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FINAL RECORD OF DECISION SITES 11 OPERABLE UNIT 11 (OU11) AND 12 OPERABLE UNIT 8 (OU8) ALLEGHENY BALLISTICS ROCKET CENTER WV

11/1/2011

CH2M HILL

Final

Record of Decision
Sites 11 (Operable Unit 11) and 12 (Operable Unit 8)

Allegany Ballistics Laboratory
Rocket Center, West Virginia

Contract Task Order WE14

November 2011

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Acronyms and Abbreviations

ABL	Allegany Ballistics Laboratory
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirement
ASI	advanced site inspection
AST	aboveground storage tank
ATK	ATK Tactical Systems Company LLC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
COC	constituent of concern
CSM	conceptual site model
CTE	central tendency exposure
DBCP	1,2-dibromo-3-chloropropane
DNAPL	dense nonaqueous phase liquid
EAB	enhanced anaerobic biodegradation
ERA	ecological risk assessment
ERP	Environmental Restoration Program
FFA	federal facility agreement
FS	feasibility study
ft^2	square foot/square feet
Hercules	Hercules Aerospace Company
HHRA	human health risk assessment
HI	Hazard Index
HQ	hazard quotient
IC	institutional control
IR Program	Installation Restoration Program
ISCO	in situ chemical oxidation
LNAPL	light nonaqueous phase liquid
LUC RD	Land Use Control Remedial Design
µg/L	micrograms per liter
MC	methylene chloride
MCL	Maximum Contaminant Level
MNA	monitored natural attenuation
Navy	U.S. Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List

O&M	operation and maintenance
OU	operable unit
PCE	tetrachloroethene
PRAP	Proposed Remedial Action Plan
RAO	Remedial Action Objective
RFA	Resource Conservation and Recovery Act Facility Assessment
RI	remedial investigation
RME	reasonable maximum exposure
ROD	Record of Decision
ROI	radius of influence
SRG	site remediation goal
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCE	trichloroethene
UFP-SAP	Uniform Federal Policy Sampling and Analysis Plan
USEPA	U.S. Environmental Protection Agency
VC	vinyl chloride
VOC	volatile organic compound
WVDEP	West Virginia Department of Environmental Protection

Final

Record of Decision

Sites 11 (Operable Unit 11) and 12 (Operable Unit 8)

Allegany Ballistics Laboratory, Rocket Center, West Virginia

November 2011

1 Declaration

1.1 Site Name and Location

Site 11, Former Production Well "F" (Operable Unit [OU] 11) and Site 12, Building 167 Solid Waste Management Units (OU 8) at Allegany Ballistics Laboratory (ABL) in Rocket Center, West Virginia. National Superfund Database Identification Number: WV0170023691.

1.2 Statement of Basis and Purpose

ABL was placed on the National Priorities List (NPL) in May 1994. As a result of the NPL listing and pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the U.S. Environmental Protection Agency (USEPA) Region III, the West Virginia Department of Environmental Protection (WVDEP), and the United States Department of the Navy (Navy), entered into a Federal Facility Agreement (FFA) for ABL in 1998. Because of their close proximity, similarities, and hydrogeologic relationship, Sites 11 and 12 are addressed as one combined area for this Record of Decision (ROD).

The remedy was selected in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record file for the site.

The Navy is the lead agency and provides funding for environmental restoration activities at ABL. The Navy and the USEPA, the lead regulatory agency, issue this ROD jointly. The WVDEP, the support regulatory agency, participated throughout the investigation process, has reviewed this ROD and the materials on which it is based, and concurs with the selected remedy.

1.3 Assessment of Site

The response action selected in this ROD is necessary to protect public health, welfare, and the environment from actual or threatened releases of hazardous substances from the site.

1.4 Description of Selected Remedy

The selected remedy, as documented in this ROD, addresses all potential risks from exposure to residual constituents remaining in place after removal efforts and does not include or affect any other sites at the installation. The Site 11 shallow groundwater (i.e., alluvial aquifer) constituents of concern (COCs) consist of tetrachloroethene (PCE), trichloroethene (TCE), vinyl chloride (VC), total antimony, total barium, total chromium, dissolved iron, dissolved and total manganese, and dissolved and total thallium. The Site 11 deep groundwater (i.e., bedrock aquifer) COCs consist of TCE and dissolved and total arsenic. The Site 12 alluvial aquifer COCs consist of 1,2-dibromo-3-chloropropane (DBCP), methylene chloride (MC), TCE, VC, dissolved arsenic, dissolved manganese, and dissolved thallium.

Lastly, the Site 12 bedrock aquifer COCs consist of MC, TCE, bis(2-ethylhexyl)phthalate, total arsenic, total chromium, total lead, total manganese, and dissolved and total thallium. Elevated metals concentrations in groundwater at both sites are believed to be attributable to the presence of VOCs, which are affecting a change in the natural metals concentrations.

In alluvial groundwater, the COCs targeted for direct remediation are TCE at Sites 11 and 12 and VC at Site 11. In bedrock groundwater, the COCs targeted for direct remediation are TCE at Site 11 and MC at Site 12. It is anticipated that the COCs which are not targeted (mainly metals) will be indirectly remediated.

The site-specific Remedial Action Objectives (RAOs) for groundwater at Sites 11 and 12 are:

- Prevent human exposure to groundwater containing COCs above site remediation goals (SRGs)
- Reduce concentrations of COCs to meet SRGs in groundwater in order to remediate the targeted aquifer to drinking water quality within 36 years

Five remedies were evaluated in the Remedial Investigation and Feasibility Study (RI/FS) and presented in the Proposed Remedial Action Plan (PRAP) for Site 11 (OU 11) and Site 12 (OU 8). The Selected Remedy is Alternative 4: Focused Enhanced Anaerobic Biodegradation, monitored natural attenuation (MNA), and institutional controls (ICs). The components of Alternative 4 are:

- Focused Enhanced Anaerobic Biodegradation for actively treating groundwater will be conducted within the alluvial and shallow bedrock aquifers at Sites 11 & 12 where the highest concentrations of TCE and MC are detected
- MNA for all COCs not targeted for direct remediation
- ICs in the form of excavation restrictions to require adequate worker protection if excavation activities encounter groundwater at Site 11, and a prohibition of potable groundwater use at Sites 11 and 12, and a long-term groundwater monitoring program to assess changes in water quality

Soil removal actions, which removed contaminated soil within known source areas, were completed at Sites 11 and 12 in 1994 and 2005, respectively. Post removal confirmatory soil samples from Site 12 indicated that the detected concentrations pose an acceptable risk to human receptors and a limited pathway to ecological receptors. Confirmatory soil samples from Site 11 indicated that the concentrations of iron at Site 11 might pose an unacceptable risk to human receptors; however, the detected concentrations of iron are attributable to site-specific background concentrations. Therefore, soil at Sites 11 and 12 requires no further action.

The vapor intrusion pathway of groundwater to indoor air will be evaluated under a separate investigation.

1.5 Statutory Determinations

The selected remedy meets the statutory requirements and is protective of human health and the environment, complies with Federal and State regulations that are applicable or relevant and appropriate to the remedial action, is cost-effective, and uses permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants or contaminants as a principle element through treatment). Because the remedy will result in pollutants or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years of the initiation of the remedial action (and every 5 years thereafter). This is to evaluate continuing remedy effectiveness and to determine if the remedy continues to be protective of human health and the environment and is meeting the RAOs.

1.6 ROD Data Certification Checklist

The following information was considered in selecting the remedy for Site 11 and Site 12 (the sections of the ROD where the information can be found is also provided below):

Data	Sites 11 and 12
Chemicals of concern and their respective concentrations.	2.5
Risk represented by the COCs.	2.7
Cleanup levels established for COCs and the basis for these levels.	2.8
How source materials constituting principal threats are addressed.	2.11
Current and reasonably anticipated future land-use assumptions and beneficial uses of groundwater used in the risk assessment.	2.6, 2.7
Potential land and groundwater use that will be available at the sites as a result of the Selected Remedy.	2.12.4
Estimated capital, annual operation and maintenance, and total present worth costs, and the number of years over which the remedy cost estimates are projected.	2.9.1
Key factors that led to selecting the remedy.	2.12.1

1.7 Authorizing Signatures

The Navy and USEPA selected this remedy with the concurrence of the WVDEP.

12/6/2011

Stephen G. Hoffman
Director
Program Management Office (PMO)
Information Technology (SEA 04FP)

Date

1/4/12

Ronald J. Borsellino, Director
Hazardous Site Cleanup Division
USEPA, Region III

Date

12/13/11

Ken Ellison, Director
Division of Land Restoration
WVDEP

Date

2 Decision Summary

2.1 Site Name, Location, and Brief Description

ABL is a government-owned (Navy), contractor-operated (ATK Tactical Systems Company LLC [ATK]), research, development, testing, and production facility. ABL was constructed in 1942 by the Kelly Springfield Engineering Company as a loading plant for 0.50-caliber machine gun ammunition for the U.S. Army and operated by Hercules Aerospace Company (Hercules). The Navy took ownership of the facility in 1945 and the Aerospace Division of Hercules assumed management of the facility. The facility currently operates as a highly automated production facility for tactical propulsion systems and composite and metal structures. ABL is a leading producer of tactical rocket motors, gas generators, and conventional warheads for the U.S. Department of Defense.

ABL is located in Rocket Center, West Virginia, in the northern part of Mineral County. The facility is situated along the North Branch Potomac River, separating Mineral County, West Virginia, from Allegany County, Maryland (Figure 1). The land surrounding ABL is primarily rural agricultural and forest. Several small towns are located near the facility, including Short Gap, West Virginia, to the southeast, and Pinto, Maryland, to the north.

Operations at the facility are divided into two distinct operating plants, Plant 1 and Plant 2. Plant 1, owned by the Navy and operated by ATK, occupies approximately 1,577 acres and includes a large undeveloped area located northwest of Knobly Mountain. In May 1994, Plant 1 was listed on the NPL (USEPA ID: WV0170023691). Plant 2, a 57-acre facility adjacent to Plant 1, is owned and operated by ATK. Plant 2 is not on the NPL. Sites 11 and 12 are located adjacent to each other in the northwest portion of Plant 1.

The Navy is the lead agency and provides funding for environmental restoration activities at ABL. The Navy and the USEPA, the lead regulatory agency, issue this ROD jointly. The WVDEP, the support regulatory agency, participated throughout the investigation process, has reviewed this ROD and the materials on which it is based, and concurs with the selected remedy.

Site 11

Site 11 formerly consisted of a boiler house (Building 215), fuel oil storage area, and a deep bedrock production well, known as F-Well (Figure 2). The original boiler house, built in the late 1950s, was approximately 1,000 square feet (ft^2) in area, and housed a single boiler unit. In 1961, F-Well was installed adjacent to Building 215 to provide potable water to Plant 1 and boiler water to Building 215. Following its installation, attempts to develop F-Well were unsuccessful due to sand flowing into the well through fractures in the bedrock. Because the sand prevented pump operation in the well, F-Well was not put into operation; however, it was not properly abandoned. In 1962, the boiler house was renovated, which doubled the size and the number of boilers. During this expansion, F-Well was covered by the larger building footprint.

An oil pit was located within the perimeter of a 2½-foot concrete containment barrier, which contained the aboveground storage tank (AST) area within an 18 foot by 42 foot area (i.e., dike area) (Figure 2). The oil pit was constructed of a 55-gallon drum (former solid waste management unit [SWMU] 24U), used for collecting waste fuel oil from the oil-water separator (SWMU 34) in the boiler room. The drum was a fully enclosed structure buried up to its neck with a concrete floor surface. Facility representatives stated that the unit may have served as a transfer hose drip catchment. It has been reported that although oil was discharged to the pit during operation of the boiler house, no oil was ever pumped from the pit.

