N91571.AR.002139
NIROP ABL ROCKET CENTER
5090.3a

DRAFT ENGINEERING EVALUATION AND COST ANALYSIS BERYLLIUM LANDFILL 7 ABL ROCKET CENTER WV

11/7/1995

NAVFAC MIDLANT

DRAFT ENGINEERING EVALUATION AND COST ANALYSIS
BERYLLIUM LANDFILL, SITE 7
ALLEGANY BALLISTICS LABORATORY, WEST VIRGINIA

Prepared by
Naval Facility Engineering Command Atlantic Division

November 7, 1995

TABLE OF CONTENTS

ABBREVIATIONS

ABL	Allegany Ballistics Laboratory
ARARs	Applicable or Relevant and Appropriate Requirements
AWQC	Ambient Water Quality Criteria
Be	Beryllium
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chemicals of Concern
DNR	State of West Virginia Department of Natural Resources
DOD	Department of Defense
DOT	Department of Transportation
EE/CA	Engineering Evaluation and Cost Analysis
EP toxicity	Extraction Procedure toxicity
HDPE	High Density Polyethylene
Hg	Mercury
IAS	Initial Assessment Study
IRP	Installation and Restoration Program
MCL	Maximum Contaminant Level
NACIP	Navy Assessment and Control of Installation Pollutants Program
NCP	National Oil and Hazardous Substance Pollution Contingency Act
NEESA	Naval Energy and Support Activity
NEPA	National Environmental Policy Act of 1969
OSHA	Occupation Safety and Health Act
PCBs	Polychlorinated Biphenyls
PEP	Propellants, Explosives, and Pyrotechnics
PPE	Personal Protective Equipment

RAOs	Remediation Action Objectives
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SARA	Superfund Amendment and Reauthorization Act of 1986
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
TLC	Target Compound List
USEPA	United States Environmental Protection Agency
WV DEP	West Virginia Division of Environmental Protection

EXECUTIVE SUMMARY

This report presents an Engineering Evaluation and Cost Analysis (EE/CA) for a non-time-critical removal action for Site 7, the Beryllium Landfill, at the Allegany Ballistics Laboratory (ABL) in West Virginia. ABL is a government-owned, contractor-operated (Hercules Aerospace Corporation) research, development, testing, and production facility for solid propellant rocket motors. The facility lies between the North Branch Potomac River on the north and west and Knobly mountain on the south and east. Site 7 is directly south of the main administration building, and adjacent to State Route 956. The Site 7 landfill material has already been excavated and is currently in two 20 cubic yard steel containers at Site 5 at the ABL facility. This EE/CA addresses human health exposure and environmental concerns, and compares three removal alternatives for treatment and/or disposal of the landfill material.

This document was prepared to facilitate public participation in the decision-making process and is available for public review and comment regarding the Navy's tentatively selected removal action for Site 7. Submittal of this document fulfills the requirements of the National Environmental Policy Act of 1969 (NEPA) for non-time-critical actions and the requirements defined by CERCLA, SARA, and the NCP. This EE/CA was in accordance with USEPA's guidance document *Superfund, Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA*, PB93-963402 January 1993.

The following information is presented in the EE/CA:

- Site description and analytical data.
- Identification of the removal action objectives.
- Identification of removal action alternatives and technologies.
- Recommendation of a preferred removal alternative.

The EE/CA compares three removal alternatives based on their technical feasibility, ability to protect human health and the environment and to prevent the potential release of hazardous constituents, and cost. Individual goals of this EE/CA are to: (1) satisfy environmental review

and public relations requirements for removal actions, (2) satisfy administrative record requirements for documenting the removal action selection, and (4) provide a framework for evaluating and selecting alternative technologies.

The objective of the removal action is to prevent hazardous contaminants, pollutants and/or constituents from being released to or from the shallow subsurface soil media and prevent the release of hazardous contaminants, pollutants and/or constituents from bulk storage containers. The removal action described herein will address disposal of soil and debris mixed with beryllium, mercury, and propellant, explosives, and pyrotechnics (PEP) removed from Site 7.

The three removal action alternatives evaluated in the EE/CA are:

1. Materials that have been excavated from Site 7 will be screened, segregated into several waste streams, and sampled. The most likely waste streams will be (1) vials of beryllium, (2) vials of mercury, (3) PEP, and (4) soils. Following segregation of the material, samples will be collected and analyzed to determine waste profiles.

   Waste classified as beryllium (P015) or mercury (D014) will be treated in accordance with land disposal restrictions and will be reclaimed or recycled. PEP will be disposed of onsite, under the facility's RCRA subpart X permit. Any additional waste generated during the removal action will be disposed of either in a RCRA permitted Subpart D or Subpart C landfill, depending on analytical results.

2. Materials that have been excavated from Site 7 will be resampled and a disposal variance will be sought from the US EPA Region III and West Virginia Division of Environmental Protection based on the technical impracticability of treating the beryllium/mercury/PEP mixed waste.

   Upon receipt of a variance a disposal facility will be located and a variance request will be

sought from the receiving state. Once all necessary variances are received the material will be disposed of offsite as a hazardous waste.

3. Materials that have been excavated from Site 7 will be placed at a secured location at ABL. A long term storage facility will be constructed and the steel intermodal containers will be placed into the unit. A chainlink fence will be erected around the containers.

   The containers will remain onsite until an offsite future treatment/disposal facility is available and permitted to receive the mixed waste from the containers.

Based on a comparative analyses of the three removal alternatives, the recommended removal action is Alternative 1. This alternative is recommended because it will achieve the removal action objectives and is judged to be the highest ranked alternative in effectiveness and implementability.

1.0 INTRODUCTION

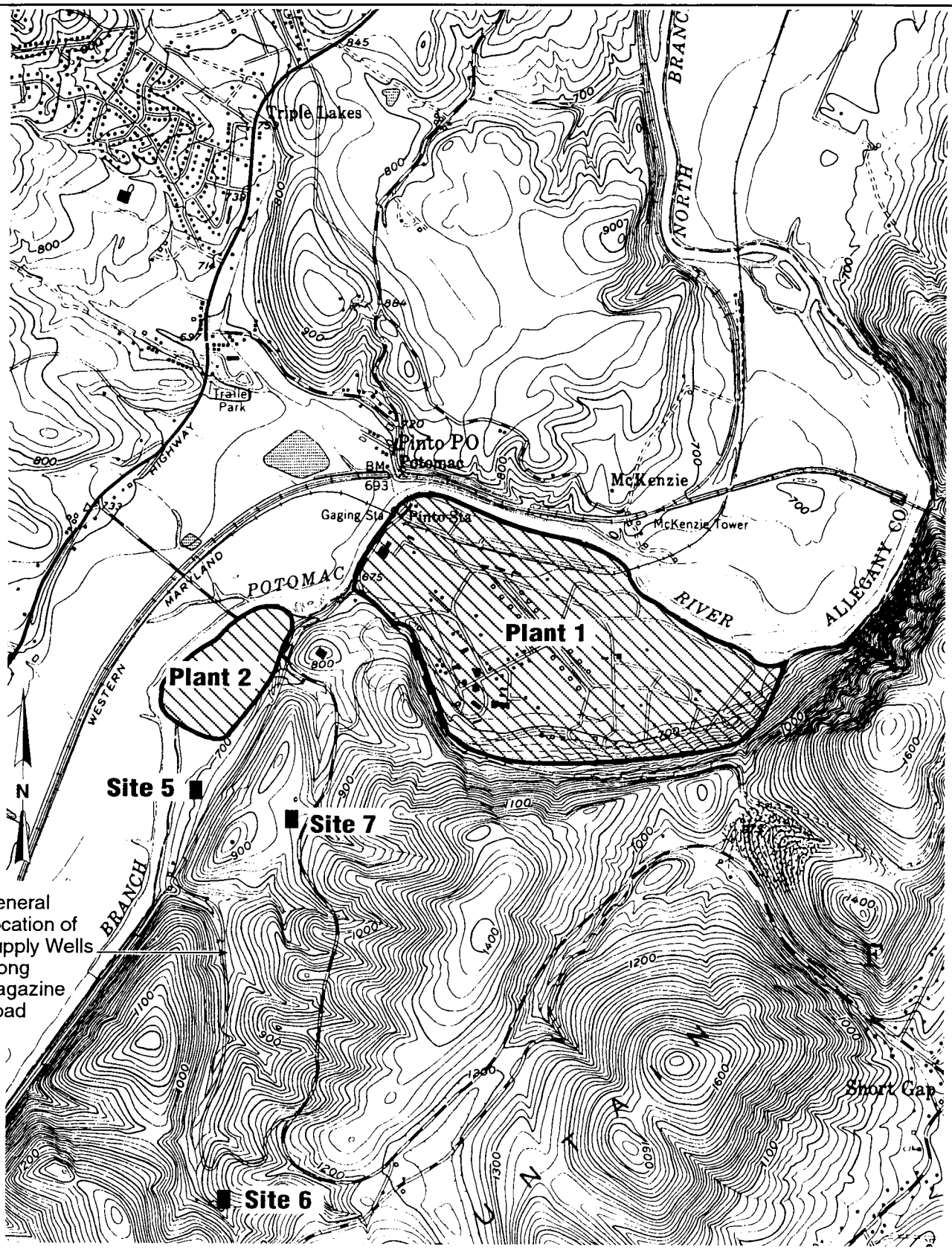
This report presents an Engineering Evaluation and Cost Analysis (EE/CA) for a non-time-critical removal action for Site 7, the Beryllium Landfill, at Allegany Ballistics Laboratory (ABL), in West Virginia. ABL is a government-owned, contractor-operated (Hercules Aerospace Corporation) research, development, testing, and production facility for solid propellant rocket motors. The facility lies between the North Branch Potomac River on the north and west and Knobly mountain on the south and east. Site 7 is located directly south of the main administration building, Building 300, and adjacent to State Route 956. Figure 1-1 shows the location of Site 7 with respect to the ABL facility. Figure 1-2 show the locations of Site 7 with respect to State Route 956. This document was prepared to facilitate public participation in the decision-making process and is made available for public review and comment regarding the Navy's tentatively selected removal action for Site 7.

