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PHASE III/IV INVESTIGATION OF SOLID WASTE MANAGEMENT UNIT 2 (SWMU 2), SOLID  
WASTE MANAGEMENT UNIT 27A (SWMU 27A), SOLID WASTE MANAGEMENT UNIT 37E  
(SWMU 37E) AND SOLID WASTE MANAGEMENT UNIT 37V (SWMU 37V) REPORT  
ALLEGANY BALLISTICS LABORATORY ROCKET CENTER WV  
3/1/2005  
CH2M HILL

Final

**Phase III/IV Investigation of Solid Waste  
Management Units 2, 27A, 37E, and 37V Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia**

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# Acronyms and Abbreviations

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ABL	Allegany Ballistics Laboratory
bgs	below ground surface
DRO	diesel range organics
GRO	gasoline range organics
SWMU	Solid Waste Management Unit
SVOC	semi-volatile organic compound
TAL	Target Analyte List
TOC	total organic carbon
TPH	total petroleum hydrocarbon
VOC	volatile organic compound

# Introduction

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## 1.1 Introduction

The Atlantic Division of the Naval Facilities Engineering Command (Navy) contracted CH2M HILL to perform investigations of solid waste management units (SWMUs) at the Allegany Ballistics Laboratory (ABL) in Rocket Center, West Virginia.

This report contains the results associated with Phase III and Phase IV investigations at four SWMUs located within Plant 1:

- SWMU 2 - Former Hazardous Waste Storage Area II
- SWMU 27A - Drainage Ditch System
- SWMU 37E - Building 15 Wastewater Sump
- SWMU 37V - Building 14 Wastewater Sump and Acetone Collector.

The facility location and the approximate locations of these SWMUs within the Plant 1 area are shown in Figure 1-1. Table 1-1 provides brief descriptions of these SWMUs.

Results of Phase II investigations are presented in the *Draft Phase II Investigation of Solid Waste Management Units and Areas of Concern, Allegany Ballistics Laboratory Superfund Site, Rocket Center, West Virginia* (CH2M HILL 2001).

## 1.2 Project Objectives

The primary objective of the Phase III and Phase IV SWMU investigations was to determine if releases of constituents from past practices at SWMUs to the surrounding media have occurred and, if so, if the constituents released pose a potentially unacceptable risk to human health and the environment. During the Phase III and IV investigations, samples were collected from locations to supplement data collected during Phase I and/or Phase II investigations or to generate data where no previous data existed. Phase III/IV investigation goals are presented in greater detail in the related work plans (CH2M HILL, 2002; 2003; 2004).

## 1.3 Report Organization

The primary objective of this report is to document the data collection activities and analytical data collected during the Phase III and IV SWMU investigations. As such, the field procedures and sampling activities are discussed in Section 2. Analytical data for the samples collected at each SWMU are presented in Section 3. Tables and figures are presented following the text. Well construction diagrams and soil boring logs are presented

in Appendix A. The raw analytical data is presented in Appendix B. The analytical data validation reports are presented in Appendix B.

Evaluation and conclusions regarding the data, and recommendations for the corresponding SWMUs will be presented in subsequent reports.

# Field Investigation Activities

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## 2.1 General Field Procedures

Unless otherwise stated in this text, the investigations at the four SWMUs were carried out in accordance with the following work plans.

- *Final Work Plan for the Phase III Solid Waste management Unit and Area of Concern Investigation* (CH2M HILL, 2002).
- *Final Work Plan Addendum for Phase III Investigations at SWMU 27A and 37V and Remedial Investigation for Site 12* (CH2M HILL, 2003).
- *Final Work Plan Addendum for Phase IV Investigations at SWMUs 2 and 27A and Removal Activities at SWMU 37II* (CH2M HILL, 2004).

The locations of the four SWMUs within Plant 1 are shown on Figure 2-1. Table 2-1 lists the samples collected and associated analytical parameters that are the subject of this report. Because some areas described in these work plans are still under investigation (i.e., the Range Road Area of SWMU 27A and Site 12) and others are the subject of a removal action (i.e., SWMU 37ii), the results associated with these investigations will be presented in other reports at later dates.

An appropriate set of associated QA/QC samples (i.e., field and equipment blanks, trip blanks, matrix spike/matrix spike duplicates, and duplicate samples) were collected during the soil and groundwater sampling events. Both laboratory and third party QA/QC checks were performed on the analytical results.

## 2.2 Specific Field Sampling Activities

### 2.2.1 Sampling Activities at SWMU 2

Eight soil samples (from four locations) and one groundwater sample (Figure 2-2) were collected by CH2M HILL on March 9, 2004 and April 5, 2004, respectively. Soil samples were collected using direct push technology. A temporary groundwater monitoring well was installed on March 16, 2004 for the collection of the groundwater sample. The soil logs for the direct push soil samples and the well construction diagram for the temporary well are included as Appendix A.

### 2.2.2 Sampling Activities at SWMU 27A

The work plans (CH2M HILL, 2002; 2003; 2004) recommended the collection of 24 groundwater samples, 21 sediment samples, 4 surface water samples, and 10 soil samples. Based on concurrence by the ABL Partnering Team, an additional four sediment samples were collected from SWMU 27A in May 2004. The sediment and surface water samples that

are the subject of this report are presented in Table 2-1. The groundwater and soil samples are associated with the Range Road Area of SWMU 27A. This area is being investigated separately from the remainder of SWMU 27A, therefore, these groundwater and soil sample results will be presented in a future report.

Sediment samples were collected by CH2M HILL on April 25, 26, and 30, 2002, May 29, 2003, and May 25, 2004. As shown in Figure 2-3, samples 27A-19 and 27A-23 are background samples. All samples were analyzed as indicated in Table 2-1.

The following sediment samples, collected on April 26, 2002, were preserved in the laboratory past the holding time for volatile organic compounds (VOCs): 27A-12P-SD, 27A-15-SD, 27A-5-SD, 27A-5P-SD, 27A-6-SD, 27A-7-SD, 27A-9-SD, and 27A-9P-SD. Therefore, new samples were collected from these locations on April 30, 2002 and analyzed for VOCs only. The April 30 VOC results are presented in Section 3 with the April 26 sample results for the other analytes.

The four surface water samples, recommended in the Phase III work plan (CH2M HILL, 2002), were not collected because no standing water was encountered at the sample locations.

### 2.2.3 Sampling Activities at SWMU 37E

The Phase III work plan (CH2M HILL, 2002) recommended the collection of one groundwater sample from a newly installed groundwater monitoring well. The monitoring well GGW-20 was installed on August 26, 2003 by Miller Drilling (Figure 2-4). The groundwater sample was collected September 12, 2003. The well construction log and soil boring log are included in Appendix A.

### 2.2.4 Sampling Activities at SWMU 37V

The work plans (CH2M HILL, 2002; 2003) recommended the collection of four direct push groundwater samples, three groundwater samples from permanent monitoring wells, and six soil samples (Table 2-1). Four direct-push groundwater samples were collected around the former SWMU 37V sump on April 23, 2002 by Eichelbergers Drillers. The sample depths are listed on Table 2-1. Figure 2-5 shows the locations of the samples collected at SWMU 37V. Groundwater samples from the three monitoring wells were collected on September 12, 2003. Since some of the September results were rejected by a third-party validation of the data, a second set of groundwater samples were collected on April 5, 2004, for VOC analyses.

The results of the geoprobe groundwater sampling activities conducted as part of the Phase II SWMU/AOC Investigation indicated that elevated VOCs are present in groundwater in the area immediately adjacent to the former SWMU 37V sump. Therefore, four grab groundwater samples collected at SWMU 37V during the Phase III investigation. Although VOCs were detected in the four grab groundwater samples, they were not detected at concentrations that exceeded their respective USEPA Region III maximum contaminant level (MCLs) or RBCs. The Partnering Team deemed it necessary to install the three monitoring wells between the locations of the former direct push samples at the SWMU 37V to better quantify the nature and extent of groundwater contamination.

Examination of the subsurface conditions at SWMU 37V using a solid probe indicated that a historic building footer rather than a subsurface concrete slab exists in the vicinity of SWMU 37V. It is this footer that the excavation encountered during the SWMU removal activities. Therefore, the Partnering Team altered the approach for the investigation of soil at SWMU 37V to collect soil samples from four locations, at two distinct depths per location: 7 feet below ground surface (bgs) and just above the water table (12 to 13 feet bgs). These samples were collected 2 to 3 feet away from each side of the former excavation. Thus, a total of eight subsurface soil samples were collected and analyzed for VOCs. Additionally, the two 7-foot depth samples collected at the southern and eastern sides of the former excavation were analyzed for TAL metals (Table 2-1).

# Summary of Analytical Results

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This section presents the analytical results for the Phase III/IV soil, sediment, and groundwater samples. Tables 3-1 to 3-6 present the concentrations of detected analytes greater than the corresponding method detection limit for each analytical parameter. The detected results that are greater than the method detection limit and less than the reporting limit are flagged with a “J” data qualifier. The raw analytical results (i.e. detect and non-detect results) are included as Appendix B. Third party data validation reports are included as Appendix C.

SECTION 4

# References

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A.T. Kearney, 1993. *Phase II RCRA Facility Assessment for Allegany Ballistics Laboratory, Rocket Center, West Virginia*. August 18.

CH2M HILL, 2001. *Draft Phase II Investigation of Solid Waste Management Units and Areas of Concern, Allegany Ballistics Laboratory Superfund Site, Rocket Center, West Virginia*. June.

CH2M HILL, 2002. *Final Work Plan for the Phase III Solid Waste Management Unit and Areas of Concern Investigation at the Allegany Ballistics Laboratory Superfund Site, Rocket Center, West Virginia*. July.

CH2M HILL, 2003. *Final Work Plan Addendum for Phase III Investigations at SWMU 27A and 37V and Remedial Investigation for Site 12, Allegany Ballistics Laboratory, Rocket Center, West Virginia*. January.

CH2M HILL, 2004. *Final Work Plan Addendum for Phase IV Investigations at SWMUs 2 and 27A and Removal Activities at SWMU 37II, Allegany Ballistics Laboratory, Rocket Center, West Virginia*. January.

OHM, 1999. *Final Closeout Report, Removal Action for Solid Waste Management Units, Allegany Ballistics Laboratory*. May 28.

**Tables**

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Table 1-1  
 Description of Solid Waste Management Units  
 Phase III/IV SWMU Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

SWMU	Description	Brief History
2	Former Hazardous Waste Storage Area II	SWMU 2 is located in the southern portion of Plant 1, immediately east of Building 360. This unit operated as a hazardous waste satellite accumulation area (SAA) from approximately 1981 to June 1990. Drummed wastes from other facility SAAs (SWMU 24) were stored at SWMU 2 prior to being shipped off site to a permitted facility. Paint-related materials, still bottoms, paint removers, chromium-containing waste, lead-containing waste, and corrosive waste were typically managed at SWMU 2 (A.T. Kearney, 1993).
27A	Drainage Ditch System	SWMU 27A is a stormwater drainage system composed of open earthen drainage ditches, catch basins, and culverts that are located throughout Plant 1. The ditches vary in size, but are generally about 4 feet deep and 5 feet wide. The ditches drain toward the northern end of the Plant 1 property and discharge through 16 outfalls into the North Branch Potomac River. This unit manages stormwater runoff from the developed property area. The unit receives washdown from some of the process buildings (e.g. Bldg. 181) and formerly received discharge from the settling basin (SWMU 44, which was removed in 1993).
37E	Building 15 Wastewater Sump	SWMU 37E is the former Building 15 wastewater sump, which was an earthen sump equipped with a filter to remove solid propellant chips. The wastewater sump reportedly received propellant contact cooling water containing nitrate esters, nitramines, aluminum, ammonium perchlorate, and lead. The wastewater was filtered to remove solid propellant chips prior to discharge to the sump. The sump was not lined and potentially discharged to nearby components of the facility's drainage ditch system (i.e., SWMU 27A). A second sump was identified near Building 15. Both sumps were removed during SWMU removal activities in 1998 (OHM, 1999).
37V	Building 14 Wastewater Sump and Acetone Collector	SWMU 37V consisted of two concrete sumps adjacent to former Building 14. One of the sumps reportedly received wastewater suspected to contain acetone and the second sump was reportedly used to collect spent acetone. SWMU 37V was initially investigated during the Phase II SWMU/AOC Investigation. A removal action was performed at SWMU 37V on November 8, 2000, following the Phase II SWMU/AOC Investigation activities. The action comprised removal of the wastewater sump and excavation of any impacted soil as determined by visual observation and confirmation sample data.

Table 2-1  
Summary of Soil, Sediment and Groundwater Samples  
Phase III/IV SWMU Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

SWMU	Sample Type	Sample Number	Collection depth (ft bgs) <sup>(2)</sup>	Date Collected	Analytical Parameters											
					SVOCs	VOCs	TPH (DRO & GRO)	Dissolved TAL Metals	Dissolved Hex. Chromium	Total TAL Metals	Hexavalent Chromium	Explosives	pH	Total Cyanide	Perchlorate	TOC
SWMU 2	Groundwater	2-5-GW	19-29	4/5/2004	X	X		X	X	X	X		X			
SWMU 2	Soil	2-1-D	12	3/9/2004	X	X				X	X		X			
SWMU 2	Soil	2-1P-D	12	3/9/2004	X	X				X	X		X			
SWMU 2	Soil	2-1-T	12	3/9/2004	X	X				X	X		X		X	
SWMU 2	Soil	2-2-D	11	3/9/2004	X	X				X	X		X			
SWMU 2	Soil	2-2-T	3	3/9/2004	X	X				X	X		X		X	
SWMU 2	Soil	2-3-D	12	3/9/2004	X	X				X	X		X			
SWMU 2	Soil	2-3-T	1	3/9/2004	X	X				X	X		X		X	
SWMU 2	Soil	2-4-D	11	3/9/2004	X	X				X	X		X			
SWMU 2	Soil	2-4-T	11	3/9/2004	X	X				X	X		X		X	
SWMU 27A	Surface Water	27A-1-SW	NA	NC		X										
SWMU 27A	Surface Water	27A-2-SW	NA	NC		X										
SWMU 27A	Surface Water	27A-3-SW	NA	NC		X										
SWMU 27A	Surface Water	27A-4-SW	NA	NC		X										
SWMU 27A	Sediment	27A-3-SD	Surface	4/25/2002								X				
SWMU 27A	Sediment	27A-4-SD	Surface	4/25/2002		X						X				
SWMU 27A	Sediment	27A-5-SD	Surface	4/26/2002		X	X			X		X		X		
SWMU 27A	Sediment (Duplicate)	27A-5P-SD	Surface	4/26/2002		X	X			X		X		X		
SWMU 27A	Sediment	27A-6-SD	Surface	4/26/2002		X				X				X		
SWMU 27A	Sediment	27A-7-SD	Surface	4/26/2002		X				X		X		X		
SWMU 27A	Sediment	27A-8-SD	Surface	4/25/2002		X				X			X			
SWMU 27A	Sediment	27A-9-SD	Surface	4/26/2002	X	X	X									
SWMU 27A	Sediment (Duplicate)	27A-9P-SD	Surface	4/26/2002	X											
SWMU 27A	Sediment	27A-10-SD	Surface	4/30/2002	X	X	X									
SWMU 27A	Sediment	27A-11-SD	Surface	4/26/2002		X				X		X		X		
SWMU 27A	Sediment	27A-12-SD	Surface	4/26/2002						X		X		X		
SWMU 27A	Sediment (Duplicate)	27A-12P-SD	Surface	4/26/2002										X		
SWMU 27A	Sediment	27A-13-SD	Surface	4/25/2002								X				
SWMU 27A	Sediment	27A-14-SD	Surface	4/30/2002		X						X			X	
SWMU 27A	Sediment	27A-15-SD	Surface	4/26/2002		X				X		X		X		
SWMU 27A	Sediment	27A-16-SD	Surface	4/25/2002		X				X		X		X		
SWMU 27A	Sediment	27A-17-SD	Surface	4/25/2002		X				X		X		X		
SWMU 27A	Sediment	27A-18-SD	Surface	5/29/2003	X					X		X	X	X	X	
SWMU 27A	Sediment	27A-19-SD	Surface	5/29/2003	X					X		X	X	X	X	
SWMU 27A	Sediment	27A-20-SD	Surface	5/29/2003						X		X	X	X	X	
SWMU 27A	Sediment (Duplicate)	27A-20P-SD	Surface	5/29/2003						X		X	X	X	X	
SWMU 27A	Sediment	27A-21-SD	Surface	5/29/2003						X		X	X	X	X	
SWMU 27A	Sediment	27A-22-SD	Surface	5/29/2003	X					X		X	X	X	X	
SWMU 27A	Sediment	27A-23-SD	Surface	5/29/2003	X					X		X	X	X	X	
SWMU 27A	Sediment	27A-34-SD	Surface	5/24/2004												X
SWMU 27A	Sediment	27A-34-SD/DUP	Surface	5/24/2004												X
SWMU 27A	Sediment	27-35-SD	Surface	5/24/2004												X
SWMU 27A	Sediment	27-36-SD	Surface	5/24/2004												X
SWMU 27A	Sediment	27-37-SD	Surface	5/24/2004												X
SWMU 27A	Sediment	27-38-SD	Surface	5/24/2004												X

Table 2-1  
 Summary of Soil, Sediment and Groundwater Samples  
 Phase III/IV SWMU Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

SWMU	Sample Type	Sample Number	Collection depth (ft bgs) <sup>(2)</sup>	Date Collected	Analytical Parameters												
					SVOCs	VOCs	TPH (DRO & GRO)	Dissolved TAL Metals	Dissolved Hex. Chromium	Total TAL Metals	Hexavalent Chromium	Explosives	pH	Total Cyanide	Perchlorate	TOC	Iron
SWMU 37E	Groundwater	37E-GGW20-1 <sup>(1)</sup>	15-25	9/12/2003								X			X		
SWMU 37V	Subsurface soil	37V-4-D/D	12	4/25/2002		X											
SWMU 37V	Subsurface soil	37V-4-D/S	7	4/25/2002		X					X						
SWMU 37V	Subsurface soil	37V-5-D/D	12	4/25/2002		X											
SWMU 37V	Subsurface soil	37V-5-D/S	7	4/25/2002		X					X						
SWMU 37V	Subsurface soil	37V-6-D/D	12	4/25/2002		X											
SWMU 37V	Subsurface soil	37V-6-D/S	7	4/25/2002		X											
SWMU 37V	Subsurface soil	37V-7-D/D	12	4/25/2002		X											
SWMU 37V	Subsurface soil (Duplicate)	37V-7P-D/D	12	4/25/2002		X											
SWMU 37V	Subsurface soil	37V-7-D/S	7	4/25/2002		X											
SWMU 37V	Subsurface soil	37V-8-D/D	NA	NC													
SWMU 37V	Subsurface soil	37V-8-D/S	NA	NC													
SWMU 37V	Subsurface soil	37V-9-D/D	NA	NC													
SWMU 37V	Subsurface soil	37V-9-D/S	NA	NC													
SWMU 37V	Groundwater	37V-10-GW	28-32	4/23/2002		X											
SWMU 37V	Groundwater	37V-11-GW	20-24	4/23/2002		X											
SWMU 37V	Groundwater	37V-12-GW	12-16	4/23/2002		X											
SWMU 37V	Groundwater	37V-13-GW	24-28	4/23/2002		X											
SWMU 37V	Groundwater	37V-GGW17-1	25-35	9/12/2003		X											
SWMU 37V	Groundwater	37V-GGW17-2	25-35	4/5/2004		X											
SWMU 37V	Groundwater	37V-GGW18-1	28-38	9/12/2003		X											
SWMU 37V	Groundwater	37V-GGW18-2	28-38	4/5/2004		X											
SWMU 37V	Groundwater	37V-GGW19-1	28-38	9/12/2003		X											
SWMU 37V	Groundwater	37V-GGW19-2	28-38	4/5/2004		X											
SWMU 37V	Groundwater	37V-GGW19-R02	28-38	4/5/2004		X											
SWMU 37V	Groundwater (Duplicate)	37V-GGW19-R02/DUP	28-38	4/5/2004		X											

**Notes:**

(1) = This sample was referenced in the work plan as sample 37E-GGW17-1.

(2) = Approximate sample depth for soil samples or screen interval for groundwater samples.

NC = Sample not collected

NA = Not applicable

VOC = Volatile Organic Compound

SVOC = Semi-volatile Organic Compound

TPH = Total Petroleum Hydrocarbons

PAH = Polyaromatic Hydrocarbons

TAL = Target Analyte List

TOC = Total Organic Carbon

Table 3-1  
 Detected Analytical Results for SWMU 2 Groundwater Sample  
 Phase III/IV SWMU Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

<b>Station ID</b>	2-5
<b>Sample ID</b>	2-5-GW
<b>Sample Date</b>	04/05/04
<b>Chemical Name</b>	
<b>Volatile Organic Compounds (UG/L)</b>	
Chloromethane	0.45 J
<b>Semi-volatile Organic Compounds (UG/L)</b>	
No Detections	
<b>Total Metals (UG/L)</b>	
Aluminum	18,100
Arsenic	14.5 K
Barium	132 J
Beryllium	1.4 J
Calcium	129,000
Chromium	30
Cobalt	16.6 J
Copper	33.5
Iron	36,800
Lead	21.2
Magnesium	16,400
Manganese	371
Nickel	33.1 J
Potassium	4,670 J
Sodium	13,200
Vanadium	36.6 J
Zinc	109
<b>Dissolved Metals (UG/L)</b>	
Arsenic	4.5 J
Barium	47.2 J
Calcium	120,000
Cobalt	1.8 J
Iron	683
Magnesium	15,000
Manganese	164
Nickel	7.7 J
Potassium	1,380 J
Sodium	12,900
Zinc	14 J

**Notes:**

J - Reported value is estimated

K - Reported value may be biased high

Shading Indicates that the constituent was positively detected.

Table 3-2  
 Detected Analytical Results for SWMU 2 Soil Samples  
 Phase III/IV SWMU Investigation Report  
 Allegheny Ballistics Laboratory  
 Rocket Center, West Virginia

Station ID	2-1			2-2		2-3		2-4	
	2-1-T	2-1-D	2-1-P-D	2-2-T	2-2-D	2-3-T	2-3-D	2-4-T	2-4-D
Sample ID	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04
<b>Chemical Name</b>									
<b>Volatile Organic Compounds (UG/KG)</b>									
No Detections									
<b>Semi-volatile Organic Compounds (UG/KG)</b>									
Benzo(a)anthracene	390 U	410 U	420 U	76 J	420 U	370 U	410 U	410 U	400 U
Benzo(a)pyrene	390 U	410 U	420 U	54 J	420 U	370 U	410 U	410 U	400 U
Benzo(b)fluoranthene	390 U	410 U	420 U	77 J	420 U	370 U	410 U	410 U	400 U
Chrysene	390 U	410 U	420 U	53 J	420 U	370 U	410 U	410 U	400 U
Di-n-butylphthalate	390 U	410 U	420 U	380 U	390 J	160 J	300 J	410 U	400 U
Fluoranthene	390 U	410 U	420 U	110 J	420 U	370 U	410 U	410 U	400 U
Phenanthrene	390 U	410 U	420 U	52 J	420 U	370 U	410 U	410 U	400 U
Pyrene	390 U	410 U	420 U	66 J	420 U	370 U	410 U	410 U	400 U
bis(2-Ethylhexyl)phthalate	390 U	410 U	43 J	380 U	420 U	41 J	410 U	410 U	40 J
<b>Total Metals (MG/KG)</b>									
Aluminum	6,070	14,200	15,900	9,560	15,600	7,400	12,800	6,710	15,500
Arsenic	8.7	11.2	7.8	10.1	7.1	3 B	6.9	14.3	3.6 B
Barium	707	83.8	80.4	985	126	26.5	57	776	59.6
Beryllium	1.1	1	1.1	0.68 J	1	0.35 J	0.82	0.77 J	0.96
Cadmium	0.047 U	0.043 U	0.053 U	1.4	0.041 U	0.55 J	0.046 U	0.047 U	0.039 U
Calcium	5,590	42,300	19,100	20,400	3,870	243,000	93,400	1,220	23,500
Chromium	19.3	17	20.5	24.1	22.4	9.8	13.8	12.7	19.4
Cobalt	4.3 J	14.6	10.3	6.4 J	10.7	3.9 J	9.4	6.6 J	7.6
Copper	15.9	28.5	25.3	21.8	21.5	7.7	17.6	10.2	23.8
Iron	31,000	22,500	22,700	28,200	20,900	8,670	15,000	19,600	26,500
Lead	24	12.6	13.2	32.1	19	8.5	7.9	28.9	11.2
Magnesium	733 J	3,120	3,510	2,300	3,220	39,600	3,430	838 K	2,970
Manganese	92	305	123	98.5	153	196	178	101	128
Nickel	10.8	25.9	25.7	14.3	26.4	8.9	19.2	13.2	23.3
Potassium	1,580	2,020	2,140	2,580	1,730	2,210	2,210	2,650	2,150
Sodium	528 B	452 B	287 B	1,360 L	441 B	843 B	935 B	1,100 L	148 B
Vanadium	20.3	19.5	24.4	24.1	27.7	12.5	15.3	15.6	16.9
Zinc	152	44.4	56.7	119	62.7	23.5	30	102	41.7
<b>Wet Chemistry (MG/KG)</b>									
% Solids	85	81	80	87	80	89	82	82	83
Carbon	23,000 L	NA	NA	30,000 L	NA	39,000 L	NA	5,800 L	NA
pH	8.4	7.6	7.5	7.9	7.8	9.4	7.5	8.2	7.8

**Notes:**

- 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
- U - Analyte not detected
- Shading Indicates that the constituent was positively detected.

Table 3-3  
 Detected Analytical Results for SWMU 27A Sediment Samples  
 Phase III/IV Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

Station ID	27A-3	27A-4	27A-5		27A-6	27A-7	27A-8	27A-9		27A-10	27A-11	27A-12		27A-13	27A-14
Sample ID	27A-3-SD	27A-4-SD	27A-5-SD	27A-5P-SD	27A-6-SD	27A-7-SD	27A-8-SD	27A-9-SD	27A-9P-SD	27A-10-SD	27A-11-SD	27A-12-SD	27A-12P-SD	27A-13-SD	27A-14-SD
Sample Date	04/25/02	04/25/02	04/26/02	04/26/02	04/26/02	04/26/02	04/26/02	04/26/02	04/26/02	04/30/02	04/26/02	04/26/02	04/26/02	04/25/02	04/30/02
Chemical Name															
<b>Volatile Organic Compounds (UG/KG)</b>															
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	3.5 J	NA	NA	NA	15 U
1,2,4-Trichlorobenzene	NA	18 U	5 B	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA	15 U
1,2-Dichlorobenzene	NA	18 U	2.2 J	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA	15 U
Acetone	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	93	31 U	NA	NA	NA	4.6 J
Carbon disulfide	NA	6 J	7.9 J	9.5 J	3.7 J	5.2 J	13 J	16 J	NA	61 U	8 J	NA	NA	NA	15 U
Chloromethane	NA	3.9 J	16 U	5.3 J	5.3 J	9.4 J	18 U	5.4 J	NA	19 J	14 J	NA	NA	NA	5.6 J
Toluene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA	15 U
Trichloroethene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA	15 U
<b>Semi-volatile Organic Compounds (UG/KG)</b>															
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	460 J	190 J	230	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	40 J	8.6 J	11 J	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	21 J	8.6 J	14	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	260 J	28 J	28	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	1,000 J	170 J	180	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	270 J	41 J	23 J	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	55 UJ	46 UJ	110 U	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	41 J	11 J	21	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	190 J	170 J	210 J	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	2,700 J	640 J	740	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	97 J	29 J	57 U	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	120 J	25 J	34 J	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	140 UJ	110 UJ	280 U	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	34 J	26 J	27	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	6.9 J	1.1 J	1.4	NA	NA	NA	NA	NA
<b>Explosives (UG/KG)</b>															
3-Nitrotoluene	200 U	200 U	200 U	200 U	NA	750	NA	NA	NA	NA	200 U	200 U	NA	200 U	200 U
HMX	200 U	200 U	200 U	200 U	NA	200 U	NA	NA	NA	NA	200 U	160 J	NA	200 U	200 U
Nitrobenzene	100 U	100 U	100 UJ	300 J	NA	170	NA	NA	NA	NA	120	100 U	NA	100 U	100 U
<b>Total Metals (MG/KG)</b>															
Aluminum	NA	NA	6,000	5,810	10,500	7,920	5,720	NA	NA	NA	13,400	17,300	NA	NA	NA
Antimony	NA	NA	1.4 L	1 L	0.76 UL	6.4 UL	0.77 UL	NA	NA	NA	1.4 L	0.8 UL	NA	NA	NA
Arsenic	NA	NA	9.4	8.1	6.4	9.6 J	24.1	NA	NA	NA	9.8	9.4	NA	NA	NA
Barium	NA	NA	115	119	134	45.4 J	112	NA	NA	NA	104	241	NA	NA	NA
Beryllium	NA	NA	0.69 J	0.71 J	1	0.68 J	1	NA	NA	NA	1.3	1.6	NA	NA	NA
Cadmium	NA	NA	0.58 J	0.67 J	0.26 J	2.6 J	0.32 J	NA	NA	NA	1.3	0.25 J	NA	NA	NA
Calcium	NA	NA	41,400 J	55,200 J	28,000 J	6,630 J	156,000	NA	NA	NA	49,800 J	5,010 J	NA	NA	NA
Chromium	NA	NA	15.4	21.9	16.9	45.2	14.3	NA	NA	NA	24.1	23.9	NA	NA	NA
Cobalt	NA	NA	13.5	13.3	14.7	9.8 J	9.3	NA	NA	NA	14.5	16.1	NA	NA	NA
Copper	NA	NA	47.9	53.2	45.6	1,290	41.1	NA	NA	NA	88.5	25.3	NA	NA	NA
Iron	NA	NA	22,000	21,600	27,900	213,000	13,900	NA	NA	NA	31,300	39,500	NA	NA	NA
Lead	NA	NA	14.6	14.9	21.2	68.9	21.6	NA	NA	NA	58.6	42.1	NA	NA	NA
Magnesium	NA	NA	2,060	2,360	2,620	1,470 J	8,060	NA	NA	NA	6,300	2,070	NA	NA	NA
Manganese	NA	NA	312 K	350 K	574 K	238 K	294	NA	NA	NA	310 K	1,400 K	NA	NA	NA
Mercury	NA	NA	0.18	0.24	0.14	0.02 J	0.04	NA	NA	NA	0.18	0.9	NA	NA	NA
Nickel	NA	NA	91.5	97.5	23.5	224	48.2	NA	NA	NA	30.5	28.7	NA	NA	NA
Potassium	NA	NA	997 J	935 J	1,480	1,400 J	1,040	NA	NA	NA	1,840	2,150	NA	NA	NA
Selenium	NA	NA	0.78 U	0.75 U	0.69 J	5.7 J	0.6 J	NA	NA	NA	0.91 J	1.4	NA	NA	NA
Silver	NA	NA	32.3	35	0.39 J	2.7 J	0.83 J	NA	NA	NA	1.8 J	0.49 J	NA	NA	NA
Sodium	NA	NA	282 B	330 J	73.9 B	459 U	524 J	NA	NA	NA	221 B	61.6 B	NA	NA	NA
Thallium	NA	NA	1.4 U	1.4 U	1.1 J	8.8 U	1.1 U	NA	NA	NA	1.4 U	1.1 U	NA	NA	NA
Vanadium	NA	NA	83.4	97.4	29	18.6 J	83.4	NA	NA	NA	48.7	36.1	NA	NA	NA
Zinc	NA	NA	136	144	145	190	176	NA	NA	NA	327	95	NA	NA	NA
<b>Wet Chemistry (MG/KG)</b>															
% Solids	NA	71	53	53	65	38	59	49	59	23	56	70	72	NA	68
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	NA	NA	NA	NA	NA	NA	8	NA	NA	NA	NA	NA	NA	NA	NA
<b>Total Petroleum Hydrocarbons (MG/KG)</b>															
TPH-diesel range	NA	NA	83 NJ	38 B	NA	NA	NA	2,400 NJ	NA	69 B	NA	NA	NA	NA	NA