FIGURE 1
General Facility Setting and Locations of Sites

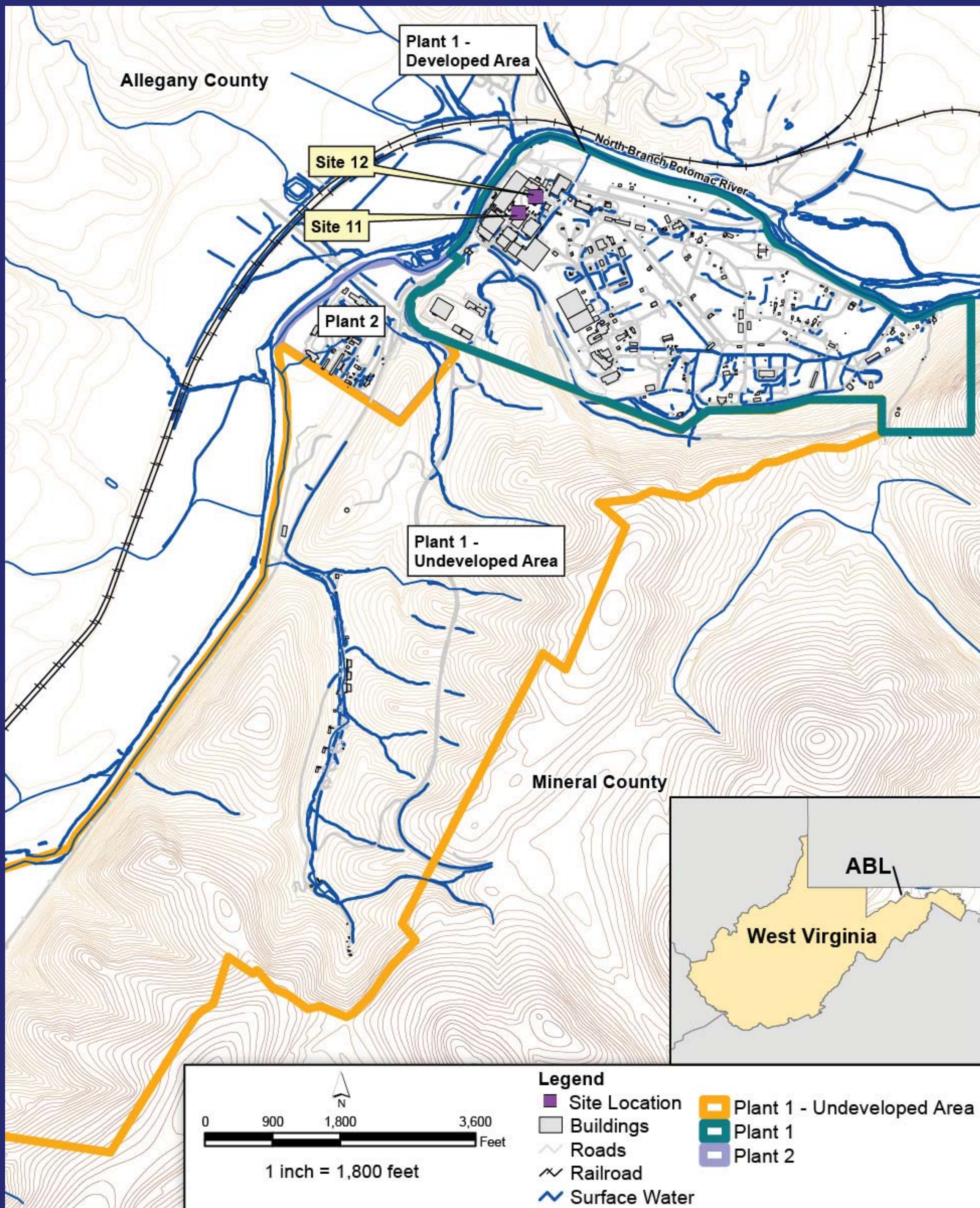
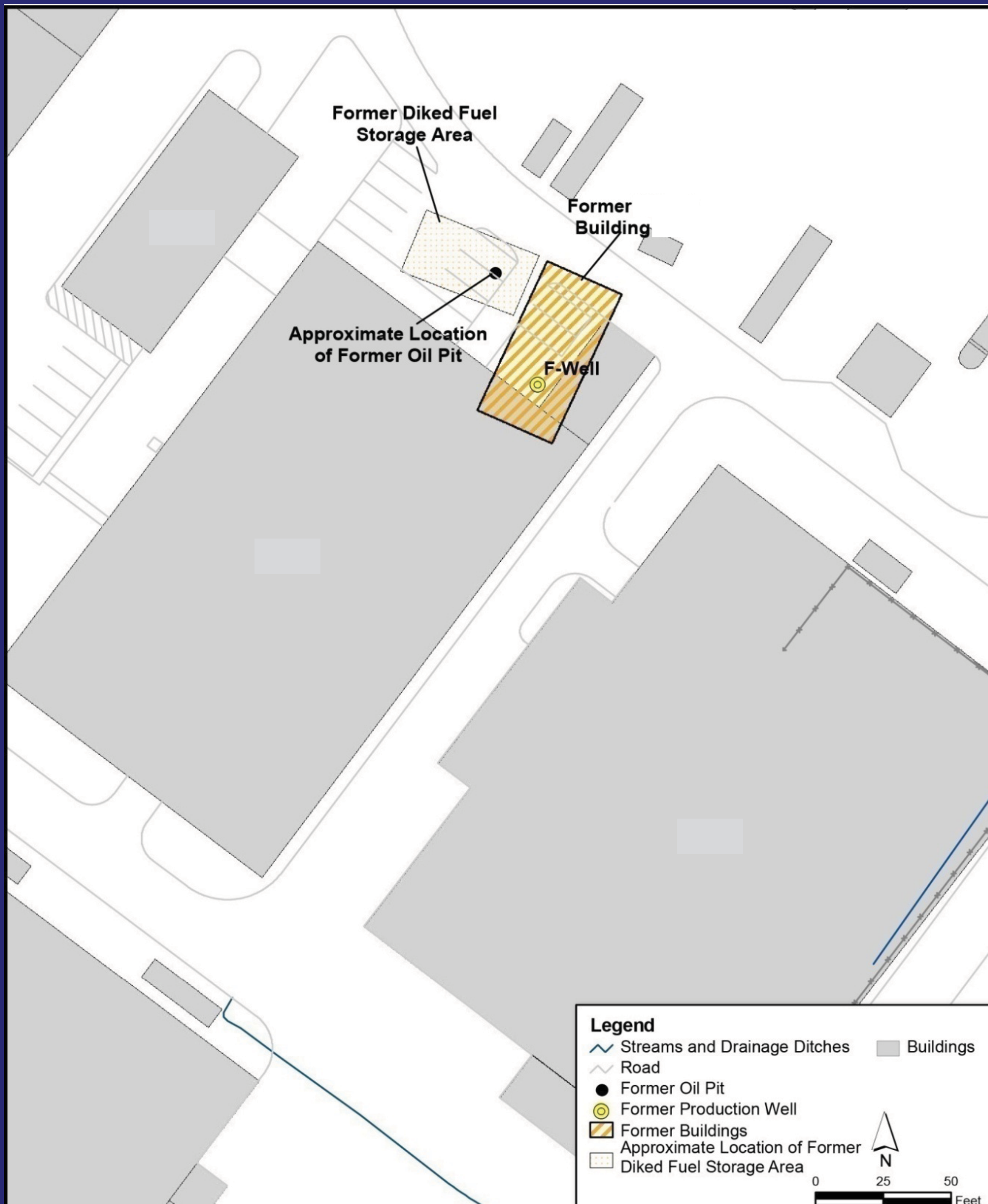


FIGURE 2
Site 11 and Associated Features



Site 12

The Site 12 area (Building 167) serves as the preparation chamber building used mainly for the preparation of rocket casings. Casing preparation activities in the building include hydro-testing, grit blasting, degreasing, painting, and coating for propellant bonding. In the 1960s and 1970s, both trichloroethene (TCE) and methylene chloride (MC) were used as degreasing solvents in the building operations. The building housed a solvent recovery unit and two ASTs, with capacities between 500 and 1,000 gallons. Both ASTs were used for storage and handling of solvent that contained MC. Historical features of the building also included an unlined waste water sump (SWMU 37N) and an alodine treatment tank (SWMU 52).

Nine SWMUs[1] were originally identified in the vicinity of what is now known as Site 12 (Figure 3). At seven of these SWMUs (SWMUs 12, 14, 24S, 24T, 25B, 29F, and 30) it was determined that no further action was required. Additionally it was determined at possible releases from SWMUs 12, 14, 24S, 24T and 25B would be evaluated as part of the investigation of SWMU 52. Therefore, only two SWMUs, SWMU 37N and SWMU 52, were recommended for further investigation. SWMU 37N was an unlined wastewater sump that was connected to a grated trench from Building 167. SWMU 37N was located approximately 60 feet southeast of the southeast corner of Building 167. Historical information indicated that the sump received water from a grated trench located between the original alodine treatment tank (SWMU 12) and Building 167 Satellite Accumulation Area II (SWMU 24S). Therefore, SWMU 37N was considered to have potentially received alodine waste or products from alodine treatment operations. The original alodine treatment tank (SWMU 12) operated between 1978 and 1982; however, SWMU 52 began operation in 1991 as a replacement for SWMU 12. SWMU 52 was located approximately 10 feet south of Building 167. The AST was outside on a concrete pad surrounded by exposed ground. It was also open on top and had a plastic containment structure (6 feet in diameter and 2 feet deep) below it. The **Phase II Resource Conservation and Recovery Act Facility Assessment** (RFA) reported evidence of a possible release from SWMU 12 at Building 167 during a 1982 inspection. The inspectors noted an area of dead vegetation that had presumably been caused by a release of waste or product.

2.2 Site History and Enforcement Activities

Investigation efforts for Sites 11 and 12 are summarized in Tables 1 and 2.

[1] **Blue bold text** identifies detailed site information available in the Administrative Record and listed as References that specifically support this ROD.