The following information is presented within the EE/CA:

- Site description and analytical data.
- Identification of the removal action objectives.
- Identification of removal action alternatives and technologies.
- Recommendation of a preferred removal alternative.
- Schedule for the selected removal alternative.

1.1 Regulatory Background

This document is issued by the U.S. Department of the Navy, the lead agency responsible for Site 7 remediation. The Navy became the lead agency through the president's signing of Executive Order 12580 on January 23, 1987. This Executive Order delegated the president's authority under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the Superfund Amendments and Reauthorization Act of 1986 (SARA) to federal agencies such as the Department of Defense (DOD) and Department of the Navy. This authority gave the Department of the Navy the responsibility, as lead agency, for conducting



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

0 1000 2000

Scale in Feet

Figure 1-1
LOCATION MAP
Site 7 EE/CA
Allegany Ballistics Laboratory

CH2MHILL

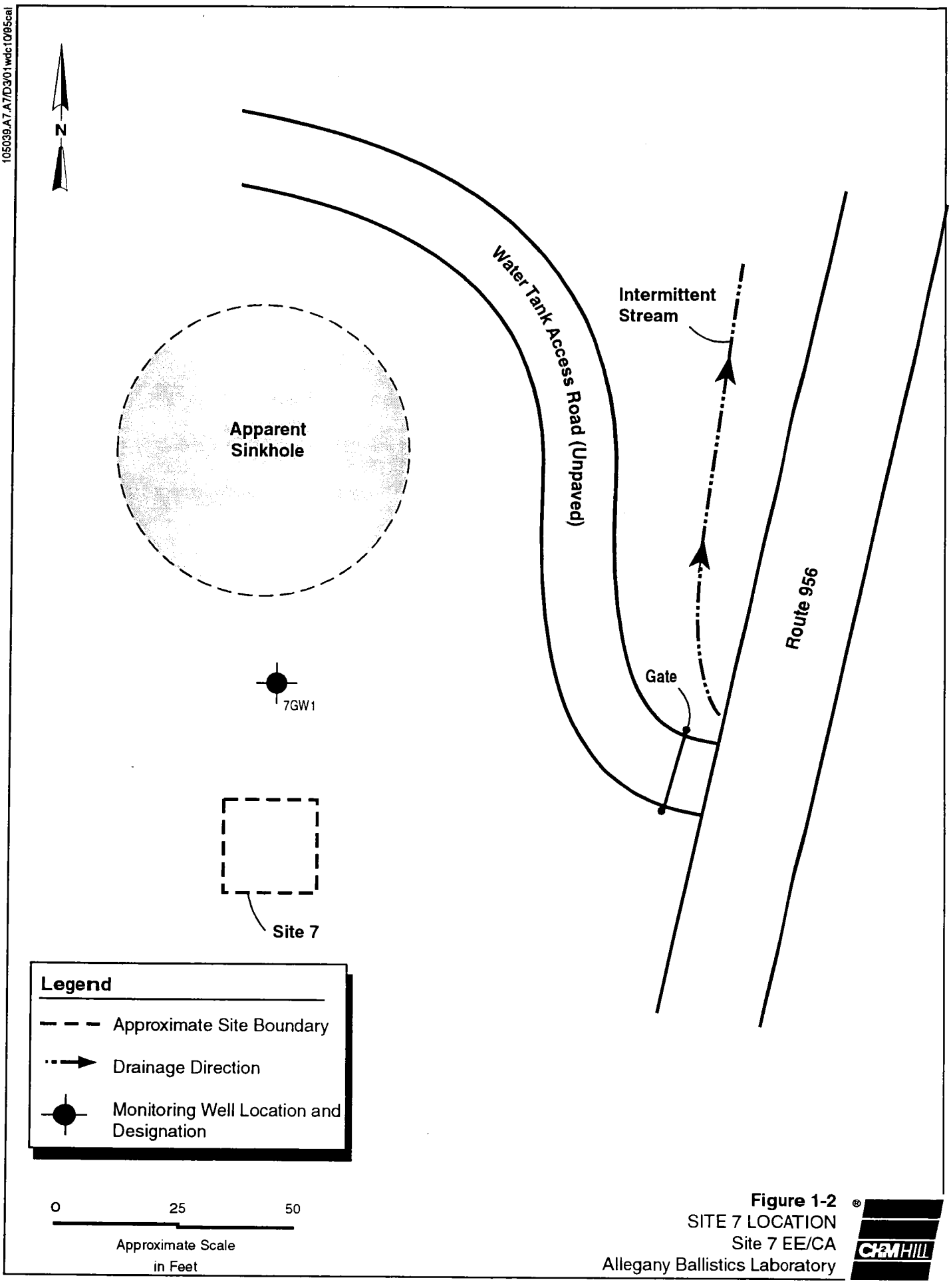


Figure 1-2
SITE 7 LOCATION
Site 7 EE/CA
Allegany Ballistics Laboratory

Table 2-1
BEDROCK STRATIGRAPHIC UNITS OF THE WILLS MOUNTAIN ANTICLINORIUM
UNDERLYING THE ABL FACILITY

System	Formation	Description	Appropriate Thickness (ft)
Devonian	Marcellus Shale	Shale, thinly laminated to fissile, black or grayish black, pyritic.	250[1]
	Needmore Shale	Shale, usually calcareous, non fissile, medium dark gray	100[1]
	Oriskany Formation	Sandstone, calcareous and cherry at bottom, siliceous at top, coarse-grained, bluish	180 to 200[2]
	Heidelberg Group	Limestone, medium to dark gray with interbeds of crystalline limestone and dark gray chert nodules. Prominent basal unit called the Kayser Formation.	467[1]
Silurian	Tonoloway Formation	Argillaceous dolomitic limestone with interbedded calcareous shale, dark gray.	625[3]
	Wills Creek Formation	Calcareous shale and interbedded argillaceous limestone, medium to dark gray. Williamsport, Sandstone Formation at base (21 feet thick), consisting of an upper and lower sandstone unit separated by shale or limestone.	467[3]
	Mifflintown Formation: McKenzie Member	Shale, calcareous, medium gray, and interbedded argillaceous limestone.	241.5[3]
	Rochester Member	Shale, fissile, medium to dark gray, interbedded with fossilferous limestone.	28[3]
	Keefer Member	Sandstone, fine-grained, dark gray, overlain by a thin seam of oolitic hematite.	7.5[3]
	Rose Hill Formation	Shale interbedded with lesser amounts of sandstone; a few beds of highly fossiliferous dolomitic limestone at the top of the formation. Greenish-gray to moderate brown.	420[2]

Sources for Lithologic Descriptions: Clark (1967), Dyott(1956), Eddy(1964), and Helfrich (1975).
Sources for Thickness: [1]Eddy (1964), [2]Dyott (1956), [3]Helfrich (1975).

the topography surrounding the site is gently sloped to the north at approximately an 8% grade. The area immediately north of the site has a slightly greater topographic relief.

2.1.4 Hydrology

The predominant hydrologic feature in the vicinity of ABL is the North Branch Potomac River, which borders the western and northern sides of the facility. The elevation of the river ranges from about 655 feet msl, in the vicinity of Site 5, to about 645 feet msl at the eastern end of the facility.

Surface water from Site 7 flows northward down Knobly Mountain towards the North Branch Potomac River, which is approximately 2,000 feet downgradient of the site.

2.1.5 Climate

Northeastern West Virginia has a semi-humid continental climate characterized by warm summers and cold winters and an even distribution of precipitation. At Cumberland, Maryland, the closest official recording station to ABL, the average annual temperature is 53.0 degrees Fahrenheit, with an average annual precipitation of 35 inches. However, annual precipitation averages about 50 inches along the divide in western Mineral County where ABL is located. Annual evaporation averages approximately 33 inches in the vicinity of ABL. Temperature, total precipitation, and snowfall are all somewhat variable within the region due to the mountainous topography. (NEESA, 1983)

2.1.6 Surrounding Land Use

The land surrounding ABL consists of undeveloped woodland, cropland, and a limestone quarry. The property approximately 3/4 of a mile west of Site 7, on the Maryland side of the North Branch Potomac River, is primarily bottomland and is used for growing crops. A limestone quarry is approximately 3/4 of a mile south of Site 7 adjacent to State Route 956. The land east of Site 7, off of Plant 1, is divided by a mountain ridge and is undeveloped woodlands and croplands.

