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ALLEGANY BALLISTICS LABORATORY (USNAVY)
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RECORD OF DECISION

SITE 5 LANDFILL CONTENTS AND SURFACE SOIL

at the

ALLEGANY BALLISTICS LABORATORY, WEST VIRGINIA

JANUARY 1997

TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

1.0 THE DECLARATION

1.1 SITE NAME AND LOCATION

Site 5 (Inert Landfill)
Allegany Ballistics Laboratory
Rocket Center, West Virginia

1.2 STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Site 5 Landfill Contents and Surface Soil at the Allegany Ballistics Laboratory (ABL), Rocket Center, West Virginia. This document focuses on remedial decisions for Site 5 at ABL and the term "site" in this document refers to Site 5. 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 of the landfill in two phases or Operable Units (OUs). The remedial action selected in this Record of Decision (ROD) addresses contamination associated with Site 5 landfill contents and surface soils and is to be implemented as Operable Unit One (OU 1). Operable Unit Two (OU 2), defined as the contaminated groundwater beneath Site 5 and the surface water and sediment in the North Branch Potomac River near Site 5, will undergo further evaluation and will be monitored during operations for OU 1.

The selected remedy for Site 5, OU 1 is a Composite Cap-Geosynthetic Clay Liner (GCL) and Flexible Membrane Cap (FMC).

The major components of the selected remedy are:

- Deed notation along with property use and limited access restrictions
- Installation of a composite Cap-GCL and FMC.
- Installation of a drainage layer utilizing a geonet
- Installation of a passive landfill gas (LFG) venting system
- Revegetation of the capped area
- Installation of perimeter drainage system
- Post-closure requirements

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 surface soils and landfill contents. Additionally, this action should reduce the risk associated with continued leaching of landfill contents to the groundwater beneath the site. The selected remedy will also address the proper closure of a RCRA subtitle C landfill.

1.4 STATUTORY DETERMINATIONS

The selected remedy for OU 1 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, and is cost-effective.

The selected remedy for OU 1 addresses the containment of surface soils and landfill wastes at Site 5. The selected remedy will provide for the long-term reduction of leachate generation and possible contamination of the groundwater beneath the landfill. This remedy fulfills the RCRA Subtitle C regulations by using an equivalent recommended design for the cap. The installation of a RCRA Subtitle C cap will eliminate direct contact, ingestion, and inhalation threats from contaminated soils and will reduce the leaching of contaminants to groundwater by controlling precipitation entering the landfill and minimizing leachate generation. Also, the permanent RCRA Subtitle C cap will stabilize existing conditions at the landfill.

The selected remedy for OU 1 will be constructed to meet all applicable or relevant and appropriate requirements (ARARs) whether chemical, action, or location specific. No waivers of any ARARs are requested.

Capping is a permanent solution and is a common remedy for land filled wastes of high volume and low contaminant concentration. Containment in the form of capping is typical and appropriate for a site of this type.

This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this operable unit. However, because treatment of the principal threats of the operable unit was not found to be practicable, this remedy does not satisfy the statutory preference for treatment 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.

<IMG SRC 97089A>

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 separate industrial plant areas (Figure 1-1). Plant 1 occupies approximately 1,572 acres and is owned by the Navy and operated by Alliant Techsystems. The industrial portion (400 acres) of Plant 1 is located on an alluvial plain adjacent to the North Branch Potomac River. The remainder of Plant 1 is located in forested, mountainous upland. Plant 1 is the portion of ABL that was listed on the National Priorities List (NPL) on May 31, 1994 (59 FR 27989). 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.

Site 5, shown in Figure 1-2, is a landfill situated on a terrace above the North Branch Potomac River, about 1,000 feet south of Plant 2 and is bounded on its western side by the river. Site 5 has an area of approximately 4 acres and has a range in surface elevation from 680 feet above mean sea level (msl) to about 704 feet msl. The top portion is nearly level, with scattered vegetation. The eastern edge is mostly bare ground related to steep, rocky slopes. The western edge is composed of a steep bank that grades towards the North Branch Potomac River.

The land across the North Branch Potomac River has primarily agricultural and residential uses, however there are small businesses within 6,000 feet west of Site 5. Immediately north of Site 5, a second landfill exists. Within 1,000 feet south of Site 5 there is a small building used for storage, and directly east uphill from Site 5 is a facility road leading to the remote portion of Plant 1.

Groundwater production wells, which are located approximately 2,000 feet southeast of Site 5 supply potable water to ABL. Natural springs are located near the wells. Commercial limestone quarries are also located within 3000 feet south of the Site 5.

The closest residences, approximately six homes, are within 5,000 feet west of Site 5, across the North Branch Potomac River. The river is the closest major surface water body and a small drainage feature is located 1,000 feet south of Site 5. As stated above, the nearest groundwater wells are 2,000 feet to the

southeast.

The Site 5 landfill has been covered with a one to two foot layer of crushed limestone. However, metal drums are still visible along the face of the landfill. A trash consolidation area, which formerly included a metal dumpster, exists on top of the landfill. A road crosses Site 5, with a large turn-around area on top of the landfill, leading to the landfill immediately to the north.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 History of Site Activities

The Site 5 landfill operated from the early 1960's to 1985 accepting wastes generated by ABL and deemed to be inert. Inert wastes were defined as wastes not contaminated with explosives nor generated at an area on the facility where explosives were managed. Wastes reported to have been disposed of at Site 5 include drums that previously contained trichloroethene (TCE), methylene chloride (MC), and acetone; fluorescent tubes (mercury source); unknown laboratory and photographic chemicals; fiberglass and other resin-coated fibers; metal and plastic machining wastes; and construction and demolition debris.

2.2.2. Previous Investigations

Five studies have been conducted at ABL during which Site 5 has been either part of or the focus of the investigation: (1) the Initial Assessment Study (IAS); (2) the Confirmation Study (CS); the Remedial Investigation (RI); (4) the Phase II RI and (5) Focused Feasibility Study (FFS).

The IAS, completed in 1983 under the Navy Assessment and Control of Installation Pollutant 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 5, 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) (Weston, October 1989). The Interim RI Report recommended further investigation at six of the seven sites, including Site 5.

Following the recommendations of the Interim RI Report and in accordance with the Navy's changed IRP policy, Hercules Aerospace Company, former owner of the facility contracted CH2M HILL to conduct an RI following EPA's Remedial Investigation/Feasibility Study (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 5. The RI at Site 5 is discussed in detail in the Remedial Investigation of the Allegany Ballistics Laboratory, January 1996.