FIGURE 3
Site 12 and Associated Features

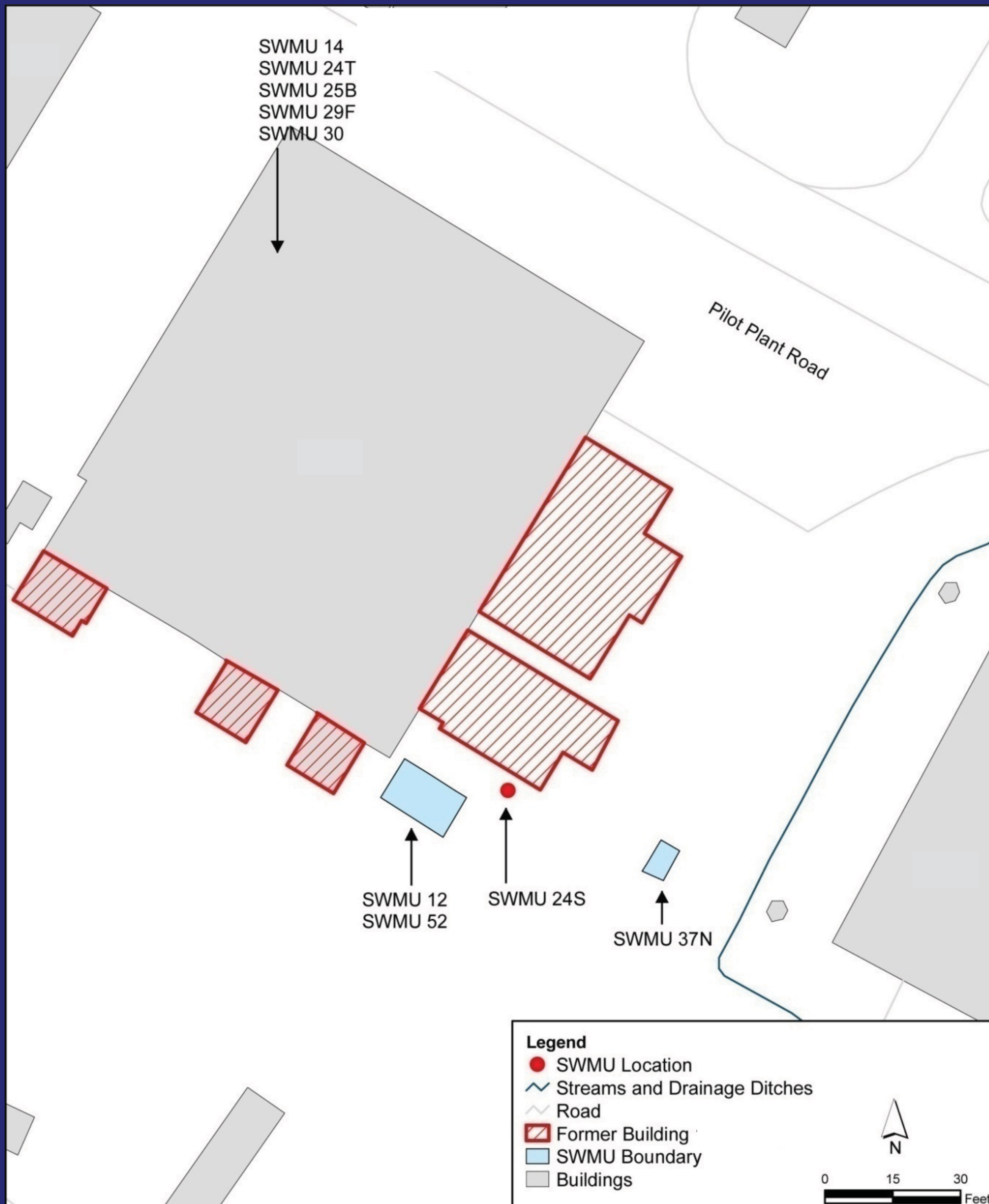


TABLE 1
Site 11 Investigations

Investigation and or Remediation Activities	Results Summary
Boiler House Decommissioning late 1980's	The boiler house was decommissioned in the late-1980s, including removal of the boilers and two aboveground storage tanks (ASTs). In 1994, the AST pad, oil pit, dike wall, and all soil within the confines of the diked area were removed, and the well casing for F-Well was revealed. Soil samples collected from the diked fuel storage area indicated the soil was impacted by petroleum hydrocarbons. Subsequently, a total of 3,000 to 4,500 cubic feet of soil in the fuel storage area was removed to meet cleanup requirements. Following soil removal, Building 421 was constructed adjacent to F-Well, and an asphalt parking lot was constructed around F-Well and over the former diked fuel storage area and former oil pit.
Advanced Site Inspection 1995	The **Advanced Site Inspection** (ASI) was conducted to characterize groundwater contamination associated with F-Well and potential soil and groundwater contamination associated with the oil pit. Six temporary piezometers and nine deep soil borings were installed and sampled to characterize soil and groundwater. Several volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) were detected in soil above the risk-based concentrations (RBCs) in the vicinity of Site 11, mostly near the estimated location of the former oil pit. Several VOCs, including tetrachloroethene (PCE), trichloroethene (TCE), 1,2-dichloroethene, and vinyl chloride (VC), were detected in alluvial groundwater. Two downhole video camera surveys and overdrilling techniques were used to investigate F-Well. During the second downhole survey, a 1-foot thick layer of light nonaqueous phase liquid (LNAPL) was observed. Subsequently, three potential water bearing fractures at 32 feet below ground surface (bgs), 81-83 feet bgs, and 129 feet bgs were identified. The camera also encountered what is believed to have been a dense nonaqueous phase liquid (DNAPL) at 172 feet bgs. The well was purged and sampled, indicating VOCs and SVOCs were present in both the LNAPL and DNAPL.
Remedial Investigation 1998 - 2001	An RI was conducted at Site 11 to characterize the site and evaluate the potential risk to human health and the environment from site media. Surface soil and groundwater samples were collected to further delineate the nature and extent of contamination. Seven monitoring wells were installed to assess the groundwater contamination associated with the source areas identified in the ASI. In addition, the six temporary piezometers installed during the ASI were modified to become permanent alluvial monitoring wells. With the use of downhole video inspection and overdrilling techniques the assumed original depth of F-Well was reached at 350 feet bgs. Any LNAPL or DNAPL in F-Well was removed by the overdrilling activities. Groundwater samples collected from significant water bearing zones indicated that VOCs were not present below a depth of 158 feet bgs. Five rounds of groundwater sampling indicated that COCs were lower than anticipated and that the source was likely the LNAPL and DNAPL in F-Well, which had been removed while overdrilling the F-Well. Analytical results from the alluvial aquifer groundwater, the bedrock aquifer groundwater, and subsurface soil were used to **evaluate the potential human health risks**. Both aquifer groundwater (alluvial and bedrock) and soil had carcinogenic risks or noncarcinogenic hazards greater than the USEPA acceptable levels. The human health COCs for the alluvial groundwater are TCE, VC, iron, manganese, and thallium; and for the bedrock aquifer groundwater is arsenic. Iron was identified as a human health COC in soil, however, the detected concentrations of iron are attributable to site-specific background. A **baseline ecological risk assessment** (ERA) was conducted to evaluate whether potential risks to ecological receptors exist as a result of exposure to Site 11 soil. The ERA concluded that negligible risks to ecological receptors are expected at the site based on the site configuration and the lack of complete and significant exposure pathways in terrestrial areas. Therefore, no remedial action for iron in soil was recommended.
Feasibility Study 2009 - 2010	An FS was completed to address groundwater contamination at Site 11 and to evaluate remedial alternatives for mitigating potential hazards associated with the groundwater.

TABLE 2
Site 12 Investigations

Investigation Activities	Results Summary
Phase II Resource Conservation and Recovery Act Facility Assessment (RFA) 1993	The **Phase II RFA** was conducted to identify SWMUs as possible contamination sources. Nine SWMUs (12, 14, 24S, 24T, 25B, 29F, 30, 37N, and 52) were identified in what is now known as Site 12.
SWMU/Area of Concern Assessment 1995	Assessment of the SWMU/Area of Concern (AOC) determined that **no further action** was required for seven SWMUs (12, 14, 24S, 24T, 25B, 29F, and 30). Because of the general locations of the SWMUs, it was further determined that possible releases from SWMUs 12, 14, 24S, 24T, and 25B would be evaluated under a single SWMU, and would become the investigation of SWMU 52. Therefore, both SWMU 37N and 52 were included in subsequent investigations.
Alodine Treatment Tank Removal 1995	When the alodine treatment tank (SWMU 52) was removed, no evidence of a release to soil or groundwater was observed. SWMU 52 ceased operations sometime prior to 1995.
Phase I SWMU/AOC Investigation 1996	The Phase I SWMU/AOC Investigation was initiated to assess whether the site required further investigation. It was concluded that **further investigation of SWMUs 37N and 52 was warranted** because organic and inorganic constituents were detected above U.S. Environmental Protection Agency (USEPA) Risk-Based Concentrations.
Phase II SWMU/AOC Investigation 2000	The Phase II SWMU/AOC Investigation was conducted to adequately define the nature and extent of inorganic and organic constituents in surface soil and alluvial groundwater in the vicinity of SWMUs 37N and 52. During the investigation, SWMUs 37N and 52 were combined into one AOC (AOC N). Constituents were detected in the soil and groundwater at concentrations that posed an unacceptable risk to human health and the environment. Consequently, **AOC N was recommended for further investigation**.
Sump Removal 2000	During the investigation of SWMU 37N, the concrete and metal sump and some surrounding soil were excavated and removed. Soil samples collected from the excavation indicated that a potential non-cancer hazard associated with soil exposure was still present. Therefore, it was determined that **additional investigations of soil were required** at AOC N.
Phase III SWMU/AOC Investigation 2002 - 2003	The Phase III SWMU/AOC Investigation was conducted to: (1) define the nature and extent of VOCs and inorganics in alluvial groundwater, (2) define the nature and extent of inorganics in soil in the southeastern portion of Site 12, and (3) define the limits of soil and groundwater contamination associated with the former SWMUs 37N and 52. Based on the soil analytical results, **a non-time-critical removal action was recommended**. The groundwater analytical results identified two areas of trichloroethene (TCE) contamination and one area of methylene chloride (MC) contamination in the alluvial aquifer. One area of TCE contamination was centered around Building 167, the second TCE area of contamination was centered beneath the former SWMU 37N sump location. The results also identified the limits of an area of MC contamination in groundwater that coincided with the TCE area of contamination beneath SWMU 37N. AOC N was designated as Installation Restoration Program (IR Program) Site 12.
Site 12 CERCLA Soil Removal Action 2005	Soil analytical results from Site 12 indicated that the unacceptable human health and ecological risks were associated with impacted shallow soils (less than 2 feet deep) near the locations of SWMUs 37N and SWMU 52. In order to address these risks, a soil removal action was performed following an **Engineering Evaluation and Cost Analysis.** This action included removal of approximately 240 tons of soil from the site. Confirmatory sampling indicated that the cleanup goals were obtained and that the soil no longer posed an unacceptable risk to human or ecological receptors. Therefore, no further action was recommended for Site 12 soil.
Remedial Investigation 2003 - 2008	An RI was conducted at Site 12 to characterize groundwater and evaluate the potential risk to human health and the environment from this medium. Investigation activities included installation and sampling of 20 shallow and deep groundwater monitoring wells, downhole geophysical surveys, well packer testing, aquifer yield tests, and a dye trace study. Five rounds of groundwater sampling were also completed. In general, concentrations of TCE and MC were lower than initially anticipated and supported the conclusion that the former SWMU 37N sump was a primary source of groundwater contamination at Site 12. Analytical results from the alluvial aquifer and bedrock groundwater were used to **evaluate the potential human health risks**. Both the alluvial and bedrock aquifer groundwater had carcinogenic risks or noncarcinogenic hazards greater than the USEPA acceptable levels. A **baseline ERA** was conducted to evaluate whether potential risks to ecological receptors exist. The ERA concluded that negligible risks to ecological receptors are expected at the site and that no unacceptable risks or complete exposure pathways are present in terrestrial areas.
Feasibility Study (FS) 2009 - 2010	An FS was completed to address groundwater contamination at Site 12 and to evaluate remedial alternatives for mitigating potential hazards associated with the groundwater.

2.3 Community Participation

The Navy, as lead agency for CERCLA activities at ABL, has met the public participation requirements of CERCLA Section 117(a) and the NCP at 40 *Code of Federal Regulations* Section 300.430(f)(3) as follows:

- The notice of availability of the PRAP for Sites 11 and 12 was published in the Cumberland Times-News and the Mineral Daily News Tribune on February 17, 2011. The transcript of the public meeting is part of the Administrative Record for ABL and a copy is included in this ROD as Appendix B.
- The 45-day public comment period for the Proposed Plan was February 21, 2011 through April 7, 2011.
- The Sites 11 and 12 Administrative Record (i.e., the PRAP and supporting documents related to Sites 11 and 12) was made available to the public at the following information repositories:

  LaVale Public Library
  815 National Highway
  LaVale, MD 21502

  Fort Ashby Public Library
  Lincoln Street, IGA Plaza
  P.O. Box 74
  Fort Ashby, WV 26719

The Navy held a Public Meeting on March 8, 2011 to explain the PRAP and to address public comments. The meeting proceedings were transcribed by Word for Word Reporting and are included in Appendix B. In addition to the NCP public participation requirements, the Navy and ABL have had a comprehensive public involvement program for more than 15 years.

2.4 Scope and Role of Operable Units or Response Action

Sites 11 and 12 are two of several sites identified in the Federal Facility Agreement for ABL. A list of all sites can be found in the **Site Management Plan** for ABL. This ROD addresses Site 11 (OU 11) and Site 12 (OU 8). The Selected Remedy, as documented in this ROD represents the final remedial actions for these sites. The Selected Remedy addresses the potential risks from exposure to impacted media as a result of releases from Sites 11 and 12 and does not include or affect any other sites at the facility

Sites 11 and 12 are two of fourteen sites being addressed under CERCLA as part of the ABL Environmental Restoration Program (ERP). Two other sites are currently in RI/FS stage of the CERCLA process and seven sites have a final ROD in place.

2.5 Site Characteristics

Sites 11 and 12 have similar geologic and hydrogeologic characteristics because they are located adjacent to each other. Therefore, the site characteristics are discussed together.

Site Geology

ABL is located on the floodplain of the North Branch Potomac River and is flanked by Knobly Mountain to the south and east. The facility is immediately underlain by sediments generally comprised of an upper silt and clay layer underlain by coarser deposits of sand and gravel. Limestone appears to be the dominant lithology beneath the western third of the facility where Sites 11 and 12 are located. The geology of both sites is dominated by steeply dipping, to vertically folded, bedrock (mainly limestone) overlain by various unconsolidated alluvial deposits from the

North Branch Potomac River. The characteristics and stratigraphy of the unconsolidated deposits are similar to the alluvial deposits that are encountered across the facility.

Alluvial thickness beneath Sites 11 and 12 varies from about 18 to 32 feet. The alluvium consists of three distinct types of deposits: (1) silty clay layer of approximately 4 to 11 feet thick (surficial layer), (2) sandy clay to coarse sand approximately 0.5 to 2 feet thick (intermittent layer), and (3) poorly sorted, heterogeneous sand, gravel, pebbles, and cobbles with variable but typically significant amounts of clay and silt (basal layer). The water table is generally 13 to 15 feet below ground surface (bgs).

The lithology of the bedrock beneath Sites 11 and 12 was largely evaluated from observations of the structural geology of the large bedrock outcrop adjacent to the railroad tracks on the north side of the North Branch Potomac River at Pinto, Maryland. In addition, observations from downhole video camera surveys in bedrock boreholes and the application of geophysical logs were used to describe the bedrock at the sites. The Tonoloway Limestone and Wills Creek Formation can be projected directly under Sites 11 and 12. Locally, the Tonoloway Limestone appears in the outcrop as 30- to 45-foot-thick massive limestone interbedded with thin calcareous shale. The Wills Creek Formation appears in the outcrop as a massive 30-foot-thick unit composed primarily of limestone with minor amounts of thin interbedded calcareous shale.

Site Hydrogeology

Similar to the facility-wide hydrogeologic regime at ABL, the alluvium and bedrock that underlie Sites 11 and 12 form two hydrogeologic units. To better understand the distribution of contamination, the bedrock groundwater at Sites 11 and 12 has been further divided into two units: shallow bedrock aquifer and deep bedrock aquifer. The bedrock aquifer has been divided into two segments because of where the fracture zones were observed at the sites.

The alluvial aquifer at Site 11 is typically 5 feet thick, with a considerable degree of spatial variability present in the alluvial aquifer material and properties. The general direction of groundwater flow at Site 11 is westward or northwestward, toward the river. However, at times, there may be a local component of flow to the southwest. The cobble rich strata at the base of the alluvium are the significant water bearing zones in the alluvial aquifer. However, due to bedrock mounding along the western portion of Site 11, this cobble zone, and essentially the entire alluvial aquifer, is not present in the western area.

The alluvial aquifer at Site 12 is typically about 16 feet thick. The general direction of groundwater flow at Site 12 is north and northwest through the alluvial aquifer, toward the river. The Site 12 potentiometric surface maps indicate localized artesian conditions, where the upward movement of groundwater in the southeast portion of the site creates a localized “mound” in the alluvial water table. The alluvial groundwater subsequently appears to flow radially outward from the “mound” generally in a north to northwest direction. The “mound” dissipates toward the margins of the site, and groundwater flow likely becomes consistent with the regional flow gradient.

The groundwater flow in the bedrock aquifers at both sites is affected by the orientation and density of fractures in the bedrock. Therefore, the potentiometric surface contours may not represent the primary direction or magnitude of groundwater flow in this aquifer. For example, at Site 12 the potentiometric surface contours suggest bedrock groundwater flows to the northwest (parallel to subordinate fractures that trend N39ºW). It is more likely, however, that the migration pathway for bedrock groundwater is northeast to the North Branch Potomac River, through the prominent fracture zones that trend approximately N29ºE, located beneath the northwest portion of the site.

As with the remainder of the ABL facility, the data suggest a hydrogeologic connectivity between the alluvial and bedrock aquifers at Site 11. The data from one of the alluvial/bedrock well pairs at Site 11 suggest that the vertical gradient between the alluvium and bedrock are predominantly upward in the southeast portion of the site. Groundwater typically flows upward from deep to shallow bedrock; however, a downward component of flow is periodically observed.

Site 12 potentiometric surface maps show the largest difference in hydraulic head between the alluvial and bedrock aquifers (upward) occurs near the southeast corner of the site, with declining magnitude of difference toward the northwest. This pattern suggests an upward discharge of bedrock groundwater to the alluvial aquifer in the southeast portion of the site. Flow patterns in both the alluvial and bedrock aquifers appear to change relative to conditions observed in the southeast portion of the site. Overall, an upward flow from bedrock to the alluvial aquifer is noticeable in wells located farther to the east/southeast and a downward flow from the alluvial aquifer to bedrock in wells located farther to the west.