There are currently between 400 to 500 employees at ABL. The majority of the employees work at Plant 1 which is one-half mile from Site 7. There are no known residents within one-half mile radius of Site 7, and it is estimated that less than 50 residents live within a one mile radius. Residents on the other side of the North Branch Potomac River use groundwater as their water supply. The North Branch Potomac River is not used as a water supply in the vicinity of ABL, but may be used for recreational activities such as boating, fishing, and swimming.

2.1.7 Terrestrial Flora and Fauna

Terrestrial flora at ABL is predominantly woodland species. The predominant tree stand is oak-hickory-pine forest. This area was probably originally dominated by oak-chestnut forest, but cutting of large oaks and elimination of chestnut by blight have allowed hickory and pine to become established. Site 7 and the area immediately adjacent is a small open area surrounded by oak-hickory-pine forest (NEESA, 1983).

The undeveloped areas within the facility support a variety of indigenous wildlife species such as white-tailed deer, woodchuck, gray fox, opossum, squirrel, raccoon, and rabbit, as well as game birds such as wild turkey and quail. The area also has a rich herpetofauna (reptiles), which include both northern and southern species at the limits of their range (NEESA, 1983).

2.1.8 Aquatic Flora and Fauna

Aquatic flora and fauna are not present at Site 7.

2.1.9 Wetlands

Wetlands are not present at Site 7.

2.2 Regulatory and Investigative Background

In the early 1960's, ABL requested and obtained a permit from the State of West Virginia (permit 3324) to establish a landfill for waste disposal, specifically beryllium. ABL was

conducting research on propellants containing beryllium and needed to dispose of both beryllium-containing propellants and beryllium. A small (10-feet by 15-feet by 6-feet deep) earthen pit was created, and was used intermittently in the 1960s to dispose of beryllium-contaminated waste. The work with beryllium at ABL ceased in the late 1960's.

Records documenting the material disposed of at Site 7 were not kept and identification of material disposed of in the landfill was based on conversations with personnel who were involved at the time the site was active. The following information was gathered from the personnel:

1. No beryllium-containing propellant was landfilled.
2. Beryllium-containing wastes included wiping tissues, gloves, emptied containers, and respirator cartridges which might be contaminated with metallic beryllium or beryllium oxide.
3. The total quantity of waste disposed of in the landfill was "small". The landfill was approximately 150 square feet in area and 6 feet deep. Waste was placed in the pit and covered with a few shovels of dirt.
4. A small quantity of laboratory chemicals was also placed in the landfill, however no one was able to provide information as to specific chemicals or chemical types.

The site was inspected in January 1979 and officially closed on June 28, 1979. In June 1980 the landfill was again inspected by the State of West Virginia and the facility was directed to remove the landfilled waste. The activities that followed this request are detailed below.

2.2.1 Initial Assessment Study

Prior to initiation of the Installation Restoration Program (IRP) at ABL, environmental investigations were conducted under the Navy Assessment and Control of Installation Pollutants (NACIP) program. The NACIP program called for two primary phases, the Initial Assessment Study (IAS), and the Confirmation Study. The Navy completed an IAS (NEESA, 1983) in 1983 to identify areas where hazardous substances, pollutants, or contaminants may exist as a result of

the facilities past hazardous material storage, handling, and waste disposal operations. The IAS identified the beryllium landfill as an area where hazardous substances may exist, and reported that a maximum of 2 pounds of beryllium, which was used experimentally in the production of propellant, was buried in the pit. In addition, the IAS reported that less than 100 pounds of miscellaneous unidentified overage laboratory chemicals were disposed of in the pit in an isolated event. Soil from a nearby area was used as cover material for the pit, and 3 to 4 feet of soil cover the buried waste (NEESA, 1983).

The IAS concluded that the extent of potential groundwater contamination resulting from leaching and downward migration of beryllium and other potentially hazardous compounds is likely to be minor because of the small amounts of waste which were disposed of in the landfill. (NEESA, 1983)

Coordination efforts with the State of West Virginia Department of Natural Resources (DNR) regarding final disposition of the material in the landfill were on-going during the IAS. The IAS recommended no further action in the Confirmation Study which was the next step in the NACIP Program.

2.2.2 Interim Remedial Investigation

In 1984 the Navy decided that additional information was required to assess the environmental risks posed by Site 7. The Navy conducted a Confirmation Study under the NACIP program. In 1986, the NACIP program was changed to the Navy's Installation Restoration Program (IRP) to comply with the requirements of CERCLA as amended by SARA. SARA required Federal Agencies to institute a program which followed the requirements of CERCLA along with standard Superfund policies and procedures. As a result, the Confirmation Study was re-titled to be consistent with CERCLA terminology as an Interim Remedial Investigation (Interim RI).

During the Interim RI three tests pits were excavated at Site 7 (Figure 2-1). Composite samples were collected from each test pit at 0-3 feet, and from one test pit at 3-6 feet. All of the samples

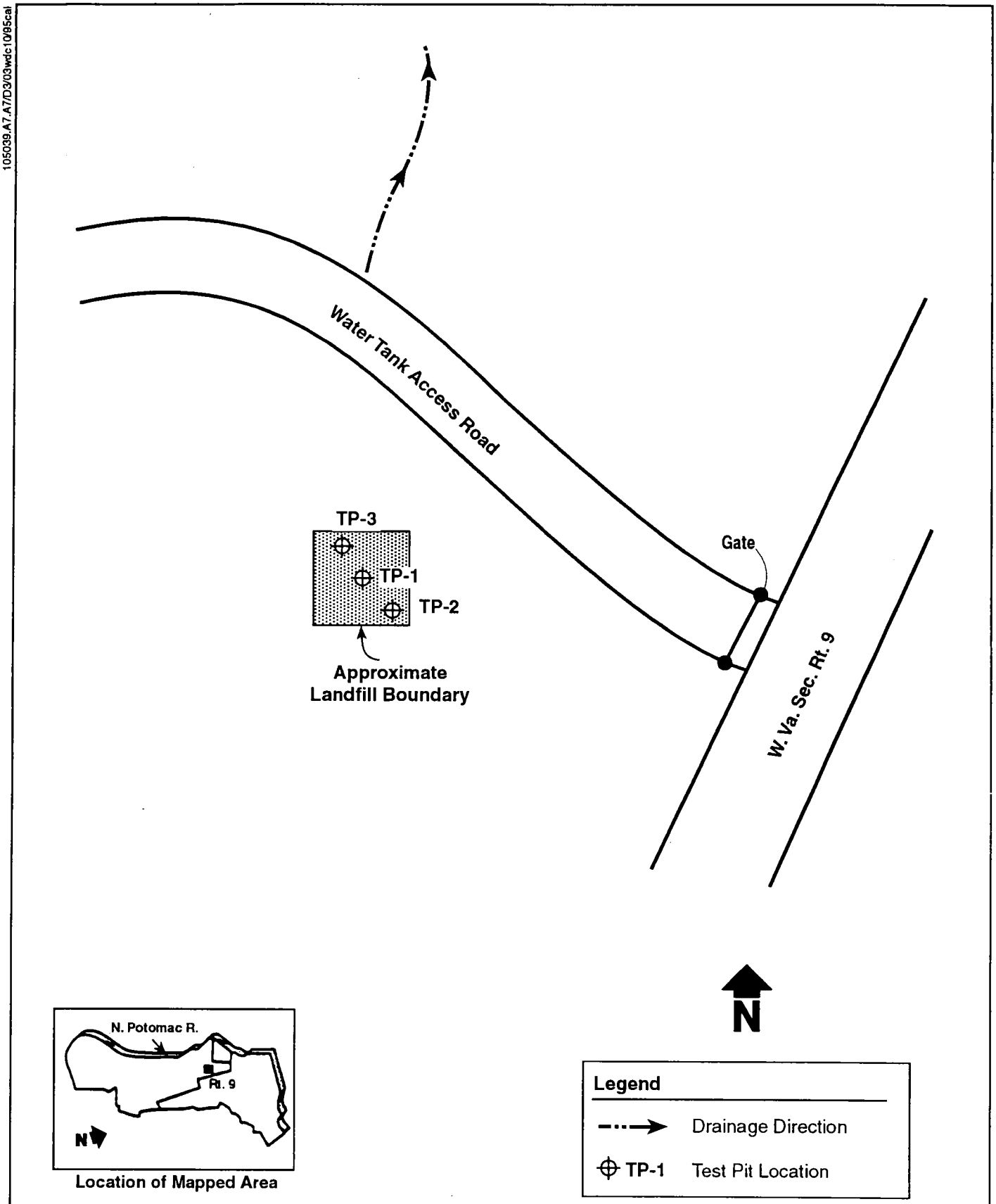


Figure 2-1
SITE 7 BERYLLIUM LANDFILL
Site 7 EE/CA
Allegany Ballistics Laboratory

CH2MHILL

were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, metals, cyanide, phenols and EP toxicity. Analytical data is presented and discussed in Section 2.3.

The Interim RI concluded that beryllium was not a concern at the concentrations detected at Site 7. Mercury and silver were the only inorganics detected at concentrations above background levels, but the EP Toxicity test results for mercury and silver were below regulatory levels. The Interim RI recommended that a groundwater monitoring well be installed downgradient of the site and sampled for full EPA Target Compound List (TLC) parameters to assess any impact to groundwater.

2.2.3 Remedial Investigation

In July 1992 a groundwater monitoring well was installed downgradient of Site 7. The well was sampled in October 1992 and analytical results are presented in Section 2.3.

