DRAFT RESOURCE CONSERVATION AND RECOVERY ACT PART A AND PART B PERMIT APPLICATIONS FOR BURNING GROUNDS AND HAZARDOUS WASTE CONTAINER STORAGE BUILDINGS 366 AND 810 VOLUME 1 OF 2 WITH TRANSMITTAL ABL ROCKET CENTER WV

1/1/2002

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Draft

Volume I

Resource Conservation and Recovery Act

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

ATK
ALLIANT TECHSYSTEMS

Prepared for
ATK Tactical Systems Company LLC

EPA I.D. No. WVO170023691

January 2002

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December 27, 2001

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

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

Dear Maritza:

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

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

Sincerely,

Sana Hamady

Sana Hamady
Project Manager, Environmental Engineer
CH2M HILL

Enclosure

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

Draft

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

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Acronyms

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

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

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

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

WVDEP	West Virginia Department of Environmental Protection
WW	Wastewater

Section A
Part A Application

Part A Application
[40 CFR 270.10(d), 270.11(a) and (d), 270.13]

For EPA Regional Use Only

Date Received
Month Day Year

EPA

United States Environmental Protection Agency
Washington, DC 20460

Hazardous Waste Permit Application Part A

(Read the Instructions before starting)

I. Facility's ID Number *(Mark 'X' in the appropriate box)*

☐ A. First Part A submission	☒ B.Revised Part A Submission (Amendment # 5)
C. Facility's EPA ID Number	**D. Secondary ID Number** *(If applicable)*
WV0170023691	

II. Name of Facility

Allegany Ballistics Laboratory

III. Facility Location *(Physical address not P.O. Box or Route Number*

A. Street

210 State Route 956

Street *(Continued)*

City or Town	State	ZIP Code
Rocket Center	WV	26726-0210

ounty Code *(If known)*	County Name
	Mineral

B. Land Type *(Enter code)*	C. Geographic Location LATITUDE *(Degrees, minutes, & seconds)*	LONGITUDE *(Degrees, minutes & seconds)*	D. Facility Existence Date Month	Day	Year
F	39d, 33m, 030s	078d, 50m, 030s	12	13	1942

IV. Facility Mailing Address

Street or P.O. Box

210 State Route 956

City or Town	State	ZIP Code
Rocket Center	WV	26726-0210

V. Facility Contact *(Person to be contacted regarding waste activities at facility)*

Name *(Last)*	*(First)*
Waugaman	John
Job Title	**Phone Number** *(Area Code and Number)*
Manager, Environmental Programs	(304) 726-5218

VI. Facility Contact Address *(See instructions)*

A. Contact Address	B. Street or P.O. Box
Location ☐ Mailing ☒ Other ☐	

City or Town	State	ZIP Code

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VII. Operator Information (*See Instructions*)

A. Name of Operator		
ATK Tactical Systems Company LLC		
Street or P.O. Box		
210 State Route 956		
City or Town	**State**	**ZIP Code**
Rocket Center	WV	26726-0210

Phone Number (*Area Code and Number*)	B. Operator Type	C. Change of Operator Indicator	Date Changed Month	Day	Year
(304) 726-5000	P	Yes [ ] No [X]			

VIII. Facility Owner (*See Instructions*)

A. Name of Facility's Legal Owner		
U.S. Navy Naval Sea Systems Command		
Street or P.O. Box		
2531 Jefferson Davis Highway		
City or Town	**State**	**ZIP Code**
Arlington	VA	22242-5160

Phone Number (*Area Code and Number*)	B. Owner Type	C. Change of Owner Indicator	Date Changed Month	Day	Year
(703) 602-4364	F	Yes [ ] No [X]			

IX. NAICS Codes (*In order of significance; start in left box*)

First	336415		**Third**		
(Description) guided missile & space vehicle			*(Description*		
Second	336413		**Fourth**		
(Description) other aircraft parts & aux. equip.			*(Description)*		

X. Other Environmental Permits (*See instructions*)

A. Permit Type (*Enter Code*)	B. Permit Number	C. Description
R	WVO170023691	RCRA Part B (1995)
R	Interim Status	Subpart X Application (1988)
E	R13-898A	CAA Construction Permit (1986)
E	R13-974A	CAA Construction Permit (1988)
E	R13-1047A	CAA Construction Permit (1991)
E	R13-1455A	CAA Construction Permit (1992)
E	R13-1694A	CAA Construction Permit (1994)
E	R13-1771	CAA Construction Permit (1995)
E	R13-1782A	CAA Construction Permit (1995)

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Secondary ID Number (*Enter from page 1*):

X. Other Environmental Permits *(See instructions)*

Permit Type *(Enter Code)*	B. Permit Number	C. Description
E	R13-1797	CAA Construction Permit (1995)
E	R13-1798A	CAA Construction Permit (1995)
E	R13-2023A	CAA Construction Permit (1996)
E	R13-2037A	CAA Construction Permit (1996)
E	R13-2246	CAA Construction Permit (1999)
E	R13-0401B	CAA Modification Permit (1999)
E	R13-2301A	CAA Construction Permit (1999)
E	PD99-205	CAA Construction Permit (1999)
E	Interim Status	CAA Title V Permit Application (1996)
N	WV0020371	WV/NPDES Individual Permit (1996)
E	12,791 (WVDHHR)	SDWA Operating Permit (2000)
E	SUB-1440	NRC License for Depleted Uranium Use

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XI. Nature of Business (*Provide a brief description*)

ATK Tactical Systems Company (ATK TSC) conducts development and production of solid propellant units (rocket motors and gas generators) and warheads for the U.S. DoD and for the space program. ATK TSC designs and manufactures resin fiber composite structures. ATK TSC provides process and product engineering services. ATK TSC manufactures precision metal parts.

XII. Process Codes and Design Capacities

A. PROCESS CODE – ***Enter the code from the list of process codes below that best describes each process to be used at the facility. Thirteen lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in Item XIII.***

B. PROCESS DESIGN CAPACITY – ***For each code entered in column A, enter the capacity of the process.***

1. **AMOUNT –** ***Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.***
2. **UNIT OF MEASURE –** ***For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.***

C. PROCESS TOTAL NUMBER OF UNITS – ***Enter the total number of units used with the corresponding process code.***

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	Disposal:	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectare-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
	Storage	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
505	Drip Pad	Gallons; Liters; Acres; Cubic Meters; Hectares; or Cubic Yards
506	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
	Treatment	
T01	Tank Treatment	Gallons Per Day; Liters Per Day; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; or Metric Tons Per Hour
T02	Surface Impoundment Treatment	Gallons Per Day; Liters Per Day; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; or Metric Tons Per Hour
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Gallons Per Day; Liters Per Hour; or Million Btu Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; Btu Per Hour; or Million Btu Per Hour
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Liters Per Hour; Kilograms Per Hour; or Million Btu Per Hour.
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, Or Refining Furnaces	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Gallons Per Hour; Liters Per Hour; or Million Btu Per Hour
788	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion device Used In The Recovery Of Sulfur Values From Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR §260.10	
794	Containment Building - Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
	Miscellaneous (Subpart X)	
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical/Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; or Million Btu Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed below

UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE
Gallons	G	Short Tons Per Hour	D	Cubic Yards	Y
Gallons Per Hour	E	Metric Tons Per Hour	W	Cubic Meters	C
Gallons Per Day	U	Short Tons Per Day	N	Acres	B
Liters	L	Metric Tons Per Day	S	Acre-feet	A
Liters Per Hour	H	Pounds Per Hour	J	Hectares	Q
Liters Per Day	V	Kilograms Per Hour	R	Hectare-meter	F
		Million Btu Per Hour	X	Btu Per Hour	I

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XII. Process Codes and Design Capabilities *(Continued)*

EXAMPLE FOR COMPLETING ITEM XII (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY 1. Amount (Specify)	2. Unit of Measure (Enter code)	C. Process Total Number of Units	For Official Use Only
X	1	S	0	2	5 3 3 . 7 8 8	G	0 0 1	
	1	S	0	1	19,400 .	G	002	
	2	X	0	1	1 . 63	N	001	
	3				.			
	4				.			
	5				.			
	6				.			
	7				.			
	8				.			
	9				.			
1	0				.			
1	1				.			
1	2				.			
	3				.			

NOTE: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be use "for other" processes (i.e., D99, S99, T04 and X99) in Item XIII.

XIII. Other Processes *(Follow instructions from Item XII for D99, S99, T04 and X99 process codes)*

Line Number (Enter #s in seg w/XII)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY 1. Amount (Specify)	2. Unit of Measure (Enter code)	C. Process Total Number of Units	D. Description of Process
X	1	T	0	4				*In-situ Vitrification*
	1							
	2							
	3							
	4							

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XIV. Description of Hazardous Wastes

A. **EPA HAZARDOUS WASTE NUMBER** – *Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four digit number(s) from 40 CFR, Part 261 Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.*

B. **ESTIMATED ANNUAL QUANTITY** –*For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.*

C. **UNIT OF MEASURE** – *For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:*

ENGLISH UNIT OF MEASURE	*CODE*	*METRIC UNIT OF MEASURE*	*CODE*
POUNDS	*P*	*KILOGRAMS*	*K*
TONS	*T*	*METRIC TONS*	*M*

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. **PROCESSES**

1. **PROCESS CODES:**

For listed hazardous waste: For each listed hazardous waste entered in column A select the code(s) from the list of process codes contained in Item XII A. on page 3 to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in Item XII A. on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. *Enter the first two as described above.*
2. *Enter "000" in the extreme right box of item XIV-D(1).*
3. *Use additional sheet, enter number from previous sheet, and enter additional code(s) in item XIV-E.*

2. **PROCESS DESCRIPTION:** *If a code is not listed for a process that will be used, describe the process in the space provided on the form (D.(2)).*

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUSE WASTE NUMBER – Hazardous wastes that can be described by more than one DEP Hazardous Waste Number shall be described on the form as follows:

1. *Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B, C and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.*
2. *In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "Included with above" and make no other entries on that line.*
3. *Repeat step 2 for each DEP Hazardous Waste Number that can be used to describe the hazardous waste.*

EXAMPLE FOR COMPLETING ITEM XIV (shown in line numbers X-1, X-2, X-3, and X-4 below) – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		*A. DEP Hazard Waste No. (Enter code)*				*B. ESTIMATED ANNUAL QUANTITY OF WASTE*	*C. UNIT OF MEASURE (Enter code)*	*D. PROCESS*									
								(1) PROCESS CODES (Enter)									*(2) PROCESS DESCRIPTION (If a code is not entered in D(1))*
X	*1*	*K*	*0*	*5*	*4*	*900*	*P*	*T*	*0*	*3*	*D*	*8*	*0*				
X	*2*	*D*	*0*	*0*	*2*	*400*	*P*	*T*	*0*	*3*	*D*	*8*	*0*				
X	*3*	*D*	*0*	*0*	*1*	*100*	*P*	*T*	*0*	*3*	*D*	*8*	*0*				
X	*4*	*D*	*0*	*0*	*2*												*Included With Above*

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XIV. Description of Hazardous Wastes (*Continued; use additional sheets as necessary*)

Line Number		A. DEP Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
	1	D	0	0	3	211.9	T	X	0	1							
	2	D	0	0	1												Included w/ above
	3	D	0	0	8												Included w/ above
	4	F	0	0	3												Included w/ above
	5	D	0	0	1	50	T	S	0	1							
	6	D	0	0	2	5	T	S	0	1							
	7	D	0	0	4	100	P	S	0	1							
	8	D	0	0	5	100	P	S	0	1							
	9	D	0	0	6	100	P	S	0	1							
1	0	D	0	0	7	65	T	S	0	1							
1	1	D	0	0	8	40	T	S	0	1							
1	2	D	0	0	9	100	P	S	0	1							
1	3	D	0	1	0	100	P	S	0	1							
1	4	D	0	1	1	100	P	S	0	1							
1	5	D	0	1	8	100	P	S	0	1							
1	6	D	0	1	9	100	P	S	0	1							
1	7	D	0	2	1	100	P	S	0	1							
1	8	D	0	2	2	100	P	S	0	1							
1	9	D	0	2	3	100	P	S	0	1							
2	0	D	0	2	4	100	P	S	0	1							
2	1	D	0	2	5	100	P	S	0	1							
2	2	D	0	2	6	100	P	S	0	1							
2	3	D	0	2	7	100	P	S	0	1							
2	4	D	0	2	8	100	P	S	0	1							
2	5	D	0	2	9	100	P	S	0	1							
2	6	D	0	3	0	100	P	S	0	1							
2	7	D	0	3	2	100	P	S	0	1							
2	8	D	0	3	5	100	P	S	0	1							
2	9	D	0	3	6	100	P	S	0	1							
3	0	D	0	3	8	100	P	S	0	1							
3	1	D	0	3	9	100	P	S	0	1							
3	2	D	0	4	0	100	P	S	0	1							
3	3	D	0	4	1	100	P	S	0	1							
3	4	D	0	4	2	100	P	S	0	1							

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EPA ID Number (*Enter from page 1*)	Secondary ID Number (*Enter from page 1*)
WV0170023691	

XIV. Description of Hazardous Wastes (*Continued; use additional sheets as necessary*)

Line Number	A. DEP Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (3) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	D043	100	P	S01	
2	F001	35	T	S01	
3	F002	35	T	S01	
4	F003	35	T	S01	
5	F005	35	T	S01	
6	P005	100	P	S01	
7	P008	100	P	S01	
8	P018	100	P	S01	
9	P021	100	P	S01	
10	P022	100	P	S01	
11	P023	100	P	S01	
12	P024	100	P	S01	
13	P028	100	P	S01	
14	P049	100	P	S01	
15	P047	100	P	S01	
16	P068	100	P	S01	
17	P067	100	P	S01	
18	P078	100	P	S01	
19	P074	100	P	S01	
20	P087	100	P	S01	
21	P007	100	P	S01	
22	P002	100	P	S01	
23	P025	100	P	S01	
24	P000	100	P	S01	
25	U001	100	P	S01	
26	U002	100	P	S01	
27	U003	100	P	S01	
28	U004	100	P	S01	
29	U006	100	P	S01	
30	U007	100	P	S01	
31	U008	100	P	S01	
32	U009	100	P	S01	
33	U012	100	P	S01	

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EPA ID Number (*Enter from page 1*)	Secondary ID Number (*Enter from page 1*)
WV0170023691	

XIV. Description of Hazardous Wastes (*Continued; use additional sheets as necessary*)

Line Number		A. DEP Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									(4) PROCESS DESCRIPTION (If a code is not entered in D(1))
	1	U	0	2	8	100	P	S	0	1							
	2	U	0	2	9	100	P	S	0	1							Included w/ above
	3	U	0	3	1	100	P	S	0	1							Included w/ above
	4	U	0	3	2	100	P	S	0	1							
	5	U	0	3	7	100	P	S	0	1							
	6	U	0	4	1	100	P	S	0	1							
	7	U	0	4	3	100	P	S	0	1							
	8	U	0	4	4	100	P	S	0	1							
	9	U	0	4	5	100	P	S	0	1							
1	0	U	0	4	8	100	P	S	0	1							
1	1	U	0	5	2	100	P	S	0	1							
1	2	U	0	5	5	100	P	S	0	1							
1	3	U	0	5	6	100	P	S	0	1							
1	4	U	0	5	7	100	P	S	0	1							
1	5	U	0	6	9	100	P	S	0	1							
1	6	U	0	7	0	100	P	S	0	1							
1	7	U	0	7	1	100	P	S	0	1							
1	8	U	0	7	2	100	P	S	0	1							
1	9	U	0	7	5	100	P	S	0	1							
2	0	U	0	7	6	100	P	S	0	1							
2	1	U	0	7	7	100	P	S	0	1							
2	2	U	0	7	8	100	P	S	0	1							
2	3	U	0	8	0	100	P	S	0	1							
2	4	U	0	8	8	100	P	S	0	1							
2	5	U	0	9	2	100	P	S	0	1							
2	6	U	0	9	8	100	P	S	0	1							
2	7	U	1	0	2	100	P	S	0	1							
2	8	U	1	0	5	100	P	S	0	1							
2	9	U	1	0	6	100	P	S	0	1							
3	0	U	1	0	8	100	P	S	0	1							
3	1	U	1	1	2	100	P	S	0	1							
3	2	U	1	1	3	100	P	S	0	1							
3	3	U	1	1	5	100	P	S	0	1							

EPA ID Number (*Enter from page 1*)

WV0170023691

Secondary ID Number (*Enter from page 1*)

XIV. Description of Hazardous Wastes (*Continued; use additional sheets as necessary*)

Line Number	A. DEP Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (5) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	U117	100	P	S01	
2	U118	100	P	S01	
3	U122	100	P	S01	
4	U123	100	P	S01	
5	U125	100	P	S01	
6	U126	100	P	S01	
7	U133	100	P	S01	
8	U134	100	P	S01	
9	U138	100	P	S01	
10	U140	100	P	S01	
11	U144	100	P	S01	
12	U147	100	P	S01	
13	U151	100	P	S01	
14	U154	100	P	S01	
15	U159	100	P	S01	
16	U160	100	P	S01	
17	U161	100	P	S01	
18	U162	100	P	S01	
19	U165	100	P	S01	
20	U169	100	P	S01	
21	U170	100	P	S01	
22	U171	100	P	S01	
23	U182	100	P	S01	
24	U184	100	P	S01	
25	U188	100	P	S01	
26	U196	100	P	S01	
27	U201	100	P	S01	
28	U202	100	P	S01	
29	U208	100	P	S01	
30	U209	100	P	S01	
31	U210	100	P	S01	
32	U211	100	P	S01	
33	U213	100	P	S01	

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Secondary ID Number (*Enter from page 1*):

IV. Description of Hazardous Wastes (*Continued; use additional sheets as necessary*)

Line Number	A. DEP Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (6) PROCESS DESCRIPTION (If a code is not entered in D(1))
1	U219	100	P	S01	
2	U220	100	P	S01	
3	U221	100	P	S01	
4	U223	100	P	S01	
5	U225	100	P	S01	
6	U226	100	P	S01	
7	U227	100	P	S01	
8	U228	100	P	S01	
9	U234	100	P	S01	
10	U238	100	P	S01	
11	U239	100	P	S01	
12	U328	100	P	S01	
13	U353	100	P	S01	
14	U359	100	P	S01	
15	U404	100	P	S01	

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ID Number (*Enter from page 1*)	Secondary ID Number (*Enter from page 1*)
WVO170023691	

XV. Map

Attach to this application a topographic map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See Instructions for precise requirements.

XVI. Facility Drawing

All existing facilities must include a scale drawing of the facility (See Instructions for more detail).

XVII. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

XVIII. Certification(s)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Owner Signature	Date Signed
Name and Official Title (Type or print) David W. Anderson, Installations and Equipment Branch	
Owner Signature	Date Signed
Name and Official Title (Type or print)	
Operator Signature	Date Signed
Name and Official Title (Type or print) James W. Cates, Vice President, ATK Tactical Systems Company LLC (ABL)	
Operator Signature	Date Signed
Name and Official Title (Type or print)	

XIX. Comments

Note: Mail completed form to the appropriate EPA Regional or State Office. (Refer to instructions for more information)

Photos of
Allegany Ballistics Laboratory
Burning Grounds and
Hazardous Waste Container Storage
Buildings 366 and 810

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

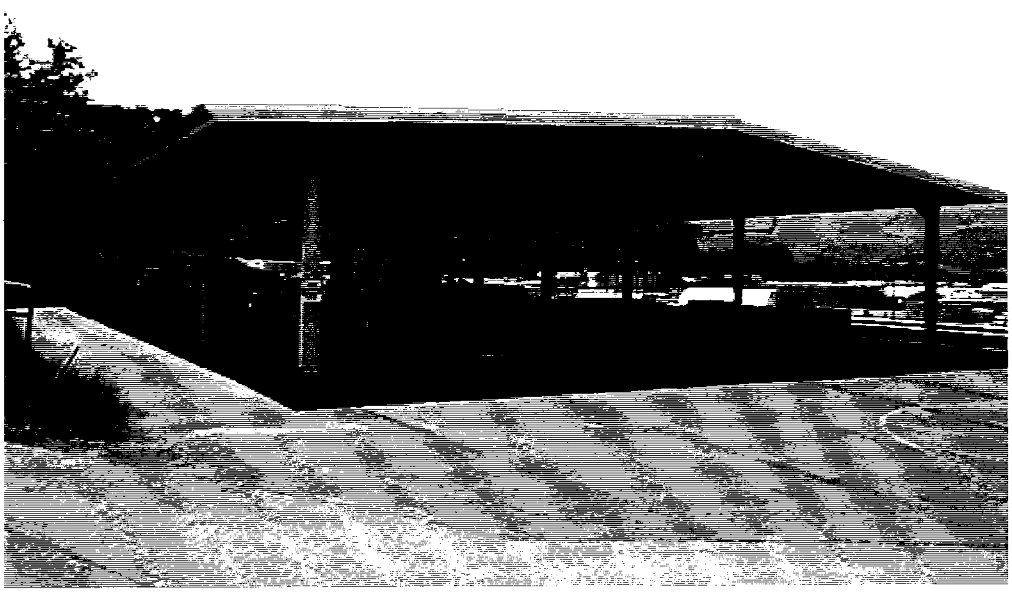

Photo No. 2: Building 366 where hazardous waste generated at Allegany Ballistics Laboratory (ABL) is stored (June 4, 2001)

Photo No. 3: Hazardous waste at Building 366 stored on pallets and containment trays at Allegany Ballistics Laboratory (ABL) (June 4, 2001)

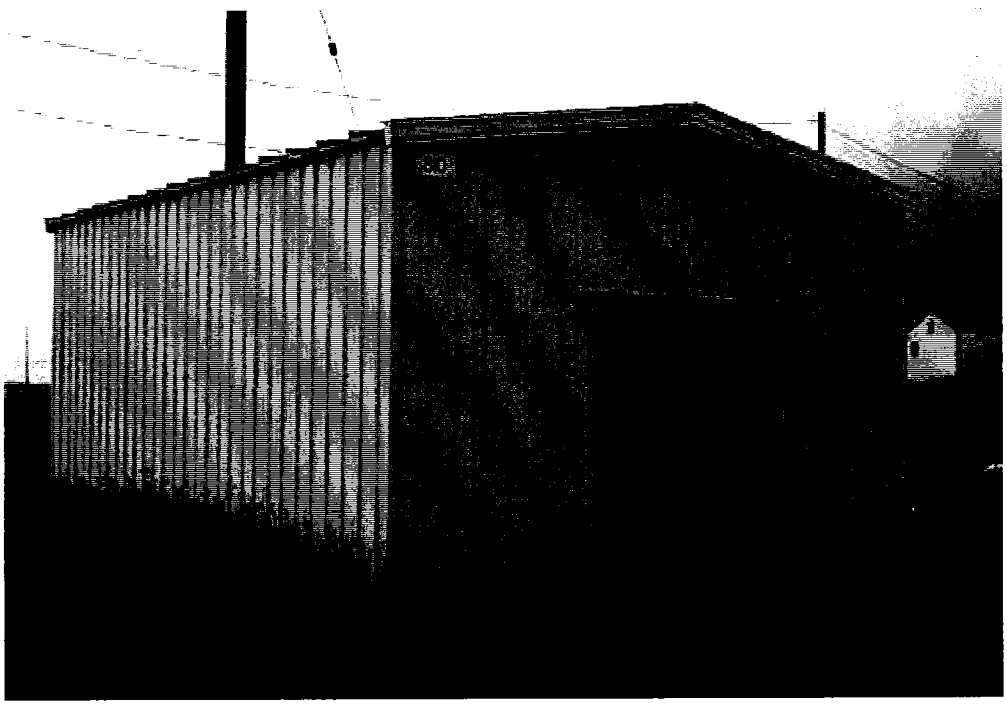

Photo No. 4: Building 810 where hazardous waste generated at Allegany Ballistics Laboratory (ABL) will be stored (June 5, 2001) [**Note:** Once it is permitted, it will be properly marked as a hazardous waste storage building.]

Figures

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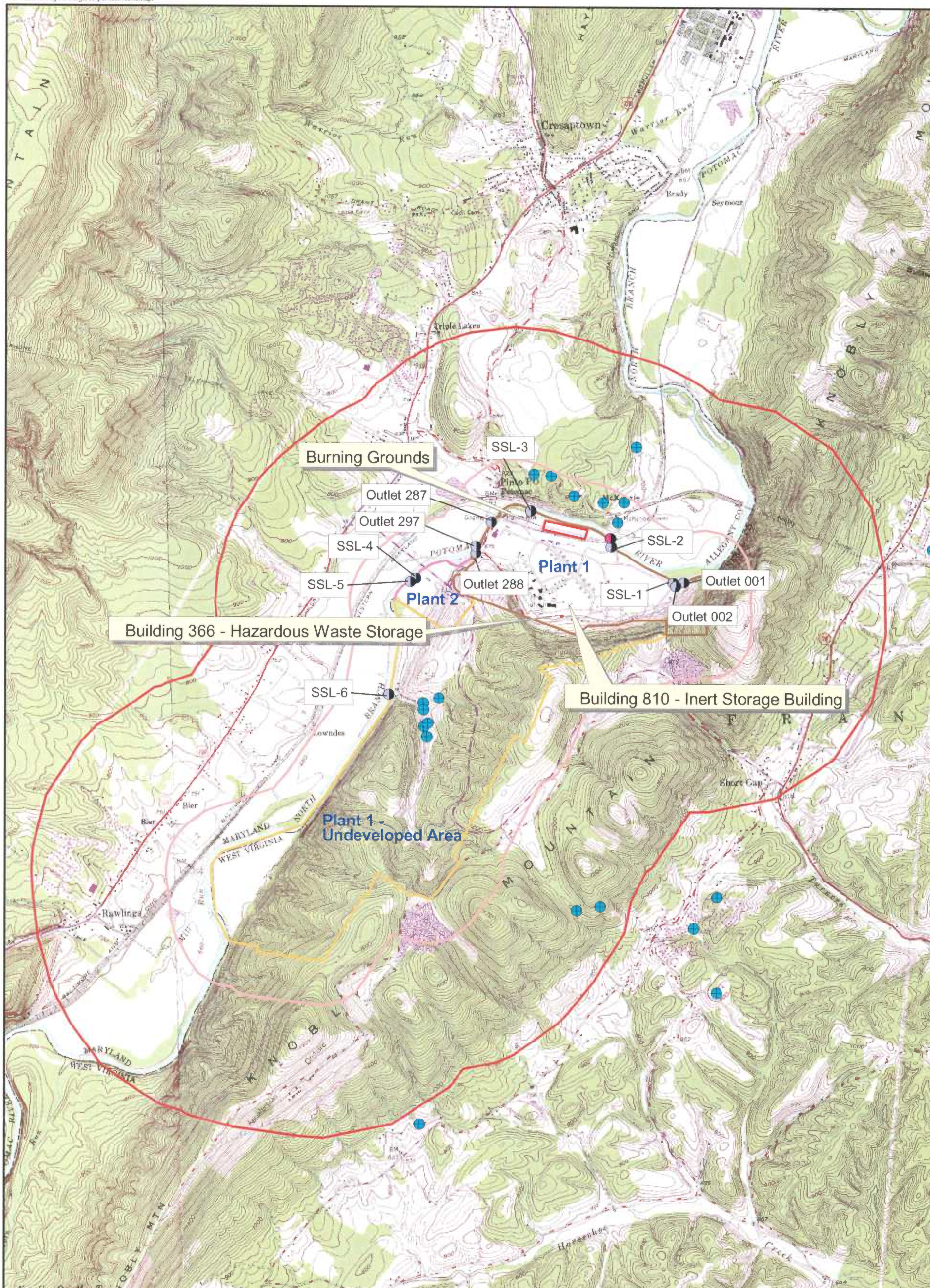

LEGEND
- Drinking Water Wells
- GWTP Discharge Location
- NPDES Off-Site Discharge Location
- Quarter Mile Buffer
- One Mile Buffer
- Hazardous Waste Storage Buildings
- Burning Ground Boundary
- Springs and Surface Water

Legal Boundary
- Plant 1
- Plant 1 - Undeveloped Area
- Plant 2

N

1 0 1 Miles

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

CH2MHILL

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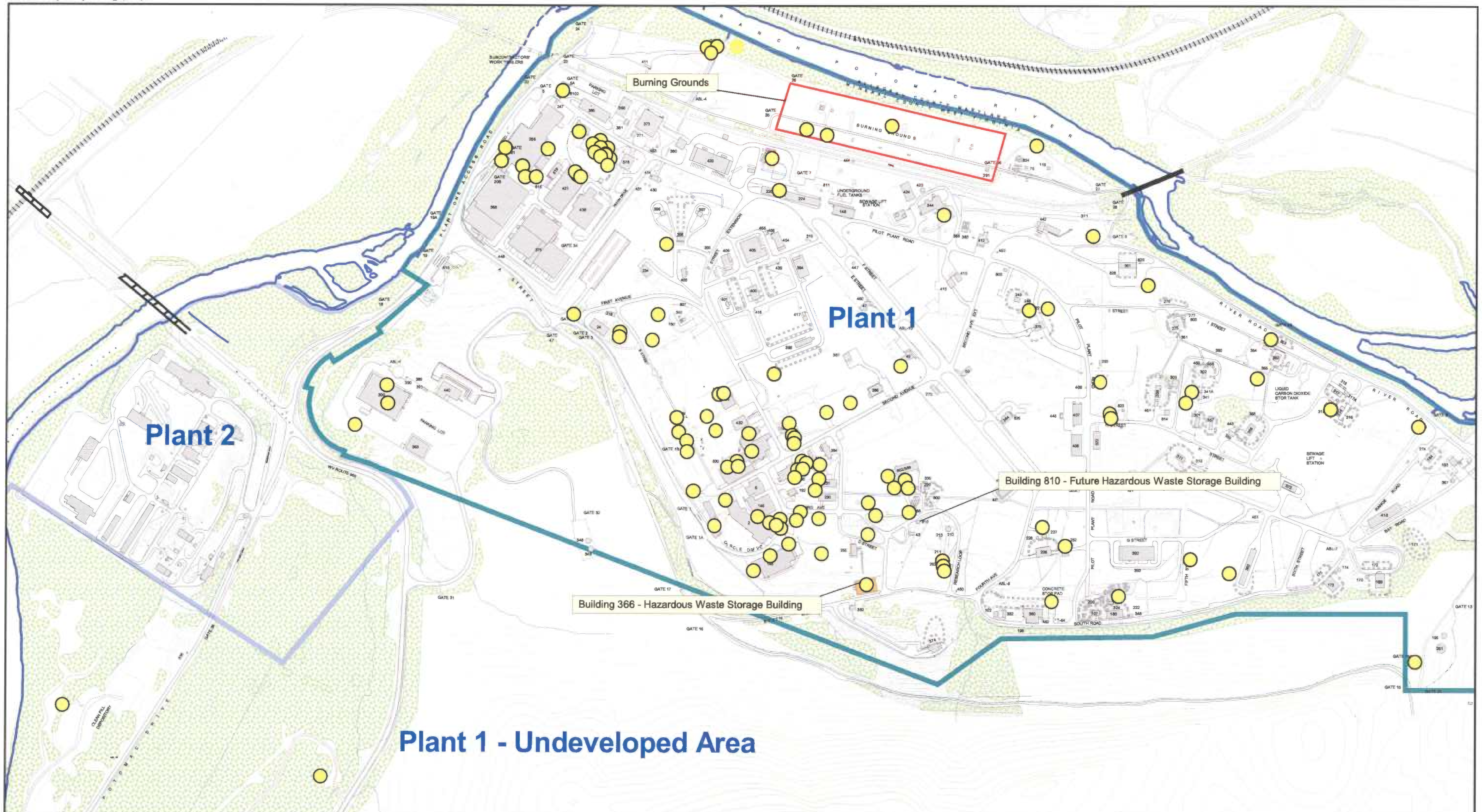

LEGEND

- Areas of Past Storage, Treatment, or Disposal Operations
- Buildings

N

400 0 400 800 Feet

Figure A-2
Facility Drawing
Allegany Ballistiscs Laboratory

CH2MHILL

Section B
Facility Description

SECTION B

Facility Description [40 CFR 270.14(b)(1)]

B-1 General Description [40 CFR 270.14(b)(1)]

Introduction and Overview [40 CFR 270.14(b)(1)]

This section provides a general description of Allegany Ballistics Laboratory (ABL) and the hazardous waste activities at ABL. This description is intended as an overview. ATK Tactical Systems Company LLC (ATK), the operator at ABL, generates hazardous wastes and stores them on site in one of two container storage units for more than 90 days before the wastes are transported off site for disposal. ATK also treats hazardous wastes through open burning (OB) at a designated area. Pursuant to 40 CFR Part 264, storage and treatment of hazardous wastes require a Resource Conservation and Recovery Act (RCRA) hazardous waste permit. Details of specific hazardous waste activities are provided in Section D of this application.

ATK's primary activities are development and production of solid propellant rocket motors, gas generators, warheads, and laser initiation systems for the Department of Defense. Other activities include development and production of metal parts, metal components, and filament wound composite structures and testing of automobile component product.

Throughout the industry, open burning procedures are normally used to dispose of propellant and explosive (P/E) wastes. Principal reasons for using OB treatment are related to safety and protection of human health and compliance with U.S. Department of Transportation (DOT) regulations that prohibit the transportation of certain explosive classifications across public roads. This approach typically emphasized minimal material handling and personnel exposure. ABL has conducted OB operations since the early 1940s. ABL's safety record has been excellent, with no injuries or physical problems due to an OB fire or explosion during operation for more than 50 years.

General Site Description and Environmental Setting [40 CFR 270.14(b)(1)]

ABL is located in Rocket Center, Mineral County, West Virginia. The facility is approximately 9 miles south of Cumberland, Maryland, adjacent to the North Branch Potomac River. Figure B-1 shows the location of ABL. ABL consists of Plant 1 and Plant 2. Plant 1 is owned by the Department of Navy, Naval Sea Systems Command (NAVSEA). Plant 1 covers an area of approximately 1,572 acres: approximately 400 acres are developed bottomland, and the remainder is largely undeveloped forested mountainous land. Plant 2 is owned by ATK and is 57 acres of bottomland adjacent to Plant 1. Both plants are operated by ATK. Container storage of non-reactive hazardous waste and OB of reactive waste are conducted at the Plant 1 facility.

The Burning Grounds used for OB is located adjacent to the North Branch Potomac River at the northern edge of Plant 1. The Burning Grounds is an open, flat, fenced area, 280 feet (ft) by 1,250 ft, with a nearby firing bunker (Building 75) and a material and equipment storage building. Figure B-2 shows the location of the Burning Grounds and the container storage buildings. Hazardous waste is currently stored in Buildings 366 and will be stored in Building 810 located on Plant 1, once permitted. OB is conducted under a Consent Order, CO-R6, 13, 25-99-35A (95), signed in 1999 between the West Virginia Department of Environmental Protection (WVDEP), Office of Air Quality, and NAVSEA and ATK. The management of hazardous waste at Building 366 is under RCRA Part B permit (No. WV0170023691).

Waste Generation and Management [40 CFR 270.14(b)(1)]

Development and production of rocket motors, gas generators, and warheads use reactive propellants, explosives, and materials containing P/E as ingredients. These materials are prepared, compounded, and "cast" into the rocket motor, gas generator, or warhead mold. Material preparation consists of drying, screening, and grinding. Compounding involves mixing operations. These operations generate reactive wastes consisting of batch heels, cleanup residue, and off-specification material. These wastes present an immediate concern because they must be handled and disposed of on a continual basis at the location of generation. P/E wastes are thermally treated at ABL by OB. Reactive wastes are open burned at ABL in a batch process at various burning pads. Additional details are provided in Section D-8.

Other hazardous and non-hazardous wastes are generated as a result of industrial activities at ABL. These wastes are stored in Building 366, and will also be stored in Building 810 once permitted. All wastes stored in Building 366 are containerized in DOT approved containers. No waste generated off site is stored in Building 366.

Lab packs with D-, P-, and U-series hazardous waste codes also are stored at Building 366. Non-hazardous wastes stored at this building include oils and oil sludges, oil/antifreeze mixtures, cured and uncured resins, antiozonant, and ethyl hexyl acrylate, as well as other wastes. Storage process information is discussed in more detail in Section D-1.

B-2 Topographic Map [40 CFR 270.14(b)(19)]

B-2a General Requirements

Figure B-3 is the U.S. Geological Survey (USGS) 7.5 minute topographic map for ABL and the surrounding area.

- **100-Year Floodplain Area.** A portion of the fenced Burning Grounds Area is within the 100-year floodplain. The location of the 100-year flood elevation within the Burning Grounds is shown on Figure B-3. However, the pans in which P/E wastes are treated are outside of the 100-year floodplain.

- **Surface Waters.** The main surface water body in the vicinity of ABL is the North Branch Potomac River, which is shown on Figure B-3. A pond is located approximately ½ mile northwest of the facility. There is also a network of storm drainage ditches throughout the developed portion of ABL.

- **Surrounding Land Use.** The predominant land use of the area surrounding ABL is shown on Figure B-4.
- **Wind Rose.** A wind rose for ABL is shown on Figure B-5.
- **Legal Boundaries.** The legal boundaries of ABL are shown on Figures B-3.
- **Access Control.** Access control features for the ABL facility are shown on Figure B-3. Access control features for the Burning Grounds are shown on Figure B-3.
- **Injection and Withdrawal Wells.** There are no injection wells at ABL. The locations of the ABL water supply wells are shown on Figure B-3. The location of monitoring and extraction wells associated with the groundwater remediation system at the Burning Grounds is shown on Figure B-3.
- **Buildings and Other Structures.** Buildings and other structures at ABL are shown on Figure B-3.
- **Drainage and Flood Control Barriers.** There are no drainage or flood control barriers at ABL.
- **Location of Storage and Treatment Units.** Buildings 366 and 810 and the Burning Grounds are shown on Figure B-2.
- **Sewers.** The storm and sanitary sewer systems at ABL are shown on Figure B-3. There are no process sewers at ABL.
- **Fire Control.** The ABL Fire Station (Building 75) and fire hydrants are shown on Figure B-3.
- **Loading and Unloading.** Ordnance waste at the Burning Grounds is loaded directly into the pans. Loading and unloading of hazardous waste occur at Building 366 and all the less-than-90 days storage areas.
- **Run-off Controls.** The existing site vegetation provides run-off controls.
- **Solid Waste Management Units (SWMUs).** Existing and new SWMUs are shown on Figure B-3.

B-2b Additional Requirements for Land Disposal Facilities [40 CFR 270.14(c)(2), (c)(3), (c)(4)(i), and (d), 264.95, 264.97]

ABL is not a land disposal facility, therefore this section does not apply.

B-3 Location Information [40 CFR 270.14(b)(11) and 264.18]

B-3a Seismic Standard [40 CFR 270.14(b)(11)(i) and (ii) and 264.18(a), Part 264 Appendix VI]

ABL is located in Mineral County, West Virginia, which is not listed in 40 CFR 264 Appendix VI. Therefore, it is not required to demonstrate compliance with the seismic standard.

B-3b Floodplain Standard [40 CFR 270.14(b)(11)(iii) and 264.18(b)]

The North Branch Potomac River borders approximately 50 percent of the developed portion of Plant 1, primarily on the western and northern sides. The 100-year floodplain data were obtained from the Federal Emergency Management Agency (FEMA) and were included on Figure B-3. These data indicate that the 100-year flood elevation is 668 ft above mean sea level (msl) at the Pinto Gaging Station (Figure B-3). The 100-year flood elevation varies from 665 to 666 ft above msl along the river adjacent to the Burning Grounds. A portion of the Burning Grounds is within the 100-year floodplain. However, the burn pans are not located in the floodplain. The Building 366 hazardous waste storage area is at an elevation of 680 ft msl, which is approximately 15 ft above the 100-year flood elevation. The building 810 storage area is at an elevation of 669 ft msl, which is approximately 4 ft above the 100-year flood elevation. Therefore this section does not apply to ABL.

B-4 Traffic Information [40 CFR 270.14(b)(10)]

Traffic Patterns

Number and Types of Vehicles

The facility is located on West Virginia Route 956, just east of the Maryland-West Virginia border at the North Branch Potomac River. The daily traffic count through the main gate is approximately 500 to 750 vehicles. The daily traffic count at both the Burning Grounds and the two container storage buildings is typically less than 10 vehicles per day. Vehicles at the Burning Grounds include sedans and pickup trucks. Vehicles at the storage units may include forklifts, vans, stake-bed trucks, sedans, and tractor-trailer rigs.

Quantity of Waste Moved per Movement of the Vehicle

Burning Grounds. No more than 1,630 pounds (lbs) of explosives are typically transported to the Burning Grounds in a pickup truck. This is equal to the total capacity of the burning operation. The route for waste transportation to the Burning Grounds varies depending on where in the facility the waste is generated. Vehicles carrying explosive material have the right of way on all roads.

Building 366 and Building 810 Container Storage. No more than five 55-gallon drums of hazardous waste are typically transported to Building 366 in a single vehicle. This will apply to Building 810 once permitted. Typically, no more than ninety-six 55-gallon drums of waste (a combination of both hazardous and nonhazardous waste drums) are transported off site from the hazardous waste storage buildings in a single vehicle. The routes for offsite transport of waste from Buildings 366 and 810 are shown on Figure B-3.

Traffic Control Signs and Personnel

Traffic enters and leaves Plant 1, where hazardous waste activities are conducted, through the main gate (Gate 19). The main gate is staffed 24 hours per day by facility security personnel. An alternate entrance to Plant 1 is through Gate 47, which is controlled remotely by security personnel at the main entrance. All internal roads are named and are marked. Traffic patterns are posted, and all roads contain signs, direction information, speed limits, and other necessary information.

An internal fence system separates the operating portion of the facility from the personal vehicle parking areas. There are two internal gates by which traffic within the operating portion of the plant is controlled. Most personal vehicles are confined to the parking lots. Vehicles within the fenced operating area are primarily company vehicles, with some commercial and authorized privately owned vehicles. All commercial vehicles transporting hazardous waste are escorted by site personnel or security.

Road Surface Composition and Load-Bearing Capacity

All plant roads are constructed of 3 inches (in.) of bituminous concrete pavement (blacktop), composed of 2 in. of concrete base material and 1 in. of concrete surface material. This overlies 6 in. of compacted aggregate base. All roads are capable of bearing loads up to 50,000 lbs per axle. This capacity is adequate for tanker truck or tandem tractor-trailer traffic that may be used to transport wastes from the storage unit for offsite disposal. All hazardous waste areas are readily accessible by plant roads.

Figures

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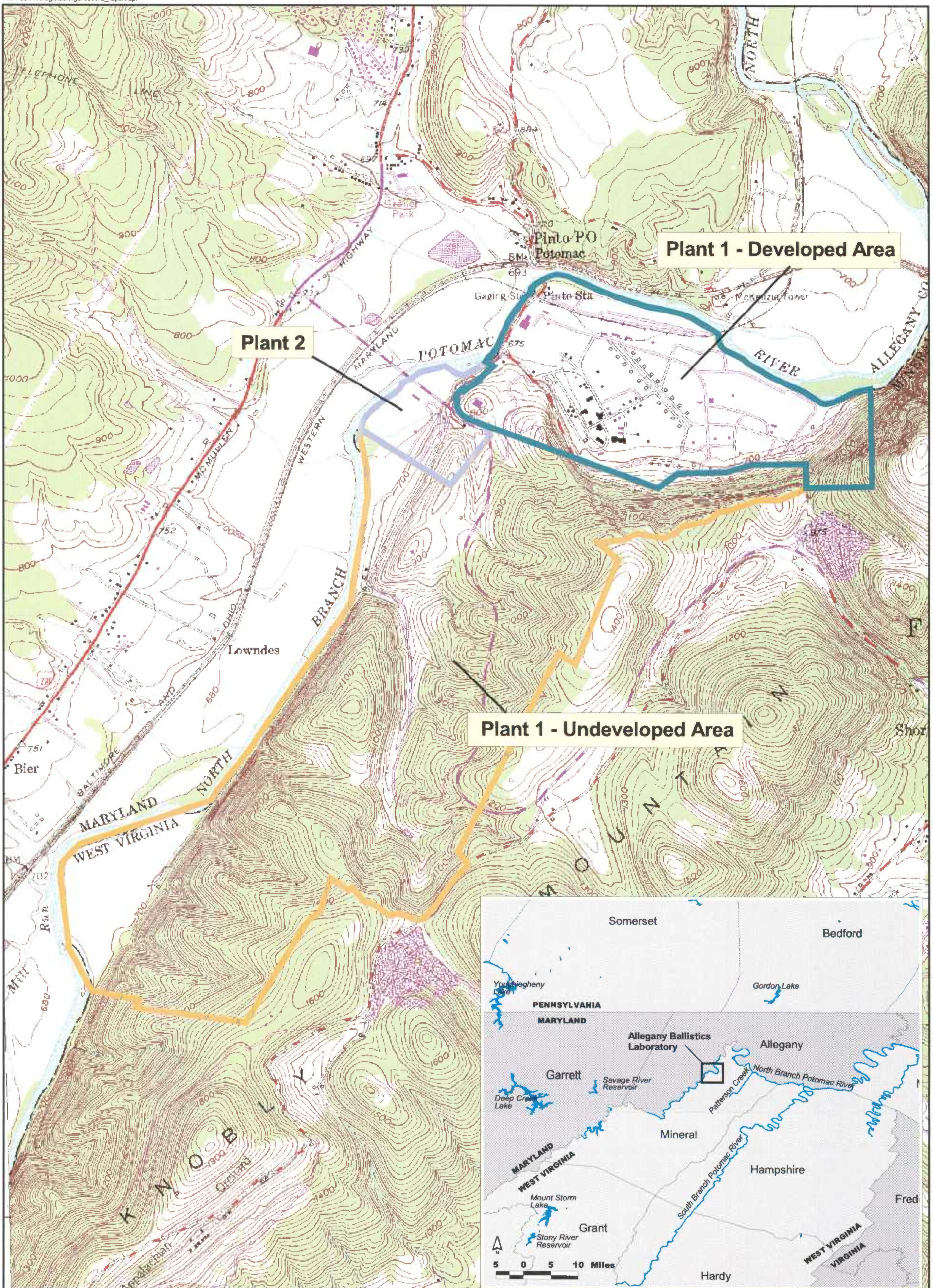

LEGEND

- Plant 1
- Plant 2
- Plant 1 - Undeveloped Area

N

1000 0 1000 2000 Feet

Figure B-1
Facility Location Map
Allegany Ballistics Laboratory

CH2MHILL

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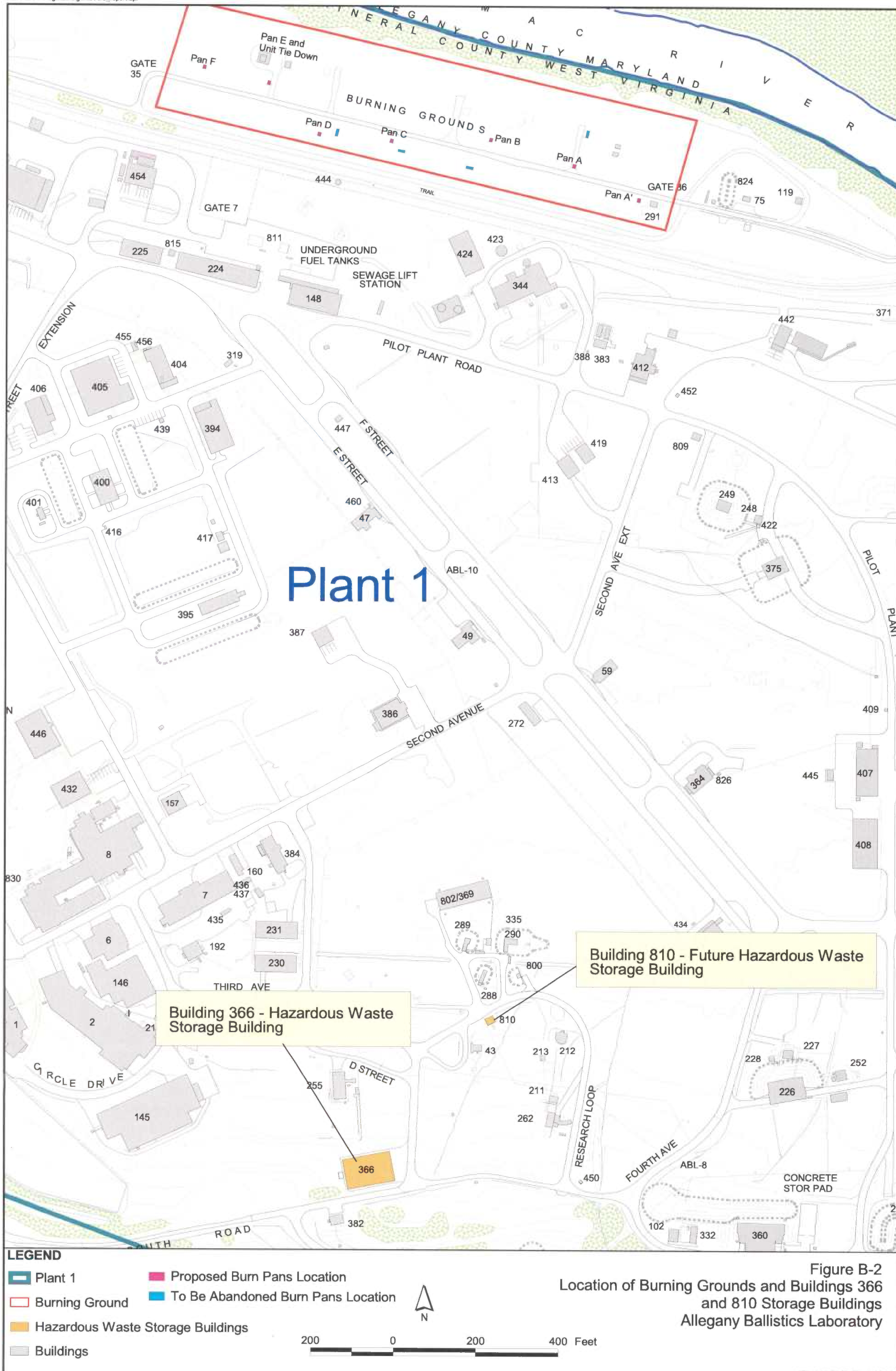

Figure B-2
Location of Burning Grounds and Buildings 366 and 810 Storage Buildings
Allegany Ballistics Laboratory

CH2MHILL

Figure B-3

Topographic Map (1,000-ft radius), Allegany Ballistics Laboratory

[Located under separate tab at the end of Volume I]

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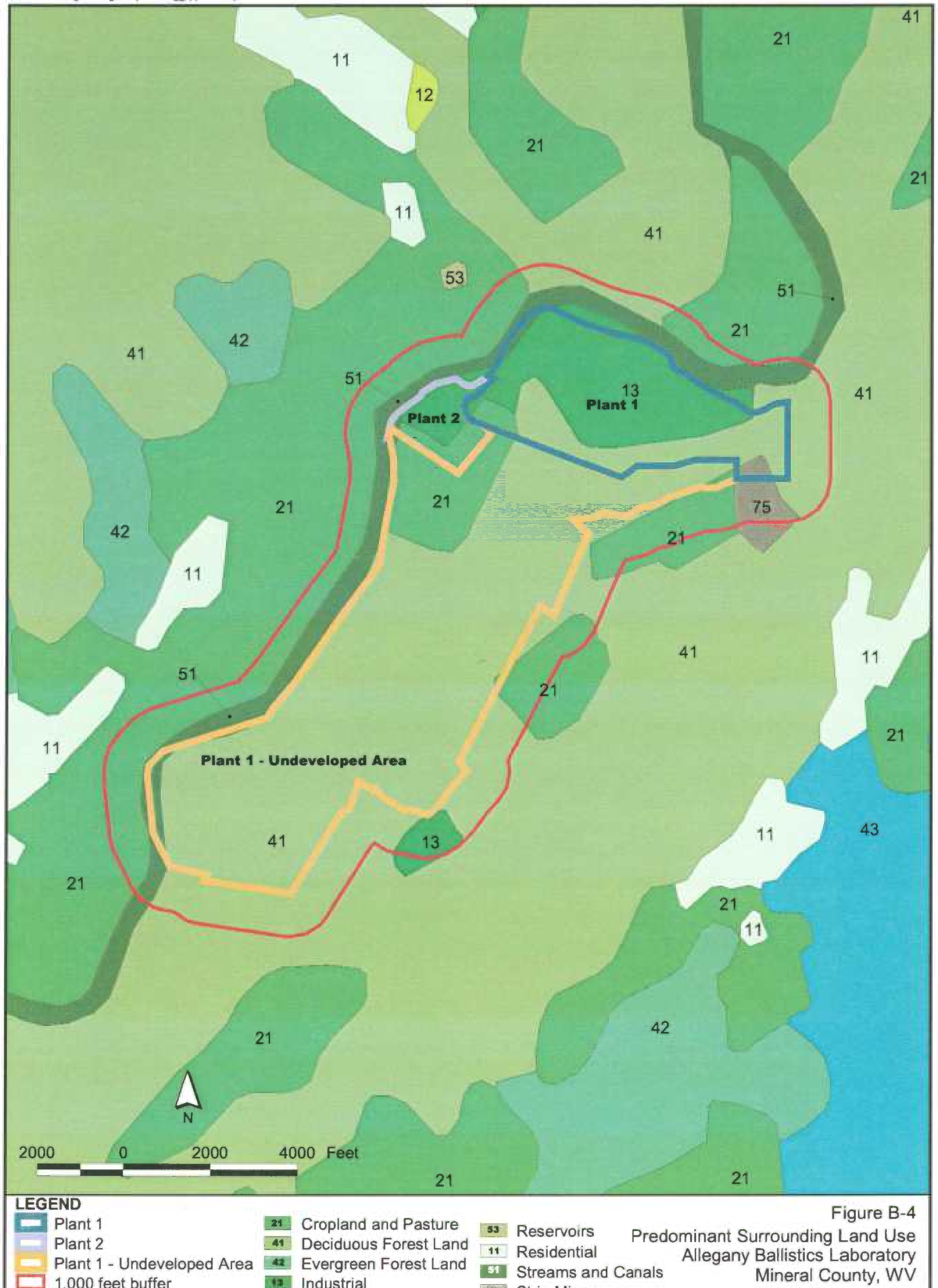
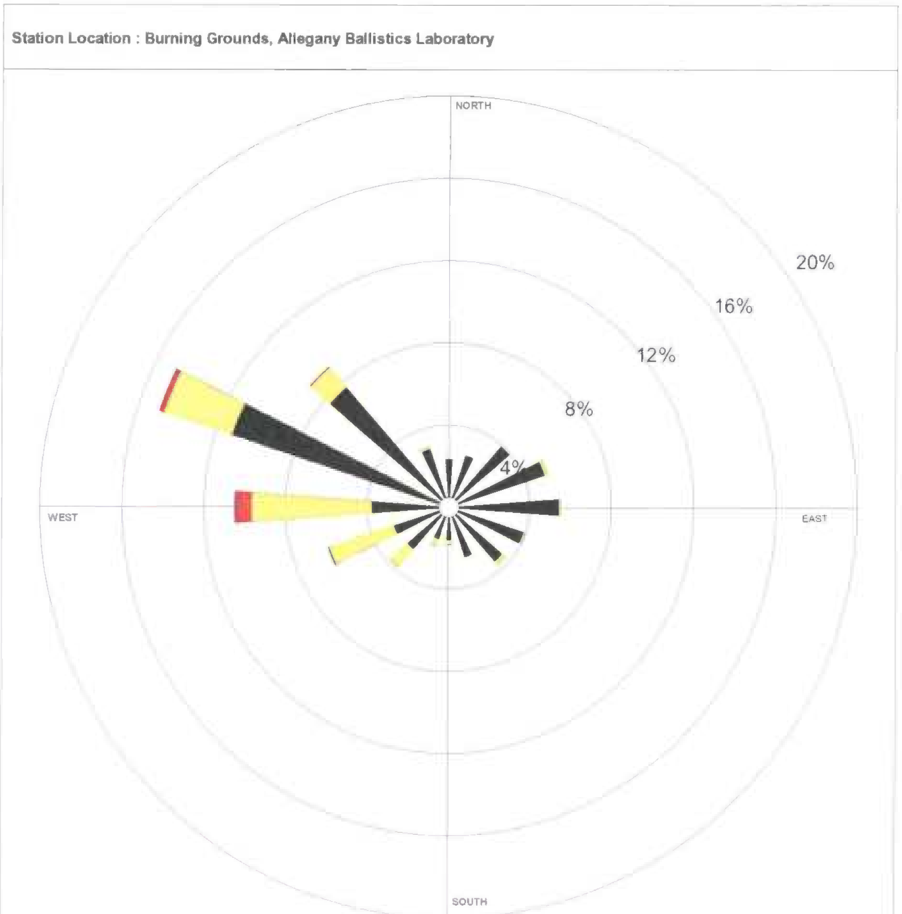


Source: USGS 1:250,000 Cumberland, WV, PA, MD land use land cover map, 1973.

Figure B-4
Predominant Surrounding Land Use
Allegany Ballistics Laboratory
Mineral County, WV

CH2MHILL



Wind Speed (m/s)			
> 18.00 14.00 - 18.00 11.00 - 14.00 7.00 - 11.00 3.00 - 7.00 0.25 - 3.00	MODELER	DATE **7/3/2001**	**CH2M HILL**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **2.09 m/s**	CALM WINDS **19.02%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **2000** **Jan 1 - Dec 31** **Midnight - 11 PM**	Figure B-5 Wind Rose Allegany Ballistics Laboratory

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

Section C
Waste Characterization

SECTION C

Waste Characteristics [40 CFR 264.13 and 270.14(b)(2) and (3)]

This section describes the chemical and physical characteristics of the hazardous wastes that will be stored at two hazardous waste storage buildings, Buildings 366 and 810 (once permitted) and P/E waste that will treated by OB at the Burning Grounds. This section includes a Waste Analysis Plan for wastes that describes the waste to be stored at the two buildings, the P/E waste treated at the Burning Grounds, and the treatment residues from the Burning Grounds. The plan also discusses quality assurance, treatment emissions, and land disposal restrictions.

C-1 Chemical and Physical Analyses [40 CFR 270.14(b)(2), 264.13(a)]

C-1a Containerized Waste [40 CFR 270.15, 264.172, 270.15(b)(1)]

Liquid and non-liquid hazardous wastes are stored in containers in Building 366 and will be stored in Building 810. The storage facilities have secondary containment that meets the requirements of 40 CFR 264.175(b). All wastes are stored in containers that meet DOT requirements for containers and the wastes stored are compatible with the container construction materials. The wastes that are routinely stored in larger quantities and their RCRA waste codes are summarized in Table C-1. Section 2 of the Waste Analysis Plan in Attachment C-1 contains information on the generation, hazardous characteristics, and classification of each waste stream. Other waste streams exhibiting the same hazard characteristics may also be stored.

In addition to the wastes listed in Table C-1, smaller quantities (typically 100 lbs or less) of lab pack wastes are currently stored in Building 366 and will be stored in Building 810 once permitted. Most of the lab pack wastes have the RCRA P and U codes and several have D codes. The Part A form lists all applicable RCRA waste codes. In all cases, no analysis is conducted; process knowledge is used for the chemical characterization of these wastes. In many cases, the lab pack wastes are in their original containers with the original labels. In other cases, the waste is generated from routine procedures where all chemicals are known. Information from material safety data sheets (MSDS) is also used.

Nonhazardous wastes are also stored in Building 366 and will potentially be stored in Building 810. Summary information for these nonhazardous waste streams is provided in Table C-2. More detailed information on the generation and the basis for the nonhazardous designation of these waste streams is provided in Section 2 of the Waste Analysis Plan in Attachment C-1.

C-1b Wastes in Tank Systems [40 CFR 270.16, 264.190(a), 264.191(b)(2), 264.192(a)(2)]

ATK does not store hazardous waste in tanks at ABL. Therefore, this section is not applicable.

C-1c Wastes in Piles [40 CFR 270.17]

ATK does not have any hazardous waste surface impoundments at ABL. Therefore, this section is not applicable.

C-1d Landfilled Wastes [40 CFR 270.21, 264.13(c)(3), 264.314]

ATK does not have any hazardous waste landfills at ABL. Therefore, this section is not applicable.

C-1e Wastes Incinerated and Wastes Used in Performance Tests [40 CFR 270.19, 264.341, 270.62(b)]

ATK does not have any hazardous waste incinerators at ABL. Therefore, this section is not applicable.

C-1f Wastes to be Land Treated [40 CFR 270.20(b)(4), 264.271(a)(1) and (2), 264.272, 264.276, Part 261 Appendix VIII]

ATK does not have any hazardous waste land treatment units at ABL. Therefore, this section is not applicable.

C-1g Wastes in Miscellaneous Treatment Units [40 CFR 270.23(d)]

ATK treats reactive hazardous wastes by OB at the ABL Burning Grounds. The Burning Grounds are classified as a miscellaneous unit.

Burning Grounds

Waste Treatment. The Burning Grounds, which is used to treat reactive hazardous waste, is classified as a miscellaneous unit. This reactive waste includes propellants, explosives, and materials containing propellants or explosives (P/E) waste. ATK generates a quantity of P/E wastes during the processing of materials to produce solid propellant rocket motors, gas generators, and explosive warheads. Materials burned at ABL fall into four general categories. First, several of the ingredient materials used in manufacturing are explosives. These materials, when not suitable for manufacturing use, may be declared waste. Second, any excess compounded propellant or explosive, in either uncured or cured conditions, may be declared waste. A third waste category is uncured or cured P/E that is off-specification because of deviation from composition, physical, ballistic, or configuration product specifications. The fourth category is solvents and saw dust contaminated with propellants or explosives. Table C-3 presents a summary of the ingredient list for pure energetic materials and the associated waste streams to be treated by open burning.

The composition of these materials is known based primarily on process knowledge. Section 1 of the Waste Analysis Plan in Attachment C-1 contains a detailed description of the waste streams and their hazard designations. A discussion of the effectiveness of waste treatment is provided in Section C-4.

Wastes to be burned are placed on top of sand and clay refractory materials contained on above-ground pans. A schematic of this process is shown in Figure 2 of Section 1 of the Waste Analysis Plan provided in Attachment C-1. A small amount (total annual use less than 100 lbs) of boron/potassium nitrate ($BKNO_3$) pellets are used as an initiator for the burning process.

Treatment Residues and Accumulated Water. Open burning of P/E wastes in the burn pans at the Burning Grounds generates ash (treatment residue). In general, the treatment residue is removed occasionally as needed to maintain efficient operations. The physical form of the treatment residue is distinctly different from the unburned P/E waste. The treatment residue is a dark, coarse-grained material. The unburned P/E wastes have physical forms such as liquid absorbed onto sawdust, thick dough-like substance, solid rubber-like material, powdered crystalline solid, and granular crystals, depending on the waste being treated.

Excess precipitation collected in the burn pans is removed using a small plastic bucket, pump, or other suitable method and is placed in a container for proper disposal. Maintenance of the burn pans is discussed in further detail in Section D-8a.

Historical data indicate that the open burning residues, both ash and water, may not meet the land disposal restriction (LDR) treatment standards for solvents and lead. Waste evaluation information is provided in Section 1 of the Waste Analysis Plan in Attachment C-1.

C-1h Wastes in Boilers and Industrial Furnaces [40 CFR 270.22, 266.102(b), 270.66(c)]

ATK does not have any hazardous waste boilers or industrial furnaces at ABL. Therefore, this section is not applicable.

C-1i Wastes at Facilities with Process Vents [40 CFR 270.24]

ATK does not have any process vents at ABL. Therefore, this section is not applicable.

C-1j Equipment Leak Organic Air Emissions [40 CFR 270.25]

ATK does not have any equipment (compressors, pumps, pressure-relief devices, sample connection systems, or valves) in hazardous waste service. Therefore, this section is not applicable.

C-1k Wastes at Drip Pads [40 CFR 270.26]

ABL does not have hazardous waste drip pads at ABL. Therefore, this section is not applicable.

C-1l Process Unit Organic Air Emissions [40 CFR 270.27]

ATK stores hazardous wastes containing volatile organics in 55-gallon (maximum) containers. Analysis is not necessary for compliance with 40 CFR 270.27. Section D-11 has details.

C-2 Waste Analysis Plan [40 CFR 270.14(b)(3), 264.13(b) and (c), 268.7, 266.102(a)(2)(ii), 266.104(a)(2)]

The waste analysis plan describes the methodologies for conducting the analysis required to properly treat and store hazardous waste. The following information is discussed:

- Parameters and Rationale
- Test Methods
- Sampling Methods
- Frequency of Analysis
- Additional Requirements for Wastes Generated Offsite
- Additional Requirements for Ignitable, Reactive, and Incompatible Waste

The Waste Analysis Plan is provided in Attachment C-1.

C-2a Parameters and Rationale [40 CFR 264.13(b)(1)]

Wastes Treated at Burning Grounds

See Section 1 of the Waste Analysis Plan that is provided in Attachment C-1.

Open Burning Treatment Residues and Accumulated Water

See Section 1 of the Waste Analysis Plan that is provided in Attachment C-1.

Building 366 Container Storage

See Section 2 of the Waste Analysis Plan that is provided in Attachment C-1.

C-2b Test Methods [264.13(b)(2)]

Wastes Treated at Burning Grounds

See Section 1 of the Waste Analysis Plan that is provided in Attachment C-1.

Treatment Residues and Accumulated Water

See Section 1 of the Waste Analysis Plan that is provided in Attachment C-1.

Building 366 Container Storage

See Section 2 of the Waste Analysis Plan that is provided in Attachment C-1.

C-2c Sampling Methods [40 CFR 264.13(b)(3), Part 261 Appendix I, Part 266 Appendix IX]

Waste Treatment at Burning Grounds

See Section 1 of the Waste Analysis Plan that is provided in Attachment C-1.

Treatment Residues and Accumulated Water

See Section 1 of the Waste Analysis Plan that is provided in Attachment C-1.

Building 366 Container Storage

See Section 2 of the Waste Analysis Plan that is provided in Attachment C-1.

C-2d Frequency of Analysis [40 CFR 264.13(b)(4)]

Waste Treatment at Burning Grounds

See Section 1 of the Waste Analysis Plan that is provided in Attachment C-1.

Treatment Residues and Accumulated Water

See Section 1 of the Waste Analysis Plan that is provided in Attachment C-1.

Building 366 Container Storage

See Section 2 of the Waste Analysis Plan that is provided in Attachment C-1.

C-2e Additional Requirements for Wastes Generated OffSite [40 CFR 264.13(b)(5) and (c) and 264.73(b)]

Currently, ATK handles only wastes that are generated onsite; therefore this section does not apply.

C-2f Additional Requirements for Ignitable, Reactive, or Incompatible Wastes [40 CFR 264.13(b)(6) and 264.17]

Burning Grounds. There are no additional waste analysis requirements for ignitable, reactive, or incompatible wastes. All the wastes treated by open burning at the Burning Grounds are reactive. The reactivity characteristic is the primary RCRA characteristic of concern. Therefore, all the waste characterization procedures have been developed considering reactivity, ignitability, and potential incompatibilities of the wastes treated.

Buildings 366 and Building 810 Container Storage. There are no additional waste analysis requirements for ignitable, reactive, or incompatible wastes. The characteristics of the hazardous waste that is stored have already been discussed in Attachment C-1.

C-2g Additional Requirements Pertaining to Boiler and Industrial Furnace Facilities [40 CFR 266.102(e)(6)(ii)(C), 266.102(e)(b)(iii)]

ATK does not utilize boiler and industrial furnaces for waste management; therefore, this section is not applicable.

C-2h Additional Requirements Pertaining to Containment Buildings [40 CFR 264.1100]

ATK does not utilize containment buildings for waste management, accordingly this section is not applicable.

C-3 Waste Analysis Requirements Pertaining to Land Disposal Restrictions [40 CFR 262.10, 262.11, 264.13, 264.73, 266.102(a)(2)(ii), Part 268, 270.14(b)(3)]

C-3a Waste Analysis [40 CFR 261.21 through 261.24, 264.13(a)(1), 268.1, 268.7, 268.9, 268.32 through 268.37, 268.41 through 268.43]

The waste analysis procedures described in the Waste Analysis Plan are also used to provide analytical data necessary to determine whether a waste is a restricted waste and whether the waste is being managed properly under the land disposal requirements of 40 CFR 268.

Burning Grounds. See Section 1 of the Waste Analysis Plan provided in Attachment C-1.

Buildings 366 and 810 Container Storage. See Section 2 of the Waste Analysis Plan provided in Attachment C-1.

C-3a(1) Spent Solvent and Dioxin Wastes [40 CFR 264.13(a)(1), 268.2(f)(1), 268.7, 268.30, 268.31]

Attachment C –1 and Tables 1-1 and 2-1 contain a summary of the waste analysis performed at ABL. These tables include a notation as to whether the waste is restricted and whether it meets land disposal treatment standards.

C-3a(2) California List Wastes [40 CFR 264.13(a)(1), 268.7, 268.32, 268.42(a), RCRA Section 3004(d)]

See Waste Analysis Plan Sections 1 and 2, Attachment C-1.

C-3a(3) Listed Wastes [40 CFR 264.13(a)(1), 268.7, 268.33, 268.34, 268.35, 268.36, 268.41, 268.42, 268.43]

See Waste Analysis Plan Sections 1 and 2, Attachment C-1.

C-3a(4) Characteristic Wastes [40 CFR 261.3(d)(1), 264.13(a)(1), 268.7, 268.9, 268.37, Part 268 Appendix I, Part 268 Appendix IX]

See Waste Analysis Plan Sections 1 and 2, Attachment C-1.

C-3a(5) Radioactive Mixed Waste [40 CFR 268.7, 268.35(c), 268.35(d), 268.36, 268.42(d)]

ATK does not treat or dispose of radioactive mixed waste at ABL. Therefore, this section is not applicable.

C-3a(6) Leachates [40 CFR 260.10, 268.35(a)]

ATK does not treat or dispose of leachates at ABL. Therefore, this section is not applicable.

C-3a(7) Lab Packs [40 CFR 268.7(a)(7), 268.7(a)(8), 268.42(c), Part 268 Appendix IV, Part 268 Appendix V]

During preparation of lab packs, materials being packaged are evaluated for restricted wastes. Treatment standards for all contents are evaluated and the entire lab pack is treated to meet the most stringent standard for each waste constituent before being land disposed.

C-3a(8) Contaminated Debris [40 CFR 268.2(g), 268.7, 268.9, 268.36, 268.45, 270.13(n)]

The specific hazardous debris categories and contaminant categories are included in Attachment C-1, Table 2-1.

C-3a(9) Waste Mixtures and Wastes with Overlapping Requirements [40 CFR 264.13(a)(1), 268.7, 268.9, 268.41(b), 268.43(b), 268.45(a)]

Waste mixtures are identified with all applicable waste codes. Waste are shipped offsite and treated to the most stringent treatment requirement for each hazardous waste constituent of concern prior to land disposal.

C-3a(10) Dilution and Aggregation of Wastes [40 CFR 268.3]

ATK does not perform dilution of wastes at ABL. Wastes with different wastes codes that are aggregated for disposal are treated as described in Section C-3a(9).

C-3b Notification, Certification, and Recordkeeping Requirements [40 CFR 264.73, 268.7, 268.9(d)]

C-3b(1) Retention of Generator Notices and Certifications [40 CFR 268.7(a)]

The discussion in this section applies to the hazardous wastes generated at ABL and stored at the hazardous waste storage area Building 366 and, after permit issuance, Building 810.

If the waste does not meet the treatment standard, a one-time written notice is sent to the facility receiving the waste, and a copy is placed in the file. The notice includes the EPA Hazardous Waste Numbers, manifest number of the first shipment, a statement that the waste is subject to LDRs, a list of the constituents of concern, applicable wastewater/non-wastewater codes, and waste analysis data. No further notification is made until such time as the waste or facility changes, in which case a new notification will be sent and a copy will be placed in the file.

If the waste attains the applicable treatment standards, a one-time written notice, with the information described above, is sent to the facility receiving the waste, and a copy is placed in the file. In addition, an authorized representative of ATK will make the following certification:

> *"I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR part 268 subpart D.*

> *I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."*

If a waste is determined to be restricted based solely on knowledge of the waste, all supporting data are maintained on site in ATK's files. If a waste is determined to be restricted based on analytical testing, all waste analysis data are maintained on site in ATK's files.

C-3b(2) Notification and Certification Requirements for Treatment Facilities [40 CFR 268.7(b)]

The discussion in this section applies to the treatment residuals (Burning Grounds Pan Ash, Burning Ground Pan Water) generated by treatment of reactive waste at the Burning Grounds. Treatment residuals taken from the burning pans may be hazardous or non-hazardous depending on the composition of the wastes burned on the pans. Treatment residuals will be tested for compliance with 40 CFR 268.48 prior to disposal. Notification and certification requirements are indicated below.

Hazardous Residuals

Treatment residuals determined to be hazardous are containerized and transported offsite for proper disposal. For these containerized wastes, notification and record keeping requirements are as described above under Retention of Generator Notices and Certifications [40 CFR 268.7(a)].

Non-Hazardous Residuals

A one-time written notice is sent to the land disposal facility receiving the treatment residue, and a copy is placed in ATK's file. The notice includes the EPA Hazardous Waste Numbers, manifest number of the first shipment, a statement that the waste is subject to LDRs, a list of the constituents of concern, applicable wastewater/non-wastewater codes, and waste analysis data. No further notification is made until such time as the waste or facility change, in which case a new notification will be sent and a copy placed in ATK's file.

In addition, an authorized representative of ATK will make the following one-time certification with the initial waste shipment:

> *"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40 without impermissible dilution of the prohibited waste. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."*

A copy of the above certification will be placed in the onsite files. If the waste, treatment residue, or receiving facility changes, a new certification will be sent to the receiving facility and a copy will be placed in ATK's file.

If the treatment residue will be further managed at a different facility, ATK will comply with the notice and certification requirements applicable to generators discussed in Section C-5b(1).

For waste that is only hazardous because it is reactive (D003), the treatment residuals will no longer be a hazardous waste after treatment by open burning. For such waste, a one-time notification will be placed in the ATK files and sent to the WVDEP. The notification and certification that is placed in the files will be updated if the process or operation that generates the waste changes and/or if the subtitle D facility receiving the waste changes. WVDEP will be notified on an annual basis, but no later than December 31, if such changes occur. The notification will include the name and address of the RCRA Subtitle D facility receiving the waste shipment, a description of the waste initially generated, including the applicable EPA hazardous waste code(s), treatability group(s), and underlying hazardous constituents. The certification will be signed by an authorized representative of ATK and will contain the certification described above.

C-3b(3) Notification and Certification Requirements for Land Disposal Facilities [40 CFR 268.7(c)(1)]

ABL is not a land disposal facility. Therefore, this section is not applicable.

C-3b(4) Wastes Shipped to Subtitle C Facilities [40 CFR 268.7(a), 268.7(b)(6)]

ATK determines whether wastes require further treatment under LDR by following the waste analysis plan in Attachment C-1. For wastes that require additional treatment under LDR, ATK will provide a one-time notification to the treatment facility. This notification will be updated if the waste stream changes.

C-3b(5) Wastes Shipped to Subtitle D Facilities [40 CFR 268.7(d), 268.9(d)]

ATK does not ship hazardous waste residues to Subtitle D facilities. Therefore, this section is not applicable.

C-3b(6) Recyclable Materials [40 CFR 268.7(b)(7)]

ATK does not dispose of hazardous wastes that are recyclable material. Therefore, this section is not applicable.

C-3b(7) Recordkeeping [40 CFR 264.73, 268.7(a)(5), 268.7(a)(6), 268.7(a)(7), 268.7(d)]

ATK uses process knowledge and/or chemical and physical analysis to determine whether wastes generated on site are restricted from land disposal and keeps documentation of that determination. ATK also maintains documentation to indicate where restricted wastes were treated, stored, and/or disposed. All process knowledge data and waste analysis data used to determine compliance with LDRs are maintained on site in the facility's files. All generator and treatment facility notices and certifications are also kept in ATK's files.

All notices, certifications, waste analysis data, and other documentation will be maintained for at least 3 years.

C-3c Requirements Pertaining to the Storage of Restricted Wastes [40 CFR 268.50]

ATK stores restricted waste in containers solely for the purpose of accumulating sufficient waste to facilitate proper treatment.

C-3c(1) Restricted Wastes Stored in Containers [40 CFR 268.50(a)(2)(i)]

All restricted hazardous wastes at Building 366 are stored in containers and will be stored in containers at Building 810, once permitted. Such storage is solely for the purpose of accumulating sufficient quantities of waste to facilitate proper treatment, recovery, or disposal. Each container is clearly marked to identify its contents and the date each period of accumulation begins. Under normal conditions, all waste is shipped offsite within 1 year.

C-3c(2) Restricted Wastes Stored in Tanks [40 CFR 268.50(a)(2)(ii)]

ATK does not store restricted wastes in tanks. Therefore, this section is not applicable.

C-3c(3) Storage of Liquid PCB Wastes [40 CFR 268.50(f)]

ATK does not store liquid PCB wastes. Therefore, this section is not applicable.

C-3d Exemptions, Extensions, and Variances to Land Disposal Restrictions

ATK is not requesting an exemption, extension or variance to LDRs. Therefore, this section is not applicable.

C-4 Treatment Effectiveness of Open Burning in Pans [40 CFR 270.23(d)]

The effectiveness of treatment by open burning with respect to air emissions has been evaluated at ABL. The emissions were tested at a specialized testing facility at Sandia National Laboratory (SNL) known as the Air Emissions Test Chamber. Representative samples of the various waste forms encountered at the ABL facility were burned to attempt to document pollutant emission characteristics for the broad spectrum of chemicals likely to be encountered during burning operations. This approach enabled pollutant emission testing under controlled conditions and in a manner that yielded pollutant emission factors that were used in the dispersion model to estimate pollutant concentrations at offsite receptors. An emission factor is a measure of the mass of a particular pollutant released per unit mass of starting material. The emission factor is typically expressed as a ratio (e.g., grams of pollutant release per kilogram of material consumed). An experimental approach to measure emissions from specific ABL waste streams was judged to be the best approach in defining a set of target pollutants and their associated emission factors. The SNL study, as well as other studies highlighted in Section D-8c, were used to determine the emission factors and input data to the air dispersion modeling of emissions. The modeling results are provided in Appendix A.

Burning scenarios in the SNL study included the combustion of both pure propellant and explosives and the combustion of propellant- and explosive-contaminated waste products such as sawdust, other cellulose material, and miscellaneous plastic material. Pure materials that were tested include aluminized composite propellant, non-aluminized composite propellant, double base propellant, and plastic bonded explosive. Contaminated waste products included two mixtures: a sawdust, acetone, and double base propellant mixture; and a sawdust/acetone, explosive, and miscellaneous debris mixture.

Known quantities of each material were placed in the test chamber and remotely ignited. The combustion process was allowed to go to completion with no operator intervention. The emission products were held in the chamber and were sampled with a range of sampling instruments positioned inside and outside the chamber. Three large-diameter fans were also positioned inside the chamber to thoroughly mix the chamber contents. Samples of emission products collected were used to determine the total release mass of each of the emission products because the chamber volume is mixed and known. Emission product measurements were made for the following:

- Gases – carbon dioxide (CO_2), carbon monoxide (CO), nitrogen oxide (NO), nitrogen dioxide (NO_2), hydrogen chloride (HCl), and ammonia
- Vapors – total non-methane hydrocarbons and toxic volatile organic compounds (VOCs)
- Aerosol – PM_{10}, size distribution, semivolatile organic compounds (SVOCs), and heavy metals

The results of the testing show that open burning in pans of ABL wastes is effective.

Tables

TABLE C-1
Summary of RCRA Regulated Wastes at ABL

Material	RCRA Code
Acetone	D001, F003, F005
Actrel	D001
Alodine Liquids	D007
Alodine Solids	D007
Bondliner	D001, F003, F005
Cadmium Liquid Coolant	D006
Cadmium Solids	D006
Chemlok/Water	D001
Corrosives (Miscellaneous)	D002
Flammable Solvent/Paint Contaminated Rags	D007, D008
Flammable Liquids (Miscellaneous)	D001, F002, F003, F005
Heptane	D001
Isocyanates	D001, F002
Isopropanol/Water	D001
Lab solvents	D001, F002, F003, F005
Lacquer premix with methylene chloride	D001, F002
Lacquer premix without methylene chloride	None
Lead solids (including paste)	D008
Methylene Chloride	F002
Mold Release Agents (MS143/MS145)	F002
Oakite Solution- acidic	D002
Oakite Solution- alkaline	D002
Oil/ Varsol – Kerosene (Previous Name: Oil/solvent)	D001
Paint Related Waste Material (Liquid)	D001, D007, D008, F003, F005
Paint Related Waste Material (Solid)	D007, D008, F003, F005
Solvent Contaminated Rags	F003, F005
Styrene monomer & inhibitors	D001
Trichloroethane (1,1,1)	F002
Trichloroethylene	F002
Used Grit	D006, D007, D008
Valenite VNT Valcool Coolant	D007, D008
Varsol	D001
Versetec Developer Solution	D001
P/E Contaminated Waste – Double Base (Rags, spatulas, material containers, etc. contaminated with Double Base Propellant)	D008, F003
P/E Contaminated Waste – Hybrid (Rags, spatulas, material containers, etc.)	F003
Water Shield	D001, D006, D007

TABLE C-2
Non-Regulated Wastes at ABL

Waste Stream	Hazard	Basis for Non-Hazardous Designation
Ammonium Perchlorate (AP) Water	None	Material contains >95% water with dissolved AP, not reactive or oxidizer
Asbestos	Inhalation	Material contains asbestos from abatement operations
Ascorbic Acid Solution	None	Contains small amounts of ascorbic acid with a pH of ~7
Chemlok/Water	None	Contains water and water based bonding agent with no listed constituents
Coolant	None	Contains machine coolant (95% water/5% coolant solution)
Cured Resins	None	Consists of non-hazardous polymeric resins in a cured state
Curing Agents	Sensitizer	Consists of non-RCRA listed curatives for resins; no HW characteristics
ECA 100	Irritant	Consists of non-RCRA listed curatives for resins; no HW characteristics
Flyash	None	Consists of ash from boilers
HP990/Water	None	Consists of small quantities of cured resins in water
HP990/Water Cleanup Debris	None	Consists of above waste stream in soil
Isopropanol/Water (weak solution)	None	Waste consists of IPA in water at <27% with a flashpoint >140 F
Lacquer premix without methylene chloride	None	Consists of all materials for lacquers other than methylene chloride or nitrate esters – all constituents are non-RCRA regulated
Oil	None	Waste contains used hydraulic, fuel, and motor oils
Oil Cleanup Debris	None	Waste consists of fuel oil and soil from spill cleanup
Oil Sludge	None	Waste contains heavy sludges of oil and sediment
Oil/Coolant	None	Waste contains mixtures of used hydraulic oil and machining coolant
Oil/solvent	None	Waste oil of any type that may have been mixed with cleanup solvents such as varsol, kerosene, etc.
Oily Water	None	Material is generated primarily from oil/water separator for compressors.
P/E Contaminated Waste-Composite	None	Material contains <10% explosive contamination and heptane contaminated solid debris
Styrene & Inhibitors	None	Waste monomer and monomer mixtures
Tumbler Water	None	Waste consists of aqueous detergent solution from aluminum deburring operations.
Uncured Resins	None	Waste consists of non-hazardous polymeric resins in a semi-cured state

TABLE C-3
Burning Grounds Waste Stream Designations and Associated Major Formulation Ingredients

Waste Stream Designation	Pure Energetic Materials And Their Composition		Waste Codes
	Ingredient	Weight Percent[1]	
P/E Bulk Waste – Aluminized Composite	**Aluminized Composite Propellant**		**D003**
	Aluminum	5 – 22	
	Ammonium perchlorate	60 – 80	
	Polymer binder (e.g., hydroxy-terminated polybutadiene)	9 – 15	
	Ammonium nitrate	0 – 10	
P/E Bulk Waste – Non-Aluminized Composite	**Non-Aluminized Composite Propellant**		**D003**
	Ammonium perchlorate	83 – 88	
	Polymer binder (e.g., hydroxy-terminated polybutadiene)	11 – 16	
	Zirconium compounds (metallic zirconium, zirconium carbide, and zirconium oxide)	1	
	Ammonium nitrate	0 – 10	
	2,2-Bis(ethylferrocenyl)propane	Various	
P/E Bulk Waste – Double Base Propellants	**Double Base Propellants**		**D003, D008**
	Nitramines (cyclotrimethylenenitramine [RDX] and/or cyclotetramethylenenitramine [HMX]	60 – 65	
	Nitrate esters (nitroglycerine, nitrocellulose, and/or butanetrioltrinitrate)	10 – 27	
	Lead compounds (lead citrate, lead salicate, lead resorcilate, lead sesquioxide)	1 – 2	
	Zirconium compounds (metallic zirconium, zirconium carbide, and zirconium oxide)	1	
	Polymers and nitro-organics (e.g., polyglycol adipate, methylnitroaniline, 2-dinitrophenylamine)	8 – 35	
	Bismuth and/or tin	0 – 21	
	Ammonium nitrate	10 – 20	
	Ammonium perchlorate	Various	
	Aluminum	Various	

TABLE C-3
Burning Grounds Waste Stream Designations and Associated Major Formulation Ingredients

Waste Stream Designation	Pure Energetic Materials And Their Composition		Waste Codes
	Ingredient	**Weight Percent[1]**	
P/E Bulk Waste – PBX Explosives	**Plastic-bonded Explosives**		**D003**
	Nitramines (RDX and/or HMX)	64 – 82	
	Binder components (e.g., polypropylene glycol, toluene diisocyanate, hexamethylene diisocyanate, isodecyl perlargonate, 2-ethylhexyl acrylate, N-vinyl-2-pyrrolidone, dioctyl maleate, dioctyl adipate, silica)	Approx. 12	
	Aluminum, dibutylin dilaurate	0 – 20	
Other Waste Streams			
Acetone Squares	Saw dust mixed with acetone squares from Double Base casting cleanup	Not available	**D003, F003**
P/E Lacquer Squares	Saw dust mixed with nitrate ester lacquers, acetone and triacetin	Not available	**D003, F003**

Notes:

[1] Constituents present at concentrations which may be greater than one percent.

General Note: A small amount (total annual use less than 100 lbs) of boron/potassium nitrate (BKNO3) pellets are used as an initiator for the burning process.

Attachment C-1
Waste Analysis Plan

CONSOLIDATED WASTE ANALYSIS PLAN

FOR BURNING GROUND AND CONTAINER STORAGE AREAS

ALLEGANY BALLISTICS LABORATORY
ATK TACTICAL SYSTEMS COMPANY LLC

SEPTEMBER 2001

REVIEWED IN DEPTH AND APPROVED
FOR ATK TACTICAL SYSTEMS COMPANY LLC

BY: ______________________ **DATE:** ________

REVISION HISTORY		
Date	**Revisions**	**Approved By**
	Initial Issue. For Burning Ground Application	

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Allegany Ballistics Laboratory Facility Description and Overview of Manufacturing, Waste Generation, and Waste Management Processes

ATK manufactures solid fuel rocket motors and explosive warheads as well as other products not directed toward the manufacture of warheads and rocket motors at ABL. Raw materials for solid fuels are mixed to produce propellants that are either cast inside the motor casing or otherwise fitted into the motor casing to produce the finished unit. Motor casings may be manufactured on site or received from offsite sources. Wastes may be generated in the propellant preparation, motor casing preparation or motor assembly steps. Explosive warheads are manufactured in a similar process involving explosives preparation, warhead casing manufacture and warhead finishing operations. Operations for other products such as the Ferrulmatic product line and F-22 pivot shaft generate wastes that are similar to materials from propellant/explosive products manufacture. An overview of manufacturing and waste management is provided in Figure 1. For facility details, see RCRA Part B permit for Burning Ground (Not attached).

Waste from the propellant operations are explosive and are treated on-site via burning on above-ground pans. The propellant wastes consist of the propellant and solvents associated with removal of the propellant from the mixing and casting equipment. Wastes from finished motor assembly operations are also explosive and managed onsite via burning in above-ground pans. The wastes from warhead manufacture are explosive and treated on-site via burning on above-ground pans. Further information on wastes treated in the Burning Ground is provided in Section 1.

Wastes from motor casing preparation are typical of those associated with metals machining and surface preparation. These materials are segregated, containerized and transported offsite for treatment and/or disposal at properly permitted facilities. Miscellaneous articles such as contaminated Personnel Protective Equipment, spatulas, rags, etc. are containerized and sent offsite for treatment and/or disposal in permitted facilities. Additional information on containerized wastes is found in Section 2.

Section 1—Wastes for Treatment at Burning Grounds

(RCRA Category: Generator Treating Reactive Hazardous Wastes to meet LDRs)

Processes and activities that generate wastes or are used to manage wastes at the facility:

Propellant preparation is closely controlled for safety and to ensure product ballistic performance. Some propellants are incompatible with others. Propellants and their associated wastes are segregated by propellant type to ensure safe handling. Batch processing systems of various sizes are available to produce batches to meet motor production needs while minimizing wastes. The mixing and casting equipment may be utilized for more than one type of propellant necessitating proper cleaning to ensure there is not cross contamination of propellant types. The cleaning typically consists of a mechanical cleaning step followed by a solvent cleaning step.

Propellants and explosives are grouped by their ingredients into categories. The categories are:

- Aluminized Composite Propellants
- Non-Aluminized Composite or Hybrid Propellants
- Double Base Propellants
- PBX (plastic-bonded explosives)

The waste materials are also grouped in these categories plus waste propellant, warhead explosives and the associated equipment clean up materials are designated D003 for reactivity per RCRA regulations. The presence of lead in some products adds D008 designation to the wastes. Acetone and heptane (F003) used for equipment cleaning is distilled and recycled. The still bottoms are D003. The mix bowl cleaning wastes from propellant manufacturing are collected in plastic bags termed "diapers" as the materials are generated. For other manufacturing steps (mold disassembly, final assembly, etc.) wastes are collected in anti-static plastic bags. The materials are segregated, bagged and tagged for housing in sheds near each propellant mixing/casting building. The materials are transported from these staging areas to the Burning Grounds as necessary for proper waste management.

Wastes from finished motor assembly are typically solid propellants machined from a cast propellant. Machining of doublebase propellants results in water wet propellant wastes. Burlap bags are used to collect this waste. Both the bag and the excess propellant are sent to the Burning Grounds for treatment.

Warheads processed at the facility contain polymer bound explosives. The explosives are primarily RDX and HMX. In some cases, metal-containing catalysts are used to effect the polymerization. The warhead wastes are RCRA hazardous for reactivity. The RCRA code is D003.

The conceptual treatment process is to deactivate the explosive characteristic D003 by open burning as depicted in Figure 2. Burn Pan Ash and Burn Pan Water are the combustion residuals that are subject to Treatment Standards for Hazardous Wastes (§ 268.40 particularly (d) and (e)) and Universal Treatment Standards (UTS) for underlying hazardous constituents (UHC)(§ 268.48).

Waste Analysis Parameters

Information on the sources of wastes to be burned and treatment residues is provided in Table 1-1. This table reflects in excess of 99.9% of the materials handled in the Burning Grounds. For example, a material that is not a waste but is handled in the Burning Grounds is boron/potassium nitrate (BKNO3). A small amount, substantially less than 100 pounds per year, of BKNO3 pellets are used as a burn initiator.

Applicable test methods include:

Parameters	Test Method
TC Leaching Procedure	SW-846 1311
Lead	SW-846 6010, SW-846 7420, or SW-846 7421
Acetone	SW-846 8260B
Lead	SW-846 6010, SW-846 7420, or SW-846 7421

Figure 1 MANUFACTURING & WASTE HANDLING OVERVIEW

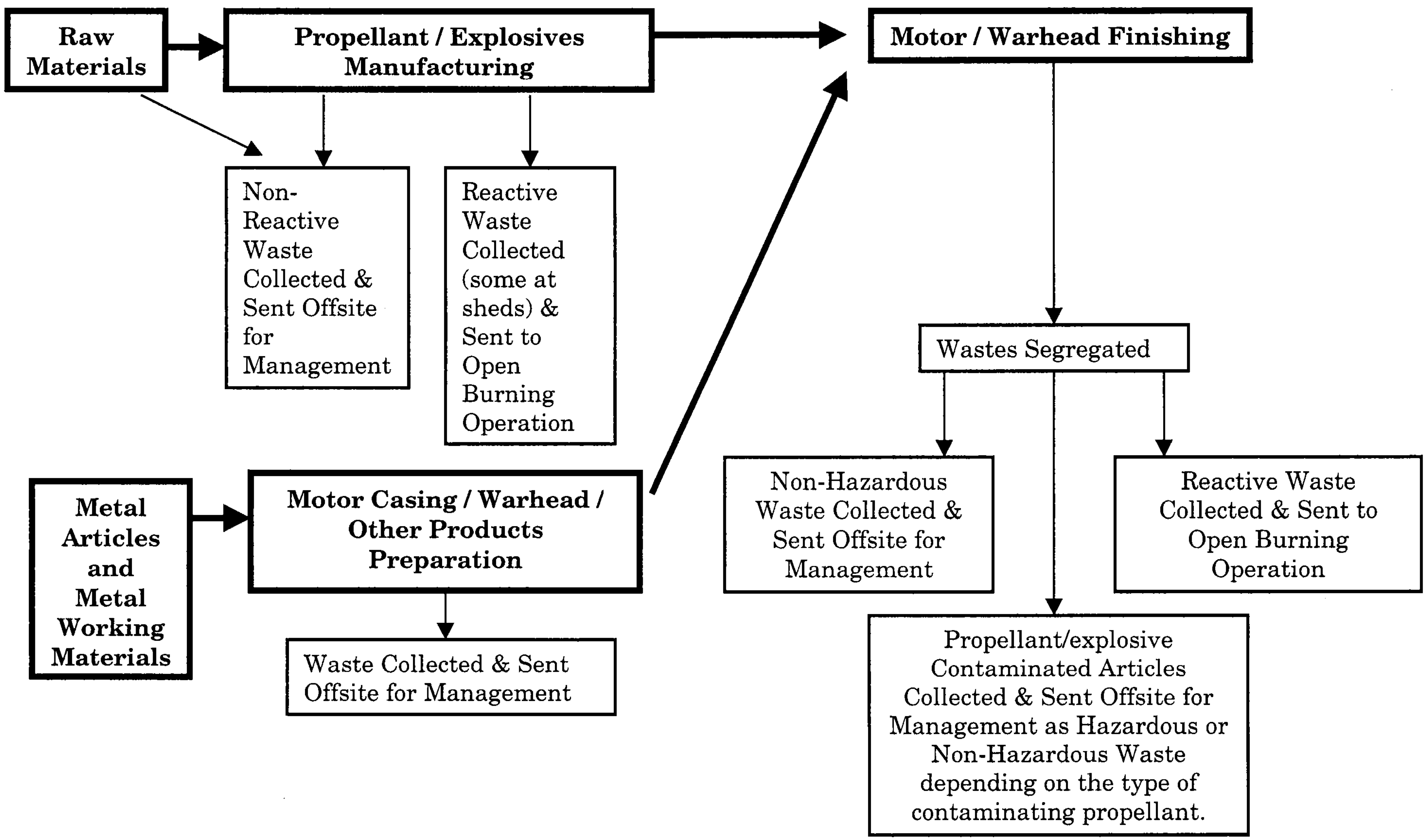
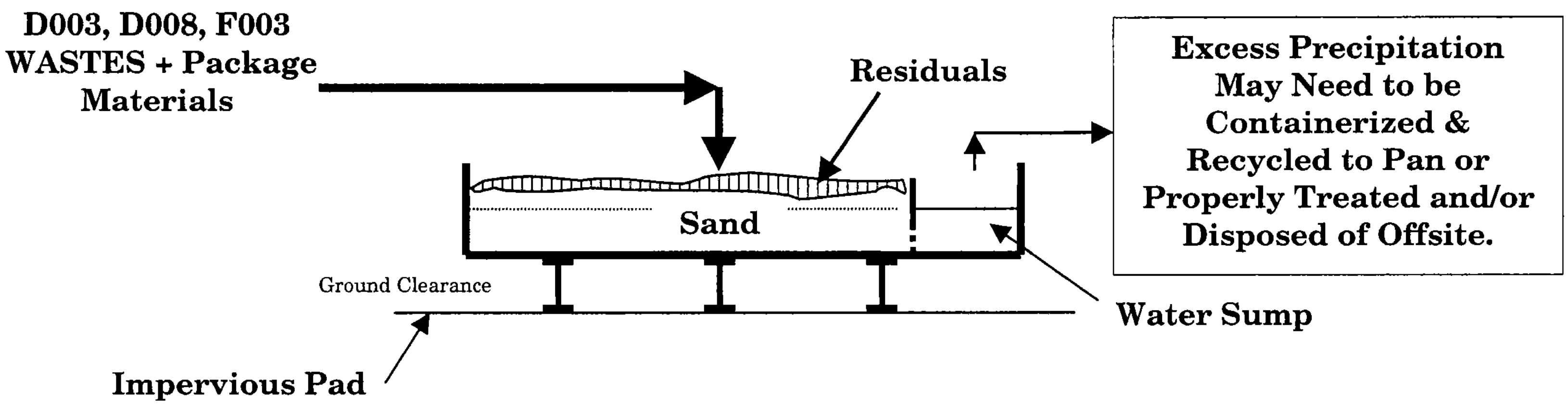


Figure 2 BURNING GROUND PROCESS



Conceptual Unit
(Cover removed for illustrative purposes)

TABLE 1-1
Burning Ground Wastes, Codes, Waste Analysis Parameters, LDR Requirements, and Re-evaluation Frequency

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Physical & Chemical Analyses + Frequency	Treatment	LDR Treatment Standards and Test Results
Waste Name: **P/E Bulk Waste – Aluminized Composite Propellants** Waste Description: Bulk propellant or explosive materials that go to the Burning Ground (such as propellant heels, propellant samples, or neat explosive material) Waste Code Rationale D003 – reactive (yellow waste ticket); per process knowledge Container Type: Conductive or anti-static plastic bags Management: These materials are treated by open burning Mixing and casting propellant results in a specific quantity of the mix that adheres to the equipment and cannot be forced out of the mix bowl as well as residual materials that were used in the mix. These materials meet the definition of reactivity. Classification as Class 1.1 or 1.3 propellants is sufficient to determine reactivity.	D003	NWW	None. Code established based on process knowledge. Re-evaluate only when manufacturing process changes.	Burning	Deactivation and meet section §268.48 standards for underlying hazardous constituents
Waste Name: **P/E Bulk Waste – Non-Aluminized Composite or Hybrid Propellants** Waste Description: Bulk propellant or explosive materials that go to the Burning Ground (such as propellant heels, propellant samples, or neat explosive material) Waste Code Rationale D003 – reactive (yellow waste ticket); per process knowledge Container Type: Conductive or anti-static plastic bags Management: These materials are treated by open burning Mixing and casting propellant results in a specific quantity of the mix that adheres to the equipment and cannot be forced out of the mix bowl as well as residual materials that were used in the mix. These materials meet the definition of reactivity. Classification as Class 1.1 or 1.3 propellants is sufficient to determine reactivity.	D003	NWW	None. Code established based on process knowledge. Re-evaluate only when manufacturing process changes.	Burning	As above
Waste Name: **P/E Bulk Waste – Double Base Propellants** Waste Description: Bulk propellant or explosive materials that go to the Burning Ground (such as propellant heels, propellant samples, or neat explosive material) Waste Code Rationale D003 – reactive (yellow waste ticket), D008 – lead; per process knowledge Container Type: Conductive or anti-static plastic bags Management: These materials are treated by open burning Mixing and casting propellant results in a specific quantity of the mix that adheres to the equipment and cannot be forced out of the mix bowl as well as residual materials that were used in the mix. These materials meet the definition of reactivity. Classification as Class 1.1 or 1.3 propellants is sufficient to determine reactivity.	D003, D008	NWW	None. Code established based on process knowledge. Re-evaluate only when manufacturing process changes.	Burning	Deactivation plus Lead: 0.11 mg/kg. Toxicity characteristic leaching procedure (TCLP) for Nonwastewater and 0.69 mg/l for Wastewater and meet section 268.48 standards for underlying hazardous constituents

TABLE 1-1
Burning Ground Wastes, Codes, Waste Analysis Parameters, LDR Requirements, and Re-evaluation Frequency

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Physical & Chemical Analyses + Frequency	Treatment	LDR Treatment Standards and Test Results
Waste Name: **P/E Bulk Waste – PBX Explosives** Waste Description: Bulk propellant or explosive materials that go to the Burning Ground (such as propellant heels, propellant samples, or neat explosive material) Waste Code Rationale D003 – reactive (yellow waste ticket) lead; per process knowledge Container Type: Conductive or anti-static plastic bags Management: These materials are treated by open burning Mixing and casting propellant results in a specific quantity of the mix that adheres to the equipment and cannot be forced out of the mix bowl as well as residual materials that were used in the mix. These materials meet the definition of reactivity. Classification as Class 1.1 or 1.3 propellants is sufficient to determine reactivity.	D003	NWW	None. Code established based on process knowledge. Re-evaluate only when manufacturing process changes.	Burning	Deactivation and meet section §268.48 standards for underlying hazardous constituents
Waste Name: **P/E Acetone Squares** Waste Description: Sawdust mixed with acetone containing double base propellant from cleanup operations Waste Code Rationale D003 - reactive (yellow waste ticket), F003 - acetone; per process knowledge Container Type: Conductive or anti-static plastic bags Management: These materials are treated by open burning Equipment used for mixing and casting double base waste is soaked in acetone for cleaning. The acetone is reused as long as possible before being emptied into sawdust for disposal. Waste is soaked in sawdust to minimize likelihood of detonation during handling. Previous Sensitivity Data for these acetone squares indicate they are reactive, particularly if solvent is allowed to evaporate from the material.	D003 F003	NWW	None. Code established based on process knowledge. Re-evaluate only when manufacturing process changes.	Burning	Deactivation plus Acetone: 160 mg/kg Non Wastewater, 0.28 mg/l for Wastewater and meet section §268.48 standards for underlying hazardous constituents
Waste Name: **P/E Lacquer Squares** Waste Description: Sawdust squares containing nitrate ester lacquers, acetone, and triacetin Waste Code Rationale D003 - reactive (yellow waste ticket), F003 – acetone; per process knowledge Container Type: Conductive or anti-static plastic bags Management: These materials are treated by open burning Waste liquid explosives are soaked in sawdust to minimize likelihood of detonation during handling. Previous Sensitivity data for these sawdust squares indicate they are reactive, particularly if solvent is allowed to evaporate from the material.	D003, F003	NWW	None. Code established based on process knowledge. Re-evaluate only when manufacturing process changes.	Burning	Deactivation plus Acetone: 160 mg/kg Non Wastewater, 0.28 mg/l for Wastewater and meet section §268.48 standards for underlying hazardous constituents

TABLE 1-1
Burning Ground Wastes, Codes, Waste Analysis Parameters, LDR Requirements, and Re-evaluation Frequency

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Physical & Chemical Analyses + Frequency	Treatment	LDR Treatment Standards and Test Results
Treatment Residuals					
Waste Name: **Burning Ground (BG) Pan Ash** Waste Description: Ash and other residue from the open burning of waste propellants and explosives at the Burning Grounds Waste Code Rationale D008 – lead; per testing Container Type: Open-head drum Management: Do not combine with other wastes Waste from the production of rocket motors, gas generators, and warheads exhibits the characteristic of reactivity. This material is treated by open burning at the Burning Grounds. Some propellants contain lead as a burn rate modifier. Therefore, the ash remaining after a burn may fail the TCLP for lead. The ash is removed from the pans periodically, placed in drums, and shipped offsite to a permitted treatment, storage, and disposal facility (TSDF).	D008	NWW	Code established based on testing. TCLP metals, dioxins, furans (no pesticides). Sample (representative grab) and re-evaluate only when material containerized for offsite disposal.	None. Container-ized for occasional Offsite Disposal	Meet section §268.48 standards for underlying hazardous constituents. Test results above LDRs: TCLP Lead (60 mg/l); 2378 TCDF, 123478 HxCDF, 234678 HxCDF, 1234678 HpCDF, 1234678 HpCDD, OCDD, OCDF
Waste Name: **BG Pan Water** Waste Description: Contaminated water removed from burn pans at the Burning Grounds Waste Code Rationale D001 – ignitable, F003 – acetone, D008 – lead; per testing. Assumed <1% TOC, <1%TSS Container Type: Closed-head drum Management: Do not combine with other wastes Waste from the production of rocket motors, gas generators, and warheads exhibits the characteristic of reactivity. This material is treated by open burning in burn pans at the Burning Grounds. Pans cannot be covered immediately after a burn because of safety restrictions, which may cause the pans to accumulate water if a heavy rain occurs shortly after a burn event. The water is removed as needed to provide a dry surface upon which to burn, and is placed in drums for shipment offsite to a permitted TSDF.	D001, F003, D008	WW	Code established based on testing. Flash Point, pH, TCLP metals, Solvent List (see below). Sample (representative grab) and re-evaluate only when material containerized for offsite disposal	None. Container-ized for occasional Offsite Disposal	Test results above LDRs: Toluene, Acetone, Xylenes, Bis (2-ethyl hexyl) phthalate, 4-Methyl-2-pentanone

WW = (Wastewater), **NWW** (Non-Wastewater)

UHCs: Analysis for selected waste streams is required for the underlying hazardous constituents found in 40 CFR 268.48. Analysis for dioxins, furans, and/or pesticides is excluded for selected wastes as indicated. Analysis for the solvent list (below) is required for selected waste streams in lieu of full UHC analysis.

