Toluene		6	U
10061-02-6	trans-1,3-Dichloropropene		6	U
97-63-2	Ethyl methacrylate		6	U
79-00-5	1,1,2-Trichloroethane		6	U
106-93-4	1,2-Dibromoethane		6	U
127-18-4	Tetrachloroethene		6	U
591-78-6	2-Hexanone		6	U
124-48-1	Dibromochloromethane		6	U
108-90-7	Chlorobenzene		6	U
630-20-6	1,1,1,2-Tetrachloroethane		6	U
100-41-4	Ethylbenzene		6	U
1330-20-7	Xylenes (total)		6	U
100-42-5	Styrene		6	U
75-25-2	Bromoform		6	U
110-57-6	trans-1,4-Dichloro-2-butene		6	U
76-01-7	Pentachloroethane		6	U
79-34-5	1,1,2,2-Tetrachloroethane		6	U
96-18-4	1,2,3-Trichloropropane		6	U
96-12-8	1,2-Dibromo-3-chloropropane		6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX04-SS0001-R01

ab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.04A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46766.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	62	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	5	J	✓
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	250	U	
75-09-2	Methylene Chloride	5	~~B0~~	✓ B
107-13-1	Acrylonitrile	62	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	120	~~U~~	R
126-98-7	Methacrylonitrile	120	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	250	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	9		✓
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	620	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX04-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.04A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46766.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX05-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.05A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46767.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 15 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	59	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	10	
74-88-4	Methyl Iodide	6	U
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	9	B
107-13-1	Acrylonitrile	59	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	590	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX05-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.05A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46767.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 15 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX06-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.06A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46768.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 20 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	62	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	16		/
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	250	U	
75-09-2	Methylene Chloride	2	~~BU~~	/ B
107-13-1	Acrylonitrile	62	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	120	~~U~~	R
126-98-7	Methacrylonitrile	120	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	250	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	620	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX06-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.06A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46768.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 20 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX07-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.09A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46782.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 14 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	58	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	230	U	
75-09-2	Methylene Chloride	6	B	
107-13-1	Acrylonitrile	58	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	120	~~U~~	R
126-98-7	Methacrylonitrile	120	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	230	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	580	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX07-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.09A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46782.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 14 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX08-SS0001-R01

ab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.07A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46769.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 21 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	63	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	12		/
74-88-4	Methyl Iodide	6	U	
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	250	U	
75-09-2	Methylene Chloride	9	B	/
107-13-1	Acrylonitrile	63	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	130	~~U~~	R
126-98-7	Methacrylonitrile	130	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	250	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	630	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX08-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.07A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46769.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 21 Date Analyzed: 03/02/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001-R01

Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.15D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46786.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 17 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	60	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	12	B
74-88-4	Methyl Iodide	6	U
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	8	B
107-13-1	Acrylonitrile	60	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	600	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.15D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46786.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 17 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.23D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46794.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 21 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	63	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	L
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	250	U	
75-09-2	Methylene Chloride	9	B	✓
107-13-1	Acrylonitrile	63	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	130	~~U~~	R
126-98-7	Methacrylonitrile	130	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	250	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	630	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.23D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46794.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 21 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX10-SS0001-R01

ab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.12A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46785.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 18 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	61	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	8	B
74-88-4	Methyl Iodide	6	U L
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	4	~~BJ~~ B
107-13-1	Acrylonitrile	61	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	610	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX10-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.12A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46785.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 18 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX11-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.16D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46787.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 15 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	59	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	~~BJ~~ / B
74-88-4	Methyl Iodide	6	U L
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	15	B /
107-13-1	Acrylonitrile	59	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	3	J /
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	590	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX11-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.16D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46787.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 15 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX12-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.10A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46783.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	62	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	250	U
75-09-2	Methylene Chloride	10	B ✓
107-13-1	Acrylonitrile	62	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	250	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	620	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX12-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.10A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46783.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-SS0001-R01

Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.17D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46788.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 21 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	63	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U L
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	250	U
75-09-2	Methylene Chloride	3	~~BJ~~ / B
107-13-1	Acrylonitrile	63	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	130	~~U~~ R
126-98-7	Methacrylonitrile	130	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	250	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	630	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.17D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46788.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 21 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46789.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 20 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	62	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	8	B
74-88-4	Methyl Iodide	6	U L
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	250	U
75-09-2	Methylene Chloride	6	B
107-13-1	Acrylonitrile	62	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	250	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	620	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46789.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 20 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-SS0001-R01

b Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.19D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46790.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 17 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	60	~~UJ~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U L
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	3	~~BJ~~ B
107-13-1	Acrylonitrile	60	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~UJ~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~UJ~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	600	~~UJ~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.19D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46790.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 17 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.20D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46791.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 15 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	59	~~UJ~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U L
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	5	~~BJ~~ / B
107-13-1	Acrylonitrile	59	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~UJ~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~UJ~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	590	~~UJ~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.20D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46791.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 15 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.22D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46793.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	60	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	240	U
75-09-2	Methylene Chloride	8	B
107-13-1	Acrylonitrile	60	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	240	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	600	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.22D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46793.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 16 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.24D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46795.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 18 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG		Q
75-71-8	Dichlorodifluoromethane	6	U	
74-87-3	Chloromethane	6	U	
75-01-4	Vinyl Chloride	6	U	
74-83-9	Bromomethane	6	U	
75-00-3	Chloroethane	6	U	
75-69-4	Trichlorofluoromethane	6	U	
107-02-8	Acrolein	61	~~U~~	R
75-35-4	1,1-Dichloroethene	6	U	
67-64-1	Acetone	6	U	
74-88-4	Methyl Iodide	6	U	L
75-15-0	Carbon Disulfide	6	U	
107-05-1	Allyl chloride	6	U	
75-05-8	Acetonitrile	240	U	
75-09-2	Methylene Chloride	6	~~BJ~~	B
107-13-1	Acrylonitrile	61	U	
75-34-3	1,1-Dichloroethane	6	U	
108-05-4	Vinyl Acetate	6	U	
126-99-8	Chloroprene	6	U	
540-59-0	1,2-Dichloroethene (total)	6	U	
78-93-3	2-Butanone	6	U	
107-12-0	Propionitrile	120	~~U~~	R
126-98-7	Methacrylonitrile	120	U	
67-66-3	Chloroform	6	U	
71-55-6	1,1,1-Trichloroethane	6	U	
56-23-5	Carbon Tetrachloride	6	U	
71-43-2	Benzene	6	U	
78-83-1	Isobutyl alcohol	240	~~U~~	R
107-06-2	1,2-Dichloroethane	6	U	
79-01-6	Trichloroethene	6	U	
78-87-5	1,2-Dichloropropane	6	U	
74-95-3	Dibromomethane	6	U	
123-91-1	1,4-Dioxane	610	~~U~~	R
80-62-6	Methyl methacrylate	6	U	
75-27-4	Bromodichloromethane	6	U	
110-75-8	2-Chloroethyl vinyl ether	6	U	
10061-01-5	cis-1,3-Dichloropropene	6	U	

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VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.24D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46795.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 18 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01

ab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46792.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	62	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U L
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	250	U
75-09-2	Methylene Chloride	4	~~BJ~~ ✓ B
107-13-1	Acrylonitrile	62	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	250	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	620	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21D

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46792.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01

ab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46784.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	62	~~UJ~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	6	U
74-88-4	Methyl Iodide	6	U L
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	250	U
75-09-2	Methylene Chloride	5	~~BJ~~ / B
107-13-1	Acrylonitrile	62	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~UJ~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	250	~~UJ~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	620	~~UJ~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46784.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 19 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

JS 4/2/01

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46781.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 20 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	6	U
74-87-3	Chloromethane	6	U
75-01-4	Vinyl Chloride	6	U
74-83-9	Bromomethane	6	U
75-00-3	Chloroethane	6	U
75-69-4	Trichlorofluoromethane	6	U
107-02-8	Acrolein	62	~~U~~ R
75-35-4	1,1-Dichloroethene	6	U
67-64-1	Acetone	10	B
74-88-4	Methyl Iodide	6	U L
75-15-0	Carbon Disulfide	6	U
107-05-1	Allyl chloride	6	U
75-05-8	Acetonitrile	250	U
75-09-2	Methylene Chloride	2	~~BU~~ B
107-13-1	Acrylonitrile	62	U
75-34-3	1,1-Dichloroethane	6	U
108-05-4	Vinyl Acetate	6	U
126-99-8	Chloroprene	6	U
540-59-0	1,2-Dichloroethene (total)	6	U
78-93-3	2-Butanone	6	U
107-12-0	Propionitrile	120	~~U~~ R
126-98-7	Methacrylonitrile	120	U
67-66-3	Chloroform	6	U
71-55-6	1,1,1-Trichloroethane	6	U
56-23-5	Carbon Tetrachloride	6	U
71-43-2	Benzene	6	U
78-83-1	Isobutyl alcohol	250	~~U~~ R
107-06-2	1,2-Dichloroethane	6	U
79-01-6	Trichloroethene	6	U
78-87-5	1,2-Dichloropropane	6	U
74-95-3	Dibromomethane	6	U
123-91-1	1,4-Dioxane	620	~~U~~ R
80-62-6	Methyl methacrylate	6	U
75-27-4	Bromodichloromethane	6	U
110-75-8	2-Chloroethyl vinyl ether	6	U
10061-01-5	cis-1,3-Dichloropropene	6	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08A

Sample wt/vol: 5.0 (g/mL) G Lab File ID: N46781.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: not dec. 20 Date Analyzed: 03/03/01

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: ____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-10-1	4-Methyl-2-Pentanone	6	U
108-88-3	Toluene	6	U
10061-02-6	trans-1,3-Dichloropropene	6	U
97-63-2	Ethyl methacrylate	6	U
79-00-5	1,1,2-Trichloroethane	6	U
106-93-4	1,2-Dibromoethane	6	U
127-18-4	Tetrachloroethene	6	U
591-78-6	2-Hexanone	6	U
124-48-1	Dibromochloromethane	6	U
108-90-7	Chlorobenzene	6	U
630-20-6	1,1,1,2-Tetrachloroethane	6	U
100-41-4	Ethylbenzene	6	U
1330-20-7	Xylenes (total)	6	U
100-42-5	Styrene	6	U
75-25-2	Bromoform	6	U
110-57-6	trans-1,4-Dichloro-2-butene	6	U
76-01-7	Pentachloroethane	6	U
79-34-5	1,1,2,2-Tetrachloroethane	6	U
96-18-4	1,2,3-Trichloropropane	6	U
96-12-8	1,2-Dibromo-3-chloropropane	6	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX01-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.01

Sample wt/vol: 31.4 (g/mL) G Lab File ID: V1030919.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 24 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	420	U
108-95-2	Phenol	420	U
111-44-4	bis(2-Chloroethyl)ether	420	U
95-57-8	2-Chlorophenol	420	U
541-73-1	1,3-Dichlorobenzene	420	U
106-46-7	1,4-Dichlorobenzene	420	U
100-51-6	Benzyl alcohol	420	U
95-50-1	1,2-Dichlorobenzene	420	U
108-60-1	bis(2-Chloroisopropyl)ether	420	U
95-48-7	2-Methylphenol	420	U
67-72-1	Hexachloroethane	420	U
110-86-1	Pyridine	420	U
62-75-9	N-Nitrosodimethylamine	420	U
109-06-8	2-Picoline	420	U
10595-95-6	n-Nitrosomethylethylamine	420	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	420	U
62-50-0	Ethyl methanesulfonate	420	U
98-86-2	Acetophenone	420	U
930-55-2	n-Nitrosopyrrolidine	420	U
59-89-2	n-Nitrosomorpholine	420	U
621-64-7	N-Nitroso-di-n-propylamine	420	U
95-53-4	o-Toluidine	420	U
108-39-4	3-Methylphenol	420	~~U~~ K U
106-44-5	4-Methylphenol	420	U
88-75-5	2-Nitrophenol	420	U
105-67-9	2,4-Dimethylphenol	420	U
111-91-1	bis(2-Chloroethoxy)methane	420	U
120-83-2	2,4-Dichlorophenol	420	U
120-82-1	1,2,4-Trichlorobenzene	420	U
91-20-3	Naphthalene	40	J
87-65-0	2,6-Dichlorophenol	420	U
106-47-8	4-Chloroaniline	420	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX01-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.01

Sample wt/vol: 31.4 (g/mL) G Lab File ID: V1030919.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 24 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	420	U
59-50-7	4-Chloro-3-methylphenol	420	U
91-57-6	2-Methylnaphthalene	420	U
95-94-3	1,2,4,5-Tetrachlorobenzene	420	U
98-95-3	Nitrobenzene	420	U
100-75-4	n-Nitrosopiperidine	420	U
78-59-1	Isophorone	420	U
126-68-1	o,o,o-Triethylphosphorothioate	420	U
924-16-3	n-Nitrosodibutylamine	420	U
120-58-1	Isosafrole	420	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	200	JB
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	420	U
88-06-2	2,4,6-Trichlorophenol	420	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	420	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	420	U
208-96-8	Acenaphthylene	420	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	420	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	420	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	420	U
58-90-2	2,3,4,6-Tetrachlorophenol	420	U
84-66-2	Diethylphthalate	420	U
7005-72-3	4-Chlorophenyl-phenylether	420	U
86-73-7	Fluorene	420	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	420	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX01-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.01

Sample wt/vol: 31.4 (g/mL) G Lab File ID: V1030919.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 24 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	420	U
99-65-0	1,3-Dinitrobenzene	420	U
606-20-2	2,6-Dinitrotoluene	420	U
134-32-7	1-Naphthylamine	420	U
121-14-2	2,4-Dinitrotoluene	420	U
91-59-8	2-Naphthylamine	420	U
99-55-8	2-Methyl-5-nitroaniline	420	U
297-97-2	Thionazin	420	U
122-39-4	Diphenylamine	420	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
101-55-3	4-Bromophenyl-phenylether	420	U
118-74-1	Hexachlorobenzene	420	U
85-01-8	Phenanthrene	140	J
120-12-7	Anthracene	420	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	420	U
84-74-2	Di-n-butylphthalate	420	U
206-44-0	Fluoranthene	420	U
87-86-5	Pentachlorophenol	1000	U
86-30-6	N-Nitrosodiphenylamine	420	U
298-02-2	Phorate	420	U
62-44-2	Phenacetin	420	U
2303-16-4	Diallate	420	U
60-51-5	Dimethoate	420	U
92-67-1	4-Aminobiphenyl	420	U
82-68-8	Pentachloronitrobenzene	1000	U
23950-58-5	Pronamide	420	U
298-04-4	Disulfoton	420	U
298-00-0	Methyl parathion	420	U
56-38-2	Parathion	420	U
91-80-5	Methapyrilene	1000	U
465-73-6	Isodrin	420	U
3689-24-5	Sulfotep	420	U
56-57-5	4-Nitroquinoline-1-oxide	1000	~~U~~ R

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX01-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.01

Sample wt/vol: 31.4 (g/mL) G Lab File ID: V1030919.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 24 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	420	U
129-00-0	Pyrene	420	U
85-68-7	Butylbenzylphthalate	420	U
56-55-3	Benzo(a)anthracene	66	J
218-01-9	Chrysene	110	J
117-81-7	bis(2-Ethylhexyl)phthalate	420	U
140-57-8	Aramite	1000	U
60-11-7	Methyl Yellow	420	U
510-15-6	Chlorobenzilate	420	~~U~~ R
119-93-7	3,3'-Dimethylbenzidine	420	U
53-96-3	2-Acetylaminofluorene	420	U
91-94-1	3,3'-Dichlorobenzidine	420	U
143-50-0	Kepone	1000	U
52-85-7	Famphur	420	U
117-84-0	Di-n-octylphthalate	420	U
205-99-2	Benzo(b)fluoranthene	420	U
207-08-9	Benzo(k)fluoranthene	420	U
50-32-8	Benzo(a)pyrene	54	J
193-39-5	Indeno(1,2,3-cd)pyrene	420	U
53-70-3	Dibenz(a,h)anthracene	420	U
191-24-2	Benzo(g,h,i)perylene	420	U
57-97-6	7,12-Dimethylbenz(a)anthracene	420	U
56-49-5	3-Methylchloranthrene	420	U
70-30-4	Hexachlorophene	17000	U
92-52-4	1,1'-Biphenyl	420	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02

Sample wt/vol: 33.0 (g/mL) G Lab File ID: V1030922.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 12 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	340	U
108-95-2	Phenol	340	U
111-44-4	bis(2-Chloroethyl)ether	340	U
95-57-8	2-Chlorophenol	340	U
541-73-1	1,3-Dichlorobenzene	340	U
106-46-7	1,4-Dichlorobenzene	340	U
100-51-6	Benzyl alcohol	340	U
95-50-1	1,2-Dichlorobenzene	340	U
108-60-1	bis(2-Chloroisopropyl)ether	340	U
95-48-7	2-Methylphenol	340	U
67-72-1	Hexachloroethane	340	U
110-86-1	Pyridine	340	U
62-75-9	N-Nitrosodimethylamine	340	U
109-06-8	2-Picoline	340	U
10595-95-6	n-Nitrosomethylethylamine	340	U
66-27-3	Methyl methanesulfonate	860	U
55-18-5	n-Nitrosodiethylamine	340	U
62-50-0	Ethyl methanesulfonate	340	U
98-86-2	Acetophenone	340	U
930-55-2	n-Nitrosopyrrolidine	340	U
59-89-2	n-Nitrosomorpholine	340	U
621-64-7	N-Nitroso-di-n-propylamine	340	U
95-53-4	o-Toluidine	340	U
108-39-4	3-Methylphenol	340	U
106-44-5	4-Methylphenol	340	U
88-75-5	2-Nitrophenol	340	U
105-67-9	2,4-Dimethylphenol	340	U
111-91-1	bis(2-Chloroethoxy)methane	340	U
120-83-2	2,4-Dichlorophenol	340	U
120-82-1	1,2,4-Trichlorobenzene	340	U
91-20-3	Naphthalene	340	U
87-65-0	2,6-Dichlorophenol	340	U
106-47-8	4-Chloroaniline	340	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02

Sample wt/vol: 33.0 (g/mL) G Lab File ID: V1030922.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 12 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	340	U
59-50-7	4-Chloro-3-methylphenol	340	U
91-57-6	2-Methylnaphthalene	340	U
95-94-3	1,2,4,5-Tetrachlorobenzene	340	U
98-95-3	Nitrobenzene	340	U
100-75-4	n-Nitrosopiperidine	340	U
78-59-1	Isophorone	340	U
126-68-1	o,o,o-Triethylphosphorothioate	340	U
924-16-3	n-Nitrosodibutylamine	340	U
120-58-1	Isosafrole	340	U
122-09-8	a,a-Dimethylphenethylamine	860	U
65-85-0	Benzoic acid	860	U
106-50-3	p-Phenylenediamine	860	U
77-47-4	Hexachlorocyclopentadiene	340	U
88-06-2	2,4,6-Trichlorophenol	340	U
95-95-4	2,4,5-Trichlorophenol	860	U
91-58-7	2-Chloronaphthalene	340	U
88-74-4	2-Nitroaniline	860	U
131-11-3	Dimethylphthalate	2300	
208-96-8	Acenaphthylene	340	U
99-09-2	3-Nitroaniline	860	U
83-32-9	Acenaphthene	340	U
51-28-5	2,4-Dinitrophenol	860	U
100-02-7	4-Nitrophenol	860	U
132-64-9	Dibenzofuran	340	U
1888-71-7	Hexachloropropene	860	U
608-93-5	Pentachlorobenzene	340	U
58-90-2	2,3,4,6-Tetrachlorophenol	340	U
84-66-2	Diethylphthalate	160	J
7005-72-3	4-Chlorophenyl-phenylether	340	U
86-73-7	Fluorene	340	U
100-01-6	4-Nitroaniline	860	U
94-59-7	Safrole	340	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02

Sample wt/vol: 33.0 (g/mL) G Lab File ID: V1030922.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 12 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
130-15-4	1,4-Naphthoquinone	340	U	
99-65-0	1,3-Dinitrobenzene	340	U	
606-20-2	2,6-Dinitrotoluene	340	U	
134-32-7	1-Naphthylamine	340	U	
121-14-2	2,4-Dinitrotoluene	340	U	
91-59-8	2-Naphthylamine	340	U	
99-55-8	2-Methyl-5-nitroaniline	340	U	
297-97-2	Thionazin	340	U	
122-39-4	Diphenylamine	340	U	
534-52-1	4,6-Dinitro-2-methylphenol	860	U	J
101-55-3	4-Bromophenyl-phenylether	340	U	
118-74-1	Hexachlorobenzene	340	U	
85-01-8	Phenanthrene	340	U	
120-12-7	Anthracene	340	U	
88-85-7	2-sec-butyl-4,6-Dinitrophenol	340	U	
84-74-2	Di-n-butylphthalate	340	U	
206-44-0	Fluoranthene	340	U	
87-86-5	Pentachlorophenol	860	U	
86-30-6	N-Nitrosodiphenylamine	340	U	J
298-02-2	Phorate	340	U	
62-44-2	Phenacetin	340	U	
2303-16-4	Diallate	340	U	
60-51-5	Dimethoate	340	U	
92-67-1	4-Aminobiphenyl	340	U	
82-68-8	Pentachloronitrobenzene	860	U	J
23950-58-5	Pronamide	340	U	
298-04-4	Disulfoton	340	U	
298-00-0	Methyl parathion	340	U	
56-38-2	Parathion	340	U	
91-80-5	Methapyrilene	860	U	
465-73-6	Isodrin	340	U	
3689-24-5	Sulfotep	340	U	J
56-57-5	4-Nitroquinoline-1-oxide	860	U	R

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02

Sample wt/vol: 33.0 (g/mL) G Lab File ID: V1030922.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 12 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	340	U	J
129-00-0	Pyrene	340	U	
85-68-7	Butylbenzylphthalate	340	U	
56-55-3	Benzo(a)anthracene	340	U	
218-01-9	Chrysene	340	U	
117-81-7	bis(2-Ethylhexyl)phthalate	97	~~J~~	
140-57-8	Aramite	860	U	
60-11-7	Methyl Yellow	340	U	J
510-15-6	Chlorobenzilate	340	~~U~~	R
119-93-7	3,3'-Dimethylbenzidine	340	U	J
53-96-3	2-Acetylaminofluorene	340	U	
91-94-1	3,3'-Dichlorobenzidine	340	U	
143-50-0	Kepone	860	U	J
52-85-7	Famphur	340	U	J
117-84-0	Di-n-octylphthalate	340	U	
205-99-2	Benzo(b)fluoranthene	340	U	
207-08-9	Benzo(k)fluoranthene	340	U	
50-32-8	Benzo(a)pyrene	340	U	
193-39-5	Indeno(1,2,3-cd)pyrene	340	U	
53-70-3	Dibenz(a,h)anthracene	340	U	
191-24-2	Benzo(g,h,i)perylene	340	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	340	U	
56-49-5	3-Methylchloranthrene	340	U	
70-30-4	Hexachlorophene	14000	U	
92-52-4	1,1'-Biphenyl	340	U	

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02RA

Sample wt/vol: 33.0 (g/mL) G Lab File ID: V1031218.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 12 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	340	U
108-95-2	Phenol	340	U
111-44-4	bis(2-Chloroethyl)ether	340	U
95-57-8	2-Chlorophenol	340	U
541-73-1	1,3-Dichlorobenzene	340	U
106-46-7	1,4-Dichlorobenzene	340	U
100-51-6	Benzyl alcohol	340	U
95-50-1	1,2-Dichlorobenzene	340	U
108-60-1	bis(2-Chloroisopropyl)ether	340	U
95-48-7	2-Methylphenol	340	U
67-72-1	Hexachloroethane	340	U
110-86-1	Pyridine	340	U
62-75-9	N-Nitrosodimethylamine	340	U
109-06-8	2-Picoline	340	U
10595-95-6	n-Nitrosomethylethylamine	340	U
66-27-3	Methyl methanesulfonate	860	U
55-18-5	n-Nitrosodiethylamine	340	U
62-50-0	Ethyl methanesulfonate	340	U
98-86-2	Acetophenone	340	U
930-55-2	n-Nitrosopyrrolidine	340	U
59-89-2	n-Nitrosomorpholine	340	U
621-64-7	N-Nitroso-di-n-propylamine	340	U
95-53-4	o-Toluidine	340	U
108-39-4	3-Methylphenol	340	U
106-44-5	4-Methylphenol	340	U
88-75-5	2-Nitrophenol	340	U
105-67-9	2,4-Dimethylphenol	340	U
111-91-1	bis(2-Chloroethoxy)methane	340	U
120-83-2	2,4-Dichlorophenol	340	U
120-82-1	1,2,4-Trichlorobenzene	340	U
91-20-3	Naphthalene	340	U
87-65-0	2,6-Dichlorophenol	340	U
106-47-8	4-Chloroaniline	340	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02RA