Table 3-3  
Detected Analytical Results for SWMU 27A Sediment Samples  
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Station ID	27A-15	27A-16	27A-17	27A-18	27A-19	27A-20	27A-21	27A-22	27A-23	27A-34	27A-35	27A-36	27A-37	27A-38		
Sample ID	27A-15-SD	27A-16-SD	27A-17-SD	27A-18-SD	27A-19-SD	27A-20-SD	27A-20P-SD	27A-21-SD	27A-22-SD	27A-23-SD	27A-34-SD	27A-34-SD/DUP	27A-35-SD	27A-36-SD	27A-37-SD	27A-38-SD
Sample Date	04/26/02	04/25/02	04/25/02	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/24/04	05/24/04	05/24/04	05/24/04	05/24/04	05/24/04
Chemical Name																
<b>Volatile Organic Compounds (UG/KG)</b>																
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	13 U	5.9 J	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	13 U	4 J	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	33	22 U	21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	5.5 J	22 U	5.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	13 U	4 J	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	13 U	22 U	2.3 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>Semi-volatile Organic Compounds (UG/KG)</b>																
Acenaphthene	NA	NA	NA	5.7 U	4.5 U	NA	NA	NA	6.4 U	5.7 U	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	16	4.5 U	NA	NA	NA	6.4 U	8.6	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	55	4.5 U	NA	NA	NA	33	25	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	49	4.5 U	NA	NA	NA	28	5.7 U	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	73	4.5 U	NA	NA	NA	51	5.7 U	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	25 L	4.5 UL	NA	NA	NA	6.4 UL	5.7 UL	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	23	4.5 U	NA	NA	NA	15	5.7 U	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	58	4.5 U	NA	NA	NA	41	24	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	5.7 U	4.5 U	NA	NA	NA	6.4 U	5.7 U	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	92	4.5 U	NA	NA	NA	59	33	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	6.2	4.5 U	NA	NA	NA	6.4 U	5.7 U	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	26	4.5 U	NA	NA	NA	6.4 U	5.7 U	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	8.5	4.5 U	NA	NA	NA	8.9	5.7 U	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	62	4.5 U	NA	NA	NA	44	20	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	96	4.5 U	NA	NA	NA	64	50	NA	NA	NA	NA	NA	NA
<b>Explosives (UG/KG)</b>																
3-Nitrotoluene	200 U	200 U	200 U	200 U	NA	200 U	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA
HMX	200 U	200 U	200 U	200 U	NA	200 U	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	100 U	55 J	100 U	100 U	NA	100 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA
<b>Total Metals (MG/KG)</b>																
Aluminum	7,750	12,800	13,600	6,870	10,700	12,100	11,900	11,300	14,200	9,200	NA	NA	NA	NA	NA	NA
Antimony	0.66 UL	0.66 UL	0.88 UL	0.75 L	0.35 L	0.57 UL	0.54 UL	0.53 L	0.72 L	0.41 UL	NA	NA	NA	NA	NA	NA
Arsenic	5.5	11.7	7.7	10.4	8	8.7	8.3	7.7	12.2	7.3	NA	NA	NA	NA	NA	NA
Barium	76.6	109	121	137	66.2	120	126	118	208	65.1	NA	NA	NA	NA	NA	NA
Beryllium	0.81	1.4	1.1	1.2	0.89	1.1 J	1.1 J	0.97 J	1.6	0.76 J	NA	NA	NA	NA	NA	NA
Cadmium	0.07 J	0.09 J	0.37 J	0.88 J	0.042 U	0.074 U	0.071 U	0.18 J	0.068 U	0.054 U	NA	NA	NA	NA	NA	NA
Calcium	2,180 J	5,470	23,100	9,580	17,400	20,800	31,600	30,400	6,250	27,600	NA	NA	NA	NA	NA	NA
Chromium	12.7	23.4	18.2	22	13.2	17.8	19.1	18.9	22	11.8	NA	NA	NA	NA	NA	NA
Cobalt	11.8	22.9	14.4	27.8	19.4	13.7	13.5	13.5	32.6	14.6	NA	NA	NA	NA	NA	NA
Copper	13.2	25.6	32.6	75	25.4	26.3	25.3	45.1	31.8	23.5	NA	NA	NA	NA	NA	NA
Iron	27,300	49,300	32,900	47,100	34,900	33,000	33,500	31,200	46,600	29,200	7320	8060	3950	10300	7990	12100
Lead	12.3	24	22	51.2	15.2	27.7	26.9	33.5	26.5	19.4	NA	NA	NA	NA	NA	NA
Magnesium	1,160	1,540	2,610	1,500 J	2,400 J	5,590 J	5,700 J	3,210 J	2,510 J	2,330 J	NA	NA	NA	NA	NA	NA
Manganese	546 K	1,080	1,330	870	863	635	626	1,070	1,460	297	NA	NA	NA	NA	NA	NA
Mercury	0.02 J	0.04	0.06	0.18	0.024 J	0.085	0.062	0.1	0.098	0.019 U	NA	NA	NA	NA	NA	NA
Nickel	16.8	17.4	25.1	58	26.3	23.9	23.6	23.7	40.7	21.2	NA	NA	NA	NA	NA	NA
Potassium	1,150	1,150	1,950	984	1,750	1,830	1,830	1,710	1,460	1,840	NA	NA	NA	NA	NA	NA
Selenium	0.5 U	2	0.67 U	0.54 U	0.4 U	0.7 U	0.66 U	0.6 U	0.64 U	0.5 U	NA	NA	NA	NA	NA	NA
Silver	0.19 U	2.9	5.5	35.5	0.099 U	0.62 B	0.39 B	76.3	0.36 B	0.13 U	NA	NA	NA	NA	NA	NA
Sodium	47.6 U	71 J	110 J	189 B	60.7 B	154 B	138 B	159 B	86.8 B	79.7 B	NA	NA	NA	NA	NA	NA
Thallium	0.91 U	0.92 U	1.2 U	1.1 B	0.78 B	0.79 U	0.75 U	1.1 B	1.1 B	0.57 U	NA	NA	NA	NA	NA	NA
Vanadium	18.2	31.8	26.7	27.8	13.7	27.1	26.7	34.4	32.5	16	NA	NA	NA	NA	NA	NA
Zinc	63.8	76.8	153	478	45.4	259	229	229	142	181	NA	NA	NA	NA	NA	NA
<b>Wet Chemistry (MG/KG)</b>																
% Solids	76	72	62	59	74	52	49	50	52	58	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	14,000	7,400	40,000	43,000	33,000	14,000	25,000	NA	NA	NA	NA	NA	NA
pH	NA	NA	NA	6.8 J	7.3 J	6.6 J	6.7 J	6.8 J	6.7 J	6.7 J	NA	NA	NA	NA	NA	NA
<b>Total Petroleum Hydrocarbons (MG/KG)</b>																
TPH-diesel range	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA						

Notes:  
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  
NJ - Presumptively present at an estimated concentration  
U - Analyte not detected  
Shading Indicates that the constituent was positively detected.

Table 3-4  
 Detected Analytical Results for SWMU 37E Groundwater Sample  
 Phase III/IV Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

<b>Station ID</b>	GGW20		
<b>Sample ID</b>	37E-GGW20-1		
<b>Sample Date</b>	09/12/03		
<b>Chemical Name</b>			
<b>Explosives (UG/L)</b>			
HMX	41		
RDX	7.4		
<b>Note:</b>			
Shading Indicates that the constituent was positively detected.			

Table 3-5  
 Detected Analytical Results for SWMU 37V Direct Push Groundwater Samples  
 Phase III/IV Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

Station ID	37V-10	37V-11	37V-12	37V-13-GW
Sample ID	37V-10-GW	37V-11-GW	37V-12-GW	37V-13-GW
Sample Date	04/23/02	04/23/02	04/23/02	04/23/02
<b>Chemical Name</b>				
<b>Volatile Organic Compounds (UG/L)</b>				
1,1,2,2-Tetrachloroethane	10 U	10 U	1.1 J	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	10 U	1 J	10 U	10 U
1,2-Dibromo-3-chloropropane	10 U	10 U	3.1 J	10 U
1,2-Dichloropropane	10 U	1.6 J	10 U	10 U
2-Butanone	10 U	10 U	7 J	10 U
Acetone	3.2 J	10 U	25	2.1 J
Carbon disulfide	10 U	1.3 J	10 U	10 U
Chloromethane	10 U	10 U	10 U	10 U
Methylene chloride	10 U	10 U	1.1 J	10 U
Toluene	10 U	10 U	1.5 J	10 U
cis-1,2-Dichloroethene	10 U	10 U	10 U	4.5 J

**Notes:**

J - Reported value is estimated

U - Analyte not detected

Shading Indicates that the constituent was positively detected.

Table 3-6  
Detected Analytical Results for SWMU 37V Groundwater Monitoring Well Samples  
Phase III/IV Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

Station ID	GGW17		GGW18		GGW19			
Sample ID	37V-GGW17-1	37V-GGW17-2	37V-GGW18-1	37V-GGW18-2	37V-GGW19-1	37V-GGW19-2	37V-GGW19-R02	37V-GGW19-R02/DUP
Sample Date	09/12/03	04/05/04	09/12/03	04/05/04	09/12/03	04/05/04	04/05/04	04/05/04
Chemical Name								
<b>Volatile Organic Compounds (UG/L)</b>								
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U						
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	0.5 U	0.5 U						
1,2-Dibromo-3-chloropropane	0.5 R	0.5 U	0.5 R	0.5 U	0.5 R	0.5 U	0.5 U	0.5 U
1,2-Dichloropropane	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL
2-Butanone	5 R	5 UJ	5 R	5 UJ	5 R	5 UJ	5 UJ	5 UJ
Acetone	5 R	5 UJ	5 R	5 UJ	5 R	5 UJ	5 UJ	5 UJ
Carbon disulfide	3.1 B	0.5 U	0.52 B	0.5 U	1 B	0.5 U	0.5 U	0.5 U
Chloromethane	0.5 U	0.42 J	0.5 U	0.49 J	0.5 U	0.38 J	0.5 U	0.35 J
Methylene chloride	1.6 B	0.5 U	1.5 B	0.5 U	1.5 B	0.5 U	0.5 U	0.5 U
Toluene	0.5 U	0.41 J	0.58	0.44 J				
cis-1,2-Dichloroethene	0.5 U	0.5 U						

**Notes:**

- B - Analyte not detected above associated blank
- J - Reported value is estimated
- R - Unreliable result
- U - Analyte not detected
- L - Reported value may be biased low
- Shading Indicates that the constituent was positively detected.

Table 3-7  
Detected Analytical Results for SWMU 37V Soil Samples  
Phase III/IV Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

Station ID	37V-4		37V-5		37V-6		37V-7		
Sample ID	37V-4-D/S	37V-4-D/D	37V-5-D/S	37V-5-D/D	37V-6-D/S	37V-6-D/D	37V-7-D/S	37V-7-D/D	37V-7P-D/D
Sample Date	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02
Chemical Name									
<b>Volatile Organic Compounds (UG/KG)</b>									
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	10 U	8.5 U	24	240	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,1-Dichloroethane	10 U	2.7 J	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Chloromethane	2.9 J	1.8 J	2.6 J	1.7 J	2.6 J	2.2 J	3.1 J	2.8 J	2.3 J
Dichlorodifluoromethane(Freon-12)	10 U	8.5 U	9.6 U	5.5 J	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Tetrachloroethene	3 B	100	2.1 B	1.1 B	0.97 B	0.85 B	1.1 B	0.88 B	1 B
Trichloroethene	7.9 J	22	1.3 J	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
cis-1,2-Dichloroethene	18 J	20 J	9.6 U	1.1 J	8.1 U	0.86 J	8.4 U	1.6 J	1.7 J
trans-1,2-Dichloroethene	1.8 J	2.2 J	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
<b>Total Metals (MG/KG)</b>									
Aluminum	17,400	NA	17,600	NA	NA	NA	NA	NA	NA
Arsenic	8.1	NA	5.3	NA	NA	NA	NA	NA	NA
Barium	125	NA	107	NA	NA	NA	NA	NA	NA
Beryllium	1.2	NA	1.2	NA	NA	NA	NA	NA	NA
Cadmium	0.43 J	NA	0.06 U	NA	NA	NA	NA	NA	NA
Calcium	13,400	NA	6,870	NA	NA	NA	NA	NA	NA
Chromium	22.7	NA	23.1	NA	NA	NA	NA	NA	NA
Cobalt	19	NA	13.8	NA	NA	NA	NA	NA	NA
Copper	27.4	NA	25.9	NA	NA	NA	NA	NA	NA
Iron	31,700	NA	21,500	NA	NA	NA	NA	NA	NA
Lead	24.2	NA	23.4	NA	NA	NA	NA	NA	NA
Magnesium	3,820	NA	4,510	NA	NA	NA	NA	NA	NA
Manganese	322	NA	156	NA	NA	NA	NA	NA	NA
Mercury	0.02 J	NA	0.02 J	NA	NA	NA	NA	NA	NA
Nickel	27.2	NA	27.5	NA	NA	NA	NA	NA	NA
Potassium	1,860	NA	2,090	NA	NA	NA	NA	NA	NA
Selenium	0.51 J	NA	0.48 U	NA	NA	NA	NA	NA	NA
Sodium	61.8 J	NA	95 J	NA	NA	NA	NA	NA	NA
Vanadium	29.3	NA	28.9	NA	NA	NA	NA	NA	NA
Zinc	430	NA	63.4	NA	NA	NA	NA	NA	NA
<b>Wet Chemistry (MG/KG)</b>									
% Solids	81	NA	83	NA	NA	NA	NA	NA	NA

**Notes:**

NA - Not analyzed

B - Analyte not detected above associated blank

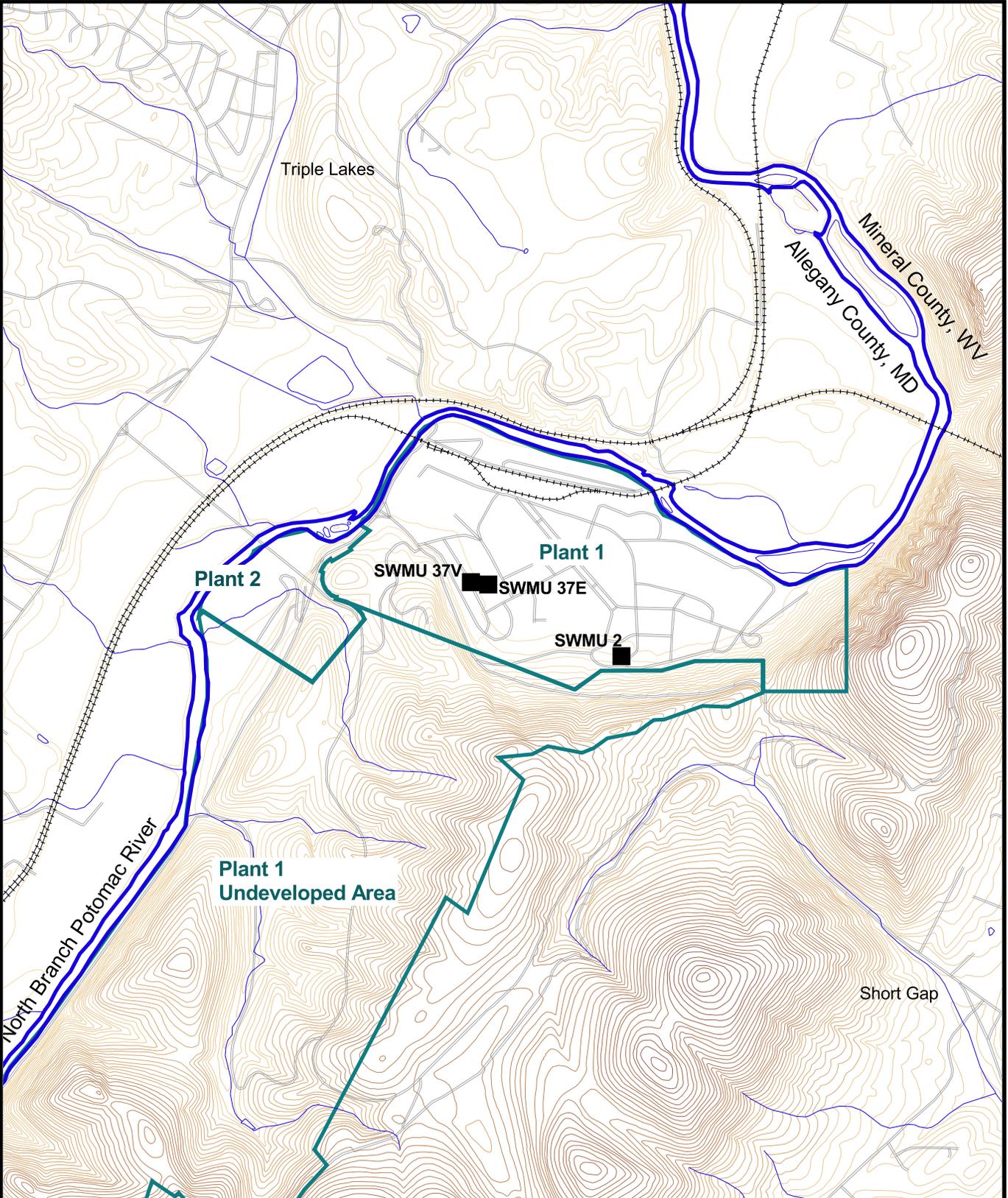
J - Reported value is estimated

U - Analyte not detected

Shading Indicates that the constituent was positively detected.

Figures

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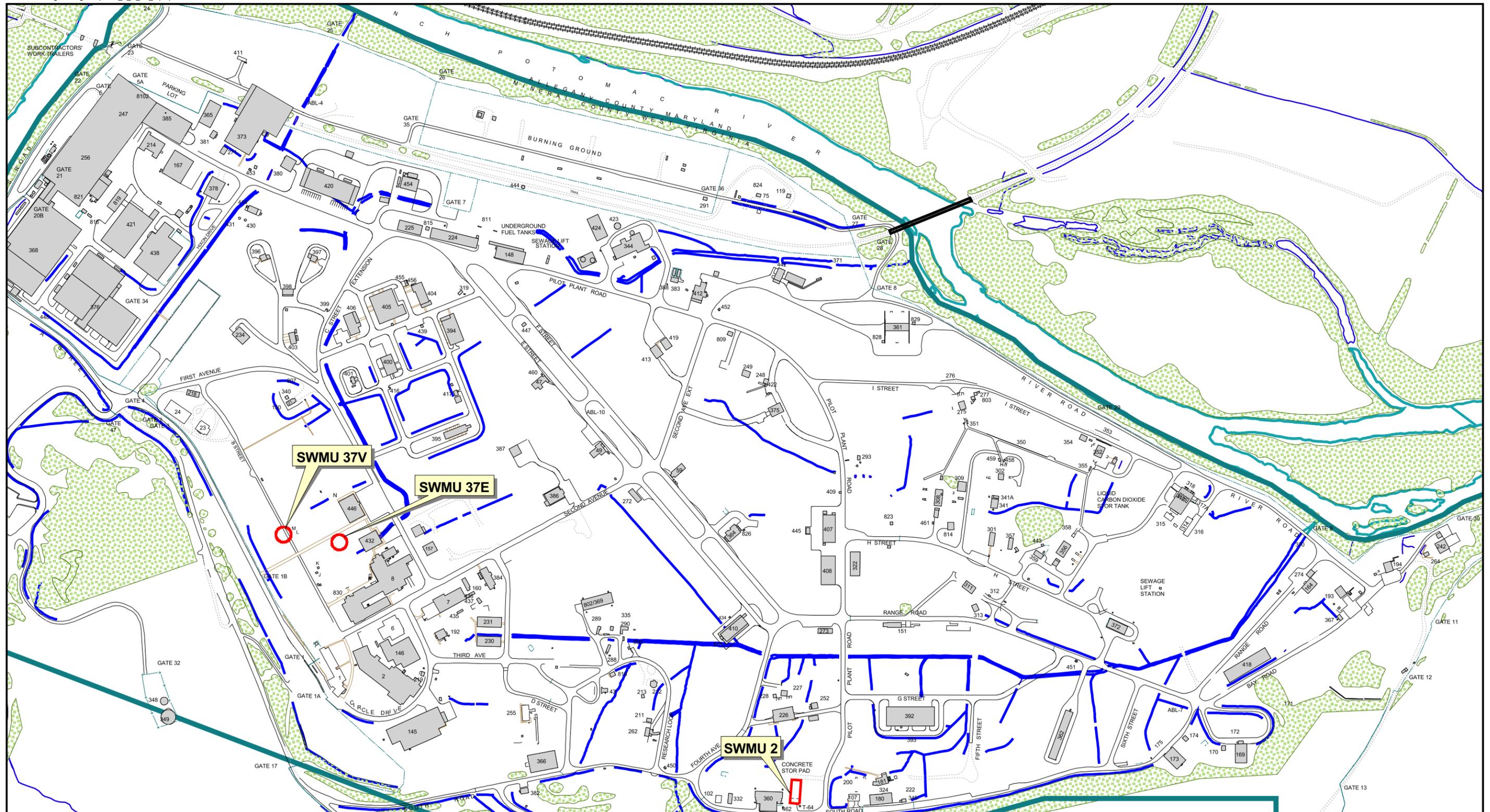
Source: USGS 7.5 minute Cresaptown, WV-MD digital quadrangle map



One Inch Equals  
Two Thousand Feet

Note: SWMU 27A comprises the drainage ditch system which is located throughout Plant 1

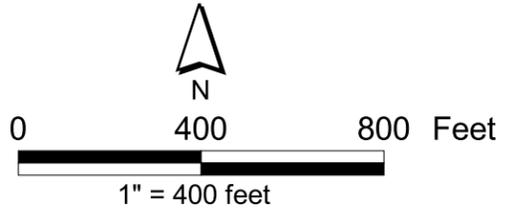
**Figure 1-1**  
**FACILITY, PLANT,**  
**AND SWMU LOCATIONS**  
PHASE III/IV SWMU INVESTIGATION REPORT  
ALLEGANY BALLISTICS LABORATORY



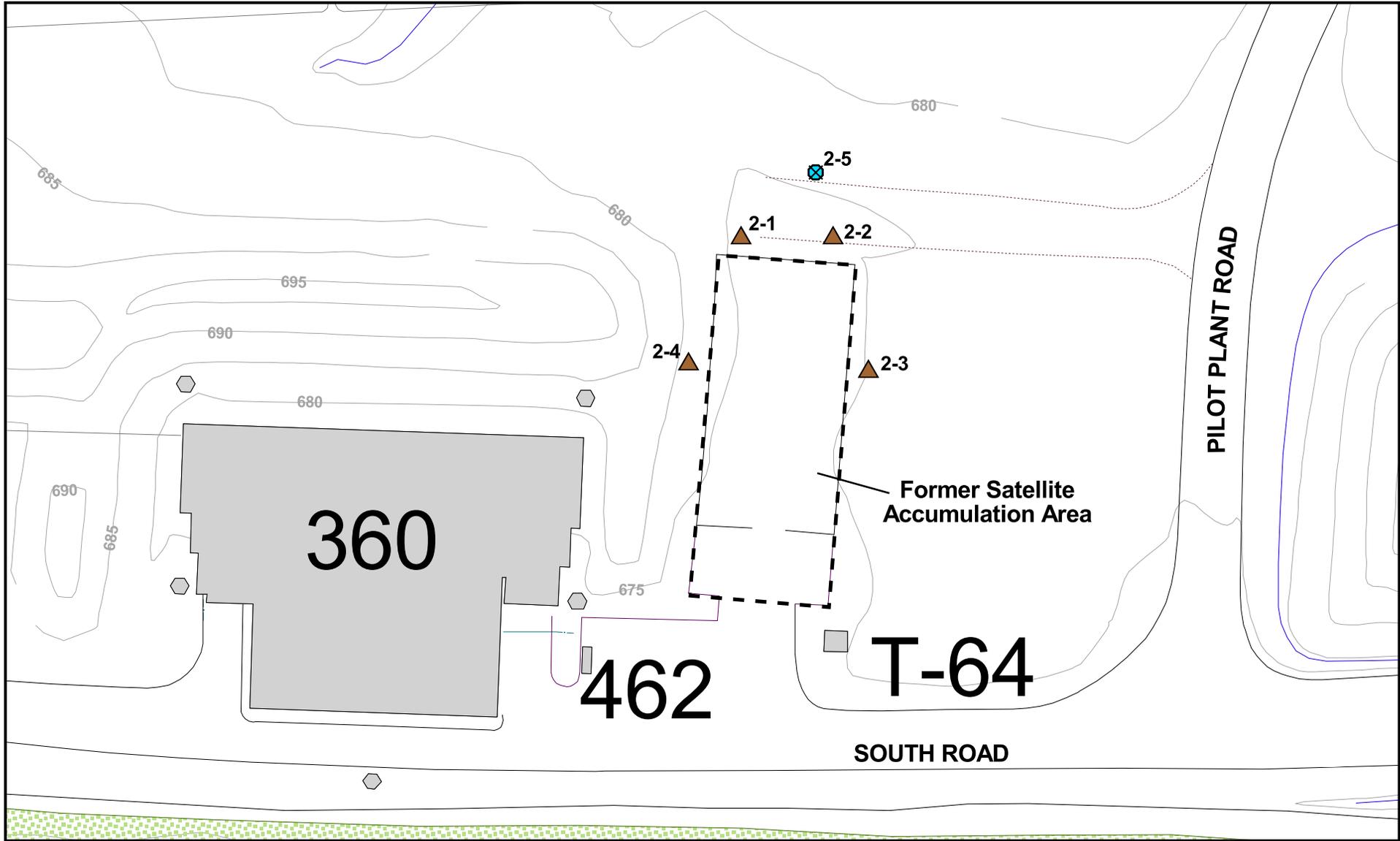
**LEGEND**

- ▭ SWMU LOCATIONS
- ▬ SWMU 27A: ABL PLANT 1 DRAINAGE DITCH SYSTEM
- VEGETATION
- BUILDINGS
- ROADS
- DIRT ROADS
- SIDEWALKS
- ~ WATER BODIES

Note: SWMU 27A comprises the drainage ditch system which is located throughout Plant 1

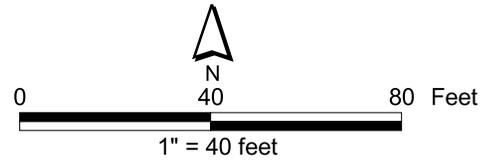


**Figure 2-1**  
 PLANT 1 MAP AND APPROXIMATE SWMU LOCATIONS  
 PHASE III/IV SWMU INVESTIGATION REPORT  
 ALLEGANY BALLISTICS LABORATORY

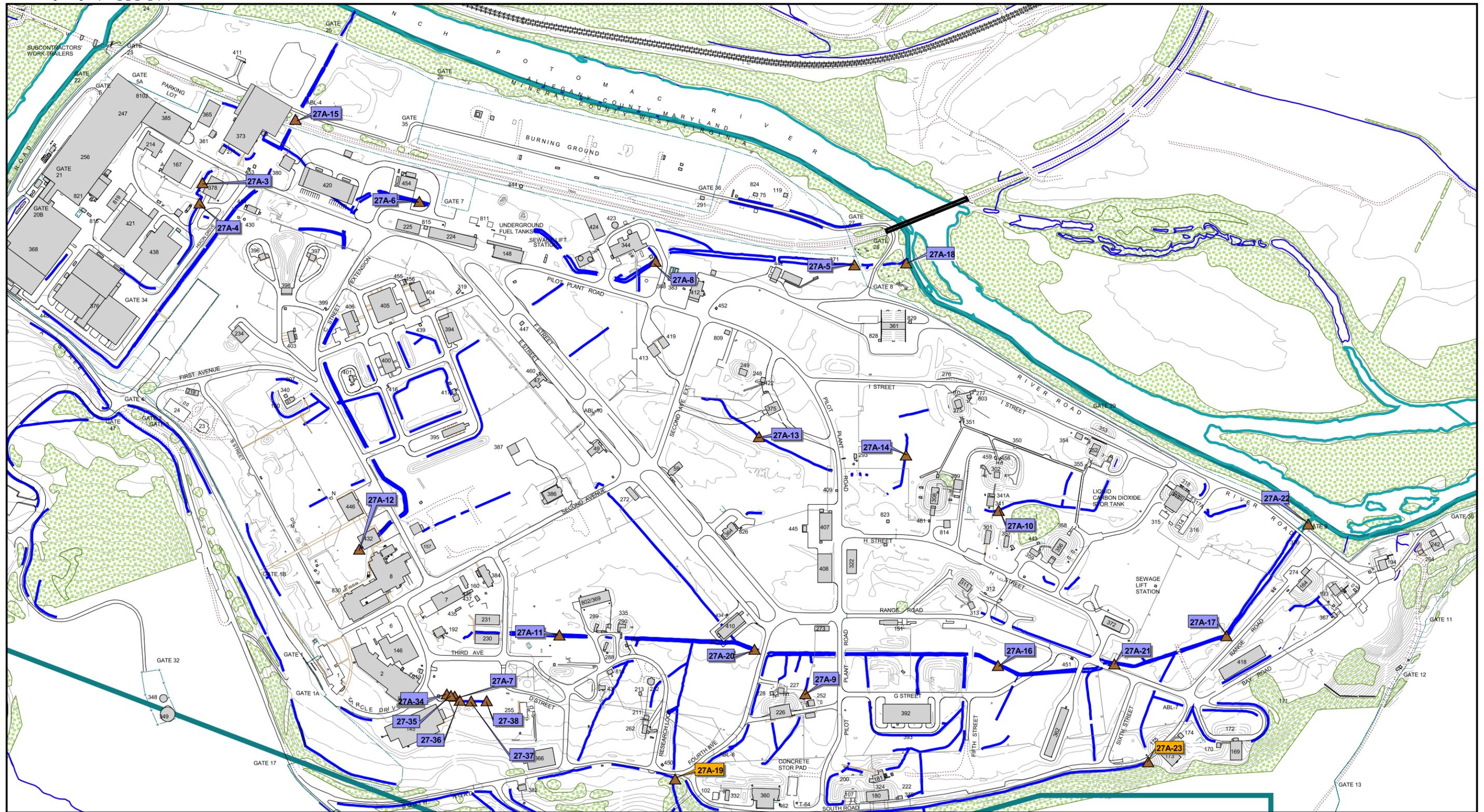


**LEGEND**

-  SOIL SAMPLING LOCATION
-  GROUNDWATER SAMPLING LOCATION
-  BUILDINGS
-  VEGETATION
-  ROADS
-  ELEVATION CONTOURS (5 FT)
-  WATER BODIES

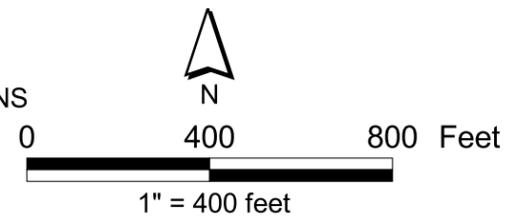


**Figure 2-2**  
SWMU 2 SOIL AND GROUNDWATER  
SAMPLING LOCATIONS  
PHASE III/IV SWMU INVESTIGATION REPORT  
ALLEGANY BALLISTICS LABORATORY

