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FINAL 2012 SITE MANAGEMENT PLAN ALLEGHENY BALLISTICS LABORATORY ROCKET
CENTER WV
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CH2M HILL

Final

2012 Site Management Plan

Allegany Ballistics Laboratory Rocket Center, West Virginia

Contract Task Order WE37

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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 Propulsion and Controls
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	Constituent of Concern
COPC	Constituent of Potential Concern
CS	Confirmation Study
DERA	Defense Environmental Restoration Account
DNAPL	Dense Non-aqueous Phase Liquid
DoD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
ERN	Environmental Restoration Navy
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
FS	Feasibility Study
FY	Fiscal year
GIS	Geographic Information System
gpm	gallons per minute
GPS	Global Positioning System
Hercules	Hercules Aerospace Corporation
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
IAS	Initial Assessment Study
Interim RI	Interim Remedial Investigation
IRP	Installation Restoration Program
LC	low concentration
LNAPL	light non-aqueous phase liquid
MDE	Maryland Department of the Environment
MNA	Monitored Natural Attenuation
NACIP	Navy Assessment and Control of Installation Pollutants Program
NAVFAC	Naval Facilities Engineering Command Atlantic Division
NAVFACENCOM	Naval Facilities Engineering Command
NAVSEA	Naval Sea Systems Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NFA	No Further Action
NFESC	Naval Facilities Engineering Service Center
NG	Nitroglycerine

NPL	National Priorities List
PA/SI	Preliminary Assessment/Site Inspection
PAH	Polyaromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
PETN	pentaerythritol biphenyl
Phase II RI	Phase II Remedial Investigation
PR	Preliminary Review
PRAP	Proposed Remedial Action Plan
PRG	Preliminary Remediation Goal
PWA	Production Well "A"
PWC	Production Well "C"
RA	Remedial Action
RAB	Restoration Advisory Board
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SAA	satellite accumulation area
SARA	Superfund Amendment and Reauthorization Act
SI	Site Investigation
SMP	Site Management Plan
SSA	Site Screening Area
SSP	Site Screening Process
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TNT	Trinitrotoluene
TPH	total petroleum hydrocarbon
TSCA	Toxic Substance Control Act
USEPA	U.S. Environmental Protection Agency
UFP SAP	Uniform Federal Policy Sampling and Analysis Plan
VOC	volatile organic compound
VSI	Visual Site Inspection
WVDEP	West Virginia Department of Environmental Protection

Introduction

This document is the 2012 Site Management Plan (SMP) for the Allegany Ballistics Laboratory (ABL) located in Rocket Center, West Virginia. The SMP has been prepared by CH2M HILL for use by Naval Facilities Engineering Command Atlantic Division (NAVFAC), Naval Sea Systems Command (NAVSEA), U.S. Environmental Protection Agency (USEPA) Region III, and West Virginia Department of Environmental Protection (WVDEP).

This SMP is organized into five sections as described below:

1. Introduction – This section describes the purpose and organization of the SMP, a facility description, the environmental history, and previous investigations conducted at ABL.
2. Unit Descriptions and Tracking Matrix - This section describes the units included in the FFA for further investigation, summarizes activities conducted to date including removal activities, and documents the status of each unit.
3. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Process Activities – This section summarizes the process for investigation, feasibility study, and remedial action for CERCLA Installation Restoration Program (IRP) sites. It also describes how team partnering has been applied to streamline the CERCLA process.
4. Site Management Plan Schedules – This section provides the scheduling assumptions and SMP project schedules
5. References – This section lists all the references that were consulted for the preparation of this SMP.

1.1 Site Management Plan Purpose

The purpose of the SMP is to provide a management tool for the Navy, USEPA, and WVDEP to plan, schedule, and set priorities for environmental remedial response activities to be conducted at ABL. The SMP is a living document and will be updated annually. This SMP focuses on activities and schedules for response actions planned from Fiscal Year 2013 through the ABL project end date.