In order to expedite the RI/FS process at ABL by filling data gaps remaining after completion of the RI, the Atlantic Division of the Navy contracted CH2M HILL to conduct a Phase II Focused RI at Other Sites following EPA's RI/FS format under CERCLA. The Phase II Focused RI further defined the nature and extent of contamination at and adjacent to Site 5 and included baseline risk assessments for human health and the environment. The results of the Phase II Focused RI indicated that the landfill contents are the likely source of volatile organic contaminants (VOC) contamination detected in groundwater down gradient from Site 5. Additionally, the soils exposed at Site 5 may pose a potential ecological risk. The results of this investigation are presented in Phase II Remedial Investigation at Allegany Ballistics Laboratory Superfund Site, August 1996.

Based on the results from the previous four investigations a Focused Feasibility Study was undertaken for Site 5. The FFS was conducted to assess several containment alternatives for remediation of the soils and landfill contents at Site 5.

2.2.3 Enforcement Actions

There have been no enforcement actions taken at Site 5.

2.2.4. Highlights of Community Participation

In accordance with Section 113 and 117 of CERCLA, 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 5 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

Past disposal operations at the landfill have contaminated soil and groundwater. The Navy has decided to manage the remediation of the landfill 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 remedial actions identified in this ROD address contamination associated with Site 5 landfill contents and surface soils, as identified in the RI Report and the Phase II Focused RI Report. The selected response actions for these medial are identified and the rationale for their selection is described in Section 2.8.

The selected final remedial action (FRA), is to be implemented as Operable Unit One (OU 1). It will reduce the potential risk to human health and the environment associated with the surface soils and landfill contents. The FRA consists of a RCRA Subtitle C cap and a passive landfill gas collection system. The cap will reduce any possible exposure to contaminants on the landfill and will reduce infiltration of precipitation. Leachate, produced in the landfill from the infiltration of precipitation, should be reduced. This should reduce groundwater contamination, which currently exceeds risk-based (MCL) standards. The landfill gas will be monitored and treated if necessary.

Operable Unit Two (OU 2), defined as the contaminated groundwater beneath Site 5 and the surface water and sediment in the North Branch Potomac River near Site 5, will undergo further evaluation and will be monitored during operations for OU 1. Data collected during this monitoring will be used with previous data to assess the risk associated with OU 2 and possible response actions at OU 2 will be evaluated.

The final remedy or remedies for the OU 2 investigation will be for surface water, sediment and groundwater.

The final remedial action for OU 1 is consistent with long-term remedial goals for both operable units at Site 5. The remedial action at OU 1 will help to contain the landfill wastes thereby reducing the principal threat from groundwater contamination. The RCRA Subtitle C cap will also address the low-level ecological risks posed by exposure to landfill soils and surface debris.

2.4 SUMMARY OF SITE CHARACTERISTICS

2.4.1 Sources of Contamination

Geophysical investigations at Site 5 included magnetometer and ground penetrating radar (GPR) surveys. The results of the magnetometer survey outlined areas of buried metallic objects in the landfill. these areas are indicated on Figure 1-2. The GPR survey was used to delineate the extent of the landfill. A soil gas survey was also performed which revealed the presence of some of the same volatile organic compounds (VOCs) (1,1-dichloroethene and trichloroethene) in the soils of the existing cap above the landfill that are found in groundwater at Site 5. Therefore, the source of groundwater contamination is most likely the waste present in the Landfill.

2.4.2 Description of Contamination

Wastes in the landfill have never been sampled and analyzed. Landfill wastes are not typically sampled because they are not homogenous. There is no current estimate of the volume of contaminated material in the landfill, however several areas of buried drums have been identified. There were no "hot-spots" or high concentration of wastes identified in the landfill that could be removed.

Surface soil samples were collected at the landfill and analyzed for VOCs, semivolatile organic contaminants (SVOCs), pesticides, PCBs, Target Analyte List (TAL) inorganics, and cyanide. Only estimated concentrations below the quantitation limit of five VOCs (1,1,1-trichloroethane (TCA), 2-hexanone, chlorobenzene, toluene, and trichloroethene (TCE)) were detected. Thirteen SVOCs (carbazole, chrysene, phenanthrene, several anthracenes (including dibenzo (a,h) anthracene), fluoranthenes, andd pyrenes, (including benzo (a) pyrene)) were detected at low concentrations. All but two of the SVOCs (fluoranthene, 920 ug/kg and phenanthrene, 490 ug/kg) were reported as estimated. Only estimated concentrations of 4,4'-DDE (10 ug/kg) and 4,4'-DDT (6.6 ug/kg) were detected. No PCBs were reported.

Cyanide was not detected, at a detection level of 1.2 milligram per kilogram (mg/kg) in any soil sample. Arsenic, barium, chromium, lead, manganese, and mercury were reported to exceed screening levels for human health and ecological impacts.

2.4.3 Contaminant Migration

Access to Site 5 is currently restricted by fences and security guards. Workers visit Site 5 infrequently. These workers may be exposed to minor surface soil contamination. Access to the North Branch Potomac River, which borders the site, is unrestricted and the river is used for recreational purposes. A residential area occurs 5,000 feet to the west and these residents might be exposed to wind-borne soil particles.

Because of the open habitat available and because soil particles may be eroded and transported to the river, the ecological risk is considered high for Site 5.

Minor contamination was detected in the surface soils that surround Site 5. Release and transport of contamination from Site 5 surface soils may occur by volatilization and particulate emissions during soil excavation, soil erosion, and from leaching from the soil to the groundwater. Leaching of contaminants from the surface soils and the landfill occurs predominantly in a vertical direction and little lateral migration of contaminants from the toe of the landfill to the surrounding soil occurs.

Two small drainages are located on the northwestern section of the landfill and eroded soils and surface water runoff may migrate to the alluvial plain and to the North Branch Potomac River (Figure 1-2). Precipation infiltrating through the landfill does leach some contaminants from the wastes. VOCs and some inorganics have been detected at moderately high levels in the groundwater beneath Site 5.

2.5 SUMMARY OF SITE RISKS

The human health and ecological risks associated with exposure to contaminated media at Site 5 were evaluated in the Phase II 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. Under the current use scenario, potential receptors were quantified for onsite workers. A construction worker could be exposed to both surface and subsurface soil during excavation and construction, and therefore exposure to both were evaluated.

Site 5 is likely to remain industrial; however, exposure to surface soil was assumed for a future residential scenario, as suggested by USEPA guidance.

Under the future land use scenario, potential exposures were quantified for a child and adult resident, and a construction worker.

An ecological evaluation was also performed and addressed the threats to ecological receptors. A summary of the human health and ecological risks associated with Site 5 soils and landfill contents are summarized below. Appendix A provides a list of toxicological profiles of the contaminants of concern (COC) at Site 5. These COCs include VOCs that were detected in the groundwater beneath Site 5.

2.5.1 Human Health Risks

Exposure Pathways

Receptors coming into contact with chemicals in surface soil may become exposed via incidental ingestion, dermal contact and inhalation of vapors and fugitive dust. In the risk assessment, inhalation of vapors and fugitive dust was considered only for the construction workers. Groundwater, another potential exposure pathway, will be evaluated as part of OU 2 at Site 5.