Constituents of Concern

The Site 11 alluvial groundwater COCs consist of PCE, TCE, VC, total antimony, total barium, total chromium, dissolved iron, dissolved and total manganese, and dissolved and total thallium. The Site 11 bedrock groundwater COCs consist of TCE and dissolved and total arsenic. The Site 12 alluvial groundwater COCs consist of DBCP, MC, TCE, VC, dissolved arsenic, dissolved manganese, and dissolved thallium. Lastly, the Site 12 bedrock aquifer COCs consist of MC, TCE, bis(2-ethylhexyl)phthalate, total arsenic, total chromium, total lead, total manganese, and dissolved and total thallium. VOCs present in groundwater are a result of historical activities conducted at Sites 11 and 12. COCs in groundwater were selected based on HHRA screening and comparison with USEPA Safe Drinking Water Act MCLs.

COC	Historical Maximum Concentration (µg/L)	Sample Location	SRG (µg/L)*
Site 11 Alluvial Groundwater			
PCE	11	11GW07	5
TCE	190	11GW06	5
VC	13	11GW02	2
Total Antimony	8.6	11GW05	6
Total Barium	2,770	11GW06	2,900
Total Chromium	704	11GW06	100
Dissolved Iron	16,600	11GW08	5,400**
Dissolved Manganese	3,030	11GW08	270**
Total Manganese	44,800	11GW06	270**
Dissolved Thallium	7.4	11GW08	2
Total Thallium	23.4	11GW06	2
Site 11 Bedrock Groundwater			
TCE	30	11GW12S	5
Dissolved Arsenic	16.2	F-WELL-S	10
Total Arsenic	18.4	F-WELL-S	10
Site 12 Alluvial Groundwater			
TCE	24	12MW18	5
MC	2,900	12MW01	5
VC	15	12MW01	2
DBCP	3.8	12MW10	0.2
Dissolved Arsenic	8.9	12MW08	10
Dissolved Manganese	6,290	12MW02	270**
Dissolved Thallium	6.2	12MW08	2

COC	Historical Maximum Concentration (µg/L)	Sample Location	SRG (µg/L)*
Site 12 Bedrock Groundwater			
MC	4,400	12MW09S	5
TCE	8.9	12MW07S	5
bis(2-ethylhexyl)phthalate	21	12MW09D	6
Total Arsenic	10.6	12MW09S	10
Total Chromium	250	12MW09S	100
Total Lead	18.5	12MW09D	15
Total Manganese	738	12MW09S	270**
Dissolved Thallium	5.8	12MW21S	2
Total Thallium	6.2	12MW07D/12MW17D	2

µg/L = microgram(s) per liter

* MCL, unless otherwise noted

** Human health risk based concentration

The following COCs were retained based on comparison with MCLs:

- Site 11 alluvial groundwater: total antimony, total barium, total chromium, and total thallium
- Site 11 bedrock groundwater: TCE and total arsenic
- Site 12 alluvial groundwater: MC and TCE
- Site 12 bedrock groundwater: MC, TCE, bis(2-ethylhexyl)phthalate, total lead, and dissolved thallium

The conceptual site models (CSMs) for Sites 11 and 12 (Figures 4 and 5, respectively) illustrate key features of each site, as well as potential migration pathways for constituents that may have been released from possible source areas. The Site 11 CSM also shows fill material where excavation activities have occurred.

2.6 Current and Potential Future Land and Resource Uses

Sites 11 and 12 and the surrounding area are industrial and located within Plant 1 at ABL. The Navy anticipates that this area will remain under Navy ownership and will continue to be used as part of the industrial facility for the foreseeable future. The alluvial and bedrock groundwater are currently not an active groundwater resource and are not anticipated to be used as a source of drinking water at ABL. However, groundwater may be of potential use as a drinking water source in the future.

FIGURE 4
Site 11 Conceptual Site Model

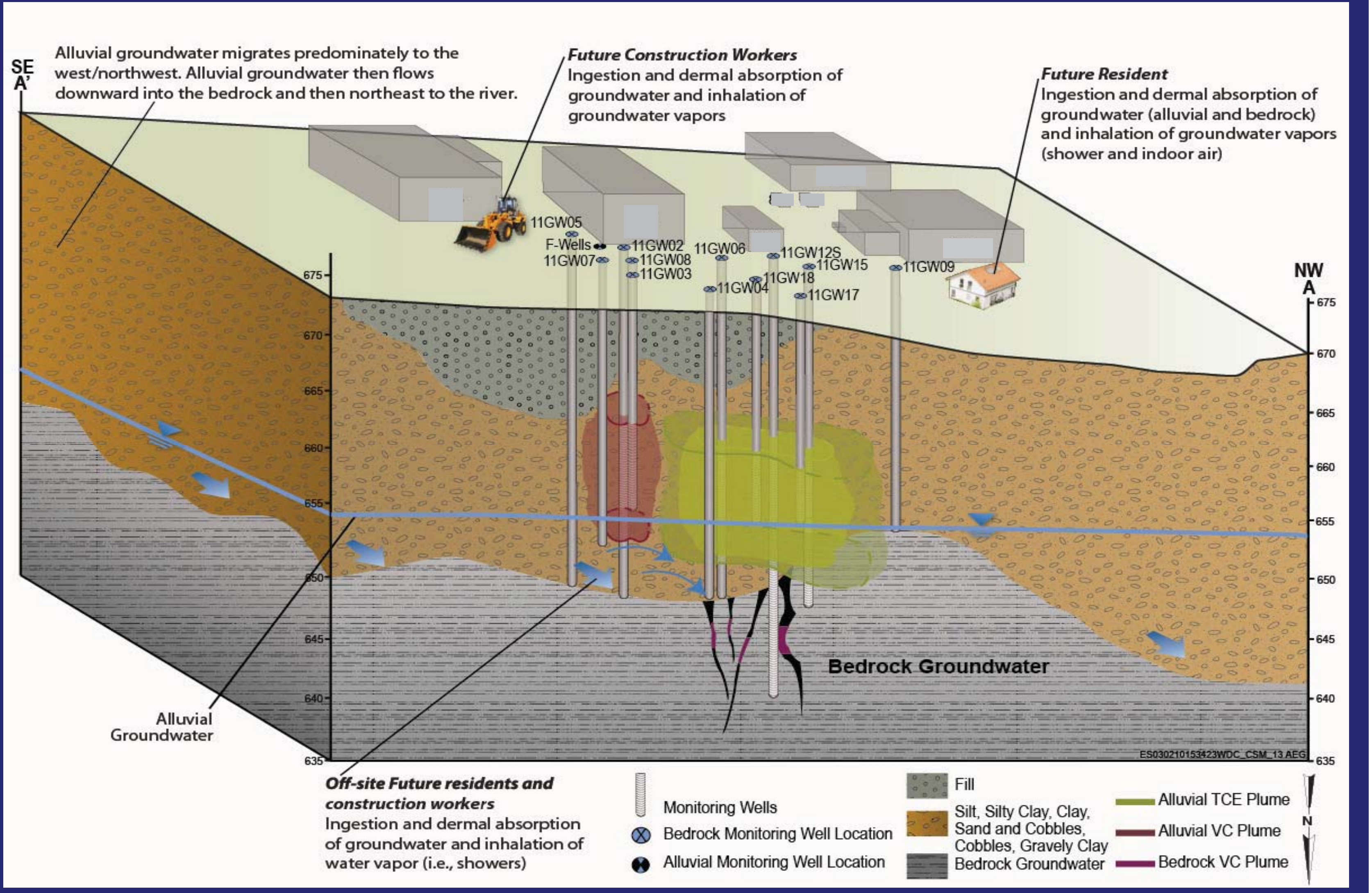
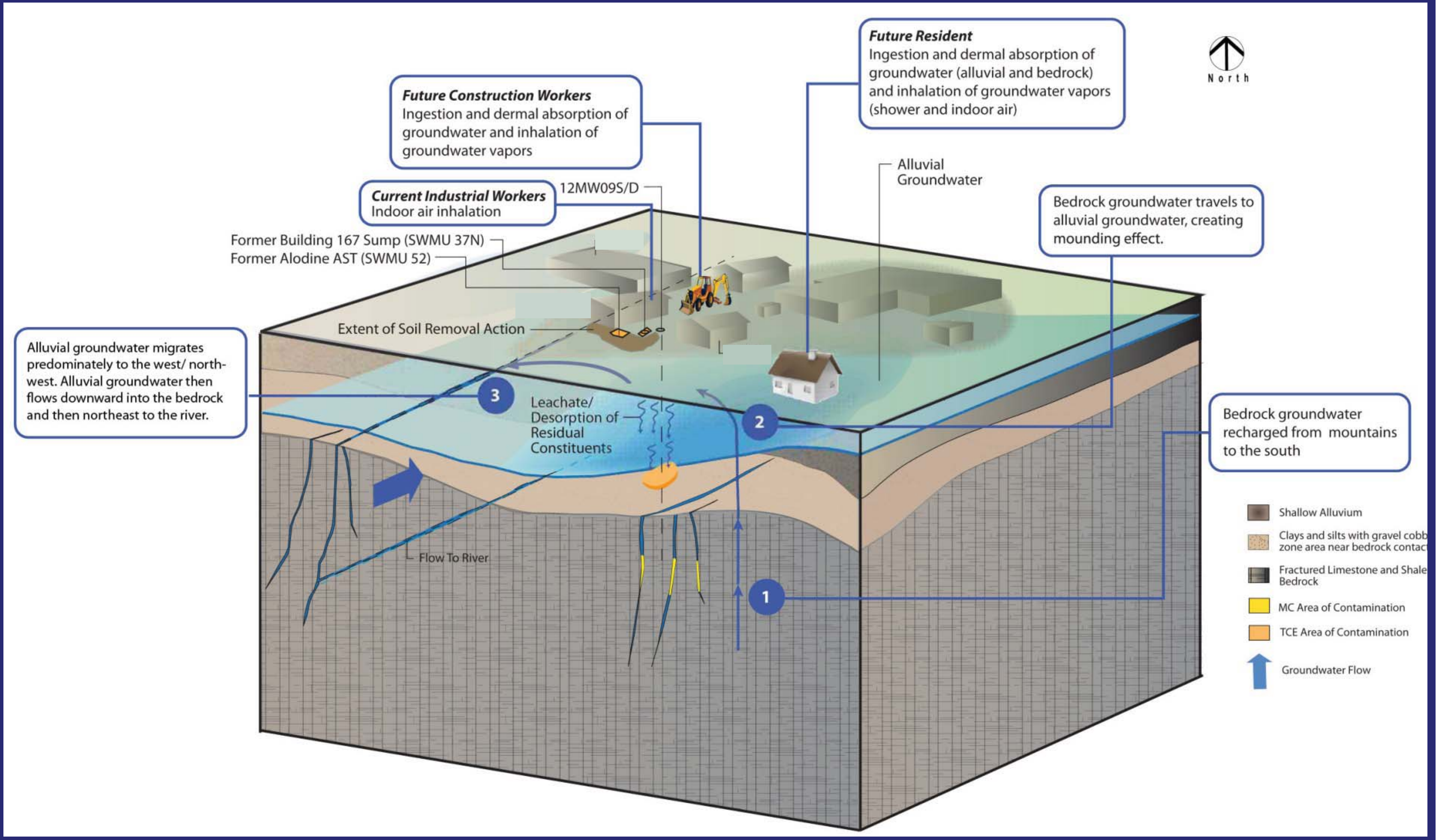


FIGURE 5
Site 12 Conceptual Site Model



2.7 Summary of Site Risks

A human health risk assessment (HHRA) was conducted to evaluate the potential human health risks from current receptor and hypothetical future receptor exposure to groundwater at Sites 11 and 12 using reasonable maximum exposure (RME) and central tendency exposure (CTE) point concentrations. The RME assumes the highest level (maximum concentrations) of human exposure that could reasonably be expected to occur, whereas the CTE scenario reflects human exposure to average concentrations across the site.

The potential for non-cancer hazards, the hazard quotient (HQ), is evaluated by calculating the ratio of exposure to toxicity. An HQ greater than 1 indicates that a receptor's exposure to a particular constituent may present an unacceptable non-cancer hazard. In addition, hazard indices (HIs) are generated by adding the HQs for all constituents that affect the same target organ or cause adverse health effects within a medium or across all media to which an individual may reasonably be exposed. HI values greater than 1 indicate the potential for unacceptable non-cancer hazards due to site exposure.

For known or suspected carcinogens, the likelihood of any type of cancer resulting is generally expressed as an upper bound probability using information on the relationship between dose and response. Acceptable exposure levels are generally considered as concentrations that represent a lifetime cancer risk to an individual of between 10^{-4} (a 1 in 10,000 chance of one extra cancer occurring because of exposure) and 10^{-6} (a 1 in 1,000,000 chance of one extra cancer occurring because of exposure). The 10^{-6} risk level is used as the point of departure for developing performance standards for alternatives when applicable or relevant and appropriate requirements (ARARs) are not available or are not sufficiently protective because of the presence of multiple contaminants at a site or multiple pathways of exposure.

The exposure scenarios evaluated consisted of hypothetical future exposure of an adult/child resident, industrial worker, and construction worker exposure to groundwater. The exposure pathways evaluated were dermal contact, inhalation, and ingestion of groundwater. A summary of the COC non-cancer hazards and cancer risks exceeding USEPA threshold levels in groundwater at Sites 11 and 12 is provided in Tables 3 and 4.

The vapor intrusion pathway of groundwater to indoor air will be evaluated under a separate investigation.