The Plant 1 portion of ABL was proposed by the USEPA for inclusion on the National Priorities List (NPL) in the *Federal Register*, in June 1993. Plant 1 of ABL was added to the NPL at *Federal Register*, Volume 59, Number 27989, on May 31, 1994. Under the “Federal Facilities” section of the NPL, federal agencies are considered responsible for conducting most of the response actions at facilities under their jurisdiction. A Federal Facilities Agreement (FFA) between USEPA Region III, WVDEP, and the Navy was finalized in January 1998, as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). An SMP was developed as part of the FFA to establish deadlines and milestones for performing the environmental activities and submitting associated deliverables. The SMP is updated annually to revise established schedules for these deadlines and milestones.

This SMP is intended to serve as a comprehensive management and educational tool for current and future remedial project managers (RPMs) or other interested parties, by providing a brief description, history, and summary of previous investigations and remedial actions for FFA sites. Laboratory data from previous investigations at these sites are not included in the SMP; however, references are provided to indicate where such data can be found. In addition, analytical data for the facility are maintained in a master database linked to the ABL desktop environmental Geographic Information System (GIS) updated in July 2011. The SMP also presents the rationale for the sequence of past, present, and future environmental investigations and remedial response activities for each site and the estimated schedule for completion of these activities.

1.2 Facility Description

1.2.1 Facility Name, Location, and Description

ABL is located in Mineral County in the northeastern part of West Virginia, approximately 10 miles southwest of Cumberland, Maryland along the West Virginia and Maryland border (**Figure 1-1**). The facility lies between the North Branch Potomac River, to the north and west, and Knobly Mountain, to the south and east. Several small towns are located near the facility, including Short Gap, West Virginia, to the southeast, and Pinto, Maryland, to the north (**Figure 1-2**).

ABL consists of about 1,634 acres of land with about 350 buildings (**Figure 1-3**). The facility is divided into two distinct operating plants:

- Plant 1, which occupies about 1,577 acres (including a large undeveloped area), is owned by the Navy and leased to its operator, ATK Tactical Propulsion and Controls (ATK), by NAVSEA through a Facilities Use Contract. Approximately 400 acres of Plant 1 (the majority of the developed portion of ABL) is in the floodplain of the North Branch Potomac River where the river has cut into the base of Knobly Mountain. Of the 12 past or present IRP sites at ABL, 9 are located within the developed area of Plant 1 and 3 are within the undeveloped area.
- Plant 2, which occupies the remaining 57 acres, is both owned and operated by ATK. Plant 2 is not included on the NPL.

ABL is located in the Valley and Ridge Physiographic Province near its western boundary with the Allegheny Plateau province and is underlain by sedimentary rocks folded and faulted during the Paleozoic Era. The most significant physiographic feature in the vicinity of ABL is Knobly Mountain, which flanks Plant 1 to the south and east. Knobly Mountain is the surface expression of a portion of the Wills Mountain anticlinorium, the anticlinal axis of which trends approximately N30°E and plunges to the southwest. This anticlinal axis is believed to bisect Plant 1.

Groundwater flow across Plant 1 in the alluvial and shallow bedrock aquifers generally is toward the North Branch Potomac River with no identifiable confining unit separating the two aquifers. The land surrounding the ABL facility is primarily rural agricultural, with some forestry. Residents across the North Branch Potomac River in Maryland use bedrock groundwater as a potable water source. Hydraulic data collected to date indicate that the North Branch Potomac River is a hydraulic divide for both alluvial and bedrock groundwater. Alluvial and bedrock groundwater at ABL is believed to discharge to the river, rather than pass beneath. In the residential area across from ABL, groundwater flow is south toward the river and ABL. The North Branch Potomac River is not used as a potable water supply in the vicinity of ABL, but may be used for recreational activities such as boating, fishing, and swimming.

1.2.2 Facility History and Current Activities

ABL was constructed in 1942 by the Kelly Springfield Engineering Company for the U.S. Army. At that time, the facility was used as a loading plant for 50-caliber machine gun ammunition for the U.S. Army. In 1943, George Washington University assumed management of the facility to conduct research and development of ballistic devices, primarily solid propellant for bazooka ammunition, until 1945. The Navy took ownership of the 400-acre Plant 1 portion of the facility in 1945 and the Aerospace Division of Hercules assumed management of the facility. In 1962, the Navy acquired an additional 1,177 acres of undeveloped land adjacent to Plant 1. In 1964, Hercules signed a Facilities Use Contract and began operating ABL under its own direction. In 1995, Alliant Techsystems, Inc. acquired the Aerospace division of Hercules and assumed operation of ABL.