Potential Receptors

Risk estimates were calculated for current and future Site 5 related workers, future construction workers, and future residential receptors potentially exposed to surface soil.

Exposure Assessment

No VOCs were identified as contaminants of concern in the surface soil at Site 5. Two SVOCs (benzo (a) pyrene and dibenzo (a,h) anthracene) were identified with a maximum concentration of 4.4 x _0 -1 mg/kg. No pesticides or PCBs were identified as contaminants of concern in the surface soils at Site 5. Two inorganics, arsenic at a maximum concentration of 7.8 mg/kg and manganese at a maximum concentration of 596 mg/kg, were identified in the surface soils.

Toxicity Assessment

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg-day) -1, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level.

The term "upper bound" reflects the conservative estimate of the risks calculated from the CPFs. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

For the soil ingestion and dermal contact pathway the oral slope factor used to calculate the cancer risk for arsenic is 1.5 kg-day/mg. The noncarcinogenic risk calculation for arsenic uses an oral reference dose of 3 x 10 -4 mg/kg-day and an absorption factor of 3.2 x 10 -2. Table 8.8 in the Phase II Remedial Investigation at Allegany Ballistics Laboratory Superfund Site, August 1996 lists the Toxicity Information for potential chemicals of concern at Site 5.

Risk Characterization

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1x10 -6 or 1E-6). An excess lifetime cancer risk of 1x10 -6 indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated.

The HI provides a useful reference point for gauging the potential significance of multiple contaminant

exposures within a single medium or across media. Table 8-12 and Table 8-19 in the Phase II Remediall Investigation at Allegany Ballistics Laboratory Superfund Site, August 1996 present a summary of risks for Site 5.

Current Onsite Workers. The cumulative hazard indices for ingestion of and dermal contact with surface soil for Site 5 are less than 1. The cumulative ingestion and dermal contact cancer risk is 6 x 10 -6, well within EPA's target risk range of 1 x 10 -6 to 1 x 10 -4.

Future Construction Worker. The cumulative noncancer hazard index and cancer risk from exposure via inhalation of volatiles and fugitive dust, and ingestion of and dermal contact with Site 5 surface soil are 0.3 and 1 X 10 -6, respectively.

Future Residents. The cumulative hazard index and cancer risk associated with future residential exposure to surface soil at Site 5 are 0.9 and 6 X 10 -5 respectively. The exposure routes evaluated for future residents included soil ingestion and dermal contact.

2.5.2 Environmental Evaluation

The intent of the baseline ecological risk assessment (ERA) was to characterize potential receptors and to estimate the potential hazard or risk to environmental receptors. Contaminant pathways were identified to evaluate receptors potentially at risk. The ERA generally followed USEPA guidance for performing ecological risk assessments. The baseline ERA is described fully in the Phase II Remedial Investigation at Allegany Ballistics Laboratory Superfund Site, August 1996, and briefly summarized here.

Analytical data compiled from the Phase II 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 such as EPA Region III and Biological Technical Assistance Group (BTAG) guidelines.

Ratios 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.

Surface water and sediments samples were collected in the North Branch Potomac River and the results do not indicate the presence of contamination from Site 5. Surface water and sediment will be evaluated further as part of Operable Unit 2 and during monitoring of the operations for the selected OU 1 remedial action. No aquatic toxicity or bioassays were performed.

There were no aquatic surveys performed along the area of the river near Site 5 during the recent investigations.

A terrestrial reconnaissance was performed at Site 5. Because of its location and proximity to the river, the types of habitats within the immediate area of Site 5 are more complex than the majority of the ABL facility.

Habitat types include a narrow band of riparian forested land along the river, an upland forested floodplain. A grassy meadow exists on the top and slopes of the landfill. The small pools near the access road provide seasonal habitat, although no water-dependent species were observed during the investigations. Site 5 does not appear to have any sensitive or unique habitat types. The variety
of habitat types increases the types of wildlife potentially using those areas.

The exposure assessment for soil is presented below.

Exposure Pathways

The exposure pathways include: dermal absorption of chemicals from soil, ingestion of soil, inhalation of volatile chemicals from soil, absorption of chemicals from soil by plants, and bioaccumulation of chemicals through the food chain.

Exposure Assessment

Only one VOC, 1,2-dichloroethane had a EEQ above 1.0 (6.9) and that was based on using one-half of the detection limit from the soil analysis. The EEQs related to SVOCs in the soils ranged from 0.02 (benzo(a) pyrene) to 11 (pyrene). Analytical testing for pesticides and PCBs at Site 5 indicated only minor risks.

EEQs ranged 0.01 to 0.1. Inorganics in soils at Site 5 generally had EEQs less than or close to 1. Chromium had EEQs that ranged from 1,200 to 2,733. The highest EEQ for mercury was 6.55. The range of EEQs for lead was 1108 to 1800.

Potential Receptors

The organisms most likely to be receptors include: mice, voles, rabbits, earthworms, other ground insects, and a variety of birds. Because of the open nature of Site 5 and the variety of nearby habitats, Site 5 is likely to have a great diversity of wildlife.

Risk Characterization

Certain of the SVOCs and mercury in the soils at Site 5 represent a low potential of risk to ecological resources. Chromium and lead represent a high potential ecological risk.

2.5.3 Assessment of Site 5 Risk

The risk assessment for soils at Site 5 indicates that future residents are at a low risk and the ecological risk is considered high. Currently the groundwater beneath Site 5 is contaminated above risk-based (MCL) standards. The remedial action selected in this ROD will reduce all risks and will be consistent with additional actions to be proposed for OU 2 at Site 5.

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.

2.6 DESCRIPTION OF ALTERNATIVES

A detailed analysis of the possible remedial alternatives for Site 5 landfill contents and surface soils is included in the Site 5 FFS report. The detailed analysis was conducted in accordance with the EPA document entitled analysis "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 associate with Site 5 landfill contents and surface soils is presented below.

Alternative 1 - No Action

Description: Under this alternative no further effort or resources would be expended at Site 5. Because contaminated media would be left at Site 5, a review of the 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.

Alternative 2 - RCRA Subtitle D Cap

Description: This alternative consists of installing a soil cap consisting of low hydraulic conductivity material over the landfill contents.

RCRA Subtital C regulations, which deal with the disposal of hazardous waste, apply at Site 5. RCRA Subtitle C guidance documents indicate there are minimum parameters for the design of landfill covers.

Subtitle C covers must contain a vegetative cover layer (24 inch thick), a drainage layer (>10 -3 conductivity), and a 2 component, low permeability layer.