Solvent List: acetone, benzene, n-butyl alcohol, carbon disulfide, carbon tetrachloride, chlorobenzene, o-, m-, and p-cresol, cyclohexanone, o-dichlorobenzene, ethyl acetate, ethyl benzene, ethyl ether, isobutyl alcohol, methanol, methylene chloride, MEK, MIBK, nitrobenzene, pyridine, tetrachloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, trichloroethylene, trichlorofluoromethane, xylenes.

Sampling

Propellant/explosive wastes that are D003 coded are managed based on process knowledge. No sampling will be performed.

Treatment residues such as burn pan ash and water will be grab sampled.

Waste Reevaluation Frequencies

Waste parameters for P/E wastes treated at the Burning Ground and treatment residuals will be re-evaluated when:

- Process changes or other factors affecting waste identification have occurred,
- Regulations affecting the definition of hazardous wastes are promulgated that may result in an increase in the number or types of hazardous wastes managed at the facility, or regulations are promulgated affecting the management of existing wastes at the facility.

Additionally, treatment wastes such as burn pan ash and water will be sampled and re-evaluated prior to disposal.

Special Procedure Requirements

Propellant wastes and explosive wastes are segregated by propellant or explosive type to ensure safe handling. Material segregation procedures are established by the site Safety Department. Additional special handling information, such as ticketing and container type, etc., is noted in Table 1-1.

Chain of Custody Procedure

Standardized Chain of Custody procedures will be employed.

Section 2—Containerized Wastes for Offsite Treatment and/or Disposal (Generator Only)

Processes and activities that generate wastes or are used to manage wastes at the facility:

Wastes that are not viewed as RCRA reactive and articles contaminated with low levels of propellants or warhead materials are containerized and sent offsite for proper management. These non-D003 wastes include out of date lab chemicals, unused raw materials, paints, used oil, spent solvents, etc.

The manufacturing process is operated in a campaign mode. Specific products are not necessarily made throughout the year. Not all wastes are available on site at any given time.

As noted in Table 2-1, some wastes are subject to the Treatment Standards (§ 268.40, particularly (d) and (e)) and to UTS for UHC (§ 268.48).

Facility Physical Layout

Containers are stored in the existing Container Storage Buildings 366 and 810. Key information includes:

Building 366: Approx. 150 ft long by 50 ft wide by 20 ft at peak of roof. (All dimensions are approximate.) Open sided. Laid out in rows of separate bays each with secondary containment.

Building 810: Approx. 10 ft long by 12 ft wide by 10 ft at peak of roof. (All dimensions are approximate.) Totally enclosed. Double door front entry. Secondary containment. Insulated, ventilated, heated.

Waste Analysis Parameters

Table 2-1 contains information on the sources, applicable RCRA codes, LDR category for containerized wastes. The physical and chemical parameters needed to support the waste code determination are noted in the column headed "Hazardous Waste Parameters". Waste codes for solvents are used to indicate the groups of the chemical species to be analyzed for. Analyses needed to ascertain if there are Underlying Hazardous Constituents in the waste stream are identified in the column "UHCs to be analyzed." Streams for which testing is needed to confirm LDR requirements are noted with the term "Required" followed by the type of information needed. The chemicals to be included in the Solvent List are noted at the end of Table 2-1. Available test information indicating if the waste does exceed LDR Standards is provided in the column titled "Constituents Above LDRs Dec 2000 / March 2001 Test results." These are analytical test results from samples taken and analyzed in the December 2000 to March 2001 time frame.

Analysis methods include those identified Table 2-2.

Sampling

Grab sampling techniques will be used.

Waste Reevaluation Frequencies

Waste parameters will be re-evaluated when:

- Process changes or other factors affecting waste identification have occurred,
- Regulations affecting the definition of hazardous wastes are promulgated that may result in an increase in the number or types of hazardous wastes managed at the facility, or regulations are promulgated affecting the management of existing wastes at the facility.

To ensure the availability of a complete LDR baseline assessment, RCRA wastes will be analyzed for UHCs once when the waste is available from the manufacturing operations. Additional sampling and characterization will occur only if triggered by the process change or regulatory change provisions noted above.

Special Procedure Requirements

Material segregation procedures to avoid incompatibilities are established by the site Safety Department. Additional special handling information, such as ticketing and container type, etc., is noted in Table 2-1.

Chain of Custody Procedure

Standardized Chain of Custody procedures and documentation will be employed.

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Acetone** Waste Description: Waste acetone only Waste Code: D001 – ignitable, F003 – listed solvents Container Type: Closed-head drum Management: Acetone may also be added to Waste Flammable or Paint Related Waste as appropriate Acetone is used in the Composite Structures area parts cleaning in 5-gallon pails or smaller containers. Some parts are degreased while others are cleaned to remove uncured, non-regulated resins. No other solvents are added and the only materials that may be in the acetone are the non-regulated resins.	D001, F003, F005	NWW	Flash Point, F003, F005, TCLP metals	Solvent list (high total organic carbon (TOC))	Acetone, Toluene
Waste Name: **Actrel** Waste Description: Waste actrel only Waste Code: None Container Type: Closed-head drum Management: Actrel may also be added to Waste Flammable as appropriate Process knowledge may be used for the general waste stream. However, TCLP for heavy metals should be run since cases are grit blasted prior to being degreased. Actrel is used to degrease empty rocket motor cases after they have been grit blasted. The degreased cases then move on for surface coating. The Actrel is recycled in order to be reused for further degreasing rather than disposal after a single pass. When the material can no longer be cleaned for further use, it is drummed for disposal. No other solvents or materials are added to Waste Actrel drums.	D001	NWW	Flash Point, TCLP metals	TCLP metals	None
Waste Name: **Alodine Liquid** Waste Description: Alodine rinsewater, possibly with concentrated alodine powder or liquid Waste Code: D007 – chromium Container Type: Closed-head drum Management: Do not combine with other wastes Aluminum rocket motor cases are sprayed with a concentrated solution (pH of ~2) of distilled water and Alodine Powder. The units then undergo a double rinse with distilled water to remove residue. The rinsewater which is collected for disposal has a pH between 5 and 7. Only Alodine rinsewater or small quantities of concentrated solution are added to drums. Alodine powder is known to contain hexavalent chromium and previous analytical testing has shown the solution to be above TCLP limit for chromium.	D007	NWW	TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	-

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Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: Alodine Solids Waste Description: Rags, gloves, etc. contaminated with alodine solution Waste Code: D007 – chromium Container Type: Open-head drum Management: Do not combine with other wastes The alodine process described above also generates rags, gloves, and other solid debris contaminated with alodine solution. This is the only waste that is added to drums. Material is known from previous analytical testing to be above TCLP limit for chromium.	D007	NWW	TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	-
Waste Name: Ammonium Perchlorate (AP) Water Waste Description: Water contaminated with AP from hopper cleaning, building cleaning etc Waste Code: Not regulated Container Type: Closed-head drum Management: Do not combine with other wastes Water is used to clean AP contaminated hoppers, grinding equipment and building surfaces in the AP grinding area. Only AP, ammonium nitrate or ammonium sulfate may be processed in this building and equipment. Therefore, any water used for cleaning would contain only AP, AN, or AS and ordinary building contamination (soil, grass, etc.). This water is kept separate from any machining wastewaters that may contain NG or other materials. Material does not contain any RCRA listed chemicals nor does it exhibit any characteristics of RCRA waste.	None	NA	None	None	None
Waste Name: Asbestos Waste Description: Double bagged, water wet asbestos only Waste Code: Not regulated Container Type: Open-head drum Management: Do not combine with other wastes Process generating the material is asbestos abatement projects. According to approved work plans, only asbestos and asbestos containing or contaminated items are added to bags or drums. Material is non-RCRA regulated.	None	NA	None	None	None

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: Ascorbic Acid Waste Description: Dilute ascorbic acid solution from Composite Structures Waste Code: not regulated Container Type: Closed-head drum Management: Do not combine with other wastes Process involves the use of an ultraviolet cure epoxy resin. Composite wound units are placed in a pressurized resin bath. The resin is used to seal the porous surface of the unit. The unit is then placed in a water bath under ultraviolet lights to cure. The curing process must be stopped at a certain point in the process. In order to stop the curing, the unit is placed in a dilute solution (pH between 5 and 7) of ascorbic acid (original solution was made by adding crushed consumer Vitamin C tablets to the water). This solution is the only material added to the drums. The only other material that may be present in the solution is cured resin that would present no hazards.	None	NWW	pH if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-
Waste Name: Bondliner Waste Description: Mixtures of any bondliner formulations containing organic or halogenated solvents (toluene, MEK, MIBK, ethyl acetate, xylene, etc.) Waste Code: D001 - ignitable; F003 & F005 - listed solvents Container Type: Closed-head drum Management: Do not combine with other wastes Process consists of mixing above solvents with rubber compounds to form an adhesive solution. The solution is then sprayed on the interior surface of empty rocket motor cases. Waste material consists of remaining solution and solvent used to cleanup spray equipment (toluene/ethanol solution and n-propyl bromide). Waste accumulation sheets that indicate the materials added to the drums are also maintained on this material.	F003, F005, D001	NWW	Flash Point, F003, F005, TCLP metals	Solvent list (high TOC)	Toluene, MEK, Isobutanol
Waste Name: Cadmium Liquid Waste Description: Coolant contaminated with cadmium (from special operations). Waste Code: D006 - cadmium Container Type: Closed-head drum Management: Do not combine with other wastes The machining of cadmium-plated motor cases creates cadmium-contaminated coolant. Such machining is not routinely conducted. Any coolant from these machining operations is segregated from other waste streams and drummed to avoid cross-contamination of waste streams.	D006	NWW	pH, Flash Point, TCLP metals	Required – 268.48 list (no dioxins/ furans / pesticides)	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Cadmium Solids** Waste Description: Rags, gloves, etc. contaminated with cadmium (from special operations Waste Code: D006 - cadmium Container Type: Open-head drum Management: Do not combine with other wastes Special operations such as machining or hand buffing of cadmium-plated motor cases creates cadmium contaminated solid debris (rags, personal protective equipment (PPE), etc.). Such special operations are not routinely conducted. Any wastes from these operations is segregated from other waste streams and drummed to avoid cross-contamination of waste streams.	D006	NWW	TCLP metals	Required – 268.48 list (no dioxins/furans/ pesticides)	-
Waste Name: **Chemlok/Water** Waste Description: Water based Chemloks only (805, 855, 8560) which may or may not be diluted with water Waste Code: Not regulated Container Type: Open-head drum Management: Do not combine with other wastes. ***Do NOT add solvent based Chemloks to this drum (they should go in Bondliner, Waste Flammable, or Paint Related Waste drums).*** Material should be tested for organic compounds due to the continued use of solvent-based Chemloks as well as possible confusion over the term "bondliner". These items could lead to the disposal of solvent-based Chemloks with the water-based materials or disposal of other bondliner (interior coating). Process knowledge will be used to determine the constituents when waste accumulation records are kept. Otherwise, testing of the waste will be conducted. Process involves spraying water based Chemlok material (adhesive solution) on the interior of empty rocket motor cases to improve the bond between the case and the propellant, which will be cast later. Waste material includes residuals from spraying, water from cleaning spray equipment, and out of shelf-life material.	D001	NWW	Flash Point, F002, F003, F005, TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	Toluene, Acetone, Methylene Chloride
Waste Name: **Coolant** Waste Description: Machining or maintenance coolants such as Cimcool, propylene glycol, etc. Waste Code: Not regulated Container Type: Closed-head drum Management: Do not combine with other wastes Water based coolants (non-regulated) are used during metal machining processes. The liquid may contain leachable levels of heavy metals depending on the particle size of the machining waste. Valenite VNT Valcool coolant must be kept segregated from other coolants due to metals content.	None	NWW	Flash Point, TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Corrosives (Miscellaneous)** Waste Description: Oakite 32, 33, 132, acids, photo developing solutions, certain boiler chemicals Waste Code: D002 – corrosive Container Type: Closed-head poly-lined drum Management: Do not mix products without authorization	D002	NWW	pH, TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	-
Waste Name: **Cured Resins** Waste Description: Resins and plasticizer materials (such as Epon products or other epoxy type materials that contain no regulated chemicals) which have cured and hardened Waste Code: Not regulated Container Type: Open-head drum Management: Do not mix products without authorization Materials are unused and consolidated from their original containers to a drum to reduce disposal cost. Material Safety Data Sheets may be used to determine hazards. Material has enough contact with moisture to begin curing and hardening to form a solid during consolidation and storage. Waste accumulation sheets are also maintained for drums of this waste.	None	NWW if RCRA trig-gered.	None	Evaluate if RCRA triggered.	-
Waste Name: **Curing Agents** Waste Description: Materials used to cure resins or epoxies (such as DBTDA, DBTDL, Ethacure, ECA 100, Anchor 1115, Epon curatives (DETDA), etc.). Waste Code: Not regulated Container Type: Closed-head drum Management: Do not mix products without authorization Materials are unused and consolidated from their original containers to a drum to reduce disposal cost. Material Safety Data Sheets may be used to determine hazards. Waste accumulation sheets are also maintained for drums of this waste.	None	NWW if RCRA trig-gered.	TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-
Waste Name: **ECA 100** Waste Description: ECA 100 only Waste Code: Not regulated Container Type: Closed-head drum Management: May be added to Curing Agents as appropriate. Material is unused and in its original container. Material Safety Data Sheet may be used to determine hazards.	None	NWW if RCRA trig-gered.	TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Flammable Liquids (Miscellaneous)** Waste Description: Various flammable liquids Waste Code: D001 – ignitable, F002, F003 & F005 - listed solvents Container Type: Closed-head drum Management: Large quantities of any specific material should be in drums for specific wastes (such as acetone). This should be used for small quantities of various solvents, solvent based Chemloks, etc. Process knowledge may be used to determine the constituents when the drum contains only one material from a specific process. However, material should be tested for organic compounds in order to determine which F listed wastes are contained in it.	F002, F003, F005, D001	NWW	Flash Point, F002, F003, F005, TCLP metals	Required - Solvent list (high TOC)	-
Waste Name: **Flyash** Waste Description: Ash from combustion of coal in boilers Waste Code: Not regulated Container Type: Roll-off Management: Shipment offsite for disposal Ash from the combustion of coal in the steam-generating boilers is accumulated in a roll-off to be shipped offsite for disposal.	None	NWW if RCRA trig-gered.	TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-
Waste Name: **Heptane** Waste Description: Waste heptane only Waste Code: D001 – ignitable Container Type: Closed-head drum Management: Do not combine with other wastes Spent heptane is generated from the cleaning of composite propellant-contaminated mixing and casting equipment.	D001	NWW	Flash Point, TCLP metals	Not required	-
Waste Name: **HP990/Water** Waste Description: Solution of water and HPS 990 Sealant from Bldg 368. Waste Code: Not regulated Container Type: Closed-head drum Management: Do not combine with other wastes Process involves the use of an ultraviolet cure epoxy resin. Composite wound units are placed in a pressurized resin bath. The resin is used to seal the porous surface of the unit. The unit is then placed in a water bath under ultraviolet lights to cure. This water is drummed after a specific number of units have been cured to maximize curing efficiency. The only materials that may be present in the solution are water and a mix of the cured and uncured resin that would present no hazards.	None	NWW if RCRA trig-gered.	pH, TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Isocyanates** Waste Description: Waste isocyanates that are not part of a bondliner system, paint system, etc. This usually consists of off-spec materials for disposal and may include HDI, TDI, MDI (PAPI, Desmodur N-100, Desmodur RE), IPDI, DDI, etc. Waste Code: D001 – ignitable, F002 - chlorinated solvents Container Type: Closed-head drum Management: Do not combine with other wastes Materials are unused (residuals and expired shelf life) and consolidated from their original containers to a drum to reduce disposal cost. Material Safety Data Sheets may be used to determine hazards and constituents. Waste accumulation sheets are also maintained for drums of this waste.	D001, F002	NWW	Flash Point, F002, F003, F005, TCLP metals	Required - Solvent list (high TOC); TCLP Metals	-
Waste Name: **Isopropanol/Water Solution** Waste Description: Mixture of IPA and water from RDX drying operations Waste Code: D001 – ignitable or not regulated, depending on alcohol concentration Container Type: Closed-head drum Management: Do not combine with other wastes Process involves preparation of RDX for use. RDX is packaged wet with a water/isopropanol mixture (isopropanol is used as an anti-freeze agent). RDX must be dried and ground to the proper size prior to being mixed in propellant. The liquid is removed prior to grinding and drummed for disposal. RDX content of the liquid is too low to create the characteristic of reactivity.	D001 or None (See text to left)	NWW	Flash Point, TCLP metals	Not required	-
Waste Name: **Lab Solvents** Waste Description: Mixed solvents from lab operations Waste Code: D001 - ignitable; F002, F003 & F005 - listed solvents Container Type: Closed-head drum Management: Solvents and acids/bases should be kept separate. Materials are residuals from analytical or research procedures. Material Safety Data Sheets may be used to determine hazards and constituents. Waste accumulation sheets are also maintained for drums of this waste.	F002, F003, F005, D001	NWW	Flash Point, F002, F003, F005	Solvent list (high TOC)	Toluene, Acetone, Isobutanol, Methylene Chloride

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Lacquer Premix with Methylene Chloride** Waste Description: Mixture of all materials for lacquers with other methylene chloride or nitrate esters Waste Code: F002 Container Type: Closed-head drum Management: Do not combine with other wastes In order to safely transport nitroglycerin (NG), a stabilizer mixture must be added. This mixture consists of a plasticizer and antioxidant compounds. None of the materials are regulated under RCRA. The mixture is added to dessicators (NG containers) prior to adding methylene chloride. The dessicators are then shipped to the NG manufacturing facility where the NG is added and the dessicators are returned to ABL. Premix may be made ahead of time and stored prior to adding the methylene chloride. Waste is generated from mix residuals or off spec batches. Any materials that contain methylene chloride or NG are segregated and treated separately.	D001, F002	NWW	Flash Point, F002, TCLP metals	Solvent list	Toluene, MEK, Methylene Chloride
Waste Name: **Lacquer Premix without Methylene Chloride** Waste Description: Mixture of all materials for lacquers other than methylene chloride or nitrate esters Waste Code: Not regulated Container Type: Closed-head drum Management: Small quantities of this material may be added to Uncured Resins drums. In order to safely transport nitroglycerin (NG), a stabilizer mixture must be added. This mixture consists of a plasticizer and antioxidant compounds. None of the materials are regulated under RCRA. The mixture is added to dessicators (NG containers) prior to adding methylene chloride. The dessicators are then shipped to the NG manufacturing facility where the NG is added and the dessicators are returned to ABL. Premix may be made ahead of time and stored prior to adding the methylene chloride. Waste is generated from mix residuals or off spec batches. Any materials that contain methylene chloride or NG are segregated and treated separately.	None	NWW if RCRA trig-gered.	Flash Point, F002, TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: Lead Solids Waste Description: Rags, gloves, bags, freezettes, etc. contaminated with lead salts or lead salt paste Waste Code: D008 - lead Container Type: Open-head drum Management: Large quantities of lead salts or lead salt paste should be drummed separately from the contaminated materials. Lead citrate powder is used to change the burn rate properties of NG based propellants. In order to use the material, it must be ground to the proper size and then incorporated into a paste, which is used during propellant mixing. A paste is utilized in order to obtain a homogenous mixture without lumps. The primary generation of this waste is from the lead citrate processing building (384). The dried lead citrate is added to a grinding unit and heptane is added. The material is then ground to correct particle size and the heptane is evaporated off and recovered for reuse. The dried material is then mixed with a plasticizer (polyglycol adipate, or PGA) and carbon black. The mixed material is run through a roll mill to remove any lumps. Additional waste is generated in the propellant mixing areas when paste containers are emptied into propellant mixes. Waste materials include rags, paint paddles, PPE, tape, containers, etc. that become contaminated with the lead or lead paste during the process.	D008	NWW	TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	UHC: Bis (2-ethyl hexyl) phthalate
Waste Name: Methylene Chloride Waste Description: Waste methylene chloride only. Waste Code: F002 - chlorinated solvent Container Type: Closed-head drum Management: Methylene chloride that is reclaimed from Bldg 352 should be stored in poly lined closed-head drums in case of water contamination from the recovery system Bldg 352 Process - NG with methylene chloride is received in dessicators. The methylene chloride must be stripped from the NG before it can be used to manufacture propellant. Air is bubbled through the liquid in the dessicators to drive off the methylene chloride, which is much more volatile than NG. The methylene chloride vapor is captured and condensed to control air emissions. The solvent that is condensed is collected and reused in empty dessicators that are returned to the NG supplier for the next shipment. Solvent may be recirculated through the system to remove moisture. If moisture level is too high and cannot be reduced, the material is disposed of.	F002	NWW	F002, TCLP metals	Solvent list	Methylene Chloride
Waste Name: Mold Release Agents (MS143/MS145) Waste Description: Waste halogenated solvent-based mold release agents only. Waste Code: F002 - chlorinated solvent Container Type: Closed-head drum Management: Do not mix products without authorization Materials are unused and consolidated from their original containers to a drum to reduce disposal cost. Waste accumulation sheets are also maintained for drums of this waste.	F002	NW W	Flash Point, F002, F003, F005, TCLP metals	Required - Solvent list	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Oakite Solution - Acidic** Waste Description: Oakite 32, 33, 132 solutions with a pH of 1 to 6 Waste Code: D002 - corrosive Container Type: Closed-head poly-lined drum Management: Do not mix products without authorization Pipe shop and mechanics use acidic solution to clean parts. Only material that may be introduced into the waste is dirt and oils. Material Safety Data Sheets may be used to determine hazards.	D002	NWW	pH, TCLP metals	Required – 268.48 list	-
Waste Name: **Oakite Solution - Alkaline** Waste Description: Oakite Enprox and Inpro-Tect solutions with a pH of 8-14 Waste Code: D002 - corrosive Container Type: Closed-head poly-lined drum Management: Do not mix products without authorization Metal fabrication area uses alkaline solution to clean parts. Only material that may be introduced into the waste is dirt and oils. Material Safety Data Sheets may be used to determine hazards.	D002	NWW	pH, TCLP metals	Required – 268.48 list	-
Waste Name: **Oil** Waste Description: Waste motor oil, fuel oil, and hydraulic oils Waste Code: Not regulated Container Type: Closed-head drum Management: Do not mix products without authorization Because shops also use kerosene, varsol, or other solvents, material should be tested for solvents that may be inadvertently added to the drum with the oils.	None	NWW if RCRA trig-gered.	Flash Point, TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-
Waste Name: **Oil Cleanup Debris** Waste Description: Rags, pads, coveralls, soil, absorbent, etc. which is collected from any oil spills Waste Code: Not regulated Container Type: Open-head drum Management: Do not mix products without authorization Waste is generated when fuel oil or hydraulic oil spills are cleaned up. The only materials introduced into the oil stream are adsorbents (kitty litter, etc.), rags, PPE, and other cleanup materials.	None	NWW if RCRA trig-gered.	Flash Point, TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: Oil Sludge Waste Description: Thick residual oil material that settles out of oil in tanks, etc. Usually has to be physically cleaned out (doesn't drain) Waste Code: not regulated Container Type: Open-head drum Management: Do not mix products without authorization Because shops also use kerosene, varsol, or other solvents, material should be tested for solvents that may be inadvertently added to the drum with the oils.	None	NWW if RCRA trig-gered.	Flash Point, TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-
Waste Name: Oil/Coolant Waste Description: Mixture of waste oil and coolant Waste Code: not regulated Container Type: Closed-head drum Management: Preferred method is to keep oils and coolants separate if possible Because shops also use kerosene, varsol, or other solvents, material should be for tested solvents that may be inadvertently added to the drum with the oils.	None	NWW if RCRA trig-gered.	Flash Point, TCLP metals if triggered by process or regulatory changes	Evaluate if RCRA triggered.	-
Waste Name: Oil/Solvent Waste Description: Waste oil of any type that may have been mixed with cleanup solvents such as varsol, kerosene, etc. (solvent may make material flammable) Waste Code: not regulated but potentially D001 - ignitable Container Type: Closed-head drum Management: Do not mix products without authorization Because shops also use kerosene, varsol, or other solvents, material should be tested at least annually to detect solvents that may be inadvertently added to the drum with the oils.	None	NWW if RCRA trig-gered.	Flash Point, TCLP metals	Evaluate if RCRA triggered.	Flash Point tested at 140 °F
Waste Name: Oily Water Waste Description: Aqueous solution with oil or oily machine coolants Waste Code: not regulated Container Type: Closed-head drum Management: Do not mix products without authorization Material is generated primarily from oil/water separator systems for compressors. No other materials should be introduced into the wastestream.	None	NWW if RCRA trig-gered.	Flash Point, TCLP metals	Evaluate if RCRA triggered.	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **P/E Contaminated Waste - Composite** Waste Description: Rags, spatulas, material containers, etc. that are contaminated with composite propellant or explosives, but the total quantity of P/E does not exceed approximately 10%, by weight. (Includes heptane contaminated sawdust) Waste Code: Not regulated (blue waste ticket) Container Type: Conductive or anti-static plastic bags that are loaded into cubic yard boxes Management: These materials must be shipped offsite for treatment and disposal Mixing and casting propellant results in a specific quantity of the mix that adheres to the equipment and must be cleaned out before the mixer may be used again. These materials do not contain enough propellant contamination to meet the definition of reactivity. Composite propellant does not contain any RCRA listed wastes, nor is the heptane used for cleaning listed. Waste logs are maintained for each bag and box of waste generated.	None	NWW if RCRA trig-gered.	TCLP metals	Evaluate if RCRA triggered.	UHC: TCLP metals below UTS
Waste Name: **P/E Contaminated Waste - Double Base** Waste Description: Rags, spatulas, material containers, etc. which are contaminated with double base propellant or explosives, but the total quantity of P/E does not exceed approximately 10% by weight. Waste Code: D008 – lead, F003 - acetone (yellow waste ticket) Container Type: Conductive or anti-static plastic bags that are loaded into cubic yard boxes Management: These materials must be shipped offsite for treatment and disposal Mixing and casting propellant results in a specific quantity of the mix that adheres to the equipment and must be cleaned out before the mixer may be used again. These materials do not contain enough propellant contamination to meet the definition of reactivity. Double base propellant contains lead compounds (D008) and uses acetone (F003 listed) for cleanup. Waste logs are maintained for each bag and box of waste generated.	D008, F003	NWW	F003, TCLP metals	268.48 list (no dioxins / furans / pesticides)	Acetone, MEK
Waste Name: **P/E Contaminated Waste - Hybrid** Waste Description: Rags, spatulas, material containers, etc. that are contaminated with hybrid propellant or explosives, but the total quantity of P/E does not exceed approximately 10% by weight. Waste Code: F003 - acetone (yellow waste ticket for nitrate ester based hybrids) or not regulated (blue waste ticket for AP-based hybrids) Container Type: Conductive or anti-static plastic bags that are loaded into cubic yard boxes Management: These materials must be shipped offsite for treatment and disposal Mixing and casting propellant results in a specific quantity of the mix that adheres to the equipment and must be cleaned out before the mixer may be used again. These materials do not contain enough propellant contamination to meet the definition of reactivity. Hybrid propellant does not contain any RCRA listed wastes. Composite based hybrids use heptane (which is unlisted) for cleaning. Double base hybrids use acetone (F003 listed) for cleaning. Waste logs are maintained for each bag and box of waste generated.	F003	NWW	F003, TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Paint Related Waste Material (liquid)** Waste Description: Paints (1 or 2 part types, including epoxies, polyurethanes, and other topcoats, primers, etc.), thinners (including solvents used for thinning which may not be a trade name thinner product) Waste Code: D001 - ignitable; D007 & D008 - chromium or lead ; F003 & F005 - listed solvents Container Type: Closed-head drum Management: Paint is mixed and sprayed on exterior surface of either empty or propellant containing rocket motor cases. Waste consists of either residual paint that was mixed and not needed and off-spec or out of shelf-life paints. Material Safety Data Sheets may be used to determine hazards. Waste accumulation sheets that indicate the materials added to the drums are also maintained on this material.	F003, F005, D001, D007, D008	NWW	Flash Point, F003, F005, TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	Toluene, Acetone, MEK TCLP metals not tested.
Waste Name: **Paint Related Waste Material (solid)** Waste Description: Paint booth filters, rags, other solid items such as mixing cups, etc. which are contaminated with paint Waste Code: D007 & D008 - chromium or lead ; F003 & F005 - listed solvents Container Type: Open-head drum Management: Mixing cups which have been wiped clean or rinsed clean with solvent may be disposed of in ordinary trash Paint is mixed and sprayed on exterior surface of either empty or propellant containing rocket motor cases. Waste consists of rags, PPE, containers, and used paint booth filters contaminated with paint. The debris would be contaminated with the same materials that have been added to the liquid paint waste drums. Material Safety Data Sheets may be used to determine hazards.	F003, F005, D007, D008	NWW	Flash Point, F003, F005, TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	Toluene, MEK, Ethylbenzene, Xylenes, 1,2-Dichloro-ethane, Naphthalene, Di-n-butyl phthalate,. TCLP for Cr needed.
Waste Name: **Solvent-Contaminated Rags** Description: Rags contaminated with solvents from composite structure clean-up Waste Code: F003 & F005 – solvents Container Type: Plastic bags that are loaded into cubic yard boxes Management: These materials must be shipped offsite for treatment and disposal Rags are generated from hand cleaning operations of winding equipment and solvents may include isopropyl alcohol, toluene, MEK, acetone, or other F003, F005, or non-listed solvents.	F003, F005	NWW	F003, F005	Required – Solvent List	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Styrene & Inhibitors** Waste Description: Waste styrene monomer, or styrene mixed with cobalt octoate, Santoflex, and MEKP Waste Code: Not regulated Container Type: Closed-head drum Management: Materials are unused and consolidated from their original containers to a drum to reduce disposal cost. Material Safety Data Sheets may be used to determine hazards. Waste accumulation sheets are maintained for drums of this waste.	None	NWW if RCRA trig-gered.	Flash Point, TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-
Waste Name: **Trichloroethylene** Waste Description: Waste trichloroethylene only Waste Code: F002 - chlorinated solvent Container Type: Closed-head drum Management: Do not mix products without authorization Materials are unused and consolidated from their original containers to a drum to reduce disposal cost. Material Safety Data Sheets may be used to determine hazards. Waste accumulation sheets are also maintained for drums of this waste.	F002	NWW	Flash Point, F003, F005, TCLP metals	Required - Solvent list	-
Waste Name: **Tumbler Water** Waste Description: Water containing detergent, cutting oils, and sediment from aluminum deburring operations Waste Code: Not regulated Container Type: Closed-head drum Management: Do not mix products without authorization Material consists of an aqueous detergent solution that is used in tumbling machines to de-burr metal parts. Used tumbler water is accumulated in a vertical 3000-gallon polyethylene tank or drums dependent upon production needs. The waste is removed from the tank or drums by vacuum truck to be transported to an industrial wastewater pre-treatment facility.	None	NWW if RCRA trig-gered.	TCLP metals if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-
Waste Name: **Uncured Resins** Waste Description: Plasticizer or resinous materials such as R45M, Rucoflex, etc. that are still in a liquid form Waste Code: Not regulated Container Type: Closed-head drum Management: Do not mix products without authorization Materials are unused and consolidated from their original containers to a drum to reduce disposal cost. Material Safety Data Sheets may be used to determine hazards. Material may have had enough contact with moisture to begin curing and hardening to form a solid during consolidation and storage. Waste accumulation sheets are also maintained for drums of this waste.	None	NWW if RCRA trig-gered.	Flash Point if triggered by process or regulatory changes.	Evaluate if RCRA triggered.	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Used Grit** Waste Description: Used grit-blasting material Waste Code: Not regulated or D006, D007, D008 Container Type: Open-head drum Management: If any special blasting is conducted (such as stripping cad-plated cases, etc.) grit is held, sampled, and analyzed prior to disposal. Various types of metal cases are grit-blasted in different areas on site. Previous analysis of grit has not shown any metals levels close to the TCLP limits.	D006, D007, D008	NWW	TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	-
Waste Name: **Valenite VNT Valcool Coolant** Waste Description: Used Valcool coolant from broaching machine operations Waste Code: D007 & D008 – chromium, lead Container Type: Closed-head drum Management: Segregate from other coolants in closed head drums Valcool coolant from broaching machines picks up chromium and lead from machining operations and must be segregated from other coolants and treated separately. Drums are sent offsite from disposal.	D007, D008	NWW	TCLP metals	Required – 268.48 list (no dioxins / furans / pesticides)	-
Waste Name: **Varsol** Waste Description: Waste varsol only Waste Code: D001 - ignitable Container Type: Closed-head drum Management: Varsol may be added to a Waste Flammable drum as appropriate. Maintenance shops use varsol to clean oily parts. Only material that may be introduced into the waste is dirt and oils. Material Safety Data Sheets may be used to determine hazards.	D001	NWW	Flash Point, TCLP metals	Not required	-
Waste Name: **Versatec Developer Solution** Waste Description: Solution from drafting equipment only Waste Code: D001 - ignitable Container Type: Closed-head drum Management: Versatec may be added to a Waste Flammable drum as appropriate. Drafting department equipment uses Versatec Developer Solution for printing drawings. Residual material is consolidated from its original containers to a drum to reduce disposal cost. Material Safety Data Sheets may be used to determine hazards.	D001	NWW	Flash Point, TCLP metals	Not required	-

TABLE 2-1
Containerized Wastes and Waste Analysis Parameters

Waste Name, Description, Container, Management, Process Source	Waste Code	LDR	Hazardous Waste Parameters to be Analyzed[1]	UHCs to be analyzed[1]	Constituents Above LDRs Dec 2000 / March 2001 Test Results
Waste Name: **Watershield** Waste Description: Watershield (with or without water added) only Waste Code: D001 – ignitable, D006 – Chromium, D007 - Cadmium Container Type: Closed-head drum Management: NO other mold release materials shall be added to this material. Water based mold release is applied to parts in a dip tank. The parts are then oven dried to remove any moisture. The mold release prevents propellant from sticking to the mold parts so they can be removed once the propellant is cured. Residual or off spec material is consolidated from its original containers to a drum to reduce disposal cost. Material Safety Data Sheets may be used to determine hazards.	D001, D006, D007	NWW	pH, Flash Point, TCLP metals.	Evaluate if RCRA triggered.	Chromium, Cadmium

WW = (Wastewater), **NWW** (Non-Wastewater), **NA** = Not Applicable

GENERAL NOTE: Some entries for specific materials state that they may be added to another drum (Waste Flammable, Bondliner, etc.) as appropriate. This means there is only a small quantity of the material to be disposed of and there is no reason to have an entire drum in that area for that one material. For example, a painting area has a quart of acetone to dispose of. They have a Waste Paint drum, but no acetone drum since this is not a usual occurrence. Therefore, they may add the acetone to the Waste Paint drum since acetone is a constituent of the paint waste.

Note 1: **Required** = Testing to be accomplished.

Note 2: **TS** = Treatment Standard, **UTS** = Universal Treatment Standard

UHCs: Analysis for selected waste streams is required for the underlying hazardous constituents found in 40 CFR 268.48. Analysis for dioxins, furans, and/or pesticides is excluded for selected wastes as indicated. Analysis for the solvent list (below) is required for selected waste streams in lieu of full UHC analysis.

Solvent List: acetone, benzene, n-butyl alcohol, carbon disulfide, carbon tetrachloride, chlorobenzene, o-, m-, and p-cresol, cyclohexanone, o-dichlorobenzene, ethyl acetate, ethyl benzene, ethyl ether, isobutyl alcohol, methanol, methylene chloride, MEK, MIBK, nitrobenzene, pyridine, tetrachloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, trichloroethylene, trichlorofluoromethane, xylenes

TABLE 2-2
Analytical Methods

Waste Code	Parameters	Analytical Methods
D001	Flashpoint	ASTM D93-99a or ASTM D3278-96e1
D002	pH	SW-846 1110 or SW-846 9040B
D004 to D043	TCLP	SW-846 1311
D004	Arsenic	SW-846 6010B, SW-846 7060A, or SW-846 7061A
D005	Barium	SW-846 6010B, SW-846 7080A, or SW-846 7081
D006	Cadmium	SW-846 6010B, SW-846 7130, or SW-846 7131A
D007	Chromium	SW-846 6010B, SW-846 7190, or SW-846 7191
D008	Lead	SW-846 6010B, SW-846 7420, or SW-846 7421
D009	Mercury	SW-846 7470A or SW-846 7472
D010	Selenium	SW-846 6010B, SW-846 7740, or SW-846 7741A
D011	Silver	SW-846 6010B, SW-846 7760A, or SW-846 7761
D018	Benzene	SW-846 8021B or SW-846 8260B
D019	Carbon tetrachloride	SW-846 8021B or SW-846 8260B
D021	Chlorobenzene	SW-846 8021B or SW-846 8260B
D022	Chloroform	SW-846 8021B or SW-846 8260B
D023	o-Cresol	SW-846 8041 or SW-846 8270C
D024	m-Cresol	SW-846 8041 or SW-846 8270C
D025	p-Cresol	SW-846 8041 or SW-846 8270C
D026	Cresol	SW-846 8041 or SW-846 8270C
D027	1,4-Dichlorobenzene	SW-846 8041 or SW-846 8270C
D028	1,2-Dichloroethane	SW-846 8021B or SW-846 8260B
D029	1,1-Dichloroethene	SW-846 8021B or SW-846 8260B
D030	2,4-Dinitrotoluene	SW-846 8091 or SW-846 8270C
D032	Hexachlorobenzene	SW-846 8081A or SW-846 8270C
D035	Methyl ethyl ketone	SW-846 8021B or SW-846 8260B
D036	Nitrobenzene	SW-846 8091 or SW-846 8270C
D038	Pyridine	SW-846 8091 or SW-846 8270C
D039	Tetrachloroethene	SW-846 8021B or SW-846 8260B
D040	Trichloroethene	SW-846 8021B or SW-846 8260B
D041	2,4,5-Trichlorophenol	SW-846 8041 or SW-846 8270C
D042	2,4,6-Trichlorophenol	SW-846 8041 or SW-846 8270C
D043	Vinyl chloride	SW-846 8021B or SW-846 8260B
F001	VOCs	SW-846 8021B or SW-846 8260B
F002	VOCs	SW-846 8021B or SW-846 8260B
F003	VOCs	SW-846 8021B or SW-846 8260B
F005	VOCs	SW-846 8021B or SW-846 8260B

References

1. *Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Wastes: A Guidance Manual;* USEPA OSWER 9938.4-03, April 1994

Section D
Process Information

SECTION D

Process Information [40 CFR 270.15, 270.23, 264.170 through 264.178, and 264.601]

Section D provides information on the design and operation of the ABL hazardous waste storage buildings and the Burning Grounds, including the burn pans and the rocket motor tie-down unit. Descriptions are provided for all these units. This section also includes a description of recordkeeping requirements.

D-1 Containers [40 CFR 270.15 and 264.170 through 264.178]

ATK stores hazardous waste in containers. Currently, waste is stored at Building 366. Building 810 will be used for waste storage after permit issuance.

Building 366. Building 366 is approximately 100 ft long and 75 ft wide and is covered with a roof. The sides of the building are open. The container storage area consists of two sets of concrete cells that are raised above the ground. Each set contains 20 cells, each with dimensions of 9 ft 3 in. long by 6 ft wide by 6 ft 3 in. in deep.

Building 810. The lab pack storage building is metal-sided structure with a concrete foundation. The inside dimensions of the building are 19 ft 4 in. by 15 ft 4 in., with a 10 ft ceiling. Secondary containment is provided by nine portable polyethylene containment modules placed within the building. Four of these modules are 8 ft 4 in. by 4 ft 5 in.; three are 6 ft 6 in. by 4 ft 5 in. and two are 4 ft 5 in. by 2 ft 8 in. Each containment module is topped with a rigid grate designed to ensure waste containers do not contact any liquids collected by the containment modules.

D-1a Containers with Free Liquids

D-1a(1) Description of Containers [40 CFR 264.171, 264.172, and 270.14(b)(1)]

The container storage units are or will be used for storage of both hazardous and nonhazardous waste. The Building 366 hazardous waste storage area is designed to store a maximum of 320 drums within 40 diked cells (i.e., eight drums per cell). The containers are typically either 45-gallon or 55-gallon drums. Building 810 is designed primarily to store containerized wastes (typically in quantities less than 5 gallons) in preparation for lab packing, to prepare lab packs for shipment, and to store the lab packs. These wastes are typically expired lab chemicals, stored in the original containers until lab packed. Maximum capacity is forty-four 55-gallon drums and four 21-gallon drums. All waste drums meet DOT specifications for the waste stored in the drums and are in good condition. "Good condition" means without significant rust, apparent structural defects, or leaks. Low-carbon steel drums that are compatible with the wastes generated on site are typically used for all wastes, except Burning Grounds ash and corrosive wastes. Burning Grounds ash is typically stored in 45-gallon polyethylene drums that allow the drum and its contents to be shredded for incineration when sent off site for disposal. Corrosive wastes are stored in polyethylene-lined drums or other corrosion-resistant containers. Obsolete labels are removed from previously used drums. No drums that may have held incompatible materials are used for waste storage.

D-1a(2) Container Management Practices [40 CFR 264.173]

Procedures for transporting, handling, storing, and closing containers include provisions to ensure that containers are not opened, handled, or stored in a manner that may rupture the containers. Persons engaged in hazardous waste operations are trained in the applicable procedures. Containers are moved with hand trucks, drum handlers, forklifts, or trucks with hydraulic tailgates, depending on the job task.

Container management practices include the following:

- Containers and drums are transported to and handled at the storage areas only by designated, trained personnel.
- Only trained drivers operate forklifts. Forklifts enter Building 366 from the ramp at the north end of the building.
- Containers will typically be placed into Building 810 by hand. There is a small internal ramp to accommodate a hand truck.
- Designated tools and equipment will be used for moving drums (e.g., forklift) or for opening and closing drum bungs and lids.
- Containers are not opened except to add or remove wastes and to obtain samples.
- Weekly inspections are performed to verify that drums are closed and in good condition.
- Drums to be transported off site are inspected for the following: they are DOT approved for hazardous waste; they are visually in good condition; they contain sufficient freeboard; they are securely closed and properly labeled; identification tag number and drum labels agree with the waste log; and they are labeled with the accumulation date.

In Building 366, containers are stored on steel skids, and a maximum of eight drums are stored in each of the 40 diked cells. Waste containers are not stacked. Cells are separated by concrete lips and the two rows of cells are separated by a center aisle approximately 20 ft wide.

In Building 810, containers will be stored directly on the portable containment units or on portable shelving units, depending on the size of the container. Materials such as out of date lab chemicals will be stored in their original containers prior to being packaged for off site shipment. Waste containers will not be stacked.

D-1a(3) Secondary Containment System Design and Operation [40 CFR 270.15(a)(1), 264.175(a), and 264.175(d)]

Building 366. The storage area design provides secondary containment well in excess of the volume of the largest container stored and/or in excess of the 10 percent of the entire volume stored. The area consists of two sets of concrete cells that are raised approximately

4 in. above the ground. Each set contains 20 cells, each with dimensions of 9 ft 3 in. long by 6 ft wide 6 ft 3 in. deep. The separate, diked cells allow incompatible wastes to be segregated.

Building 810. The area consists of nine sets of portable containment modules that are placed on the concrete floor of Building 810. These modules consist of:

- Four large containment modules that can each hold eight drums. Each module is 100 in. long, 53 in. wide, and 6 in. deep. The sump capacity of the eight-drum containment module (according to the manufacturer) is 73 gallons.
- Three mid-sized containment modules that can each hold six-drums. Each module is 76 in. long, 53 in. wide, and 6 in. deep. The sump capacity of the six-drum containment module (according to the manufacturer) is 61 gallons.
- Two small containment modules that can each hold two-drums. Each module is 53 in. long, 29 in. wide, and 6 in. deep. The sump capacity of the two-drum containment module (according to the manufacturer) is 21 gallons. The separate containment modules allow incompatible wastes to be segregated. No containers larger than 21 gallons will be stored on the two-drum containment modules.

The storage area design provides secondary containment either in excess of the volume of the largest container stored or greater than 10 percent of the total volume stored.

D-1a(3)(a) Requirement for the Base or Liner to Contain Liquids [40 CFR 264.175(b)(1)]

Building 366. The concrete forming the floor in the cells will be free from cracks or gaps. The concrete is resistant to precipitation (e.g., runoff) and the wastes stored at the unit. The concrete is compatible with the waste and would not be adversely affected by contact with the waste. A roof to keep precipitation out of the cells covers the entire storage area. A 6-mil polyethylene vapor barrier was installed under the concrete at the storage area.

Building 810. The portable containment modules in Building 810 are formed from a single piece of polyethylene and are free from cracks and gaps. They are compatible with and resistant to all materials stored within the unit. The building is completely enclosed and prevents precipitation from entering the containment modules. No waste containers will be positioned to straddle two containment modules, thereby ensuring that any leaks or spills are contained within a single containment module.

D-1a(3)(b) Containment System Drainage [40 CFR 270.15(a)(2) and 264.175(b)(2)]

Building 366. Each cell in the storage area contains steel skids that are used to keep containers from direct contact with the base. The roof over the unit prevents run-on into the containment system and prevents the accumulation of precipitation in the cells. Checking for the presence or absence of standing liquid or other foreign residue in the cells is a weekly inspection item.

Building 810. Each containment unit in the storage area contains rigid grates that are used to keep containers from direct contact with the container base. The roof and walls prevent run-on into the containment units. Checking for the presence or absence of standing liquid or other foreign residue in the containment areas will be a weekly inspection item.

D-1a(3)(c) Containment System Capacity [40 CFR 270.15(a)(3) and 264.175(b)(3)]

Building 366. Each cell accommodates eight drums and has a gross containment volume of 28.9 cubic feet (ft^3) (9.25 ft long by 6 ft wide by 6.25 in. deep). The largest container that is stored is a 55-gallon drum. The volume of the steel skids is no more than 0.3 ft^3 per cell. The displacement of each drum (to a height of 6.25 in.) is 1.5 ft^3. The net containment volume (calculated as gross containment volume minus skid volume minus displacement volume of seven drums) is 18.1 ft^3 (135 gallons) per cell. The containment system capacity of 135 gallons is sufficient to contain the volume of the largest container (55 gallons) or 10 percent of the volume of all containers (44 gallons). The calculation of containment volume is as follows:

Capacity = gross containment volume (28.9 ft^3) – skid volume (0.3 ft^3) – volume of 7 drums (7 by 1.5 ft^3) = 18.1 ft^3 by 7.48 gal/ft^3 = 135 gallons

Building 810. Containment capacity for each module is as follows:

- Each of the largest of the three containment modules in the Building 810 lab pack storage unit has a containment volume of 73 gallons. The largest module has a storage capacity of eight 55-gallon drums. The containment volume of 73 gallons is larger than the volume of the largest container (55 gallons) or 10 percent of the volume of all containers (44 gallons).
- The mid-sized modules have a containment volume of 61 gallons. The containment volume of 61 gallons is larger than the volume of the largest container (55 gallons) or 10 percent of the volume of all containers (33 gallons).
- The smallest modules have a containment volume of 21 gallons. The containment volume of 73 gallons is larger than the volume of the largest container (limited to 21 gallons or less by procedure) or 10 percent of the volume of all containers (11 gallons).

D-1a(3)(d) Control of Run-On [40 CFR 270.15(a)(4) and 264.175(b)(4)]

Building 366. The cells are raised above ground level which prevents run-on. In addition, the storage pad is slightly elevated from the surrounding area and covered with a roof.

Building 810. The building is totally enclosed, preventing run-on. In addition, the containers are raised above ground level which prevents run-on.

D-1a(3)(e) Removal of Liquids from Containment System [40 CFR 270.15(a)(5) and 264.175(b)(5)]

Spilled or leaked waste and any accumulated rain or snow is removed from the containment system to prevent overflow. Personnel trained in hazardous waste cleanup procedures clean up spilled or leaked waste. Any cleanup materials are collected and added to containers storing similar wastes. If necessary, accumulated liquid can be removed from the cells or containment units by pumping or using an absorbent pad. Liquids removed would be transferred into a drum. Accumulated liquids would be analyzed for the waste constituents stored in the cells containing standing liquids, if knowledge of the wastes stored were not adequate to characterize the liquid.

D-1b Containers Without Free Liquids

D-1b(1) Test for Free Liquids [40 CFR 270.15(b)(1)]

All containerized hazardous waste is managed as if it contained free liquid. Therefore, wastes are not tested to determine whether they contain free liquid.

D-1b(2) Description of Containers [40 CFR 264.171 and 264.172]

The containers used for waste without free liquids are the same as those for waste with free liquids, as discussed in Section D-1a(1).

D-1b(3) Container Management Practices [40 CFR 264.173]

Container management practices used for waste without free liquids are the same as those for waste with free liquids, as discussed in Section D-1a(2).

D-1b(4) Container Storage Area Drainage [40 CFR 270.15(b)(2) and 264.175(c)]

Containers without free liquids are stored within the secondary containment structure described in Section D-1a(3).

D-2 Tank Systems [40 CFR 270.16 and 264.191 through 264.200]

There are no hazardous waste storage tanks at ABL. Therefore, this section is not applicable.

D-3 Waste Piles [40 CFR 270.18 and 264.250 through 264.259]

There are no hazardous waste piles at ABL. Therefore, this section is not applicable.

D-4 Surface Impoundments [40 CFR 270.17 and 264.220 through 264.231]

There are no hazardous waste surface impoundments at ABL. Therefore, this section is not applicable.

D-5 Incinerators [40 CFR 270.19 and 264.340 through 264.351]

There are no hazardous waste incinerators at ABL. Therefore, this section is not applicable.

D-6 Landfills [40 CFR 270.21 and 264.300 through 264.317]

There are no hazardous waste landfills at ABL. Therefore, this section is not applicable.

D-7 Land Treatment [40 CFR 270.20 and 264.270 through 264.283]

There are no hazardous waste land treatment units at ABL. Therefore, this section is not applicable.

D-8 Miscellaneous Units [40 CFR 270.23 and 264.600 through 264.603]

The Burn Pan Units, including the Rocket Motor Tie Down Unit is a miscellaneous treatment unit.

D-8a Description of Miscellaneous Units

Location

Thermal treatment is conducted at the Burning Grounds that encompasses an area of 8 acres. A total of seven burn pans will be used for thermal treatment. There are currently six pans at the Burning Grounds identified as A, B, C, D, E, and F. One additional pan (A') will be installed and is included in this permit application. Pans E and F will remain at their existing location. Pans A, B, C, and D will be moved to a new location within the Burning Grounds. Figure D-1 shows the proposed pan locations. A rocket motor tie-down unit also will be installed at the Pan E location. For safety purposes, Pans D, E, and F will not be used whenever rocket motors are treated.

Design and Construction

The burns pans range from 6 to 9 ft long, 9 to 12 ft wide, and 1 ft deep. The pans are made from ¼-in. thick seam welded carbon steel or stainless steel to prevent warping during burning operations. The condition of the existing pans has deteriorated and shown signs of corrosion. In order to avoid pan deterioration over time, the new pan (A') will be constructed of ¼-in. stainless steel. The existing pans might be upgraded by replacing them with ¼-in. stainless steel pans. The new pans will be lined with 4 in. of coarse sand overlain with 10 in. of soil. Each burn pan will have a sump in one corner that facilitates drainage and removal of accumulated water. Two steel I-beams will be welded to the bottom of each pan to elevate the pan and provide additional structural rigidity. Asphalt pads will be installed for the pans and located approximately 100 to 150 ft apart. Figure D-2 shows the conceptual design of the burn pans and pads.

ABL uses a mobile cover to protect each pan. The pan covers are made of an aluminum super-structure with a corrugated aluminum cover. It is used to prevent rainfall from collecting in the burn pan and prevent wind dispersion of treatment residue. The cover is placed over each burn pan when safe to approach after treatment (during normal business hours) and in times of inclement weather. The roof of the structure is pitched from side to side to shed precipitation. The overall structure is mounted on four wheels. To prevent the mobile covers from being blown around, the covers can be secured to the burn pans. Figure D-3 shows the conceptual design of the burn pan covers.

Certain whole rocket motors may be treated in the tie-down device. Vertical (approximately 80^{0}) tie-down devices will be used. Figure D-4 shows conceptual section views of the burn pans, support walls, earth embankment, and tie down-devices.

Design and Construction Schedule

The schedule for the Burning Grounds upgrade is as follows:

Action	Timeframe
Submit Construction Schedule	30 days after the effective date of the permit
Submit Air Permit Application	60 days after the effective date of the permit
Submit Detailed Design and Specifications and CQAP – Begin Phased Construction	60 days after the effective date of the permit
Submit Progress Reports	60 days after issuance of the Air Permit and quarterly thereafter
Submit Construction Certification(s)	45 days after completion of each phase
Complete Construction	360 days after beginning construction
Submit Final Construction Certificate	45 days after completion of construction

The facility may choose not to construct all upgraded pans during this construction period and will continue to use the existing pans. Other pans may be upgraded later. The upgraded pans will be operated only after the pan upgrade is completed and certified.

Operation

Open burning at ABL is conducted in above-ground pans as discussed in Section D-8a. The steel burn pans contain a layer of clay or sand to act as a refractory material to maintain the integrity of the pan during the very high temperature burning operation. Wastes are spread across the top of the refractory material. The combustion process may, under some conditions, leave small amounts of partially unburned material on the pan. After a cool down period, these solids are incorporated into the next burn operation. Precipitation on the burning pans collects inside the pan sump. The water provides an additional degree of protection for the pans during the burning cycle. Operation of the Burning Grounds will be conducted under specified conditions as described in Table D-1. These conditions were established based on the air modeling (see Appendix A) and the risk assessment (see Appendices B and C) results.

Maintenance

Maintenance of burn pans and associated equipment generally consists of repair or replacement of damaged parts or the soil liner in the pan. Pre-burning and post burning maintenance activities are conducted at the Burning Grounds. All ash/residue in the pans accumulated during the burning operations is collected, tested, and disposed of properly. Excess water collected in the pans is removed from the burn pan sump using a small plastic bucket, pump, or other suitable method and is placed into a container. The contents of the container are transferred to a DOT-approved closed-top drum. The drum is labeled and accumulated at the Burning Grounds. It is kept closed, except when waste is added or removed. When the drum is filled, it will removed from the Burning Grounds within 3 days and taken to the Hazardous Waste Storage Facility at Building 366. Otherwise the drum will be directly shipped offsite. A sample of the water is analyzed for acetone and TCLP metals after the drum has been filled. Section C, Attachment C-1, Table 1-1 provides details on sampling and analysis of water accumulated in the pans.

Monitoring

The early stages of the OB event is monitored, visually, by facility personnel from the bunker area.

Inspection

Before and after treatment, each burn pan is visually inspected for leaks. The integrity of the pans is checked to determine if any leaks or spills of P/E waste or treatment residues have occurred. Any ejected material is collected and placed back into the burn pan for treatment in the next burn if it is an untreated waste or into a container if it is a treatment residue. The cover is placed over the burn pan until the next event. Detailed inspection procedures are described in Section F-2.

D-8b Waste Characterization [264.601(a), 264.601(b)(1), 264.601(c)(1)]

The Burning Grounds is used to treat reactive hazardous waste including propellants, explosives, and materials containing P/E waste. Materials burned at ABL consists of waste explosive materials from manufacturing, any excess compounded propellant or explosive, in either uncured or cured conditions, uncured or cured P/E that is off-specification for reasons such as deviation from composition, physical, ballistic, or configuration product specifications, and solvents and saw dust contaminated with propellants or explosives. Typical concentrations of energetic material constituents in the waste are listed in Table C-3.

Open burning of P/E wastes in the burn pans at the Burning Grounds generates ash (treatment residue) and emissions to the air. The physical form of the treatment residue is distinctly different from the unburned P/E waste. The treatment residue is a dark, coarse-grained material. The unburned P/E wastes have physical forms, such as liquid absorbed onto sawdust, thick dough-like substance, solid rubber-like material, powdered crystalline solid, and granular crystals, depending on the waste being treated.

D-8c Treatment Effectiveness

The effectiveness of OB treatment is addressed by the following studies and air models: *Emission Factors for the Disposal of Energetic Material by Open Burning and Open Detonation* (Mitchell and Suggs, August 1998), *SNL Report* (SNL, December 1996), *POLU13* (U.S. Naval Surface Warfare Center), and *Open Burning Open Detonation Model (OBODM)* (Bjorklund et al., 1998). A database of emission factors applicable to the OB (routinely used to destroy surplus or unserviceable energetic materials) was constructed and validated using emissions data from 16 energetic materials which were burned in a 930 m^3 chamber called a BangBox (Mitchell and Suggs, 1998). Additionally, emission factors exist from an emissions test using waste streams intended to be characteristic of ABL Burning Ground Activities, as part of the SNL 1996 air pathway risk assessment (SNL, 1996). Emissions data presented in the SNL Report were collected from test burns conducted in the SNL Air Emissions Test Chamber.

POLU13 is an update of the original POLU10 computer model published by the Department of the Navy's Ordnance Environmental Support Office. The POLU10 model is a modification of the Propellant Evaluation Program, written at the Naval Weapons Center, China Lake, California. The POLU13 model has the ability to calculate pollution products under the special conditions encountered in the open detonation and OB of explosives and propellants. The POLU13 model calculates products associated with the combustion of propellants and other energetic materials contained within the munitions. The model requires material ingredient data (constituent information) and material weight-to-air ratios as input data. The output file contains a calculated mass for each predicted combustion product.

OB procedures are normally used to dispose of propellants. The BangBox study shows that the following four parameters are statistically consistent across all explosive items detonated and burned in an unconfined state:

- %C as COx,
- %CO/COx,
- %N as NOx,
- %NO/NOx

The emission products from most energetic materials destroyed by OB will be adequately represented by the following analytes: CO2, CO, NO, NO2, total saturated hydrocarbons (e.g., ethane, propane, butane), acetylene, ethylene, propene, benzene, toluene, and particulate. (Mitchell and Suggs, August 1998).

The Open Burn/Open Detonation Dispersion Model (OBOD-M) (Bjorklund et al., 1998) was developed at the U.S. Army Dugway Proving Ground and was designed to evaluate the potential air quality impacts associated with OB and open detonation activities using empirical emission factors obtained from measurements (e.g., BangBox) or predicted by a products of combustion model (e.g., POLU13). The emission factors define the quantities of pollutants released per unit mass of material burned or detonated. OBOD-M calculates the downwind transport and dispersion of the pollutants using cloud rise and dispersion model algorithms from existing dispersion models.

Dispersion modeling of emissions to the air from OB of propellants and explosives on the Burning Grounds at ABL was conducted using the above-referenced studies and model as input data into the OBOD-M. The results of the site-specific air dispersion modeling are included as Appendix A, Air Modeling Results.

D-8d Environmental Performance Standards for Miscellaneous Units

D-8d(1) Protection of Groundwater and Subsurface Environment [40 CFR 264.601(a), 270.23(b) and (c)]

This section addresses the protection of groundwater and the subsurface environment associated with the operations of the Burning Grounds as a permitted unit.

D-8d(1)(a) Environmental Assessment [40 CFR 264.601(a), 270.23(b) and (c)]

D-8d(1)(a)-1 Waste Characteristics and Volume, Including Potential for Migration through Soils, Liners, or Other Containing Structures

Waste from the propellant operations are energetic and are treated on-site via burning on above-ground pans. The propellant wastes consist of the propellant and solvents associated with removal of the propellant from the mixing and casting equipment and from rocket motor treatment. Wastes from finished motor assembly operations are also energetic and managed onsite via burning in above-ground pans. Wastes from motor casing preparation are typical of those associated with metals machining and surface preparation. These materials are segregated, containerized and transported offsite for treatment or disposal at properly permitted facilities. Propellants are grouped by their ingredients into categories. The categories are:

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

Other materials that will be treated via burning on above-ground pans include paper, wood chips and scraps, plastics, cotton rags, cardboard, acetone and acetone/sawdust (50/50 mixture). Section C of this Part B application contains detailed information on the physical and chemical characteristics of the wastes treated at the Burning Grounds.

Section D-8d(3)(a) contains detailed information on maximum quantity of wastes treated. The Burning Grounds will have a maximum annual throughput of 300,000 lbs/year for any single waste stream, and a total maximum annual throughput of 300,000 lbs/year. The potential for future migration of wastes or waste constituents is considered to be low based on design of the pans and pads, Burning Grounds operations, and physical/chemical characteristics of the waste constituents. All burning operations take place in sand- and soil-lined steel burn pans. The sand and soil layers provide primary containment of waste materials. The burn pans provide secondary containment. The burn pans have mobile covers and will be placed on asphalt pads. The covers minimize accumulation of precipitation in the burn pans. The asphalt surface provides tertiary containment for any ejected wastes. The pads are slightly elevated above the surrounding ground surface to prevent run-on to the pads. Treatment is not initiated during precipitation events. Removal of ejected wastes from the pads reduces the potential for contaminated run-off from the pad.

ATK intends to conduct surface soil sampling once every 5 years to verify that these measures have been effective. Appendix D contains the initial soil sampling plan.

Constituents that may deposit onto the ground following burning operations may include metals and some semivolatile organic compounds (such as polycyclic aromatic hydrocarbons). In the case of metals, the concentrations that could deposit onto the soil are listed in Appendix B, the HHRA.

D-8d(1)(a)-2 Hydrologic and Geologic Characteristics of the Unit and Surrounding Areas

The following discussion of hydrologic and geologic characteristics of the Burning Grounds was obtained from several documents: *Focused Remedial Investigation of Site 1 at Allegany Ballistics Laboratory Superfund Site* (CH2M HILL, 1995), *Phase II Remedial Investigation at Allegany Ballistics Laboratory* (CH2M HILL, 1996), *Long-Term Monitoring Plan Site 1 – Burning Grounds* (CH2M HILL, 1998), *Phase I Aquifer Testing at Allegany Ballistics Laboratory* (CH2M HILL, 1998), *Phase II Aquifer Testing at Site 1 at Allegany Ballistics Laboratory* (CH2M HILL, 1999), and the *Draft Annual Long-Term Monitoring Report for Sites 1 and 10* (CH2M HILL, 2001).

- **Geology of Surrounding Area.** ABL is located in the Valley and Ridge Physiographic Province, near its western boundary with the Allegheny Plateau Province. The transition between these provinces is referred to as the Allegheny Structural Front. The Valley and Ridge Physiographic Province is underlain by sedimentary rocks folded and faulted during the Paleozoic Era. The linear belts of ridges and valleys that characterize the province result from differential erosion of the various rock types. In general, more-resistant sandstone underlies ridges, whereas less-resistant shale and soluble limestone underlie lowlands.

  The most significant physiographic feature in the vicinity of ABL is Knobly Mountain, which flanks the developed portion of Plant 1 to the south and east. Plant 1, along the northern border of which is the Burning Grounds, is located on the floodplain of the North Branch Potomac River at a point where the river has cut into the base of Knobly Mountain.

  Knobly Mountain is the surface expression of a portion of the Wills Mountain anticlinorium, the anticlinal axis of which plunges to the southwest and trends approximately N30°E as it approaches Plant 1 from the southwest, but displays a more north-south trend immediately north of Plant 1. Figure D-5 from the *Site 1 Focused Remedial Investigation Report* (CH2M HILL, 1995), suggests the anticlinal axis passes beneath the Burning Grounds.

  Fracture trace analysis performed in the area surrounding the developed portion of Plant 1 indicated that the most common fracture pattern in the bedrock is parallel to the structural trend of the Wills Mountain anticlinorium (i.e., N26°E). The second-most common fracture pattern was found to be oblique to the primary fracture trace (i.e., N39°W).

- **Geology of Unit.** The geology beneath the Burning Grounds has been characterized through a number of activities, including drilling, soil sampling, rock coring, geophysical logging, downhole video, seismic refraction, seismic reflection, and fracture trace analysis. These activities identified three primary lithologic units which are described below.

  Four interpretative cross-sections of the lithologic units underlying the Burning Grounds have been prepared to assist in formulating a conceptual model of the subsurface stratigraphy. Figure D-6 shows the locations of the four cross-section alignments. Figures D-7, D-8, D-9, and D-10 present the cross sections for A-A′, B-B′, C-C′, and D-D′, respectively.

- **Floodplain Deposits.** The natural surficial material at the Burning Grounds is silty clay, considered to be floodplain deposits of the North Branch Potomac River. Just north of the Burning Grounds, between the perimeter fence and the North Branch Potomac River, up to several feet of fill material may exist, deposited in conjunction with historic, non-related activities that took place adjacent to the Burning Grounds.

  The surficial silty clay is typically light to dark brown. Toward the lower parts of the layer there are traces of fine-grained sand. The thickness of the silty clay layer at the Burning Grounds ranges from approximately 10 to 15 ft; its base is generally a few feet higher than the typical river surface elevation adjacent to the site (i.e., 650 ft above mean sea level, or amsl).

- **Alluvial Deposits.** Beneath the silty clay is alluvium consisting of generally poorly sorted sand, gravel, pebbles, and cobbles, with variable but typically significant amounts of clay and silt. This layer is presumably alluvial channel deposits laid down by the North Branch Potomac River as it meandered across its valley. Drilling activities conducted at the Burning Grounds have determined that the gravel size and quantity generally increase with depth, producing a relatively transmissive zone at the base of the alluvium.

  The natural (i.e., in the absence of groundwater pumping) saturated thickness of the alluvium varies across the Burning Grounds but, in general, is between 8 and 16 ft and tends to decrease from south to north across the unit.

- **Bedrock.** Directly beneath the alluvial deposits lies bedrock, consisting of primarily calcareous shale, limestone, and sandstone of Silurian age. As noted previously, the axis of Wills Mountain anticlinorium is assumed to pass beneath the Burning Grounds in a generally northeast-southwest orientation. On the southeast side of the axis, the strata are primarily calcareous shale that dip relatively gently to the southeast at approximately 30°. On the northwest side, the strata contain appreciable limestone and are generally vertical to slightly overturned.

  Bedrock drilling has identified fracture (and void) sets at similar elevations across the Burning Grounds. The two most common fracture sets were identified at elevations between 600 and 615 ft amsl and between 623 and 629 ft amsl. The primary difference in the fracture sets identified in the bedrock across the Burning Grounds is the quantity of water they yield. Aquifer testing and geophysical logging of bedrock boreholes at the unit suggest the fracture sets beneath the eastern portion of the Burning Grounds tend to have higher production capacities than those in the west. This finding is supported by the results of a seismic reflection survey that determined, in general, a higher density of fractures lie beneath the eastern portion of the unit than beneath the western portion.

  The bedrock surface beneath the Burning Grounds is fairly uniform with an elevation generally between 638 and 640 ft amsl. The most significant feature is an apparent depression in the bedrock surface just to the west of the Burning Grounds, which was identified during geophysical investigations and confirmatory drilling. The average depth to bedrock beneath the Burning Grounds is 18 to 20 ft.

- **Hydrology.** There are no surface-water bodies within the boundary of the Burning Grounds. A north-south trending stormwater drainage ditch lies approximately 450 ft west of the western end of the Burning Grounds. The ditch is spring-fed and generally contains at least some flow. The predominant hydrologic feature in the vicinity of the Burning Grounds is the North Branch Potomac River, which borders the northern and western boundaries of the developed portion of Plant 1. The reach of the river adjacent to the Burning Grounds is within approximately 75 to 100 ft of the unit's northern perimeter fence. The elevation of the river adjacent to the Burning Grounds is generally between 648 and 650 ft msl and the average flow from 1939 through 1979, measured at the Pinto gauging station just upstream of the Burning Grounds, was 886 ft^3 per second (ft^3/sec) (Maryland Geologic Survey, Report of Investigation No. 35).

- **Hydrogeology of the Surrounding Area.** Because the geology of the area is complex, so too is the hydrogeology. Significant quantities of groundwater across the developed portion of Plant 1 are found within both the alluvium and bedrock. Further, studies to date suggest there is no appreciable confining unit between these two hydrogeologic units and that there is clear hydraulic connection between them.

  Recharge to the alluvial aquifer within the developed portion of Plant 1 is assumed to be from precipitation. This information is supported by historical data that show marked decreases in the saturated thickness of the alluvial aquifer following periods of little or no precipitation. Conversely, increases in the water table are generally observed during the "wet" periods of the year.

  Recharge to the bedrock aquifer within the developed portion of Plant 1 is believed to be from leakage from the alluvial aquifer and upwelling of deeper bedrock groundwater under the pressure influence of the surrounding highlands. This supposition is supported by historical data that generally show a downward vertical hydraulic gradient from the alluvium to the bedrock across the facility and an upward vertical hydraulic gradient from the deep (i.e., greater than approximately 90 ft) to more shallow bedrock.

  Unlike the alluvial aquifer, lateral groundwater flow in the bedrock aquifer is confined to partings along bedding planes, fractures, and solution channels. Like the alluvial aquifer, however, this results in a complex flow regime whereby groundwater flow in the bedrock is controlled by the size, frequency, and orientation of these features. Where the bedrock is more highly fractured and more calcareous (i.e., dissolvable), as in the vicinity of the Wills Mountain anticlinal axis and to the west for example, groundwater flow may be more prevalent than to the east where there is less limestone and the strata are less folded and faulted.

  Regardless of the specific direction or rate of flow, the ultimate discharge point for both alluvial and bedrock groundwater beneath the developed portion of Plant 1 is believed to be the North Branch Potomac River. The elevation of the base of the alluvial aquifer across the plant is approximately equal to the elevation of the river bottom. In addition, historically measured water levels in the river have been lower than water levels measured in bedrock wells adjacent to the river.

  This complexity of the hydrogeologic regime at ABL has been enhanced beneath the Burning Grounds by the operation of a groundwater pump and treat system to remove VOC contamination attributed to historic solvent disposal activities within the unit's boundaries. Because of the physical CERCLA site/Burning Grounds overlap, appreciable additional hydrogeologic information has been obtained at the Burning Grounds relative to the remainder of Plant 1. This information is discussed below.

- **Hydrogeology of Unit.** As noted above, the alluvial aquifer beneath the Burning Grounds consists of between about 8 to 16 ft of silt, clay, and gravel. Natural groundwater flow (i.e., not influenced by groundwater extraction) in the alluvial aquifer beneath the Burning Grounds is north-northeast toward the North Branch Potomac River, with a generally uniform horizontal hydraulic gradient of approximately 0.008. However, near the western end of the burning ground, the direction of alluvial groundwater flow changes to the north-northwest toward the river, with a steeper gradient of approximately 0.016. This phenomenon is likely due to a reduction in bedrock aquifer transmissivity at the western end of the unit causing bedrock groundwater to mound as it approaches from an area of higher transmissivity and influence the gradient in the overlying alluvial aquifer.

  Testing conducted in conjunction with installation of the groundwater pump and treat system revealed that hydraulic conductivities in the alluvial aquifer are highest across the eastern half of the Burning Grounds and lowest across the western half, with a sharp decrease in the hydraulic conductivities observed near the western third of the burning ground. Across the eastern half of the Burning Grounds, the observed hydraulic conductivities range from approximately 13 ft/day to 182 ft/day, with a mean of approximately 70 ft/day. This contrasts with the observed hydraulic conductivities across the western half, which range from about 0.4 ft/day to 17 ft/day, with a mean of approximately 6 ft/day. Although there were two wells with calculated hydraulic conductivities greater than 60 ft/day in the western half (i.e., wells 1EW23 and 1EW26 in Figure D-11), all but 3 of the 14 hydraulic conductivity measurements are less than 10 ft/day.

  Based upon the hydraulic gradient and hydraulic conductivity values presented above, the average linear velocity of natural (i.e., not influenced by groundwater extraction) horizontal groundwater flow in the alluvial aquifer beneath the eastern half of the Burning Grounds is estimated to average approximately 1,000 ft per year (ft/yr), depending on the amount of clay present. This calculation assumes an effective porosity of 20 percent for the alluvium. Because of the lower observed hydraulic conductivities in the alluvial aquifer beneath the western portion of the Burning Grounds, the calculated average linear velocity of horizontal groundwater flow there is estimated to be about 175 ft/yr.

  Similar to that of the alluvial aquifer, the general direction of groundwater flow in the bedrock beneath the Burning Grounds is north-northeast toward the North Branch Potomac River, with a nearly uniform horizontal hydraulic gradient of approximately 0.01. However, near the west end of the Burning Grounds, the groundwater flow becomes north-northwest toward the river with an increased horizontal hydraulic gradient of approximately 0.03. As stated previously, this phenomenon is likely due to a reduction in bedrock aquifer transmissivity beneath the western end of the unit causing bedrock groundwater to mound as it approaches from an area of higher transmissivity.

Although the bedrock across the Burning Grounds appears to be moderately fractured, the fractures beneath the western portion of the Burning Grounds do not appear to be capable of producing appreciable quantities of groundwater. Similar to the hydraulic conductivity values observed for the alluvial aquifer across the Burning Grounds, the observed transmissivity of the bedrock aquifer beneath the eastern portion of the unit (i.e., 285 square feet per day [ft^2/day]) is approximately 4 times that observed for the bedrock beneath the western portion (i.e., 70 ft^2/day). This is believed due to the relatively lower number of fractures present below the western part of the unit compared to the eastern part.

The above discussion focuses on the hydrogeologic characteristics of the alluvial and bedrock aquifer under natural (i.e., non-pumping) conditions. Currently, a series of 27 alluvial extraction wells and 7 bedrock extraction wells exist at CERCLA Site 1 that withdraw groundwater at an average of about 100 gallons per minute (gpm) from the alluvial and bedrock aquifers beneath the Burning Grounds. The primary objective of the groundwater extraction well array is to create a hydraulic barrier whereby the direction of alluvial and bedrock groundwater flow is reversed from the river back to the extraction well alignments, which traverse the Burning Grounds from west to east (Figure D-11). These extraction wells have altered the natural hydraulic gradient, whereby both alluvial and bedrock groundwater within the boundaries of the Burning Grounds is being hydraulically contained.

D-8d(1)(a)-3 Existing Groundwater Quality, Including Other Sources of Contamination and Their Cumulative Impact on the Groundwater

Existing groundwater quality information is derived from the four rounds of groundwater quality data that were collected as part of the RCRA baseline groundwater monitoring program for the Burning Grounds developed by the WVDEP, USEPA, Navy, ATK, and CH2M HILL in April 1999. Under this program, a subset of the CERCLA monitoring and extraction wells (i.e., five alluvial and four bedrock extraction wells and two upgradient alluvial and two upgradient bedrock monitoring wells) were sampled in April 1999, April 2000, July 2000, and October 2000. Additional data from the CERCLA long-term monitoring program (June 1998, January 1999, October 1999, and July 2000) are also included in the discussion of existing groundwater quality.

The results of a statistical evaluation conducted on the four rounds of RCRA baseline monitoring data indicate that the most prevalent constituents of potential concern in groundwater beneath the Burning Grounds are VOCs and explosives. No other organic constituents (i.e., SVOCs, pesticides, polychlorinated biphenyls (PCBs), herbicides, dioxins, furans) have been detected at statistically significant levels. In addition, detected concentrations of inorganic constituents in groundwater beneath the Burning Grounds are similar to those found elsewhere at Plant 1.

The presence of VOCs, and in particular TCE (the most prevalent VOC detected), is attributed to the historic use of solvents at the facility and subsequent disposal in three solvent disposal pits located in the southwestern portion of the Burning Grounds (Figure D-11). Although solvents were historically present in a portion of the propellants burned at the Burning Grounds, it is unlikely that the VOCs related to these solvents significantly contributed to groundwater contamination at the unit. Because, relative to the quantity of solvents discharged into the solvent disposal pits, the solvents in the waste burned represented a minimal quantity of VOCs. Solvents associated with propellant were likely destroyed during burning. Any solvents not destroyed during burning are more likely to have volatilized during and after burning than to have been transported to groundwater.

HMX, RDX, and perchlorate are the explosive constituents detected most frequently in the groundwater beneath the Burning Grounds. All three of these constituents are common components of waste material historically burned at the unit. Of these three, perchlorate is the most prevalent explosive constituent detected, with respect to both concentration and distribution. The highest perchlorate concentrations were detected in the wells down-gradient of the solvent disposal pits, which has been attributed to the historic practice of disposing of spent solvents in the solvent disposal pits. Historically, TCE and other solvents were used to clean up composite propellant, which contained ammonium perchlorate and other explosives. Discharge of these spent solvents in the solvent disposal pits would have released to the subsurface both VOCs and constituents picked up in the solvents during the cleaning processes (e.g., perchlorate).

D-8d(1)(a)-4 Quantity and Direction of Groundwater Flow [264.601(a)(4)]

Groundwater beneath the developed portion of Plant 1 flows toward the North Branch Potomac River (Figures D-12 and D-13). Under natural (i.e., non-pumping) conditions, alluvial and bedrock groundwater beneath the central and eastern portions of the Burning Grounds flows in a north-northeasterly direction. Near the western end of the Burning Grounds, alluvial and bedrock groundwater flow toward the north-northwest, under natural conditions.

Alluvial groundwater flow velocities calculated based on natural flow directions and hydraulic gradients vary between 175 ft/yr (beneath the western portion of the unit) and 1,000 ft/yr (beneath the eastern portion of the unit). Natural bedrock groundwater flow is expected to vary substantially across the Burning Grounds, and would be based on the size, distribution, and connectivity of the openings (e.g., fractures, solution channels).

The operation of the Site 1 groundwater extraction and treatment system has altered the natural hydraulic gradients and velocities of groundwater beneath the Burning Grounds. Water-level drawdown in both the alluvial and bedrock aquifers has reversed the direction of groundwater flow from the river back to the extraction wells, thereby preventing discharge of contaminated groundwater from the CERCLA site into the North Branch Potomac River. This gradient reversal has resulted in hydraulic containment of the alluvial and bedrock groundwater beneath the Burning Grounds since the pump and treat system became operational in September 1998. Figures D-12 and D-13 demonstrate the hydraulic containment that has been achieved beneath the Burning Grounds.

D-8d(1)(a)-5 Proximity to and Withdrawal Rates of Current and Potential Groundwater Users

Except for the CERCLA groundwater extraction and treatment system, no groundwater is withdrawn for use from the developed portion of Plant 1. A portion of the treated groundwater is utilized by the facility's steam generation plant on an as-needed basis. Residents across the North Branch Potomac River from ABL do use bedrock groundwater as a potable water source. The exact amount of groundwater usage by nearby residents is unknown. The nearest residential well(s) to the Burning Grounds is approximately 1/3 mile from the northern perimeter fence. The locations of withdrawal wells in the vicinity of ABL are shown in Figure A-3. Historical data suggest contaminated groundwater did not migrate beneath the river under normal flow conditions and existing data suggest that operation of the groundwater extraction system prevents offsite migration of groundwater beneath the Burning Grounds.

D-8d(1)(a)-6 Regional Land Use Patterns

Land use in the area of ABL is a mixture of rural and suburban residential. Dairy cattle grazing occurs among low-density residential areas north of the Burning Grounds; manufacturing and storage facilities with additional open space within plant boundaries lie further to the south. Residential areas located to the northwest of the Burning Grounds include Bel Air and Pinto about 1 mile to the west-northwest and Cresaptown, about 2 miles northwest. Cumberland Maryland, with a population of approximately 35,000 lies further north.

D-8d(1)(a)-7 Potential for Deposition or Migration of Waste Constituents into Subsurface Physical Structures and the Root Zone of Vegetation

Operations at the Burning Grounds result in the emissions of gases as described in Appendix D, Air Modeling Results. The emissions then can be dispersed in air and transported to offsite areas. The particulates suspended into the air may deposit onto soil, foliage, and surface water. SVOCs and metals adsorbed to deposited particulates may become incorporated into surface soil through mixing and desorption (i.e., leaching from the deposited particulates). Concentrations in surface soil resulting from particle deposition to offsite locations could become accumulated through root uptake into vegetation, such as fruits and vegetables grown in a backyard garden. Particles also could be deposited onto aboveground foliage.

The human health risk assessment presented in Appendix B discusses the potential for soil deposition and migration to the surface or root zone in greater detail.

D-8d(1)(a)-8 Potential for Human Health Risks Caused by Exposure to Waste Constituents

Operation of the groundwater extraction and treatment system results in this pathway of exposure being incomplete. This RCRA permit application contains a groundwater Corrective Action program for the Burning Grounds that will, in conjunction with the existing CERCLA activities, maintain hydraulic control of the groundwater. See Appendix B for detailed discussion of human health risk assessment.

D-8d(1)(a)-9 Potential for Damage to Domestic Animals, Wildlife, Crops, Vegetation, and Physical Structures Caused by Exposure to Waste Constituents

Precipitation falling on the Burning Grounds is lost to evapo-transpiration processes or infiltrates the soils to reach groundwater. Groundwater flow at the Burning Grounds is generally north towards the North Branch Potomac River. However, groundwater at the Burning Grounds does not currently discharge directly to the river due to the presence of extraction wells associated with CERCLA activities in the area. Extracted water is treated before discharge to the river. Thus, damage to domestic animals, wildlife, crops, vegetation, and physical structures from exposure to waste constituents in groundwater is prevented by the operation of the groundwater extraction and treatment system. Operation of the ground-water extraction and treatment system results in this pathway of exposure being incomplete. This RCRA permit application contains a groundwater Corrective Action program for the Burning Grounds that will, in conjunction with the existing CERCLA activities, maintain hydraulic control of the groundwater. See Appendix C for detailed discussion of the ecological risk assessment.

D-8d(1)(a)-10 Potential Magnitude and Nature of Exposure of Humans or Environmental Receptors to Hazardous Waste or Hazardous Constituents

Potential exposure to groundwater at the Burning Grounds is negligible because this pathway is incomplete. Most ecological receptors have very limited exposure to subsurface soil (e.g., soil at depths greater than 2 ft below the ground surface). Workers performing excavation activities could encounter hazardous constituents in subsurface soil. Potential exposure pathways to workers under these conditions include dermal contact with soil and incidental soil ingestion. The concentrations present in subsurface soil would not pose a threat to workers. Additionally, specific work practices and personal protective equipment required for activities at the Burning Grounds would further reduce potential exposures to workers.

D-8d(1)(b) Performance Standards

This section addresses the environmental performance standards for the protection of groundwater from operations of the Burning Grounds as a permitted unit.

D-8d(1)(b)-1 Design and Operating Requirements

The Burning Grounds are within a larger area that has been designated Site 1 under the CERCLA program at ABL. Further, groundwater beneath the Burning Grounds is part of a CERCLA remedial action, documented in the *Final Record of Decision (ROD) for Site 1 Operable Unit 3: Groundwater, Surface Water, and Sediment at Allegany Ballistic Laboratory, West Virginia, April 1997*. Under this remedial action, groundwater in the alluvial and bedrock aquifers at CERCLA Site 1 is hydraulically contained, thereby preventing its discharge to the North Branch Potomac River. The contained groundwater is extracted from the aquifers, treated at an onsite groundwater treatment plant to remove VOCs, and discharged to ABL's steam generation plant and/or the North Branch Potomac River. The primary VOC chemicals of potential concern (COPCs) for the CERCLA program in Site 1 groundwater are TCE; 1,2-dichloroethene (1,2-DCE); 1,1,1-trichloroethane (1,1,1-TCA); methylene chloride; and acetone.

The groundwater extraction and treatment system at Site 1 has been in operation since September 1998. This system has been extracting and treating groundwater at an average rate of more than 100 gallons per minute (gpm) since that time. The system includes 27 alluvial extraction wells and 7 bedrock extraction wells that are oriented approximately parallel to the North Branch Potomac River. Figure D-6 shows that the extraction well alignments traverse the Burning Grounds and extend several hundred feet east and west beyond the fenceline.

Under the CERCLA program, a long-term monitoring program has been instituted to evaluate the effectiveness of the Site 1 groundwater remedial action. As part of long-term monitoring, continuous automated and monthly manual water-level measurements are collected from a network of extraction and monitoring wells to ensure horizontal hydraulic gradients remain reversed from the river back to the extraction-well alignment in both the uppermost (i.e., alluvial) and underlying (i.e., bedrock) aquifers. The water-level data are used to develop monthly piezometric surface maps that show the capture zones in both aquifers. To date, hydraulic monitoring data have shown the alluvial and bedrock groundwater beneath the Burning Grounds has been completely contained while the extraction system is operational (figures D-12 and D-13).

As agreed upon during an April 15, 1999 meeting attended by WVDEP, United States Environmental Protection Agency (USEPA), the Navy, ATK, and CH2M HILL, a RCRA baseline monitoring program was initiated for groundwater at the Burning Grounds. The purpose of the baseline groundwater monitoring program was to evaluate the existing groundwater conditions and to establish a baseline for development of a corrective action monitoring program under RCRA. This baseline monitoring program comprised four rounds of quarterly groundwater sample collection from selected extraction wells in the Burning Grounds and selected upgradient monitoring wells. Existing wells installed as part of the CERCLA program activities were selected for RCRA baseline groundwater monitoring during the April 15, 1999 meeting.

The initial round of RCRA baseline groundwater sampling was conducted in April 1999. Following submittal of the first round of groundwater data to WVDEP, the Navy assumed the responsibility for the remaining three rounds of quarterly sampling. These groundwater sampling rounds were conducted in April 2000, July 2000, and October 2000 (April 2001). During each event, groundwater was sampled from nine extraction wells, four monitoring wells, and the treatment plant influent and effluent. The sampled monitoring wells comprised two upgradient alluvial monitoring wells (1GW11 and 1GW32), two upgradient bedrock monitoring wells (1GW10 and 1GW15), five downgradient alluvial extraction wells (1EW10, 1EW14, 1EW16, 1EW18, and 1EW21), and four downgradient bedrock extraction wells (1EW29, 1EW30, 1EW31, and 1EW33). All samples were analyzed for full Appendix IX parameters (i.e., VOCs, SVOCs, pesticides, PCBs, herbicides, dioxins, furans, and metals), explosives, perchlorate, nitroglycerine, and nitrocellulose. A complete analytical parameter list is presented in Section E, Table E-1.

40 CFR 264.602 governs monitoring for Subpart X units as necessary for protection of human health and the environment. Specifically, groundwater monitoring for releases from solid waste management units, such as the Burning Grounds, is required by 40 CFR 264 Subpart F. Because constituents have already been detected in groundwater beneath the Burning Grounds, a corrective action program is proposed in this section.

D-8d(1)(b)-2 RCRA Detection Monitoring Program

As mentioned previously, four rounds of Appendix IX groundwater data were collected from wells in the alluvial and bedrock aquifers upgradient and downgradient of the Burning Grounds, in general accordance with a detection monitoring program. A statistical evaluation performed in accordance with 40 CFR 264.97 on the four rounds of RCRA baseline groundwater data showed a statistically significant increase in two explosive, two metal, and twelve volatile constituents and that at least one explosive constituent (i.e., RDX) was detected at a concentration above the groundwater protection standard.

As previously noted, the presence of the volatile constituents is attributed to historic discharge of spent solvents in pits at the Burning Grounds, and is being addressed under a CERCLA remedial action and corrective action monitoring program. A key component of this program is monthly piezometric surface monitoring that ensures all groundwater in the alluvial and bedrock aquifers at Burning Grounds, including the area underlying the Burning Grounds, is hydraulically contained, extracted, and treated at the onsite groundwater treatment plant. Tri-quarterly (i.e., every 9 months) groundwater sampling at Burning Grounds provides a means of monitoring the corrective action reduction in volatile contaminant concentrations.

With the above information, a proposed corrective action groundwater monitoring program has been developed in accordance with the appropriate sections of 40 CFR 264, in cooperation with the WVDEP, and with consideration given to the existence of a groundwater extraction system within the Burning Grounds operated under CERCLA.

D-8d(1)(b)-3 RCRA Corrective Action Monitoring Program

Because both statistically significant increases of groundwater constituents and at least one groundwater protection standard exceedance have been identified, and because there is an existing groundwater extraction system in operation at the Burning Grounds, it is proposed that a corrective action monitoring program be instituted for the groundwater at the permitted unit. The proposed RCRA corrective action groundwater monitoring program relies on the use of the existing extraction system to prevent offsite migration of groundwater beneath the Burning Grounds. While groundwater capture beneath the Burning Grounds is maintained by this system, the monitoring program will include sampling three alluvial extraction wells and three bedrock extraction wells that are selected to represent downgradient points spanning the width of the unit. One upgradient alluvial well and one upgradient bedrock well will also be sampled as points of comparison. Groundwater samples will be collected on a 9-month cycle, in conjunction with the CERCLA long-term monitoring program, and all samples will be analyzed for explosives, nitroglycerine, and perchlorate.

Each of the RCRA corrective action groundwater monitoring components is discussed below. A field sampling plan is presented as Attachment E-3 that details how all field-related corrective action groundwater monitoring program activities will be conducted, including water-level measurements and groundwater sample collection.

One of the primary goals for the groundwater extraction system, including the Burning Grounds, is to maintain a hydraulic barrier between the groundwater beneath the site and the North Branch Potomac River. In doing so, contaminated groundwater is prevented from discharging to the river. In order to demonstrate that this goal is being achieved, monthly manual water-level measurements are collected from all wells in and around the Burning Grounds (approximately 70 wells). These measurements are used to generate piezometric surface maps of both the alluvial and bedrock aquifers, which show the area of groundwater hydraulically contained.

To satisfy a requirement under 40 CFR 264.100, the piezometric surface maps will be submitted to WVDEP, with the sampling event results, in order to provide continuous demonstration of hydraulic containment beneath the Burning Grounds.

Table E-9 in Section E lists the wells proposed for the RCRA corrective action groundwater monitoring program. As shown in this table, three downgradient alluvial wells, three downgradient bedrock wells, one upgradient alluvial well, and one upgradient bedrock well will be sampled during each event. The location of each well listed in Table E-9 is shown in Figure E-1 (Section E). The wells were selected for inclusion in the monitoring program because they best represent current downgradient compliance points across the width of the RCRA facility, in both water-bearing units (i.e., alluvial and bedrock aquifers).

All groundwater samples collected from the wells listed in Table E-9, Section E will be analyzed for explosives, nitroglycerine, and perchlorate by a contracted laboratory that fulfills all requirements of the USEPA's Contract Laboratory Program. Table E-10 in Section E lists each specific analytical constituent, the corresponding analytical method, and the instrument quantitation limit. All laboratory analytical results will be validated by an independent data validator, conforming to Navy guidance for Level D validation.

In addition to explosives, nitroglycerine, and perchlorate analyses, measurements of the following parameters will be made using hand-held meters at each well:

- pH
- Temperature
- Specific Conductance
- DO

Sampling under the RCRA corrective action groundwater monitoring program will be conducted on a tri-quarterly (i.e., every 9 months) basis, in conjunction with CERCLA long-term monitoring program sampling events. In this way, seasonal variations in groundwater quality can be evaluated (i.e., tri-quarterly sampling yields seasonal data over four consecutive sampling events). Data collected concurrently to meet CERCLA requirements, but not required for the RCRA unit, will be provided voluntarily to the RCRA permit manager upon request.

As noted above, all piezometric surface maps generated under the CERCLA program will be submitted to WVDEP to verify long-term hydraulic containment beneath the Burning Grounds. Each set of maps will be provided to WVDEP within 45 days of collecting the water levels.

Following each sampling event, all of the groundwater data collected under the RCRA corrective action monitoring program will be summarized in a report. Each report will contain a short (1 to 2-page) narrative that describes the sampling activities (i.e., sample date, wells sampled, and analytical parameters) and how the analytical results compare to previous sampling rounds and the regulatory screening criteria in Table E-10. Each report will also contain four appendices: (1) table of detects from current round, (2) table of detects from all rounds, (3) table of raw analytical data from current round, and (4) a compilation of the piezometric surface maps for all months prior to last report submittal.

Each report will be submitted to WVDEP within 45 days following receipt of validated analytical data from the independent data validator. Five (5) copies of each report will be submitted to the following address:

Mr. James Duranti
West Virginia Department of Environmental Protection
Office of Waste Management
1356 Hansford Street
Charleston, West Virginia 25301

As discussed previously, the contained groundwater that is extracted is treated at an onsite groundwater treatment plant to remove VOCs and discharged to ABL's steam generation plant and/or the North Branch Potomac River. Compliance with the Clean Water Act (CWA)–equivalent requirements fulfills intent of RCRA program as stated in two exclusions:

- Industrial wastewater discharge exclusion. Industrial wastewater discharges that are point source discharges subject to regulation under Section 402 of CWA are not solid wastes. [40 CFR 261.4(a)(2)]
- Wastewater treatment unit exclusion. Permitting requirements do not apply to wastewater treatment units. Wastewater treatment units are defined as tank systems subject to either Section 402 or 307(b) of the CWA. [40 CFR 264.1(g)6)]

If the groundwater extraction system is modified such that hydraulic containment in both aquifers beneath the Burning Grounds no longer can be demonstrated (other than for short-duration system shutdowns for maintenance and repairs), a proposed alternative groundwater monitoring program, consistent with the requirements of 40 CFR 264 Subpart F, will be submitted to WVDEP within 60 days. Short duration system shutdowns are defined as those less than or equal to 30 days.

D-8d(1)(b)-4 Requirements for Responses to Releases

See Section F, Procedures to Prevent Hazards for a detailed discussion of release responses.

D-8d(2) Protection of Surface Water, Wetlands, and Soil Surface [40 CFR 264.601(b), 270.23(b) and (c)]

This section addresses the assessment of impact on the surface water, wetlands, and surface soil pathways from operations of the Burning Grounds as a permitted unit.

D-8d(2)(a) Environmental Assessment [40 CFR 264.601(b), 270.23(b) and (c)]

D-8d(2)(a)-1 Waste Characteristics and Volume

Section D-8d(1)(a) of this Part B application contains information on the physical and chemical characteristics of the wastes treated at the Burning Grounds as well as the maximum quantity of wastes treated.

D-8d(2)(a)-2 Effectiveness and Reliability of Containing, Confining, and Collecting Systems and Structures in Preventing Migration

Burning operations take place in soil-lined steel burn pans where the soil layer provides primary containment of waste materials. Secondary containment is provided for the burn pans. The burn pans have covers to minimize any buildup of precipitation inside the pans. The covers are mobile and can be moved to keep the pans open during treatment operations. The pans will be placed on asphalt pads to provide tertiary containment for any ejected wastes. After each burn, the asphalt surface will be inspected for any ejected untreated wastes. Any ejected untreated wastes will be collected, placed into the pan, and treated in the next burn. Inspection and removal from the pads of any ejected wastes and treatment residues eliminates the potential for run-off from the pad to contain untreated wastes. The asphalt surfaces will be slightly elevated above the surrounding ground surface to prevent run-on to the pads. Waste treatment is not conducted during precipitation events.

D-8d(2)(a)-3 Hydrologic Characteristics of the Unit and the Surrounding Area

There are no surface-water bodies within the boundary of the Burning Grounds. A north-south trending stormwater drainage ditch lies approximately 450 ft west of the unit's western perimeter fence. The ditch is spring-fed and generally contains at least some flow. The predominant hydrologic feature in the vicinity of the Burning Grounds is the North Branch Potomac River, which borders the northern and western boundaries of the developed portion of Plant 1. The reach of the river adjacent to the Burning Grounds is within approximately 75 to 100 ft of the unit's northern perimeter fence. The elevation of the river adjacent to the Burning Grounds is generally between 648 and 650 ft amsl and the average flow from 1938 through 1981, measured at the Pinto gauging station just upstream of the Burning Grounds, was 886 ft^3/sec.

D-8d(2)(a)-4 Topography of the Surrounding Area and Hydrologic Unit Characteristics

The Burning Grounds are located in a relatively flat area of the historic floodplain of the North Branch Potomac River; there is less than approximately 5 ft total relief across the unit. With the exception of an east-west asphalt road through the unit, groundwater extraction well vaults, and burn pads, the Burning Grounds are grass-covered. Because of these characteristics, the potential for surface water runoff is low.