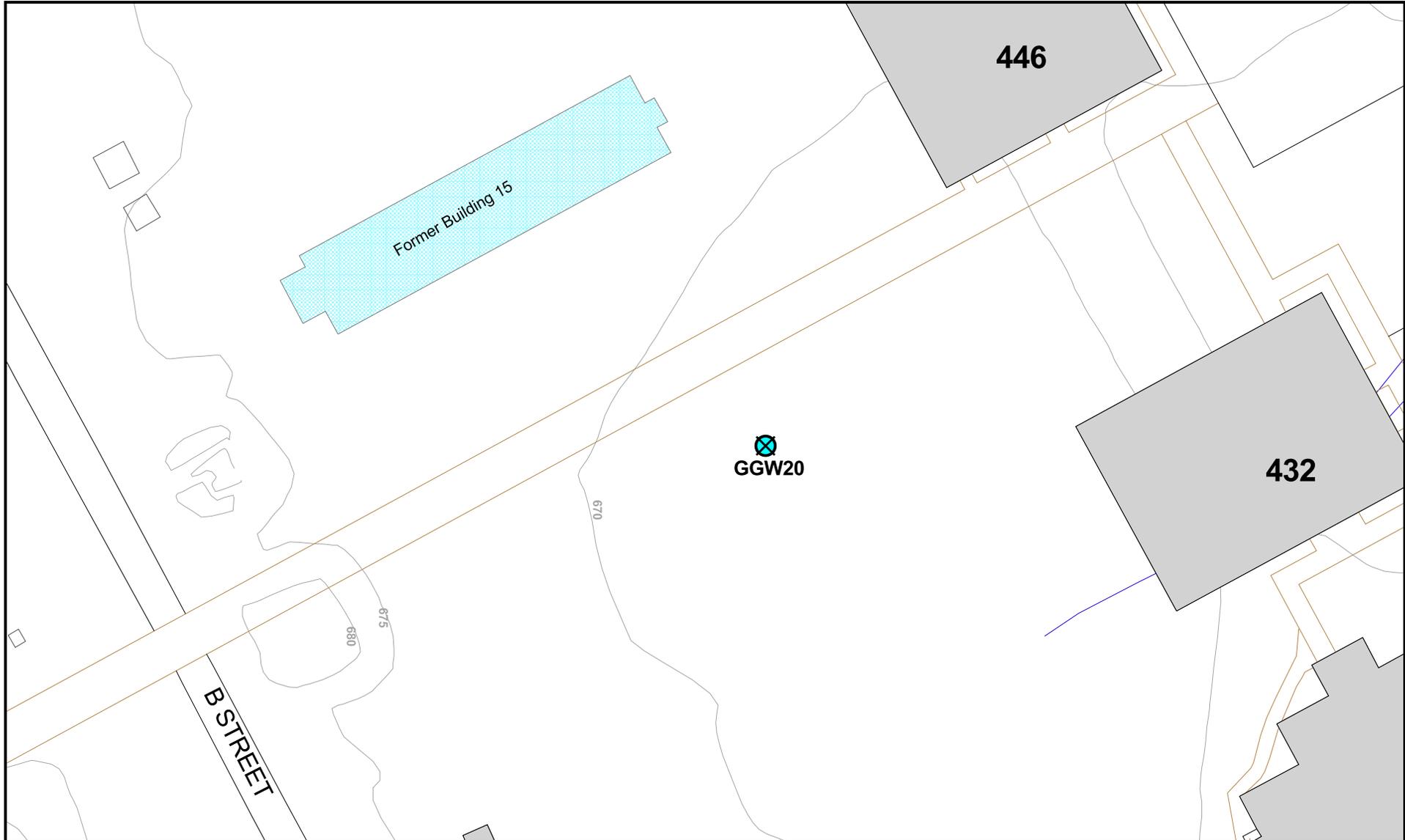


- LEGEND**
- ▲ SEDIMENT SAMPLING LOCATIONS
  - VEGETATION
  - BUILDINGS
  - ROADS
  - SIDEWALKS
  - ELEVATION CONTOURS (5 FT)
  - SWMU 27A
  - WATER BODIES

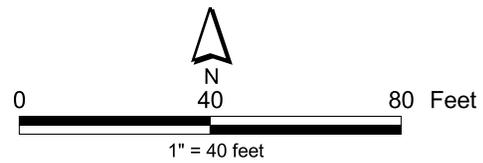
- ▲ 27A-11 INVESTIGATION SEDIMENT SAMPLE
- ▲ 27A-18 BACKGROUND SEDIMENT SAMPLE LOCATIONS



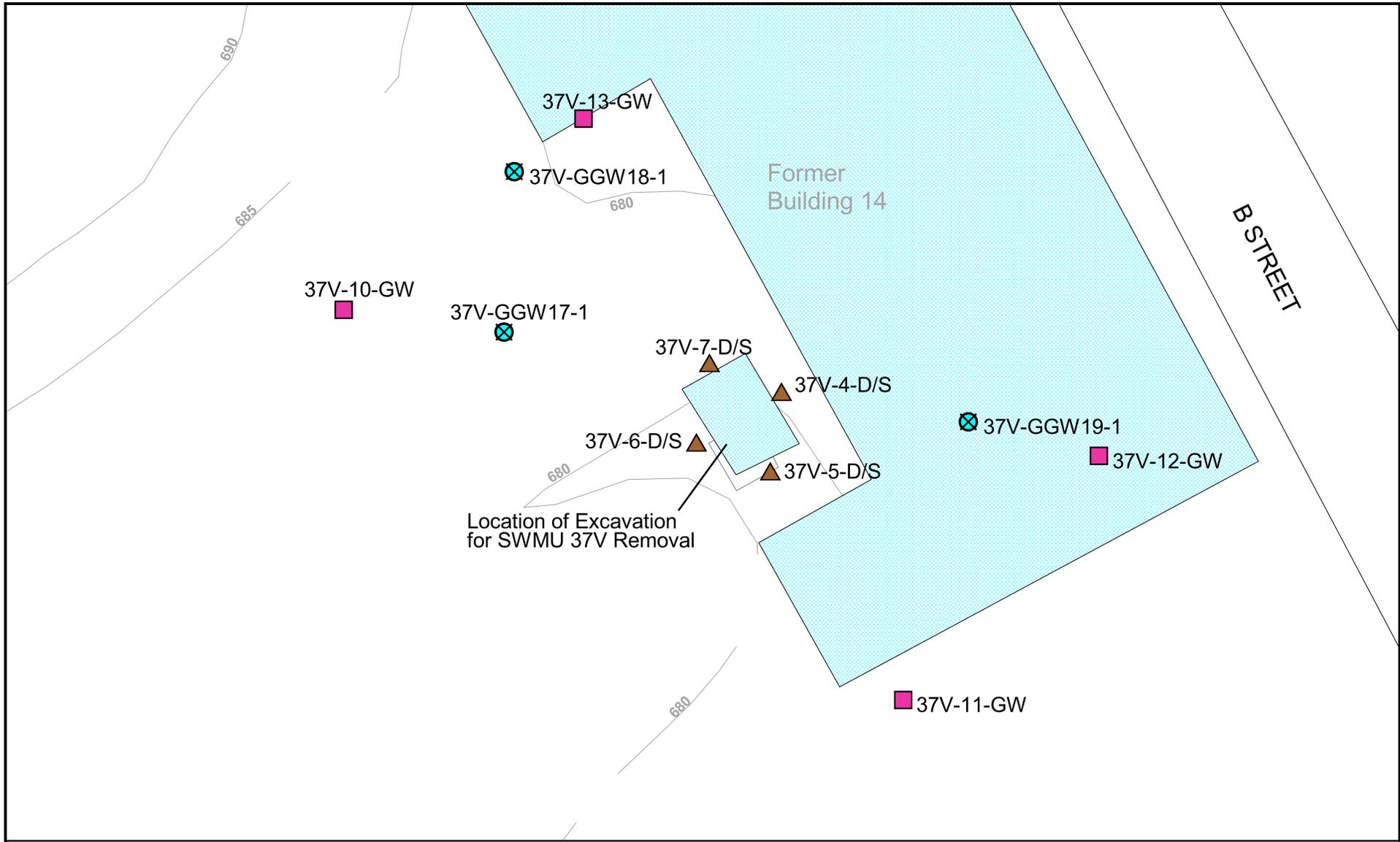
**Figure 2-3**  
 SWMU 27A ABL PLANT 1 DRAINAGE DITCH SYSTEM  
 SEDIMENT SAMPLING LOCATIONS  
 PHASE III/IV SWMU INVESTIGATION REPORT  
 ALLEGANY BALLISTICS LABORATORY



- LEGEND**
- GROUNDWATER SAMPLING LOCATION
  - BUILDINGS
  - ROADS
  - SIDEWALK
  - ELEVATION CONTOURS (5 FT)

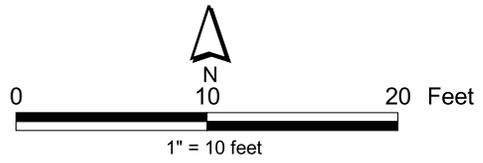


**Figure 2-4**  
**SWMU 37E GROUNDWATER**  
**SAMPLING LOCATION**  
PHASE III/IV SWMU INVESTIGATION REPORT  
ALLEGANY BALLISTICS LABORATORY



**LEGEND**

- DIRECT PUSH GROUNDWATER SAMPLING LOCATION
- MONITORING WELL GROUNDWATER SAMPLING LOCATION
- SOIL SAMPLING LOCATION
- FORMER BUILDINGS
- ROADS
- ELEVATION CONTOURS (5 FT)



**Figure 2-5**

**SWMU 37V SOIL AND GROUNDWATER SAMPLING LOCATIONS**  
 PHASE III/IV SWMU INVESTIGATION REPORT  
 ALLEGANY BALLISTICS LABORATORY

Appendix A  
Well Construction Diagrams and Soil Logs



PROJECT NUMBER: 158030.FI.MW

WELL NUMBER: 2-5

# WELL COMPLETION DIAGRAM

PROJECT: SWMU 2 Temporary Well Installation

LOCATION: Allegany Ballistics laboratory, Rocket Center, WV

DRILLING CONTRACTOR: Eichelbergers

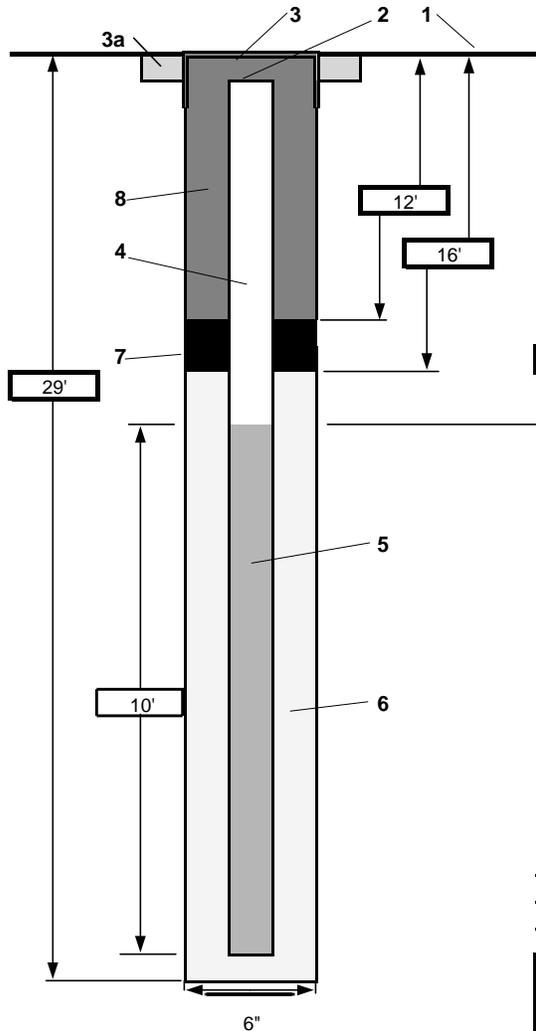
DRILLING METHOD AND EQUIPMENT USED: 6" Air Hammer

WATER LEVELS:

START: 03/16/2004

END: 03/16/2004

LOGGER: R. Murley



- 1- Ground elevation at well \_\_\_\_\_
- 2- Top of casing elevation \_\_\_\_\_
- 3- Wellhead protection cover type Flushmount Manhole  
 (a) concrete pad dimensions No pad, temporary well
- 4- Dia./type of well casing 6" Steel
- 5- Type/slot size of screen Machine/0.010"/10' Long
- 6- Type screen filter  
 a) Quantity used # 2 Silica Sand  
6 bags
- 7- Type of seal  
 a) Quantity used 3/8" Bentonite Pellets  
2 Bags
- 8- Grout  
 a) Grout mix used Portland/Bentonite mix  
 b) Method of placement Tremie  
 c) Vol. of well casing grout \_\_\_\_\_
- Development method Surge block and whale pump
- Development time 1 hr.
- Estimated development volume 65 gal.

Soil cuttings consisted of medium brown to dark brown fine sand and silt with some clay. Inclusions of coarse grained, well rounded quartz/sandstone gravel common as well as soft grey angular chips of limestone bedrock.

Time	pH	Conductivity	Turbidity	DO	Temperature	ORP
1245	7.04	0.761	999	7.69	13.43	73
1255	6.98	0.753	999	7.45	10.89	68
1305	6.97	0.757	999	6.49	10.38	80
1315	7.06	0.773	161	10.01	10.29	79
1335	7.01	0.784	999	6.59	10.32	70
1345	7.06	0.786	781	7.73	11.16	69



PROJECT NUMBER  
152130.FI.MW

WELL NUMBER  
GGW17 SHEET 1 OF 1

## WELL COMPLETION DIAGRAM

PROJECT : ABL Drilling and Well Installation

LOCATION : SWMU 37V

DRILLING CONTRACTOR Miller Drilling Company, Inc.

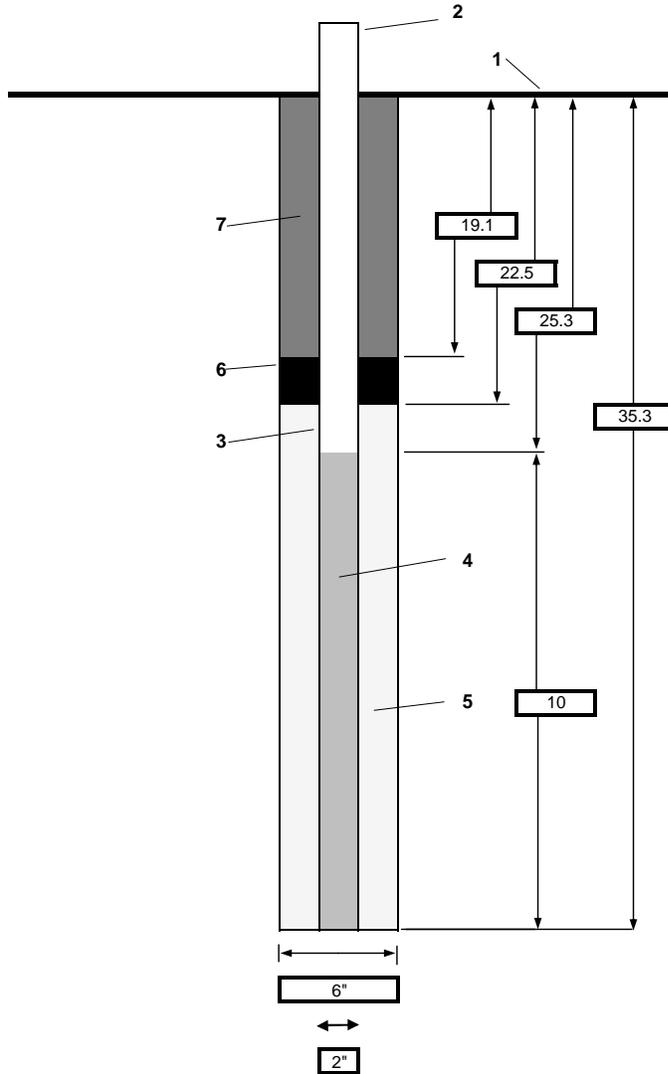
DRILLING METHOD AND EQUIPMENT USED :

WATER LEVELS : 16' During Drilling

START : 3/22/03

END : 3/22/03

LOGGER : Leo Kurylo



1- Ground elevation at well	681.26	NGVD 29, US Feet
2- Top of casing elevation a) vent hole?	683.48	NAD 83, Virginia State Plane
3- Dia./type of well casing	2-inch diameter PVC	
4- Type/slot size of screen	10-slot schedule 40 PVC with threaded bottom cap	
5- Type screen filter a) Quantity used	Morie #2 filter sand	
6- Type of seal a) Quantity used	Bentonite chips	
7- Grout a) Grout mix used b) Method of placement c) Vol. of well casing grout	31:1 Portland Cement/Bentonite Powder	
Development method		
Development time		
Estimated purge volume		

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



PROJECT NUMBER  
152130.FI.MW

WELL NUMBER  
GGW18 SHEET 1 OF 1

## WELL COMPLETION DIAGRAM

PROJECT : ABL Drilling and Well Installation

LOCATION : SWMU 37V

DRILLING CONTRACTOR Miller Drilling Company, Inc.

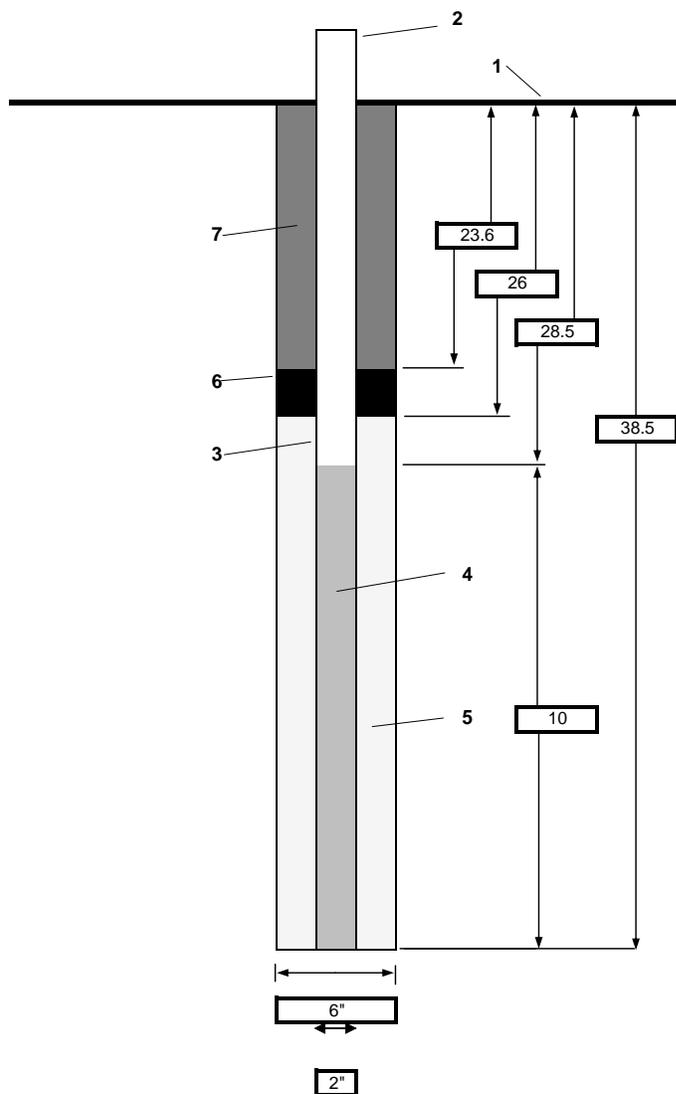
DRILLING METHOD AND EQUIPMENT USED :

WATER LEVELS : 16' During Drilling

START : 4/2/03

END : 4/4/03

LOGGER : Leo Kurylo



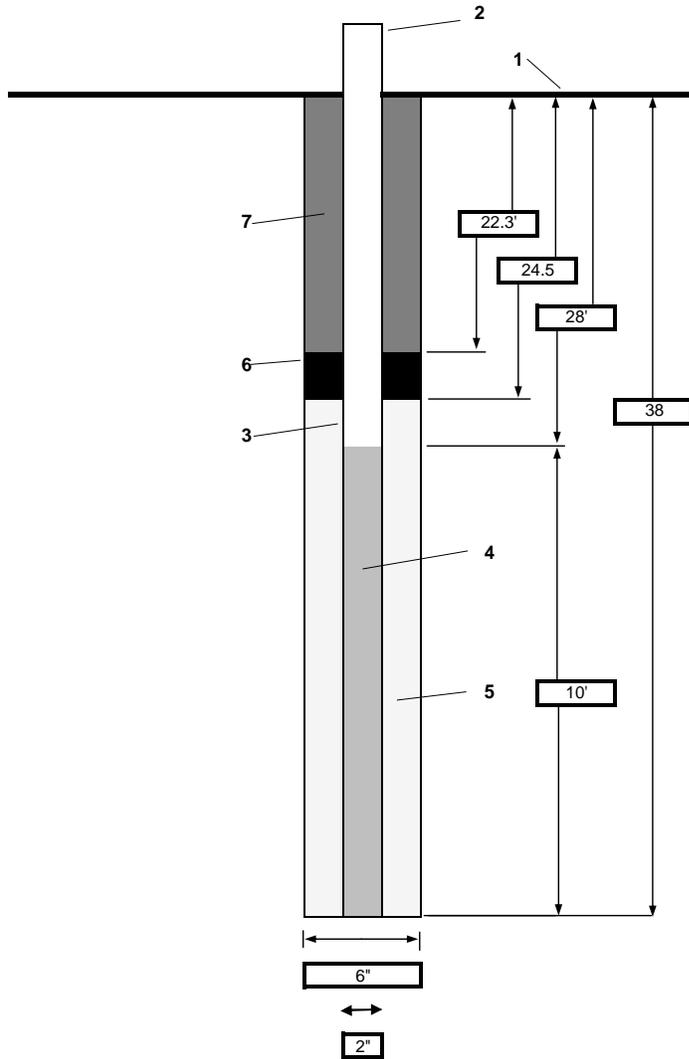
1- Ground elevation at well	680.87	NGVD 29, US Feet
2- Top of casing elevation a) vent hole?	682.78	NAD 83, Virginia State Plane
3- Dia./type of well casing	2-inch diameter PVC	
4- Type/slot size of screen	10-slot schedule 40 PVC with threaded bottom cap	
5- Type screen filter a) Quantity used	Morie #2 filter sand	
6- Type of seal a) Quantity used	Bentonite chips	
7- Grout a) Grout mix used b) Method of placement c) Vol. of well casing grout	20:1 Portland Cement/Bentonite Powder Tremie	
Development method		
Development time		
Estimated purge volume		

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



PROJECT NUMBER 152130.FI.MW	WELL NUMBER GGW19	SHEET 1	OF 1
<b>WELL COMPLETION DIAGRAM</b>			

PROJECT : ABL Drilling and Well Installation	LOCATION : SWMU 37V
DRILLING CONTRACTOR : Miller Drilling Company, Inc.	
DRILLING METHOD AND EQUIPMENT USED :	
WATER LEVELS : 16' During Drilling	START : 4/4/03      END : 4/4/03      LOGGER : Leo Kurylo



1- Ground elevation at well	679.16	NGVD 29, US Feet
2- Top of casing elevation a) vent hole?	681.43	NAD 83, Virginia State Plane
3- Dia./type of well casing	2-inch diameter PVC	
4- Type/slot size of screen	PVC 0.01"	
5- Type screen filter a) Quantity used	Morie #2 Sand	
6- Type of seal a) Quantity used	Bentonite Pellets	
7- Grout a) Grout mix used b) Method of placement c) Vol. of well casing grout	Portland Cement/Bentonite Powder	
Development method		
Development time		
Estimated purge volume		
Comments		

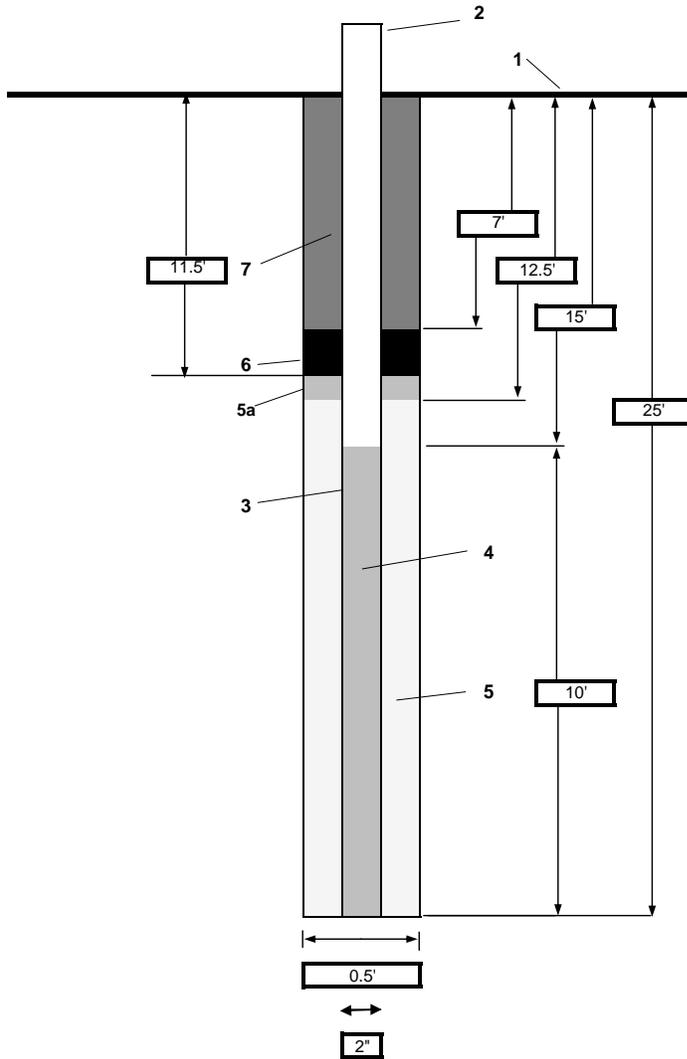


PROJECT NUMBER  
152130.FI.MW

WELL NUMBER  
GGW20 SHEET 1 OF 1

## WELL COMPLETION DIAGRAM

PROJECT : Allegany Ballistics Laboratory Site 37V Drilling and MW Installation      LOCATION : SWMU 37 E, Between Bldgs. 446 and Ave B  
 DRILLING CONTRACTOR Miller Drilling, Tracy Thrasher  
 DRILLING METHOD AND EQUIPMENT USED : Schramm T450 Rotodrill, 6" Dia. Casing Advancement  
 WATER LEVELS Approx. 2 ft bgs      START : 08/26/2003      END : 08/26/2003      LOGGER : E. Spande



1- Ground elevation at well	668.18	NGVD 29, US Feet
2- Top of casing elevation a) vent hole?	670.85	NAD 83, Virginia State Plane
3- Dia./type of well casing	2" Diameter, Schedule 40 PVC	
4- Type/slot size of screen	0.010 Slot	
5- Type screen filter	#2 Coarse sand, 7.5 50-lb bags	
5a- Type screen filter	#0 Fine sand, 1/4 50 lb. bag	
6- Type of seal a) Quantity used	3/8" Bentonite pellets* 1 5-gal bucket	
7- Type of seal	Cement grout	
8- Grout a) Grout mix used b) Method of placement c) Vol. of well casing grout	Portland Cement/Bentonite Powder Tremie Pipe 20 gallons	
Development method	Surge block and pump	
Development time	1 hr. 40 min.	
Estimated purge volume	173 gal	

Comments Use remaining grout from 12MW17 S/D location casing installation on 8/28/03

\* Since water was approx. 2 ft bgs, bentonite pellets didn't need to be hydrated



**CH2MHILL**

**PROJECT NUMBER**

152130.FI.27

**BORING NUMBER**

2-1

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT : ABL Drilling and MW Instal      LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; SWMU 37V

DRILLING CONTRACTOR : Vironex      DRILLING METHOD & EQUIPMENT USED:

DEPTH TO WATER (ft. Bgs): NA      START : 3/9/04      END : 3/9/04      LOGGER : R. Murley

DEPTH BELOW SURFACE (FT)			STANDARD PENETRATION TEST RESULTS	CORE DESCRIPTION	USCS	COMMENTS
INTERVAL (FT)	RECOVERY (IN)	#/TYPE				
			6"-6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0-4	48	NA	NA	0.0-0.4' Loose soil and roots, 10-15% gravels 0.4-2.0' Silty CLAY (CL) 10YR 7/8 yellow, w/angular crushed rock fill material, damp 2.0-4.0' Same as above, gravel content increases	CL	OVM = ambient OVM = ambient OVM = ambient
4-8	24	NA	NA	4.0-6.0' Silty CLAY (CL) 10YR 5/8 yellowish brown some clay mottles, 10YR 7/2 grey	CL	OVM = ambient
8-12	48	NA	NA	8.0-12.0' Silty CLAY (CL) 10YR 5/8 yellowish brown, 10-15% angular gravels (sample collected above bottom of boring)	CL	OVM = ambient

**Note:**

NA = Not Applicable



**CH2MHILL**

**PROJECT NUMBER**

152130.FI.27

**BORING NUMBER**

2-2

SHEET 1 OF 1

**SOIL BORING LOG**

PROJECT : ABL Drilling and MW Instal      LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; SWMU 37V

DRILLING CONTRACTOR : Vironex      DRILLING METHOD & EQUIPMENT USED:

DEPTH TO WATER (ft. Bgs): NA      START 3/9/04      END : 3/9/04      LOGGER : R. Murley

DEPTH BELOW SURFACE (FT)		STANDARD PENETRATION TEST RESULTS	CORE DESCRIPTION	USCS	COMMENTS
INTERVAL (FT)	RECOVERY (IN)				
	#/TYPE	6"-6"-6" (N)			
0-4	36	NA	NA	SM	0.0-0.2' Wet loose soil and roots
					0.2-2.0' Angular gravel fill material, with 20% silty clay 10YR 3/5 dark yellowish brown
					2.0-4.0' Silty SAND (SM) 7.5YR 6/7 reddish yellow stiff, moist
4-8	24	NA	NA	CL	4.0-4.5' Slough
					4.5-6.0' Silty CLAY (CL) 7.5YR 3/4 dark brown stiff, plastic, damp, lenses of clay 10YR 7/2 light gray
8-11	36	NA	NA	CL	8.0-9.0' Slough
					9.0-11.0' CLAY (CL) 10YR 7/2 light gray, wet with
					lenses silty clay (sample collected)

**Note:**  
NA = Not Applicable



**CH2MHILL**

<b>PROJECT NUMBER</b> 152130.FI.27	<b>BORING NUMBER</b> 2-3	SHEET 1 OF 1
<b>SOIL BORING LOG</b>		

PROJECT : ABL Drilling and MW Instal      LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; SWMU 37V  
 DRILLING CONTRACTOR : Vironex      DRILLING METHOD & EQUIPMENT USED:

DEPTH TO WATER (ft. Bgs): NA      START : 3/9/04      END : 3/9/04      LOGGER : R. Murley

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION	CORE DESCRIPTION	USCS	COMMENTS
				TEST RESULTS			
				6"-6"-6" (N)			
0-4	30	2-3-1 Grab	NA	NA	0.0-1.0' Fill material, 50% angular gravels, with silty clay 7.5YR 5/8 strong brown, loose, moist (sample collected)	CL	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm Breathing Zone Above Hole) OVM = ambient
5 4-8	36	NA	NA	NA	4.0-5.0' Slough	CL	OVM = ambient
					5.0-7.0' CLAY (CL) 10YR 7/2 light gray, stiff, plastic, damp, 10-15% clay mottles, 10YR 7/6 yellow		OVM = ambient
10 8-12	48	NA	NA	NA	8.0-9.0' Slough	CL	OVM = ambient
					9.0-12.0' CLAY (CL) 10YR 7/2 light gray, stiff, moist 10% clay mottles, 10YR 7/6 yellow		
					(sample collected above bottom of boring)		

**Note:**  
NA = Not Applicable

				PROJECT NUMBER 152130.FI.27		BORING NUMBER 2-4		SHEET 1 OF 1	
				<b>SOIL BORING LOG</b>					
PROJECT : ABL Drilling and MW Instal				LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; SWMU 37V					
DRILLING CONTRACTOR : Vironex				DRILLING METHOD & EQUIPMENT USED:					
DEPTH TO WATER (ft. Bgs): NA				START : 3/9/04		END : 3/9/04		LOGGER : R. Murley	
DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (IN)	#/TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	CORE DESCRIPTION	USCS	COMMENTS		
							DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm Soil Headspace)		
5	0-4	48	2-4-1 Grab	NA	0.0-0.3' Wet loose soil and roots 0.3-1.0' Silty CLAY (CL) 10YR yellowish brown, w/brick, angular gravel and crushed rock fill material (sample collected)	CL	OVM = ambient		
			NA				1.0-1.5' Gravel layer 1.5-4.0' Silty CLAY (CL) 5Y 6/6 olive yellow,	CL	OVM = ambient
5	4-8	48	NA	NA	4.0-6.0' Same as above, increasing angular gravel content with depth 6.0-8.0' Same as above	CL	OVM = ambient		
							OVM = ambient		
10	8-11	36	NA	NA	8.0-11.0' Same as above (sample collected from bottom of boring)	CL			
			2-4-1011						

**Note:**  
NA = Not Applicable



**CH2MHILL**

**PROJECT NUMBER**  
152130.FI.MW

**BORING NUMBER**  
GGW17

SHEET 1 OF 2

### SOIL BORING LOG

PROJECT : ABL Drilling and MW Instal    LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; SWMU 37V

DRILLING CONTRACTOR : Miller Drilling    DRILLING METHOD & EQUIPMENT USED:

DEPTH TO WATER (ft. Bgs):