2.2.4 Construction Investigation

The Navy initiated an investigation to excavate and characterize the waste from Site 7 for disposal under a Removal Action. In June 1994 the material from Site 7 was excavated and placed into steel storage containers. The results from the Interim RI were used to initially characterize the material as non-hazardous.

The excavation of the Site 7 landfill was completed June 30, 1994. Excavation began at the southern end of Site 7. The soil first excavated from the site was visibly clean and contained no debris. This soil was placed into the first 20 cubic yard (yd^3) container. As the excavation proceeded north, it was visually apparent where material had been placed into the ground. The material excavated from the remainder of the site that was visibly mixed with debris was placed into two remaining 20 yd^3 containers. Small vials (2 to 3 oz.) which were partially filled with a gray-white solid substance and a dark gray solid substance were observed within the debris. Various sized laboratory bottles were also mixed within the debris. During excavation, the

material was visually screened to remove a representative number of containers for further characterization of the material.

The excavation continued until the remaining soil was visibly free of containers and debris. When the excavation was complete, samples were collected from each of the sidewalls and the bottom of the excavation. The samples were analyzed for Contract Laboratory Program (CLP) Full Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. The analytical results of these samples are presented in Section 2.3. Analytical results from the samples were compared to USEPA Region III Risk Based Concentration (RBC) Table. This table provides chemical concentrations within a media that correspond to a fixed risk level of 10^{-6} or a hazard level of 1.0. The values in the table were used as a guideline to determine whether the excavation was complete.

Following excavation, the material in the vials was characterized as beryllium (Be) and beryllium oxide based on conversations with plant personnel. The solid gray-white material in the vials was identified as a beryllium-oxide and the solid dark gray material was identified as beryllium-powder (the marking "Be-Metal" was observed on one of the vials that was approximately 3 oz. and 1/2 full). A representative sample was sent to Brush Wellman in Elmore, OH, a RCRA treatment facility for Be, to evaluate treatment options. The facility rejected the sample because if contained both a small vial containing metallic mercury (Hg) and an unidentifiable cylindrical polymer object.

The unidentifiable object was returned to ABL where it was subjected to a series of tests. Initial analytical results concluded that the object was composed of approximately 50% nitroglycerin. The remaining 50% of the material was unknown but suspected of being a type of polymer coating. A hazard analysis was completed by ABL to determine the potential hazards associated with this material. Sensitivity testing indicated that the object is reactive. Positive reactions were obtained in both the ABL friction and impact tests at relatively low testing levels. However, no reactions occurred when a 25 LB weight was dropped on the sample from a height

of six feet, and the sample burned only moderately when exposed to a kerosene soaked sawdust fire. Based on the results of the tests, initiation of similar items is considered unlikely with prudent handling of the soil, and if initiated in an unconfined state, the most likely response is a moderate burning reaction. The results of the sensitivity testing are included as Appendix A.

Two composite samples of the excavated material were collected from the steel intermodal containers (one from the container with visibly clean soils and one from the two remaining containers) and analyzed for Toxicity Characteristic Leaching Procedure (TCLP). The results were negative, indicating that the waste was not a characteristic waste. The container which contained the visibly clean soils was determined to be non-hazardous and disposed of in a RCRA Subtitle D Landfill.

Currently, no disposal/treatment facility can be located that is licensed to receive the waste contained in the remaining two containers because of the multiple wastes; beryllium, mercury, and nitroglycerin. Three alternatives for removal of the waste from the site are evaluated in this document. These alternatives are presented in Sections 4.0 and 5.0.

2.3 Analytical Data

The analytical results of the soil samples discussed in the Interim RI are presented in Table 2-2. A total of four samples from three test pits were collected and analyzed. The samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, metals, cyanide, phenols, and EP toxicity. The Interim RI concluded that only silver and mercury were detected above background values. Concentration ranges for silver and mercury were 3.1 mg/kg to 12 mg/kg and 0.15 mg/kg to 28 mg/kg, respectively. Silver was detected in 2 of the 4 samples, and mercury was detected in all 4 samples. The EP toxicity tests for silver and mercury were negative, indicating a low potential for mobility of these constituents.

TABLE 2-2
Interim Remedial Investigation
Analytical Results of Constituents Detected in Soil Samples Collected from Test Pit Samples
Sample No. (depth in feet)

CONSTITUENT	SAMPLE NUMBER			
	TP-1-1 (0-3)	**TP-1-2 (3-6)**	**TP-2-1 (0-3)**	**TP-3-1 (0-3)**
Volatile Organics (µg/Kg)				
Methylene Chloride	22B	11B	47B	9B
Toluene	4J	2J	4J	ND
Metals (mg/Kg)				
Silver	12	ND	3.1	ND
Arsenic	3.4	4.9	3.1	6.3
Beryllium	1.1	2.3	ND	ND
Chromium	16	17	18	18
Copper	24	13	16	14
Mercury	0.2	28	0.99	0.15
Nickel	9	12	17	13
Lead	22	25	27	25
Zinc	42	51	50	46
EP Tox Mercury	ND	1.8	0.26	0.22
Phenol	0.18	0.14	0.17	0.16

J - Estimated Value
ND - Not Detected
B - Detected in an Associated Blank Sample

Well 7GW1 was installed in July 1992, 15 feet downgradient of Site 7. Well 7GW1 is screened from about 10 feet to 80 feet below ground surface. Well 7GW1 was sampled on October 29, 1992 and the sample was analyzed for volatile organics, explosives, and total metals. No volatile organics or explosives were detected in the groundwater sample. Analytical results of constituents detected in 7GW1 are presented in Table 2-3.

During the Construction Investigation, samples were collected from the walls and bottom of the Site 7 excavation and from the steel intermodal containers. Analytical results from the container samples are presented in Table 2-4, and analytical results from the excavation pit are presented in Table 2-5. The container samples were analyzed for TCLP and the excavation pit samples were analyzed for TCL organics and TAL inorganics.

2.4 Conditions that Justify Removal

A removal action is warranted at Site 7 under 40 CFR 300.415(b)(2)(ii) and (iii): actual or potential contamination of drinking water supplies; and hazardous substances, pollutants or contaminants in containers that may pose a threat of release.

The material in the small vials has been identified as beryllium dust which is acutely toxic. In addition to the beryllium dust, a small amount of metallic mercury was discovered in a glass vial, and a small item classified as PEP composed of approximately 50% nitroglycerin was also discovered. The quantity of waste mixed in with the soils is unknown. The soil and debris were excavated from Site 7 due to the potential contamination of groundwater which is used as a drinking water supply.

TABLE 2-3
Remedial Investigation
Analytical Results of Constituents Detected in Groundwater from Well 7GW1

CONSTITUENT	7GW1
Metals (µg/L)	
Aluminum	731
Antimony	12.4b
Barium	185b
Beryllium	0.54b
Calcium	126000
Chromium	6.0b
Copper	3.6b
Iron	520
Magnesium	11100
Manganese	39
Mercury	0.09b
Nickel	7.7b
Potassium	2910b
Sodium	6780
Zinc	47.5

b - reported value less than contract required detection limit but greater than instrument detection limit

TABLE 2-4
Construction Investigation
Analytical Results of Constituents Detected in Soil Samples Collected from Steel Intermodal Container Samples

CONSTITUENT	SAMPLE NUMBER		
	DA-001	**DA-002**	**Q-001 (Duplicate of DA-001)**
TCLP Volatiles (mg/L)			
Chloroform	< 0.125	< 0.125	0.135
TCLP Pesticides (mg/L)			
alpha-Chlordane	< 0.005	< 0.005	0.007
gamma-Chlordane	< 0.005	< 0.005	0.011
TCLP Metals (mg/L)			
Barium	1.03	0.529	0.418
Chromium	0.002	0.003	< 0.001
Mercury	0.0004	0.019	0.002
Total Metal (mg/Kg)			
Beryllium	NA	33.0	NA

NA - Not Analyzed

TABLE 2-5
Construction Investigation
Analytical Results of Constituents Detected in Soil Samples Collected from the Excavation of Sidewalls and Bottom of the Site 7 Beryllium Landfill

CONSTITUENT	SAMPLE NUMBER				
	N-001	**E-002**	**S-003**	**W-004**	**B-005**
Volatiles (mg/Kg)					
Acetone	0.009	0.009	0.009	0.01	<0.006
Semivolatiles (mg/Kg)					
bis(2-Ethylhexyl)phthalate	0.828	1.04	1.53	2.825	<0.408
Metals (mg/Kg)					
Aluminum	7590	12500	7390	8940	7850
Antimony	1.9	1.37	<0.851	<4.38	13.6
Arsenic	2.38	1.91	2.58	5.19	58.2
Barium	68.2	99.6	78.5	63.7	109
Beryllium	1.40	1.19	1.06	6.71	7.00
Cadmium	<0.034	<0.037	<0.031	<0.162	0.903
Calcium	2470	3720	2360	8340	7000
Chromium	16.6	14.9	9.82	13.4	16.1
Cobalt	14.0	15.2	8.08	11.5	22.1
Copper	11.6	14.0	7.14	10.7	16.4
Iron	27500	30700	17800	24700	23100
Lead	19.7	20.1	18.4	22.5	28.6
Magnesium	623	837	374	628	759
Manganese	873	415	671	510	438
Mercury	0.288	0.163	0.363	0.068	35.2
Nickel	13.9	16	5.85	10.3	21.2
Potassium	608	844	520	1060	944
Selenium	<0.633	<0.605	<0.533	<0.735	54.1
Silver	<0.179	<0.193	<0.166	<0.853	0.865

TABLE 2-5 (continued)
Construction Investigation
Analytical Results of Constituents Detected in Soil Samples Collected from the Excavation of Sidewalls and Bottom of the Site 7 Beryllium Landfill

CONSTITUENT	SAMPLE NUMBER				
	N-001	**E-002**	**S-003**	**W-004**	**B-005**
Sodium	13.9	18.5	14.8	103	253
Thallium	<1.27	<1.21	<1.07	1.6	51.8
Vanadium	19.3	22.2	17.3	22.4	31.5
Zinc	24.4	26.7	17.2	27.2	34.7

3.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

This section identifies the scope, goals, and objectives of the proposed removal action. The purpose, scope, and scheduling requirements for implementing the selected removal action alternatives are described to delineate any performance limits on the removal action described in the EE/CA based on time, budget, technical feasibility, and relevant criteria and standards. The potentially Applicable or Relevant and Appropriate Requirements (ARARs) for this removal action are presented and discussed in this section, along with other criteria specifically applicable to the removal action.