D-8d(2)(a)-5 Regional Precipitation Patterns

Mean annual rainfall for the local area is ranges between 36-46 inches per year. The maximum 24-hour rainfall is estimated to be in the range of 5-6 inches. Tornadoes are rare in this area, and severe thunderstorms are infrequent. However, intense local rainfall from warm-season thunderstorms can cause flash flooding in narrow valleys of the area.

D-8d(2)(a)-6 Quantity, Quality, and Direction of Groundwater Flow

See Section D-8d(1)(a) for details of groundwater flow.

D-8d(2)(a)-7 Proximity of the Unit to Surface Waters

The North Branch Potomac River is the closest surface-water body to the Burning Grounds, located between approximately 75 and 100 ft from the unit's northern perimeter fence. In addition, there is a north-south trending, spring-fed stormwater drainage ditch located approximately 450 ft west of the unit's western perimeter fence.

D-8d(2)(a)-8 Current and Potential Uses of Nearby Surface Waters

The lower 52 miles of the North Fork Potomac River, prior to its confluence with the South Branch of the Potomac to form the Potomac River, is physically located within the Commonwealth of Maryland. For each water body there are specific designated uses specified in the State's Water Quality Standards. These uses may be designated, whether or not they are being obtained. Unless otherwise designated streams are designated for: 1). the propagation and maintenance of fish and other aquatic life, and, 2). water contact recreation.

D-8d(2)(a)-9 Established Water Quality Standards for Surface Waters

The Maryland Water Quality Standards (Title 26, Subtitle 08, Subsections (13 et. seq., annotated Code of Maryland) do not limit the uses of surface water to those designated in the Water Quality Standards provided water quality is not adversely affected. The North Branch of the Potomac (Subbasin 02-14-10) is designated as Use I-P. Use I-P carries the following Specific Designated Uses:

- Water contact sports;.
- Play and leisure time activities where individuals may come in direct contact with the surface water;
- Fishing;
- The growth and propagation of fish (other than trout), other aquatic life, and wildlife;
- Agricultural water supply;
- Industrial water supply; and
- Use as a public water supply

Likewise the West Virginia Water Quality Standards include other designations for public water supply, agricultural and wildlife uses and industrial uses, where applicable.

Water quality criteria are established to protect the designated standards. There are water quality criteria specific to the designated uses. For the I-P designation, the numerical criteria for toxic substances in surface waters are applicable as well as other, more traditional criteria apply. These include:

- Bacteriological - less than a log mean of 200 colonies per 100 ml, based on a five samples taken over a 30 day period and if 10 percent of the total number of samples taken during any 30-day period exceed 400 colonies per 100 ml, or other criteria as may be determined by the Department of the Environment following a sanitary survey.
- Dissolved oxygen - greater than 5 mg/l at any time
- Temperature – a maximum instream temperature (outside the mixing zone) of 90 degrees F (32 C), or the ambient temperature of the surface water whichever is greater.
- pH - > 6-5 and < 8.5

Turbidity – no discharge shall cause the surface water to exceed 150 nephelometric turbidity units (NTU) at any time or 50 NTU as a monthly average for exceed levels detrimental to aquatic life.

D-8d(2)(a)-10 Existing Quality of Surface Waters and Surface Soils, Including Other Sources of Contamination and their Cumulative Impact on Surface Waters and Surface Soils

Surface Waters. Generally, the topography within the boundary of the Burning Grounds is flat with no surface-water bodies and low potential for surface water runoff. Puddles of precipitation at the Burning Grounds are usually observed after a rainfall event. The puddled water either infiltrates to the groundwater, that is being captured by the CERCLA groundwater program instituted at Site 1, or evaporates to the atmosphere. Due to the paucity of surface water runoff from the Burning Grounds and the resulting absence of a surface water risk pathway, the cumulative impact of existing water quality of the North Fork Potomac River is expected to be negligible.

Existing water quality information has been extrapolated for the North Fork Potomac River from a report entitled *"An Ecological Assessment of the North Fork of the Potomac River Watershed"*, WVDEP, Office of Water Resources, 1997, Report No. 02070002-1997 (the Report). This report provides some insight into the biological and physical and chemical conditions that can be expected in the main fork. However, sine the lower 52 miles of the North Fork Potomac River are located in Maryland, the report indicates that there could be undetermined impacts from the towns of Cumberland, Maryland; Keyser, West Virginia; and, large tributaries of Savage River and Patterson Creek.

The segment of the North Fork of the Potomac River adjacent to ABL is Ecoregion 67. Upstream of the Maryland/West Virginia state line, the river is greatly influenced by historical acid mine drainage , which has been attenuated to some extent by AMD treatment and the construction of the Jennings Randolph Reservoir. The Report finds that Ecoregion 67 streams have an average Bioscore of 65.00 percent (100 percent is best) and an average Habitat Score of 67.5 percent (100 percent is most diverse). In Ecoregion 67 only 3 of the 27 sample points had comparable Bioscores less than 50 .

In stream water chemistry for traditional parameters and applicable WVDEP Water Quality standards are included in Table D-2.

The corresponding WVDEP Water Quality Standards list the relevant criteria as 5 mg/l DO, pH 6-9, conductivity (no criterion but generally expected to be less than 1000 uohms/cm), Ammonia Nitrogen (no criterion), and Nitrate plus Nitrite nitrogen (no criterion). These criteria do not vary significantly from the Maryland Criteria listed in a previous section. However, the findings did lead the WVDEP to conclude in the Report that The North Fork of the Potomac exceeded the WVDEP Water Quality Standards and, if it were in West Virginia, it would be listed on the 303 (d) list of impaired waters. (See description of four sampling stations in Appendix B for more information.)

Soils. Soil borings were-completed (see Appendix C, Ecological Risk Assessment) at locations shown in Figure D-14, for the purpose of collecting surface and subsurface soil samples to determine the current conditions of soil at the Burning Grounds and provide data for a human health and ecological risk screening.

Seventeen discrete surface soil samples and seven subsurface soil samples were collected from locations within the Burning Grounds. An additional three surface soil samples were collected adjacent to the Burning Grounds. Surface soil samples were collected to a depth of 6 inches, while subsurface samples were collected from 18 to 24 inches below the ground surface (bgs).

The number and location of the proposed samples at the Burning Grounds were determined by reviewing existing soil data and by taking into consideration the historic locations, the existing locations, and the proposed locations of burn pads. The three proposed surface soil samples adjacent to the Burning Grounds were collected in a drainage ditch south of the Burning Grounds unit in order to determine if any chemicals had been transported to low lying areas of surface-water runoff.

Surface and subsurface soil samples were analyzed for Appendix IX metals plus aluminum, cyanide, iron, and manganese, Appendix IX VOCs and SVOCs plus biphenyl, dioxins and furans, explosives, nitroglycerin, perchlorate, ammonium nitrate, pH, and total organic carbon (TOC).

Results of the analysis of the surface soil boring samples are presented in Appendix D-1. Subsurface soils boring samples results are also presented in Appendix D-1.

Surface Soil. This section addresses the results of the analytical data obtained from surface soil samples collected at the Burning Grounds. Soil screening criteria are addressed as part of the risks presented in appendices B and C.

- **Volatile Organic Compounds.** Two VOCs were detected in surface soil borings at the Burning Grounds. The VOCs detected were acetone and TCE. Acetone was detected in surface soil samples at concentrations at or below 16 µg/kg, with the highest acetone concentration detected at sample location SB06. TCE was detected in surface soil samples at concentrations at or below 28 µg/kg, with the highest TCE concentration detected at sample location SB02. Appendix D-1 presents VOC concentrations at each sample location. Figure D-15 presents the location and concentrations of detected VOCs in surface soil at the Burning Grounds.

- **Semi-volatile Organic Compounds.** Nine SVOCs were detected in surface soil borings at the Burning Grounds. The SVOCs detected were 1,1-biphenyl, benzo(a)anthracene, benzo(a)pyrene, chrysene, diethylphthalate, dimethyl phthalate, naphthalene, phenanthrene, and bis(2-Ethylhexyl)phthalate. Appendix D-1 presents SVOC concentrations at each sample location. Figure D-16 presents the location and concentrations of detected SVOCs in surface soil at the Burning Grounds.

- **Dioxins / Furans.** Two dioxin/furan isomers and four total dioxin/furan constituents were detected in surface soil borings at the Burning Grounds. The dioxins/furans detected were 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin, 1,2,3,4,6,7,8-heptachloro-dibenzofuran, total hepta-dioxins, total hepta-furans, total octachlorodibenzo-p-dioxin, and total octachlorodibenzofuran. Appendix D-1 presents dioxins/furans concentrations at each sample location. Figure D-17 presents the location and concentrations of detected dioxins/furans in surface soil at the Burning Grounds.

- **Explosives.** Three explosive compounds were detected in surface soil borings at the Burning Grounds. The explosives detected were HMX, RDX, and perchlorate. HMX was detected at concentrations at or below 2,400 µg/kg, with the highest concentration detected at sample location SB03. RDX was detected at or below 784 µg/kg, with the highest concentration detected at sample location SB05. Perchlorate was detected at or below 880 µg/kg, with the highest concentration detected at sample location SB05. Appendix D-1 presents explosives concentrations at each sample location. Figure D-18 presents the location and concentrations of detected explosives in surface soil at the Burning Grounds.

- **Metals.** Twenty-one metals were detected in surface soil borings at the Burning Grounds. The metals detected were aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, tin, vanadium, and zinc. Table D-8-8-10A presents metals concentrations at each sample location. Lead was the constituent of concern for the human health and ecological risk assessments at the Burning Grounds. Figure D-19 presents the location and concentrations of detected lead in surface soil at the Burning Grounds. The facility background mean concentration for lead in surface soil is 17.5 milligrams per kilogram (mg/kg).

- **Wet Chemistry Parameters.** Four wet chemistry parameters were analyzed for at the Burning Grounds (nitrate, nitrite, TOC, and pH). Three of the four wet chemistry parameters were found in surface soil borings at the Burning Grounds. The parameters found were nitrate, TOC, and pH. Nitrate was found in surface soil samples at concentrations at or below 9.9 mg/kg, with the highest concentration found at sample location SB20. TOC was found at concentrations up to 78,400 mg/kg, with that highest TOC concentration found at sample location SB01. The pH of the surface soil was found to be between 5.7and 7.9. Appendix D-1 presents wet chemistry parameters found at each sample location.

Subsurface Soil. This section addresses the results of the analytical data obtained from subsurface soil samples collected at the Burning Grounds. Appendix A-1 presents the analytical data for subsurface soil samples at the Burning Grounds.

- **Volatile Organic Compounds.** One VOC was detected in subsurface soil borings at the Burning Grounds. TCE was detected in the subsurface soil sample at a concentration of 5 (J) μg/kg at sample location SB16. Appendix D-1presents the VOC concentration at SB16. Figure D-20 presents the location and concentration of the TCE detected in subsurface soil at the Burning Grounds.

- **Semi-volatile Organic Compounds.** No SVOCs were detected in subsurface soil borings at the Burning Grounds.

- **Dioxins/Furans.** One dioxins/furan constituent was detected in subsurface soil borings at the Burning Grounds. Total octachlorodibenzo-p-dioxin, was detected in subsurface soil samples at concentrations at or below 0.158 μg/kg, with the highest concentration detected at sample location SB19. Appendix D-1 presents the dioxins/furan concentrations at each sample location. Figure D-21 presents the location and concentrations of detected dioxins/furans in subsurface soil at the Burning Grounds.

- **Explosives.** Two explosive compounds were detected in subsurface soil borings at the Burning Grounds. The explosives detected were HMX and perchlorate. HMX was detected in one subsurface soil sample, at a concentration of 340 (J) μg/kg at sample location SB14. Perchlorate was detected in three subsurface soil samples (SB14, SB16, and SB17) at concentrations at or below 2,500 μg/kg, with the highest concentration detected at sample location SB17. Appendix D-1 presents explosives concentrations at each sample location. Figure D-22 presents the location and concentrations of detected explosives in subsurface soil at the Burning Grounds.

- **Metals.** Sixteen metals were detected in subsurface soil borings at the Burning Grounds. The metals detected were aluminum, antimony, arsenic, barium, beryllium, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, thallium, vanadium, and zinc. Appendix D-1 presents metals concentrations at each sample location. Lead was the constituent of concern for the human health and ecological risk assessments at the

Burning Grounds. Figure D-23 presents the location and concentrations of detected lead in subsurface soil at the Burning Grounds. The facility background mean concentration for lead in subsurface soil is 23.3 milligrams per kilogram (mg/kg).

- **Wet Chemistry Parameters.** Four wet chemistry parameters were sampled for at the Burning Grounds (nitrate, nitrite, TOC, and pH). Two of the four parameters were found in subsurface soil at the Burning Grounds. TOC was found up to 12,300 mg/kg, with that highest TOC concentration found at sample location SB19. The pH of the soil was found to be between 7.0 and 7.6. Appendix A-1 presents wet chemistry parameters found at each sample location.

D-8d(2)(a)-11 Regional Land Use Patterns
See Section D-8d(1)(a)-6 for Regional Land Use Patterns.

D-8d(2)(a)-12 Potential for Human Health Risks Caused by Exposure to Waste Constituents
Current Conditions. The human health risk assessment (Appendix B) evaluated potential risks for humans from exposure to facility-related chemical constituents in surface soils based on current conditions. The risk assessment incorporated sampling and analytical data collected in soil during a field investigation of the Burning Grounds. Contaminants of potential concern were identified from these analytical data, using procedures outlined by USEPA Region III. Potential intake of these contaminants by workers were estimated using intake equations and conservative exposure factors. Health risks potentially associated with these estimated intake rates were characterized using USEPA-derived toxicity values.

The results from this risk assessment indicated that there were no complete human exposure pathways from hazardous constituents in soil to surface water. The site is relatively flat, contains no drainage features (such as ditches), and is completely covered with periodically mowed grasses and other herbaceous plants (except on a few unpaved roads and in the area immediately surrounding a few of the active burn pans). Thus, significant surface runoff is not likely to occur even during flood events. However, this potential transport pathway was evaluated based on the three surface soil samples collected in the most obvious drainage feature present, a shallow depression located just south of the Burning Grounds fence line. Evaluation of site topography indicates this depression has no connection with the river. The site maximum for six metals occurred within this set of three samples although only chromium was elevated (in one of the three samples) relative to background. While the site maximums for polycyclic aromatic hydrocarbons (PAHs) occurred in one of these three samples (SS-01), concentrations were low. The site maximum for total dioxin (consisting of hepta and octa congeners) also occurred at SS-01 although the most commonly occurring dioxin and furan congeners (octa) were fairly uniformly distributed over the site. Based on the available data, there does not appear to be any systematic contaminant transport via surface runoff to this low area south of the Burning Grounds. In addition, this depressional area does not appear to outlet to the North Branch Potomac River.

Continued Operations. The human health risk assessment (Appendix B) evaluated potential future risks from continued operations of the Burning Grounds based on an assumed 30-year additional facility lifetime. This portion of the evaluation focused on areas surrounding the Burning Grounds and the likelihood of transport by prevailing winds of uncombusted materials and/or combustion products may occur from the Burning Grounds to surrounding areas where they may deposit to surface soils and surface water bodies. Complete exposure pathways may exist to offsite residents from dispersion of emissions to the air, and deposition of particulate emissions onto soil or surface water. Emissions to the air could result in concentrations in surface water from deposition onto soil followed by surface runoff into water, or from direct deposition onto the water. Potential pathways of exposure considered in the risk assessment included ingestion of fish.

The results from this risk assessment indicate that the total estimated risk is below 1×10^{-5}, and that noncancer hazard quotients (HQ) are less than 0.25, for fish ingestion exposure scenario. These levels are the risk thresholds for consideration of risk management actions under current conditions at the Burning Grounds. Therefore, action does not appear warranted to prevent unacceptable cancer risks or unacceptable noncancer effects from emissions to the air associated with continued operations at the Burning Grounds. Characterization of health risks associated with chemical contaminants in emissions to the air from the Burning Grounds has been based on a series of conservative assumptions that tend to overstate rather than understate health risks. The results of the risk assessment, using these conservative approaches, is that the emissions are highly unlikely to pose significant human health risks to offsite human receptors through contact with surface water and soils.

D-8d(2)(a)-13 Potential for Damage to Domestic Animals, Wildlife, Crops, Vegetation, and Physical Structures Caused by Exposure to Waste Constituents

Current Conditions Within the Boundaries of the Burning Grounds. There are no surface water bodies, wetlands, or other surface drainage features located within the boundaries of the Burning Grounds. The North Branch Potomac River is located just north of the Burning Grounds. The entire area of the Burning Grounds is within the 500-year floodplain of the river and a portion of the Burning Grounds (not including the burning pans) is within the 100-year floodplain. As discussed in Section D-8d(1)(a), potential transport of waste constituents to the North Branch Potomac River via groundwater is prevented by the operation of the groundwater extraction and treatment system.

The design of the burn pads and pans (i.e., soil-lined steel pans, asphalt burn pads, and precipitation covers) will minimize the potential for migration of wastes and combustion residues onto the surface soils. The site is relatively flat, contains no drainage features (such as ditches), and is completely covered with periodically mowed grasses and other herbaceous plants (except on a few unpaved roads and in the area immediately surrounding a few of the active burn pans). Thus, significant surface runoff from the Burning Grounds to the North Branch Potomac River is not likely to occur even during flood events.

The ecological risk assessment (Appendix C) evaluated potential risks for terrestrial receptors (e.g., wildlife and vegetation) from exposure to facility-related chemical constituents in surface soils based on current conditions. Baseline risk estimates using site-wide averages indicate low to negligible risks to upper trophic level receptors (wildlife). Other than dioxins/furans, only arsenic had a hazard quotient exceeding one (1.68), although surface soil concentrations for arsenic were consistent with facility-specific background concentrations. Exceedances for dioxins/furans were heavily influenced by non-detected congeners (representing the more toxic congeners) in a few samples and estimates based solely on detected congeners (representing the least toxic congeners) indicated negligible risk.

Widespread, high-magnitude exceedances of both soil Toxicity Reference Values (TRVs) and facility-specific background concentrations were not apparent based on the existing surface soil data collected in February 2001. Except for lead, background exceedances were generally infrequent and of relatively low magnitude. Lead, which is attributable at least in part to deposition from burning activities, was elevated in two areas. The first was in the southwestern corner of the Burning Grounds where the site maximum of 1,730 mg/kg occurred. The second area was in the east-central portion of the Burning Grounds. Given the limited habitat quality of the Burning Grounds, these relatively small areas of elevated lead concentrations are not likely to result in adverse impacts to populations of ecological receptors.

Except for chromium, most exceedances were of plant TRVs. Manganese and vanadium, each with a relatively high frequency of exceedance for soil fauna TRVs, were consistent with background. Lead, mercury, and zinc exceeded soil fauna TRVs in one, one, and two samples, respectively (mean hazard quotients were all less than one). The site is covered in periodically-mowed grasses and other herbaceous plants, providing habitat of limited diversity and quality. Except for unpaved roads and the areas immediately around some of the active burn pans, areas of bare soil are uncommon and no obvious phytotoxic effects (e.g., large areas of bare soil, dead or dying plants) were observed. This suggests limited potential for adverse effects to ecological receptors at the Burning Grounds.

Based on the ecological evaluation of current site conditions, the risk estimates do not warrant any remedial actions be taken prior to the construction of the new burn pads. The relatively small areas with potentially elevated lead concentrations could be evaluated further in the future closure plan for the unit because they are not likely to be adversely affecting receptor populations at the current time under current land uses.

Continued Operations of the Burning Grounds. The ecological risk assessment (Appendix C) also evaluated potential future risks from continued operations of the Burning Grounds based on an assumed 30-year additional facility lifetime. This portion of the evaluation focused on areas surrounding the Burning Grounds because transport by prevailing winds of non-combusted materials and/or combustion products may occur from the Burning Grounds to surrounding areas where they may deposit to surface soils and surface water bodies. Based on the results of the ecological risk assessment (Appendix C) for terrestrial habitats, low-magnitude exceedances of soil TRVs and background concentrations occurred for copper and lead but only under the most conservative exposure assumptions (e.g., 1-cm soil mixing depth, maximum point of deposition, screening inputs). Risk estimates based on more realistic exposures indicated low to negligible risks.

The ecological risk assessment also evaluated three water bodies: (1) the portion of the North Branch Potomac River directly adjacent to the Burning Grounds; (2) a pond located about 1-km west-northwest of the Burning Grounds; and (3) an emergent wetland located approximately 1-km north of the Burning Grounds. The ecological evaluation of the portion of the North Branch Potomac River indicated negligible risks to wetland and aquatic receptors, even using the most conservative exposure assumptions. For the pond and wetland, there were low-magnitude exceedances of surface water TRVs for aluminum (pond - HQ of 1.22) and lead (pond - HQ of 3.37; wetland - HQ of 2.48) based on the most conservative assumptions. Risk estimates based on more realistic exposure assumptions indicated low to negligible risks. Risks to upper trophic level receptors at both the pond and wetland were negligible, even using the most conservative exposure assumptions.

Based upon the results of the ecological evaluation, risks to ecological receptors inhabiting the terrestrial, wetland, and aquatic habitats surrounding the Burning Grounds are expected to be negligible from the continued operation of the Burning Grounds facility.

Meteorological Assessment

The weather in this area is characterized by warm summers and cold winters with a fairly even distribution of precipitation throughout the year. The mean annual temperature is approximately 53°F, with an average minimum daily temperature (January) of 20°F and an average daily maximum temperature (July) of 87°F. Average annual precipitation is about 33 inches and average annual snowfall is 28.1 inches. Prevailing winds are generally from the northwest at an average speed of 6.2 miles per hour (mph).

Potential Magnitude and Nature of Exposures of Humans or Environmental Receptors to Hazardous Waste Constituents

Based on the ecological conceptual model, complete exposure pathways in terrestrial habitats exist to surface soil within the Burning Grounds. Complete exposure pathways also exist to upper trophic level receptors that may feed on prey items in terrestrial habitats located within the Burning Grounds. There are no surface water bodies, wetlands, or other surface drainage features located within the boundaries of the Burning Grounds. Thus, there are no complete exposure pathways to surface water, sediment, or aquatic biota.

Based on the ecological conceptual model, complete exposure pathways exist to ground-level ambient air and surface soil (terrestrial habitats) in areas surrounding the Burning Grounds. Complete exposure pathways also exist to surface water and sediments in surface water bodies located adjacent to (North Branch Potomac River) and near (ponds and wetlands) the Burning Grounds. Complete exposure pathways also exist to upper trophic level receptors that may feed on prey items in these terrestrial, aquatic, and wetland habitats.

As discussed in the previous section, the potential magnitude of the risks to ecological receptors in terrestrial, wetland, and aquatic habitats on and surrounding the Burning Grounds is low to negligible.

The human health risk assessment (Appendix B) also evaluated potential future risks from continued operations of the Burning Grounds based on an assumed 30-year additional facility lifetime. This portion of the evaluation focused on areas surrounding the Burning Grounds because transport by prevailing winds of non-combusted materials and/or combustion products may occur from the Burning Grounds to surrounding areas where they may deposit to surface soils and surface water bodies. Complete exposure pathways may exist to offsite residents from dispersion of emissions to the air, and deposition of particulate emissions onto soil or surface water. Potential pathways of exposure considered in the risk assessment included inhalation of ambient air, and ingestion of soil, home-grown fruits and vegetables, ingestion of meat and milk products raised by subsistence farmers, and ingestion of fish.

The results from this risk assessment indicate that the total estimated risk is below 1×10^{-5}, and that noncancer hazard quotients are less than 0.25, for all of the exposure scenarios evaluated. These levels are the risk thresholds for consideration of risk management actions under current conditions at the Burning Grounds. Therefore, action does not appear warranted to prevent unacceptable cancer risks or unacceptable noncancer effects from emissions to the air associated with continued operations at the Burning Grounds. Characterization of health risks associated with chemical contaminants in emissions to the air from the Burning Grounds has been based on a series of conservative assumptions that tend to overstate rather than understate health risks. The results of the risk assessment, using these conservative approaches, is that the emissions are highly unlikely to pose significant human health risks to offsite human receptors. Based on the human health evaluation of current site conditions, the risk estimates do not warrant additional conditions or limitations on wastes to be burned at the Burning Grounds.

D-8d(2)(b) Performance Standards

Design and Operating Requirements

A National Pollutant Discharge Elimination System (NPDES) permit modification application will be submitted to replace the authorization letter of July 11, 1997, issued by the State of Maryland and modified October 6, 2001. This permit application will broaden the parametric coverage of the discharge and monitoring requirements to include RCRA related constituents that may be present in the groundwater. The NPDES permit number WV0020371 will be modified to include the discharge from the groundwater (GW) treatment plant so a new permit will not be required.

Detection and Monitoring Requirements

Under the CERCLA program, a long-term monitoring program has been instituted to evaluate the effectiveness of the Site 1 groundwater remedial action. As part of long-term monitoring, continuous automated and monthly manual water-level measurements are collected from a network of extraction and monitoring wells to ensure horizontal hydraulic gradients remain reversed from the river back to the extraction-well alignment in both the uppermost (i.e., alluvial) and underlying (i.e., bedrock) aquifers. The water-level data are used to develop monthly piezometric surface maps that show the capture zones in both aquifers. To date, hydraulic monitoring data have shown the alluvial and bedrock groundwater beneath the Burning Grounds has been completely contained while the extraction system is operational. The proposed RCRA corrective action groundwater monitoring program as described in Section D-8d(1)(b)-3 and the Field Sampling Plan included in Section E, Attachment 3, relies on the use of the existing extraction system to prevent offsite migration of groundwater beneath the Burning Grounds. While groundwater capture beneath the Burning Grounds is maintained by this system, the monitoring program will include sampling three alluvial extraction wells and three bedrock extraction wells that are selected to represent downgradient points spanning the width of the unit. One upgradient alluvial well and one upgradient bedrock well will also be sampled as points of comparison. Groundwater samples will be collected on a 9-month cycle, in conjunction with the CERCLA long-term monitoring program, and all samples will be analyzed for explosives, nitroglycerine, and perchlorate.

In addition, hydraulic head (water-level) data collected monthly under the CERCLA program will be reported to the WVDEP RCRA permit manager (in the form of piezometric surface maps) with the groundwater sample results. These data will be collected to confirm long-term capture of alluvial and bedrock groundwater beneath the Burning Grounds.

When the NPDES permit is issued to replace the authorization letter of July 11, 1997, the discharge and monitoring requirements associated with the NPDES permit will be followed.

Requirements for Responses to Releases

See Section F, Procedures to Prevent Hazards for a detailed discussion of release responses.

D-8d(3) Protection of the Atmosphere

D-8d(3)(a) Environmental Assessment

Waste Characteristics and Volume, Including Potential for Emission and Dispersal of Gases, Aerosols, and Particulates

The following information provides an assessment of the potential for release to air. The waste characteristics and volume, including the potential for emission and dispersal of gases, aerosols, and particulates, is included to address 40 CFR 264.601(c)(1). Wastes burned at the Burning Grounds are materials from ABL resulting from the cleanup of P/E preparation equipment or trimmed from propellant castings. These wastes include NG, nitrocellulose (NC), AP, HMX, RDX, and various propellants and explosives. Propellants are grouped by their ingredients into categories. The categories are:

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

The wastes are RCRA characteristically hazardous due to their explosive nature and are designated as D003 wastes. Formulation information is provided in Section C. The composite propellants and warhead materials are classified as D003. Some propellants in the double base propellants category are likely to contain lead in concentrations above the listing criteria of 5 mg/1 TCLP). These double base propellants are designated as D008 in addition to D003. Equipment cleanup for double base propellants preparation necessitates the use of acetone. These cleanup wastes are identified as D003, D008 and F003 (acetone). Other materials that will be treated via burning on above-ground pans include paper, wood chips and scraps, plastics, cotton rags, cardboard, acetone and acetone/sawdust (50/50).

Methylene chloride is stripped out of the nitroglycerine in a batch still prior to use in the propellant manufacturing process. Still bottoms are blended with saw dust to manage nitroglycerine shock sensitivity. This waste is called NG, Nitroglycerine or Lacquer Squares and carries RCRA codes D003 and F003.

Formulation information is provided in Section C, Attachment C-1.

The maximum throughput of wastes treated is 300,000 lb/year in any combination of each P/E material. The volumes of waste treated at the Burning Grounds are presented in Table D-3.

The maximum total represents the maximum amount of any P/E material that can be burned at the unit. This is a conservative throughput amount that assumes that all of the burn pans operate simultaneously at capacity. Representing the maximum waste volumes in such a way allows for a conservative modeling of worst-case emissions. It also allows operating flexibility of the unit, capping the total throughput at 300,000 lb/year.

Air dispersion modeling of emissions to the air from the open burning of P/E wastes at the Burning Ground was conducted to provide the conceptual understanding of the nature, composition, and impact of the air emissions from the OB activities. The protocol followed for this air dispersion modeling, the emission factors used, and results can be seen in Appendix A.

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

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

Tables D-6 and D-7 present the maximum estimated hourly and daily air emissions of criteria and non-criteria pollutants from the facility, based on the worst case (by pollutant rather than waste) emissions using these maximum hourly and daily material throughput projections (including constraints) and emission factors in Appendix A.

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

The coarse and fine receptor locations are not limited to the surrounding topography beyond the ABL property fenceline. The highest and second highest emission concentrations may be located at receptors that are within the ABL property fenceline. The isopleths that are presented in Appendix A provide a visual representation of the concentration levels that extend beyond the property fenceline. It is evident from the isopleths that the dispersion of the pollutants is isolated within the 4-kilometer square of the fine grid receptors. The bodies of water that are of concern (pond, wetland, and North Branch Potomac River), though not on the site, are located within the fine grid receptors. The exposure to these bodies of water is further discussed in the human health and ecological risk assessments.

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

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

In order for the emission concentrations from the Burning Grounds to be compliant with the NAAQS or risk thresholds, constraints on the meteorological conditions and the number of daily burns are imposed. The operational strategy for the Burning Grounds is summarized in the following burning constraints for each P/E waste:

- Aluminum Composite Propellant OB events are limited to one burn per day (1,630 lbs.). There is no burning when wind direction is blowing from 120-260 degrees while the wind speed is greater than 1 meter per second at beginning of the burn. Burning is limited to 5 days per week.

- Non-Aluminized Composite Propellant OB events are limited to one burn per day (1630 lbs.). There is no burning when wind direction is blowing from 120-260 degrees while the wind speed is greater than 1 meter per second at beginning of the burn. Burning is limited to 5 days per week.

- Double Base Propellant OB events are limited to one burn event per day (1,630 lbs.). There is no burning when wind direction is blowing from 120-260 degrees while the wind speed is greater than 1 meter per second at beginning of the burn. Burning is limited to 5 days per week.

- Plastic Bonded Explosives OB events are limited to two (1,630 lbs.) burn events per day (3260 lbs.) with a 3-hr period between burns.

- Type 1 and Type 2 mixed wastes are limited to two (1,630 lbs.) burn events per day (3,260 lbs.) with a 3-hour period between burns.

Effectiveness and Reliability of Systems and Structures to Reduce or Prevent Emissions

To address 40 CFR 264.610(c)(2), the effectiveness and reliability of the systems and structures to reduce or prevent emissions are as follows. OB procedures are normally used to dispose of propellants. The following four parameters are statistically the same across all explosive items detonated and burned in an unconfined state: %C as COx, %CO/COx, %N as NOx, and %NO/NOx. The emission products from most energetic materials destroyed by OB will be adequately represented by the following analytes: CO_2, CO, NO, NO2, total saturated hydrocarbons (e.g., ethane, propane, butane), acetylene, ethylene, propene, benzene, toluene, and particulate. (EPA, 1998).

Open burning at ABL is conducted on above-ground pans as discussed in Section D-8a. The steel burn pans contain a layer of clay or sand to act as a refractory material to maintain the integrity of the pan during the very high temperature burning operation. Wastes for a given propellant are spread across the top of the refractory material. The combustion process may, under some conditions leave small amounts of partially unburned material on the pan. After a cool down period, these solids are incorporated into the next burn operation. The pans will be covered when not in use, but any precipitation falling on the pans will be collected inside the pan. The water provides an additional degree of protection for the pans during the burning cycle.

Operating Characteristics of the Unit

Based on the capacity of the burning pans, the maximum waste limit for the Burning Grounds is 1,630 lbs per burn. Up to two burns per day may be conducted (depending on the material being treated), totaling 3,260 lbs per day for the facility. The OB constraints for all wastes are detailed in Table D-1 and Appendix A.

Atmospheric, Meteorologic, and Topographic Characteristics of the Unit and the Surrounding Area

To address 264.601(c)(4), the atmospheric, meteorological, and topographic characteristics of the unit and the surrounding area are presented.

ABL is located in the complex terrain of the Allegheny Mountains and experiences variations in seasonal climate from year to year. Summers are characterized by warm, humid, showery weather, but the heat is moderated by elevation and topography induced cloudiness. High temperatures in the summer can exceed 90°F. Winters are moderately severe with rapid changes. Snowfall may be frequent, and at times heavy. Snow seldom remains on the ground for extended periods of time. Glaze formation on trees, wires and the ground is rare. Cold spells alternate frequently with thaws, and snow is subject to frequent complete melting during the winter. Severe cold spells occur occasionally but they seldom last more than two or three days. A daily low of zero degrees or below can be expected several times annually.

Climatic characteristics of the area are associated with air currents rising and descending over the mountains. Orographic lifting of air can cause low clouds to persist when upslope winds prevail from the north-west quadrant in the winter. Downsloping winds from the

Allegheny Mountains prevail with easterly or southerly winds, tending to diminish low cloud layers. Nocturnal radiation fog is common during the summer and the autumn but it usually dissipates rapidly after sunrise. Temperature inversions can occur as a result of strong nocturnal cooling and colder air collecting in the valleys. These inversions generally dissipate by mid to late morning.

The mean relative humidity for the area is generally about 70 percent each month, with the exception of the period July through September when the mean monthly relative humidity is about 80 percent. The mean annual Class A pan evaporation is estimated to be about 39 in.. The mean annual lake evaporation is about 29 in.

Prevailing wind direction varies with season, with winds being more southerly in the spring and summer, while being more west and northwesterly in the fall and winter. A wind rose, depicting the frequency distribution of wind speed and direction at the ABL Burning Grounds, is presented in Figure B-5.

By virtue of its location in the foothills of the Allegheny Mountains, the ABL facility is surrounded by hilly terrain. The North Branch Potomac River flows northward along the western boundary of the ABL plant property. The river then turns toward the east and forms the northern border of the plant boundary, ultimately turning back in a northerly direction as it flows toward the city of Cumberland, Md. The Burning Grounds, located on the flat terrain along the river are at an elevation of 705 ft amsl. Adjacent hilly terrain is found nearly all directions with the highest ridges, rising to 1,300 to 1,600 ft msl directly to the northeast and east. The slope is more gradual to the north and northwest; however. Ridge lines at altitudes nearing 1,000 ft amsl are observed in these directions as well.

Existing Air Quality, Including Other Sources of Contamination and Their Cumulative Impact on the Air

To address 264.601(c)(5), the existing air quality, including other sources of contamination and their cumulative impact on the air are as follows:

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

There are no air monitoring sites in Mineral County, WV. The state presently classifies Mineral County as attainment/unclassifiable. This classification means that insufficient air quality data exists to definitively classify the county attainment or non-attainment. There are no non-attainment areas proximate to the area. The entire State of Maryland is in attainment of all of the NAAQS with the exception of ozone. Ozone non-attainment areas in Maryland are in the central and eastern portions of the State. Emission inventory records for sources of criteria and hazardous pollutants in each county were requested from both West Virginia and Maryland environmental protection departments. A listing of reported contaminant emission sources within Mineral County, West Virginia is shown in Table D-8. Sources located in Allegany County, Maryland are summarized in Table D-9.

Background concentration data for criteria pollutants at the site were not available. A monitoring station was located in Allegany, Co. MD in 1997 and part of 1998. The SO_2 and PM_{10} data from this site was used for those background concentrations. Those data are available at: http://www.mde.state.md.us/environment/air/air_data/datareport.htm. In lieu of local data, background concentrations were estimated by using the averages of all available monitoring data in the state of West Virginia obtained from EPA's Aerometric Information Retrieval System (AIRS) database (http://www.epa.gov/air/data/monvals.html) for the most recently available year. The year 1997 was used for lead and 2000 for CO. These data are presented in Appendix A, Table 6-1, and are considered to be rough, conservative estimates. These data are used to demonstrate conservative compliance with NAAQS. Modeling indicates no new violations of NAAQS will occur and that considerable "margin" exists between modeled concentrations and NAAQS.

Potential for Human Health Risks Caused by Exposure to Waste Constituents

As part of the human health risk assessment (Appendix B), annual average concentrations in ground-level air at the point of maximum impact outside the facility boundary, based on dispersion modeling, were used to estimate potential human exposures and health risks via inhalation. The results of this evaluation were that potential risks from inhalation exposures are highly unlikely to pose significant human health risks to offsite human receptors. Thus the potential magnitude of human health risks is negligible.

Potential for Damage to Domestic Animals, Wildlife, Crops, Vegetation, and Physical Structures Caused by Exposure to Waste Constituents

The potential for damage to domestic animals, wildlife, crops, vegetation, and physical structures from exposure to waste constituents in air is low. As part of the ecological risk assessment (Appendix C), concentrations in ground-level air (based on modeled annual average concentrations at the estimated point of maximum impact on or outside of the boundaries of the Burning Grounds) were compared to inhalation-based TRVs. There were no exceedances of inhalation-based TRVs from exposure to facility-related chemicals in ground-level air for chemicals with available toxicity data. Thus, the potential ecological risks associated with exposures via air (wildlife and vegetation) are negligible.

Potential exposures to crops or domestic animals from exposures to waste constituents in air correspondingly is low, and potential risks are considered negligible.

Potential Magnitude and Nature of Exposures of Humans or Environmental Receptors to Hazardous Waste of Hazardous Constituents

Non-combusted materials and/or combustion products from Burning Ground operations are released to the air where they may be transported to surrounding areas by prevailing winds. Based on the ecological conceptual model (Appendix C), complete exposure pathways exist to ground-level ambient air in areas surrounding the Burning Grounds (via inhalation for animals or foliar contact for plants).

As part of the ecological risk assessment, concentrations in ground-level air (based on modeled annual average concentrations at the estimated point of maximum impact on or outside of the boundaries of the Burning Grounds) were compared to inhalation-based TRVs. There were no exceedances of inhalation-based TRVs from exposure to facility-related chemicals in ground-level air for chemicals with available toxicity data. Thus, the magnitude of potential ecological risks is negligible.

As part of the human health risk assessment (Appendix B), annual average concentrations in ground-level air at the point of maximum impact outside the facility boundary, based on dispersion modeling, were used to estimate potential human exposures and health risks via inhalation. The results of this evaluation were that potential risks from inhalation exposures highly unlikely to pose significant human health risks to offsite human receptors. Thus the potential magnitude of human health risks is negligible.

D-8d(3)(b) Performance Standards

Design and Operating Requirements

The following operating constraints are proposed, the maximum waste limit for the Burning Grounds is 1,630 lbs per burn. Up to two burns per day may be conducted (depending on material), totaling 3,260 lbs per day for the facility.

Detection and Monitoring Requirements

Ambient air monitoring of open burning activities at the Burning Grounds would be unsafe and impractical. Safety regulations prohibit personnel from entry into the Burning Grounds during operations. Remote location of ambient monitors would be problematic due to the variations in pan usage and wind directions. Therefore operating constraints based on conservative air models are proposed in lieu of monitoring.

Requirements for Responses to Releases

See Section F, Procedures to Prevent Hazards for a detailed discussion of release responses.

D-8e Monitoring, Analysis, Inspection, Response, Reporting, and Corrective Action [40 CFR 264.602]

Monitoring, analysis, inspection, response, reporting, and corrective action measures are included to meet the applicable requirements of this section and to protect human health and the environment.

D-8e(1) Elements of the Monitoring Program [40 CFR 264.602]

Groundwater and Subsurface Environment

Location of Monitors – The groundwater monitoring wells selected for corrective action monitoring program are identified in Section E, Table E-9. These consist of three downgradient alluvial wells, three downgradient bedrock wells, one upgradient alluvial well and one upgradient bedrock well. The corrective action monitoring well locations are depicted on Section E, Figure E-1.

Constituents to be Monitored and Frequency of Monitoring - In addition to explosives, nitroglycerine, and perchlorates, the following field measurements will be collected: pH, temperature, specific conductance, and dissolved oxygen. Samples will be taken at nine months intervals to coincide with the CERCLA monitoring program. Table E-1 in Section E contains a list of analytical parameters for the corrective action monitoring plan. In addition, monthly piezometer readings will be taken to demonstrate that the inward hydraulic gradient is being maintained. Reporting requirements are contained in Section E.

Procedures to Maintain Integrity of Monitoring Devices – Attachment E-3 of Section E is the Field Sampling Plan for Corrective Action Monitoring Program, Burning Grounds. This attachment contains Standard Operating Procedures (SOPs) for maintenance and calibration of all sampling equipment. Maintenance of the extraction and monitoring wells will be in accordance with the Final Corrective Action Implementation Plan for Site 1, conducted under the CERCLA program.

Sample Collection and Preservation – Sample collection and preservation procedures are outlined in Attachment E-3 of Section E.

Analytical Methods – The Corrective Action Monitoring Plan analytical methods and instrument quantification limits are shown in Section E, Table E-10.

Applicable Procedures for Evaluation of Data – Since it has already been determined that the groundwater beneath the Burning Grounds is impacted and corrective action already implemented, a statistical evaluation of the groundwater data is not necessary. Instead, data will be used to provide a comparison of concentrations of constituents with established data in an attempt to identify groundwater quality trends and determine when the groundwater performance standards are met.

Appropriate Response Procedures – Since Corrective Action for groundwater has already been implemented, response procedures are focused on operation and maintenance of the extraction well system and groundwater treatment plant in accordance with the ROD for Site 1, and subsequent NPDES permit requirements for the treatment plant. Other response procedures are contained in Section F.

Surface Water, Wetland, and Soil Surface

Because neither surface water nor wetlands are not considered significant exposure pathways at ABL, the discussion of the surface water performance standard is limited to the discharge from the groundwater treatment plant. Surface soils will be addressed separately under each heading.

Location of Monitors – Other than the discharge from the groundwater treatment plant, monitoring of surface water is not anticipated at the Burning Grounds. Effluent monitoring for the groundwater treatment unit discharge to the North Branch Potomac River is conducted in accordance with the letter of authorization from the Commonwealth of Maryland, dated July 11, 1997 and modified October 6, 1998.

The background soil sampling was conducted at locations shown in Figure D-14, in accordance with the Soil Sampling Plan in Appendix D-2.

Constituents to be Monitored and Frequency of Monitoring – Effluent samples are collected monthly and analyzed for the following constituents: antimony, arsenic, barium, beryllium, cadmium, chromium (VI), cobalt, copper, lead, manganese, mercury, nickel, silver, thallium, zinc, chloroform, 1-1-dichloroethane, 1-2-dichloroethane, 1-1-dichcloroehtene, 1-2-dichloroethene, methylene chloride, tetrachloroethene, toluene, 1-1-1-trichloroethane, trichloroethene, vinyl chloride, and acute toxicity. In addition, sample analyses are conducted for ammonium perchlorate, hardness, and total suspended solids. The flow of treated groundwater is also monitored on a monthly basis.

Since surface soil is not considered and important risk pathway (Appendix B and C), surface soil sampling will be conducted once every five (5) years in accordance with the original Soil Sampling Plan, Appendix D-2. Samples are analyzed for Appendix IX metals, plus aluminum, cyanide, iron, and manganese, Appendix IX volatile organic compounds, Appendix IX semivolatile compounds, plus biphenyl, dioxins and furans, explosives, nitroglycerin, perchlorate, ammonium nitrate, pH, and total organic carbon.

Procedures to Maintain Integrity of Monitoring Devices – All analytical and biomonitoring testing is being conducted by laboratories certified by the state of West Virginia and/or surrounding states. These laboratories are required to demonstrate compliance with instrument calibration as set forth in the state programs.

Surface soil sampling will be conducted in accordance with the Surface Soil Sampling Plan, Appendix D-2. This plan contains procedures for instrument and laboratory quality assurance and instrument calibration.

Sample Collection and Preservation – Effluent sampling, preservation, shipping, and chain of custody procedures are specified in the Operations and Maintenance for the groundwater treatment facility which is maintained on site.

Surface soil sampling and preservation will be conducted in accordance with Appendix D-2.

Analytical Methods – Laboratory effluent testing is conducted in accordance with SW 646-8260B, SW 846-6010B and other approved EPA or Standard Methods as required.

The analytical methods used of the surface soil sampling are contained in Appendix D-2.

Applicable Procedures for Evaluation of Data – Effluent data is compared against the permit limitations and submitted to WVDEP in the facility monthly DMR.

Surface soil data will be compared with soil background data contained in Appendix D.

Appropriate Response Procedures - Response procedures are contained in Section F.

D-8e(2) Air Monitoring Alternatives [40 CFR 264.602]

Ambient air monitoring of open burning activities at the Burning Grounds would be unsafe and impractical. Safety regulations prohibit personnel from entry into the Burning Grounds during operations. Remote location of ambient monitors would be problematic due to the variations in pan usage and wind directions. Emission factors were determined for the ATK waste stream in actual burn testing and through literature values. This rationale is contained in Section D-8d(3) and Appendix A. Other than the discontinuation of several waste types tested, there are no changes anticipated that would result in different emission factors.

D-9 Boilers and Industrial Furnaces (BIFs)

There are no boilers at ABL; therefore this section is not applicable.

D10 Containment Buildings [40 CFR 260.10, 264.1100, 264.1101, 264.1102]

There are no containment buildings at ABL; therefore this section is not applicable.

Tables

TABLE D-1
Burning Constraints

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

TABLE D-2
Existing Surface Water Quality for Ecoregion 67, WVDEP, 1997

	DO mg/l	Conductivity (umhos or uohms/cm)	Temp C	TSS Mg/l	P Mg/l	PH Standard units	Ammonia Nitrogen mg/l	Nitrates + nitrates
Average	7.44	322	21.9	11	0.03	8	0.5	0.3
Minimum	2.7	85	15.5	5	0.02	7.3	0.5	0.7
Maximum	8.8	1391	27.8	23	0.04	8.8	0.5	0.53

TSS = total suspended solids.

TABLE D-3
Waste Volumes

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

TABLE D-4
Estimated Annual Air Emissions of Criteria Pollutants

Criteria Pollutants	lbs/year	Tons/year
NO	1,200.00	0.60
NO_2	3,30.00	0.17
SO_2	420.00	0.21
PM_{10}	17,100.00	8.55
VOC*	1,332.39	0.67
CO	24,900.00	12.45

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

TABLE D-5
Estimated Maximum Annual Non-Criteria Air Emissions

Other Emissions[1]	lbs/year	Tons/year
HCl (gas)	8580.00	4.29
1,3-Butadiene	49.50	0.02
1,6-Dinitropyrene	0.01	0.00
1-Methylnaphthalene	0.72	0.00
1-Nitropyrene	0.66	0.00
2,4-Dinitrotoluene	0.01	0.00
2,5-Diphenyloxazole	0.29	0.00
2,6-Dinitrotoluene	1.74	0.00
2-Methylnaphthalene	0.72	0.00
2-Nitroaphthalene	0.51	0.00
4-Nitrophenol	0.01	0.00
4-Nitrosodiphenylamine	0.01	0.00
Benzo[a]anthracene	1.32	0.00
Benzene	330.00	0.17
Benzo[a]pyrene	0.01	0.00
Biphenyl	1.41	0.00
Dibenz[a,h]anthracene	0.01	0.00
Dibenzofuran	0.30	0.00
Di-n-propyl adipate	0.41	0.00

[1] Maximum of reported concentration or ½ of detection levels.

TABLE D-5
Estimated Maximum Annual Non-Criteria Air Emissions

Other Emissions[1]	lbs/year	Tons/year
Dioxin	7.8E-06	0.00
Diphenylamine	0.06	0.00
Mesitylene	0.09	0.00
Naphthalene	1.17	0.00
n-Hexane	49.50	0.02
N-Nitrosodiphenylamine	0.01	0.00
Phenanthrene	0.60	0.00
Phenol	0.84	0.00
Pyrene	0.01	0.00
Resorcinol	1.80	0.00
Styrene	49.50	0.02
Thianaphthene	0.01	0.00
Toluene	1050.00	0.53
Tractin	0.01	0.00
Xylenes	282.00	0.14
Aluminum	30000.00	15.00
Lead	2640.00	1.32
Zirconium	2640.00	1.32
copper	300.00	6.00
Iron	3.30	0.00

TABLE D-6
Estimated Maximum Hourly and Daily Air Emissions of Criteria Pollutants

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

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

TABLE D-7
Estimated Maximum Hourly and Daily Air Emissions of Non-Criteria Pollutants

Other Emissions[2]	Maximum, lbs./day	Maximum, tons/day	Maximum, lbs./hr	Maximum, tons/hr
HCl	93.2360	0.05	46.6180	0.02
1,3-Butadiene	0.5379	0.00	0.2690	0.00
1,6-Dinitropyrene	0.0001	0.00	0.0001	0.00
1-Methylnaphthalene	0.0078	0.00	0.0039	0.00
1-Nitropyrene	0.0072	0.00	0.0036	0.00
2,4-Dinitrotoluene	0.0001	0.00	0.0001	0.00
2,5-Diphenyloxazole	0.0031	0.00	0.0015	0.00
2,6-Dinitrotoluene	0.0189	0.00	0.0095	0.00
2-Methylnaphthalene	0.0078	0.00	0.0039	0.00
2-Nitroaphthalene	0.0055	0.00	0.0028	0.00
4-Nitrophenol	0.0001	0.00	0.0001	0.00
4-Nitrosodiphenylamine	0.0001	0.00	0.0001	0.00
Benzo[a]anthracene	0.0143	0.00	0.0072	0.00
Benzene	3.5860	0.00	1.7930	0.00
Benzo[a]pyrene	0.0001	0.00	0.0001	0.00
Biphenyl	0.0153	0.00	0.0077	0.00
Dibenz[a,h]anthracene	0.0001	0.00	0.0001	0.00
Dibenzofuran	0.0033	0.00	0.0016	0.00
Di-n-propyl adipate	0.0044	0.00	0.0022	0.00
Dioxin	0.0011	0.00	0.0005	0.00
Diphenylamine	0.0006	0.00	0.0003	0.00
Mesitylene	0.0010	0.00	0.0005	0.00
Naphthalene	0.0127	0.00	0.0064	0.00
n-Hexane	0.5379	0.00	0.2690	0.00
N-Nitrosodiphenylamine	0.0001	0.00	0.0001	0.00
Phenanthrene	0.0065	0.00	0.0033	0.00
Phenol	0.0091	0.00	0.0046	0.00
Pyrene	0.0001	0.00	0.0001	0.00
Resorcinol	0.0196	0.00	0.0098	0.00
Styrene	0.5379	0.00	0.2690	0.00

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

TABLE D-7
Estimated Maximum Hourly and Daily Air Emissions of Non-Criteria Pollutants

Other Emissions[2]	Maximum, lbs./day	Maximum, tons/day	Maximum, lbs./hr	Maximum, tons/hr
Thianaphthene	0.0001	0.00	0.0001	0.00
Toluene	11.4100	0.01	5.7050	0.00
Tractin	0.0001	0.00	0.0001	0.00
Xylenes	3.0644	0.00	1.5322	0.00
Aluminum	326.0000	0.16	163.0000	0.08
Lead	28.6880	0.01	14.3440	0.01
Zirconium	28.6880	0.01	14.3440	0.01
Copper	130.4000	0.07	65.2000	0.03
Iron	0.0359	0.00	0.0179	0.00

TABLE D-8
Air Emission Sources Located in Mineral County, West Virginia, within 10 Kilometers of the ABL Burning Grounds

Source Name	Pollutant	Emissions (tons/yr)
Kingsford Manufacturing	Particulate	91.2
	Sulfur dioxide	29.2
	Nitrogen dioxide	68.1
	Carbon monoxide	1.1
	Volatile organic Compounds	1.3
	Methyl alcohol	0.4
Westvaco Corporation	Particulate	148.0
	Sulfur dioxide	0.4
	Nitrogen dioxide	108.0
	Carbon monoxide	77.3
	Volatile organic Compounds	12.6
	Styrene	0.03
	Ethylene dichloride	0.0001
	Hexone	0.02
	Toluene	0.04
	Hexane	0.001
	Trichlorobenzene	0.002
	1,2,4-Trichlorobenzene	0.02
	Tetrachloroethylene	0.03
	Formaldehyde	0.3

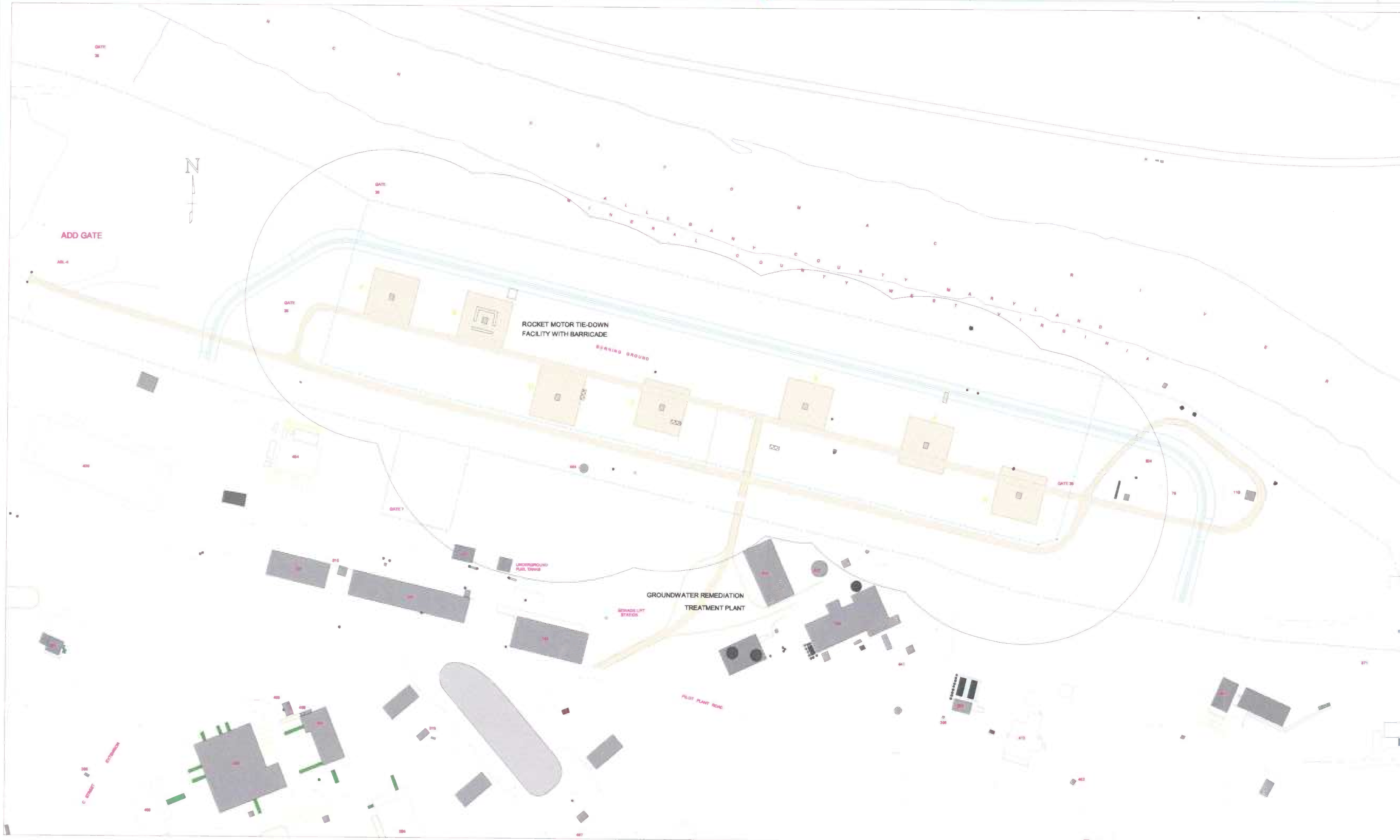
TABLE D-8
Air Emission Sources Located in Mineral County, West Virginia, within 10 Kilometers of the ABL Burning Grounds

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

TABLE D-9
Air Emission Sources Located within Allegany County, Maryland, that are within 10 Kilometers of the ABL Burning Grounds

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

Figures



BURNING GROUND PAN LIMITS	
PAN	1998 MODIFICATION
A'	200
A	200
B	155
C	275
D	400
E	200
F	200
TOTAL	1630

PROPOSED PAN LOCATIONS		
PAN	LONGITUDE	LATITUDE
A'	78^ 49' 52.7"	39^33' 52.3"
A	78^ 49' 54.7"	39^33' 53.1"
B	78^ 49' 57.2"	39^33' 53.8"
C	78^ 50' 00.3"	39^33' 53.7"
D	78^ 50' 02.5"	39^33' 53.9"
E	78^ 50' 04.1"	39^33' 55.2"
F	78^ 50' 06.1"	39^33' 55.5"

LEGEND

SITING PLAN

EXISTING BURNING PAN

PROPOSED BURNING PAN

TYP BURNING PAD SITE PAVING

GRAPHIC SCALE

80' 0 80' 160' 240' 320' 400'

1"= 80'-0"

ATK ALLIANT TECHSYSTEMS

ALLIANT MISSILE PRODUCTS COMPANY LLC
ALLEGANY BALLISTICS LABORATORY
210 STATE ROUTE 956
ROCKET CENTER, WV 26726-3548

ABL Rocket Center, WV

BURNING GROUNDS PAVING PLAN CONCEPT

APPROVALS		DATE
DRAFTER	J.R. ROBISON	11/12/01
CHECKER	L.H. MULL	11/12/01
ENGR	L.H. MULL	11/12/01
DES SUPV		
AREA SUPV		
SAFETY		
ENG MGR		

DATE | DRAWING HISTORY

CAGE CODE 70272 | SIZE D

SCALE: 1" - 80.0'

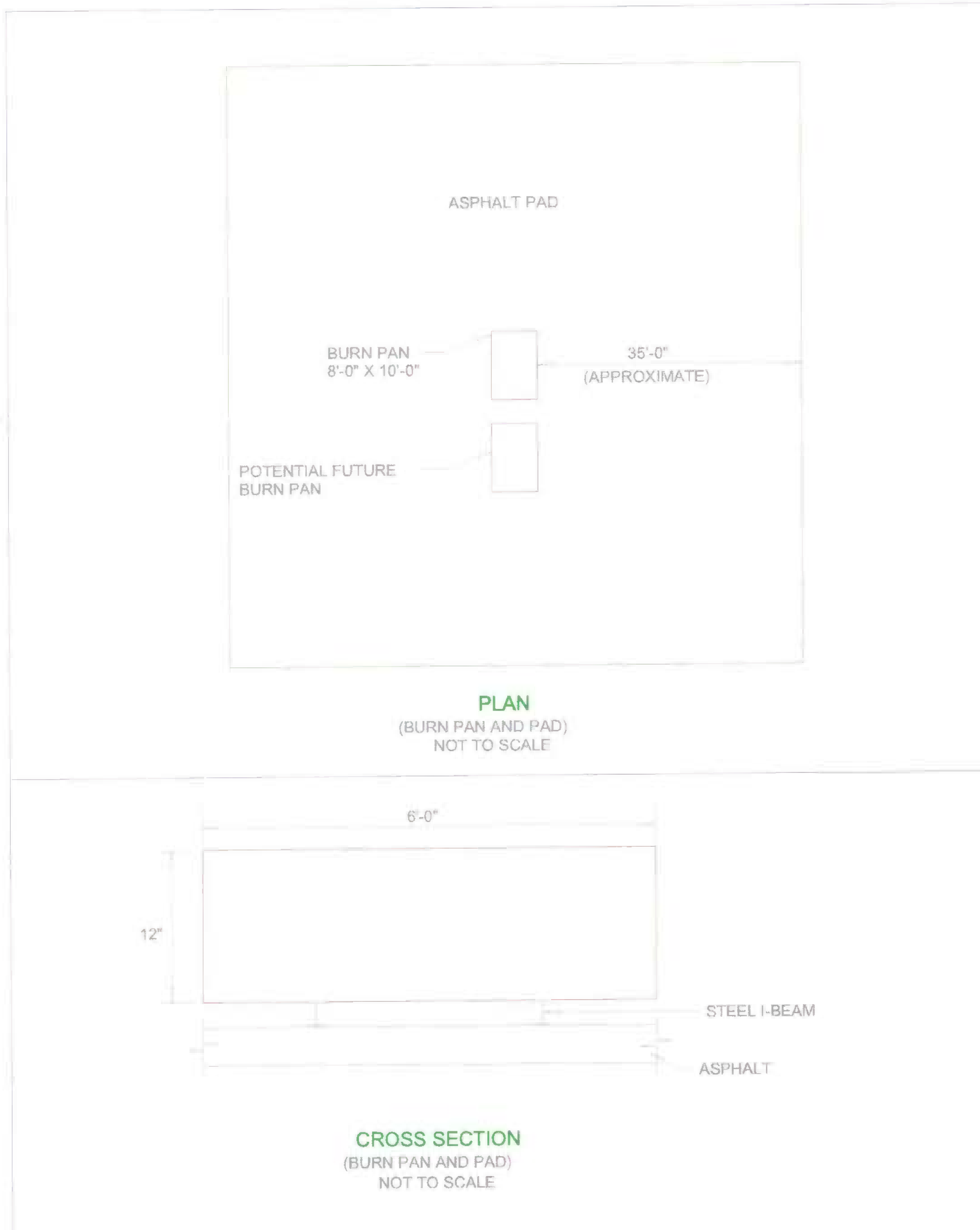
NEXT ASSEMBLY / USED ON

BUILDING NO	DRAWING PKG
ENVR	RCRA
CONTRACTOR DRAWING NO	REV
22301	-

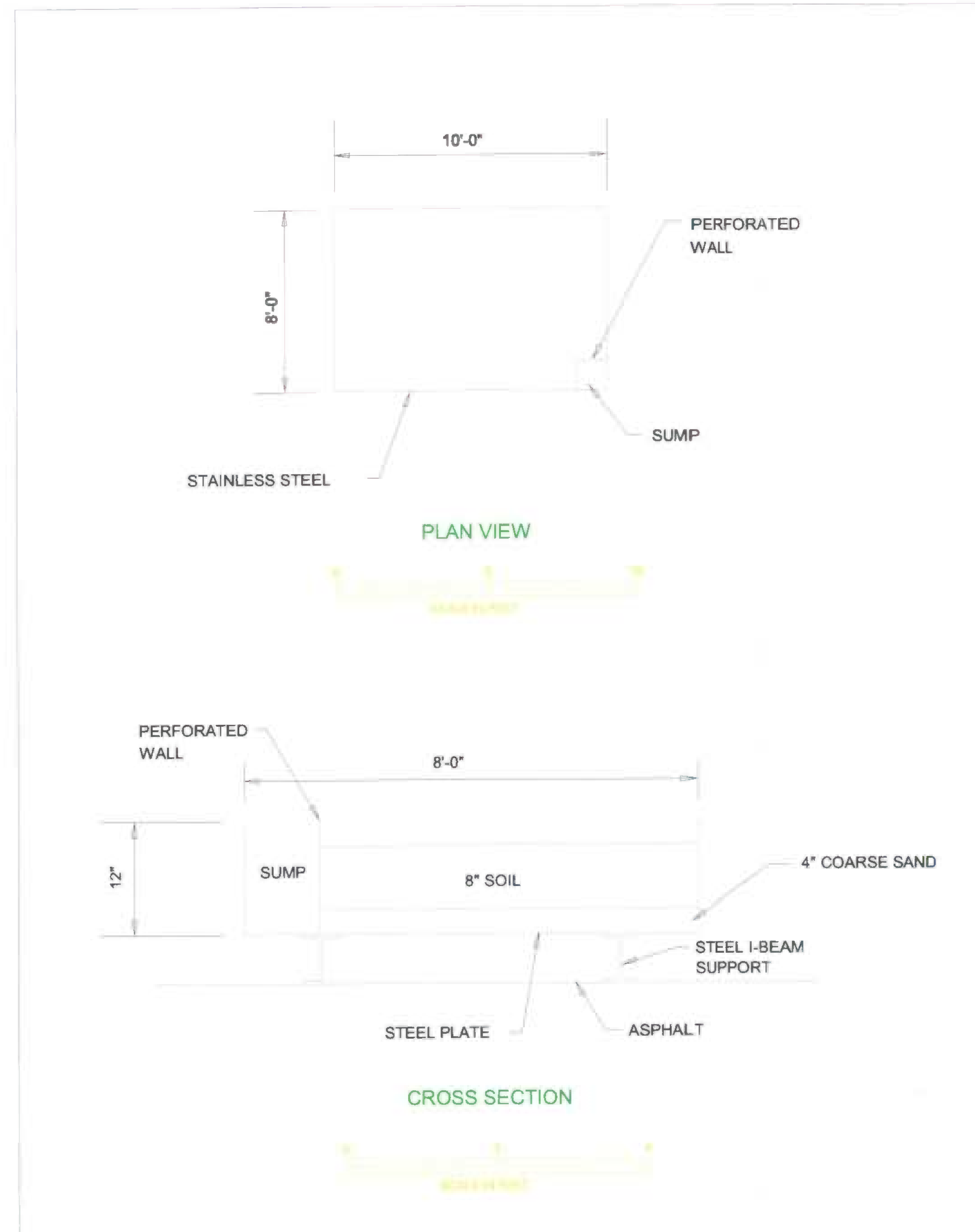
D-1

INTERPRET THIS DRAWING IN ACCORDANCE WITH DOD-STD-100

$Sdgn$$ $Stime$$



SCALE NOT TO SCALE	BURN PAD (CONCEPTUAL) PLAN VIEW AND CROSS SECTION ALLEGANY BALLISTICS LABORATORY ROCKET CENTER, WEST VIRGINIA	DRAWING NO. FIGURE D-1	REV. 0



SCALE AS NOTED	BURN PAN (CONCEPTUAL) PLAN VIEW, AND CROSS SECTION ALLEGANY BALLISTICS LABORATORY ROCKET CENTER, WEST VIRGINIA	DRAWING NO. FIGURE D-2	REV. 0

ATK TACTICAL SYSTEMS COMPANY LLC
210 STATE ROUTE 956
ROCKET CENTER, WV 26726-3548

BURN PAN (CONCEPTUAL)
PLAN VIEW
& CROSS SECTION

WORK ORDER:
CHARGE CODE:
PROJECT NO:
DO NOT SCALE DRAWING

APPROVALS		DATE
DRAFTER	J.R. ROBISON	
CHECKER		
ENGR		
DES SUPV		
AREA SUPV		
SAFETY		
ENG MGR		

TOLERANCES: .XXX± .XXX
.XX± .XX
FRAC ± ANGLES ± X°
SURFACE TEXTURE XXX
FILLETS .03 MAX
EDGES MAY BE BROKEN
REMOVE ALL BURRS
MATERIAL:
XXXXX

SYM	DESCRIPTION	BY	DATE	CHK	APPD	APPD	APPD

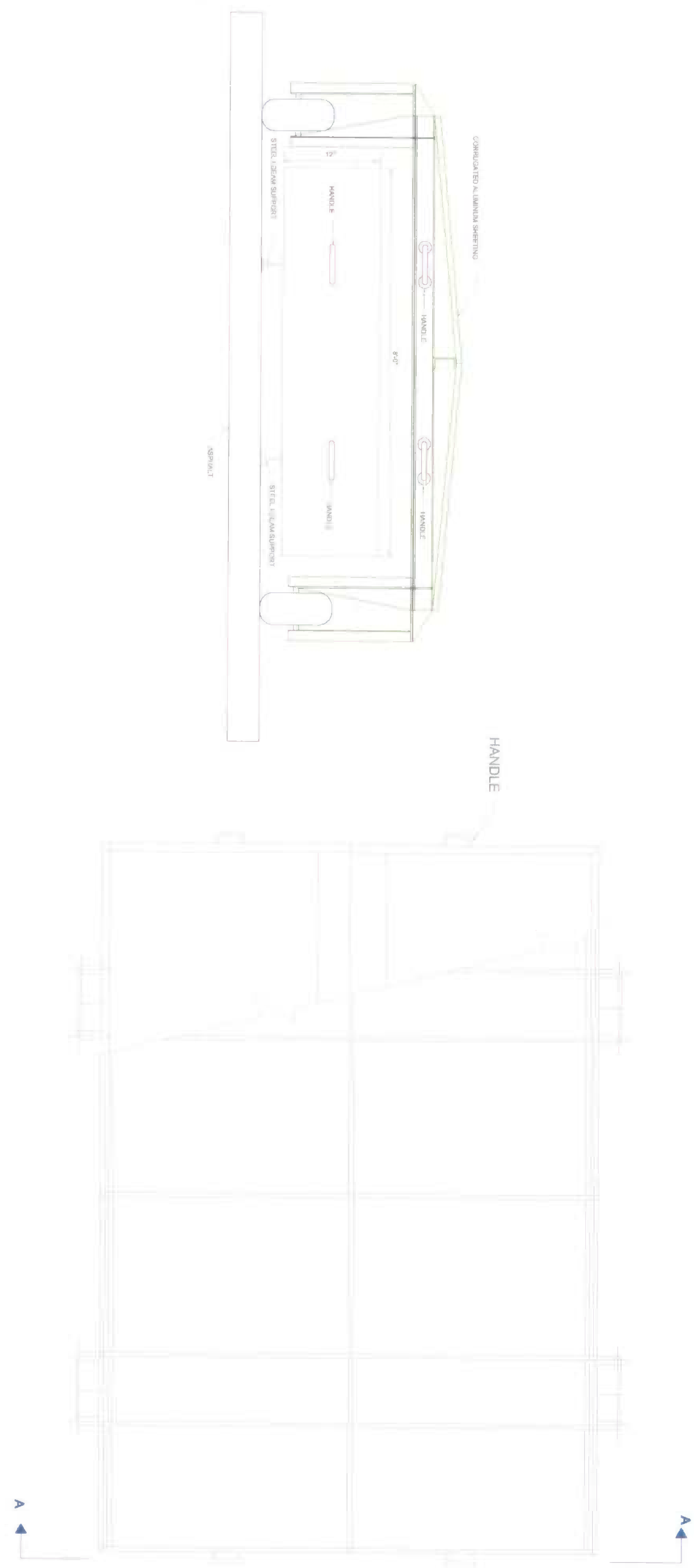
REVISIONS

CAGE CODE 70272 SIZE: D
SCALE: NONE
NEXT ASSEMBLY / USED ON

BUILDING NO.	DRAWING PKG
ENVR	RCRA
CONTRACTOR DRAWING NO.	REV
69001	-

D-2

INTERPRET THIS DRAWING IN ACCORDANCE WITH DOD-STD-100



ATK TACTICAL SYSTEMS COMPANY LLC
210 STATE ROUTE 956
ROCKET CENTER, WV 26726-3548

ATK ALLIANT TECHSYSTEMS — ABL Rocket Center, WV

BURN PAN COVER (CONCEPTUAL)

WORK ORDER:	
CHARGE CODE:	
PROJECT NO:	
DO NOT SCALE DRAWING	

CAGE CODE 70272 | SIZE: D | SCALE: NONE | NEXT ASSEMBLY / USED ON

BUILDING NO: ENVR | DRAWING PRG: RCRA | CONTRACTOR DRAWING NO: 69002 | REV: -

APPROVALS		DATE
DRAFTER	J.R. ROBISON	
CHECKER		
ENGR		
DES SUPV		
AREA SUPV		
SAFETY		
ENG MGR		

TOLERANCES: .XXX± .XXX
.XX± .XX
FRAC ± ANGLES ± X°
SURFACE TEXTURE XXX
FILLETS .03 MAX
EDGES MAY BE BROKEN
REMOVE ALL BURRS
MATERIAL:
XXXXX

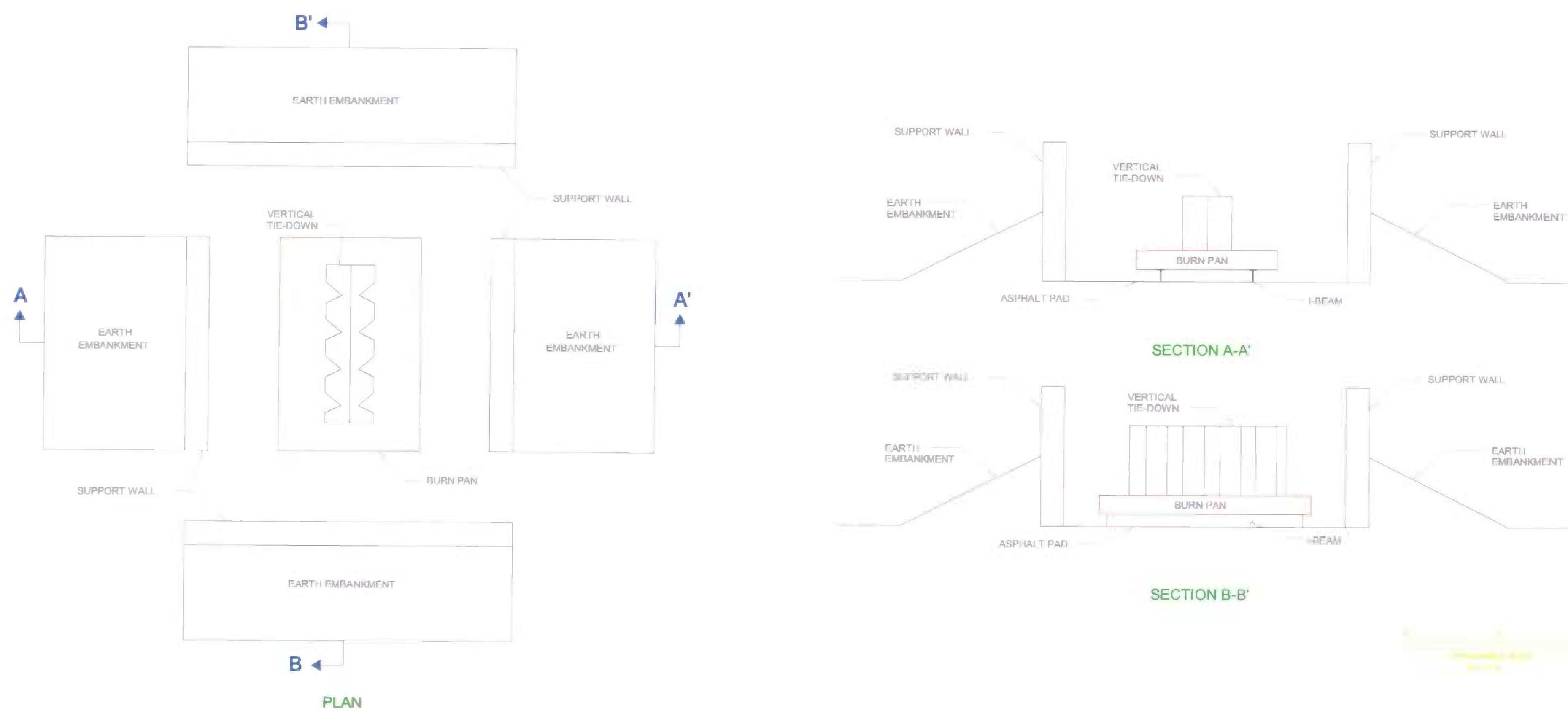
SYM	DESCRIPTION	BY	DATE	CHK	APPD	APPD	APPD

REVISIONS

INTERPRET THIS DRAWING IN ACCORDANCE WITH DOD-STD-100

$$time$$ $$dgn$$

D-3



ATK TACTICAL SYSTEMS COMPANY LLC
210 STATE ROUTE 956
ROCKET CENTER, WV 26726-3548

ABL Rocket Center, WV

WORK ORDER:
CHARGE CODE:
PROJECT NO:

DO NOT SCALE DRAWING

ROCKET MOTOR TIE-DOWN
UNIT (CONCEPTUAL)
PLAN VIEW & SECTIONS

APPROVALS		DATE
DRAFTER	J.R. ROBISON	11/12/01
CHECKER	L.H. MULL	11/12/01
ENGR	L.H. MULL	11/12/01
DES SUPV		
AREA SUPV		
SAFETY		
ENG MGR		

TOLERANCES: .XXX .XXX
.XX .XX
FRAC ANGLES X°
SURFACE TEXTURE XXX
FILLETS .03 MAX
EDGES MAY BE BROKEN
REMOVE ALL BURRS
MATERIAL:
XXXXX

SYM	DESCRIPTION	BY	DATE	CHK	APPD	APPD	APPD

REVISIONS

CAGE CODE 70272 | SIZE: D
SCALE: NONE
NEXT ASSEMBLY / USED ON

BUILDING NO	DRAWING PKG
ENVR	RCRA

CONTRACTOR DRAWING NO	REV
69003	-

D-4

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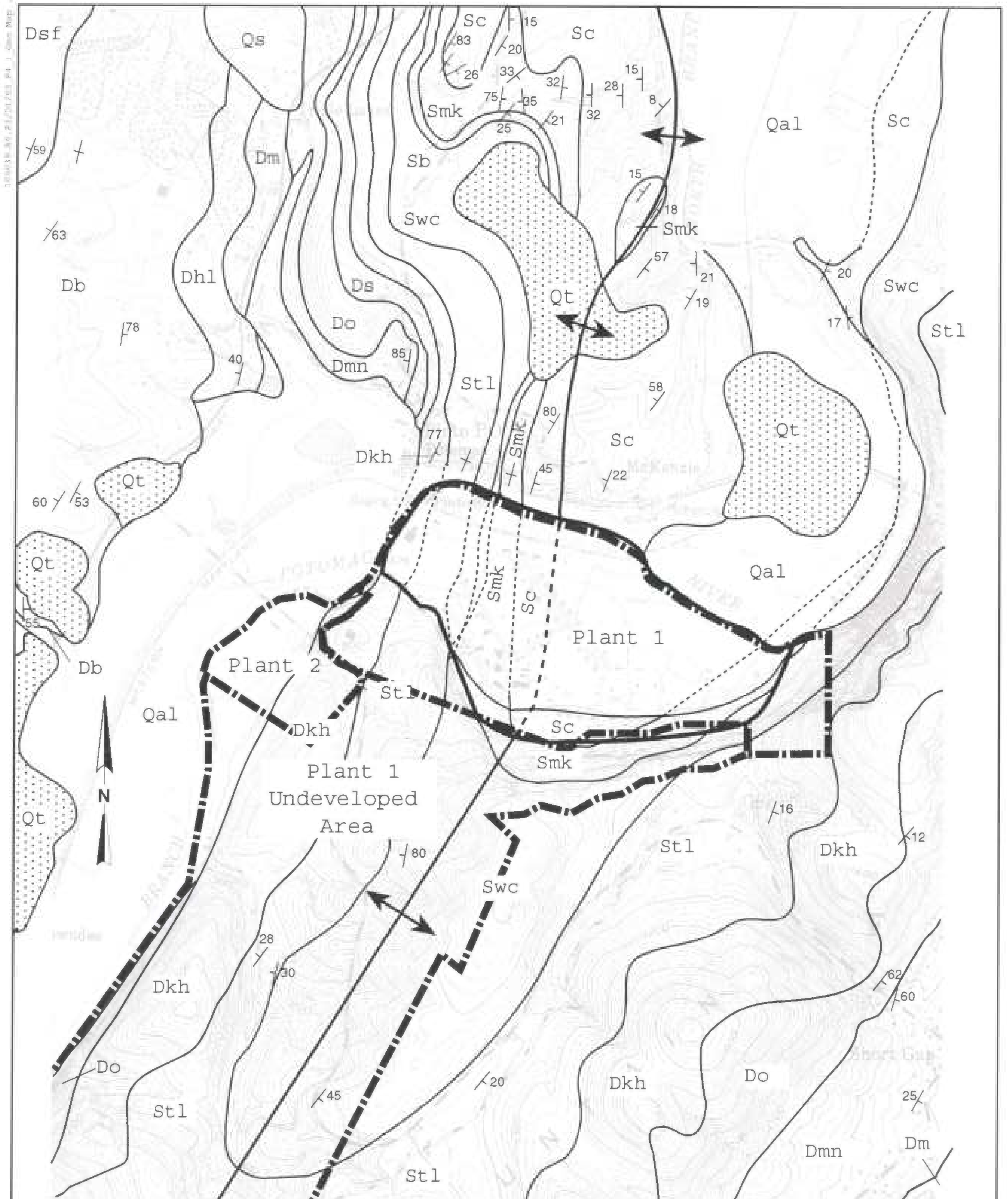

Basemap: USGS 7.5 minute Cresaptown, WV-MD quadrangle map.

0 1000 2000
Scale in Feet

LEGEND

Location of Wills Mountain Anticlinal Axis, dashed where inferred (from Eddy, 1964 and Glaser, 1994)

63 Normal strike and dip

Vertical Strike

Figure D-5
GEOLOGIC MAP OF THE AREA SURROUNDING ABL

Allegany Ballistics Laboratory

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Bedrock Stratigraphic Units In The Vicinity Of The ABL Facility			
System	**Unit**	**Map Designation**	**Approximate Thickness (ft)**
Quaternary	Alluvium	Qal	10 to 40
Quaternary	Terrace Deposits and Colluvium	Qt/Qs	15 to 20
Devonian	Scherr/Foreknobs Formations	Dsf	>3,000
Devonian	Brallier Shale	Db	2,000 to 2,500
Devonian	Harrell Shale	Dhl	150
Devonian	Mahantango Formation	Dm	600
Devonian	Oriskany Sandstone	Do	140 to 150
Devonian	Keyser Limestone/ Helderberg Limestone	Dkh	350
Silurian	Tonoloway Limestone	Stl	600
Silurian	Wills Creek Formation	Swc	430
Silurian	Bloomsburg Formation	Sb	36 to 45
Silurian	McKenzie Formation	Smk	200 to 300
Silurian	Clinton Group:	Sc	
	Rochester Shale		25 to 42
	Keefer Sandstone		12 to 14
	Rose Hill Shale		540 to 580

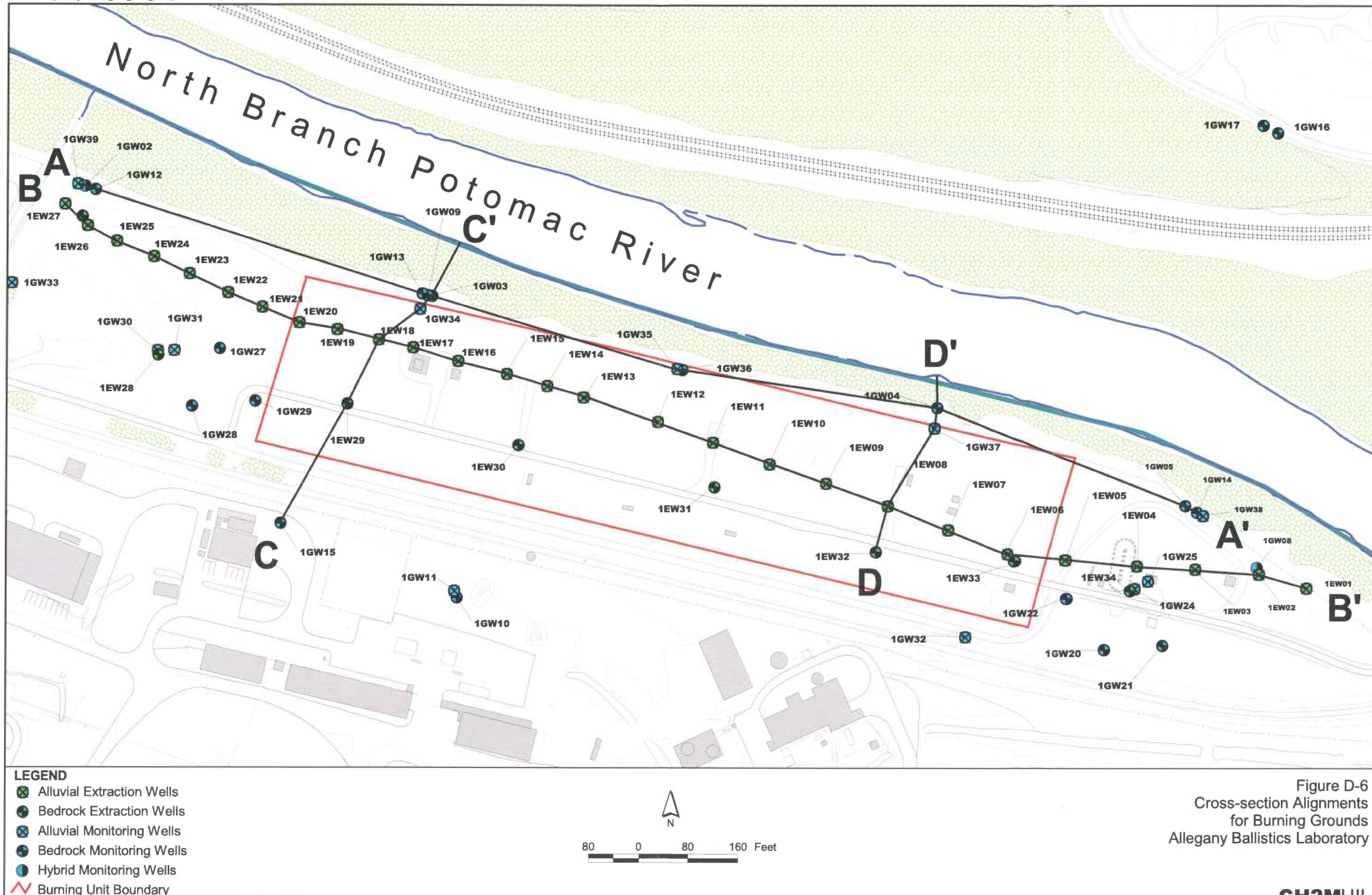

Figure D-6
Cross-section Alignments
for Burning Grounds
Allegany Ballistics Laboratory

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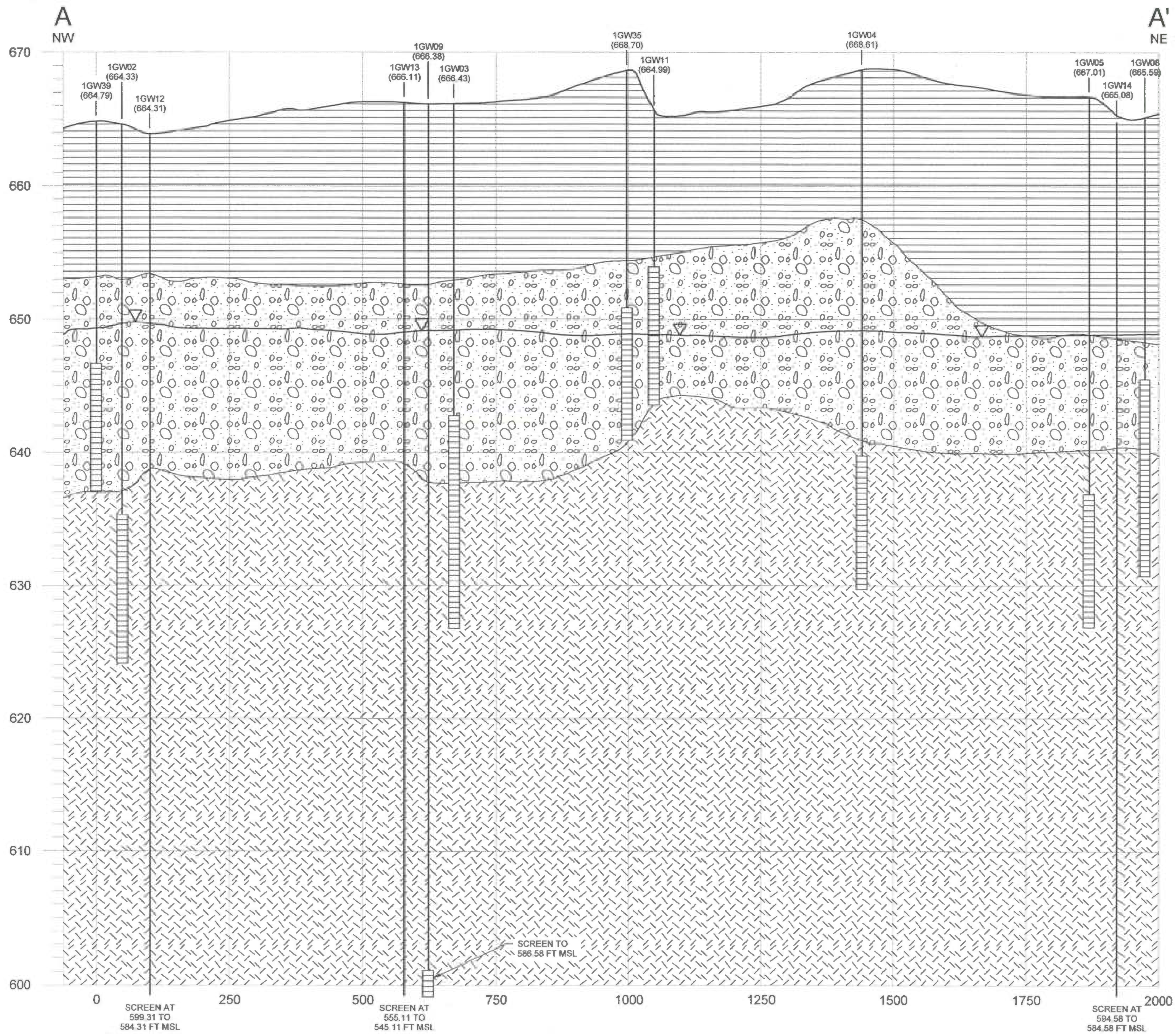


NOTES:

THIS CROSS SECTION WAS INTERPOLATED BETWEEN BORING LOCATIONS. ACTUAL CONDITIONS MAY DIFFER FROM THOSE SHOWN HERE. CROSS SECTION LOCATION IS SHOWN IN FIGURE X-X.

LITHOLOGIC DESCRIPTIONS:

SILTY CLAY (FLOOD PLAIN DEPOSITS)

CLAYEY GRAVEL ALLUVIUM (ALLUVIAL DEPOSITS)

BEDROCK

LEGEND:

1GW39 (664.79) — WELL DESIGNATION AND SURFACE ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL)

APPROXIMATE WATER-TABLE ELEVATION NOVEMBER 1994

WELL CONSTRUCTION:

WELL CASING

SCREENED INTERVAL

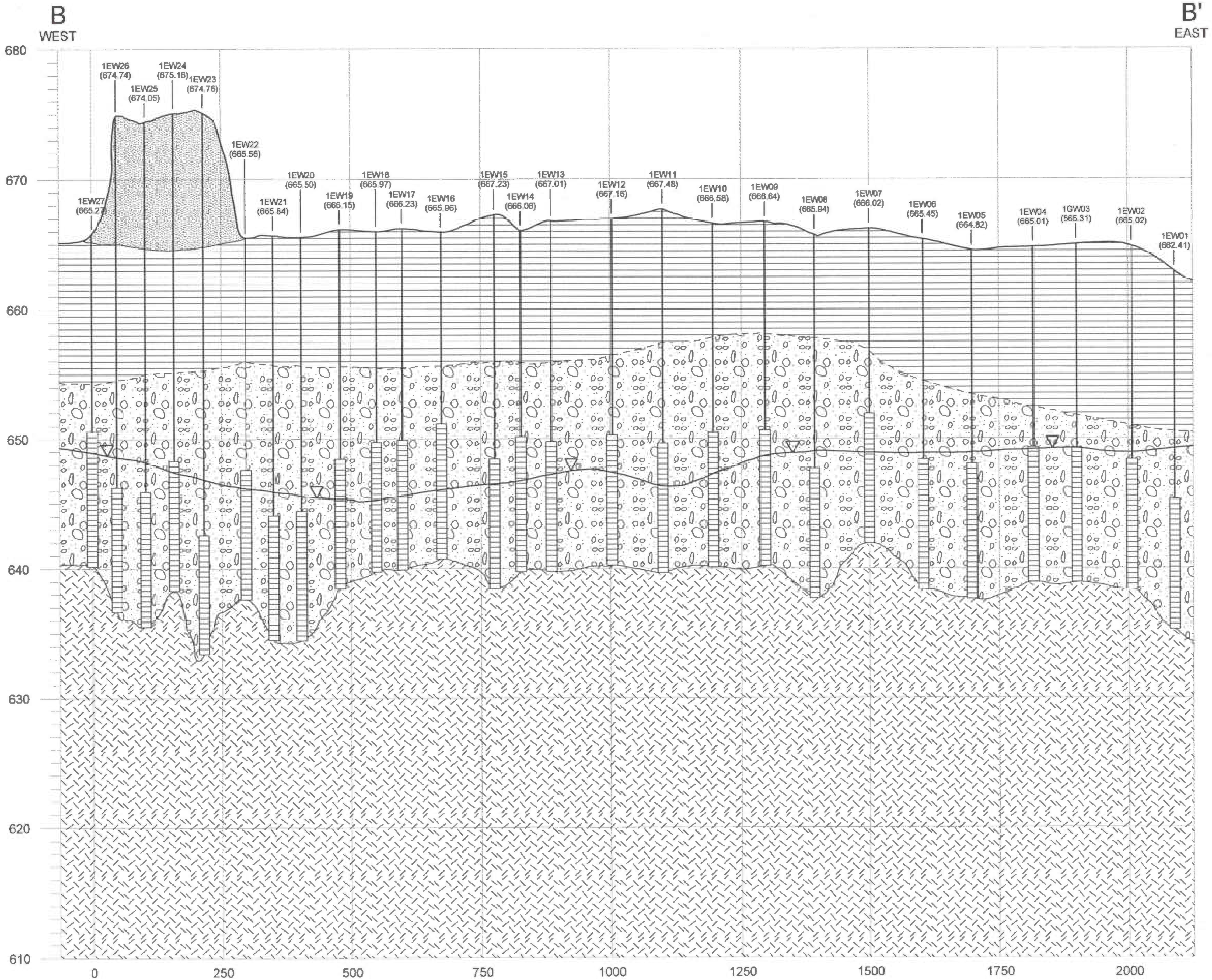
VERTICAL SCALE 0 10

0 250

HORIZONAL SCALE
SCALE IN FEET

FIGURE D-7
CROSS SECTION A-A'
BURNING GROUNDS
ALLEGANY BALLISTICS LABORATORY
CH2MHILL

8263f001.dlv



NOTES:

THIS CROSS SECTION WAS INTERPOLATED BETWEEN BORING LOCATIONS. ACTUAL CONDITIONS MAY DIFFER FROM THOSE SHOWN HERE. CROSS SECTION LOCATION IS SHOWN IN FIGURE X-X.

LITHOLOGIC DESCRIPTIONS:

- FILL
- SILTY CLAY (FLOOD PLAIN DEPOSITS)
- CLAYEY GRAVEL ALLUVIUM (ALLUVIAL DEPOSITS)
- BEDROCK

LEGEND:

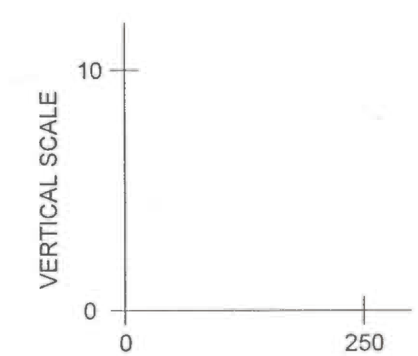
1GW39 (664.79) — WELL DESIGNATION AND SURFACE ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL)

APPROXIMATE WATER-TABLE ELEVATION NOVEMBER 1994

WELL CONSTRUCTION:

WELL CASING

SCREENED INTERVAL



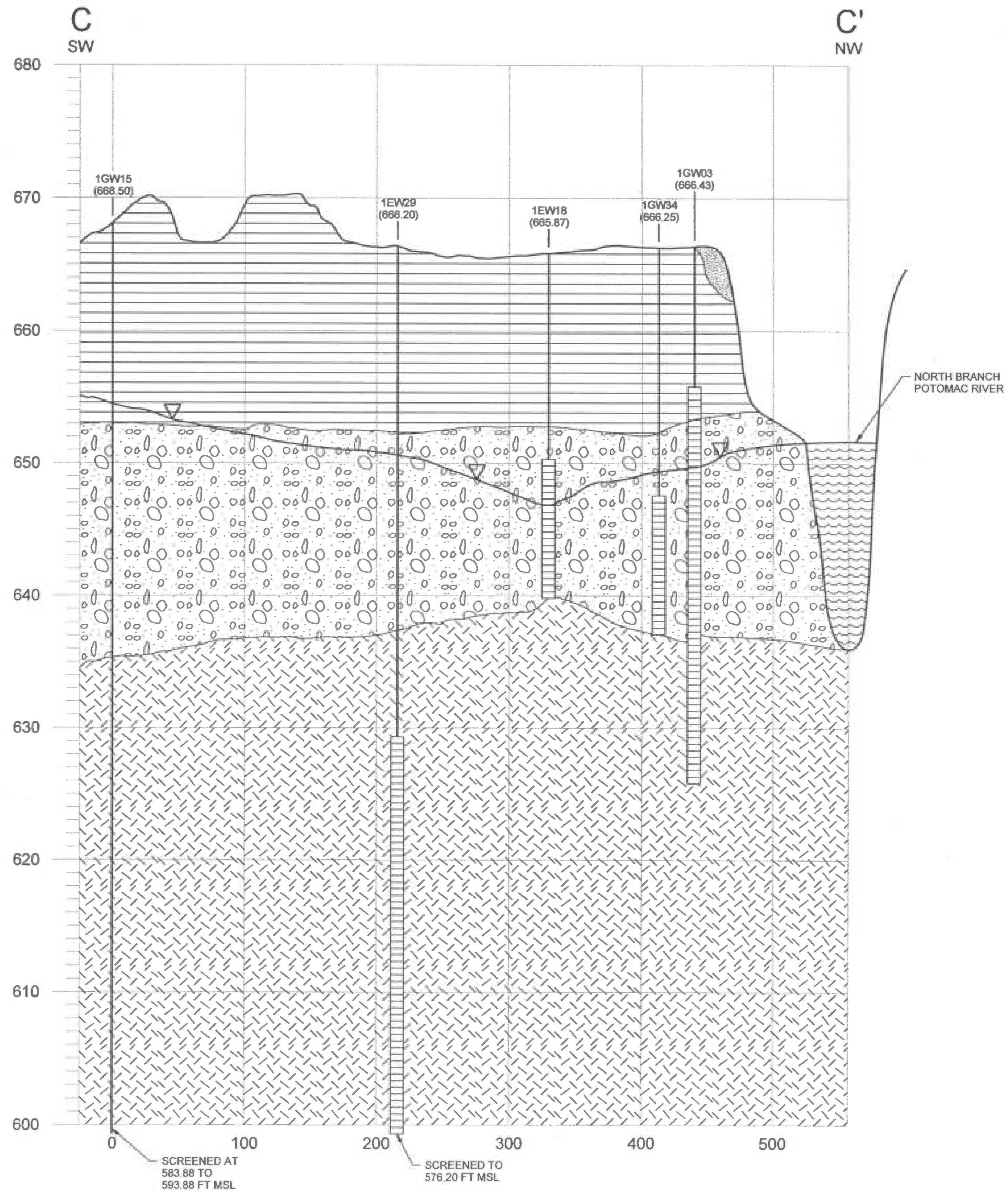
HORIZONAL SCALE
SCALE IN FEET

FIGURE D-8
CROSS SECTION B-B'
BURNING GROUNDS
ALLEGANY BALLISTICS LABORATORY
CH2MHILL

8263f002.dlv

NOTES:

THIS CROSS SECTION WAS INTERPOLATED BETWEEN BORING LOCATIONS. ACTUAL CONDITIONS MAY DIFFER FROM THOSE SHOWN HERE. CROSS SECTION LOCATION IS SHOWN IN FIGURE X-X.