The 2 components include; a flexible membrane layer (FML) and a soil component (<10 -7 conductivity) 2 feet thick. Some form of each of the three layers must be present in the design of the Subtitle C landfill cap. RCRA does allow variation for each of the layers as long as it meets the intent or is equivalent to the recommended design. Alternative 2 has been eliminated from consideration because it does not fulfill the RCRA Subtitle C guidance for multi-layer design and therefore no cost information was developed.

The major components of this alternative include:

- Deed notation along with property use and limited access restrictions
- Installation of a single, low hydraulic conductivity material
- Revegetation of the capped area
- Post-closure requirements

Alternative 3 - Single Barrier Cap-Flexible Membrane Cap (FMC)

Description: This alternative consists of installing a single barrier cap which utilizes a flexible membrane (40-mil liner) as the barrier layer.

As with Alternative 2, Alternative 3 is considered a containment alternative which has two primary goals; reducing leaching of contaminants from the landfill into the groundwater, and preventing direct contact of human and ecological receptors with the landfill contents and contaminated soil. This alternative does not fulfill RCRA Subtitle C regulations and guidance as described above under Alternative 2. The major components are:

- Deed notation along with property use and limited access restrictions
- Installation of a single barrier cap-FMC
- Installation of a drainage layer composed of sand
- Installation of a passive landfill gas (LFG) venting system
- Revegetation of the capped area
- Post-closure requirements

Capital Cost	$ 900,000
First-Year Annual Operation & Maintenance (O & M) Cost	$ 24,000
Present-Worth	$1,360,000
Months to Implement	4

Alternative 4 - Single Barrier Cap-FMC with Geosynthetic Drainage Layer

Description: Alternative 4, which is very similar to Alternative 3, provides a slight variation of the capping cross-section presented by that alternative. Alternative 4 utilizes the 40-mil liner specified in Alternative 3, but a geonet is used in place of sand for the drainage layer. This alternative does not fulfill RCRA Subtitle C regulations and guidance as described above under Alternative 2. The major components are:

- Deed notation along with property use and limited access restrictions
- Installation of a single barrier Cap-FMC
- Installation of a drainage layer utilizing a geonet
- Installation of a passive LFG venting system
- Revegetation of the capped area
- Post-closure requirements

Capital Cost	$ 880,000
First-Year Annual O & M Cost	$ 24,000
Present-Worth	$1,250,000

Months to Implement	4

Alternative 5 - Composite Cap-GCL and FMC

Description: This Alternative includes a composite cover system. Alternative 5 is an advanced containment alternative which shares the common goals of the previous alternatives, and utilizes the 40-mil liner specified in Alternative 3.

This alternative fulfills the RCRA Subtitle C regulations, and guidance described above under Alternative 2 by using an equivalent recommended design for the cap. The major components of Alternative 5 are:

- Deed notation along with property use and limited access restrictions
- Installation of a composite Cap-Geosynthetic Clay Liner (GCL) and FMC.
- Installation of a drainage layer utilizing a geonet
- Installation of a passive landfill gas (LFG) venting system
- Revegetation of the capped area
- Post-closure requirements

Capital Cost	$1,240,000
First-Year Annual O & M Cost	$ 24,000
Present-Worth	$1,610,000
Months to Implement	4

Alternative 6 - Composite Cap-GCL and FMC with Clay Layer on Side Slopes

Description: As with Alternative 5, Alternative 6 is an advanced containment alternative. This alternative fulfills the RCRA Subtitle C regulations and guidance as described above under Alternative 2 by using an equivalent recommended design for the cap. The major components of Alternative 6 are:

- Deed notation along with property use and limited access restrictions
- Installation of a composite Cap-GCL and FMC with a Clay Layer on Side Slopes
- Installation of a drainage layer utilizing a geonet
- Installation of a passive LFG venting system
- Revegetation of the capped area
- Post-closure requirements

Capital Cost	$1,160,000
First-Year Annual O & M Cost	$ 24,000
Present-Worth	$1,530,000
Months to Implement	4

Alternative 7 - RCRA Subtitle C Cap

Description: This alternative is the standard RCRA Subtitle C design for a landfill cap. The major components of this alternative include:

- Deed notation along with property use and limited access restrictions.

- Installation of a composite Cap-Clay Layer and FMC.
- Installation of drainage layer - sand.
- Installation of a passive LFG venting system.
- Revegetation of the cap area.
- Post-closure requirements.

Capital Cost	$1,470,000
First-Year Annual O & M Cost	$ 24,000
Present-Worth	$1,840,000
Months to Implement	4

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. The comparison of each alternative to the nine criteria is presented below:

2.7.1 Threshold Criteria

Overall Protection of Human Health and the Environment

The Site 5 Remedial Action Objectives ("RAOs") include:

- Prevent or minimize infiltration and any resulting leaching of contaminants from the landfill into groundwater.
- Prevent or minimize direct contact of human and ecological receptors with landfill contents.
- Prevent surface water run-on and control surface water runoff erosion.

Excluding the No Action alternative and Alternative 2, the remaining alternatives (alternatives 3 through 7) meet all of the RAOs.

With respect to the first and third RAOs, based on the results of the Hydrologic Evaluation of Landfill Performance (HELP) model, all of the caps in the alternatives 3 through 7 have identical efficiencies, and therefore, minimize leaching of contaminants from the landfill to the same degree. The efficiencies estimated by themodel are identical because each cap incorporates a 40-mil polypropylene FMC, and the final cover grades are the same for eachalternative. Additionally, Alternatives 5 through 7 have a secondary barrier layer underlying the FMC, providing a safeguard against tears or material defects associated with the FMC.

All of the alternatives (excluding alternative 1) meet the second RAO as well. Direct contat with the landfill contents is prevented due to the physical barrier provided by the caps. One defining distinction between the caps is the thickness of the physical barrier.

The minimum thickness of each cap in alternatives 3 through 7 is four feet, three feet, four feet, four feet, and six feet, respectively. These are minimum thickness measurements because the additional fill required for grading is not accounted for. The second RAO will be equally met in the long term because deed notations and post-closure care requirements are identical under each alternative.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

No chemical-specific ARARs were identified for landfill contents or surface soil, however the State of West Virginia Groundwater Protection Act would apply to any specific chemical that potentially would contaminate groundwater.

All of the alternatives (excluding Alternative 1) comply with the location-specific ARARs because the nature and location of the final cover systems is identical in each alternative. Storm water controls (earth channels) will be the only structures constructed in the 100-year floodplain in each alternative. According

to federal regulatory agencies, no federally listed or proposed endangered species are known to exist on Site 5. Also, construction activities will incorporate erosion and sediment controls to avoid river water quality degradation, thus complying with the Wild and Scenic Rivers Act (16 USC 1271).

Alternatives 3 and 4 do not comply with action-specific ARARs because they do not incorporate the use of a composite cap. Alternatives 5 through 7 comply with action-specific ARARs.