The goal of this non-time critical removal action is to prevent hazardous contaminants, pollutants and/or constituents from being released to or from the shallow subsurface soil media and prevent the release of hazardous contaminants, pollutants and/or constituents from bulk storage containers. This goal corresponds to 40 CFR Section 300.415(b)(2)(iii). The specific objectives developed for this site include: (1) excavation of the material, (2) restricting access to the material, (3) characterization of the material, and (4) removal, treatment, and disposal of the material from the site. Since the material has already been excavated from the site, the remaining three objectives will be achieved by the removal action. The objectives will be achieved by meeting specified cleanup levels while working within the statutory limits and attaining ARARs to the extent practicable.

3.1 Statutory Limits in Removal Actions

Statutory limits regarding the cost and duration of federally driven, fund-financed, removal actions do not apply to this removal action because the Navy is the lead agency.

3.2 Removal Action Scope

The scope of the removal action is limited to the approximately 35 yd^3 of material that has been excavated from Site 7 and has been placed into two steel intermodal containers which are

currently located at Site 5. The removal action will be to properly treat and/or dispose of the excavated material based on its characteristics.

3.3 Removal Action Schedule

The removal action for the above scope is expected to begin at the beginning of January, 1996 and be completed in 8 weeks, if weather permits.

3.4 Applicable or Relevant and Appropriate Requirements

The removal action will, to the extent practicable, attain ARARs under federal and state environmental laws, as described in 40 CFR 300.415(i). Other federal and state advisories, criteria, or guidance, will, as appropriate, be considered in formulating the removal action. Applicable requirements are those requirements specific to the conditions at Site 7 that satisfy all jurisdictional prerequisites of the law or requirements. Relevant and appropriate requirements are those that do not have jurisdictional authority over the particular circumstances at Site 7, but are meant to address similar situations, and, therefore, are suitable for use at Site 7. Federal ARARs are determined by the lead agency, who in this case is the Department of the Navy. As outlined by the 40 CFR Section Part 300.415(i), the lead agency may consider the urgency of the situation and the scope of the removal action to be conducted in determining whether compliance with ARARs is practicable. The WV DEP is responsible for providing the state ARARs.

ARARs are generally divided into three categories: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs are particular to individual contaminants. Location-specific ARARs are restrictions placed on the concentrations of hazardous substances or the conduct of activities based on the location of the site (e.g., wetlands, floodplains, etc.). Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous waste.

The following sections present ARARs that must be attained or considered as part of this removal action.

3.4.1 Chemical-Specific ARARs

Chemical-specific ARARs are health or risk management-based numbers or methodologies that result in the establishment of numerical values for a given media that would meet the NCP "threshold criteria" of overall protection of human health and the environment. These requirements generally set protective cleanup concentrations for the chemicals of concern (COC) in the designated media or set safe concentrations of discharge for remedial activity.

The Navy proposed health based levels for beryllium and mercury in soil which were accepted by WV DEP in a letter from Mr. Thomas L. Bass dated May 31, 1995. The health based levels were calculated using the US EPA Region III Risk Based Concentration Table for a commercial industrial exposure scenario. The health based level for beryllium is 13 mg/kg, based on a cancer risk of 1×10^{-5}. The health based level for mercury is 305 mg/kg, based on a hazard quotient of 0.5.

Additional chemical-specific ARARs include Maximum Contaminant Levels (MCLs) for groundwater and Ambient Water Quality Criteria (AWQC) for surface water. These ARARs would need to be considered if soil and debris from Site 7 or the chosen remedial activity were to adversely affect groundwater or surface water.

3.4.2 Location-Specific ARARs

Location-specific ARARs restrict remedial activities and media concentrations based on the characteristics of the surrounding environments. Location-specific ARARs may include restrictions on remedial actions within wetlands or floodplains, near locations of known endangered species, or on protected waterways. Site 7 is not located within a wetland or floodplain, therefore ARARs associated with wetlands and floodplains are not applicable or appropriate for Site 7.

Fish and Wildlife Coordination Act (16 USC 661, et seq. [40 CFR 6.302]): The Fish and Wildlife Coordination Act requires protecting fish and wildlife from actions modifying streams or areas affecting streams. There are no plans to disturb or modify any streams in the area.

Endangered Species Act (16 USC 1531 et seq. [50 CFR 200, 50 CFR 402]): The Endangered Species Act requires action to avoid jeopardizing the continued existence of endangered or threatened species or modifying their habitat. Except for the occasional transient individuals, no federally listed or proposed endangered species are known to exist within the vicinity of ABL.

3.4.3 Action-Specific ARARs

Action-specific ARARs are usually technology- or activity-based requirements or limits. ABL is required to follow the Navy's IRP, which details factors to be considered in determining a removal action's appropriateness. These factors and how they relate to each removal alternative are discussed in the following subsections. Action-specific ARARs pertinent to the alternatives evaluated are discussed in Section 5.

Federal Hazardous Waste Regulations (40 CFR 268): These regulations provide standards that hazardous waste must meet when they are generated, stored, and disposed. The following technology-based standards apply as land disposal restrictions:

Contaminant	Waste Water	Non-waste Water (Technology Standard)
beryllium dust	NA	Thermal Recovery of Metals, Recovery of Metals
mercury	NA	Retorting, Roasting
nitroglycerin	NA	Biodegradation, Chemical Reduction, Chemical Oxidation, Carbon Adsorption Incineration

NA - Not Applicable

RCRA technology-based standards are required for disposing of beryllium dust, mercury, and nitroglycerin. These restricted wastes may be land disposed after they are treated using the methods identified above. These technology standards range from physical, chemical, and biological treatment to thermal treatment.

A restricted waste may be land disposed only if a Toxicity Characteristic Leaching Procedure extract (Method 1311) does not exceed the value in Table CCWE of 40 CFR Section 268.41 for any hazardous constituent listed in Table CCWE for that waste.

Hazardous Materials Transportation Act (49 CFR 170 and 171): These regulations provide rules for transporting hazardous materials. Transportation activities must conform with applicable requirements of 40 CFR Parts 262, 263, 761.40, and 761.65. Containers used for transportation of all contaminated materials shall comply with applicable U.S. Department of Transportation (DOT) regulations pertaining to packaging and 49 CFR Parts 173, 178, and 179. Labeling of all containers will be in accordance with DOT regulations pertaining to the transport of hazardous materials as specified in 49 CFR Part 172.

3.4.4 TBC Criteria

Contained-In Policy: The contained-in policy is derived from 40 CFR 261.3(c)(1) and 40 CFR 261.3(d)(2). The policy states that mixtures of environmental media and listed hazardous waste must be managed as if they are hazardous waste.

3.4.5 Other Requirements

Occupational Safety and Health Act (OSHA) (29 CFR 1910.120): The regulations provide requirements for hazardous waste workers. Workers who perform the removal action have to comply with the OSHA standards.

3.5 Disposal Requirements

Before any waste is disposed of, it will be characterized. The characterization will determine if the wastes meet the regulatory definition of a hazardous waste. A waste characterization will include, at a minimum, a description of the waste, the waste quantity, and laboratory results on representative samples using USEPA's TCLP, ignitability, and reactivity methods. In addition, full TCL/TAL analyses and explosives testing will be performed on representative samples from segregated soil. Segregated vials will be analyzed for metals. Segregated soil must meet ARARs for disposal in the Site 5 Landfill. If wastes are to be disposed of offsite, in addition to a waste characterization, written permission must be obtained from the receiving facility and from the state in which the disposal facility is located (if applicable).

Additionally, in accordance with CERCLA's offsite disposal policy, before a hazardous contaminant, pollutant, or constituent generated from a CERCLA removal action can be transferred to an offsite facility for storage, treatment, and/or disposal, efforts must be made to document that the offsite facility meets the following conditions: (1) it is operating in compliance with applicable federal laws and applicable state requirements, and (2) it has no uncontrolled releases of hazardous substances that are deemed relevant.