LITHOLOGIC DESCRIPTIONS:

- FILL
- SILTY CLAY (FLOOD PLAIN DEPOSITS)
- CLAYEY GRAVEL ALLUVIUM (ALLUVIAL DEPOSITS)
- BEDROCK
- WATER

LEGEND:

1GW39 (664.79) — WELL DESIGNATION AND SURFACE ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL)

APPROXIMATE WATER-TABLE ELEVATION NOVEMBER 1994

WELL CONSTRUCTION:

WELL CASING

SCREENED INTERVAL

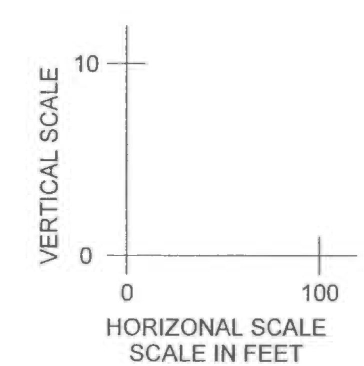
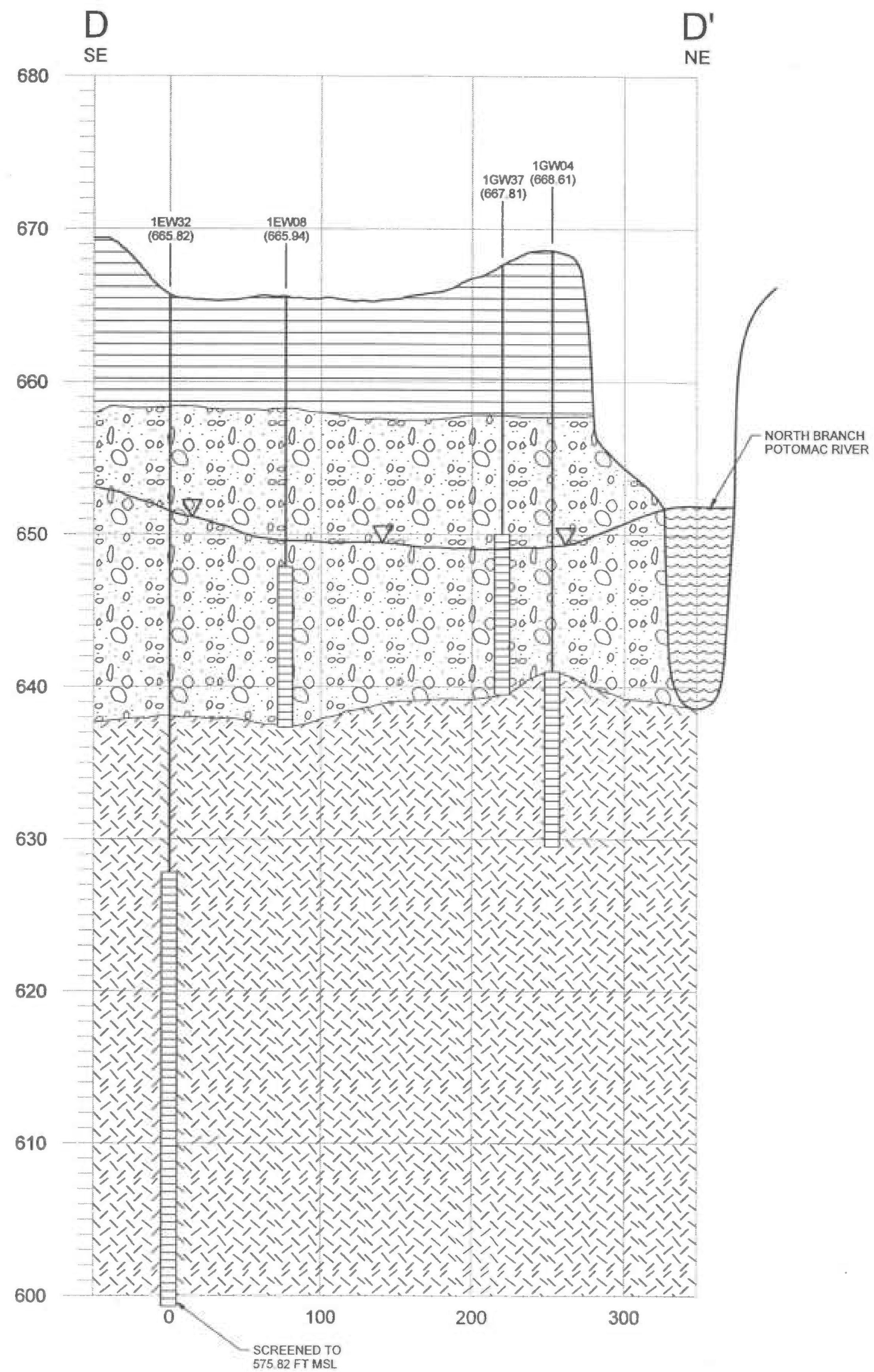


FIGURE D-9
CROSS SECTION C-C'
BURNING GROUNDS
ALLEGANY BALLISTICS LABORATORY
CH2MHILL

8263f003.dlv



NOTES:

THIS CROSS SECTION WAS INTERPOLATED BETWEEN BORING LOCATIONS. ACTUAL CONDITIONS MAY DIFFER FROM THOSE SHOWN HERE. CROSS SECTION LOCATION IS SHOWN IN FIGURE X-X.

LITHOLOGIC DESCRIPTIONS:

SILTY CLAY
(FLOOD PLAIN DEPOSITS)

CLAYEY GRAVEL ALLUVIUM
(ALLUVIAL DEPOSITS)

BEDROCK

WATER

LEGEND:

1GW39 (664.79) — WELL DESIGNATION AND SURFACE ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL)

APPROXIMATE WATER-TABLE ELEVATION NOVEMBER 1994

WELL CONSTRUCTION:

WELL CASING

SCREENED INTERVAL

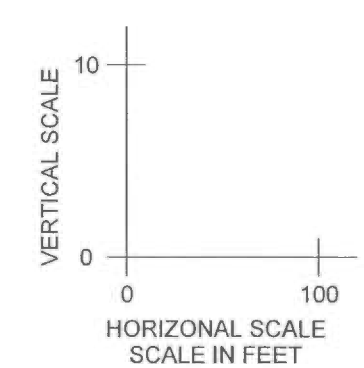


FIGURE D-10
CROSS SECTION D-D'
BURNING GROUNDS
ALLEGANY BALLISTICS LABORATORY
CH2MHILL

8263f004.dlv

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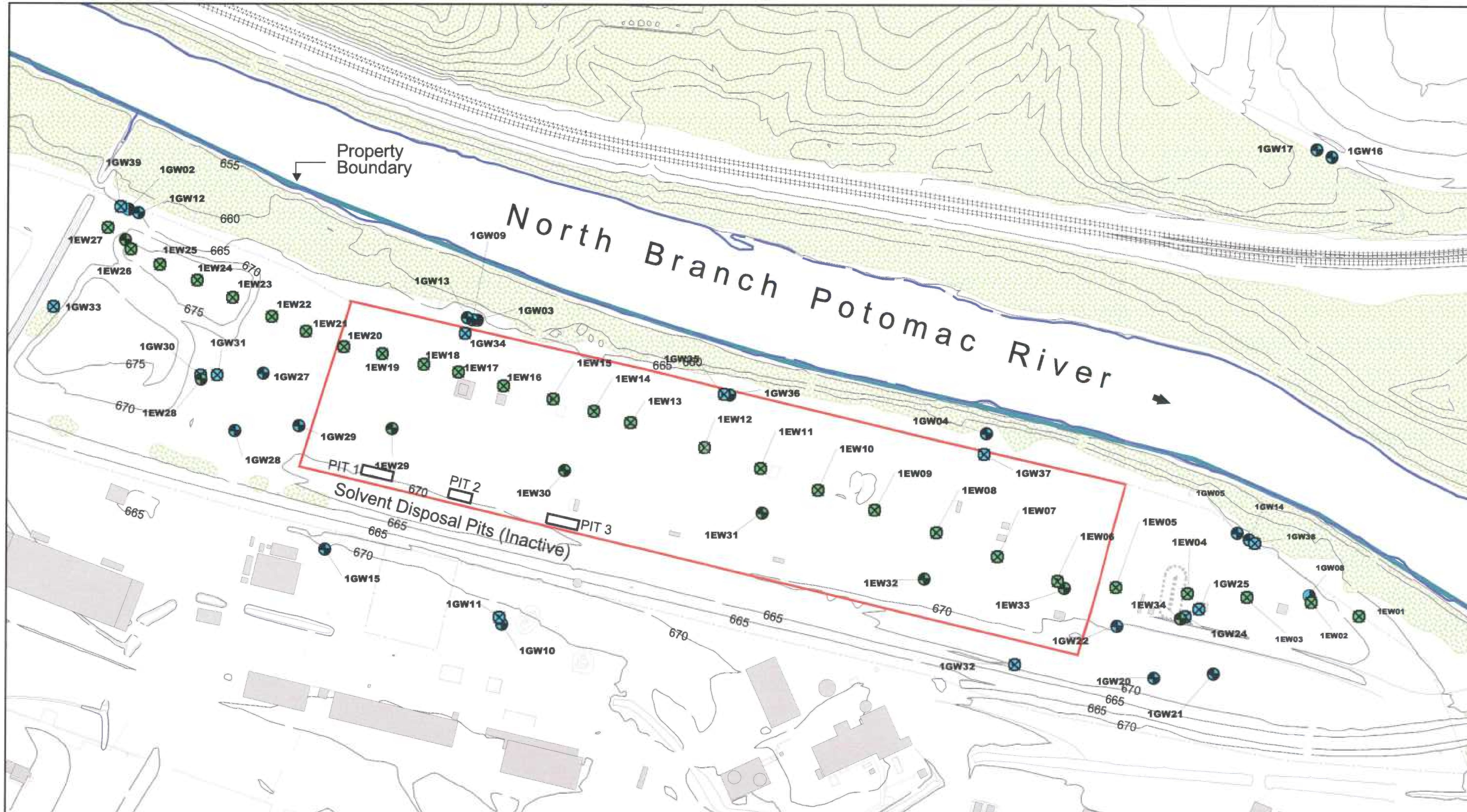

LEGEND
- Alluvial Extraction Wells
- Bedrock Extraction Wells
- Alluvial Monitoring Wells
- Bedrock Monitoring Wells
- Hybrid Monitoring Wells
- Burning Unit Boundary
- Contours

N

80 0 80 160 Feet

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

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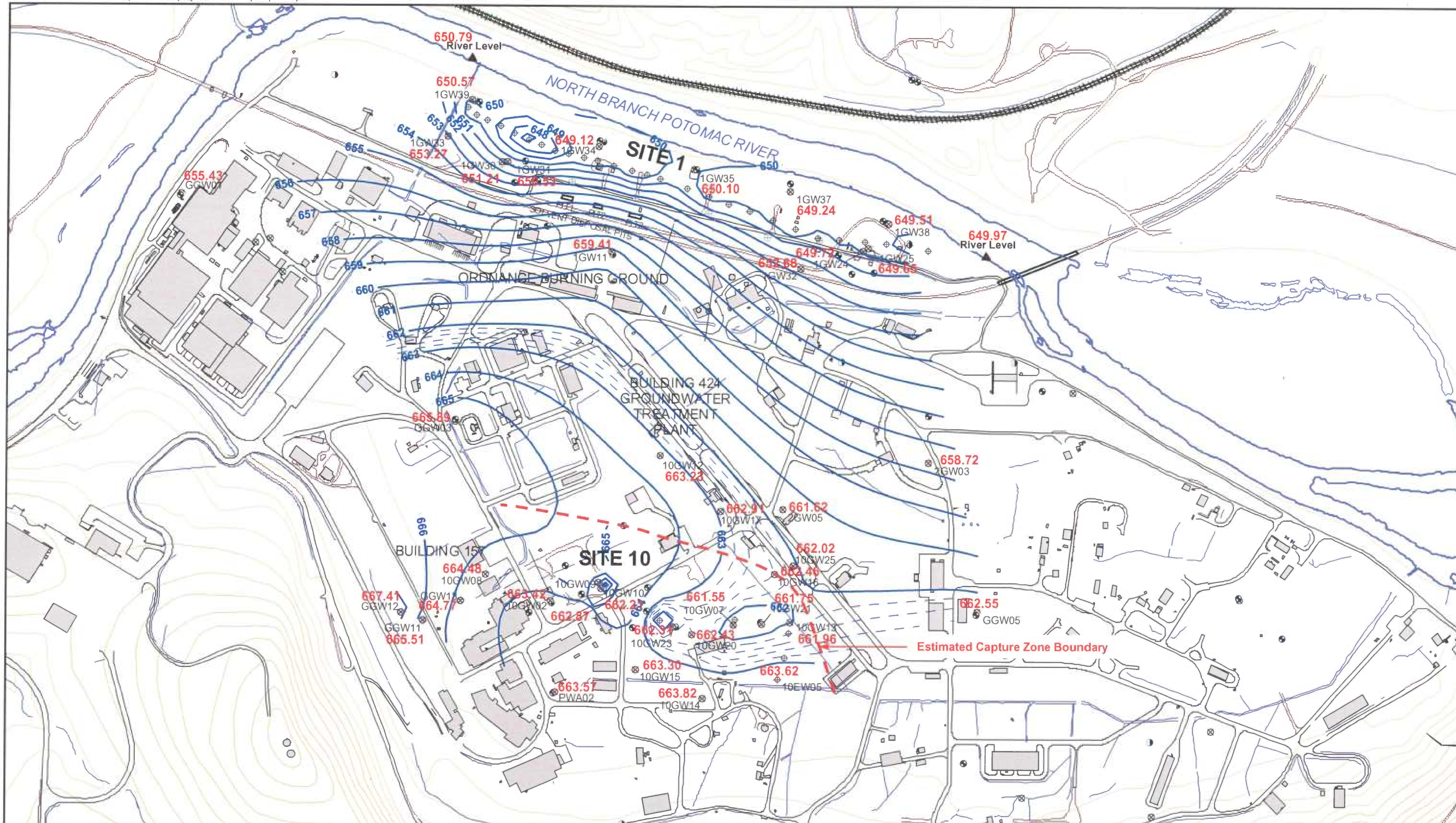
V:\abl\Site-10-soil-GW-workplan-oct-99\projects\dfink-maps-apr00-apr



Legend

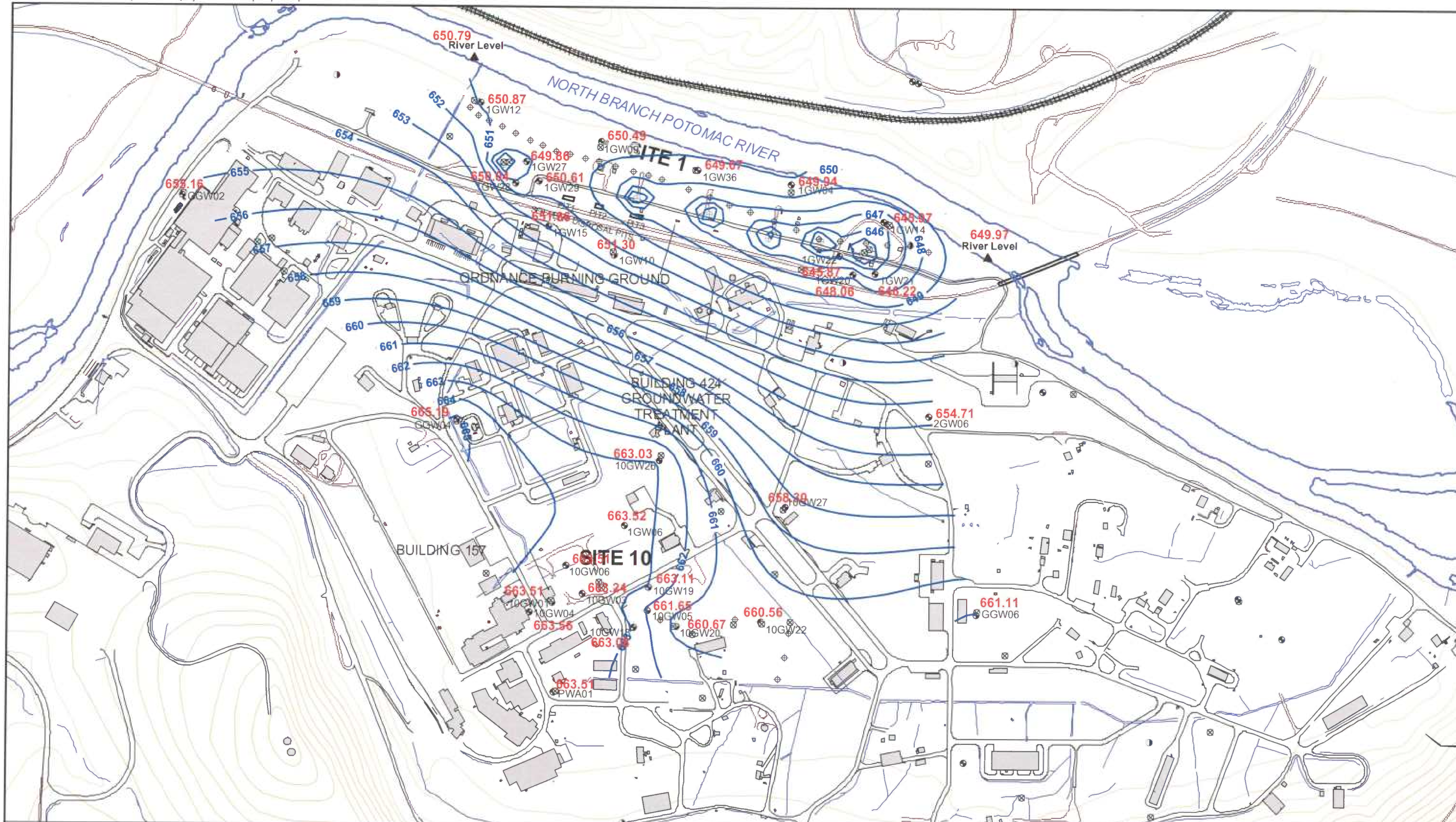
- Extraction Well - Alluvial
- Extraction Well - Bedrock
- Monitoring Well - Hybrid
- Monitoring Well - Alluvial
- Monitoring Well - Bedrock

N

400 0 400 800 Feet

Figure D-12
Alluvial Water Levels at Burning Grounds Measured on May 29, 2001
(Water Levels in Feet MSL)

CH2MHILL



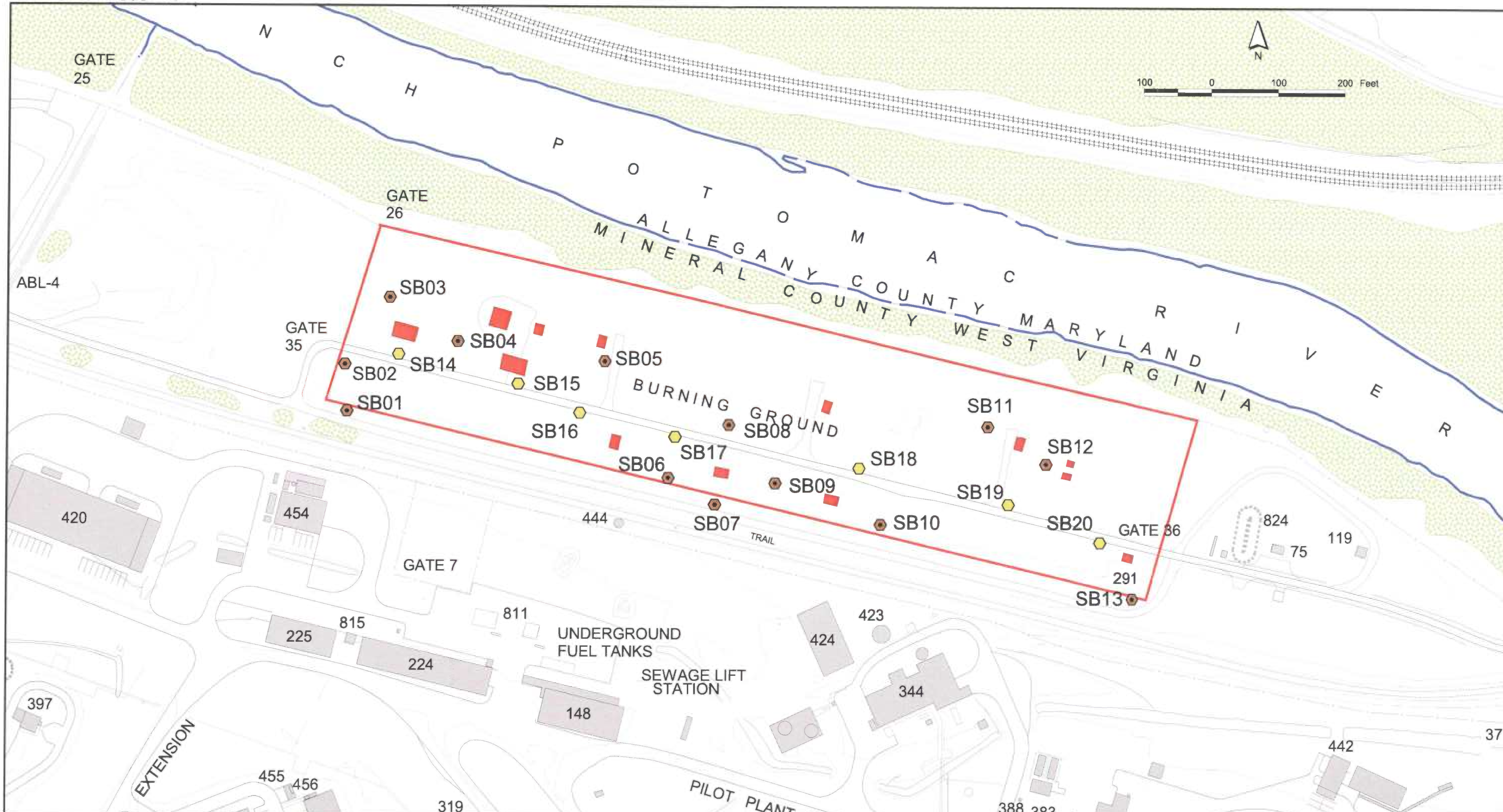
Legend

- Extraction Well - Alluvial
- Extraction Well - Bedrock
- Monitoring Well - Hybrid
- Monitoring Well - Alluvial
- Monitoring Well - Bedrock

Figure D-13
Bedrock Water Levels at Burning Grounds
Measured on May 29, 2001
(Water Levels in Feet MSL)

CH2MHILL

File Path: v:\18gis\abl\figures\site1_roger_102500.apr



LEGEND

- Proposed Surface Soil Sample Locations
- Proposed Surface Soil and Sub-surface Soil Sample Locations
- Existing and Historic Burn Pan Locations
- Burning Unit Boundary

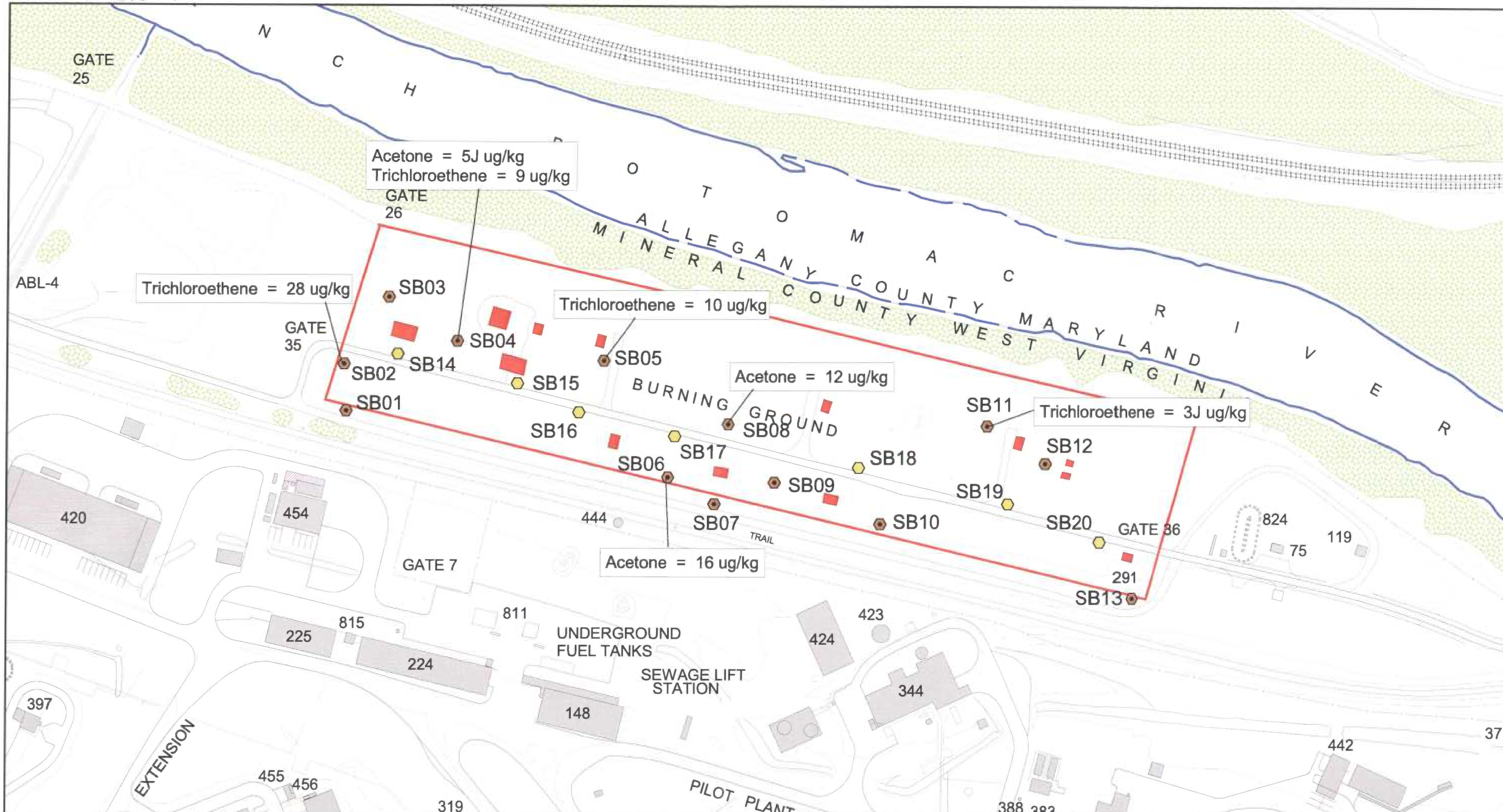
Station ID	Northing			Easting		
	Degree	Minute	Second	Degree	Minute	Second
SB01	39	33	54.3960	-78	50	7.1880
SB02	39	33	55.0800	-78	50	7.2240
SB03	39	33	56.0880	-78	50	6.3600
SB04	39	33	55.4400	-78	50	5.0280
SB05	39	33	55.1160	-78	50	2.2200
SB06	39	33	53.3880	-78	50	1.0320
SB07	39	33	53.0280	-78	50	0.1320
SB08	39	33	54.1800	-78	49	59.8440
SB09	39	33	53.3160	-78	49	58.9800
SB10	39	33	52.7040	-78	49	56.9280

Station ID	Northing			Easting		
	Degree	Minute	Second	Degree	Minute	Second
SB11	39	33	54.1440	-78	49	54.8760
SB12	39	33	53.5680	-78	49	53.7960
SB13	39	33	51.5880	-78	49	52.1400
SB14	39	33	55.2240	-78	50	6.1800
SB15	39	33	54.7920	-78	50	3.8760
SB16	39	33	54.3600	-78	50	2.7240
SB17	39	33	54.0000	-78	50	0.8880
SB18	39	33	53.5320	-78	49	57.3600
SB19	39	33	52.9920	-78	49	54.4800
SB20	39	33	52.4160	-78	49	52.7520

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

CH2MHILL

File Path: v:\18gis\abl\figures\site1_roger_102500.apr



LEGEND

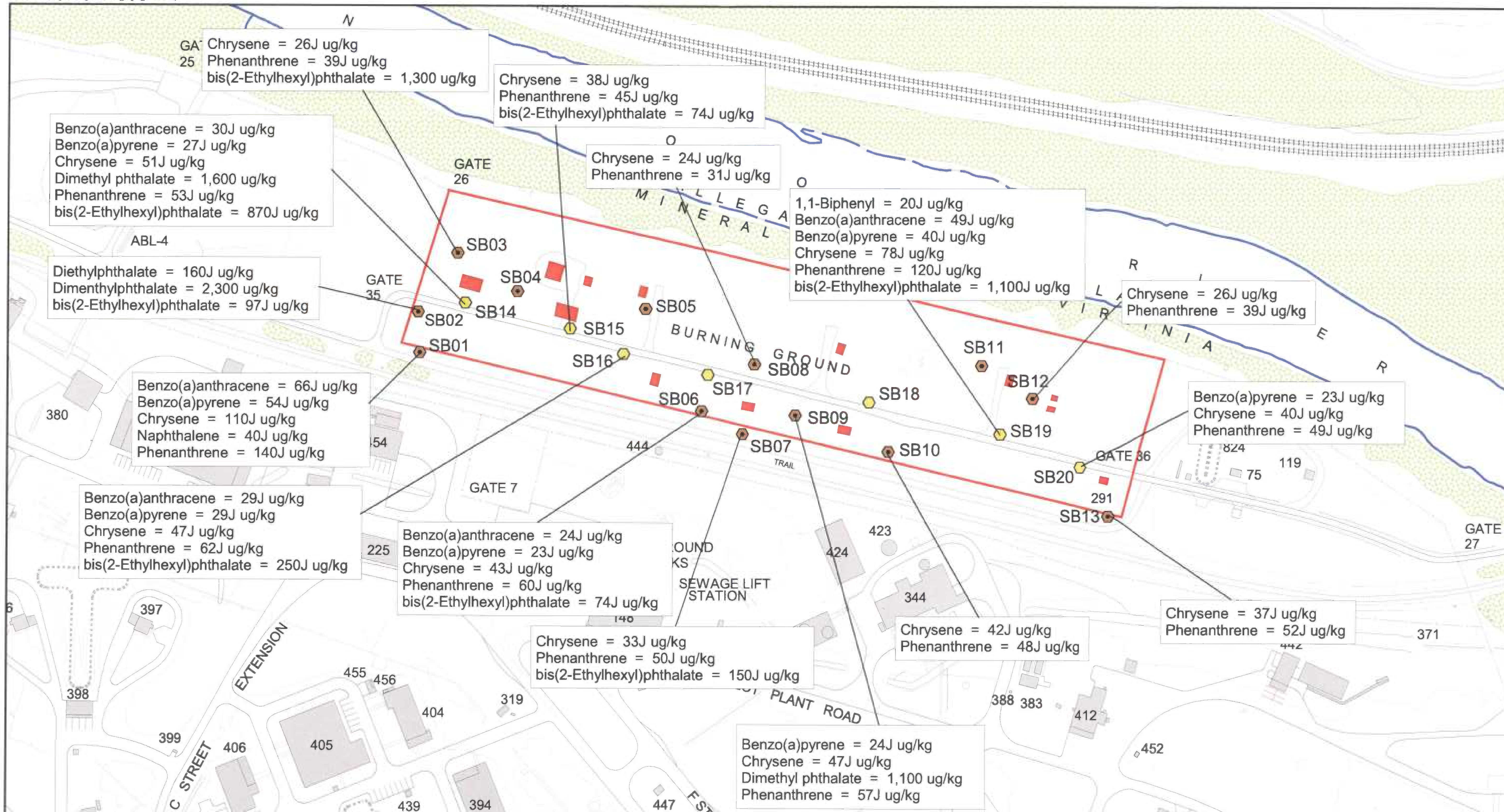
- Surface Soil Sample Locations
- Surface Soil and Sub-surface Soil Sample Locations
- Existing and Historic Burn Pan Locations
- Burning Unit Boundary

N

100 0 100 200 Feet

Figure D-15
Detected Volatile Organic Compounds
Surface Soil (0'-0.5') Samples
Burning Grounds
Allegany Ballistics Laboratory

CH2MHILL



LEGEND

- Surface Soil Sample Locations
- Surface Soil and Sub-surface Soil Sample Locations
- Existing and Historic Burn Pan Locations
- Burning Unit Boundary

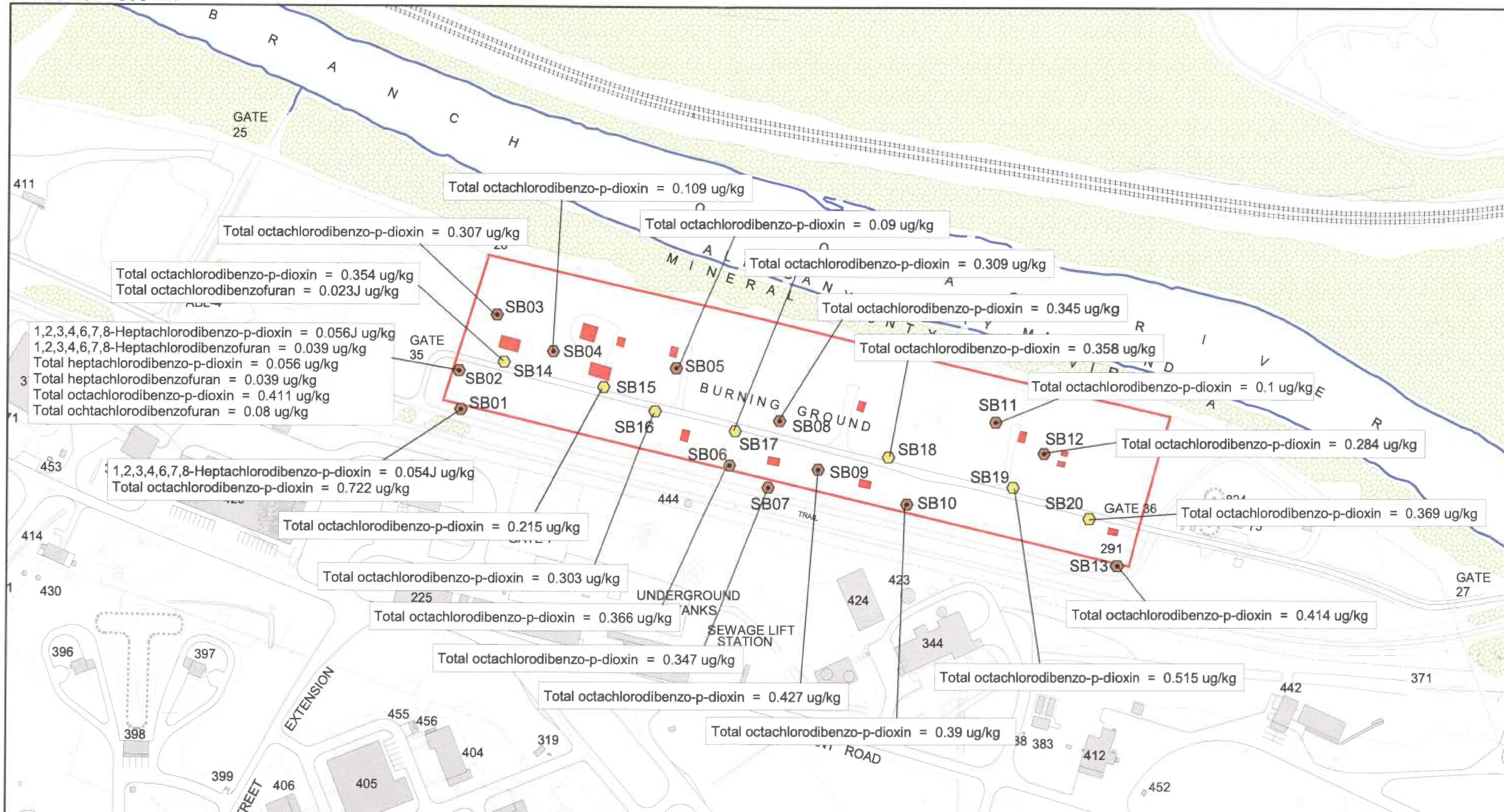
N

100 0 100 200 Feet

Figure D-16
Detected Semi Volatile Organic Compounds
Surface Soil (0'-0.5') Samples
Burning Grounds
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\site1_roger_102500.apr



LEGEND

- Surface Soil Sample Locations
- Surface Soil and Sub-surface Soil Sample Locations
- Existing and Historic Burn Pan Locations
- Burning Unit Boundary

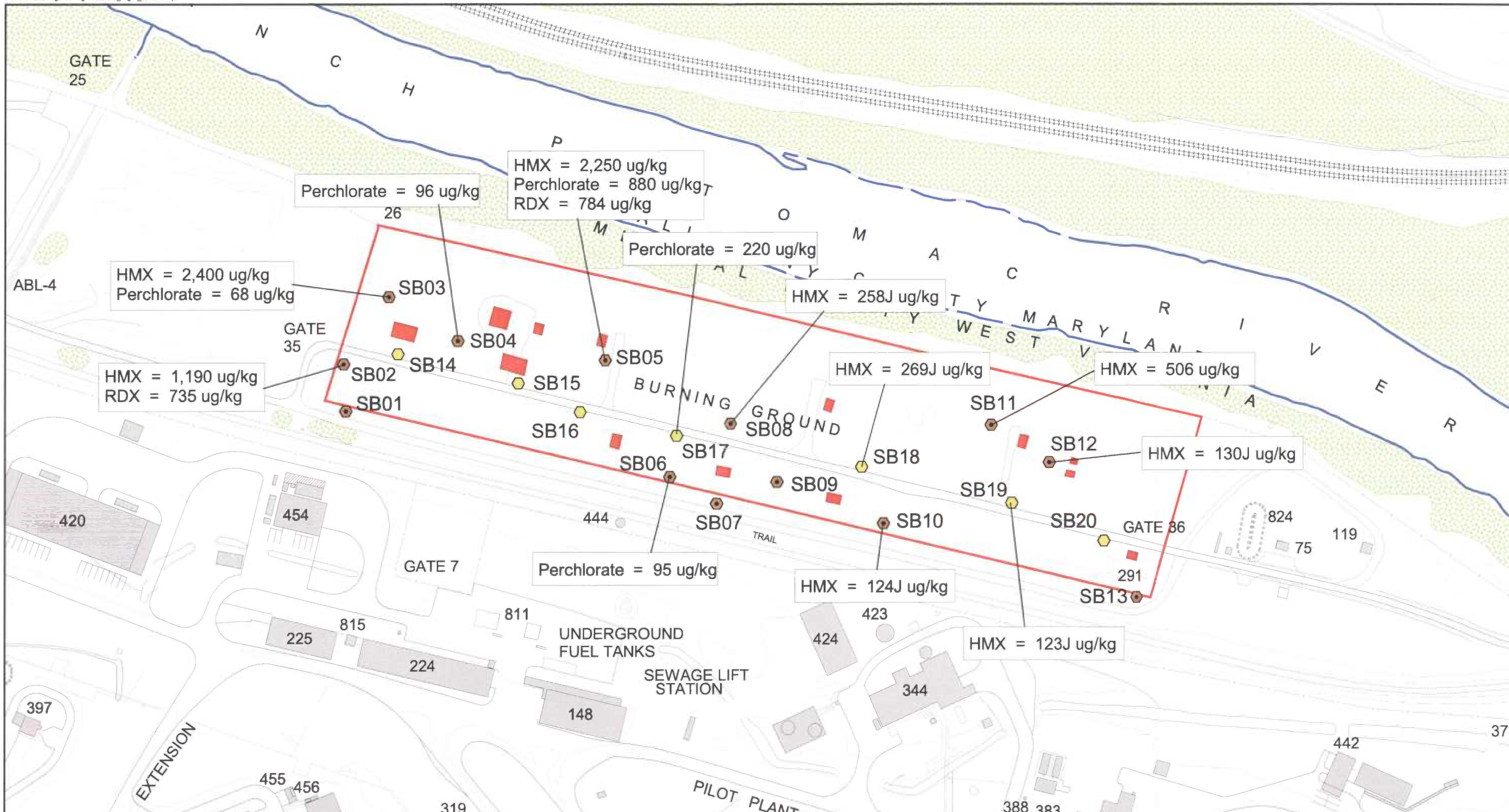
N

100 0 100 200 Feet

Figure D-17
Detected Dioxins/Furans
Surface Soil (0'-0.5') Samples
Burning Grounds
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\site1_roger_102500.apr



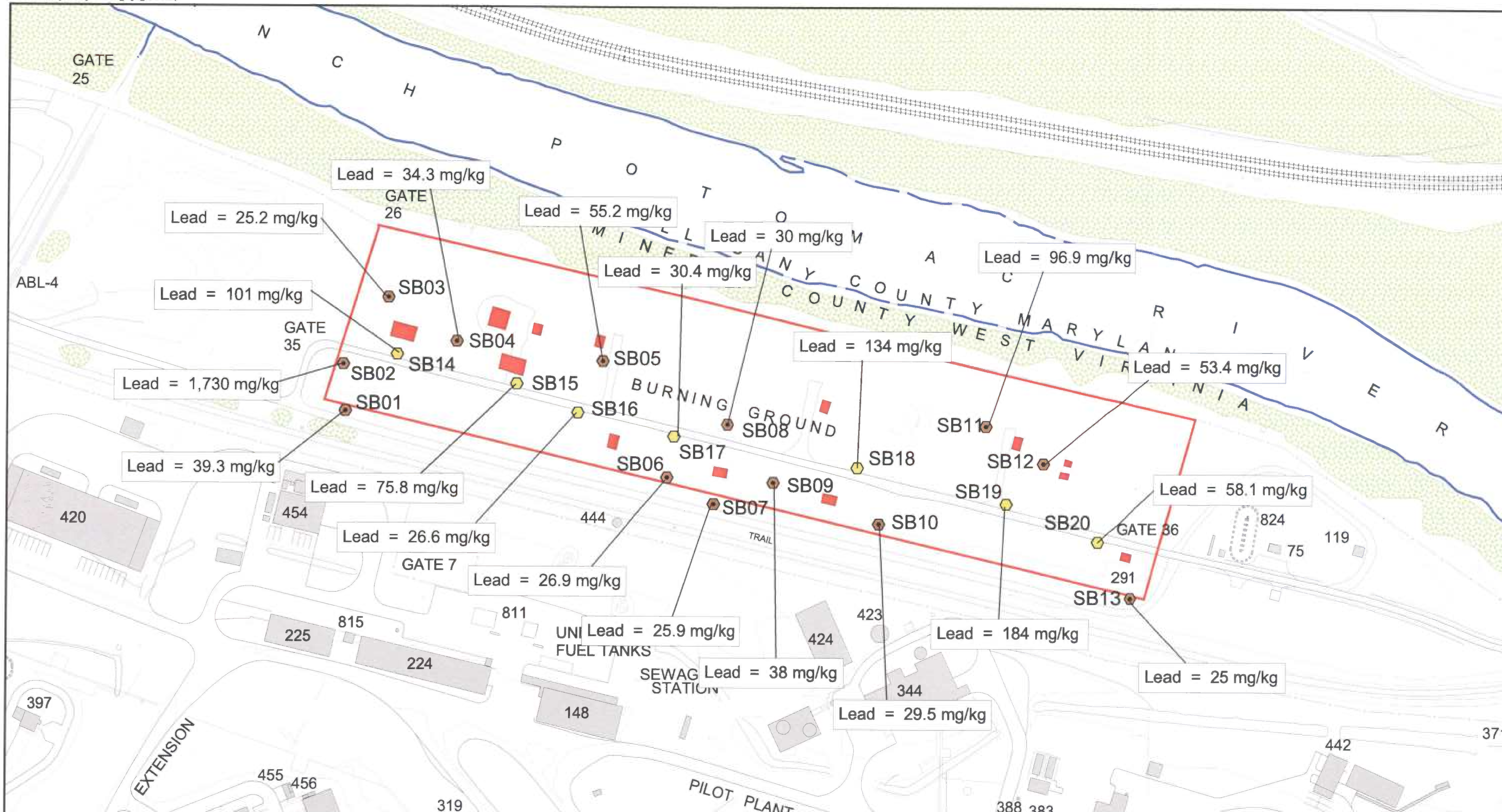
LEGEND

- Surface Soil Sample Locations
- Surface Soil and Sub-surface Soil Sample Locations
- Existing and Historic Burn Pan Locations
- Burning Unit Boundary

Figure D-18
Detected Explosive Compounds
Surface Soil (0'-0.5') Samples
Burning Grounds
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\site1_roger_102500.apr



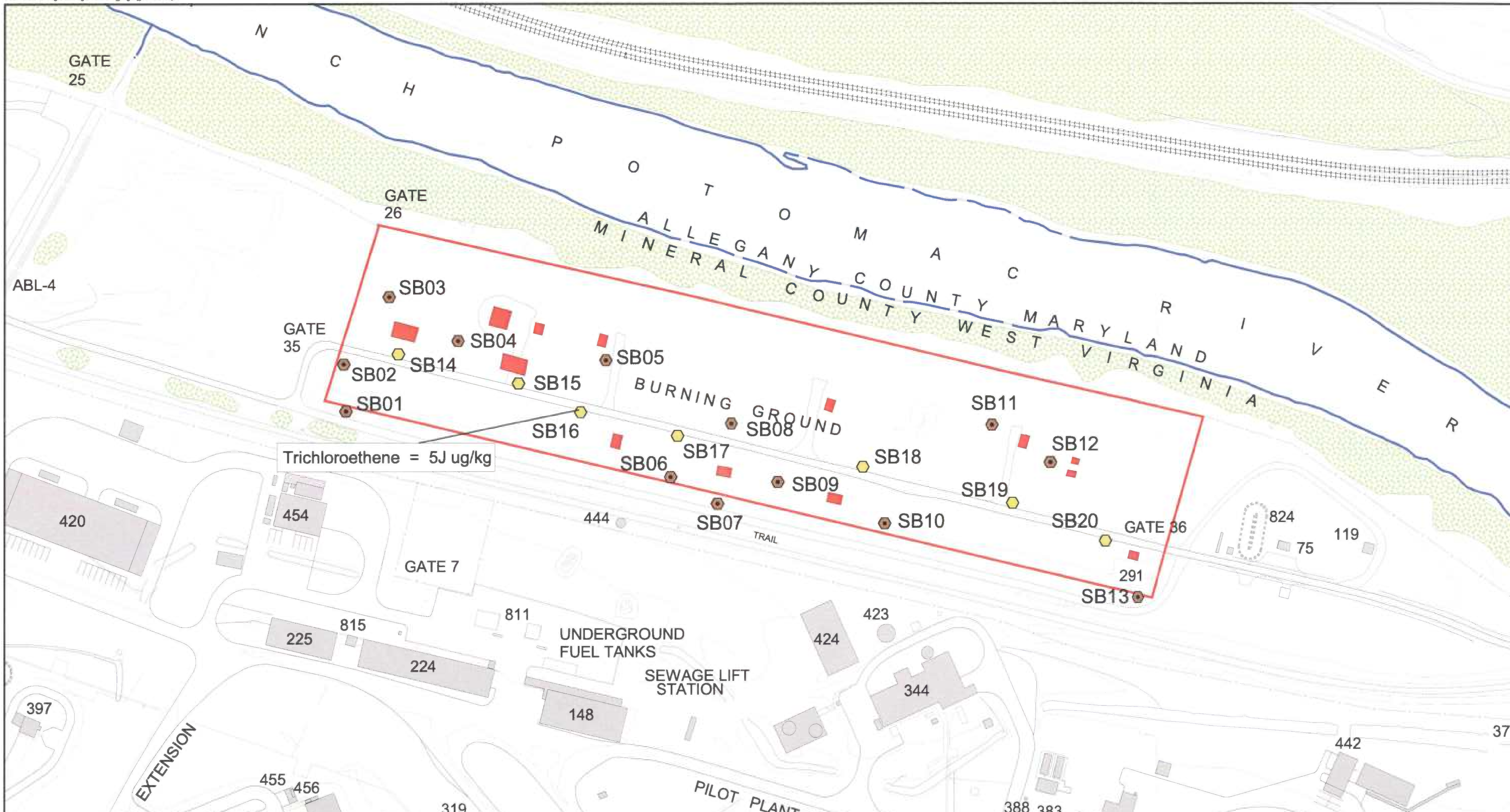
LEGEND

- Surface Soil Sample Locations
- Surface Soil and Sub-surface Soil Sample Locations
- Existing and Historic Burn Pan Locations
- Burning Unit Boundary

Figure D-19
Detected Lead
Surface Soil (0'-0.5') Samples
Burning Grounds
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\site1_roger_102500.apr



LEGEND

- Surface Soil Sample Locations
- Surface Soil and Sub-surface Soil Sample Locations
- Existing and Historic Burn Pan Locations
- Burning Unit Boundary

N

100 0 100 200 Feet

Figure D-20
Detected Volatile Organic Compounds
Subsurface Soil (1.5'-2') Samples
Burning Grounds
Allegany Ballistics Laboratory

CH2MHILL

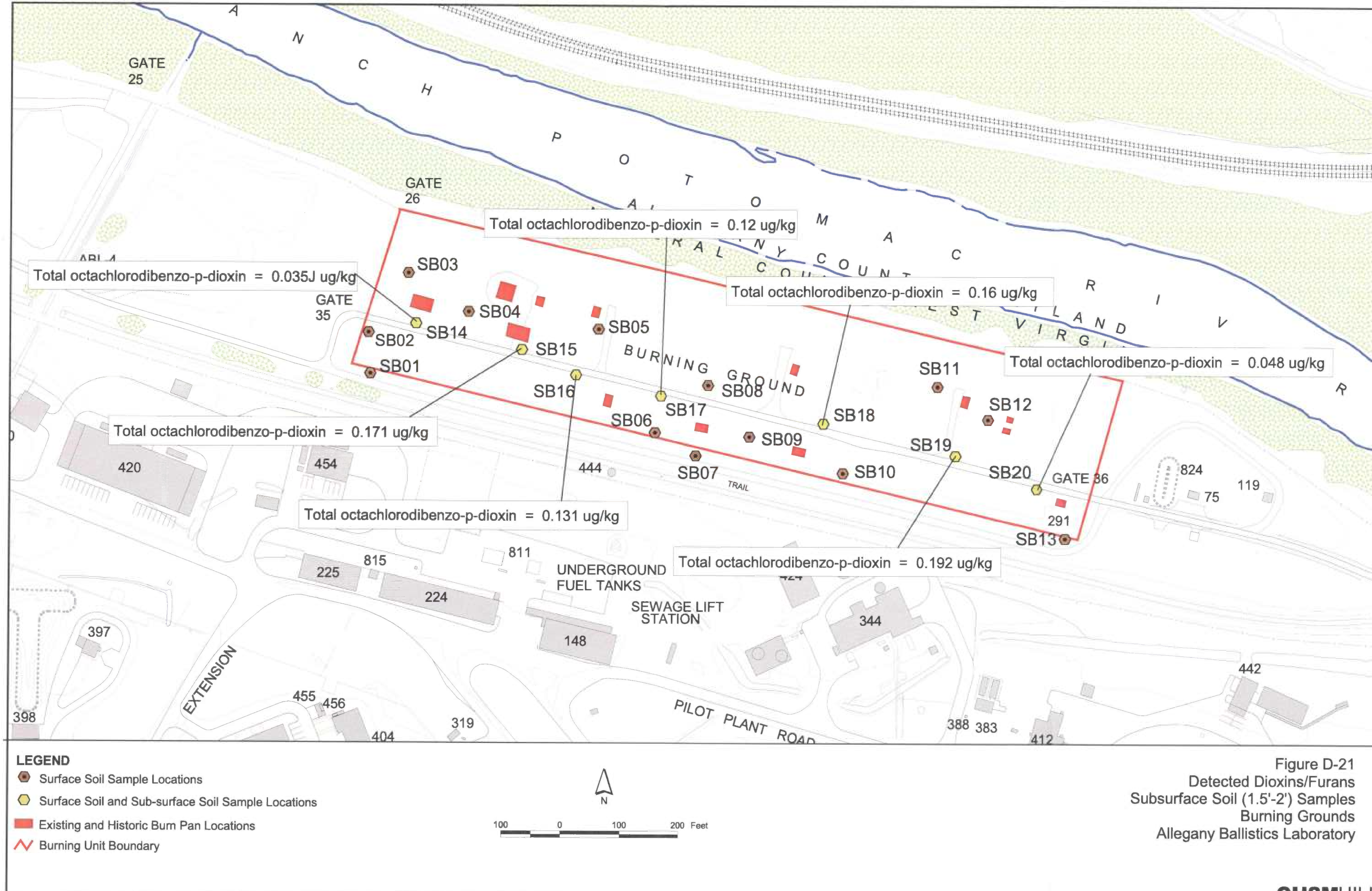


Figure D-21
Detected Dioxins/Furans
Subsurface Soil (1.5'-2') Samples
Burning Grounds
Allegany Ballistics Laboratory

CH2MHILL

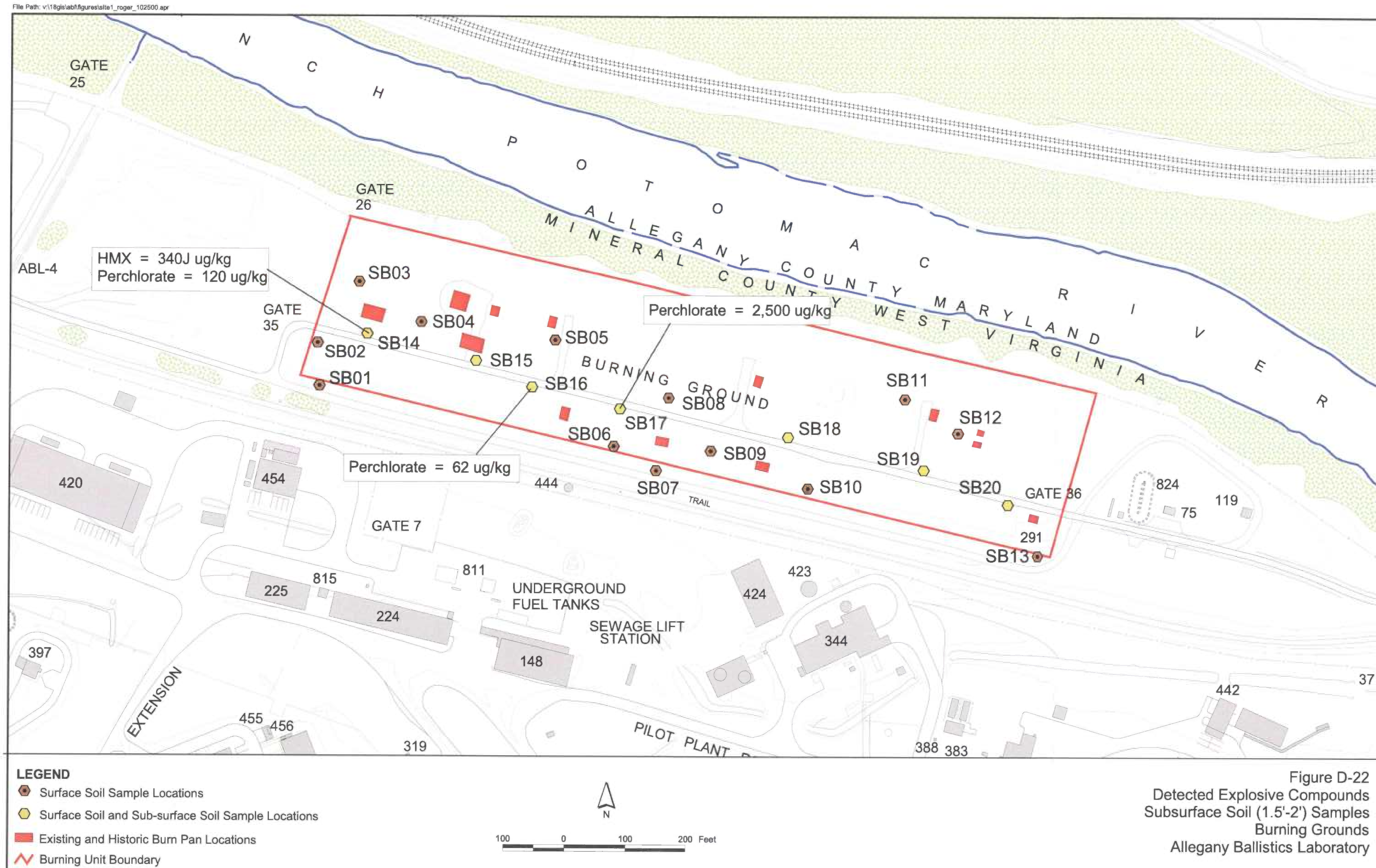


Figure D-22
Detected Explosive Compounds
Subsurface Soil (1.5'-2') Samples
Burning Grounds
Allegany Ballistics Laboratory

CH2MHILL

File Path: v:\18gis\abl\figures\site1_roger_102500.apr

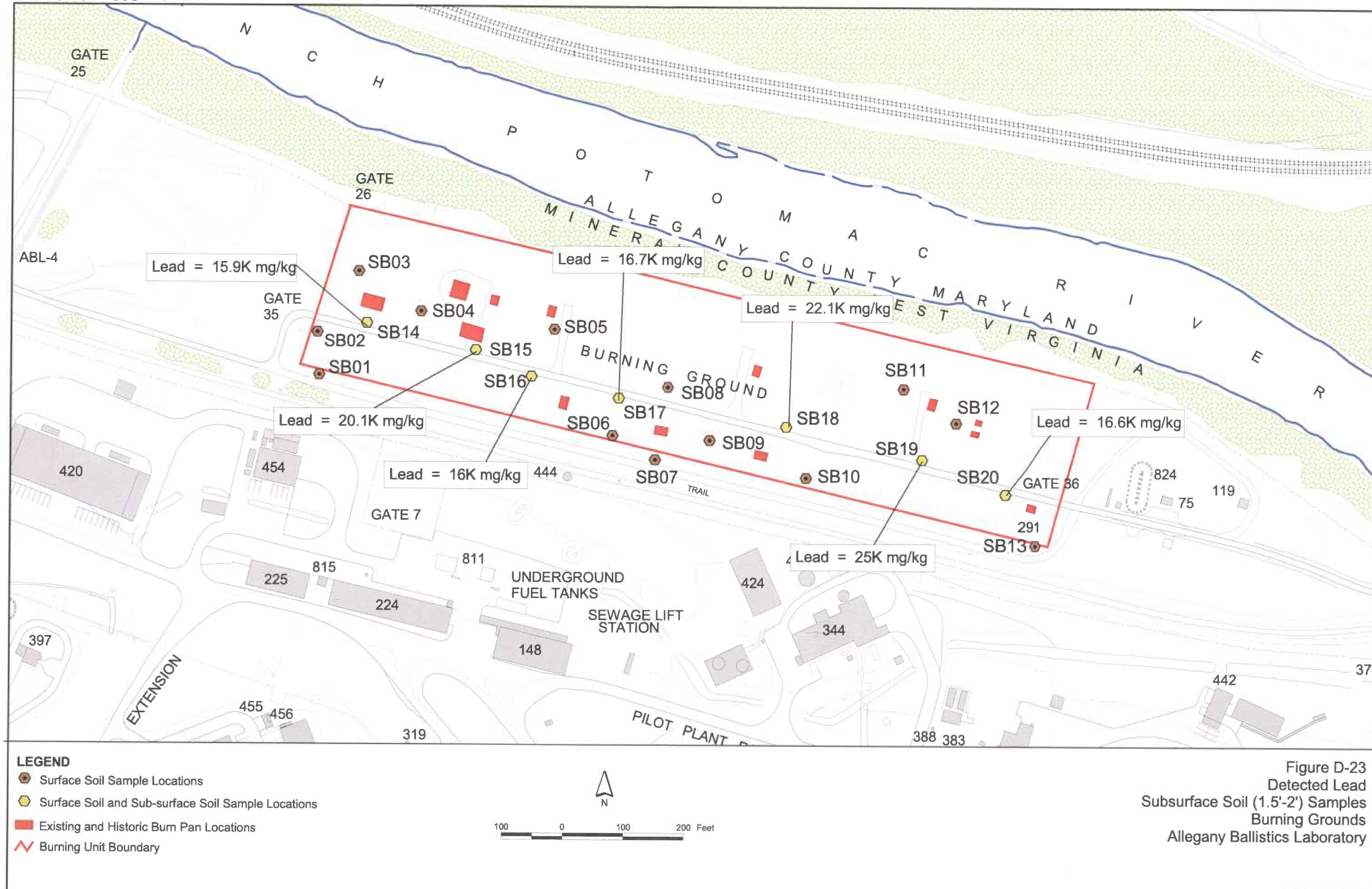


Figure D-23
Detected Lead
Subsurface Soil (1.5'-2') Samples
Burning Grounds
Allegany Ballistics Laboratory

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Section E
Groundwater Monitoring

Groundwater Monitoring

The Burning Grounds is a Subpart X unit where there is a potential for groundwater contamination. Section E is intended to provide a description of the proposed groundwater monitoring program.

E-1 Exemption from Groundwater Protection Requirements [270.14(c)]

The requirements of this section pertain to surface impoundments, landfills, or landfill treatment facilities; therefore, this section is not applicable.

E-1a Waste Piles [40 CFR 270.18(b), 264.90(b)(2) and (5)]

There are no waste piles at ABL. Therefore, this section is not applicable.

E-1b Landfill [40 CFR 264.90(b)(2)]

There are no active landfills at ABL. Therefore, this section is not applicable.

E-1c No Migration [40 CFR 264.90(b)(4)]

This section is not applicable.

E-2 Interim Status Groundwater Monitoring Data [270.14(c)(1), 265.90 – 265.94]

This section provides a summary of groundwater monitoring data and supporting documentation obtained during the interim status period.

E-2a Description of Interim Status Period Wells and Analytical Parameters

A RCRA baseline monitoring program was completed for groundwater at the Burning Grounds. The purpose of the baseline groundwater monitoring program was to evaluate the existing groundwater conditions and to establish a baseline for development of a long-term monitoring program under RCRA. This monitoring program comprised four rounds of quarterly groundwater sample collection from selected extraction wells in the Burning Grounds and selected upgradient monitoring wells. The existing wells installed as part of the CERCLA program activities were selected for RCRA baseline groundwater monitoring.

The initial round of RCRA baseline groundwater sampling was conducted in April 1999. The remaining three rounds of quarterly sampling were conducted in April 2000, July 2000, and October 2000. During each event, groundwater was sampled from nine extraction wells, four monitoring wells, and the treatment plant influent and effluent. Figure E-1 provides a topographic map of the Burning Grounds. This map shows the location of the wells sampled during the baseline period and shows the boundaries of the Burning Grounds as well as the property boundary.

The sampled monitoring wells comprised two upgradient alluvial monitoring wells (1GW11 and 1GW32), two upgradient bedrock monitoring wells (1GW10 and 1GW15), five downgradient alluvial extraction wells (1EW10, 1EW14, 1EW16, 1EW18, and 1EW21), and four downgradient bedrock extraction wells (1EW29, 1EW30, 1EW31, and 1EW33). Attachment E-1 provides details of the design and construction of each of the background monitoring wells. Attachment E-2 provides the details of the design and construction of each of the extraction wells for baseline RCRA groundwater monitoring. All samples collected from these wells were analyzed for full Appendix IX parameters (i.e., VOCs, SVOCs, pesticides, PCBs, herbicides, dioxins, furans, and metals), and for explosives, perchlorate, nitroglycerine, and nitrocellulose. A complete analytical parameter list is presented in Table E-1.

Evaluation of the analytical results of the four rounds of RCRA baseline groundwater monitoring indicates that VOCs are the most prevalent COPCs in groundwater beneath the Burning Grounds. Although solvents were historically present in a portion of the propellants burned at the Burning Grounds, it is unlikely that VOCs related to these solvents significantly contributed to groundwater contamination there. This is because, relative to the quantity of solvents discharged into the disposal pits, the solvents in the waste burned represented a minimal quantity of the VOCs potentially released in this area. Additionally, solvents that were associated with propellant were likely destroyed during burning. Any solvents not destroyed during burning are more likely to have volatilized than to have become dissolved in groundwater.

Perchlorate was the most prevalent explosive constituent detected with respect to concentration and distribution. The highest concentrations of perchlorate were from wells downgradient of the inactive solvent disposal pits 2 and 3. As discussed above, the presence of perchlorate in groundwater is attributed to both burning at the unit and its presence in the spent solvents discharged in the solvent disposal pits. Additionally, the explosive compounds HMX and RDX were found in groundwater collected from beneath the Burning Grounds, but with the exception of one detection of RDX, neither was found at a concentration above its groundwater protection standard.

None of the other organic constituents (i.e., SVOCs, pesticides, PCBs, herbicides, dioxins, furans) were detected at a statistically significant level in groundwater beneath the burning grounds. Additionally, the metals concentrations detected there were similar to those found elsewhere at Plant 1.

E-2b Description of Sampling/Analysis Procedures [40 CFR 265.92]

Attachment E-3 provides the Field Sampling Plan for the RCRA groundwater monitoring program. This document describes sample collection procedures, sample preservation and shipment procedures, field quality control procedures, and documentation requirements.

E-2c Monitoring Data [40 CFR 265.92]

The constituents detected in groundwater collected from background monitoring wells during the four RCRA baseline groundwater monitoring events are presented in Table E-2.

The constituents detected in baseline monitoring, downgradient extraction wells during the four RCRA events are summarized in Table E-3. Table E-4 provides groundwater surface elevation measurements corresponding to each sampling event. Table E-5 contains the mean and variance data for the background wells.

E-2d Statistical Procedures [40 CFR 265.93]

A statistical evaluation of all analytical data generated during the four rounds of RCRA baseline groundwater monitoring was completed to determine if there was a statistically significant increase in analyte concentrations between the upgradient and downgradient wells in each aquifer (i.e., alluvial and bedrock). For all detected parameters, an interwell statistical comparison between upgradient and downgradient wells for the alluvial and bedrock aquifers was performed using a non-parametric Mann-Whitney test with a significance level of 0.05. This evaluation was completed in accordance with the *Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/G-9* (EPA/600/R-96/08) and 40 CFR Part 264, Section 97.

Method detection limits (MDLs) were used for non-detect results when the practical quantitation limits were judged to be sufficiently high to potentially mask statistically significant increases in detected constituents.

In addition to the statistical evaluation, the analytical results for individual wells were compared to groundwater protection standards. USEPA Maximum Contaminant Levels (MCLs) were used as the groundwater protection standards where available. For constituents without established MCLs, other criteria (e.g., Drinking Water Exposure Limits (DWELs), USEPA Region III Risk-based Concentrations [RBCs] for tap water) were used.

Results of Statistical Evaluation — Baseline Evaluation

Table E-6 summarizes the results of the statistical evaluation for the alluvial and bedrock aquifer data. For those constituents that were found to be statistically higher in the downgradient wells, a comparison was made to the screening criteria and any exceedences also noted in the table.

E-2e Groundwater Assessment Plan [40 CFR 265.93(d)(2)]

The presence of the volatile constituents in groundwater is attributed to historic discharge of spent solvents in pits at the Burning Grounds, and is being addressed under a CERCLA remedial action and long-term monitoring program. A key component of this program is monthly piezometric surface monitoring that ensures all groundwater in the alluvial and bedrock aquifers at Site 1, including the area underlying the Burning Grounds, is hydraulically contained, extracted, and treated at the onsite groundwater treatment plant. Tri-quarterly (i.e., every 9 months) groundwater sampling conducted under CERCLA at Site 1 provides a means of monitoring the long-term reduction in volatile contaminant concentrations.

The evaluation of the four rounds of RCRA baseline groundwater data also indicated that hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) was detected beneath the Burning Grounds at a concentration above the DWEL, which requires implementation of a corrective action program. Therefore, an additional groundwater quality assessment program is not required.

The rate and extent of migration of the hazardous waste constituents and the concentration of the hazardous waste constituents are discussed in the sections that follow.

E-3 General Hydrogeologic Information [40 CFR 270.14(c)(2)]

The following discussion of hydrologic and geologic characteristics of the Burning Grounds was obtained from a compilation of several documents including the *Long-Term Monitoring Plan Site 1 – Burning Grounds* (CH2M HILL, 1998), *Phase I Aquifer Testing at Allegany Ballistics Laboratory* (CH2M HILL, 1998), *Phase II Aquifer Testing at Site 1 at Allegany Ballistics Laboratory* (CH2M HILL, 1999), and the *Draft Annual Long-Term Monitoring Report for Sites 1 and 10* (CH2M HILL, 2001).

Regional Geology

ABL is located in the Valley and Ridge Physiographic Province, near its western boundary with the Allegheny Plateau Province. The transition between these provinces is referred to as the Allegheny Structural Front. The Valley and Ridge Physiographic Province is underlain by sedimentary rocks folded and faulted during the Paleozoic Era. The linear belts of ridges and valleys that characterize the province result from differential erosion of the various rock types. In general, more-resistant sandstone underlies ridges, whereas less-resistant shale and soluble limestone underlie lowlands.

The most significant physiographic feature in the vicinity of ABL is Knobly Mountain, which flanks Plant 1 to the south and east. Plant 1, along the northern border of which lies the Burning Grounds, is located on the floodplain of the North Branch Potomac River at a point where the river has cut into the base of Knobly Mountain. Knobly

Mountain is the surface expression of a portion of the Wills Mountain anticlinorium, the anticlinal axis of which plunges to the southwest and trends approximately N30°E as it approaches Plant 1 from the southwest, but displays a more north-south trend immediately north of Plant 1.

Site Geology

The geology at the Burning Grounds has been characterized through a number of activities, including drilling, soil sampling, rock coring, geophysical logging and downhole video of boreholes, seismic refraction, seismic reflection, and fracture trace analysis. These activities identified three primary lithologic units which are described below.

Four interpretative geologic cross-sections of the material underlying the Burning Grounds have been prepared to assist in formulating a site conceptual model of site geology. Cross-section alignments are provided in Section D, Figures D-6, D-7, D-8, D-9, and D-10.

The natural surficial material at the Burning Grounds is a silty clay layer, considered to be floodplain deposits of the North Branch Potomac River. However, at some locations, particularly along the northern perimeter of the site, up to several feet of fill material are located at the surface. The silty clay is typically light to dark brown. Toward the lower parts of the layer there are traces of fine-grained sand. The thickness of the silty clay layer at the Burning Grounds ranges from approximately 10 to 15 ft; its base approximates the river surface elevation adjacent to the site (i.e., 648 ft).

Beneath the silty clay layer is an alluvial layer consisting of generally poorly sorted sand, gravel, pebbles, and cobbles, with variable but typically significant amounts of clay and silt. This layer is presumably alluvial channel deposits laid down by the North Branch Potomac River as it meandered across the valley. Drilling activities conducted at the Burning Grounds have determined that the gravel size and quantity generally increase with depth, producing a relatively transmissive zone at the base of the alluvium.

The saturated thickness of the alluvium varies across the Burning Ground. In general, the saturated thickness of the alluvial aquifer decreases from south to north across the site.

Directly beneath the alluvial deposits lies bedrock, consisting of primarily calcareous shale, limestone, and sandstone of Silurian age. As noted previously, the axis of Wills Mountain anticlinorium is assumed to pass through the Burning Grounds in a generally northeast-southwest orientation. The anticlinal axis is asymmetrical, however. On the southeast side of the axis, the strata are primarily calcareous shale that dip relatively gently to the southeast at approximately 30°. On the northwest side, the strata contain appreciable limestone and are generally vertical to slightly overturned.

Bedrock drilling has identified fracture sets at similar elevations across the Burning Grounds. Aquifer testing and geophysical logging of boreholes showed the eastern fracture sets tend to have higher production capacities than those in the west. This was supported by a seismic reflection survey that determined, in general, a higher density of fracture traces lie beneath the eastern portion of the site than beneath the western portion.

The bedrock surface across the Burning Grounds is fairly uniform with most of the high and low areas occurring in the southwestern corner of the Burning Grounds. The most significant feature is an apparent depression (i.e., 26 ft amsl) in the bedrock surface just along the western edge of the Burning Grounds. There are also several areas of relatively shallow bedrock (i.e., 14 ft amsl) in the southwestern corner of the Burning Grounds.

Site Hydrogeology

A conceptual hydrogeologic model of the alluvial and bedrock aquifers at the Burning Grounds was developed and refined to assist in the design and construction of a groundwater extraction and treatment system for VOC contamination in Site 1 groundwater under the CERCLA program. The groundwater extraction and treatment system at Site 1 has been in operation since September 1998 to hydraulically contain groundwater in the alluvial and bedrock aquifers beneath Site 1, which includes the Burning Grounds. A series of 27 alluvial and 7 bedrock extraction wells withdraw groundwater to maintain a cone of depression beneath the site and prevent contaminated groundwater from leaving the facility and discharging to the North Branch Potomac River. The discussion below provides an evaluation of natural (non-pumping) hydrogeologic conditions at the Burning Grounds in addition to current conditions.

An alluvial aquifer, consisting of 12 to 18 ft of silt, clay, sand, and gravel, is present across all of the Burning Grounds. The alluvial aquifer lies immediately above the bedrock, and is believed to be hydraulically well-connected, rather than separated from the bedrock aquifer by a low-permeability layer such as clay or weathered bedrock.

Natural groundwater flow in the alluvial aquifer at the Burning Grounds is north-northeast toward the North Branch Potomac River, with a generally uniform gradient of approximately 0.008. However, near the western end of the burning ground, the direction of alluvial groundwater flow changes to the north-northwest toward the river, with a steeper gradient of approximately 0.016. This phenomenon is likely due to a reduction in bedrock aquifer transmissivity at the western end of the site causing bedrock groundwater to mound as it approaches from an area of higher transmissivity.

During Phase II Aquifer Testing, alluvial extraction wells were installed and tested to evaluate how the aquifer hydraulic conductivity varied across the site. The tests revealed that hydraulic conductivities were highest across the eastern half of the Burning Grounds and lowest across the western half, with a sharp decrease in the hydraulic conductivities observed near the western third of the burning ground. Across the eastern half of the Burning Grounds the observed hydraulic conductivities range from approximately 13 ft/day to 182 ft/day, with a mean of approximately 70 ft/day. This contrasts with the observed hydraulic conductivities across the western half, which range from about 0.4 ft/day to 17 ft/day, with a mean of approximately 6 ft/day. Although there were two wells with calculated hydraulic conductivities greater than 60 ft/day in the western half (i.e., wells 1EW23 and 1EW26), all but 3 of the 14 hydraulic conductivity measurements were less than 10 ft/day.

Based upon the hydraulic gradient and hydraulic conductivity values presented above, the average linear velocity of natural (non-pumping) horizontal groundwater flow in the alluvial aquifer beneath the eastern half of the Burning Grounds is estimated to be approximately 1,000 ft/yr, depending on the amount of clay present. This calculation assumes an effective porosity of 20 percent for the alluvium. Because of the lower observed hydraulic conductivities, the average linear velocity of horizontal groundwater flow in the alluvial aquifer beneath the western half of the site is estimated to be about 175 ft/yr.

Unlike the alluvial aquifer, lateral groundwater flow in the bedrock aquifer is believed to be confined to partings along bedding planes, fractures, and solution channels. However, the direction of natural (non-pumping) bedrock groundwater flow across much of the Burning Grounds is similar to that of the alluvial aquifer (i.e., north-northeast toward the North Branch Potomac River). As determined during Phase II Aquifer Testing, except near the western end of the burning ground, the horizontal hydraulic gradient in the bedrock aquifer has a nearly uniform gradient of approximately 0.01. Near the west end of the burning ground, the groundwater flow becomes north-northwest toward the river with an increased horizontal hydraulic gradient of approximately 0.03. As stated previously, this phenomenon is likely due to a reduction in bedrock aquifer transmissivity at the western end of the site causing bedrock groundwater to mound as it approaches from an area of higher transmissivity.

Similar to the hydraulic conductivity values observed for the alluvial aquifer across the Burning Ground, the observed transmissivity of the bedrock aquifer beneath the eastern portion of the site (i.e., 285 ft^2/day) is approximately 4 times that observed for the bedrock beneath the western portion (i.e., 70 ft^2/day). As noted previously, this is believed due to the lower number of fractures apparently present below the western part of the site.

At nine locations across the Burning Grounds, a well screened in the alluvium is located adjacent to a well screened in the bedrock. At one of the locations, there is also a well screened in the shallow bedrock (i.e., less than 90 ft below ground surface, or bgs) next to one screened in the deep bedrock (i.e., greater than 90 ft bgs). During Phase II Aquifer Testing, water-level measurements from these paired wells were compared to determine the direction and magnitude of the vertical component of the hydraulic gradient between the alluvium and bedrock and between the shallow and deep bedrock. The results indicate under naturally occurring conditions (non-pumping) there is a downward vertical component of flow from alluvium to shallow bedrock at all locations except at the 1GW39/1GW12 alluvial/bedrock well pair. At the 1GW34/1GW9/1GW13 alluvial/shallow bedrock/deep bedrock well cluster, the vertical component of flow is downward from alluvium to shallow bedrock, but upward from deep bedrock to shallow bedrock and alluvium.

Phase II Aquifer Testing data also show the calculated vertical component of hydraulic gradient for the well pairs in the western portion of the Burning Grounds are generally lower than those for the well pairs in the eastern portion of the site. This suggests the alluvial and bedrock aquifers are better-connected hydraulically at the west end of the Burning Grounds than at the east end. Since groundwater extraction began, the vertical component of groundwater flow is more strongly downward from the alluvium to bedrock due to the much higher rate of groundwater extraction from the bedrock aquifer.

Water-level data gathered from all Site 1 bedrock monitoring wells during May 2001 were used to generate a piezometric surface representation of current bedrock aquifer conditions. Based on this information, bedrock and alluvial groundwater flow along the northern boundary of the Burning Grounds is no longer north-northwest toward the North Branch Potomac River. A significant cone of depression has been created by pumping of the alluvial and bedrock extraction wells that has resulted in containment of the alluvial and bedrock groundwater beneath the Burning Grounds and prevention of its discharge to the North Branch of the Potomac River.

E-4 Topographic Map Requirements [40 CFR 270.14(c)(2), (3), (4)(i)]

Figure E-1 provides a topographic map of Burning Grounds. This map shows the location of the wells sampled during the interim status period, the boundaries of the hazardous waste management unit, the property boundary in the vicinity of the Burning Grounds, and the groundwater flow direction (not accounting for conditions during pumping). While the groundwater extraction system is effectively containing groundwater beneath the Burning Grounds, the point of compliance will be represented by the extraction wells to be sampled as part of the corrective action monitoring program. These wells provide current downgradient compliance points across the width of the RCRA unit.

Figure E-2 presents the horizontal extent of the total VOC plume in the alluvial aquifer, as determined during the July 2000 CERCLA groundwater sampling event. Figure E-3 presents the horizontal extent of the total VOC plume in the bedrock aquifer, as determined during the July 2000 CERCLA groundwater sampling event. Figure E-4 presents the vertical extent of the total VOC plume in the alluvial and bedrock aquifers, as determined during the same event. Figure E-5 presents the detected concentrations of explosive compounds in both alluvial and bedrock wells, as determined in July 2000.

E-5 Contaminant Plume Description [40 CFR 270.14(c), (2), (4) and (7)(ii); Part 261, Appendix VIII]

Evaluation of the analytical results of the four rounds of RCRA baseline groundwater monitoring indicate that VOCs are the most prevalent COPCs in groundwater beneath the Burning Grounds. The analytical results are presented in tables E-2 and E-3. The horizontal and vertical extent of total VOCs in groundwater, as determined during the July 2000 groundwater sampling event, are presented in Figures E-2, E-3, and E-4.

In the nine downgradient wells (i.e., the alluvial and bedrock extraction wells), seven VOCs (1,1,2-trichloroethane, 1,2-dibromo-3-chloropropane, 1,2-dichloroethane, benzene, chloromethane, cis-1,2-dichloroethene, and tetrachloroethane) were infrequently detected, and generally at low concentrations. Table E-7 displays the nine VOCs most commonly detected, the corresponding range of detections, and frequency of detections, in order of decreasing detection frequency.

VOCs in groundwater beneath the Burning Grounds are part of a CERCLA remedial action, documented in the *Final Record of Decision (ROD) for Site 1 Operable Unit 3: Groundwater, Surface water, and Sediment at Allegany Ballistic Laboratory, West Virginia,* April 1997. TCE was the primary constituent of concern for the CERCLA groundwater remedial action at Site 1. The presence of TCE in groundwater is primarily is attributed to its historic use as a solvent at the facility and subsequent disposal in three solvent disposal pits located in the western portion of the Burning Grounds (identified as solvent disposal pits 1, 2, and 3 in Figure E-1).

Although solvents were historically present in a portion of the propellants burned at the Burning Grounds, it is unlikely that VOCs related to these solvents significantly contributed to groundwater contamination there. This is because, relative to the quantity of solvents discharged into the disposal pits, the solvents in the waste burned represent a minimal quantity of the VOCs potentially released in this area. Additionally, solvents that were associated with propellant were likely destroyed during burning. Any solvents not destroyed during burning are more likely to have volatilized than to have become dissolved in groundwater.

Figure E-5 presents the detected concentrations of selected explosive compounds in both alluvial and bedrock wells, as determined during the July 2000 groundwater sampling event. Perchlorate was the most prevalent explosive constituent detected with respect to concentration and distribution. Detected concentrations of perchlorate ranged from less than 5 μg/l to 34,900 μg/l. The highest concentrations of perchlorate were from wells downgradient of solvent disposal pits 2 and 3. TCE was used to clean composite propellant, which contained ammonium perchlorate. Therefore, the presence of perchlorate in groundwater is attributed to both burning at the unit and its presence in the spent solvents discharged in the solvent disposal pits. Additionally, the explosive compounds HMX and RDX were found in groundwater collected from beneath the Burning Grounds, but with the exception of one detection of RDX (above the DWEL), neither was found at a concentration above its groundwater screening criteria.

None of the other Appendix IX organic constituents (i.e., SVOCs, pesticides, PCBs, herbicides, dioxins, furans) were detected at a statistically significant level in groundwater beneath the burning grounds. Additionally, the metals concentrations detected there were similar to those found elsewhere at Plant 1.

E-6 General Monitoring Program Requirements [40 CFR 270.14(c)(5), 264.97, 264.90(b)(4)]

Because both statistically significant increases of groundwater constituents and at least one groundwater protection standard exceedance have been identified, and because there is an existing groundwater extraction system in operation at the Burning Grounds, it is proposed that a corrective action monitoring program be instituted for groundwater at the permitted unit.

The corrective action monitoring program is described in Section E-9.

E-6a Description of Wells [40 CFR 264.97(a), (b), (c)]

A description of the wells for the corrective action monitoring program is described in attachments E-1 and E-2, boring logs.

E-6b Description of Sampling/Analysis Procedures [40 CFR 264.97(d), (e), (f)]

A description of the sampling and analysis procedures for the corrective action monitoring program is described in Section E-9 and in Attachment E-3.

E-6c Procedures for Establishing Background Quality [40 CFR 264.97(a)(1), (g)]

One upgradient alluvial monitoring well (1GWll) and one upgradient bedrock well (1GW10) will be used to establish background groundwater quality. These wells were part of the background well set used for the baseline monitoring program.

E-6d Statistical Procedures [40 CFR 264.97(h); (i)(1), (5), and (6)]

Statistical evaluations will not be performed on the data generated during the corrective action monitoring program. The purpose of statistical evaluations is to determine if groundwater beneath the unit has been impacted. Because it has already been determined that constituents are present in groundwater at concentrations exceeding the groundwater protection standards at the point of compliance, a statistical evaluation is not necessary.

E-7 Detection Monitoring Program [40 CFR 270.14(c)(6), 264.91(a)(4), 264.98]

Under 40 CFR 264.98, the objective of a detection monitoring -program is to determine if a release from a unit has occurred by comparing groundwater constituent concentrations in wells upgradient of the permitted unit to those downgradient of the unit. If a statistically significant increase in constituent concentrations are identified, a compliance monitoring program may be warranted.

The results of the statistical evaluation of the RCRA baseline groundwater monitoring data for the Burning Grounds indicate there is statistically significant evidence of a release. Therefore, a detection monitoring program is not applicable; applicability of a compliance monitoring or corrective action monitoring program should be evaluated.

E-8 Compliance Monitoring Program [40 CFR 270.14(c)(7), 264.99]

Under 40 CFR 264.99, the objective of a compliance monitoring program is to determine if the concentrations of constituents exhibiting a statistically significant increase exceed established groundwater protection standards. If constituent concentration(s) exceed groundwater protection standard(s), a corrective action program may be warranted.

Groundwater data collected during RCRA baseline monitoring suggest that at least one groundwater protection standard has been exceeded beneath the Burning Grounds. Therefore, a compliance monitoring program is not applicable; applicability of a corrective action monitoring program should be evaluated.

E-9 Corrective Action Program [40 CFR 270.14(c)(8), 264.100, 264.99(I)]

As mentioned above, because both statistically significant increases of groundwater constituents and at least one groundwater protection standard exceedance have been identified, and because there is an existing groundwater extraction system in operation at the Burning Grounds, it is proposed that a corrective action monitoring program be instituted for groundwater at the permitted unit.

E-9a Characterization of Contaminated Groundwater [40 CFR 270.14(c)(8)(i)]

Section E-2 provides a characterization of the contaminated groundwater beneath the Burning Grounds.

E-9b Concentration Limits [40 CFR 270.14(c)(8)(ii), 264.9(a)(2), 264.94(b)]

Table E-8 provides the maximum concentration limits for the constituents that will be sampled during the corrective action monitoring program.

E-9c Alternative Concentration Limits [40 CFR 270.14(c)(8)(ii), 264.99(a)(2), 264.94(b)]

No alternative concentration limits have been established; therefore, this section is not applicable.

E-9d Corrective Action Plan [40 CFR 270.14(c)(8)(iii), 264.100(b)]

The proposed corrective action relies on the use of the existing groundwater extraction and treatment system to prevent offsite migration of contaminated groundwater beneath the Burning Grounds. The corrective action plan includes extraction of groundwater from the alluvial and bedrock aquifers beneath the Burning Grounds and subsequent treatment at the on-site groundwater treatment plant. This corrective action plan is being implemented as part of a CERCLA remedial action, documented in the *Final Record of Decision (ROD) for Site 1 Operable Unit 3: Groundwater, Surface water, and Sediment at Allegany Ballistic Laboratory, West Virginia,* April 1997. Details concerning the corrective action plan, including location, construction details, plans for removing wastes, descriptions of the treatment technologies, effectiveness of the correction program, additional hydrogeologic information, and operation and maintenance plans, are provided in the ROD (Attachment E-4) and other relevant project documents prepared under CERCLA.

One of the primary goals for the corrective action plan is to maintain a hydraulic barrier between the groundwater beneath the site and the North Branch Potomac River. In doing so, contaminated groundwater is prevented from discharging to the river. In order to demonstrate that this goal is being achieved, monthly manual water-level measurements are collected from all wells in and around the Burning Grounds (approximately 70 wells). These measurements are used to generate piezometric surface maps of both the alluvial and bedrock aquifers, which show the area of groundwater hydraulically contained.

If the groundwater extraction system is modified such that hydraulic containment in both aquifers beneath the Burning Grounds no longer can be demonstrated (other than for short-duration system shutdowns for maintenance and repairs), a proposed alternative groundwater monitoring program, consistent with the requirements of 40 CFR 264 Subpart F, will be submitted to WVDEP within 60 days. Short duration system shutdowns are defined as those less than or equal to 30 days.

E-9d(1) Location [40 CFR 270.14(c)(8)(iii), 264.100(b)]

See Attachment E-4.

E-9d(2) Construction Detail [40 CFR 270.14(c)(8)(iii), 264.100(b)]

See Attachment E-4.

E-9d(3) Plans for Removing Wastes [40 CFR 270.14(c)(8)(iii), 264.100(b)]

See Attachment E-4.

E-9d(4) Treatment Technologies [40 CFR 270.14(c)(8)(iii), 264.100(b)]

See Attachment E-4.

E-9d(5) Effectiveness of Correction Program [40 CFR 270.14(c)(8)(iv), 264.100(b)]

See Attachment E-4.

E-9d(6) Reinjection System [40 CFR 270.14(c)(8)(iii), 264.100(b)]

See Attachment E-4.

E-9d(7) Additional Hydrogeologic Data [40 CFR 270.14(c)(8)(iii), 264.100(b)]

See Attachment E-4.

E-9d(8) Operation and Maintenance [40 CFR 270.14(c)(8)(iii), 264.100(b)]

See Attachment E-4.

E-9d(9) Closure and Post-Closure Plans [40 CFR 270.14(c)(8)(iii), 264.100(b)]

See Attachment E-4.

E-9e Groundwater Monitoring Program [40 CFR 270.14(c)(8)(iv), 264.100(d)]

The proposed corrective action groundwater monitoring program relies on the use of the existing extraction system wells to monitor both hydraulic containment and groundwater quality.

E-9e(1) Description of Monitoring System [40 CFR 270.14(c)(7)(v), (8)]

While groundwater capture beneath the Burning Grounds is maintained by the extraction system, the monitoring program will include sampling three alluvial extraction wells (1EW8, 1EW12, and 1EW16) and three bedrock extraction wells (1EW29, 1EW31, and 1EW33) that are selected to represent downgradient points spanning the width of the unit. One upgradient alluvial well (1GW11) and one upgradient bedrock well (1GW10) will also be sampled as points of comparison. Table E-9 provides a list of the wells, their depths, and screened intervals for the wells to be sampled during the corrective action program. Well construction diagrams are provided in attachments E-1 and E-2.

In addition to sampling activities, hydraulic head (water-level) data will be collected monthly under the CERCLA program to confirm long-term capture of alluvial and bedrock groundwater beneath the Burning Grounds.

E-9e(2) Description of Sampling and Analysis Procedures [40 CFR 270.14(c)(7)(vi), (8)]

Groundwater samples will be collected on a 9-month cycle, in conjunction with the CERCLA long-term monitoring program. The groundwater samples will be analyzed for dissolved RCRA metals (plus zinc), explosives, nitroglycerine, and perchlorate. Table E-10 provides a list of the specific analytes, analytical methods, and instrument quantitation limits applicable for the corrective action program. Laboratory analytical results will be validated by an independent data validator. In addition to the laboratory analyses, measurements of the following parameters will be made using hand-held meters at each well: pH, temperature, specific conductance, and dissolved oxygen.

A description of the sampling and analysis and field quality control procedures for the corrective action monitoring program is presented in Attachment E-3.

E-9e(3) Monitoring Data and Statistical Procedures [40 CFR 270.14(c)(7)(vi), (8)]

Statistical evaluations will not be performed on the data generated during the corrective action monitoring program. The purpose of statistical evaluations is to determine if groundwater beneath the unit has been impacted. Since it has already been determined that constituents are present in groundwater at concentrations exceeding the groundwater protection standards at the point of compliance and a corrective action plan is already being implemented, a statistical evaluation is not necessary.

The monitoring data will be used to provide characterization of the contaminated groundwater including concentrations of hazardous constituents compared to established concentration limits. In addition to the analytical data, monthly piezometric surface maps will be generated under the CERCLA program to demonstrate the effectiveness of the corrective action program.

E-9e(4) Reporting Requirements [40 CFR 264.100(g)]

As noted above, all piezometric surface maps generated under the CERCLA program will be submitted to WVDEP to verify long-term hydraulic containment beneath the Burning Grounds. Each set of maps will be provided to WVDEP within 45 days of collecting the water levels.

Following each sampling event, all of the groundwater data collected under the RCRA long-term monitoring program will be summarized in a report. Each report will contain a short (1 to 2-page) narrative that describes the sampling activities (i.e., sample date, wells sampled, and analytical parameters) and how the analytical results compare to previous sampling rounds and the regulatory screening criteria. Each report will also contain four appendices: (1) table of detects from current round, (2) table of detects from all rounds, (3) table of raw analytical data from current round, and (4) a compilation of the piezometric surface maps for all months prior to last report submittal.