Since 1943, the facility has been used primarily for the research, development, production, and testing of solid propellants and motors for ammunition, rockets, and armaments. Currently, the facility is operated 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 Department of Defense (DoD). The rocket motors produced vary in size and configuration, allowing for a wide range of

applications including: air-to-air, air-to-surface, surface-to-surface, and surface-to-air missions. Work in other fields, including hazards analysis and risk control, gun control, and gun propellant testing, also is ongoing at ABL.

1.3 Environmental History

In the 1980s, DoD began identifying potential Naval facilities under the Navy Assessment and Control of Installation Pollutants Program (NACIP) (now referred to as the IRP). DoD tasked the Naval Energy and Environmental Support Activity (NEESA) (now referred to as the Naval Facilities Engineering Service Center [NFESC]) with producing preliminary site assessment reports for Naval facilities throughout the United States. After the reports were issued, CERCLA responsibilities under the IRP were transferred to the Naval Facilities Engineering Command (NAVFAC).

1.3.1 National Priorities List

The Plant 1 portion of ABL was proposed by USEPA for inclusion on the NPL in June 1993. The NPL, which was established by CERCLA, is the USEPA's list of the highest-priority hazardous waste sites in the nation. The decision to list a particular site is determined on the basis of calculated risks to human health and the environment. The Plant 1 portion of ABL was added to the NPL at *Federal Register*, Volume 59, Number 27989, on May 31, 1994.

CERCLA is often referred to as "Superfund" because it established a fund for cleaning up abandoned or uncontrolled hazardous waste sites. However, all activities at federal facilities listed on the NPL are funded by the responsible federal agency. In the case of the ABL site, the Navy funds the investigation and remedial activities. To fund these activities at military installations, DoD set up the Defense Environmental Restoration Account (DERA). The Navy's portion of that funding mechanism is known as the Environmental Restoration Navy (ERN) account which NAVFAC uses to fund CERCLA activities at ABL. Non-ERN funds, such as those available directly through the facility owner (i.e., NAVSEA), may also be used to fund various environmental activities. Although the responsibility for funding and carrying out environmental restoration at ABL rests with the Navy, the NPL listing gives USEPA a specific role in the oversight of these actions.

In addition, because ABL is on the NPL, the Navy and USEPA approve all Records of Decision (RODs) with West Virginia's concurrence. Therefore, prior to closing out a particular site, a no further action (NFA) ROD(s) must be signed to formally document site close-out through the CERCLA process.

1.3.2 Installation Restoration Program

In 1975, the DoD began a program to assess past hazardous and toxic materials storage and disposal activities at military installations. The goals of this program, now known as the Installation Restoration Program (IRP), were to identify environmental contamination resulting from past hazardous materials management practices, to assess the impacts of the contamination on public health and the environment, and to provide corrective measures as required to mitigate adverse impacts to the public and the environment.

In 1976, the Resource Conservation and Recovery Act (RCRA) was passed by Congress to address potentially adverse human health and environmental impacts of hazardous waste management and disposal practices. RCRA was legislated to manage the present and future disposal of hazardous wastes. In 1980, CERCLA, or "Superfund," was passed to investigate and remediate areas resulting from past hazardous waste management practices. This program is administered by USEPA or state agencies.

In 1981, the DOD's IRP was reauthorized with additional responsibilities and authorities specified in CERCLA delegated to the Secretary of Defense. The Navy subsequently restructured the IRP to match the terminology and structure of the CERCLA Program. The current IRP is consistent with CERCLA and applicable state environmental laws.

The environmental condition of ABL is being investigated through the DoD's IRP, which is being conducted in accordance with the applicable federal and state environmental regulations and requirements.

1.3.3 Federal Facility Agreement

Following ABL's listing on the NPL, negotiations on a FFA between USEPA, the State of West Virginia, and the Department of Navy was initiated. Under the "Federal Facilities" section of the NPL, federal agencies are considered responsible for conducting most of the response actions at facilities under their jurisdiction. The FFA between USEPA Region III, WVDEP, and the Navy was finalized in January 1998.