Sample wt/vol: 33.0 (g/mL) G Lab File ID: V1031218.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 12 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	340	U
59-50-7	4-Chloro-3-methylphenol	340	U
91-57-6	2-Methylnaphthalene	340	U
95-94-3	1,2,4,5-Tetrachlorobenzene	340	U
98-95-3	Nitrobenzene	340	U
100-75-4	n-Nitrosopiperidine	340	U
78-59-1	Isophorone	340	U
126-68-1	o,o,o-Triethylphosphorothioate	340	U
924-16-3	n-Nitrosodibutylamine	340	U
120-58-1	Isosafrole	340	U
122-09-8	a,a-Dimethylphenethylamine	860	U
65-85-0	Benzoic acid	860	U
106-50-3	p-Phenylenediamine	860	U
77-47-4	Hexachlorocyclopentadiene	340	U
88-06-2	2,4,6-Trichlorophenol	340	U
95-95-4	2,4,5-Trichlorophenol	860	U
91-58-7	2-Chloronaphthalene	340	U
88-74-4	2-Nitroaniline	860	U
131-11-3	Dimethylphthalate	2400	
208-96-8	Acenaphthylene	340	U
99-09-2	3-Nitroaniline	860	U
83-32-9	Acenaphthene	340	U
51-28-5	2,4-Dinitrophenol	860	U
100-02-7	4-Nitrophenol	860	U
132-64-9	Dibenzofuran	340	U
1888-71-7	Hexachloropropene	860	U
608-93-5	Pentachlorobenzene	340	U
58-90-2	2,3,4,6-Tetrachlorophenol	340	U
84-66-2	Diethylphthalate	190	J
7005-72-3	4-Chlorophenyl-phenylether	340	U
86-73-7	Fluorene	340	U
100-01-6	4-Nitroaniline	860	U
94-59-7	Safrole	340	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02RA

Sample wt/vol: 33.0 (g/mL) G Lab File ID: V1031218.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 12 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	340	U
99-65-0	1,3-Dinitrobenzene	340	U
606-20-2	2,6-Dinitrotoluene	340	U
134-32-7	1-Naphthylamine	340	U
121-14-2	2,4-Dinitrotoluene	340	U
91-59-8	2-Naphthylamine	340	U
99-55-8	2-Methyl-5-nitroaniline	340	U
297-97-2	Thionazin	340	U
122-39-4	Diphenylamine	340	U
534-52-1	4,6-Dinitro-2-methylphenol	860	U
101-55-3	4-Bromophenyl-phenylether	340	U
118-74-1	Hexachlorobenzene	340	U
85-01-8	Phenanthrene	340	U
120-12-7	Anthracene	340	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	340	U
84-74-2	Di-n-butylphthalate	340	U
206-44-0	Fluoranthene	340	U
87-86-5	Pentachlorophenol	860	U
86-30-6	N-Nitrosodiphenylamine	340	U
298-02-2	Phorate	340	U
62-44-2	Phenacetin	340	U
2303-16-4	Diallate	340	U
60-51-5	Dimethoate	340	U
92-67-1	4-Aminobiphenyl	340	U
82-68-8	Pentachloronitrobenzene	860	U
23950-58-5	Pronamide	340	U
298-04-4	Disulfoton	340	U
298-00-0	Methyl parathion	340	U
56-38-2	Parathion	340	U
91-80-5	Methapyrilene	860	U
465-73-6	Isodrin	340	U
3689-24-5	Sulfotep	340	U
56-57-5	4-Nitroquinoline-1-oxide	860	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX02-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.02RA

Sample wt/vol: 33.0 (g/mL) G Lab File ID: V1031218.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 12 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	340	U	R
129-00-0	Pyrene	340	U	
85-68-7	Butylbenzylphthalate	340	U	
56-55-3	Benzo(a)anthracene	340	U	
218-01-9	Chrysene	24	J	
117-81-7	bis(2-Ethylhexyl)phthalate	86	J	
140-57-8	Aramite	860	U	
60-11-7	Methyl Yellow	340	U	
510-15-6	Chlorobenzilate	340	U	R
119-93-7	3,3'-Dimethylbenzidine	340	U	
53-96-3	2-Acetylaminofluorene	340	U	
91-94-1	3,3'-Dichlorobenzidine	340	U	
143-50-0	Kepone	860	U	
52-85-7	Famphur	340	U	
117-84-0	Di-n-octylphthalate	340	U	
205-99-2	Benzo(b)fluoranthene	340	U	
207-08-9	Benzo(k)fluoranthene	340	U	
50-32-8	Benzo(a)pyrene	340	U	
193-39-5	Indeno(1,2,3-cd)pyrene	340	U	
53-70-3	Dibenz(a,h)anthracene	340	U	
191-24-2	Benzo(g,h,i)perylene	340	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	340	U	
56-49-5	3-Methylchloranthrene	340	U	
70-30-4	Hexachlorophene	14000	U	
92-52-4	1,1'-Biphenyl	340	U	R

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX03-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.03

Sample wt/vol: 33.1 (g/mL) G Lab File ID: T1030819.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	370	U
108-95-2	Phenol	370	U
111-44-4	bis(2-Chloroethyl)ether	370	U
95-57-8	2-Chlorophenol	370	U
541-73-1	1,3-Dichlorobenzene	370	U
106-46-7	1,4-Dichlorobenzene	370	U
100-51-6	Benzyl alcohol	370	U
95-50-1	1,2-Dichlorobenzene	370	U
108-60-1	bis(2-Chloroisopropyl)ether	370	U
95-48-7	2-Methylphenol	370	U
67-72-1	Hexachloroethane	370	U
110-86-1	Pyridine	370	U
62-75-9	N-Nitrosodimethylamine	370	U
109-06-8	2-Picoline	370	U
10595-95-6	n-Nitrosomethylethylamine	370	U
66-27-3	Methyl methanesulfonate	920	U
55-18-5	n-Nitrosodiethylamine	370	U
62-50-0	Ethyl methanesulfonate	370	U
98-86-2	Acetophenone	370	U
930-55-2	n-Nitrosopyrrolidine	370	U
59-89-2	n-Nitrosomorpholine	370	U
621-64-7	N-Nitroso-di-n-propylamine	370	U
95-53-4	o-Toluidine	370	U
108-39-4	3-Methylphenol	370	U
106-44-5	4-Methylphenol	370	U
88-75-5	2-Nitrophenol	370	U
105-67-9	2,4-Dimethylphenol	370	U
111-91-1	bis(2-Chloroethoxy)methane	370	U
120-83-2	2,4-Dichlorophenol	370	U
120-82-1	1,2,4-Trichlorobenzene	370	U
91-20-3	Naphthalene	370	U
87-65-0	2,6-Dichlorophenol	370	U
106-47-8	4-Chloroaniline	370	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX03-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.03

Sample wt/vol: 33.1 (g/mL) G Lab File ID: T1030819.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	370	U
59-50-7	4-Chloro-3-methylphenol	370	U
91-57-6	2-Methylnaphthalene	370	U
95-94-3	1,2,4,5-Tetrachlorobenzene	370	U
98-95-3	Nitrobenzene	370	U
100-75-4	n-Nitrosopiperidine	370	U
78-59-1	Isophorone	370	U
126-68-1	o,o,o-Triethylphosphorothioate	370	U
924-16-3	n-Nitrosodibutylamine	370	U
120-58-1	Isosafrole	370	U
122-09-8	a,a-Dimethylphenethylamine	920	U
65-85-0	Benzoic acid	920	U
106-50-3	p-Phenylenediamine	920	U
77-47-4	Hexachlorocyclopentadiene	370	U
88-06-2	2,4,6-Trichlorophenol	370	U
95-95-4	2,4,5-Trichlorophenol	920	U
91-58-7	2-Chloronaphthalene	370	U
88-74-4	2-Nitroaniline	920	U
131-11-3	Dimethylphthalate	370	U
208-96-8	Acenaphthylene	370	U
99-09-2	3-Nitroaniline	920	U
83-32-9	Acenaphthene	370	U
51-28-5	2,4-Dinitrophenol	920	U
100-02-7	4-Nitrophenol	920	U
132-64-9	Dibenzofuran	370	U
1888-71-7	Hexachloropropene	920	U
608-93-5	Pentachlorobenzene	370	U
58-90-2	2,3,4,6-Tetrachlorophenol	370	U
84-66-2	Diethylphthalate	370	U
7005-72-3	4-Chlorophenyl-phenylether	370	U
86-73-7	Fluorene	370	U
100-01-6	4-Nitroaniline	920	U
94-59-7	Safrole	370	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX03-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.03

Sample wt/vol: 33.1 (g/mL) G Lab File ID: T1030819.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	370	U
99-65-0	1,3-Dinitrobenzene	370	U
606-20-2	2,6-Dinitrotoluene	370	U
134-32-7	1-Naphthylamine	370	U
121-14-2	2,4-Dinitrotoluene	370	U
91-59-8	2-Naphthylamine	370	U
99-55-8	2-Methyl-5-nitroaniline	370	U
297-97-2	Thionazin	370	U
122-39-4	Diphenylamine	370	U
534-52-1	4,6-Dinitro-2-methylphenol	920	U
101-55-3	4-Bromophenyl-phenylether	370	U
118-74-1	Hexachlorobenzene	370	U
85-01-8	Phenanthrene	39	J
120-12-7	Anthracene	370	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	370	U
84-74-2	Di-n-butylphthalate	370	U
206-44-0	Fluoranthene	370	U
87-86-5	Pentachlorophenol	920	U
86-30-6	N-Nitrosodiphenylamine	370	U
298-02-2	Phorate	370	U
62-44-2	Phenacetin	370	U
2303-16-4	Diallate	370	U
60-51-5	Dimethoate	370	U
92-67-1	4-Aminobiphenyl	370	U
82-68-8	Pentachloronitrobenzene	920	U
23950-58-5	Pronamide	370	U
298-04-4	Disulfoton	370	U
298-00-0	Methyl parathion	370	U
56-38-2	Parathion	370	U
91-80-5	Methapyrilene	920	U
465-73-6	Isodrin	370	U
3689-24-5	Sulfotep	370	U
56-57-5	4-Nitroquinoline-1-oxide	920	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX03-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.03

Sample wt/vol: 33.1 (g/mL) G Lab File ID: T1030819.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	370	~~U~~ R
129-00-0	Pyrene	370	U
85-68-7	Butylbenzylphthalate	370	U
56-55-3	Benzo(a)anthracene	370	U
218-01-9	Chrysene	26	J
117-81-7	bis(2-Ethylhexyl)phthalate	1300	
140-57-8	Aramite	920	U
60-11-7	Methyl Yellow	370	U
510-15-6	Chlorobenzilate	370	U
119-93-7	3,3'-Dimethylbenzidine	370	U
53-96-3	2-Acetylaminofluorene	370	U
91-94-1	3,3'-Dichlorobenzidine	370	U
143-50-0	Kepone	920	U
52-85-7	Famphur	370	U
117-84-0	Di-n-octylphthalate	370	U
205-99-2	Benzo(b)fluoranthene	370	U
207-08-9	Benzo(k)fluoranthene	370	U
50-32-8	Benzo(a)pyrene	370	U
193-39-5	Indeno(1,2,3-cd)pyrene	370	U
53-70-3	Dibenz(a,h)anthracene	370	U
191-24-2	Benzo(g,h,i)perylene	370	U
57-97-6	7,12-Dimethylbenz(a)anthracene	370	U
56-49-5	3-Methylchloranthrene	370	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	370	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX04-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.04

Sample wt/vol: 30.5 (g/mL) G Lab File ID: T1030812.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	400	U
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
100-51-6	Benzyl alcohol	400	U
95-50-1	1,2-Dichlorobenzene	400	U
108-60-1	bis(2-Chloroisopropyl)ether	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
110-86-1	Pyridine	400	U
62-75-9	N-Nitrosodimethylamine	400	U
109-06-8	2-Picoline	400	U
10595-95-6	n-Nitrosomethylethylamine	400	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	400	U
62-50-0	Ethyl methanesulfonate	400	U
98-86-2	Acetophenone	400	U
930-55-2	n-Nitrosopyrrolidine	400	U
59-89-2	n-Nitrosomorpholine	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
95-53-4	o-Toluidine	400	U
108-39-4	3-Methylphenol	400	U
106-44-5	4-Methylphenol	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	400	U
87-65-0	2,6-Dichlorophenol	400	U
106-47-8	4-Chloroaniline	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX04-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.04

Sample wt/vol: 30.5 (g/mL) G Lab File ID: T1030812.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-methylphenol	400	U
91-57-6	2-Methylnaphthalene	400	U
95-94-3	1,2,4,5-Tetrachlorobenzene	400	U
98-95-3	Nitrobenzene	400	U
100-75-4	n-Nitrosopiperidine	400	U
78-59-1	Isophorone	400	U
126-68-1	o,o,o-Triethylphosphorothioate	400	U
924-16-3	n-Nitrosodibutylamine	400	U
120-58-1	Isosafrole	400	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	1000	U
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	400	U
208-96-8	Acenaphthylene	400	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	400	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	400	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	400	U
58-90-2	2,3,4,6-Tetrachlorophenol	400	U
84-66-2	Diethylphthalate	400	U
7005-72-3	4-Chlorophenyl-phenylether	400	U
86-73-7	Fluorene	400	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	400	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX04-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.04

Sample wt/vol: 30.5 (g/mL) G Lab File ID: T1030812.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	400	U
99-65-0	1,3-Dinitrobenzene	400	U
606-20-2	2,6-Dinitrotoluene	400	U
134-32-7	1-Naphthylamine	400	U
121-14-2	2,4-Dinitrotoluene	400	U
91-59-8	2-Naphthylamine	400	U
99-55-8	2-Methyl-5-nitroaniline	400	U
297-97-2	Thionazin	400	U
122-39-4	Diphenylamine	400	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
101-55-3	4-Bromophenyl-phenylether	400	U
118-74-1	Hexachlorobenzene	400	U
85-01-8	Phenanthrene	400	U
120-12-7	Anthracene	400	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	400	U
84-74-2	Di-n-butylphthalate	400	U
206-44-0	Fluoranthene	400	U
87-86-5	Pentachlorophenol	1000	U
86-30-6	N-Nitrosodiphenylamine	400	U
298-02-2	Phorate	400	U
62-44-2	Phenacetin	400	U
2303-16-4	Diallate	400	U
60-51-5	Dimethoate	400	U
92-67-1	4-Aminobiphenyl	400	U
82-68-8	Pentachloronitrobenzene	1000	U
23950-58-5	Pronamide	400	U
298-04-4	Disulfoton	400	U
298-00-0	Methyl parathion	400	U
56-38-2	Parathion	400	U
91-80-5	Methapyrilene	1000	U
465-73-6	Isodrin	400	U
3689-24-5	Sulfotep	400	U
56-57-5	4-Nitroquinoline-1-oxide	1000	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX04-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.04

Sample wt/vol: 30.5 (g/mL) G Lab File ID: T1030812.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	400	~~U~~ R
129-00-0	Pyrene	400	U
85-68-7	Butylbenzylphthalate	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	400	U
117-81-7	bis(2-Ethylhexyl)phthalate	400	U
140-57-8	Aramite	1000	U
60-11-7	Methyl Yellow	400	U
510-15-6	Chlorobenzilate	400	U
119-93-7	3,3'-Dimethylbenzidine	400	U
53-96-3	2-Acetylaminofluorene	400	U
91-94-1	3,3'-Dichlorobenzidine	400	U
143-50-0	Kepone	1000	U
52-85-7	Famphur	400	U
117-84-0	Di-n-octylphthalate	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U
57-97-6	7,12-Dimethylbenz(a)anthracene	400	U
56-49-5	3-Methylchloranthrene	400	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	400	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX05-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.05

Sample wt/vol: 31.8 (g/mL) G Lab File ID: T1030813.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	370	U
108-95-2	Phenol	370	U
111-44-4	bis(2-Chloroethyl)ether	370	U
95-57-8	2-Chlorophenol	370	U
541-73-1	1,3-Dichlorobenzene	370	U
106-46-7	1,4-Dichlorobenzene	370	U
100-51-6	Benzyl alcohol	370	U
95-50-1	1,2-Dichlorobenzene	370	U
108-60-1	bis(2-Chloroisopropyl)ether	370	U
95-48-7	2-Methylphenol	370	U
67-72-1	Hexachloroethane	370	U
110-86-1	Pyridine	370	U
62-75-9	N-Nitrosodimethylamine	370	U
109-06-8	2-Picoline	370	U
10595-95-6	n-Nitrosomethylethylamine	370	U
66-27-3	Methyl methanesulfonate	920	U
55-18-5	n-Nitrosodiethylamine	370	U
62-50-0	Ethyl methanesulfonate	370	U
98-86-2	Acetophenone	370	U
930-55-2	n-Nitrosopyrrolidine	370	U
59-89-2	n-Nitrosomorpholine	370	U
621-64-7	N-Nitroso-di-n-propylamine	370	U
95-53-4	o-Toluidine	370	U
108-39-4	3-Methylphenol	370	U
106-44-5	4-Methylphenol	370	U
88-75-5	2-Nitrophenol	370	U
105-67-9	2,4-Dimethylphenol	370	U
111-91-1	bis(2-Chloroethoxy)methane	370	U
120-83-2	2,4-Dichlorophenol	370	U
120-82-1	1,2,4-Trichlorobenzene	370	U
91-20-3	Naphthalene	370	U
87-65-0	2,6-Dichlorophenol	370	U
106-47-8	4-Chloroaniline	370	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX05-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.05

Sample wt/vol: 31.8 (g/mL) G Lab File ID: T1030813.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	370	U
59-50-7	4-Chloro-3-methylphenol	370	U
91-57-6	2-Methylnaphthalene	370	U
95-94-3	1,2,4,5-Tetrachlorobenzene	370	U
98-95-3	Nitrobenzene	370	U
100-75-4	n-Nitrosopiperidine	370	U
78-59-1	Isophorone	370	U
126-68-1	o,o,o-Triethylphosphorothioate	370	U
924-16-3	n-Nitrosodibutylamine	370	U
120-58-1	Isosafrole	370	U
122-09-8	a,a-Dimethylphenethylamine	920	U
65-85-0	Benzoic acid	920	U
106-50-3	p-Phenylenediamine	920	U
77-47-4	Hexachlorocyclopentadiene	370	U
88-06-2	2,4,6-Trichlorophenol	370	U
95-95-4	2,4,5-Trichlorophenol	920	U
91-58-7	2-Chloronaphthalene	370	U
88-74-4	2-Nitroaniline	920	U
131-11-3	Dimethylphthalate	370	U
208-96-8	Acenaphthylene	370	U
99-09-2	3-Nitroaniline	920	U
83-32-9	Acenaphthene	370	U
51-28-5	2,4-Dinitrophenol	920	U
100-02-7	4-Nitrophenol	920	U
132-64-9	Dibenzofuran	370	U
1888-71-7	Hexachloropropene	920	U
608-93-5	Pentachlorobenzene	370	U
58-90-2	2,3,4,6-Tetrachlorophenol	370	U
84-66-2	Diethylphthalate	370	U
7005-72-3	4-Chlorophenyl-phenylether	370	U
86-73-7	Fluorene	370	U
100-01-6	4-Nitroaniline	920	U
94-59-7	Safrole	370	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX05-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.05

Sample wt/vol: 31.8 (g/mL) G Lab File ID: T1030813.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	370	U
99-65-0	1,3-Dinitrobenzene	370	U
606-20-2	2,6-Dinitrotoluene	370	U
134-32-7	1-Naphthylamine	370	U
121-14-2	2,4-Dinitrotoluene	370	U
91-59-8	2-Naphthylamine	370	U
99-55-8	2-Methyl-5-nitroaniline	370	U
297-97-2	Thionazin	370	U
122-39-4	Diphenylamine	370	U
534-52-1	4,6-Dinitro-2-methylphenol	920	U
101-55-3	4-Bromophenyl-phenylether	370	U
118-74-1	Hexachlorobenzene	370	U
85-01-8	Phenanthrene	370	U
120-12-7	Anthracene	370	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	370	U
84-74-2	Di-n-butylphthalate	370	U
206-44-0	Fluoranthene	370	U
87-86-5	Pentachlorophenol	920	U
86-30-6	N-Nitrosodiphenylamine	370	U
298-02-2	Phorate	370	U
62-44-2	Phenacetin	370	U
2303-16-4	Diallate	370	U
60-51-5	Dimethoate	370	U
92-67-1	4-Aminobiphenyl	370	U
82-68-8	Pentachloronitrobenzene	920	U
23950-58-5	Pronamide	370	U
298-04-4	Disulfoton	370	U
298-00-0	Methyl parathion	370	U
56-38-2	Parathion	370	U
91-80-5	Methapyrilene	920	U
465-73-6	Isodrin	370	U
3689-24-5	Sulfotep	370	U
56-57-5	4-Nitroquinoline-1-oxide	920	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX05-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.05

Sample wt/vol: 31.8 (g/mL) G Lab File ID: T1030813.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	370	~~U~~ R
129-00-0	Pyrene	370	U
85-68-7	Butylbenzylphthalate	370	U
56-55-3	Benzo(a)anthracene	370	U
218-01-9	Chrysene	370	U
117-81-7	bis(2-Ethylhexyl)phthalate	370	U
140-57-8	Aramite	920	U
60-11-7	Methyl Yellow	370	U
510-15-6	Chlorobenzilate	370	U
119-93-7	3,3'-Dimethylbenzidine	370	U
53-96-3	2-Acetylaminofluorene	370	U
91-94-1	3,3'-Dichlorobenzidine	370	U
143-50-0	Kepone	920	U
52-85-7	Famphur	370	U
117-84-0	Di-n-octylphthalate	370	U
205-99-2	Benzo(b)fluoranthene	370	U
207-08-9	Benzo(k)fluoranthene	370	U
50-32-8	Benzo(a)pyrene	370	U
193-39-5	Indeno(1,2,3-cd)pyrene	370	U
53-70-3	Dibenz(a,h)anthracene	370	U
191-24-2	Benzo(g,h,i)perylene	370	U
57-97-6	7,12-Dimethylbenz(a)anthracene	370	U
56-49-5	3-Methylchloranthrene	370	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	370	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX06-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.06

Sample wt/vol: 30.6 (g/mL) G Lab File ID: T1030824.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	410	U
108-95-2	Phenol	410	U
111-44-4	bis(2-Chloroethyl)ether	410	U
95-57-8	2-Chlorophenol	410	U
541-73-1	1,3-Dichlorobenzene	410	U
106-46-7	1,4-Dichlorobenzene	410	U
100-51-6	Benzyl alcohol	410	U
95-50-1	1,2-Dichlorobenzene	410	U
108-60-1	bis(2-Chloroisopropyl)ether	410	U
95-48-7	2-Methylphenol	410	U
67-72-1	Hexachloroethane	410	U
110-86-1	Pyridine	410	U
62-75-9	N-Nitrosodimethylamine	410	U
109-06-8	2-Picoline	410	U
10595-95-6	n-Nitrosomethylethylamine	410	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	410	U
62-50-0	Ethyl methanesulfonate	410	U
98-86-2	Acetophenone	410	U
930-55-2	n-Nitrosopyrrolidine	410	U
59-89-2	n-Nitrosomorpholine	410	U
621-64-7	N-Nitroso-di-n-propylamine	410	U
95-53-4	o-Toluidine	410	U
108-39-4	3-Methylphenol	410	U
106-44-5	4-Methylphenol	410	U
88-75-5	2-Nitrophenol	410	U
105-67-9	2,4-Dimethylphenol	410	U
111-91-1	bis(2-Chloroethoxy)methane	410	U
120-83-2	2,4-Dichlorophenol	410	U
120-82-1	1,2,4-Trichlorobenzene	410	U
91-20-3	Naphthalene	410	U
87-65-0	2,6-Dichlorophenol	410	U
106-47-8	4-Chloroaniline	410	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX06-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.06

Sample wt/vol: 30.6 (g/mL) G Lab File ID: T1030824.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	410	U
59-50-7	4-Chloro-3-methylphenol	410	U
91-57-6	2-Methylnaphthalene	410	U
95-94-3	1,2,4,5-Tetrachlorobenzene	410	U
98-95-3	Nitrobenzene	410	U
100-75-4	n-Nitrosopiperidine	410	U
78-59-1	Isophorone	410	U
126-68-1	o,o,o-Triethylphosphorothioate	410	U
924-16-3	n-Nitrosodibutylamine	410	U
120-58-1	Isosafrole	410	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	1000	U
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	410	U
88-06-2	2,4,6-Trichlorophenol	410	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	410	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	410	U
208-96-8	Acenaphthylene	410	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	410	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	410	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	410	U
58-90-2	2,3,4,6-Tetrachlorophenol	410	U
84-66-2	Diethylphthalate	410	U
7005-72-3	4-Chlorophenyl-phenylether	410	U
86-73-7	Fluorene	410	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	410	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX06-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.06