START :3/22/03

END : 3/22/03

LOGGER : L. Kurylo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)			STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION	USCS	COMMENTS
	RECOVERY (IN)	#/TYPE					
0-5	NA	NA	NA	LEAN SILT Light brown, moist, soft, medium plasticity, trace sand	ML	FID = ambient	
5-10	NA	NA	NA	Soil cuttings unaccessible due to curtain around drill table		FID = ambient Drill rate = 1.5 ft/min	
10-15	NA	NA	NA	Same as above		FID = ambient Driller reports groundwater at 15' bgs	
15-20	NA	NA	NA	Same as above		FID = ambient	
20-25	NA	NA	NA	Same as above		FID = ambient	
25-27	NA	NA	NA	Same as above		FID = ambient	
27-30	NA	NA	NA	WELL GRADED GRAVEL Driller reports change in drilling - Apparently in gravel layer	GW	FID = ambient	



**CH2MHILL**

**PROJECT NUMBER**

152130.FI.MW

**BORING NUMBER**

GGW17

SHEET 2 OF 2

# SOIL BORING LOG

PROJECT : ABL Drilling and MW Instal    LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; SWMU 37V

DRILLING CONTRACTOR : Miller Drilling    DRILLING METHOD & EQUIPMENT USED:

DEPTH TO WATER (ft. Bgs):

START :3/22/03

END : 3/22/03

LOGGER : L. Kurylo

DEPTH BELOW SURFACE (FT)				STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION	USCS	COMMENTS
INTERVAL (FT)	RECOVERY (IN)						
	#	TYPE					
30-36	NA	NA	NA	WELL GRADED GRAVEL Same as above	SM	FID = Ambient	
35				LIMESTONE Dark gray to black, strong reaction to dilute HCl solution		FID = Ambient	
40							

**Note:**

NA = Not Applicable



**CH2MHILL**

**PROJECT NUMBER**

152130.FI.MW

**BORING NUMBER**

GGW18

SHEET 1 OF 2

**SOIL BORING LOG**

PROJECT : ABL Drilling and MW Instal LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; SWMU 37V

DRILLING CONTRACTOR : Miller Drilling DRILLING METHOD & EQUIPMENT USED: 6" tricone roller bit

DEPTH TO WATER (ft. Bgs):

START :4/3/03

END : 4/3/03

LOGGER : L. Kurylo

DEPTH BELOW SURFACE (FT)				STANDARD PENETRATION TEST RESULTS	CORE DESCRIPTION	USCS	COMMENTS
INTERVAL (FT)	RECOVERY (IN)		#/TYPE				
				6"-6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
0-5	NA	NA	NA	NA	LEAN SILT Brown, moist, soft, high plasticity, <5% fine to coarse sand	OH/OL	FID = ambient
5-10	NA	NA	NA	NA			FID = ambient Drill rate = 1.5 ft/min
10-15	NA	NA	NA	NA			FID = ambient
15-20	NA	NA	NA	NA			Driller breathing zone, FID = 0.2 ppm Drill rods, FID = 0.5 ppm (2.1 ppm spike) Drilling rate = 1.6 ft/min Dark brown organic substance (appears to be naturally occurring) floating on drill cutting water
20-25	NA	NA	NA	NA	Driller reports sand/gravel at 22' bgs	SP GP	Driller breathing zone, FID = 0.0 to 0.4 ppm Drill rods, FID = 0.1 to 0.9 ppm Driller reports groundwater at 22' bgs
25-30	NA	NA	NA	NA			Driller breathing zone, FID = 0.1 to 0.6 ppm Drill rods, FID = 0.1 to 1.9 ppm Trough breathing zone, FID = ambient



**CH2MHILL**

**PROJECT NUMBER**

152130.FI.MW

**BORING NUMBER**

GGW18

SHEET 2 OF 2

## SOIL BORING LOG

PROJECT : ABL Drilling and MW Instal    LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; SWMU 37V

DRILLING CONTRACTOR : Miller Drilling    DRILLING METHOD & EQUIPMENT USED:

DEPTH TO WATER (ft. Bgs):

START :4/3/03

END : 4/3/03

LOGGER : L. Kurylo

DEPTH BELOW SURFACE (FT)				STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION	USCS	COMMENTS
INTERVAL (FT)	RECOVERY (IN)		#/TYPE				
30-35	NA	NA	NA	Driller reports hard layer 31'-32' bgs		Driller breating zone, FID = ambient Drill rods, FID = ambient Trough breating zone, FID = ambient	
35-38	NA	NA	NA	Driller reports bedrock at 38.5' bgs		Driller breating zone, FID = ambient Drill rods, FID = ambient Trough breating zone, FID = ambient Driller added 50 gal water to help remove cuttings	
40				LIMESTONE Black to dark gray, <5% white to light gray calcite present, strong HCl reaction			

**Note:**

NA = Not applicable



**CH2MHILL**

<b>PROJECT NUMBER</b> 152130.FI.MW	<b>BORING NUMBER</b> GGW19	SHEET 1 OF 2
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## SOIL BORING LOG

PROJECT : ABL Drilling and MW Instal      LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; SWMU 37V

DRILLING CONTRACTOR : Miller Drilling      DRILLING METHOD & EQUIPMENT USED:

DEPTH TO WATER (ft. Bgs):      START :4/4/03      END : 4/4/03      LOGGER : L. Kurylo

DEPTH BELOW SURFACE (FT)	RECOVERY (IN)			STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	USCS	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION. OVM (ppm): Breathing Zone Above Hole
	INTERVAL (FT)	#/TYPE					
0-5	NA	NA	NA	ORGANIC SILT Brown, moist, soft, medium plasticity, ~5% fine to coarse sand, earthy odor	OH/OL	Driller breathing zone, FID = ambient Drill rods, FID = ambient	
5-10	NA	NA	NA	LEAN SILT Brown, dry, soft, low plasticity, <5% fine sand	ML	Driller breathing zone, FID = ambient Drill rods, FID = ambient	
10-15	NA	NA	NA	LEAN SILT Same as above	CL	Driller breathing zone, FID = ambient Drill rods, FID = ambient	
15-20	NA	NA	NA	LEAN CLAY Dark gray, moist, soft, high plasticity	CL	Driller breathing zone, FID = ambient Drill rods, FID = ambient Drilling rate approx 1.5 ft/min	
20-25	NA	NA	NA	LEAN CLAY Same as above	SM	Driller breathing zone, FID = ambient Trough breathing zone, FID = 0.9 ppm Drillrods, FID = 7.8 ppm Drillers close drill curtain	
25-30	NA	NA	NA	SILTY SAND WITH GRAVEL Brown, we, dense, well graded fine to coarse sand, ~25% silt/clay, ~20% fine to medium gravel	SM	Driller breathing zone, FID = ambient Trough breathing zone, FID = 0.2 ppm, (3.2 ppm spike) Drill curtain seam, FID = 6.8 ppm	



**CH2MHILL**

**PROJECT NUMBER**

152130.FI.MW

**BORING NUMBER**

GGW19

SHEET 2 OF 2

## SOIL BORING LOG

PROJECT : ABL Drilling and MW Instal    LOCATION : Allegeny Ballistics Laboratory, Rocket Center, WV; Site 37V

DRILLING CONTRACTOR : Miller Drilling    DRILLING METHOD & EQUIPMENT USED:

DEPTH TO WATER (ft. Bgs):

START :4/4/03

END : 4/4/03

LOGGER : L. Kurylo

DEPTH BELOW SURFACE (FT)				STANDARD PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	CORE DESCRIPTION	USCS	COMMENTS
INTERVAL (FT)	RECOVERY (IN)		#/TYPE				
30-35	NA	NA	NA	SILTY SAND WITH GRAVEL Same as above, but light brown to light gray	SM	Driller breathing zone, FID = ambient Trough breathing zone, FID = ambient Drill curtain, FID = 3.6 ppm	
35-38	NA	NA	NA	SILTY SAND WITH GRAVEL Same as above		Driller breathing zone, FID = ambient Trough breathing zone, FID = ambient Drill curtain, FID = 4.2 ppm Driller added approx. 35 gallons (max.) to help remove cuttings.	
40				LIMESTONE BEDROCK Black to dark gray, strong HCl reaction		Driller breathing zone, FID = ambient Trough breathing zone, FID = ambient Drill curtain seam, FID = 22.2 ppm	

**Note:**

NA = Not applicable

**Appendix B**  
**Raw Analytical Data**

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Table B-1  
Raw Analytical Results for SWMU 2 Groundwater Sample  
Phase III/IV Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

<b>Station ID</b>	2-5
<b>Sample ID</b>	2-5-GW
<b>Sample Date</b>	04/05/04
<b>Chemical Name</b>	
<b>Volatile Organic Compounds (UG/L)</b>	
1,1,1-Trichloroethane	0.5 U
1,1,2,2-Tetrachloroethane	0.5 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	0.5 U
1,1,2-Trichloroethane	0.5 U
1,1-Dichloroethane	0.5 U
1,1-Dichloroethene	0.5 U
1,2,3-Trichlorobenzene	0.5 U
1,2,4-Trichlorobenzene	0.5 U
1,2-Dibromo-3-chloropropane	0.5 U
1,2-Dibromoethane	0.5 U
1,2-Dichlorobenzene	0.5 U
1,2-Dichloroethane	0.5 U
1,2-Dichloropropane	0.5 U
1,3-Dichlorobenzene	0.5 U
1,4-Dichlorobenzene	0.5 U
2-Butanone	5 R
2-Hexanone	5 R
4-Methyl-2-pentanone	5 U
Acetone	5 R
Benzene	0.5 U
Bromochloromethane	0.5 U
Bromodichloromethane	0.5 U
Bromoform	0.5 U
Bromomethane	0.5 U
Carbon disulfide	0.5 U
Carbon tetrachloride	0.5 U
Chlorobenzene	0.5 U
Chloroethane	0.5 U
Chloroform	0.5 U
Chloromethane	0.45 J
Cumene	0.5 U
Cyclohexane	0.5 U
Dibromochloromethane	0.5 U
Dichlorodifluoromethane(Freon-12)	0.5 U
Ethylbenzene	0.5 U
Methyl acetate	0.5 R
Methyl-tert-butyl ether (MTBE)	0.5 U
Methylcyclohexane	0.5 U
Methylene chloride	0.5 U
Styrene	0.5 U
Tetrachloroethene	0.5 U
Toluene	0.5 U
Trichloroethene	0.5 U
Trichlorofluoromethane(Freon-11)	0.5 U
Vinyl chloride	0.5 U
Xylene, total	0.5 U
cis-1,2-Dichloroethene	0.5 U
cis-1,3-Dichloropropene	0.5 U
trans-1,2-Dichloroethene	0.5 U
trans-1,3-Dichloropropene	0.5 U
<b>Semi-volatile Organic Compounds (UG/L)</b>	
1,1-Biphenyl	5.1 U
1,2,4,5-Tetrachlorobenzene	5.1 U
2,4,5-Trichlorophenol	20 U
2,4,6-Trichlorophenol	5.1 U
2,4-Dichlorophenol	5.1 U
2,4-Dimethylphenol	5.1 U
2,4-Dinitrophenol	20 U
2,4-Dinitrotoluene	5.1 U
2,6-Dinitrotoluene	5.1 U
2-Chloronaphthalene	5.1 U
2-Chlorophenol	5.1 U

Table B-1  
 Raw Analytical Results for SWMU 2 Groundwater Sample  
 Phase III/IV Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

<b>Station ID</b>	2-5
<b>Sample ID</b>	2-5-GW
<b>Sample Date</b>	04/05/04
<b>Chemical Name</b>	
2-Methylnaphthalene	5.1 U
2-Methylphenol	5.1 U
2-Nitroaniline	20 U
2-Nitrophenol	5.1 U
3,3'-Dichlorobenzidine	5.1 U
3-Nitroaniline	20 U
4,6-Dinitro-2-methylphenol	20 U
4-Bromophenyl-phenylether	5.1 U
4-Chloro-3-methylphenol	5.1 U
4-Chloroaniline	5.1 U
4-Chlorophenyl-phenylether	5.1 U
4-Methylphenol	5.1 U
4-Nitroaniline	20 U
4-Nitrophenol	20 UL
Acenaphthene	5.1 U
Acenaphthylene	5.1 U
Acetophenone	5.1 U
Anthracene	5.1 U
Atrazine	5.1 U
Benzaldehyde	5.1 U
Benzo(a)anthracene	5.1 U
Benzo(a)pyrene	5.1 U
Benzo(b)fluoranthene	5.1 U
Benzo(g,h,i)perylene	5.1 U
Benzo(k)fluoranthene	5.1 U
Bis(2-chloro-1-methylethyl) ether	5.1 U
Butylbenzylphthalate	5.1 U
Caprolactam	5.1 U
Chrysene	5.1 U
Di-n-butylphthalate	5.1 U
Di-n-octylphthalate	5.1 U
Dibenz(a,h)anthracene	5.1 U
Dibenzofuran	5.1 U
Diethylphthalate	5.1 U
Dimethyl phthalate	5.1 U
Fluoranthene	5.1 U
Fluorene	5.1 U
Hexachlorobenzene	5.1 U
Hexachlorobutadiene	5.1 U
Hexachlorocyclopentadiene	5.1 U
Hexachloroethane	5.1 U
Indeno(1,2,3-cd)pyrene	5.1 U
Isophorone	5.1 U
Naphthalene	5.1 U
Nitrobenzene	5.1 U
Pentachlorophenol	5.1 U
Phenanthrene	5.1 U
Phenol	5.1 U
Pyrene	5.1 U
bis(2-Chloroethoxy)methane	5.1 U
bis(2-Chloroethyl)ether	5.1 U
bis(2-Ethylhexyl)phthalate	5.1 U
n-Nitroso-di-n-propylamine	5.1 U
n-Nitrosodiphenylamine	5.1 U

Table B-1  
 Raw Analytical Results for SWMU 2 Groundwater Sample  
 Phase III/IV Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

<b>Station ID</b>	2-5
<b>Sample ID</b>	2-5-GW
<b>Sample Date</b>	04/05/04
<b>Chemical Name</b>	
<b>Total Metals (UG/L)</b>	
Aluminum	18,100
Antimony	4.1 U
Arsenic	14.5 K
Barium	132 J
Beryllium	1.4 J
Cadmium	0.41 B
Calcium	129,000
Chromium	30
Chromium (hexavalent)	10 U
Cobalt	16.6 J
Copper	33.5
Cyanide	10 U
Iron	36,800
Lead	21.2
Magnesium	16,400
Manganese	371
Mercury	0.1 U
Nickel	33.1 J
Potassium	4,670 J
Selenium	2.3 U
Silver	0.9 U
Sodium	13,200
Thallium	4.1 UL
Vanadium	36.6 J
Zinc	109
<b>Dissolved Metals (UG/L)</b>	
Aluminum	247 B
Antimony	4.1 U
Arsenic	4.5 J
Barium	47.2 J
Beryllium	0.12 B
Cadmium	0.3 U
Calcium	120,000
Chromium	1.6 B
Chromium (hexavalent)	10 U
Cobalt	1.8 J
Copper	2.4 B
Iron	683
Lead	1.7 UL
Magnesium	15,000
Manganese	164
Mercury	0.1 U
Nickel	7.7 J
Potassium	1,380 J
Selenium	2.3 U
Silver	0.9 U
Sodium	12,900
Thallium	4.1 UL
Vanadium	1.2 U
Zinc	14 J

**Notes:**

- 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 B-2  
Raw Analytical Results for SWMU 2 Soil Samples  
Phase III/IV Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

Station ID	2-1			2-2		2-3		2-4	
Sample ID	2-1-T	2-1-D	2-1-P-D	2-2-T	2-2-D	2-3-T	2-3-D	2-4-T	2-4-D
Sample Date	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04
Chemical Name									
<b>Volatile Organic Compounds (UG/KG)</b>									
1,1,1-Trichloroethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,1,2,2-Tetrachloroethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,1,2-Trichloroethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,1-Dichloroethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,1,1-Dichloroethene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,2,4-Trichlorobenzene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,2-Dibromo-3-chloropropane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,2-Dibromoethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,2-Dichlorobenzene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,2-Dichloroethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,2-Dichloropropane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,3-Dichlorobenzene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
1,4-Dichlorobenzene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
2-Butanone	8.4 B	8.1 B	8.5 B	7.1 B	7.1 B	6.3 B	9.9 B	8.5 B	7.9 B
2-Hexanone	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
4-Methyl-2-pentanone	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Acetone	11 B	7.9 B	9.7 UJ	7 B	7.3 B	5.1 B	8.1 B	11 B	7.8 B
Benzene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Bromodichloromethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Bromoform	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Bromomethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Carbon disulfide	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Carbon tetrachloride	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Chlorobenzene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Chloroethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Chloroform	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Chloromethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Cumene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Cyclohexane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Dibromochloromethane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Dichlorodifluoromethane(Freon-12)	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Ethylbenzene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Methyl acetate	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Methyl-tert-butyl ether (MTBE)	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Methylcyclohexane	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Methylene chloride	2.3 B	2.2 B	2.3 B	2.8 B	3 B	2.5 B	2.8 B	3.1 B	2.7 B
Styrene	1.9 B	1.9 B	2.1 B	2.4 B	2.2 B	2.4 B	3.5 B	3.3 B	1.9 B
Tetrachloroethene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Toluene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Trichloroethene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U

Table B-2  
Raw Analytical Results for SWMU 2 Soil Samples  
Phase III/IV Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

Station ID	2-1			2-2		2-3		2-4	
Sample ID	2-1-T	2-1-D	2-1P-D	2-2-T	2-2-D	2-3-T	2-3-D	2-4-T	2-4-D
Sample Date	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04
Chemical Name									
Trichlorofluoromethane(Freon-11)	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Vinyl chloride	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Xylene, total	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
cis-1,2-Dichloroethene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
cis-1,3-Dichloropropene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
trans-1,2-Dichloroethene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
trans-1,3-Dichloropropene	9.4 U	10 U	9.7 U	9.5 U	10 U	8.5 U	10 U	10 U	9.7 U
Semi-volatile Organic Compounds (UG/KG)									
1,1-Biphenyl	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2,4,5-Trichlorophenol	980 U	1,000 U	1,000 U	960 U	1,000 U	930 U	1,000 U	1,000 U	1,000 U
2,4,6-Trichlorophenol	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2,4-Dichlorophenol	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2,4-Dimethylphenol	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2,4-Dinitrophenol	980 U	1,000 U	1,000 U	960 U	1,000 U	930 U	1,000 U	1,000 U	1,000 U
2,4-Dinitrotoluene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2,6-Dinitrotoluene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2-Chloronaphthalene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2-Chlorophenol	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2-Methylnaphthalene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2-Methylphenol	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
2-Nitroaniline	980 U	1,000 U	1,000 U	960 U	1,000 U	930 U	1,000 U	1,000 U	1,000 U
2-Nitrophenol	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
3,3'-Dichlorobenzidine	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
3-Nitroaniline	980 U	1,000 U	1,000 U	960 U	1,000 U	930 U	1,000 U	1,000 U	1,000 U
4,6-Dinitro-2-methylphenol	980 U	1,000 U	1,000 U	960 U	1,000 U	930 U	1,000 U	1,000 U	1,000 U
4-Bromophenyl-phenylether	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
4-Chloro-3-methylphenol	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
4-Chloroaniline	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
4-Chlorophenyl-phenylether	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
4-Methylphenol	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
4-Nitroaniline	980 U	1,000 U	1,000 U	960 U	1,000 U	930 U	1,000 U	1,000 U	1,000 U
4-Nitrophenol	980 U	1,000 U	1,000 U	960 U	1,000 U	930 U	1,000 U	1,000 U	1,000 U
Acenaphthene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Acenaphthylene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Acetophenone	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Anthracene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Atrazine	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Benzaldehyde	390 UJ	410 UJ	420 UJ	380 UJ	420 UJ	370 UJ	410 UJ	410 UJ	400 UJ
Benzo(a)anthracene	390 U	410 U	420 U	76 J	420 U	370 U	410 U	410 U	400 U
Benzo(a)pyrene	390 U	410 U	420 U	54 J	420 U	370 U	410 U	410 U	400 U
Benzo(b)fluoranthene	390 U	410 U	420 U	77 J	420 U	370 U	410 U	410 U	400 U
Benzo(g,h,i)perylene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U

Table B-2  
Raw Analytical Results for SWMU 2 Soil Samples  
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Station ID	2-1			2-2		2-3		2-4	
Sample ID	2-1-T	2-1-D	2-1-P-D	2-2-T	2-2-D	2-3-T	2-3-D	2-4-T	2-4-D
Sample Date	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04
Chemical Name									
Benzo(k)fluoranthene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Bis(2-chloro-1-methylethyl) ether	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Butylbenzylphthalate	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Carbazole	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Chrysene	390 U	410 U	420 U	53 J	420 U	370 U	410 U	410 U	400 U
Di-n-butylphthalate	390 U	410 U	420 U	380 U	390 J	160 J	300 J	410 U	400 U
Di-n-octylphthalate	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Dibenz(a,h)anthracene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Dibenzofuran	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Diethylphthalate	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Dimethyl phthalate	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Fluoranthene	390 U	410 U	420 U	110 J	420 U	370 U	410 U	410 U	400 U
Fluorene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Hexachlorobenzene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Hexachlorobutadiene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Hexachlorocyclopentadiene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Hexachloroethane	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Indeno(1,2,3-cd)pyrene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Isophorone	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Naphthalene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Nitrobenzene	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Pentachlorophenol	980 U	1,000 U	1,000 U	960 U	1,000 U	930 U	1,000 U	1,000 U	1,000 U
Phenanthrene	390 U	410 U	420 U	52 J	420 U	370 U	410 U	410 U	400 U
Phenol	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
Pyrene	390 U	410 U	420 U	66 J	420 U	370 U	410 U	410 U	400 U
bis(2-Chloroethoxy)methane	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
bis(2-Chloroethyl)ether	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
bis(2-Ethylhexyl)phthalate	390 U	410 U	43 J	380 U	420 U	41 J	410 U	410 U	40 J
bis(Chloromethyl)ether	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
n-Nitroso-di-n-propylamine	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
n-Nitrosodiphenylamine	390 U	410 U	420 U	380 U	420 U	370 U	410 U	410 U	400 U
<b>Total Metals (MG/KG)</b>									
Aluminum	6,070	14,200	15,900	9,560	15,600	7,400	12,800	6,710	15,500
Antimony	0.82 B	0.59 R	0.73 R	0.62 R	0.56 R	0.53 B	0.75 B	0.64 R	0.54 R
Arsenic	8.7	11.2	7.8	10.1	7.1	3 B	6.9	14.3	3.6 B
Barium	707	83.8	80.4	985	126	26.5	57	776	59.6
Beryllium	1.1	1	1.1	0.68 J	1	0.35 J	0.82	0.77 J	0.96
Cadmium	0.047 U	0.043 U	0.053 U	1.4	0.041 U	0.55 J	0.046 U	0.047 U	0.039 U
Calcium	5,590	42,300	19,100	20,400	3,870	243,000	93,400	1,220	23,500
Chromium	19.3	17	20.5	24.1	22.4	9.8	13.8	12.7	19.4
Chromium (hexavalent)	0.52 U	0.59 U	0.56 U	0.53 U	0.58 U	0.51 U	0.55 U	0.53 U	0.54 U
Cobalt	4.3 J	14.6	10.3	6.4 J	10.7	3.9 J	9.4	6.6 J	7.6

Table B-2  
Raw Analytical Results for SWMU 2 Soil Samples  
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Station ID	2-1			2-2		2-3		2-4	
Sample ID	2-1-T	2-1-D	2-1P-D	2-2-T	2-2-D	2-3-T	2-3-D	2-4-T	2-4-D
Sample Date	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/09/04
Chemical Name									
Copper	15.9	28.5	25.3	21.8	21.5	7.7	17.6	10.2	23.8
Cyanide	0.16 U	0.18 U	0.16 U	0.15 U	0.17 U	0.15 U	0.15 U	0.17 U	0.16 U
Iron	31,000	22,500	22,700	28,200	20,900	8,670	15,000	19,600	26,500
Lead	24	12.6	13.2	32.1	19	8.5	7.9	28.9	11.2
Magnesium	733 J	3,120	3,510	2,300	3,220	39,600	3,430	838 K	2,970
Manganese	92	305	123	98.5	153	196	178	101	128
Mercury	0.027 B	0.024 B	0.02 B	0.03 B	0.03 B	0.019 B	0.018 B	0.031 B	0.034 B
Nickel	10.8	25.9	25.7	14.3	26.4	8.9	19.2	13.2	23.3
Potassium	1,580	2,020	2,140	2,580	1,730	2,210	2,210	2,650	2,150
Selenium	1.1 B	0.6 B	0.41 UL	1.3 B	0.4 B	0.31 B	0.73 B	0.47 B	0.65 B
Silver	0.14 U	0.13 U	0.16 U	0.14 U	0.12 U	0.12 U	0.14 U	0.14 U	0.12 U
Sodium	528 B	452 B	287 B	1,360 L	441 B	843 B	935 B	1,100 L	148 B
Thallium	1.4 B	0.68 B	1.2 B	1.1 B	0.73 B	0.52 U	0.62 U	1.1 B	1.3 B
Vanadium	20.3	19.5	24.4	24.1	27.7	12.5	15.3	15.6	16.9
Zinc	152	44.4	56.7	119	62.7	23.5	30	102	41.7
Wet Chemistry (MG/KG)									
% Solids	85	81	80	87	80	89	82	82	83
Carbon	23,000 L	NA	NA	30,000 L	NA	39,000 L	NA	5,800 L	NA
pH	8.4	7.6	7.5	7.9	7.8	9.4	7.5	8.2	7.8

**Notes:**

- 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 B-3  
Raw Analytical Results for SWMU 27A Sediment Samples  
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Station ID	27A-3	27A-4	27A-5		27A-6	27A-7	27A-8	27A-9		27A-10	27A-11	27A-12		27A-13
Sample ID	27A-3-SD	27A-4-SD	27A-5-SD	27A-5P-SD	27A-6-SD	27A-7-SD	27A-8-SD	27A-9-SD	27A-9P-SD	27A-10-SD	27A-11-SD	27A-12-SD	27A-12P-SD	27A-13-SD
Sample Date	04/25/02	04/25/02	04/26/02	04/26/02	04/26/02	04/26/02	04/25/02	04/26/02	04/26/02	04/30/02	04/26/02	04/26/02	04/26/02	04/25/02
Chemical Name														
Volatiles Organic Compounds (UG/KG)														
1,1,1-Trichloroethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	3.5 J	NA	NA	NA
1,1,2-Trichloroethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,1-Dichloroethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,1-Dichloroethene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,2,4-Trichlorobenzene	NA	18 U	5 B	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,2-Dibromo-3-chloropropane	NA	18 U	16 R	15 R	16 R	22 R	18 U	120 R	NA	61 R	31 R	NA	NA	NA
1,2-Dibromoethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,2-Dichlorobenzene	NA	18 U	2.2 J	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,2-Dichloroethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,2-Dichloropropane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,3-Dichlorobenzene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
1,4-Dichlorobenzene	NA	18 U	2.6 B	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
2-Butanone	NA	18 U	16 U	15 U	16 U	22 U	18 UJ	120 U	NA	61 U	31 U	NA	NA	NA
2-Hexanone	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
4-Methyl-2-pentanone	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Acetone	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	93	31 U	NA	NA	NA
Benzene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Bromodichloromethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Bromoform	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Bromomethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Carbon disulfide	NA	6 J	7.9 J	9.5 J	3.7 J	5.2 J	13 J	16 J	NA	61 U	8 J	NA	NA	NA
Carbon tetrachloride	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Chlorobenzene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Chloroethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Chloroform	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Chloromethane	NA	3.9 J	16 U	3.6 J	5.3 J	9.4 J	18 U	54 J	NA	19 J	14 J	NA	NA	NA
Cumene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Cyclohexane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Dibromochloromethane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Dichlorodifluoromethane(Freon-12)	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Ethylbenzene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Methyl acetate	NA	18 U	16 U	15 U	16 U	22 U	18 UJ	120 U	NA	61 U	31 U	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Methylcyclohexane	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Methylene chloride	NA	6.1 B	7.2 B	9.6 B	12 B	17 B	18 U	110 B	NA	40 B	21 B	NA	NA	NA
Styrene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Tetrachloroethene	NA	2 B	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Toluene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Trichloroethene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Trichlorofluoromethane(Freon-11)	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Vinyl acetate	NA	18 U	NA	NA	NA	NA	18 U	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
Xylene, total	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
cis-1,2-Dichloroethene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
cis-1,3-Dichloropropene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
trans-1,2-Dichloroethene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA
trans-1,3-Dichloropropene	NA	18 U	16 U	15 U	16 U	22 U	18 U	120 U	NA	61 U	31 U	NA	NA	NA

Table B-3  
Raw Analytical Results for SWMU 27A Sediment Samples  
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Station ID	27A-3	27A-4	27A-5		27A-6	27A-7	27A-8	27A-9		27A-10	27A-11	27A-12		27A-13
Sample ID	27A-3-SD	27A-4-SD	27A-5-SD	27A-5P-SD	27A-6-SD	27A-7-SD	27A-8-SD	27A-9-SD	27A-9P-SD	27A-10-SD	27A-11-SD	27A-12-SD	27A-12P-SD	27A-13-SD
Sample Date	04/25/02	04/25/02	04/26/02	04/26/02	04/26/02	04/26/02	04/25/02	04/26/02	04/26/02	04/30/02	04/26/02	04/26/02	04/26/02	04/25/02
Chemical Name														
<b>Semi-volatile Organic Compounds (UG/KG)</b>														
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	460 J	190 J	230	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	69 UJ	57 UJ	140 U	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	40 J	8.6 J	11 J	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	21 J	8.6 J	14	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	260 J	28 J	28	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	1,000 J	170 J	180	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	270 J	41 J	23 J	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	55 UJ	46 UJ	110 U	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	41 J	11 J	21	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	190 J	170 J	210 J	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	2,700 J	640 J	740	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	97 J	29 J	57 U	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	120 J	25 J	34 J	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	140 UJ	110 UJ	280 U	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	34 J	26 J	27	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	6.9 J	1.1 J	1.4	NA	NA	NA	NA
<b>Explosives (UG/KG)</b>														
1,3,5-Trinitrobenzene	100 U	100 U	100 U	100 U	NA	100 U	NA	NA	NA	NA	100 U	100 U	NA	100 U
1,3-Dinitrobenzene	100 U	100 U	100 U	100 U	NA	100 U	NA	NA	NA	NA	100 U	100 U	NA	100 U
2,4,6-Trinitrotoluene	100 U	100 U	100 U	100 U	NA	100 U	NA	NA	NA	NA	100 U	100 U	NA	100 U
2,4-Dinitrotoluene	100 U	100 U	100 U	100 U	NA	100 U	NA	NA	NA	NA	100 U	100 U	NA	100 U
2,6-Dinitrotoluene	100 U	100 U	100 U	100 U	NA	100 U	NA	NA	NA	NA	100 U	100 U	NA	100 U
2-Amino-4,6-dinitrotoluene	100 U	100 U	100 U	100 U	NA	100 U	NA	NA	NA	NA	100 U	100 U	NA	100 U
2-Nitrotoluene	200 U	200 U	200 U	200 U	NA	200 U	NA	NA	NA	NA	200 U	200 U	NA	200 U
3-Nitrotoluene	200 U	200 U	200 U	200 U	NA	750	NA	NA	NA	NA	200 U	200 U	NA	200 U
4-Amino-2,6-dinitrotoluene	100 U	100 U	100 U	100 U	NA	100 U	NA	NA	NA	NA	100 U	100 U	NA	100 U
4-Nitrotoluene	200 U	200 U	200 U	200 U	NA	200 U	NA	NA	NA	NA	200 U	200 U	NA	200 U
HMX	200 U	200 U	200 U	200 U	NA	200 U	NA	NA	NA	NA	200 U	160 J	NA	200 U
Nitrobenzene	100 U	100 U	100 UJ	300 J	NA	170	NA	NA	NA	NA	120	100 U	NA	100 U
Nitroglycerin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perchlorate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20 U	20 U	NA
RDX	200 U	200 U	200 U	200 U	NA	200 U	NA	NA	NA	NA	200 U	200 U	NA	200 U
Tetryl	200 U	200 U	200 U	200 U	NA	200 U	NA	NA	NA	NA	200 U	200 U	NA	200 U
<b>Total Metals (MG/KG)</b>														
Aluminum	NA	NA	6,000	5,810	10,500	7,920	5,720	NA	NA	NA	13,400	17,300	NA	NA
Antimony	NA	NA	1.4 L	1 L	0.76 UL	6.4 UL	0.77 UL	NA	NA	NA	1.4 L	0.8 UL	NA	NA
Arsenic	NA	NA	9.4	8.1	6.4	9.6 J	24.1	NA	NA	NA	9.8	9.4	NA	NA
Barium	NA	NA	115	119	134	45.4 J	112	NA	NA	NA	104	241	NA	NA
Beryllium	NA	NA	0.69 J	0.71 J	1	0.68 J	1	NA	NA	NA	1.3	1.6	NA	NA
Cadmium	NA	NA	0.58 J	0.67 J	0.26 J	2.6 J	0.32 J	NA	NA	NA	1.3	0.25 J	NA	NA
Calcium	NA	NA	41,400 J	55,200 J	28,000 J	6,630 J	156,000	NA	NA	NA	49,800 J	5,010 J	NA	NA
Chromium	NA	NA	15.4	21.9	16.9	45.2	14.3	NA	NA	NA	24.1	23.9	NA	NA
Cobalt	NA	NA	13.5	13.3	14.7	9.8 J	9.3	NA	NA	NA	14.5	16.1	NA	NA
Copper	NA	NA	47.9	53.2	45.6	1,290	41.1	NA	NA	NA	88.5	25.3	NA	NA
Cyanide	NA	NA	0.25 U	0.25 U	0.23 U	0.35 U	0.23 U	NA	NA	NA	0.26 U	0.22 U	NA	NA
Iron	NA	NA	22,000	21,600	27,900	213,000	13,900	NA	NA	NA	31,300	39,500	NA	NA
Lead	NA	NA	14.6	14.9	21.2	68.9	21.6	NA	NA	NA	58.6	42.1	NA	NA
Magnesium	NA	NA	2,060	2,360	2,620	1,470 J	8,060	NA	NA	NA	6,300	2,070	NA	NA
Manganese	NA	NA	312 K	350 K	574 K	238 K	294	NA	NA	NA	310 K	1,400 K	NA	NA
Mercury	NA	NA	0.18	0.24	0.14	0.02 J	0.04	NA	NA	NA	0.18	0.9	NA	NA
Nickel	NA	NA	91.5	97.5	23.5	224	48.2	NA	NA	NA	30.5	28.7	NA	NA