2.7.1 Summary of Human Health Risk Assessment

HHRAs were prepared for the 2005 **Site 11 RI Report** and the 2008 **Site 12 RI Report**. The baseline risk assessments included an evaluation of the potential human health risks associated with exposure to groundwater and soil at Site 11 and groundwater at Site 12. The HHRAs incorporated the general methodology described in ***Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part A*** and ***Part D***. Health risks are based on a conservative estimate of the potential cancer risk or the potential to cause other health effects not related to cancer (non-cancer risk or HI). The NCP, at 40 Code of Federal Regulations (CFR) Section 300.430 (e)(2)(i)(A), defines an acceptable non-cancer hazard as an HI of less than 1 and an acceptable cancer risk as a cancer risk within or below the cancer risk range of 10^{-4} to 10^{-6}.

While many constituents have decreased in concentration over time, using a conservative approach, the data were screened against human-health risk-based concentrations using the maximum concentration detected from the available data set at the time the RIs were completed to identify constituents of potential concern. Health risks were calculated using the reasonable maximum exposure point concentration for each constituent of potential concern, which was calculated as a 95 percent upper confidence limit of the arithmetic mean of the data sets for each site (groundwater monitoring data from 2000 to 2001 and soil data from 1995 and 1998 were used for Site 11, and groundwater monitoring data from 2005 to 2007 were used for Site 12). Groundwater and soil exposure pathways evaluated at Site 11 and groundwater exposure pathways at Site 12 included the following:

Current Land Use Exposure Scenarios

- Based on the current site use, no complete exposure routes are present for groundwater. The groundwater is not used as a potable or industrial supply.
- Sites 11 and 12 consist almost entirely of buildings and paved areas, there is no exposed surface soil. No complete exposure routes are present for surface soil

Future Land Use Exposure Scenarios

- Construction Worker: Dermal contact with and inhalation of volatiles from alluvial aquifer groundwater. Incidental ingestion and dermal contact with Site 11 soil, inhalation of airborne particulates and volatile emissions from Site 11 soil.
- Onsite resident (adult and child): Ingestion of alluvial and bedrock aquifer groundwater, dermal contact with alluvial and bedrock aquifer groundwater, and inhalation (adults only) of volatiles from alluvial and bedrock aquifer groundwater. Children were not included for inhalation since it is assumed that most children would be taking baths instead of showers and volatilization from groundwater while showering is expected to be much greater than during a bath. Incidental ingestion and dermal contact with Site 11 soil, inhalation of airborne particulates and volatile emissions from Site 11 soil.
- Industrial Worker: Incidental ingestion and dermal contact with Site 11 soil, inhalation of airborne particulates and volatile emissions from Site 11 soil.

Site 11

The **Site 11 HHRA** concluded that noncarcinogenic hazards and/or carcinogenic risks exceed USEPA's acceptable risk levels for the following groundwater receptors:

- A future adult, child, and age-adjusted resident[2] and construction worker exposed to Site 11 alluvial aquifer groundwater
- A future child and age-adjusted resident exposed to Site 11 bedrock aquifer groundwater

The ingestion pathway for the adult, child, and age-adjusted resident exposed to Site 11 alluvial aquifer groundwater exceeds USEPA acceptable risk levels, primarily associated with TCE, iron, manganese, thallium, VC, and PCE. The ingestion pathway for the child and age-adjusted resident exposed to Site 11 bedrock aquifer groundwater also exceeds the USEPA acceptable risk levels, primarily associated with arsenic. The dermal pathway for the construction worker exposed to Site 11 alluvial aquifer groundwater exceeds USEPA acceptable risk levels, mainly due to the manganese in the groundwater.

[2] Carcinogenic risks were calculated for an age-adjusted resident to incorporate the different contact rates (ingestion, dermal contact, etc.) of exposure during the first 30 years of life. The age-adjusted exposures were calculated using age-adjusted factors that combine exposure factors for small children (0-6 years) and adults (for a total of 24 years).

The HHRAs identified the following human health COCs (Table 3) at Site 11:

- Alluvial aquifer – TCE, VC, dissolved iron, total manganese, dissolved manganese, dissolved thallium, and PCE
- Bedrock aquifer – Dissolved arsenic

Site 12

The **Site 12 HHRA** concluded that noncarcinogenic hazards and/or carcinogenic risks exceed USEPA's acceptable levels for the following groundwater receptors:

- A future adult, child, and age-adjusted resident exposed to Site 12 alluvial aquifer groundwater
- A future adult, child, and age-adjusted resident exposed to Site 12 bedrock aquifer groundwater

The ingestion and inhalation pathway for the adult resident exposed to Site 12 alluvial aquifer groundwater exceeds USEPA's acceptable risk levels, primarily associated with manganese, thallium, and DBCP. The ingestion and dermal pathway for the child resident exposed to Site 12 alluvial aquifer groundwater exceeds the USEPA acceptable risk levels, mainly due to DBCP, arsenic, manganese, and thallium. The ingestion pathway for the age-adjusted resident exposed to Site 12 alluvial aquifer groundwater also exceeds the USEPA acceptable risk levels associated with arsenic, DBCP, and VC. The ingestion and dermal (for child only) pathways for the adult, child, and age adjusted resident exposed to Site 12 bedrock aquifer groundwater also exceed the USEPA acceptable risk levels, associated with arsenic, chromium, manganese, and thallium.

The HHRAs identified the following human health COCs (Table 4) at Site 12:

- Alluvial aquifer – VC, DBCP, dissolved arsenic, dissolved manganese, and dissolved thallium
- Bedrock aquifer – Total arsenic, total chromium, total manganese, and total thallium

2.7.2 Summary of Ecological Risk Assessment

Ecological risk assessments (ERAs) were conducted for both Site 11 and Site 12 during the RIs to estimate the potential risks posed to ecological receptors if no action were taken (existing conditions) related to soil and groundwater. Soil data (all subsurface and those collected from under paved areas) was not considered in the ERA because there are no complete and significant exposure pathways on the site for terrestrial organisms based on habitat. There are no exposed surface soils near the source areas and no feasible transport pathways to nearby vegetated areas (which are limited in extent). Groundwater data was used in this ERA to evaluate the potential for the transport of site-related constituents via groundwater to the North Branch Potomac River.

Based on the configuration of Site 11 and Site 12, there are no complete or significant exposure pathways at the sites. Therefore, negligible risks to ecological receptors are expected at Site 11 and Site 12.

TABLE 3
Site 11 Summary of Unacceptable Human Health Risks associated with site COCs in Groundwater from 2005 RI

Receptor	Media	Exposure Route	COC	RME EPC* µg/L	RME		CTE		Cancer Toxicity Factor (CSF) mg/kg-day-1	Non-Cancer Toxicity Factor (RfD) mg/kg-day	
					Cancer Risk	Non-Cancer Hazard	Cancer Risk	Non-Cancer Hazard			
Future Resident Adult	Alluvial Aquifer	Ingestion	Iron-dissolved	1.7E+04	N/A	**1.5**	N/A	0.7	N/A	3.0E-01	***
			Manganese-dissolved	2.7E+03	N/A	**3.7**	N/A	**1.7**	N/A	2.0E-02	***
			Thallium-dissolved	4.9E+00	N/A	**1.9**	N/A	0.9	N/A	7.0E-05	***
Future Resident Child	Alluvial Aquifer	Ingestion	Trichloroethene	1.8E+02	N/A	**2.2**	N/A	0.9	N/A	6.0E-03	***
			Iron-dissolved	1.7E+04	N/A	**4.1**	N/A	**1.6**	N/A	3.0E-01	***
			Manganese-dissolved	2.7E+03	N/A	**10.1**	N/A	**3.9**	N/A	2.0E-02	***
			Thallium-dissolved	4.9E+00	N/A	**5.2**	N/A	**2.0**	N/A	7.0E-05	***
Future Lifetime Resident	Alluvial Aquifer	Ingestion	Tetrachloroethene**	1.1E+01	9.0E-05	N/A	1.4E-05	N/A	5.4E-01	N/A	
			Vinyl chloride	2.3E+00	**1.5E-04**	N/A	7.7E-05	N/A	7.2E-01	N/A	
Future Construction Worker	Alluvial Aquifer	Dermal	Manganese	1.4E+04	N/A	**8.2**	N/A	**6.1**	N/A	8.0E-04	***
Future Resident Child	Bedrock Aquifer	Ingestion	Arsenic	6.5E+00	N/A	**1.6**	N/A	0.6	N/A	3.0E-04	
Future Lifetime Resident	Bedrock Aquifer	Ingestion	Arsenic	6.5E+00	**1.5E-04**	N/A	2.4E-05	N/A	1.5E+00	N/A	

Notes:
EPC – exposure point concentration
CSF – cancer slope factor (value used in RI; USEPA Region III RBC Table, April, 2004)
RfD – reference dose (value used in RI; USEPA Region III RBC Table, April, 2004)
N/A-Not Applicable
*The RME EPC for groundwater were calculated as the 95% UCL of the arithmetic mean. In cases where there were less than five samples in the data set, or the recommended UCL exceeded the maximum detected concentration, the maximum concentration was used as the RME EPC. The arithmetic mean concentration was used as the CTE EPC.
**Exposure route cancer risk alone for COC does not exceed 10^{-4}, however total cancer risk for all exposure routes for COC exceeds 10^{-4}.
*** RfD or CSF no longer current.
Bold, highlighted values indicate a cancer risk outside of USEPA's acceptable range of 1x10-4 to 1x10-6 or a non-cancer hazard greater than 1.

TABLE 4

Site 12 Summary of Unacceptable Human Health Risks associated with site COCs in Groundwater from 2008 RI

Receptor	Media	Exposure Route	COC	RME EPC* µg/L	RME		CTE		Cancer Toxicity Factor (CSF) mg/kg-day-1	Non-Cancer Toxicity Factor (RfD) mg/kg-day
					Cancer Risk	Non-Cancer Hazard	Cancer Risk	Non-Cancer Hazard		
Future Resident Adult	Alluvial Aquifer	Ingestion	Manganese-dissolved	2.5E+03	N/A	**3.5**	N/A	0.6	N/A	2.0E-02 ***
			Thallium-dissolved	6.2E+00	N/A	**2.4**	N/A	1.0	N/A	7.0E-05 ***
		Inhalation	1,2-Dibromo-3-chloropropane	3.8E+00	**1.7E-04**	N/A	5.8E-06	N/A	2.1E+01	N/A
Future Resident Child	Alluvial Aquifer	Ingestion	1,2-Dibromo-3-chloropropane	3.8E+00	N/A	**1.2**	N/A	0.3	N/A	2.0E-04
			Manganese-dissolved	2.5E+03	N/A	**8.1**	N/A	**1.9**	N/A	2.0E-02 ***
			Thallium-dissolved	6.2E+00	N/A	**5.7**	N/A	**3.3**	N/A	7.0E-05 ***
		Dermal	Manganese-dissolved	2.5E+03	N/A	**1.3**	N/A	0.2	N/A	8.0E-04 ***
Future Lifetime Resident	Alluvial Aquifer	Ingestion	1,2-Dibromo-3-chloropropane	3.8E+00	**1.4E-04**	N/A	2.6E-05	N/A	8.0E-01	N/A
			Vinyl chloride	2.0E+00	**1.2E-04**	N/A	5.7E-05	N/A	7.2E-01	N/A
			Arsenic	4.8E+00	**1.1E-04**	N/A	2.8E-05	N/A	1.5E+00	N/A
		Inhalation	1,2-Dibromo-3-chloropropane	3.8E+00	**1.7E-04**	N/A	5.8E-06	N/A	2.1E+01	N/A
Future Resident Adult	Bedrock Aquifer	Ingestion	Thallium	5.9E+00	N/A	**2.3**	N/A	**1.1**	N/A	7.0E-05 ***
Future Resident Child	Bedrock Aquifer	Ingestion	Arsenic	4.9E+00	N/A	**1.1**	N/A	0.6	N/A	3.0E-04
			Chromium**	3.6E+01	N/A	0.8	N/A	0.2	N/A	3.0E-03
			Manganese	4.2E+02	N/A	**1.3**	N/A	0.3	N/A	2.0E-02 ***
			Thallium	5.9E+00	N/A	**5.4**	N/A	**3.6**	N/A	7.0E-05 ***
Future Lifetime Resident		Ingestion	Arsenic	4.9E+00	**1.1E-04**	N/A	3.3E-05	N/A	1.5E+00	N/A

Notes:
EPC – exposure point concentration
CSF – cancer slope factor (value used in RI; USEPA Region III RBC Table, October, 2007)
RfD – reference dose (value used in RI; USEPA Region III RBC Table, October, 2007)
N/A-Not Applicable

*The RME EPC for groundwater were calculated as the 95% UCL of the arithmetic mean. In cases where there were less than five samples in the data set, or the recommended UCL exceeded the maximum detected concentration, the maximum concentration was used as the RME EPC. The arithmetic mean concentration was used as the CTE EPC.

**Exposure route HQ alone for COC does not exceed 1, however total HI for all exposure routes for COC exceeds 1.

*** RfD or CSF no longer current.

Bold, highlighted values indicate a cancer risk outside of USEPA's acceptable range of 1x10-4 to 1x10-6 or a non-cancer hazard greater than 1.

2.7.3 Basis for Response Action

The response action selected in this ROD is necessary to protect public health, welfare, and the environment from release of hazardous substances to groundwater at Sites 11 and 12. Based on the results of the HHRA, MCL exceedances, and further evaluation the following COCs are being targeted for direct remediation: TCE in Sites 11 alluvial and bedrock aquifers and Site 12 alluvial aquifer, VC at Site 11 alluvial aquifer, and MC at Site 12 shallow bedrock aquifer.