Sample wt/vol: 30.6 (g/mL) G Lab File ID: T1030824.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	410	U
99-65-0	1,3-Dinitrobenzene	410	U
606-20-2	2,6-Dinitrotoluene	410	U
134-32-7	1-Naphthylamine	410	U
121-14-2	2,4-Dinitrotoluene	410	U
91-59-8	2-Naphthylamine	410	U
99-55-8	2-Methyl-5-nitroaniline	410	U
297-97-2	Thionazin	410	U
122-39-4	Diphenylamine	410	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
101-55-3	4-Bromophenyl-phenylether	410	U
118-74-1	Hexachlorobenzene	410	U
85-01-8	Phenanthrene	60	J
120-12-7	Anthracene	410	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	410	U
84-74-2	Di-n-butylphthalate	410	U
206-44-0	Fluoranthene	410	U
87-86-5	Pentachlorophenol	1000	U
86-30-6	N-Nitrosodiphenylamine	410	U
298-02-2	Phorate	410	U
62-44-2	Phenacetin	410	U
2303-16-4	Diallate	410	U
60-51-5	Dimethoate	410	U
92-67-1	4-Aminobiphenyl	410	U
82-68-8	Pentachloronitrobenzene	1000	U
23950-58-5	Pronamide	410	U
298-04-4	Disulfoton	410	U
298-00-0	Methyl parathion	410	U
56-38-2	Parathion	410	U
91-80-5	Methapyrilene	1000	U
465-73-6	Isodrin	410	U
3689-24-5	Sulfotep	410	U
56-57-5	4-Nitroquinoline-1-oxide	1000	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX06-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.06

Sample wt/vol: 30.6 (g/mL) G Lab File ID: T1030824.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	410	U
129-00-0	Pyrene	410	U
85-68-7	Butylbenzylphthalate	410	U
56-55-3	Benzo(a)anthracene	24	J
218-01-9	Chrysene	43	J
117-81-7	bis(2-Ethylhexyl)phthalate	74	J
140-57-8	Aramite	1000	U
60-11-7	Methyl Yellow	410	U
510-15-6	Chlorobenzilate	410	U
119-93-7	3,3'-Dimethylbenzidine	410	U
53-96-3	2-Acetylaminofluorene	410	U
91-94-1	3,3'-Dichlorobenzidine	410	U
143-50-0	Kepone	1000	U
52-85-7	Famphur	410	U
117-84-0	Di-n-octylphthalate	410	U
205-99-2	Benzo(b)fluoranthene	410	U
207-08-9	Benzo(k)fluoranthene	410	U
50-32-8	Benzo(a)pyrene	23	J
193-39-5	Indeno(1,2,3-cd)pyrene	410	U
53-70-3	Dibenz(a,h)anthracene	410	U
191-24-2	Benzo(g,h,i)perylene	410	U
57-97-6	7,12-Dimethylbenz(a)anthracene	410	U
56-49-5	3-Methylchloranthrene	410	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	410	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX07-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.09

Sample wt/vol: 30.2 (g/mL) G Lab File ID: T1030821.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 14 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	960	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX07-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.09

Sample wt/vol: 30.2 (g/mL) G Lab File ID: T1030821.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 14 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U
98-95-3	Nitrobenzene	380	U
100-75-4	n-Nitrosopiperidine	380	U
78-59-1	Isophorone	380	U
126-68-1	o,o,o-Triethylphosphorothioate	380	U
924-16-3	n-Nitrosodibutylamine	380	U
120-58-1	Isosafrole	380	U
122-09-8	a,a-Dimethylphenethylamine	960	U
65-85-0	Benzoic acid	960	U
106-50-3	p-Phenylenediamine	960	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	960	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	960	U
131-11-3	Dimethylphthalate	380	U
208-96-8	Acenaphthylene	380	U
99-09-2	3-Nitroaniline	960	U
83-32-9	Acenaphthene	380	U
51-28-5	2,4-Dinitrophenol	960	U
100-02-7	4-Nitrophenol	960	U
132-64-9	Dibenzofuran	380	U
1888-71-7	Hexachloropropene	960	U
608-93-5	Pentachlorobenzene	380	U
58-90-2	2,3,4,6-Tetrachlorophenol	380	U
84-66-2	Diethylphthalate	380	U
7005-72-3	4-Chlorophenyl-phenylether	380	U
86-73-7	Fluorene	380	U
100-01-6	4-Nitroaniline	960	U
94-59-7	Safrole	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX07-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.09

Sample wt/vol: 30.2 (g/mL) G Lab File ID: T1030821.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 14 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	960	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	50	J
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	960	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	960	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	960	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	960	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX07-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.09

Sample wt/vol: 30.2 (g/mL) G Lab File ID: T1030821.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 14 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	380	~~U~~ R
129-00-0	Pyrene	380	U
85-68-7	Butylbenzylphthalate	380	U
56-55-3	Benzo(a)anthracene	380	U
218-01-9	Chrysene	33	J
117-81-7	bis(2-Ethylhexyl)phthalate	150	J
140-57-8	Aramite	960	U
60-11-7	Methyl Yellow	380	U
510-15-6	Chlorobenzilate	380	U
119-93-7	3,3'-Dimethylbenzidine	380	U
53-96-3	2-Acetylaminofluorene	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
143-50-0	Kepone	960	U
52-85-7	Famphur	380	U
117-84-0	Di-n-octylphthalate	380	U
205-99-2	Benzo(b)fluoranthene	380	U
207-08-9	Benzo(k)fluoranthene	380	U
50-32-8	Benzo(a)pyrene	380	U
193-39-5	Indeno(1,2,3-cd)pyrene	380	U
53-70-3	Dibenz(a,h)anthracene	380	U
191-24-2	Benzo(g,h,i)perylene	380	U
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U
56-49-5	3-Methylchloranthrene	380	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	380	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX08-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.07

Sample wt/vol: 31.6 (g/mL) G Lab File ID: T1030820.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	400	U
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
100-51-6	Benzyl alcohol	400	U
95-50-1	1,2-Dichlorobenzene	400	U
108-60-1	bis(2-Chloroisopropyl)ether	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
110-86-1	Pyridine	400	U
62-75-9	N-Nitrosodimethylamine	400	U
109-06-8	2-Picoline	400	U
10595-95-6	n-Nitrosomethylethylamine	400	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	400	U
62-50-0	Ethyl methanesulfonate	400	U
98-86-2	Acetophenone	400	U
930-55-2	n-Nitrosopyrrolidine	400	U
59-89-2	n-Nitrosomorpholine	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
95-53-4	o-Toluidine	400	U
108-39-4	3-Methylphenol	400	U
106-44-5	4-Methylphenol	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	400	U
87-65-0	2,6-Dichlorophenol	400	U
106-47-8	4-Chloroaniline	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX08-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.07

Sample wt/vol: 31.6 (g/mL) G Lab File ID: T1030820.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-methylphenol	400	U
91-57-6	2-Methylnaphthalene	400	U
95-94-3	1,2,4,5-Tetrachlorobenzene	400	U
98-95-3	Nitrobenzene	400	U
100-75-4	n-Nitrosopiperidine	400	U
78-59-1	Isophorone	400	U
126-68-1	o,o,o-Triethylphosphorothioate	400	U
924-16-3	n-Nitrosodibutylamine	400	U
120-58-1	Isosafrole	400	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	1000	U
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	400	U
208-96-8	Acenaphthylene	400	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	400	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	400	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	400	U
58-90-2	2,3,4,6-Tetrachlorophenol	400	U
84-66-2	Diethylphthalate	400	U
7005-72-3	4-Chlorophenyl-phenylether	400	U
86-73-7	Fluorene	400	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX08-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.07

Sample wt/vol: 31.6 (g/mL) G Lab File ID: T1030820.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	400	U
99-65-0	1,3-Dinitrobenzene	400	U
606-20-2	2,6-Dinitrotoluene	400	U
134-32-7	1-Naphthylamine	400	U
121-14-2	2,4-Dinitrotoluene	400	U
91-59-8	2-Naphthylamine	400	U
99-55-8	2-Methyl-5-nitroaniline	400	U
297-97-2	Thionazin	400	U
122-39-4	Diphenylamine	400	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
101-55-3	4-Bromophenyl-phenylether	400	U
118-74-1	Hexachlorobenzene	400	U
85-01-8	Phenanthrene	31	J
120-12-7	Anthracene	400	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	400	U
84-74-2	Di-n-butylphthalate	400	U
206-44-0	Fluoranthene	400	U
87-86-5	Pentachlorophenol	1000	U
86-30-6	N-Nitrosodiphenylamine	400	U
298-02-2	Phorate	400	U
62-44-2	Phenacetin	400	U
2303-16-4	Diallate	400	U
60-51-5	Dimethoate	400	U
92-67-1	4-Aminobiphenyl	400	U
82-68-8	Pentachloronitrobenzene	1000	U
23950-58-5	Pronamide	400	U
298-04-4	Disulfoton	400	U
298-00-0	Methyl parathion	400	U
56-38-2	Parathion	400	U
91-80-5	Methapyrilene	1000	U
465-73-6	Isodrin	400	U
3689-24-5	Sulfotep	400	U
56-57-5	4-Nitroquinoline-1-oxide	1000	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX08-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.07

Sample wt/vol: 31.6 (g/mL) G Lab File ID: T1030820.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	400	~~U~~ P
129-00-0	Pyrene	400	U
85-68-7	Butylbenzylphthalate	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	24	J
117-81-7	bis(2-Ethylhexyl)phthalate	400	U
140-57-8	Aramite	1000	U
60-11-7	Methyl Yellow	400	U
510-15-6	Chlorobenzilate	400	U
119-93-7	3,3'-Dimethylbenzidine	400	U
53-96-3	2-Acetylaminofluorene	400	U
91-94-1	3,3'-Dichlorobenzidine	400	U
143-50-0	Kepone	1000	U
52-85-7	Famphur	400	U
117-84-0	Di-n-octylphthalate	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U
57-97-6	7,12-Dimethylbenz(a)anthracene	400	U
56-49-5	3-Methylchloranthrene	400	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	400	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.15

Sample wt/vol: 31.1 (g/mL) G Lab File ID: T1030822.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	390	U
108-95-2	Phenol	390	U
111-44-4	bis(2-Chloroethyl)ether	390	U
95-57-8	2-Chlorophenol	390	U
541-73-1	1,3-Dichlorobenzene	390	U
106-46-7	1,4-Dichlorobenzene	390	U
100-51-6	Benzyl alcohol	390	U
95-50-1	1,2-Dichlorobenzene	390	U
108-60-1	bis(2-Chloroisopropyl)ether	390	U
95-48-7	2-Methylphenol	390	U
67-72-1	Hexachloroethane	390	U
110-86-1	Pyridine	390	U
62-75-9	N-Nitrosodimethylamine	390	U
109-06-8	2-Picoline	390	U
10595-95-6	n-Nitrosomethylethylamine	390	U
66-27-3	Methyl methanesulfonate	970	U
55-18-5	n-Nitrosodiethylamine	390	U
62-50-0	Ethyl methanesulfonate	390	U
98-86-2	Acetophenone	390	U
930-55-2	n-Nitrosopyrrolidine	390	U
59-89-2	n-Nitrosomorpholine	390	U
621-64-7	N-Nitroso-di-n-propylamine	390	U
95-53-4	o-Toluidine	390	U
108-39-4	3-Methylphenol	390	U
106-44-5	4-Methylphenol	390	U
88-75-5	2-Nitrophenol	390	U
105-67-9	2,4-Dimethylphenol	390	U
111-91-1	bis(2-Chloroethoxy)methane	390	U
120-83-2	2,4-Dichlorophenol	390	U
120-82-1	1,2,4-Trichlorobenzene	390	U
91-20-3	Naphthalene	390	U
87-65-0	2,6-Dichlorophenol	390	U
106-47-8	4-Chloroaniline	390	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.15

Sample wt/vol: 31.1 (g/mL) G Lab File ID: T1030822.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	390	U
59-50-7	4-Chloro-3-methylphenol	390	U
91-57-6	2-Methylnaphthalene	390	U
95-94-3	1,2,4,5-Tetrachlorobenzene	390	U
98-95-3	Nitrobenzene	390	U
100-75-4	n-Nitrosopiperidine	390	U
78-59-1	Isophorone	390	U
126-68-1	o,o,o-Triethylphosphorothioate	390	U
924-16-3	n-Nitrosodibutylamine	390	U
120-58-1	Isosafrole	390	U
122-09-8	a,a-Dimethylphenethylamine	970	U
65-85-0	Benzoic acid	970	U
106-50-3	p-Phenylenediamine	970	U
77-47-4	Hexachlorocyclopentadiene	390	U
88-06-2	2,4,6-Trichlorophenol	390	U
95-95-4	2,4,5-Trichlorophenol	970	U
91-58-7	2-Chloronaphthalene	390	U
88-74-4	2-Nitroaniline	970	U
131-11-3	Dimethylphthalate	1100	
208-96-8	Acenaphthylene	390	U
99-09-2	3-Nitroaniline	970	U
83-32-9	Acenaphthene	390	U
51-28-5	2,4-Dinitrophenol	970	U
100-02-7	4-Nitrophenol	970	U
132-64-9	Dibenzofuran	390	U
1888-71-7	Hexachloropropene	970	U
608-93-5	Pentachlorobenzene	390	U
58-90-2	2,3,4,6-Tetrachlorophenol	390	U
84-66-2	Diethylphthalate	390	U
7005-72-3	4-Chlorophenyl-phenylether	390	U
86-73-7	Fluorene	390	U
100-01-6	4-Nitroaniline	970	U
94-59-7	Safrole	390	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.15

Sample wt/vol: 31.1 (g/mL) G Lab File ID: T1030822.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	390	U
99-65-0	1,3-Dinitrobenzene	390	U
606-20-2	2,6-Dinitrotoluene	390	U
134-32-7	1-Naphthylamine	390	U
121-14-2	2,4-Dinitrotoluene	390	U
91-59-8	2-Naphthylamine	390	U
99-55-8	2-Methyl-5-nitroaniline	390	U
297-97-2	Thionazin	390	U
122-39-4	Diphenylamine	390	U
534-52-1	4,6-Dinitro-2-methylphenol	970	U
101-55-3	4-Bromophenyl-phenylether	390	U
118-74-1	Hexachlorobenzene	390	U
85-01-8	Phenanthrene	57	J
120-12-7	Anthracene	390	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	390	U
84-74-2	Di-n-butylphthalate	390	U
206-44-0	Fluoranthene	390	U
87-86-5	Pentachlorophenol	970	U
86-30-6	N-Nitrosodiphenylamine	390	U
298-02-2	Phorate	390	U
62-44-2	Phenacetin	390	U
2303-16-4	Diallate	390	U
60-51-5	Dimethoate	390	U
92-67-1	4-Aminobiphenyl	390	U
82-68-8	Pentachloronitrobenzene	970	U
23950-58-5	Pronamide	390	U
298-04-4	Disulfoton	390	U
298-00-0	Methyl parathion	390	U
56-38-2	Parathion	390	U
91-80-5	Methapyrilene	970	U
465-73-6	Isodrin	390	U
3689-24-5	Sulfotep	390	U
56-57-5	4-Nitroquinoline-1-oxide	970	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.15

Sample wt/vol: 31.1 (g/mL) G Lab File ID: T1030822.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	390	~~U~~ R
129-00-0	Pyrene	390	U
85-68-7	Butylbenzylphthalate	390	U
56-55-3	Benzo(a)anthracene	390	U
218-01-9	Chrysene	47	J
117-81-7	bis(2-Ethylhexyl)phthalate	390	U
140-57-8	Aramite	970	U
60-11-7	Methyl Yellow	390	U
510-15-6	Chlorobenzilate	390	U
119-93-7	3,3'-Dimethylbenzidine	390	U
53-96-3	2-Acetylaminofluorene	390	U
91-94-1	3,3'-Dichlorobenzidine	390	U
143-50-0	Kepone	970	U
52-85-7	Famphur	390	U
117-84-0	Di-n-octylphthalate	390	U
205-99-2	Benzo(b)fluoranthene	390	U
207-08-9	Benzo(k)fluoranthene	390	U
50-32-8	Benzo(a)pyrene	24	J
193-39-5	Indeno(1,2,3-cd)pyrene	390	U
53-70-3	Dibenz(a,h)anthracene	390	U
191-24-2	Benzo(g,h,i)perylene	390	U
57-97-6	7,12-Dimethylbenz(a)anthracene	390	U
56-49-5	3-Methylchloranthrene	390	U
70-30-4	Hexachlorophene	15000	U ✓
92-52-4	1,1'-Biphenyl	390	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.23

Sample wt/vol: 30.7 (g/mL) G Lab File ID: T1030722.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	410	U
108-95-2	Phenol	410	U
111-44-4	bis(2-Chloroethyl)ether	410	U
95-57-8	2-Chlorophenol	410	U
541-73-1	1,3-Dichlorobenzene	410	U
106-46-7	1,4-Dichlorobenzene	410	U
100-51-6	Benzyl alcohol	410	U
95-50-1	1,2-Dichlorobenzene	410	U
108-60-1	bis(2-Chloroisopropyl)ether	410	U
95-48-7	2-Methylphenol	410	U
67-72-1	Hexachloroethane	410	U
110-86-1	Pyridine	410	U
62-75-9	N-Nitrosodimethylamine	410	U
109-06-8	2-Picoline	410	U
10595-95-6	n-Nitrosomethylethylamine	410	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	410	U
62-50-0	Ethyl methanesulfonate	410	U
98-86-2	Acetophenone	410	U
930-55-2	n-Nitrosopyrrolidine	410	U
59-89-2	n-Nitrosomorpholine	410	U
621-64-7	N-Nitroso-di-n-propylamine	410	U
95-53-4	o-Toluidine	410	U
108-39-4	3-Methylphenol	410	U
106-44-5	4-Methylphenol	410	U
88-75-5	2-Nitrophenol	410	U
105-67-9	2,4-Dimethylphenol	410	U
111-91-1	bis(2-Chloroethoxy)methane	410	U
120-83-2	2,4-Dichlorophenol	410	U
120-82-1	1,2,4-Trichlorobenzene	410	U
91-20-3	Naphthalene	410	U
87-65-0	2,6-Dichlorophenol	410	U
106-47-8	4-Chloroaniline	410	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.23

Sample wt/vol: 30.7 (g/mL) G Lab File ID: T1030722.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	410	U
59-50-7	4-Chloro-3-methylphenol	410	U
91-57-6	2-Methylnaphthalene	410	U
95-94-3	1,2,4,5-Tetrachlorobenzene	410	U
98-95-3	Nitrobenzene	410	U
100-75-4	n-Nitrosopiperidine	410	U
78-59-1	Isophorone	410	U
126-68-1	o,o,o-Triethylphosphorothioate	410	U
924-16-3	n-Nitrosodibutylamine	410	U
120-58-1	Isosafrole	410	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	1000	U
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	410	U
88-06-2	2,4,6-Trichlorophenol	410	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	410	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	410	U
208-96-8	Acenaphthylene	410	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	410	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	410	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	410	U
58-90-2	2,3,4,6-Tetrachlorophenol	410	U
84-66-2	Diethylphthalate	410	U
7005-72-3	4-Chlorophenyl-phenylether	410	U
86-73-7	Fluorene	410	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	410	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.23

Sample wt/vol: 30.7 (g/mL) G Lab File ID: T1030722.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	410	U
99-65-0	1,3-Dinitrobenzene	410	U
606-20-2	2,6-Dinitrotoluene	410	U
134-32-7	1-Naphthylamine	410	U
121-14-2	2,4-Dinitrotoluene	410	U
91-59-8	2-Naphthylamine	410	U
99-55-8	2-Methyl-5-nitroaniline	410	U
297-97-2	Thionazin	410	U
122-39-4	Diphenylamine	410	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
101-55-3	4-Bromophenyl-phenylether	410	U
118-74-1	Hexachlorobenzene	410	U
85-01-8	Phenanthrene	58	J
120-12-7	Anthracene	410	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	410	U
84-74-2	Di-n-butylphthalate	410	U
206-44-0	Fluoranthene	410	U
87-86-5	Pentachlorophenol	1000	U
86-30-6	N-Nitrosodiphenylamine	410	U
298-02-2	Phorate	410	U
62-44-2	Phenacetin	410	U
2303-16-4	Diallate	410	U
60-51-5	Dimethoate	410	U
92-67-1	4-Aminobiphenyl	410	U
82-68-8	Pentachloronitrobenzene	1000	U
23950-58-5	Pronamide	410	U
298-04-4	Disulfoton	410	U
298-00-0	Methyl parathion	410	U
56-38-2	Parathion	410	U
91-80-5	Methapyrilene	1000	U
465-73-6	Isodrin	410	U
3689-24-5	Sulfotep	410	U
56-57-5	4-Nitroquinoline-1-oxide	1000	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX09-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.23

Sample wt/vol: 30.7 (g/mL) G Lab File ID: T1030722.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	410	~~U~~ R
129-00-0	Pyrene	410	U
85-68-7	Butylbenzylphthalate	410	U
56-55-3	Benzo(a)anthracene	24	J
218-01-9	Chrysene	43	J
117-81-7	bis(2-Ethylhexyl)phthalate	410	U
140-57-8	Aramite	1000	U
60-11-7	Methyl Yellow	410	U
510-15-6	Chlorobenzilate	410	U
119-93-7	3,3'-Dimethylbenzidine	410	U
53-96-3	2-Acetylaminofluorene	410	U
91-94-1	3,3'-Dichlorobenzidine	410	U
143-50-0	Kepone	1000	U
52-85-7	Famphur	410	U
117-84-0	Di-n-octylphthalate	410	U
205-99-2	Benzo(b)fluoranthene	410	U
207-08-9	Benzo(k)fluoranthene	410	U
50-32-8	Benzo(a)pyrene	410	U
193-39-5	Indeno(1,2,3-cd)pyrene	410	U
53-70-3	Dibenz(a,h)anthracene	410	U
191-24-2	Benzo(g,h,i)perylene	410	U
57-97-6	7,12-Dimethylbenz(a)anthracene	410	U
56-49-5	3-Methylchloranthrene	410	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	410	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX10-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.12

Sample wt/vol: 30.8 (g/mL) G Lab File ID: T1030816.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	400	U
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
100-51-6	Benzyl alcohol	400	U
95-50-1	1,2-Dichlorobenzene	400	U
108-60-1	bis(2-Chloroisopropyl)ether	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
110-86-1	Pyridine	400	U
62-75-9	N-Nitrosodimethylamine	400	U
109-06-8	2-Picoline	400	U
10595-95-6	n-Nitrosomethylethylamine	400	U
66-27-3	Methyl methanesulfonate	990	U
55-18-5	n-Nitrosodiethylamine	400	U
62-50-0	Ethyl methanesulfonate	400	U
98-86-2	Acetophenone	400	U
930-55-2	n-Nitrosopyrrolidine	400	U
59-89-2	n-Nitrosomorpholine	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
95-53-4	o-Toluidine	400	U
108-39-4	3-Methylphenol	400	U
106-44-5	4-Methylphenol	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	400	U
87-65-0	2,6-Dichlorophenol	400	U
106-47-8	4-Chloroaniline	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX10-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.12

Sample wt/vol: 30.8 (g/mL) G Lab File ID: T1030816.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-methylphenol	400	U
91-57-6	2-Methylnaphthalene	400	U
95-94-3	1,2,4,5-Tetrachlorobenzene	400	U
98-95-3	Nitrobenzene	400	U
100-75-4	n-Nitrosopiperidine	400	U
78-59-1	Isophorone	400	U
126-68-1	o,o,o-Triethylphosphorothioate	400	U
924-16-3	n-Nitrosodibutylamine	400	U
120-58-1	Isosafrole	400	U
122-09-8	a,a-Dimethylphenethylamine	990	U
65-85-0	Benzoic acid	990	U
106-50-3	p-Phenylenediamine	990	U
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	990	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	990	U
131-11-3	Dimethylphthalate	400	U
208-96-8	Acenaphthylene	400	U
99-09-2	3-Nitroaniline	990	U
83-32-9	Acenaphthene	400	U
51-28-5	2,4-Dinitrophenol	990	U
100-02-7	4-Nitrophenol	990	U
132-64-9	Dibenzofuran	400	U
1888-71-7	Hexachloropropene	990	U
608-93-5	Pentachlorobenzene	400	U
58-90-2	2,3,4,6-Tetrachlorophenol	400	U
84-66-2	Diethylphthalate	400	U
7005-72-3	4-Chlorophenyl-phenylether	400	U
86-73-7	Fluorene	400	U
100-01-6	4-Nitroaniline	990	U
94-59-7	Safrole	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX10-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.12

Sample wt/vol: 30.8 (g/mL) G Lab File ID: T1030816.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	400	U
99-65-0	1,3-Dinitrobenzene	400	U
606-20-2	2,6-Dinitrotoluene	400	U
134-32-7	1-Naphthylamine	400	U
121-14-2	2,4-Dinitrotoluene	400	U
91-59-8	2-Naphthylamine	400	U
99-55-8	2-Methyl-5-nitroaniline	400	U
297-97-2	Thionazin	400	U
122-39-4	Diphenylamine	400	U
534-52-1	4,6-Dinitro-2-methylphenol	990	U
101-55-3	4-Bromophenyl-phenylether	400	U
118-74-1	Hexachlorobenzene	400	U
85-01-8	Phenanthrene	48	J
120-12-7	Anthracene	400	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	400	U
84-74-2	Di-n-butylphthalate	400	U
206-44-0	Fluoranthene	400	U
87-86-5	Pentachlorophenol	990	U
86-30-6	N-Nitrosodiphenylamine	400	U
298-02-2	Phorate	400	U
62-44-2	Phenacetin	400	U
2303-16-4	Diallate	400	U
60-51-5	Dimethoate	400	U
92-67-1	4-Aminobiphenyl	400	U
82-68-8	Pentachloronitrobenzene	990	U
23950-58-5	Pronamide	400	U
298-04-4	Disulfoton	400	U
298-00-0	Methyl parathion	400	U
56-38-2	Parathion	400	U
91-80-5	Methapyrilene	990	U
465-73-6	Isodrin	400	U
3689-24-5	Sulfotep	400	U
56-57-5	4-Nitroquinoline-1-oxide	990	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX10-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.12