RCRA Subtitle C requirements (40 CFR 265.310 (a)) are applicable because landfill contents (drums previously containing used solvents), which may have been contaminated through contact with a RCRA listed waste, were disposed of in the landfill after the effective date (November 19, 1980) of the RCRA regulations. Alternative 7 incorporates the specific layers indicated by the EPA guidance to be included in a Subtitle C cap, and therefore complies with EPA guidance for Subtitle C requirements. The cap designs presented in alternative 5 and 6 provide an equivalent design because they incorporate the use of a composite barrier layer.

2.7.2 Primary Balancing Criteria

Long-Term Effectiveness and Permanence

There is no significant distinction between alternatives 3 through 7 in meeting this evaluation criterion. All of the alternatives (excluding the No Action alternative and Alternative 2) will provide a very minimal magnitude of residual risk following implementation of the alternative. Initial infiltration will be minimized to the same degree under each capping scenario. Therefore, the risk posed by landfill contaminants leaching to groundwater will be identical for each alternative. Alternatives 5 through 7 provide an additional barrier layer which does help to minimize residual risk posed by material defects or tears in the FMC. Alternatives 3 and 4, which do not have an additional barrier, may be less effective at minimizing residual risk over time.

All of the alternatives (excluding Alternatives 1 and 2) protect to a similar magnitude of residual risk associated with continued exposures to landfill contents. Alternative 7 provides the thickest physical barrier. However, no significant distinction can be made between the protection offered by a three-foot thick (Alternative 4) and a six-foot thick barrier (Alternative 7). All of the alternatives incorporate identical post-closure care, thereby equally minimizing long-term residual risk under each scenario.

Reduction of Toxicity, Mobility, and Volume

No significant distinction can be made between the capping alternatives concerning their performance against this evaluation criterion. The toxicity of landfill contents will remain the same following cap installation under each alternative. Landfill volume will be reduced by a small margin in each alternative due to the weight of the caps. The mobility of landfill contaminants will be reduced an equivalent amount by each cap as indicated by the HELP model. The efficiency of each cap is estimated to be 99.86 percent.

Alternatives 5 through 7 provide an additional barrier layer thereby ensuring reduced mobility in the event that the integrity of the FMC is compromised. The GCL secondary layer in Alternative 5 has a hydraulic conductivity of less than 1 x 10 -10 centimeters per second, exceeding the minimum hydraulic conductivity criteria provided by the clay secondary barrier layers in alternatives 6 and 7.

Short-Term Effectiveness

Alternatives 4 and 5 can be implemented the quickest and therefore provide the most protection in the shortest time.

Alternative 7 will most likely require the most significant disturbance to the surrounding community due to the significant material handling required to construct the cap's layers. Material for the 24-inch clay layer and the 12-inch sand drainage layer must be imported from an offsite source. Therefore, there will be a significant amount of construction traffic associated with implementation of this alternative.

Alternatives 3 and 6 will require a moderate amount of hauling to import the 12-inch sand layer in Alternative 3, and the 24-inch clay layer in Alternative 6. No significant import will be required for alternatives 4 and 5, excepted for the 24-inch thick topsoil layer.

None of the alternatives will require the excavation or significant handling of landfill contents or contaminated surface soil. Several rusted 55-gallon steel drums currently protrude through the limestone

cover. Any drums whose contents are greater then 10 % by volume will undergo proper off-site disposal. Any exposed debris will be consolidated and covered by the proposed landfill cap. Construction workers may be required to use personal protective equipment (PPE) under each scenario during the installation of the leveling layer.

Implementability

There are no technical difficulties associated with the implementation of any of the alternatives. Moderate effort will be required to install the sand drainage layers or clay barrier layers on 3:1 side slopes in alternatives 3, 6, and 7. Contaminated material will be left onsite in all of the alternatives, necessitating the need for 5-year site reviews, and post-closure care and maintenance.

Cost

The annual O&M cost is estimated to be the same for alternatives 3 through 7. On a present worth basis, Alternative 4 is the least costly, at $1,250,000. The present worth of Alternative 3 is $1,360,000. Alternatives 5 and 6 have a present worth of $1,610,000 and $1,530,000, respectively. Alternative 7 is the most expensive capping scenario, with a present worth of $1,840,000.

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 5 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 included in the Responsiveness Summary, Section 3.0 of the ROD.

2.8 THE SELECTED REMEDY

Alternative 5 is the selected remedy. Based on available information and the current understanding of the conditions at Site 5, Alternative 5 appears to provide the best balance with respect to the nine NCP evaluation criteria. In addition, the selected remedy is anticipated to meet the following statutory requirements:

- Protection of human health and the environment.
- Compliance with ARARs.
- Cost-effectiveness.

The selected remedy addresses the containment of surface soils and landfill wastes at Site 5. The selected remedy will provide for the long-term reduction of leachate generation and possible continued contamination of the groundwater beneath the landfill. This selected remedy fulfills the RCRA Subtitle C regulations by using an equivalent recommended design for the cap.

As mentioned previously in this ROD, a separate FFS will be prepared as part of OU 2 which will address groundwater contamination and possible surface water and sediment contamination.

2.8.1 PERFORMANCE STANDARDS

Landfill Cap

The landfill cap shall be designed, constructed, operated, and maintained to meet the performance requirements of RCRA Subtitle C regulations specified in 40 C.F.R. ºº 265.19, 265.111 and 265.310.

The cap shall also be designed to meet the requirements of the following EPA technical guidance documents: "Final Covers on Hazardous Waste Landfills and Surface Impoundments" (EPA/530-SW-89-047, July 1989); and "Construction Quality Management for Remedial Action and Remedial Design Waste Containment System" (EPA/540/R-92/073, October 1992).

The cap design shall minimize infiltration, collect and monitor landfill gas, and control surface water run on/runoff. The multi-layer landfill cap shall be constructed according to the following performance standards:

-- Surface water drainage controls will be constructed to prevent erosion of the cap. As determined by the final site 5 Cap Design, drainage channels shall be installed in certain areas on the top and perimeter of the landfill cap to channel runoff away from the landfill.

-- The top layer of the cap shall be the vegetative cover. This layer shall be a minimum of 24 inches of fill material and will: (I) provide frost protection; (ii) provide adequate water-holding capacity to attenuate rainfall infiltration to the drainage layer and to sustain vegetation through dry periods; and (iii) provide sufficient thickness to allow for expected long-term erosion losses. Deep rooted plants that could damage the drainage and barrier layers shall not be allowed to grow on the cover. Cover material shall contain sufficient organic materials and nutrients to sustain a vegetative cover. Vegetative stabilization with perennial species shall occur within 45-days after the final cover is installed. A filter fabric may be placed between the top layer and the drainage layer to minimize fill material from clogging thedrainage layer. This will be determined during the development of the final design plans.