The evaluation did not eliminate COCs, but rather served as a means to identify which COCs in groundwater are to be targeted for direct remediation (VOCs) versus those that will be indirectly remediated (mainly metals). The VOCs were selected for direct remediation because their concentrations cannot be reduced by indirect remediation within an acceptable timeframe; however, metals in groundwater were selected for indirect remediation because their elevated concentrations are correlated with the localizing reducing conditions in groundwater resulting from the site setting and the presence of VOCs. Once the concentrations of VOCs diminish, the concentrations of these metals are expected to decrease. Regardless of whether a COC is targeted for direct or indirect remediation, all COCs undergo MNA during and after remediation and the data will be evaluated for trends in the contaminant levels over time.

The remainder of this section identifies the site COCs by media and provides the rationale for not pursuing active remediation for selected COCs.

Sites 11 & 12 Soil

Based on the results from the Sites 11 and 12 HHRA and ERA, potential risks associated with soil are acceptable.

Site 11 Groundwater

The HHRA results and comparison with MCLs identified eleven COCs (TCE, PCE, VC, total antimony, total barium, total chromium, dissolved iron, total manganese, dissolved manganese, total thallium, and dissolved thallium) in the alluvial aquifer and three COCs (TCE, total arsenic, and dissolved arsenic) were identified as COCs in the bedrock aquifer. The rationale for not retaining the following COCs for direct remedial action is presented below:

- PCE, total antimony, total barium, total chromium, and dissolved iron maximum concentrations in 2006 were less than the MCL.
- Dissolved and total manganese, dissolved and total thallium, and total arsenic are not attributable to past CERCLA releases as these constituents are likely a result of localized reducing conditions in groundwater resulting from the site setting and the presence of organics, causing the metals in the soil to mobilize. Buildings and paved areas overlying the subsurface of Sites 11 alter the natural air and infiltration influx into the subsurface, causing oxygen-deficient conditions in the subsurface. The reducing condition is further enhanced by the presence of natural organics and the VOCs. The reducing condition of the groundwater has the potential to alter the oxidation state of metals, causing them to mobilize from the soil to the groundwater. Once the VOCs concentration (and corresponding reducing conditions) diminish, the concentrations of these metals are expected to decrease.

Site 12 Groundwater

The HHRA results and comparison with MCLs identified seven COCs (VC, DBCP, MC, TCE, dissolved arsenic, dissolved manganese, and dissolved thallium) in the Site 12 alluvial aquifer and eight COCs (MC, TCE, bis(2-ethylhexyl) phthalate, total arsenic, total chromium, total lead, total manganese, and total and dissolved thallium) in the bedrock aquifer. The rationale for not retaining the following COCs for direct remediation is presented below:

- DBCP, MC, VC and dissolved arsenic maximum concentrations detected in the alluvial aquifer in 2007 were less than the MCLs.
- Dissolved manganese and dissolved thallium were not attributable to past CERCLA releases. The presence of these inorganics at these concentrations are likely a result of groundwater reducing conditions because of site setting and the presence of organics which are similar to Site 11.
- TCE and bis(2-ethylhexyl) phthalate maximum concentrations detected in the bedrock aquifer in 2007 were less than the MCLs.
- Total arsenic and total chromium in the bedrock aquifer that were detected at concentrations exceeding MCL were isolated occurrences and are not representative of groundwater contamination. Due to the large difference in the total and dissolved values of chromium and high turbidity recorded in the field, the total chromium exceedance is likely due to turbidity in the sample.
- Total lead, total manganese, dissolved thallium, and total thallium were not representative of groundwater contamination. The MCL exceedances of these inorganics are similar to Site 11 conditions and likely a result of groundwater reducing conditions because of site setting and the presence of organics causing the metals in the soil to mobilize. Once the VOC concentrations (and corresponding reducing conditions) diminish, the concentrations of these metals are expected to decrease.

2.8 Remedial Action Objectives

The site-specific **RAOs** for groundwater at Sites 11 and 12 are:

- Prevent human exposure to groundwater containing COCs above SRGs.
- Reduce concentrations of COCs to meet SRGs in groundwater in order to remediate the targeted aquifer to drinking water quality within 36 years.

To achieve the RAOs above, **SRGs** were developed for each COC. The SRGs were determined primarily by the federal groundwater MCLs. If no MCL exists, a human health risk based concentration was used as the SRG.

The site risk analysis resulted in the following COCs being targeted for direct remediation:

- Site 11 alluvial aquifer: TCE and VC
- Site 11 bedrock aquifer: TCE
- Site 12 alluvial aquifer: TCE
- Site 12 bedrock aquifer: MC

The SRGs for these COCs are listed below. The SRGs for TCE, VC, and MC are based on their respective MCLs for drinking water.

Contaminants Targeted for Direct Remediation	SRG (µg/L)
Site 11	
TCE	5
VC	2
Site 12	
TCE	5
MC	5

µg/L = microgram(s) per liter

2.9 Description of Remedial Alternatives

The **remedial alternatives** were evaluated in relation to one another based on each of the nine NCP criteria. The purpose of this analysis was to identify the relative advantages and disadvantages of each alternative. The groundwater alternatives evaluated are listed below:

Alternative 1—No Action

Alternative 2—MNA and ICs

Alternative 3—Enhanced Anaerobic Biodegradation, MNA, and ICs

Alternative 4—Focused Enhanced Anaerobic Biodegradation, MNA, and ICs.

Alternative 5—In situ chemical oxidation (ISCO), MNA, and ICs

2.9.1 Description of Remedial Alternatives

Table 5 provides the major components, details, and cost of each remedial alternative evaluated for Sites 11 and 12.

TABLE 5
Remedial Alternatives

Alternative	Description	Costs
1	No Action	Capital Cost: $0 Lifetime O&M Cost: $0 **Present-Worth Cost: $0** Timeframe to achieve RAOs: Not applicable
2	MNA and ICs Alternative 2 involves MNA for COCs and a continuous implementation of ICs, in the form of land and groundwater use controls to prohibit the potable use of groundwater and to restrict excavation to ensure that adequate worker protection is used if excavation activities encounter groundwater, in conjunction with a long-term groundwater monitoring program to monitor changes in water quality.	Capital Cost: $149,982 Lifetime O&M Cost: $1,515,454 **Present-Worth Cost: $1,124,077** Timeframe to achieve RAOs: 36 years
3	Enhanced Anaerobic Biodegradation, MNA, and ICs Alternative 3 implements similar remediation components as those described in Alternative 2 and enhanced anaerobic biodegradation (EAB) which is a type of remediation which will actively treat the TCE in the alluvial aquifer and MC in the shallow bedrock aquifer at Sites 11 and 12, respectively. EAB via injection would be implemented where the concentrations of COCs are greater than the remediation goal to reduce the contamination mass and then rely on natural attenuation processes.	Capital Cost: $1,388,449 Lifetime O&M Cost: $649,972 **Present-Worth Cost: $1,920,643** Timeframe to achieve RAOs: 18 years
4	Focused Enhanced Anaerobic Biodegradation, MNA, and ICs Alternative 4 implements similar remediation components as those described in Alternative 3 except that a focused EAB would be implemented. The focused EAB system consists of an EAB reagent delivery into select monitoring wells located in the highest TCE and MC concentration areas.	Capital Cost: $167,445 Lifetime O&M Cost: $1,179,898 **Present-Worth Cost: $975,481** Timeframe to achieve RAOs: 18-36 years
5	ISCO, MNA, and ICs Alternative 5 has similar components as those described in Alternative 3, except that ISCO technology would be used instead of EAB. The ISCO injection would oxidize the chlorinated VOCs to carbon dioxide and water.	Capital Cost: $1,769,085 Lifetime O&M Cost: $615,634 **Present-Worth Cost: $2,264,830** Timeframe to achieve RAOs: 18 years

O&M = operations and maintenance

2.9.2 Common Elements and Distinguishing Features of Each Alternative

With the exception of Alternative 1, the “no action” alternative, all alternatives meet the ARARs. Common elements and distinguishing features of the alternatives (with the exception of the “no action” Alternative 1) are summarized below.

Common Elements:

- Alternatives 3, 4, and 5 provide treatment of the groundwater to meet the RAOs.
- Groundwater monitoring is common to Alternatives 2, 3, 4, and 5.
- Groundwater use controls will be required for Alternatives 2, 3, 4, and 5 until RAOs are met.

Distinguishing Features:

- Alternative 2: implementation is easiest relative to other alternatives with only minimal operational requirements remaining.
- Alternative 2: requires the longest timeframe to reach RAOs.

2.9.3 Expected Outcomes of Each Alternative

Under all alternatives, except the “no action” alternative, groundwater likely will be remediated to a level that achieves unrestricted residential use. Because of the uncertainties in the duration of natural attenuation, Alternatives 2 and 4 may require additional time to achieve levels for unrestricted groundwater use (relative to Alternatives 3 and 5).

2.10 Comparative Analysis of Remedial Alternatives

Each remedial alternative was evaluated against the nine criteria established by the NCP. The State agreed with the remedy as proposed in the Proposed Plan. Following the public comment period, during which time no comments were received on the Proposed Plan, the state concurred with the selected remedy. Community Acceptance criteria were met by providing a public comment period for the Proposed Plan and holding a public meeting. Community involvement information is presented in the Responsiveness Summary (Section 3) of this ROD.

Threshold Criteria

Overall Protection of Human Health and the Environment. This section describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, and/or ICs.

Alternative 1 does not satisfy the RAOs because it does not prevent exposure to the groundwater nor does it verify that the COCs in groundwater are achieving the SRGs. As a result, Alternative 1 is not sufficiently protective of human health or the environment. Therefore, since Alternative 1 does not satisfy this threshold criterion, it will not be considered further in this analysis. Alternatives 2 through 5 meet the RAOs and are protective of human health and the environment because they prevent exposure to site groundwater through the use of ICs and reduce contaminant concentrations to SRGs. In the short-term, Alternatives 3, 4, and 5 may temporarily change the valence state of certain metals, potentially increasing/decreasing their mobility and toxicity; however, potential changes in metal mobility under Alternative 5 may occur to a greater degree than under Alternatives 3 and 4. The concentrations of metals are anticipated to return to normal as the VOCs are degraded and the injected material is consumed.

Any alternative other than Alternative 1 will achieve the RAOs. In addition to the completed source removal, Alternatives 2 through 5 rely, at least in part, on natural attenuation processes to reduce TCE, VC, and MC concentrations to SRGs. Alternatives 3, 4, and 5 actively treat the contamination to shorten the projected remediation timeframe.

Compliance with ARARs. Complying with ARARs includes Federal or State environmental or facility siting standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate to a CERCLA site or action. The ARARs for the Selected Remedy for Sites 11 and 12 are provided in Appendix A.

As described below, all of the remaining alternatives meet ARARs.

Location-Specific ARARs

Alternatives 2 through 5 are equally in compliance with the location-specific ARARs. They can easily be met with proper planning.

Action-Specific ARARs

Alternatives 3 through 5 comply with the action-specific ARARs. The action specific ARARs would not be applicable to Alternative 2.

Chemical-Specific ARARs

All alternatives would likely achieve chemical-specific ARARs within a reasonable timeframe. Alternatives 3 and 5 are more aggressive (i.e., shorter timeframe) in achieving the chemical-specific ARARs (i.e., SRGs).

Primary Balancing Criteria

Long-Term Effectiveness and Permanence. Long-term effectiveness and permanence addresses the expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, after cleanup goals have been met.

Alternatives 3, 4, and 5 may provide more certainty in reducing the magnitude of the residual risks than Alternative 2, because they involve an active treatment component that can be engineered. However, a temporary solubilization of metals may be associated with Alternatives 3 through 5. Alternative 4 has a longer expected timeframe to meet SRGs because the active treatment is focused on the most highly contaminated portions of the aquifers.

Controls can be adequately and reliably implemented, maintained, and verified for Alternatives 2, 3, 4, and 5.

Reduction of Toxicity, Mobility, and Volume through Treatment. Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternative 2 does not employ treatment to reduce the toxicity, mobility, and volume of contamination and, therefore, does not satisfy this criterion. Alternatives 3 and 5 are the most aggressive in terms of the timeframe for reduction of toxicity, mobility, and volume of contamination through treatment because the treatment takes place over a larger area. These alternatives would actively treat the Site 11 alluvial and shallow bedrock TCE mass and Site 12 shallow bedrock MC, followed by natural attenuation processes to achieve the SRGs, which is estimated to occur within approximately 18 years.

Alternative 4 would actively treat the TCE and MC hot spots present in the Sites 11 and 12 alluvial and shallow bedrock aquifers, followed by natural attenuation processes to achieve the SRGs, which are estimated to occur within approximately 36 years or less.

Alternatives 3, 4, and 5 may result in temporary increases of dissolved metals because of the changing groundwater geochemical condition. As part of the long-term groundwater monitoring program, total and dissolved metals would be monitored to evaluate that change. As the MNA process progresses, the metals concentrations would be expected to return to normal conditions (conditions in the absence of contamination and the injected material).

Short-Term Effectiveness. Short-term effectiveness addresses the time period needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

Because site conditions support natural attenuation processes, Alternatives 2 and 4 are capable of meeting the RAOs, and therefore the SRGs, within an estimated 36-year timeframe, with Alternative 4 having a range of 18 to 36 years. Alternatives 3 and 5 are expected to meet the RAOs, and, therefore, the SRGs, within an estimated period of 18 years. The estimated timeframes for each alternative are reasonable because groundwater beneath these sites is not currently used or encountered, and impacted groundwater is not migrating offsite at detectable levels.