Under the terms and conditions of the FFA, Site Screening Areas (SSAs) are required to be investigated and, if appropriate, remediated in accordance with the NCP, CERCLA, Superfund Amendments and Reauthorization Act (SARA), and RCRA. These areas are designated in Appendix A of the FFA. Units that require additional documentation or sampling before a decision is made for no further action or inclusion as an SSA are classified as Areas of Concern (AOCs), or Appendix B units, in the FFA.

Section VIII paragraph 8.1 of the FFA describes integration the Navy's obligations under CERCLA and RCRA as stated below:

"The Parties intend to integrate the Navy's CERCLA response obligations and RCRA corrective action obligations which relate to the release(s) of hazardous substances, hazardous wastes, pollutants or contaminants covered by this Agreement into this comprehensive Agreement. Therefore, the Parties intend that activities covered by this Agreement will achieve compliance with CERCLA, 42 U.S.C. Section 9601 et seq.; satisfy the corrective action requirements of RCRA Sections 3004(u) and (v), 42 U.S.C. Sections 6924(u) and (v), for a RCRA permit, and RCRA Section 3008(h), 42 U.S.C. Section 6928(h), for interim status facilities; and meet or exceed all applicable or relevant and appropriate Federal and State laws and regulations, to the extent required by CERCLA Section 121, 42 U.S.C. Section 9621, and applicable State law."

The USEPA, WVDEP, and the Navy recognize that the requirement to obtain permits for response actions undertaken pursuant to the FFA shall be as provided for in CERCLA and the NCP and that ongoing hazardous waste management activities at ABL may still require the issuance of permits under Federal and State laws. This Agreement does not affect the requirements, if any, to obtain such permits.

Eight IRP sites are referenced in the FFA findings of fact for further investigation under CERCLA (i.e., Sites 1, 2, 3, 4B, 5, 7, PWA [Site 10], and 11). Six additional sites have been identified but are not included in the FFA (i.e., Sites 4A, 6, 8, 9, 12, and 13). SWMU 27A Range Road Area was identified as Site 13 Operable Unit 15 (OU-15) in 2008.

Table 1-1 summarizes further investigation IRP Sites, SWMUs, and AOCs that have been identified at ABL.

Additional areas agreed to by the USEPA, WVDEP, and the Navy can be added to either Appendix A or B of the FFA at any time.

1.3.4 Previous Investigations

This subsection briefly describes environmental investigations conducted at ABL. Section 2 of this SMP describes how these investigations relate to the individual sites and units listed below. The approximate location of each IRP site that is under investigation or remediation is shown in **Figure 1-3**. As shown in the figure, seven of the sites are located within the 400-acre developed area of Plant 1 (i.e., sites 1, 2, 3, 4B, 10, 11, 12, and 13). Sites 5 and 7 are located in the largely undeveloped area to the south.

1.3.4.1. General Investigations at Installation Restoration Program Sites

An Initial Assessment Study (IAS) was performed at ABL in 1983 under the NACIP to identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous materials handling and operations (NACIP, 1983). Nine potentially contaminated sites were identified at ABL, based upon information obtained from historical records, photographs, site inspections, and personnel interviews, during the IAS.

These nine sites are:

- Site 1: Northern Riverside Waste Disposal Area (includes SWMUs 1, 6, 7, 8, 11, 20, 22C and 22D)
- Site 2: Previous Burning Ground (1942-1949) (includes SWMU 4)
- Site 3: Previous Burning Ground (1950-1958) (includes SWMU 5)

- Site 4: Spent Photographic Developing Solutions Disposal Sites
 - Site 4A: Spent X-Ray Developing Solution Disposal Site (includes SWMU 19)
 - Site 4B: Spent Photographic Developing Solution Disposal Site (includes SWMU 18)
- Site 5: Inert (Non-Ordnance) Landfill (includes SWMU 5)
- Site 6: Sensitivity Test Area/Surface Water Impoundment
- Site 7: Beryllium Landfill (includes SWMU 10)
- Site 8: Explosives Wastewater Sumps/Catch Basins
- Site 9: Former Acid Disposal Pit