Each report will be submitted to WVDEP within 45 days following receipt of validated analytical data from the independent data validator. Five (5) copies of each report will be submitted to the following address:

Mr. James Duranti
West Virginia Division of Environmental Protection
Office of Waste Management
1356 Hansford Street
Charleston, West Virginia 25301

Tables

Table E-1
Analytical Parameter List for RCRA Baseline Groundwater Monitoring

Volatile Organic Compounds		
Anlytical Method 8260		
1,1,1,2-Tetrachloroethane	Acrolein	Methacrylonitrile
1,1,1-Trichloroethane	Acrylonitrile	Methyl methacrylate
1,1,2,2-Tetrachloroethane	Allyl chloride	Methylene chloride
1,1,2-Trichloroethane	Benzene	Propionitrile
1,1-Dichloroethane	Bromodichloromethane	Styrene
1,1-Dichloroethene	Bromoform	Tetrachloroethene
1,2,3-Trichloropropane	Bromomethane	Toluene
1,2-Dibromo-3-chloropropane	Carbon disulfide	Trichloroethene
1,2-Dibromoethane	Carbon tetrachloride	Trichlorofluoromethane
1,2-Dichloroethane	Chlorobenzene	Vinyl acetate
1,2-Dichloroethene (total)	Chloroethane	Vinyl chloride
1,2-Dichloropropane	Chloroform	Xylene, total
1,4-Dioxane	Chloromethane	cis-1,2-Dichloroethene
2-Butanone	Dibromochloromethane	cis-1,3-Dichloropropene
2-Chloro-1,3-butadiene	Dibromomethane	trans-1,2-Dichloroethene
2-Chloroethyl vinyl ether	Dichlorodifluoromethane	trans-1,3-Dichloropropene
2-Hexanone	Ethyl methacrylate	trans-1,4-Dichloro-2-butene
4-Methyl-2-pentanone	Ethylbenzene	
Acetone	Iodomethane	
Acetonitrile	Isobutanol	
Semi-volatile Organic Compounds		
Anlytical Method SW8270		
1,2,4,5-Tetrachlorobenzene	4-Methylphenol	Indeno(1,2,3-cd)pyrene
1,2,4-Trichlorobenzene	4-Nitroaniline	Isodrin
1,2-Dichlorobenzene	4-Nitrophenol	Isophorone
1,3,5-Trinitrobenzene	4-Nitroquinoline-1-oxide	Isosafrole
1,3-Dichlorobenzene	7,12-Dimethylbenz(a)anthracene	Kepone
1,3-Dinitrobenzene	Acenaphthene	Methapyrilene
1,4-Dichlorobenzene	Acenaphthylene	Methyl methanesulfonate
1,4-Naphthoquinone	Acetophenone	N-Nitrosomorpholine
1-Naphthylamine	Aniline	N-Nitrosopiperidine
2,2'-Oxybis(1-chloropropane)	Anthracene	Naphthalene
2,3,4,6-Tetrachlorophenol	Aramite	Nitrobenzene
2,4,5-Trichlorophenol	Benzo(a)anthracene	Nitroglycerin
2,4,6-Trichlorophenol	Benzo(a)pyrene	O,O,O-Triethyl phosphorothioate
2,4-Dichlorophenol	Benzo(b)fluoranthene	PETN
2,4-Dimethylphenol	Benzo(g,h,i)perylene	Pentachlorobenzene
2,4-Dinitrophenol	Benzo(k)fluoranthene	Pentachloroethane
2,6-Dichlorophenol	Benzyl alcohol	Pentachloronitrobenzene
2-Acetylaminofluorene	Butylbenzylphthalate	Pentachlorophenol
2-Chloronaphthalene	Chlorobenzilate	Phenacetin
2-Chlorophenol	Chrysene	Phenanthrene
2-Methyl-5-nitroaniline	Di-n-butylphthalate	Phenol
2-Methylaniline	Di-n-octylphthalate	Phorate
2-Methylnaphthalene	Diallate	Pronamide
2-Methylphenol	Dibenz(a,h)anthracene	Pyrene
2-Naphthylamine	Dibenzofuran	Pyridine
2-Nitroaniline	Diethylphthalate	Safrole
2-Nitrophenol	Dimethoate	Sulfotepp
2-Picoline	Dimethyl phthalate	Thionazin
3,3'-Dichlorobenzidine	Dinoseb	a,a-Dimethylphenethylamine
3,3'-Dimethylbenzidine	Diphenylamine	bis(2-Chloroethoxy)methane
3,4-Dimethylphenol	Disulfoton	bis(2-Chloroethyl)ether
3- and 4-Methylphenol	Ethyl methanesulfonate	bis(2-Ethylhexyl)phthalate
3-Methylcholanthrene	Famphur	n-Nitroso-di-n-butylamine
3-Methylphenol	Fluoranthene	n-Nitroso-di-n-propylamine
3-Nitroaniline	Fluorene	n-Nitroso-n-methylethylamine
4,6-Dinitro-2-methylphenol	Hexachlorobenzene	n-Nitrosodiethylamine
4-Aminobiphenyl	Hexachlorobutadiene	n-Nitrosodimethylamine

Table E-1
Analytical Parameter List for RCRA Baseline Groundwater Monitoring

Anlytical Method SW8270 (Continued)		
4-Bromophenyl-phenylether	Hexachlorocyclopentadiene	n-Nitrosodiphenylamine
4-Chloro-3-methylphenol	Hexachloroethane	n-Nitrosopyrrolidine
4-Chloroaniline	Hexachlorophene	p-Dimethylaminoazobenzene
4-Chlorophenyl-phenylether	Hexachloropropene	p-Phenylenediamine
Pesticide/Polychlorinated Biphenyls	**Herbicides**	**Total Metals**
Anlytical Methods SW8081, SW8081,	**Anlytical Method SW 8151**	**Anlytical Methods 6010,**
SW8141	2,4,5-T	**SW7060, SW7421, SW7740**
2,4,5-TP (Silvex)	2,4,5-TP (Silvex)	**SW7841, SW7470**
2,4-D	2,4-D	Antimony
4,4'-DDD	Dinoseb	Arsenic
4,4'-DDE	Pentachlorophenol	Barium
4,4'-DDT		Beryllium
Aldrin	**Dioxin/Furans**	Cadmium
Aroclor-1016	**Anlytical Method SW8290**	Chromium
Aroclor-1221	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	Cobalt
Aroclor-1232	1,2,3,4,6,7,8-Heptachlorodibenzofuran	Copper
Aroclor-1242	1,2,3,4,7,8,9-Heptachlorodibenzofuran	Cyanide
Aroclor-1248	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	Dimethoate
Aroclor-1254	1,2,3,4,7,8-Hexachlorodibenzofuran	Disulfoton
Aroclor-1260	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	Lead
Chlordane	1,2,3,6,7,8-Hexachlorodibenzofuran	Mercury
Chlorobenzilate	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	Nickel
Diallate	1,2,3,7,8,9-Hexachlorodibenzofuran	Selenium
Dieldrin	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	Silver
Dimethoate	1,2,3,7,8-Pentachlorodibenzofuran	Thallium
Dinoseb	2,3,4,6,7,8-Hexachlorodibenzofuran	Tin
Disulfoton	2,3,4,7,8-Pentachlorodibenzofuran	Vanadium
Endosulfan I	2,3,7,8-TCDD (dioxin)	Zinc
Endosulfan II	2,3,7,8-Tetrachlorodibenzofuran	
Endosulfan sulfate	Total hexachlorodibenzo-p-dioxin	**Explosives**
Endrin	Total hexachlorodibenzofuran	**Anlytical Methods SW-846**
Endrin aldehyde	Total octachlorodibenzo-p-dioxin	**8330, 8332, EPA 300m, IAAP**
Endrin ketone	Total octachlorodibenzofuran	1,3,5-Trinitrobenzene
Famphur	Total pentachlorodibenzo-p-dioxin	1,3-Dinitrobenzene
Heptachlor	Total pentachlorodibenzofuran	2,4,6-Trinitrotoluene
Heptachlor epoxide	Total tetrachlorodibenzo-p-dioxin	2,4-Dinitrotoluene
Isodrin	Total tetrachlorodibenzofuran	2,6-Dinitrotoluene
Kepone		2-Amino-4,6-dinitrotoluene
Methoxychlor	**Wet Chemistry**	2-Nitrotoluene
Methyl parathion	**Anlytical Method EPA 376.1**	3-Nitrotoluene
O,O,O-Triethyl phosphorothioate	Sulfide	4-Amino-2,6-dinitrotoluene
Parathion		4-Nitrotoluene
Pentachlorophenol		Ammonium perchlorate
Phorate		HMX
Sulfotepp		Nitrobenzene
Thionazin		Nitrocellulose
Toxaphene		Nitroglycerin
alpha-BHC		Perchlorate
alpha-Chlordane		RDX
beta-BHC		Tetryl
delta-BHC		
gamma-BHC (Lindane)		
gamma-Chlordane		

Table E-2
Detected Compounds from Groundwater Compliance Monitoring at the Burning Grounds - Upgradient Monitoring Wells
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID				
Sample Date	AS01-1GW10-CM01 4/27/99	AS01-1GW10-CM02 4/19/00	AS01-1GW10-CM03 7/27/00	AS01-1GW10-CM04 10/26/00
Chemical Name				
Volatile Organic Compounds (UG/L)				
1,1,1-Trichloroethane	5 U	5 U	1 U	5 U
1,1,2-Trichloroethane	5 U	5 U	1 U	5 U
1,1-Dichloroethane	5 U	5 U	1 U	5 U
1,1-Dichloroethene	5 U	5 U	1 U	5 U
1,2-Dibromo-3-chloropropane	5 U	5 U	2 U	5 U
1,2-Dichloroethane	5 U	5 U	1 U	5 U
Benzene	5 U	5 U	1 U	5 U
Chlorobenzene	5 U	5 U	1 U	5 U
Chloromethane	10 U	5 U	2 U	5 U
Methylene chloride	5 U	5 U	1 U	5 U
Tetrachloroethene	5 U	5 U	1 U	5 U
Toluene	5 U	5 U	1 U	5 U
Trichloroethene	5 U	5 U	1 U	5 U
Vinyl chloride	10 U	5 U	2 U	5 U
cis-1,2-Dichloroethene	NS	NS	NS	NS
trans-1,2-Dichloroethene	5 U	5 U	0.5 U	5 U
Semi-volatile Organic Compounds (UG/L)				
Di-n-butylphthalate	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U
Pesticide/Polychlorinated Biphenyls (UG/L)				
4,4'-DDD	0.1 U	0.03 U	0.05 U	0.038 U
4,4'-DDE	0.1 U	0.03 U	0.05 U	0.038 U
4,4'-DDT	0.1 U	0.03 U	0.05 U	0.038 U
Diallate	NS	NS	1 U	NS
Endrin	0.1 U	0.03 U	0.05 U	0.038 U
Isodrin	NS	NS	0.1 U	NS
Methoxychlor	0.5 U	0.15 U	0.1 U	0.19 U
Pentachlorophenol	0.1	NS	NS	NS
Herbicides (UG/L)				
2,4-D	NS	0.055 U	4 U	0.055 U

NS - Not sampled
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 (UJ, UL UR)

Table E-2
Detected Compounds from Groundwater Compliance Monitoring at the Burning Grounds - Upgradient Monitoring Wells
Allegany Ballistics Laboratory
Rocket Center, WV

Sample Date	AS01-1GW10-CM01 4/27/99	AS01-1GW10-CM02 4/19/00	AS01-1GW10-CM03 7/27/00	AS01-1GW10-CM04 10/26/00	
Chemical Name					
Dioxin/Furans (UG/L)					
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.003125 U	0.00005 U	NS	0.000025 U	
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.003125 U	0.00005 U	NS	0.000025 U	
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.003125 U	0.00005 U	NS	0.000025 U	
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.003125 U	0.00005 U	NS	0.000025 U	
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.003125 U	0.00005 U	NS	0.000025 U	
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.00125 U	0.00002 U	NS	0.00001 U	
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.00125 U	0.00002 U	NS	0.00001 U	
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.003125 U	0.00005 U	NS	0.000025 U	
Total octachlorodibenzo-p-dioxin (OCDD)	0.0002006 B	0.0001 U	NS	0.00000788 B	
Total octachlorodibenzofuran (OCDF)	0.00625 U	0.0001 U	NS	0.00005 U	
Explosives (UG/L)					
1,3,5-Trinitrobenzene	1.2 U	1 U	0.2 U	NS	
2,4-Dinitrotoluene	1.2 U	1 U	0.2 U	0.26 U	
2,6-Dinitrotoluene	1.2 U	1 U	0.2 U	0.26 U	
Ammonium perchlorate	5 U	5 U	4 U	NS	
HMX	2.6 U	3 U	0.5 U	0.52 U	
Nitrocellulose	133 U	134 U	179 UL	134 U	
Perchlorate	NS	NS	NS	5 U	
RDX	2.6 U	3 U	0.5 U	0.52 U	
Total Metals (UG/L)					
Antimony	60 U	5 U	2.2 U	8.4 B	
Arsenic	10	5 U	9.3 B	7.4 B	
Barium	6 U	83	65 J	50	
Cadmium	6 U	1 U	0.28 U	1 UL	
Chromium	13 U	5 U	1.5 B	5.9 B	
Cobalt	60 U	5 U	1.3 U	5 U	
Copper	33 U	8.5	4.2 U	5 U	
Lead	130 U	5 U	2.5 U	5 U	
Mercury	0.5 U	0.2 U	0.13 U	0.2 U	
Nickel	60 U	5 U	2.2 U	7.1 B	
Thallium	13 U	5 U	5 U	5 UL	
Vanadium	60 U	5 U	0.82 U	5 U	
Zinc	26 U	62 B	12 U	20 U	
Wet Chemistry (MG/L)					
Sulfide	5 U	1 U	1 U	1 U	

NS - Not sampled
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 ' 'etected (UJ, UL UR)

Table E-2
Detected Compounds from Groundwater Compliance Monitoring at the Burning Grounds - Upgradient Monitoring Wells
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1GW32					
	AS01-1GW32-CM01	AS01-1GW32-CM02	AS01-1GW32P-CM02	AS01-1GW32-CM03	AS01-1GW32-CM04	AS01-1GW10P-CM04
Sample Date	4/27/99	4/19/00	4/19/00	7/27/00	10/26/00	10/26/00
Chemical Name						
Volatile Organic Compounds (UG/L)						
1,1,1-Trichloroethane	5 U	5 U	5 U	1 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U	1 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	1 U	5 U	5 U
1,1-Dichloroethene	5 U	5 U	5 U	1 U	5 U	5 U
1,2-Dibromo-3-chloropropane	5 U	5 U	5 U	2 U	5 U	5 U
1,2-Dichloroethane	5 U	5 U	5 U	1 U	5 U	5 U
Benzene	5 U	5 U	5 U	1 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U	1 U	5 U	5 U
Chloromethane	10 U	5 U	5 U	2 U	5 U	5 U
Methylene chloride	5 U	5 U	5 U	1 U	5 U	5 U
Tetrachloroethene	5 U	5 U	5 U	0.42 J	5 U	5 U
Toluene	5 U	5 U	5 U	0.066 B	5 U	5 U
Trichloroethene	5 U	5 U	5 U	3.8	5 U	5 U
Vinyl chloride	10 U	5 U	5 U	2 U	5 U	5 U
cis-1,2-Dichloroethene	NS	NS	NS	0.22 J	NS	NS
trans-1,2-Dichloroethene	5 U	5 U	5 U	0.5 U	5 U	5 U
Semi-volatile Organic Compounds (UG/L)						
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U
Pesticide/Polychlorinated Biphenyls (UG/L)						
4,4'-DDD	0.1 U	0.03 U	0.03 UL	0.05 U	0.038 UJ	0.038 UJ
4,4'-DDE	0.1 U	0.03 U	0.03 UL	0.05 U	0.038 U	0.038 U
4,4'-DDT	0.1 U	0.03 U	0.03 UL	0.05 U	0.038 UJ	0.038 UJ
Diallate	NS	NS	NS	1 U	NS	NS
Endrin	0.1 U	0.03 U	0.03 UL	0.05 U	0.038 U	0.038 U
Isodrin	NS	NS	NS	0.1 U	NS	NS
Methoxychlor	0.5 U	0.15 U	0.15 UL	0.1 U	0.19 UJ	0.19 UJ
Pentachlorophenol	0.06 U	NS	NS	NS	NS	NS
Herbicides (UG/L)						
2,4-D	NS	0.055 U	0.055 U	4 U	0.055 U	0.055 U

NS - Not sampled
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 (UJ, UL UR)

Table E-2
Detected Compounds from Groundwater Compliance Monitoring at the Burning Grounds - Upgradient Monitoring Wells
Allegany Ballistics Laboratory
Rocket Center, WV

	AS01-1GW32-CM01	AS01-1GW32-CM02	AS01-1GW32P-CM02	AS01-1GW32-CM03	AS01-1GW32-CM04	AS01-1GW10P-CM04
Sample Date	4/27/99	4/19/00	4/19/00	7/27/00	10/26/00	10/26/00
Chemical Name						
Dioxin/Furans (UG/L)						
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.003125 U	0.00005 U	0.00005 U	NS	0.000025 U	0.000025 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.003125 U	0.00005 U	0.00005 U	NS	0.000025 U	0.000025 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.003125 U	0.00005 U	0.00005 U	NS	0.000025 U	0.000025 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.003125 U	0.00005 U	0.00005 U	NS	0.000025 U	0.000025 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.003125 U	0.00005 U	0.00005 U	NS	0.000025 U	0.000025 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.00125 U	0.00002 U	0.00002 U	NS	0.00001 U	0.00001 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.00125 U	0.00002 U	0.00002 U	NS	0.00001 U	0.00001 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.003125 U	0.00005 U	0.00005 U	NS	0.000025 U	0.000025 U
Total octachlorodibenzo-p-dioxin (OCDD)	0.000228 B	0.000105 B	0.000153 B	NS	0.00000632 B	0.00000116 B
Total octachlorodibenzofuran (OCDF)	0.00625 U	0.0000187 B	0.0000154 B	NS	0.00005 U	0.00005 U
Explosives (UG/L)						
1,3,5-Trinitrobenzene	1.2 U	1 U	1 U	0.2 U	0.26 U	0.26 U
2,4-Dinitrotoluene	1.2 U	1 U	1 U	0.2 U	0.26 U	0.26 U
2,6-Dinitrotoluene	1.2 U	1 U	1 U	0.2 U	0.26 U	0.26 U
Ammonium perchlorate	14.6	32	33	20	NS	NS
HMX	2.6 U	3 U	3 U	0.43 B	0.375 J	0.52 U
Nitrocellulose	141 U	135 U	135 U	179 UL	136 U	133 U
Perchlorate	NS	NS	NS	NS	15.8	26.7
RDX	2.6 U	3 U	3 U	0.5 U	0.52 U	0.52 U
Total Metals (UG/L)						
Antimony	60 U	5 U	5 U	2.2 U	5 UL	5 UL
Arsenic	6 U	5 U	5 U	4.1 U	5 UL	8 B
Barium	150	86	77	68 J	60	75
Cadmium	6 U	1 U	1 U	0.28 U	1 UL	1 UL
Chromium	13 U	5.1	5 U	3.2 B	5.9 B	5 UL
Cobalt	60 U	6.9	7.4	6.8 B	7.8 B	5 U
Copper	33 U	5 U	5 U	6.1 B	5.9 B	6.7 B
Lead	130 U	5 U	5 U	2.5 U	5 U	5 U
Mercury	0.5 U	0.2 U	0.2 U	0.13 U	0.2 U	0.2 U
Nickel	60 U	6.8 B	6.2 B	8.8 B	7.5	5 U
Thallium	13 U	5 U	5 U	5 U	5 UL	5 UL
Vanadium	60 U	5 U	5 U	2.7 B	5 U	5 U
Zinc	26 U	28 B	27 B	13 B	22	20 U
Wet Chemistry (MG/L)						
Sulfide	5 U	1 U	1 U	1 U	1 U	1 U

NS - Not sampled
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 [illegible]detected (UJ, UL UR)

Table E-2
Detected Compounds from Groundwater Compliance Monitoring at the Burning Grounds - Upgradient Monitoring Wells
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1GW11				1GW15			
	AS01-1GW11-CM01	AS01-1GW11-CM02	AS01-1GW11-CM03	AS01-1GW11-CM04	AS01-1GW15-CM01	AS01-1GW15-CM02	AS01-1GW15-CM03	AS01-1GW15-CM04
Sample Date	4/27/99	4/19/00	7/27/00	10/26/00	4/27/99	4/19/00	7/27/00	10/27/00
Chemical Name								
Volatile Organic Compounds (UG/L)								
1,1,1-Trichloroethane	5 U	5 U	0.31 J	5 U	5 U	5 U	1 U	5 U
1,1,2-Trichloroethane	5 U	5 U	1 U	5 U	5 U	5 U	1 U	5 U
1,1-Dichloroethane	5 U	5 U	1 U	5 U	5 U	5 U	1 U	5 U
1,1-Dichloroethene	5 U	5 U	1 U	5 U	5 U	5 U	1 U	5 U
1,2-Dibromo-3-chloropropane	12 U	5 U	2 U	5 U	12 U	5 U	2 U	5 U
1,2-Dichloroethane	5 U	5 U	0.099 B	5 U	5 U	5 U	1 U	5 U
Benzene	5 U	5 U	1 U	5 U	5 U	5 U	1 U	5 U
Chlorobenzene	5 U	5 U	1 U	5 U	5 U	5 U	1 U	5 U
Chloromethane	10 U	5 U	2 U	5 U	10 U	5 U	2 U	5 U
Methylene chloride	5 U	5 U	1 U	5 U	5 U	5 U	1 U	5 U
Tetrachloroethene	5 U	5 U	1 U	5 U	5 U	5 U	1 U	5 U
Toluene	5 U	5 U	1 U	5 U	5 U	5 U	1 U	5 U
Trichloroethene	5 U	5 U	1 U	5 U	5 U	5 U	0.48 J	5 U
Vinyl chloride	10 U	5 U	2 U	5 U	10 U	5 U	2 U	5 U
cis-1,2-Dichloroethene	NS	NS	NS	NS	NS	NS	NS	NS
trans-1,2-Dichloroethene	5 U	5 U	0.5 U	5 U	5 U	5 U	0.5 U	5 U
Semi-volatile Organic Compounds (UG/L)								
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pesticide/Polychlorinated Biphenyls (UG/L)								
4,4'-DDD	0.11 U	0.03 U	0.05 U	0.038 U	0.1 U	0.03 U	0.05 U	0.038 U
4,4'-DDE	0.11 U	0.03 U	0.05 U	0.038 U	0.1 U	0.03 U	0.05 U	0.038 U
4,4'-DDT	0.11 U	0.03 U	0.05 U	0.038 U	0.1 U	0.03 U	0.05 U	0.038 U
Diallate	NS	NS	1 U	NS	NS	NS	1 U	NS
Endrin	0.11 U	0.03 U	0.05 U	0.038 U	0.1 U	0.03 U	0.05 U	0.038 U
Isodrin	NS	NS	0.1 U	NS	NS	NS	0.1 U	NS
Methoxychlor	0.54 U	0.15 U	0.1 U	0.19 U	0.5 U	0.15 U	0.1 U	0.19 U
Pentachlorophenol	0.06 U	NS	NS	NS	0.06 U	NS	NS	NS
Herbicides (UG/L)								
2,4-D	NS	0.055 U	4 U	0.055 U	NS	0.055 U	4 U	0.055 U

NS - Not sampled
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 (UJ, UL UR)

Table E-2
Detected Compounds from Groundwater Compliance Monitoring at the Burning Grounds - Upgradient Monitoring Wells
Allegany Ballistics Laboratory
Rocket Center, WV

	AS01-1GW11-CM01	AS01-1GW11-CM02	AS01-1GW11-CM03	AS01-1GW11-CM04	AS01-1GW15-CM01	AS01-1GW15-CM02	AS01-1GW15-CM03	AS01-1GW15-CM04
Sample Date	4/27/99	4/19/00	7/27/00	10/26/00	4/27/99	4/19/00	7/27/00	10/27/00
Chemical Name								
Dioxin/Furans (UG/L)								
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.003125 U	0.00005 U	NS	0.000025 U	0.000092 J	0.00005 U	NS	0.000025 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.003125 U	0.00005 U	NS	0.000025 U	0.003125 U	0.00005 U	NS	0.000025 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.003125 U	0.00005 U	NS	0.000025 U	0.003125 U	0.00005 U	NS	0.000025 U
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.003125 U	0.00005 U	NS	0.000025 U	0.003125 U	0.00005 U	NS	0.000025 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.003125 U	0.00005 U	NS	0.000025 U	0.003125 U	0.00005 U	NS	0.000025 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.00125 U	0.00002 U	NS	0.00001 U	0.00125 U	0.00002 U	NS	0.00001 U
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.00125 U	0.00002 U	NS	0.00001 U	0.00125 U	0.00002 U	NS	0.00001 U
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.003125 U	0.00005 U	NS	0.000025 U	0.003125 U	0.00005 U	NS	0.000025 U
Total octachlorodibenzo-p-dioxin (OCDD)	0.000301 B	0.0003 B	NS	0.0000199 J	0.000189 B	0.000284 B	NS	0.00005 U
Total octachlorodibenzofuran (OCDF)	0.000101 J	0.0000432 B	NS	0.00005 U	0.00625 U	0.0001 U	NS	0.00005 U
Explosives (UG/L)								
1,3,5-Trinitrobenzene	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	0.2 U	NS
2,4-Dinitrotoluene	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	0.073 J	0.26 U
2,6-Dinitrotoluene	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	0.2 U	0.26 U
Ammonium perchlorate	12.2	8	7.5	NS	5 U	5 U	4 U	NS
HMX	2.6 U	3 U	0.5 U	0.52 U	2.6 U	3 U	0.5 U	0.52 U
Nitrocellulose	133 U	141 U	179 UL	165	142 U	136 U	179 UL	133 U
Perchlorate	NS	NS	NS	5 U	NS	NS	NS	5 U
RDX	2.6 U	3 U	0.5 U	0.52 U	2.6 U	3 U	0.5 U	0.52 U
Total Metals (UG/L)								
Antimony	60 U	5 U	2.2 U	5 UL	60 U	5 U	2.2 U	5 UL
Arsenic	6 U	5 U	4.1 U	5 UL	6 U	5 U	4.1 U	5 UL
Barium	150	95	130 J	160	49	66	45 J	47
Cadmium	6 U	1 U	0.28 U	1 UL	6 U	1.2	0.28 U	1 UL
Chromium	13 U	9.4	9.1 B	40	13 U	24	1.9 B	5 UL
Cobalt	60 U	5 U	2.1 B	8.3 B	60 U	13	1.3 U	5 U
Copper	33 U	5 U	8.3 B	9.5 B	33 U	5.2	4.2 U	5 U
Lead	130 U	5 U	2.5 U	5 U	130 U	5.7	2.5 U	5 U
Mercury	0.5 U	0.2 U	0.13 U	2 U	0.5 U	0.2 U	0.13 U	2 U
Nickel	60 U	9.6 B	11 B	32	60 U	10 B	2.2 U	5 U
Thallium	13 U	5 U	5 U	5 UL	13 U	5 U	5 U	5 UL
Vanadium	60 U	5 U	5.5 B	8.7	60 U	5 U	0.82 U	5 U
Zinc	30	31 B	18 B	28	26 U	38 B	12 U	20 U
Wet Chemistry (MG/L)								
Sulfide	5 U	1 U	1 U	1 U	5 U	1 U	1	1 U

NS - Not sampled
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 tected (UJ, UL UR)

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds -
Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW10				1EW14				
Sample ID	AS01-1EW10-CM01	AS01-1EW10-CM02	AS01-1EW10-CM03	AS01-1EW10-CM04	AS01-1EW14-CM01	AS01-1EW14-CM02	AS01-1EW14P-CM02	AS01-1EW14-CM03	AS01-1EW14-CM04
Sample Date	04/26/99	04/17/00	07/25/00	10/24/00	04/26/99	04/20/00	04/20/00	07/25/00	10/25/00
Chemical Name									
Volatile Organic Compounds (UG/L)									
1,1,1-Trichloroethane	5 U	5 U	1 U	5 U	42 K	8.5	9.1	500 U	9.7
1,1,2-Trichloroethane	5 U	5 U	1 U	5 U	5 U	5 U	5 U	500 U	5 U
1,1-Dichloroethane	5 U	5 U	1 U	5 U	5 U	5 U	5 U	500 U	5 U
1,1-Dichloroethene	5 U	5 U	1 U	5 U	8 K	5 U	5 U	500 U	5 U
1,2-Dibromo-3-chloropropane	7	5 U	2 U	5 U	5 U	5 U	5 U	1,000 U	5 U
1,2-Dichloroethane	5 U	5 U	0.1 J	5 U	5 U	5 U	5 U	500 U	5 U
Benzene	5 U	5 U	1 U	5 U	5 U	5 U	5 U	500 U	5 U
Chlorobenzene	5 U	5 U	1 U	5 U	9 K	5 U	5 U	500 U	5 U
Chloromethane	10 U	5 U	2 U	5 U	10 U	5 U	5 U	1,000 U	5 U
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	5 U	5 U	1 U	5 U	1,000	5 U	5 U	500 U	5 U
Tetrachloroethene	5 U	5 U	0.48 J	5 U	5 U	5 U	5 U	500 U	5 U
Toluene	5 U	5 U	1 U	5 U	8 K	5 U	5 U	500 U	5 U
trans-1,2-Dichloroethene	5 U	5 R	0.5 U	5 U	9 K	5 U	5 U	250 U	18
Trichloroethene	96	60	37	98	37,000	7,100	7,200	13,000	7,000
Vinyl chloride	10 U	5 U	2 U	5 U	10 U	5 U	5 U	1,000 U	5 U
Semi-volatile Organic Compounds (UG/L)									
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UR	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UR	10 U
Pesticide/Polychlorinated Biphenyls (UG/L)									
4,4'-DDD	0.1 U	0.15 U	0.05 U	0.038 U	0.1 U	0.03 U	0.03 U	0.05 U	0.038 UJ
4,4'-DDE	0.1 U	0.15 U	0.05 U	0.038 U	0.1 U	0.03 U	0.03 U	0.05 U	0.038 U
4,4'-DDT	0.1 U	0.15 U	0.05 U	0.038 U	0.1 U	0.03 U	0.03 U	0.05 U	0.038 UJ
Diallate	NA	NA	1 U	NA	NA	NA	NA	0.083 J	NA
Endrin	0.1 U	0.15 U	0.05 U	0.038 U	0.1 U	0.03 U	0.03 U	0.05 U	0.038 U
Isodrin	NA	NA	0.1 U	NA	NA	NA	NA	0.041 J	NA
Methoxychlor	0.5 U	0.75 U	0.1 U	0.19 U	0.5 U	0.15 U	0.15 U	0.1 U	0.19 UJ
Pentachlorophenol	0.06 U	NA	NA	NA	0.06 U	NA	NA	NA	NA
Herbicides (UG/L)									
2,4-D	NA	0.055 U	4 U	0.055 U	NA	0.68	0.055 U	4 U	0.055 U

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW10				1EW14				
Sample ID	AS01-1EW10-CM01	AS01-1EW10-CM02	AS01-1EW10-CM03	AS01-1EW10-CM04	AS01-1EW14-CM01	AS01-1EW14-CM02	AS01-1EW14P-CM02	AS01-1EW14-CM03	AS01-1EW14-CM04
Sample Date	04/26/99	04/17/00	07/25/00	10/24/00	04/26/99	04/20/00	04/20/00	07/25/00	10/25/00
Chemical Name									
Dioxin/Furans (UG/L)									
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.00313 U	6.48E-05 B	NA	3.20E-06 B	0.00313 U	5.00E-05 U	5.00E-05 U	NA	2.50E-05 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	9.20E-06 J	0.00313 U	5.00E-05 U	5.00E-05 U	NA	2.50E-05 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	5.00E-05 U	NA	2.50E-05 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	5.00E-05 U	NA	2.50E-05 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	5.00E-05 U	NA	2.50E-05 U
1,2,3,7,8-Pentachlorodibenzofuran	0.00125 U	2.00E-05 U	NA	2.00E-05 U	0.00125 U	2.00E-05 U	2.00E-05 U	NA	1.00E-05 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.00125 U	2.00E-05 U	NA	2.00E-05 U	0.00125 U	2.00E-05 U	2.00E-05 U	NA	1.00E-05 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	5.00E-05 U	NA	2.50E-05 U
Total octachlorodibenzofuran	0.00625 U	8.18E-05 J	NA	1.00E-04 U	0.00625 U	1.00E-04 U	1.86E-05 J	NA	5.00E-05 U
Total octachlorodibenzo-p-dioxin	0.00625 U	0.00122	NA	7.26E-05 B	2.07E-04 B	1.00E-04 U	1.02E-04 B	NA	5.00E-05 U
Explosives (UG/L)									
1,3,5-Trinitrobenzene	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	1 U	0.2 U	0.26 U
2,4-Dinitrotoluene	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	1 U	0.2 U	0.26 U
2,6-Dinitrotoluene	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	1 U	0.2 U	0.26 U
HMX	1.4 J	3 U	0.96 B	0.859	3.6	4	3	0.31 B	0.52 U
Nitrocellulose	143 U	137 U	357 U	131 U	138 U	134 U	133 U	357 U	185
Perchlorate	317	148	260	329	7,930	3,750	4,230	720	826
RDX	1.1 J	2 J	0.82	0.679	12.9	11	10	4.2	0.52 U
Total Metals (UG/L)									
Antimony	60 U	5 U	2.2 U	5 UL	60 U	5 U	5 U	2.2 U	5 UL
Arsenic	6 U	5 U	4.1 U	5 UL	6 U	5 U	5 U	4.1 U	5 UL
Barium	45	45	41 J	45	86	86	95	98 J	95
Cadmium	6 U	1 U	0.28 U	1 UL	6 U	1 U	1 U	0.28 B	1 UL
Chromium	13 U	13	1.4 U	5 UL	13 U	5 U	5 U	22	15
Cobalt	60 U	11	6.9 B	8.6 B	60 U	5 U	5 U	2.9 B	5 U
Copper	33 U	5 U	4.2 U	11 B	33 U	20	24	86	230
Lead	130 U	5 U	2.5 U	5 U	130 U	5 U	12	130	56
Mercury	0.5 U	0.2 U	0.13 U	0.2 U	0.5 U	0.2 U	0.2 U	0.13 U	0.2 U
Nickel	60 U	24 B	10 B	9.1	60 U	5 U	8.9	9.5 B	9.7
Thallium	13 U	5 U	5 U	5 UL	13 U	5 U	5 U	5 U	5 UL
Vanadium	60 U	5 U	0.82 U	5 U	60 U	5 U	5 U	1.1 B	5 U
Zinc	61	320 B	30 B	210	48	280 B	210 B	78	180

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds -
Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW10				1EW14				
Sample ID	AS01-1EW10-CM01	AS01-1EW10-CM02	AS01-1EW10-CM03	AS01-1EW10-CM04	AS01-1EW14-CM01	AS01-1EW14-CM02	AS01-1EW14P-CM02	AS01-1EW14-CM03	AS01-1EW14-CM04
Sample Date	04/26/99	04/17/00	07/25/00	10/24/00	04/26/99	04/20/00	04/20/00	07/25/00	10/25/00
Chemical Name									
Dissolved Metals (UG/L)									
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (MG/L)									
Sulfide	5 U	1 U	1	1 U	5 U	2	1 U	1 U	1 U

Shaded result indicates that the constituent was detected.

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW16				1EW18			
Sample ID	AS01-1EW16-CM01	AS01-1EW16-CM02	AS01-1EW16-CM03	AS01-1EW16-CM04	AS01-1EW18-CM01	AS01-1EW18-CM02	AS01-1EW18-CM03	AS01-1EW18-CM04
Sample Date	04/28/99	04/19/00	07/26/00	10/24/00	04/26/99	04/17/00	07/25/00	10/24/00
Chemical Name								
Volatile Organic Compounds (UG/L)								
1,1,1-Trichloroethane	130	36	130 J	160	2,500	1,000 U	690 J	480
1,1,2-Trichloroethane	5 U	5 U	170 U	5 U	13	1,000 U	1,200 U	6
1,1-Dichloroethane	5 U	5 U	170 U	12	99	1,000 U	1,200 U	48
1,1-Dichloroethene	8	5 U	170 U	15	220	1,000 U	1,200 U	53
1,2-Dibromo-3-chloropropane	5 U	5 U	330 U	5 U	5 U	1,000 U	2,500 U	5 U
1,2-Dichloroethane	5 U	5 U	170 U	5 U	5 U	1,000 U	1,200 U	5 U
Benzene	5 U	5 U	170 U	5 U	5 U	1,000 U	1,200 U	5 U
Chlorobenzene	5 U	5 U	170 U	5 U	5	1,000 U	1,200 U	5 U
Chloromethane	10 U	5 U	330 U	5 U	10 U	1,000 U	2,500 U	5 U
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	5 U	5 U	170 U	75	460	1,000 U	1,200 U	12
Tetrachloroethene	5 U	5 U	170 U	5 U	5 U	1,000 U	1,200 U	5 U
Toluene	5 U	5 U	170 U	5 U	63	1,000 U	1,200 U	5 U
trans-1,2-Dichloroethene	5 U	5 U	83 U	12	30	1,000 U	620 U	35
Trichloroethene	3,900	2,600	4,300	4,000	97,000	40,000	41,000	36,000
Vinyl chloride	10 U	5 U	330 U	5 U	14	1,000 U	2,500 U	14
Semi-volatile Organic Compounds (UG/L)								
Diethylphthalate	11 U	10 U	10 U	10 U	10 U	10 U	10 UR	10 U
Di-n-butylphthalate	11 U	10 U	10 U	10 U	10 U	10 U	10 UR	10 U
Pesticide/Polychlorinated Biphenyls (UG/L)								
4,4'-DDD	0.1 U	0.03 U	0.05 U	0.038 U	0.11 U	0.15 U	0.05 U	0.038 U
4,4'-DDE	0.1 U	0.03 U	0.05 U	0.038 U	0.11 U	0.15 U	0.05 U	0.038 U
4,4'-DDT	0.1 U	0.03 U	0.05 U	0.038 U	0.11 U	0.15 U	0.05 U	0.038 U
Diallate	NA	NA	1 U	NA	NA	NA	1 U	NA
Endrin	0.1 U	0.03 U	0.05 U	0.038 U	0.11 U	0.15 U	0.05 U	0.038 U
Isodrin	NA	NA	0.089 J	NA	NA	NA	0.1 U	NA
Methoxychlor	0.5 U	0.15 U	0.1 U	0.19 U	0.55 U	0.75 U	0.1 U	0.19 U
Pentachlorophenol	0.06 U	NA	NA	NA	0.06 U	NA	NA	NA
Herbicides (UG/L)								
2,4-D	NA	0.055 U	4 U	0.055 U	NA	0.055 U	4 U	0.055 U

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW16				1EW18			
Sample ID	AS01-1EW16-CM01	AS01-1EW16-CM02	AS01-1EW16-CM03	AS01-1EW16-CM04	AS01-1EW18-CM01	AS01-1EW18-CM02	AS01-1EW18-CM03	AS01-1EW18-CM04
Sample Date	04/28/99	04/19/00	07/26/00	10/24/00	04/26/99	04/17/00	07/25/00	10/24/00
Chemical Name								
Dioxin/Furans (UG/L)								
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	6.48E-06 B	0.00313 U	5.00E-05 U	NA	5.00E-05 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	6.40E-06 B	0.00313 U	5.00E-05 U	NA	5.00E-05 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.00313 U	2.68E-06 J	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U
1,2,3,7,8-Pentachlorodibenzofuran	0.00125 U	5.12E-06 J	NA	2.00E-05 U	0.00125 U	2.00E-05 U	NA	2.00E-05 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.00125 U	2.00E-05 U	NA	2.00E-05 U	0.00125 U	2.00E-05 U	NA	2.00E-05 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U
Total octachlorodibenzofuran	0.00625 U	2.16E-05 J	NA	1.00E-04 U	0.00625 U	1 00E-04 U	NA	1.00E-04 U
Total octachlorodibenzo-p-dioxin	2.90E-04 B	3.59E-04	NA	6.52E-05 B	1 98E-04 B	5.88E-05 B	NA	3.50E-05 B
Explosives (UG/L)								
1,3,5-Trinitrobenzene	1.2 U	1 U	0.6 U	0.26 U	1.2 U	1 U	0.2 U	0.26 U
2,4-Dinitrotoluene	1.2 U	1 U	0.6 U	0.26 U	1.2 U	1 U	0.2 U	8
2,6-Dinitrotoluene	1.2 U	1 U	0.6 U	0.26 U	1.2 U	1 U	0.2 U	0.5
HMX	10.4	3	0.47 B	0.52 U	1.2 J	3 U	0.47 B	0.52 U
Nitrocellulose	133 U	133 U	179 UL	199	133 U	136 U	357 U	137 U
Perchlorate	26,200	34,900	11,000	10,900	46.6	72	63	34.2
RDX	2.6 U	136	22	23.5	6.8	2 J	3	2.59
Total Metals (UG/L)								
Antimony	60 U	5 U	2.2 U	5 UL	60 U	5 U	2.2 U	5 UL
Arsenic	6 U	5 U	5.4 B	5 UL	6 U	5 U	4.1 U	5 UL
Barium	89	83	140 J	91	90	87	81 J	94
Cadmium	6 U	1 U	0.52 B	1 UL	6 U	1 U	0.28 U	1 UL
Chromium	15	37	35	12	13 U	5 U	1.4 U	5 UL
Cobalt	60 U	5 U	5.4 B	5 U	60 U	5 U	3.4 B	5 U
Copper	79	17	310	380	33 U	5 U	7.8 B	77
Lead	130 U	20	69	56	130 U	5 U	5.8	18
Mercury	0.5 U	0.2 U	0.13 U	0.2 U	0.5 U	0 2 U	0.13 U	0.2 U
Nickel	60 U	12	28 B	15	60 U	5 U	3.3 B	5 U
Thallium	13 U	5 U	5 U	5 UL	13 U	5 U	5 U	5 UL
Vanadium	60 U	5 U	15 J	5 U	60 U	5 U	0.82 U	5 U
Zinc	740	230 B	460	610	30	210 B	22 B	34

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW16				1EW18			
Sample ID	AS01-1EW16-CM01	AS01-1EW16-CM02	AS01-1EW16-CM03	AS01-1EW16-CM04	AS01-1EW18-CM01	AS01-1EW18-CM02	AS01-1EW18-CM03	AS01-1EW18-CM04
Sample Date	04/28/99	04/19/00	07/26/00	10/24/00	04/26/99	04/17/00	07/25/00	10/24/00
Chemical Name								
Dissolved Metals (UG/L)								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (MG/L)								
Sulfide	5 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U

Shaded result indicates that the constituent was detected.

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW21				1EW29				
Sample ID	AS01-1EW21-CM01	AS01-1EW21-CM02	AS01-1EW21-CM03	AS01-1EW21-CM04	AS01-1EW29-CM01	AS01-1EW29-CM02	AS01-1EW29-CM03	AS01-1EW29P-CM03	AS01-1EW29-CM04
Sample Date	04/26/99	04/18/00	07/25/00	10/24/00	04/26/99	04/20/00	07/25/00	07/25/00	10/24/00
Chemical Name									
Volatile Organic Compounds (UG/L)									
1,1,1-Trichloroethane	61	1,000 U	24 J	12	290	140 J	620 J	630 J	180
1,1,2-Trichloroethane	5 U	1,000 U	38 U	5 U	5 U	5 U	1,000 U	830 U	5 U
1,1-Dichloroethane	5	1,000 U	38 U	5 U	37	13	1,000 U	830 U	30
1,1-Dichloroethene	6	1,000 U	38 U	5 U	40	17	1,000 U	830 U	25
1,2-Dibromo-3-chloropropane	5 U	1,000 U	77 U	5 U	5 U	5 U	2,000 U	1,700 U	5 U
1,2-Dichloroethane	5 U	1,000 U	38 U	5 U	5 U	5 U	1,000 U	830 U	5 U
Benzene	5 U	1,000 U	38 U	5 U	5 U	5 U	1,000 U	830 U	5 U
Chlorobenzene	5 U	1,000 U	38 U	5 U	5 U	5 U	1,000 U	830 U	5 U
Chloromethane	10 U	1,000 U	77 U	5 U	10 U	5 U	2,000 U	1,700 U	5 U
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene chloride	5 U	1,000 U	38 U	5 U	24	66 J	1,000 U	200 B	71
Tetrachloroethene	5 U	1,000 U	38 U	5 U	5 U	5 U	1,000 U	830 U	5 U
Toluene	5 U	1,000 U	38 U	5 U	27	6.2	1,000 U	830 U	8.6
trans-1,2-Dichloroethene	5 U	1,000 U	19 U	5 U	12	5.5	500 U	420 U	14
Trichloroethene	2,100	14,000	910	440	19,000	14,000	28,000	29,000	33,000
Vinyl chloride	27	1,000 U	77 U	8	10 U	5 U	2,000 U	1,700 U	5 U
Semi-volatile Organic Compounds (UG/L)									
Diethylphthalate	10 U	10 U	3 J	10 U	10 UL	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 UL	10 U	10 U	10 U	10 U
Pesticide/Polychlorinated Biphenyls (UG/L)									
4,4'-DDD	0.11 U	0.15 U	0.05 U	0.03 U	0.1 U	0.03 U	0.05 U	0.05 U	0.038 U
4,4'-DDE	0.11 U	0.15 U	0.05 U	0.03 U	0.1 U	0.03 U	0.05 U	0.05 U	0.038 U
4,4'-DDT	0.11 U	0.15 U	0.05 U	0.03 U	0.1 U	0.03 U	0.05 U	0.05 U	0.038 U
Diallate	NA	NA	1 U	NA	NA	NA	1 U	1 U	NA
Endrin	0.11 U	0.15 U	0.05 U	0.03 U	0.1 U	0.03 U	0.05 U	0.05 U	0.038 U
Isodrin	NA	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA
Methoxychlor	0.55 U	0.75 U	0.1 U	0.15 U	0.5 U	0.15 U	0.1 U	0.1 U	0.19 U
Pentachlorophenol	0.06 U	NA	NA	NA	0.06 U	NA	NA	NA	NA
Herbicides (UG/L)									
2,4-D	NA	0.055 U	4 U	0.055 U	NA	0.055 U	4 U	4 U	0.055 U

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW21				1EW29				
Sample ID	AS01-1EW21-CM01	AS01-1EW21-CM02	AS01-1EW21-CM03	AS01-1EW21-CM04	AS01-1EW29-CM01	AS01-1EW29-CM02	AS01-1EW29-CM03	AS01-1EW29P-CM03	AS01-1EW29-CM04
Sample Date	04/26/99	04/18/00	07/25/00	10/24/00	04/26/99	04/20/00	07/25/00	07/25/00	10/24/00
Chemical Name									
Dioxin/Furans (UG/L)									
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	NA	5.00E-05 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	NA	5.00E-05 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	NA	5.00E-05 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	NA	5.00E-05 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	NA	5.00E-05 U
1,2,3,7,8-Pentachlorodibenzofuran	0.00125 U	2.00E-05 U	NA	2.00E-05 U	0.00125 U	2.00E-05 U	NA	NA	2.00E-05 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.00125 U	2.00E-05 U	NA	2.00E-05 U	0.00125 U	2.00E-05 U	NA	NA	2.00E-05 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	NA	5.00E-05 U
Total octachlorodibenzofuran	0.00625 U	1.00E-04 U	NA	1.00E-04 U	0.00625 U	1.00E-04 U	NA	NA	1.00E-04 U
Total octachlorodibenzo-p-dioxin	2.28E-04 B	4.25E-05 B	NA	3.62E-05 B	1.99E-04 B	0.00108	NA	NA	1.00E-04 U
Explosives (UG/L)									
1,3,5-Trinitrobenzene	1.2 U	1 U	0.2 U	0.26 U	1.6	1 U	0.2 U	0.2 U	0.26 U
2,4-Dinitrotoluene	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	0.2 U	0.2 U	0.26 U
2,6-Dinitrotoluene	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	0.2 U	0.2 U	0.26 U
HMX	2.6 U	3 U	0.5 U	0.52 U	2.6 U	3 U	0.5 U	0.5 U	0.52 U
Nitrocellulose	137 U	134 U	357 U	133 U	135 U	134 U	357 U	357 U	133 U
Perchlorate	8.9	5 U	1.9 J	5 U	5 U	5 U	4 U	4 U	5 U
RDX	2.6 U	3 U	0.5 U	0.52 U	2.6 U	3 U	0.5 U	0.5 U	0.52 U
Total Metals (UG/L)									
Antimony	60 U	5 U	2.2 U	5 UL	60 U	5 U	2.2 U	2.2 U	5 UL
Arsenic	6 U	5 U	4.1 U	5 UL	6 U	5 U	4.5 B	4.6 B	5 UL
Barium	60	63	65 J	69	69	50	64 J	66 J	65
Cadmium	6 U	1 U	0.28 U	1 UL	6 U	1 U	0.28 U	0.2 U	1 UL
Chromium	13 U	5 U	1.4 U	5 UL	13 U	5 U	1.4 U	0.8 U	5 UL
Cobalt	60 U	5 U	1.3 U	5 U	60 U	5 U	1.3 U	0.6 U	5 U
Copper	33 U	5 U	4.2 U	5 U	33 U	5 U	4.2 U	0.7 U	5 U
Lead	130 U	5 U	2.5 U	5 U	130 U	5 U	2.5 U	1.1 U	5 U
Mercury	0.5 U	0.2 U	0.13 U	0.2 U	0.5 U	0.2 U	0.13 U	0.13 U	0.32
Nickel	60 U	5 U	2.2 U	13	60 U	5 U	2.2 U	1.5 U	5 U
Thallium	13 U	5 U	5 U	5 UL	13 U	5 U	5 U	2.7 U	5 UL
Vanadium	60 U	5 U	0.82 U	5 U	60 U	5 U	0.82 U	0.6 U	5 U
Zinc	26 U	64 B	13 B	20 U	33	46 B	12 U	0.5 U	20 U

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds -
Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW21				1EW29				
Sample ID	AS01-1EW21-CM01	AS01-1EW21-CM02	AS01-1EW21-CM03	AS01-1EW21-CM04	AS01-1EW29-CM01	AS01-1EW29-CM02	AS01-1EW29-CM03	AS01-1EW29P-CM03	AS01-1EW29-CM04
Sample Date	04/26/99	04/18/00	07/25/00	10/24/00	04/26/99	04/20/00	07/25/00	07/25/00	10/24/00
Chemical Name									
Dissolved Metals (UG/L)									
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (MG/L)									
Sulfide	5 U	1.2	1 U	1 U	5 U	2	1	1 U	1 U

Shaded result indicates that the constituent was detected.

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW30					1EW31			
Sample ID	AS01-1EW30-CM01	AS01-1EW30P-CM01	AS01-1EW30-CM02	AS01-1EW30-CM03	AS01-1EW30-CM04	AS01-1EW31-CM01	AS01-1EW31-CM02	AS01-1EW31-CM03	AS01-1EW31-CM04
Sample Date	04/27/99	04/27/99	04/18/00	07/25/00	10/24/00	04/27/99	04/18/00	07/25/00	10/24/00
Chemical Name									
Volatile Organic Compounds (UG/L)									
1,1,1-Trichloroethane	7	7	1,000 U	710 U	5 U	5 U	5 U	1 U	5 U
1,1,2-Trichloroethane	5 U	5 U	1,000 U	710 U	5 U	5 U	5 U	1 U	5 U
1,1-Dichloroethane	5 U	5 U	1,000 U	710 U	5 U	5 U	5 U	1 U	5 U
1,1-Dichloroethene	13	13	1,000 U	710 U	5 U	5 U	5 U	1 U	5 U
1,2-Dibromo-3-chloropropane	5 U	5 U	1,000 U	1,400 U	5 U	5 U	5 U	2 U	5 U
1,2-Dichloroethane	5 U	5 U	1,000 U	710 U	5 U	5 U	5 U	1 U	5 U
Benzene	5 U	5 U	1,000 U	710 U	5 U	5 U	5 U	0.064 B	5 U
Chlorobenzene	17	17	1,000 U	710 U	5 U	5 U	5 U	1 U	5 U
Chloromethane	10 U	10 U	1,000 U	1,400 U	5 U	10 U	5 U	2 U	5 U
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA	NA	NA	0.11 J	NA
Methylene chloride	330	300	1,000 U	710 U	7.9	5 U	5 U	1 U	5 U
Tetrachloroethene	5 U	5 U	1,000 U	710 U	5 U	5 U	5 U	1 U	5 U
Toluene	22	22	1,000 U	710 U	5 U	5 U	5 U	1 U	5 U
trans-1,2-Dichloroethene	15	16	1,000 U	360 U	5 U	5 U	5 U	0.5 U	5 U
Trichloroethene	54,000	71,000	25,000	17,000	18,000	5 U	5 U	0.57 J	5 U
Vinyl chloride	10 U	10 U	1,000 U	1,400 U	5 U	10 U	5 U	2 U	5 U
Semi-volatile Organic Compounds (UG/L)									
Diethylphthalate	10 U	10 U	10 U	1.2 J	10 U	10 U	10 U	10 UR	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UR	10 U
Pesticide/Polychlorinated Biphenyls (UG/L)									
4,4'-DDD	0.1 U	0.1 U	0.15 U	0.019 J	0.038 U	0.1 U	0.15 U	0.05 U	0.038 U
4,4'-DDE	0.1 U	0.1 U	0.15 U	0.01 J	0.038 U	0.1 U	0.15 U	0.05 U	0.038 U
4,4'-DDT	0.1 U	0.1 U	0.15 U	0.014 J	0.038 U	0.1 U	0.15 U	0.05 U	0.038 U
Diallate	NA	NA	NA	1 U	NA	NA	NA	1 U	NA
Endrin	0.1 U	0.1 U	0.15 U	0.015 J	0.038 U	0.1 U	0.15 U	0.05 U	0.038 U
Isodrin	NA	NA	NA	0.1 U	NA	NA	NA	0.1 U	NA
Methoxychlor	0.5 U	0.5 U	0.75 U	0.043 J	0.19 U	0.5 U	0.75 U	0.1 U	0.19 U
Pentachlorophenol	0.06 U	0.06 U	NA	NA	NA	0.2	NA	NA	NA
Herbicides (UG/L)									
2,4-D	NA	NA	0.055 U	4 U	0.055 U	NA	0.055 U	4 U	0.055 U

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Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW30					1EW31			
Sample ID	AS01-1EW30-CM01	AS01-1EW30P-CM01	AS01-1EW30-CM02	AS01-1EW30-CM03	AS01-1EW30-CM04	AS01-1EW31-CM01	AS01-1EW31-CM02	AS01-1EW31-CM03	AS01-1EW31-CM04
Sample Date	04/27/99	04/27/99	04/18/00	07/25/00	10/24/00	04/27/99	04/18/00	07/25/00	10/24/00
Chemical Name									
Dioxin/Furans (UG/L)									
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.00313 U	0.00313 U	4.05E-05 B	NA	4.16E-06 B	0.00313 U	6.87E-05 B	NA	5.00E-05 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.00313 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	0.00313 U	5.00E-05 U	NA	1.10E-05 J	0.00313 U	5.00E-05 U	NA	5.00E-05 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.00313 U	0.00313 U	5.00E-05 U	NA	6.40E-06 J	0.00313 U	5.00E-05 U	NA	5.00E-05 U
1,2,3,7,8-Pentachlorodibenzofuran	0.00125 U	0.00125 U	2.00E-05 U	NA	2.00E-05 U	0.00125 U	2.00E-05 U	NA	2.00E-05 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.00125 U	0.00125 U	2.00E-05 U	NA	2.00E-05 U	0.00125 U	2.00E-05 U	NA	2.00E-05 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.00313 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U	0.00313 U	5.00E-05 U	NA	5.00E-05 U
Total octachlorodibenzofuran	0.00625 U	0.00625 U	4.09E-05 J	NA	1.00E-04 U	0.00625 U	5.62E-05 J	NA	1.76E-06 J
Total octachlorodibenzo-p-dioxin	2.24E-04 B	1.80E-04 B	5.03E-04 B	NA	1.00E-04 U	1.76E-04 B	0.00101	NA	1.53E-05 B
Explosives (UG/L)									
1,3,5-Trinitrobenzene	1.2 U	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	0.2 U	0.26 U
2,4-Dinitrotoluene	1.2 U	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	0.2 U	0.26 U
2,6-Dinitrotoluene	1.2 U	1.2 U	1 U	0.2 U	0.26 U	1.2 U	1 U	0.2 U	0.26 U
HMX	2.6 U	2.6 U	3 U	0.5 U	0.52 U	2.6 U	3 U	0.5 U	0.52 U
Nitrocellulose	133 U	136 U	134 U	357 U	137 U	136 U	134 U	357 U	135 U
Perchlorate	1,110	1,110	782	190	245	5 U	5 U	14	5 U
RDX	2.6 U	2.6 U	3 U	0.5 U	0.52 U	2.6 U	3 U	0.5 U	0.52 U
Total Metals (UG/L)									
Antimony	60 U	60 U	5 U	2.2 U	5 UL	60 U	5 U	2.2 U	5 UL
Arsenic	6 U	6 U	5 U	4.8 B	5 UL	6 U	8.3	9.2 B	7.8 B
Barium	88	110	85	83 J	84	380	240	260	250
Cadmium	6 U	6 U	1 U	0.28 U	1 UL	6 U	1 U	0.28 U	1 UL
Chromium	13 U	13 U	5 U	1.4 U	5 UL	13 U	5 U	1.4 U	5 UL
Cobalt	60 U	60 U	5 U	1.3 U	5 U	60 U	5 U	1.3 U	5 U
Copper	33 U	33 U	5 U	4.2 U	5 U	33 U	5 U	4.2 U	5 U
Lead	130 U	130 U	5 U	2.5 U	5 U	130 U	5 U	2.5 U	5 U
Mercury	0.5 U	0.5 U	0.2 U	0.13 U	0.2 U	0.5 U	0.2 U	0.13 U	0.2 U
Nickel	60 U	60 U	5 U	2.2 U	5 U	60 U	5 U	3.4 B	5 U
Thallium	13 U	13 U	5 U	5 U	5 UL	13 U	5 U	5 U	5 UL
Vanadium	60 U	60 U	5 U	0.82 U	5 U	60 U	5 U	0.82 U	5 U
Zinc	26 U	36	150 B	12 U	20 U	26 U	91 B	13 B	84

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds -
Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW30					1EW31			
Sample ID	AS01-1EW30-CM01	AS01-1EW30P-CM01	AS01-1EW30-CM02	AS01-1EW30-CM03	AS01-1EW30-CM04	AS01-1EW31-CM01	AS01-1EW31-CM02	AS01-1EW31-CM03	AS01-1EW31-CM04
Sample Date	04/27/99	04/27/99	04/18/00	07/25/00	10/24/00	04/27/99	04/18/00	07/25/00	10/24/00
Chemical Name									
Dissolved Metals (UG/L)									
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA
Wet Chemistry (MG/L)									
Sulfide	5 U	5 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U

Shaded result indicates that the constituent was detected.

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW33				
Sample ID	AS01-1EW33-CM01	AS01-1EW33-CM02	AS01-1EW33-CM03	AS01-1EW33P-CM03	AS01-1EW33-CM04
Sample Date	04/27/99	04/18/00	07/25/00	07/25/00	10/24/00
Chemical Name					
Volatile Organic Compounds (UG/L)					
1,1,1-Trichloroethane	5 U	5 U	10 U	10 U	5 U
1,1,2-Trichloroethane	5 U	5 U	10 U	10 U	5 U
1,1-Dichloroethane	5 U	5 U	10 U	10 U	5 U
1,1-Dichloroethene	5 U	5 U	10 U	10 U	5 U
1,2-Dibromo-3-chloropropane	12 U	5 U	20 U	20 U	5 U
1,2-Dichloroethane	5 U	5 U	10 U	10 U	5 U
Benzene	5 U	5 U	10 U	0.66 J	5 U
Chlorobenzene	5 U	5 U	10 U	10 U	5 U
Chloromethane	10 U	5.7	20 U	20 U	5 U
cis-1,2-Dichloroethene	NA	NA	NA	NA	NA
Methylene chloride	5 U	5 U	10 U	10 U	5 U
Tetrachloroethene	5 U	5 U	1.2 J	1.8 J	5 U
Toluene	5 U	5 U	10 U	10 U	5 U
trans-1,2-Dichloroethene	5 2	5 U	5 U	1.9 J	5 U
Trichloroethene	84	84	56	65	43
Vinyl chloride	22	40	34	45	33
Semi-volatile Organic Compounds (UG/L)					
Diethylphthalate	10 U	10 U	10 U	1.3 J	10 U
Di-n-butylphthalate	10 U	10 U	10 U	1.1 J	10 U
Pesticide/Polychlorinated Biphenyls (UG/L)					
4,4'-DDD	0.1 U	0.15 U	0.05 U	0.05 U	0.038 U
4,4'-DDE	0.1 U	0.15 U	0.05 U	0.05 U	0.038 U
4,4'-DDT	0.1 U	0.15 U	0.05 U	0.05 U	0.038 U
Diallate	NA	NA	1 U	1 U	NA
Endrin	0.1 U	0.15 U	0.05 U	0.05 U	0.038 U
Isodrin	NA	NA	0.1 U	0.1 U	NA
Methoxychlor	0.5 U	0.75 U	0.1 U	0.1 U	0.19 U
Pentachlorophenol	0.09	NA	NA	NA	NA
Herbicides (UG/L)					
2,4-D	NA	0.055 U	4 U	4 U	0.055 U

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds - Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW33				
Sample ID	AS01-1EW33-CM01	AS01-1EW33-CM02	AS01-1EW33-CM03	AS01-1EW33P-CM03	AS01-1EW33-CM04
Sample Date	04/27/99	04/18/00	07/25/00	07/25/00	10/24/00
Chemical Name					
Dioxin/Furans (UG/L)					
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	NA	5.00E-05 U
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	NA	5.00E-05 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.00313 U	5.00E-05 U	NA	NA	4.80E-07 J
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	NA	5.00E-05 U
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.00313 U	5.00E-05 U	NA	NA	6.32E-06 J
1,2,3,7,8-Pentachlorodibenzofuran	0.00125 U	2.00E-05 U	NA	NA	2.00E-05 U
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	0.00125 U	2.00E-05 U	NA	NA	9.60E-07 J
2,3,4,6,7,8-Hexachlorodibenzofuran	0.00313 U	5.00E-05 U	NA	NA	2.40E-07 J
Total octachlorodibenzofuran	0.00625 U	1.00E-04 U	NA	NA	1.00E-04 U
Total octachlorodibenzo-p-dioxin	2.12E-04 B	1.00E-04 U	NA	NA	3.18E-05 B
Explosives (UG/L)					
1,3,5-Trinitrobenzene	1.2 U	1 U	0.2 U	0.2 U	0.26 U
2,4-Dinitrotoluene	1.2 U	1 U	0.2 U	0.2 U	0.26 U
2,6-Dinitrotoluene	1.2 U	1 U	0.2 U	0.2 U	0.26 U
HMX	2.6 U	3 U	0.5 U	0.5 U	0.52 U
Nitrocellulose	133 U	134 U	357 U	357 U	157
Perchlorate	5 U	5 U	4 U	4 U	5 U
RDX	2.6 U	3 U	0.5 U	0.5 U	0.52 U
Total Metals (UG/L)					
Antimony	60 U	5 U	2.2 J	2.2 U	5 UL
Arsenic	6 U	5 U	6.3 B	4.7 B	5 UL
Barium	240	250	230	230	200
Cadmium	6 U	1 U	0.28 U	0.28 U	1 UL
Chromium	13 U	5 U	1.4 U	1.4 U	5 UL
Cobalt	60 U	5 U	1.3 U	1.3 U	5 U
Copper	33 U	5 U	4.2 U	4.2 U	5 U
Lead	130 U	5 U	2.5 U	2.5 U	5 U
Mercury	0.5 U	0.2 U	0.13 U	0.13 U	0.2 U
Nickel	60 U	5 U	2.6 B	2.5 B	5 U
Thallium	13 U	5 U	5.2 J	5 U	5 UL
Vanadium	60 U	5 U	0.82 U	0.82 U	5 U
Zinc	26 U	44 B	12 B	13 B	20 U

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-3
Detected Compounds from Groundwater Compliance Monitoring at the Open Burning Grounds -
Extraction Well Data
Allegany Ballistics Laboratory
Rocket Center, WV

Station ID	1EW33				
Sample ID	AS01-1EW33-CM01	AS01-1EW33-CM02	AS01-1EW33-CM03	AS01-1EW33P-CM03	AS01-1EW33-CM04
Sample Date	04/27/99	04/18/00	07/25/00	07/25/00	10/24/00
Chemical Name					
Dissolved Metals (UG/L)					
Aluminum	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA
Wet Chemistry (MG/L)					
Sulfide	5 U	1 U	1	1 U	1 U

Shaded result indicates that the constituent was detected.

NA - Not analyzed
B - Analyte not detected above associated blank
J - Reported value is estimated
K - Reported value may be biased high
R - Unreliable result
U, UJ, UL - Analyte not detected

Table E-4
Groundwater Surface Elevation Measurements for Each Sampling Event

Station ID	Sample Date	Groundwater Gauging Date	Water-Level Elevation (ft above msl)
1EW10	4/26/99	4/22/99	647.93
	4/17/00	4/20/00	646.75
	7/25/00	7/11/00	645.34
	10/24/00	10/13/00	645.39
1EW14	4/26/99	4/22/99	646.81
	4/20/00	4/20/00	645.66
	7/25/00	7/11/00	644.16
	10/25/00	10/13/00	645.66
1EW16	4/28/99	4/22/99	650.75
	4/19/00	4/6/00	649.07
	7/26/00	7/11/00	646.37
	10/24/00	10/13/00	646.99
1EW18	4/26/99	4/22/99	646.56
	4/17/00	4/20/00	645.48
	7/25/00	7/11/00	645.56
	10/24/00	10/13/00	645.65
1EW21	4/26/99	4/22/99	642.87
	4/18/00	4/20/00	641.55
	7/25/00	7/11/00	641.52
	10/24/00	10/13/00	643.22
1EW29	4/26/99	4/22/99	647.92
	4/20/00	4/20/00	642.39
	7/25/00	7/11/00	640.71
	10/24/00	10/13/00	641.93
1EW30	4/27/99	4/22/99	634.79
	4/18/00	4/20/00	629.18
	7/25/00	7/11/00	622.45
	10/24/00	10/13/00	628.10
1EW31	4/27/99	4/22/99	644.19
	4/18/00	4/20/00	643.19
	7/25/00	7/11/00	640.33
	10/24/00	10/13/00	640.63
1EW33	4/27/99	4/22/99	646.52
	4/18/00	4/20/00	641.54
	7/25/00	7/11/00	639.65
	10/24/00	10/13/00	641.04
1GW10	4/27/99	4/22/99	651.23
	4/19/00	4/20/00	647.47
	7/27/00	7/11/00	645.99
	10/26/00	10/13/00	646.97
1GW11	4/27/99	4/22/99	657.83
	4/19/00	4/20/00	654.68
	7/27/00	7/11/00	652.20
	10/26/00	10/13/00	651.23
1GW15	4/27/99	4/22/99	654.44
	4/19/00	4/20/00	645.18
	7/27/00	7/11/00	643.40
	10/27/00	10/13/00	644.14
1GW32	4/27/99	4/22/99	653.70
	4/19/00	4/20/00	651.65
	7/27/00	7/11/00	650.26
	10/26/00	10/13/00	650.48

Table E-5
Mean and Variance Data for Background Wells

	Downgradient						Upgradient					
	Alluvial (GW11, GW32)			Bedrock (GW10, GW15)			Alluvial (EW10, EW14, EW16, EW18)			Bedrock (EW29, EW30, EW31, EW33)		
	Sample Mean	Standard Deviation	Number of Samples	Sample Mean	Standard Deviation	Number of Samples	Sample Mean	Standard Deviation	Number of Samples	Sample Mean	Standard Deviation	Number of Samples
Volatile Organic Compounds (UG/L)												
1,1,1-Trichloroethane	340	605	20	187	313	16	3.91	2.02	8	4	1.85	8
1,1,2-Trichloroethane	199	393	20	174	367	16	4	1.85	8	4	1.85	8
1,1-Dichloroethane	206	390	20	178	365	16	4	1.85	8	4	1.85	8
1,1-Dichloroethene	213	388	20	178	365	16	4	1.85	8	4	1.85	8
1,2-Dibromo-3-chloropropane	299	632	20	280	617	16	5.13	3.09	8	5.13	3.09	8
1,2-Dichloroethane	199	393	20	174	367	16	3.89	2.07	8	4	1.85	8
Benzene	199	393	20	173	367	16	4	1.85	8	4	1.85	8
Chlorobenzene	199	393	20	174	367	16	4	1.85	8	4	1.85	8
Chloromethane	300	631	20	281	616	16	5.5	3.07	8	5.5	3.07	8
Methylene chloride	275	425	20	203	362	16	4	1.85	8	4	1.85	8
Tetrachloroethene	199	393	20	173	367	16	3.93	1.99	8	4	1.85	8
Toluene	202	391	20	176	366	16	3.88	2.08	8	4	1.85	8
Trichloroethene	15500	24100	20	13000	16100	16	4.35	1.42	8	3.94	1.98	8
Vinyl chloride	302	630	20	287	614	16	5.5	3.07	8	5.5	3.07	8
cis-1,2-Dichloroethene	NA	NA	NA	0.11	NA	1	0.22	NA	1	3.88	2.08	8
trans-1,2-Dichloroethene	164	329	19	129	284	15	3.88	2.08	8	10	0	8
Semi-volatile Organic Compounds (UG/L)												
Di-n-butylphthalate	10.1	0.224	20	10	0	16	10	0	8	10	0	8
Diethylphthalate	9.7	1.59	20	9.45	2.2	16	10	0	8	0.0545	0.0291	8
Pesticide/Polychlorinated Biphenyls (UG/L)												
4,4'-DDD	0.0731	0.0434	20	0.0751	0.0461	16	0.0558	0.0314	8	0.0545	0.0291	8
4,4'-DDE	0.0731	0.0434	20	0.0745	0.0469	16	0.0558	0.0314	8	0.0545	0.0291	8
4,4'-DDT	0.0731	0.0434	20	0.0748	0.0465	16	0.0558	0.0314	8	12.8	8.46	8
Diallate	12.8	8.25	20	12.8	8.18	16	12.8	8.46	8	0.0545	0.0291	8
Endrin	0.0731	0.0434	20	0.0748	0.0464	16	0.0558	0.0314	8	12.5	8.82	8
Isodrin	12.6	8.46	20	12.5	8.52	16	12.5	8.82	8	0.235	0.167	8
Methoxychlor	0.328	0.246	20	0.344	0.257	16	0.24	0.176	8	12.5	23.1	8
Pentachlorophenol	12.5	22.2	20	12.6	22.3	16	12.5	23.1	8	1.04	1.83	8
Herbicides (UG/L)												
2,4-D	1.07	1.74	20	1.04	1.76	16	1.04	1.83	8	0.000561	0.00126	6
Dioxin/Furans (UG/L)												
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.00107	0.00151	15	0.00107	0.00152	12	0.00107	0.00159	6	0.00107	0.00159	6
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.00107	0.00151	15	0.00108	0.00151	12	0.00107	0.00159	6	0.00107	0.00159	6

Table E-5
Mean and Variance Data for Background Wells

	Downgradient						Upgradient					
	Alluvial (GW11, GW32)			Bedrock (GW10, GW15)			Alluvial (EW10, EW14, EW16, EW18)			Bedrock (EW29, EW30, EW31, EW33)		
	Sample Mean	Standard Deviation	Number of Samples	Sample Mean	Standard Deviation	Number of Samples	Sample Mean	Standard Deviation	Number of Samples	Sample Mean	Standard Deviation	Number of Samples
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.00107	0.0015	15	0.00107	0.00152	12	0.00107	0.00159	6	0.00107	0.00159	6
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.00107	0.0015	15	0.00107	0.00152	12	0.00107	0.00159	6	0.00107	0.00159	6
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.00107	0.0015	15	0.00107	0.00152	12	0.00107	0.00159	6	0.000427	0.000638	6
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.000429	0.000601	15	0.000428	0.000607	12	0.000427	0.000638	6	0.000427	0.000638	6
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.000428	0.000601	15	0.00043	0.000606	12	0.000427	0.000638	6	0.00107	0.00159	6
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.00107	0.0015	15	0.00107	0.00152	12	0.00107	0.00159	6	0.000139	0.000104	6
Total octachlorodibenzo-p-dioxin (OCDD)	0.000614	0.00159	15	0.000313	0.000365	12	0.00016	0.000134	6	0.00213	0.00319	6
Total octachlorodibenzofuran (OCDF)	0.00214	0.00301	15	0.00213	0.00304	12	0.00109	0.00253	6	5.21	9.13	8
Explosives (UG/L)												
1,3,5-Trinitrobenzene	0.267	0.137	20	0.329	0.364	16	0.258	0.148	8	0.202	0.151	8
2,4-Dinitrotoluene	0.597	1.75	20	0.199	0.149	16	0.199	0.154	8	0.265	0.124	8
2,6-Dinitrotoluene	0.295	0.129	20	0.265	0.12	16	0.265	0.124	8	1.28	0.811	6
Ammonium perchlorate	5690	10700	15	176	370	12	15.7	9.21	6	0.448	0.276	8
HMX	1.54	2.37	20	0.448	0.267	16	0.497	0.232	8	0.145	0.0213	8
Nitrocellulose	0.186	0.0898	20	0.19	0.0995	16	0.149	0.0216	8	1.8	0	2
Perchlorate	2380	4770	5	62.6	122	4	8.8	9.9	2	0.375	0.249	8
RDX	11.4	30.2	20	0.375	0.24	16	0.375	0.249	8	18.5	25.7	8
Total Metals (UG/L)												
Antimony	18.1	24.9	20	18.1	25	16	18.1	25.9	8	6.48	2.19	8
Arsenic	5.09	0.658	20	5.93	1.38	16	5.03	0.719	8	51.4	22.4	8
Barium	77.7	24	20	165	102	16	112	39.9	8	2.1	2.43	8
Cadmium	2.08	2.34	20	2.07	2.36	16	2.07	2.45	8	8.66	7.6	8
Chromium	11.8	10	20	6.1	4.39	16	12.3	11.7	8	18.8	25.7	8
Cobalt	19	24.4	20	17.8	25.2	16	19.6	25	8	12.3	12.9	8
Copper	68.9	108	20	11.8	12.6	16	13.2	12.3	8	35.7	58.2	8
Lead	52	55.9	20	35.6	56.3	16	35.6	58.3	8	0.483	0.631	8
Mercury	0.258	0.147	20	0.265	0.148	16	0.483	0.631	8	18.9	25.5	8
Nickel	22.8	22.9	20	18.2	25	16	24.5	23.4	8	7	3.7	8
Thallium	7	3.55	20	7.01	3.57	16	7	3.7	8	17.7	26.2	8
Vanadium	18.4	24.8	20	17.7	25.3	16	19	25.4	8	27	16.5	8
Zinc	183	210	20	38.4	36.7	16	24.5	6.32	8	2	1.85	8
Wet Chemistry (MG/L)												
Sulfide	2.06	1.76	20	2.06	1.77	16	2	1.85	8	NA	NA	NA

TABLE E-6
Summary of Constituents at Statistically Higher Concentrations in Downgradient Wells During RCRA Baseline Groundwater Monitoring
Allegany Ballistics Laboratory

		Aquifer with Statistically Higher Results in Downgradient Wells			Exceedance of Criteria	
Chemical Group	**Chemical Name**	**Bedrock**	**Alluvial**	**MCL**	**Bedrock**	**Alluvial**
Explosive	Perchlorate		X	NA		
Explosive	RDX		X	100 µg/l**		X
Metal	Barium	X		2,000 µg/l		
Metal	Zinc		X	11,000 µg/l*		
Volatile Organic	1,1,1-Trichloroethane	X	X	200 µg/l	X	X
Volatile Organic	1,1,2-Trichloroethane		X	5 µg/l		X
Volatile Organic	1,1-Dichloroethane	X	X	800 µg/l*		
Volatile Organic	1,1-Dichloroethene	X	X	7 µg/l	X	X
Volatile Organic	1,2-Dichloroethane		X	5 µg/l		
Volatile Organic	Chlorobenzene	X	X	100 µg/l		
Volatile Organic	Methylene chloride	X	X	5 µg/l	X	X
Volatile Organic	Tetrachloroethene		X	5 µg/		
Volatile Organic	Toluene	X	X	1,000 µg/l		
Volatile Organic	Trichloroethene	X	X	5 µg/l	X	X
Volatile Organic	Vinyl chloride	X	X	2 µg/l	X	X
Volatile Organic	Trans-1,2-Dichloroethene	X	X	100 µg/l		

* USEPA Region III Risk-based Concentration for Tap Water
** DWEL – Drinking Water Exposure Limit
NA – Not Available

TABLE E-7
Range of Detection for the Most Commonly Detected VOCs during RCRA Baseline Groundwater Sampling
Allegany Ballistics Laboratory

Analyte	Range of Detections (μg/L)	Frequency of Detections
TCE	0.48 – 97,000	43 of 66 samples
1,1,1-TCA	0.31 – 2,500	24 of 66 samples
Methylene chloride	5.7 – 1,000	13 of 66 samples
1,1-DCE	6 – 220	12 of 66 samples
Trans-1,2-DCE	1.9 – 35	11 of 66 samples
Vinyl chloride	8 – 45	9 of 66 samples
Toluene	0.07 – 63	8 of 66 samples
1,1-DCA	12 – 99	7 of 66 samples
Chlorobenzene	5 –17	4 of 66 samples

TABLE E-8
Concentration Limits for the Corrective Action Monitoring Program (from 40 CFR 264.94)

Chemical Group	Chemical Name	Abbreviation	Concentration Limit
Explosive	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	1800 μg/l
	Hexahydro-1,3,5-trinitro-1,3,5-trazine	RDX	100 μg/l
	1,3,5-Trinitrobenzene	1,3,5-TNB	1100 μg/l
	1,3-Dinitrobenzene	1,3-DNB	3.7 μg/l
	Methyl-2,4,6-trinitrophenylnitramine	Tetryl	370 μg/l
	Nitrobenzene	NB	3.5 μg/l
	2,4,6-Trinitrotoluene	2,4,6-TNT	2.2 μg/l
	4-Amino-2,6-dinitrotoluene	4-AM-DNT	2.2 μg/l
	2-Amino-4,6-dinitrotoluene	2-AM-DNT	2.2 μg/l
	2,4- Dinitrotoluene	2,4-DNT	73 μg/l
	2,6- Dinitrotoluene	2,6-DNT	37 μg/l
	2- Nitrotoluene	2-NT	61 μg/l
	3- Nitrotoluene	3-NT	61 μg/l
	4- Nitrotoluene	4-NT	61 μg/l
	Perchlorate	Perchlorate	NA
	Nitroglycerine	NG	4.8 μg/l
Metals	Arsenic	As	50 μg/l
	Barium	Ba	1000 μg/l
	Cadmium	Cd	10 μg/l
	Chromium	Cr	50 μg/l
	Lead	Pb	50 μg/l
	Mercury	Hg	2 μg/l
	Selenium	Se	10 μg/l
	Silver	Ag	50 μg/l
	Zinc	Zn	11,000 μg/l

NA = Not Available

TABLE E-9
Corrective Action Monitoring Program Wells and Screened Intervals
Allegany Ballistics Laboratory

Well Name	Ground Elevation (ft amsl)	Monitoring Point Elevation (ft amsl)	Screen Depth Interval (ft bgs)	Screen Depth Interval (ft amsl)
		Alluvial Aquifer		
Downgradient Wells				
1EW08	665.94	669.01	19 – 29	646.94 – 636.94
1EW12	667.16	670.10	17 – 27	650.16 – 640.16
1EW16	666.58	669.49	17 – 27	649.58 – 639.58
Upgradient Well				
1GW11	664.99	667.53	11 – 18	653.99 – 646.99
		Bedrock Aquifer		
Downgradient Wells				
1EW29[a]	666.20	669.33	37 – 90	629.20 – 576.20
1EW31[a]	665.29	668.19	38 – 90	627.29 – 575.29
1EW33[a]	665.19	668.09	37 – 90	628.19 – 575.19
Upgradient Well				
1GW10	664.79	667.48	70 – 80	594.79 – 584.79

[a] Effective screen interval listed; depth is from bottom of surface casing to total depth of boring.

amsl = above mean sea level; bgs = below ground surface

TABLE E-10
Analytical Parameters, Analytical Methods and Instrument Quantitation Limits – Corrective Acton Program
Allegany Ballistics Laboratory

Analyte	Abbreviation	Analytical Method	Instrument Quantitation Limits (μg/l)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	SW-846 8330	1.0
Hexahydro-1,3,5-trinitro-1,3,5-trazine	RDX	SW-846 8330	1.0
1,3,5-Trinitrobenzene	1,3,5-TNB	SW-846 8330	1.0
1,3-Dinitrobenzene	1,3-DNB	SW-846 8330	1.0
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	SW-846 8330	1.0
Nitrobenzene	NB	SW-846 8330	1.0
2,4,6-Trinitrotoluene	2,4,6-TNT	SW-846 8330	1.0
4-Amino-2,6-dinitrotoluene	4-AM-DNT	SW-846 8330	1.0
2-Amino-4,6-dinitrotoluene	2-AM-DNT	SW-846 8330	1.0
2,4- Dinitrotoluene	2,4-DNT	SW-846 8330	1.0
2,6- Dinitrotoluene	2,6-DNT	SW-846 8330	1.0
2- Nitrotoluene	2-NT	SW-846 8330	1.0
3- Nitrotoluene	3-NT	SW-846 8330	1.0
4- Nitrotoluene	4-NT	SW-846 8330	1.0
Perchlorate	Perchlorate	EPA 300: IC[1]	5.0
Nitroglycerine	NG	SW-846 8332	1.0
Arsenic	As	SW-846 6010B	10
Barium	Ba	SW-846 6010B	200
Cadmium	Cd	SW-846 6010B	5
Chromium	Cr	SW-846 6010B	10
Lead	Pb	SW-846 6010B	3
Mercury	Hg	SW-846 6010B	0.2
Selenium	Se	SW-846 6010B	5
Silver	Hg	SW-846 6010B	10
Zinc	Zn	SW-846 6010B	10

[1] Perchlorate by USEPA method 300 (modified) using ion chromatography.

Figures

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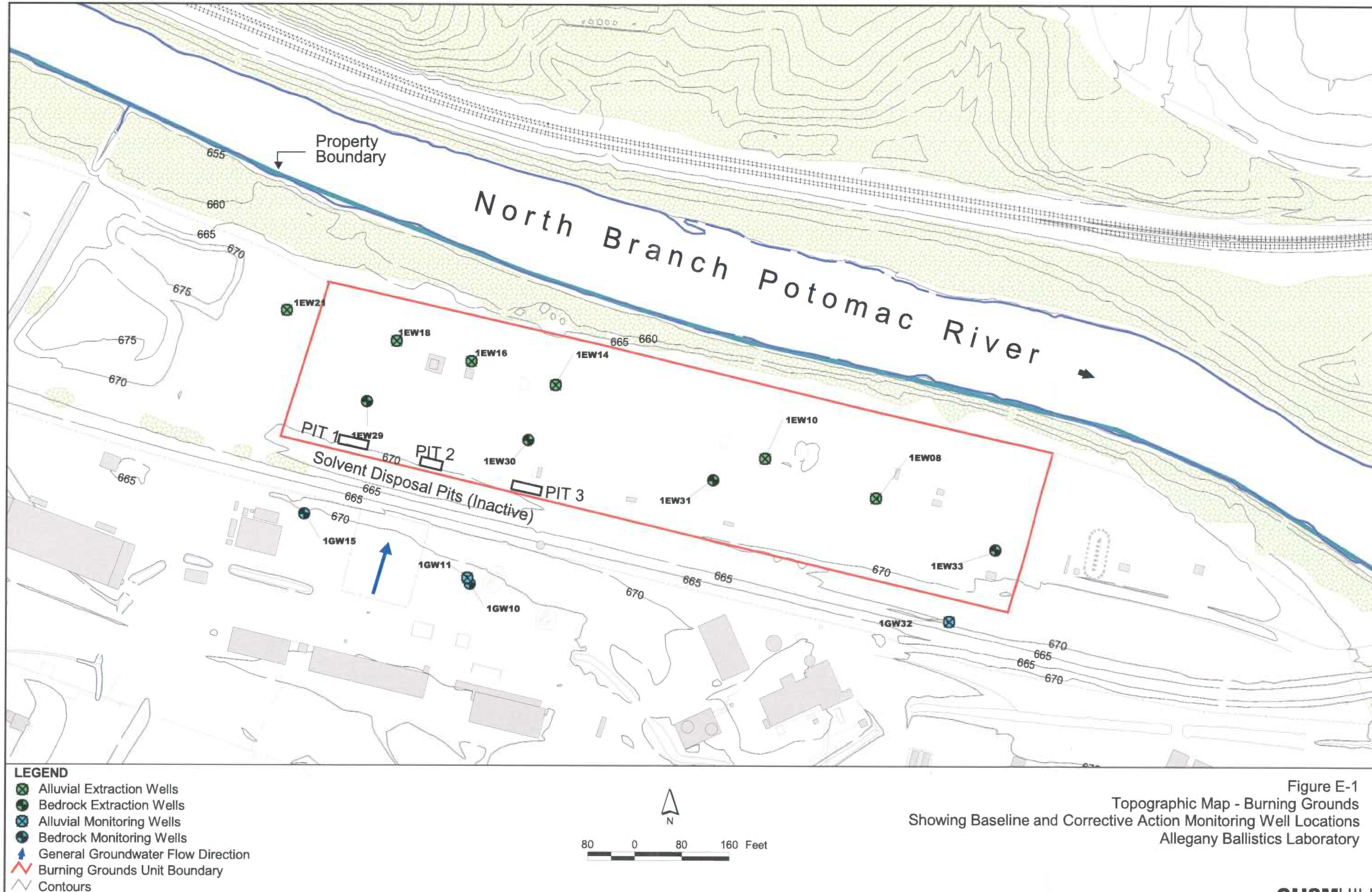

Figure E-1
Topographic Map - Burning Grounds
Showing Baseline and Corrective Action Monitoring Well Locations
Allegany Ballistics Laboratory

CH2MHILL

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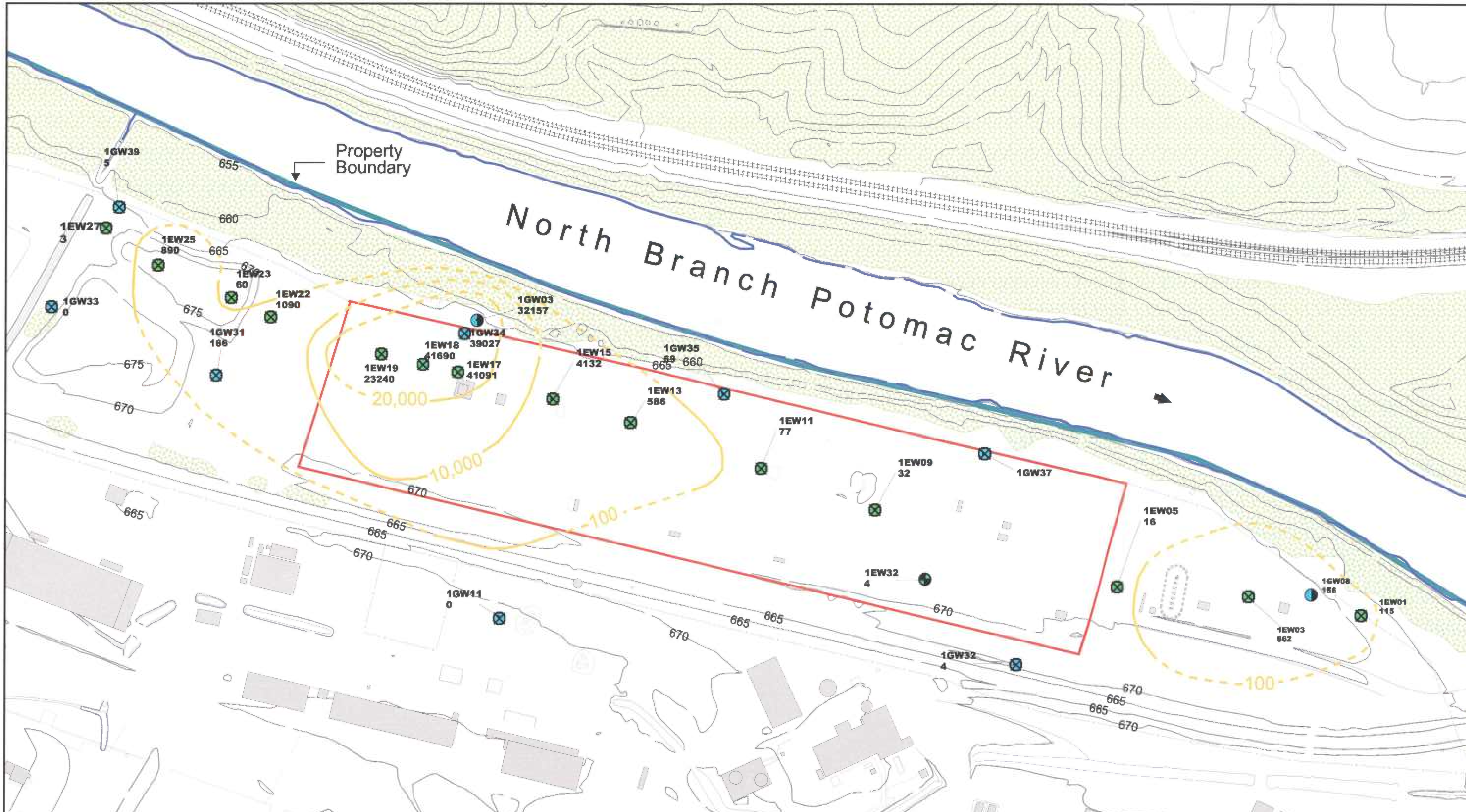

LEGEND

- Alluvial Extraction Wells
- Bedrock Extraction Wells
- Alluvial Monitoring Wells
- Hybrid Monitoring Wells
- Burning Ground Unit Boundary
- Contours

100 — 100 ug/L Total VOC Isoconcentration Line (dashed where inferred)

1090 = Concentration of Total VOCs (ug/L)

N

80 0 80 160 Feet

Figure E-2
Burning Grounds
Isoconcentration Map of Total VOCs
in Alluvial Aquifer (July 2000)
Allegany Ballistics Laboratory

CH2MHILL

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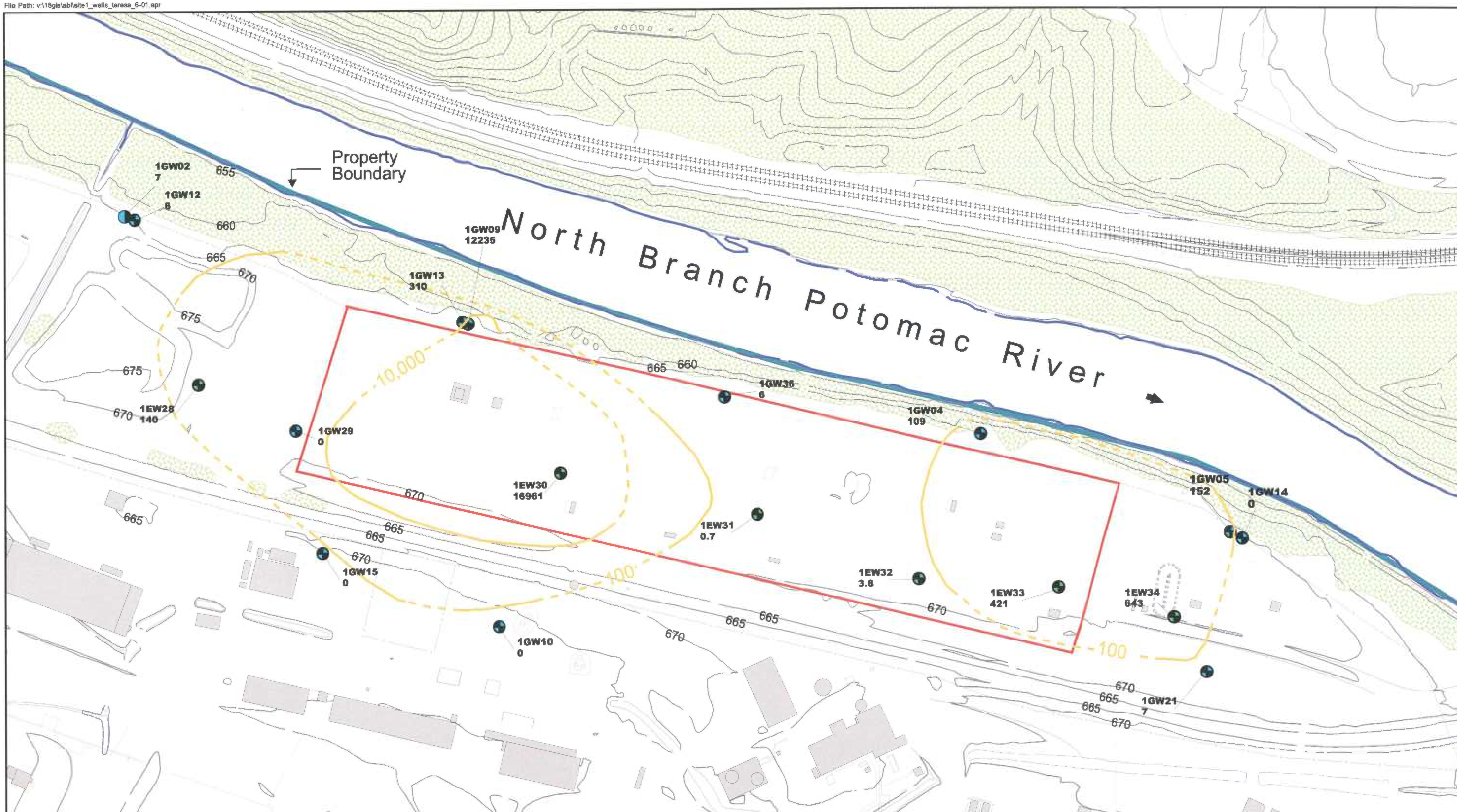


LEGEND

- Bedrock Extraction Wells
- Bedrock Monitoring Wells
- Hybrid Monitoring Wells
- Burning Ground Unit Boundary
- Contours

100 — 100 ug/L Total VOC Isonconcentration Line (dashed where inferred)

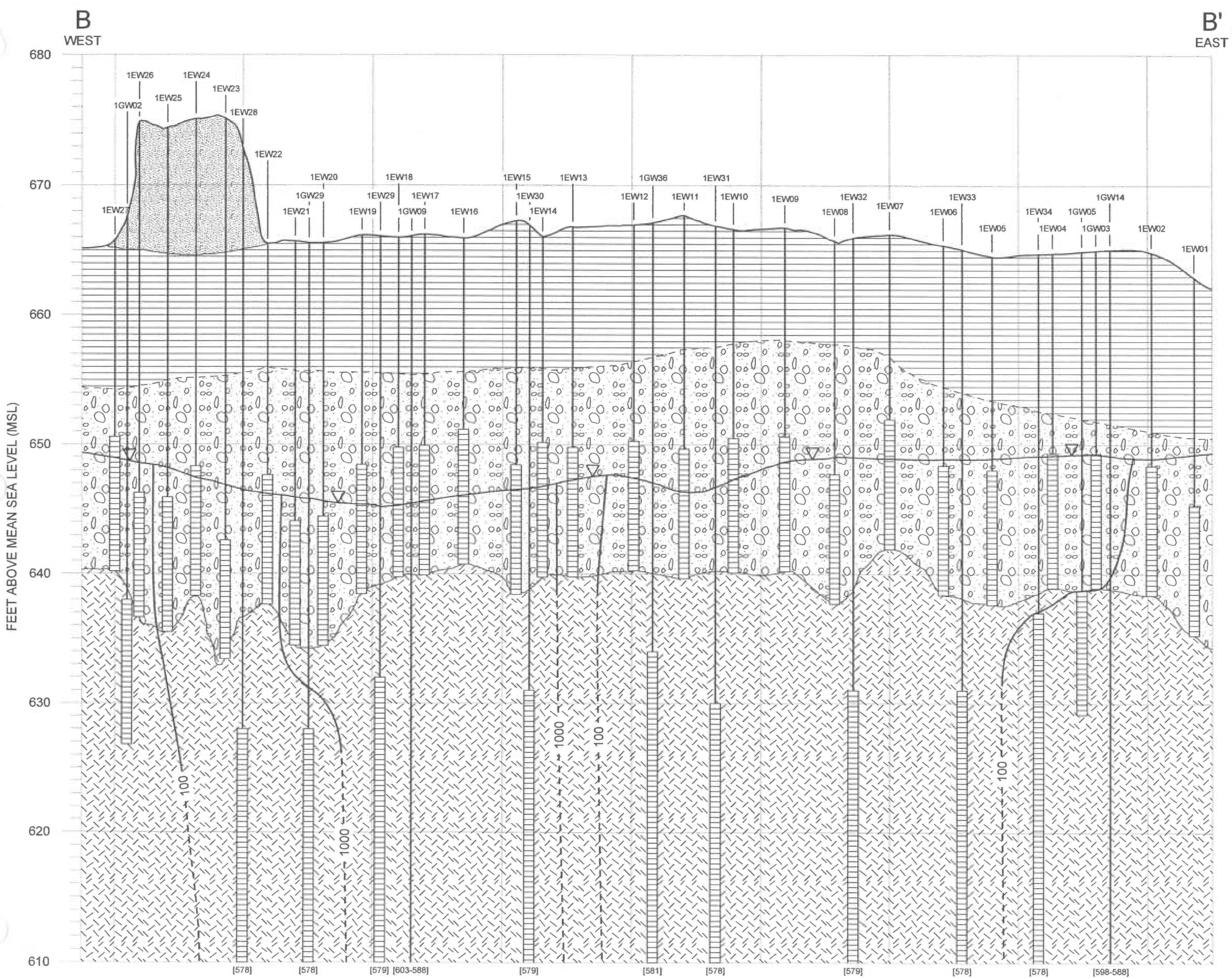
140 = Concentration of Total VOCs (ug/L)

N

80 0 80 160 Feet

Figure E-3
Burning Grounds
Isoconcentration Map of Total VOCs
in Bedrock Aquifer (July 2000)
Allegany Ballistics Laboratory

CH2MHILL



NOTES:

THIS CROSS SECTION WAS INTERPOLATED BETWEEN BORING LOCATIONS. ACTUAL CONDITIONS MAY DIFFER FROM THOSE SHOWN HERE. CROSS SECTION LOCATION IS SHOWN IN FIGURE D-1. THE BEDROCK WELL WERE PROJECTED ONTO CROSS SECTION B-B'.