Sample wt/vol: 30.8 (g/mL) G Lab File ID: T1030816.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	400	~~U~~ R
129-00-0	Pyrene	400	U
85-68-7	Butylbenzylphthalate	400	U
56-55-3	Benzo(a)anthracene	400	U
218-01-9	Chrysene	42	J
117-81-7	bis(2-Ethylhexyl)phthalate	400	U
140-57-8	Aramite	990	U
60-11-7	Methyl Yellow	400	U
510-15-6	Chlorobenzilate	400	U
119-93-7	3,3'-Dimethylbenzidine	400	U
53-96-3	2-Acetylaminofluorene	400	U
91-94-1	3,3'-Dichlorobenzidine	400	U
143-50-0	Kepone	990	U
52-85-7	Famphur	400	U
117-84-0	Di-n-octylphthalate	400	U
205-99-2	Benzo(b)fluoranthene	400	U
207-08-9	Benzo(k)fluoranthene	400	U
50-32-8	Benzo(a)pyrene	400	U
193-39-5	Indeno(1,2,3-cd)pyrene	400	U
53-70-3	Dibenz(a,h)anthracene	400	U
191-24-2	Benzo(g,h,i)perylene	400	U
57-97-6	7,12-Dimethylbenz(a)anthracene	400	U
56-49-5	3-Methylchloranthrene	400	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	400	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX11-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.16

Sample wt/vol: 33.1 (g/mL) G Lab File ID: T1030814.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 5.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	360	U
108-95-2	Phenol	360	U
111-44-4	bis(2-Chloroethyl)ether	360	U
95-57-8	2-Chlorophenol	360	U
541-73-1	1,3-Dichlorobenzene	360	U
106-46-7	1,4-Dichlorobenzene	360	U
100-51-6	Benzyl alcohol	360	U
95-50-1	1,2-Dichlorobenzene	360	U
108-60-1	bis(2-Chloroisopropyl)ether	360	U
95-48-7	2-Methylphenol	360	U
67-72-1	Hexachloroethane	360	U
110-86-1	Pyridine	360	U
62-75-9	N-Nitrosodimethylamine	360	U
109-06-8	2-Picoline	360	U
10595-95-6	n-Nitrosomethylethylamine	360	U
66-27-3	Methyl methanesulfonate	890	U
55-18-5	n-Nitrosodiethylamine	360	U
62-50-0	Ethyl methanesulfonate	360	U
98-86-2	Acetophenone	360	U
930-55-2	n-Nitrosopyrrolidine	360	U
59-89-2	n-Nitrosomorpholine	360	U
621-64-7	N-Nitroso-di-n-propylamine	360	U
95-53-4	o-Toluidine	360	U
108-39-4	3-Methylphenol	360	U
106-44-5	4-Methylphenol	360	U
88-75-5	2-Nitrophenol	360	U
105-67-9	2,4-Dimethylphenol	360	U
111-91-1	bis(2-Chloroethoxy)methane	360	U
120-83-2	2,4-Dichlorophenol	360	U
120-82-1	1,2,4-Trichlorobenzene	360	U
91-20-3	Naphthalene	360	U
87-65-0	2,6-Dichlorophenol	360	U
106-47-8	4-Chloroaniline	360	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX11-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.16

Sample wt/vol: 33.1 (g/mL) G Lab File ID: T1030814.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 5.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	360	U
59-50-7	4-Chloro-3-methylphenol	360	U
91-57-6	2-Methylnaphthalene	360	U
95-94-3	1,2,4,5-Tetrachlorobenzene	360	U
98-95-3	Nitrobenzene	360	U
100-75-4	n-Nitrosopiperidine	360	U
78-59-1	Isophorone	360	U
126-68-1	o,o,o-Triethylphosphorothioate	360	U
924-16-3	n-Nitrosodibutylamine	360	U
120-58-1	Isosafrole	360	U
122-09-8	a,a-Dimethylphenethylamine	890	U
65-85-0	Benzoic acid	890	U
106-50-3	p-Phenylenediamine	890	U
77-47-4	Hexachlorocyclopentadiene	360	U
88-06-2	2,4,6-Trichlorophenol	360	U
95-95-4	2,4,5-Trichlorophenol	890	U
91-58-7	2-Chloronaphthalene	360	U
88-74-4	2-Nitroaniline	890	U
131-11-3	Dimethylphthalate	360	U
208-96-8	Acenaphthylene	360	U
99-09-2	3-Nitroaniline	890	U
83-32-9	Acenaphthene	360	U
51-28-5	2,4-Dinitrophenol	890	U
100-02-7	4-Nitrophenol	890	U
132-64-9	Dibenzofuran	360	U
1888-71-7	Hexachloropropene	890	U
608-93-5	Pentachlorobenzene	360	U
58-90-2	2,3,4,6-Tetrachlorophenol	360	U
84-66-2	Diethylphthalate	360	U
7005-72-3	4-Chlorophenyl-phenylether	360	U
86-73-7	Fluorene	360	U
100-01-6	4-Nitroaniline	890	U
94-59-7	Safrole	360	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX11-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.16

Sample wt/vol: 33.1 (g/mL) G Lab File ID: T1030814.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 5.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	360	U
99-65-0	1,3-Dinitrobenzene	360	U
606-20-2	2,6-Dinitrotoluene	360	U
134-32-7	1-Naphthylamine	360	U
121-14-2	2,4-Dinitrotoluene	360	U
91-59-8	2-Naphthylamine	360	U
99-55-8	2-Methyl-5-nitroaniline	360	U
297-97-2	Thionazin	360	U
122-39-4	Diphenylamine	360	U
534-52-1	4,6-Dinitro-2-methylphenol	890	U
101-55-3	4-Bromophenyl-phenylether	360	U
118-74-1	Hexachlorobenzene	360	U
85-01-8	Phenanthrene	360	U
120-12-7	Anthracene	360	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	360	U
84-74-2	Di-n-butylphthalate	360	U
206-44-0	Fluoranthene	360	U
87-86-5	Pentachlorophenol	890	U
86-30-6	N-Nitrosodiphenylamine	360	U
298-02-2	Phorate	360	U
62-44-2	Phenacetin	360	U
2303-16-4	Diallate	360	U
60-51-5	Dimethoate	360	U
92-67-1	4-Aminobiphenyl	360	U
82-68-8	Pentachloronitrobenzene	890	U
23950-58-5	Pronamide	360	U
298-04-4	Disulfoton	360	U
298-00-0	Methyl parathion	360	U
56-38-2	Parathion	360	U
91-80-5	Methapyrilene	890	U
465-73-6	Isodrin	360	U
3689-24-5	Sulfotep	360	U
56-57-5	4-Nitroquinoline-1-oxide	890	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX11-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.16

Sample wt/vol: 33.1 (g/mL) G Lab File ID: T1030814.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 5.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	360	U
129-00-0	Pyrene	360	U
85-68-7	Butylbenzylphthalate	360	U
56-55-3	Benzo(a)anthracene	360	U
218-01-9	Chrysene	360	U
117-81-7	bis(2-Ethylhexyl)phthalate	360	U
140-57-8	Aramite	890	U
60-11-7	Methyl Yellow	360	U
510-15-6	Chlorobenzilate	360	U
119-93-7	3,3'-Dimethylbenzidine	360	U
53-96-3	2-Acetylaminofluorene	360	U
91-94-1	3,3'-Dichlorobenzidine	360	U
143-50-0	Kepone	890	U
52-85-7	Famphur	360	U
117-84-0	Di-n-octylphthalate	360	U
205-99-2	Benzo(b)fluoranthene	360	U
207-08-9	Benzo(k)fluoranthene	360	U
50-32-8	Benzo(a)pyrene	360	U
193-39-5	Indeno(1,2,3-cd)pyrene	360	U
53-70-3	Dibenz(a,h)anthracene	360	U
191-24-2	Benzo(g,h,i)perylene	360	U
57-97-6	7,12-Dimethylbenz(a)anthracene	360	U
56-49-5	3-Methylchloranthrene	360	U
70-30-4	Hexachlorophene	14000	U
92-52-4	1,1'-Biphenyl	360	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX12-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.10

Sample wt/vol: 32.5 (g/mL) G Lab File ID: T1030815.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	950	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX12-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.10

Sample wt/vol: 32.5 (g/mL) G Lab File ID: T1030815.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U
98-95-3	Nitrobenzene	380	U
100-75-4	n-Nitrosopiperidine	380	U
78-59-1	Isophorone	380	U
126-68-1	o,o,o-Triethylphosphorothioate	380	U
924-16-3	n-Nitrosodibutylamine	380	U
120-58-1	Isosafrole	380	U
122-09-8	a,a-Dimethylphenethylamine	950	U
65-85-0	Benzoic acid	950	U
106-50-3	p-Phenylenediamine	950	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	950	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	950	U
131-11-3	Dimethylphthalate	380	U
208-96-8	Acenaphthylene	380	U
99-09-2	3-Nitroaniline	950	U
83-32-9	Acenaphthene	380	U
51-28-5	2,4-Dinitrophenol	950	U
100-02-7	4-Nitrophenol	950	U
132-64-9	Dibenzofuran	380	U
1888-71-7	Hexachloropropene	950	U
608-93-5	Pentachlorobenzene	380	U
58-90-2	2,3,4,6-Tetrachlorophenol	380	U
84-66-2	Diethylphthalate	380	U
7005-72-3	4-Chlorophenyl-phenylether	380	U
86-73-7	Fluorene	380	U
100-01-6	4-Nitroaniline	950	U
94-59-7	Safrole	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX12-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.10

Sample wt/vol: 32.5 (g/mL) G Lab File ID: T1030815.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	950	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	39	J
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	950	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	950	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	950	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	950	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX12-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.10

Sample wt/vol: 32.5 (g/mL) G Lab File ID: T1030815.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	380	U R
129-00-0	Pyrene	380	U
85-68-7	Butylbenzylphthalate	380	U
56-55-3	Benzo(a)anthracene	380	U
218-01-9	Chrysene	26	J
117-81-7	bis(2-Ethylhexyl)phthalate	380	U
140-57-8	Aramite	950	U
60-11-7	Methyl Yellow	380	U
510-15-6	Chlorobenzilate	380	U
119-93-7	3,3'-Dimethylbenzidine	380	U
53-96-3	2-Acetylaminofluorene	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
143-50-0	Kepone	950	U
52-85-7	Famphur	380	U
117-84-0	Di-n-octylphthalate	380	U
205-99-2	Benzo(b)fluoranthene	380	U
207-08-9	Benzo(k)fluoranthene	380	U
50-32-8	Benzo(a)pyrene	380	U
193-39-5	Indeno(1,2,3-cd)pyrene	380	U
53-70-3	Dibenz(a,h)anthracene	380	U
191-24-2	Benzo(g,h,i)perylene	380	U
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U
56-49-5	3-Methylchloranthrene	380	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	380	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.17

Sample wt/vol: 30.6 (g/mL) G Lab File ID: T1030823.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	410	U
108-95-2	Phenol	410	U
111-44-4	bis(2-Chloroethyl)ether	410	U
95-57-8	2-Chlorophenol	410	U
541-73-1	1,3-Dichlorobenzene	410	U
106-46-7	1,4-Dichlorobenzene	410	U
100-51-6	Benzyl alcohol	410	U
95-50-1	1,2-Dichlorobenzene	410	U
108-60-1	bis(2-Chloroisopropyl)ether	410	U
95-48-7	2-Methylphenol	410	U
67-72-1	Hexachloroethane	410	U
110-86-1	Pyridine	410	U
62-75-9	N-Nitrosodimethylamine	410	U
109-06-8	2-Picoline	410	U
10595-95-6	n-Nitrosomethylethylamine	410	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	410	U
62-50-0	Ethyl methanesulfonate	410	U
98-86-2	Acetophenone	410	U
930-55-2	n-Nitrosopyrrolidine	410	U
59-89-2	n-Nitrosomorpholine	410	U
621-64-7	N-Nitroso-di-n-propylamine	410	U
95-53-4	o-Toluidine	410	U
108-39-4	3-Methylphenol	410	U
106-44-5	4-Methylphenol	410	U
88-75-5	2-Nitrophenol	410	U
105-67-9	2,4-Dimethylphenol	410	U
111-91-1	bis(2-Chloroethoxy)methane	410	U
120-83-2	2,4-Dichlorophenol	410	U
120-82-1	1,2,4-Trichlorobenzene	410	U
91-20-3	Naphthalene	410	U
87-65-0	2,6-Dichlorophenol	410	U
106-47-8	4-Chloroaniline	410	U

SS 4/3/01

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.17

Sample wt/vol: 30.6 (g/mL) G Lab File ID: T1030823.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	410	U
59-50-7	4-Chloro-3-methylphenol	410	U
91-57-6	2-Methylnaphthalene	410	U
95-94-3	1,2,4,5-Tetrachlorobenzene	410	U
98-95-3	Nitrobenzene	410	U
100-75-4	n-Nitrosopiperidine	410	U
78-59-1	Isophorone	410	U
126-68-1	o,o,o-Triethylphosphorothioate	410	U
924-16-3	n-Nitrosodibutylamine	410	U
120-58-1	Isosafrole	410	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	1000	U
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	410	U
88-06-2	2,4,6-Trichlorophenol	410	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	410	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	410	U
208-96-8	Acenaphthylene	410	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	410	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	410	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	410	U
58-90-2	2,3,4,6-Tetrachlorophenol	410	U
84-66-2	Diethylphthalate	410	U
7005-72-3	4-Chlorophenyl-phenylether	410	U
86-73-7	Fluorene	410	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	410	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.17

Sample wt/vol: 30.6 (g/mL) G Lab File ID: T1030823.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	410	U
99-65-0	1,3-Dinitrobenzene	410	U
606-20-2	2,6-Dinitrotoluene	410	U
134-32-7	1-Naphthylamine	410	U
121-14-2	2,4-Dinitrotoluene	410	U
91-59-8	2-Naphthylamine	410	U
99-55-8	2-Methyl-5-nitroaniline	410	U
297-97-2	Thionazin	410	U
122-39-4	Diphenylamine	410	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
101-55-3	4-Bromophenyl-phenylether	410	U
118-74-1	Hexachlorobenzene	410	U
85-01-8	Phenanthrene	52	J
120-12-7	Anthracene	410	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	410	U
84-74-2	Di-n-butylphthalate	410	U
206-44-0	Fluoranthene	410	U
87-86-5	Pentachlorophenol	1000	U
86-30-6	N-Nitrosodiphenylamine	410	U
298-02-2	Phorate	410	U
62-44-2	Phenacetin	410	U
2303-16-4	Diallate	410	U
60-51-5	Dimethoate	410	U
92-67-1	4-Aminobiphenyl	410	U
82-68-8	Pentachloronitrobenzene	1000	U
23950-58-5	Pronamide	410	U
298-04-4	Disulfoton	410	U
298-00-0	Methyl parathion	410	U
56-38-2	Parathion	410	U
91-80-5	Methapyrilene	1000	U
465-73-6	Isodrin	410	U
3689-24-5	Sulfotep	410	U
56-57-5	4-Nitroquinoline-1-oxide	1000	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX13-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.17

Sample wt/vol: 30.6 (g/mL) G Lab File ID: T1030823.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 21 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.7

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	410	U
129-00-0	Pyrene	410	U
85-68-7	Butylbenzylphthalate	410	U
56-55-3	Benzo(a)anthracene	410	U
218-01-9	Chrysene	37	J
117-81-7	bis(2-Ethylhexyl)phthalate	410	U
140-57-8	Aramite	1000	U
60-11-7	Methyl Yellow	410	U
510-15-6	Chlorobenzilate	410	U
119-93-7	3,3'-Dimethylbenzidine	410	U
53-96-3	2-Acetylaminofluorene	410	U
91-94-1	3,3'-Dichlorobenzidine	410	U
143-50-0	Kepone	1000	U
52-85-7	Famphur	410	U
117-84-0	Di-n-octylphthalate	410	U
205-99-2	Benzo(b)fluoranthene	410	U
207-08-9	Benzo(k)fluoranthene	410	U
50-32-8	Benzo(a)pyrene	410	U
193-39-5	Indeno(1,2,3-cd)pyrene	410	U
53-70-3	Dibenz(a,h)anthracene	410	U
191-24-2	Benzo(g,h,i)perylene	410	U
57-97-6	7,12-Dimethylbenz(a)anthracene	410	U
56-49-5	3-Methylchloranthrene	410	U
70-30-4	Hexachlorophene	16000	U
92-52-4	1,1'-Biphenyl	410	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18

Sample wt/vol: 30.6 (g/mL) G Lab File ID: V1031220.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	410	U
108-95-2	Phenol	410	U
111-44-4	bis(2-Chloroethyl)ether	410	U
95-57-8	2-Chlorophenol	410	U
541-73-1	1,3-Dichlorobenzene	410	U
106-46-7	1,4-Dichlorobenzene	410	U
100-51-6	Benzyl alcohol	410	U
95-50-1	1,2-Dichlorobenzene	410	U
108-60-1	bis(2-Chloroisopropyl)ether	410	U
95-48-7	2-Methylphenol	410	U
67-72-1	Hexachloroethane	410	U
110-86-1	Pyridine	410	U
62-75-9	N-Nitrosodimethylamine	410	U
109-06-8	2-Picoline	410	U
10595-95-6	n-Nitrosomethylethylamine	410	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	410	U
62-50-0	Ethyl methanesulfonate	410	U
98-86-2	Acetophenone	410	U
930-55-2	n-Nitrosopyrrolidine	410	U
59-89-2	n-Nitrosomorpholine	410	U
621-64-7	N-Nitroso-di-n-propylamine	410	U
95-53-4	o-Toluidine	410	U
108-39-4	3-Methylphenol	410	~~U~~ RU
106-44-5	4-Methylphenol	410	U
88-75-5	2-Nitrophenol	410	U
105-67-9	2,4-Dimethylphenol	410	U
111-91-1	bis(2-Chloroethoxy)methane	410	U
120-83-2	2,4-Dichlorophenol	410	U
120-82-1	1,2,4-Trichlorobenzene	410	U
91-20-3	Naphthalene	410	U
87-65-0	2,6-Dichlorophenol	410	U
106-47-8	4-Chloroaniline	410	U

3/2/01

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18

Sample wt/vol: 30.6 (g/mL) G Lab File ID: V1031220.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	410	U
59-50-7	4-Chloro-3-methylphenol	410	U
91-57-6	2-Methylnaphthalene	410	U
95-94-3	1,2,4,5-Tetrachlorobenzene	410	U
98-95-3	Nitrobenzene	410	U
100-75-4	n-Nitrosopiperidine	410	U
78-59-1	Isophorone	410	U
126-68-1	o,o,o-Triethylphosphorothioate	410	U
924-16-3	n-Nitrosodibutylamine	410	U
120-58-1	Isosafrole	410	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	1000	U
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	410	U
88-06-2	2,4,6-Trichlorophenol	410	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	410	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	1600	
208-96-8	Acenaphthylene	410	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	410	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	410	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	410	U
58-90-2	2,3,4,6-Tetrachlorophenol	410	U
84-66-2	Diethylphthalate	410	U
7005-72-3	4-Chlorophenyl-phenylether	410	U
86-73-7	Fluorene	410	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	410	U

JS 4/3/01

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18

Sample wt/vol: 30.6 (g/mL) G Lab File ID: V1031220.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
130-15-4	1,4-Naphthoquinone	410	U	
99-65-0	1,3-Dinitrobenzene	410	U	
606-20-2	2,6-Dinitrotoluene	410	U	
134-32-7	1-Naphthylamine	410	U	
121-14-2	2,4-Dinitrotoluene	410	U	
91-59-8	2-Naphthylamine	410	U	
99-55-8	2-Methyl-5-nitroaniline	410	U	
297-97-2	Thionazin	410	U	
122-39-4	Diphenylamine	410	U	
534-52-1	4,6-Dinitro-2-methylphenol	1000	U	J
101-55-3	4-Bromophenyl-phenylether	410	U	J
118-74-1	Hexachlorobenzene	410	U	J
85-01-8	Phenanthrene	53	J	J
120-12-7	Anthracene	410	U	J
88-85-7	2-sec-butyl-4,6-Dinitrophenol	410	U	
84-74-2	Di-n-butylphthalate	410	U	
206-44-0	Fluoranthene	410	U	
87-86-5	Pentachlorophenol	1000	U	
86-30-6	N-Nitrosodiphenylamine	410	U	
298-02-2	Phorate	410	U	
62-44-2	Phenacetin	410	U	
2303-16-4	Diallate	410	U	
60-51-5	Dimethoate	410	U	
92-67-1	4-Aminobiphenyl	410	U	
82-68-8	Pentachloronitrobenzene	1000	U	
23950-58-5	Pronamide	410	U	
298-04-4	Disulfoton	410	U	
298-00-0	Methyl parathion	410	U	
56-38-2	Parathion	410	U	
91-80-5	Methapyrilene	1000	U	
465-73-6	Isodrin	410	U	
3689-24-5	Sulfotep	410	U	J
56-57-5	4-Nitroquinoline-1-oxide	1000	U	R

rc 4/2/01

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18

Sample wt/vol: 30.6 (g/mL) G Lab File ID: V1031220.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	410	U	J
129-00-0	Pyrene	410	U	J
85-68-7	Butylbenzylphthalate	410	U	J
56-55-3	Benzo(a)anthracene	30	J	
218-01-9	Chrysene	51	J	
117-81-7	bis(2-Ethylhexyl)phthalate	870		J
140-57-8	Aramite	1000	U	J
60-11-7	Methyl Yellow	410	U	J
510-15-6	Chlorobenzilate	410	~~U~~	R
119-93-7	3,3'-Dimethylbenzidine	410	U	J
53-96-3	2-Acetylaminofluorene	410	U	
91-94-1	3,3'-Dichlorobenzidine	410	U	
143-50-0	Kepone	1000	U	
52-85-7	Famphur	410	U	
117-84-0	Di-n-octylphthalate	410	U	
205-99-2	Benzo(b)fluoranthene	410	U	
207-08-9	Benzo(k)fluoranthene	410	U	J
50-32-8	Benzo(a)pyrene	27	J	
193-39-5	Indeno(1,2,3-cd)pyrene	410	U	J
53-70-3	Dibenz(a,h)anthracene	410	U	
191-24-2	Benzo(g,h,i)perylene	410	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	410	U	
56-49-5	3-Methylchloranthrene	410	U	
70-30-4	Hexachlorophene	16000	U	J
92-52-4	1,1'-Biphenyl	410	U	

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18RA

Sample wt/vol: 30.6 (g/mL) G Lab File ID: V1031224.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
62-53-5	Aniline	410	U	R
108-95-2	Phenol	410	U	
111-44-4	bis(2-Chloroethyl)ether	410	U	
95-57-8	2-Chlorophenol	410	U	
541-73-1	1,3-Dichlorobenzene	410	U	
106-46-7	1,4-Dichlorobenzene	410	U	
100-51-6	Benzyl alcohol	410	U	
95-50-1	1,2-Dichlorobenzene	410	U	
108-60-1	bis(2-Chloroisopropyl)ether	410	U	
95-48-7	2-Methylphenol	410	U	
67-72-1	Hexachloroethane	410	U	
110-86-1	Pyridine	410	U	
62-75-9	N-Nitrosodimethylamine	410	U	
109-06-8	2-Picoline	410	U	
10595-95-6	n-Nitrosomethylethylamine	410	U	
66-27-3	Methyl methanesulfonate	1000	U	
55-18-5	n-Nitrosodiethylamine	410	U	
62-50-0	Ethyl methanesulfonate	410	U	
98-86-2	Acetophenone	410	U	
930-55-2	n-Nitrosopyrrolidine	410	U	
59-89-2	n-Nitrosomorpholine	410	U	
621-64-7	N-Nitroso-di-n-propylamine	410	U	
95-53-4	o-Toluidine	410	U	
108-39-4	3-Methylphenol	410	U	R
106-44-5	4-Methylphenol	410	U	
88-75-5	2-Nitrophenol	410	U	
105-67-9	2,4-Dimethylphenol	410	U	
111-91-1	bis(2-Chloroethoxy)methane	410	U	
120-83-2	2,4-Dichlorophenol	410	U	
120-82-1	1,2,4-Trichlorobenzene	410	U	
91-20-3	Naphthalene	410	U	
87-65-0	2,6-Dichlorophenol	410	U	
106-47-8	4-Chloroaniline	410	U	R