4.0 DESCRIPTION OF REMOVAL ACTION ALTERNATIVES

This removal action is unique because the material has already been excavated from the site. The excavation was completed in June 1994, and the excavated material was placed into steel intermodal containers for containment. Site 7 was initially excavated because of the small quantities of material known to exist, less than 100 cubic yards, and to characterize the material. This removal action will focus on the material in the containers that was removed from the landfill.

Three different removal alternatives were subjectively selected for further evaluation using best professional judgment and based on communications with WV DEP. Two removal alternatives are based on removal of the material from the site, and the third is based on long-term storage at the facility with future treatment and/or disposal.

Alternatives:

Alternative (1): This alternative includes, but is not limited to, the following actions. Materials that have been excavated from Site 7 will be screened, segregated into several waste streams, and sampled. The most likely waste streams will be (1) vials of beryllium, (2) vials of mercury, (3) PEP, and (4) soils. Following segregation of the material, samples will be collected and analyzed for chemicals of concern to determine waste profiles. Collected samples will also be analyzed using USEPA's TCLP, ignitability, and reactivity methods, and a full TCL/TAL analyses will be performed on soil. Segregated vials will be analyzed for metals.

Any waste classified as beryllium (P015) or mercury (D014, U151) will be treated in accordance with land disposal restrictions and will be reclaimed or recycled. Any propellants/explosives will be disposed of onsite, under the facility's RCRA subpart X permit. Any additional waste generated during the removal action will be disposed of either in a RCRA permitted Subpart D or Subpart C landfill, depending on analytical results.

Alternative (2): This alternative includes, but is not limited to, the following actions. Materials that have been excavated from Site 7 will be resampled and a disposal variance will be sought from the USEPA Region III and WV DEP based on the technical impracticability of treating the beryllium/mercury/PEP mixed waste.

Upon receipt of a variance a disposal facility will be located and a variance request will be sought from the receiving state. Once all necessary variances are received the material will be disposed of offsite as a hazardous waste.

Alternative (3): This alternative includes, but is not limited to, the following actions. The material will be placed at a secured location at ABL. A long term storage facility will be constructed and the steel intermodal containers will be placed into the unit. A chainlink fence will be erected around the containers.

The containers will remain onsite until an offsite future treatment/disposal facility is available and permitted to receive the mixed waste in the containers.

5.0 ANALYSIS OF REMOVAL ALTERNATIVES

The 40 CFR Section 300.415 requires evaluation of removal alternatives but does not establish the criteria for this evaluation. US EPA's "Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA", August 1993 provides guidance criteria for evaluating removal alternatives. Each alternative was evaluated with respect to these criteria and is summarized below.

5.1 Effectiveness

Each alternative was evaluated for its ability to meet the removal action objectives (RAOs) within the scope of the removal action. The RAOs, as stated in the previous sections, are to prevent hazardous contaminants, pollutants and/or constituents from being released to or from the shallow subsurface soil media and prevent the release of hazardous contaminants, pollutants and/or constituents from bulk storage containers. Meeting RAOs will reduce potential risk and hazard to humans and the environment. In addition, each alternative was evaluated for its effectiveness in reducing potential risk and hazard to humans and the environment. The following paragraphs evaluate the adequacy of the proposed actions relative to the protectiveness each alternative provides, and the ability of each alternative to achieve the RAOs.

5.1.1 Protectiveness

Protection of public health and community: Presently, the material excavated from Site 7 is contained in two steel intermodal containers in a secured area at the facility. All removal action work will be conducted within this area. The greatest protection to public health and the community is offered by removal of the material from the facility. Alternatives 1 and 2 involve removal of the material from ABL, and therefore, offer the same degree of protection. Alternative 3 offers the least protection because the time frame associated with the availability of a landfill for disposal is unknown, and therefore, it is unknown how long the material will remain at the site.

Protective of workers: Beryllium is a suspected carcinogen and a moderate fire hazard if exposed to an ignition source. Combustion products of beryllium, such as beryllium oxide, are highly toxic, and beryllium and beryllium oxide are inhalation hazardous to humans. Precautions must be taken to preclude inhalation of beryllium products. This can be accomplished by using personal protective equipment (PPE) during removal action activities. Appropriate PPE will be worn by workers during all field work and air monitoring will be conducted.

Other compounds of concern in the material excavated from Site 7 are mercury and nitroglycerin. Although these compounds are not expected to be present at significant concentrations, hazards associated with these compounds will be evaluated and the necessary safety precautions will be taken. Mercury is highly toxic and is a health hazard through inhalation, skin absorption, and eye contact. Mercury effects the human gastrointestinal tract and the central nervous system. The PPE used to prevent beryllium exposure will also prevent mercury exposure. A small solid cylindrical object containing nitroglycerin was found in the excavated soils. A Hazard Analysis was conducted on the object by ABL, and is presented in Appendix A. Results from the Hazard Analysis will be used to determine the appropriate level of protection for onsite workers in conjunction with OSHA requirements.

Alternatives 2 & 3 require the least amount of contact with material and therefore offer the greatest protection to workers.

Protective of the environment: Excavation of the material from Site 7 has greatly reduced the threat of migration of contaminants or pollutants to subsurface soils and groundwater.

Alternative 1 involves onsite handling of the material in the steel intermodal containers. All of the necessary protective measures will be taken while handling the material to protect the environment. The best protection is achieved by removing the material from the site using the minimal amount of field activities and disturbances possible. Alternative 2 and 3, which do not include separation of the material in the containers, offer greater protection then Alternative 1.

Alternative 2 offers greater protection then Alternative 3, because of the unknown time frame associated with onsite storage of the material under Alternative 3.

Complies with ARARs: The ARARs for the removal are discussed in Section 3.4. Compliance with chemical-specific ARARs will be achieved by all of the proposed alternatives. Air quality will be monitored during excavation and screening of the soils to determine if workers are taking the proper precautions and complying with OSHA regulations. All of the alternatives will comply with location-specific and action-specific ARARs.

5.1.2 Ability to Achieve RAOs

Threat reduction: The threat to human health and the environment from the material within the containers remaining onsite will be reduced by proper treatment/disposal of the material. All of the alternatives eventually reduce this threat by removing the material from the facility. The time frame in which this is achieved is much longer and possibly indefinite for Alternative 3 than for Alternatives 1 and 2.

Potential exposure to remaining risks: The material has already been excavated from Site 7, therefore the potential for exposure is limited to exposure to the material within the containers. The material is in steel containers that are securely covered with waterproof canvas tarps. In addition, an HDPE liner underlies the containers, and the containers are covered with a roof and surrounded by a bermed area. Access to the containers is limited because the containers are within the ABL facility, which is fenced and patrolled on a routine basis. The potential exposure to any remaining risk is very limited.

The material from Site 7 was excavated until the soil was visibly free of containers (vials) and debris. The excavation was then backfilled with clean soil. The potential for migration and exposure through the groundwater pathway has been significantly reduced by excavation of the material.

Long-term reliability for continued protection: Alternatives 1 and 2 provide the most reliable long-term protection because the soils are removed from the facility. Alternative 1 provides the most reliable long-term protection because it allows for greater accuracy in the identification of material and presently requires no variances from treatment technologies or land disposal restrictions. Alternative 1 also may involve treatment of the specific waste streams, which results in a reduction of toxicity and volume. Treatment that permanently and significantly reduces toxicity, mobility, or volume is EPA's preferred removal action methodology. Alternative 3 offers the least long-term reliability for continued protection, because of the unknown time frame for treatment/disposal and interim storage at the facility.

5.2 Implementability

Implementability focuses on the technical and administrative feasibility of implementing the alternative and the availability of various services and materials required during its implementation.

5.2.1 Technical Feasibility

Alternative 1: Alternative 1 involves a labor intensive effort to physically screen, segregate, and characterize all of the material contained within the two containers. The technical feasibility of this alternative is dependent on the extent to which the waste within the containers may have commingled with the soils. During excavation of the material from Site 7 a large number of intact containers were observed. Additionally, the soils within the containers have passed TCLP analysis. Based on these observations, it appears that any mixing of waste caused by the excavation and containerization of the soils is limited. The potential waste streams are beryllium dust, mercury, propellant/explosives, and soils. Visual identification will be used to segregate the waste.

The technical feasibility of Alternative 1 is limited to the worker's ability to segregate the waste. Segregation will be done based on visual characteristics of beryllium, metallic mercury, and PEP

solids. In order to properly characterize the remaining soils, a statistically based sampling plan will be developed to analyze for the contaminants of concern for disposal requirements.

Another consideration which may affect the technical feasibility of Alternative 1 is weather, including precipitation and cold, which may pose difficulties and delays during the field activities.

Alternative 1 provides a long-term solution by characterizing the material and removal of the different waste streams to offsite permitted treatment/disposal facilities.

Alternative 2: Alternative 2 is based on obtaining a waiver from the technology-based treatment standards established under 40 CFR Section 268.42. Under CERCLA 121(4) (c) a waiver may be obtained if compliance with such requirements are technically impracticable from an engineering perspective. The Department of the Navy, through an exhaustive effort, has been unable to locate a treatment/disposal facility that is permitted for the different treatment technologies that are required for beryllium, mercury, and nitroglycerin (PEP) waste under 40 CFR Section 268.42(a). The technical implementability of this alternative is based on the technically impracticable treatment of the mixed waste. The technology-based standard for each of the wastes contained within the soils is different and does exist, but no one facility is permitted for all of the waste codes. This can be documented and would be the basis of the technical impracticability for the variance request.