No significant impact will occur on the ABL facility during implementation of any of the alternatives. Alternatives 2 and 4 would require minimal disturbance if additional monitoring or injection wells need to be installed. Alternatives 3 and 5 would produce additional disturbance during construction because drilling equipment would be required during the substrate injection process under these two alternatives. Finally, there are potential risks to workers transporting, managing, and injecting the EAB/ISCO materials. Workers would be required to wear appropriate levels of protection to avoid exposure to EAB/ISCO materials.

Implementability. Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation.

Technical Implementability

No significant technical difficulties are associated with any of the alternatives. Alternatives 2 and 4 may require installation of additional wells for the long-term groundwater monitoring. Alternatives 3 and 5 would require installation of additional monitoring wells for the active treatment zone and long-term groundwater monitoring. EAB and ISCO have been demonstrated in full-scale application for TCE and MC remediation.

Administrative Implementability

Long-term administrative resources for implementation of ICs would be required throughout the entire duration of these alternatives.

Cost. Table 5 of Section 2.9.1 presents a comparative summary of the alternatives. In terms of capital costs, the least costly alternative, other than No Action (Alternative 1), is Alternative 2 – MNA and ICs, followed by Alternative 4 –Focused Enhanced Anaerobic Biodegradation, MNA, and ICs, Alternative 3 – Enhanced Anaerobic Biodegradation, MNA and ICs, and lastly Alternative 5 –ISCO, MNA, and ICs. Other than No Action (Alternative 1), the least costly total present worth cost is Alternative 4, followed by Alternative 2, Alternative 3, and lastly by Alternative 5.

It should be noted that changes in implementation (e.g., need for additional injections/applications) could have a large impact on costs for Alternatives 3 and 5. It is assumed that Alternative 4 would only require a single injection. Finally, it should be noted that the actual time required to remediate the site under each alternative would have a significant impact on the cost.

Modifying Criteria

State Acceptance. State involvement has been achieved throughout the CERCLA process and proposed remedy selection. WVDEP, as the State support agency in West Virginia, has reviewed this ROD and has approved the Selected Remedy.

Community Acceptance. The public meeting was held on March 8, 2011, to present the Proposed Plan and to address community questions with regard to the proposed remedial action at Sites 11 and 12. Detailed information on the public meeting is provided in the Responsiveness Summary (Section 3) of this ROD.

2.11 Principal Threat Wastes

Principal threat wastes are hazardous or highly toxic source materials that result in ongoing contamination to surrounding media, generally cannot be reliably contained, or present a significant risk to human health or the environment should exposure occur. Site data indicate that under current conditions there are no principal threat wastes associated with Sites 11 and 12.

2.12 Selected Remedy

2.12.1 Rationale for Selected Remedy

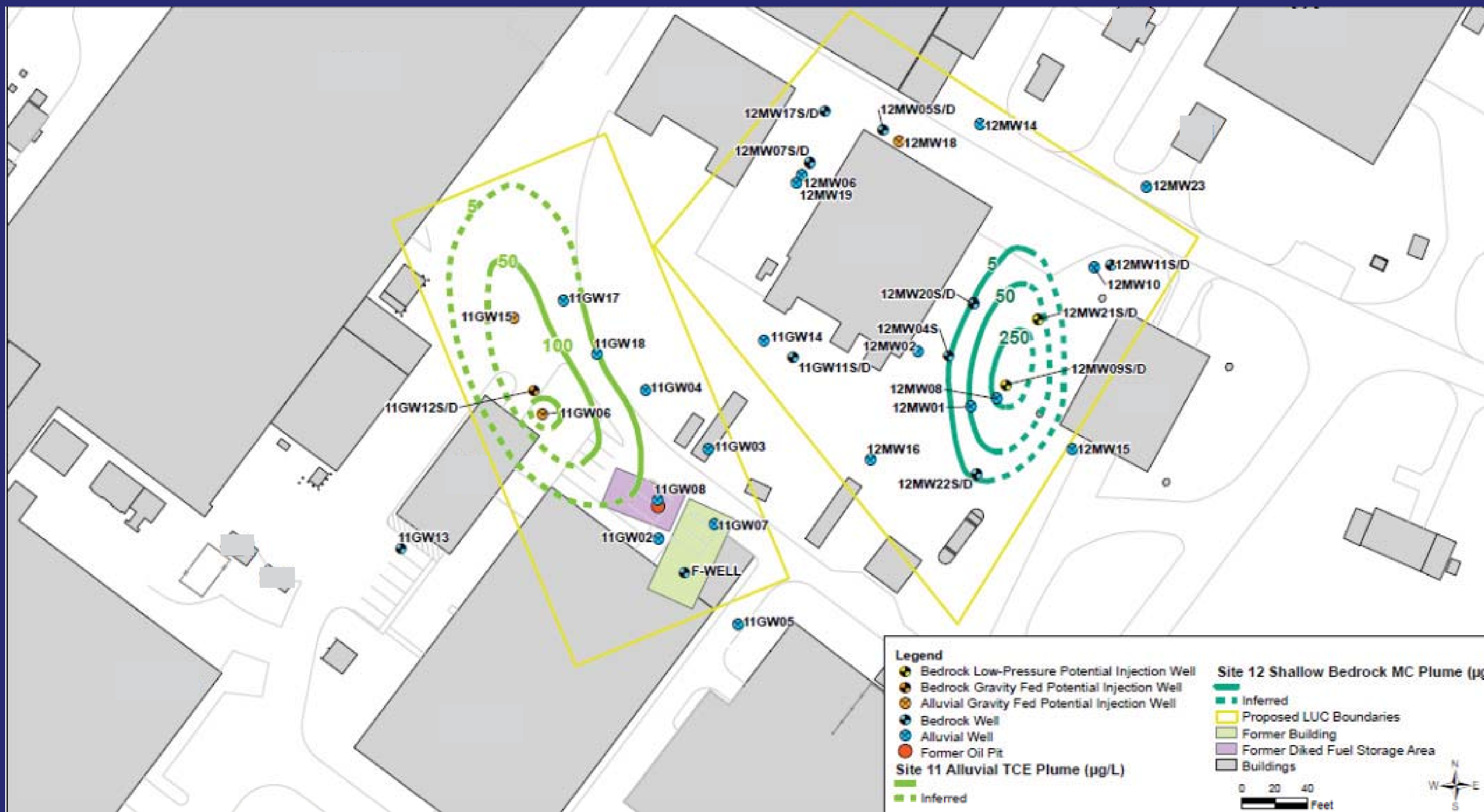
Of the alternatives evaluated, Alternative 4 provides the best balance of the seven NCP criteria. Of the viable options, Alternative 4 has the best sustainability (i.e., the least overall negative impact to the environment), the lowest cost, and the highest cost-benefit or risk-reward characteristics. The alternatives that are more aggressive than Alternative 4 have limitations that could lead to significant cost growth if multiple rounds of treatment are required. In addition, the more aggressive alternatives may cause an increase in the mobility and concentrations of metal COCs and other metals whose concentrations are currently at acceptable levels. Although natural attenuation processes are ongoing at Site 11 and Site 12, Alternative 2 was not selected because the site data did not demonstrate sufficient biological degradation.

2.12.2 Description of Selected Remedy

Alternative 4 involves the following: focused EAB for actively treating the alluvial and shallow bedrock aquifers containing the highest concentrations of TCE and MC are detected. In addition, MNA will be used for the residual dissolved area of contamination. ICs will be implemented in the form of land and groundwater use controls to prevent potable use of groundwater and to ensure that adequate worker protection is used if excavation activities encounter groundwater in the affected area. These restrictions will be enforced through a land use control remedial design that will include a map of the affected area. The facility GIS mapping system will also identify the affected area. Where practical, this type of injection will be conducted using a substrate via gravity-fed system in existing monitoring wells near the current TCE and MC hot spots. Figure 6 provides a generalized map of the wells that will be utilized for the injection. The specific existing wells to be utilized, substrate material and delivery technique will be specified in a work plan developed prior to remedial action.

An anaerobic degradation stimulant will be introduced to enhance biological activity and locally create conditions that are more reducing in the groundwater. It is expected that this will increase the rate at which TCE and MC act as electron acceptors and the rate at which they are reductively dechlorinated. The focused EAB system consists of an EAB reagent delivery into select existing monitoring wells, which are located in the area of highest TCE and MC concentrations.

FIGURE 6
Alternative 4—Sites 11 & 12 Focused Enhanced Anaerobic Biodegradation Design



On a conceptual basis, assuming a maximum radius of influence (ROI) of 4 feet, the substrate injection area covers approximately 50 ft^2 around each targeted monitoring well. To the extent practicable, EAB substrate will be delivered via a gravity-fed system through existing wells. However, because of the artesian conditions in wells 12MW09S and 12MW21S, the ability to deliver chemicals via gravity feed may not be practical. The substrate, therefore, will be delivered into these two monitoring wells via low-pressure injection.

MNA and ICs

Under Alternative 4, existing groundwater monitoring wells at Sites 11 and 12 will be used as performance monitoring wells. On site wells located downgradient of the area of contamination should adequately serve as sentinel wells. As part of the remedy evaluation, one additional deep sentinel well may be installed downgradient of Sites 11 and 12.

The timeframe for achieving SRGs is assumed to be 36 years or less. This conservative duration was selected based on the range of timeframes of 18 to 36 years derived in the models presented in the FS. Note that natural attenuation evaluation based on actual data from Sites 11 and 12 suggests a shorter timeframe (approximately 22 years) is necessary.

A baseline groundwater monitoring event will be conducted before implementing the remedy. After the focused EAB injection, one year of groundwater monitoring will be performed to ensure that the EAB injection created reducing conditions. Analytical requirements and sampling locations of the baseline sampling and performance monitoring will be presented in the Uniform Federal Policy Sampling and Analysis Plan (UFP-SAP). After it has been determined that the injection was successful, groundwater samples will be collected on a seasonal rotation until the SRGs are achieved. The analytical requirements, sampling locations, frequency, and duration of the long-term monitoring will be included in a long-term monitoring plan.

Under Alternative 4, Sites 11 and 12 will be designated as "restricted use" areas. Groundwater use controls will prevent potable use of untreated groundwater and excavation restrictions will ensure that adequate worker protection is used if excavation activities encounter groundwater in the affected area. The restricted use designation will remain in place until groundwater monitoring indicates that SRGs have been met and contaminants at the site are at levels that do not present a risk for unlimited use and unrestricted exposures at the site.

The Navy is responsible for implementing, inspecting, reporting, and enforcing the institutional controls. A Land Use Control Remedial Design (LUC RD) shall be prepared as the land use component of the remedial design. The Navy will develop and submit to USEPA and WVDEP, in accordance with the FFA, a LUC Remedial Design to provide for implementation and maintenance actions, including periodic inspections and reporting. The Navy will implement, maintain, monitor, report on, and enforce the LUCs according to the LUC Remedial Design.

2.12.3 Summary of the Estimated Remedy Costs

The capital cost of the selected remedy is approximately $167,400. This cost includes the implementation of groundwater use restrictions as part of the ICs and drilling of new groundwater monitoring wells, submitting the long-term monitoring UFP-SAP, and introducing substrate via a one-time process. The projected substrate demand is approximately 915 lbs. Operation and maintenance activities under the selected remedy were mostly associated with post-injection monitoring and MNA monitoring. Periodic costs associated under the selected remedy are primarily associated with the 5-year reviews. The total present worth cost of this alternative is approximately $975,500.

2.12.4 Expected Outcomes of the Selected Remedy

The expected outcome of the Selected Remedy is to allow for unrestricted use of the groundwater. However, the land use at Sites 11 and 12 is not expected to change once the groundwater cleanup levels are met. The site will continue to be used for industrial purposes for the foreseeable future. In accordance with the objectives of the Land Use Controls, use of untreated impacted groundwater will be limited to monitoring or remedial purposes, until the SRGs are achieved.

As a treatment mechanism, focused EAB will reduce the toxicity, mobility, and volume of VOCs in the groundwater through enhanced biodegradation processes. This may then expedite natural attenuation processes for the remaining mass of TCE, MC, and VC. The remaining COCs at both sites would naturally attenuate through biological degradation, geochemical processes, and other natural attenuation processes.

2.13 Statutory Determinations

In accordance with the NCP, the Selected Remedy meets the following statutory requirements.

Protection of Human Health and the Environment—Alternative 4 is protective of human health and the environment. Focused EAB would reduce a portion of the contaminant mass and enhance the achievement of RAOs by natural attenuation. Natural attenuation processes would continue to degrade the COCs and achieve the SRGs. ICs would prevent exposure to groundwater until RAOs are met.

Compliance with ARARs—The Selected Remedy complies with all ARARs (see Appendix A).

Cost-Effectiveness—The Selected Remedy represents the most reasonable value relative to cost. The costs are proportional to overall effectiveness because the remedy achieves long-term effectiveness and permanence within a reasonable timeframe.

Use of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable—The Navy, in partnership with USEPA and WVDEP, determined the Selected Remedy for Sites 11 and 12 represents the maximum extent to which treatment technologies can be used in a practicable manner.

Preference for Treatment as a Principal Element –The selected remedy will reduce the toxicity of the groundwater by breaking down the VOCs through treatment. In situ natural attenuation will also reduce the toxicity of the groundwater contaminants in both the alluvial and bedrock aquifers by breaking down the VOCs and eventually reducing the concentration of metals.

Five-Year Review Requirements – As required under CERCLA, the remedy will result in pollutants or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within 5 years of initiation of the remedial action (and every 5 years thereafter), to evaluate continuing remedy effectiveness and to evaluate whether the remedy continues to be protective of human health and the environment.