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Station ID	27A-3	27A-4	27A-5		27A-6	27A-7	27A-8	27A-9		27A-10	27A-11	27A-12		27A-13
Sample ID	27A-3-SD	27A-4-SD	27A-5-SD	27A-5P-SD	27A-6-SD	27A-7-SD	27A-8-SD	27A-9-SD	27A-9P-SD	27A-10-SD	27A-11-SD	27A-12-SD	27A-12P-SD	27A-13-SD
Sample Date	04/25/02	04/25/02	04/26/02	04/26/02	04/26/02	04/26/02	04/25/02	04/26/02	04/26/02	04/30/02	04/26/02	04/26/02	04/26/02	04/25/02
Chemical Name														
Potassium	NA	NA	997 J	935 J	1,480	1,400 J	1,040	NA	NA	NA	1,840	2,150	NA	NA
Selenium	NA	NA	0.78 U	0.75 U	0.69 J	5.7 J	0.6 J	NA	NA	NA	0.91 J	1.4	NA	NA
Silver	NA	NA	32.3	35	0.39 J	2.7 J	0.83 J	NA	NA	NA	1.8 J	0.49 J	NA	NA
Sodium	NA	NA	282 B	330 J	73.9 B	459 U	524 J	NA	NA	NA	221 B	61.6 B	NA	NA
Thallium	NA	NA	1.4 U	1.4 U	1.1 J	8.8 U	1.1 U	NA	NA	NA	1.4 U	1.1 U	NA	NA
Vanadium	NA	NA	83.4	97.4	29	18.6 J	83.4	NA	NA	NA	48.7	36.1	NA	NA
Zinc	NA	NA	136	144	145	190	176	NA	NA	NA	327	95	NA	NA
Wet Chemistry (MG/KG)														
% Solids	NA	71	53	53	65	38	59	49	59	23	56	70	72	NA
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perchlorate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	NA	NA	NA	NA	NA	NA	8	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (MG/KG)														
TPH-diesel range	NA	NA	83 NJ	38 B	NA	NA	NA	2,400 NJ	NA	69 B	NA	NA	NA	NA
TPH-gas range	NA	NA	0.19 U	0.19 U	NA	NA	NA	0.21 U	NA	0.43 U	NA	NA	NA	NA

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Station ID	27A-14	27A-15	27A-16	27A-17	27A-18	27A-19	27A-20		27A-21	27A-22	27A-23	27A-34		27A-35	27A-36	27A-37	27A-38
Sample ID	27A-14-SD	27A-15-SD	27A-16-SD	27A-17-SD	27A-18-SD	27A-19-SD	27A-20-SD	27A-20P-SD	27A-21-SD	27A-22-SD	27A-23-SD	27A-34-SD	27A-34-SD/DUP	27A-35-SD	27A-36-SD	27A-37-SD	27A-38-SD
Sample Date	04/30/02	04/26/02	04/25/02	04/25/02	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/24/04	05/24/04	05/24/04	05/24/04	05/24/04	05/24/04
Chemical Name																	
Volatiles Organic Compounds (UG/KG)																	
1,1,1-Trichloroethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	15 U	13 U	5.9 J	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-chloropropane	15 R	13 R	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromoethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	15 U	13 U	4 J	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	15 U	13 U	22 UJ	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	4.6 J	33	22 U	21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloromethane	5.6 J	5.5 J	22 U	5.5 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cumene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyclohexane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane(Freon-12)	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl acetate	15 U	13 U	22 UJ	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl-tert-butyl ether (MTBE)	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylcyclohexane	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	9.1 B	8.8 B	22 U	5.7 B	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Styrene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	15 U	13 U	4 J	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	15 U	13 U	22 U	2.3 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane(Freon-11)	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl acetate	NA	NA	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl chloride	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xylene, total	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dichloroethene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,3-Dichloropropene	15 U	13 U	22 U	19 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Station ID	27A-14	27A-15	27A-16	27A-17	27A-18	27A-19	27A-20		27A-21	27A-22	27A-23	27A-34		27A-35	27A-36	27A-37	27A-38
Sample ID	27A-14-SD	27A-15-SD	27A-16-SD	27A-17-SD	27A-18-SD	27A-19-SD	27A-20-SD	27A-20P-SD	27A-21-SD	27A-22-SD	27A-23-SD	27A-34-SD	27A-34-SD/DUP	27A-35-SD	27A-36-SD	27A-37-SD	27A-38-SD
Sample Date	04/30/02	04/26/02	04/25/02	04/25/02	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/24/04	05/24/04	05/24/04	05/24/04	05/24/04	05/24/04
Chemical Name																	
<b>Semi-volatile Organic Compounds (UG/KG)</b>																	
Acenaphthene	NA	NA	NA	NA	5.7 U	4.5 U	NA	NA	NA	6.4 U	5.7 U	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	5.7 U	4.5 U	NA	NA	NA	6.4 U	5.7 U	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	16	4.5 U	NA	NA	NA	6.4 U	8.6	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	55	4.5 U	NA	NA	NA	33	25	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	49	4.5 U	NA	NA	NA	28	5.7 U	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	73	4.5 U	NA	NA	NA	51	5.7 U	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	25 L	4.5 UL	NA	NA	NA	6.4 UL	5.7 UL	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	23	4.5 U	NA	NA	NA	15	5.7 U	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	58	4.5 U	NA	NA	NA	41	24	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	5.7 U	4.5 U	NA	NA	NA	6.4 U	5.7 U	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	92	4.5 U	NA	NA	NA	59	33	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	6.2	4.5 U	NA	NA	NA	6.4 U	5.7 U	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	26	4.5 U	NA	NA	NA	6.4 U	5.7 U	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	8.5	4.5 U	NA	NA	NA	8.9	5.7 U	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	62	4.5 U	NA	NA	NA	44	20	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	96	4.5 U	NA	NA	NA	64	50	NA	NA	NA	NA	NA	NA
<b>Explosives (UG/KG)</b>																	
1,3,5-Trinitrobenzene	100 U	100 U	100 U	100 U	100 R	NA	100 R	100 R	100 R	100 R	NA	NA	NA	NA	NA	NA	NA
1,3-Dinitrobenzene	100 U	NA	100 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA				
2,4,6-Trinitrotoluene	100 U	NA	100 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA				
2,4-Dinitrotoluene	100 U	NA	100 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA				
2,6-Dinitrotoluene	100 U	NA	100 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA				
2-Amino-4,6-dinitrotoluene	100 U	NA	100 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA				
2-Nitrotoluene	200 U	NA	200 U	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA				
3-Nitrotoluene	200 U	NA	200 U	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA				
4-Amino-2,6-dinitrotoluene	100 U	NA	100 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA				
4-Nitrotoluene	200 U	NA	200 U	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA				
HMX	200 U	NA	200 U	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA				
Nitrobenzene	100 U	100 U	55 J	100 U	100 U	NA	100 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA
Nitroglycerin	NA	NA	NA	NA	10,000 U	NA	10,000 U	10,000 U	10,000 U	10,000 U	NA	NA	NA	NA	NA	NA	NA
Perchlorate	20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA						
RDX	200 U	NA	200 U	200 U	200 U	200 U	NA	NA	NA	NA	NA	NA	NA				
Tetryl	200 U	200 U	200 U	200 U	200 R	NA	200 R	200 R	200 R	200 R	NA	NA	NA	NA	NA	NA	NA
<b>Total Metals (MG/KG)</b>																	
Aluminum	NA	7,750	12,800	13,600	6,870	10,700	12,100	11,900	11,300	14,200	9,200	NA	NA	NA	NA	NA	NA
Antimony	NA	0.66 UL	0.66 UL	0.88 UL	0.75 L	0.35 L	0.57 UL	0.54 UL	0.53 L	0.72 L	0.41 UL	NA	NA	NA	NA	NA	NA
Arsenic	NA	5.5	11.7	7.7	10.4	8	8.7	8.3	7.7	12.2	7.3	NA	NA	NA	NA	NA	NA
Barium	NA	76.6	109	121	137	66.2	120	126	118	208	65.1	NA	NA	NA	NA	NA	NA
Beryllium	NA	0.81	1.4	1.1	1.2	0.89	1.1 J	1.1 J	0.97 J	1.6	0.76 J	NA	NA	NA	NA	NA	NA
Cadmium	NA	0.07 J	0.09 J	0.37 J	0.88 J	0.042 U	0.074 U	0.071 U	0.18 J	0.068 U	0.054 U	NA	NA	NA	NA	NA	NA
Calcium	NA	2,180 J	5,470	23,100	9,580	17,400	20,800	31,600	30,400	6,250	27,600	NA	NA	NA	NA	NA	NA
Chromium	NA	12.7	23.4	18.2	22	13.2	17.8	19.1	18.9	22	11.8	NA	NA	NA	NA	NA	NA
Cobalt	NA	11.8	22.9	14.4	27.8	19.4	13.7	13.5	13.5	32.6	14.6	NA	NA	NA	NA	NA	NA
Copper	NA	13.2	25.6	32.6	75	25.4	26.3	25.3	45.1	31.8	23.5	NA	NA	NA	NA	NA	NA
Cyanide	NA	0.19 U	0.23 U	0.27 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	27,300	49,300	32,900	47,100	34,900	33,000	33,500	31,200	46,600	29,200	7320	8060	3950	10300	7990	12100
Lead	NA	12.3	24	22	51.2	15.2	27.7	26.9	33.5	26.5	19.4	NA	NA	NA	NA	NA	NA
Magnesium	NA	1,160	1,540	2,610	1,500 J	2,400 J	5,590 J	5,700 J	3,210 J	2,510 J	2,330 J	NA	NA	NA	NA	NA	NA
Manganese	NA	546 K	1,080	1,330	870	863	635	626	1,070	1,460	297	NA	NA	NA	NA	NA	NA
Mercury	NA	0.02 J	0.04	0.06	0.18	0.024 J	0.085	0.062	0.1	0.098	0.019 U	NA	NA	NA	NA	NA	NA
Nickel	NA	16.8	17.4	25.1	58	26.3	23.9	23.6	23.7	40.7	21.2	NA	NA	NA	NA	NA	NA

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Station ID	27A-14	27A-15	27A-16	27A-17	27A-18	27A-19	27A-20		27A-21	27A-22	27A-23	27A-34		27A-35	27A-36	27A-37	27A-38
Sample ID	27A-14-SD	27A-15-SD	27A-16-SD	27A-17-SD	27A-18-SD	27A-19-SD	27A-20-SD	27A-20P-SD	27A-21-SD	27A-22-SD	27A-23-SD	27A-34-SD	27A-34-SD/DUP	27A-35-SD	27A-36-SD	27A-37-SD	27A-38-SD
Sample Date	04/30/02	04/26/02	04/25/02	04/25/02	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/29/03	05/24/04	05/24/04	05/24/04	05/24/04	05/24/04	05/24/04
Chemical Name																	
Potassium	NA	1,150	1,150	1,950	984	1,750	1,830	1,830	1,710	1,460	1,840	NA	NA	NA	NA	NA	NA
Selenium	NA	0.5 U	2	0.67 U	0.54 U	0.4 U	0.7 U	0.66 U	0.6 U	0.64 U	0.5 U	NA	NA	NA	NA	NA	NA
Silver	NA	0.19 U	2.9	5.5	35.5	0.099 U	0.62 B	0.39 B	76.3	0.36 B	0.13 U	NA	NA	NA	NA	NA	NA
Sodium	NA	47.6 U	71 J	110 J	189 B	60.7 B	154 B	138 B	159 B	86.8 B	79.7 B	NA	NA	NA	NA	NA	NA
Thallium	NA	0.91 U	0.92 U	1.2 U	1.1 B	0.78 B	0.79 U	0.75 U	1.1 B	1.1 B	0.57 U	NA	NA	NA	NA	NA	NA
Vanadium	NA	18.2	31.8	26.7	27.8	13.7	27.1	26.7	34.4	32.5	16	NA	NA	NA	NA	NA	NA
Zinc	NA	63.8	76.8	153	478	45.4	259	229	229	142	181	NA	NA	NA	NA	NA	NA
Wet Chemistry (MG/KG)																	
% Solids	68	76	72	62	59	74	52	49	50	52	58	NA	NA	NA	NA	NA	NA
Cyanide	NA	NA	NA	NA	0.23 U	0.18 U	0.27 U	0.28 U	0.27 U	0.26 U	0.24 U	NA	NA	NA	NA	NA	NA
Perchlorate	NA	NA	NA	NA	0.0058 U	NA	0.0063 U	0.008 U	0.0053 U	0.0062 U	NA	NA	NA	NA	NA	NA	NA
Total organic carbon (TOC)	NA	NA	NA	NA	14,000	7,400	40,000	43,000	33,000	14,000	25,000	NA	NA	NA	NA	NA	NA
pH	NA	NA	NA	NA	6.8 J	7.3 J	6.6 J	6.7 J	6.8 J	6.7 J	6.7 J	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (MG/KG)																	
TPH-diesel range	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA							
TPH-gas range	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA							

**Notes:**

- 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
- NJ - Presumptively present at an estimated concentration
- R - Unreliable result
- U - Analyte not detected

Table B-4  
 Raw Analytical Results for Phase III/IV SWMU 37E Groundwater Sample  
 Phase III/IV Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

<b>Station ID</b>	GGW20
<b>Sample ID</b>	37E-GGW20-1
<b>Sample Date</b>	09/12/03
<b>Chemical Name</b>	
<b>Explosives (UG/L)</b>	
HMX	41
Nitroglycerin	1,000 U
Perchlorate	1 U
RDX	7.4

**Notes:**

U - Analyte not detected

Table B-5  
Raw Analytical Results SWMU 37V Direct Push Groundwater Samples  
Phase III/IV Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

Station ID	37V-10	37V-11	37V-12	37V-13-GW
Sample ID	37V-10-GW	37V-11-GW	37V-12-GW	37V-13-GW
Sample Date	04/23/02	04/23/02	04/23/02	04/23/02
Chemical Name				
<b>Volatile Organic Compounds (UG/L)</b>				
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	1.1 J	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	10 U	1 J	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U
1,2,3-Trichlorobenzene	NA	NA	NA	NA
1,2,4-Trichlorobenzene	10 U	10 U	3.3 JB	10 U
1,2-Dibromo-3-chloropropane	10 U	10 U	3.1 J	10 U
1,2-Dibromoethane	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	1.3 JB	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	1.6 J	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
2-Butanone	10 U	10 U	7 J	10 U
2-Hexanone	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U
Acetone	3.2 J	10 U	25	2.1 J
Benzene	10 U	10 U	10 U	10 U
Bromochloromethane	NA	NA	NA	NA
Bromodichloromethane	10 U	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U
Carbon disulfide	10 U	1.3 J	10 U	10 U
Carbon tetrachloride	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U
Chloromethane	10 U	10 U	10 U	10 U
Cumene	10 U	10 U	10 U	10 U
Cyclohexane	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U
Dichlorodifluoromethane(Freon-12)	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U
Methyl acetate	10 U	10 U	10 U	10 U
Methyl-tert-butyl ether (MTBE)	10 U	10 U	10 U	10 U
Methylcyclohexane	10 U	10 U	10 U	10 U
Methylene chloride	10 U	10 U	1.1 J	10 U
Styrene	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	1.5 J	10 U
Trichloroethene	10 U	10 U	10 U	10 U
Trichlorofluoromethane(Freon-11)	10 U	10 U	10 U	10 U
Vinyl chloride	10 U	10 U	10 U	10 U
Xylene, total	10 U	10 U	10 U	10 U
cis-1,2-Dichloroethene	10 U	10 U	10 U	4.5 J
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U
trans-1,2-Dichloroethene	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U

**Notes:**

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

Table B-6  
Raw Analytical Results SWMU 37V Monitoring Well Groundwater Samples  
Phase III/IV Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

Station ID	GGW17		GGW18		GGW19			
	37V-GGW17-1	37V-GGW17-2	37V-GGW18-1	37V-GGW18-2	37V-GGW19-1	37V-GGW19-2	37V-GGW19-R02	37V-GGW19-R02/DUP
Sample ID	09/12/03	04/05/04	09/12/03	04/05/04	09/12/03	04/05/04	04/05/04	04/05/04
Sample Date								
Chemical Name								
<b>Volatile Organic Compounds (UG/L)</b>								
1,1,1-Trichloroethane	0.5 U	0.5 U						
1,1,2,2-Tetrachloroethane	0.5 U	0.5 U						
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	0.5 U	0.5 U						
1,1,2-Trichloroethane	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL
1,1-Dichloroethane	0.5 U	0.5 U						
1,1-Dichloroethene	0.5 U	0.5 U						
1,2,3-Trichlorobenzene	0.5 U	0.5 U						
1,2,4-Trichlorobenzene	0.5 U	0.5 U						
1,2-Dibromo-3-chloropropane	0.5 R	0.5 U	0.5 R	0.5 U	0.5 R	0.5 U	0.5 U	0.5 U
1,2-Dibromoethane	0.5 U	0.5 U						
1,2-Dichlorobenzene	0.5 U	0.5 U						
1,2-Dichloroethane	0.5 U	0.5 U						
1,2-Dichloropropane	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL
1,3-Dichlorobenzene	0.5 U	0.5 U						
1,4-Dichlorobenzene	0.5 U	0.5 U						
2-Butanone	5 R	5 UJ	5 R	5 UJ	5 R	5 UJ	5 UJ	5 UJ
2-Hexanone	5 U	5 R	5 U	5 R	5 U	5 R	5 U	5 R
4-Methyl-2-pentanone	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acetone	5 R	5 UJ	5 R	5 UJ	5 R	5 UJ	5 UJ	5 UJ
Benzene	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL
Bromochloromethane	0.5 U	0.5 U						
Bromodichloromethane	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL
Bromoform	0.5 U	0.5 U						
Bromomethane	0.5 U	0.5 U						
Carbon disulfide	3.1 B	0.5 U	0.52 B	0.5 U	1 B	0.5 U	0.5 U	0.5 U
Carbon tetrachloride	0.5 U	0.5 U						
Chlorobenzene	0.5 U	0.5 U						
Chloroethane	0.5 U	0.5 U						
Chloroform	0.5 U	0.5 U						
Chloromethane	0.5 U	0.42 J	0.5 U	0.49 J	0.5 U	0.38 J	0.5 U	0.35 J
Cumene	0.5 U	0.5 U						
Cyclohexane	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL
Dibromochloromethane	0.5 U	0.5 U						
Dichlorodifluoromethane(Freon-12)	0.5 U	0.5 U						
Ethylbenzene	0.5 U	0.5 U						
Methyl acetate	0.5 R	0.5 U	0.5 R					
Methyl-tert-butyl ether (MTBE)	0.5 U	0.5 U						
Methylcyclohexane	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL
Methylene chloride	1.6 B	0.5 U	1.5 B	0.5 U	1.5 B	0.5 U	0.5 U	0.5 U
Styrene	0.5 U	0.5 U						
Tetrachloroethene	0.5 U	0.5 U						
Toluene	0.5 U	0.41 J	0.58	0.44 J				
Trichloroethene	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL
Trichlorofluoromethane(Freon-11)	0.5 U	0.5 U						
Vinyl chloride	0.5 U	0.5 U						
Xylene, total	0.5 U	0.5 U						
cis-1,2-Dichloroethene	0.5 U	0.5 U						
cis-1,3-Dichloropropene	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL
trans-1,2-Dichloroethene	0.5 U	0.5 U						
trans-1,3-Dichloropropene	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL	0.5 U	0.5 UL

**Notes:**

- 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 B-7  
Raw Analytical Results for SWMU 37V Soil Samples  
Phase III/IV Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

Station ID	37V-4		37V-5		37V-6		37V-7		
Sample ID	37V-4-D/S	37V-4-D/D	37V-5-D/S	37V-5-D/D	37V-6-D/S	37V-6-D/D	37V-7-D/S	37V-7-D/D	37V-7P-D/D
Sample Date	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02
Chemical Name									
<b>Volatiles Organic Compounds (UG/KG)</b>									
1,1,1-Trichloroethane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,1,2,2-Tetrachloroethane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,1,2-Trichloro-1,2,2-trifluoroethane(Freon-113)	10 U	8.5 U	24	240	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,1,2-Trichloroethane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,1-Dichloroethane	10 U	2.7 J	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,1-Dichloroethene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,2,4-Trichlorobenzene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,2-Dibromo-3-chloropropane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,2-Dibromoethane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,2-Dichlorobenzene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,2-Dichloroethane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,2-Dichloropropane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,3-Dichlorobenzene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
1,4-Dichlorobenzene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
2-Butanone	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
2-Hexanone	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
4-Methyl-2-pentanone	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Acetone	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Benzene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Bromodichloromethane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Bromoform	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Bromomethane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Carbon disulfide	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Carbon tetrachloride	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Chlorobenzene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Chloroethane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Chloroform	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Chloromethane	2.9 J	1.8 J	2.6 J	1.7 J	2.6 J	2.2 J	3.1 J	2.8 J	2.3 J
Cumene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Cyclohexane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Dibromochloromethane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Dichlorodifluoromethane(Freon-12)	10 U	8.5 U	9.6 U	5.5 J	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Ethylbenzene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Methyl acetate	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U

Table B-7  
Raw Analytical Results for SWMU 37V Soil Samples  
Phase III/IV Investigation Report  
Allegany Ballistics Laboratory  
Rocket Center, West Virginia

Station ID	37V-4		37V-5		37V-6		37V-7		
Sample ID	37V-4-D/S	37V-4-D/D	37V-5-D/S	37V-5-D/D	37V-6-D/S	37V-6-D/D	37V-7-D/S	37V-7-D/D	37V-7P-D/D
Sample Date	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02
Chemical Name									
Methyl-tert-butyl ether (MTBE)	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Methylcyclohexane	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Methylene chloride	3.9 B	3 B	3.3 B	3.2 B	3.6 B	2.9 B	3.1 B	3 B	3 B
Styrene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Tetrachloroethene	3 B	100	2.1 B	1.1 B	0.97 B	0.85 B	1.1 B	0.88 B	1 B
Toluene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Trichloroethene	7.9 J	22	1.3 J	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Trichlorofluoromethane(Freon-11)	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Vinyl acetate	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Vinyl chloride	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Xylene, total	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
cis-1,2-Dichloroethene	18 J	20 J	9.6 U	1.1 J	8.1 U	0.86 J	8.4 U	1.6 J	1.7 J
cis-1,3-Dichloropropene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
trans-1,2-Dichloroethene	1.8 J	2.2 J	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
trans-1,3-Dichloropropene	10 U	8.5 U	9.6 U	8.1 U	8.1 U	8 U	8.4 U	8.2 U	8.2 U
Total Metals (MG/KG)									
Aluminum	17,400	NA	17,600	NA	NA	NA	NA	NA	NA
Antimony	0.63 UL	NA	0.63 UL	NA	NA	NA	NA	NA	NA
Arsenic	8.1	NA	5.3	NA	NA	NA	NA	NA	NA
Barium	125	NA	107	NA	NA	NA	NA	NA	NA
Beryllium	1.2	NA	1.2	NA	NA	NA	NA	NA	NA
Cadmium	0.43 J	NA	0.06 U	NA	NA	NA	NA	NA	NA
Calcium	13,400	NA	6,870	NA	NA	NA	NA	NA	NA
Chromium	22.7	NA	23.1	NA	NA	NA	NA	NA	NA
Cobalt	19	NA	13.8	NA	NA	NA	NA	NA	NA
Copper	27.4	NA	25.9	NA	NA	NA	NA	NA	NA
Cyanide	0.21 U	NA	0.2 U	NA	NA	NA	NA	NA	NA
Iron	31,700	NA	21,500	NA	NA	NA	NA	NA	NA
Lead	24.2	NA	23.4	NA	NA	NA	NA	NA	NA
Magnesium	3,820	NA	4,510	NA	NA	NA	NA	NA	NA
Manganese	322	NA	156	NA	NA	NA	NA	NA	NA
Mercury	0.02 J	NA	0.02 J	NA	NA	NA	NA	NA	NA
Nickel	27.2	NA	27.5	NA	NA	NA	NA	NA	NA
Potassium	1,860	NA	2,090	NA	NA	NA	NA	NA	NA
Selenium	0.51 J	NA	0.48 U	NA	NA	NA	NA	NA	NA

Table B-7  
 Raw Analytical Results for SWMU 37V Soil Samples  
 Phase III/IV Investigation Report  
 Allegany Ballistics Laboratory  
 Rocket Center, West Virginia

Station ID	37V-4		37V-5		37V-6		37V-7		
Sample ID	37V-4-D/S	37V-4-D/D	37V-5-D/S	37V-5-D/D	37V-6-D/S	37V-6-D/D	37V-7-D/S	37V-7-D/D	37V-7P-D/D
Sample Date	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02	04/25/02
Chemical Name									
Silver	0.18 U	NA	0.18 U	NA	NA	NA	NA	NA	NA
Sodium	61.8 J	NA	95 J	NA	NA	NA	NA	NA	NA
Thallium	0.87 U	NA	0.88 U	NA	NA	NA	NA	NA	NA
Vanadium	29.3	NA	28.9	NA	NA	NA	NA	NA	NA
Zinc	430	NA	63.4	NA	NA	NA	NA	NA	NA
Wet Chemistry (MG/KG)									
% Solids	81	NA	83	NA	NA	NA	NA	NA	NA

**Notes:**

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

**Appendix C**  
**Analytical Data Validation Reports**

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**SWMU 2**

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# ENVIRONMENTAL

Data Services, Inc.

## SEMIVOLATILE ORGANIC COMPOUNDS

USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 404045

Client: CH2M Hill, Inc. Date: June 3, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2-5-GW	404045-001-025-1/6	Water
1MS	2-5-GWMS	404045-001-025-1/6MS	Water
1MSD	2-5-GWMSD	404045-001-025-1/6MSD	Water
2	FB-040504	404045-002-031-1/2	Water

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days for all samples.

GC/MS Tuning - All of the BFB tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values except the following.

ICAL Date	Compound	%RSD/RRF	Qualifier	Affected Samples
04/28/04	Several Compounds	%RSD<50%	None	All ND

Continuing Calibration - The continuing calibration exhibited acceptable %D and RRF values.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD sample exhibited acceptable %R and RPD values except the following.

MS/MSD Sample ID	Compound	MS/MSD %R/RPD	Qualifier
2-5-GW	2,4-Dinitrotoluene	120%/120%	None
	4-Nitrophenol	85%/90%	UL
	n-Nitroso-di-n-propylamine	120%/Ok	None

Laboratory Control Sample - The LCS sample exhibited several high %R values, however, all associated results are non-detect and no qualifications were required.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria except the following.

Sample ID	Internal Standard	Area Count	Qualifier
2-5-GW	IS1 - IS5	High	None-ND
FB-040504	IS3	High	None-ND

Method Blank - The method blanks were free of contamination.

Trip, Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
EB-040504 (SDG 404066)	Bis(2-ethylhexyl)phthalate	49	245	None	ND
FB-040504	None-ND	--	--	--	--

Field Duplicates - Field duplicate samples were not analyzed.

Tentatively Identified Compounds (TICs) - All "unknown" TICs were qualified as estimated (J).

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the MS/MSD and TIC sections of this report. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, was used in evaluating the data in this summary report.

**ENVIRONMENTAL**  
Data Services, Inc.

**VOLATILE ORGANIC COMPOUNDS**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 404045

Client: CH2M Hill, Inc. Date: June 3, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2-5-GW	404045-001-001-1/9	Water
1MS	2-5-GWMS	404045-001-001-1/9MS	Water
1MSD	2-5-GWMSD	404045-001-001-1/9MSD	Water
2	FB-040504	404045-001-010-1/3	Water

Holding Times - All samples were analyzed within 14 days for preserved water samples.

GC/MS Tuning - All of the BFB tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values except the following.

ICAL Date	Compound	%RSD/RRF	Qualifier	Affected Samples
03/10/03	Acetone	RRF=0.022	R	1, 2
	Methyl Acetate	RRF=0.042	R	
	2-Butanone	RRF=0.029	R	
	2-Hexanone	RRF=0.048	R	
	Several Compounds	%RSD<50%	None	

Continuing Calibration - The continuing calibration exhibited acceptable %D and RRF values except the following.

CCAL Date	Compound	%D/RRF	Qualifier	Affected Samples
04/07/04	Several Compounds	%D<50%	None	ND

Surrogates - All samples exhibited acceptable surrogate recoveries except the following.

Sample ID	Surrogate	%R	Qualifier
FB-040504	1,1-Dichloroethene-d2	Low	UL

MS/MSD - The MS/MSD sample exhibited acceptable %R and RPD values.

Laboratory Control Sample - The LCS sample exhibited acceptable %R values.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Method Blank - The method blanks were free of contamination.

Trip, Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc.	Action Level	Qualifier	Affected Samples
EB-040504 (SDG 404066)	None - ND	--	--	--	--
FB-040504	None - ND	--	--	--	--

Field Duplicates - Field duplicate samples were not analyzed.

Tentatively Identified Compounds (TICs) - TICs were not present.

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the surrogate section of this report with the exception of rejected compounds due to the initial calibration. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, was used in evaluating the data in this summary report.

**ENVIRONMENTAL**  
Data Services, Inc.

**TOTAL & DISSOLVED METALS**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 404045

Client: CH2M Hill, Inc. Date: June 2, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Paula Benham

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2-5-GW	404045-001-017-1/3	Water
1MS	2-5-GWMS	404045-001-017-1/3MS	Water
1MSD	2-5-GWMSD	404045-001-017-1/3MSD	Water
2	FB-040504	404045-002-020-1/1	Water
3	2-5-GWFIL	404045-005-037-1/3	Water
3MS	2-5-GWFILMS	404045-005-037-1/3MS	Water
3MSD	2-5-GWFILMSD	404045-005-037-1/3MSD	Water

Holding Times - All samples were prepared and analyzed within 28 days for mercury and 180 days for all other metals.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited acceptable %R values except those noted below. The associated samples were qualified as indicated unless >2X the CRDL or already qualified.

Compound	%R - High/Low	Qualifier	Affected Samples
Arsenic	High	K	1
Lead	Low	UL	2, 3
Thallium	Low	UL	1, 2, 3

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited the following contamination that resulted in qualification.

Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
Aluminum	75.4	377	B	3
Barium	0.7	3.5	B	2
Beryllium	0.1	0.5	B	3
Cadmium	0.5	2.5	B	1

Calcium	122	610	B	2
Chromium	1.1	5.5	B	2, 3
Copper	2.2	11	B	3
Iron	65.0	325	B	2
Magnesium	119	595	B	2
Manganese	1.3	6.5	B	2
Zinc	2.4	12	B	2

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level	Qualifier	Affected Samples
EB-040504 (SDG 404066)	Chromium	6.3	--	None	Applies to samples in other data packages
	Nickel	4.7	--	None	
	Potassium	109	--	None	
	Zinc	14.5	--	None	
EB-040504FIL (SDG 404066)	Potassium	77.4	--	None	Applies to samples in other data packages
FB-040504	Potassium	123	615	None	>5X
	Sodium	437	2185	None	>5X

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike - The matrix spike sample(s) exhibited acceptable %R values.

Matrix Duplicate - The matrix duplicate sample(s) exhibited acceptable RPD values.

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilutions - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate samples were not analyzed.

Compound Quantitation - All results reported with a (B) qualifier by the laboratory were further qualified as estimated (J) except those results already qualified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the CRDL standard, method and calibration blanks and compound quantitation sections of this report. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.



**ENVIRONMENTAL**  
Data Services, Inc.

**CYANIDE & HEXAVALENT CHROMIUM**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 404045

Client: CH2M Hill, Inc. Date: June 2, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Paula Benham

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2-5-GW	404045-001-021-1/3	Water
1MS	2-5-GWMS	404045-001-021-1/3MS	Water
1MSD	2-5-GWMSD	404045-001-021-1/3MSD	Water
2	FB-040504	404045-002-024-1/1	Water
3*	2-5-GWFIL	404045-005-040-1/3	Water
3MS*	2-5-GWFILMS	404045-005-040-1/3MS	Water
3MSD*	2-5-GWFILMSD	404045-005-040-1/3MSD	Water

\* - Hexavalent Chromium analysis only

Holding Times - All samples were prepared and analyzed within 14 days for cyanide and 24 hours for hexavalent chromium.

Calibration - The ICV and CCV %R values were acceptable.

Method and Calibration Blanks - The method blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level	Qualifier	Affected Samples
EB-040504 (SDG 404066)	None - ND	--	--	--	--
EB-040504FIL (SDG 404066)	None - ND	--	--	--	--
FB-040504	None - ND	--	--	--	--

Matrix Spike - The matrix spike sample(s) exhibited acceptable %R values.

Sample Duplicate - Sample duplicate results were acceptable.

LCS - The LCS samples exhibited acceptable %R values.

Field Duplicates - Field duplicate samples were not analyzed.

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.

**CYANIDE**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 403079

Client: CH2M Hill, Inc. Date: May 3, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Paula Benham

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	FB030904	403079-001-013-1/1	Water
1MS	FB030904MS	403079-001-013-1/1MS	Water
2	EB030904-SB	403079-002-014-1/1	Water
3	2-4-T	403079-006-084-1/1	Soil
4	2-2-T	403079-007-085-1/1	Soil
5	2-3-T	403079-008-086-1/1	Soil
6	2-1-T	403079-009-087-1/1	Soil
7	2-2-0910	403079-010-088-1/3	Soil
7MS	2-2-0910MS	403079-010-088-1/3MS	Soil
8	2-3-1011	403079-011-091-1/1	Soil
9	2-1P-1011	403079-012-092-1/1	Soil
10	2-4-1011	403079-013-093-1/1	Soil
11	2-1-1011	403079-014-094-1/1	Soil

Holding Times - All samples were prepared and analyzed within 14 days.

Calibration - The ICV and CCV %R values were acceptable.

Method and Calibration Blanks - The method blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. mg/L	Action Level mg/kg	Qualifier	Affected Samples
EB030904-SB	None - ND	--	--	--	--
FB030904	None - ND	--	--	--	--

Matrix Spike - The matrix spike sample(s) exhibited acceptable %R values.

Sample Duplicate - Sample duplicate results were acceptable.

LCS - The LCS samples exhibited acceptable %R values.

Field Duplicates - Field duplicate results are summarized below.

Compound	2-1-1011 mg/kg	2-1P-1011 mg/kg	RPD	Qualifier
Cyanide	ND	ND	--	--

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.

**TOTAL METALS**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 403079

Client: CH2M Hill, Inc. Date: April 23, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Paula Benham

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	FB030904	S403079-001-011-1/1	Water
2	EB030904-SB	S403079-002-012-1/1	Water
3	2-4-T	S403079-006-073-1/1	Soil
4	2-2-T	S403079-007-074-1/1	Soil
5	2-3-T	S403079-008-075-1/1	Soil
6	2-1-T	S403079-009-076-1/1	Soil
7	2-2-0910	S403079-010-077-1/3	Soil
7MS	2-2-0910MS	S403079-010-077-1/3MS	Soil
7MSD	2-2-0910MSD	S403079-010-077-1/3MSD	Soil
8	2-3-1011	S403079-011-080-1/1	Soil
9	2-1P-1011	S403079-012-081-1/1	Soil
10	2-4-1011	S403079-013-082-1/1	Soil
11	2-1-1011	S403079-014-083-1/1	Soil

Holding Times - All samples were prepared and analyzed within 28 days for mercury and 180 days for all other metals.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited acceptable %R values except those noted below. The associated samples were qualified as indicated unless >2X the CRDL or already qualified.

Compound	%R - High/Low	Qualifier	Affected Samples
Magnesium	High	K	3, 6
Selenium	Low	UL	9
Sodium	Low	L	3, 4

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited contamination for several compounds, however, all sample results are non-detect or greater than 5X the blank concentration with the exception of the following:

Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
Aluminum	26	130	B	1
Vanadium	1.0	5	B	
Barium	0.4	2.0	B	1, 2
Calcium	58.8	294	B	
Copper	1.4	7.0	B	
Potassium	20.0	138	B	
Sodium	350	2195	B	
Zinc	1.5	7.5	B	
Antimony	4.1	4.1 mg/kg	B	5, 6, 8
Arsenic	3.4	3.4 mg/kg	B	5, 10
Selenium	2.3	2.3 mg/kg	B	3, 4, 5, 6, 8, 10, 11
Sodium	270	840 mg/kg	B	5, 6, 8, 9, 10, 11
Thallium	9.3	9.3 mg/kg	B	3, 4, 6, 9, 10, 11
Mercury	0.1	0.085 mg/kg	B	All Soil Samples
Selenium	2.3	2.3 mg/kg	B	7
Sodium	290	840 mg/kg	B	
Thallium	6.0	6.0 mg/kg	B	

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level mg/kg	Qualifier	Affected Samples
EB030904-SB	None - ND	--	--	--	--
FB030904	None - ND	--	--	--	--

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike - The matrix spike sample(s) exhibited acceptable %R values except the following.

MS Sample ID	Compound	%R	Qualifier	Affected Samples
2-2-0910	Antimony	20.5%	R	3, 4, 7, 9, 10, 11
	Selenium	72.0%	UL	None - All Already Qualified

Matrix Duplicate - The matrix duplicate sample(s) exhibited acceptable RPD values.

LCS - The LCS samples exhibited acceptable %R values.

ICP Serial Dilutions - The ICP serial dilution sample exhibited acceptable %D values.

Field Duplicates - Field duplicate results are summarized below.

Compound	2-1-1011 mg/kg	2-1P-1011 mg/kg	RPD	Qualifier
Aluminum	14200	15900	11%	None
Arsenic	11.2	7.8	36%	None
Barium	83.8	80.4	4%	None
Beryllium	1.0	1.1	10%	None
Calcium	42300	19100	76%	None
Chromium	17.0	20.5	19%	None
Cobalt	14.6	10.3	35%	None
Copper	28.5	25.3	12%	None
Iron	22500	22700	1%	None
Lead	12.6	13.2	5%	None
Magnesium	3120	3510	12%	None
Manganese	305	123	85%	None
Nickel	25.9	25.7	1%	None
Potassium	2020	2140	6%	None
Vanadium	19.5	24.4	22%	None
Zinc	44.4	56.7	24%	None

Compound Quantitation - All results reported with a (B) qualifier by the laboratory were further qualified as estimated (J) except those results already qualified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the CRDL standard, method and calibration blanks, matrix spike and compound quantitation sections of this report with the exception of rejected results due to the low matrix spike recovery. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.





**SEMIVOLATILE ORGANIC COMPOUNDS**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 403079

Client: CH2M Hill, Inc. Date: April 27, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Lauren Nardone

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	FB030904	403079-001-007-1/2	Water
2	EB030904-SB	403079-002-009-1/2	Water
3	2-4-T	403079-006-062-1/1	Soil
4	2-2-T	403079-007-063-1/1	Soil
5	2-2-TRE	403079-007-063-1/1RE	Soil
6	2-3-T	403079-008-064-1/1	Soil
7	2-1-T	403079-009-065-1/1	Soil
8	2-1-TRE	403079-009-065-1/1RE	Soil
9	2-2-0910	403079-010-066-1/3	Soil
10	2-2-0910MS	403079-010-066-1/3MS	Soil
11	2-2-0910MSD	403079-010-066-1/3MSD	Soil
12	2-3-1011	403079-011-069-1/1	Soil
13	2-1P-1011	403079-012-070-1/1	Soil
14	2-4-1011	403079-013-071-1/1	Soil
15	2-1-1011	403079-014-072-1/1	Soil

Holding Times - All samples were extracted within 7 days for water samples and 14 days for soil samples and analyzed within 40 days for all samples.

GC/MS Tuning - All of the BFB tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values except the following.

ICAL Date	Compound	%RSD/RRF	Qualifier	Affected Samples
03/15/04	Benzaldehyde	%RSD=40.7	None	All ND

ICAL Date	Compound	%RSD/RRF	Qualifier	Affected Samples
03/23/04	Benzaldehyde	%RSD=71.6	UJ	5, 8
	Hexachlorocyclopentadiene	%RSD=38.4	None	All ND
	2,4-Dinitrophenol	%RSD=35.5	None	All ND

Continuing Calibration - The continuing calibrations exhibited acceptable %D and RRF values except the following.

CCAL Date	Compound	%D/RRF	Qualifier	Affected Samples
03/16/04 (0855)	Benzaldehyde	%D=106.2	UJ	1, 2
	3,3'-Dichlorobenzidine	%D=25.9	None	All ND
03/17/04	Benzaldehyde	%D=136.4	UJ	3, 4, 6, 7, 9, 12, 13, 14, 15
	2,4-Dinitrophenol	%D=39.8	None	All ND
	4-Nitrophenol	%D=33.2	None	All ND
	3,3'-Dichlorobenzidine	%D=36.4	None	All ND
3/24/04	3-Nitroaniline	%D=28.7	None	All ND
	3,3'-Dichlorobenzidine	%D=44.2	None	All ND

Surrogates - All samples exhibited acceptable surrogate recoveries except the following.

Sample ID	Surrogate	%R	Qualifier
2-1-T	2,4,5-Tribromophenol	1%	R - All Acid Compounds
	2-Fluorophenol	2%	
	Phenol-d5	17%	
2-2-T	2,4,5-Tribromophenol	4%	R - All Acid Compounds
	2-Fluorophenol	4%	

MS/MSD - The MS/MSD sample exhibited acceptable %R and RPD values.

Laboratory Control Sample - The LCS sample(s) exhibited acceptable %R values.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Method Blank - The method blanks exhibited contamination for several compounds, however, all sample results are non-detect or greater than 5X the blank concentration.

Trip, Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/kg	Qualifier	Affected Samples
EB030904-	Caprolactam	1.2	--	None	Not reported in soil samples
SB	Bis(2-ethylhexyl)phthalate	1.6	--	None	All ND or >5X
FB030904	Bis(2-ethylhexyl)phthalate	1.4	--	None	All ND or >5X

Field Duplicates - Field duplicate results are summarized below.

Compound	2-1-1011 ug/kg	2-1P-1011 ug/kg	RPD	Qualifier
Bis(2-ethylhexyl)phthalate	ND	43	NC	None

Tentatively Identified Compounds (TICs) - All "unknown" TICs were qualified as estimated (J), all "known" TICs were qualified (NJ) and all TICs affected by blank contamination were qualified (B).

Compound Quantitation - Samples 2-2-T and 2-1-T exhibited low acid surrogate recoveries. The samples were re-extracted and reanalyzed with acceptable surrogate recoveries. The reanalysis results should be used for reporting purposes.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the initial calibration, continuing calibration and TIC sections of this report with the exception of rejected compounds due to the low surrogate recoveries. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, was used in evaluating the data in this summary report.



**VOLATILE ORGANIC COMPOUNDS**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 403079

Client: CH2M Hill, Inc. Date: April 27, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Lauren Nardone

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	FB030904	403079-001-095-1/3	Water
2	EB030904-SB	403079-002-098-1/3	Water
3	TB030904	403079-003-101-1/2	Water
4	2-4-T	403079-006-029-1/3	Soil
5	2-2-T	403079-007-032-1/3	Soil
6	2-3-T	403079-008-035-1/3	Soil
7	2-1-T	403079-009-038-1/3	Soil
8	2-2-0910	403079-010-041-1/9	Soil
9	2-2-0910MS	403079-010-041-1/9MS	Soil
10	2-2-0910MSD	403079-010-041-1/9MSD	Soil
11	2-3-1011	403079-011-050-1/3	Soil
12	2-1P-1011	403079-012-053-1/3	Soil
13	2-4-1011	403079-013-056-1/3	Soil
14	2-1-1011	403079-014-059-1/3	Soil

Holding Times - All samples were analyzed within 14 days for preserved water and soil samples.

GC/MS Tuning - All of the BFB tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values except the following that resulted in qualification.

ICAL Date	Compound	%RSD/RRF	Qualifier	Affected Samples
02/25/04	Acetone	%RSD=59.2%	UJ	All Water Samples
	2-Butanone	%RSD=60.1%	UJ	
03/01/04	Acetone	%RSD=71.8%	UJ	12

Continuing Calibration - The continuing calibrations exhibited several high %D values, however, all associated results have already been qualified.

Surrogates - All samples exhibited acceptable surrogate recoveries.

MS/MSD - The MS/MSD sample exhibited acceptable %R values.

Laboratory Control Sample - The LCS sample(s) exhibited acceptable %R values.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Method Blank - The method blanks exhibited contamination for several compounds, however, all sample results are non-detect or greater than 5X the blank concentration with the exception of the following:

Blank ID	Compound	Conc. ug/kg	Action Level ug/kg	Qualifier	Affected Samples
BLK65334	2-Butanone	10	50	B	All Soil Samples
	Acetone	12	60	B	All Soil Samples except 12
	Methylene Chloride	7.5	37.5	B	All Soil Samples
	Styrene	8.9	44.5	B	All Soil Samples

Trip, Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/kg	Qualifier	Affected Samples
EB030904-SB	Methylene Chloride	5.1	5.1	None	All Already Qualified
TB030904	Methylene Chloride	3.6	3.6	None	All Already Qualified
FB030904	Methylene Chloride	1.3	1.3	None	All Already Qualified

Field Duplicates - Field duplicate results are summarized below.

Compound	2-1-1011 ug/kg	2-1P-1011 ug/kg	RPD	Qualifier
None	ND	ND	--	--

Tentatively Identified Compounds (TICs) - All "unknown" TICs were qualified as estimated (J) and all "known" TICs were qualified (NJ).

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the initial calibration, method blank and TIC sections of this report. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, was used in evaluating the data in this summary report.



**HEXAVALENT CHROMIUM**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 403079

Client: CH2M Hill, Inc. Date: May 3, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Paula Penham

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	FB030904	403079-001-015-1/1	Water
2	EB030904-SB	403079-002-016-1/1	Water
2MS	EB030904-SBMS	403079-002-016-1/1MS	Water
3	2-4-T	403079-006-084-1/1	Soil
4	2-2-T	403079-007-085-1/1	Soil
5	2-3-T	403079-008-086-1/1	Soil
6	2-1-T	403079-009-087-1/1	Soil
7	2-2-0910	403079-010-088-1/3	Soil
8	2-3-1011	403079-011-091-1/1	Soil
9	2-1P-1011	403079-012-092-1/1	Soil
9MS	2-1P-1011MS	403079-012-092-1/1MS	Soil
10	2-4-1011	403079-013-093-1/1	Soil
11	2-1-1011	403079-014-094-1/1	Soil

Holding Times - All samples were prepared and analyzed within 28 days.

Calibration - The ICV and CCV %R values were acceptable.

Method and Calibration Blanks - The method blanks were free of contamination.

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level mg/kg	Qualifier	Affected Samples
EB030904-SB	None - ND	--	--	--	--
FB030904	None - ND	--	--	--	--

Matrix Spike - The matrix spike sample(s) exhibited acceptable %R values.

Sample Duplicate - Sample duplicate results were acceptable.

LCS - The LCS samples exhibited acceptable %R values.

Field Duplicates - Field duplicate results are summarized below.

Compound	2-1-1011 mg/kg	2-1P-1011 mg/kg	RPD	Qualifier
Cyanide	ND	ND	--	--

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.



**TOTAL ORGANIC CARBON, pH**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-174 SDG #: 403079

Client: CH2M Hill, Inc. Date: May 3, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Paula Benham

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	2-4-T	403079-006-084-1/1	Soil
1MS	2-4-TMS	403079-006-084-1/1MS	Soil
2	2-2-T	403079-007-085-1/1	Soil
3	2-3-T	403079-008-086-1/1	Soil
4	2-1-T	403079-009-087-1/1	Soil
5*	2-2-0910	403079-010-088-1/3	Soil
6*	2-3-1011	403079-011-091-1/1	Soil
7*	2-1P-1011	403079-012-092-1/1	Soil
8*	2-4-1011	403079-013-093-1/1	Soil
9*	2-1-1011	403079-014-094-1/1	Soil

\* - pH analysis only

Holding Times - All samples were prepared and analyzed within the recommended holding time except the TOC analysis in the following samples.

Sample	Date Sampled	Date Analyzed	# of Days	Qualifier
2-4-T	03/09/04	03/24/04	15	L
2-2-T	03/09/04	03/24/04	15	L
2-3-T	03/09/04	03/24/04	15	L
2-1-T	03/09/04	03/24/04	15	L

Calibration - The ICV and CCV %R values were acceptable.

Method and Calibration Blanks - The calibration blanks were free of contamination.

Field and Equipment Blank - Field QC samples were not analyzed.

Matrix Spike - The matrix spike sample(s) exhibited acceptable %R values.

Sample Duplicate - Sample duplicate results were acceptable.

LCS - A LCS sample was not analyzed.

Field Duplicates - Field duplicate results are summarized below.

Compound	2-1-1011	2-1P-1011	RPD	Qualifier
pH	7.6	7.5	1%	--

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the holding time section of this report. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.

**SWMU 27A**

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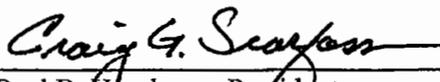
**HEARTLAND**  
ENVIRONMENTAL SERVICES, INC.

**Data Validation Report**

SDG#: 204156  
Date: June 10, 2002  
Client Name: CH2M Hill  
Project/Site Name: ABL  
Date Sampled: April 25, 2002  
Number of Samples: 6 Non-Aqueous Sample(s) with 0 MS/MSD(s)  
1 Aqueous Sample(s) with 0 MS/MSD(s)  
Laboratory: GPL Laboratories  
Validation Guidance: National Functional Guidelines for Organic and Inorganic Data,  
Region III Modifications  
QA/QC Level: NEESA D  
Method(s) Utilized: CLP Multimedia SOW and SW846 Third Edition  
Analytical Fractions: Volatiles, Explosives, Metals, pH and Cyanide

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

  
for Paul B. Humburg, President

6-10-02  
Date

SDG# 204156

Samples and Fractions Reviewed

Sample Identifications

Analytical Fractions

CH2M HILL ID	MATRIX	VOA	EXPL	MET	pH	CN					
27A-13-SD	SOIL		X								
27A-16-SD	SOIL	X	X	X		X					
27A-17-SD	SOIL	X	X	X		X					
27A-3-SD	SOIL		X								
27A-4-SD	SOIL	X	X								
27A-8-SD	SOIL	X		X	X	X					
TB0425/02	WATER	X									
Total Billable Samples (Water/Soil)		1	4	0	5	0	3	0	1	0	3

VOA= Volatiles  
 EXPL= Explosives  
 MET= Metals  
 pH= pH  
 CN= Cyanide

**MAJOR AND MINOR FINDINGS  
GC/MS VOLATILES**

**SDG 204156**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. GC/MS Tuning  
No major or minor findings.
4. Calibration  
Minor findings.
5. Blanks  
Minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Internal Standard Recoveries  
No major or minor findings.
8. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
9. Field Duplicates  
No major or minor findings.
10. Compound Identification  
No major or minor findings.
11. Compound Quantitation  
Minor findings.

**MAJOR AND MINOR FINDINGS  
EXPLOSIVES**

**SDG 204156**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. HPLC Performance  
No major or minor findings.
4. Calibration  
No major or minor findings.
5. Blanks  
No major or minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
8. Field Duplicates  
No major or minor findings.
9. Compound Identification  
No major or minor findings.
10. Compound Quantitation  
No major or minor findings

MAJOR AND MINOR FINDINGS  
METALS AND WET CHEMISTRY  
SDG 204156

Blank results

No major or minor findings for this section.

Calibration results

No major or minor findings for this section.

Matrix Spike results

Minor findings for this section.

Matrix Duplicate results

No major or minor findings for this section.

Laboratory Control Standard results

No major or minor findings for this section.

Serial Dilution results

No major or minor findings for this section.

## **DATA ASSESSMENT NARRATIVES**

## DATA ASSESSMENT NARRATIVE

### GC/MS VOLATILE ORGANICS

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the CLP Statement of Work OLM04.2 for GC/MS Volatiles; the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review); and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG # 204156

A validation was performed on the Volatile Data from SDG 204156. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • GC/MS Tuning
- Calibration
- Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- \* • Internal Standard Performance
- \* • Compound Identification
- Compound Quantitation

\* - All criteria were met for this parameter.

**DATA ASSESSMENT NARRATIVE  
GC/MS VOLATILE ORGANICS**

**PAGE 2**

**Calibrations**

The continuing calibration standard A34279.D exhibited one (1) compound with a %D greater than 25% but less than 50% for which qualifications were required. For the following samples and compound, the reported positive results are qualified as estimated, J.

27A-17-SD                      chloromethane  
27A-4-SD

The continuing calibration standard A34368.D exhibited two (2) compounds with %Ds greater than 50%. For the following samples and compounds, the reported positive and non-detect results are qualified as estimated, J/UJ.

27A-16-SDRE                2-butanone  
27A-8-SDRE                methyl acetate

The continuing calibration standard A34368.D exhibited one (1) compound with a %D greater than 25% but less than 50% for which qualifications were required. For the following samples and compound, the reported positive results are qualified as estimated, J.

27A-16-SDRE                1,2,4-trichlorobenzene

**Blanks**

The method blanks associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

<u>Associated blank</u>	<u>Compound</u>	<u>Concentration</u>	<u>Action Level</u>
BLK54311	methylene chloride	3.9J ug/Kg	39 ug/Kg
	tetrachloroethylene	1.9J ug/Kg	9.5 ug/Kg
BLK54396	methylene chloride	1.3J ug/L	13 ug/L

**DATA ASSESSMENT NARRATIVE  
GC/MS VOLATILE ORGANICS**

**PAGE 2**

**Blanks (continued)**

<u>Samples</u>	<u>Compound</u>	<u>Qualifications</u>
27A-17-SD 27A-4-SD TB0425/02	methylene chloride	B
27A-4-SD	tetrachloroethylene	B

**Compound Quantitation**

The following samples exhibited non-compliant internal standard area recoveries and/or surrogate recoveries on the initial analysis. Both samples were re-analyzed within holding times and all quality control criteria was met. Therefore, the following samples are rejected, R, in favor of the results reported from the RE analyses.

27A-16-SD  
27A-8-SD

**System Performance and Overall Assessment**

The data, as reported, required qualifications.

## GLOSSARY OF DATA QUALIFIERS

### QUALIFICATION CODES

**U** = Not detected

**J** = Estimated value

**UJ** = Reported Quantitation limit is qualified as estimated

**L** = Result is estimated and biased low

**K** = Result is estimated and biased high

**R** = Result is rejected and unusable

**D** = Result value is based on dilution analysis

### METHOD BLANK QUALIFICATION CODES

**B =** The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

**B =** The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

**No Action =** The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QUAL CODE</u>
27A-17-SD 27A-4-SD	chloromethane	+	J	CCH
27A-16-SDRE 27A-8-SDRE	2-butanone methyl acetate	+/-	J/UJ	CCH
27A-16-SDRE	1,2,4-trichlorobenzene	+	J	CCL
27A-17-SD 27A-4-SD TB0425/02	methylene chloride	+B	B	BL
27A-4-SD	tetrachloroethylene	+B	B	BL
27A-16-SD 27A-8-SD	All Compounds	+/-	R	RE

- \* DL denotes the Form I qualifier supplied by the laboratory  
 QL denotes the qualifier used by the data validation firm  
 + in the DL column denotes a positive result  
 - in the DL column denotes a non detect result

## DATA ASSESSMENT NARRATIVE

### EXPLOSIVES (8330)

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, HPLC performance and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8330 Explosives, the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review), as applicable; and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG 204156

A validation was performed on the Explosives Data from SDG 204156. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • HPLC Performance
- \* • Calibration
- \* • Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- \* • Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

#### Overall Assessment

The data did not require qualifications.

## **GLOSSARY OF DATA QUALIFIERS**

### **DATA QUALIFIERS**

**U** = Not detected

**J** = Estimated value

**UJ** = Reported Quantitation limit is qualified as estimated

**L** = Result is estimated and biased low

**K** = Result is estimated and biased high

**R** = Result is rejected and unusable

**D** = Result value is based on dilution analysis

### **METHOD BLANK DATA QUALIFIERS**

**B** = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified B.

**B** = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as B.

**No Action** = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QUAL CODE</u>
------------------	--------------------	-----------	-----------	------------------

NO QUALIFICATIONS WERE REQUIRED

- \* DL denotes the Form I qualifier supplied by the laboratory
- QL denotes the qualifier used by the data validation firm
- + in the DL column denotes a positive result
- in the DL column denotes a non detect result

# DATA ASSESSMENT NARRATIVE METALS AND WET CHEMISTRY

## General

The inorganic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 methods: the Region III Functional Guidelines for Inorganic Data Validation, February 1994, and NEESA D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

## SDGs # 204156

A validation was performed on the Metals and wet chemistry Data from SDG 204156. The data was evaluated based on the following parameters.

- \* ● Data Completeness
- \* ● Holding Times
- \* ● Calibrations
- Blanks
- \* ● Interferences
- Matrix Spike Recovery
- \* ● Matrix Duplicates
- \* ● Field Duplicates
- \* ● Laboratory Control Samples
- \* ● Serial Dilutions

\* - All criteria were met for this parameter.

## Preparation and Field Blanks

1. The preparation and calibration blanks exhibited contamination for the following elements.

<u>Elements</u>	<u>Conc.</u>	<u>Samples affected</u>
Aluminum	9.52 mg/kg	no impact
Calcium	18.4 mg/kg	no impact
Manganese	0.10 mg/kg	no impact
Potassium	10.1 mg/kg	no impact
Zinc	0.13 mg/kg	no impact

The USEPA Region III requires that all sample values below five times the preparation or calibration blank contamination be qualified as estimated, "B". (BL)

### Matrix Spike Recovery results

2. The matrix spike recovery results for soil samples for Antimony (42%) was below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "L and "UL". (MSL)
3. All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B". Value is below the CRDL but greater than the IDL. (OT)

## SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL	MSL
2.all soil samples	Sb.	+/U	L/UL	
3.all "B" results	all analytes	B	J	OT



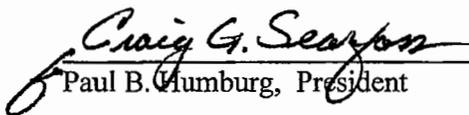
**HEARTLAND**  
ENVIRONMENTAL SERVICES, INC.

**Data Validation Report**

SDG#: 204167  
Date: July 3, 2002  
Client Name: CH2M Hill  
Project/Site Name: ABL  
Date Sampled: April 26, 2002  
Number of Samples: 10 Non-Aqueous Sample(s) with 2 MS/MSD(s)  
3 Aqueous Sample(s) with 2 MS/MSD(s)  
Laboratory: GPL Laboratories  
Validation Guidance: National Functional Guidelines for Organic and Inorganic Data,  
Region III Modifications  
QA/QC Level: NEESA D  
Method(s) Utilized: CLP Multimedia SOW and SW846 Third Edition  
Analytical Fractions: Volatiles, Polynuclear Aromatic Hydrocarbons, Explosives, Diesel  
Range Organics, Gasoline Range Organics, Metals, Perchlorate,  
Hexavalent Chromium, and Cyanide

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

  
Paul B. Humburg, President

7-3-02  
Date

SDG# 204167

Samples and Fractions Reviewed

Sample Identifications

Analytical Fractions

CH2M HILL ID	MATRIX	VOA	PAH	EXPL	DRO	GRO	MET	PER	HCR	CN									
EB-042602	WATER	X	X	X	X	X	X	X	X	X									
EB-042602 MS	WATER					X													
EB-042602 MSD	WATER					X													
FB-042602	WATER	X	X	X	X	X	X	X	X	X									
FB-042602 MS	WATER								X										
FB-042602 MSD	WATER								X										
TB-042602	WATER	X																	
27A-15-SD	SOIL			X			X			X									
27A-6-SD	SOIL						X			X									
27A-5-SD	SOIL			X	X	X	X			X									
27A-5-SD MS	SOIL			X	X	X	X			X									
27A-5-SD MSD	SOIL			X	X	X	X			X									
27A-5-SD/DUP	SOIL			X	X	X	X			X									
27A-12-SD	SOIL			X			X	X		X									
27A-12-SD/DUP	SOIL							X											
27A-11-SD	SOIL			X			X			X									
27A-7-SD	SOIL			X			X			X									
27A-9-SD	SOIL		X		X	X													
27A-9-SD MS	SOIL		X																
27A-9-SD MSD	SOIL		X																
27A-9-SD/DUP	SOIL		X																
Total Billable Samples (Water/Soil)		3	0	2	4	2	8	2	5	4	5	2	9	2	2	4	0	2	9

VOA= Volatiles  
 PAH= Polynuclear Aromatic Hydrocarbons  
 EXPL= Explosives  
 DRO= Diesel Range Organics  
 GRO= Gasoline Range Organics  
 MET= Metals  
 PER= Perchlorate  
 HCR= Hexavalent Chromium  
 CN= Cyanide

**MAJOR AND MINOR FINDINGS  
VOLATILE  
SDG # 204167**

1. **Holding Times**  
No major or minor findings for this section.
2. **GC/MS Tuning**  
No major or minor findings for this section.
3. **Calibrations**  
No major or minor findings for this section.
4. **Internal Standard Performance**  
No major or minor findings for this section.
5. **Blanks**  
Minor findings for this section.
6. **Surrogate Recoveries**  
No major or minor findings for this section.
7. **Laboratory Control Samples**  
No major or minor findings for this section.
8. **Field Duplicates**  
No major or minor findings for this section.
9. **Compound Identification/Quantitation**  
No major or minor findings for this section.

**MAJOR AND MINOR FINDINGS  
PAHS**

**SDG 204167**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. HPLC Performance  
No major or minor findings.
4. Calibration  
Minor findings.
5. Blanks  
No major or minor findings.
6. Surrogate Recoveries  
Minor findings.
7. Matrix Spike/Matrix Spike Duplicates  
Minor findings.
8. Field Duplicates  
Minor findings.
9. Compound Identification  
No major or minor findings.
10. Compound Quantitation  
No major or minor findings

**MAJOR AND MINOR FINDINGS  
EXPLOSIVES**

**SDG 204167**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. HPLC Performance  
No major or minor findings.
4. Calibration  
No major or minor findings.
5. Blanks  
No major or minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
8. Field Duplicates  
Minor findings.
9. Compound Identification  
No major or minor findings.
10. Compound Quantitation  
No major or minor findings

**MAJOR AND MINOR FINDINGS  
DRO**

**SDG 204167**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. GC Performance  
No major or minor findings.
4. Calibration  
No major or minor findings.
5. Blanks  
Minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
8. Field Duplicates  
No major or minor findings.
9. Compound Identification  
Minor findings.
10. Compound Quantitation  
No major or minor findings.