Alternative 2 provides a long term solution. If the variance was granted, the technology-based standard for one or more of the waste codes would be removed, and the waste could be landfilled in a hazardous waste landfill. Offsite disposal in a secure, permitted facility is technically viable because the designs of these facilities are based on standard engineering practices.

Alternative 3: Because the technology currently does not exist for Alternative 3, this alternative can not be implemented technically.

5.2.2 Availability

Alternative 1: Implementation of Alternative 1 requires the availability of OSHA 40-hour training for onsite workers. Additionally, all workers would be required to be trained in explosive identification and handling. The availability of workers, equipment, and material does not present a problem with the field operations.

Treatment/disposal facilities are available for treatment of individual waste streams classified as either beryllium dust (P015), mercury (D04 or U151), or nitroglycerin (P081). Once all of the gross contamination has been removed from the soils it is assumed that the soils will be classified as either a listed hazardous waste (P015) or a solid waste, based on the beryllium concentrations within the soils. The availability of facilities to received large amounts of P015 waste is limited, and Part B permit modifications may be required by disposal facilities to receive the quantity of P015 waste. The availability of this alternative is assessed as low to medium.

Alternative 2: If a variance is granted there is no guarantee that an offsite disposal facility will be found that will accept the Site 7 waste. The availability of disposal facilities can only be assessed through personnel communications until the necessary technology-based treatment standards variance is obtained. Based on personnel communications, at least one facility has said that it would accept the material if all waivers were obtained. Because of the uncertainty associated with locating a facility, the availability is assessed as low.

Alternative 3: Currently there is no available treatment/disposal facility for this alternative, and no estimate can be made on when a facility will be available.

5.2.3 Administrative Feasibility

Alternative 1: The administrative feasibility of this alternative depends on several factors, including acceptance of the waste classifications by regulatory agencies and the availability of offsite disposal facilities. Approval can be obtained when appropriate waste profile information

is submitted and appropriate fees are paid to the disposal facilities. The administrative feasibility of Alternative 1 is assessed as medium to high.

Alternative 2: The administrative feasibility of this alternative is based on obtaining a waiver of technology-based treatment standards for several waste codes from USEPA, WV DEP, and the state where the receiving facility is located. This process is outlined in 40 CFR 268. The administrative process is available and therefore this alternative is assessed as medium to high.

Alternative 3: The administrative feasibility of this alternative requires that a treatment facility be permitted to receive and dispose of the waste codes associated with the soils and debris. Based on best professional judgment the potential for this occurring is very low.

5.3 Cost

Total cost (present worth) of the alternatives

Appendix B contains supplemental tables detailing the cost estimate.

Statutory Limits: Statutory limits on the cost of federally driven removal actions do not apply to this removal action because the Navy is the lead agency.

Alternative 1:

The total cost for implementing Alternative 1 is estimated at $117,665.

Estimated Capital Cost ($): 117,665

Estimated Annual O & M Cost ($): 0

Estimated Duration of Removal (years): 0.2

Estimated Present Worth ($): 117,665

Alternative 2:

The total cost for implementing Alternative 2 is estimated at $141,868.

Estimated Capital Cost ($): 141,868

Estimated Annual O & M Cost ($): 0

Estimated Duration of Removal (years): 0.5

Estimated Present Worth ($): 141,868

Alternative 3:

The total cost for implementing Alternative 3 is estimated at $85,058.

Estimated Capital Cost ($): 39,659

Estimated Annual O & M Cost ($): 0

Estimated Duration of Removal (years): 5 years

Estimated Present Worth ($): 85,058

5.4 Comparative Analysis

In this section, the alternatives are compared against each other in order to evaluate the performance of each alternative in relation to each of the criteria. The criteria used in this comparison are the same used to analyze each alternative in Sections 5.1 through 5.3, specifically, effectiveness, implementability, and cost.

5.4.1 Effectiveness of Alternatives

The effectiveness of each alternative is the ability of the alternative to provide protection and achieve the RAOs. Alternatives 1 and 2 are the most effective alternatives because of the short time frame needed to accomplish the objectives. Because the long term reliability of Alternative 3 is unknown, the effectiveness of this alternative is judged to be much lower than Alternatives 1 and 2.

Alternative 1 provides the most reliable long term protection because it allows for greater accuracy in the identification of the material within the steel intermodal containers and disposal of the material without a variance. In addition, the beryllium and mercury waste streams will be

treated and reclaimed instead of land disposed. Alternative 1 appears to be the most effective alternative.

5.4.2 Implementability of Alternatives

Implementability focuses on the technical and administrative feasibility of implementing the alternative and the availability of various services and materials required during its implementation.

Although Alternative 3 is technically and administratively feasible, a definitive time frame can not be placed on the availability of the alternative. Therefore, Alternative 3 can not be implemented at this time.

Alternatives 1 and 2 are both technically feasible. The differences are in the availability and administrative feasibility of these two alternatives. The availability of a disposal facility for Alternative 2 is dependent on obtaining a variance of the treatment technology-based standards by USEPA, WV DEP, and the state receiving the waste. Because Alternative 1 has been assessed to be technically practicable under this EE/CA, the basis for obtaining a wavier can not be technically justified, unless Alternative 1 fails.

Alternative 1 appears to be the best implementable alternative.

5.4.3 Cost of Alternatives

Alternative 3 is the least expensive alternative at an estimated net present worth (NPW) of $85,000. Alternative 1 is more expensive than Alternative 3 with a NPW of $117,600 and Alternative 2 is the most expensive with a NPW of $141,800. Based on cost alone, Alternative 3 is the best alternative. However, costs for each alternative are relatively low.

6.0 Recommended Removal Action

The EE/CA was performed in accordance with current USEPA and Navy guidance documents for a non-time critical removal action under CERCLA. The purpose of this EE/CA was to identify and analyze removal actions to address the material excavated from Site 7, the beryllium landfill, at ABL. Three alternatives were identified, evaluated and ranked.

The comparative analyses of the removal alternatives included evaluating the effectiveness, implementability, and cost of each alternative. The effectiveness evaluation included reviewing the protectiveness of the alternative and it's ability to meet the removal action objectives. Implementability included looking at the technical feasibility, availability, and administrative feasibility of the alternatives. The evaluation of cost included a review of capital cost, operating cost, and present worth cost.

Based on the comparative analyses of the removal alternatives completed in Section 5.0, the recommended removal action is Alternative 1. Alternative 1 involves screening, segregating, and sampling the material that was excavated from Site 7 and is contained within the two steel intermodal containers. After segregation and sampling, the waste streams will be disposed of in accordance with RCRA regulations.

This alternative is recommended because it will achieve the RAOs and is judged to be the highest alternative in effectiveness and implementability. The cost for implementation of Alternative 1 is estimated to have a present worth of $117,665. Although the cost for this alternative is the not the lowest, it provides the most cost effective removal action because of the unknown time frame associated with Alternative 3, the lowest cost alternative.

7.0 REFERENCES

Allegany Ballistics Laboratory. 1989. Draft, Interim Remedial Investigation for Allegany Ballistics Laboratory, Mineral County, WV.

Allegany Ballistics Laboratory. 1992. Draft, Remedial Investigation of the Allegany Ballistics Laboratory.

Allegany Ballistics Laboratory, 1995. Draft, Final Workplan, Soil Segregation and Analysis for Allegany Ballistics Laboratory, prepared by OHM Remediation Services, Corp., May 16, 1995.

Environmental and Natural Resources Program Manual, OPNAVINST 5090.1A .

Naval Energy and Environmental Support Activity (NEESA). 1983 Initial Assessment Study of Allegany Ballistics Laboratory, West Virginia

Navy/Marine Corps Installation Restoration Manual. 1992.

U.S. Code of Federal Regulations. 1990. 40 CFR Part 300. National Oil and Hazardous Substances Pollution Contingency Plan.

U.S. Code of Federal Regulations. 1993. 40 CFR Parts 300-375. Superfund, Emergency Planning, and Community Right-To-Know Programs.

U.S. EPA. 1980. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), Public Law 96-510

U.S. EPA. 1988. CERCLA Compliance with Other Laws Manual: Interim Final. EPA/540/G-89/006.

U.S. EPA. 1991. CERCLA Compliance with Other Laws Manual: Part II. Clean Air Act and Other Environmental Statutes and State Requirements. EPA/540/G-89/009.

U.S. EPA. 1991. Superfund Removal Procedures: Guidance on the Consideration of ARARs During Removal Actions. EPA/540/P-91/011.

U.S. EPA. 1992. Superfund Removal Procedures: Public Participation Guidance for On-Scene Coordinators - Community Relations and the Administrative Record. OERR Publication 9360.3-05.

U.S. EPA. 1992. Community Relations in Superfund: A Handbook. OERR Directive 9230.0-03C.

U.S. EPA. 1993. Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA. OSWER Publication 9360.0-32. EPA540-R-93-057.

U.S. EPA, Region III. Risk-Based Concentration Table

Appendix A

Hazard Analysis of Material at Site 7

HERCULES
AEROSPACE

Interoffice Memo

March 1, 1995

HA 95-003

TO: D. A. McBride

FROM: L. B. Hinkle L B Hinkle

SUBJECT: Hazard Analysis of ABL Site 7 Scenarios

Summary

Sensitivity testing conducted on the item retrieved from Site 7 indicates that it is reactive. Positive reactions were obtained in both the ABL friction and impact tests at relatively low testing levels. However, no reactions could be obtained when a 25 lb weight was dropped on the sample from a height of six feet, and the sample burned only moderately when exposed to a kerosene soaked sawdust fire.