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18RA

Sample wt/vol: 30.6 (g/mL) G Lab File ID: V1031224.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
87-68-3	Hexachlorobutadiene	410	U	R
59-50-7	4-Chloro-3-methylphenol	410	U	
91-57-6	2-Methylnaphthalene	410	U	
95-94-3	1,2,4,5-Tetrachlorobenzene	410	U	
98-95-3	Nitrobenzene	410	U	
100-75-4	n-Nitrosopiperidine	410	U	
78-59-1	Isophorone	410	U	
126-68-1	o,o,o-Triethylphosphorothioate	410	U	
924-16-3	n-Nitrosodibutylamine	410	U	
120-58-1	Isosafrole	410	U	
122-09-8	a,a-Dimethylphenethylamine	1000	U	
65-85-0	Benzoic acid	1000	U	
106-50-3	p-Phenylenediamine	1000	U	
77-47-4	Hexachlorocyclopentadiene	410	U	
88-06-2	2,4,6-Trichlorophenol	410	U	
95-95-4	2,4,5-Trichlorophenol	1000	U	
91-58-7	2-Chloronaphthalene	410	U	
88-74-4	2-Nitroaniline	1000	U	
131-11-3	Dimethylphthalate	1700		
208-96-8	Acenaphthylene	410	U	
99-09-2	3-Nitroaniline	1000	U	
83-32-9	Acenaphthene	410	U	
51-28-5	2,4-Dinitrophenol	1000	U	
100-02-7	4-Nitrophenol	1000	U	
132-64-9	Dibenzofuran	410	U	
1888-71-7	Hexachloropropene	1000	U	
608-93-5	Pentachlorobenzene	410	U	
58-90-2	2,3,4,6-Tetrachlorophenol	410	U	
84-66-2	Diethylphthalate	410	U	
7005-72-3	4-Chlorophenyl-phenylether	410	U	
86-73-7	Fluorene	410	U	
100-01-6	4-Nitroaniline	1000	U	
94-59-7	Safrole	410	U	R

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18RA

Sample wt/vol: 30.6 (g/mL) G Lab File ID: V1031224.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	410	U
99-65-0	1,3-Dinitrobenzene	410	U
606-20-2	2,6-Dinitrotoluene	410	U
134-32-7	1-Naphthylamine	410	U
121-14-2	2,4-Dinitrotoluene	410	U
91-59-8	2-Naphthylamine	410	U
99-55-8	2-Methyl-5-nitroaniline	410	U
297-97-2	Thionazin	410	U
122-39-4	Diphenylamine	410	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
101-55-3	4-Bromophenyl-phenylether	410	U
118-74-1	Hexachlorobenzene	410	U
85-01-8	Phenanthrene	56	J
120-12-7	Anthracene	410	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	410	U
84-74-2	Di-n-butylphthalate	410	U
206-44-0	Fluoranthene	410	U
87-86-5	Pentachlorophenol	1000	U
86-30-6	N-Nitrosodiphenylamine	410	U
298-02-2	Phorate	410	U
62-44-2	Phenacetin	410	U
2303-16-4	Diallate	410	U
60-51-5	Dimethoate	410	U
92-67-1	4-Aminobiphenyl	410	U
82-68-8	Pentachloronitrobenzene	1000	U
23950-58-5	Pronamide	410	U
298-04-4	Disulfoton	410	U
298-00-0	Methyl parathion	410	U
56-38-2	Parathion	410	U
91-80-5	Methapyrilene	1000	U
465-73-6	Isodrin	410	U
3689-24-5	Sulfotep	410	U
56-57-5	4-Nitroquinoline-1-oxide	1000	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX14-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.18RA

Sample wt/vol: 30.6 (g/mL) G Lab File ID: V1031224.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	410	U	R
129-00-0	Pyrene	410	U	
85-68-7	Butylbenzylphthalate	410	U	
56-55-3	Benzo(a)anthracene	29	J	
218-01-9	Chrysene	52	J	
117-81-7	bis(2-Ethylhexyl)phthalate	980		
140-57-8	Aramite	1000	U	
60-11-7	Methyl Yellow	410	U	
510-15-6	Chlorobenzilate	410	U	R
119-93-7	3,3'-Dimethylbenzidine	410	U	
53-96-3	2-Acetylaminofluorene	410	U	
91-94-1	3,3'-Dichlorobenzidine	410	U	
143-50-0	Kepone	1000	U	
52-85-7	Famphur	410	U	
117-84-0	Di-n-octylphthalate	410	U	
205-99-2	Benzo(b)fluoranthene	410	U	
207-08-9	Benzo(k)fluoranthene	410	U	
50-32-8	Benzo(a)pyrene	26	J	
193-39-5	Indeno(1,2,3-cd)pyrene	410	U	
53-70-3	Dibenz(a,h)anthracene	410	U	
191-24-2	Benzo(g,h,i)perylene	410	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	410	U	
56-49-5	3-Methylchloranthrene	410	U	
70-30-4	Hexachlorophene	16000	U	
92-52-4	1,1'-Biphenyl	21	J	R

JS 4/3/01

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.19

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031221.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
62-53-5	Aniline	380	U	R
108-95-2	Phenol	380	U	
111-44-4	bis(2-Chloroethyl)ether	380	U	
95-57-8	2-Chlorophenol	380	U	
541-73-1	1,3-Dichlorobenzene	380	U	
106-46-7	1,4-Dichlorobenzene	380	U	
100-51-6	Benzyl alcohol	380	U	
95-50-1	1,2-Dichlorobenzene	380	U	
108-60-1	bis(2-Chloroisopropyl)ether	380	U	
95-48-7	2-Methylphenol	380	U	
67-72-1	Hexachloroethane	380	U	
110-86-1	Pyridine	380	U	
62-75-9	N-Nitrosodimethylamine	380	U	
109-06-8	2-Picoline	380	U	
10595-95-6	n-Nitrosomethylethylamine	380	U	
66-27-3	Methyl methanesulfonate	960	U	
55-18-5	n-Nitrosodiethylamine	380	U	
62-50-0	Ethyl methanesulfonate	380	U	
98-86-2	Acetophenone	380	U	
930-55-2	n-Nitrosopyrrolidine	380	U	
59-89-2	n-Nitrosomorpholine	380	U	
621-64-7	N-Nitroso-di-n-propylamine	380	U	
95-53-4	o-Toluidine	380	U	
108-39-4	3-Methylphenol	380	U	R
106-44-5	4-Methylphenol	380	U	
88-75-5	2-Nitrophenol	380	U	
105-67-9	2,4-Dimethylphenol	380	U	
111-91-1	bis(2-Chloroethoxy)methane	380	U	
120-83-2	2,4-Dichlorophenol	380	U	
120-82-1	1,2,4-Trichlorobenzene	380	U	
91-20-3	Naphthalene	380	U	
87-65-0	2,6-Dichlorophenol	380	U	
106-47-8	4-Chloroaniline	380	U	R

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.19

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031221.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
87-68-3	Hexachlorobutadiene	380	U	R
59-50-7	4-Chloro-3-methylphenol	380	U	
91-57-6	2-Methylnaphthalene	380	U	
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U	
98-95-3	Nitrobenzene	380	U	
100-75-4	n-Nitrosopiperidine	380	U	
78-59-1	Isophorone	380	U	
126-68-1	o,o,o-Triethylphosphorothioate	380	U	
924-16-3	n-Nitrosodibutylamine	380	U	
120-58-1	Isosafrole	380	U	
122-09-8	a,a-Dimethylphenethylamine	960	U	
65-85-0	Benzoic acid	960	U	
106-50-3	p-Phenylenediamine	960	U	
77-47-4	Hexachlorocyclopentadiene	380	U	
88-06-2	2,4,6-Trichlorophenol	380	U	
95-95-4	2,4,5-Trichlorophenol	960	U	
91-58-7	2-Chloronaphthalene	380	U	
88-74-4	2-Nitroaniline	960	U	
131-11-3	Dimethylphthalate	380	U	
208-96-8	Acenaphthylene	380	U	
99-09-2	3-Nitroaniline	960	U	
83-32-9	Acenaphthene	380	U	
51-28-5	2,4-Dinitrophenol	960	U	
100-02-7	4-Nitrophenol	960	U	
132-64-9	Dibenzofuran	380	U	
1888-71-7	Hexachloropropene	960	U	
608-93-5	Pentachlorobenzene	380	U	
58-90-2	2,3,4,6-Tetrachlorophenol	380	U	
84-66-2	Diethylphthalate	380	U	
7005-72-3	4-Chlorophenyl-phenylether	380	U	
86-73-7	Fluorene	380	U	
100-01-6	4-Nitroaniline	960	U	
94-59-7	Safrole	380	U	R

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.19

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031221.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	960	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	44	J
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	960	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	960	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	960	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	960	U

15 4/3/01

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.19

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031221.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	380	U	R
129-00-0	Pyrene	380	U	
85-68-7	Butylbenzylphthalate	380	U	
56-55-3	Benzo(a)anthracene	380	U	
218-01-9	Chrysene	35	J	
117-81-7	bis(2-Ethylhexyl)phthalate	380	U	
140-57-8	Aramite	960	U	
60-11-7	Methyl Yellow	380	U	
510-15-6	Chlorobenzilate	380	U	R
119-93-7	3,3'-Dimethylbenzidine	380	U	
53-96-3	2-Acetylaminofluorene	380	U	
91-94-1	3,3'-Dichlorobenzidine	380	U	
143-50-0	Kepone	960	U	
52-85-7	Famphur	380	U	
117-84-0	Di-n-octylphthalate	380	U	
205-99-2	Benzo(b)fluoranthene	380	U	
207-08-9	Benzo(k)fluoranthene	380	U	
50-32-8	Benzo(a)pyrene	380	U	
193-39-5	Indeno(1,2,3-cd)pyrene	380	U	
53-70-3	Dibenz(a,h)anthracene	380	U	
191-24-2	Benzo(g,h,i)perylene	380	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U	
56-49-5	3-Methylchloranthrene	380	U	
70-30-4	Hexachlorophene	15000	U	
92-52-4	1,1'-Biphenyl	380	U	R

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.19RA

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031225.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	960	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX15-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.19RA

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031225.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 17 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U
98-95-3	Nitrobenzene	380	U
100-75-4	n-Nitrosopiperidine	380	U
78-59-1	Isophorone	380	U
126-68-1	o,o,o-Triethylphosphorothioate	380	U
924-16-3	n-Nitrosodibutylamine	380	U
120-58-1	Isosafrole	380	U
122-09-8	a,a-Dimethylphenethylamine	960	U
65-85-0	Benzoic acid	960	U
106-50-3	p-Phenylenediamine	960	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	960	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	960	U
131-11-3	Dimethylphthalate	380	U
208-96-8	Acenaphthylene	380	U
99-09-2	3-Nitroaniline	960	U
83-32-9	Acenaphthene	380	U
51-28-5	2,4-Dinitrophenol	960	U
100-02-7	4-Nitrophenol	960	U
132-64-9	Dibenzofuran	380	U
1888-71-7	Hexachloropropene	960	U
608-93-5	Pentachlorobenzene	380	U
58-90-2	2,3,4,6-Tetrachlorophenol	380	U
84-66-2	Diethylphthalate	380	U
7005-72-3	4-Chlorophenyl-phenylether	380	U
86-73-7	Fluorene	380	U
100-01-6	4-Nitroaniline	960	U
94-59-7	Safrole	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.20

Sample wt/vol: 31.2 (g/mL) G Lab File ID: T1030827.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	940	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	62	J
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	940	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	940	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	940	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	940	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.20

Sample wt/vol: 31.2 (g/mL) G Lab File ID: T1030827.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	380	~~U~~ R
129-00-0	Pyrene	380	U
85-68-7	Butylbenzylphthalate	380	U
56-55-3	Benzo(a)anthracene	29	J
218-01-9	Chrysene	47	J
117-81-7	bis(2-Ethylhexyl)phthalate	250	J
140-57-8	Aramite	940	U
60-11-7	Methyl Yellow	380	U
510-15-6	Chlorobenzilate	380	U
119-93-7	3,3'-Dimethylbenzidine	380	U
53-96-3	2-Acetylaminofluorene	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
143-50-0	Kepone	940	U
52-85-7	Famphur	380	U
117-84-0	Di-n-octylphthalate	380	U J
205-99-2	Benzo(b)fluoranthene	380	U
207-08-9	Benzo(k)fluoranthene	380	U
50-32-8	Benzo(a)pyrene	29	J
193-39-5	Indeno(1,2,3-cd)pyrene	380	U
53-70-3	Dibenz(a,h)anthracene	380	U
191-24-2	Benzo(g,h,i)perylene	380	U
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U
56-49-5	3-Methylchloranthrene	380	U
70-30-4	Hexachlorophene	15000	U J
92-52-4	1,1'-Biphenyl	380	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.20RA

Sample wt/vol: 31.2 (g/mL) G Lab File ID: V1030920.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
62-53-5	Aniline	380	U	R
108-95-2	Phenol	380	U	
111-44-4	bis(2-Chloroethyl)ether	380	U	
95-57-8	2-Chlorophenol	380	U	
541-73-1	1,3-Dichlorobenzene	380	U	
106-46-7	1,4-Dichlorobenzene	380	U	
100-51-6	Benzyl alcohol	380	U	
95-50-1	1,2-Dichlorobenzene	380	U	
108-60-1	bis(2-Chloroisopropyl)ether	380	U	
95-48-7	2-Methylphenol	380	U	
67-72-1	Hexachloroethane	380	U	
110-86-1	Pyridine	380	U	
62-75-9	N-Nitrosodimethylamine	380	U	
109-06-8	2-Picoline	380	U	
10595-95-6	n-Nitrosomethylethylamine	380	U	
66-27-3	Methyl methanesulfonate	940	U	
55-18-5	n-Nitrosodiethylamine	380	U	
62-50-0	Ethyl methanesulfonate	380	U	
98-86-2	Acetophenone	380	U	
930-55-2	n-Nitrosopyrrolidine	380	U	
59-89-2	n-Nitrosomorpholine	380	U	
621-64-7	N-Nitroso-di-n-propylamine	380	U	
95-53-4	o-Toluidine	380	U	
108-39-4	3-Methylphenol	380	U	R
106-44-5	4-Methylphenol	380	U	
88-75-5	2-Nitrophenol	380	U	
105-67-9	2,4-Dimethylphenol	380	U	
111-91-1	bis(2-Chloroethoxy)methane	380	U	
120-83-2	2,4-Dichlorophenol	380	U	
120-82-1	1,2,4-Trichlorobenzene	380	U	
91-20-3	Naphthalene	380	U	
87-65-0	2,6-Dichlorophenol	380	U	
106-47-8	4-Chloroaniline	380	U	R

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.20RA

Sample wt/vol: 31.2 (g/mL) G Lab File ID: V1030920.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
87-68-3	Hexachlorobutadiene	380	U	R
59-50-7	4-Chloro-3-methylphenol	380	U	
91-57-6	2-Methylnaphthalene	380	U	
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U	
98-95-3	Nitrobenzene	380	U	
100-75-4	n-Nitrosopiperidine	380	U	
78-59-1	Isophorone	380	U	
126-68-1	o,o,o-Triethylphosphorothioate	380	U	
924-16-3	n-Nitrosodibutylamine	380	U	
120-58-1	Isosafrole	380	U	
122-09-8	a,a-Dimethylphenethylamine	940	U	
65-85-0	Benzoic acid	940	U	
106-50-3	p-Phenylenediamine	940	U	
77-47-4	Hexachlorocyclopentadiene	380	U	
88-06-2	2,4,6-Trichlorophenol	380	U	
95-95-4	2,4,5-Trichlorophenol	940	U	
91-58-7	2-Chloronaphthalene	380	U	
88-74-4	2-Nitroaniline	940	U	
131-11-3	Dimethylphthalate	380	U	
208-96-8	Acenaphthylene	380	U	
99-09-2	3-Nitroaniline	940	U	
83-32-9	Acenaphthene	380	U	
51-28-5	2,4-Dinitrophenol	940	U	
100-02-7	4-Nitrophenol	940	U	
132-64-9	Dibenzofuran	380	U	
1888-71-7	Hexachloropropene	940	U	
608-93-5	Pentachlorobenzene	380	U	
58-90-2	2,3,4,6-Tetrachlorophenol	380	U	
84-66-2	Diethylphthalate	380	U	
7005-72-3	4-Chlorophenyl-phenylether	380	U	
86-73-7	Fluorene	380	U	
100-01-6	4-Nitroaniline	940	U	
94-59-7	Safrole	380	U	R

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.20RA

Sample wt/vol: 31.2 (g/mL) G Lab File ID: V1030920.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	940	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	61	J
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	940	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	940	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	940	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	940	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.20RA

Sample wt/vol: 31.2 (g/mL) G Lab File ID: V1030920.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 15 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	380	U	R
129-00-0	Pyrene	380	U	
85-68-7	Butylbenzylphthalate	380	U	
56-55-3	Benzo(a)anthracene	29	J	
218-01-9	Chrysene	48	J	
117-81-7	bis(2-Ethylhexyl)phthalate	170	J	
140-57-8	Aramite	940	U	
60-11-7	Methyl Yellow	380	U	
510-15-6	Chlorobenzilate	380	U	R
119-93-7	3,3'-Dimethylbenzidine	380	U	
53-96-3	2-Acetylaminofluorene	380	U	
91-94-1	3,3'-Dichlorobenzidine	380	U	
143-50-0	Kepone	940	U	
52-85-7	Famphur	380	U	
117-84-0	Di-n-octylphthalate	380	U	
205-99-2	Benzo(b)fluoranthene	380	U	
207-08-9	Benzo(k)fluoranthene	380	U	
50-32-8	Benzo(a)pyrene	380	U	
193-39-5	Indeno(1,2,3-cd)pyrene	380	U	
53-70-3	Dibenz(a,h)anthracene	380	U	
191-24-2	Benzo(g,h,i)perylene	380	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U	
56-49-5	3-Methylchloranthrene	380	U	
70-30-4	Hexachlorophene	15000	U	
92-52-4	1,1'-Biphenyl	380	U	R

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.22

Sample wt/vol: 31.2 (g/mL) G Lab File ID: T1030826.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	950	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.22

Sample wt/vol: 31.2 (g/mL) G Lab File ID: T1030826.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U
98-95-3	Nitrobenzene	380	U
100-75-4	n-Nitrosopiperidine	380	U
78-59-1	Isophorone	380	U
126-68-1	o,o,o-Triethylphosphorothioate	380	U
924-16-3	n-Nitrosodibutylamine	380	U
120-58-1	Isosafrole	380	U
122-09-8	a,a-Dimethylphenethylamine	950	U
65-85-0	Benzoic acid	950	U
106-50-3	p-Phenylenediamine	950	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	950	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	950	U
131-11-3	Dimethylphthalate	380	U
208-96-8	Acenaphthylene	380	U
99-09-2	3-Nitroaniline	950	U
83-32-9	Acenaphthene	380	U
51-28-5	2,4-Dinitrophenol	950	U
100-02-7	4-Nitrophenol	950	U
132-64-9	Dibenzofuran	380	U
1888-71-7	Hexachloropropene	950	U
608-93-5	Pentachlorobenzene	380	U
58-90-2	2,3,4,6-Tetrachlorophenol	380	U
84-66-2	Diethylphthalate	380	U
7005-72-3	4-Chlorophenyl-phenylether	380	U
86-73-7	Fluorene	380	U
100-01-6	4-Nitroaniline	950	U
94-59-7	Safrole	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.22

Sample wt/vol: 31.2 (g/mL) G Lab File ID: T1030826.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	950	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	49	J
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	950	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	950	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	950	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	950	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX16-SS0001P-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.22

Sample wt/vol: 31.2 (g/mL) G Lab File ID: T1030826.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 16 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	380	~~U~~
129-00-0	Pyrene	380	U
85-68-7	Butylbenzylphthalate	380	U
56-55-3	Benzo(a)anthracene	380	U
218-01-9	Chrysene	40	J
117-81-7	bis(2-Ethylhexyl)phthalate	380	U
140-57-8	Aramite	950	U
60-11-7	Methyl Yellow	380	U
510-15-6	Chlorobenzilate	380	U
119-93-7	3,3'-Dimethylbenzidine	380	U
53-96-3	2-Acetylaminofluorene	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
143-50-0	Kepone	950	U
52-85-7	Famphur	380	U
117-84-0	Di-n-octylphthalate	380	U
205-99-2	Benzo(b)fluoranthene	380	U
207-08-9	Benzo(k)fluoranthene	380	U
50-32-8	Benzo(a)pyrene	24	J
193-39-5	Indeno(1,2,3-cd)pyrene	380	U
53-70-3	Dibenz(a,h)anthracene	380	U
191-24-2	Benzo(g,h,i)perylene	380	U
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U
56-49-5	3-Methylchloranthrene	380	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	380	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.24

Sample wt/vol: 31.9 (g/mL) G Lab File ID: T1030727.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	960	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.24

Sample wt/vol: 31.9 (g/mL) G Lab File ID: T1030727.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U
98-95-3	Nitrobenzene	380	U
100-75-4	n-Nitrosopiperidine	380	U
78-59-1	Isophorone	380	U
126-68-1	o,o,o-Triethylphosphorothioate	380	U
924-16-3	n-Nitrosodibutylamine	380	U
120-58-1	Isosafrole	380	U
122-09-8	a,a-Dimethylphenethylamine	960	U
65-85-0	Benzoic acid	960	U
106-50-3	p-Phenylenediamine	960	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	960	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	960	U
131-11-3	Dimethylphthalate	380	U
208-96-8	Acenaphthylene	380	U
99-09-2	3-Nitroaniline	960	U
83-32-9	Acenaphthene	380	U
51-28-5	2,4-Dinitrophenol	960	U
100-02-7	4-Nitrophenol	960	U
132-64-9	Dibenzofuran	380	U
1888-71-7	Hexachloropropene	960	U
608-93-5	Pentachlorobenzene	380	U
58-90-2	2,3,4,6-Tetrachlorophenol	380	U
84-66-2	Diethylphthalate	380	U
7005-72-3	4-Chlorophenyl-phenylether	380	U
86-73-7	Fluorene	380	U
100-01-6	4-Nitroaniline	960	U
94-59-7	Safrole	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.24

Sample wt/vol: 31.9 (g/mL) G Lab File ID: T1030727.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	960	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	380	U
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	960	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	960	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	960	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	960	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX17-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.24

Sample wt/vol: 31.9 (g/mL) G Lab File ID: T1030727.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 18 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/07/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	380	U
129-00-0	Pyrene	380	U
85-68-7	Butylbenzylphthalate	380	U
56-55-3	Benzo(a)anthracene	380	U
218-01-9	Chrysene	380	U
117-81-7	bis(2-Ethylhexyl)phthalate	380	U
140-57-8	Aramite	960	U
60-11-7	Methyl Yellow	380	U
510-15-6	Chlorobenzilate	380	U
119-93-7	3,3'-Dimethylbenzidine	380	U
53-96-3	2-Acetylaminofluorene	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
143-50-0	Kepone	960	U
52-85-7	Famphur	380	U
117-84-0	Di-n-octylphthalate	380	U
205-99-2	Benzo(b)fluoranthene	380	U
207-08-9	Benzo(k)fluoranthene	380	U
50-32-8	Benzo(a)pyrene	380	U
193-39-5	Indeno(1,2,3-cd)pyrene	380	U
53-70-3	Dibenz(a,h)anthracene	380	U
191-24-2	Benzo(g,h,i)perylene	380	U
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U
56-49-5	3-Methylchloranthrene	380	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	380	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21RA

Sample wt/vol: 32.5 (g/mL) G Lab File ID: V1030921.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	950	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21RA

Sample wt/vol: 32.5 (g/mL) G Lab File ID: V1030921.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	380	U
59-50-7	4-Chloro-3-methylphenol	380	U
91-57-6	2-Methylnaphthalene	380	U
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U
98-95-3	Nitrobenzene	380	U
100-75-4	n-Nitrosopiperidine	380	U
78-59-1	Isophorone	380	U
126-68-1	o,o,o-Triethylphosphorothioate	380	U
924-16-3	n-Nitrosodibutylamine	380	U
120-58-1	Isosafrole	380	U
122-09-8	a,a-Dimethylphenethylamine	950	U
65-85-0	Benzoic acid	950	U
106-50-3	p-Phenylenediamine	950	U
77-47-4	Hexachlorocyclopentadiene	380	U
88-06-2	2,4,6-Trichlorophenol	380	U
95-95-4	2,4,5-Trichlorophenol	950	U
91-58-7	2-Chloronaphthalene	380	U
88-74-4	2-Nitroaniline	950	U
131-11-3	Dimethylphthalate	380	U
208-96-8	Acenaphthylene	380	U
99-09-2	3-Nitroaniline	950	U
83-32-9	Acenaphthene	380	U
51-28-5	2,4-Dinitrophenol	950	U
100-02-7	4-Nitrophenol	950	U
132-64-9	Dibenzofuran	380	U
1888-71-7	Hexachloropropene	950	U
608-93-5	Pentachlorobenzene	380	U
58-90-2	2,3,4,6-Tetrachlorophenol	380	U
84-66-2	Diethylphthalate	380	U
7005-72-3	4-Chlorophenyl-phenylether	380	U
86-73-7	Fluorene	380	U
100-01-6	4-Nitroaniline	950	U
94-59-7	Safrole	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21RA