-- A drainage layer shall be installed above the synthetic barrier to allow water to drain off the synthetic barrier and to prevent the ponding of water over the synthetic barrier.

This layer will be composed of either 12 inches of sand with a minimum hydraulic conductivity of 1 x 10 -2 cm/sec or a synthetic material with similar hydraulic characteristics. The sand should be no coarser than 3/8 inch. The selection of drainage layer material shall be determined during the development of the final design plans.

-- The top low hydraulic conductivity layer shall be a synthetic barrier. This will be the main barrier which prevents water infiltration from entering the landfill. This synthetic barrier shall be a type of flexible geomembrane at leat 40 mil thick, to be determined during deseign, selected to prevent infiltration and minimize the potential for sliding.

-- The bottom low hydraulic conductivity layer shall be installed to minimize potential leakage through the low hydraulic conductivity geomembrane, into the landfill. This layer acts as a safeguard to the geomembrane and is generally made of clay or a geo-synthetic clay liner (GCL). The bottom layer for the selected remedy shall be a GCL. However, GCLs cannot be placed on very steep slopes. The side slopes of the composite barrier layer shall be on a 4:1 angle and may, if needed to increase the friction angle for the GCL, be reinforced with a geogrid. This layer shall have a hydraulic conductivity no greater than 1 x 10 -7 cm/sec.

-- the gas management system shall be installed to collect and control any gas that may be generated in the landfill.

-- The base layer shall be comprised of unclassified fill material. This material is used to establish the base grade of the landfill.

Landfill Gas Collection System

The collected landfill gas shall be monitored. The landfill gas collection system shall be constructed and operated according to the following performance standards:

Volatile organic compounds (VOCs) emissions shall not exceed 450 lb/hr, 3,000 lb/day, 10 gal/day. The State of West Virginia Air regulations limit the emissions of Acrylonitrile, 1,3 Butadiene, Ethylene Oxide to 500 lb/yr; Benzene, Carbon Tetrachloride, Chloroform, Ethylene Dichloride, Formaldehyde, and Vinyl Chloride to 1,000 lb/yr; Vinylidene Chloride to 2,000 lb/yr; Methylene Chloried and Propylene Oxide to 5,000 lb/yr; and Allyl Chloride and Trichloroethylene to 10,000 lb/yr. Methane vented to the atmosphere shall not exceed 25% of the lower explosive limit (LEL).

Drum and Debris Disposal

Any drums whose contents are greater then 10 % by volume will undergo proper off-site disposal. Any exposed debris will be consolidated and covered by proposed landfill cap.

2.9 STATUTORY DETERMINATIONS

Remedial actions must meet the statutory requirements of Section 121 of CERCLA 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 the selected remedy. Refer to the attached ARAR table (Appendix B) 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 a RCRA Subtitle C cap will eliminate direct contact, ingestion, and inhalation threats from contaminated by controlling precipitation entering the landfill and minimizing leachate generation. There will be limited short term risks as with any construction activity at Site 5. However, the short-term risk should be minimal because the landfill wastes will not be removed from the landfill during construction activities. Also, the permanent RCRA Subtitle C cap will stabilize existing conditions at the landfill.

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. No waivers of any ARARs are requested.

Location-specific ARARs include both federal and State regulations to protect endangered species. According to federal regulatory agencies, no federally listed or proposed endangered species are known to exist on Site 5. In addition, both federal and State regulations regarding the protection of wetlands and RCRA capping requirements are considered Location-Specific ARARs. Storm water controls (earth channels) will be the only structures constructed in the 100-year floodplain in each alternative.

Also, construction activities will incorporate erosion and sediment controls to avoid river water quality degradation, thus complying with the Wild and Scenic Rivers Act (16 USC 1271).

The low permeability cap shall be designed to minimize infiltration. The design of the cover system and low permeability cap will be consistent with both Federal and State regulations. A RCRA Subtitle C cap is required to close this landfill.

The cover thickness shall include a vegetative layer (a minimum of 2 feet thick), a drainage layer with a permeability greater than 1x10 -2 cm/sec, a composite barrier layer consisting of a geosynthetic clay liner (GCL) overlain by a 40-mil flexible membrane cap (FMC) (this barrier layer will have a maximum permeability of 1x10 -7 cm/sec), a gas management system, and a leveling layer. The side slopes of the composite barrier layer may be on a 4:1 angle and may be reinforced with a geogrid. Cover material shall contain sufficient organic material and nutrients to sustain a vegetative cover.

Within 45-days after the final earthen cover is installed, the area shall be vegetatively stabilized with perennial cover species. A management plan for creating a grassland or grass/shrub habitat on Site 5 shall be developed in consultation with biologists knowledgeable about the creation and management of these habitats. In general, Site 5 shall be vegetated with a mix of native warm season grasses and other plants. Grassland is best managed by burning (which may not be viable at Site 5), having, or mowing. Approximately one third of Site 5 shall be managed every year so that vegetation is allowed three years growth. Undesirable shrub and tree communities can be managed with selective use of herbicides or mechanical removal. The operation and maintenance program shall state that a yearly evaluation of the vegetative cover will be made by a qualified individual.

If the final cover is installed at a time which precludes seeding, the area shall be mulched in accordance with sedimentation and erosion control specifications, to be presented in the final design plans until the next available seeding window when Site 5 shall be vegetatively stabilized.

Regular inspections of the cap shall be conducted to ensure that its integrity is maintained and that it is functioning as designed. These inspections shall continue for 30 years after the date of closure certification. The O&M plan shall include procedures to repair and/or replace components of the cap as necessary, to maintain its grade and vegetative cover in order to control sedimentation and erosion.

Monitoring of Site 5 shall also include an evaluation of the success of the vegetation (i.e., the percentage of the cap that is covered with desirable species), the presence of wildlife species, and, if possible, evidence that these species are reproducing, such as observations of nests or fledglings.

Action-specific ARARs include capping, leachate management, storm water management, sediment and erosion control, and landfill gas collection and treatment regulations.

The low permeability cap shall exceed both Federal and State ARARs for cap components to reduce infiltration of precipitation. Sedimentation and erosion control measures shall be implemented as a component of the design specifications. Sedimentation and erosion control measures shall be consistent with State and local ARARs. During construction, air borne dust emissions shall be controlled by the application of clean potable water. Dust suppression activities shall meet the Clean Air Act and West Virginia Pollution Control regulations.

Long-term sampling and analysis of the landfill gas and groundwater at Site 5 shall be conducted. The specific analytical methods, procedures and sampling frequency will be specified in the O&M plan. Any new groundwater monitoring wells shall be installed in accordance with state requirements. Substantive permit and licensing requirements shall be followed. These activities shall be conducted to ensure that long-term effectiveness and integrity of the remedy is maintained.

Land-use and access restrictions shall limit the use and development of the property. These restrictions shall ensure the long-term effectiveness and integrity of the remedy.