2.14 Documentation of Significant Changes from Preferred Alternative of Proposed Plan

The **PRAP** for ABL Sites 11 and 12 was presented for public comment on February 21, 2011. The PRAP recommended Alternative 4 as the Preferred Alternative for Sites 11 and 12. The public comment period ran from February 21, 2011 through April 7, 2011. No written or oral comments were received during the public comment period. The Navy, USEPA, and WVDEP determined that no significant changes to the proposed alternative, as originally identified in the PRAP, were necessary or appropriate.

3 Responsiveness Summary

The notice of availability of the PRAP for Sites 11 and 12 was published in the Cumberland Times-News and the Mineral Daily News Tribune on February 17, 2011. The Navy held a Public Meeting on March 8, 2011 to explain the PRAP and to address public comments. The meeting proceedings were transcribed by Word for Word Reporting and are included in Appendix B. The 45-day public comment period for the Proposed Plan ran from February 21, 2011 through April 7, 2011.

No written comments, concerns, or questions were received by the Navy, USEPA, or WVDEP during the public comment period. Navy, WVDEP, and USEPA representatives were available to present the PRAP for Sites 11 and 12 and answer questions regarding the PRAP as well as any other documents in the information repository. No one from the public attended the public meeting held on March 8, 2011.

References

Item	Reference Phrase in ROD	Location in ROD	Identification of Referenced Document Available in the Administrative Record
1	Nine SWMUs	Section 2.1	CH2M HILL, 1996a. Phase I Investigation of Solid Waste Management Units and Areas of Concern at the Allegany Ballistics Laboratory Superfund Site, Rocket Center, West Virginia.
2	Phase II Resource Conservation and Recovery Act Facility Assessment	Section 2.1	A. T. Kearney, 1993. Phase II RCRA Facility Assessment for Allegany Ballistics Laboratory, Rocket Center, West Virginia. Submitted to: USEPA Region III, Philadelphia, PA.
3	Advanced Site Inspection	Section 2.2, Table 1	CH2M HILL, 1996b. Advanced Site Inspection of Site 11 at Allegany Ballistics Superfund Site.
4	evaluate the potential human health risks	Section 2.2, Table 1	CH2M HILL, 2005a. Final Remedial Investigation Report for Site 11 – Former Production Well "F' at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
5	baseline ecological risk assessment	Section 2.2, Table 1	CH2M HILL, 2005a. Final Remedial Investigation Report for Site 11 – Former Production Well "F' at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
6	Phase II RFA	Section 2.2, Table 2	A. T. Kearney, 1993. Phase II RCRA Facility Assessment for Allegany Ballistics Laboratory, Rocket Center, West Virginia. Submitted to: USEPA Region III, Philadelphia, PA.
7	no further action	Section 2.2, Table 2	CH2M HILL, 1995. Interim Memorandum for Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Identified in the RCRA Assessment for Allegany Ballistics Laboratory. Prepared for: ABL Partnering Team.
8	further investigation of SWMUs 37N and 52 was warranted	Section 2.2, Table 2	CH2M HILL, 1996a. Phase I Investigation of Solid Waste Management Units and Areas of Concern at the Allegany Ballistics Laboratory Superfund Site, Rocket Center, West Virginia.
9	AOC N was recommended for further investigation	Section 2.2, Table 2	CH2M HILL, 2005b. Phase II Investigation of Solid Waste Management Units and Areas of Concern, Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
10	additional investigations of soil were required	Section 2.2, Table 2	CH2M HILL, 2005c. Solid Waste Management Units Removal Action Report, Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.

Item	Reference Phrase in ROD	Location in ROD	Identification of Referenced Document Available in the Administrative Record
11	**a non-time-critical removal action was recommended**	Section 2.2, Table 2	CH2M HILL, 2003. Summary of Initial Results of the Phase III Sampling Activities of the AOC N, Allegany Ballistics Laboratory. Prepared for: the ABL Partnering Team.
12	**Engineering Evaluation and Cost Analysis**	Section 2.2, Table 2	CH2M HILL, 2004b. Site 12 Soil Engineering Evaluation and Cost Analysis, Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
13	**evaluate the potential human health risks**	Section 2.2, Table 2	CH2M HILL, 2008. Final Remedial Investigation Report for Site 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
14	**baseline ERA**	Section 2.2, Table 2	CH2M HILL, 2008. Final Remedial Investigation Report for Site 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
15	**Site Management Plan**	Section 2.4	CH2M HILL, 2004a. Site Management Plan (SMP) for ABL. April.
16	**Site 11 RI report**	Section 2.7.1	CH2M HILL, 2005a. Final Remedial Investigation Report for Site 11 – Former Production Well “F’ at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
17	**Site 12 RI report**	Section 2.7.1	CH2M HILL, 2008. Final Remedial Investigation Report for Site 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
18	***Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part A***	Section 2.7.1	USEPA, 1989. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part A) Interim Final. December.
19	***Part D***	Section 2.7.1	USEPA, 2001. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part D, Standardized Planning, Reporting and Review of Superfund Risk Assessments) Final. December.
20	**Site 11 HHRA**	Section 2.7.1	CH2M HILL, 2005a. Final Remedial Investigation Report for Site 11 – Former Production Well “F’ at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
21	**Site 12 HHRA**	Section 2.7.1	CH2M HILL, 2008. Final Remedial Investigation Report for Site 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
22	**RAOs**	Section 2.8	CH2M HILL, 2010a. Final Feasibility Study for Groundwater at Sites 11 and 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
23	**SRGs**	Section 2.8	CH2M HILL, 2010a. Final Feasibility Study for Groundwater at Sites 11 and 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.

Item	Reference Phrase in ROD	Location in ROD	Identification of Referenced Document Available in the Administrative Record
24	**remedial alternatives**	Section 2.9	CH2M HILL, 2010a. Final Feasibility Study for Groundwater at Sites 11 and 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.
25	**Present-Worth Cost: $0**	Section 2.9.1, Table 5	CH2M HILL, 2010a. Final Feasibility Study for Groundwater at Sites 11 and 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division. Appendix E.
26	**Present-Worth Cost: $1,124,077**	Section 2.9.1, Table 5	CH2M HILL, 2010a. Final Feasibility Study for Groundwater at Sites 11 and 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division. Appendix E.
27	**Present-Worth Cost: $1,920,643**	Section 2.9.1, Table 5	CH2M HILL, 2010a. Final Feasibility Study for Groundwater at Sites 11 and 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division. Appendix E.
28	**Present-Worth Cost: $975,481**	Section 2.9.1, Table 5	CH2M HILL, 2010a. Final Feasibility Study for Groundwater at Sites 11 and 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division. Appendix E.
29	**Present-Worth Cost: $2,264,830**	Section 2.9.1, Table 5	CH2M HILL, 2010a. Final Feasibility Study for Groundwater at Sites 11 and 12 at Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division. Appendix E.
30	**PRAP**	Section 2.14	CH2M HILL, 2010b. Proposed Remedial Action Plan Sites 11 and 12. Allegany Ballistics Laboratory, Rocket Center, West Virginia. Prepared for: Department of the Navy, Naval Facilities Engineering Command, Atlantic Division.

Appendix A
ARARs

TABLE A-1
Chemical-Specific ARARs
Sites 11 and 12 Feasibility Study
Allegany Ballistics Laboratory, Rocket Center, West Virginia

Relevant Media	Requirement	Prerequisites	Citation	ARAR or TBC	Comments
Federal Chemical-Specific ARARs					
Groundwater at Sites 11 and 12	Federal maximum contaminant levels under the SDWA designating the levels of a contaminant that are allowable in groundwater.	Groundwater contamination exceeds federally allowable MCLs	40 CFR 141.61(a) (1), (5), and (19)	Applicable	The following SRGs for Site 11 and 12 groundwater are based on federal MCLs: **COC** — **SRG (µg/L)** TCE — 5 VC — 2 MC — 5
No West Virginia Chemical-Specific ARARs apply					

ARAR - Applicable or relevant and appropriate requirement
CFR - Code for Federal Regulations
SDWA - Safe Drinking Water Act
MCLs - Maximum Contaminant Levels
SRG -Site Remediation Goal
MC - methylene chloride (also known as dichloromethane)
TCE - trichloroethylene
VC - vinyl chloride
COC - contaminant of concern

TABLE A-2
Location-Specific ARARs
Sites 11 and 12 Record of Decision
Allegany Ballistics Laboratory, Rocket Center, West Virginia

Location	Requirement	Prerequisite	Citation	Applicability Determination	Comments
Federal Location-Specific ARARs					
Migratory Bird Treaty Act					
Migratory bird area	Protects almost all species of native birds in the United States from unregulated "taking".	Presence of migratory birds.	Migratory Bird Treaty Act, 16 USC 703	Applicable	The site is located in the Atlantic Migratory Flyway. If migratory birds, or their nests or eggs, are identified at the site, operations will not destroy the birds, nests, or eggs.
No West Virginia State Location-Specific ARARs apply					

ARAR - Applicable or relevant and appropriate requirement

USC - United States Code

TABLE A-3
Action-Specific ARARs
Sites 11 and 12 Record of Decision
Allegany Ballistics Laboratory
Rocket Center, West Virginia

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Federal Action-Specific ARARs					
Clean Water Act					
Oil storage during in situ treatment	This regulation establishes procedures, methods, equipment, and other requirements to prevent the discharge of oil from non-transportation-related onshore and offshore facilities into or upon the navigable waters of the United States.	Storage of petroleum and non-petroleum oil	40 CFR 112.3(a), (b),(e), and (g); 112.7 (a), (b),(c)(1), (d) through (g), (i), (j); 112.8(b), (c)(1)-(3), (6), (10), (11); 112.12 (b),(c)(1)-(3), (6),(10), (11)	Applicable	Injection of an ERD substrate is a component of the remedy. If an oil based substrate is selected, then these rules may apply If the storage capacity for all oil onsite, in containers with a capacity of 55 gallons or greater, is equal to or exceeds 1,320 U.S. gallons a Spill Prevention, Control, and Countermeasure (SPCC) Plan must be prepared and implemented.
Water Pollution Control Act					
Underground Injection Control (UIC) Program	Class 5 injection wells must have mechanical integrity. This is determined by demonstrating that there are no significant leaks in the casing, tubing, or packer; and that there is no significant fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore.	Injection of fluids into a well or subsurface distribution system	40 CFR 144.82, 144.89, 146.6, 7, 8, and 10(c)	Applicable	Injection wells used during the response action would be considered Class 5 injection wells. Since this is a CERCLA response action, the substantive requirements for construction will be met but a permit will not be required.
West Virginia State Action-Specific ARARs					
Groundwater Pollution Control					
Staging of wastes	Wastes will be staged in a manner that is protective of groundwater, using a liner system if necessary.	Onsite staging of non-hazardous waste	47 CSR 58-4.3b	Applicable	Non-hazardous wastes will be generated and managed onsite during the response action.

TABLE A-3
Action-Specific ARARs
Sites 11 and 12 Record of Decision
Allegany Ballistics Laboratory
Rocket Center, West Virginia

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Installation of groundwater well	Specific requirements and procedures governing the installation of monitoring wells.	Well installation	47 CSR 60-7 through 15, 17, 19.2, 19.3, and 19.4	Applicable	Monitoring wells installed during the response action will be constructed and maintained in accordance with these specifications.
Water Pollution Control Act					
Underground Injection Control (UIC) Program	Class 5 injection wells must have mechanical integrity. This is determined by demonstrating that there are no significant leaks in the casing, tubing, or packer; and that there is no significant fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore.	Injection of fluids into a well or subsurface distribution system	47 CSR 13-6.2.a.1 and 2	Applicable	Injection wells used during the response action would be considered Class 5 injection wells. Since this is a CERCLA response action, the substantive requirements for construction will be met but a permit will not be required.

ARAR - Applicable or relevant and appropriate requirement

CFR - Code for Federal Regulations

CSR - Code of State Rules

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

Appendix B – Public Meeting Transcript

PUBLIC MEETING

PROPOSED REMEDIAL ACTION PLAN

FOR ABL SITES 11 and 12

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TRANSCRIPT OF PROCEEDINGS

LaVale Public Library

815 National Highway

LaVale, Maryland 21502

March 8, 2011

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PRESENT:

CH2M HILL:

Steven Glennie
Cassandra Brown
Vicki Waranski

NAVFAC:

William Fraser

NAVSEA:

Lou Williams
John Aubert

WV DEP:

Tom Bass

EPA:

Mark Leipert
Sun Yi

MANAGEMENT EDGE:

Nancy Rouse

P R O C E E D I N G S

(The meeting was called to order at 7:00 p.m. by Steve Glennie.)

MR. GLENNIE: We're opening the public meeting for the Proposed Remedial Action Plan for Sites 11 and 12 at Allegany Ballistics Laboratory which is located in Rocket Center, West Virginia. This is a plan to conduct remedial action at these two sites. The meeting was advertised in the local newspapers, and representatives from West Virginia DEP, US EPA Region 3, the Navy, and CH2M Hill are in attendance. No members of the public have arrived at the meeting; therefore, the presentation is not going to be shown. However, the presentation will be posted to the public website. The meeting was scheduled for 6:30 p.m. on March 8th, 2011. We waited for 30 minutes for public members to arrive, and no one has yet arrived, so the meeting is hereby closed.

(Whereupon the meeting was concluded at 7:05 p.m.)

* * * * *

STATE OF MARYLAND, SS:

I, Christina D. Pratt, a Notary Public of the State of Maryland, do hereby certify that I recorded the Proceedings of the Public Meeting held March 8, 2011, and this transcript is a true record of those proceedings.

Given under my hand and Notarial Seal this 9th day of March, 2011.

/s/ Christina D. Pratt

My commission expires:
November 1, 2012