LITHOLOGIC DESCRIPTIONS:

FILL

SILTY CLAY (FLOOD PLAIN DEPOSITS)

CLAYEY GRAVEL ALLUVIUM (ALLUVIAL DEPOSITS)

BEDROCK

LEGEND:

1GW39 WELL DESIGNATION

APPROXIMATE WATER-TABLE ELEVATION NOVEMBER 1994

— 100 — 100 UG/L TOTAL VOCs ISOCONCENTRATION LINE (DASHED WHERE INFERRED)

WELL CONSTRUCTION:

WELL CASING

SCREENED INTERVAL

[579] ELEVATION OF SCREEN BOTTOM

[603-588] ELEVATION OF SCREENED INTERVAL

VERTICAL SCALE 0 10

HORIZONAL SCALE 0 250
SCALE IN FEET

FIGURE E-4
VERTICAL DISTRIBUTION OF TOTAL VOCS
BURNING GROUNDS
ALLEGANY BALLISTICS LABORATORY
CH2MHILL

8263f006.dlv

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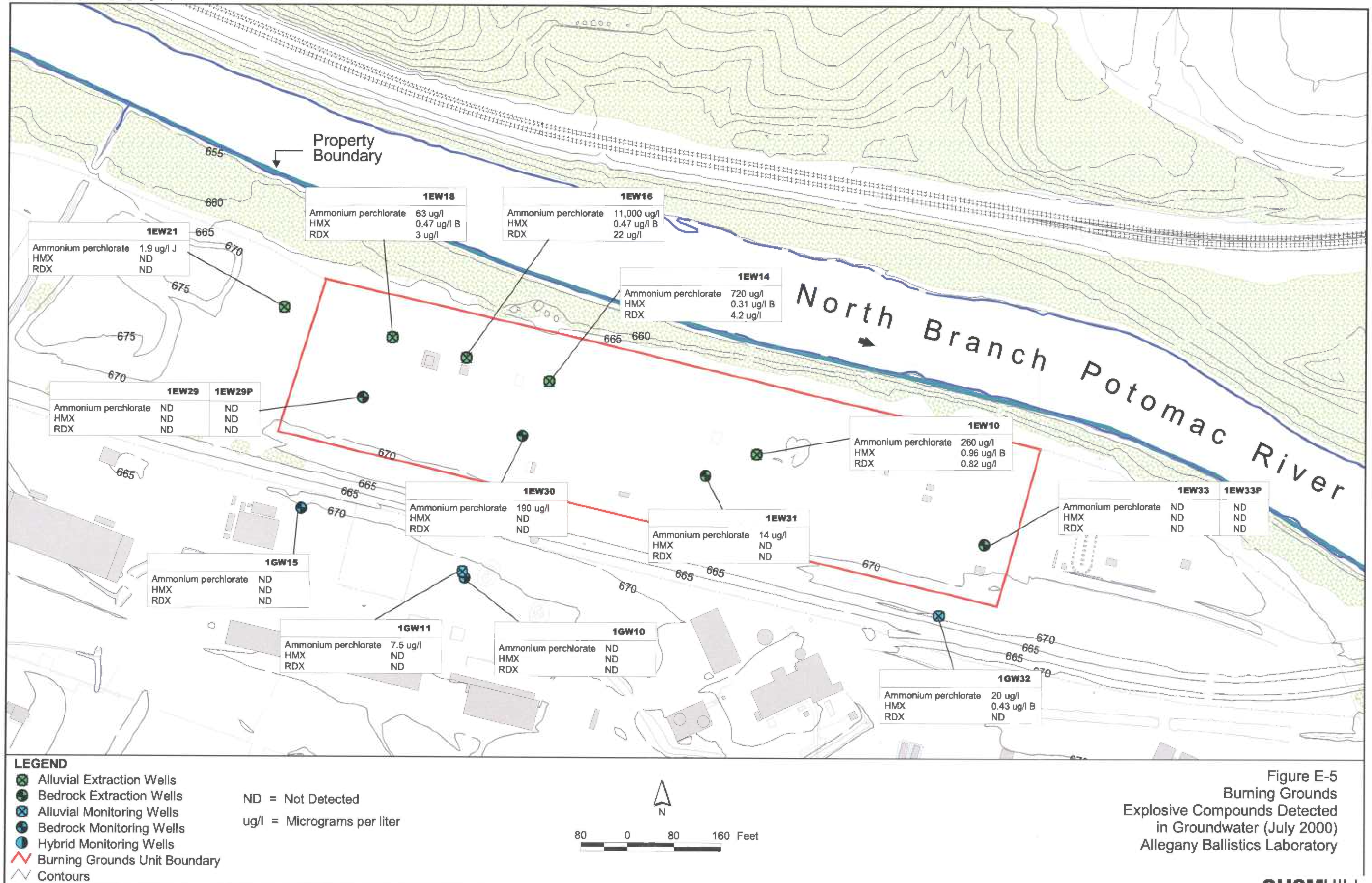

Figure E-5
Burning Grounds
Explosive Compounds Detected
in Groundwater (July 2000)
Allegany Ballistics Laboratory

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Attachment E-1
Design and Construction of Background Status Monitoring Wells

CH2M HILL

PROJECT NUMBER	BORING NUMBER
WDC34159.A0.RI	1GW10

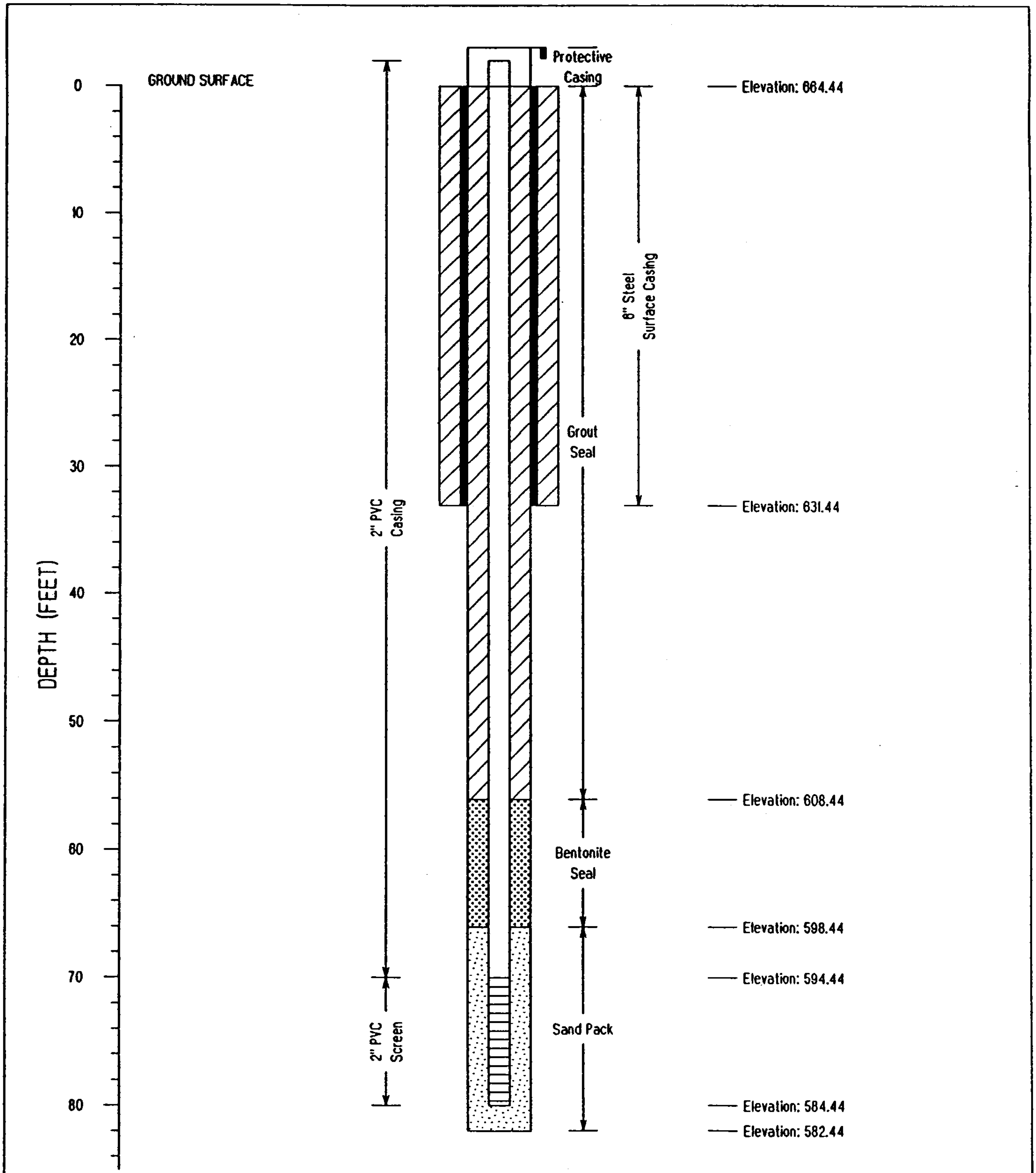
WELL COMPLETION LOG

PROJECT Hercules – Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia

ELEVATION 664.44 **DRILLING CONTRACTOR** Mid-Eastern Geotech/R. Ball, W. Sigler

DRILLING METHOD AND EQUIPMENT 10" Cable Tool/5-7/8" Air Rotary

WATER LEVELS **START** 7-7-92 **FINISH** 7-23-92 **LOGGER**

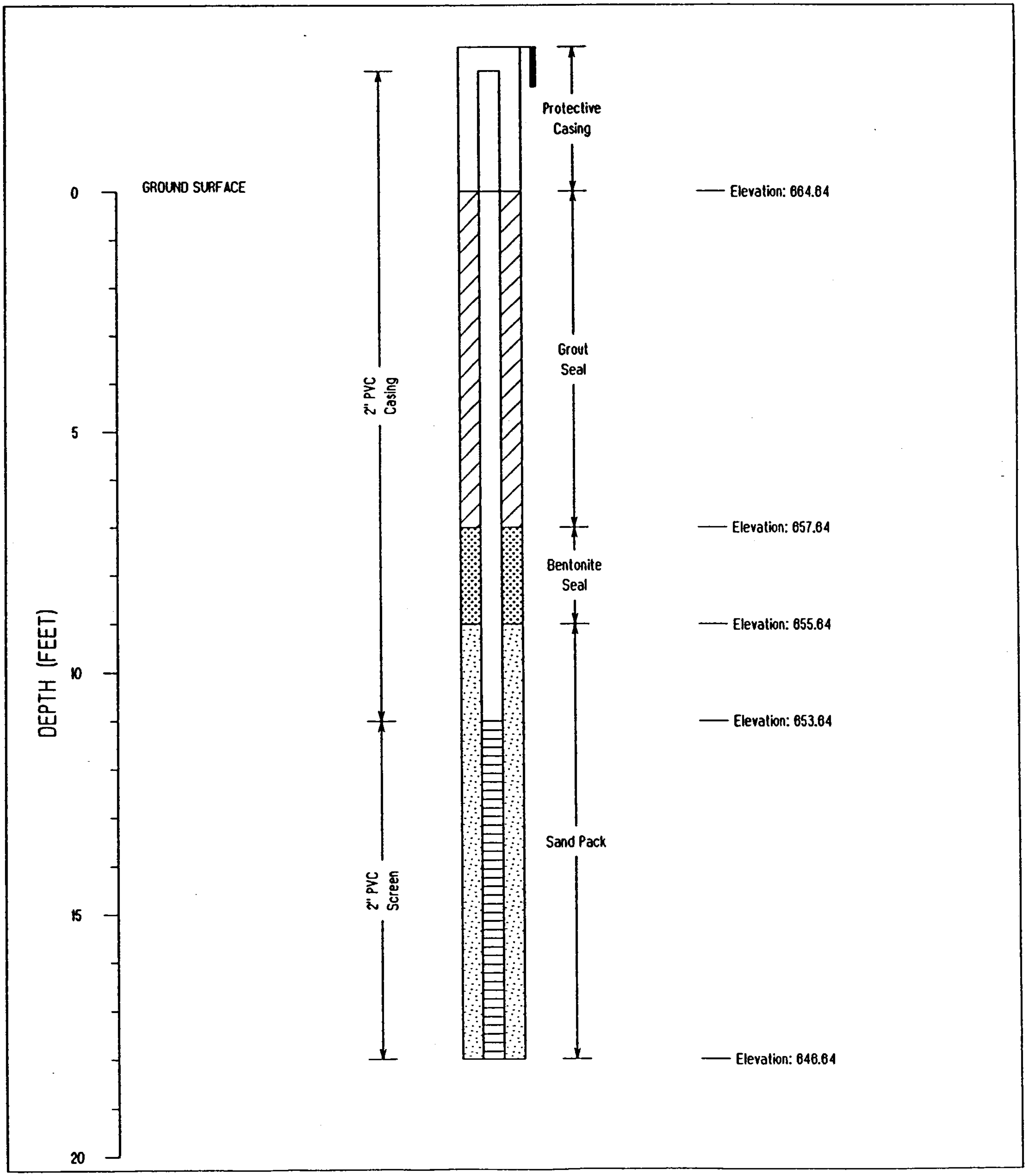


CH2M HILL

PROJECT NUMBER	BORING NUMBER
WDC34159.A0.RI	1GW11

WELL COMPLETION LOG

PROJECT Hercules – Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia
ELEVATION 664.64 **DRILLING CONTRACTOR** Mid-Eastern Geotech/K. Young
DRILLING METHOD AND EQUIPMENT 4-1/4" ID HSA
WATER LEVELS **START** 7-9-92 **FINISH** 7-9-92 **LOGGER**



CH2M HILL

PROJECT NUMBER	BORING NUMBER
MAE70342.A0.RI	1GW15 SHEET 1 OF 1

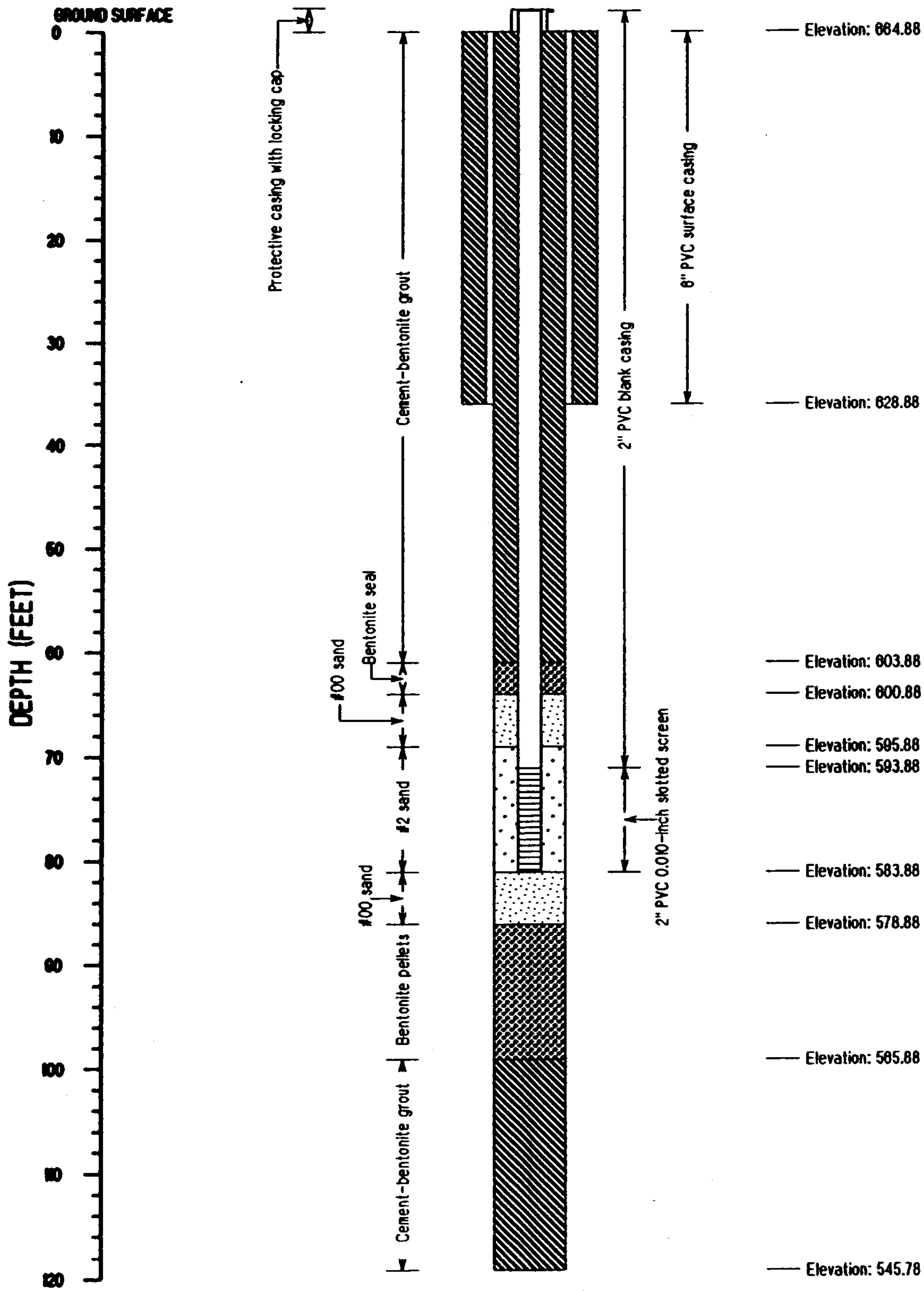
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory Focused RI/FS **LOCATION** Rocket Center, West Virginia

ELEVATION 664.88' **DRILLING CONTRACTOR** Layne-Northwest Co. / B. Jordan

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand Cyclone TH-60

WATER LEVELS **START** 8/2/94 **FINISH** 8/2/94 **LOGGER** J. Madretzke



See Boring Log
For Drilling Details

PROJECT NUMBER	BORING NUMBER	SHEET 1 OF 1
105039.AT.WI	1GW32	

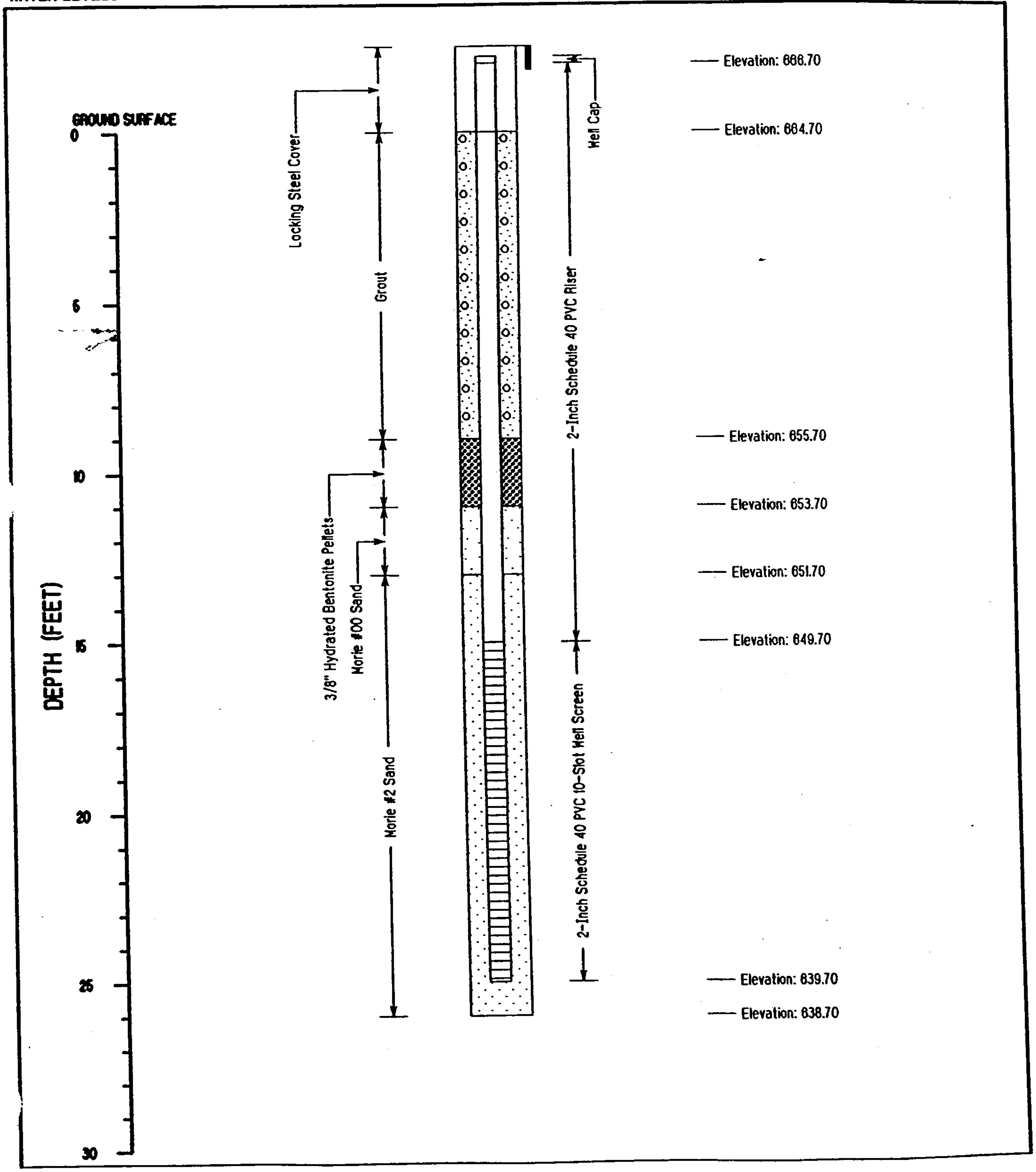
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory LOCATION Rocket Center, West Virginia

ELEVATION 664.70 DRILLING CONTRACTOR Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll Rand T4W - 2" ODEX

WATER LEVELS START 12/22/95 FINISH 12/22/95 LOGGER B. Doerr



Attachment E-2
Design and Construction of Extraction Wells

CH2M HILL

PROJECT NUMBER	BORING NUMBER	
135913.TS.01	IEW8	SHEET 1 OF 1

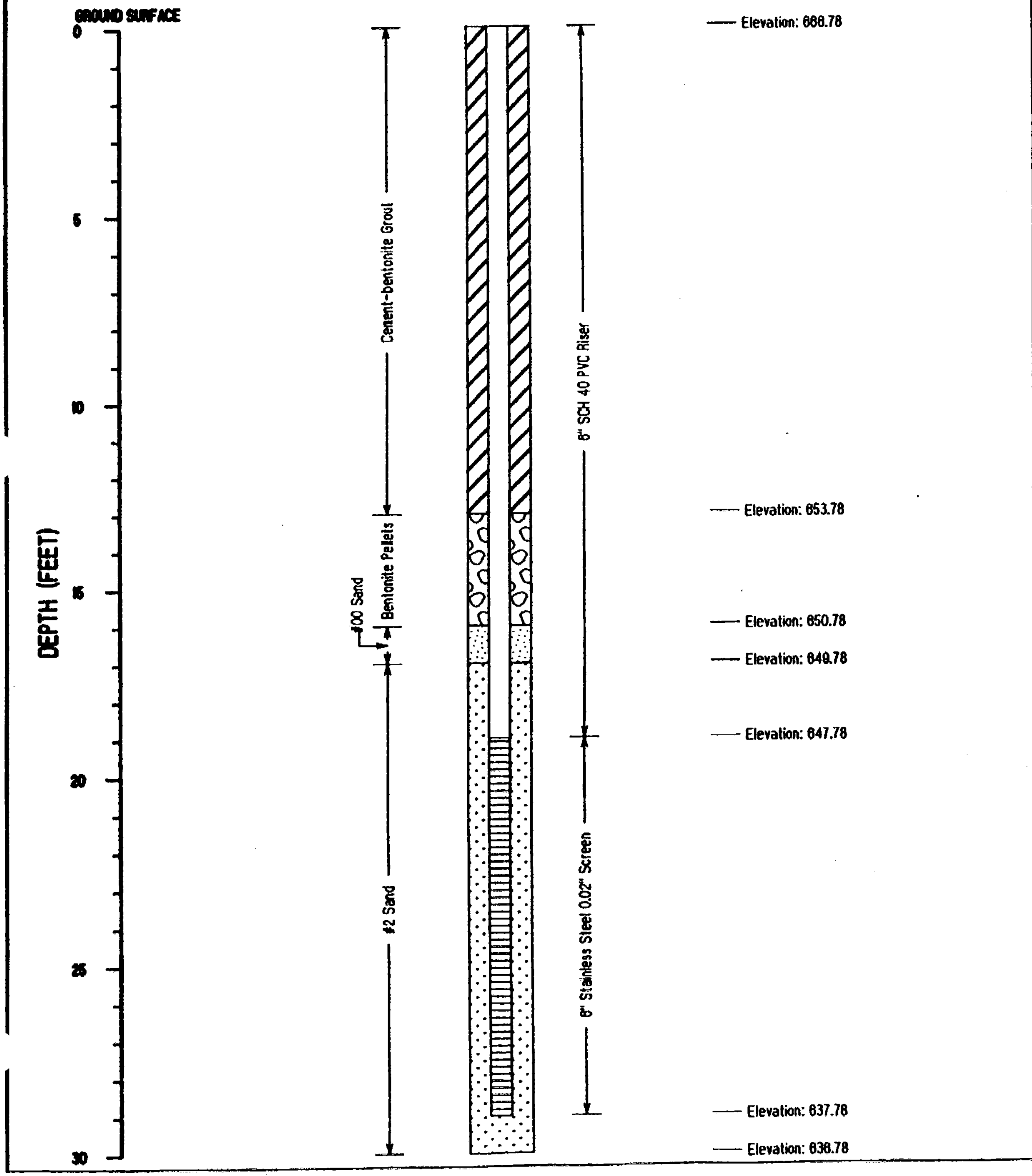
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia

ELEVATION 666.78 **DRILLING CONTRACTOR** Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX

WATER LEVELS **START** 10/18/96 **FINISH** 10/18/96 **LOGGER** A. Driscoll



CH2M HILL

PROJECT NUMBER	BORING NUMBER	
135913.TS.01	IEW10	SHEET 1 OF 1

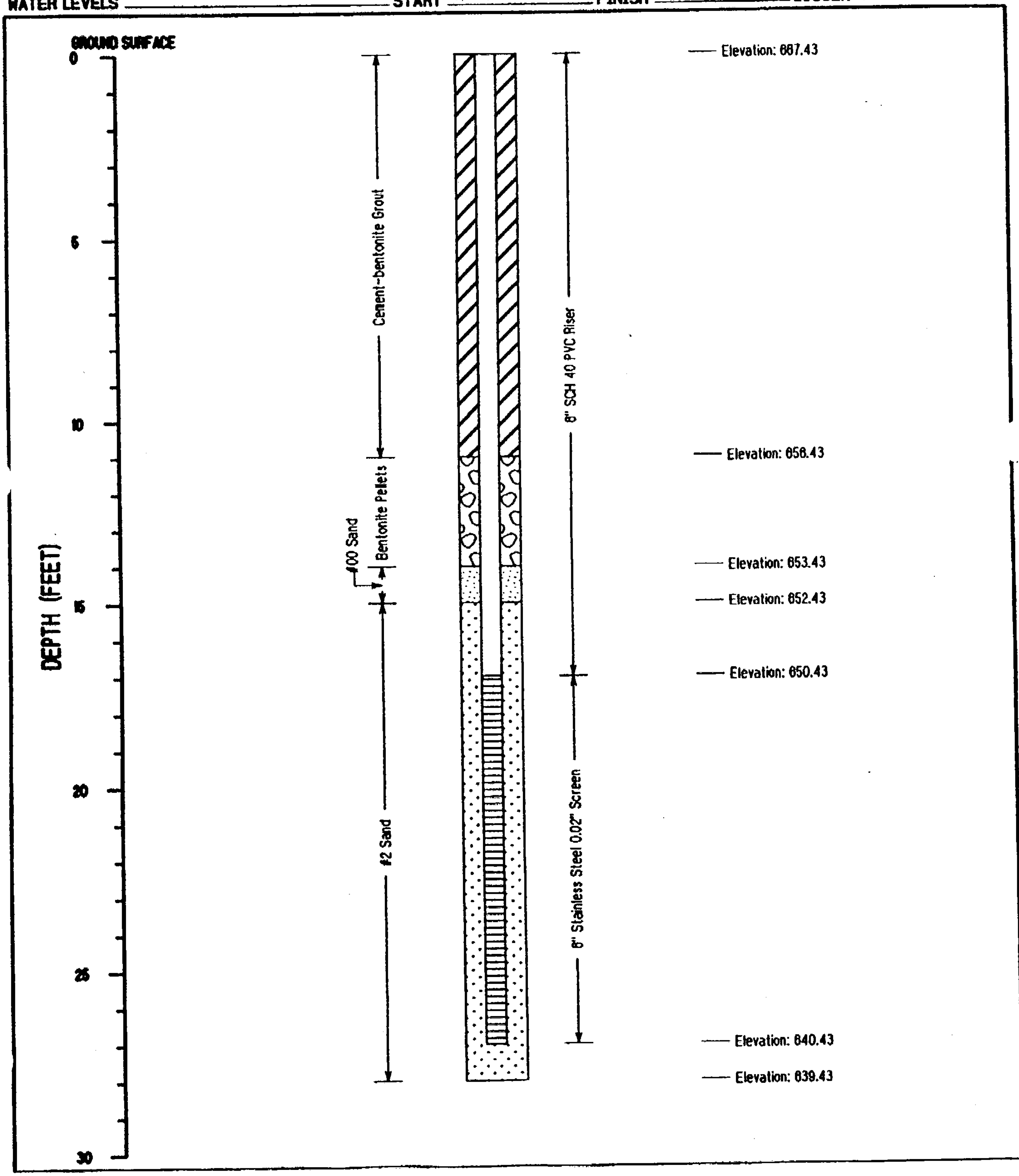
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia

ELEVATION 667.43 **DRILLING CONTRACTOR** Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX

WATER LEVELS **START** 9/24/96 **FINISH** 9/25/96 **LOGGER** A. Driscoll



CH2M HILL

PROJECT NUMBER	BORING NUMBER	
135913.TS.01	1EW12	SHEET 1 OF 1

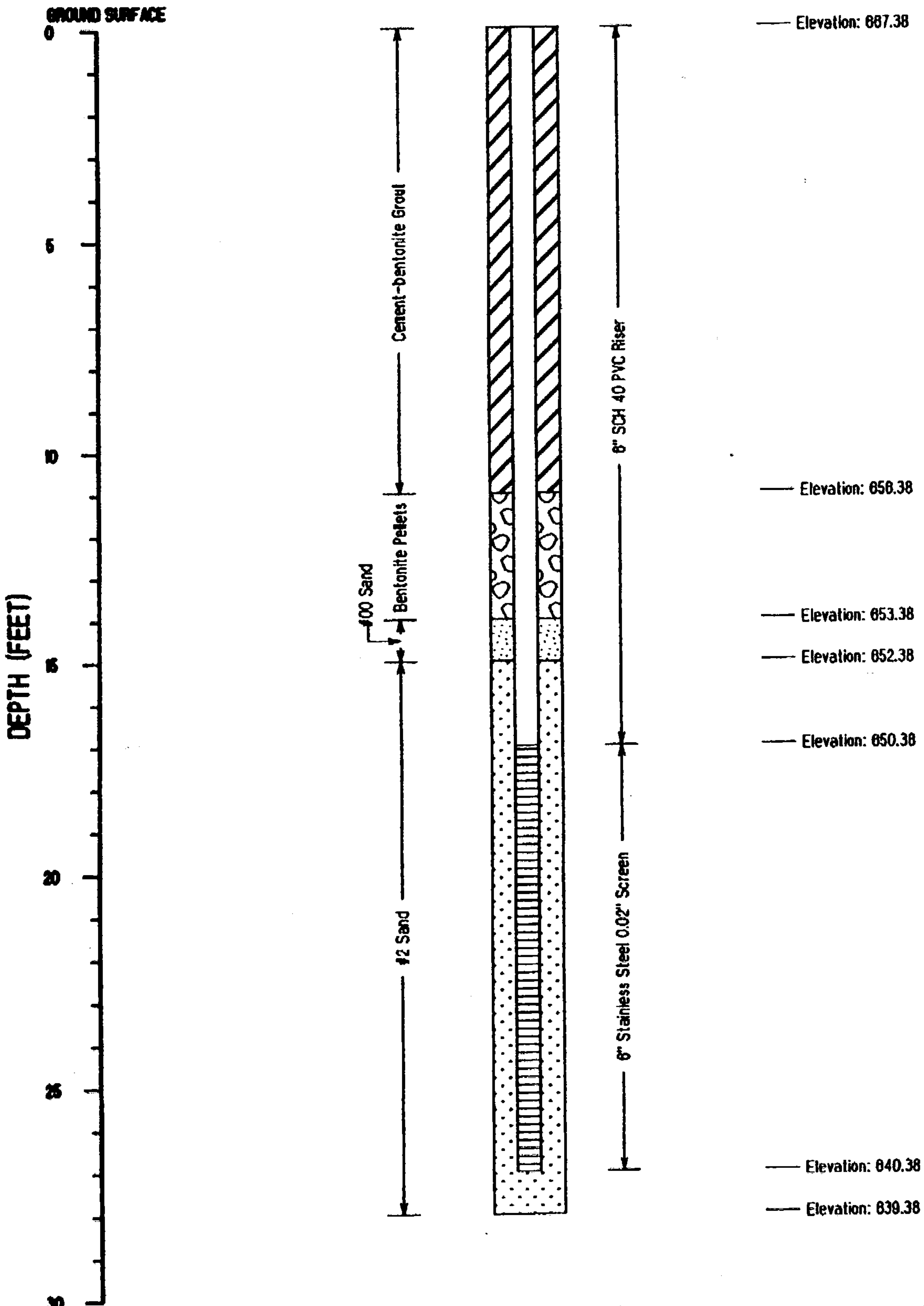
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia

ELEVATION 667.38 **DRILLING CONTRACTOR** Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX

WATER LEVELS **START** 10/23/96 **FINISH** 10/23/96 **LOGGER** A. Driscoll



CH2M HILL

PROJECT NUMBER	BORING NUMBER	
135913.TS.01	IEW14	SHEET 1 OF 1

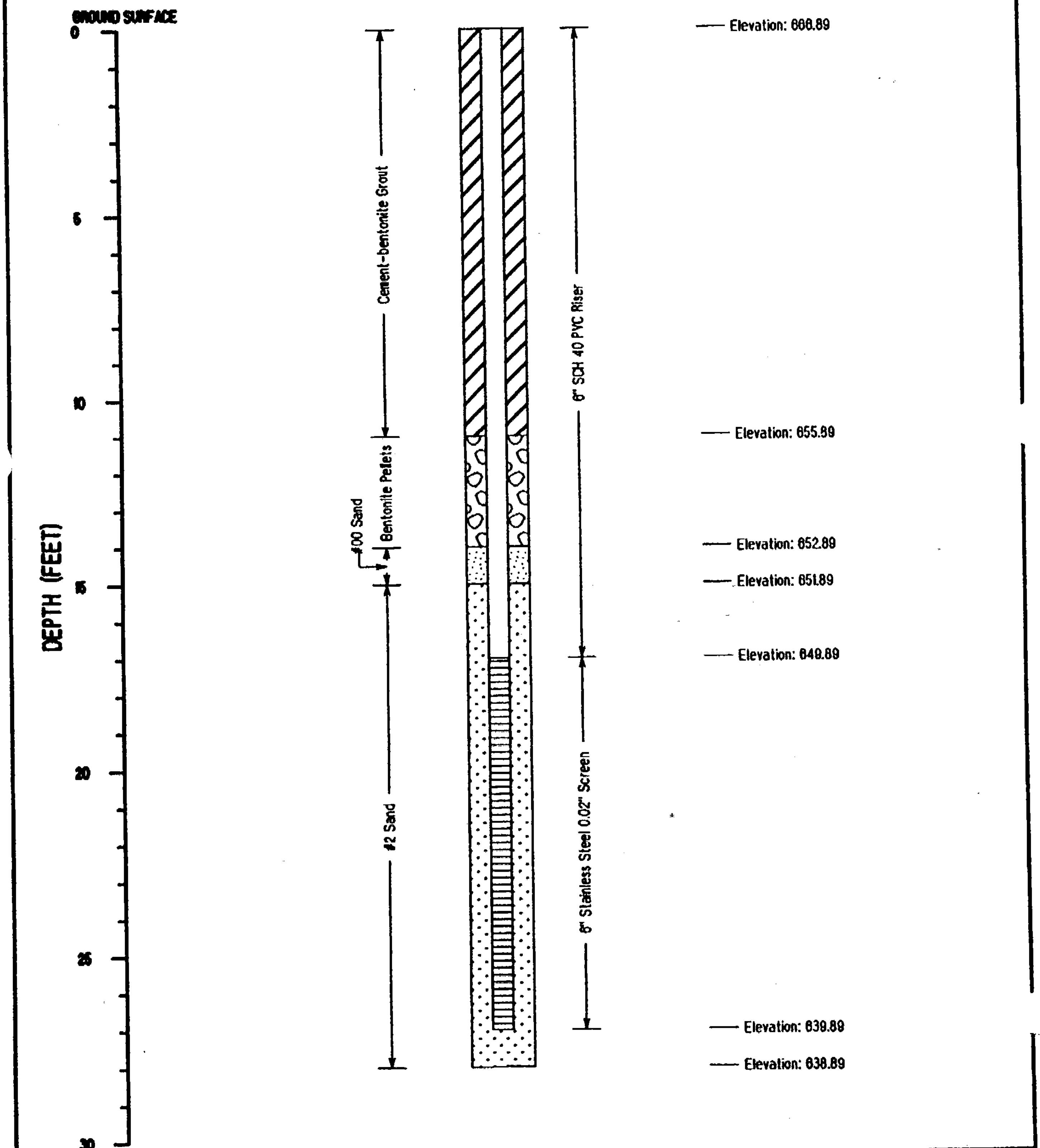
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory LOCATION Rockel Center, West Virginia

ELEVATION 666.89 DRILLING CONTRACTOR Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX

WATER LEVELS ______ START 10/24/96 FINISH 10/24/96 LOGGER A. Driscoll



CH2M HILL

PROJECT NUMBER	BORING NUMBER	
135913.TS.01	1EW16	SHEET 1 OF 1

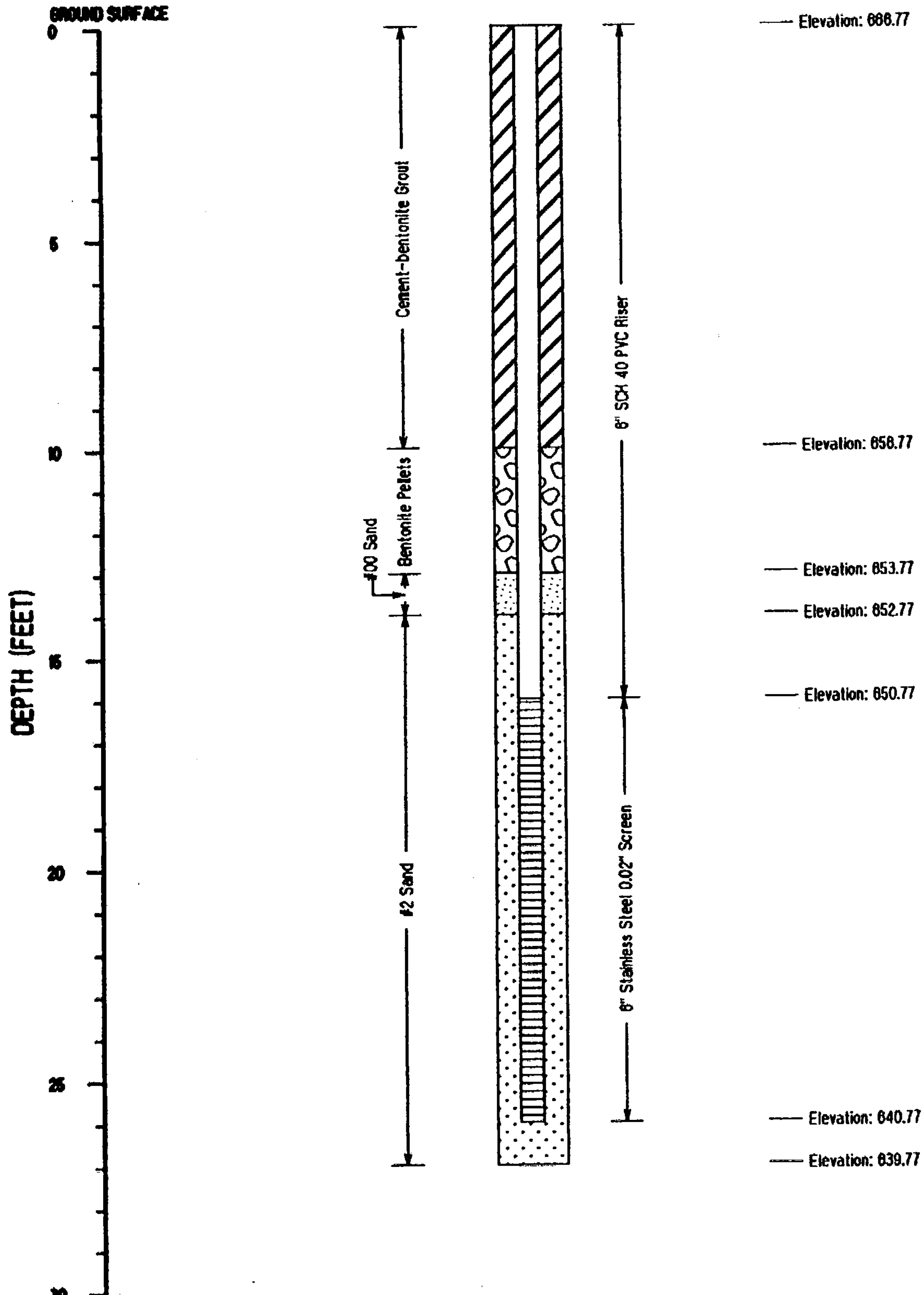
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia

ELEVATION 666.77 **DRILLING CONTRACTOR** Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX

WATER LEVELS **START** 10/28/96 **FINISH** 10/28/96 **LOGGER** A. Driscoll

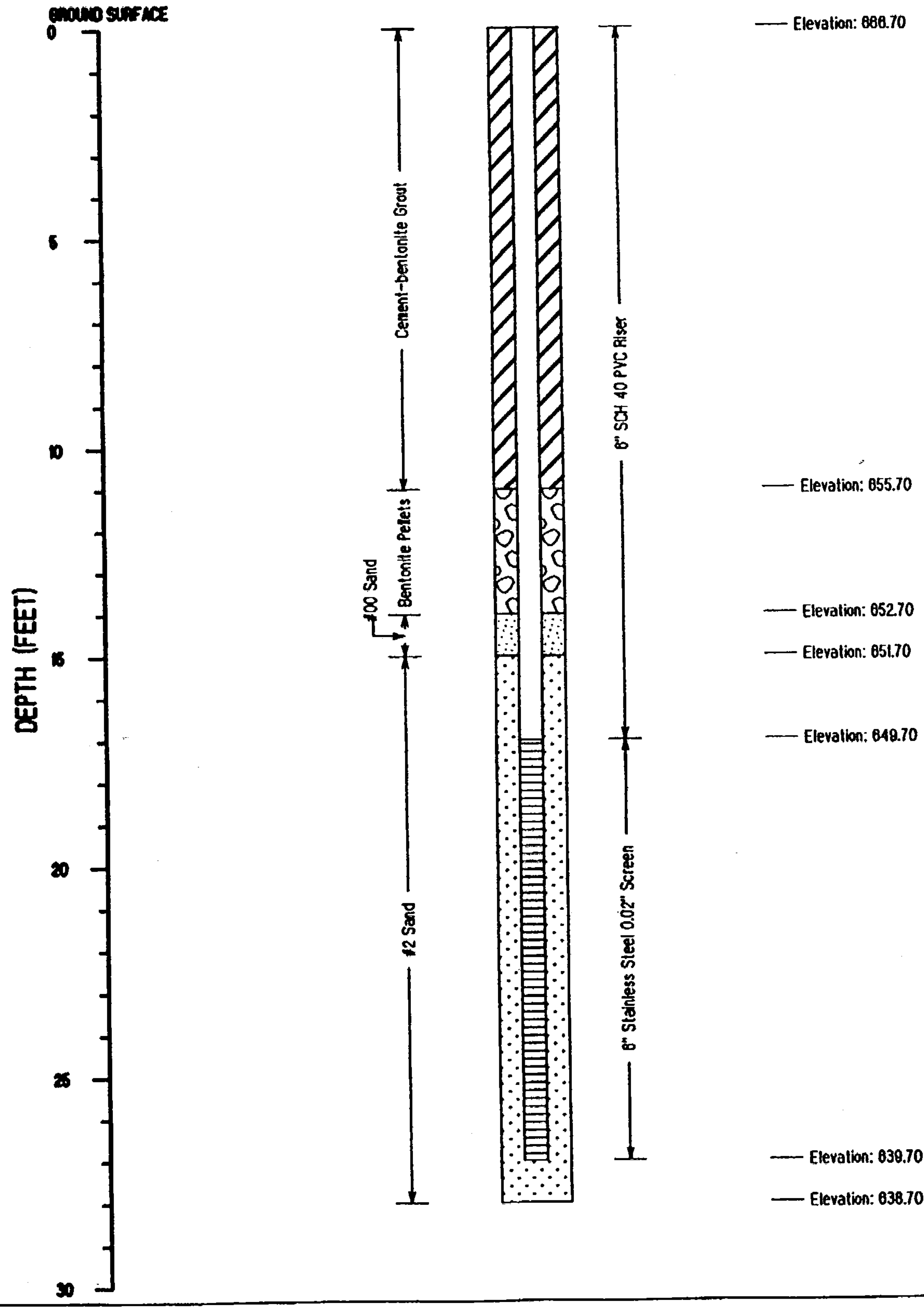


CH2M HILL

PROJECT NUMBER	BORING NUMBER	
135913.T5.01	1EW18	SHEET 1 OF 1

WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia
ELEVATION 666.70 **DRILLING CONTRACTOR** Reichart Well Drilling, Inc.
DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX
WATER LEVELS **START** 10/28/96 **FINISH** 10/28/96 **LOGGER** A. Driscoll



CH2M HILL

135913.TS.01 | 1EW21 | SHEET 1 OF 1

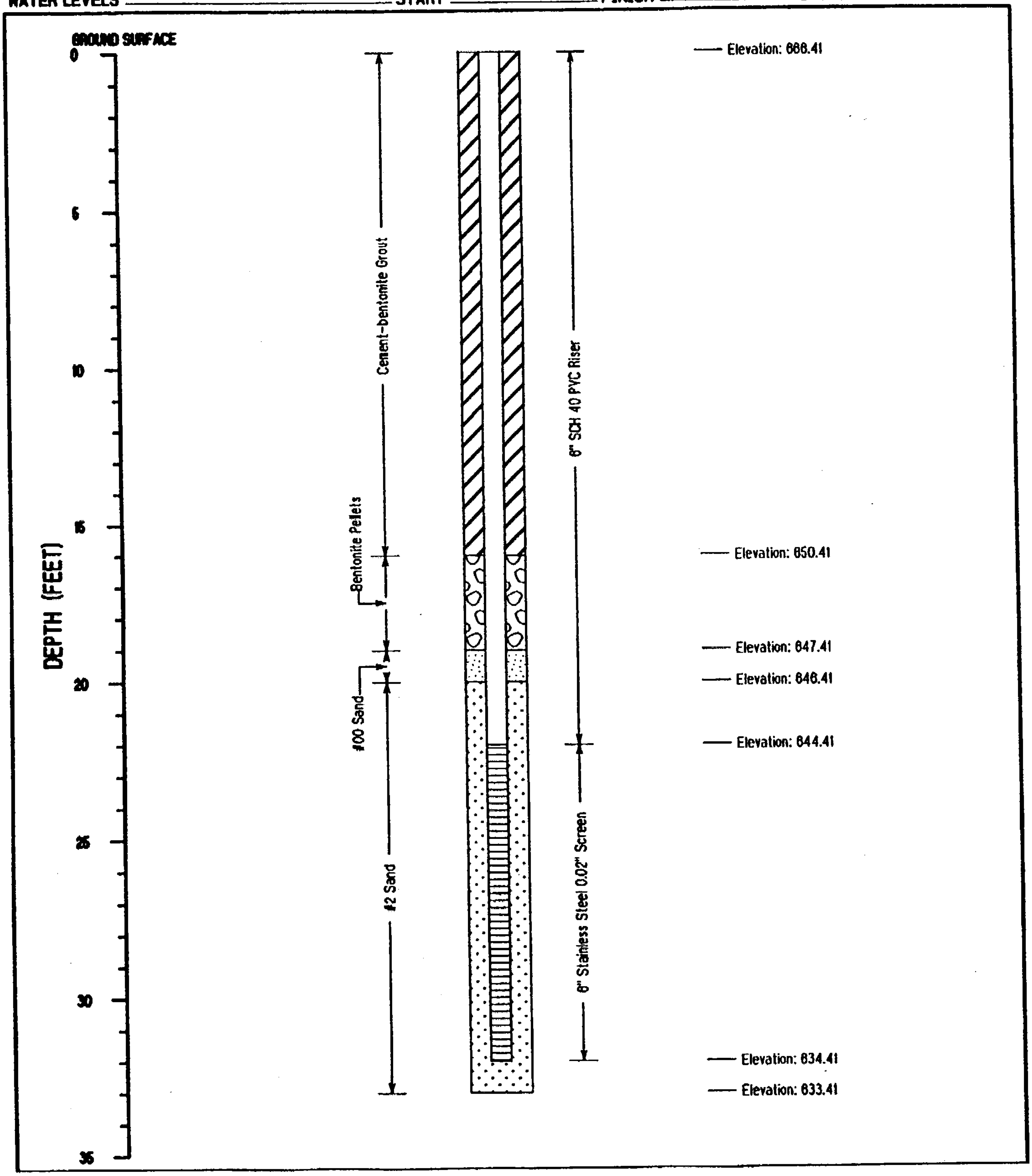
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia

ELEVATION 666.41 **DRILLING CONTRACTOR** Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX

WATER LEVELS ______ **START** 10/1/96 **FINISH** 10/1/96 **LOGGER** A. Driscoll



CH2M HILL

PROJECT NUMBER	BORING NUMBER	
135913.TS.01	1EW29	SHEET 1 OF 1

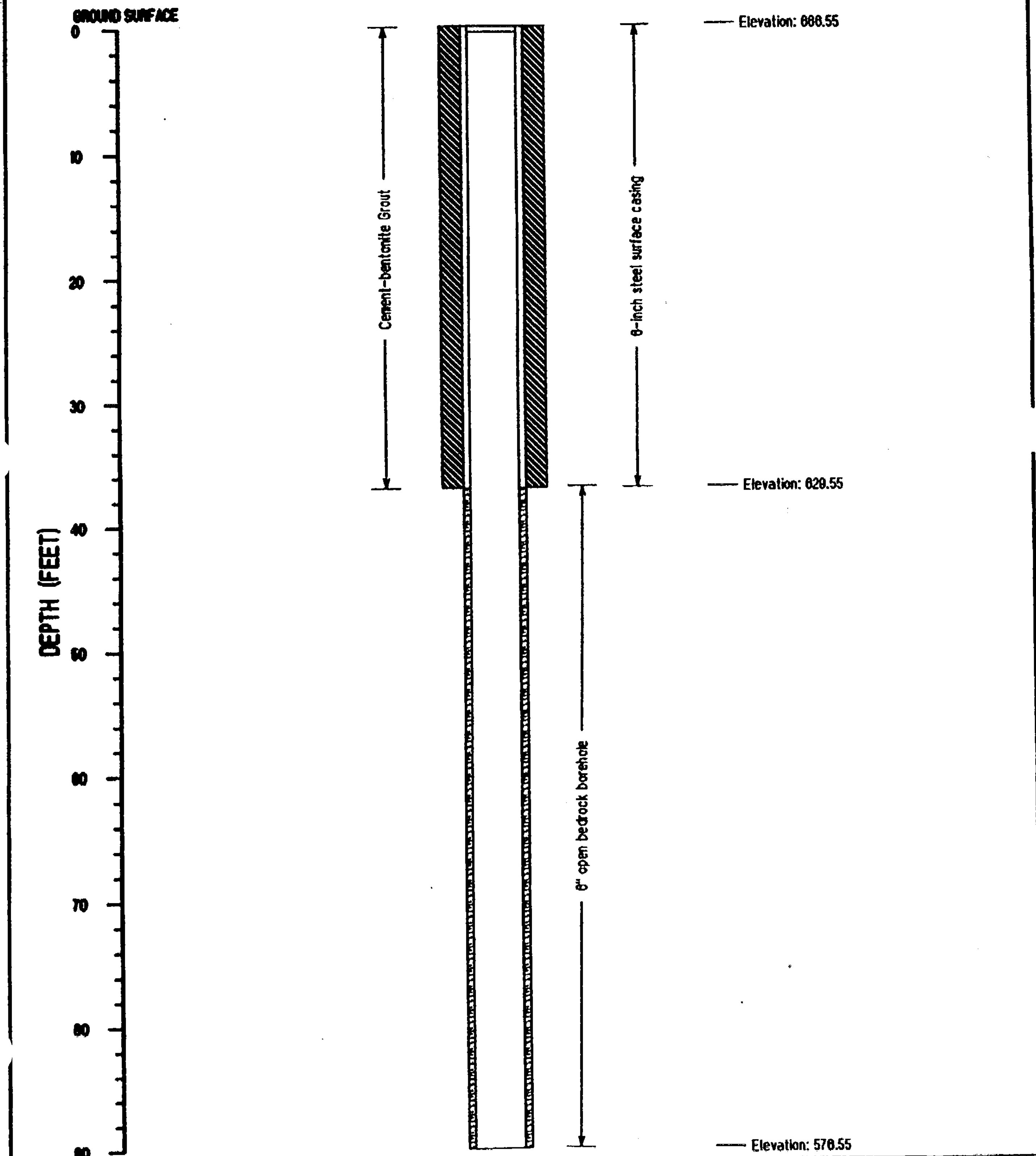
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia

ELEVATION 666.55 **DRILLING CONTRACTOR** Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX and 6" air hammer

WATER LEVELS **START** 9/26/96 **FINISH** 9/26/96 **LOGGER** A. Driscoll



PROJECT NUMBER	BORING NUMBER	
135913.TS.01	IEW30	SHEET 1 OF 1

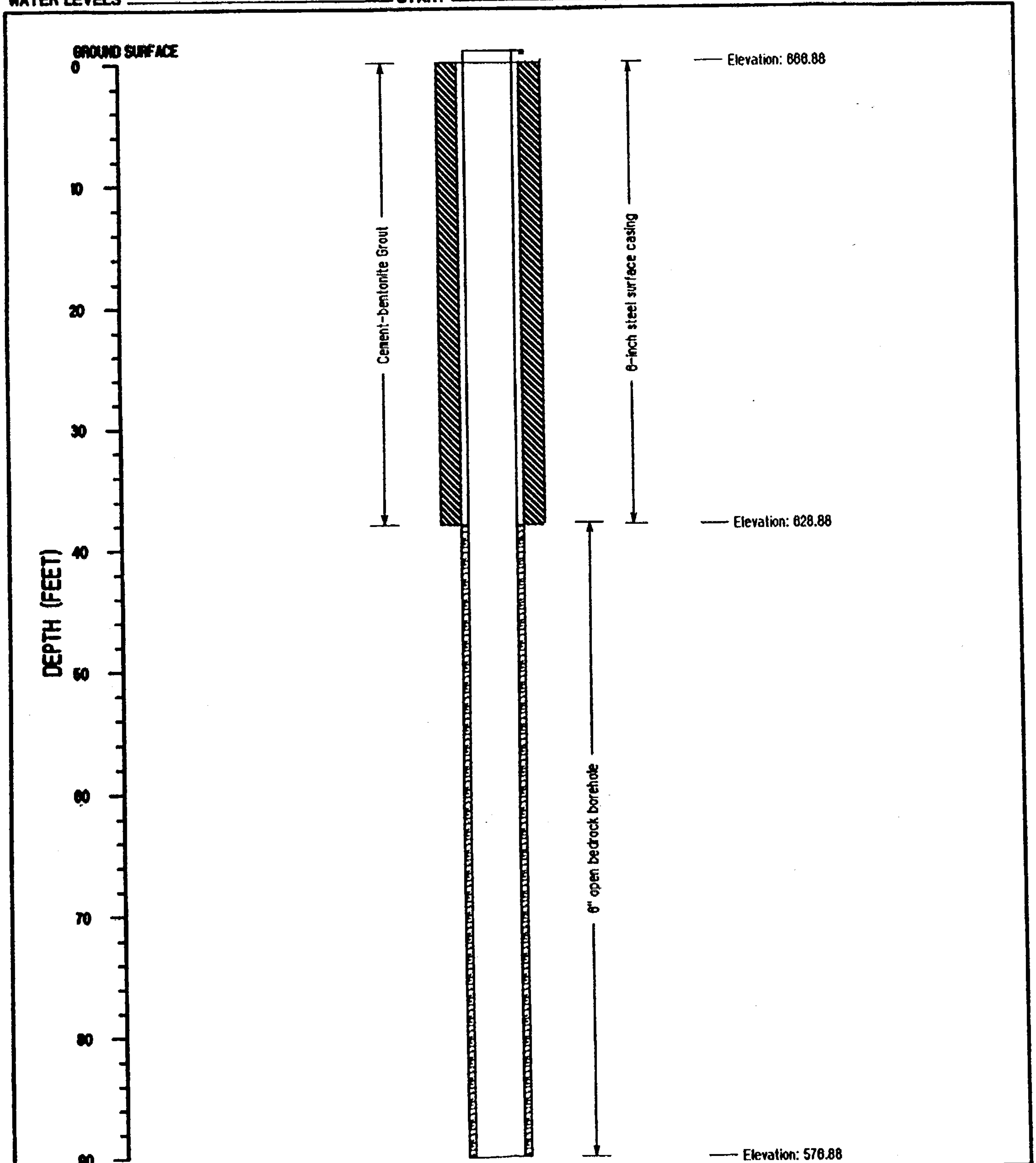
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory LOCATION Rocket Center, West Virginia

ELEVATION 666.88 DRILLING CONTRACTOR Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX and 6" air hammer

WATER LEVELS START 9/27/96 FINISH 9/27/96 LOGGER A. Driscoll



CH2M HILL

PROJECT NUMBER	BORING NUMBER	
135913.TS.01	1EW31	SHEET 1 OF 1

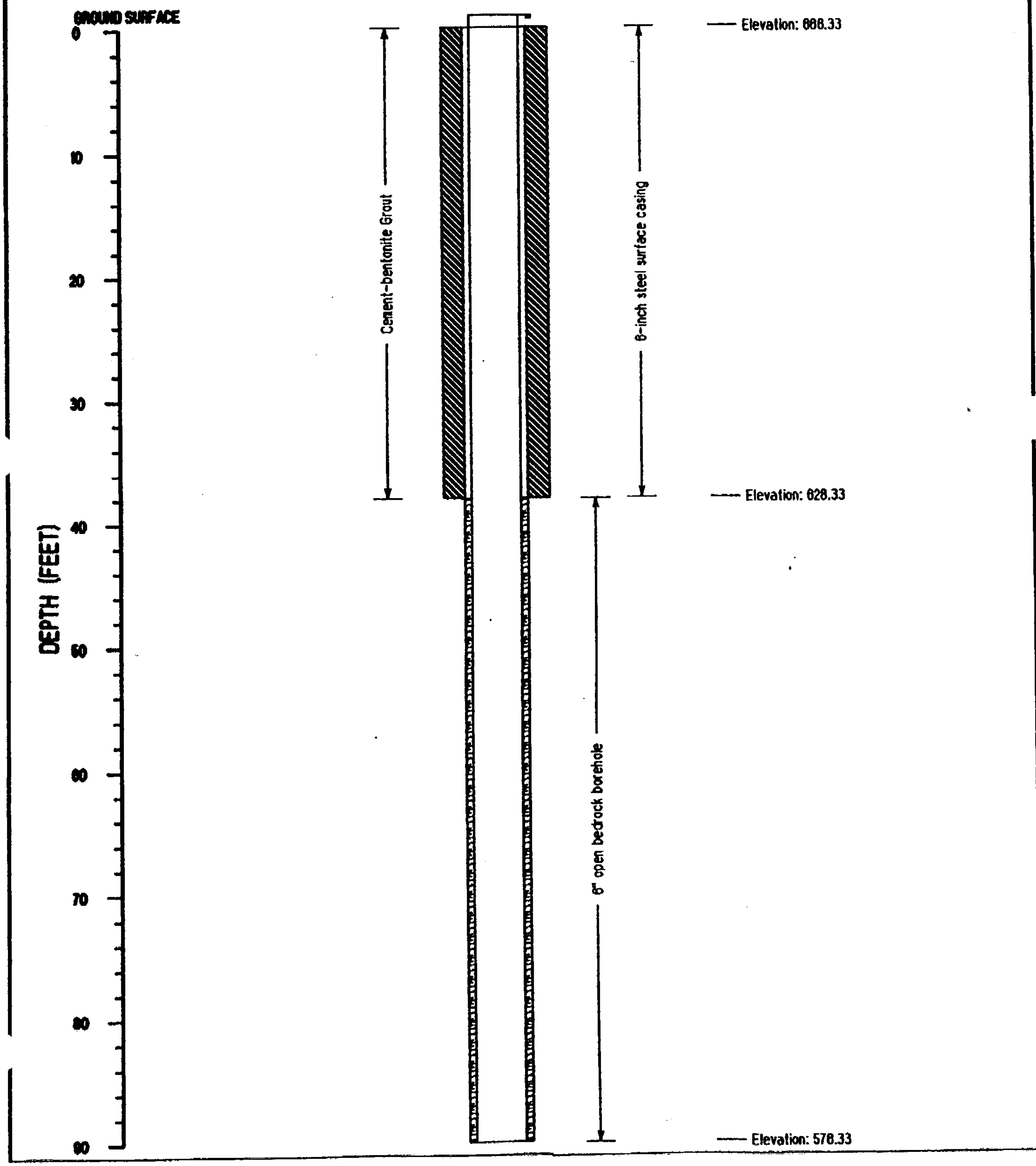
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory LOCATION Rocket Center, West Virginia

ELEVATION 666.33 DRILLING CONTRACTOR Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX and 6" air hammer

WATER LEVELS START 9/27/96 FINISH 9/27/96 LOGGER A. Driscoll



CH2M HILL

PROJECT NUMBER	BORING NUMBER	
135913.TS.01	1EW33	SHEET 1 OF 1

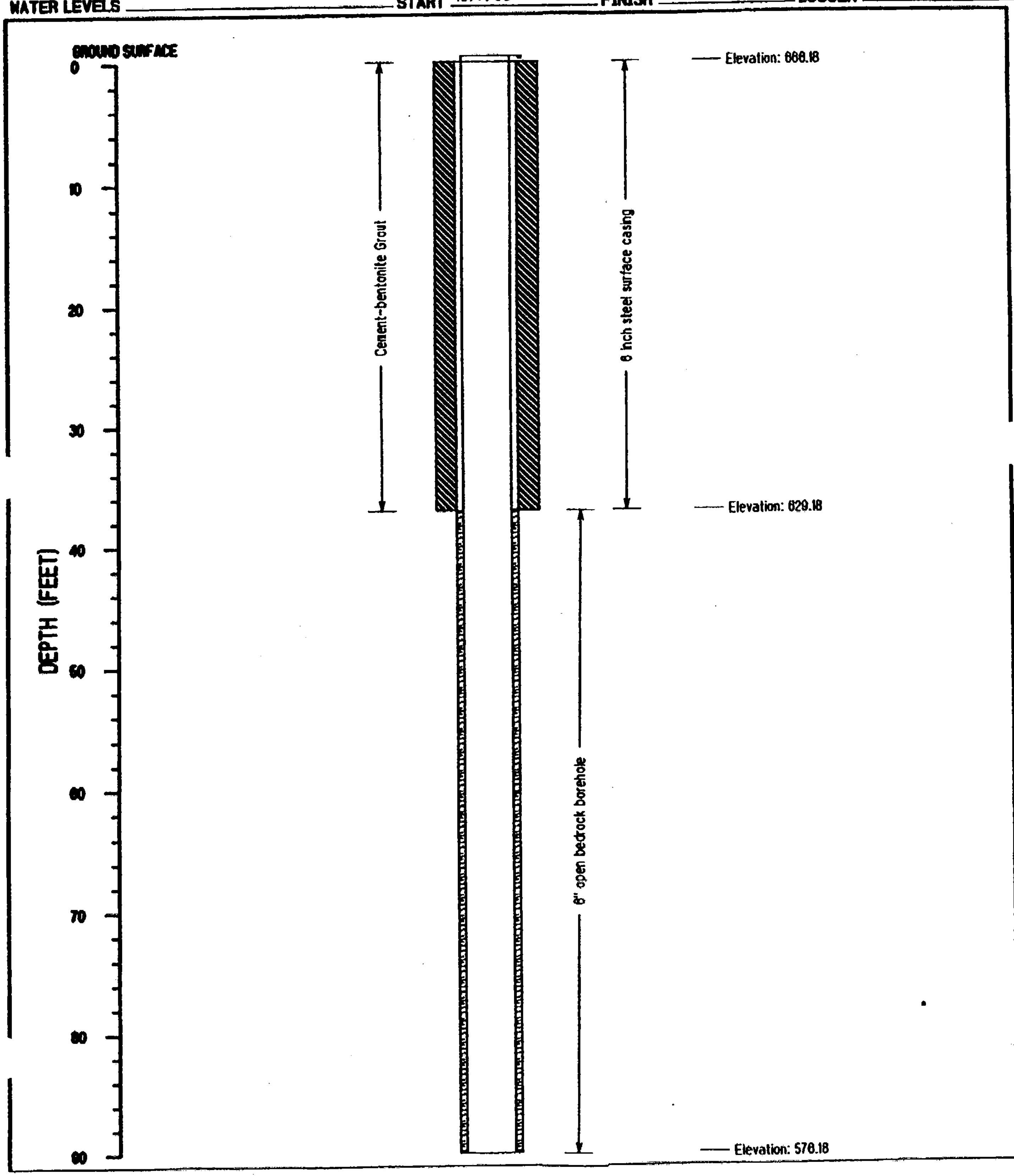
WELL COMPLETION LOG

PROJECT Allegany Ballistics Laboratory **LOCATION** Rocket Center, West Virginia

ELEVATION 666.18 **DRILLING CONTRACTOR** Reichart Well Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Ingersoll-Rand T-4 w/ 10" ODEX and 6" air hammer

WATER LEVELS ______ **START** 10/7/96 **FINISH** 10/7/96 **LOGGER** A. Driscoll



Attachment E-3
Field Sampling Plan

Field Sampling Plan
RCRA Groundwater Monitoring Program
Open Burning Grounds

Allegany Ballistics Laboratory
Rocket Center, West Virginia

Contract Task Order 175
March 2001

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN II Program
Contract N62470-95-D-6007

Prepared by

CH2MHILL

Herndon, Virginia

CONTENTS

Field Sampling Plan

Introduction

This field sampling plan (FSP) documents procedures and practices to be followed during the RCRA long-term groundwater monitoring program at the ABL Open Burning Grounds.

Groundwater Sampling

The specific wells to be sampled are presented in Table 3 of the Technical Memorandum for the RCRA Groundwater Monitoring Program, to which this FSP is an appendix. Table 1 of this FSP lists the analyses to be performed during the RCRA long-term groundwater monitoring program and provides the required containers, preservatives, and holding times.

Sampling procedures will vary between the monitoring wells and the extraction wells. Samples from the extraction wells will be collected from a sampling port on the discharge piping at each wellhead. Because these wells are in continuous operation, purging will not be required prior to sampling. At each well, a dedicated length of polyethylene tubing will be attached to the sampling port and the port opened. The pH, temperature, specific conductance, and dissolved oxygen (i.e., indicator parameters) of the discharged groundwater will be recorded. Once the indicator parameters are recorded, samples for explosives, nitroglycerin and perchlorate will be collected directly into the containers listed in Table 1.

Purging and sampling of monitoring wells will be performed using a low-flow submersible pump. Low-flow purging will be performed until temperature, specific conductance, dissolved oxygen, and pH have stabilized (i.e., less than a 10 percent change between consecutive readings). The discharge rate will be set as low as possible to minimize loss of constituents through volatilization. To minimize generation of investigation-derived waste (IDW), the samples will be obtained as soon as the indicator parameters have stabilized. Upon collection, all samples will be placed in an iced cooler, chilled to 4 °C. Following each day of sample collection, the samples will be packaged for overnight delivery at 4 °C to the analytical laboratory.

Decontamination requirements are described in the attached standard operating procedure "Decontamination of Personnel and Equipment."

All groundwater and decontamination fluids will be temporarily containerized and transported to the onsite groundwater treatment plant for disposal.

Table 1
Sample Containers, Preservatives, and Holding Times
RCRA Long-term Groundwater Monitoring Program at the Open Burning Grounds
Allegany Ballistics Laboratory

Media	Analysis	Sample Container[1]	Preservative	Holding Time
Groundwater	Explosives	One 1-liter Glass Amber	Cool to 4°C	7 days
	Nitroglycerine	One 1-liter Glass Amber	Cool to 4°C	7 days
	Perchlorate	One 250-ml plastic	Cool to 4°C	14 days

[1] Separate bottles must be used for explosives and nitroglycerine.

Field Quality Control Procedures

Quality control (QC) duplicate samples and blanks are used to provide a measure of the internal consistency of the samples and provide an estimate of the components of variance and bias in the analytical process. One duplicate sample and one equipment blank will be collected during each sampling event. Additionally, one sample will be collected in triple volume for matrix spike/matrix spike duplicate (MS/MSD) analysis.

Documentation

Sample Designation

Each sample will be designated by an alphanumeric code that will uniquely identify the site and matrix sampled, and contain descriptors to indicate whether the sample is a QC sample, etc. Sample designation protocol is detailed in Table 2.

Sample Shipping Procedures

All field sampling activities will be documented through the use of field logs and chain-of-custody (CoC) procedures. Sample containers will be clean, first-quality containers provided by the laboratory. An identification label will be affixed to each sample container. Labels will include the sample number, station number, analysis to be performed, preservative used, date and time of sample collection, and responsible sample team member.

After collection, samples will be packed in coolers with vermiculite or bubble wrap and ice. CoC forms will be taped to the inside lid of each cooler. CoC forms contain general information about the location of the sampling event, and the members of the sampling team, as well as specific information about the type of sample, sample location, number of sample containers from each station, and analyses to be performed. Each time the sample is relinquished or received, the party involved signs the form and indicates the time and date.

Shipping coolers will be sealed with strapping tape. Evidence tape (custody seals) will be placed across the front and back of the lid to control tampering. The samples will be sent via overnight delivery to the subcontracted laboratory to ensure that holding times are met.

Standard Operating Procedures

Attachment A to this FSP provides standard operating procedures (SOPs) for performing the following activities:

- Field Measurement of Specific Conductance and Temperature;
- Field Measurement of Dissolved Oxygen;
- Water-Level Measurements;
- Low-Flow Groundwater Sampling from Monitoring Wells;
- Decontamination of Personnel and Equipment;
- Field Rinse Blank Preparation;
- Packaging and Shipping Procedures, and;
- Disposal of Fluids and Solids.

Table 2
Sample Designation

First Segment	Second Segment		Third Segment
Facility, Station, and Site Number	Site Location and Type	Sample Location + Sample Qualifier	Additional Qualifiers (sampling round)
AANN	NAA	NN or NNAAA	AANN
Facility: A = ABL Station Type: S = Site Site Number: 01 = Open Burning Grounds	Site location and Type: 1MW = Site 1 Monitoring Well 1EW = Site 1 Extraction Well Sample Location: 1. Station Samples (NN) NN – refers to the Well ID 2. Sample Qualifiers (AAA) MS = matrix spike sample MSD = matrix spike duplicate sample		Additional Qualifiers: 1. Compliance Round (refers to sampling round for that location): CM01 - Round 1 CM02 - Round 2 CM03 - Round 3 Etc.

Notes: "A" = alphabetic "N" = numeric

Examples:
AS01-1EW29-CM01 (Sample from well 1EW29 collected during compliance Round 1)

AS01-1EW29MSD-CM02 (Matrix spike duplicate sample from well 1EW29 collected during Compliance Round 2)

ATTACHMENT A to Field Sampling Plan
Standard Operating Procedures

Standard Operating Procedure

Field Measurement of Specific Conductance and Temperature

I. Purpose and Scope

The purpose of this procedure is to provide a general guideline for field measurement of specific conductivity and temperature of groundwater samples. The following general discussion applies to most commonly used meters but may differ between specific brands. The operator's manual should be consulted for specific calibration and operating procedures.

II. Equipment and Materials

- Conductivity meter and electrode
- Distilled water in squirt bottle
- Standard potassium chloride (KCl) solution (0.01 N)

III. Procedures and Guidelines

A. Technical:

Detection limit = 1 µmho/cm @ 25°C; range = 0.1 to 100,000 µmho/cm

B. Calibration:

Calibrate prior to initial daily use with standard solution. Check calibration throughout and at end of the day. The standards should have different orders of conductance. Clean probe according to manufacturer's recommendations. Duplicates should be run once every 10 samples. Calibration procedure:

1. With mode switch in OFF position, check meter zero. If not zeroed, set with zero adjust.
2. Plug probe into meter.
3. Turn mode switch to red line and turn red line knob until needle aligns with red line on dial. If they cannot be aligned, change the batteries.
4. Immerse probe in 0.01 N standard KCl solution. Do not allow the probe to touch the sample container.
5. Set the mode control to TEMPERATURE. Record the temperature on the bottom scale of the meter in degrees C.
6. Turn the mode switch to appropriate conductivity scale (i.e., x100, x10, or x1). Use a scale that will give a midrange output on the meter.

7. Wait for the needle to stabilize. Multiply reading by scale setting and record the conductivity.
8. If the conductivity meter does not perform an automatic temperature adjustment, the conductivity may be adjusted to 25•C using the formula:

$$G_{25} = G_T / [1 + 0.02 (T - 25)]$$

Where:

G_{25} = conductivity at 25°C, µmho/cm

T = temperature of sample, degrees C

G_T = conductivity of sample at temperature T, µmho/cm

The table below lists the values of conductivity that the calibration solution would have if the distilled water were totally nonconductive; however, even water of high purity will possess a small amount of conductivity.

Temperature °C	Conductivity (µmho/cm)
15	1,141.5
16	1,167.5
17	1,193.6
18	1,219.9
19	1,246.4
20	1,273.0
21	1,299.7
22	1,326.6
24	1,380.8
26	1,436.5
28	1,490.9
30	1,546.7

9. Rinse the probe with deionized water.

C. Sample Measurement:

Pour the sample into a small beaker and place the probe in the sample. Note and record the reading. Rinse the probe with deionized water when done.

IV. Attachments

- Conductivity meter calibration sheet

V. Key Checks and Preventive Maintenance

- Check battery.
- Calibrate meter and check calibration throughout and at end of day.
- Clean probe with deionized water when done.
- When reading results, note sensitivity settings.
- Refer to operations manual for recommended maintenance.
- Check batteries, and have a replacement set on hand.

CONDUCTIVITY METER CALIBRATION SHEET

			Instrument Readings		
Date	Time	Analyst Initials	Uncalibrated @ EC=225	Calibrated @ EC=225	Comments

Standard Operating Procedure
Field Measurement of Dissolved Oxygen

I. Purpose

To provide general guidelines for the calibration and use of the Dissolved Oxygen (DO) meter.

II. Scope

The following general discussion applies to more commonly used meters but may differ between specific brands. The operator's manual should be consulted for specific calibration and operation procedures.

III. Equipment and Materials

- Operations manual
- A DO probe and readout/control unit with batteries
- Electrolyte solution (KCl dissolved in deionized water) and probe membrane

IV. Procedures and Guidelines

A. Calibration

Calibrate prior to initial daily use before any readings are taken. Clean probe according to manufacturer's recommendations.

1. Prepare DO probe according to manufacturer's recommended procedures using electrolyte solution.
2. In the off position, set the pointer to zero using the screw in the center of the meter panel.
3. Turn function switch to red line and adjust using red line knob until the meter needle aligns with red mark at the 31 degrees C position.
4. Turn function switch to zero and adjust to zero using the zero control knob.
5. Attach prepared probe and adjust retaining ring finger tight.
6. Allow 15 minutes for optimum probe stabilization (when meter is off or during disconnection of the probe).
7. For YSI meters, place probe in hollow stopper that is supplied for use with the YSI Calibration Chamber.
8. Place approximately 1/2 inch of deionized water into a 4-ounce, wide mouth screw cap bottle. Keep this bottle capped and with the DO meter.
9. Just before use, shake the bottle to saturate the water with air.

10. Remove cap, place probe in bottle keeping an air-tight seal around the rubber stopper. Swirl water around in the bottle while waiting for conditions to reach equilibrium.
11. Shield chamber from sun and wind to avoid temperature fluctuations during calibration.
12. Turn function switch to temperature and record temperature reading. Determine calibration factor for that temperature and altitude correction factor from tables supplied by manufacturer.
13. Multiply the calibration factor by the correction factor to get a corrected calibration value.
14. Turn function switch to appropriate ppm range and adjust the calibrate knob until the meter reads the corrected calibration value. Wait two minutes to verify calibration value. Re-adjust as necessary.

B. Procedure

1. Before going out into the field:
   a) Check batteries
   b) Obtain fresh electrolyte solution
   c) Prepare DO probe
2. Calibrate meter using calibration procedure.
3. Place probe in water to be measured. The probe should be moved through the water at 1 ft/sec or use a probe with a built-in stirrer.
4. Allow sufficient time for probe to stabilize to water temperature and DO. Record DO meter reading.

V. Attachments

DO Meter Calibration Sheet.

VI. Key Checks and Items

- Battery check
- Calibration

VII. Preventive Maintenance

- Refer to operation manual for recommended maintenance.
- Check batteries, have replacement set on hand.

DO METER
CALIBRATION SHEET

Date	Time	Analyst's Signature	Temp (C)	Alt. (ft)	Predict (ppm 0_2)	Actual (ppm 0_2)	Comment

Standard Operating Procedure
Water-Level Measurements

I. Purpose and Scope

The purpose of this procedure is to provide a guideline for the measurement of the depth to groundwater in monitoring wells, where a second phase of floating liquid (e.g., gasoline) is not encountered. This SOP includes guidelines for discrete measurements of static water levels and does not cover the use of continuously recording loggers.

II. Equipment and Materials

- Electronic water level meter, Solinst or equivalent, with a minimum 100-foot tape; the tape should have graduations in increments of 0.01 feet or less

III. Procedures and Guidelines

Verify that the unit is turned on and functioning properly. Slowly lower the probe on its cable into the well until the probe just contacts the water surface; the unit will respond with a tone or light signal. Sight across the top of the locking well casing adjacent to the measuring point, recording the position of the cable when the probe is at the water surface. The measuring point will be a standardized surveyed location on the top of each well casing, adjacent to the lock hasp, indicated by a notch, paint mark, or similar method. Measure the distance from this point to the closest interval marker on the tape, and record the water level reading in the log book.

IV. Attachments

None.

V. Key Checks and Preventative Maintenance

Prior to each use, verify that the battery is charged by pressing the test button on the water-level meter. Verify that the unit is operating correctly by testing the probe in distilled or deionized water. Leave the unit turned off when not in use.

Standard Operating Procedure Low-Flow Groundwater Sampling from Monitoring Wells

I. Purpose and Scope

This procedure presents general guidelines for the collection of groundwater samples from monitoring wells. Low-flow purging and sampling procedures are specifically addressed. Operations manuals should be consulted for specific calibration and operating procedures.

II. Equipment and Materials

- Flow-through cell with inlet/outlet ports for purged groundwater and watertight ports for each probe
- pH meter: Orion Model SA250 or equivalent
- Temperature/conductivity meter: YSI Model 33 or equivalent
- Dissolved oxygen meter: YSI Model 57 or equivalent
- Water-level indicator
- Bailer, teflon or stainless steel
- Adjustable-rate, positive-displacement pump
- Generator
- Disposable polyethylene tubing
- Plastic sheeting

III. Procedures and Guidelines

A. Setup and Purging

1. For the well to be sampled, information is obtained on well location, diameter(s), depth, and screened interval(s), and the method for disposal of purged water.
2. Instruments are calibrated according to manufacturer's instructions.
3. The well number, site, date, and condition are recorded in the field logbook.
4. Plastic sheeting is placed on the ground, and the well is unlocked and opened. All decontaminated equipment to be used in sampling will be placed only on the plastic sheeting until after the sampling has been completed.
5. Water level measurements are collected in accordance with SOP Water Level Measurements. **Do not measure the depth to the bottom of the well** (in order to avoid disturbing any accumulated sediment). Obtain depth to bottom information from well installation log.

6. The volume in gallons of water in the well casing or sections of telescoping well casing is calculated as follows:
   $0.052\,(\pi\, r^2h) = 0.163\,(r^2h) =$ gallons
   where: $\pi = 3.14$
   - r = Radius of the well pipe in inches
   - h = height of water in well in feet

   The volume of water in typical well casings may be calculated as follows:
   - 2-inch diameter well:
     0.163 gal/ft x ___ (linear feet of water) = gallons
   - 4-inch diameter well:
     0.653 gal/ft x ___ (linear feet of water) = gallons
   - 6-inch diameter well:
     1.469 gal/ft x ___ (linear feet of water) = gallons

   The initial field parameters of pH, specific conductance, and temperature of water are measured and recorded in the field logbook. The measurement probes are inserted into the probe box. The purged groundwater is directed through the box, allowing measurements to be collected before the water contacts the atmosphere.
7. Sampling equipment is cleaned and decontaminated prior to sampling in accordance with SOP *Decontamination of Personnel and Equipment*.
8. Lay out polyethylene sheeting and place all equipment on the sheeting. To avoid cross-contamination, do not let any downhole equipment touch the ground surface.
9. Attach and secure the polyethylene tubing to the low-flow pump. Lower the pump slowly into the well and set it at approximately the middle of the screen. Place the pump intake at least two feet above the bottom of the well to avoid mobilization of any sediment present in the bottom. Start purging the well at 0.2 to 0.5 liters per minute. Avoid surging. Purging rates for more transmissive formations could be started at 0.5 to 1 liter per minute.
10. The water level should be monitored during purging, and ideally, the purge rate should equal the well recharge rate so that there is little or no drawdown in the well. (The water level should stabilize for the specific purge rate.) There should be at least one foot of water over the pump intake so there is no risk of the pump suction being broken, or entrainment of air in the sample. Record adjustments in the purge rate and changes in depth to water in the logbook. Purge rates should, if needed, be decreased to the minimum capabilities of the pump (0.1 to 0.2 liters per minute) to avoid affecting well drawdown. The well should not be purged dry. If the recharge rate of the well is so low that the well is purged dry, then the contractor may wait until the well has recharged to a sufficient level and collect the appropriate volume of water for the sample with the pump.
11. During purging, the field parameters are measured frequently (every three to five minutes) until the parameters have stabilized. Field parameters are considered stabilized when pH measurements agree

within 0.5 units, temperature measurements agree within 1°C, and specific conductance, Eh, and dissolved oxygen measurements agree within 10 percent.

B. Sample Collection

Once purging has been completed, the well is ready to be sampled. The elapsed time between completion of purging and collection of the groundwater sample from the well should be minimized. Typically, the sample is collected immediately after the well has been purged, but this is also dependent on well recovery.

Samples will be placed in bottles that are appropriate to the respective analysis and that have been cleaned to laboratory standards. Each bottle typically will have been previously prepared with the appropriate preservative, if any.

The following information, at a minimum, will be recorded in the log book:

1. Sample identification (site name, location, and project number; sample name/number and location; sample type and matrix; time and date; sampler's identity)
2. Sample source and source description
3. Field observations and measurements (appearance, volatile screening, field chemistry, sampling method), volume of water purged prior to sampling, number of well volumes purged, and field parameter measurements
4. Sample disposition (preservatives added; laboratory sent to, date and time sent; laboratory sample number, chain-of-custody number, sample bottle lot number)

The steps to be followed for sample collection are as follows:

1. The cap is removed from the sample bottle, and the bottle is tilted slightly.
2. The sample is slowly discharged from the pump so that it runs down the inside of the sample bottle with a minimum of splashing.
3. Adequate space is left in the bottle to allow for expansion.
4. The bottle is capped, then labeled clearly and carefully following the procedures in SOP *Packaging and Shipping Procedures*.
5. Samples are placed in appropriate containers and, if necessary, packed with ice in coolers as soon as practical.
6. If the sampler is dedicated, it is returned to the well and the well is capped and locked. Nondedicated samplers are cleaned and decontaminated in accordance with SOP *Decontamination of Personnel and Equipment*. Disposable polyethylene tubing is disposed of with PPE and other site trash.

IV. Attachments

None.

V. Key Checks and Preventative Maintenance

Maintain field equipment in accordance with the manufacturer's recommendations. This will include, but is not limited to:

- Inspect sampling pump regularly and replace as warranted
- Inspect air/sample line quick-connects regularly and replace as warranted
- Verify battery charge, calibration, and proper working order of field measurement equipment prior to initial mobilization and daily during field efforts

Standard Operating Procedure
Decontamination of Personnel and Equipment

I. Purpose

To provide general guidelines for the decontamination of personnel, sampling equipment, and monitoring equipment used in potentially contaminated environments.

II. Scope

This is a general description of decontamination procedures.

III. Equipment and Materials

- Demonstrated analyte-free, deionized ("DI") water (specifically, ASTM Type II water)
- Distilled water
- Potable water; must be from a municipal water supplier, otherwise an analysis must be run for appropriate volatile and semivolatile organic compounds and inorganic chemicals (e.g., Target Compound List and Target Analyte List chemicals)
- 2.5% (W/W) Alconox® and water solution
- Concentrated (V/V) pesticide grade methanol (DO NOT USE ACETONE)
- Large plastic pails or tubs for Alconox® and water, scrub brushes, squirt bottles for Alconox® solution, methanol and water, plastic bags and sheets
- DOT approved 55-gallon drum for disposal of waste
- Phthalate-free gloves
- Decontamination pad and steam cleaner/high pressure cleaner for large equipment

IV. Procedures and Guidelines

A. PERSONNEL DECONTAMINATION

To be performed after completion of tasks whenever potential for contamination exists, and upon leaving the exclusion zone.

1. Wash boots in Alconox® solution, then rinse with water. If disposable latex booties are worn over boots in the work area, rinse with Alconox® solution, remove, and discard into site trash receptacle.
2. Wash outer gloves in Alconox® solution, rinse with water, remove, and discard into site trash receptacle.
3. Remove disposable coveralls ("Tyveks") and discard into site trash receptacle.
4. Remove respirator (if worn).

5. Remove inner gloves and discard.
6. At the end of the work day, shower entire body, including hair, either at the work site or at home.
7. Sanitize respirator if worn.

B. SAMPLING EQUIPMENT DECONTAMINATION—GROUNDWATER SAMPLING PUMPS

Sampling pumps are decontaminated after each use as follows.

1. Don phthalate-free gloves.
2. Spread plastic on the ground to keep hoses from touching the ground
3. Turn off pump after sampling. Remove pump from well and place pump in decontamination tube, making sure that tubing does not touch the ground
4. Turn pump back on and pump 1 gallon of Alconox® solution through the sampling pump.
5. Rinse with 1 gallon of 10% methanol solution pumped through the pump. (DO NOT USE ACETONE).
6. Rinse with 1 gallon of tap water.
7. Rinse with 1 gallon of deionized water.
8. Keep decontaminated pump in decontamination tube or remove and wrap in aluminum foil or clean plastic sheeting.
9. Collect all rinsate and dispose of in a DOT-approved 55-gallon drum.

C. SAMPLE CONTAINER DECONTAMINATION

The outsides of sample bottles or containers filled in the field may need to be decontaminated before being packed for shipment or handled by personnel without hand protection. The procedure is:

1. Wipe container with a paper towel dampened with Alconox® solution or immerse in the solution AFTER THE CONTAINERS HAVE BEEN SEALED. Repeat the above steps using potable water.
2. Dispose of all used paper towels in site trash receptacle.

V. Attachments

None.

VI. Key Checks and Items

- Clean with solutions of Alconox®, methanol, and distilled water.
- Do not use acetone for decontamination.
- Drum all contaminated rinsate.
- Decontaminate filled sample bottles before relinquishing them to anyone.

Standard Operating Procedure
Equipment Rinse Blank Preparation

I. Purpose

To prepare an equipment blank to determine adequacy of decontamination procedures and whether any cross-contamination is occurring during sampling.

II. Scope

The general protocols for preparing the equipment rinse blank are outlined. The actual equipment to be rinsed will depend on the requirements of the specific sampling procedure.

III. Equipment and Materials

- Deionized Water (use ASTM Type II grade water)
- Sample bottles as appropriate
- Gloves
- Sample equipment as appropriate

IV. Procedures and Guidelines

A. Decontaminate all sampling equipment that has come in contact with sample According to SOP Decontamination of Personnel and Equipment.

B. For non-volatiles, one aliquot is to be used for equipment. For example, if more than one pump is used to sample the monitoring wells, pump deionized water through each pump and into the appropriate sample bottles.

C. Do not let the blank fluid come in contact with any equipment that has not been decontaminated.

D. Document and ship samples in accordance with the procedures for other samples.

E. Collect next field sample.

V. Attachments

None.

VI. Key Checks and Items

- Wear gloves.
- Do not use any non-decontaminated equipment to prepare blank.
- Use ASTM-Type II grade deionized water.

Standard Operating Procedure
Packaging and Shipping Procedures

I. Low-Concentration Samples

1. Prepare coolers for shipment:

   - Tape drains shut.
   - Affix "This Side Up" labels on all four sides and "Fragile" labels on at least two sides of each cooler.
   - Place mailing label with laboratory address on top of coolers.
   - Fill bottom of coolers with about 3 inches of vermiculite.

2. Arrange decontaminated sample containers in groups by sample number. Consolidate VOC samples into one cooler to minimize the need for trip blanks.

3. Affix appropriate adhesive sample labels to each container. Protect with clear label protection tape.

4. Seal each sample bottle within a separate ziplock plastic bag or bubble wrap, if available. Tape the bag around bottle. Sample label should be visible through the bag.

5. Arrange sample bottles in coolers so that they do not touch.

6. If ice is required to preserve the samples, cubes should be repackaged in zip-lock bags and placed on and around the containers.

7. Fill remaining spaces with vermiculite.

8. Complete and sign chain-of-custody form (or obtain signature) and indicate the time and date it was relinquished to Federal Express or the courier.

9. Separate copies of forms. Seal proper copies (traffic reports, packing lists) along with a return address label within a large zip-lock bag and tape to inside lid of cooler.

10. Close lid and latch.

11. Carefully peel custody seals from backings and place intact over lid openings (right front and left back). Cover seals with clear protection tape.

12. Tape cooler shut on both ends, making several complete revolutions with strapping tape. Do not cover custody seals.

13. Relinquish to Federal Express or to a courier arranged with the laboratory. Place airbill receipt inside the mailing envelope and send to the sample documentation coordinator along with the other documentation.

II. Medium- and High-Concentration Samples:

Medium- and high-concentration samples are packaged using the same techniques used to package low-concentration samples, with several additional restrictions. First, a special airbill including a Shipper's Certification for Restricted Articles is required. Second, "Flammable Liquid N.O.S." or "Flammable Solid N.O.S." (as appropriate) labels must be placed on at least two sides of the cooler. Third, sample containers are packaged in metal cans with lids before being placed in the cooler, as indicated below:

- Place approximately ½ inch of vermiculite in the bottom of the can.
- Position the sample jar in the zip-loc bag so that the sample tags can be read through the plastic bag.
- Place the jar in the can and fill the remaining volume with vermiculite.
- Close the can and secure the lid with metal clips.
- Write the traffic report number on the lid.
- Place "This Side Up" and "Flammable Liquid N.O.S." or "Flammable Solid N.O.S." (as appropriate) labels on the can.
- Place the cans in the cooler.
- For medium concentration samples, ship samples with ice or "blue ice" inside the coolers. (Double bag ice in zip-lock plastic bags.)

III. Special Instructions for Shipping Medium and High Concentration Samples by Federal Express

A. Label cooler as hazardous shipment:

- Write shipper's address on outside of cooler. If address is stenciled on, just write "shipper" above it.
- Write or affix sticker saying "This Side Up" on two adjacent sides.
- Write or affix sticker saying "ORM-E" with box around it on two adjacent sides. Below ORM-E, write NA#9188.
- Label cooler with "Hazardous Substance, N.O.S." and "liquid" or "solid," as applicable.

B. Complete the special shipping bill for restricted articles.

- Use a type-written shipping label if FEDEX is used.
- Under Proper Shipping Name, write "Hazardous Substance, N.O.S." and "liquid" or "solid," as applicable.
- Under Class, write "ORM-E.
- "Under Identification No., write NA No. 9188.

C. For high concentration samples, ship samples with "blue ice" only inside coolers.

Standard Operating Procedure
Disposal of Fluids and Solids

I. Purpose and Scope

This SOP describes the procedures used to dispose of hazardous fluid and solid materials generated as a result of the site operations. This SOP does not provide guidance on the details of Department of Transportation regulations pertaining to the transport of hazardous wastes; the appropriate Code of Federal Regulations (49 CFR 171 through 177) should be referenced.

II. Equipment and Materials

A. Fluids

- 55-gallon steel drums or plastic containers (unless corrosive materials are encountered)

III. Procedures and Guidelines

A. Methodology

Water purged during the sampling events from the extraction and monitoring wells will be temporarily stored in carboys or drums and transferred for disposal in the groundwater treatment plant. Decontamination fluids will also be containerized and disposed in the treatment plant. All PPE and sampling equipment will be placed in garbage bags and disposed of at the site.

B. Storage and Disposal

The drums or carboys will be stored at the site and will be reused to minimize the amount of waste.

Attachment E-4
Record of Decision (ROD) for Site 1
Allegany Ballistic Laboratory

6.04 4/1/97 1015

RECORD OF DECISION

SITE 1 OPERABLE UNIT 3, GROUNDWATER, SURFACE WATER, AND SEDIMENT

at the

ALLEGANY BALLISTICS LABORATORY, WEST VIRGINIA

APRIL 1997

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APPENDICES

1.0 THE DECLARATION

1.1 SITE NAME AND LOCATION

Site 1 Groundwater, Surface Water and Sediments
Allegany Ballistics Laboratory
Rocket Center, West Virginia

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Site 1 (the "site") Groundwater, Surface Water and Sediments at the Allegany Ballistics Laboratory (ABL), Rocket Center, West Virginia. This determination has been made in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980(CERCLA), as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site.

The Department of the Navy (DoN) has obtained concurrence from the State of West Virginia and the United States Environmental Protection Agency (USEPA), Region III with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

1.3 DESCRIPTION OF THE SELECTED REMEDY

The Navy will manage the remediation at Site 1 in two phases or Operable Units (OUs). The remedial action selected in this Record of Decision (ROD) addresses contamination associated with groundwater, surface water and sediments in the North Branch Potomac River near Site 1 and is to be implemented as Operable Unit Three (OU 3).

Operable Unit Four (OU 4), defined as the contaminated surface and subsurface soils at Site 1, will undergo further evaluation and separate remediation alternatives will be studied.

The selected remedy for OU 3 is a site-wide groundwater extraction, with Dense Non-Aqueous Phase Liquids (DNAPLs) targeting and air stripping.

The major components of the selected remedy are:

- Construction of a groundwater treatment plant onsite for treatment of flow in the range of 175 gpm to 540 gpm.

- Extraction of groundwater across Site 1. Groundwater extraction will prevent flow of contaminated groundwater into the river thereby allowing contaminated surface water and sediments to undergo processes of volatilization, degradation, dilution, mixing, and sediment removal or erosion. Extracted groundwater will be treated by the groundwater treatment plant and discharged to the North Branch Potomac River. A portion of the treated groundwater will be utilized by the facility, on an as needed basis, for steam generation. The extraction well network would be periodically evaluated and modified as necessary in order to enhance recovery of contaminants and better control the dissolution of DNAPLs into groundwater.

- Establishment of an Operation and Maintenance (O&M) program for the groundwater treatment plant and extraction system. Deed notations and property use and access restrictions will be implemented to prevent future groundwater use.

- A sediment, surface water, and aquifer monitoring plan will be undertaken to monitor contaminant concentrations in the river and across Site 1. Human health risk from ingestion of fish will be reconsidered during this monitoring. In concurrence with State and EPA, wells that no longer produce contaminated groundwater concentrations above MCLs would be shut off, providing residual groundwater contaminant concentrations do not present unacceptable risk to human and ecological receptors in the river. This process would continue until a smaller zone of groundwater contamination is defined in the aquifer, likely corresponding to DNAPLs.

Implementation of the selected remedy will address the principal threats at the site by reducing the potential risk to human health and the environment associated with the discharge of groundwater to the North Branch Potomac River.

1.4 STATUTORY DETERMINATIONS

The selected remedy for OU 3 is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to this action (a waiver for cleanup of the DNAPL-zone under the Safe Drinking Water Act may be justified because of technical impracticability from an engineering perspective), and is cost-effective.

This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on-site above health based levels, a review will be conducted within five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

7 MAY 1997

David W. Anderson
Director
Installations and Equipment Office,
by direction of Commander
Naval Sea Systems Command

Date

5/29/97

Thomas C. Voltaggio, Director
Hazardous Waste Management Division
USEPA -- Region III

Date

The State of West Virginia has reviewed this Record of Decision and the materials on which it is based and concurs with the selected remedy.

5-8-97

Pamela D. Hayes
Assistant Chief
Site Investigation and Response
Office of Waste Management

Date

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

Allegany Ballistics Laboratory (ABL) is located at Rocket Center, in the north central panhandle of West Virginia, about 10 miles south of Cumberland, Maryland. ABL consists of two plants and several additional sites (Figure 1). Plant 1 occupies approximately 1,572 acres and is owned by the Navy and operated by Alliant Techsystems. Plant 2, a 56-acre area adjacent to Plant 1, is owned exclusively by Alliant Techsystems, and was not listed on the NPL. Plant 2 is located along the river on a floodplain separate from Plant 1. Plant 1 lies between the North Branch Potomac River to the north and west, and Knobly Mountain to the south and east. Several small towns and communities are located near Plant 1, including Pinto, Maryland, (1,500 feet to the northwest) and the community along McKenzie Road (750 feet north of Site 1) both located directly across the river from Site 1 (Figure 1). These Maryland communities include a total of approximately 30-40 residents, 15 of whom obtain all potable water from private residential wells. Other residents use a public water system. Short Gap, West Virginia, is located on the other side of Knobly Mountain, 5,000 feet to the southeast of Plant 1.

Site 1, shown in Figure 2, is approximately 11 acres and is situated on the northern edge of Plant 1. Site 1 is located on the alluvial plain above the North Branch Potomac River and has a range in elevation from 648 feet above mean sea level (msl) and 671 feet msl. A portion of Site 1 is located in the 100-year flood zone. Most of Site 1 is level, however there is lower topography and a man-made drainage in the western portion of the Site 1. The northern edge of Site 1 is moderately steep, sloping toward a lower-level terrace and the river.

The land use across the river from Site 1 is primarily agricultural. The land is used for growing corn and hay, and a dairy farm also exists at the eastern end of McKenzie road. In addition, an aeration basin treating wastewater from the unincorporated Maryland communities of Pinto, Bel Air, and Glen Oaks is located just west of Pinto and discharges to the river.

Limestone quarry and treatment works were formerly located to the northeast of Site 1 across the North Branch Potomac River. The operation has been abandoned for over 50 years.

To the northwest of Site 1, a former industrial operation was located on top of the bedrock terrace.

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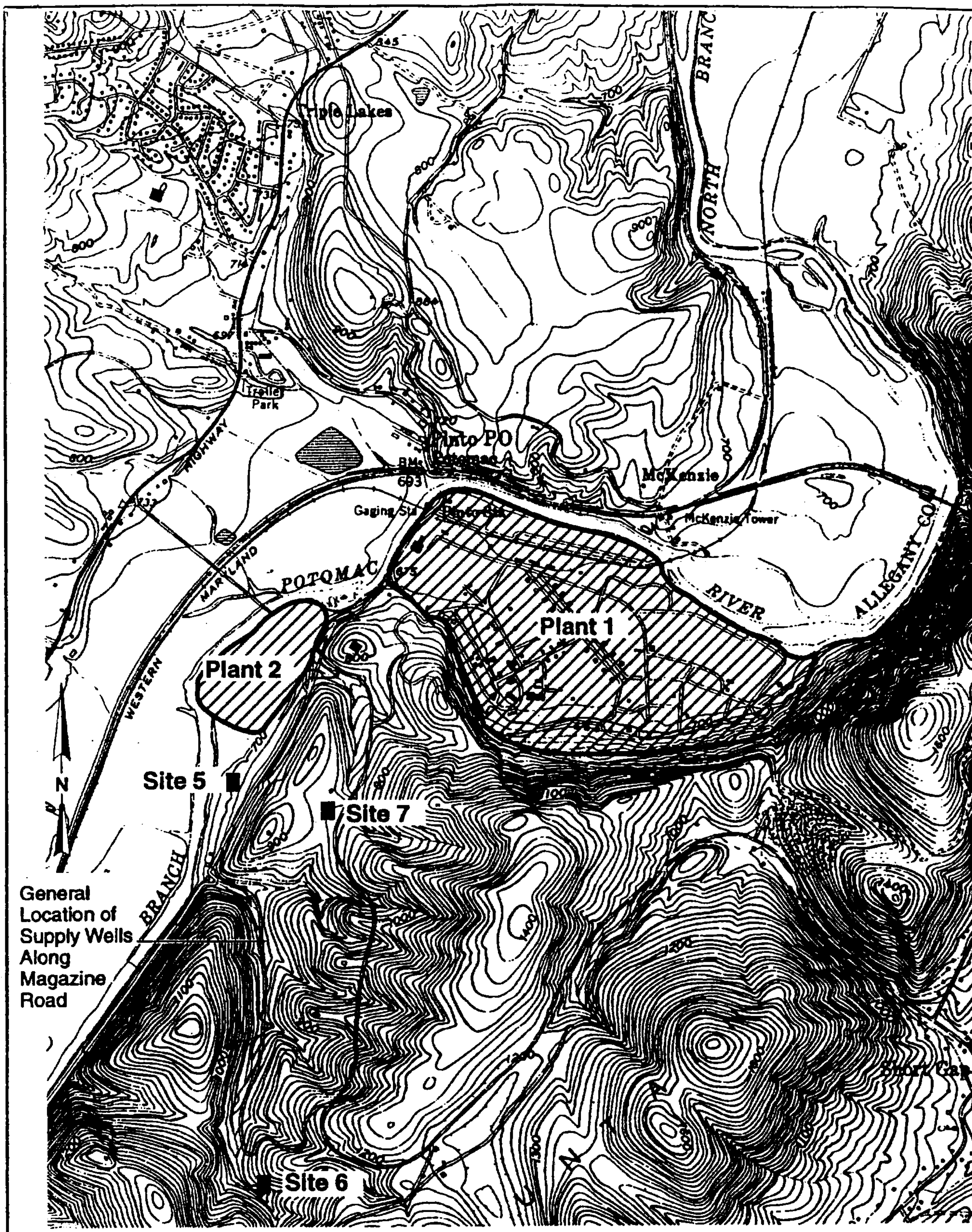

Source: USGS 7.5 minute Cresaptown, WV-MD quadrangle map.

0 1000 2000

Scale in Feet

Figure 1
LOCATION MAP
Focused Remedial Investigation
Allegany Ballistics Laboratory

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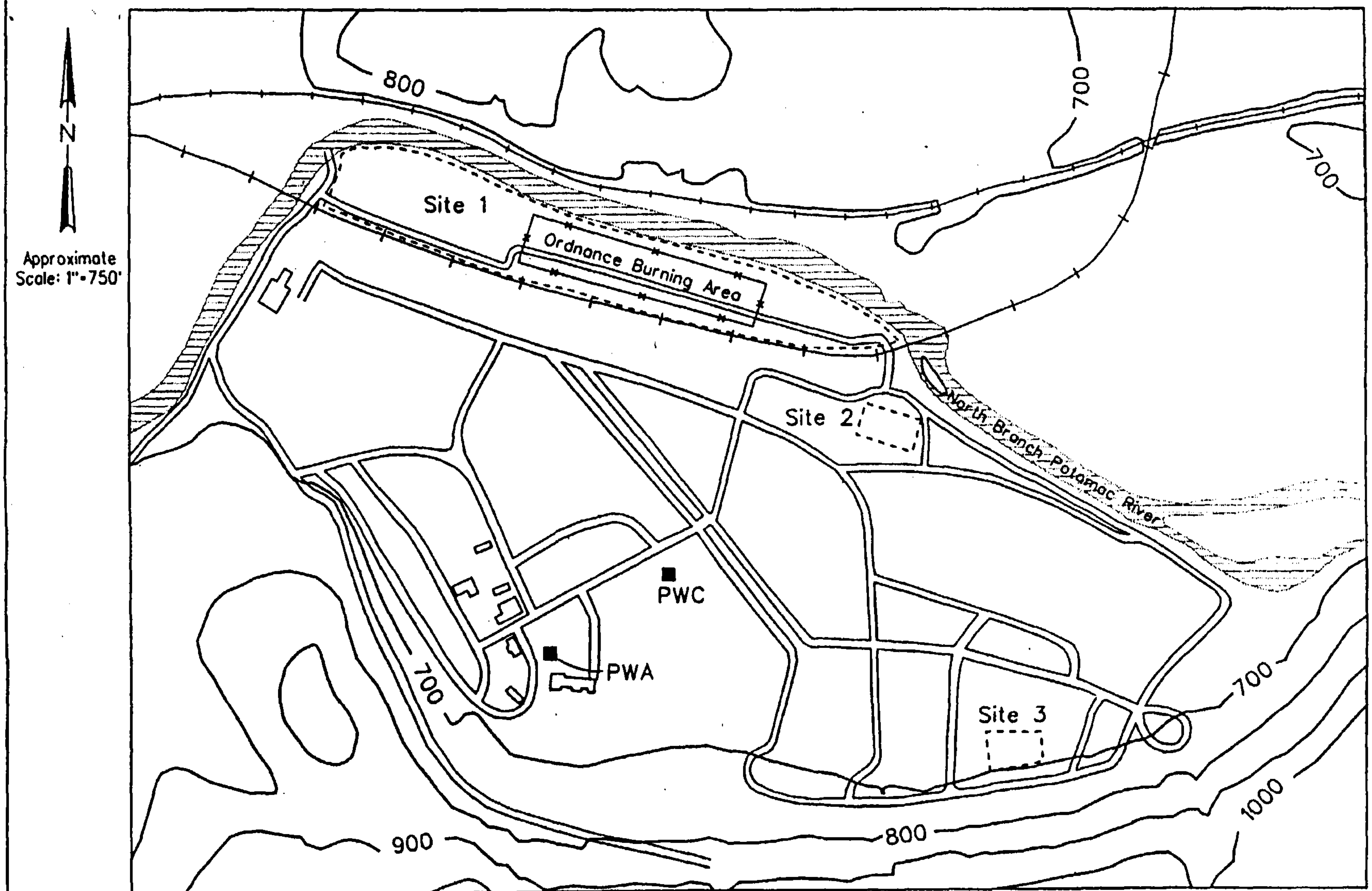

LEGEND

■ Production Well

Approximate Boundaries

— 900 — Topographic Contour (Elevation in ft above msl)

Railroad

Fence

Figure 2
PLANT 1 FEATURES
AND SITE LOCATIONS
FOCUSED REMEDIAL INVESTIGATION
Allegany Ballistics Laboratory

There are no ground water production wells currently active on the alluvial plain portion of Plant 1 at ABL. Several residences utilize ground water wells, within 1,000 feet of Site 1 across the river. Springs have been identified on Plant 1 approximately 2,000 feet to the south of Site 1.

The North Branch Potomac River is the closest major body of water.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 History of Site Activities

Plant operations at ABL included research, development and the production of solid propellant rocket motors. The formulation of the rocket fuels included the use of oxidizing and explosive materials. Processing the propellant and hardware equipment required the use of organic solvents.

Since 1959, Site 1 has been utilized for various types of waste burning and disposal activities. As shown in Figure 3, Site 1 contains inert (non-ordnance)open and ordnance burn areas, two landfills, a former drum storage area, and three solvent disposal pits. Within the fenced portion of Site 1, known as the ordnance burning ground, eight earthen pads were formerly used to burn ordnance material generated at the facility. Selected pads are currently used for burning, however all burning is now done on steel pans. Near the southwest corner of the ordnance burning ground, three unlined pits historically were used to dispose of used solvents, acids, and bases generated by plant operations.

Near the eastern end of Site 1, inert wastes (i.e., rags, paper, etc.), possibly contaminated as a result of plant operations, historically were burned and the ash buried. Burning and disposal activities at this area have ceased.

Waste not classified as ordnance or explosive contaminated, such as sanitary waste, was burned in the open burn area, located near the western end of Site 1. The ash from the open burning activities was landfilled, together with building material and other nonflammable debris, in the open burn area landfill along the bank of the North Branch Potomac River.

Prior to 1981, the former drum storage area was used to store 55-gallon drums containing used solvents generated during plant operations.