Sample wt/vol: 32.5 (g/mL) G Lab File ID: V1030921.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	380	U
99-65-0	1,3-Dinitrobenzene	380	U
606-20-2	2,6-Dinitrotoluene	380	U
134-32-7	1-Naphthylamine	380	U
121-14-2	2,4-Dinitrotoluene	380	U
91-59-8	2-Naphthylamine	380	U
99-55-8	2-Methyl-5-nitroaniline	380	U
297-97-2	Thionazin	380	U
122-39-4	Diphenylamine	380	U
534-52-1	4,6-Dinitro-2-methylphenol	950	U
101-55-3	4-Bromophenyl-phenylether	380	U
118-74-1	Hexachlorobenzene	380	U
85-01-8	Phenanthrene	380	U
120-12-7	Anthracene	380	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U
84-74-2	Di-n-butylphthalate	380	U
206-44-0	Fluoranthene	380	U
87-86-5	Pentachlorophenol	950	U
86-30-6	N-Nitrosodiphenylamine	380	U
298-02-2	Phorate	380	U
62-44-2	Phenacetin	380	U
2303-16-4	Diallate	380	U
60-51-5	Dimethoate	380	U
92-67-1	4-Aminobiphenyl	380	U
82-68-8	Pentachloronitrobenzene	950	U
23950-58-5	Pronamide	380	U
298-04-4	Disulfoton	380	U
298-00-0	Methyl parathion	380	U
56-38-2	Parathion	380	U
91-80-5	Methapyrilene	950	U
465-73-6	Isodrin	380	U
3689-24-5	Sulfotep	380	U
56-57-5	4-Nitroquinoline-1-oxide	950	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21RA

Sample wt/vol: 32.5 (g/mL) G Lab File ID: V1030921.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/09/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	380	U	R
129-00-0	Pyrene	380	U	
85-68-7	Butylbenzylphthalate	380	U	
56-55-3	Benzo(a)anthracene	380	U	
218-01-9	Chrysene	380	U	
117-81-7	bis(2-Ethylhexyl)phthalate	380	U	
140-57-8	Aramite	950	U	
60-11-7	Methyl Yellow	380	U	R
510-15-6	Chlorobenzilate	380	U	R
119-93-7	3,3'-Dimethylbenzidine	380	U	R
53-96-3	2-Acetylaminofluorene	380	U	
91-94-1	3,3'-Dichlorobenzidine	380	U	
143-50-0	Kepone	950	U	
52-85-7	Famphur	380	U	
117-84-0	Di-n-octylphthalate	380	U	
205-99-2	Benzo(b)fluoranthene	380	U	
207-08-9	Benzo(k)fluoranthene	380	U	
50-32-8	Benzo(a)pyrene	380	U	
193-39-5	Indeno(1,2,3-cd)pyrene	380	U	
53-70-3	Dibenz(a,h)anthracene	380	U	
191-24-2	Benzo(g,h,i)perylene	380	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U	
56-49-5	3-Methylchloranthrene	380	U	
70-30-4	Hexachlorophene	15000	U	
92-52-4	1,1'-Biphenyl	380	U	R

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21

Sample wt/vol: 32.5 (g/mL) G Lab File ID: T1030828.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	380	U
108-95-2	Phenol	380	U
111-44-4	bis(2-Chloroethyl)ether	380	U
95-57-8	2-Chlorophenol	380	U
541-73-1	1,3-Dichlorobenzene	380	U
106-46-7	1,4-Dichlorobenzene	380	U
100-51-6	Benzyl alcohol	380	U
95-50-1	1,2-Dichlorobenzene	380	U
108-60-1	bis(2-Chloroisopropyl)ether	380	U
95-48-7	2-Methylphenol	380	U
67-72-1	Hexachloroethane	380	U
110-86-1	Pyridine	380	U
62-75-9	N-Nitrosodimethylamine	380	U
109-06-8	2-Picoline	380	U
10595-95-6	n-Nitrosomethylethylamine	380	U
66-27-3	Methyl methanesulfonate	950	U
55-18-5	n-Nitrosodiethylamine	380	U
62-50-0	Ethyl methanesulfonate	380	U
98-86-2	Acetophenone	380	U
930-55-2	n-Nitrosopyrrolidine	380	U
59-89-2	n-Nitrosomorpholine	380	U
621-64-7	N-Nitroso-di-n-propylamine	380	U
95-53-4	o-Toluidine	380	U
108-39-4	3-Methylphenol	380	U
106-44-5	4-Methylphenol	380	U
88-75-5	2-Nitrophenol	380	U
105-67-9	2,4-Dimethylphenol	380	U
111-91-1	bis(2-Chloroethoxy)methane	380	U
120-83-2	2,4-Dichlorophenol	380	U
120-82-1	1,2,4-Trichlorobenzene	380	U
91-20-3	Naphthalene	380	U
87-65-0	2,6-Dichlorophenol	380	U
106-47-8	4-Chloroaniline	380	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21

Sample wt/vol: 32.5 (g/mL) G Lab File ID: T1030828.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
87-68-3	Hexachlorobutadiene	380	U	L
59-50-7	4-Chloro-3-methylphenol	380	U	
91-57-6	2-Methylnaphthalene	380	U	L
95-94-3	1,2,4,5-Tetrachlorobenzene	380	U	L
98-95-3	Nitrobenzene	380	U	L
100-75-4	n-Nitrosopiperidine	380	U	L
78-59-1	Isophorone	380	U	
126-68-1	o,o,o-Triethylphosphorothioate	380	U	
924-16-3	n-Nitrosodibutylamine	380	U	L
120-58-1	Isosafrole	380	U	L
122-09-8	a,a-Dimethylphenethylamine	950	U	L
65-85-0	Benzoic acid	950	U	
106-50-3	p-Phenylenediamine	950	U	L
77-47-4	Hexachlorocyclopentadiene	380	U	L
88-06-2	2,4,6-Trichlorophenol	380	U	
95-95-4	2,4,5-Trichlorophenol	950	U	
91-58-7	2-Chloronaphthalene	380	U	L
88-74-4	2-Nitroaniline	950	U	L
131-11-3	Dimethylphthalate	380	U	
208-96-8	Acenaphthylene	380	U	L
99-09-2	3-Nitroaniline	950	U	L
83-32-9	Acenaphthene	380	U	L
51-28-5	2,4-Dinitrophenol	950	U	
100-02-7	4-Nitrophenol	950	U	
132-64-9	Dibenzofuran	380	U	L
1888-71-7	Hexachloropropene	950	U	L
608-93-5	Pentachlorobenzene	380	U	L
58-90-2	2,3,4,6-Tetrachlorophenol	380	U	
84-66-2	Diethylphthalate	380	U	
7005-72-3	4-Chlorophenyl-phenylether	380	U	
86-73-7	Fluorene	380	U	L
100-01-6	4-Nitroaniline	950	U	L
94-59-7	Safrole	380	U	L

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21

Sample wt/vol: 32.5 (g/mL) G Lab File ID: T1030828.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
130-15-4	1,4-Naphthoquinone	380	U	L
99-65-0	1,3-Dinitrobenzene	380	U	L
606-20-2	2,6-Dinitrotoluene	380	U	
134-32-7	1-Naphthylamine	380	U	L
121-14-2	2,4-Dinitrotoluene	380	U	
91-59-8	2-Naphthylamine	380	U	L
99-55-8	2-Methyl-5-nitroaniline	380	U	L
297-97-2	Thionazin	380	U	L
122-39-4	Diphenylamine	380	U	L
534-52-1	4,6-Dinitro-2-methylphenol	950	U	
101-55-3	4-Bromophenyl-phenylether	380	U	
118-74-1	Hexachlorobenzene	380	U	L
85-01-8	Phenanthrene	380	U	L
120-12-7	Anthracene	380	U	L
88-85-7	2-sec-butyl-4,6-Dinitrophenol	380	U	
84-74-2	Di-n-butylphthalate	380	U	
206-44-0	Fluoranthene	380	U	L
87-86-5	Pentachlorophenol	950	U	
86-30-6	N-Nitrosodiphenylamine	380	U	L
298-02-2	Phorate	380	U	
62-44-2	Phenacetin	380	U	L
2303-16-4	Diallate	380	U	
60-51-5	Dimethoate	380	U	
92-67-1	4-Aminobiphenyl	380	U	
82-68-8	Pentachloronitrobenzene	950	U	L
23950-58-5	Pronamide	380	U	L
298-04-4	Disulfoton	380	U	L
298-00-0	Methyl parathion	380	U	
56-38-2	Parathion	380	U	
91-80-5	Methapyrilene	950	U	L
465-73-6	Isodrin	380	U	L
3689-24-5	Sulfotep	380	U	L
56-57-5	4-Nitroquinoline-1-oxide	950	U	L

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX18-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.21

Sample wt/vol: 32.5 (g/mL) G Lab File ID: T1030828.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/08/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-35-4	1,3,5-Trinitrobenzene	380	U
129-00-0	Pyrene	380	U
85-68-7	Butylbenzylphthalate	380	U
56-55-3	Benzo(a)anthracene	380	U
218-01-9	Chrysene	380	U
117-81-7	bis(2-Ethylhexyl)phthalate	380	U
140-57-8	Aramite	950	U
60-11-7	Methyl Yellow	380	U
510-15-6	Chlorobenzilate	380	U
119-93-7	3,3'-Dimethylbenzidine	380	U
53-96-3	2-Acetylaminofluorene	380	U
91-94-1	3,3'-Dichlorobenzidine	380	U
143-50-0	Kepone	950	U
52-85-7	Famphur	380	U
117-84-0	Di-n-octylphthalate	380	U
205-99-2	Benzo(b)fluoranthene	380	U
207-08-9	Benzo(k)fluoranthene	380	U
50-32-8	Benzo(a)pyrene	380	U
193-39-5	Indeno(1,2,3-cd)pyrene	380	U
53-70-3	Dibenz(a,h)anthracene	380	U
191-24-2	Benzo(g,h,i)perylene	380	U
57-97-6	7,12-Dimethylbenz(a)anthracene	380	U
56-49-5	3-Methylchloranthrene	380	U
70-30-4	Hexachlorophene	15000	U
92-52-4	1,1'-Biphenyl	380	U

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11

Sample wt/vol: 31.1 (g/mL) G Lab File ID: V1031222.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	400	U
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
100-51-6	Benzyl alcohol	400	U
95-50-1	1,2-Dichlorobenzene	400	U
108-60-1	bis(2-Chloroisopropyl)ether	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
110-86-1	Pyridine	400	U
62-75-9	N-Nitrosodimethylamine	400	U
109-06-8	2-Picoline	400	U
10595-95-6	n-Nitrosomethylethylamine	400	U
66-27-3	Methyl methanesulfonate	990	U
55-18-5	n-Nitrosodiethylamine	400	U
62-50-0	Ethyl methanesulfonate	400	U
98-86-2	Acetophenone	400	U
930-55-2	n-Nitrosopyrrolidine	400	U
59-89-2	n-Nitrosomorpholine	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
95-53-4	o-Toluidine	400	U
108-39-4	3-Methylphenol	400	U
106-44-5	4-Methylphenol	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	400	U
87-65-0	2,6-Dichlorophenol	400	U
106-47-8	4-Chloroaniline	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11

Sample wt/vol: 31.1 (g/mL) G Lab File ID: V1031222.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
87-68-3	Hexachlorobutadiene	400	U	
59-50-7	4-Chloro-3-methylphenol	400	U	
91-57-6	2-Methylnaphthalene	400	U	
95-94-3	1,2,4,5-Tetrachlorobenzene	400	U	
98-95-3	Nitrobenzene	400	U	
100-75-4	n-Nitrosopiperidine	400	U	
78-59-1	Isophorone	400	U	
126-68-1	o,o,o-Triethylphosphorothioate	400	U	
924-16-3	n-Nitrosodibutylamine	400	U	
120-58-1	Isosafrole	400	U	
122-09-8	a,a-Dimethylphenethylamine	990	U	
65-85-0	Benzoic acid	990	U	
106-50-3	p-Phenylenediamine	990	U	
77-47-4	Hexachlorocyclopentadiene	400	U	J
88-06-2	2,4,6-Trichlorophenol	400	U	
95-95-4	2,4,5-Trichlorophenol	990	U	
91-58-7	2-Chloronaphthalene	400	U	
88-74-4	2-Nitroaniline	990	U	
131-11-3	Dimethylphthalate	400	U	
208-96-8	Acenaphthylene	400	U	
99-09-2	3-Nitroaniline	990	U	
83-32-9	Acenaphthene	400	U	
51-28-5	2,4-Dinitrophenol	990	U	
100-02-7	4-Nitrophenol	990	U	
132-64-9	Dibenzofuran	400	U	
1888-71-7	Hexachloropropene	990	U	
608-93-5	Pentachlorobenzene	400	U	J
58-90-2	2,3,4,6-Tetrachlorophenol	400	U	
84-66-2	Diethylphthalate	400	U	
7005-72-3	4-Chlorophenyl-phenylether	400	U	
86-73-7	Fluorene	400	U	
100-01-6	4-Nitroaniline	990	U	
94-59-7	Safrole	400	U	J

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11

Sample wt/vol: 31.1 (g/mL) G Lab File ID: V1031222.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
130-15-4	1,4-Naphthoquinone	400	U	J
99-65-0	1,3-Dinitrobenzene	400	U	
606-20-2	2,6-Dinitrotoluene	400	U	
134-32-7	1-Naphthylamine	400	U	
121-14-2	2,4-Dinitrotoluene	400	U	
91-59-8	2-Naphthylamine	400	U	
99-55-8	2-Methyl-5-nitroaniline	400	U	
297-97-2	Thionazin	400	U	
122-39-4	Diphenylamine	400	U	
534-52-1	4,6-Dinitro-2-methylphenol	990	U	
101-55-3	4-Bromophenyl-phenylether	400	U	
118-74-1	Hexachlorobenzene	400	U	
85-01-8	Phenanthrene	120	J	J
120-12-7	Anthracene	400	U	
88-85-7	2-sec-butyl-4,6-Dinitrophenol	400	U	
84-74-2	Di-n-butylphthalate	400	U	
206-44-0	Fluoranthene	400	U	
87-86-5	Pentachlorophenol	990	U	
86-30-6	N-Nitrosodiphenylamine	400	U	
298-02-2	Phorate	400	U	
62-44-2	Phenacetin	400	U	
2303-16-4	Diallate	400	U	
60-51-5	Dimethoate	400	U	
92-67-1	4-Aminobiphenyl	400	U	
82-68-8	Pentachloronitrobenzene	990	U	
23950-58-5	Pronamide	400	U	
298-04-4	Disulfoton	400	U	
298-00-0	Methyl parathion	400	U	
56-38-2	Parathion	400	U	
91-80-5	Methapyrilene	990	U	
465-73-6	Isodrin	400	U	
3689-24-5	Sulfotep	400	U	J
56-57-5	4-Nitroquinoline-1-oxide	990	U	R

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11

Sample wt/vol: 31.1 (g/mL) G Lab File ID: V1031222.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	400	U	J
129-00-0	Pyrene	400	U	J
85-68-7	Butylbenzylphthalate	400	U	J
56-55-3	Benzo(a)anthracene	49	J	J
218-01-9	Chrysene	78	J	J
117-81-7	bis(2-Ethylhexyl)phthalate	1100		J
140-57-8	Aramite	990	U	J
60-11-7	Methyl Yellow	400	U	J
510-15-6	Chlorobenzilate	400	U	R
119-93-7	3,3'-Dimethylbenzidine	400	U	J
53-96-3	2-Acetylaminofluorene	400	U	
91-94-1	3,3'-Dichlorobenzidine	400	U	
143-50-0	Kepone	990	U	
52-85-7	Famphur	400	U	
117-84-0	Di-n-octylphthalate	400	U	
205-99-2	Benzo(b)fluoranthene	400	U	
207-08-9	Benzo(k)fluoranthene	400	U	
50-32-8	Benzo(a)pyrene	40	U	
193-39-5	Indeno(1,2,3-cd)pyrene	400	U	
53-70-3	Dibenz(a,h)anthracene	400	U	
191-24-2	Benzo(g,h,i)perylene	400	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	400	U	
56-49-5	3-Methylchloranthrene	400	U	
70-30-4	Hexachlorophene	16000	U	J
92-52-4	1,1'-Biphenyl	20	J	

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11RA

Sample wt/vol: 31.1 (g/mL) G Lab File ID: V1031226.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	400	U
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
100-51-6	Benzyl alcohol	400	U
95-50-1	1,2-Dichlorobenzene	400	U
108-60-1	bis(2-Chloroisopropyl)ether	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
110-86-1	Pyridine	400	U
62-75-9	N-Nitrosodimethylamine	400	U
109-06-8	2-Picoline	400	U
10595-95-6	n-Nitrosomethylethylamine	400	U
66-27-3	Methyl methanesulfonate	990	U
55-18-5	n-Nitrosodiethylamine	400	U
62-50-0	Ethyl methanesulfonate	400	U
98-86-2	Acetophenone	400	U
930-55-2	n-Nitrosopyrrolidine	400	U
59-89-2	n-Nitrosomorpholine	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
95-53-4	o-Toluidine	400	U
108-39-4	3-Methylphenol	400	U R
106-44-5	4-Methylphenol	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	400	U
87-65-0	2,6-Dichlorophenol	400	U
106-47-8	4-Chloroaniline	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11RA

Sample wt/vol: 31.1 (g/mL) G Lab File ID: V1031226.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-methylphenol	400	U
91-57-6	2-Methylnaphthalene	400	U
95-94-3	1,2,4,5-Tetrachlorobenzene	400	U
98-95-3	Nitrobenzene	400	U
100-75-4	n-Nitrosopiperidine	400	U
78-59-1	Isophorone	400	U
126-68-1	o,o,o-Triethylphosphorothioate	400	U
924-16-3	n-Nitrosodibutylamine	400	U
120-58-1	Isosafrole	400	U
122-09-8	a,a-Dimethylphenethylamine	990	U
65-85-0	Benzoic acid	990	U
106-50-3	p-Phenylenediamine	990	U
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	990	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	990	U
131-11-3	Dimethylphthalate	400	U
208-96-8	Acenaphthylene	400	U
99-09-2	3-Nitroaniline	990	U
83-32-9	Acenaphthene	400	U
51-28-5	2,4-Dinitrophenol	990	U
100-02-7	4-Nitrophenol	990	U
132-64-9	Dibenzofuran	400	U
1888-71-7	Hexachloropropene	990	U
608-93-5	Pentachlorobenzene	400	U
58-90-2	2,3,4,6-Tetrachlorophenol	400	U
84-66-2	Diethylphthalate	400	U
7005-72-3	4-Chlorophenyl-phenylether	400	U
86-73-7	Fluorene	400	U
100-01-6	4-Nitroaniline	990	U
94-59-7	Safrole	400	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11RA

Sample wt/vol: 31.1 (g/mL) G Lab File ID: V1031226.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	400	U
99-65-0	1,3-Dinitrobenzene	400	U
606-20-2	2,6-Dinitrotoluene	400	U
134-32-7	1-Naphthylamine	400	U
121-14-2	2,4-Dinitrotoluene	400	U
91-59-8	2-Naphthylamine	400	U
99-55-8	2-Methyl-5-nitroaniline	400	U
297-97-2	Thionazin	400	U
122-39-4	Diphenylamine	400	U
534-52-1	4,6-Dinitro-2-methylphenol	990	U
101-55-3	4-Bromophenyl-phenylether	400	U
118-74-1	Hexachlorobenzene	400	U
85-01-8	Phenanthrene	120	J
120-12-7	Anthracene	400	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	400	U
84-74-2	Di-n-butylphthalate	400	U
206-44-0	Fluoranthene	400	U
87-86-5	Pentachlorophenol	990	U
86-30-6	N-Nitrosodiphenylamine	400	U
298-02-2	Phorate	400	U
62-44-2	Phenacetin	400	U
2303-16-4	Diallate	400	U
60-51-5	Dimethoate	400	U
92-67-1	4-Aminobiphenyl	400	U
82-68-8	Pentachloronitrobenzene	990	U
23950-58-5	Pronamide	400	U
298-04-4	Disulfoton	400	U
298-00-0	Methyl parathion	400	U
56-38-2	Parathion	400	U
91-80-5	Methapyrilene	990	U
465-73-6	Isodrin	400	U
3689-24-5	Sulfotep	400	U
56-57-5	4-Nitroquinoline-1-oxide	990	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX19-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.11RA

Sample wt/vol: 31.1 (g/mL) G Lab File ID: V1031226.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 19 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 8.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	400	U	R
129-00-0	Pyrene	400	U	
85-68-7	Butylbenzylphthalate	400	U	
56-55-3	Benzo(a)anthracene	56	J	
218-01-9	Chrysene	80	J	
117-81-7	bis(2-Ethylhexyl)phthalate	1200		
140-57-8	Aramite	990	U	
60-11-7	Methyl Yellow	400	U	
510-15-6	Chlorobenzilate	400	U	R
119-93-7	3,3'-Dimethylbenzidine	400	U	
53-96-3	2-Acetylaminofluorene	400	U	
91-94-1	3,3'-Dichlorobenzidine	400	U	
143-50-0	Kepone	990	U	
52-85-7	Famphur	400	U	
117-84-0	Di-n-octylphthalate	400	U	
205-99-2	Benzo(b)fluoranthene	400	U	
207-08-9	Benzo(k)fluoranthene	400	U	
50-32-8	Benzo(a)pyrene	42	J	
193-39-5	Indeno(1,2,3-cd)pyrene	400	U	
53-70-3	Dibenz(a,h)anthracene	400	U	
191-24-2	Benzo(g,h,i)perylene	400	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	400	U	
56-49-5	3-Methylchloranthrene	400	U	
70-30-4	Hexachlorophene	16000	U	
92-52-4	1,1'-Biphenyl	400	U	R

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031219.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	400	U
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
100-51-6	Benzyl alcohol	400	U
95-50-1	1,2-Dichlorobenzene	400	U
108-60-1	bis(2-Chloroisopropyl)ether	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
110-86-1	Pyridine	400	U
62-75-9	N-Nitrosodimethylamine	400	U
109-06-8	2-Picoline	400	U
10595-95-6	n-Nitrosomethylethylamine	400	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	400	U
62-50-0	Ethyl methanesulfonate	400	U
98-86-2	Acetophenone	400	U
930-55-2	n-Nitrosopyrrolidine	400	U
59-89-2	n-Nitrosomorpholine	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
95-53-4	o-Toluidine	400	U
108-39-4	3-Methylphenol	400	U
106-44-5	4-Methylphenol	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	400	U
87-65-0	2,6-Dichlorophenol	400	U
106-47-8	4-Chloroaniline	400	U

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031219.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-methylphenol	400	U
91-57-6	2-Methylnaphthalene	400	U
95-94-3	1,2,4,5-Tetrachlorobenzene	400	U
98-95-3	Nitrobenzene	400	U
100-75-4	n-Nitrosopiperidine	400	U
78-59-1	Isophorone	400	U
126-68-1	o,o,o-Triethylphosphorothioate	400	U
924-16-3	n-Nitrosodibutylamine	400	U
120-58-1	Isosafrole	400	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	1000	U
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	400	U
208-96-8	Acenaphthylene	400	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	400	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	400	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	400	U
58-90-2	2,3,4,6-Tetrachlorophenol	400	U
84-66-2	Diethylphthalate	400	U
7005-72-3	4-Chlorophenyl-phenylether	400	U
86-73-7	Fluorene	400	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031219.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
130-15-4	1,4-Naphthoquinone	400	U
99-65-0	1,3-Dinitrobenzene	400	U
606-20-2	2,6-Dinitrotoluene	400	U
134-32-7	1-Naphthylamine	400	U
121-14-2	2,4-Dinitrotoluene	400	U
91-59-8	2-Naphthylamine	400	U
99-55-8	2-Methyl-5-nitroaniline	400	U
297-97-2	Thionazin	400	U
122-39-4	Diphenylamine	400	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
101-55-3	4-Bromophenyl-phenylether	400	U
118-74-1	Hexachlorobenzene	400	U
85-01-8	Phenanthrene	49 ✓	J
120-12-7	Anthracene	400	U
88-85-7	2-sec-butyl-4,6-Dinitrophenol	400	U
84-74-2	Di-n-butylphthalate	400	U
206-44-0	Fluoranthene	400	U
87-86-5	Pentachlorophenol	1000	U
86-30-6	N-Nitrosodiphenylamine	400	U
298-02-2	Phorate	400	U
62-44-2	Phenacetin	400	U
2303-16-4	Diallate	400	U
60-51-5	Dimethoate	400	U
92-67-1	4-Aminobiphenyl	400	U
82-68-8	Pentachloronitrobenzene	1000	U
23950-58-5	Pronamide	400	U
298-04-4	Disulfoton	400	U
298-00-0	Methyl parathion	400	U
56-38-2	Parathion	400	U
91-80-5	Methapyrilene	1000	U
465-73-6	Isodrin	400	U
3689-24-5	Sulfotep	400	U
56-57-5	4-Nitroquinoline-1-oxide	1000	~~U~~ R