**MAJOR AND MINOR FINDINGS  
GRO**

**SDG 204167**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. GC Performance  
No major or minor findings.
4. Calibration  
No major or minor findings.
5. Blanks  
No major or minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
8. Field Duplicates  
No major or minor findings.
9. Compound Identification  
No major or minor findings.
10. Compound Quantitation  
No major or minor findings.

MAJOR AND MINOR FINDINGS  
METALS AND WET CHEMISTRY  
SDG 204167

**Blank results**

Minor findings for this section.

**Calibration results**

No major or minor findings for this section.

**Matrix Spike results**

Minor findings for this section.

**Matrix Duplicate results**

Minor findings for this section.

**Laboratory Control Standard results**

No major or minor findings for this section.

**Serial Dilution results**

No major or minor findings for this section.

**DATA ASSESSMENT NARRATIVES**

## DATA ASSESSMENT AND NARRATIVE

### VOLATILE ORGANICS

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in USEPA CLP SOW OLM04.2; the Region III Modifications to the National functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review) and NEESA D. All comments made within this report should be considered when examining the analytical results.

#### SDG # 204167

A validation was performed on the Volatile Data from SDG #204167. The data was evaluated based on the following parameters.

- \* Data Completeness
- \* Holding Times
- \* GC/MS Tuning
- \* Calibrations
- \* Internal Standard Performance
- \* Blanks
- \* Surrogate Recoveries
- \* Laboratory Control Samples
- \* Field Duplicates
- \* Compound Identification /Quantitation

\* - All criteria were met for this parameter

**DATA ASSESSMENT AND NARRATIVE  
VOLATILE ANALYSIS**

**PAGE - 2**

**Blank**

The blank(s) associated with samples in this SDG exhibited contamination. Qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

<u>Associated blank</u>	<u>Compound</u>	<u>Concentration</u>	<u>Action Level</u>
BLK54396	methylene chloride	1.3J ug/L	13 ug/L

<u>Samples</u>	<u>Compound</u>	<u>Qualification</u>
EB-042602 FB-042602 TB-042602	methylene chloride	B ( <i>qualifier code: BL</i> )

**System Performance and Overall Assessment**

The data as presented requires qualifications.

## **GLOSSARY OF DATA QUALIFIERS**

### **QUALIFICATION CODES**

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

### **METHOD BLANK QUALIFICATION CODES**

B =                   The sample result for the blank contaminant is less than or greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action =       The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

**QUALIFIER CODE REFERENCE  
ABL**

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QUAL CODE</u>
EB-042602 FB-042602 TB-042602	methylene chloride	+	B	BL

- \* DL denotes the Form I qualifier supplied by the laboratory  
QL denotes the qualifier used by the data validation firm  
+ in the DL column denotes a positive result  
- in the DL column denotes a non detect result

## DATA ASSESSMENT NARRATIVE

### PAHS (8310)

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, HPLC performance and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8330 Explosives, the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review), as applicable; and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG 204167

A validation was performed on the PAH Data from SDG 204167. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • HPLC Performance
- Calibration
- \* • Blanks
- Surrogate Recoveries
- Matrix Spike/Matrix Spike Duplicates
- Field Duplicates
- \* • Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

#### Calibration

The continuing calibration standard LCC5796F.D exhibited a %D greater than 15% but less than 50% for which qualifications were required. For the following sample and compound, the reported positive result is qualified as estimated, J.

27A-9-SD/DUP                      benzo(g,h,i)perylene  
27A-9-SD MS  
27A-9-SD MSD

**DATA ASSESSMENT NARRATIVE  
PAHS (8310)**

**PAGE 2**

**Calibrations (continued)**

The continuing calibration standard LCC5811U.D exhibited a %D greater than 15% but less than 50% for which qualifications were required. For the following sample and compound, the reported positive result is qualified as estimated, J.

27A-9-SD DL (1:10)            dibenz(a,h)anthracene  
27A-9-SD/DUP DL (1:5)

**Surrogate Recoveries**

The following sample exhibited a non-compliant recovery above the QC limits. All reported positive results in the sample are qualified as estimated, J.

27A-9-SD

**Matrix Spike/Matrix Spike Recoveries**

The MS/MSD pair of the following sample exhibited variable recovery results for all of the spike compounds except acenaphthylene. The unspiked sample and field duplicate exhibited positive results for all compounds except aceanpthylene. Based on the variable recovery results in the spike pair, all reported results in the sample and field duplicate noted below are qualified as estimated, J/UJ.

27A-9-SD  
27A-9-SD MS  
27A-9-SD MSD  
27A-9-SD/DUP

**DATA ASSESSMENT NARRATIVE  
PAHS (8310)**

**PAGE 3**

**Field Duplicates**

The field duplicate pair of the following samples exhibited non-compliant precision results for the noted compounds. The following compounds are qualified as estimated, J.

27A-9-SD	anthracene
27A-9-SD/DUP	fluorene
	indeno(1,2,3-cd)pyrene
	acenaphthene
	benzo(a)anthracene
	benzo(a)pyrene
	benzo(b)fluoranthene
	benzo(g,h,i)perylene
	chrysene
	fluoranthene
	pyrene

**Overall Assessment**

The data did require qualifications.

## GLOSSARY OF DATA QUALIFIERS

### DATA QUALIFIERS

**U** = Not detected

**J** = Estimated value

**UJ** = Reported Quantitation limit is qualified as estimated

**L** = Result is estimated and biased low

**K** = Result is estimated and biased high

**R** = Result is rejected and unusable

**D** = Result value is based on dilution analysis

### METHOD BLANK DATA QUALIFIERS

**B** = The sample result for the blank contaminant is less than the sample RL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified B.

**B** = The sample result for the blank contaminant is greater than the sample RL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as B.

**No Action** = The sample result for the blank contaminant is greater than the sample RL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

RL - indicates Reporting Limit

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QUAL CODE</u>
27A-9-SD/DUP 27A-9-SD MS 27A-9-SD MSD	benzo(g,h,i)perylene	+	J	CCH
27A-9-SD DL (1:10) 27A-9-SD/DUP DL (1:5)	dibenz(a,h)anthracene	+	J	CCH
27A-9-SD	All compounds	+	J	SSH
27A-9-SD 27A-9-SD MS 27A-9-SD MSD 27A-9-SD/DUP	All compounds	+/-	J/UJ	MSL/MSH
27A-9-SD 27A-9-SD/DUP	anthracene fluorene indeno(1,2,3-cd)pyrene acenaphthene benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g,h,i)perylene chrysene fluoranthene pyrene	+	J	FD

- \* DL denotes the Form I qualifier supplied by the laboratory  
 QL denotes the qualifier used by the data validation firm  
 + in the DL column denotes a positive result  
 - in the DL column denotes a non detect result

## DATA ASSESSMENT NARRATIVE

### EXPLOSIVES (8330)

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, HPLC performance and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8330 Explosives, the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review), as applicable; and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG 204167

A validation was performed on the Explosives Data from SDG 204167. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • HPLC Performance
- \* • Calibration
- \* • Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- Field Duplicates
- \* • Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

#### Field Duplicates

The field duplicate pair of the following samples exhibited a non-compliant precision result for the noted compound. The reported positive and non-detect results are qualified as estimated, J/UJ.

27A-5-SD                      nitrobenzene  
27A-5-SD-DUP

#### Overall Assessment

The data did require qualifications.

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QUAL CODE</u>
27A-5-SD 27A-5-SD-DUP	nitrobenzene	+/-	J/UJ	FD

- \* DL denotes the Form I qualifier supplied by the laboratory  
QL denotes the qualifier used by the data validation firm  
+ in the DL column denotes a positive result  
- in the DL column denotes a non detect result

## **GLOSSARY OF DATA QUALIFIERS**

### **DATA QUALIFIERS**

**U** = Not detected

**J** = Estimated value

**UJ** = Reported Quantitation limit is qualified as estimated

**L** = Result is estimated and biased low

**K** = Result is estimated and biased high

**R** = Result is rejected and unusable

**D** = Result value is based on dilution analysis

### **METHOD BLANK DATA QUALIFIERS**

**B** = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified B.

**B** = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as B.

**No Action** = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## DATA ASSESSMENT NARRATIVE

### DIESEL RANGE ORGANICS (DRO)

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8015 Modified for DRO; the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review), as applicable; and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG # 204167

A validation was performed on the DRO Data from SDG 204167. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • GC Performance
- \* • Calibration
- Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

**DATA ASSESSMENT NARRATIVE  
DIESEL RANGE ORGANICS (DRO)**

**PAGE 2**

**Blanks**

The field QC blanks associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

<u>Associated blank</u>	<u>Compound</u>	<u>Concentration</u>	<u>Action Level</u>
EB-042602	DRO	0.17 mg/L	25.5 mg/Kg
FB-042602	DRO	0.21 mg/L	31.5 mg/Kg

<u>Samples</u>	<u>Compound</u>	<u>Qualifications</u>
27A-5-SD/DUP	DRO	B

**Compound Identification**

The reported positive results for diesel in the samples are qualified as presumptively present at an estimated concentration, NJ. Based on a review of the sample chromatography, with comparison to the standards chromatography, the patterns present in the sample may contain diesel, but appear to be that of a heavier fuel.

**System Performance and Overall Assessment**

The data, as reported, did require qualifications.

## **GLOSSARY OF DATA QUALIFIERS**

### **QUALIFICATION CODES**

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

### **BLANK QUALIFICATION CODES**

B = The sample result for the blank contaminant is less than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B.

B = The sample result for the blank contaminant is greater than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B.

No Action = The sample result for the blank contaminant is greater than the sample RL and is greater than 5X the blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

RL - indicates reporting limit

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QL CODE</u>
27A-5-SD/DUP	DRO	+	B	BL
All Samples	DRO	+	NJ	OT

- \* DL denotes the Form I qualifier supplied by the laboratory  
QL denotes the qualifier used by the data validation firm  
+ in the DL column denotes a positive result  
- in the DL column denotes a non detect result

## DATA ASSESSMENT NARRATIVE

### GASOLINE RANGE ORGANICS (GRO)

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8015 Modified for GRO; the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review), as applicable; and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG # 204167

A validation was performed on the GRO Data from SDG 204167. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • GC Performance
- \* • Calibration
- \* • Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- \* • Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

#### System Performance and Overall Assessment

The data, as reported, did not require qualifications. There was no case narrative submitted for the GRO fraction. Based on the review of the data, there were no problems noted.

## **GLOSSARY OF DATA QUALIFIERS**

### **QUALIFICATION CODES**

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

### **BLANK QUALIFICATION CODES**

B = The sample result for the blank contaminant is less than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B.

B = The sample result for the blank contaminant is greater than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B.

No Action = The sample result for the blank contaminant is greater than the sample RL and is greater than 5X the blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

RL - indicates reporting limit

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>
------------------	--------------------	-----------	-----------

NO QUALIFICATIONS WERE REQUIRED

- \* DL denotes the Form I qualifier supplied by the laboratory  
QL denotes the qualifier used by the data validation firm  
+ in the DL column denotes a positive result  
- in the DL column denotes a non detect result

# DATA ASSESSMENT NARRATIVE METALS AND WET CHEMISTRY

## General

The inorganic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 methods: the Region III Functional Guidelines for Inorganic Data Validation, February 1994, and NEESA D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

## SDGs # 204167

A validation was performed on the Metals and wet chemistry Data from SDG 204167. The data was evaluated based on the following parameters.

- \* ● Data Completeness
- \* ● Holding Times
- \* ● Calibrations
- Blanks
- \* ● Interferences
- Matrix Spike Recovery
- Matrix Duplicates
- \* ● Field Duplicates
- \* ● Laboratory Control Samples
- \* ● Serial Dilutions

\* - All criteria were met for this parameter.

## Preparation and Field Blanks

1. The preparation and calibration blanks exhibited contamination for the following elements.

<u>Elements</u>	<u>Conc.</u>	<u>Samples affected</u>
Aluminum	9.04 mg/kg	no impact
Antimony	0.98 mg/kg	all soil samples below 5.0 mg/kg
Barium	0.09 mg/kg	no impact
Calcium	17.4 mg/kg	no impact
Manganese	0.10 mg/kg	no impact

Potassium	4.41mg/kg	no impact
Sodium	67.7 mg/kg	all soil samples below 340 mg/kg
Aluminum	45.6 ug/l	all water samples below 228 ug/l
Barium	0.58 ug/l	all water samples below 2.9 ug/l
Calcium	143.0 ug/l	all water samples below 715 ug/l
Iron	61.4 ug/l	all water samples below 307 ug/l
Magnesium	15.6 ug/l	all water samples below 78.0 ug/l
Manganese	0.85 ug/l	all water samples below 4.25 ug/l
Zinc	3.12 ug/l	all water samples below 15.6 ug/l

The USEPA Region III requires that all sample values below five times the preparation or calibration blank contamination be qualified as estimated, "B". (BL)

### Matrix Spike Recovery results

2. The matrix spike recovery results for soil samples for Antimony (52%) was below the lower control limits (>30% but <75%). All positive and non-detect results are qualified as estimated, "L and "UL". (MSL)
3. The matrix spike recovery results for soils for Manganese (138%) and for waters for Aluminum (138%) were above the upper control limits (>125%). All positive results are qualified as estimated, "K". (MSH)

### Matrix Duplicate RPD results

4. The matrix duplicate RPD for Calcium (48%) was greater than 35%. All positive results are qualified as estimated, "J". (MDP)
5. All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B". Value is below the CRDL but greater than the IDL. (OT)

## SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL	BL
1. all soil samples below 340 mg/kg	Na.	+	B	BL
all soil samples below 5.0 mg/kg	Sb			
all water samples below 228 ug/l	Al.			
all water samples below 2.9 ug/l	Ba.			
all water samples below 715 ug/l	Ca.			
all water samples below 307 ug/l	Fe.			
all water samples below 78.0 ug/l	Mg.			
all water samples below 4.25 ug/l	Mn.			
all water samples below 15.6 ug/l	Zn.			
2. all soil samples	Sb.	+ / U	L / UL	MSL
3. all soil samples	Mn.	+	K	MSH
all water samples	Al.			
4. all soil samples	Ca.	+	J	MDP
5. all "B" results	all analytes	B	J	OT



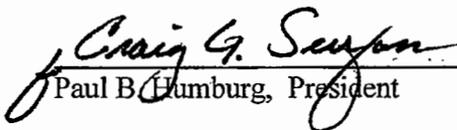
**HEARTLAND**  
ENVIRONMENTAL SERVICES, INC.

**Data Validation Report**

SDG#: 205009  
Date: July 3, 2002  
Client Name: CH2M Hill  
Project/Site Name: ABL  
Date Sampled: April 30, 2002  
Number of Samples: 9 Non-Aqueous Sample(s) with 1 MS/MSD(s)  
1 Aqueous Sample(s) with 0 MS/MSD(s)  
Laboratory: GPL Laboratories  
Validation Guidance: National Functional Guidelines for Organic and Inorganic Data,  
Region III Modifications  
QA/QC Level: NEESA D  
Method(s) Utilized: CLP Multimedia SOW and SW846 Third Edition  
Analytical Fractions: Volatiles, Polynuclear Aromatic Hydrocarbons, Explosives, Diesel  
Range Organics, Gasoline Range Organics, and Perchlorate

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

  
Paul B. Humburg, President

7-3-02  
Date

SDG# 205009

Samples and Fractions Reviewed

Sample Identifications

Analytical Fractions

CH2M HILL ID	MATRIX	VOA	PAH	EXPL	DRO	GRO	PER						
27A-5-SD2	SOIL	X											
27A-5-SD2/DUP	SOIL	X											
27A-6-SD2	SOIL	X											
27A-7-SD2	SOIL	X											
27A-9-SD2	SOIL	X											
27A-11-SD2	SOIL	X											
27A-15-SD2	SOIL	X											
27A-10-SD	SOIL	X	X		X	X							
27A-10-SD MS	SOIL					X							
27A-10-SD MSD	SOIL					X							
27A-14-SD	SOIL	X		X			X						
TB043002	WATER	X											
Total Billable Samples (Water/Soil)		1	9	0	1	0	1	0	1	0	3	0	1

VOA= Volatiles

PAH= Polynuclear Aromatic Hydrocarbons

EXPL= Explosives

DRO= Diesel Range Organics

GRO= Gasoline Range Organics

PER= Perchlorate

**MAJOR AND MINOR FINDINGS  
VOLATILE  
SDG # 205009**

1. Holding Times  
No major or minor findings for this section.
2. GC/MS Tuning  
No major or minor findings for this section.
3. Calibrations  
Major findings for this section.
4. Internal Standard Performance  
No major or minor findings for this section.
5. Blanks  
Minor findings for this section.
6. Surrogate Recoveries  
No major or minor findings for this section.
7. Laboratory Control Samples  
No major or minor findings for this section.
8. Field Duplicates  
No major or minor findings for this section.
9. Compound Identification/Quantitation  
No major or minor findings for this section.

**MAJOR AND MINOR FINDINGS  
PAHS**

**SDG 205009**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. HPLC Performance  
No major or minor findings.
4. Calibration  
Minor findings.
5. Blanks  
No major or minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
8. Field Duplicates  
No major or minor findings.
9. Compound Identification  
No major or minor findings.
10. Compound Quantitation  
No major or minor findings.

**MAJOR AND MINOR FINDINGS  
EXPLOSIVES**

**SDG 205009**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. HPLC Performance  
No major or minor findings.
4. Calibration  
No major or minor findings.
5. Blanks  
No major or minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
8. Field Duplicates  
No major or minor findings.
9. Compound Identification  
No major or minor findings.
10. Compound Quantitation  
No major or minor findings.

**MAJOR AND MINOR FINDINGS  
DRO**

**SDG 205009**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. GC Performance  
No major or minor findings.
4. Calibration  
No major or minor findings.
5. Blanks  
Minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
8. Field Duplicates  
No major or minor findings.
9. Compound Identification  
Minor findings.
10. Compound Quantitation  
No major or minor findings

**MAJOR AND MINOR FINDINGS  
GRO**

**SDG 205009**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. GC Performance  
No major or minor findings.
4. Calibration  
No major or minor findings.
5. Blanks  
No major or minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
8. Field Duplicates  
No major or minor findings.
9. Compound Identification  
No major or minor findings.
10. Compound Quantitation  
No major or minor findings.

MAJOR AND MINOR FINDINGS  
PERCHLORATE  
SDG 205009

Blank results

No major or minor findings for this section.

Calibration results

No major or minor findings for this section.

Matrix Spike results

No major or minor findings for this section.

Matrix Duplicate results

No major or minor findings for this section.

Laboratory Control Standard results

No major or minor findings for this section.

Serial Dilution results

No major or minor findings for this section.

**DATA ASSESSMENT NARRATIVES**

## DATA ASSESSMENT AND NARRATIVE

### VOLATILE ORGANICS

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in USEPA CLP SOW OLM04.2; the Region III Modifications to the National functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review) and NEESA D. All comments made within this report should be considered when examining the analytical results.

#### SDG # 205009

A validation was performed on the Volatile Data from SDG #205009. The data was evaluated based on the following parameters.

- \* Data Completeness
- \* Holding Times
- \* GC/MS Tuning
- Calibrations
- \* Internal Standard Performance
- Blanks
- \* Surrogate Recoveries
- \* Laboratory Control Samples
- \* Field Duplicates
- \* Compound Identification /Quantitation

\* - All criteria were met for this parameter

**DATA ASSESSMENT AND NARRATIVE  
VOLATILE ANALYSIS**

**PAGE - 2**

**Calibrations**

The continuing calibration, A34401.D, contained compounds with RRFs less than 0.050. For the samples and non-compliant compounds listed below, qualify all positive results as biased low (L) and non detected results as rejected (R). (*qualifer code: CCL*)

All Soil Samples                      1,2-dibromo-3-chloropropane

**Blank**

The blank(s) associated with samples in this SDG exhibited contamination. Qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

<u>Associated blank</u>	<u>Compound</u>	<u>Concentration</u>	<u>Action Level</u>
BLK54428	methylene chloride	4.5J ug/Kg	45 ug/Kg
	1,2,4-trichlorobenzene	3.4J	34
	1,4-dichloropropane	1.8J	18
BLK54489	methylene chloride	2.3J ug/L	23 ug/L

<u>Samples</u>	<u>Compound</u>	<u>Qualification</u>
All Samples	methylene chloride	B ( <i>qualifer code: BL</i> )
27A-5-SD2	1,2,4-trichlorobenzene	B ( <i>qualifer code: BL</i> )
	1,4-dichloropropane	

**System Performance and Overall Assessment**

The data as presented requires qualifications.

## **GLOSSARY OF DATA QUALIFIERS**

### **QUALIFICATION CODES**

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

UR = Result is rejected and unusable

D = Result value is based on dilution analysis

### **METHOD BLANK QUALIFICATION CODES**

B =                   The sample result for the blank contaminant is less than or greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

No Action =        The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

## QUALIFIER CODE REFERENCE ABL

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QUAL CODE</u>
All Soil Samples	1,2-dibromo-3-chloropropane	+/-	L/R	CCL
All Samples	methylene chloride	+	B	BL
27A-5-SD2	1,2,4-trichlorobenzene 1,4-dichloropropane	+	B	BL

- \* DL denotes the Form I qualifier supplied by the laboratory  
QL denotes the qualifier used by the data validation firm  
+ in the DL column denotes a positive result  
- in the DL column denotes a non detect result

## DATA ASSESSMENT NARRATIVE

### PAHS (8310)

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, HPLC performance and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8330 Explosives, the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review), as applicable; and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG 205009

A validation was performed on the PAH Data from SDG 205009. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • HPLC Performance
- Calibration
- \* • Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- \* • Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

#### Calibration

The continuing calibration standard LCC5811U.D exhibited a %D greater than 15% but less than 50% for which qualifications were required. For the following sample and compound, the reported positive result is qualified as estimated, J.

27A-10-SD

dibenz(a,h)anthracene

**DATA ASSESSMENT NARRATIVE  
PAHS (8310)**

**PAGE 2**

**Overall Assessment**

The data did require qualifications.

## **GLOSSARY OF DATA QUALIFIERS**

### **DATA QUALIFIERS**

**U** = Not detected

**J** = Estimated value

**UJ** = Reported Quantitation limit is qualified as estimated

**L** = Result is estimated and biased low

**K** = Result is estimated and biased high

**R** = Result is rejected and unusable

**D** = Result value is based on dilution analysis

### **METHOD BLANK DATA QUALIFIERS**

**B** = The sample result for the blank contaminant is less than the sample RL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified B.

**B** = The sample result for the blank contaminant is greater than the sample RL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as B.

**No Action** = The sample result for the blank contaminant is greater than the sample RL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

RL - indicates Reporting Limit

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QUAL CODE</u>
27A-10-SD	dibenz(a,h)anthracene	+	J	CCH

- \* DL denotes the Form I qualifier supplied by the laboratory  
QL denotes the qualifier used by the data validation firm  
+ in the DL column denotes a positive result  
- in the DL column denotes a non detect result

## DATA ASSESSMENT NARRATIVE

### EXPLOSIVES (8330)

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, HPLC performance and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8330 Explosives, the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review), as applicable; and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG 205009

A validation was performed on the Explosives Data from SDG 205009. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • HPLC Performance
- \* • Calibration
- \* • Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- \* • Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

#### Overall Assessment

The data did not require qualifications.

## GLOSSARY OF DATA QUALIFIERS

### DATA QUALIFIERS

**U** = Not detected

**J** = Estimated value

**UJ** = Reported Quantitation limit is qualified as estimated

**L** = Result is estimated and biased low

**K** = Result is estimated and biased high

**R** = Result is rejected and unusable

**D** = Result value is based on dilution analysis

### METHOD BLANK DATA QUALIFIERS

**B** = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified B.

**B** = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X the method blank value. The sample result for the blank contaminant is qualified as B.

**No Action** = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QUAL CODE</u>
------------------	--------------------	-----------	-----------	------------------

NO QUALIFICATIONS WERE REQUIRED

- \* DL denotes the Form I qualifier supplied by the laboratory
- QL denotes the qualifier used by the data validation firm
- + in the DL column denotes a positive result
- in the DL column denotes a non detect result

## DATA ASSESSMENT NARRATIVE

### DIESEL RANGE ORGANICS (DRO)

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8015 Modified for DRO; the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review), as applicable; and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG # 205009

A validation was performed on the DRO Data from SDG 205009. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • GC Performance
- \* • Calibration
- Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

**DATA ASSESSMENT NARRATIVE  
DIESEL RANGE ORGANICS (DRO)**

**PAGE 2**

**Blanks**

The field QC blanks associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

<u>Associated blank</u>	<u>Compound</u>	<u>Concentration</u>	<u>Action Level</u>
EB-042602	DRO	0.17 mg/L	25.5 mg/Kg
FB-042602	DRO	0.20 mg/L	30.0 mg/Kg

<u>Samples</u>	<u>Compound</u>	<u>Qualifications</u>
27A-10-SD	DRO	B

**Compound Identification**

The reported positive results for diesel in the samples are qualified as presumptively present at an estimated concentration, NJ. Based on a review of the sample chromatography, with comparison to the standards chromatography, the patterns present in the sample may contain diesel, but appear to be that of a heavier fuel.

**System Performance and Overall Assessment**

The data, as reported, did require qualifications.

## **GLOSSARY OF DATA QUALIFIERS**

### **QUALIFICATION CODES**

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

### **BLANK QUALIFICATION CODES**

B = The sample result for the blank contaminant is less than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B.

B = The sample result for the blank contaminant is greater than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B.

No Action = The sample result for the blank contaminant is greater than the sample RL and is greater than 5X the blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

RL - indicates reporting limit

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QL CODE</u>
27A-10-SD	DRO	+	B	BL
All Samples	DRO	+	NJ	OT

- \* DL denotes the Form I qualifier supplied by the laboratory  
QL denotes the qualifier used by the data validation firm  
+ in the DL column denotes a positive result  
- in the DL column denotes a non detect result

## DATA ASSESSMENT NARRATIVE

### GASOLINE RANGE ORGANICS (GRO)

#### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC performance and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW-846 Method 8015 Modified for GRO; the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review), as applicable; and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

#### SDG # 205009

A validation was performed on the GRO Data from SDG 205009. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • GC Performance
- \* • Calibration
- \* • Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- \* • Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

#### System Performance and Overall Assessment

The data, as reported, did not require qualifications.

## **GLOSSARY OF DATA QUALIFIERS**

### **QUALIFICATION CODES**

U = Not detected

J = Estimated value

UJ = Reported Quantitation limit is qualified as estimated

L = Result is estimated and biased low.

K = Result is estimated and biased high.

R = Result is rejected and unusable

D = Result value is based on dilution analysis

### **BLANK QUALIFICATION CODES**

B = The sample result for the blank contaminant is less than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B.

B = The sample result for the blank contaminant is greater than the sample RL and is less than 5X the blank value. The sample result for the blank contaminant is qualified as B.

No Action = The sample result for the blank contaminant is greater than the sample RL and is greater than 5X the blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

RL - indicates reporting limit

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

SAMPLE ID

COMPOUND ID

DL QL

NO QUALIFICATIONS WERE REQUIRED

- \* DL denotes the Form I qualifier supplied by the laboratory
- QL denotes the qualifier used by the data validation firm
- + in the DL column denotes a positive result
- in the DL column denotes a non detect result

## DATA ASSESSMENT NARRATIVE PERCHLORATE

### General

The inorganic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 methods: the Region III Functional Guidelines for Inorganic Data Validation, February 1994, and NEESA D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

### SDGs # 205009

A validation was performed on the perchlorate Data from SDG 205009. The data was evaluated based on the following parameters.

- \* ● Data Completeness
- \* ● Holding Times
- \* ● Calibrations
- \* ● Blanks
- \* ● Matrix Spike Recovery
- \* ● Matrix Duplicates
- \* ● Field Duplicates
- \* ● Laboratory Control Samples

\* - All criteria were met for this parameter.

## SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL
Data stands as reported without qualification.			

**CYANIDE**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 306003

Client: CH2M Hill, Inc. Date: July 28, 2003

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Nancy Weaver

Client Sample ID	Laboratory Sample ID	Matrix
27A-21-SD	306003-001-007-1/1	Soil
27A-23-SD	306003-002-008-1/1	Soil
27A-22-SD	306003-003-009-1/1	Soil
27A-18-SD	306003-004-010-1/1	Soil
27A-20-SD	306003-005-021-1/1	Soil
27A-20-SD MS	306003-005-021-1/1 MS	Soil
27A-20P-SD	306003-006-011-1/1	Soil
27A-19-SD	306003-007-012-1/1	Soil

Holding Times - All samples were prepared and analyzed within 14 days. No qualifications were required.

Calibration - The ICV and CCV %R values were acceptable. No qualifications were required.

Method and Calibration Blanks - All method blanks were free of contamination. No qualifications were required.

Field and Equipment Blank - Equipment blank sample EB053003 (SDG 306001) was free of contamination. No qualifications were required.

Field blank sample FB053003 (SDG 306001) was free of contamination. No qualifications were required.

MS/MSD - Matrix spike sample 27A-20-SD exhibited an acceptable %R value for cyanide. No qualifications were required.

Sample Duplicates - Sample 27A-20-SD and the duplicate sample were non-detect for cyanide. No qualifications were required.

Laboratory Control Sample - The LCS sample exhibited an acceptable %R value. No qualifications were required.

Field Duplicates - Field duplicate results are summarized below. No qualifications were required.

Compound	27A-20-SD	27A-20P-SD	RPD
Cyanide	ND	ND	--

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples were valid. Ten percent of calculations for the samples in this data package were verified for the level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.



**EXPLOSIVES**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 306003

Client: CH2M Hill, Inc. Date: July 28, 2003

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Nancy Weaver

Client Sample ID	Laboratory Sample ID	Matrix
27A-21-SD	306003-001-001-1/1	Soil
27A-22-SD	306003-003-003-1/1	Soil
27A-18-SD	306003-004-004-1/1	Soil
27A-20-SD	306003-005-019-1/2	Soil
27A-20-SD MS	306003-005-019-1/2 MS	Soil
27A-20-SD MSD	306003-005-019-1/2 MSD	Soil
27A-20P-SD	306003-006-005-1/2	Soil

Holding Times - All samples were extracted within 14 days for soil samples and analyzed within 40 days. No qualifications were required.

Initial Calibration - The initial calibrations analyzed on 12/30/02 and 03/26/03 exhibited acceptable %RSD values. No qualifications were required.

Continuing Calibration - The continuing calibrations analyzed on 07/02/03, 07/03/03 and 07/08/03 exhibited acceptable %D values. No qualifications were required.

Surrogates - All samples exhibited acceptable surrogate recoveries. No qualifications were required.

MS/MSD - MS/MSD sample 27A-20-SD exhibited a high MSD %R value for 4-amino-2,6-dinitrotoluene of 133%, however, the associated result is non-detect and no qualifications were required.

LCS - LCS sample BKS60734 exhibited severely low %R values for 1,3,5-trinitrobenzene and tetryl of 8% and 0%, respectively. 1,3,5-Trinitrobenzene and tetryl have been rejected (R) in all samples.

LCS sample BKS60735 exhibited an acceptable %R value for nitroglycerine. No qualifications were required.

Method Blank - Method blanks BLK60734 and BLK60735 were free of contamination. No qualifications were required.

Field, Equipment Blank - Equipment blank sample EB053003-SD (SDG 306001) was free of contamination. No qualifications were required.

Field blank sample FB053003 (SDG 306003) was free of contamination. No qualifications were required.

Field Duplicates - Field duplicate results are summarized below. No qualifications were required.

Compound	27A-20-SD	27A-20P-SD	RPD
None	ND	ND	--

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid with the exception of two compounds rejected in all samples due to the low LCS recoveries. Ten percent of calculations for the samples in this data package were verified for the level IV validation. The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, in conjunction with method specific criteria were used in evaluating the data in this summary report.

**PERCHLORATE**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 306003

Client: CH2M Hill, Inc. Date: July 28, 2003

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Nancy Weaver

Client Sample ID	Laboratory Sample ID	Matrix
27A-21-SD	306003-001-001-1/1	Soil
27A-22-SD	306003-003-003-1/1	Soil
27A-18-SD	306003-004-004-1/1	Soil
27A-20-SD	306003-005-019-1/2	Soil
27A-20-SD MS	306003-005-019-1/2 MS	Soil
27A-20-SD MSD	306003-005-019-1/2 MSD	Soil
27A-20P-SD	306003-006-005-1/1	Soil

Holding Times - All samples were prepared and analyzed within 28 days. No qualifications were required.