2.9.3 Cost-Effectiveness

The selected remedy is cost-effective because it provides overall effectiveness proportional to the cost. Although more costly than the alternatives that have only a single barrier layer, the selected alternative provides greater long-term protection of human health and/or the environment and meets the all ARARs.

2.9.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable ("MEP")

The selected remedial action does not utilize permanent alternative treatment (or resource recovery) technologies for this operable unit because digging up and treating all the soil in the landfill is impracticable. The costs of such treatment would far outweigh the benefits. Containment in the form of capping is typical and appropriate for a site of this type.

Although this selected remedy does not fully address the statutory mandate for treatment, the selected remedy (capping) is permanent and thus partially satisfies this mandate.

2.9.5 Preference for Treatment as a Principal Element

The selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy because treatment of the Site 5 soils and landfill contents was found not to be practicable. The selected remedy does reduce the mobility of the contaminants by controlling infiltration and reducing leachate formation within the landfill. The selected remedy is consistent with the Superfund program policy of containment, rather than treatment, for wastes that do not present a principal threat and that are representative of CERCLA municipal landfill sites.

2.96 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. The names of both Alternatives 5 and 6 have been corrected in this ROD.

3.0 RESPONSIVENESS SUMMARY

The selected remedy for Site 5 OU 1 is a composite cap comprised of a geosynthetic clay liner (GCL) and a 40 mil flexible membrane cap (FMC). 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 5 OU 1 and to answer any questions on the Propsed 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.

Both the EPA and the West Virginia Division of Environmental Protection, representing the State of West Virginia, concur that the selected remedy is protective of human health and the environment.

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 5 and the Proposed Plan were both discussed at the RAB meetings and a Site 5 tour was undertaken during a special RAB meeting.

Community relations activities for the final selected remedy include:

- The documents concerning the investigation and analysis Site 5, 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 5 OU 1 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.

<IMG SRC 97089B>
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APPENDIX A

Toxicological Profiles for COCs at Site 5 - Landfill

VOLATILE ORGANIC COMPOUNDS (VOCs)

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 central nervous system (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.

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)O carcinogen via the oral and inhalation routes of exposure.

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 dematitis, 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.

SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs)

BENZO (A) PYRENE

DIBENZO (A,H) ANTHRACENE

PYRENE

The polycyclic aromatic hydrocarbons (PAHs) constitute a class of contaminants consisting of substituted and unsubstituted polycyclic aromatic rings formed by the incomplete combustion of organic materials. Their physical, chemical, and biological properties vary with their size and shape. PAHs are persisitent in the environment. Some PAHs are carcinogens and classified by the EPA as a Group B2 probable human carcinogen. Long term exposure to PAHs may cause birth defects.

Benzo (a) pyrene is a polycyclic aromatic hydrocarbon which occurs naturally in coal deposits, and is also formed by incomplete combustion (e.g., auto exhaust, cigarette smoke, and coal burning). It exists as yellowish crystals at room temperature, melts at 179 C, and is soluble in alcohols and aromatic solvents but nearly insoluble in water.

Benzo (a) pyrene is a Class B2 carcinogen, based on evidence that it causes stomach, skin, and lung tumors in animals when administered by injection. In humans, strong associations between benzo (a) pyrene exposure and occurrence of cancer of the lung and scrotum have been reported

INORGANICS

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 lessmobile. 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. 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.

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 flood; 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.

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. Experimental studies involving laboratory animals indicate that both organic and inorganic forms of mercury are toxic to embryos.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
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 º 469	Applicable	Requires actions to avoid potential loss or destruction of significant scientific, historical, or archaeological data
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.
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

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

Hazardous Waste Control Act	40 C.F.R. 264.18 (b)	Potentially Applicable or Relavent and Appropriate to removal and treatment activities.	RCRA hazardous waste located within 100-year floodplain, treatment, storage, or disposal of hazardous waste.
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.
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.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

Executive Order 11990, Protection of Wetlands	40 C.F.R. 6, Appendix A	Applicable	Action to minimize the destruction, loss, or degradation of wetlands.
	Clean Water Act of 1972 (CWA) Section 404		
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.
II. ACTION SPECIFIC			
Capping/Closure and Post Closure			

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

Resource Conservation and Recovery Act	40 C.F.R. 265.19	Relevant and Appropriate	Construction Quality Assurance Program.
Resource Conservation and Recovery Act	40 C.F.R. 265.111	Relevant and Appropriate	For a closing facility, owner must minimize need for further maintenance, control, minimize, or eliminate post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and comply with other closure requirements.
Resource Conservation and Recovery Act	40 C.F.R. 265.114	Relevant and Appropriate	During final closure, all contaminated equipment, structures, and soil must be properly disposed of, or decontaminated.
Resource Conservation and Recovery Act	40 C.F.R. 265.115	Relevant and Appropriate	Within 60 days of completion of closure, the owner or operator must submit to the Regional Administrator, by registered mail, a certification that the unit has been closed in accordance with the specifications in the approved closure plan.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

Resource Conservation and Recovery Act	40 C.F.R 265.116	Relevant and Appropriate	No later than the submission of the certification of closure, an owner or operator must submit to the local zoning authority and to the Regional Administrator, a survey plat indicating the location and dimensions of the landfill with respect to permanently surveyed benchmarks.
Resource Conservation and Recovery Act	40 C.F.R. 265.117	Relevant and Appropriate	Post-closure care for each hazardous waste management unit must begin after completion of closure and continue for 30 years after that date. It must consist of monitoring and reporting under requirements RCRA Subpart N and maintenance and monitoring of waste containment systems.
Resource Conservation and Recovery Act	40 C.F.R. 265.118	Relevant and Appropriate	The owner or operator must develop a written post-closure plan. The post-closure plan must identify activities to be carried on after closure and the frequency of these activities. The activities include a description of the planned monitoring activities and frequencies to be performed; a description of the planned maintenance activities and frequencies to be performed to ensure the integrity of the cap and final cover and the function of the monitoring equipment. The post-closure plan must also include the name, address, and phone number of the person to contact during the post-closure care period.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

Resource Conservation and Recovery Act	40 C.F.R. 265.119	Relevant and Appropriate	The owner or operator must, within 60 days after certification of closure of each hazardous waste disposal unit, submit to the local zoning authority and to the Regional Administrator a record of the type, location, and quantity of hazardous waste disposed of within the disposal unit. The owner or operator must record a notation on the deed to the facility property that will perpetuity notify any potential purchaser of the property that the land has been used to manage hazardous waste, its use is restricted under 40 C.F.R. Subpart G regulations and that a survey plat is included. The owner or operator must submit a certification that he has recorded the notation on the deed.
Resource Conservation and Recovery	40 C F R 265.120	Relevant and Appropriate	The owner or operator, within 60 days after completion of the post-closure care period, must submit to the Regional Administrator, by registered mail, a certification that the post-closure care period was performed in accordance with the specifications in the approved post-closure plan.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