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031219.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	400	U	
129-00-0	Pyrene	400	U	J
85-68-7	Butylbenzylphthalate	400	U	
56-55-3	Benzo(a)anthracene	400	U	
218-01-9	Chrysene	40	J	
117-81-7	bis(2-Ethylhexyl)phthalate	400	U	
140-57-8	Aramite	1000	U	
60-11-7	Methyl Yellow	400	U	J
510-15-6	Chlorobenzilate	400	U	R
119-93-7	3,3'-Dimethylbenzidine	400	U	J
53-96-3	2-Acetylaminofluorene	400	U	
91-94-1	3,3'-Dichlorobenzidine	400	U	
143-50-0	Kepone	1000	U	
52-85-7	Famphur	400	U	
117-84-0	Di-n-octylphthalate	400	U	J
205-99-2	Benzo(b)fluoranthene	400	U	
207-08-9	Benzo(k)fluoranthene	400	U	
50-32-8	Benzo(a)pyrene	23	J	
193-39-5	Indeno(1,2,3-cd)pyrene	400	U	
53-70-3	Dibenz(a,h)anthracene	400	U	
191-24-2	Benzo(g,h,i)perylene	400	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	400	U	
56-49-5	3-Methylchloranthrene	400	U	
70-30-4	Hexachlorophene	16000	U	J
92-52-4	1,1'-Biphenyl	400	U	

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08RA

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031223.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
62-53-5	Aniline	400	U
108-95-2	Phenol	400	U
111-44-4	bis(2-Chloroethyl)ether	400	U
95-57-8	2-Chlorophenol	400	U
541-73-1	1,3-Dichlorobenzene	400	U
106-46-7	1,4-Dichlorobenzene	400	U
100-51-6	Benzyl alcohol	400	U
95-50-1	1,2-Dichlorobenzene	400	U
108-60-1	bis(2-Chloroisopropyl)ether	400	U
95-48-7	2-Methylphenol	400	U
67-72-1	Hexachloroethane	400	U
110-86-1	Pyridine	400	U
62-75-9	N-Nitrosodimethylamine	400	U
109-06-8	2-Picoline	400	U
10595-95-6	n-Nitrosomethylethylamine	400	U
66-27-3	Methyl methanesulfonate	1000	U
55-18-5	n-Nitrosodiethylamine	400	U
62-50-0	Ethyl methanesulfonate	400	U
98-86-2	Acetophenone	400	U
930-55-2	n-Nitrosopyrrolidine	400	U
59-89-2	n-Nitrosomorpholine	400	U
621-64-7	N-Nitroso-di-n-propylamine	400	U
95-53-4	o-Toluidine	400	U
108-39-4	3-Methylphenol	400	U
106-44-5	4-Methylphenol	400	U
88-75-5	2-Nitrophenol	400	U
105-67-9	2,4-Dimethylphenol	400	U
111-91-1	bis(2-Chloroethoxy)methane	400	U
120-83-2	2,4-Dichlorophenol	400	U
120-82-1	1,2,4-Trichlorobenzene	400	U
91-20-3	Naphthalene	400	U
87-65-0	2,6-Dichlorophenol	400	U
106-47-8	4-Chloroaniline	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08RA

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031223.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
87-68-3	Hexachlorobutadiene	400	U
59-50-7	4-Chloro-3-methylphenol	400	U
91-57-6	2-Methylnaphthalene	400	U
95-94-3	1,2,4,5-Tetrachlorobenzene	400	U
98-95-3	Nitrobenzene	400	U
100-75-4	n-Nitrosopiperidine	400	U
78-59-1	Isophorone	400	U
126-68-1	o,o,o-Triethylphosphorothioate	400	U
924-16-3	n-Nitrosodibutylamine	400	U
120-58-1	Isosafrole	400	U
122-09-8	a,a-Dimethylphenethylamine	1000	U
65-85-0	Benzoic acid	1000	U
106-50-3	p-Phenylenediamine	1000	U
77-47-4	Hexachlorocyclopentadiene	400	U
88-06-2	2,4,6-Trichlorophenol	400	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	400	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	400	U
208-96-8	Acenaphthylene	400	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	400	U
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	400	U
1888-71-7	Hexachloropropene	1000	U
608-93-5	Pentachlorobenzene	400	U
58-90-2	2,3,4,6-Tetrachlorophenol	400	U
84-66-2	Diethylphthalate	400	U
7005-72-3	4-Chlorophenyl-phenylether	400	U
86-73-7	Fluorene	400	U
100-01-6	4-Nitroaniline	1000	U
94-59-7	Safrole	400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08RA

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031223.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
130-15-4	1,4-Naphthoquinone	400	U	R
99-65-0	1,3-Dinitrobenzene	400	U	
606-20-2	2,6-Dinitrotoluene	400	U	
134-32-7	1-Naphthylamine	400	U	
121-14-2	2,4-Dinitrotoluene	400	U	
91-59-8	2-Naphthylamine	400	U	
99-55-8	2-Methyl-5-nitroaniline	400	U	
297-97-2	Thionazin	400	U	
122-39-4	Diphenylamine	400	U	
534-52-1	4,6-Dinitro-2-methylphenol	1000	U	
101-55-3	4-Bromophenyl-phenylether	400	U	
118-74-1	Hexachlorobenzene	400	U	
85-01-8	Phenanthrene	53	J	
120-12-7	Anthracene	400	U	
88-85-7	2-sec-butyl-4,6-Dinitrophenol	400	U	
84-74-2	Di-n-butylphthalate	400	U	
206-44-0	Fluoranthene	400	U	
87-86-5	Pentachlorophenol	1000	U	
86-30-6	N-Nitrosodiphenylamine	400	U	
298-02-2	Phorate	400	U	
62-44-2	Phenacetin	400	U	
2303-16-4	Diallate	400	U	
60-51-5	Dimethoate	400	U	
92-67-1	4-Aminobiphenyl	400	U	
82-68-8	Pentachloronitrobenzene	1000	U	
23950-58-5	Pronamide	400	U	
298-04-4	Disulfoton	400	U	
298-00-0	Methyl parathion	400	U	
56-38-2	Parathion	400	U	
91-80-5	Methapyrilene	1000	U	
465-73-6	Isodrin	400	U	
3689-24-5	Sulfotep	400	U	
56-57-5	4-Nitroquinoline-1-oxide	1000	U	R

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.

ASX20-SS0001-R01RE

Lab Name: SWL-TULSA Contract: CTO-175

Lab Code: SWOK Case No.: CH2M-VA SAS No.: SDG No.: 45903

Matrix: (soil/water) SOIL Lab Sample ID: 45903.08RA

Sample wt/vol: 31.3 (g/mL) G Lab File ID: V1031223.D

Level: (low/med) LOW Date Received: 02/26/01

% Moisture: 20 decanted: (Y/N) N Date Extracted: 02/27/01

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 03/12/01

Injection Volume: 2 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: 7.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
99-35-4	1,3,5-Trinitrobenzene	400	U	R
129-00-0	Pyrene	400	U	
85-68-7	Butylbenzylphthalate	400	U	
56-55-3	Benzo(a)anthracene	400	U	
218-01-9	Chrysene	39	J	
117-81-7	bis(2-Ethylhexyl)phthalate	400	U	
140-57-8	Aramite	1000	U	
60-11-7	Methyl Yellow	400	U	
510-15-6	Chlorobenzilate	400	UJ	R
119-93-7	3,3'-Dimethylbenzidine	400	U	
53-96-3	2-Acetylaminofluorene	400	U	
91-94-1	3,3'-Dichlorobenzidine	400	U	
143-50-0	Kepone	1000	U	
52-85-7	Famphur	400	U	
117-84-0	Di-n-octylphthalate	400	U	
205-99-2	Benzo(b)fluoranthene	400	U	
207-08-9	Benzo(k)fluoranthene	400	U	
50-32-8	Benzo(a)pyrene	400	U	
193-39-5	Indeno(1,2,3-cd)pyrene	400	U	
53-70-3	Dibenz(a,h)anthracene	400	U	
191-24-2	Benzo(g,h,i)perylene	400	U	
57-97-6	7,12-Dimethylbenz(a)anthracene	400	U	
56-49-5	3-Methylchloranthrene	400	U	
70-30-4	Hexachlorophene	16000	U	
92-52-4	1,1'-Biphenyl	20	J	R

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID. ASX01-SS0001-E101

Lab Name: Southwest Lab. of Oklahoma
Episode No.: 45903

Client Name: CH2M-VA
Lab Sample ID: 45903.01

Matrix (aqueous/solid/leachate): solid
Sample Wt/Vol: 15.20 g or mL: g

Sample Receipt Date: 02-26-01
Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01
Instrument ID: HP72E GC

Analysis Date: 14-MAR-01 Time: 16:58:00
GC Column:db5

Ext. Vol(ul): 100
Sample Data Filename: E004790#1

Inj. Vol(ul): 2.0
Blank Data Filename: E004789#1

Dilution Factor: 1
Cal. Ver. Data Filename: E004786#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg
% Moisture: 23.98

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.008	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.074	U	*	*	1.16
1,2,3,4,7,8-HxCDD	*	0.132	U	*	*	0.69
1,2,3,6,7,8-HxCDD	*	0.116	U	*	*	0.79
1,2,3,7,8,9-HxCDD	*	0.111	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	0.054	0.012	~~X~~ J	2.13	1.083	0.73 Q1
OCDD	0.722	0.178		0.84	1.000	0.70
2,3,7,8-TCDF	*	0.007	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.082	U	*	*	1.23
2,3,4,7,8-PeCDF	*	0.071	U	*	*	1.42
1,2,3,4,7,8-HxCDF	*	0.023	U	*	*	1.03
1,2,3,6,7,8-HxCDF	*	0.020	U	*	*	1.21
1,2,3,7,8,9-HxCDF	*	0.023	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.023	U	*	*	1.03
1,2,3,4,6,7,8-HpCDF	*	0.046	U	*	*	1.47
1,2,3,4,7,8,9-HpCDF	*	0.056	U	*	*	1.23
OCDF	*	0.073	U	*	*	1.18
Total Tetra-Dioxins	*	0.008	U			
Total Penta-Dioxins	*	0.074	U			
Total Hexa-Dioxins	*	0.116	U			
Total Hepta-Dioxins	*	0.012	U			
Total Tetra-Furans	*	0.007	U			
Total Penta-Furans	*	0.071	U			
Total Hexa-Furans	*	0.020	U			
Total Hepta-Furans	*	0.046	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID. ASX02-SS0001-FR01 3-30-01

Lab Name: Southwest Lab. of Oklahoma
Episode No.: 45903

Client Name: CH2M-VA
Lab Sample ID: 45903.02

Matrix (aqueous/solid/leachate): solid
Sample Wt/Vol: 15.31 g or mL: g

Sample Receipt Date: 02-26-01
Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01
Instrument ID: HP72E GC

Analysis Date: 14-MAR-01 Time: 17:47:00
GC Column:db5

Ext. Vol(ul): 100
Sample Data Filename: E004791#1

Inj. Vol(ul): 2.0
Blank Data Filename: E004789#1

Dilution Factor: 1
Cal. Ver. Data Filename: E004786#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 11.61

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.010	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.088	U	*	*	1.16
1,2,3,4,7,8-HxCDD	*	0.168	U	*	*	0.69
1,2,3,6,7,8-HxCDD	*	0.147	U	*	*	0.79
1,2,3,7,8,9-HxCDD	*	0.146	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	0.056	0.026	~~X~~ J	2.00	1.083	0.73 Q1
OCDD	0.411	0.266		0.81	1.000	0.70
2,3,7,8-TCDF	*	0.008	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.102	U	*	*	1.23
2,3,4,7,8-PeCDF	*	0.088	U	*	*	1.42
1,2,3,4,7,8-HxCDF	*	0.028	U	*	*	1.03
1,2,3,6,7,8-HxCDF	*	0.024	U	*	*	1.21
1,2,3,7,8,9-HxCDF	*	0.028	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.028	U	*	*	1.03
1,2,3,4,6,7,8-HpCDF	0.039	0.015		1.02	1.000	1.47
1,2,3,4,7,8,9-HpCDF	*	0.018	U	*	*	1.23
OCDF	0.080	0.056		0.95	1.003	1.18
Total Tetra-Dioxins	*	0.010	U			
Total Penta-Dioxins	*	0.088	U			
Total Hexa-Dioxins	*	0.147	U			
Total Hepta-Dioxins	*	0.026	U			
Total Tetra-Furans	*	0.008	U			
Total Penta-Furans	*	0.088	U			
Total Hexa-Furans	*	0.024	U			
Total Hepta-Furans	*	0.015	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/19/01

Form 1

CLIENT ID.

ASX03-SS0001-~~E~~A01

3-20-01

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

Lab Name: Southwest Lab. of Oklahoma

Episode No.: 45903

Client Name: CH2M-VA

Lab Sample ID: 45903.03

Matrix (aqueous/solid/leachate): solid

Sample Wt/Vol: 15.30 g or mL: g

Sample Receipt Date: 02-26-01

Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01

Instrument ID: HP72E GC

Analysis Date: 14-MAR-01 Time: 18:37:00

GC Column:db5

Ext. Vol(ul): 100

Sample Data Filename: E004792#1

Inj. Vol(ul): 2.0

Blank Data Filename: E004789#1

Dilution Factor: 1

Cal. Ver. Data Filename: E004786#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 18.30

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.007	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.066	U	*	*	1.16
1,2,3,4,7,8-HxCDD	*	0.136	U	*	*	0.69
1,2,3,6,7,8-HxCDD	*	0.119	U	*	*	0.79
1,2,3,7,8,9-HxCDD	*	0.114	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.121	U	*	*	0.73
OCDD	0.307	0.191		0.80 ✓	1.000	0.70
2,3,7,8-TCDF	*	0.005	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.068	U	*	*	1.23
2,3,4,7,8-PeCDF	*	0.059	U	*	*	1.42
1,2,3,4,7,8-HxCDF	*	0.032	U	*	*	1.03
1,2,3,6,7,8-HxCDF	*	0.028	U	*	*	1.21
1,2,3,7,8,9-HxCDF	*	0.030	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.030	U	*	*	1.03
1,2,3,4,6,7,8-HpCDF	*	0.062	U	*	*	1.47
1,2,3,4,7,8,9-HpCDF	*	0.074	U	*	*	1.23
OCDF	*	0.114	U	*	*	1.18
Total Tetra-Dioxins	*	0.007	U			
Total Penta-Dioxins	*	0.066	U			
Total Hexa-Dioxins	*	0.119	U			
Total Hepta-Dioxins	*	0.121	U			
Total Tetra-Furans	*	0.005	U			
Total Penta-Furans	*	0.059	U			
Total Hexa-Furans	*	0.028	U			
Total Hepta-Furans	*	0.062	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

8280F1

SML 4/10/2001

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX05-SS0001-E R01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45903

Client Name: CH2M-VA Lab Sample ID: 45903.05

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.21 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 14-MAR-01 Time: 20:16:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004794#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004789#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004786#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 14.64

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.007	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.089	U	*	*	1.16
1,2,3,4,7,8-HxCDD	*	0.087	U	*	*	0.69
1,2,3,6,7,8-HxCDD	*	0.076	U	*	*	0.79
1,2,3,7,8,9-HxCDD	*	0.103	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.105	U	*	*	0.73
OCDD	0.090	0.025		0.79	1.000	0.70
2,3,7,8-TCDF	*	0.006	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.074	U	*	*	1.23
2,3,4,7,8-PeCDF	*	0.065	U	*	*	1.42
1,2,3,4,7,8-HxCDF	*	0.019	U	*	*	1.03
1,2,3,6,7,8-HxCDF	*	0.016	U	*	*	1.21
1,2,3,7,8,9-HxCDF	*	0.019	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.019	U	*	*	1.03
1,2,3,4,6,7,8-HpCDF	*	0.039	U	*	*	1.47
1,2,3,4,7,8,9-HpCDF	*	0.047	U	*	*	1.23
OCDF	*	0.090	U	*	*	1.18
Total Tetra-Dioxins	*	0.007	U			
Total Penta-Dioxins	*	0.089	U			
Total Hexa-Dioxins	*	0.076	U			
Total Hepta-Dioxins	*	0.105	U			
Total Tetra-Furans	*	0.006	U			
Total Penta-Furans	*	0.065	U			
Total Hexa-Furans	*	0.016	U			
Total Hepta-Furans	*	0.039	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX06-SS0001-[illegible]

Lab Name: Southwest Lab. of Oklahoma
Episode No.: 45903

Client Name: CH2M-VA
Lab Sample ID: 45903.06

Matrix (aqueous/solid/leachate): solid
Sample Wt/Vol: 15.28 g or mL: g

Sample Receipt Date: 02-26-01
Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01
Instrument ID: HP72E GC

Analysis Date: 14-MAR-01 Time: 21:06:00
GC Column:db5

Ext. Vol(ul): 100
Sample Data Filename: E004795#1

Inj. Vol(ul): 2.0
Blank Data Filename: E004789#1

Dilution Factor: 1
Cal. Ver. Data Filename: E004786#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg
% Moisture: 20.41

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.008	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.069	U	*	*	1.16
1,2,3,4,7,8-HxCDD	*	0.127	U	*	*	0.69
1,2,3,6,7,8-HxCDD	*	0.111	U	*	*	0.79
1,2,3,7,8,9-HxCDD	*	0.106	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.116	U	*	*	0.73
OCDD	0.366	0.167		0.84	1.000	0.70
2,3,7,8-TCDF	*	0.006	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.077	U	*	*	1.23
2,3,4,7,8-PeCDF	*	0.067	U	*	*	1.42
1,2,3,4,7,8-HxCDF	*	0.012	U	*	*	1.03
1,2,3,6,7,8-HxCDF	*	0.010	U	*	*	1.21
1,2,3,7,8,9-HxCDF	*	0.013	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.013	U	*	*	1.03
1,2,3,4,6,7,8-HpCDF	*	0.056	U	*	*	1.47
1,2,3,4,7,8,9-HpCDF	*	0.068	U	*	*	1.23
OCDF	*	0.100	U	*	*	1.18
Total Tetra-Dioxins	*	0.008	U			
Total Penta-Dioxins	*	0.069	U			
Total Hexa-Dioxins	*	0.111	U			
Total Hepta-Dioxins	*	0.116	U			
Total Tetra-Furans	*	0.006	U			
Total Penta-Furans	*	0.067	U			
Total Hexa-Furans	*	0.010	U			
Total Hepta-Furans	*	0.056	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

CLIENT ID.

ASX08-SS0001-EA01

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

Lab Name: Southwest Lab. of Oklahoma — Episode No.: 45903

Client Name: CH2M-VA — Lab Sample ID: 45903.07

Matrix (aqueous/solid/leachate): solid — Sample Wt/Vol: 15.21 g or mL: g

Sample Receipt Date: 02-26-01 — Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 — Instrument ID: HP72E GC

Analysis Date: 14-MAR-01 Time: 21:55:00 — GC Column:db5

Ext. Vol(ul): 100 — Sample Data Filename: E004796#1

Inj. Vol(ul): 2.0 — Blank Data Filename: E004789#1

Dilution Factor: 1 — Cal. Ver. Data Filename: E004786#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg — % Moisture: 20.95

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.007	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.032	U	*	*	1.16
1,2,3,4,7,8-HxCDD	*	0.115	U	*	*	0.69
1,2,3,6,7,8-HxCDD	*	0.100	U	*	*	0.79
1,2,3,7,8,9-HxCDD	*	0.099	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.102	U	*	*	0.73
OCDD	0.345	0.145		0.82	1.000	0.70
2,3,7,8-TCDF	*	0.008	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.068	U	*	*	1.23
2,3,4,7,8-PeCDF	*	0.059	U	*	*	1.42
1,2,3,4,7,8-HxCDF	*	0.010	U	*	*	1.03
1,2,3,6,7,8-HxCDF	*	0.009	U	*	*	1.21
1,2,3,7,8,9-HxCDF	*	0.010	U	*	*	1.05
2,3,4,6,7,8-HxCDF	*	0.010	U	*	*	1.03
1,2,3,4,6,7,8-HpCDF	*	0.051	U	*	*	1.47
1,2,3,4,7,8,9-HpCDF	*	0.061	U	*	*	1.23
OCDF	*	0.086	U	*	*	1.18
Total Tetra-Dioxins	*	0.007	U			
Total Penta-Dioxins	*	0.032	U			
Total Hexa-Dioxins	*	0.100	U			
Total Hepta-Dioxins	*	0.102	U			
Total Tetra-Furans	*	0.008	U			
Total Penta-Furans	*	0.059	U			
Total Hexa-Furans	*	0.009	U			
Total Hepta-Furans	*	0.051	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

EMW 3-30-01

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX20-SS0001-~~F~~ no1

Lab Name: Southwest Lab. of Oklahoma
Episode No.: 45903

Client Name: CH2M-VA
Lab Sample ID: 45903.08

Matrix (aqueous/solid/leachate): solid
Sample Wt/Vol: 15.06 g or mL: g

Sample Receipt Date: 02-26-01
Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01
Instrument ID: HP72E GC

Analysis Date: 15-MAR-01 Time: 03:46:00
GC Column:db5

Ext. Vol(ul): 100
Sample Data Filename: E004801#1

Inj. Vol(ul): 2.0
Blank Data Filename: E004789#1

Dilution Factor: 1
Cal. Ver. Data Filename: E004799#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 20.51

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.006	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.129	U	*	*	1.19
1,2,3,4,7,8-HxCDD	*	0.179	U	*	*	0.70
1,2,3,6,7,8-HxCDD	*	0.162	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.152	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.102	U	*	*	0.76
OCDD	0.369	0.201		0.87	1.000	0.70
2,3,7,8-TCDF	*	0.009	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.086	U	*	*	1.25
2,3,4,7,8-PeCDF	*	0.074	U	*	*	1.45
1,2,3,4,7,8-HxCDF	*	0.027	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.023	U	*	*	1.15
1,2,3,7,8,9-HxCDF	*	0.026	U	*	*	1.04
2,3,4,6,7,8-HxCDF	*	0.027	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.053	U	*	*	1.45
1,2,3,4,7,8,9-HpCDF	*	0.062	U	*	*	1.25
OCDF	*	0.120	U	*	*	1.18
Total Tetra-Dioxins	*	0.006	U			
Total Penta-Dioxins	*	0.129	U			
Total Hexa-Dioxins	*	0.162	U			
Total Hepta-Dioxins	*	0.102	U			
Total Tetra-Furans	*	0.009	U			
Total Penta-Furans	*	0.074	U			
Total Hexa-Furans	*	0.023	U			
Total Hepta-Furans	*	0.053	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

SMT 4/10/2001

Form 1

CLIENT ID.

ASX07-SS0001-~~S~~ R01

EM 3-20-01

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

Lab Name: Southwest Lab. of Oklahoma

Episode No.: 45903

Client Name: CH2M-VA

Lab Sample ID: 45903.09

Matrix (aqueous/solid/leachate): solid

Sample Wt/Vol: 15.06 g or mL: g

Sample Receipt Date: 02-26-01

Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01

Instrument ID: HP72E GC

Analysis Date: 15-MAR-01 Time: 04:36:00

GC Column:db5

Ext. Vol(ul): 100

Sample Data Filename: E004802#1

Inj. Vol(ul): 2.0

Blank Data Filename: E004789#1

Dilution Factor: 1

Cal. Ver. Data Filename: E004799#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 13.82

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.007	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.033	U	*	*	1.19
1,2,3,4,7,8-HxCDD	*	0.110	U	*	*	0.70
1,2,3,6,7,8-HxCDD	*	0.099	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.093	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.095	U	*	*	0.76
OCDD	0.347	0.142		0.83	1.000	0.70
2,3,7,8-TCDF	*	0.006	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.074	U	*	*	1.25
2,3,4,7,8-PeCDF	*	0.064	U	*	*	1.45
1,2,3,4,7,8-HxCDF	*	0.021	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.018	U	*	*	1.15
1,2,3,7,8,9-HxCDF	*	0.019	U	*	*	1.04
2,3,4,6,7,8-HxCDF	*	0.020	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.040	U	*	*	1.45
1,2,3,4,7,8,9-HpCDF	*	0.047	U	*	*	1.25
OCDF	*	0.085	U	*	*	1.18
Total Tetra-Dioxins	*	0.007	U			
Total Penta-Dioxins	*	0.033	U			
Total Hexa-Dioxins	*	0.099	U			
Total Hepta-Dioxins	*	0.095	U			
Total Tetra-Furans	*	0.006	U			
Total Penta-Furans	*	0.064	U			
Total Hexa-Furans	*	0.018	U			
Total Hepta-Furans	*	0.040	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

8280F1

SML 4/10/01

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX12-SS0001-6R0)

3-30-01

Lab Name: Southwest Lab. of Oklahoma
Episode No.: 45903

Client Name: CH2M-VA
Lab Sample ID: 45903.10

Matrix (aqueous/solid/leachate): solid
Sample Wt/Vol: 15.09 g or mL: g

Sample Receipt Date: 02-26-01
Initial Calibration Date: 01-10-1

Ext. Date: 02-27-01
Instrument ID: HP72E GC

Analysis Date: 15-MAR-01 Time: 05:25:00
GC Column:DB-5

Ext. Vol(ul): 100
Sample Data Filename: E004803#1

Inj. Vol(ul): 2.0
Blank Data Filename: E004789#1

Dilution Factor: 1
Cal. Ver. Data Filename: E004799#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg
% Moisture: 19.12

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.007	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.035	U	*	*	1.19
1,2,3,4,7,8-HxCDD	*	0.068	U	*	*	0.70
1,2,3,6,7,8-HxCDD	*	0.062	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.086	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.087	U	*	*	0.76
OCDD	0.284	0.118		0.85	1.000	0.70
2,3,7,8-TCDF	*	0.006	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.073	U	*	*	1.25
2,3,4,7,8-PeCDF	*	0.063	U	*	*	1.45
1,2,3,4,7,8-HxCDF	*	0.009	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.008	U	*	*	1.15
1,2,3,7,8,9-HxCDF	*	0.016	U	*	*	1.04
2,3,4,6,7,8-HxCDF	*	0.017	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.033	U	*	*	1.45
1,2,3,4,7,8,9-HpCDF	*	0.039	U	*	*	1.25
OCDF	*	0.070	U	*	*	1.18
Total Tetra-Dioxins	*	0.007	U			
Total Penta-Dioxins	*	0.035	U			
Total Hexa-Dioxins	*	0.062	U			
Total Hepta-Dioxins	*	0.087	U			
Total Tetra-Furans	*	0.006	U			
Total Penta-Furans	*	0.063	U			
Total Hexa-Furans	*	0.008	U			
Total Hepta-Furans	*	0.033	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

SMT 4/10/2001

Form 1

CLIENT ID.