Calibration - All ICV/CCVs exhibited acceptable %R values. No qualifications were required.

Method Blanks - The method blank was free of contamination. No qualifications were required.

Field and Equipment Blank - Equipment blank sample EB053003-SD (SDG 306001) was free of contamination. No qualifications were required.

Field blank sample FB053003 (SDG 306001) was free of contamination. No qualifications were required.

Matrix Spike/Duplicate - MS/MSD sample 27A-20-SD exhibited acceptable %R and RPD values. No qualifications were required.

Laboratory Control Sample - The laboratory control sample 22648 exhibited an acceptable %R value of 101.5%. No qualifications were required.

Field Duplicates - Field duplicate results are summarized below. No qualifications were required.

Compound	27A-20-SD	27A-20P-SD	RPD
Perchlorate	ND	ND	--

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid. Ten percent of calculations for the samples in this data package were verified for the level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.



**POLYNUCLEAR AROMATIC HYDROCARBONS**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 306003

Client: CH2M Hill, Inc. Date: July 28, 2003

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Nancy Weaver

Client Sample ID	Laboratory Sample ID	Matrix
27A-23-SD	306003-002-002-1/1	Soil
27A-22-SD	306003-003-003-1/1	Soil
27A-18-SD	306003-004-004-1/1	Soil
27A-19-SD	306003-007-006-1/1	Soil
27A-19-SD MS	306003-007-006-1/1 MS	Soil
27A-19-SD MSD	306003-007-006-1/1 MSD	Soil

Holding Times - All samples were extracted within 14 days for soil samples and analyzed within 40 days. No qualifications were required.

GC/MS Tuning - All of the BFB tunes in the initial and continuing calibrations met the percent relative abundance criteria. No qualifications were required.

Initial Calibration - The initial calibration analyzed on 06/10/03 exhibited acceptable %RSD and mean RRF values. No qualifications were required.

Continuing Calibration - The continuing calibrations analyzed on 06/12/03 and 06/13/03 exhibited acceptable %D and RRF values. No qualifications were required.

Surrogates - All samples exhibited acceptable surrogate recoveries. No qualifications were required.

MS/MSD - MS/MSD sample 27A-19-SD exhibited acceptable %R and RPD values. No qualifications were required.

Laboratory Control Sample - LCS sample BKS60707 exhibited a low %R value for benzo(g,h,i)perylene of 45%. Benzo(g,h,i)perylene has been qualified (L/UL) in all samples.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria. No qualifications were required.

Method Blank - Method blank BLK60707 was free of contamination. No qualifications were required.

Trip, Field, Equipment Blank - Equipment blank sample EB053003-SD (SDG 306001) was free of contamination. No qualifications were required.

Field blank sample FB053003 (SDG 306001) was free of contamination. No qualifications were required.

Field Duplicates - Field duplicate samples were not analyzed with this data package.

Tentatively Identified Compounds (TICs) - Not reported.

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the LCS section of this report. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, was used in evaluating the data in this summary report.



**TOTAL METALS**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 306003

Client: CH2M Hill, Inc. Date: July 28, 2003

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Nancy Weaver

Client Sample ID	Laboratory Sample ID	Matrix
27A-21-SD	306003-001-007-1/1	Soil
27A-23-SD	306003-002-008-1/1	Soil
27A-22-SD	306003-003-009-1/1	Soil
27A-18-SD	306003-004-010-1/1	Soil
27A-20-SD	306003-005-021-1/2	Soil
27A-20-SD MS	306003-005-021-1/2 MS	Soil
27A-20-SD MSD	306003-005-021-1/2 MSD	Soil
27A-20P-SD	306003-006-011-1/1	Soil
27A-19-SD	306003-007-012-1/1	Soil

Holding Times - All samples were prepared and analyzed within 28 days for mercury and 180 days for all other metals. No qualifications were required.

Calibration - The ICV and CCV %R values were acceptable. No qualifications were required.

CRDL Standard - The CRDL standards exhibited high %R values for selenium, sodium and thallium, however, all associated results are non-detect or already qualified and no qualifications were required.

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited contamination for several compounds, however, all sample results are non-detect or greater than 5X the blank concentration with the exception of the following:

- Sodium has been qualified (B) in all samples.
- Thallium has been qualified (B) for positive results in all samples.

Field and Equipment Blank - Equipment blank sample EB053003-SD (SDG 306001) exhibited potassium, silver and sodium contamination at 16.5 ug/L, 2.3 ug/L and 162 ug/L, respectively. Silver has been qualified (B) in samples 27A-22-SD, 27A-20-SD and 27A-20P-SD. All other associated results are greater than non-detect, 5X the blank concentration or already qualified and no further qualifications were required.

Field blank sample FB053003 (SDG 306001) exhibited potassium contamination at 15.0 ug/L, however, all associated results are greater than 5X the blank concentration and no qualifications were required.

ICP Interference Check Sample - The ICP interference check sample exhibited acceptable %R values. No qualifications were required.

Matrix Spike - Matrix spike water sample 27A-20-SD exhibited a low %R value for antimony of 41.6%. Antimony has been qualified (L/UL) in all samples.

Matrix Duplicate - Matrix duplicate sample 27A-20-SD exhibited a high RPD value for magnesium of 49.6%. Magnesium has been qualified (J) in all samples.

LCS - The LCS samples exhibited acceptable %R values. No qualifications were required.

ICP Serial Dilutions - ICP serial dilution sample 27A-20-SD exhibited acceptable %D values. No qualifications were required.

Field Duplicates - Field duplicate results are summarized in the table below. No qualifications were required.

Compound	27A-20-SD mg/kg	27A-20P-SD mg/kg	RPD
Aluminum	12100	11900	2%
Arsenic	8.7	8.3	5%
Barium	120	126	5%
Beryllium	1.1	1.1	0%
Calcium	20800	31600	41%
Chromium	17.8	19.1	7%
Cobalt	13.7	13.5	2%
Copper	26.3	25.3	4%
Iron	33000	33500	2%
Lead	27.7	26.9	3%
Magnesium	5590	5700	2%
Manganese	635	626	1%
Nickel	23.9	23.6	1%

Compound	27A-20-SD mg/kg	27A-20P-SD mg/kg	RPD
Potassium	1830	1830	0%
Vanadium	27.1	26.7	2%
Zinc	259	229	12%

Compound Quantitation - All results reported with a (B) qualifier by the laboratory were further qualified as estimated (J) except those results already qualified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the method blank, field blank, matrix spike, matrix duplicate and compound quantitation sections of this report. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.



**TOTAL ORGANIC CARBON, pH**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 306003

Client: CH2M Hill, Inc. Date: July 28, 2003

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Christine Garvey

Client Sample ID	Laboratory Sample ID	Matrix
27A-21-SD	306003-001-013-1/1	Soil
27A-23-SD	306003-002-014-1/1	Soil
27A-22-SD	306003-003-015-1/1	Soil
27A-18-SD	306003-004-016-1/1	Soil
27A-20-SD	306003-005-023-1/2	Soil
27A-20-SD MS	306003-005-023-1/2 MS	Soil
27A-20-SD MSD	306003-005-023-1/2 MSD	Soil
27A-20P-SD	306003-006-017-1/2	Soil
27A-19-SD	306003-007-018-1/1	Soil

Holding Times - The samples were prepared and analyzed within the holding time of 28 days for TOC. The samples were received 1 day outside of the 24-hour pH holding time and analyzed 5 days outside of holding time. pH has been qualified (J) in all samples.

Calibration - The ICV and CCV %R values were acceptable. No qualifications were required.

Method and Calibration Blanks - All method blanks were free of contamination. No qualifications were required.

Field and Equipment Blank - Field QC samples were not associated with the samples in this data package.

MS/MSD - Matrix spike sample 27A-20-SD exhibited acceptable %R and RPD values. No qualifications were required.

Sample Duplicates - Sample 27A-20-SD and the duplicate sample exhibited acceptable RPD values. No qualifications were required.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values. No qualifications were required.

Field Duplicates - Field duplicate results are summarized below. No qualifications were required.

Compound	27A-20-SD	27A-20P-SD	RPD
pH	6.6	6.7	2%
TOC	40000 mg/kg	43000 mg/kg	7%

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples were valid within the constraints identified with the data quality flags as presented in the holding time section of this report. Ten percent of calculations for the samples in this data package were verified for the level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.



**TOTAL METALS (IRON ONLY)**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 405168

Client: CH2M Hill, Inc. Date: July 12, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Paula Benham

EBS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	27A-34-SD	405168-001-001-1/1	Soil
IMS	27A-34-SDMS	405168-001-001-1/IMS	Soil
IMSD	27A-34-SDMSD	405168-001-001-1/IMSD	Soil
2	27A-34-SD/DUP	405168-002-002-1/1	Soil
3	27A-35-SD	405168-003-003-1/1	Soil
4	27A-36-SD	405168-004-004-1/1	Soil
5	27A-37-SD	405168-005-005-1/1	Soil
6	27A-38-SD	405168-006-006-1/1	Soil
7	EB052104-SD	405168-007-007-1/1	Water
8	FB052104	405168-008-008-1/1	Water

Holding Times - All samples were prepared and analyzed within 180 days for iron.

Calibration - The ICV and CCV %R values were acceptable.

CRDL Standard - The CRDL standards exhibited a high %R value; however, the associated results were already qualified or >2X the CRDL.

Method and Calibration Blanks - The method blanks and continuing calibration blanks exhibited the following contamination.

Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
Iron	37.4	187	B	7, 8

Field and Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level	Qualifier	Affected Samples
EB052104-SD	ND	--	--	--	--
FB052104	ND	--	--	--	--

ICP Interference Check Sample - All %R values were acceptable.

Matrix Spike - The matrix spike sample exhibited acceptable %R values.

Matrix Duplicate - The matrix duplicate sample exhibited acceptable RPD values.

LCS - The LCS sample exhibited acceptable %R values.

ICP Serial Dilutions - The ICP serial dilution sample exhibited an acceptable %D value.

Field Duplicates - Field duplicate results are summarized below.

Compound	27A-34-SD mg/kg	27A-34-SD/DUP mg/kg	RPD	Qualifier
Iron	13100	16500	23%	None

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the method and calibration blank section of this report. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses", April 1993, was used in evaluating the data in this summary report.

**SWMU 37E**

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**EXPLOSIVES & NITROGLYCERINE**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 309086

Client: CH2M Hill, Inc. Date: November 6, 2003

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Christine Garvey

Client Sample ID	Laboratory Sample ID	Matrix
AS12-FB091203	309086-002-067-1/1	Water
37E-GGW20-1*	309086-004-023-1/1	Water
AS12-EB091203	309086-008-064-1/1	Water
AS12-12MW19-R02	309086-010-065-1/1	Water
AS12-12MW16-R02	309086-012-066-1/1	Water
AS12-12MW10-R02	309086-014-085-1/1	Water
AS12-12MW10-R02MS	309086-014-085-1/1MS	Water
AS12-12MW10-R02MSD	309086-014-085-1/1MSD	Water

\* - HMX, RDX, nitroglycerine only

Holding Times - All samples were extracted within 7 days for water samples and analyzed within 40 days. No qualifications were required.

Initial Calibration - The initial calibrations analyzed on 03/26/03 and 08/05/03 exhibited acceptable %RSD values. No qualifications were required.

Continuing Calibration - The continuing calibrations analyzed on 09/23/03, 09/24/03 and 09/25/03 exhibited acceptable %D values. No qualifications were required.

Surrogates - All samples exhibited acceptable surrogate recoveries. No qualifications were required.

MS/MSD - MS/MSD sample 12MW10 exhibited high MS/MSD %R values for 2,4,6-trinitrotoluene, 4-amino-2,6-dinitrotoluene and RDX of 103%/115%, 118%/136% and 167%/179%, respectively. However, all three compounds are non-detect in this sample and no qualifications were required.

LCS - LCS sample BKS62629 exhibited acceptable %R values. No qualifications were required.

LCS sample BKS62724 exhibited an acceptable %R value. No qualifications were required.

Method Blank - Method blank BLK62629 was free of contamination. No qualifications were required.

Method blank BLK62724 was free of contamination. No qualifications were required.

Field, Equipment Blank - Equipment blank sample AS12-EB091203 was free of contamination. No qualifications were required.

Field blank sample AS12-FB091203 was free of contamination. No qualifications were required.

Field Duplicates - Field duplicate samples were not analyzed with this data package.

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid. Ten percent of calculations for the samples in this data package were verified for the level IV validation. The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, in conjunction with method specific criteria were used in evaluating the data in this summary report.

**SWMU 37V**

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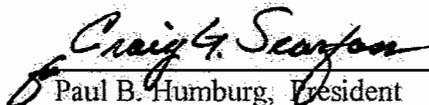
**HEARTLAND**  
ENVIRONMENTAL SERVICES, INC.

**Data Validation Report**

SDG#: 204158  
Date: June 10, 2002  
Client Name: CH2M Hill  
Project/Site Name: ABL  
Date Sampled: April 25, 2002  
Number of Samples: 9 Non-Aqueous Sample(s) with 0 MS/MSD(s)  
Laboratory: GPL Laboratories  
Validation Guidance: National Functional Guidelines for Organic and Inorganic Data,  
Region III Modifications  
QA/QC Level: NEESA D  
Method(s) Utilized: CLP Multimedia SOW  
Analytical Fractions: Volatiles, Metals, and Cyanide

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatograms, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form 1s or spreadsheets for all samples reviewed are included after the Data Assessment Narratives. Form 1s for MS/MSD samples or spreadsheets are not annotated.

The release of this Data Validation Report is authorized by the following signature:

  
Paul B. Humburg, President

6-10-02  
Date

SDG# 204158

Samples and Fractions Reviewed

Sample Identifications

Analytical Fractions

CH2M HILL ID	MATRIX	VOA	MET	CN
37V-4-D/D	SOIL	X		
37V-4-D/S	SOIL	X	X	X
37V-5-D/D	SOIL	X		
37V-5-D/S	SOIL	X	X	X
37V-6-D/D	SOIL	X		
37V-6-D/S	SOIL	X		
37V-7-D/D	SOIL	X		
37V-7-D/D/DUP	SOIL	X		
37V-7-D/S	SOIL	X		
Total Billable Samples (Water/Soil)		0 9	0 2	0 2

VOA= Volatiles  
MET= Metals  
CN= Cyanide

**MAJOR AND MINOR FINDINGS  
GC/MS VOLATILES**

**SDG 204158**

1. Data Completeness  
No major or minor findings.
2. Holding Times  
No major or minor findings.
3. GC/MS Tuning  
No major or minor findings.
4. Calibration  
Minor findings.
5. Blanks  
Minor findings.
6. Surrogate Recoveries  
No major or minor findings.
7. Internal Standard Recoveries  
No major or minor findings.
8. Matrix Spike/Matrix Spike Duplicates  
No major or minor findings.
9. Field Duplicates  
No major or minor findings.
10. Compound Identification  
No major or minor findings.
11. Compound Quantitation  
No major or minor findings.

MAJOR AND MINOR FINDINGS  
METALS AND WET CHEMISTRY  
SDG 204158

Blank results

No major or minor findings for this section.

Calibration results

No major or minor findings for this section.

Matrix Spike results

Minor findings for this section.

Matrix Duplicate results

No major or minor findings for this section.

Laboratory Control Standard results

No major or minor findings for this section.

Serial Dilution results

No major or minor findings for this section.

**DATA ASSESSMENT NARRATIVES**

# DATA ASSESSMENT NARRATIVE

## GC/MS VOLATILE ORGANICS

### General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the CLP Statement of Work OLM04.2 for GC/MS Volatiles; the Region III Modifications to the National Functional Guidelines for Organic Data Review, 9/94, (as referred by the Region III document Innovative Approaches to Data Validation, 6/95, for Level M3 review); and NEESA Level D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

### SDG # 204158

A validation was performed on the Volatile Data from SDG 204158. The data was evaluated based on the following parameters:

- \* • Data Completeness
- \* • Holding Times
- \* • GC/MS Tuning
- • Calibration
- • Blanks
- \* • Surrogate Recoveries
- \* • Matrix Spike/Matrix Spike Duplicates
- \* • Field Duplicates
- \* • Internal Standard Performance
- \* • Compound Identification
- \* • Compound Quantitation

\* - All criteria were met for this parameter.

**DATA ASSESSMENT NARRATIVE  
GC/MS VOLATILE ORGANICS**

**PAGE 2**

**Calibrations**

The continuing calibration standard A34279.D exhibited two (2) compounds with %Ds greater than 25% but less than 50% for which qualifications were required. For the following samples and compounds, the reported positive results are qualified as estimated, J.

37V-4-D/S	chloromethane
37V-4-D/D	
37V-5-D/S	
37V-5-D/D	
37V-6-D/S	
37V-6-D/D	
37V-7-D/S	
37V-7-D/D/DUP	
37V-7-D/D	

37V-4-D/S	cis-1,2-dichloroethene
37V-4-D/D	
37V-5-D/D	
37V-6-D/D	
37V-7-D/D/DUP	
37V-7-D/D	

**Blanks**

The method blanks associated with the field samples in this SDG exhibited contamination for which qualifications were required. The end user should note that the action levels indicated for the blank analysis may not involve the same weights, volumes, dilution factors, or percent moisture as associated samples. These factors must be taken into considerations when applying the 5X and 10X criteria to field samples.

<u>Associated blank</u>	<u>Compound</u>	<u>Concentration</u>	<u>Action Level</u>
BLK54311	methylene chloride	3.9J ug/Kg	39 ug/Kg
	tetrachloroethylene	1.9J ug/Kg	9.5 ug/Kg

DATA ASSESSMENT NARRATIVE  
GC/MS VOLATILE ORGANICS

PAGE 3

Blanks (continued)

<u>Samples</u>	<u>Compound</u>	<u>Qualifications</u>
37V-4-D/S 37V-4-D/D 37V-5-D/S 37V-5-D/D 37V-6-D/S 37V-6-D/D 37V-7-D/S 37V-7-D/D/DUP 37V-7-D/D	methylene chloride	B
37V-4-D/D 37V-5-D/S 37V-5-D/D 37V-6-D/S 37V-6-D/D 37V-7-D/S 37V-7-D/D/DUP 37V-7-D/D	tetrachloroethylene	B

System Performance and Overall Assessment

The data, as reported, required qualifications.

## **GLOSSARY OF DATA QUALIFIERS**

### **QUALIFICATION CODES**

**U** = Not detected

**J** = Estimated value

**UJ** = Reported Quantitation limit is qualified as estimated

**L** = Result is estimated and biased low

**K** = Result is estimated and biased high

**R** = Result is rejected and unusable

**D** = Result value is based on dilution analysis

### **METHOD BLANK QUALIFICATION CODES**

**B** = The sample result for the blank contaminant is less than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that compound is reported.

**B** = The sample result for the blank contaminant is greater than the sample CRQL and is less than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is qualified as non detected at the compound value reported.

**No Action** = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 5X (10X for common laboratory contaminants) the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

## QUALIFIER CODE REFERENCE

Qualifier	Description
TN	Tune
BSL	Blank Spike/LCS - High Recovery
BSH	Blank Spike/LCS - Low Recovery
BD	Blank Spike/Blank Spike Duplicate (LCS/LCSD) Precision
BRL	Below Reporting Limit
ISL	Internal Standard - Low Recovery
ISH	Internal Standard - High Recovery
MSL	Matrix Spike and/or Matrix Spike Duplicate - Low Recovery
MSH	Matrix Spike and/or Matrix Spike Duplicate - High Recovery
MI	Matrix interference obscuring the raw data
MDP	Matrix Spike/Matrix Spike Duplicate Precision
2S	Second Source - Bad reproducibility between tandem detectors
SSL	Spiked Surrogate - Low Recovery
SSH	Spiked Surrogate - High Recovery
SD	Serial Dilution Reproducibility
ICL	Initial Calibration - Low Relative Response Factors (RRF)
ICH	Initial Calibration - High Relative Response Factors (RRF)
ICB	Initial Calibration - Bad Linearity or Curve Function
CCL	Continuing Calibration - Low Recovery or %Difference
CCH	Continuing Calibration - High Recovery or %Difference
LD	Lab Duplicate Reproducibility
HT	Holding Time
PD	Pesticide Degradation
2C	Second Column - Poor Dual Column Reproducibility
LR	Concentration Exceeds Linear Range
BL	Blank Contamination
RE	Redundant Result - due to Re-analysis or Re-extraction
DL	Redundant Result - due to Dilution
FD	Field Duplicate
OT	Other - explained in data validation report

## SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>COMPOUND ID</u>	<u>DL</u>	<u>QL</u>	<u>QUAL CODE</u>
37V-4-D/S 37V-4-D/D 37V-5-D/S 37V-5-D/D 37V-6-D/S 37V-6-D/D 37V-7-D/S 37V-7-D/D/DUP 37V-7-D/D	chloromethane	+	J	CCH
37V-4-D/S 37V-4-D/D 37V-5-D/D 37V-6-D/D 37V-7-D/D/DUP 37V-7-D/D	cis-1,2-dichloroethene	+	J	CCH
37V-4-D/S 37V-4-D/D 37V-5-D/S 37V-5-D/D 37V-6-D/S 37V-6-D/D 37V-7-D/S 37V-7-D/D/DUP 37V-7-D/D	methylene chloride	+B	B	BL
37V-4-D/D 37V-5-D/S 37V-5-D/D 37V-6-D/S 37V-6-D/D 37V-7-D/S 37V-7-D/D/DUP 37V-7-D/D	tetrachloroethylene	+B	B	BL

DL denotes the Form I qualifier supplied by the laboratory  
 QL denotes the qualifier used by the data validation firm  
 + in the DL column denotes a positive result  
 - in the DL column denotes a non detect result

# DATA ASSESSMENT NARRATIVE METALS AND WET CHEMISTRY

## General

The inorganic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, matrix spike and LCS recoveries, matrix duplicates and calibration results. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the SW 846 methods, the Region III Functional Guidelines for Inorganic Data Validation, February 1994, and NEESA D requirements. All comments made within this report should be considered when examining the analytical results. Please refer the specific findings found in each category to the Summary of Data Qualification table.

## SDGs # 204158

A validation was performed on the Metals and wet chemistry Data from SDG 204158. The data was evaluated based on the following parameters.

- \* ● Data Completeness
- \* ● Holding Times
- \* ● Calibrations
- Blanks
- \* ● Interferences
- Matrix Spike Recovery
- \* ● Matrix Duplicates
- \* ● Field Duplicates
- \* ● Laboratory Control Samples
- \* ● Serial Dilutions

\* - All criteria were met for this parameter.

## Preparation and Field Blanks

1. The preparation and calibration blanks exhibited contamination for the following elements.

<u>Elements</u>	<u>Conc.</u>	<u>Samples affected</u>
Aluminum	9.52 mg/kg	no impact
Calcium	18.4 mg/kg	no impact
Manganese	0.10 mg/kg	no impact
Potassium	10.1 mg/kg	no impact
Zinc	0.13 mg/kg	no impact

The USEPA Region III requires that all sample values below five times the preparation or calibration blank contamination be qualified as estimated, "B". (BL)

### Matrix Spike Recovery results

2. The matrix spike recovery results for soil samples for Antimony (42%) was below the lower control limits (> 30% but < 75%). All positive and non-detect results are qualified as estimated, "L and "UL". (MSL)
3. All sample results left with a "B" qualifier after all other qualifications, will be qualified with a "J" qualifier in place of the "B". Value is below the CRDL but greater than the IDL. (OT)

## SUMMARY OF DATA QUALIFICATIONS

Sample ID	Analyte	DL	QL	MSL
2.all soil samples	Sb.	+/U	L/UL	OT
3.all "B" results	all analytes	B	J	

**LOW LEVEL VOLATILE ORGANIC COMPOUNDS**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 309086

Client: CH2M Hill, Inc. Date: November 6, 2003

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Christine Garvey

Client Sample ID	Laboratory Sample ID	Matrix
AS12-TB091203	309086-001-011-1/3	Water
AS12-FB091203	309086-002-041-1/3	Water
37V-GGW19-1	309086-005-017-1/3	Water
37V-GGW17-1	309086-006-020-1/3	Water
37V-GGW-18-1	309086-007-023-1/3	Water
AS12-EB091203	309086-008-032-1/3	Water
AS12-12MW19-R02	309086-010-035-1/3	Water
AS12-12MW16-R02	309086-012-038-1/3	Water
AS12-12MW10-R02	309086-014-094-1/6	Water
AS12-12MW10-R02MS	309086-014-094-1/6MS	Water
AS12-12MW10-R02MSD	309086-014-094-1/6MSD	Water

Holding Times - All samples were analyzed within 14 days for preserved water samples. No qualifications were required.

GC/MS Tuning - All of the BFB tunes in the initial and continuing calibrations met the percent relative abundance criteria. No qualifications were required.

Initial Calibration - The initial calibration analyzed on 08/21/03 exhibited high %RSD values for methylene chloride and acetone of 75.48% and 32.01%, respectively, and low mean RRF values for acetone and 2-butanone of 0.032 and 0.044, respectively. Acetone and 2-butanone have been rejected (R) in all samples unless already qualified. Methylene chloride has already been qualified in all samples and no further qualifications were required.

Continuing Calibration - The continuing calibration analyzed on 09/18/03 exhibited high %D values for several compounds and low RRF values for methyl acetate, 2-butanone and 1,2-dibromo-3-chloropropane of 0.047, 0.030 and 0.035, respectively. Methyl acetate and 1,2-dibromo-3-chloropropane have been rejected (R) in samples TB091203, FB091203, GGW19, GGW17, GGW18, EB091203 and 12MW19. All other associated results are non-detect or have already been qualified and no further qualifications were required.

The continuing calibration analyzed on 09/19/03 exhibited high %D values for several compounds and low RRF values for acetone, methyl acetate, 2-butanone and 1,2-dibromo-3-chloropropane of 0.031, 0.046, 0.035 and 0.036, respectively. Methyl acetate and 1,2-dibromo-3-chloropropane have been rejected (R) in samples 12MW16 and 12MW10. All other associated results are non-detect or have already been qualified and no further qualifications were required.

Surrogates - All samples exhibited acceptable surrogate recoveries. No qualifications were required.

MS/MSD - MS/MSD sample 12MW10 exhibited acceptable %R and RPD values. No qualifications were required.

Laboratory Control Sample - The LCS samples exhibited acceptable %R values. No qualifications were required.

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria. No qualifications were required.

Method Blank - Method blank BLK62617 exhibited acetone and methylene chloride contamination at 3.7 ug/L and 1.5 ug/L, respectively. Acetone has been qualified (B) in samples TB091203, FB091203 and EB091203. Methylene chloride has been qualified (B) in samples TB091203, FB091203, GGW19, GGW17, GGW18, EB091203 and 12MW19.

Method blank BLK62669 exhibited acetone, carbon disulfide and methylene chloride contamination at 2.6 ug/L, 0.36 ug/L and 0.99 ug/L, respectively. Acetone has been qualified (B) in sample 12MW10. Carbon disulfide and methylene chloride have been qualified (B) in samples 12MW16 and 12MW10.

Holding blank sample HOLDING BLANK exhibited carbon disulfide and cyclohexane contamination at 2.9 ug/L and 0.69 ug/L, respectively. Carbon disulfide has been qualified (B) in samples TB091203, FB091203, GGW19, GGW17, GGW18 and EB091203. Cyclohexane has been qualified (B) in sample 12MW10.

Trip, Field, Equipment Blank - Trip blank sample AS12-TB091203 was free of contamination. No qualifications were required.

Equipment blank sample AS12-EB091203 was free of contamination. No qualifications were required.

Field blank sample AS12-FB091203 was free of contamination. No qualifications were required.

Field Duplicates - Field duplicate samples were not analyzed with this data package.

Tentatively Identified Compounds (TICs) - TICs were qualified (NJ).

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the method blank and TIC sections of this report with the exception of the rejected compounds due to the initial and continuing calibrations. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, was used in evaluating the data in this summary report.



**ENVIRONMENTAL**  
Data Services, Inc.

**VOLATILE ORGANIC COMPOUNDS - REVISED**  
USEPA Region III - Level IV Review

Site: Allegany Ballistics Laboratory, CTO-114 SDG #: 404046

Client: CH2M Hill, Inc. Date: July 13, 2004

Laboratory: GPL Laboratories, Gaithersburg, MD Reviewer: Nancy Weaver

EDS ID	Client Sample ID	Laboratory Sample ID	Matrix
1	37V-GGW19-2	404046-001-001-1/3	Water
2	37V-GGW19-R02/DUP	404046-002-004-1/3	Water
3	37V-GGW19-R02	404046-003-007-1/6	Water
3MS	37V-GGW19-R02MS	404046-003-007-1/6MS	Water
3MSD	37V-GGW19-R02MSD	404046-003-007-1/6MSD	Water
4	37V-GGW18-2	404046-004-013-1/3	Water
5	37V-GGW17-2	404046-005-016-1/3	Water
6	TRIP BLANK	404046-007-021-1/2	Water

Holding Times - All samples were analyzed within 14 days for preserved water samples.

GC/MS Tuning - All of the BFB tunes in the initial and continuing calibrations met the percent relative abundance criteria.

Initial Calibration - The initial calibrations exhibited acceptable %RSD and mean RRF values except the following.

ICAL Date	Compound	%RSD/RRF	Qualifier *	Affected Samples
03/10/03	Acetone	RRF=0.022	J/UJ	1, 2, 4, 5, 6
	Methyl Acetate	RRF=0.042	J/UJ	
	2-Butanone	RRF=0.029	J/UJ	
	2-Hexanone	RRF=0.048	J/UJ	
	Several Compounds	%RSD<50%	None	
04/13/04	Acetone	RRF=0.017	J/UJ	3
	2-Butanone	RRF=0.027	J/UJ	

\*- The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, require compounds which have an RRF value less than 0.05 to be estimated (J) for positive results and rejected (R) for non-detects. However, per the client's request, the laboratory provided low level standards for these compounds (0.50 ug/L and 1.0 ug/L). The reviewer examined the chromatograms and using professional judgement, has decided that these compounds can be clearly detected at the lower standard, therefore, the results were qualified (J) for positive results and (UJ) for non-detects.

Continuing Calibration - The continuing calibration exhibited acceptable %D and RRF values except the following.

CCAL Date	Compound	%D/RRF	Qualifier	Affected Samples
04/10/04	Several Compounds	%D<50%	None	ND

Surrogates - All samples exhibited acceptable surrogate recoveries except the following.

Sample ID	Surrogate	%R	Qualifier
All Samples except 3	Several Surrogates	Low	L/UL

MS/MSD - The MS/MSD sample exhibited acceptable %R values.

Laboratory Control Sample - The LCS sample exhibited acceptable %R values except the following.

LCS ID	Compound	%R	Qualifier	Affected Samples
BKS66010	1,2-Dichloropropane	68%	UL	1, 2, 4, 5, 6
	Benzene	68%	UL	
	Trichloroethene	70%	UL	
BKS66011	Benzene	134%	None	ND
	Carbon Tetrachloride	144%		
	Trichloroethene	126%		

Internal Standard (IS) Area Performance - All internal standards met response and retention time (RT) criteria.

Method Blank - The method blanks exhibited the following contamination.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
Holding Blank	1, 2, 3-Trichlorobenzene	0.51	2.55	None	ND

Trip, Field, Equipment Blank - Field QC results are summarized below.

Blank ID	Compound	Conc. ug/L	Action Level ug/L	Qualifier	Affected Samples
TRIP BLANK	Carbon Tetrachloride	0.85	4.25	None	All ND
	Methylene Chloride	1.2	12.0		

Field Duplicates - Field duplicate results are summarized below.

Compound	37V-GGW19-R02 ug/L	37V-GGW19-R02/DUP ug/L	RPD	Qualifier
Chloromethane	0.50U	0.35	NC	None
Toluene	0.58	0.44	27%	None

Tentatively Identified Compounds (TICs) - All "unknown" TICs were qualified as estimated (J) and all "known" TICs were qualified (NJ).

Compound Quantitation - No discrepancies were identified.

Comments - The analyses of environmental samples and quality control samples are valid within the constraints identified with the data quality flags as presented in the initial calibration, surrogate, LCS and TIC sections of this report. Ten percent of the calculations for the samples in this data package were verified for the Level IV validation. The USEPA "Region III Modifications to the National Functional Guidelines for Organic Data Review", September 1994, was used in evaluating the data in this summary report.