Resource Conservation and Recovery Act	40 C.F.R 265.310	Relevant and Appropriate	Final cover to provide long-term minimization of infiltration. Restrict post-closure use of property to prevent damage to the cover. Prevent run-on and run-off from damaging the cap. 30-year post-closure care to ensure site is maintained and monitored.
Solid Waste Management Act	47 CSR 38-6 to 7	Relevant and Appropriate	Permanent Closure Criteria governing: Access Restriction, Deed Notation, Closure and Post Closure Care, Gas Management, Drainage Layer, Final Cover, Run-on Run-off controls, Maintenance of Leachate Control, Site Monitoring, and compiling with other permanent closure requirements.
AIR			
Gas Collection and Vents	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.
Gas Collection and Vents	40 C.F.R. 52	Applicable	Predict total emission of volatile organic compounds (VOCs) to demonstrate emissions do not exceed 450 lb/hr, 3,00 lb/day, 10 gal/day or allowable emission levels from similar sources using Reasonably Available Control Technology (RACT).
Gas Collectiion and Vents	40 C.F.R. 60 Subpart WWW and CC	To Be Considered	New Source Performance Standard (NSPS): Landfill Emission Rule, deals with non-methane organic compounds.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

Gas Collection and Vents	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.
Gas Collection and Vents	CAA Section 112(D)	Relevant and Appropriate	Emission Standards for new stationary sources.
Gas Collection and Vents	CAA Section 118	Applicable	Control of pollution from Federal Facilities.
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.
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.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

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	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.
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.
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	47CSR58-4.2	Relevant and Appropriate	Subsurface bores of all types shall be constructed, operated and closed in a manner which protects groundwater.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

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	47 CSR 60-1 to 23	Applicable	Monitoring well design Standards.
Water Pollution Control Act	46 CSR 1-1 to 9	Relevant and Appropriate	Rules establishing, governing discharge of waste into State waters.
Groundwater Protection Act	47CSR59-4 1 to 4 7	Relevant and Appropriate	Monitoring well Drillers certification.
Miscellaneous			
Resource Conservation and Recovery Act	40 CFR 262.10 (a), 262.11	Applicable	Waste generator shall determine if that waste is hazardous waste.
Resource Conservation and Recovery Act	40 CFR 262.34	Potentially Applicable	Generator may accumulate waste onsite for 90 days or less or must comply with requirements for operating a storage facility.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

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 264.174	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.
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, 176	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.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

Resource Conservation and Recovery Act	40 C.F.R. 268.40	Potentially Applicable	Movement of excavated materials to new location and placement in or on land will trigger land disposal restrictions for the excavated waste or closure requirements for the unit in which the waste is being placed.
Resource Conservation and Recovery Act	40 C.F.R. 264.251 (except 251(j), 251(e)(11)	Potentially Applicable	Use single liner and leachate collection system. Waste put into waste pile subject to land ban regulation.
Resource Conservation and Recovery Act	40 C.F.R. 268.40	Potentially Applicable	Attain land disposal treatment standards before putting waste into landfill in order to comply with ban restrictions.
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.
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.

APPENDIX B
Applicable or Relevant and Appropriate Requirements
Site 5 Landfill
Allegany Ballistics Laboratory, West Virginia

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 laneled 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 unles 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.
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 Proposed Plan for Site 5 Landfill Contents and Surface Soils was available for public comment and review beginning October 22, 1996 and the public comment period ended on December 9, 1996. No written comments were received by the EPA, WVDEP, or the Navy. The Proposed Plan was presented at a public meeting held in conjunction with the Restoration Advisory Board (RAB) meeting on October 29, 1996. After the presentation of the Plan for Site 5 Landfill Contents and Surface Soils a number of questions were asked by members of the RAB and local community. The comments and responses to these questions are summarized below. In addition, a transcript of the public meeting is provided in the administrative record. The Administrative Record 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: Has anybody run studies on the life cycles of flexible membrane caps? How long will they last?

Response: Flexible membrane caps (FMC) have only been in use for the past 10 to 20 years depending on the specific type of FMC. Therefore, we don't have any performance data on actual landfills over 10 to 20 years old that use FMCs. However, for those landfills which we do have data FMCs appear to be working fine. Manufacturers of different types of FMCs dok run various tests to determine the durability of FMCs. They expose them to sunlight (ultraviolet light), perform compatibility testing with various chemicals, and subject them to various pressure and stress tests. Most manufacturers estimate that FMCs will have a life well over 30 years (some estimate over 400 years) providing they are installed in accordance with manufacturer specifications. Natural barrier layers like clay and bentonite (included in geocomposite clay liners (GCL)) have existed in the environment for many years and this is what makes them attractive as capping material.

Question 2: Is there a method for speeding up the aging of flexible membrane caps (in order to test their longevity)?

Response: Yes. Exposure to ultraviolet light and various chemicals will promote the aging process of FMCs. This is why FMCs need to be protected from exposure to sunlight and other potentially damaging chemicals during installation. Once they are installed the soil cover and GCL layer below should provide the necessary protection.

Question 3: Does the Navy plan to run tests on the cap after it has been installed? Will testing occur once a year? Every five years? Will the cap be tested to evaluate whether it is truly holding up?

Response: Yes. a Quality Assurance and Quality Control Plan will be developed prescribing the testing protocol necessary to ensure the cap is installed correctly and in accordance with design and manufacturer specifications. A Groundwater Monitoring Plan will also be developed detailing the groundwater sampling locations and frequency to evaluate whether groundwater contamination is decreasing over time. This would be expected since the landfill cap should minimize infiltration and subsequent leaching of the landfill contents into the groundwater. The frequency of groundwater sampling will be determined when the plan is developed, but will likely occur annually or semi-annually.

Question 4: What is the average thickness of the material in the landfill?

Response: The average thickness of the landfill contents is approximately 20 to 30 feet.

Question 5: How many monitoring wells are there?

Response: There are seventeen monitoring wells.

Question 6: Why doesn't the Navy just use a good clay layer?

Response: A good clay layer would work but it is expensive and would only provide a single barrier cap. The proposed cap includes two barrier layers; the FMC and the GCL. Having two barrier layers provides a second line of defense in case aproblem occurs with the first layer.

Question 7: When is construction planned to begin?

Response: Construction is planned for June or July of 1997.

Question 8: Will local contractors have an opportunity to bid on the construction? Just for the record, the community encourages a process that would provide opportunity for the local contractors to perform the work.

Response: The prime contractor to perform the work has already been selected. However, the Navy does encourage them to consider the local pool of potential subcontractors. The prime contractor was recently recognized by the Department of Defense for their use of local subcontractors at other sites.