ASX19-SS0001-6 R01

3-20-01

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

Lab Name: Southwest Lab. of Oklahoma

Episode No.: 45903

Client Name: CH2M-VA

Lab Sample ID: 45903.11

Matrix (aqueous/solid/leachate): solid

Sample Wt/Vol: 15.06 g or mL: g

Sample Receipt Date: 02-26-01

Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01

Instrument ID: HP72E GC

Analysis Date: 15-MAR-01 Time: 06:15:00

GC Column:db5

Ext. Vol(ul): 100

Sample Data Filename: E004804#1

Inj. Vol(ul): 2.0

Blank Data Filename: E004789#1

Dilution Factor: 1

Cal. Ver. Data Filename: E004799#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 19.23

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.011	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.028	U	*	*	1.19
1,2,3,4,7,8-HxCDD	*	0.069	U	*	*	0.70
1,2,3,6,7,8-HxCDD	*	0.062	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.049	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.072	U	*	*	0.76
OCDD	0.515	0.131		0.90	1.000	0.70
2,3,7,8-TCDF	*	0.005	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.030	U	*	*	1.25
2,3,4,7,8-PeCDF	*	0.026	U	*	*	1.45
1,2,3,4,7,8-HxCDF	*	0.019	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.016	U	*	*	1.15
1,2,3,7,8,9-HxCDF	*	0.017	U	*	*	1.04
2,3,4,6,7,8-HxCDF	*	0.018	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.035	U	*	*	1.45
1,2,3,4,7,8,9-HpCDF	*	0.041	U	*	*	1.25
OCDF	*	0.079	U	*	*	1.18
Total Tetra-Dioxins	*	0.011	U			
Total Penta-Dioxins	*	0.028	U			
Total Hexa-Dioxins	*	0.062	U			
Total Hepta-Dioxins	*	0.072	U			
Total Tetra-Furans	*	0.005	U			
Total Penta-Furans	*	0.026	U			
Total Hexa-Furans	*	0.016	U			
Total Hepta-Furans	*	0.035	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/10/2001

Form 1

CLIENT ID.

ASX10-SS0001-~~E~~ R01 EW 3-20-01

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

Lab Name: Southwest Lab. of Oklahoma

Episode No.: 45903

Client Name: CH2M-VA

Lab Sample ID: 45903.12

Matrix (aqueous/solid/leachate): solid

Sample Wt/Vol: 15.20 g or mL: g

Sample Receipt Date: 02-26-01

Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01

Instrument ID: HP72E GC

Analysis Date: 15-MAR-01 Time: 09:33:00

GC Column:db5

Ext. Vol(ul): 100

Sample Data Filename: E004808#1

Inj. Vol(ul): 2.0

Blank Data Filename: E004789#1

Dilution Factor: 1

Cal. Ver. Data Filename: E004799#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 17.84

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.005	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.047	U	*	*	1.19
1,2,3,4,7,8-HxCDD	*	0.081	U	*	*	0.70
1,2,3,6,7,8-HxCDD	*	0.073	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.071	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.070	U	*	*	0.76
OCDD	0.390	0.115		0.82	1.000	0.70
2,3,7,8-TCDF	*	0.005	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.049	U	*	*	1.25
2,3,4,7,8-PeCDF	*	0.042	U	*	*	1.45
1,2,3,4,7,8-HxCDF	*	0.018	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.015	U	*	*	1.15
1,2,3,7,8,9-HxCDF	*	0.016	U	*	*	1.04
2,3,4,6,7,8-HxCDF	*	0.017	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.033	U	*	*	1.45
1,2,3,4,7,8,9-HpCDF	*	0.038	U	*	*	1.25
OCDF	*	0.069	U	*	*	1.18
Total Tetra-Dioxins	*	0.005	U			
Total Penta-Dioxins	*	0.047	U			
Total Hexa-Dioxins	*	0.073	U			
Total Hepta-Dioxins	*	0.070	U			
Total Tetra-Furans	*	0.005	U			
Total Penta-Furans	*	0.042	U			
Total Hexa-Furans	*	0.015	U			
Total Hepta-Furans	*	0.033	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

8280F1 SMK 4/10/2001

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX09-SS0001-ERO1 3-30-01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45903

Client Name: CH2M-VA Lab Sample ID: 45903.15

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.50 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 15-MAR-01 Time: 07:04:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004805#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004789#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004799#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 17.14

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.005	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.044	U	*	*	1.19
1,2,3,4,7,8-HxCDD	*	0.051	U	*	*	0.70
1,2,3,6,7,8-HxCDD	*	0.046	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.066	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.066	U	*	*	0.76
OCDD	0.427	0.111		0.88	1.000	0.70
2,3,7,8-TCDF	*	0.007	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.037	U	*	*	1.25
2,3,4,7,8-PeCDF	*	0.031	U	*	*	1.45
1,2,3,4,7,8-HxCDF	*	0.015	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.013	U	*	*	1.15
1,2,3,7,8,9-HxCDF	*	0.014	U	*	*	1.04
2,3,4,6,7,8-HxCDF	*	0.015	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.030	U	*	*	1.45
1,2,3,4,7,8,9-HpCDF	*	0.035	U	*	*	1.25
OCDF	*	0.066	U	*	*	1.18
Total Tetra-Dioxins	*	0.005	U			
Total Penta-Dioxins	*	0.044	U			
Total Hexa-Dioxins	*	0.046	U			
Total Hepta-Dioxins	*	0.066	U			
Total Tetra-Furans	*	0.007	U			
Total Penta-Furans	*	0.031	U			
Total Hexa-Furans	*	0.013	U			
Total Hepta-Furans	*	0.030	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

4/10/01

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX11-SS0001-SA01

Lab Name: Southwest Lab. of Oklahoma
Episode No.: 45903

Client Name: CH2M-VA
Lab Sample ID: 45903.16

Matrix (aqueous/solid/leachate): solid
Sample Wt/Vol: 15.33 g or mL: g

Sample Receipt Date: 02-26-01
Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01
Instrument ID: HP72E GC

Analysis Date: 15-MAR-01 Time: 07:54:00
GC Column:db5

Ext. Vol(ul): 100
Sample Data Filename: E004806#1

Inj. Vol(ul): 2.0
Blank Data Filename: E004789#1

Dilution Factor: 1
Cal. Ver. Data Filename: E004799#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg
% Moisture: 14.62

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.006	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.026	U	*	*	1.19
1,2,3,4,7,8-HxCDD	*	0.087	U	*	*	0.70
1,2,3,6,7,8-HxCDD	*	0.079	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.076	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.076	U	*	*	0.76
OCDD	0.100	0.038		0.80	1.000	0.70
2,3,7,8-TCDF	*	0.004	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.054	U	*	*	1.25
2,3,4,7,8-PeCDF	*	0.046	U	*	*	1.45
1,2,3,4,7,8-HxCDF	*	0.009	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.008	U	*	*	1.15
1,2,3,7,8,9-HxCDF	*	0.009	U	*	*	1.04
2,3,4,6,7,8-HxCDF	*	0.009	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.034	U	*	*	1.45
1,2,3,4,7,8,9-HpCDF	*	0.040	U	*	*	1.25
OCDF	*	0.049	U	*	*	1.18
Total Tetra-Dioxins	*	0.006	U			
Total Penta-Dioxins	*	0.026	U			
Total Hexa-Dioxins	*	0.079	U			
Total Hepta-Dioxins	*	0.076	U			
Total Tetra-Furans	*	0.004	U			
Total Penta-Furans	*	0.046	U			
Total Hexa-Furans	*	0.008	U			
Total Hepta-Furans	*	0.034	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX13-SS0001-~~EA01~~ 3-30-01

Lab Name: Southwest Lab. of Oklahoma Episode No.: 45903

Client Name: CH2M-VA Lab Sample ID: 45903.17

Matrix (aqueous/solid/leachate): solid Sample Wt/Vol: 15.15 g or mL: g

Sample Receipt Date: 02-26-01 Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01 Instrument ID: HP72E GC

Analysis Date: 15-MAR-01 Time: 08:43:00 GC Column:db5

Ext. Vol(ul): 100 Sample Data Filename: E004807#1

Inj. Vol(ul): 2.0 Blank Data Filename: E004789#1

Dilution Factor: 1 Cal. Ver. Data Filename: E004799#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg % Moisture: 21.26

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.006	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.026	U	*	*	1.19
1,2,3,4,7,8-HxCDD	*	0.055	U	*	*	0.70
1,2,3,6,7,8-HxCDD	*	0.050	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.072	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.074	U	*	*	0.76
OCDD	0.414	0.123		0.82	1.000	0.70
2,3,7,8-TCDF	*	0.006	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.031	U	*	*	1.25
2,3,4,7,8-PeCDF	*	0.027	U	*	*	1.45
1,2,3,4,7,8-HxCDF	*	0.008	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.007	U	*	*	1.15
1,2,3,7,8,9-HxCDF	*	0.017	U	*	*	1.04
2,3,4,6,7,8-HxCDF	*	0.018	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.036	U	*	*	1.45
1,2,3,4,7,8,9-HpCDF	*	0.042	U	*	*	1.25
OCDF	*	0.073	U	*	*	1.18
Total Tetra-Dioxins	*	0.006	U			
Total Penta-Dioxins	*	0.026	U			
Total Hexa-Dioxins	*	0.050	U			
Total Hepta-Dioxins	*	0.074	U			
Total Tetra-Furans	*	0.006	U			
Total Penta-Furans	*	0.027	U			
Total Hexa-Furans	*	0.007	U			
Total Hepta-Furans	*	0.036	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX14-SS0001-E-R01

Lab Name: Southwest Lab. of Oklahoma
Episode No.: 45903

Client Name: CH2M-VA
Lab Sample ID: 45903.18

Matrix (aqueous/solid/leachate): solid
Sample Wt/Vol: 15.50 g or mL: g

Sample Receipt Date: 02-26-01
Initial Calibration Date: 01-10-01

Ext. Date: 02-27-01
Instrument ID: HP72E GC

Analysis Date: 15-MAR-01 Time: 17:49:00
GC Column:db5

Ext. Vol(ul): 100
Sample Data Filename: E004818#1

Inj. Vol(ul): 2.0
Blank Data Filename: E004814#1

Dilution Factor: 1
Cal. Ver. Data Filename: E004813#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg
% Moisture: 20.45

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.005	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.048	U	*	*	1.18
1,2,3,4,7,8-HxCDD	*	0.078	U	*	*	0.70
1,2,3,6,7,8-HxCDD	*	0.070	U	*	*	0.78
1,2,3,7,8,9-HxCDD	*	0.068	U	*	*	0.80
1,2,3,4,6,7,8-HpCDD	*	0.071	U	*	*	0.74
OCDD	0.354	0.107		0.83	1.000	0.71
2,3,7,8-TCDF	*	0.005	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.031	U	*	*	1.25
2,3,4,7,8-PeCDF	*	0.027	U	*	*	1.44
1,2,3,4,7,8-HxCDF	*	0.019	U	*	*	1.01
1,2,3,6,7,8-HxCDF	*	0.017	U	*	*	1.16
1,2,3,7,8,9-HxCDF	*	0.019	U	*	*	1.04
2,3,4,6,7,8-HxCDF	*	0.019	U	*	*	1.01
1,2,3,4,6,7,8-HpCDF	*	0.038	U	*	*	1.47
1,2,3,4,7,8,9-HpCDF	*	0.044	U	*	*	1.25
OCDF	0.023	0.064	X J	1.12	1.002	1.18
Total Tetra-Dioxins	*	0.005	U			
Total Penta-Dioxins	*	0.048	U			
Total Hexa-Dioxins	*	0.070	U			
Total Hepta-Dioxins	*	0.071	U			
Total Tetra-Furans	*	0.005	U			
Total Penta-Furans	*	0.027	U			
Total Hexa-Furans	*	0.017	U			
Total Hepta-Furans	*	0.038	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

Form 1

PCDD/PCDF ANALYSIS DATA SHEET
Use for Sample and Blank Results

CLIENT ID.
ASX15-SS0001-6N01

Lab Name: Southwest Lab. of Oklahoma
Episode No.: 45903

Client Name: CH2M-VA
Lab Sample ID: 45903.19RE

Matrix (aqueous/solid/leachate): solid
Sample Wt/Vol: 15.10 g or mL: g

Sample Receipt Date: 02-26-01
Initial Calibration Date: 01-10-01

Ext. Date: 03-16-01
Instrument ID: HP72E GC

Analysis Date: 19-MAR-01 Time: 19:46:00
GC Column:db5

Ext. Vol(ul): 100
Sample Data Filename: E004830#1

Inj. Vol(ul): 2.0
Blank Data Filename: E004827#1

Dilution Factor: 1
Cal. Ver. Data Filename: E004825#1

Concentration Units (ng/L or ug/Kg dry weight): ug/Kg
% Moisture: 17.46

ANALYTE	CONCENTRATION FOUND	DETECTION LIMIT	Qual. (1)	ION ABUND. RATIO (2)	RRT (2)	CCAL RRF
2,3,7,8-TCDD	*	0.007	U	*	*	0.76
1,2,3,7,8-PeCDD	*	0.034	U	*	*	1.17
1,2,3,4,7,8-HxCDD	*	0.106	U	*	*	0.69
1,2,3,6,7,8-HxCDD	*	0.095	U	*	*	0.77
1,2,3,7,8,9-HxCDD	*	0.093	U	*	*	0.79
1,2,3,4,6,7,8-HpCDD	*	0.098	U	*	*	0.75
OCDD	0.215	0.161		0.82	1.000	0.71
2,3,7,8-TCDF	*	0.006	U	*	*	0.91
1,2,3,7,8-PeCDF	*	0.054	U	*	*	1.22
2,3,4,7,8-PeCDF	*	0.047	U	*	*	1.41
1,2,3,4,7,8-HxCDF	*	0.011	U	*	*	0.99
1,2,3,6,7,8-HxCDF	*	0.010	U	*	*	1.16
1,2,3,7,8,9-HxCDF	*	0.026	U	*	*	1.03
2,3,4,6,7,8-HxCDF	*	0.027	U	*	*	1.00
1,2,3,4,6,7,8-HpCDF	*	0.053	U	*	*	1.47
1,2,3,4,7,8,9-HpCDF	*	0.061	U	*	*	1.26
OCDF	*	0.063	U	*	*	1.18
Total Tetra-Dioxins	*	0.007	U			
Total Penta-Dioxins	*	0.034	U			
Total Hexa-Dioxins	*	0.095	U			
Total Hepta-Dioxins	*	0.098	U			
Total Tetra-Furans	*	0.006	U			
Total Penta-Furans	*	0.047	U			
Total Hexa-Furans	*	0.010	U			
Total Hepta-Furans	*	0.053	U			

(1) Qualifier U indicates not detected; The X & I indicates EMPC. The C needs value from second column analysis. The B indicates possible blank contamination.

(2) Ion ratios and RRTs are specified in Tables 9 and 10, Method 8280.

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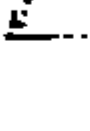

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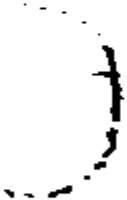

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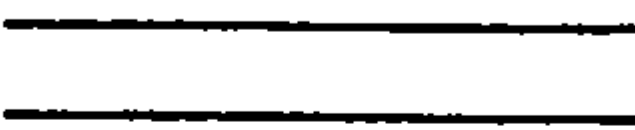

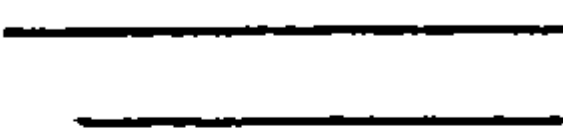

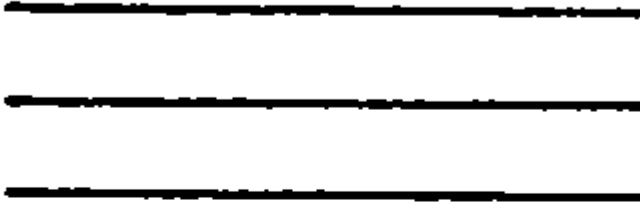

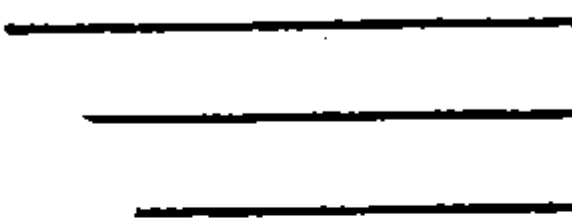

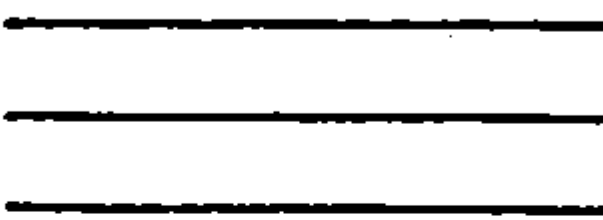

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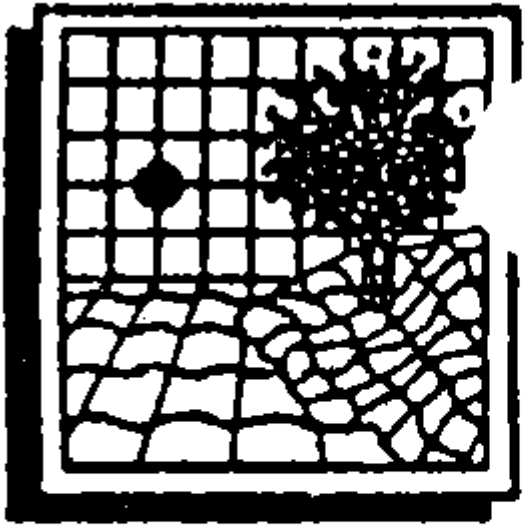

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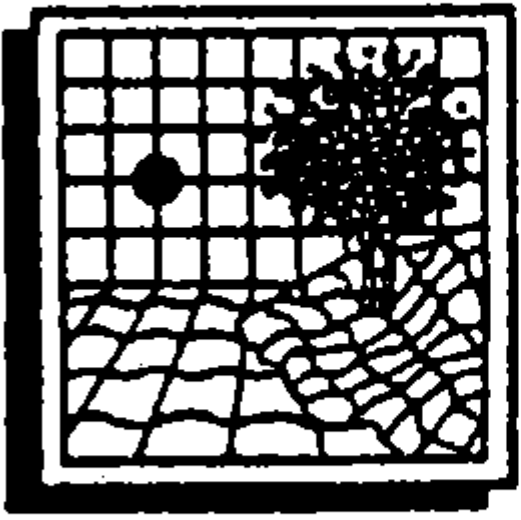

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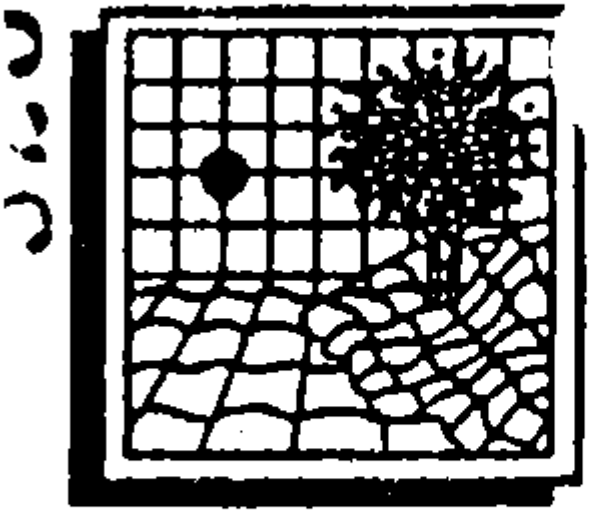

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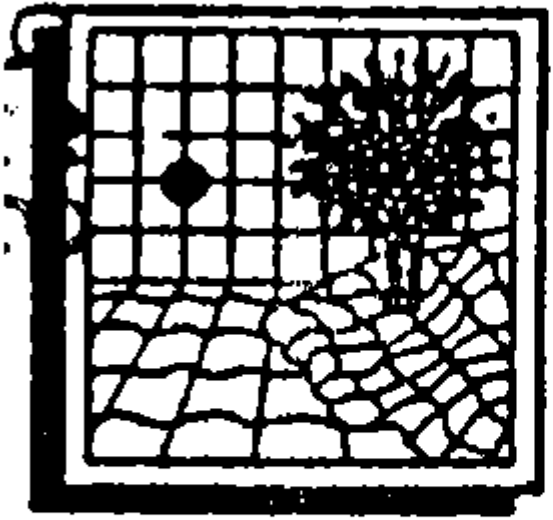

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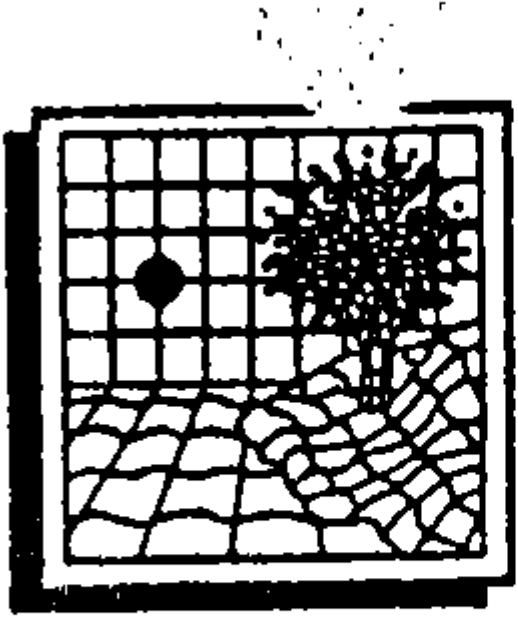

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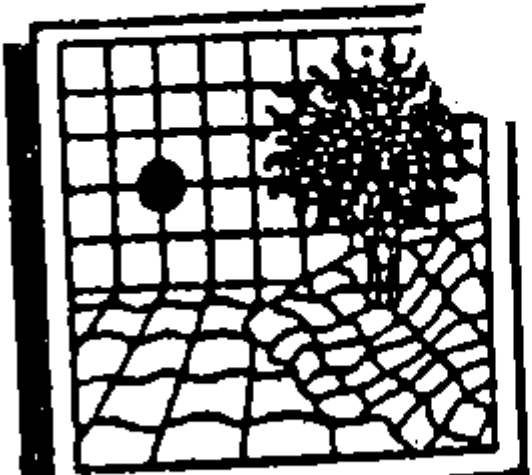

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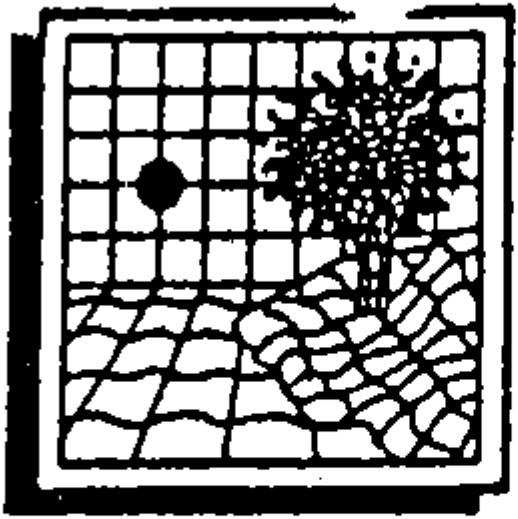

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