Based on the tests conducted, initiation of similar items (if present) is considered unlikely with prudent handling of the soil, and if initiated in an unconfined state, the most likely response is a moderate burning reaction. Situations in which very thin layers of material from the items could be trapped between hard materials (steel, rock, etc.) and subjected to impact or friction stimuli should be avoided.

The following safety procedures are recommended:

(1) If the soil is to be removed from the rolloffs by mechanical means (backhoe or equivalent), no personnel should be located at the rolloff. An enclosed unit or placement of a transparent shield between the equipment operator and the rolloff is recommended to provide protection against possible flying stones or soil particles in the event an item is present and becomes trapped between the backhoe and the rolloff and ignites.

(2) If the soil is to be handled manually, non-metallic long handled shovels or trowels or equivalent should be used. If hand screening of the waste occurs, non-metallic hand implements should be used to minimize friction and impact stimuli, and avoid direct hand contact with similar items, if present.

(3) Personal protective equipment designed for protection from explosive hazards (gloves, safety glasses, and steel-toed shoes) shall be used during attended operations. These equipment are in addition to those that may be required to provide protection from other hazards such as toxicity.

(4) Handling methods should be based on the minimum velocities and impact/friction stimuli practicable. The procedure of removing a layer of soil at a time with the backhoe from the rolloffs is recommended. Any visible "suspicious" items or vials should be removed prior to moving the waste with the backhoe.

(5) If additional "suspicious" items are observed, remove them from the remainder of the waste for inspection and determination of disposition on a case-by-case basis.

(6) Do not expose the waste material to slow heating with confinement.

(7) Similar items to the one tested should be able to be disposed of by incineration without a problem.

Discussion

During the investigative removal of material at Site 7 and placement into rolloffs, a suspicious item was found that had the appearance of an "M-80" firecracker. The color of the item was yellow, except for the "fuze," which was brown. Qualitative analyses determined that the "fuze" was wood and the remainder of the item contained NG in an adsorbent. Subsequent quantitative analysis determined that the item contained approximately 55% NG.

Sensitivity testing was conducted on the item to determine its reactivity to various stimuli. Due to the limited amount of material available, full probits could not be obtained. However, a 20 trial threshold initiation level (TIL) was obtained in the ABL friction machine at 1 ft/sec, and a 7 trial TIL was obtained in the ABL impact machine. The results of the tests are summarized in table I. Both the friction and the impact machines use samples that are 33 mils thick. Table I shows that samples of this thickness are moderately sensitive to both friction and impact stimuli.

TABLE I. SITE 7 ITEM SENSITIVITY TEST RESULTS

TEST	TIL LEVEL	TRIALS FOR TIL	REACTION DESCRIPTION
ABL Friction	200 lb_f	20	Snap, spark
ABL Impact	6.9 cm	7	Snap, spark
Modified Drop Weight	> 6 ft	2	None obtained
Unconfined Burning	---	1	Mild burn

Additional testing conducted on the remainder of the sample included the modified drop weight test and the unconfined burning test. The modified drop weight test consists of dropping a 25 lb cylindrical weight onto the sample from a height of six feet. The samples removed for the ABL friction and impact tests left a configuration of a semi-circle for a length of approximately 3/4 inch. The impact area for the first drop weight test was this right half-circular cylinder. After the first trial resulted in no reaction, a second trial was conducted with the impact area being the remainder of the sample. Again no reaction was obtained.

The unconfined burning test consisted of placing the sample (crushed from the modified drop weight test) in a bed of kerosene soaked sawdust. The sawdust was then ignited with a bag igniter. The result of this test was that the sample burned mildly.

The test results were used as a basis for a quantitative hazard analysis shown in the attached fact sheet. The purpose of the analysis was to determine the risk for handling and processing the two rolloffs of soil from Site 7. The following assumptions were necessary to complete the analysis:

(1) If additional reactive items are in the material removed from Site 7, they are no more reactive than the item tested, and they are approximately the same dimensions.

(2) The material from Site 7 will be manually screened using plastic tools.

(3) The volume of material removed from Site 7 is 1000 shovelsful.

(4) If another suspicious item(s) is(are) observed, it(they) will be removed and appropriately dispositioned (most likely by incineration).

If these assumptions are valid and the recommendations in the Summary are observed, then the remaining Site 7 handling and disposal activity meets the APS-5 risk criteria. The probability of major accident (PMA) calculated for attended operations was 3×10^{-7}, and the PMA calculated for remote operations (incineration) was 3×10^{-4}. The major driver for the remote PMA is the lack of quantity of burning test data. It is cautioned that the burning test that was conducted used a completely unconfined sample. Therefore, any future burning of reactive items that may be found should also be unconfined.

cc: P. K. Amtower
D. A. Hulburt
W. R. Workman
HA File

Appendix B

Detailed Cost Estimate of Alternatives

Table B-1 Site 7 Removal Cost Estimate
Alternative 1-Segregation, Charactization, and Off-Site Disposal
Detailed Cost Estimate

Beryllium Landfill
AlleganyBallistics Laboratory

DIRECT COST	unit	Material $	Labor $	Equip $	Total OH&P	Total $
Account Number						
33.A Mobilization and Preparatory Work						
Mob Construction Equip	lump sum			489	105	594
Mob Personnel	lump sum		713	125	871	1709
Preconstruction Submittals	lump sum	100	4428		5266	9794
Setup/Construct Temp Facilities	lump sum		713	700	994	2407
33.B Monitoring Samplig, Testing, and Analysis						
Air Monitorng	lump sum		1064	400	1346	2810
Sampling Waste	per day	130	266	40	351	787
Laboratory Chemical Analysis	lump sum			9855	2107	11962
						0
33.C Site Work						
Segregation of Material	lump sum	13796	10230	6606	16478	47110
33.T Disposal						
Containers Handling	lump sum	2940			629	3569
Transporation to Disposal Facility	lump sum		2470	1500	3246	7216
Disposal Fees and Taxes	lump sum	10500			2245	12745
33.V Demobilization						
Removal of Temporary Facilities	lump sum		713	700	994	2407
Demob Construction Equip	lump sum			498	106	604
Demob Personnel	lump sum		713	125	871	1709
Post Construction Submittals	lump sum		707		837	1544
					Subtotal	106968
				Total		106968
				Contigency 10%		10697
				Total Cost =		117665

Table B-2 Site 7 Removal Cost Estimate
Alternative 2-Disposal Variance
Detailed Cost Estimate

Beryllium Landfill
Allegany Ballistics Laboratory

DIRECT COST	unit	Material $	Labor $	Equip $	Total OH&P	Total $
Account Number						
33.A Mobilization and Preparatory Work						
Mob Personnel	lump sum		310	70	382	762
Preconstruction Submittals	lump sum	100	1490		1786	3376
33.B Monitoring Samplig, Testing, and Analysis						
Sampling Waste	per day	130	266	115	367	878
Laboratory Chemical Analysis	lump sum			2300	492	2792
						0
33.T Disposal						
Obtain Variance	lump sum	200	2470			
Containers Handling	lump sum	2940			629	3569
Transporation to Disposal Facility	lump sum		545	1000	859	2404
Disposal Fees and Taxes	lump sum	93000			19883	112883
33.V Demobilization						
Demob Personnel	lump sum		310	70	382	762
Post Construction Submittals	lump sum		707		837	1544
					Subtotal	128971
				Total		128971
				Contigency 10%		12897
				Total Cost =		141868

Table B-3 Site 7 Removal Cost Estimate
Alternative 3-Long Term Storage
Detailed Cost Estimate

Beryllium Landfill
Allegany Balistics Laboratory

DIRECT COST	unit	Material $	Labor $	Equip $	Total OH&P	Total $
Account Number						
33.A Mobilization and Preparatory Work						
Mob Construction Equip	lump sum			489	105	594
Mob Personnel	lump sum		713		844	1557
Preconstruction Submittals	lump sum	100	1490		1786	3376
Setup/Construct Temp Facilities	lump sum		713	700	994	2407
33.B Monitoring Samplig, Testing, and Analysis						
Sampling Waste (future)	per day	89	339	179	459	1066
Laboratory Chemical Analysis (future)				2935	628	3563
33.C Site Work						
Permanent Cover Structure	lump sum	4100	5049	4050	7723	20922
33.H Collection and Containment						
Waste Containment	lump sum	8000	500		2303	10803
33.T Disposal						
Transporation to Disposal Facility (future)	lump sum		3152	1914	4142	9208
Disposal Fees and Taxes (future)	lump sum	13400			2865	16265
33.V Demobilization						
Removal of Temporary Facilities (future)	lump sum		910	893	1269	3072
Demob Construction Equip (future)	lump sum			636	136	772
Demob Personnel (future)	lump sum		713	160	879	1752
Post Construction Submittals (future)	lump sum		902		1068	1970
					Subtotal	77326
				Total		77326
				Contigency 10%		7733
				Total Cost =		85058

Note: No definiative timeframe can be estimated on the availablitiy of a disposal facility. For cost comparision all future cost are assumed to be inccurred in 5 years with an annual percentage rate of 5 persent for calculating Net Present Worth