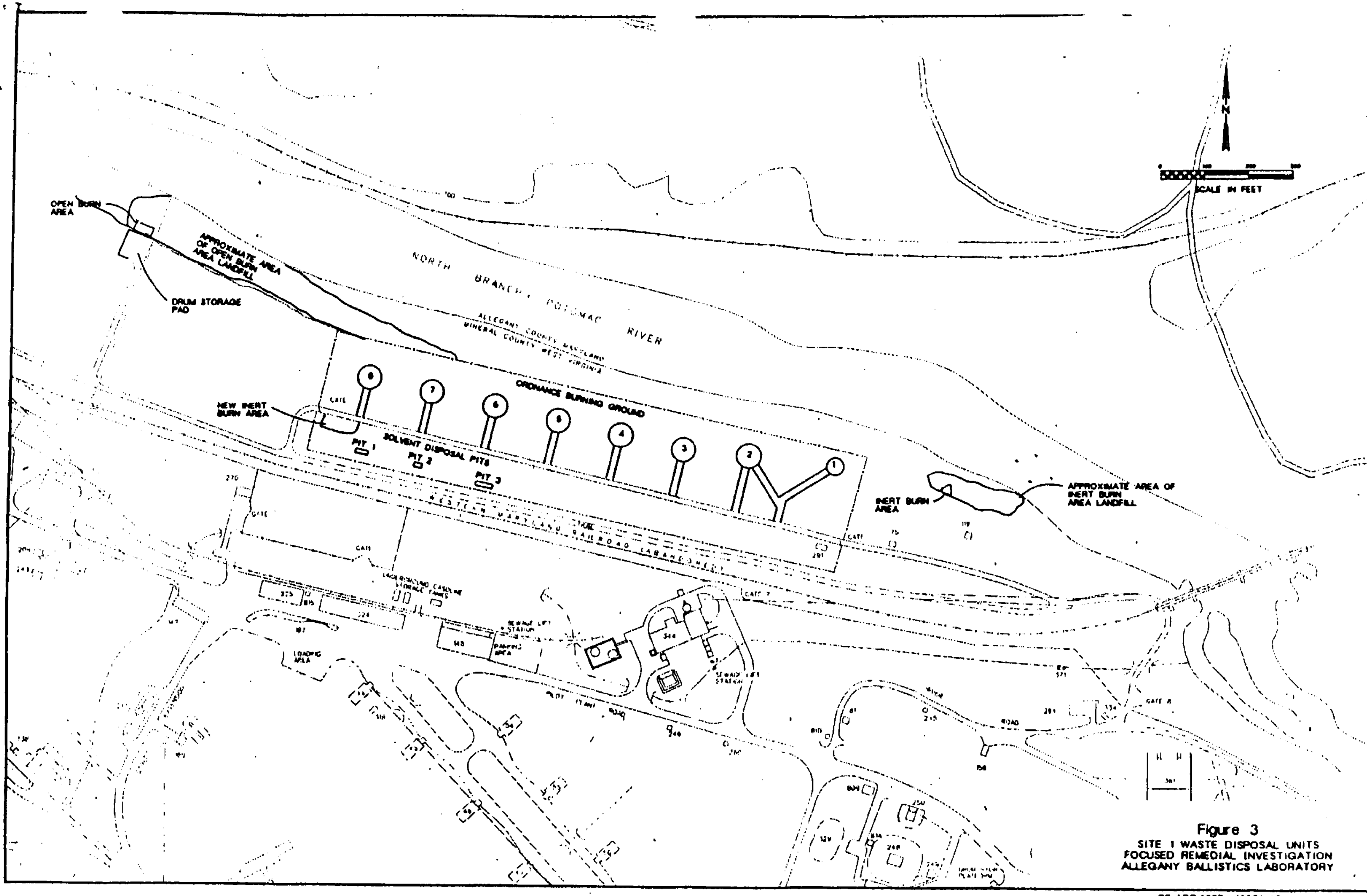

Figure 3
SITE 1 WASTE DISPOSAL UNITS
FOCUSED REMEDIAL INVESTIGATION
ALLEGANY BALLISTICS LABORATORY

22-APR-1997 4159/c12.rdo

In August 1981, reports of deteriorated drums releasing their contents to the surrounding ground surface resulted in a cleanup effort in which the spilled material from the drums was removed from the ground surface and contained in new drums. The drums were then disposed in accordance with RCRA regulations.

2.2.2 Previous Investigations

Five investigations have been conducted at ABL during which Site 1 has been either part or the focus of the investigation: (1) the Initial Assessment Study (IAS); (2) the Confirmation Study (CS); (3) the Remedial Investigation (RI); 4) the Focused RI; and (5) the Focused Feasibility Study (FFS). The IAS, completed in 1983 under the Navy Assessment and Control of Installation Pollutants Program (NACIP), identified nine sites at ABL for further investigation (Environmental Science and Engineering, January 1983). The IAS concluded that these sites did not pose an immediate threat. However, the IAS showed the need for a confirmation study at seven of the nine sites, including Site 1, to assess the potential impacts on human health and the environment by suspected contaminants.

Following the recommendations of the IAS and in accordance with the NACIP, the CS was initiated in June 1984 and completed in August 1987. The CS focused on identifying the existence, concentration, and extent of contamination at the sites recommended for further investigation in the IAS. As a result of the Superfund Amendments and Reauthorization Act (SARA) of October 1986, the Navy changed its NACIP terminology and scope under the Installation Restoration Program (IRP) to follow the rules, regulations, guidelines, and criteria established by the EPA for the Superfund program. For this reason, the results of the CS are documented in the *Interim Remedial Investigation* (Interim RI) Report (Weston, October 1989). The Interim RI Report recommended further investigation at six of the seven sites, including Site 1.

Following the recommendations of the Interim RI Report and in accordance with the Navy's changed Installation Restoration Program (IRP) policy, CH2M HILL was contracted to conduct an RI following EPA's RI/FS format under CERCLA.

The RI, initiated in May 1992 and completed in October 1992 (final document dated January 1996), was conducted to define the nature and extent of contamination at a number of ABL sites, including Site 1. The RI investigation at Site 1 is discussed in detail in the *Remedial Investigation of the Allegany Ballistics Laboratory*, January 1996 (RI).

In order to expedite the RI/FS process at Site 1 by filling data gaps remaining after completion of the RI, the Atlantic Division of the Navy contracted CH2M HILL to conduct a Focused RI at Site 1 following EPA's RI/FS format under CERCLA. The Site 1 Focused RI further defined the nature and extent of contamination at and adjacent to Site 1 and included baseline risk assessments for human health and the environment. The Site 1 Focused RI and the risk assessments are discussed in detail in the Site 1 Focused RI Report.

Based on the results from the previous four investigations a Focused Feasibility Study (FFS) was undertaken for Site 1. The FFS was conducted to assess several alternatives to address groundwater, surface water and sediment contamination identified at Site 1.

2.2.3 Enforcement Actions

In August, 1981, the State of West Virginia issued ABL a consent order for the improper storage of hazardous wastes at the storage facility within Site 1. ABL fully complied with all terms of the order resulting in no further action.

Consent Order (CO) #CO-R6,13,25-95-8 was issued on November 10, 1995 by the State of West Virginia. It deals with open burning of propellant and explosive (P/E) wastes and P/E contaminated wastes. The CO compliance program required cessation of open burning of P/E contaminated wastes by May 31, 1996. It also delineated three primary requirements: compliance demonstration; waste minimization and emissions mitigation; and utilization of an open burning management plan. Compliance demonstration included construction of an incinerator if open burning of P/E contaminated wastes was not ceased, research on alternative technologies, determination of impact on human health and the environment, and relocation of the burn site if the impact were unacceptable.

This order is currently in force and all order requirements are being met.

No other enforcement actions have occurred at Site 1.

2.2.4 Highlights of Community Participation

In accordance with Sections 113 and 117 of CERCLA, 42 U.S.C. §§9613 and 9617, the Navy held a public comment period from October 22, 1996 through December 9, 1996 for the proposed remedial action described in the Focused Feasibility Study for Site 1 and in the Proposed Plan.

These documents were available to the public in the Administrative Record and information repositories maintained at the Fort Ashby Public Library, Fort Ashby, West Virginia and at the La Vale Public Library, La Vale, Maryland. Public notice was provided in the Cumberland Times newspaper on October 18, 1996 and a Public Meeting was held in the Bel Air Elementary School on October 29, 1996. No written comments were received during the comment period and the comments and responses provided during the Public Meeting are presented in Appendix C.

2.3 SCOPE AND ROLE OF OPERABLE UNIT (OR RESPONSE ACTION) WITHIN SITE STRATEGY

The Navy has decided to manage the remediation of Site 1 in two phases or Operable Units (OUs). An OU is defined by the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300.5)(NCP), as a discrete action which is an incremental step toward comprehensively mitigating site problems. The NCP (40 CFR 300.430(a)(1)(ii)(A)) states "Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or completion of total site cleanup."

The principal threats posed by conditions at Site 1 result from potential exposures to contaminated soils, groundwater, and surface water and sediments. The remedial action identified in this ROD address contamination associated with Site 1 groundwater, surface water and sediments, as identified in the RI Report and the Focused RI Report.

The selected final remedial action (FRA) is to be implemented as Operable Unit Three (OU 3). The FRA consists of extracting groundwater across Site 1 thereby preventing flow of contaminated groundwater into the river. This action will allow contaminated surface water and sediments to undergo processes of volatilization, degradation, dilution, mixing, and sediment removal or erosion.

In addition, institutional controls will be used to prevent future groundwater use.

The remedial action at OU 3 will help to contain the DNAPLs in the aquifer, reduce contaminant concentration in the groundwater, reduce the discharge of contaminated groundwater to surface water thereby reducing the principal threat from groundwater contamination.

The response actions for groundwater, surface-water, and sediment are expected to comply with the remedial action objectives (RAOs) identified in the FFS for these media which are:

Prevent or minimize exposure of potential future onsite residents and construction workers to contaminated groundwater originating from Site 1.

Prevent or minimize offsite migration of contamination originating from Site 1.

Operable Unit Four (OU 4), defined as the contaminated soils at Site 1, will undergo further evaluation and remedial cleanup alternatives will be developed. The final remedy or remedies for OU 4 will be for surface and subsurface soils.

2.4 SUMMARY OF SITE CHARACTERISTICS

Site 1 is underlain by two distinct lithologies: (1) unconsolidated alluvial deposits of clay, silt, sand, and gravel; and (2) mainly calcareous shale and limestone of Silurian age.

Unconsolidated Aquifer

Drilling activities at Site 1 indicated that the unconsolidated deposits overlying bedrock generally consist of two distinct layers of material: (1) an upper, or surficial silty clay, considered floodplain deposits and (2) a deeper sand and gravel layer (alluvium), with variable but typically significant amounts of clay and silt.

The floodplain deposits have an average depth of approximately 12 feet below ground surface (bgs) and the alluvial materials have an average thickness of approximately 14.5 feet beneath Site 1.

The sand and gravel alluvium constitutes the shallow aquifer at Site 1. The approximate position of the water table is based on water-level measurements collected in November 1994 during the Focused RI. The alluvial deposits are believed to be saturated through their entire thickness except near the river, where the water table drops below the top of the alluvium. Water-level measurements collected in November 1994 from all Site 1 alluvial wells indicate the direction of groundwater flow in the alluvial aquifer at Site 1 is toward the river. This translates into a north-northeast flow direction in the central and eastern portions of Site 1 and a northwest flow direction in the western portion of the site. As discussed previously, the average elevation of the river surface (648 feet msl) is within the 640 to 652 feet msl elevation range of the alluvial aquifer adjacent to the river at Site 1.

This suggests that the river is the ultimate discharge zone for groundwater flowing laterally through the alluvium.

Hydraulic conductivities calculated from slug tests conducted in Site 1 alluvial monitoring wells and horizontal hydraulic gradients were used to approximate the average linear velocity of horizontal groundwater flow in the alluvial aquifer at Site 1. Assuming an effective alluvium porosity of 20 percent, the average linear velocity was estimated to be between 5 and 250 feet per year (ft/yr), depending on the amount of clay in the alluvium and on the relative steepness of the hydraulic gradient.

Bedrock Aquifer

Below the sand and gravel alluvium lies bedrock consisting of mainly calcareous shale and limestone of Silurian age. The average depth to bedrock at Site 1 is approximately 26.5 feet. Across the North Branch Potomac River from Site 1, no alluvium was encountered on the hill slopes and the top of the predominantly shale bedrock lies close to the ground surface.

During the RI and Focused RI, separate investigations were conducted to identify bedrock fracture sets and orientations in the vicinity of Plant 1 which may control local bedrock groundwater flow. During the RI, field measurement of 96 fracture planes identified two predominant orientations: (1) N26^{o}E; and (2) N39^{o}W. The former measurement was the most common measurement recorded and is approximately parallel to the structural trend of the Wills Mountain anticlinorium and the Appalachian folds in the region. The latter orientation is oblique to the Appalachian structural trend.

During the Focused RI, aerial photographs were also studied and it was found that a number of probable fracture traces adjacent to the plant display orientations that are similar to the predominant fracture orientations measured during the RI. It is assumed that fracture traces displaying these predominant orientations also exist beneath Site 1.

Because of the limited bedrock-fracture data, the areal extent of fracture sets or voids at Site 1 is unclear. The bedrock coring data collected from two monitoring wells (1GW9 and 1GW15) at Site 1 suggest that there are no voids and that the fracture sets observed are limited in areal extent.

The pattern or direction of groundwater flow in the bedrock aquifer is similar to that of the alluvial aquifer, with both aquifers locally discharging to the North Branch Potomac River. However, unlike the alluvial aquifer, lateral groundwater flow in the bedrock aquifer is confined mainly to partings along bedding planes and fractures.

Bedrock groundwater beneath the central and eastern portion of Site 1 generally flows northeast, approximately parallel to the strike of N30°E, toward the North Branch of the Potomac River; groundwater beneath the western portion of the site is believed to flow in step-wise fashion northwest, approximately parallel to the strike of N39°W, toward the river.

Aquifer tests at Plant 1 and water-level data collected from the river and monitoring wells at Site 1 suggest varying degrees of hydraulic interconnection exist between the river and alluvium, the river and shallow bedrock, and the alluvium and shallow bedrock. In addition, water-level data collected from monitoring wells across the river from Site 1 suggest that bedrock groundwater from the western two thirds of the site clearly discharges to the river and does not flow beneath the river.

These flow conditions are a result of the higher bedrock topography and related groundwater elevation heads that occur across the river in comparison to the bedrock on site. However, bedrock groundwater may migrate beneath the river from the eastern one third of the site. Water-level data from the bedrock wells on both sides of the river in this section of Site 1 are very similar, however the wells to the north have a slightly lower groundwater elevation head indicating potential flow in that direction. The wells across the river at this location have been sampled and no contaminants of concern detected at Site 1 were detected, so if groundwater does flow under the river Site 1 groundwater contamination has not reached that area. Similar to the alluvium, the river is most likely a discharge zone for shallow bedrock groundwater in the vicinity of Site 1.

Data collected from alluvial and shallow bedrock well pairs at Plant 1 indicate that the vertical component of hydraulic gradient is downward throughout the plant, including Site 1. This is not the case for the shallow and deep bedrock relationship in the north-central portion of Site 1. Here, the vertical component of hydraulic gradient was shown to be upward from the deep bedrock to the shallow bedrock.

Because the shallow bedrock was shown to be in hydraulic connection with the river, increases in head in the shallow bedrock resulting from recharge from the overlying alluvium can be dissipated through movement of shallow bedrock groundwater into the river. The deeper bedrock, likely recharged in the highlands to the southwest of the facility, may not be hydraulically connected to the river. Therefore, the heads at depth tend to increase in response to addition of groundwater in the recharge zone, which results in an upward vertical component of hydraulic gradient in the deep bedrock relative to shallow bedrock and alluvium along the river.

Sources of Contamination

Three former solvent disposal pits are located in the southwestern portion of the fenced area. These pits are considered the prime source of the ground water solvent contamination at Site 1. Two additional areas, identified as potential spill sites are possible sources for solvent contamination. These two area are located in the northeastern portion and the northwestern portion of the fenced area.

NATURE AND EXTENT OF CONTAMINATION

Based on site history, previous investigations and Site 1 Focused RI findings, contamination from prior land use practices at Site 1 has impacted surface soil, subsurface soil, sediment, surface water, and groundwater. A brief summary of the nature and extent of contamination follows. A complete list of the contaminants of concern detected in groundwater, surface water and sediment and their toxicological characteristics is presented in Appendix A. Due to site geology and the probability of dense, non-aqueous phase liquids (DNAPLs), an accurate estimate of the volume of contaminated groundwater plume cannot be made. However, Figure 4 provides an approximate areal extent of the contaminant plume. This summary focuses on the primary constituents associated with groundwater contamination, and is not intended to address all of the sampling, analytical, and evaluation results contained in previous investigative documents. A detailed discussion of contaminant nature and extent can be found in the Site 1 Focused RI Report.

Groundwater Contamination

During the course of the RI and Focused RI, groundwater samples were collected from all Site 1 monitoring wells and monitoring wells across the river from Site 1 for various analyses to determine the nature and extent of contamination. The analytical results are discussed in detail in the RI and the Focused RI, and are briefly summarized here.

Volatile Organic Compounds (VOCs)

Thirteen VOCs were detected in Site 1 groundwater during one or both investigations, but the six most prevalent (detected in six or more samples) VOCs were, in order of detection frequency: trichloroethene (TCE), total 1,2-dichloroethene (1,2-DCE), methylene chloride (MC), acetone, 1,1,1-trichloroethane (1,1,1-TCA), and tetrachloroethene (PCE).

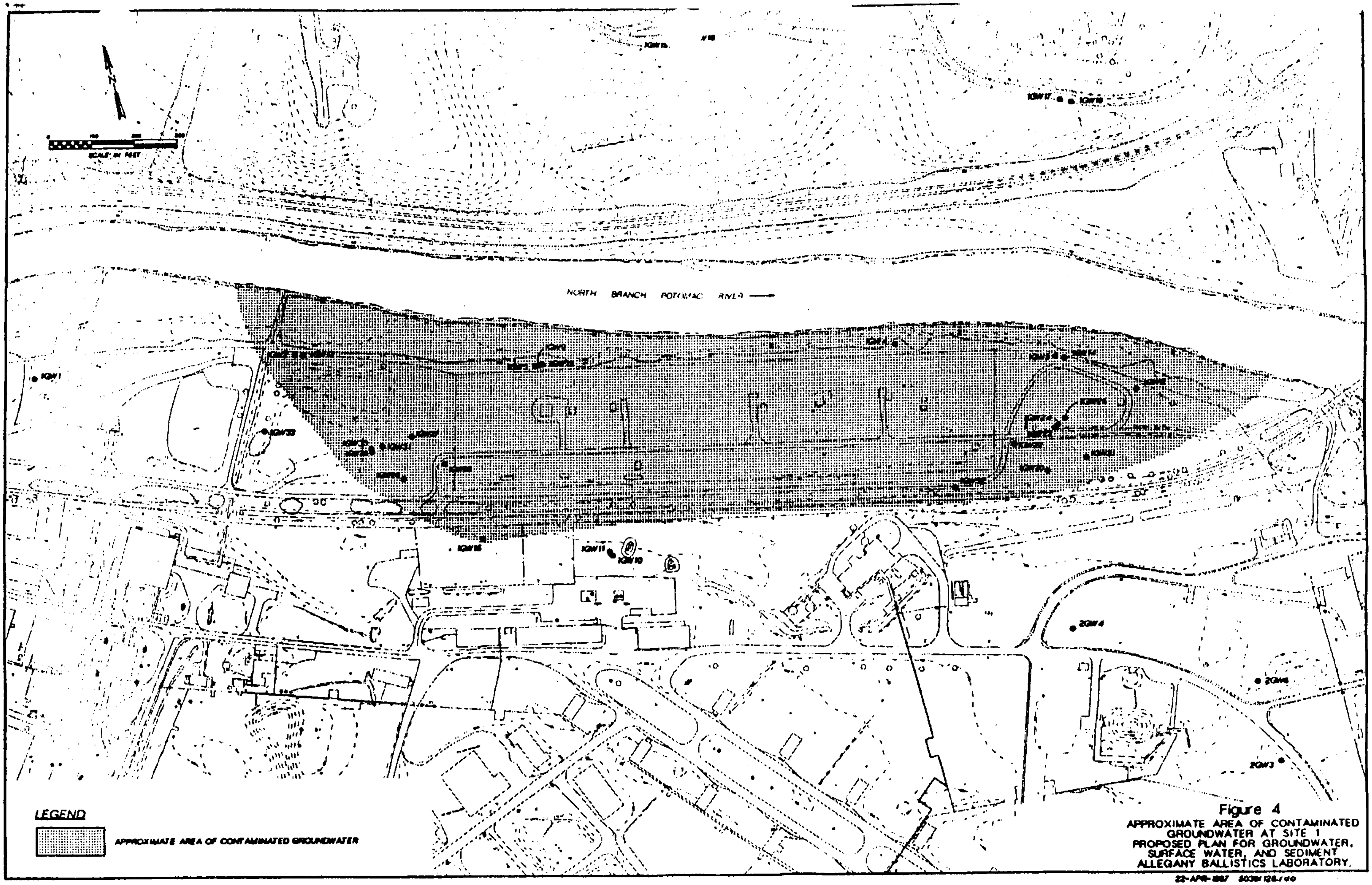

Figure 4
APPROXIMATE AREA OF CONTAMINATED GROUNDWATER AT SITE 1
PROPOSED PLAN FOR GROUNDWATER, SURFACE WATER, AND SEDIMENT
ALLEGANY BALLISTICS LABORATORY

22-APR-1997

Vinyl chloride (VC) was also detected, but in only one groundwater sample, at a concentration of 41 micrograms per kilogram (ug/kg). Of the VOCs detected in Site 1 groundwater, TCE was the most prevalent and was detected at the highest concentrations. The highest concentrations of TCE [(up to 240,000 micrograms per liter(ug/l)] were found in a well cluster located hydraulically downgradient of the solvent disposal pits. Concentration at this level indicates the presence of DNAPLs. TCE was found in all alluvial wells and most bedrock wells adjacent to the river at Site 1.

Similar to TCE, MC, 1,2-DCE, and 1,1,1-TCA were detected at the highest concentrations (8,000 ug/l, 4,800 ug/l, and 7,700 ug/l, respectively) in the well cluster located hydraulically downgradient of the solvent disposal pits. PCE was detected in both alluvial and bedrock monitoring wells at concentrations as high as 800 ug/l and 12 ug/l, respectively.

Inorganics

The highest total concentrations of inorganics in the alluvial aquifer on Site 1 were detected in a well considered to be an upgradient or "background" well for the alluvial aquifer at Site 1.

However, the total concentrations of 12 inorganics were found to be higher in one or more Site 1 bedrock wells than in a well considered to be an upgradient or "background" well for the bedrock aquifer at Site 1. The 12 inorganics include; aluminum, arsenic, barium, chromium, cobalt, copper, iron, lead, mercury, nickel, vanadium and zinc.

Surface-Water and Sediment Contamination

Surface-water and sediment samples collected from the North Branch Potomac River upstream, downstream, and adjacent to Site 1 were analyzed for VOCs, SVOCs, and inorganics. Several of the surface-water and sediment sampling locations were located along areas with elevated levels of soil contamination detected in Site 1 soil.

The analytical results are discussed in detail in the RI and the Focused RI, and are briefly summarized here.

Surface-Water VOCs

TCE and 1,2-DCE (total) were the most prevalent VOCs detected in surface-water samples collected adjacent to and downstream of Site 1.

MC was also detected, but at relatively low concentrations, suggesting that it may have been the result of laboratory contamination. None of the aforementioned VOCs were detected in the upstream surface-water sample, suggesting that groundwater discharging to the river from Site 1 is the source of VOCs.

Surface-Water SVOCs

Bis(2-ethylhexyl)phthalate was the only SVOC detected, at an estimated concentration of 1 ug/l.

Surface-Water Inorganics

In general, inorganics concentrations in samples collected adjacent to and downstream of Site 1 were similar or lower than inorganics concentrations detected in the upstream sample.

Sediment VOCs

With the exception of acetone, which is believed to have been due to laboratory contamination, no VOCs were found in the upstream sample. The highest VOC concentrations were detected in the sediment samples collected adjacent to the groundwater well cluster hydraulically downgradient of the solvent disposal pits. In general, the VOC concentrations decrease in a downstream direction to non-detect within 1.5 miles of the eastern end of Site 1.

Sediment SVOCs

In general, similar SVOCs at similar concentrations were detected in sediment samples collected upstream, downstream, and adjacent to Site 1.

Sediment Inorganics

The inorganics data for the sediment samples collected during the RI and the Focused RI indicate that all inorganics concentrations were slightly higher in the upstream sediment sample than in the sediment samples collected adjacent to and downstream of Site 1.

Potential Routes of Contaminant Migration

Contaminated groundwater in the alluvial and bedrock aquifers at Site 1 is likely discharging to the North Branch Potomac River.

Consequently, contamination (primarily VOCs) has been detected in surface water and sediment samples collected hydraulically downgradient from the approximate area of the contaminant plume at Site 1 (Figure 4). VOC-contaminated groundwater in the bedrock aquifer could possibly flow to the north beneath the river at the eastern end of Site 1 as discussed above, however, no VOC-contamination has been detected in monitoring wells or residential wells along McKenzie Road.

2.5 SUMMARY OF SITE RISKS

The human health and ecological risks associated with exposure to contaminated media at Site 1 were evaluated in the Focused RI Report. The human health baseline risk assessment evaluated and assessed the potential health risks which might result under current and potential future land use scenarios.

Cancer risks are presented as a number indicating the potential for an increased chance of developing cancer if directly exposed to contaminants. As an example, EPA's acceptable risk range for cancer is 1×10^{-6} to 1×10^{-4}, which means there might be one additional chance in one million (1×10^{-6}) to one additional chance in ten thousand (1×10^{-4}) that a person would develop cancer if exposed to the contaminants at the site using EPA's recommended exposure scenario.

EPA's recommended exposure scenario for ingestion of contaminated groundwater for an adult resident assumes the individual consumes 1 liter/day for the first six years or their life and 2 liters/day for the following twenty-four years for 350 days/year. The risks evaluated for developing other health effects (using EPA's recommended exposure scenario) are expressed as a hazard index (HI). A hazard index of one or less indicates a very low potential to experience any adverse health effects based on EPA's recommended exposure scenario. An ecological evaluation was also performed and addressed the threats to ecological receptors. A summary of the human health and ecological risks associated with the site are summarized below.

2.5.1 Human Health Risks

Groundwater

There is no current exposure to contaminated groundwater because it is not used as a drinking water source at Site 1 or on Plant 1 at ABL.

Future exposure to groundwater was evaluated for a future resident obtaining all of their potable water from the most contaminated groundwater at Site 1. Future adult resident exposure pathways include inhalation of VOCs while showering and ingestion of groundwater. Future child resident exposure pathways include dermal contact while bathing and ingestion of groundwater.

Groundwater risks for potential future exposure scenarios were calculated assuming two different water supply sources: the most likely residential water supply source, and a reasonable maximum residential water supply source. The definition of these sources is provided in the Focused RI Report, and the associated risks for each source is described below.

For the reasonable maximum exposure, which includes use of groundwater from the alluvial aquifer and shallow bedrock, the HI for the child resident is 4,000 and the HI for the adult resident is 3,000. TCE contributed greater than 90 percent of the total HI. The lifetime exposure age-adjusted cancer risk, which included dermal exposure while bathing up to age 7 and inhalation of VOCs while showering for 24 years, and ingestion of groundwater is 1×10^{-1}. The risk from ingestion is 5×10^{-2}, with TCE contributing 65 percent.

The risk from inhalation of VOCs by an adult is 8×10^{-2}, mainly from vinyl chloride. The risk from dermal exposure to a child, 2×10^{-3}, is mainly caused by TCE.

For the most likely exposure, which includes use of groundwater from the shallow and deep bedrock, the HI for a child is 1,000, and the HI for an adult is 900. TCE contributed the majority of the hazard associated with inhalation, dermal contact, and ingestion. The lifetime exposure age-adjusted cancer risk, including dermal exposure while bathing for a child, inhalation of VOCs while showering for an adult, and ingestion of groundwater is 7×10^{-2}. The lifetime risk from ingestion of groundwater for 30 years is 1×10^{-2}. The main contributor for the ingestion risk is TCE.

The risk from inhalation of VOCs by an adult is 5×10^{-2}. Vinyl chloride contributes approximately 83 percent of this risk. The risk to a child from dermal contact while bathing is 7×10^{-3}, with TCE contributing about 99 percent of the risk.

No human health risk assessment was performed for a future construction worker exposed to groundwater, however the risks would be much lower than the residential risk evaluated above.

Surface Water and Sediment

A quantitative human health risk evaluation of the surface water and sediment was not conducted during the base-line risk assessment. At the time of the evaluation, all of the contaminants in the surface water and sediment at Site 1 were eliminated during preliminary screening. However, after additional review several contaminants including iron, manganese, and antimony were determined to be of potential concern. Iron is an essential human nutrient. The other two inorganic contaminants will be re-evaluated during the development of discharge limits and during monitoring of the effectiveness of the preferred action. Human health risk from ingestion of fish was also not considered. This potential exposure pathway will also be reconsidered during the monitoring of the remedy performance.

2.5.2 Environmental Evaluation

Analytical data compiled from the Focused RI were analyzed using EPA Region III guidance for determining environmental effects quotients (EEQs). Data was reviewed for surface water, sediment, and soil. EEQs were determined by comparison with standard guidelines. EEQs greater than 1 indicate a potential for risk, greater than 10 represent potential moderate adverse effects, and greater than 100 represent a significant potential for adverse effects. The exposure assessment for surface water and sediment is presented below.

Surface Water

EEQs greater than 1.0 occurred for mercury, silver, copper, chromium, and aluminum at a "background" sampling location. EEQs over 40 were reported for silver in several site samples. EEQs for aluminum, lead, zinc, and mercury also exceeded a value of 1 for sampling locations potentially receiving site-related contaminants.

Sediment

EEQs for two SVOCs exceeded 1 at a "background" sampling location, but were based on values for non-detects. Most of the site EEQ values exceeding 1 were the result of using non-detect values (i.e., one half of the detection limit). Based on the analysis of EEQ values for surface water and sediments, there are relatively few contaminants of concern (COCs). The COCs include: antimony, cadmium, anthracene, benzo(a)anthracene, benzo(a)pyrene, chrysene, fluoranthene, TCE, and VC.

2.6 DESCRIPTION OF ALTERNATIVES

A detailed analysis of the possible remedial alternatives for Site 1 groundwater, surface water, and sediment is included in the Site 1 FFS report.

The detailed analysis was conducted in accordance with the EPA document entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" and the National Oil Hazardous Substances Pollution Contingency Plan (NCP). A summary of the remedial alternatives which were developed to address contamination associated with Site 1 groundwater, surface water, and sediment is presented below.

GROUNDWATER ALTERNATIVE 1 - NO ACTION

Description: Under this alternative no further effort or resources would be expended at Site 1. Because contaminated media would be left at the site, a review of the site conditions would be required every 5 years. The review is specified in the NCP. Alternative 1 serves as the baseline against which the effectiveness of the other alternatives is judged.

Cost: There are no costs associated with this alternative.

Time to Implement: Implementation would be immediate.

GROUNDWATER ALTERNATIVE 2 - INSTITUTIONAL CONTROL ACTIONS

Description: The major components of this alternative include:

1. Locking up or abandoning existing wells onsite.

2. Filing of a groundwater use restriction on the site.

3. Deed notations along with property use and limited access restrictions that would prevent residential development and access to the land overlying groundwater contamination.

4. Groundwater, surface water, and sediment monitoring on a routine basis, quarterly to semi-annually, for a minimum of 5-years.

Cost: The estimated costs associated with this alternative are as follows:

Capital: $50,000
Annual operation and maintenance: $0
Net present worth (30-year): $50,000

Costs associated with performing the 5-year site reviews are not included.

Time to Implement: Three to four months to implement.

GROUNDWATER ALTERNATIVE 3 - SITEWIDE GROUNDWATER EXTRACTION AND AIR STRIPPING

Description: The major components of this alternative include:

1. Construction of a groundwater treatment plant onsite. The treatment plant will be located outside the limits of the 100-year floodplain. The preliminary major process components are flow equalization, metals precipitation and clarification, gravity filtration, air stripping, and off-gas treatment by thermal oxidation.

2. Extraction of groundwater across Site 1, treatment by the groundwater treatment plant, and discharge to the North Branch Potomac River. A portion of the treated groundwater will be utilized by the facility, on an as needed basis, for steam generation.

3. During implementation of this alternative, an annual operation and maintenance (O&M) program will be established for the groundwater treatment plant. Deed notations and property use and access restrictions will be implemented to prevent future groundwater use.

4. Groundwater, surface water, and sediment monitoring on a timely basis, quarterly to semi-annually, for inclusion in the 5-year site reviews.

Groundwater extraction will occur across the length of Site 1 with the focus of preventing offsite migration of contaminants from the site to the river. This will prevent the continued contamination of surface water and sediment in the North Branch Potomac River.

Because the contaminant source (Site 1 groundwater) will be controlled, surface water and sediment contamination will be reduced through processes of volatilization, degradation, dilution, mixing, and sediment removal or erosion in the river.

Based on preliminary groundwater modeling, the extraction flow rate is estimated to range from 175 to 540 gpm, depending on the anisotropy exhibited by groundwater flow in the aquifer. The treatment plant flow rate will be revised based upon pump tests conducted on the extraction wells once they are installed and tested.

Discharge of treated water to the North Branch Potomac River will comply with ARARs, governed primarily by the State of West Virginia's National Pollutant Discharge Elimination System (NPDES) program.

The Ambient Water Quality Criteria (AWQC) for water and organisms will be considered further in the calculation of final discharge limits to be protective of human health and the environment.

The State of Maryland has the right to review the discharge limitations imposed by West Virginia, and may impose more stringent limitations at their discretion. The treatment plant will be designed to comply with the final discharge limits once they are established.

Cost: The estimated costs associated with this alternative are listed below. Costs are given over the flow rate range of 175 gpm to 540 gpm.

Capital: $3,600,00 to $7,500,000
Annual operation and maintenance: $250,000 to $550,000
Net present worth (30-year): $7,400,000 to $16,000,000

Time to Implement: Six to twelve months to implement.

GROUNDWATER ALTERNATIVE 4 - SITEWIDE GROUNDWATER EXTRACTION, TARGETING DNAPLs, AND AIR STRIPPING

Description: This sitewide alternative is very similar to Alternative 3. The major components of this alternative include:

1. Construction of a groundwater treatment plant onsite for treatment of flow in the range of 175 gpm to 540 gpm. The treatment plant in this alternative is identical to that specified in Alternative 3.

Therefore, the treatment plant will be designed to comply with the final discharge limits once they are established.

2. Extraction of groundwater across Site 1 preventing flow of contaminated groundwater into the river allowing contaminated surface water and sediments to undergo processes of volatilization, degradation, dilution, mixing, and sediment removal or erosion. Extracted groundwater will be treated by the groundwater treatment plant and discharged to the North Branch Potomac River. A portion of the treated groundwater will be utilized by the facility, on an as needed basis, for steam generation.

3. Establishment of an O&M program for the groundwater treatment plant and extraction system. Deed notations and property use and access restrictions will be implemented to prevent future groundwater use.

4. A sediment, surface water, and aquifer monitoring plan will be undertaken as well to monitor contaminant concentrations in the river and across Site 1. Human health risk from ingestion of fish will be reconsidered during this monitoring. In concurrence with State and EPA, wells that no longer produce contaminated groundwater concentrations above MCLs would be shut off, providing residual groundwater contaminant concentrations do not present unacceptable risk to human and ecological receptors in the river. This process would continue until a smaller zone of groundwater contamination is defined in the aquifer, likely corresponding to DNAPLs.

The extraction well network would be periodically evaluated and modified as necessary in order to enhance recovery of contaminants and better control the dissolution of DNAPLs into groundwater.

As with Alternative 3, the treatment plant will be designed to comply with the final discharge limits once they are established.

Cost: The estimated costs associated with this alternative are listed below. Costs are given over the flow rate range of 175 gpm to 540 gpm.

Capital: $3,700,00 to $7,600,000
Annual operation and maintenance: $250,000 to $550,000
Net present worth (30-year): $7,500,000 to 16,100,000

Time to Implement: Six to twelve months to implement.

2.7 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial alternatives presented in Section 2.6 were evaluated in the FFS against nine criteria identified in the NCP.

2.7.1 THRESHOLD CRITERIA

Overall Protection of Human Health and the Environment

The Site 1 RAOs include:

> Preventing or minimizing exposure of potential onsite residents and construction workers to contaminated groundwater originating from Site 1.
>
> Preventing or minimizing migration of contamination from Site 1.

Alternative 1 does not achieve either RAO. Alternative 2 prevents exposure to contaminated groundwater through groundwater use restrictions, but off-site migration is not prevented and contaminated groundwater will continue to discharge to surface water and sediments. Alternatives 3 and 4 attain both RAOs.

However, because of the presence of DNAPLs, neither of these alternatives are expected to attain MCLs over the 30-year project life. Alternative 4 however, does have a containment plan for areas of groundwater that have DNAPLs.

Compliance with Applicable or Relevant and Appropriate Requirements

Groundwater chemical-specific ARARs (MCLs) would likely not be attained during the 30-year project life by any alternative. This is due to the probable existence of DNAPLs which may provide a continual source of contamination.

However, alternatives 3 and 4 are expected to achieve the MCLs in areas where DNAPLs do not exist. Alternative 4 will enhance contaminant removal by setting up containment of the area of groundwater contaminated with DNAPLs and better control the possible spread of dissolved DNAPLs. This will likely increase the volume of groundwater where MCLs are attained at Site 1.

All alternatives would comply with location-specific ARARs. Applicable ARARs focus on the presence of the 100-year floodplain of the North Branch Potomac River. All alternatives would comply with action-specific ARARs as well.

2.7.2 PRIMARY BALANCING CRITERIA

Long-term Effectiveness and Permanence

Alternatives 2 through 4 minimize the risk associated with groundwater contaminants remaining at Site 1. Alternative 2 provides the lowest degree of minimization by the use of deed and groundwater use restrictions. Alternative 2 does not prevent or minimize off-site migration of groundwater contaminants and consequently, surface water and sediment contamination would continue. Alternative 3 prevents off-site migration through groundwater extraction. Alternative 4 provides the most significant degree of risk minimization. The performance of the extraction well network in this alternative would be periodically evaluated and modified.

Wells that no longer produce contaminated groundwater concentrations above MCLs would be shut off, providing residual groundwater contaminant concentrations do not present unacceptable risk to human and ecological receptors in the river. Areas with sustained high concentrations of VOCs would be targeted enhancing contaminant removal, containment, and controlling dissolution of DNAPLs. Five year site reviews are required for each alternative.

Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment

Alternatives 3 and 4 provide reductions in groundwater toxicity, mobility, and volume using a treatment plant. However, Alternative 4 enhances contaminant removal, establishes containment of the DNAPLs, and better controls the dissolution of DNAPLs into groundwater by targeting DNAPLs. These alternatives will prevent the discharge of contaminated groundwater to surface water and sediments, allowing contaminants in these media to undergo processes of volatilization, degradation, dilution, mixing, and sediment erosion or removal, effectively reducing the toxicity, mobility, and volume of contamination associated with surface water and sediments. Alternatives 1 and 2 provide no reduction in toxicity, mobility, or volume for groundwater, surface water, or sediments.

Short-Term Effectiveness

Alternatives 1 and 2 can be implemented most quickly, however they do not meet the remedial action objectives. Alternatives 3 and 4 can both be implemented in about the same amount of time, six to twelve months.

The no action alternative and alternative 2 involve no construction or site activities, and would therefore produce no disturbance to the surrounding community and environment. Alternatives 3 and 4, which require well installation and the construction of a groundwater treatment plant and a significant piping network, produce minimal to moderate disturbance to the community. All construction will take place at Site 1 on ABL property. The majority of the risk results from fugitive dust emissions which can be controlled.

Implementability

Alternatives 1 and 2 require no technical innovation. Alternatives 3 and 4 require the design and construction of an effective extraction well network and the construction of a complex treatment facility. Groundwater extraction in fractured bedrock is complicated.

Aquifer testing will be necessary to evaluate whether a well network is capable of capturing the contaminant plume. There are many specialty vendors to provide expertise in sizing the treatment plant components.

Jar testing is required to design the metals precipitation and pH adjustment process, and to select the optimum polymer dosage for flocculation of the inorganics in the groundwater treatment plant.

Cost

The annual operating and maintenance (O&M) cost is estimated to be the same for alternatives 3 and 4. On a present worth basis, Alternative 4 is slightly more costly, at $7,500,000 at a proposed flow rate of 175 gallons per minute(gpm) and $16,100,000 at a flow rate of 540 gpm. The present worth of Alternative 3 is $7,400,000 at a flow rate of 175 gpm and $16,000,000 at a flow rate of 540 gpm. Alternative 2 is the least expensive alternative (excluding the No Action Alternative), with a present worth of $50,000.

2.7.3 MODIFYING CRITERIA

State Acceptance

The West Virginia Division of Environmental Protection on behalf of the State of West Virginia, has reviewed the information available for Site 1 OU 3 and has concurred with the selected remedy.

Community Acceptance

Community Acceptance summarizes the public's general response to the alternatives described in the Proposed Plan and the Focused Feasibility Study. No written comments were received during the forty-five day comment period, which began on October 22 and ended on December 9, 1996. The comments recorded at the Proposed Plan Public Meeting held October 29, 1996 and the responses are referenced in the Responsiveness Summary, Section 3.0 and included in Appendix B of the ROD.

2.8 THE SELECTED REMEDY

Alternative 4 - Sitewide Groundwater Extraction/Targeting DNAPLs, and Air Stripping, is the selected remedial alternative.

Based on available information and the current understanding of Site 1 conditions, Alternative 4 appears to provide the best balance with respect to the nine NCP evaluation criteria. In addition, the selected alternative is anticipated to meet the following statutory requirements:

- Protection of human health and the environment (groundwater, surface water, and sediment).
- Compliance with ARARs. While compliance with chemical-specific ARARs (MCLs) for groundwater will not likely occur for the entire site during the 30-year project life, it is estimated that a major portion of the aquifer will be remediated to MCLs in 30 years, with the remainder of the aquifer (DNAPL-zone) to be hydaulically-contained with continued groundwater extraction.
- Cost-effectiveness.
- Utilization of permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.

The major components of the selected remedy include:

- Extraction of contaminated groundwater using an extraction well network to remove contaminated groundwater from both the alluvial and bedrock aquifers. Groundwater modeling and aquifer testing shall be used to design the extraction wells and the extraction network. The number and location of the extraction wells shall be specified during remedial design. The extraction system will be carefully monitored on a regular basis and its performance evaluated.

This evaluation may provide further information concerning the extent of the DNAPL-zone.

- An above ground treatment system. One or more of the treatment technologies - air stripping, granular activated carbon (GAC), chemical /UV oxidation - shall be used for treating aqueous contaminants in the extracted groundwater. Other technologies will also be used as needed in the treatment system for removal of dissolved inorganics and total suspended solids. The actual technologies and sequence of technologies used for the treatment system will be determined during remedial design. Final selection of these technologies will be based on additional site information to be collected during remedial design.

- Discharge of the treated groundwater to North Branch Potomac River. Sampling shall be conducted before and after discharge to ensure that the discharge is not causing an exceedence of Ambient Water Quality Criteria. A portion of the treated groundwater will be utilized by the facility, on an as needed basis, for steam generation.

- Long-term groundwater monitoring will be performed, including quarterly sampling for 30 years. The groundwater monitoring plan will be developed during remedial design.

- Land-use restrictions to prohibit the on-site use of untreated groundwater.

The primary goals for the groundwater portion of this remedial action is for hydraulic containment of the likely DNAPL-zone and to restore the maximum areal extent of both the alluvial aquifer and the bedrock aquifer to its beneficial uses. At Site 1, the aquifers are potentially useable as a source of drinking water and the bedrock aquifer is currently used off-site for this purpose. Based on information obtained during the remedial investigation and on a careful analysis of all remedial alternatives, the Navy, WVDEP, and the EPA believe that the selected remedy will achieve these goals.

The selected remedy will include groundwater extraction for an estimated period of 30 years, during which the system's performance will be carefully monitored, and adjusted as warranted by the performance data collected during operation.

Refinement of the extraction system may be required, if the Navy, WVDEP, and the EPA determines that such measures will be necessary in order to restore the maximum areal extent of the aquifers in a reasonable timeframe, to provide a more efficient containment of the DNAPL-zone, or to significantly reduce the timeframe or long-term cost of attaining this objective.

Refinement of the extraction system may include any or all of the following:

1) Adjusting the rate of extraction from some or all wells;

2) Discontinuing pumping at individual wells where cleanup goals have been attained:

3) Pulsed pumping of some or all extraction wells to eliminate flow stagnation areas, allow sorbed contaminants to partition into groundwater, or otherwise faciliate recovery of contaminants from the aquifers; and

4) Installing additional groundwater extraction wells to facilitate or accelerate cleanup of the contaminant plume.

The primary goal for the surface water and sediment portion of this remedial action is to stop the migration and discharge of contaminated groundwater into the North Branch Potomac River and to allow processes of volatilization, degradation, dilution, mixing, and sediment removal or erosion to clean the river. The selected remedy will achieve this goal.

The selected remedy addresses all contaminated media at Site 1, except contamination associated with surface and subsurface soil overlying the groundwater aquifers. As discussed previously, a separate FFS will be prepared which addresses soil contamination as Operable Unit 4 at Site 1.

2.8.1 PERFORMANCE STANDARDS

The performance standards outlined below shall be used to evaluate the overall performance of the selected remedy.

A sufficient number of extraction wells shall be installed to achieve three remedial objectives for both aquifers: 1) minimizing further migration of contaminants from suspected subsurface DNAPL source areas to the surrounding groundwater; 2) minimizing further migration of the leading edge of the contaminant plume; and 3) capturing the Site 1 groundwater contaminant plume and preventing discharge of contaminated groundwater into the North Branch Potomac River along Site 1.

All extracted groundwater shall be treated to levels meeting the substantive requirements of the National Pollutant Discharge Elimination System (NPDES)..

The Ambient Water Quality Criteria (AWQC) for water and organisms shall be considered further in the calculation of final discharge limits to be protective of human health and the environment.

All emissions from the air stripper shall be in compliance with the Clean Air Act and the requirements of the West Virginia Air Pollution Control Act.

Surface water and sediments in the North Branch Potomac River shall be monitored according to the substantive requirements outlined in the NPDES permit. Additionally, surface water and sediment will be sampled to monitor the contaminant concentrations in the river. This data will be used to evaluate the effectiveness of the extraction well network in reducing discharge to the river. A surface water and sediment monitoring plan, including the substantive requirements of the NPDES permit, will be developed during the remedial construction (action) phase.

A risk evaluation for fish ingestion shall be undertaken and reported before discharge of the treated groundwater begins.

Groundwater extraction shall be terminated after groundwater contaminant levels in the dissolved TCE plume at Site 1 are below the Maximum Contaminant Levels (MCLs) as defined in the Safe Drinking Water Act, providing residual groundwater contaminant concentrations do not present unacceptable risk to human and ecological receptors in the river. If the groundwater contaminant concentrations in the dissolved TCE plume at Site 1 reach background level of the contaminant, the wells can be shut off. The target level for total noncancer risk is represented by the hazard index (HI) of not more than 1 and for a total cancer risk within the range of 1×10^{-6} to 1×10^{-4}. To this end, extraction wells and monitoring wells shall be sampled for at least 30-years.

The number and location of these monitoring and extraction wells shall be specified during the remedial design, and additional monitoring wells shall be installed, if required. The O & M plan for the groundwater treatment plant and extraction well network will be developed during the remedial construction (action) phase. If sampling confirms that MCLs or background levels have been attained at individual wells and remain at the required levels for three consecutive sampling periods, operations at those wells can be suspended. The sampling periods will be determined during remedial construction (action) phase and may vary during the life of the project. The sampling periods can not be changed unless the Navy, WVDEP, and the EPA agree on the change.

If subsequent monitoring shows the groundwater concentrations of any contaminant of concern in these wells to be above MCLs or background levels, pumping at those wells shall be restarted.

2.9 STATUTORY DETERMINATIONS

Remedial actions must meet the statutory requirements of Section 121 of CERCLA, 42 U.S.C. §9621 as discussed below.

Remedial actions undertaken at NPL sites must achieve adequate protection of human health and the environment, comply with applicable or relevant and appropriate requirements of both Federal and State laws and regulations, be cost effective, and utilize, to the maximum extent practicable, permanent solutions and alternative treatment or resource recovery technologies. Also, remedial alternatives that reduce the volume, toxicity, and/or mobility of hazardous waste as the principal element are preferred. The following discussion summarizes the statutory requirements that are met by this remedial alternative. Refer to the attached ARAR table for more information on specific ARARs mentioned below.

2.9.1 Protection of Human Health and the Environment

The selected remedial action will protect human health and the environment. The installation of extraction wells and the construction of a groundwater treatment plant will prevent continued discharge of contaminated groundwater to the river and will reduce contaminant concentrations in the aquifer.

However, due to the presence of DNAPLs, contaminant concentrations in the groundwater may not be remediated at or below MCLs across a portion of Site 1 in a reasonable time frame. The DNAPL-zone shall be hydaulically-contained with continued groundwater extraction.

A waiver for cleanup of the DNAPL-zone under the Safe Drinking Water Act and a variance for the West Virginia Groundwater Protection Act may be justified because of technical impractability from an engineering perspective and may be requested at a later time after more information about the DNAPL-zone is collected.

Processes, including volatilization, degradation, dilution, mixing, and sediment removal or erosion will reduce contaminant concentrations in the river and will eliminate the associated risk of exposure to human health and the environment.

Deed notations and property use and site access restrictions will prevent future use of untreated groundwater, therefore eliminating direct contact, ingestion and inhalation threats associated with groundwater contamination at the site.

2.9.2 Compliance with ARARs

The selected remedy will be constructed to meet all applicable or relevant and appropriate requirements (ARARs) whether chemical, action, or location specific with the following exception: Cleanup level MCLs, within the DNAPL-zone, may be waived and a State required variance secured due to technical impracticability from an engineering perspective.

Chemical-Specific ARARs - Attainment of ARARs for groundwater is accomplished through the use of extraction wells across Site 1 and treatment of extracted groundwater. In order to comply with chemical-specific ARARs, aquifer contaminant concentrations must be reduced to or below MCLs. This goal is complicated by the possible presence of DNAPLs providing a long-term source of continuing contamination.

This alternative will focus on remediation of the groundwater to MCLs and containment of the contaminants in the DNAPL-zone but, because of their presence, attaining MCLs for all of the site is unlikely. Complete aquifer restoration within the DNAPL-zone may be technically impracticable from an engineering perspective, and for this reason the ARAR in the DNAPL-zone may be waived according to CERCLA §121(d)(4)(c), 42 U.S.C. §9621(d)(4)(c) in addition, it may be necessary to secure a variance from the West Virginia Groundwater Protection Act according to West Virginia Code §22-12-5(d), §47 CSR 57.

Under this remedial action, extracted groundwater will be treated, then used for boiler make-up or discharged to the North Branch Potomac River.

Chemical-specific ARARs require contaminant concentrations in treated groundwater to be less than or equal to discharge limits established by the State of West Virginia and the federal government. The groundwater treatment system will be designed to meet these criteria.

Location-Specific ARARs - Site 1 is partially located within the 100-year floodplain of the river. According to 40 CFR 264.18(b), any facilities constructed in the floodplain of a river must be designed and constructed to avoid washout.

The groundwater treatment plant will be located an appropriate distance from the river, and outside the limits of the floodplain so that washout would not occur.

Discharge piping would be located in the floodplain, and therefore, would incorporate concrete collars at intervals to counteract buoyant forces acting on the pipe during flooding.

The Navy performed an ecological risk assessment as part of the Focused RI. A site survey was performed, and information was gathered concerning the presence of endangered or threatened species on Site 1. Correspondence with federal regulatory agencies indicated that, except for the occasional transient individuals, no federally listed or proposed endangered species are known to exist on Site 1. Therefore, the requirements of the Endangered Species Act of 1973 (16 USC 1536(a)) will likely not be applicable to remediation activities occurring on Site 1.

The Wild and Scenic Rivers Act (16 USC 1271 et seq.) requires the avoidance of taking action that will have a direct adverse effect on a scenic river. Because construction activities along the river bank may impact river water quality, this ARAR is potentially applicable. Erosion and sediment controls will be incorporated into the remedial design in order to comply with this ARAR.

Action-Specific ARARs - The State of West Virginia Groundwater Protection Act regulations (47 CSR §58-4.7 to 4.7.4) require that pipelines which convey contaminants shall preferentially be installed above ground. Further, 47 CSR 58-4.4.1 requires that loading and unloading stations including but not limited to drums, trucks and railcars shall have spill prevention and control facilities and procedures as well as secondary containment, if appropriate or otherwise required. Spill containment and cleanup equipment shall be readily accessible.

All residuals from the groundwater treatment plant will be properly handled, characterized, and undergo proper disposal following federal and state regulations such as the Resource Conservation and Recovery Act (RCRA) (40 CFR 262.34, 40 CFR 262.171 to 173, 40 CFR 264.111, 174, 175, 176, and 177).

All emissions from the air stripper shall be in compliance with the Clean Air Act (40 C.F.R. 52 and 61, and CAA Sections 101 and 112) and the requirements of the West Virginia Air Pollution Control Act (45 CSR §7-4.2, 45 CSR §25-3.1 to 3.3, 45 CSR §25-4.1 to 4.3, and 45 CSR §30) and Maryland's Air Quality regulation (COMAR 26.11).

Post-closure use of the property would be restricted during the 30-year project life because the aquifers will most likely remain contaminated. Section 121 of CERCLA, 42 U.S.C. §9621 as amended by SARA, requires a periodic review of remedial actions at least every five years for as long as contaminants which pose a threat to human health and the environment remain onsite.

2.9.3 Cost-Effectiveness

The selected remedy is the most cost effective alternative in meeting the RAOs. The "no action" and "institutional control" alternatives are less costly than the selected alternative, however these alternatives do not meet all of the RAOs. Although Alternatives 3 and 4 are approximately the same cost, the selected remedy, Alternative 4, provides for better control of DNAPLs.

2.9.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable ("M.E.P.")

The selected remedial action utilizes permanent treatment technologies to the maximum extent practicable for this operable unit.

The selected remedy will greatly reduce contamination in surface water and sediment and dissolved contamination in the groundwater, providing a permanent solution in these contaminated areas. In addition, the groundwater extraction system will be modified as necessary to contain DNAPLs. Finally, a portion of the treated groundwater will be utilized by the facility for boiler make-up.

2.9.5 Preference for Treatment as a Principal Element

The statutory preference for treatment is satisfied by using aboveground treatment system to treat contaminated groundwater at Site 1.

2.9.6 Documentation of Significant Changes

The selected remedy is the same alternative identified as the recommended alternative in the Proposed Remedial Action Plan and that was presented to the public at the public meeting held October 29, 1996.

There were no significant changes to the recommended remedial action alternative presented in the Proposed Plan.

3.0 RESPONSIVENESS SUMMARY

The selected remedy for Site 1 OU 3 is the sitewide groundwater extraction, targeting DNAPLs, and air stripping. No written comments, concerns, or questions were received by the Navy, EPA, or the State of West Virginia during the public comment period from October 22, 1996 to December 9, 1996. A public meeting was held on October 29, 1996 to present the Proposed Plan for Site 1 OU 3 and to answer any questions on the Proposed Plan and on the documents in the information repositories. Several questions were answered during the meeting. Based on the limited comments, the public appears to support the selected remedy. The transcript of the meeting is part of the administrative record for this Operable Unit. A summary of comments received during the Public Meeting is attached as Appendix C.

3.1 BACKGROUND ON COMMUNITY INVOLVEMENT

The Navy and ABL has had a comprehensive public involvement program for several years. Starting in 1993, a Technical Review Committee (TRC) would meet on average twice a year to discuss issues related to investigative activities at ABL.

The TRC was comprised of mostly governmental personnel, however a few private citizens attended the meetings.

In early 1996, the Navy converted the TRC into a Restoration Advisory Broad (RAB) and 8 - 10 community representatives joined. The RAB is co-chaired by a community member and has held meetings approximately every three months since.

The Focused Feasibility Study for Site 1 and the Proposed Plan were both discussed at the RAB meetings and a Site 1 tour was undertaken during a special RAB meeting.

Community relations activities for the final selected remedy include:

- The documents concerning the investigation and analysis at Site 1, as well as a copy of the Proposed Plan was placed in the information repository at Fort Ashby and La Vale Libraries.

- Copies of the documents, including the Proposed Plan were sent to the technical committee of the RAB.

- Newspaper announcements on the availability of the documents and the public comment period/meeting date was placed in the Cumberland Times on October 18, 1996.

- The Navy established a 45-day public comment period starting October 22, 1996 and ending December 9, 1996 to present the Proposed Plan.

- A Public Meeting was held October 29, 1996 to answer any questions concerning the Site 1 OU 3 Proposed Plan. Approximately 30 people, including Federal, State and local government representatives attended the meeting. A summary of comments received during the Public Meeting is attached as Appendix C.

APPENDIX A

TOXICOLOGICAL PROFILES FOR COCs AT SITE 1
(Source: Region III TOX PROFILES)

VOLATILE ORGANIC COMPOUNDS (VOCs)

CHLOROFORM

Chloroform has a molecular weight of 119.38, and exists at room temperature as a clear, colorless liquid with a boiling point of 61.7 C. It is widely used in industry as a solvent, feedstock, and sterilizing agent, and is found in all chlorinated public water supplies (because it is a by-product of the chlorination process). Chloroform is soluble in water, acetone, and non-polar solvents, and volatilizes readily from solution. It is readily taken into the body by inhalation, ingestion, and dermal or eye contact.

Chloroform is a Class B2 carcinogen, because it causes increases in kidney tumors in rats, and in liver tumors in mice. There is also suggestive evidence from epidemiological studies that exposure to chloroform and other trihalomethanes is associated with an increased incidence of bladder tumors in humans. Other toxic effects of chloroform include central nervous system depression; eye, skin, and gastrointestinal irritation; and damage to the liver, heart, and kidney.

1,1-DICHLOROETHANE

Dichloroethane (1,1-) is a colorless liquid with a chloroform-like odor. It is used as a solvent and cleaning and degreasing agent as well as in organic synthesis as an intermediate. Exposure to 1,1-dichloroethane may occur through inhalation, ingestion, eye and skin contact. Direct contact to 1,1-dichloroethane may cause skin irritation. Oral exposure to 1,1-dichloroethane has been shown to cause mammary gland, liver and kidney tumors in rats and mice. Therefore, the EPA has classified 1,1-dichloroethane as a Group C possible human carcinogen.

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1,2-DICHLOROETHANE

1,2-Dichloroethane (1,2-DCA) is used in synthetics (nylon, rayon, rubber, plastics) industries. It can be used as a solvent, fumigant, and degreaser. It may be used in the photographic, adhesive, water softening, cosmetic, and pharmaceutical industries (Sittig, 1985).

Prolonged dermal contact with 1,2-DCA can cause irritation and dermatitis. Symptoms of inhalation exposure can include CNS effects such as dizziness and depression of respiration, as well as nausea.

EPA has classified 1,2-DCA as a Group B2 probable human carcinogen. 1,2-DCA has also been shown to alkylate DNA.

1,1-DICHLOROETHENE

1,1-Dichloroethene (1,1-DCE), formerly known as vinylidene chloride, is used in the manufacture of 1,1,1-trichloroethane and in polymers. Polymer applications include mortars, concretes, and fabrics (Sittig, 1985).

1,1-DCE is an irritant that can also affect the liver. Inhalation of high concentrations of 1,1-DCE has resulted in CNS depression, as well as liver and kidney damage. 1,1-DCE is highly volatile and is readily absorbed by the respiratory and GI tracts. EPA has classified 1,1-DCE as a Group C possible human carcinogen. 1,1-DCE has been shown to alkylate DNA.

1,2-DICHLOROETHENE

1,2-Dichloroethene (1,2-DCE) is used as a solvent for waxes, resins, and acetylcellulose. It is also used in the rubber extraction, refrigeration, and pharmaceuticals industry (Sittig, 1985).

1,2-DCE can irritate the skin and mucous membranes. Via the inhalation route, dizziness, nausea, and vomiting and CNS depression may occur (Sittig, 1985). The lungs, liver, and kidneys may be affected.

1,2-DCE is not classified as a carcinogen by EPA.

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METHYLENE CHLORIDE (DICHLOROMETHANE)

Methylene chloride, also known as dichloromethane, is a volatile solvent and common laboratory contaminant. Like many volatile solvents, methylene chloride can affect the nervous system, especially after inhalation exposure. Potential effects include dizziness, numbness, eye and skin irritation, and cardiac effects.

Methylene chloride is classified by the EPA as a Group B2 (probable human) carcinogen via the oral and inhalation routes of exposure.

TETRACHLOROETHENE

Tetrachloroethene (PCE), also known as perchloroethylene, is a commonly used solvent in the dry cleaning, degreasing, and textile industries. It is also used as an intermediate in the manufacture of organic chemicals (Sittig, 1985).

Irritation of the skin can occur after dermal exposure. High-level inhalation exposure can cause respiratory and eye irritation. Other effects include CNS depression and liver damage (Sax, 1989).

EPA ECAO classifies PCE as a Group B2 probable human carcinogen, although this is not considered Agency-wide consensus at this time.

TOLUENE

Toluene is a clear, colorless, noncorrosive liquid with a sweet, pungent, benzenelike odor. Toluene may be encountered in the manufactures of benzene. It is used as a chemical feed for toluene diisocyanate, phenol, benzyl and benzoyl derivatives, benzoic acid, toluene sulfonates, nitrotoluenes, vinyltoluenes, and saccharin. As a solvent, toluene is used for paints and coatings. It is also used as a component of automobile and aviation fuels.

APPENDIX A

Toluene has been shown to be embryotoxic in experimental animals. Chronic inhalation exposures to high levels of toluene produce central nervous system depression and narcosis in humans. Chronic exposure to toluene at high concentrations by mammals may produce cerebellar degeneration and an irreversible encephalopathy. Co-administration of toluene along with benzene or styrene has been shown to suppress the metabolism of benzene or styrene in rats. In humans toluene may cause irritation to the eyes, respiratory tract, and skin. Acute exposure to toluene causes central nervous system depression, the symptoms of which include headache, dizziness, fatigue, muscular weakness, drowsiness, loss of coordination with staggering gait, skin paresthesia, collapse, and coma.

1,1,1-TRICHLOROETHANE

1,1,1-Trichloroethane is a colorless, nonflammable liquid with an odor similar to chloroform. In recent years it has been used as a substitute for carbon tetrachloride. In liquid form it is used as a degreaser and for cold cleaning, dip-cleaning, and bucket cleaning of metals. 1,1,1-trichloroethane is a solvent used in dry-cleaning, vapor degreasing, and as a propellant.

1,1,1-Trichloroethane is irritating to the eyes on contact with either liquid or vapor phases. This effect is usually first noted in acute exposures. Mild conjunctivitis may develop but recovery is usually rapid. The solvent's defatting properties may produce a dry, scaly dermatitis upon repeated contact with the skin. Acute exposures may lead to dizziness, drowsiness, increased reaction time, loss of coordination, unconsciousness, and death. Inhalation exposure to high concentrations of 1,1,1-trichloroethane depress the central nervous system; affect cardiovascular function; and damage the lungs, liver, and kidneys in animals and humans. Mucous membranes may also be irritated by exposure to this solvent.

APPENDIX A

TRICHLOROETHENE

Trichloroethene (TCE) has been used as a solvent in degreasing operations associated with both metal-using industries and dry cleaning. TCE has been used as an intermediate in the production of pesticides, waxes, gums, resins, paints, varnishes, and trichloroacetic acid (Sittig, 1985).

TCE toxicity can include dermatitis, CNS depression, anesthesia, and effects on the liver, kidneys, and heart. TCE is a volatile compound, and inhalation exposure may be significant.

The carcinogenicity of TCE is currently under review.

VINYL CHLORIDE

Vinyl chloride is a volatile organic compound used in the manufacture of polyvinyl chloride and other resins. It is also used as a chemical intermediate and a solvent (Sittig, 1985). Vinyl chloride can be found environmentally as a breakdown product of tetrachloroethene, trichloroethene, 1,1-dichloroethene, and 1,2-dichloroethene.

Vinyl chloride can cause skin irritation and CNS depression. Chronic exposure may cause hepatic damage (Doull, 1986). Vinyl chloride is classified by EPA as a Group A (known) human carcinogen, and has been specifically associated with hemangiosarcoma of the liver.

APPENDIX A

INORGANICS

BARIUM

Barium is an extremely reactive silver white metal produced by the reduction of barium oxide. It may ignite spontaneously in air in the presence of moisture. Barium is insoluble in water but most of the barium compounds are soluble in water. Barium has many uses. It is used for removal of residual gas in vacuum tubes and in metal alloys (e.g., nickel and lead). It is used in the manufacture of lithopone (a white pigment in paints); in synthetic rubber vulcanization; in x-ray diagnostic work; in glassmaking; and in electronics industries. Long-term oral exposure to soluble barium salts may increased blood pressure. Short-term exposure may cause prolonged stimulant action on muscle. Occupation inhalation exposure to barium may result in Baritosis, a non-cancerous lung disease. There are no reports of carcinogenicity associated with exposure to barium.

MANGANESE

Manganese is used in the manufacture of dry cell batteries, paints, dyes, and in the chemical and glass and ceramics industries. Manganese is an essential nutrient in food; the average human intake is reported to be approximately 10 mg/day (Sittig, 1985).

Previous reports of neurotoxicity from manganese were generally reported from high-level occupational exposure to dust and fumes. More recent studies have focused on exposures to drinking water, with subtle neurologic effects being reported after chronic consumption of high concentrations of manganese in water (Sittig, 1985; USEPA, 1993).

Manganese is not classified as a carcinogen by EPA.

APPENDIX A

TOXICOLOGICAL PROFILES FOR CONTAMINANTS FOR FUTURE CONSIDERATION

INORGANICS

ANTIMONY

Antimony is a soft metal insoluble in water and organic solvents. It is widely used in the production of alloys. Short-term oral exposure to antimony has been shown to cause burning stomach pains, colic, nausea and vomiting in humans. Long-term occupational inhalation exposure is associated with heart disease in both humans and laboratory animals, and decreased longevity and altered cholesterol levels in rats. Antimony has not been tested for carcinogenicity.

ARSENIC

Arsenic has been used by the agricultural, pigment, glass, and metal smelting industries. Arsenic is a ubiquitous metalloid element. Acute ingestion of arsenic can be associated with damage to mucous membranes including irritation, vesicle formation, and sloughing. Arsenic can also be associated with sensory loss in the peripheral nervous system and anemia. Liver injury is characteristic of chronic exposure. Effects of arsenic on the skin can include hyperpigmentation, hyperkeratosis, and skin cancer. (Casarett & Doull, 1986)

EPA classifies arsenic in drinking water as a Group A known oral human carcinogen.

CHROMIUM

Chromium is a heavy metal that generally exists in either a trivalent or hexavalent oxidation state. Hexavalent chromium is soluble and mobile in ground water and surface water. Trivalent chromium is in the reduced form and is generally found absorbed to soil; and therefore, it is less mobile. Hexavalent chromium is used in chrome plating, copper stripping, aluminum anodizing, as a catalyst, in organic synthesis and photography. Exposure to chromium compounds can occur through ingestion, inhalation and skin contact.

APPENDIX A

Hexavalent chromium may have a direct corrosive effect on the skin and may cause upper respiratory tract irritation. Short term exposure to dust or mist of hexavalent chromium may cause upper respiratory distress, headache, fever, and loss of weight. Long term occupational inhalation exposure to dust and fumes of hexavalent chromium has been shown to cause lung cancer in humans, especially those in the chromate-producing industry. In addition, a number of salts of hexavalent chromium are carcinogenic in rats. The EPA has classified hexavalent chromium as a Group A human carcinogen. Trivalent chromium is an essential nutrient and has low toxicity; however, at high levels, it may cause skin irritation.

LEAD

Lead has been used as a gasoline additive (tetraethyl lead) and in paint pigments, batteries, X-ray shielding, and plumbing, and has been associated with smelting and plating industries.

The target organs for lead exposure include the nervous system, hematopoietic system, kidneys, and reproductive system. Symptoms of severe toxicity may include anemia, encephalopathy and peripheral neuropathy. Recently, an association between low-level lead exposure and impaired neurological development in children has been suggested.

EPA considers lead to be a Group B2 probable human carcinogen via the oral route, but no Agency-wide consensus has been reached concerning a cancer slope factor.

MERCURY

Mercury is a silver-white, heavy liquid metal that is slightly volatile at ambient temperatures. Mercury can occur in the environment in either the organic (usually methyl) or inorganic (metallic) form. Mercury compounds are used as preservatives, disinfectants, fungicides, and germicides. Additionally, mercury is used in the plating, dyeing, textile and pharmaceutical industries. In humans, prenatal exposure to methylmercury has been associated with brain damage. Other major target organs for organic mercury compounds in humans are the central and peripheral nervous systems and the kidney. In animals, toxic effects also occur in the liver, heart, gonads, pancreas, and gastrointestinal tract.

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Experimental studies involving laboratory animals indicate that both organic and inorganic forms of mercury are toxic to embryos.

NICKEL

Nickel is a white, hard, ferromagnetic metal that is a naturally-occurring element in the earth's crust and is stable in the atmosphere at ambient temperatures. Nickel forms alloys with a variety of metals, including copper, manganese, zinc, chromium and iron. Elemental nickel is used in electroplating and casting operations, magnetic tapes, surgical and dental instruments, nickel-cadmium batteries, and colored ceramics. Occupational exposure to nickel compounds has been associated with an increased incidence of nasal cavity and lung cancers. For this reason, nickel refinery dust has been classified by the EPA as a Group A - Human Carcinogen via the inhalation route of exposure. The most common reaction to nickel exposure is skin sensitization. Nickel and its compounds also irritate the conjunctiva of the eye and the mucous membranes of the upper respiratory tract.

SILVER

Silver is a white metal insoluble in water and soluble in sulfuric and nitric acids. Alloys of silver (e.g., copper, aluminum, cadmium, lead or antimony) are used in the manufacture of silverware, jewelry, coins, automobiles bearings and grid in storage batteries, in photographic films, in mirrors, as a bactericide for sterilizing water, fruit juices, etc. Some silver compounds are also of medical importance as antiseptics or astringents. Exposure to silver can occur through inhalation of fumes or dust, ingestion of solutions or dust, eye and skin contact. Eye and skin contact with metallic silver may produce local permanent discoloration of the skin similar to tattooing. This process is refer to as argyria. Argyria is characterized by a dark, slate-grey color pigmentation of the skin. Generalized argyria can also develop through exposure to silver oxides or salts through ingestion and inhalation of dust. Silver is not classifiable as to carcinogenicity.

APPENDIX A

THALLIUM

Thallium is a byproduct of iron, cadmium, and zinc refining. It has been used in alloys, optical lenses, jewelry, semiconductors, and dyes and pigments. Thallium compounds have been used as pesticides. (Casarett and Doull, 1986)

Thallium toxicity can result in hair loss, gastrointestinal irritation, paralysis, nephritis, and liver necrosis. Thallium is one of the more toxic metals, with an estimated lethal dose in humans of 8 to 12 mg/kg. (Casarett and Doull, 1986)

ZINC

Zinc is a bluish-white metal that is stable in dry air, but becomes covered with a white coating on exposure to moist air. Zinc is present in abundance in the earth's crust. Zinc chloride is used as a wood preservative, in dry battery cells, in oil refining operations, and in the manufacture of dyes, activated carbon, deodorants and disinfecting solutions. Zinc chromate and zinc oxide are used primarily as pigments. Exposure to zinc compounds can cause skin sensitization, irritation of the nose and throat, fever, and fatigue.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 1 Groundwater, Surface Water, and Sediments
Allegany Ballistics Laboratory, West Virginia

ARAR or TBC	Regulation	Classification	Requirement Synopsis
I. LOCATION SPECIFIC			
Endangered Species Act of 1978	16 USC 1531 50 C.F.R. Part 402	Applicable	Act requires federal agencies to ensure that any action authorized by an agency is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat.
The Archaeological and Historical Preservation Act of 1974	16 U.S.C § 469	Potentially Applicable	Requires actions to avoid potential loss or destruction of significant scientific, historical, or archaeological data. Construction on previously undisturbed land would require an archaeological survey of the area.
Rivers and Harbors Act of 1890	33 USC 403	Applicable	The North Branch Potomac River is classified as a navigable river. Permits required for structures or work in or affecting navigable waters.
Migratory Bird Area	16 USC Section 703	Applicable	Protects almost all species of native birds in the U.S. from unregulated "take" which can include poisoning at hazardous waste sites. Migratory birds are encountered near the river at Site 1.

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Wild and Scenic Rivers Act	16 USC 1271 et seq. And section 7(a)	Potentially Applicable	Avoid taking or assisting in action that will have direct adverse effect on scenic rivers. Construction activities near the North Branch Potomac River may have an adverse effect on the river.
Fish and Wildlife Coordination Act, Section 662	16 USC 662	Potentially Applicable	Action taken should protect fish or wildlife. Response actions (treated discharge) will be protective of human health and the environment.
Resource Conservation and Recovery Act	40 C.F.R. 264.18 (b)	Potentially Applicable or Relevant and Appropriate to removal and treatment activities.	Site 1 is located in a 100-year floodplain. Applicable to hazardous waste facilities constructed within 100-year floodplain. Relevant to construction of facilities for management of materials similar to hazardous waste. Facility must be designed, constructed, operated, and maintained to avoid washout.
Groundwater Protection Act	47 CSR 58-4.10	Relevant and Appropriate	Facility or activity design must adequately address the issues arising from locating in karst, wetlands, faults, subsidences, delineated wellhead protection areas determined vulnerable.

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Executive Order 11988, Protection of Floodplains	40 C.F.R. 6, Appendix A; excluding Sections 6(a)(2), 6(a)(4), 6(a)(6); 40 C.F.R. 6.302	Potentially Applicable	Facilities or activities located within the floodplain must comply with this order. Actions taken should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.
Executive Order 11990, Protection of Wetlands	40 C.F.R. 6, Appendix A	Applicable	Action to minimize the destruction, loss, or degradation of wetlands.
Procedures for Implementing the Requirements of the Council on Environmental Quality on the National Environmental Policy Act	40 C.F.R. Part 6 Appendix A	Applicable	This is EPA's policy for carrying out the provisions of Executive Order 11990 (Protection of Wetlands). No activity that adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available. If there is no other practicable alternative, impacts must be mitigated.

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Endangered and Threatened Fish Species	COMAR 08.02.12/ 08.03.08	Applicable	Actions will be performed to conserve endangered fish species and the habitats they depend on.
Construction on Nontidal Waters and Floodplains	COMAR 08.05.03	Applicable	Any remedial action that alters the waterway or floodplain in the State of Maryland will follow these regulations.
Nontidal Wetlands	COMAR 08.05.04/ 08.05.07	To Be Considered	Protect the nontidal wetlands of the State of Maryland.
II. ACTION SPECIFIC			
AIR			
Clean Air Act	CAA Section 101 and 40 C.F.R. 52	Relevant and Appropriate	File an Air Pollution Emission Notice (APEN) with the State to include estimation of emission rates for each pollutant expected. Design system to provide an odor-free operation.
Clean Air Act	40 C.F.R. 52	Applicable	Predict total emission of volatile organic compounds (VOCs) to demonstrate allowable emission levels from similar sources using Reasonably Available Control Technology (RACT).

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Clean Air Act	40 C.F.R. 60 Subpart WWW and CC	To Be Considered	New Source Performance Standard (NSPS): deals with non-methane organic compounds.
Clean Air Act	40 C.F.R. 61	Relevant and Appropriate	Verify that emissions of mercury, vinyl chloride, and benzene do not exceed levels expected from sources in compliance with hazardous air pollution regulation.
Clean Air Act	CAA Section 112(D)	Relevant and Appropriate	Emission Standards for new stationary sources.
Clean Air Act	CAA Section 118	Applicable	Control of pollution from Federal Facilities.
Air Pollution Control Act	§45CSR7-4.2	Applicable	Allowable mineral acids stack gas concentration.
Air Pollution Control Act	§45CSR25-3.2	Relevant and Appropriate	Adopts by reference Table 25-A of the Code of Federal Regulations
Air Pollution Control Act and the Hazardous Waste Management Act	§45CSR25-4.3	Relevant and Appropriate	Facility design, construction, maintain, and operate in a manner to minimize hazardous waste constituents to the air.

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Air Pollution Control Act	§45CSR27-3.1 thru §45-27-3.5	Applicable	Best Available Technology requirements for the discharge of emissions of toxic air pollutants.
Air Pollution Control Act	§45CSR27-4.1 thru 4.2	Applicable	Best Available Technology requirements for Fugitive Emissions of Toxic Air Pollutants.
Air Pollution Control Act	§45CSR30	Applicable	Requirements for the air quality permitting system.
Air Quality	COMAR 26.11	To Be Considered	Ambient air quality standards, general emissions standards, and restrictions for air emissions from construction activities, vents, and treatment technologies.
WATER			
Criteria for Classification of Solid Waste Disposal Facilities and Practices	49 C.F.R. 257.3-3(a)	Potentially Applicable	A facility shall not cause a discharge of pollutants into the waters of the U. S. that is in violation of the substantive requirements of the NPDES under CWA Section 402, as amended.
Criteria for Classification of Solid Waste Disposal Facilities and Practices	49 C.F.R. 257.3-3(a)	Potentially Applicable	A facility or practice shall not cause nonpoint source pollution of the waters of the U. S. that violates applicable legal substantive requirements implementing an areawide or Statewide water quality management plan approved by the Administrator under CWA Section 208, as amended.

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Criteria for Classification of Solid Waste Disposal Facilities and Practices	49 C.F.R. 257.3-4 and Appendix I	Potentially Applicable	A facility or practice shall not contaminate an underground drinking water source beyond the solid waste boundary or a court- or State-established alternative.
Clean Water Act	40 C.F.R. 403	Applicable	Pretreatment Standards. Control the introduction of pollutants into POTWs.
Clean Water Act	40 C.F.R. 121	Relevant and Appropriate	Contaminated groundwater will be cleaned up to MCLs, except in the DNAPL-zone which will be exempt because it is technically impracticable based on engineering concerns.
Clean Water Act	40 C.F.R. 122.44(a)	Applicable	Best Available Technology (BAT). Use BAT to control toxic and nonconventional pollutants. Use best conventional pollutant control technology (BCT) to control conventional pollutants.
Clean Water Act	40 C.F.R. 122.41(i), (j)	Applicable	Monitoring Requirements. Discharge must be monitored to assure compliance. Comply with additional substantive requirements.
Clean Water Act	40 C.F.R. 125.100	Applicable	Best Management Practices. Develop and implement a Best Management Practice program to prevent the release of toxic constituents to surface waters.

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Groundwater Protection Act	§46CSR12-3.1 thru 3.3 plus Appendix A; §47CSR58-1 to §47CSR58-12	Relevant and Appropriate	This establishes the minimum standards of water purity and quality for groundwater located in the state.
Groundwater Protection Act	§46CSR12-3.3	Applicable	Constituents in groundwater shall not cause a violation of the standards found at 46 CSR in any surface water.
Groundwater Protection Act	§47CSR58-4.2	Relevant and Appropriate	Subsurface bores of all types shall be constructed, operated and closed in a manner which protects groundwater.
Groundwater Protection Act	§47CSR58-4.3.2	Relevant and Appropriate	New areas used for storage shall be designed, constructed and operated to prevent release of contaminants.
Groundwater Protection Act	§47CSR58-4.4.1	Relevant and Appropriate	Loading and unloading stations including but not limited to drums, trucks and railcars shall have spill prevention and control facilities and procedures as well as secondary containment.
Groundwater Protection Act	§47CSR58-4.5.2	Relevant and Appropriate	New impoundments shall be designed and operated to prevent contamination of groundwater.

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Groundwater Protection Act	§47CSR58-4.7 to 4.7.4	Relevant and Appropriate	Pipelines conveying contaminants shall preferentially be installed above ground. Ditches conveying contaminants must have appropriate liners. Pumps and related equipment must be installed to prevent or contain any leaks or spills.
Groundwater Protection Act	§47CSR58-4.8	Relevant and Appropriate	Requirements for secondary containment for sumps and above ground tanks.
Groundwater Protection Act	§47CSR58-4.9.4 to 4.9.7	Applicable	Groundwater monitoring stations shall be located and constructed in a manner that allows accurate determination of groundwater quality and levels, and prevents contamination of groundwater through the finished well hole or casing. All groundwater monitoring stations shall be accurately located utilizing latitude and longitude by surveying, or other acceptable means, and coordinates shall be included with all data collected.
Groundwater Protection Act	§47CSR58-8.1.3	Applicable	Adequate groundwater monitoring shall be conducted to demonstrate control and containment of the substance. The director shall specify which parameters should be monitored in a remedial operation. Groundwater monitoring must continue until results assure adequate remedial action was taken.
Groundwater Protection Act	§47CSR58-8.1.2 to 8.1.3	Relevant and Appropriate	Clean up actions shall not rely primarily on dilution and dispersion if active remedial measures are technically and economically feasible.

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Groundwater Protection Act	§47CSR58-4.10	Relevant and Appropriate	Facility or activity design must adequately address the issues arising from locating in Karst, wetlands, faults, subsidence, delineated wellhead protection areas determined vulnerable.
Groundwater Protection Act	§47CSR59-4.1 to 4.7	Relevant and Appropriate	Monitoring well Drillers certification.
Groundwater Protection Act	§47CSR 60-1 to 23	Applicable	Monitoring well design Standards.
Groundwater Protection Act	§47CSR60-5 to 18 and §47CSR60-20 to 22	Relevant and Appropriate	Requirements and procedures governing the installation and development and/or redevelopment and reconditioning of temporary or permanent monitoring well(s), piezometer(s), recovery well(s), well(s), and boreholes.
Groundwater Protection Act	§47CSR60-19	Relevant and Appropriate	Abandonment requirements and procedures for temporary or permanent monitoring well(s), piezometer(s), recovery well(s), well(s), and boreholes.
Water Pollution Control Act	§46 CSR 1-1 to 9	Relevant and Appropriate	Rules establishing the requirements governing the discharge or deposit of sewage, industrial wastes and other wastes into the waters of the State and establishing water quality standards for the waters of the State standing or flowing over the surface of the State.

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Water Pollution Control Act	§47CSR10	Applicable	Requirements for NPDES
Water Appropriation or Use	COMAR 08.05.02	Applicable	Report monitoring well data for inclusion in Maryland database.
Hearing Procedures for Waterway Obstuction, Waterway Construction, and Water Appropriation and Use Permits	COMAR 08.05.06	Applicable	Requirements for public information/notification of the use of State of Maryland water resources.
Well Construction	COMAR 26.04.04	Relevant and Appropriate	Follow specifications for well construction and abandonment for wells in Maryland.
Board of Well Drillers	COMAR 26.05.11	Applicable (wells in Maryland)	Licensing requirements for persons drilling and installing wells in Maryland.

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Water Quality Discharge Limits Permits	COMAR 26.08.02/ 26.08.03/ 26.08.04	Applicable	Discharge of treated groundwater will meet State NPDES limits. There is an agreement between West Virginia and Maryland that the West Virginia NPDES limits could apply to discharges from the West Virginia shore.
Miscellaneous			
Public Health Laws of West Virginia	§64CSR42-4.3.3.20 to 4.3.3.20.2.3	Relevant and Appropriate	Abandonment criteria for test wells and groundwater sources.
Division of Environmental Protection	§38CSR11	Relevant and Appropriate	Requirements for spill prevention
Erosion and Sediment Control; Stormwater Management	COMAR 26.09.01/ 26.09.02	To Be Considered	Any land clearing, grading,other earth disturbances require an erosion and sediment control plan.
Resource Conservation and Recovery Act	40 CFR 262.10 (a), 262.11	Applicable	Waste generator shall determine if that waste is hazardous waste.

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Resource Conservation and Recovery Act	40 CFR 262.34	Potentially Applicable	Generator may accumulate hazardous waste onsite for 90 days or less or must comply with requirements for operating a storage facility. Accumulation of hazardous waste onsite for longer than 90 days would subject to the substantive RCRA requirements for storage facilities.
Resource Conservation and Recovery Act	40 CFR 262.171, 172, 173	Potentially Applicable	Containers of RCRA hazardous waste must be: - Maintained in good condition. - Compatible with hazardous waste to be stored. - Closed during storage except to add or remove waste.
Resource Conservation and Recovery Act	40 CFR 264.111	Potentially Applicable or Relevant and Appropriate	General performance standard requires elimination of need for further maintenance and control: elimination of postclosure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products. May be relevant to active management of wastes which are sufficiently similar to hazardous wastes.
Resource Conservation and Recovery Act	40 CFR 264.174	Potentially Applicable	Inspect container storage areas weekly for deterioration.
Resource Conservation and Recovery Act	40 CFR 264.175(a) and (b)	Potentially Applicable	Place containers on a sloped, crackfree base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system.

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Resource Conservation and Recovery Act	40 C.F.R. 264.176	Potentially Applicable	Keep containers of ignitable or reactive waste at least 50 feet from the facility property line.
Resource Conservation and Recovery Act	40 C.F.R. 264.177	Potentially Applicable	Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.
Resource Conservation and Recovery Act	40 C.F.R. 264.178	Potentially Applicable	At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers, liners.
Resource Conservation and Recovery Act	40 C.F.R. 268.40	Potentially Applicable	Movement and disposal of hazardous waste to new location and placement in or on land will trigger land disposal restrictions for the hazardous waste. Attain land disposal treatment standards before disposing of hazadous waste.
Resource Conservation and Recovery Act	40 C.F.R. 264.251 (except 251(j), 251(e)(11))	Potentially Applicable	Waste put into waste pile subject to land ban regulations.
U.S. Department of Transportation	49 C.F.R. 171.2(f)	Potentially Applicable	No person shall represent that a container or package is safe unless it meets the requirements of 49 USC 1802, et seq. Or represent that a hazardous material is present in a package or motor vehicle if it is not.

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U.S. Department of Transportation	49 C.F.R. 171.2(g)	Potentially Applicable	No person shall unlawfully alter or deface labels, placards, or descriptions, packages, containers, or motor vehicles used for transportation of hazardous materials.
U.S. Department of Transportation	49 C.F.R. 171.300	Potentially Applicable	Each person who offers hazardous material for transportation or each carrier that transports it shall mark each package, container, and vehicle in the manner required.
U.S. Department of Transportation	49 C.F.R. 171.301	Potentially Applicable	Each person offering non-bulk hazardous materials for transportation shall mark the proper shipping name and identification number (technical name) and consignee's name and address.
U.S. Department of Transportation	49 C.F.R. 171.302	Potentially Applicable	Hazardous materials for transportation in bulk packages must be labeled with proper identification (ID) number, specified in 49 CFR 172.101 table, with required size of print. Packages must remain marked until cleaned or refilled with material requiring other marking.
U.S. Department of Transportation	49 C.F.R. 171.303	Potentially Applicable	No package marked with a proper shipping name or ID number may be offered for transport or transported unless the package contains the identified hazardous material or its residue.
U.S. Department of Transportation	49 C.F.R. 171.304	Potentially Applicable	The marking must be durable, in English, in contrasting colors, unobscured, and away from other markings.
U.S. Department of Transportation	49 C.F.R. 171.400	Potentially Applicable	Labeling of hazardous material packages shall be as specified in the list.

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U.S. Department of Transportation	49 C.F.R. 171.312	Potentially Applicable	Non-bulk combination packages containing liquid hazardous materials must be packed with closures upward, and marked with arrows pointing upward.
U.S. Department of Transportation	49 C.F.R. 171.504	Potentially Applicable	Each bulk packaging or transport vehicle containing any quantity of hazardous material must be placarded on each side and each end with the type of placards listed in Tables 1 and 2 of 49 CFR 172.504.

APPENDIX C

SUMMARY OF COMMENTS RECEIVED DURING PUBLIC MEETING AND RESPONSES

The following represents the Department of the Navy's responses to all the comments received on the subject Proposed Plan. No written comments were received from any party by the Navy, WVDEP, or the EPA. Consequently, the following is based on remarks made or questions posed that were recorded and transcribed during the public meeting held October 29, 1996 at the Bel Air Elementary School. Because the transcript of the meeting was made from a recording, some minor editorial liberties were taken for clarification to a comment or response. A complete copy of the transcript is included in the Administrative Record which can be found in the information repositories located at:

Fort Ashby Public Library
Box 74, Lincoln Street
Fort Ashby, West Virginia 26719
Contact: Jean Howser
304/298-4493

La Vale Public Library
815 National Highway
La Vale, Maryland 21502
Contact: Sondra Ritchie
301/729-0855

Question 1: Do you (the Navy) ever analyze these materials? You call them DNAPLs (dense, non-aqueous phase liquids)?

Response: Yes. During the investigations, we collected soil and water samples for chemical analysis. The analyses provide the concentrations of the contaminants. Very high concentrations are strong evidence there is a contaminant source that will continue to dissolve over time. DNAPL presence is further deduced through research of the contaminants, their concentrations and their distribution.

Question 2: Are the extraction wells going to be on both the north and south side of the solvent disposal pits?

Response: The extraction wells will be situated to the north of the solvent disposal pits, between them and the North Branch Potomac River. Groundwater modeling predicts this is the optimum location to achieve our remediation goals.

Question 3: This proposed plan now presented is for the Site 1 groundwater. Is there to be a separate plan for the soil and the surface water?

Response: This Site 1 proposed plan addresses groundwater, surface water and sediment. By containing and treating the groundwater, we effectively remediate the surface water and sediment by not allowing the contaminants to move into the River. This will allow any contamination currently present in the sediment and the surface water to naturally attenuate or degrade. Regarding Site 1 soil, the Navy will develop an additional Site 1 soil focused Feasibility Study that will lead to a proposed plan.

Question 4: Would the "plan" chosen for the soil affect how the proposed plan for the water will work? Should they be done at the same time?

Response: The eventual "plan" for the soil should not affect the proposed plan for the groundwater. The "plan" that will address soil contamination, limited to the upper eight to ten feet, will have to take into consideration the groundwater treatment technology in place.

Question 5: Is there any possibility of the air being contaminated in any of these sites and posing a risk to the residents?

Response: Volatile organic compounds that are "stripped" from the groundwater will be captured and not released. Various monitoring stations will be established to ensure our treatment system is effective and the applicable requirements are being met. The monitoring plan will undergo review from the State of West Virginia and the EPA.

Question 6: Who pays for the cost of the clean up?

Response: We do, the taxpayers. The Navy is heading it up but it comes out of our pockets. (Ed: The work is paid for out of the Navy's budget.)

Question 7: Have soil samples been taken as planned on the Maryland side of the Potomac?

Response: The question refers to a requirement in a consent order for the facility to collect soil samples in connection with open burning. Although not part of the Navy's Installation Restoration Program, specifics will be made known to you by Allegany Ballistics Lab.

This constitutes the extent of the comments and responses on the Proposed Remedial Action Plan for Site 1 Groundwater, Surface Water and Sediments at the Allegany Ballistics Laboratory.

Section F
Procedures to Prevent Hazards

SECTION F

Procedures to Prevent Hazards

This section contains the information required to demonstrate compliance with the preparedness and prevention requirements in 40 CFR 264 Subpart C and the inspection requirements in 40 CFR 264 Subpart I for containers and in 40 CFR 264 Subpart X for miscellaneous units.

F-1 Security [40 CFR 264.14 and 270.14(b)(4)]

ABL is a government-owned defense facility, operated by ATK. Security controls and procedures play a significant role in the operation of ABL, because many operations require constant protection of Department of the Navy classified material and ATK proprietary materials. Security personnel are responsible for controlling access to the facility and for implementing security and safety requirements issued by the Department of the Navy and ATK. Security personnel are also responsible for providing fire protection and emergency services.

F-1a Security Procedures and Equipment [40 CFR 270.14(b)(4) and 264.14]

F-1a(1) 24-Hour Surveillance [40 CFR 264.14(b)(1)]

ABL fulfills the security procedures and equipment requirements through the use of a barrier and other methods to control entry. These facilities will be maintained for the life of the RCRA permit.

At the discretion of the facility for operational security purposes, security guards and firefighting guards are on duty 24 hours a day, 7 days a week. Guards are posted at the main plant entrance to control access by personnel and to prevent unauthorized entry to the facility. Other access gates are either identification card access or controlled remotely. Guards patrol and monitor the entire ABL facility, including the Burning Grounds and the hazardous waste storage unit. Lighting is provided around the perimeter and throughout the operating areas. Remotely operated video cameras are mounted in strategic locations throughout the facility. The cameras are operated from the main security building. The video camera surveillance system allows the guards to monitor virtually all portions of the plant. This surveillance system is implemented at the discretion of the facility owner and operator and is not submitted to fulfill the security procedures and equipment requirements for RCRA permitting.

F-1a(2)(a) Barrier [40 CFR 264.14(b)(2)(i)]

A 7-ft-high chain-link fence with a 1-ft top guard consisting of three strands of twisted double-strand barbed wire surround the active portion of the facility. Entry through the fence is controlled by locked gates and attendants. This fence meets the security requirements of 40 CFR 264.14(b)(2) for an artificial barrier. Both the Burning Grounds and the hazardous waste storage unit are within the fenced perimeter of the facility. The Burning Grounds is also surrounded by its own 7-ft-high chain-link fence.

F-1a(2)(b) Means to Control Entry [40 CFR 264.14(b)(2)(ii)]

Entry to the active portion of the facility is through gates controlled by identification card access and can be remotely controlled by security guards. All employees must display their security badge upon entry to the facility. All visitors and contractors must sign in with the guards and receive and wear an appropriately classed badge. Visitors must be escorted by an ABL employee. Unescorted contractors working onsite receive a security and safety briefing, are required to read and sign a "Contractor Safety and Security" handbook, and are given instructions on specific travel routes to and from their job sites. ABL personnel are trained to constantly observe work areas and report all emergencies, unauthorized or unidentified personnel, or anything unusual to the Security Office.

F-1a(3) Warning Signs [40 CFR 264.14(c)]

Signs are placed at 100-ft intervals along the facility's perimeter fence. The signs read "Danger, Keep Out, US Government Reservation, Trespassers will be Prosecuted to the Full Extent of the Law." Signs that describe the "Conditions of Entry" for personnel are posted at the main gate. Signs posted around the Burning Grounds and the hazardous waste storage unit read "Danger, Unauthorized Personnel Keep Out." Signs are legible from at least 25 ft. The signs are written in English. There is no other predominant language in the area surrounding ABL. Similar signs will be posted at Building 810 when permitted.

F-1b Waiver [40 CFR 264.14(a)]

A waiver from the security requirements of 40 CFR 264.14(a)(1) and (2) is not sought for either the Burning Grounds or the hazardous waste storage buildings.

F-2 Inspection Schedule [40 CFR 264.15, 270.14(b)(5)]

F-2a General Inspection Requirements [40 CFR 270.14(b)(5), 264.15(a) and (b), and 264.33]

The hazardous waste storage unit and the Burning Grounds are inspected for malfunctions and deterioration, operator errors, and discharges. Inspections are conducted in accordance with written SOPs.

All facility communications, emergency alerting system and fire protection, spill control, and decontamination equipment are inspected, tested, and maintained as necessary to assure their proper operation in time of emergency. Where applicable, equipment is inspected to recognized standards. Records and operation logs are maintained for each inspection performed.

Inspection records for both the Burning Grounds and the hazardous waste storage unit are maintained in the Environmental Department. The form includes date, time, inspector's name and signature, observations, and remedial actions taken. Records are kept for 3 years.

A copy of the inspection form for the Burning Grounds is provided in Figure F-1. The frequency of inspection items is indicated on the inspection form.

A copy of the inspection form for the hazardous waste storage unit is provided in Figure F-2. The unit is inspected weekly by operating personnel. Once permitted, Building 810 will undergo weekly inspection.

F-2a(1) Types of Problems Addressed at the Inspection [40 CFR 264.15(b)(3)]

Burning Grounds

The following types of problems are looked for during inspections of the Burning Grounds:

Burning Pans (before collecting waste)
- Erosion of soil in burn pan
- Foreign objects or debris
- Tall grass or weeds
- Pan temperature
- Pan integrity

Circuit Check (before collecting waste)
- Control panel short circuit

Personal Protection (before use)
- Flame resistant coveralls
- Conductive shoes
- Safety glasses

Fire Protection (before use)
- Rubber tamper
- Water hoses
- Two-way communication

Ignition Items (before use)
- Electric matches
- Firing circuit continuity check
- Blasting machine

Traffic Control (before ignition)
- Gates closed
- Signs posted

Fire Control (after completion of burn)
- Grass fires

Examples of possible problems and remedial actions for the Burning Grounds are presented below.

Problem	Remedial Action
Erosion of burning pan	Submit Work Order to Maintenance for repair
Foreign objects or debris in pan	Remove and dispose
Tall weeds or grass	Contact Grounds Crew and have grass cut
Firing circuit not shorted	Install shorting plug and retest, or contact electrician for repair
Missing fire protection item	Procure from Stores before proceeding
Missing ignition system item	Procure from Stores before proceeding
Electric match not properly connected to firing circuit	Repair connection before igniting pans
Gates open or signs not posted	Close gates and post signs before burning
Weather conditions unacceptable (See Section D-8)	Postpone burn until weather conditions acceptable

Building 366 Container Storage

The types of problems looked for during inspections of the Building 366 container storage area are listed below; Building 810, once permitted, will be inspected in a similar way:

Containers and Containment Cells

- Absent or illegible labels
- Leaking, bulging, rusted, or distorted drums
- Absence of drum bungs or closure rings
- Accumulated residue, water, or foreign material in cell containment

Structural Equipment and Operating Area

- Roof leaks, physical deterioration of structure
- Cracks or deterioration of concrete base or cell members
- Absent or illegible warning signs
- General housekeeping and cleanliness

Examples of possible problems and remedial actions for the hazardous waste storage unit are presented below.

Problem	Remedial Action
Missing or illegible label	Affix a proper legible label
Leaking drum	Transfer material to new drum
Missing or insecure bung or lid	Install and tighten bung or lid
Distorted or rusted drum	Notify supervision. Transfer material if conditions affect the structural integrity of the drum.
Foreign residues in diked area disposal	Clean up residue and place in container for disposal

F-2a(2) Frequency of Inspections [40 CFR 264.15(b)(4)]

Burning Grounds

Burning Grounds facilities and equipment are inspected according to the frequencies listed below.

Burn Pans

Burn pans are inspected before waste is collected from the less than 90-day storage areas to ensure that the pans are safe to receive waste.

Firing Circuit

The firing circuit is checked with a circuit tester before waste is collected to ensure that the control panel is short-circuited. This ensures that the circuit does not have a voltage potential between the two lines of the firing circuit, which in turn prevents premature firing of the electric match when the match is connected to the firing circuit.

Protective Equipment

Personal protective equipment (PPE) is inspected before each use.

Fire Protection

Fire protection equipment is inspected before each use.

Ignition items

The firing circuit is checked before each burn using a circuit tester to ensure that the electric match is properly connected to the firing circuit before burning is initiated. Electric matches and the blasting machine are inspected to ensure they are present and in good condition.

Traffic Control

Traffic control items (gates closed and signs posted) are inspected before each burn to ensure that unauthorized personnel do not enter the unit during a burn event.

Fire Control

The unit is inspected after each burn event to ensure that no grass fires are burning in or around the Burning Grounds.

Building 366 Container Storage

This building is inspected weekly when it contains wastes.

Monitoring Equipment

No permanent monitoring equipment is installed at the container storage building. In the event of a leak or other incident, portable equipment (e.g., air pumps, Draeger tubes, oxygen meters, or flammable vapor meters) is available from the Safety and Environmental Department. All such monitoring equipment is inspected and calibrated before use and maintained in accordance with the manufacturer's recommendations.

Areas Subject to Spills

The loading/unloading area is the center aisle driveway at the container storage building. This area is inspected after each material transfer to or from the area. Containers and containment cells are inspected weekly by operations personnel.

Operating and Structural Equipment

The concrete floor is checked visually during the weekly container area inspection. Forklifts, vehicles, and material transfer equipment (not dedicated to container area use) are on an annual preventive maintenance schedule.

Building 810

This building will be inspected weekly when it contains waste, once permitted.

Monitoring Equipment

No permanent monitoring equipment will be installed at the Building 810 container storage building. In the event of a leak or other incident, portable equipment (e.g., air pumps, Draeger tubes, oxygen meters, or flammable vapor meters) is available from the Safety and Environmental Department. All such monitoring equipment is inspected and calibrated before use and maintained in accordance with the manufacturer's recommendations.

Areas Subject to Spills

Loading and unloading of waste occurs at the front door. This area is inspected after each material transfer to or from the area. Containers and containment cells are inspected weekly by operations personnel .

Operating and Structural Equipment

The concrete floor will be checked visually during the weekly container area inspection.

F-2b Specific Process Inspection Requirements [40 CFR 270.14(b)(4) and 264.15(b)(4)]

F-2b(1) Container Inspection [40 CFR 264.174]

As discussed in Section F-2a, the containers and the container storage area are inspected weekly for leaks, spills, and deterioration caused by corrosion and other factors.

F-2b(2) Tanks System Inspection [40 CFR 264.195]

Not applicable.

F-2b(3) Waste Pile Inspection [40 CFR 270.18(d), 264.254(b)]

Not applicable.

F-2b(4) Surface Impoundment Inspection [40 CFR 270.17(c), 264.226(b), 264.226(c)]

Not applicable.

F-2b(5)(a) Incinerator and Associated Equipment [40 CFR 264.347(b)]

Not applicable.

F-2b(6) Landfill Inspection [40 CFR 264.303(b)]

Not applicable.

F-2b(7) Land Treatment Facility Inspection [40 CFR 264.273(g)]

Not applicable.

F-2b(8) Miscellaneous Unit Inspections [40 CFR 270.14(b)(5) and 264.602]

The general inspection requirements described in Section F-2a ensure compliance with the environmental performance standards discussed in Section D-8.

F-2b(9) Boilers and Industrial Furnaces (BIF) Inspections [40 CFR 264.15, 266.102(a)(2)(ii), 266.102(e)(8), 266.111(e)(3)]

Not applicable.

F-2b(10) Containment Building Inspection [40 CFR 264.1101(c), 264.1101(c)(4)]

Not applicable.

F-3 Waiver or Documentation of Preparedness and Prevention Requirements [40 CFR 270.14(b) and 264.32(a) through 264.32(d)]

A waiver from the preparedness and prevention requirements for the Burning Grounds and the hazardous waste storage units is not sought.

F-3a Equipment Requirements [40 CFR 270.14(b) and 264.32]

F-3a(1) Internal Communications and Alarms System [40 CFR 264.32(a)]

ABL provides internal communications by the following methods: telephones (cellular and fixed), two-way radios in plant vehicles, and the plant emergency alerting system. The internal communication system can be utilized to summon the plant security force, fire brigade, supervision, and the plant spill response team.

Burning Grounds

Under normal circumstances, no personnel (other than the Burning Grounds operator) are allowed to perform work activities at the Burning Grounds when waste is present on the burn pans. Grass mowing and other maintenance activities are performed only when the burn pans are empty of untreated reactive wastes. The Burning Grounds operator carries a cellular telephone at all times while performing duties at the Burning Grounds. If other personnel must perform duties within the Burning Grounds alone while waste is present, a two-way radio or cellular telephone is carried. No burning occurs while personnel are within the fenced Burning Grounds.

Building 366 Container Storage

Personnel performing duties at the hazardous waste storage unit have two-way radios in their vehicles. Security personnel with two-way radios are on duty 24 hours per day, 7 days per week to respond to emergencies. If any personnel must perform duties alone at the hazardous waste storage unit, a two-way radio or cellular telephone is carried.

Building 810 Container Storage

The provisions for internal communications and alarms systems at the Building 810 container storage unit will be the same as those for Building 366, once permitted.

F-3a(2) External Communications [40 CFR 264.32(b)]

Only ABL personnel are typically allowed on site in response to emergencies. If outside assistance is needed, communication is made by telephone through the regional Civil Defense office by dialing 911. Security and plant protection would use the telephone to contact ambulances.

F-3a(3) Emergency Equipment [40 CFR 264.32(c)]

Portable fire extinguishers are carried in all explosive-carrying vehicles and are placed strategically throughout the plant operating areas. ABL has a spill response vehicle to respond to any and all spills on location. It is equipped with the following:

Spill Kits: drain blocker, absorbent pads and booms for non-aggressive materials; oil pads and booms; pads and booms for acidic and caustic materials.

Respiratory Equipment: half and full-face respirators with cartridges, self-contained breathing apparatus (SCBA) units with spare bottles.

Personal Protective Equipment: full complement of Level B and Level C suits.

Spill Prevention Materials: drum bungs (small and large), patch putty, sealant sticks, puncture repair kit.

Medical Supplies: fully stocked medical "jump kit," oxygen cylinder and cannulas, sterile solutions, eyewash bottles.

Material Transfer Supplies: scoops, funnels (large and small), drum pumps, spatulas, drum funnels.

Cleanup Supplies: bucket, detergent, shovel, water hose, broom, dustpan, decontamination pools.

Burning Grounds

The following emergency equipment is maintained at the Burning Grounds:

- Water hose
- Plastic rakes
- Rubber fire tampers

Building 366 Container Storage

The following spill response equipment is stored at the Building 366 hazardous waste storage unit:

- Overpack drum
- Oil absorbent pad
- Vermiculite

Building 810 Container Storage

The following spill response equipment will be stored at the Building 810 hazardous waste container storage unit:

- Overpack drum
- Oil absorbent pad
- Vermiculite

F-3a(4) Water for Fire Control [40 CFR 264.32(d)]

Water is available in adequate volumes and pressures to supply fire fighting water streams. The reservoir capacity is 1.4 million gallons and is located to give hydrant pressures of 125 psi.

Burning Grounds

Three water spigots with water hoses are located within the Burning Grounds. Water is used to fight grass fires and to cool burn pans before waste is placed on the pans, when fewer than 24 hours have elapsed since the previous burn. Under no circumstances will attempts be made to extinguish fires involving explosives.

Building 366 Container Storage

A fire hydrant is located approximately 100 ft from this building.

Building 810 Container Storage

A fire hydrant is located approximately 80 ft from this building.

F-3b Aisle Space Requirement [40 CFR 264.35]

Burning Grounds

The aisle space requirement is not applicable to the Burning Grounds. As shown on Drawing B-2 in Appendix B, there is sufficient space between the burn pans to allow the unobstructed movement of personnel, fire protection equipment, or spill control equipment in an emergency.

Building 366 Container Storage

Aisle space requirements will be established in accordance with Life Safety Code 101 and in accordance with sound safety practices. Aisle space is maintained in the container storage area to allow unobstructed movement of personnel and material handling, spill control, and decontamination equipment.

Building 810 Container Storage

Aisle space requirements are established in accordance with Life Safety Code 101 and in accordance with sound safety practices. Aisle space is maintained in the container storage area to allow unobstructed movement of personnel and material handling, spill control, and decontamination equipment.

F-4 Preventive Procedures, Structures, and Equipment [40 CFR 270.14(b)(8)]

F-4a Unloading Operations [40 CFR 270.14(b)(8)(i)]

Burning Grounds

Typically, wastes are loaded onto the explosive waste transport truck and unloaded onto the burn pans by hand. Wastes weighing more than 50 lbs in a single container are loaded and unloaded with a minimum of two people to avoid injury and to ensure that the waste is safely handled, unless mechanical equipment is available.

Building 366 Container Storage

Loading and unloading operations are conducted using a hydraulic lift tailgate mounted on a 5-ton stake bed truck. The drums are moved from the bed section of the truck to the hydraulic liftgate, which is then lowered to the ground. A drum tiller is then connected to the drum to transfer it from the tailgate to the containment cell. The bungs of the drum are tightened before unloading and transfer. This assures that no material is spilled in loading, unloading, or transfer. Waste containers are placed on pallets to be loaded by forklift onto hazardous waste transport trucks for shipment to offsite treatment or disposal facilities.

Building 810 Container Storage

Loading and unloading operations will be conducted by hand or by handtruck. Waste will be moved in small quantities and in the original containers where possible.

F-4b Runoff [40 CFR 270.14(b)(8)(ii)]

Burning Grounds

The Burning Grounds is located in a relatively flat area adjacent to the North Branch Potomac River. No discrete drainage features are present to channel runoff to the river. Runoff from this area would travel by overland flow to the river. Contamination of runoff will be minimized by conducting all treatment in burn pans, which will be placed on paved surfaces and by inspecting the area around the burn pans for the presence of and collection of ejected untreated wastes. Burn pan covers will minimize exposure of the burn pans to precipitation, thereby minimizing the risk of runoff from the waste treatment unit. Standing water is removed from the burn pans as needed to maintain a dry burn pan surface and to prevent any accumulated waste from spilling out of the burn pan.

The 100-year flood elevation does not extend to the burn pan locations and is not expected to affect the pans.

Building 366 Container Storage

The hazardous waste storage containment area was designed and constructed in such a manner to prevent run-on. The containment area is protected from rainfall by a roof. Runoff from the roof and surrounding areas drains through the plant drainage ditches to the North Branch Potomac River. No runoff is expected from the waste storage area.

The hazardous waste storage unit is located at an elevation of 680 ft, which is 15 ft above the 100-year flood elevation in that area. No special precautions for flooding are necessary.

Building 810 Container Storage

The building was designed and constructed in such a manner to prevent run-on. The containment area is protected from rainfall by a roof and walls. Runoff from the roof and surrounding areas drains through the plant drainage ditches to the North Branch Potomac River. No runoff is expected from the future waste storage area.

The hazardous waste storage unit is located at an elevation of 669 ft, which is 4 ft above the 100-year flood elevation in that area. No special precautions for flooding are necessary.

F-4c Water Supplies [40 CFR 270.14(b)(8)(iii)]

The surface water and groundwater at the developed portion of ABL are not water supplies and are not upgradient of public or private water supplies. Groundwater extracted by the CERCLA groundwater remediation system is treated before discharge to the North Branch Potomac River and is used onsite for steam generation, as needed. The OB unit is operated to minimize releases, as described in Section D. The container storage units are equipped with secondary containment to prevent releases, also as described in Section D.

F-4d Equipment and Power Failure [40 CFR 270.14(b)(8)(iv)]

Equipment failure would have no adverse effects on either the Burning Grounds or the hazardous waste storage units. Only standard industrial equipment is or will be used, and redundant equipment is available from other areas if needed. In the event of physical failure of a burn pan, use of this pan would be discontinued until its repair.

Power failure should have no adverse effects on either the Burning Grounds or the hazardous waste storage units. Operations are only conducted during the day shift, and no equipment requiring connection to the electrical power grid is required.

F-4e Personal Protective Equipment [40 CFR 270.14(b)(8)(v)]

Burning Grounds

Personnel present during Burning Grounds operations are required to wear safety shoes, safety glasses, and flame-retardant coveralls. The Burning Grounds operator is required to wear latex or vinyl gloves when handling all waste except items that are rough or abrasive. The operator is required to wear canvas gloves when handling rough or abrasive items.

Building 366 Container Storage

During loading and unloading operations at the hazardous waste storage unit, personnel are required to wear protective clothing, safety glasses, and safety shoes. For hazardous waste sampling and transfer operations, operators are also required to use face shields or goggles and protective gloves. Respirators are required when transferring or sampling most volatile organic chemicals.

Building 810 Container Storage

Procedures and equipment used to prevent undue exposure of personnel to hazardous waste at the Building 810 container storage unit will be the same as those for Building 366.

F-5 Prevention of Reaction of Ignitable Reactive, and Incompatible Wastes [40 CFR 270.14(b)(9)]

F-5a Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Wastes [40 CFR 270.14(b)(9) and 264.17(a)]

Plant safety rules prohibit matches, lighters, flash bulbs, open flame, or heat-producing devices at the plant except by specific authorization. Smoking is prohibited in all operating areas and is permitted only in specific areas designated by signage. Written permits are issued for use of heat producing devices and portable power tools. These rules apply throughout the plant, including the Burning Grounds and the container storage building.

The source of ignition for open burning (i.e., electric matches) is not transported in the same vehicle as waste explosives. Starting powder and electric matches are stored in separate containers in the isolation box located within the fenced area of the Burning Grounds.

F-5b General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste [40 CFR 270.14(b)(9) and 264.17(b)]

Burning Grounds

Wastes treated at the Burning Grounds may exhibit the characteristic of ignitability and/or reactivity.

Containers for reactive wastes are lined with conductive or anti-static bags. Reactive wastes are kept out of direct sunlight until placement on the burn pan to prevent solar heating or material degradation.

Reactive wastes treated by open burning are segregated by pan. The reactive wastes are evaluated for compatibility before they can be treated. Incompatible wastes are not placed on the same pan.

Building 366 Container Storage

Reactive wastes are not stored at Building 366.

Ignitable wastes are stored in sealed containers, in a covered, non-enclosed area to prevent direct exposure to sunlight but allow natural ventilation. No additional precautions for prevention of waste ignition are required at the hazardous waste storage unit.

No containers that may have held incompatible materials are used for waste storage. Incompatible wastes are not stored in the same cell. The only potential compatibility issues among the most commonly stored wastes at the unit are between ignitable (D001, F003, and F005) and corrosive (D002 wastes). Other wastes are evaluated for compatibility before they are placed in the unit .

Building 810 Container Storage

Reactive wastes are not stored at Building 810.

Ignitable wastes are stored in sealed containers, in a covered, non-enclosed area to prevent direct exposure to sunlight but allow natural ventilation. No additional precautions for prevention of waste ignition are required at the hazardous waste storage unit.

No containers that may have held incompatible materials are used for waste storage. Incompatible wastes are not stored in the same cell. The only potential compatibility issues among the most commonly stored wastes at the unit are between ignitable (D001, F003, and F005) and corrosive (D002 wastes). Other wastes are evaluated for compatibility before they are placed in the unit .

F-5c Management of Ignitable or Reactive Wastes in Containers [40 CFR 270.15(c) and 264.176]

Building 366 Container Storage

Reactive wastes are not stored in containers at the hazardous waste storage area. The hazardous waste storage area is located at least 50 ft from the facility's property line and therefore meets the 50-ft setback requirement for management of ignitable waste.

Building 810 Container Storage

Reactive wastes will not be stored in containers at the hazardous waste storage building once permitted. The hazardous waste storage building is located at least 50 ft from the facility's property line and therefore meets the 50-ft setback requirement for management of ignitable waste.

F-5d Management of Incompatible Wastes in Containers [40 CFR 270.15(d) and 264.177]

Burning Grounds

Incompatible wastes are not stored in containers at the Burning Grounds.

Building 366 Container Storage

No containers that may have held incompatible materials are used for waste storage. Incompatible wastes are not stored in the same cell. The only potential compatibility issues among the most commonly stored wastes at the unit are between ignitable (D001, F003, and F005) and corrosive (D002 wastes). Combination of these waste could cause a fire or explosion. Fire extinguishers are or will be available in both building 366 and 810. In addition the facility maintains its own fire station for response. Other wastes are evaluated for compatibility before they are placed in the unit.

Building 810 Container Storage

No containers that may have held incompatible materials are used for waste storage. Incompatible wastes are not stored in the same cell. The only potential compatibility issues among the most commonly stored wastes at the unit are between ignitable (D001, F003, and F005) and corrosive (D002 wastes). Combination of these waste could cause a fire or explosion. Fire extinguishers are or will be available in both building 366 and 810. In addition the facility maintains its own fire station for response. Other wastes are evaluated for compatibility before they are placed in the unit.

F-5e Management of Ignitable or Reactive Wastes in Tank Systems [40 CFR 270.16(j), 264.198]

Not applicable.

F-5f Management of Incompatible Wastes in Tank Systems [40 CFR 270.16(j), 264.199]

Not applicable.

F-5g Management of Ignitable or Reactive Wastes Placed in Waste Piles [40 CFR 270.18(g), 264.256]

Not applicable.

F-5h Management of Incompatible Wastes Placed in Waste Piles [40 CFR 270.18(h), 264.257]

Not applicable.

F-5i Management of Ignitable or Reactive Wastes Placed in Surface Impoundments [40 CFR 270.17(h), 264.229]

Not applicable.

F-5j Management of Incompatible Wastes Placed in Surface Impoundments [40 CFR 270.17(h), 264.230]

Not applicable.

F-5k Management of Ignitable or Reactive Wastes Placed in Landfills [40 CFR 270.21(f), 264.312]

Not applicable.

F-5l Management of Incompatible Wastes Placed in Landfills [40 CFR 270.21(g), 264.313]

Not applicable.

F-5m Management of Ignitable or Reactive Wastes Placed in Land Treatment Units [40 CFR 270.20(g), 264.281]

Not applicable.

F-5n Management of Incompatible Wastes Placed in Land Treatment Units [40 CFR 270.20(h), 264.282]

Not applicable.

F-5o Management of Incompatible Wastes in Containment Buildings [40 CFR 264.1101(a)(3)]

Not applicable.

Figures

Figure F-1
OPEN BURNING FACILITY INSPECTION
CHECK SHEET

______________________________ ______________________________

Inspector's Name **Signature**

Date ______________________________ **Time** ______________________ AM/PM

Item	**Condition**	**Frequency**	**Acceptable**	**Repairs**
Burning pans	Erosion, foreign objects or debris, tall weeds or grass, pan cooled	Before Collecting Waste	_______	_______
Circuit check	Control panel short circuit check	Before Collecting Waste	_______	_______

Alinco (ohms) Pan A_____ Pan A[1]_____ Pan B_____ Pan C_____ Pan D_____ Pan E_____ Pan F_____

Personal protection	Flame resistant coveralls, conductive shoes, safety glasses	Before Use	_______	_______
Fire protection	Rubber tamper, water hoses, two-way communication	Before Use	_______	_______
Ignition items	Electric matches, firing circuit continuity check, blasting machine	Before Use	_______	_______

Alinco (ohms) Pan A_____ Pan A[1]_____ Pan B_____ Pan C_____ Pan D_____ Pan E_____ Pan F_____

Traffic control	Gates closed and signs posted	Before Ignition	_______	_______
Fire control	Grass fires	After Completion of Burn	_______	_______

Observations:

Remedial Actions:

NOTES:
1. All tools shall be non-sparking type as specified by the procedure.
2. If an unexpected fire or explosion incident occurs, the Burning Ground Operator shall notify the Security Department for action in accord with the ABL Emergency Control Plan.
3. If less than 24 hours has elapsed since previous burn, pans shall pass a safety inspection.

Figure F-2
HAZARDOUS WASTE STORAGE UNIT INSPECTION SHEET

		YES	NO
1.	Drum labels are present and legible	_____	_____
2.	Drums are free of leaks	_____	_____
3.	Drum bungs or lids are installed and tight/secure	_____	_____
4.	Drums contain no distortion of shape or severe rust which would damage integrity	_____	_____
5.	No foreign residues inside diked areas	_____	_____
6.	Aisle space clear and free of spills	_____	_____
7.	Structure in acceptable condition (roof, containment cells, concrete floor, etc.)	_____	_____
8.	Warning signs present and legible	_____	_____
9.	Housekeeping and cleanliness acceptable	_____	_____
10.	Overpack drums available and in good condition	_____	_____

11. Observations

____

____

____

11. Remedial Actions Taken

____

____

____

12. Area supervisor notified of discrepancy (if found) _____ _____

_________________________ _________________________
Inspector's Name **Signature**

Date _________________________ **Time** _________________**AM/PM**

Section G
Contingency Plan

SECTION G

Contingency Plan [40 CFR 270.14(b)(7), 264.50 through 264.56, 264.52(b)]

This section contains the Contingency Plan prepared in fulfillment of the requirements in 40 CFR Section 264 Subpart D. It describes response actions for fires, explosions, or any unplanned release of hazardous waste or hazardous waste constituents to air, soil, or waters of the state from the hazardous waste container storage unit and the Burning Grounds. This plan describes the organization, procedures, facilities, and equipment ABL has available to respond to emergencies in its hazardous waste operations.

G-1 General Information

A copy of this Contingency Plan and all revisions will be sent to the Mineral County Office of Emergency Services, Allegany County Civil Defense and Disaster Preparedness Agency, Cresaptown Volunteer Fire Department, Short Gap Volunteer Fire Department, Memorial Hospital, and Sacred Heart Hospital. These copies are provided as courtesy copies only. No outside emergency agencies take part in emergency activities at ABL. The only exception is an ambulance that would enter the ABL facility under escort to provide medical assistance. All assistance should be provided outside of the hazardous waste storage and treatment facilities. The ABL Environmental Department maintains this document.

Facility Name, Location, Operator, and Site Plan

Facility Name:	Naval Industrial Reserve Ordnance Plant (NIROP) Allegany Ballistics Laboratory (ABL)
Location:	210 State Route 956 Rocket Center, Mineral County, West Virginia Latitude 39 deg 33 min 30 sec N, Longitude 78 deg 50 min W UTM Zone 17 4381000 N, 686000 E
Owners:	Plant 1 – Department of the Navy, Naval Sea Systems Command Plant 2 – ATK Tactical Systems Company LLC
Operator:	ATK Tactical Systems Company LLC
Site Plan:	Drawing B-3 (Section B) is a copy of the ABL site plan.

Description of Facility Operations

ABL is primarily a solid propellant rocket motor development and production facility operated by ATK. ABL consists of Plant 1, which is owned by the Department of the Navy, NAVSEA, and Plant 2, which is owned by ATK. Both plants are operated by ATK. Plant 1 is about 1,572 acres; about 400 acres are developed bottomland and the remainder is largely undeveloped forested mountainous land. Plant 2 is 57 acres of bottomland adjacent to Plant 1.

Construction at ABL began in 1942. The site was originally operated by Kelly Tire Company, and the original purpose of the facility was loading and testing of 50-caliber ammunition for the U.S. Army. George Washington University personnel also worked on development of solid propellants for bazooka ammunition during this period. In December 1945, the Navy assumed oversight responsibility for the facility. Since 1946, the predominant industrial operations at ABL have been associated with research, development, production, and testing of solid-propellant rocket motors.

Burning Grounds

The Burning Grounds is an 8-acre site on Plant 1 of ABL. The unit is surrounded by a 7-foot-high chain-link fence. The unit will consist of seven burn pan sites and a rocket motor tie-down unit. The pans are ignited using an electric match, which is energized remotely using a standard blasting machine. The site has three water spigots with hoses attached. The unit is used for treatment of reactive (explosive) hazardous waste by open burning.

The Burning Grounds is limited to a total of 1,630 lbs of P/E material, distributed over seven pan sites. Each pan has a limit on the quantity of P/E material burned based on the site's proximity to inhabited buildings, property line, and other sensitive features (See Figure D-1, in Section D, for pan locations). The P/E material load limits are as follow:

- Pan A′ 200 pounds
- Pan A 200 pounds
- Pan B 155 pounds
- Pan C 275 pounds
- Pan D 400 pounds*
- Pan E 200 pounds*
- Tie-Down Unit 100 pounds
- Pan F 200 pounds*

* If the tie-down unit located at Pan E is in use, the load limit in the pan is zero lbs (i.e., Pan E is not used). In addition, Pans D and F would be not used for safety reasons.

Before waste is collected for a burn, the continuity of the firing circuit is checked at each pan site to ensure that the firing circuit is shorted at the firing box. The explosive waste to be burned that day is transported to the Burning Grounds by light-duty pickup truck equipped with a special electrically conductive, non-sparking bed liner. The waste is unloaded from the truck onto the pans. After the meteorological conditions are determined to be suitable for burning (see Table D-1, in Section D) for meteorological conditions), the Burning Grounds operator spreads the waste on the pan and squibs each pan by connecting an electric match to the wiring system for the pan and then placing the electric match in the pan. The pans are then ignited remotely by the operator from the Burning Grounds control room by connecting a blasting machine to the circuit corresponding to the pan to be ignited and twisting the blasting machine handle to energize the circuit and ignite the pan. Pans are ignited consecutively, allowing the fire in one pan to die down before the next pan is ignited.

Building 366 Container Storage

The Building 366 hazardous waste storage unit is a building designed specifically for drum storage. The unit consists of 40 cells capable of storing eight drums each. The storage pad is covered by a fixed roof, which protects the waste containers from precipitation. The unit is used for the storage of containerized waste, both hazardous and nonhazardous.

Before starting a new waste container, the person responsible for the waste contacts the Safety and Environmental Department. A representative issues a waste label (either hazardous or non-regulated) and an aluminum tag imprinted with an internal tracking number. The drum tracking number, waste name, generator name, and generator ID number are recorded on the waste label. The aluminum tags bearing the tracking numbers are attached to drums to enable drum identification if the waste labels become illegible.

The drum tracking number, the date the number was assigned, the drum location, and the waste name are recorded in a waste log. Once a drum is filled, the accumulation start date is recorded on the waste label, the drum is transferred to the hazardous waste storage unit within 3 days, and the date the drum is transferred is recorded in the log. Shipment dates and manifest numbers for each drum are also recorded in the log.

Drums are delivered to the site by forklift or by lift-gate truck. The drums are placed in one of the 40 cells in the unit and are inspected weekly. Drums are loaded by forklift onto the hazardous waste transporter truck for offsite shipment to a treatment, storage, or disposal facility.

Building 810 Container Storage

The hazardous waste container storage unit (once permitted) is a small metal-sided building near the Building 366 drum storage facility. The inside dimensions of the building are 19 ft 4 inches by 15 feet 4 inches, with a 10-foot ceiling. Building 810 has a fixed roof and permanent walls, which will protect the waste containers from precipitation. The unit will be for the storage of containerized waste, both hazardous and nonhazardous. Secondary containment is provided by nine portable containment modules placed within the building. Each containment module is topped with a rigid grate designed to ensure waste containers do not contact any liquids collected by the containment modules.

G-2 Emergency Coordinators [40 CFR 264.52(d) and 264.55]

Names, Addresses, and Telephone Numbers [40 CFR 264.52(d) and 264.55]

The names and telephone numbers of persons designated to act as Emergency Coordinators for both the Burning Grounds and the hazardous waste storage units are provided in Table G-1, "Emergency Coordinators List." The emergency coordinator has the authority to commit the resources necessary to implement the contingency plan. The emergency coordinator is either on the facility or on call at all times.

Duties of Emergency Coordinator [40 CFR 264.55 and 264.56]

In the event of an emergency involving hazardous waste or hazardous waste constituents at the Burning Grounds or either hazardous waste storage unit, the emergency coordinator or his designated alternate shall direct the necessary activities to bring the emergency under control. A command and control center will be established. The emergency coordinator may delegate some of the responsibilities of the position to other individuals as necessary to ensure that all tasks are properly executed. The emergency coordinator will direct emergency response activities.

West Virginia hazardous waste regulations have very specific requirements defining the duties of an emergency coordinator. These are summarized as follows:

- Notify facility personnel and request necessary assistance
- Identify the quantity and types of waste involved
- Assess hazards due to the wastes
- Report the incident to the involved regulatory agencies if areas outside the facility are affected and assist in evacuation if necessary
- Attempt to keep the emergency situation from spreading
- Monitor treatment systems if the situation has interrupted operations
- Arrange for disposal of waste and debris after the emergency is over
- Make sure that operations do not result in danger due to incompatible wastes reacting
- Make sure that operations do not resume until all emergency equipment is replenished
- Submit a written report to the required regulatory agencies within 15 days after the emergency

G-3 Implementation [40 CFR 264.52(a) and 264.56(d)]

The Burning Grounds, Building 366 hazardous waste storage unit, and Building 810 hazardous waste storage unit once permitted were evaluated with respect to their location, facility design, operating procedures, and types of wastes managed. The evaluation determined the emergency events that should be addressed in this contingency plan. Minor events not requiring implementation of the contingency plan are also discussed. The emergency events and the results of their evaluation are presented in this section.

Spills

Burning Grounds

A spill at the Burning Grounds would not constitute an emergency event requiring implementation of the contingency plan. Most of the waste items treated at the Burning Grounds are solid P/E wastes. P/E wastes containing liquid explosives (such as nitroglycerin) are absorbed in sawdust, which serves to desensitize the waste and absorb free liquids. Spills would be picked up and placed in the burn pan. If the spill occurs on the concrete, asphalt, or other surface that surrounds each burn pan, the material will be collected using a non-sparking shovel and placed into a burn pan. If the spill occurs on the soil, a thin layer of soil underlying the spill will be excavated using a non-sparking shovel and placed into a burn pan along with the spilled material.

Building 366 Container Storage

A spill at the Building 366 hazardous waste storage unit may constitute an emergency event requiring implementation of the contingency plan, depending on the size of the spill. A small leak from a drum would not require implementation of the contingency plan. The spill would be cleaned up using the onsite spill response kit, and the cleaned up material would be drummed for offsite treatment or disposal.

A catastrophic failure of a drum within Building 366, or any release escaping the confines of Building 366 would require implementation of the contingency plan. After determining the source and dispersion of a spill or release and assessing the hazards to human health and the environment, the emergency coordinator shall take the following actions:

1. If appropriate, initiate evacuation of threatened individuals according to the evacuation plan.
2. Contain spilled material by physical barriers (dikes, booms, adsorbents, or other means).
3. Control source of spill.
4. Collect all spilled material for disposal.

If a hazardous waste spill or leak from a container or if the condition of a container has deteriorated extensively, the material will be transferred to a container in good condition and labeled appropriately. Any spilled or leaked material and any contaminated soil or other material will also be cleaned up and placed in a suitable container and labeled. All containers will be properly stored until disposed.

Building 810 Container Storage

A spill at the Building 810 container storage unit (once permitted) may constitute an emergency event requiring implementation of the contingency plan, depending on the size of the spill. A small leak from a drum or other container would not require implementation of the contingency plan. The spill would be cleaned up using the onsite spill response kit, and the cleaned up material would be drummed for offsite treatment or disposal.

A catastrophic failure of a drum within Building 810, or any release escaping the confines of Building 810 would require implementation of the contingency plan. After determining the source and dispersion of a spill or release and assessing the hazards to human health and the environment, the emergency coordinator shall take the following actions:

1. If appropriate, initiate evacuation of threatened individuals according to the evacuation plan.
2. Contain spilled material by physical barriers (dikes, booms, adsorbents, or other means).
3. Control source of spill.
4. Collect all spilled material for disposal.

If a hazardous waste spills or leaks from a container or if the condition of a container has deteriorated extensively, the material will be transferred to a sound container and labeled appropriately. Any spilled or leaked material and any contaminated soil or other material will also be cleaned up, placed in a suitable container, and labeled. All containers will be properly stored until disposed.

Power Interruption

Power failure should have no adverse effects on the Burning Grounds, the Building 366 hazardous waste storage unit, or the Building 810 hazardous waste storage unit (once permitted). Operations are conducted only during the day shift, and no equipment requiring connection to the electrical power grid is required.

Fires

Burning Grounds

An unplanned fire could occur within the Burning Grounds and is a possible emergency event. An unplanned fire at the Burning Grounds may be handled by the Burning Grounds operator using a water hose or a rubber fire beater, if the fire can be safely extinguished by such means. Small grass fires that can be extinguished by the Burning Grounds operator are not considered emergency events that require implementation of the contingency plan. If the Burning Grounds supervisor determines that the fire cannot be safely extinguished by the Burning Grounds operator, the ABL Fire Brigade will be summoned by calling the guard at ABL Plant Protection at extension 5400. Larger fires that threaten structures outside the Burning Grounds are considered emergency events requiring the implementation of the contingency plan. The guard will inform the Fire Brigade of the name of the caller, the size and location of the fire, and the presence of other untreated explosives at the site. The fire may be fought using water carried by the Fire Brigade in the tanker fire truck, or water from the fire hydrant adjacent to the unit may be used. The Fire Brigade will not attempt to extinguish fires involving explosives at the Burning Grounds.

Building 366 Container Storage

A fire at the Building 366 hazardous waste storage unit is an emergency event requiring implementation of the contingency plan. In case of fire at the unit, the Plant Protection staff can be notified by two-way radio or by the fire alarm box located on a utility pole to the east of Building 366. If the alarm box is pulled, the location will appear on the fire alarm panel at guard headquarters. When Plant Protection is notified by the guard of a fire, they will sound the plant fire alarm to direct the Fire Brigade to the fire station. The fire may be fought using water carried by the Fire Brigade in the tanker fire truck, or water from the fire hydrant located approximately 100 feet from the building.

Building 810 Container Storage

A fire at the Building 810 hazardous waste storage unit (once permitted) is an emergency event requiring implementation of the contingency plan. In case of fire at the unit, the Plant Protection staff can be notified by two-way radio or by the fire alarm box located on a utility pole approximately 65 feet to the north of Building 810. If the alarm box is pulled, the location will appear on the fire alarm panel at Plant Protection. When the guard at Plant

Protection is notified of a fire, they will sound the plant fire alarm to direct the Fire Brigade to the fire station. The fire may be fought using water carried by the Fire Brigade in the tanker fire truck, or water from the fire hydrant located approximately 80 feet to the north of the unit.

Explosions

Burning Grounds

Waste explosives are treated by open burning at the Burning Grounds. Therefore, an explosion is a possible emergency event. Any explosion at the Burning Grounds resulting in ejection of materials outside the Burning Grounds is an emergency event requiring implementation of the contingency plan. The response to an explosion would be limited to addressing fires or other damage caused by the explosion.

Building 366 Container Storage

Reactive or otherwise explosive hazardous wastes are not stored at the Building 366 hazardous waste storage unit. Therefore, explosions are not expected in Building 366.

Building 810 Container Storage

Reactive or otherwise explosive hazardous wastes will not be stored at the Building 810 hazardous waste storage unit (once permitted). Therefore, explosions are not expected in Building 810.

Offsite Impacts of Explosions and Unplanned Fires

Burning Grounds

Each burn pan at the Burning Grounds has been assigned an explosive waste limit based on the proximity of the pan to the property line, inhabited buildings, and other sensitive features. These limits are designed to prevent adverse impacts from fires or explosions to offsite property, onsite buildings, or other sensitive entities near the Burning Grounds. The distance from the burn pans to the ABL property line complies with the requirements of WV CSR 45-25-3.2d. Pans are separated to prevent the propagation of explosions from one pan to another if a pan of explosives happens to explode. In the event of an explosion or unplanned fire (premature burn) of reactive wastes, offsite impacts would not be greater than those due to planned burns of waste material would. In addition, releases to air would not be greater than those due to planned burns. Therefore, significant offsite impacts from explosions or unplanned fires would not be expected.

Building 366 Container Storage

Reactive or otherwise explosive hazardous wastes are not stored at the Building 366 hazardous waste storage unit. Therefore, explosions are not expected at the unit. Significant offsite impacts from a fire, including air emissions, would not be expected because of the distance to the facility boundary and the nearest residences.

Building 810 Container Storage

Reactive or otherwise explosive hazardous wastes will not be stored at the Building 810 hazardous waste storage unit (once permitted). Therefore, explosions are not expected at the unit. Significant offsite impacts from a fire, including air emissions, would not be expected because of the distance to the facility boundary and the nearest residences.

Personnel Injury

Burning Grounds

Personnel injury is possible at the Burning Grounds because of fire or explosion. Injuries would be treated by first responders and injured personnel would be transported to a local hospital if necessary.

Building 366 Container Storage

Personnel injury is possible at the Building 366 hazardous waste storage unit because of fire or spill. Injuries would be treated by first responders and injured personnel would be transported to a local hospital if necessary.

Building 810 Container Storage

Personnel injury is possible at the Building 810 hazardous waste storage unit (once permitted) because of fire or spill. Injuries would be treated by first responders and injured personnel would be transported to a local hospital if necessary.

G-4 Emergency Actions [40 CFR 264.56]

G-4a Notification [40 CFR 264.56(a)]

The discoverer of any emergency will contact the Plant Protection Department at the Emergency Extension 5400 (24-hour basis) or at (304) 726-5000 from off-plant. The Plant Protection personnel on duty will pass notification to the emergency coordinator. The emergency coordinator shall determine and make appropriate notification for the situation.

Plant personnel will be notified of any incident involving hazardous waste operations as appropriate by sounding a siren on the plant emergency alerting system. The All Clear signal is sounding of the Westminster Chimes on the alarm system.

G-4b Identification of Hazardous Materials [40 CFR 264.56(b)]

Whenever there is a release, unplanned fire, or explosion, the cognizant personnel on the scene or the emergency coordinator shall immediately identify the character, source, amount, and extent of any released hazardous waste materials. Identification may be by observation, review of records, or chemical analysis.

G-4c Assessment [40 CFR 264.56(c) and (d)]

Hazard Assessment [40 CFR 264.56(c)]

Based on the identification and quantity of hazardous materials and the nature of the emergency, the emergency coordinator shall assess possible hazards, both direct and indirect, to human health and the environment. As the emergency coordinator deems appropriate, the emergency coordinator may consult with other cognizant facility personnel in making this assessment. After assessing the situation, the emergency coordinator or cognizant facility personnel will initiate evacuation, if necessary, according to the evacuation plan under Section G-7, and initiate the containment and cleanup of the affected area.

Notification of Offsite Impacts [40 CFR 264.56(d)]

If the emergency coordinator determines that the facility has had a release, fire, or explosion that could threaten human health or the environment outside the facility, the emergency coordinator shall notify WVDEP. The Notification Number for WVDEP is 1-(800)-642-3074. Notification shall include the following:

- Name and telephone number of notifier
- Name and address of facility
- Time and type of incident
- Name and quantity of materials involved to the extent known
- The number and extent of injuries, if any
- The possible hazards to human health or the environment outside the plant boundary

G-4d Control Procedures [40 CFR 264.52(a)]

Fires

In the case of an unplanned fire at the Burning Grounds or at either hazardous waste storage unit, the emergency coordinator shall make a determination of wind direction and dispersal of combustion products. If appropriate, evacuation will be initiated according to the evacuation plan under Section G-7. The Fire Brigade shall not attempt to extinguish fires involving explosives at the Burning Grounds.

Burning Grounds

Treatment at the Burning Grounds is by open burning. Placement of wastes to be burned is designed to prevent reaction more severe than deflagration. In the event burning gets out of control, the result would be a grass fire involving the open burning area adjacent to the burning pans. Grass fires will be controlled and extinguished by application of water by the Burning Grounds operator, if it is deemed safe to do so. For fires that cannot be safely extinguished by the operator, assistance shall be requested from the plant Fire Brigade.

Building 366 Container Storage

Responses to a fire at the Building 366 hazardous waste storage unit will be dependent on the specifics of the situation (e.g., the specific waste involved, number of drum(s) involved, and location of other drums). The first consideration will be the safety of fire-fighting personnel. In general, responses will be taken to control and limit the spread of fire and to contain products of combustion, released material, and firewater. Such responses may include application of water to uninvolved adjacent drums to prevent ignition or removal of uninvolved adjacent drums to prevent spread of fire. To the extent possible, spread of contamination from application of firewater will be avoided by limiting the amount of water applied and by containment of runoff.

Building 810 Container Storage

Responses to a fire at the Building 810 hazardous waste storage unit (once permitted) will be dependent on the specifics of the situation (e.g., the specific waste involved, number of drum(s) involved, and location of other drums). The first consideration will be the safety of fire-fighting personnel. In general, responses will be taken to control and limit the spread of fire and to contain products of combustion, released material, and firewater. Such responses may include application of water to uninvolved adjacent drums to prevent ignition or removal of uninvolved adjacent drums to prevent spread of fire. To the extent possible, spread of contamination from application of firewater will be avoided by limiting the amount of water applied and by containment of runoff.

Explosions

Burning Grounds

Control procedures for an explosion at the Burning Grounds will be limited to addressing fires or other damage caused by the explosion. Procedures for addressing fires are contained in Section G-4d(1). Procedures for addressing personnel injuries are contained in Section G-4d(4).

Building 366 Storage

Reactive or otherwise explosive hazardous wastes are not stored at the Building 366 hazardous waste storage unit. Therefore, explosions are not expected at the unit.

Building 810 Storage

Reactive or otherwise explosive hazardous wastes will not be stored at the Building 810 hazardous waste storage unit (once permitted). Therefore, explosions are not expected at the unit.

Spills

Burning Grounds

Most of the waste items treated at the Burning Grounds are solid P/E wastes. P/E wastes containing liquid explosives (such as nitroglycerin) are absorbed in sawdust, which serves to desensitize the waste and absorb free liquids. Spills involving solid explosives will be collected using non-sparking tools and placed in the burn pan. If the spill occurs on the pad surrounding the pan, the material will be collected and placed into a burn pan. If the spill occurs on soil, a thin layer of soil underlying the spill will be removed and placed into a burn pad along with the spilled materials.

Building 366 Container Storage

The release of hazardous waste from a container at the Building 366 hazardous waste storage unit would be contained by diking with appropriate materials, if necessary. The contained material would be collected and transferred to a sound container, labeled appropriately, and shipped offsite for treatment or disposal. All containers will be properly stored until shipped off site. Any contaminated spill control equipment would be decontaminated in accordance with Section G-4h, or it would be shipped off site for treatment or disposal.

If a hazardous waste is released from a container or if the condition of a container has deteriorated extensively, the material will be transferred to a sound container. The container shall be properly labeled. Any spilled or leaked material and any contaminated soil or other material will also be cleaned up, placed in a suitable container, and labeled.

Building 810 Container Storage

The release of hazardous waste from a container at the Building 810 hazardous waste storage unit (once permitted) would be contained by diking with appropriate materials, if necessary. The contained material would be collected and transferred to a sound container, labeled appropriately, and shipped offsite for treatment or disposal. All containers will be properly stored until shipped off site. Any contaminated spill control equipment would be decontaminated in accordance with Section G-4h, or it would be shipped off site for treatment or disposal.

If a hazardous waste is released from a container or if the condition of a container has deteriorated extensively, the material will be transferred to a sound container. The container shall be properly labeled. Any spilled or leaked material and any contaminated soil or other material will also be cleaned up, placed in a suitable container, and labeled.

Personnel Injury

At the Burning Grounds or at either hazardous waste storage unit, injuries to personnel will be treated immediately by trained first responders. The Plant Protection force and the Fire Brigade both have trained first responders on staff. An injured person will be transported to the Medical department if transport is possible, taking into account the nature and extent of the injuries. The staff nurse may attend the injured person at the site if the incident site is safe to enter. If transport to a hospital is required, Plant Protection will call Civil Defense, who will dispatch an ambulance to the scene. The ambulance will transport the injured personnel to either Sacred Heart Hospital or Memorial Hospital.

G-4e Prevention of Recurrence or Spread of Fires, Explosions, or Releases [40 CFR 264.56(e)]

Plant safety rules prohibit matches, lighters, flash bulbs, open flame, or heat-producing devices on plant property except by specific authorization. Smoking is prohibited in all operating areas and is permitted only outside the plant perimeter fence. "No Smoking" signs are posted at appropriate locations. Written hot work permits are issued for the use of heat producing devices and portable power tools. Any fire, explosion, or release at the facility is investigated to determine cause(s) and implement corrective measures to prevent recurrence. In case of a fire, fire watches are maintained after the fire is extinguished to ensure the fire is completely out.

Burning Grounds

Waste containers for P/E are lined with conductive or anti-static bags. P/E is kept out of direct sunlight to prevent solar heating or material degradation.

Building 366 Container Storage

Flammable wastes are stored in sealed containers in a covered, non-enclosed area to prevent direct exposure to sunlight, but allow natural ventilation. Spread of fire is prevented by control and segregation of waste inventory.

Building 810 Container Storage

Flammable wastes will be accumulated in closed containers in suitable containment. Building 810 is completely enclosed to prevent exposure of the waste to direct sunlight. Spread of fire will be prevented by control and segregation of waste inventory.

G-4f Storage and Treatment of Released Materials [40 CFR 264.56 (g)]

Immediately after an emergency, the emergency coordinator will arrange for treatment, storage, or disposal of recovered waste, contaminated soil, surface water, or any other contaminated material.

G-4g Incompatible Waste [40 CFR 264.56(h)(1)]

The emergency coordinator will ensure that wastes that may be incompatible with released materials are managed separately until cleanup activities are complete.

G-4h Post-Emergency Equipment Maintenance [40 CFR 264.56(h)(2)]

After an emergency event, all emergency equipment that has been used will be cleaned and made fit for use, or it will be replaced. Hazardous waste operations resume only when emergency and other facility equipment are replaced, repaired, or decontaminated if necessary.

G-4i Container Spills and Leakage [40 CFR 264.52 and 264.171]

A release from a container at either hazardous waste storage unit would be contained by diking with appropriate materials, if necessary. The contained material would be collected and transferred to a sound container, labeled appropriately, and shipped offsite for treatment or disposal. All containers will be properly stored until shipped off site.

If a hazardous waste is released from a container or if the condition of a container has deteriorated extensively, the material will be transferred to a sound container. The container will be properly labeled. Any spilled or leaked material and any contaminated soil or other material will also be cleaned up, placed in a suitable container, and labeled.

G-4j Tank Spills and Leakage [40 CFR 264.196]

ABL does not store or treat hazardous wastes in tanks. Therefore, this section is not applicable.

G-4k Surface Impoundment Spills and Leakage [40 CFR 264.227]

ABL does not store or treat hazardous wastes in surface impoundments. Therefore, this section is not applicable.

G-4l Containment Building Leaks [40 CFR 264.1101(c)(3)]

ABL does not store hazardous wastes in containment buildings. Therefore, this section is not applicable.

G-5 Emergency Equipment [40 CFR 264.52(e)]

Fire Extinguishing Equipment and Water for Fire Control

The facility has two fire trucks that are located in Building 157. The two trucks are a 1978 Ward fire truck and a 1989 Ford F-350 fire truck. Each truck has water-carrying capacity and a ladder. The two trucks are operated by the plant Fire Brigade. The emergency response vehicle and the Burning Grounds operator's truck are both equipped with fire extinguishers.

Burning Grounds

The Burning Grounds has three water spigots and hoses available for fire control. The three spigots are distributed across the Burning Grounds such that all burn pans can be reached by at least one water hose. The Burning Grounds operator carries a fire blanket in the Burning Grounds truck. A fire beater is available in the Burning Grounds control room.

Building 366 Container Storage

The Building 366 hazardous waste storage unit has a fire hydrant located approximately 100 feet from the unit. The hydrant is supplied by a 1.4-million-gallon water reservoir.

Building 810 Container Storage

The Building 810 hazardous waste storage unit (once permitted) has a fire hydrant located approximately 80 feet from the unit. The hydrant is supplied by a 1.4-million-gallon water reservoir.

First Aid Equipment

The facility nurse has a fully stocked first aid kit in Building 446, which is available for responding to first aid cases. Plant Protection guards who serve as first responders have first aid kits to enable them to treat minor personnel injuries and attempt to stabilize more serious injuries while awaiting an ambulance to transport the injured party to a local hospital.

Burning Grounds

No additional first aid equipment is available at the Burning Grounds.

Building 366 Container Storage

A portable eye wash station with a 1-pint capacity is available at the Building 366 hazardous waste storage unit.

Building 810 Container Storage

A portable eye wash station with a 1-pint capacity will be available at the Building 810 hazardous waste storage unit (once permitted).

Communications Equipment

Burning Grounds

The Burning Grounds operator carries a cellular telephone at all times while working at the Burning Grounds.

Building 366 Container Storage

All personnel working at the Building 366 hazardous waste storage unit have two-way radios in their vehicles.

Building 810 Container Storage

All personnel working at the Building 810 hazardous waste storage unit (once permitted) have two-way radios in their vehicles.

Spill Control Equipment

Burning Grounds

A non-sparking shovel is available to control a minor spill at the Burning Grounds. Based on the nature of the waste treated at the Burning Grounds, no major spills are expected at the unit.

Building 366 Container Storage

A spill response kit containing a drain blocker, absorbent pads and booms for non-aggressive materials, oil pads and booms, and pads and booms for acidic and caustic materials is available in the emergency response van maintained by the Safety Department. Vermiculite and absorbent pads are available in the Building 366 hazardous waste storage unit. A shovel, broom, and dustpan are also available in the Building 366 hazardous waste storage unit.

Building 810 Container Storage

A spill response kit containing a drain blocker, absorbent pads and booms for non-aggressive materials, oil pads and booms, and pads and booms for acidic and caustic materials is available in the emergency response van maintained by the Safety Department. Vermiculite and absorbent pads will be available in the Building 810 hazardous waste storage unit (once permitted). A shovel, broom, and dustpan are also available in the Building 810 hazardous waste storage unit (once permitted).

Emergency Decontamination Equipment

Burning Grounds

No decontamination equipment is available at the Burning Grounds.

Building 366 Container Storage

A decontamination kit containing a bucket, detergent, a shovel, a water hose, a broom, a dustpan, and decontamination pools are available at the emergency response van maintained by the Safety Department.

Building 810 Container Storage

A decontamination kit containing a bucket, detergent, a shovel, a water hose, a broom, a dustpan, and decontamination pools are available at the emergency response van maintained by the Safety Department.

Emergency Communications and Alarm Equipment

A plant-wide alarm can be sounded by the Plant Protection department using the plant emergency alerting system. The sounding of the alarm instructs all persons on the facility to remain where they are at the time of the alarm unless they are at the location of the emergency. Emergency response personnel are not subject to this restriction.

G-6 Coordination Arrangements [40 CFR 264.52(c) and 264.37]

Outside emergency response agencies and teams do not participate in emergency activities within ABL plant boundaries. The only exception is ambulances that would enter the ABL Facility under escort to provide medical assistance. ABL is self-sufficient for all other emergency activities. Therefore, there are no coordination agreements with outside emergency agencies and response teams.

G-7 Evacuation Plan [40 CFR 264.52(f)]

Evacuation of off-plant inhabited areas or general evacuation of plant personnel is an extremely unlikely necessity in responding to any hazardous waste emergency situation at ABL due to the limited quantities of waste, low level of toxicity, and lack of transport mechanisms for spilled wastes.

For the hazardous waste storage units, the separation of the units from adjacent buildings and the distance from the units to the plant boundaries serve to limit the likelihood of an offsite evacuation. The Building 366 hazardous waste storage unit has a roof but is open on all sides. If necessary, evacuation can take place by exiting any side of the storage building. The Building 810 hazardous waste storage unit has one exit door for emergency evacuation, which is sufficient due to the small size of the building.

A fence surrounds the Burning Grounds. The primary entrance is through Gate 36. If the exit through this gate is blocked, alternative Gate 35 can be used.

Drawing G-1 shows evacuation routes for operating personnel from the Burning Grounds and the two hazardous waste storage units.

G-8 Required Reports [40 CFR 264.56(I) and (j)]

Operational Readiness Notification to Regulatory Agencies [40 CFR 264.56(i)]

If it is necessary to implement the contingency plan for either the Burning Grounds or the hazardous waste storage unit, the emergency coordinator will notify the Chief of the Office of Waste Management, WVDEP, before operations are resumed. The notification will include the following:

- A description of the control measures used in response to the emergency
- A statement that the emergency equipment has been cleaned or replaced and is ready for use
- A statement that cleanup procedures have been completed for any released materials that may be incompatible with wastes to be treated or stored at the unit

Incident Report in Operating Record [40 CFR 264.56(j)]

The emergency coordinator will record in the operating record for the unit the date, time, and details of any incident that requires implementation of the contingency plan for either the Burning Grounds or the hazardous waste storage unit. Within 15 days after the incident, the emergency coordinator will submit a written report on the incident to Chief of the Office of Waste Management, WVDEP. The report will include the following:

- Name address, and telephone number of the owner or operator
- Name, address, and telephone number of the facility
- Date, time, and type of incident (e.g., fire, explosion)
- Name and quantity of materials involved
- Extent of injuries, if any
- Assessment of the actual or potential hazards to human health or the environment
- Estimated quantity and disposition of recovered materials

G-9 Amendment of Contingency Plan [40 CFR 264.54]

The contingency plan will be reviewed and immediately amended, if necessary, whenever any of the following occurs:

- The facility permit is revised
- The plan fails in an emergency
- The facility changes its design, construction, operation, maintenance, or other circumstances in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency.

- The list of emergency coordinators changes
- The list of emergency equipment changes

A change in the contingency plan regarding the lists of facility emergency coordinators or equipment constitutes a minor modification to the facility permit to which the plan is a condition. Revisions will be forwarded to all parties holding a copy of the plan, including federal and state agencies.

Tables

TABLE G-1
List of Emergency Coordinators
Allegany Ballistics Laboratory
Rocket Center, West Virginia

Name	Telephone Number
Primary Emergency Coordinator	
Wes Foor	304-726-5009 (ABL)
	301-729-8630 (home)
Alternate Emergency Coordinators[1]	
Randy Golden	304-726-5136 (ABL)
Jim Speis	304-726-5136 (ABL)
Richard Goldsworthy	304-726-5136 (ABL)
Tom Wolford	304-726-5136 (ABL)

(1) One of the alternate emergency coordinators is on duty at all times.

Figures

ALLIANT MISSILE PRODUCTS COMPANY LLC
ALLEGANY BALLISTICS LABORATORY
210 STATE ROUTE 956
ROCKET CENTER, WV 26726-3548

ATK ALLIANT TECHSYSTEMS — ABL Rocket Center, WV

PLANT 1
RCRA PERMITTED UNITS
EVACUATION ROUTES

APPROVALS		DATE
DRAFTER	J.R. ROBISON	11-13-01
CHECKER	L.H. MULL	11-13-01
ENGR	L.H. MULL	11-13-01
DES SUPV		
AREA SUPV		
SAFETY		
ENG MGR		

CAGE CODE 70272 | SIZE D
SCALE 1" = 250.0'
NEXT ASSEMBLY / USED ON
BUILDING NO: BASE | DRAWING PKG: PLT1
CONTRACTOR DRAWING NO: 1-112-50 | REV: -

G-1

DATE | DRAWING HISTORY

THIS DRAWING HAS BEEN ARCHIVED FOR 1994 STATUS

INTERPRET THIS DRAWING IN ACCORDANCE WITH DOD-STD-100

$$time$$ $$dgn$$

Section H
Personnel Training

SECTION H

Personnel Training [40 CFR 270.14(b)(12) and 264.16]

This section describes ABL's training program for all employees involved in hazardous waste management activities at the Burning Grounds and hazardous waste storage unit.

H-1 Outline of the Training Program [40 CFR 264.16(a)(1)]

All employees assigned to hazardous waste duties at the Burning Grounds and the hazardous waste storage units are trained within 6 months of assignment. Employees must be trained and demonstrate competency before being allowed to work without direct supervision.

This personnel training program is designed to ensure that all hazardous waste treatment and storage operations are conducted in a safe and environmentally sound manner. The training program teaches personnel to follow the General Operating Procedures (GOPs) and Unit Operating Procedures (UOPs) and other requirements that ensure that operations are conducted in compliance with environmental regulations.

Employees are trained in the procedures that are necessary to perform their job functions. Employees are trained for specific operations. The corresponding procedures include the following: the particular hazard of the material and operations; proper and safe operating procedures; required safety equipment; response to emergencies, unforeseen events, equipment malfunctions, or lack of facilities; and other safety precautions. No employee may perform an operation without supervision until completion of training in that operation. All employees must review training for all operations in which they are trained at least annually.

H-1a Job Title/Job Description [40 CFR 264.16(d)(1) and (2)]

Burning Grounds

Two employee classifications are involved in hazardous waste treatment operations: Environmental Engineer and Burning Grounds Operator. The job titles and job descriptions are provided below:

1. Environmental Engineer
   a. Hazardous Waste Duties
      - Coordinate Burning Grounds operations
      - Monitor Burning Grounds compliance
      - Determine suitability of meteorological conditions for open burning operations

   b. Qualifications
      - BS degree in engineering or natural sciences

2. Burning Grounds Operator
   a. Hazardous Waste Duties
      - Collect reactive hazardous waste from storage areas and transport to Burning Grounds
      - Prepare burn pans for waste treatment
      - Ignite burn pans
      - Inspect Burning Grounds and report any discrepancies
      - Cleanup and properly dispose of all residual material
      - Maintain all Burning Ground equipment and reactive waste containers
   b. Qualifications
      - High school diploma or equivalent

Buildings 366 and 810 Container Storage Units

Three employee classifications are involved with hazardous waste storage: Associate Safety Engineer, Environmental Specialist, and Waste Storage Operator. The job title and job descriptions are provided below.

1. Associate Engineer, Safety
   a. Hazardous Waste Duties
      - Coordinate the hazardous waste storage activities
      - Monitor waste storage area compliance
      - Prepare profiles and information for proper disposal of hazardous waste
      - Assist with proper shipping of all hazardous wastes off plant
   b. Qualifications
      - High school diploma or equivalent

2. Environmental Specialist
   a. Hazardous Waste Duties
      - Schedule waste shipments
      - Maintain manifest records
      - Assist Safety Engineer in the operation of the hazardous waste storage unit
   b. Qualifications
      - BS degree in engineering or the natural sciences

3. Hazardous Material Handler
   a. Hazardous Waste Duties
      - Identify and label all hazardous waste material
      - Transport hazardous waste materials to the storage unit
      - Maintain inventory of hazardous waste containers stored at the unit
      - Transfer and consolidate like hazardous waste materials
      - Monitor integrity of hazardous waste containers
      - Inspect hazardous waste storage unit and report any discrepancies
   b. Qualifications
      - High school diploma or equivalent

H-1b Training Content, Frequency, and Techniques [40 CFR 264.16(c) and (d)(3)]

Training is given within 6 months after hiring and prior to reassignment to any new area. Hazardous waste training is conducted on an individual basis through general and unit operating procedures (GOPs and UOPs). Employees are trained in the procedures that are necessary to perform their job functions. Prior to performing an operation, employees must read the applicable procedures and then accompany trained employees for on-the-job training. Once these items are accomplished, the employees must sign off on their training records. At this point, the employees perform the operation in the company of a supervisor or foreman. Once the supervisor has signed the record that the employee has successfully performed the operation, the employee may perform it as part of his or her job. Procedures are reviewed annually and updated as necessary. All employees who handle hazardous wastes must complete all three levels of training prior to performing hazardous waste operations. All employees must review training for all operations in which they are trained at least annually.

The training outline must include:

- Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment;
- Communications or alarm systems;
- Response to fires (at container storage unit);
- Response to groundwater contamination incidents; and
- Shutdown of operations.

Burning Grounds

Hazardous waste training for the Burning Grounds Operator consists of the following:

- Safety – including the contingency plan
- Operations
    - Pre-operation preparations and checks
    - Waste collection
    - Unloading of explosives
    - Explosives placement and set up of ignition train
    - Videotaping of pan configurations
    - Prohibitions and limitations
    - Ignition and burning of pans
- Unusual Events
    - Unsuitable meteorological conditions
    - Misfires
    - Grass fires
    - Explosive reactions
- Housekeeping and Clean-Up Operations

Buildings 366 and 810 Container Storage

Hazardous waste training for the hazardous waste storage units consists of the following:

- Safety – including the contingency plan and spill response
- Reuse of containers
- Accumulation of waste at source
- Non-P/E-related wastes (hazardous and non-regulated) packaging requirements
- Labeling
  - General
  - Specific labeling requirements
- Recordkeeping
  - Generating area
  - Material handling
- Container shipment to storage
  - Generating areas
  - Material handling
  - Receipt at hazardous waste storage Building 366
- Storage and inspection
- Transfer between drums
- Sampling hazardous waste drums
- Shipment of hazardous wastes

H-1c Training Director [40 CFR 264.16(a)(2)]

Personnel training for hazardous waste operations is directed by the Associate Safety Engineer. This individual is qualified to direct hazardous waste operations training by virtue of experience and training in the field of hazardous waste management. The training directors experience may include:

- Experience in explosive production operations, analytical chemistry, research operations, security, safety, and environmental
- Experience in hazardous waste treatment, storage, and disposal (TSD) services
- OSHA-approved Hazardous Waste Operations and Emergency Response (HAZWOPER) 1910.120
- HAZWOPER Supervisor's Program
- HAZWOPER Train the Trainer
- Fundamentals of Industrial Hygiene Monitoring
- Training for Hazardous Waste Transportation
- Hazardous Materials Technician

H-1d Relevance of Training to Job Position [40 CFR 264.16(a)(2)]

The training program has been established to provide training to personnel at levels that are relevant to their position within the plant. All personnel at the facility who are responsible for handling waste or for any associated requirements (labeling, disposal, recordkeeping, emergency response, etc.) are required to receive hazardous waste training that is relevant to their assigned duties. Sections H-1a and H-1b have details.

H-1e Training for Emergency Response [40 CFR 264.16(a)(3)]

Hazardous waste training includes procedures to be followed in response to spills, explosions, fires, and other emergencies. Sitewide emergency training includes site alarms and appropriate actions. Communications systems are inspected as required, but no additional training is deemed necessary. The Burning Grounds training includes procedures for shutdown of operations; no such training is applicable for the hazardous waste storage units. Neither the Burning Grounds nor the hazardous waste storage units has any waste feed cut-off equipment or monitoring equipment; therefore, no training in these subjects is required.

H-2 Implementation of Training Program [40 CFR 264.16(b), (d)(4), and (e)]

Individuals receiving hazardous waste training place their name, employee number, date, and signature on a sign-in roster for each class. Introductory training for personnel with hazardous waste management duties is conducted within 6 months of their employment, assignment to the facility, or transfer to a new position within the facility. The Human Resources Department maintains records documenting that each individual has received the required training. The Human Resources Department maintains all hazardous waste training records. Records are maintained on each employee receiving hazardous waste training until three years after the employee leaves the facility or until closure of the hazardous waste unit at which they perform their duties.

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

SECTION I

Closure Plans, Post-Closure Plans, and Financial Requirements [40 CFR 270.14(b)(13) and (15) through (18), 264.110 through 264.151, 264.178, 264.197, 264.228, 264.258, 264.280, 264.310, and 264.351]

This section contains the closure plan describing the steps necessary to close the container storage units and the open burning unit at ABL. The maximum extent of operations left unclosed during the active life of the hazardous waste facilities is described. A contingent closure and post-closure plan is also provided if contamination has occurred and it is not possible to achieve clean closure standards. The ABL Environmental Department maintains a copy of this closure plan and any amendments.

I-1 Closure Plans [40 CFR 270.14(b)(13), 264.112(a)(1) and (2)]

ABL is primarily a solid propellant rocket motor development and production facility operated by ATK. ABL is located at Rocket Center in Mineral County, West Virginia. The site is approximately 9 miles south of Cumberland, Maryland on the southern bank of the North Branch Potomac River. ABL consists of Plant 1, which is owned by NAVSEA, and Plant 2, which is owned by ATK. Both plants are operated by ATK. Plant 1 is approximately 1,572 acres, of which approximately 400 acres is developed bottomland and the remainder largely undeveloped forested mountain land. Plant 2 is 57 acres of developed bottomland located adjacent to Plant 1.

ABL conducts or will conduct hazardous waste operations at three principal locations on the Plant 1 facility. These locations include one container storage area (Building 366) where up to 320 containers of waste is stored, and the Burning Grounds, an open burning area where reactive hazardous wastes are treated. Also, after permitting, Building 810 will store up to 44 drums of waste.

ABL stores or will store both regulated and unregulated wastes at the container storage areas. Wastes stored in Building 366 include sludge from spent aluminum surface treatment solutions; still bottoms from degreasing and cleaning operations; spent solvents, motor oil, and antifreeze; waste paint and thinners; solvents with lead contamination; lead solids; chromium solids; burning ground treatment residues; laboratory solvents; cured and uncured resins; lab packs; and asbestos. Waste that will be stored at Building 810, once permitted, will primarily consist of lab packs but may occasionally include drums.

Reactive wastes consisting of explosives, propellants, and materials containing propellants and explosives are treated by open burning at the Burning Grounds.

I-1a Closure Performance Standard [40 CFR 264.111]

Burning Grounds

The Burning Grounds is co-located with a CERCLA remediation site known as ABL Site 1. The groundwater under the Burning Grounds is contaminated with ammonium perchlorate, explosives, TCE, and other VOCs from historical operations. An active CERCLA groundwater extraction and treatment system is located at Site 1. All groundwater under the unit is captured by the extraction system and treated for VOC contamination. The treated water is either discharged to the North Branch Potomac River or pumped to the ABL boilers for use as boiler feed water. Clean closure is intended for the aboveground and soil portion of the Burning Grounds. The existing corrective action management system will continue to operate to remediate groundwater until appropriate corrective concentration limits are met at the point of compliance.

At closure, all untreated reactive hazardous waste, burn pan treatment residues, burn pans, rocket motor tie-down unit, and contaminated soil will be removed from the Burning Grounds. The need for further maintenance, except possibly for the groundwater remediation system, will not exist other than recontouring the surface and covering the area with native soil and vegetation to prevent erosion. If decontamination of soil cannot be achieved, additional closure activities, including closing the area as a land disposal unit, will be conducted to protect human health and the environment. In addition, the contingent Post-Closure Plan in Section I-2 will be implemented.

Closure standards for hazardous constituents in soil within the Burning Grounds include background levels, soil screening levels, and site-specific risk-based concentrations for explosives, perchlorate, and metals (aluminum, bismuth, lead, tin, and zirconium). The explosives that will be considered will be those target analytes in U.S. EPA Method 8330 for analysis of explosives. Target explosive analytes include the following:

- Dinitrobenzene isomers
- Dinitrotoluene isomers
- HMX (cyclotetramethylenetetranitramine)
- Nitrobenzene
- Nitrocellulose
- Nitroglycerin
- Nitrotoluene isomers
- RDX (cyclotrimethylenetriamine)
- Tetryl (trinitro-2,4,6-phenylamine)
- 1,3,5-Trinitrobenzene
- 2,4,6-Trinitrotoluene

Soil cleanup goals will be established through a series of screening phases and detailed evaluations. The evaluation procedure that will be used to establish soil cleanup goals is outlined below.

Comparison to Background

Background soil concentrations will be developed at closure. For parameters that occur naturally, such as metals, the existence of contamination will be determined by a comparison with background concentrations. Naturally occurring parameters will be considered contaminated if the concentration exceeds the background mean plus two times that standard deviation (95 percent confidence interval using a one-tailed t-test). For parameters that do not occur naturally, such as explosives, any detected concentration will indicate potential contamination.

If background values are not exceeded for any parameter, soil at the Burning Grounds will be considered clean, and no further analysis will be conducted. If background values are exceeded, comparisons to soil screening levels will be made.

Comparison to Risk-based Concentrations

Analytical results will be compared to U.S. EPA Region III RBCs in effect at the time of closure. Table I-1 contains the available RBCs for the industrial and residential scenario parameters to be analyzed (as of May 2001), which are listed in the Region III RBCs database (accessible at EPA Region III's Internet web site under Risk Assessment Guidance). RBCs for explosives, metals, and perchlorates that are not listed in Table I-1 will be developed using U.S. EPA Region III methodology. The clean closure standard used at closure (industrial or residential) will be based on the intended future use of the Burning Grounds. If cumulative carcinogenic impacts based on screening levels do not exceed 1E-05 and cumulative hazards based on screening levels do not exceed 1.0, soil at the unit will be considered clean, and no further evaluations will be completed. If soil screening values are exceeded, a site-specific risk analysis may be conducted or decontamination activities initiated. Risk assessment procedures are discussed in the following section.

In the event that the cumulative HI does not exceed 1.0, no further analysis of potential systemic toxicants will be conducted, and the soil at the Burning Grounds will be considered clean from the standpoint of noncarcinogenic contamination. If the HI exceeds 1.0, toxicity endpoints will be considered.

Chemicals have various toxicity endpoints. For example, one chemical may affect the liver but no other organs, whereas another chemical may affect only the central nervous system. The cumulative HI is initially calculated without any regard to the toxicity endpoint. If the cumulative HI does exceed 1.0, additional evaluations will be completed to determine the HI based on the toxicity endpoints of the potential chemicals of concern. Under these circumstances, it is likely that several cumulative HIs for chemicals with similar endpoints will be determined. In this case, separate toxicity endpoints would be determined for the liver, the heart, and the central nervous system. If each of the cumulative HIs based on toxicity endpoints does not exceed 1.0, soil at the Burning Grounds will be considered clean from the standpoint of noncarcinogenic contamination.

Quantitative Risk Assessment

Quantitative risk estimates will be developed for carcinogenic and noncarcinogenic compounds that exceed background levels in accordance with methodology contained in the U.S. EPA Risk Assessment Guidance (EPA/540/1-89-002).

If the cumulative incremental cancer risk from all routes of exposure for all carcinogens detected above background does not exceed 1E-05, the soil will be considered clean from the standpoint of carcinogenic contamination.

Soil Removal

If potential risk from exposure to soil is determined to exceed an acceptable level, soil removal may be necessary to meet the soil cleanup goals. If soil removal is conducted, verification sampling will be conducted along the bottom and perimeter of excavation to determine that the soil cleanup goals have been attained.

Buildings 366 and 810 Container Storage

The closure of the hazardous waste storage units will be conducted to minimize the need for further maintenance and to provide maximum protection of human health and the environment. Clean closure will be the method used to close the container storage units. At closure, all hazardous waste and hazardous waste residue will be removed from the storage units and transported to permitted treatment or disposal facilities. Any containment areas containing or contaminated with hazardous wastes will be decontaminated or removed.

I-1b Partial and Final Closure Procedures [40 CFR 264.112(b)(1) through (7)]

Burning Grounds

The entire Burning Grounds is expected to remain in service throughout the active life of the facility. However, one or more burn pans may be temporarily taken out of service for repair or replacement. The remaining burn pans within the unit would remain active. Replacement of burn pans during the active live would not be considered a closure activity.

The following is a summary of the procedures that will be used to close the Burning Grounds. Details are provided in Section I-1e(11).

The final volume of reactive hazardous waste will be treated by open burning. Any ejected material will be collected and reburned, if necessary.

After treatment of the final volume of wastes, the burn pans will contain open burning treatment residuals and the soil/sand liner. These materials will be tested to determine whether they would be classified as a RCRA hazardous waste or a nonhazardous waste and handled accordingly.

The burn pans, rocket motor tie-down unit, and precipitation covers will be removed.

The burn pads will be wipe tested to determine whether they would be classified as a hazardous or nonhazardous waste. If the pads meet the closure criteria for clean closure they will be left in place. If not they will be removed and disposed of as hazardous wastes.

Soil samples will be collected from a grid pattern and analyzed to determine whether the soil meets the closure performance standards discussed in Section I-1a(1). If necessary, soil will be removed to attain the soil cleanup goals. The Burning Grounds will be regraded and covered with native soil and vegetation to control erosion.

Buildings 366 and 810 Container Storage

The entire hazardous waste storage units are expected to remain in service throughout the active life of the facility and will be closed at the time the facility is closed.

The following is a summary of the procedures that will be used to close the hazardous waste storage units. Details are provided in Section I-1e(4).

All wastes stored at the units will be removed and transported to permitted treatment or disposal facilities at the time of closure. Containment cell surfaces will be inspected and cleaned as necessary. Surface wipe samples will be collected to confirm the absence of contamination. This will eliminate the need for further maintenance and will eliminate the possibility of post-closure escape of hazardous waste, hazardous waste constituents, or contaminated runoff. Contamination of soil or groundwater is not anticipated because the design features of the unit reduce or eliminate the possibility of contaminants reaching the soil and, therefore, the groundwater. Soil samples will be collected to verify the absence of contamination only if cracks extending through the concrete are found in the containment area. In the unlikely event that contamination has occurred, clean closure of the soil will be accomplished.

I-1c Maximum Waste Inventory [40 CFR 264.112(b)(3)]

Burning Grounds

Reactive wastes are neither stored nor accumulated at the Burning Grounds. The maximum inventory of reactive waste ever present at the Burning Grounds is the explosive load limit or 1,630 pounds of P/E material. This quantity would be the maximum waste inventory ever present at one time. Any reactive waste present at the Burning Grounds would be treated in the burn pans before closure begins. When closure activities begin, no inventory of reactive wastes will remain.

Building 366 Container Storage

ABL stores a maximum of 320 drums of waste at Building 366, once permitted. The largest drum stored is typically 55 gallons. Therefore, the maximum waste inventory is 17,600 gallons. Both hazardous and non-hazardous wastes are stored at this unit.

Building 810 Container Storage

ABL will store a maximum of 44 drums of waste at the storage pad. The largest drum stored may be 55 gallons. Therefore, the maximum waste inventory will be 2,420 gallons. Both hazardous and non-hazardous wastes will be stored at this unit.

I-1d Schedule for Closure [40 CFR 264.112(b)(6)]

RCRA regulations require that a closure date be specified to assess the adequacy of financial assurance provisions. Federal facilities are exempted in 40 CFR 264.140(c) from these requirements. Because closure of the hazardous waste treatment and waste storage units will depend on unknown future DOD operational requirements, a closure date is not specified for the facilities to be permitted pursuant to this application. Closure of these facilities is not anticipated before the year 2050.

I-1d(1) Time Allowed for Closure [40 CFR 264.112(b)(2), 264.113(a) and (b)

Burning Grounds

The Burning Grounds will be closed in accordance with the following schedule, relative to the start of closure, once the decision for closure has been made and funding has been provided.

Description	Cumulative Time (Days)
Receipt of final volume of waste	-90
Notify WVDEP in writing of final closure	-45
Start of closure	0
Site investigation (sampling and analysis, data interpretation)	60
Site remediation	120
Complete closure activities	180*
Certification of closure	240*

* Longer if large quantities of contaminated soil are encountered.

Buildings 366 and 810 Container Storage

The hazardous waste storage units will be closed in accordance with the following schedule, relative to the start of closure, once the decision for closure has been made and funding has been provided.

Description	Cumulative Time (Days)
Receipt of final volume of waste	-90
Notify WVDEP in writing of final closure	-45
Start of closure	0
Site investigation (sampling and analysis, data interpretation)	60
Complete closure activities	90
Certification of closure	150

I-1d(1)(a) Extension for Closure Time [40 CFR 264.113(a) and (b)]

If the planned closure is expected to exceed the 90 days for treatment, removal, or disposal of wastes and/or the 180 days for completion of closure activities, a petition for a schedule for closure and a permit notification that justifies that a longer period of closure time is required will be submitted. The petition will demonstrate one of the following, depending on the circumstances that necessitate a longer period of closure time:

- Closure activities require longer than 90 or 180 days
- Unit or facility has capacity to receive additional wastes

- There is a reasonable likelihood that another person other than the owner or operator will recommence operation of the site within one year
- Closure would be incompatible with continued operation

The petition will also demonstrate that all steps have and will be taken to prevent threats to human health and the environment from the unclosed but inactive facility.

I-1e Closure Procedures [40 CFR 264.112 and 264.114]

I-1e(1) Inventory Removal [40 CFR 264.112(b)(3)]

Burning Grounds

Methods for removing, transporting, treating, storing, or disposing of all hazardous wastes at the Burning Grounds are discussed in Section I-1e(11).

Buildings 366 and 810 Container Storage

Methods for removing, transporting, treating, storing, or disposing of all hazardous wastes at the hazardous waste storage units are discussed in Section I-1e(4).

I-1e(2) Disposal or Decontamination of Equipment, Structures, and Soils [40 CFR 264.112(b)(4) and 264.114]

Waste Treatment

A description of the steps needed to decontaminate and disposal of all facility equipment and structures at the Burning Grounds is provided in Section I-1e(11).

Waste Storage

A description of the steps needed to decontaminate and disposal of all facility equipment and structures at the hazardous waste storage units is provided in Section I-1e(4).

I-1e(3) Closure of Disposal Units/Contingent Closure [40 CFR 270.14(b)(13), 270.17(f), 270.18(h), 270.21(e), 264.228(a)(2), 264.228(c)(1)(i), 264.258(c), 264.258(c)(1)(i), 264.301(a), and 264.601]

This section is not applicable because no hazardous waste disposal units are present at ABL. However, if the soil at the Burning Grounds cannot be fully decontaminated to attain the closure performance standards, ABL will amend the closure plan in accordance with Section I-1f to address the details of closure, and the Burning Grounds will be closed as a land disposal facility. The burn pads will be removed, any contaminated soil will be covered with clean soil or other material having permeability less than or equal to that of the natural subsoil present beneath the unit to minimize the migration of liquids through the closed unit. The cover will be vegetated and contoured to promote drainage and to prevent erosion. The cover material will be of sufficient thickness and elasticity to accommodate settling and subsidence. Any portion closed as a land disposal unit will also have run-on and run-off controls to prevent damage to the final cover.

If contaminated groundwater (from ABL Site 1) is present beneath the Burning Grounds at the time of closure, the existing groundwater remediation system, or a portion thereof, will continue to be operated and maintained, for the post closure care period.

If post-closure activities are required, ABL will develop a detailed post-closure plan that addresses the requirements in Section I-2.

I-1e(4) Closure of Containers [40 CFR 264.178, 264.112(b)(3), and 270.14(b)(13)]

Methods for determining the presence of contamination, performing decontamination, and evaluating the effectiveness of decontamination procedures during closure of the hazardous waste storage units are described in this section.

Inventory Removal

All waste stored at the unit will be removed at closure and transported to a permitted treatment, storage, or disposal facility.

Equipment Decontamination

Drum handling equipment, steel pallets, shovels, rakes, and other hand tools used in the cleanup of spilled or leaked materials will be rinsed with water three times to decontaminate them. The rinse water will be contained and tested for pH (corrosivity) and the presence of the predominant chemicals stored at the unit. If the rinse water is determined to be a hazardous waste, it will be shipped to an offsite permitted disposal facility. Wipe samples of the equipment surfaces will be collected and tested for the presence of the predominant chemicals stored at the unit. If surface contamination exists, the surface(s) will be cleaned with appropriate cleaning agents to acceptable RCRA levels. The cleansing agents will be disposed or treated to standards established by Federal and/or State regulations that are in force at the time of closure. Contaminated rags, absorbents, plastic barriers, PPE, and other expendable materials will be containerized and shipped for appropriate treatment or disposal.

Structure Decontamination

The storage areas were designed to minimize structural exposure to leaked or spilled hazardous wastes. The concrete floors and dikes are the only structural portions of the storage area that will potentially be exposed to releases. Released materials are not allowed to accumulate in the cells; therefore, there is little or no potential contamination of subsurface concrete. Wipe samples of the concrete surfaces will be collected and tested for the presence of the predominant chemicals stored at the unit. If surface contamination exists, the surface(s) will be cleaned with appropriate cleaning agents to acceptable RCRA levels. The cleansing agents will be disposed or treated to standards established by Federal and/or State regulations that are in force at the time of closure.

Adjacent Soils

Soil samples will be collected from the areas immediately adjacent to the edge of the hazardous waste storage units. Four samples (one from each side of the unit) will be analyzed for the predominant chemicals that have been stored in the unit during its active life. Initial samples will be collected from the top 6 inches of soil adjacent to the unit.

Additional soil sampling will be performed to determine the extent of soil contamination if the initial samples indicate the presence of contamination above applicable regulatory levels. The disposal or treatment method(s) used will be consistent with 40 CFR 264.114 or other applicable regulations at the time of closure.

I-1e(5) Closure of Tanks [40 CFR 270.14(b)(13), 264.197, and 264.112(b)(3)]

ABL does not store hazardous waste in tanks. Therefore, this section is not applicable.

I-1e(6) Closure of Waste Piles [40 CFR 270.18(h) and 264.258]

ABL does not have any hazardous waste piles. Therefore, this section is not applicable.

I-1e(7) Closure of Surface Impoundments [40 CFR 270.17(f), 264.228(a)(1) and (2), and 264.228(b)]

ABL does not have any hazardous waste surface impoundments. Therefore, this section is not applicable.

I-1e(8) Closure of Incinerators [40 CFR 264.351 and 270.14(b)(13)]

ABL does not have any hazardous waste incinerators. Therefore, this section is not applicable.

I-1e(9) Closure of Landfills [40 CFR 270.21(e) and 264.310(a)]

ABL does not have any hazardous waste landfills. Therefore, this section is not applicable.

I-1e(10) Closure of Land Treatment Facilities [40 CFR 264.280(a) and 270.20(f)]

ABL does not have any hazardous waste land treatment facilities. Therefore, this section is not applicable.

I-1e(11) Closure of Miscellaneous Units [40 CFR 270.23(a)(2)]

Methods for determining the presence of contamination, performing decontamination, and evaluating the effectiveness of decontamination procedures during closure of the Burning Grounds are described in this section.

Inventory Removal and Disposal

As stated in Section I-1c(1), no inventory of reactive hazardous wastes will remain when closure activities begin.

Removal and Disposal of Treatment Residue and Soil/Sand Liner

After treatment of the final volume of wastes, the burn pans will contain treatment residues and soil/sand liners. The treatment residue in each burn pan will be inspected for potential reactivity. If the treatment residues are determined to be reactive, they will be reburned. The treatment residues will be removed from the pans, placed into containers, and analyzed for the toxicity characteristic (TC). If the treatment residue results exceed the regulatory TC levels, they will be disposed of as a hazardous waste. If the treatment residue results are below the regulatory TC levels, they will be disposed of as a solid waste.

The soil/sand liner will be inspected for evidence of entrainment of reactive material. Once determined to be free of reactive materials, the liners will then be sampled and analyzed for the TC for lead and 2,4-dinitrotoluene. If the liner results exceed regulatory TC levels, the materials will be placed into containers and disposed of as a hazardous waste. If the liner results are below the regulatory TC levels, the material will be considered clean and disposed of as a solid waste.

Burn Pan and Precipitation Cover Removal and Disposal

The burn pans and rocket motor tie-down unit will be decontaminated in place. After all the treatment residues and liners have been removed, the burn pans, tie-down unit, and covers will be inspected, certified as explosive-free, and sold for recycle as metallic scrap. The pads will be inspected for any residual contamination. When determined to be free of reactive material, the pads will either be abandoned in place or demolished and disposed of as demolition debris.

Assessment of Soil Contamination

During closure, soil samples will be collected from the Burning Grounds up to the fence line. A soil sampling grid will be established over the Burning Grounds, and a sample will be collected from the center of each grid or where the grid lines intersect. All soil samples will be collected to a depth of 1 foot using a stainless steel auger or similar sampling device. The soil removed by the auger will be thoroughly mixed and placed into the appropriate sample bottles. All soil samples will be analyzed for the metals and explosives listed in Section I-1a(1).

If hazardous constituents are detected at concentrations above background or risk-based levels, additional samples will be collected to characterize the nature and extent of contamination. Samples will be collected deeper than 1 foot, if necessary, to define the vertical extent of contamination. Additional samples will be collected, if necessary, to define the horizontal extent of contamination.

If the analysis of the soil samples shows that concentrations of all constituents are below background or site-specific risk-based levels, no further sampling or soil removal will be necessary.

Removal and Disposal of Contaminated Soil

Any contaminated soil at the Burning Grounds exceeding background screening level or site-specific risk-based concentrations will be excavated. Soil will be removed in layers up to 2 feet thick using backhoes, bulldozers, or other excavation equipment. After a layer of contaminated soil is removed, sampling and analysis will be conducted to determine whether the cleanup goals have been attained. If the cleanup goals are not attained, additional layers of soil will be removed until closure goals are attained or the unit will be closed as a landfill. At present, removal by excavation is expected. Treatment technologies for contaminated soil cannot be determined at this time. The decision on whether treatment is appropriate will be determined in the future. This decision will depend on the contaminants present, the nature and extent of contamination, and the status of available technology at that time. If treatment is considered to be appropriate, the closure plan will be revised and submitted to WVDEP in accordance with Section I-1f.

Chemicals have various toxicity endpoints. For example, one chemical may affect the liver but no other organs, whereas another chemical may affect only the central nervous system. The cumulative HI is initially calculated without any regard to the toxicity endpoint. If the cumulative HI does exceed 1.0, additional evaluations will be completed to determine the HI based on the toxicity endpoints of the potential chemicals of concern. Under these circumstances, it is likely that several cumulative HIs for chemicals with similar endpoints will be determined. For example, some of the chemicals of concern may affect only the liver, only the hearth, or only the central nervous system. In such cases, separate toxicity endpoints would be determined for the liver, the heart, and the central nervous system. If each of the cumulative HIs based on toxicity endpoints does not exceed 1.0, soil at the Burning Grounds will be considered clean from the standpoint of noncarcinogenic contamination.

It is anticipated that contaminated soil would be classified as a nonhazardous waste. However, representative composite samples will be collected and tested for TC and any other parameters required by the disposal facility. If any excavated soil fails the TC test, it will be disposed of at an offsite hazardous waste landfill.

Equipment Decontamination

A temporary decontamination pad will be constructed if soil removal is necessary. The decontamination pad will be constructed on a graded and compacted earthen foundation surrounded by berms. The pad and the berms will be overlain by a 30-mil (minimum) thick liner so that decontamination fluids are retained. The liner will be protected by a material such as sand or plywood to prevent tearing. Ramps will be positioned at the entrance and exit of the pad to allow vehicle access over the berms. The pad will be sloped so that decontamination fluids will flow to a low point for collection. After decontamination activities have been completed, the liner will be disposed of as a solid waste.

Any contamination on PPE is expected to consist of solids. All disposable PPE, such as clothing, gloves, and expendable protective gear, will be cleaned on the decontamination pad to remove any solid material adhering to the PPE. The PPE will then be placed into a container and disposed of as a nonhazardous solid waste.

Small excavation equipment, such as shovels and rakes, and hand tools will be decontaminated by removal of solids by brushing, scraping, raking, etc followed by steam cleaning with a high-pressure washer.

Vehicles and heavy equipment, such as trucks, backhoes, bulldozers, containers, and roll-off boxes, will be decontaminated, using a high pressure steam cleaner, before leaving the remediation area and entering a clean area.

Non-disposable sampling equipment will be decontaminated as follows:

- Potable water rinse
- Alconox or Liquinox detergent wash
- Potable water rinse
- Deionized water rinse
- Ispropanol rinse
- Analyte-free water rinse

- Air dry
- Wrap in aluminum foil

Liquid and solid decontamination wastes will be collected and placed into containers meeting DOT requirements. These wastes will be tested for the TC. Any decontamination wastes failing the TC will be handled as hazardous waste; otherwise they will be handled as nonhazardous wastes.

I-1e(12) Closure of Boilers and Industrial Furnaces (BIFs) [40 CFR 266.102(a)(2)(vii)]

ABL does not have any hazardous waste BIFs. Therefore, this section is not applicable.

I-1e(13) Closure of Containment Buildings [40 CFR 264.1102]

ABL does not have any hazardous waste containment buildings. Therefore, this section is not applicable.

I-1f Amendment to Closure Plan [40 CFR 264.112(c)]

ABL will maintain this closure plan to ensure that it is current and accounts for anticipated closure activities. This closure plan will be amended when the following events or contingencies occur:

- The expected reasons that warrant closure of the treatment or storage unit change.
- Changes in operating plans or facility design affect this closure plan. This will include, but not be limited to, the need to modify the treatment or storage units or to expand the capacity.
- New information is obtained that significantly changes the underlying assumptions or procedures outlined in this closure plan.
- Unexpected events occur during closure that require significant modifications of this closure plan.

Certain events and contingencies are anticipated in this closure plan that do not warrant formal amendments to this plan. Examples of these events and contingencies include the need to remove minor additional quantities of soil than is currently anticipated. Such events and contingencies will be brought to the attention of the WVDEP; however, a formal amendment of the closure plan will not be requested.

Whenever events or contingencies require formal amendment of this closure plan occur, a written request for permit modification will be submitted to the WVDEP. Such request will be submitted to the Chief of the Office of Waste Management and sent by certified mail. Any request for amendment will describe in detail the necessary closure plan changes. This request will be submitted at least 60 days prior to the proposed change in facility design or operation or no later than 60 days after an unexpected event has occurred that has affected the closure plan. If the unexpected event occurs during the partial or final closure period, ABL will request a permit modification no later than 30 days after the unexpected event.

I-2 Post-Closure Plan/Contingent Post-Closure [40 CFR 270.14(b)(13), 270.17(f), 270.18(h), 270.20(f), 270.21(e), 270.23(a)(3), 264.118, 264.197(b), 264.197(c)(2), 264.228(c)(1)(ii), 264.280(c), and 264.603]

Post-closure is not expected to be required for the hazardous waste storage unit because clean closure is planned.

Clean closure is also planned for the hazardous waste treatment unit. However, if soils at the Burning Grounds cannot be fully decontaminated to attain the closure performance standards, the waste treatment unit will be closed as a land disposal facility. Any contaminated soil will be covered with soil or other material having permeability less than or equal to that of the natural subsoils present beneath the unit to minimize migration of liquids through the closed unit. The cover will be vegetated and contoured to promote drainage and to prevent erosion. The cover material will be of sufficient thickness and elasticity to accommodate settling and subsidence. Any portion closed as a land disposal unit will also have run-on and run-off controls to prevent damage to the final cover.

If contaminated groundwater (from another source) is present beneath the Burning Grounds at the time of closure, the existing groundwater remediation system, or some variation thereof, will continue to be operated and maintained.

If post-closure activities are required, ABL will develop a detailed post-closure plan. The contents of the post-closure plan are discussed in the following sections. The ABL Environmental Department will maintain a copy of the post-closure plan and will be responsible for updating the plan, as necessary.

I-2a Inspection Plan [40 CFR 264.118(a), 264.197(b), 264.197(c)(2), 264.226(d)(2), 264.228(b), 264.228(c)(1)(ii), 264.258(b), 264.258(c)(1)(ii), 264.303(c), and 264.310(b)]

Inspections of the Burning Grounds will be conducted during the post-closure care period whenever groundwater is sampled or, at a minimum, semiannually. Records of inspections will be maintained by ABL. The items to be inspected are as follows:

- Security – Gates, fencing, and warning signs will be inspected for damage.
- Erosion – The cover (cap) will be inspected for erosion damage such as washouts or large rodents damage (Groundhog borrows).
- Settlement – The cover (cap) will be inspected for indications of settlement, subsidence, or displacement.
- Vegetative Cover – The conditions of the vegetative cover will be inspected for adequate coverage.
- Run-on and Run-off Controls – Drainage channels designed to divert and collect storm water will be inspected to ensure good drainage.

- Monitoring Equipment – The conditions of well casing, caps, and locks will be inspected when the well is sampled.

I-2b Monitoring Plan [40 CFR 264.118(b)(1), 264.197(b), 264.197(c)(2), 264.226(d)(2), 264.228(b), 264.228(c)(1)(ii), 264.258(b), 264.258(c)(1)(ii), 264.303(c), and 264.310(b)]

Post-closure monitoring at the Burning Grounds would be conducted for the parameters and at the locations, durations, and frequencies specified in the corrective action monitoring plan for the existing groundwater remediation system. This information would be included in the detailed post-closure monitoring plan.

I-2c Maintenance Plan [40 CFR 264.118(b)(2), 264.197(b), 264.197(c)(2), 264.228(b), 264.228(c)(1)(ii), 264.258(b), 264,258(c)(1)(ii), and 264.310(b)]

Deficiencies noted during the inspections of the Burning Grounds described in Section I-2a will be corrected to maintain the integrity of the closed unit. Records of maintenance activities will be maintained by ABL. A discussion of the preventative and corrective procedures and the equipment required for the post-closure maintenance program follows:

- Security – Signs will be replaced before they become illegible. Ground at the base of the fence will be regraded, as needed, to maintain adequate site security. The fence will be replaced, as needed, to maintain adequate site security.
- Erosion – Washouts of the cover (cap) will be repaired as they are detected. If the cap integrity is in question, repair activities will be made as soon as practical. Restoration of the vegetative cover will be performed as needed. Groundhog and other rodent borrows will be filled and compacted. The vegetative cover will be restored at these locations. An effort to trap and relocate the rodents should be attempted in order to minimize future maintenance problems. If required, a permit for trapping the rodents will be obtained from the West Virginia Department of Natural Resources.
- Settlement – Settlement of the cover (cap) will be repaired by placing additional cover material on top of the existing cover and replacing vegetation.
- Vegetative Cover – Maintenance of the vegetative cover will include revegetation as needed.
- Run-on and Run-off Controls – Drainage channels will be cleaned and maintained to allow free drainage so retention of stormwater does not occur.
- Monitoring Equipment – Damage to monitoring equipment will be recorded, and repairs will be made as needed.

I-2d Land Treatment [40 CFR 264.228(c)]

ABL does not have any land treatment units. Therefore, this section is not applicable.

I-2e Post-Closure Care for Miscellaneous Units [40 CFR 270.23(a)(3) and 264.603]

Post-closure care for miscellaneous units (i.e., the Burning Grounds) is discussed in Sections I-2a, I-2b, and I-2c.

I-2f Post-Closure Security [264.117(b) and (c)]

Hazardous waste will not remain exposed after completion of final closure of the Burning Grounds. The fence will remain at the Burning Grounds; therefore, access by the public or domestic livestock will not pose a hazard to human health. ABL will retain control of the Burning Ground following closure. Post-closure use will not allow the disturbance or modification to the integrity of the final cover or any other components of the containment system or the function of any monitoring system in place at the time. The post-closure notices (see Section I-3) will contain restrictions on post-closure activities.

I-2g Post-Closure Contact [40 CFR 264.118(b)(3)]

The name, address, and the telephone number of the person or office to contact during the post-closure care period will be specified in the post-closure plan.

I-2h Amendment to Post-Closure Plan [40 CFR 264.118(d)]

ABL will maintain the post-closure plan to ensure that it is current and accounts for anticipated post-closure activities. The post-closure plan will be amended whenever either of the following occurs:

- Changes in operating plans or facility design affect the approved post-closure plan.
- Events that occur during the active life of the facility, including partial and final closures, affect the approved post-closure plan.

A written request for permit modification will be made to the Chief of the Office of Waste Management, WVDEP, if amendment to the post-closure plan is required. This request will be made at least 60 days before the proposed change in facility design or operation or not later than 60 days after an unexpected event has occurred that has affected the post-closure plan.

I-3 Notices Required for Disposal Facilities

I-3a Certification of Closure [40 CFR 264.115 and 264.280]

Within 60 days of completion of closure of the Burning Grounds or the hazardous waste storage unit and within 60 days of the completion of final closure, ABL will submit a closure certification to the Chief of the Office of Waste Management, WVDEP, by registered mail. The certification will certify that that the hazardous waste management unit or facility, as applicable, has been closed in accordance with the specifications of the approved closure plan. The certification will be signed by an authorized representative of ABL and by an independent professional engineer registered in the State of West Virginia. Documentation supporting the professional engineer's certification will be furnished to WVDEP.

I-3b Survey Plat [40 CFR 264.116]

A survey plat will not be required unless the Burning Grounds is closed as a land disposal unit or contaminated groundwater (from ABL CERCLA Site 1) remains at the time of closure. If a survey plat is required, ABL will submit the survey plat on the West Virginia State plain coordinates, to the authority with jurisdiction over local land use and the Chief of the Office of Waste Management, WVDEP. The survey plat will be submitted no later than the submission of the certification of closure. The plat will indicate the location of the land disposal unit with respect to permanently surveyed benchmarks and will be prepared and certified by a professional land surveyor registered in the State of West Virginia. The survey plat filed with the local land use authority will contain a prominently displayed note that states ABL's obligation to restrict disturbance of the land disposal unit.

I-3c Post-Closure Certification [40 CFR 264.120]

Within 60 days of completion of the post-closure care period for the Burning Grounds, certification will be submitted to the Chief of the Office of Waste Management, WVDEP. The certification will certify that the post-closure care period was performed in accordance with the specification of the approved post-closure plan. The certification will be signed by a representative of ABL and by an independent professional engineer registered in the State of West Virginia.

I-3d Post-Closure Notices [40 CFR 270.14(b)(14) and 264.119]

The following post-closure notices will be appropriately filed and submitted.

A record of the type, location, and quantity of hazardous waste remaining within each land disposal unit will be submitted to the authority with jurisdiction over local land use and to the Chief of the Office of Waste Management, WVDEP, no later than 60 days after certification of closure for each disposal unit.

A notation in the deed to the facility property will be made that will, in perpetuity, notify any potential purchasers of the property that (1) the land has been used to manage hazardous waste; (2) use of the land is restricted to activities that will not disturb the integrity of the final cover system or monitoring system during the post-closure care period; and (3) the survey plat and record of waste disposal have been submitted to the authority with jurisdiction over local land use and to the Chief of the Office of Waste Management, WVDEP. This notation will be placed within 60 days of certification of closure of the first waste disposal unit and within 60 days of certification of closure of the last waste disposal unit.

A certification, signed by an ABL representative, that the notice in the deed has been made, will be submitted to the Chief of the Office of Waste Management, WVDEP.

I-4 Closure Cost Estimate [40 CFR 270.14(B)(15) and (16), 264.140(C), and 264.142]

Federal facilities are exempted in 40 CFR 264.140(c) from financial requirements, including a closure cost estimate. ABL is a federal government facility.

I-5 Financial Assurance Mechanism for Closure [40 CFR 270.14(B)(15) and (16), 264.140(C), 264.143, and 264.151]

Federal facilities are exempted in 40 CFR 264.140(c) from financial requirements, including a financial assurance mechanism for closure.

I-6 Post-Closure Cost Estimate [40 CFR 270.14)(16), 264.140(C), and 264.144]

Federal facilities are exempted in 40 CFR 264.140(c) from financial requirements, including a post-closure cost estimate.

I-7 Financial Assurance Mechanisms for Post-Closure Care [40 CFR 270.14(B)(16), 264.140(C), 264.165, and 264.151]

Federal facilities are exempted in 40 CFR 264.140(c) from financial requirements, including a financial assurance mechanism for post-closure care.

I-8 Liability Requirements [40 CFR 270.14(B)(17), 264.140(C), and 264.147]

Federal facilities are exempt from financial requirements, including liability requirements.

I-9 Use of State-Required Mechanisms [40 CFR 270.14(B)(18)]

West Virginia has adopted the exemption of state and federal facilities from financial requirements. Therefore, this section is not applicable.

Tables

TABLE I-1
U.S. EPA Region III Soil Screening Levels
Allegany Ballistics Laboratory
Rocket Center, West Virginia

	RBC (mg/kg)	
Constituent	**Industrial**	**Residential**
1,2-Dinitrobenzene	820 (N)	31 (N)
1,3-Dinitrobenzene	200 (N)	7.8 (N)
1,4-Dinitrobenzene	820 (N)	31 (N)
2,4-Dinitrotoluene	4,100 (N)	160 (N)
2,6-Dinitrotoluene	2,000 (N)	78 (N)
Dinitrotoluene mixture	8.4 (C)	0.94 (C)
HMX	100,000 (N)	3,900 (N)
Nitrobenzene	1,000 (N)	39 (N)
Nitroglycerine	410 (C)	46 (C)
m-Nitrotoluene	41,000 (N)	1,600 (N)
o-Nitrotoluene	20,000 (N)	780 (N)
p-Nitrotoluene	20,000 (N)	780 (N)
RDX	52 (C)	5.8 (C)
Tetryl	20,000 (N)	780 (N)
1,3,5-Trinitrobenzene	61,000 (N)	2,300 (N)
2,4,6-Trinitrotoluene	190 (C)	21 (C)
Aluminum	2,000,000 (N)	78,000 (N)
Lead	1,000(1)	400(1)
Tin	1,200,000 (N)	47,000 (N)

C Carcinogenic effects
N Noncarcinogenic effects
1 OSWER Directive 9355.4-12

Section J
Solid Waste Management Units

SECTION J

Solid Waste Management Units

A Federal Facility Agreement (FFA) has been established between the Environmental Protection Agency and the U.S. Department of the Navy. The FFA, which was established under CERCLA Section 120, establishes a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at ABL in accordance with CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA), RCRA, RCRA guidance and policy, and applicable State law.

The FFA provided the framework under which a number of SWMUs at ABL have already been investigated. The remaining SWMUs may be addressed under the FFA or outside the auspices of the FFA as appropriate.

Section K
Other Federal Laws

SECTION K

Other Federal Laws [40 CFR 270.3]

The requirements of the following federal laws must be met when they apply to the hazardous waste storage and treatment facilities at ABL.

K-1 The Wild and Scenic Rivers Act [40 CFR 270.3(A)]

Because the North Branch Potomac River is not designated as a component of the national wild and scenic rivers system, this requirement does not apply to ABL.

K-2 The National Historic Preservation Act of 1966 [40 CFR 270.3(b)]

A search of the National Register of Historic Places found seven registered historic sites in Mineral Country, WV and 38 registered sites in Allegany County MD. The closest registered sites to the ABL facility are Fort Ashby (Fort Ashby) and Stewart's Tavern (Short Gap) in Mineral County, WV. Stewart's Tavern is located approximately 2 miles southeast of the ABL facility. Fort Ashby is located about 5 miles southeast of ABL. There are no historic sites in Allegany County, MD within 5 miles of the ABL facility.

ABL will coordinate with the State Historic Preservation Officers and, possibly, the Advisory Council of Historic Preservation only if it is determined that permit activities have the potential to affect these historic sites.

K-3 The Endangered Species Act [40 CFR 270.3(c)]

Impacts of the hazardous waste storage and treatment facilities on endangered or threatened species were considered in the Ecological Risk Assessment provided in Appendix C.

K-4 The Coastal Zone Management Act [40 CFR 270.3(d)]

This act does not apply to any operations at ABL because ABL is not in a coastal zone.

K-5 The Fish and Wildlife Coordination Act [40 CFR 270.3(e)]

40 CFR 270.3 references 16 U.S.C. 661 et seq., Sections 661 - 666c, of the Fish and Wildlife Coordination Act (Chapter 5A) require coordination with the U.S. Fish and Wildlife Service on permit activities that affect wildlife conservation including water resources. Section 665 of this act also provides the U.S. Fish and Wildlife Service authorization to conduct investigations to determine the affects of domestic sewage, mine, petroleum, and industrial wastes, erosion silt, and other polluting substances on wildlife.

Although the operation of the facilities at ABL does not result in the impoundment, diversion, control or modification of any surface water bodies, the Ecological Risk Assessment addresses permit activities that impact water quality and other issues that are determined to impact wildlife resources of this area.

K-6 Clean Water Act (33 USC 1251 et seq) [General Reference in 40 CFR 270.3]

Requirements referenced in various sections of 40 CFR 270 are met, as applicable, by the units. The facility currently has a groundwater extraction system covered under CERCLA, which discharges into the North Branch Potomac River. The facility currently discharges under a letter of authorization; however, upon issuance of the RCRA Part B permit, the facility will apply for an NPDES permit.

K-7 Safe Drinking Water Act (42 UCS 300f) [General Reference in 40 CFR 270.3]

Requirements referenced in various sections of 40 CFR 270 are met, as applicable, by the units.

K-8 Clean Air Act (42 USC 7401) [General Reference in 40 CFR 270.3]

Requirements referenced in various sections of 40 CFR 270 are met, as applicable, by the units. This facility, including the Burning Grounds is covered under a Title V Operating permit. This permit contains no specific requirements for the Burning Grounds or waste storage areas. Construction of the new burn pads will require a modification to the existing Title V operating permit.

K-9 Resource Conservation and Recovery Act (42 USC 6901 et seq) [General Reference in 40 CFR 270.3]

Requirements referenced in various sections of 40 CFR 270 are met, as applicable, by the units.