Four sites have been added to the IRP at ABL since the IAS. These are:

- Site 10: Former TCE Still at Building 157 (includes Site PWA)
- Site 11: Production Well “F” (uncovered and identified during building demolition activities in November 1994 and includes SWMU 36)
- Site 12: Building 167 SWMUs, formerly AOC N (groundwater VOC plume discovered during Phase III SWMU/AOC Investigation)
- Site 13: OU 15 Range Road Area

The approximate location of each IRP site that is still under investigation or remediation is shown in [Figure 1-3](#). As shown in the figure, seven of the sites are located within the 400-acre developed area of Plant 1 (i.e., sites 1, 2, 3, 4B, 10, 11, 12, and 13). Sites 5 and 7 are located in the largely undeveloped area to the south.

Each of the nine sites identified during the IAS was evaluated for the appropriate contaminant of concern, migration pathways, and pollution receptors. The IAS concluded that six of the nine sites (sites 1 through 6) posed significant potential threat to human health or the environment and warranted further evaluation in a confirmation study. Sampling and analysis was not performed as part of the IAS.

A Confirmation Study (CS) was initiated in June 1984 and completed in August 1987. The purpose of the CS was to confirm or refute the existence of the suspected contamination at sites 1 through 7 identified during the IAS, along with Plant Production Wells in the developed portion of Plant 1 (specifically PWA and PWC, which are now part of Site 10); springs; and the North Branch Potomac River. The results of the CS, documented in the Interim Remedial Investigation (Interim RI) Report (Weston, 1989), were used to recommend further investigation at seven sites (i.e., sites 1, 2, 3, 5, 7, and minimal activity at Site 4 [4A and 4B]) and Site PWA. The Interim RI Report recommended that activities be discontinued at Site 6.

Based upon the results and recommendations of the CS, a Remedial Investigation (RI), initiated in May 1992 and completed in October 1992, was conducted to further define the nature and extent of contamination at a number of ABL sites. The RI Report recommended further investigation at sites 1, 2, 3, 5 and PWA (CH2M HILL, January 1996). Because Site 1 was the largest and most complex site at ABL, with the highest concentrations and widest variety of constituents detected in soil, groundwater, surface water, and sediment samples, a separate focused Remedial Investigation/Feasibility Study (RI/FS) was recommended at the site to expedite the evaluation process. The remaining four sites were recommended for further investigation in a Phase II Remedial Investigation (Phase II RI).

In 1993, the USEPA conducted a Preliminary Review (PR) at ABL which involved a review of all relevant USEPA Region III files, including RCRA, CERCLA, Toxic Substance Control Act (TSCA), air, and water files. Additionally, a Visual Site Inspection (VSI) was conducted at the facility from February 2 through February 4, 1993. The results of the PR and VSI were documented in the *Phase II RCRA Facility Assessment for Allegany Ballistics Laboratory* (RFA) (USEPA, August 1993). Based upon the results of the RFA, it was recommended that further action be taken at 49 SWMUs and 12 AOCs. After performing a site visit to the SWMUs and AOCs identified during the RFA, the USEPA, Region III and WVDEP identified an additional 31 SWMUs and AOCs for a total of 92 units, where further evaluation was recommended.

In 1994, a Phase II RI was conducted to further define the nature and extent of contamination at sites 2, 3, 4, 5, and PWA. During this investigation, baseline human health and ecological risk assessments were performed to evaluate the risk posed by each site. The results of the Phase II RI concluded that remedial action alternatives should be evaluated for TCE contaminated soil at Site 3 near Building 151, the solvent storage shed; contaminated soils at Site 4B; contaminated soil and groundwater at the former TCE still area at Site PWA; and the landfill contents and contaminated groundwater at Site 5.

A background study was performed in 2003 to establish background concentrations for soil inorganics at ABL. These background concentrations are being utilized in ongoing human health and ecological risk assessments and in developing soil PRGs for several sites at the facility.

A planning document for use by the facility and the Navy entitled *The Final Construction, Excavation and Groundwater Use Restriction Plan for Installation Restoration Program Sites, Allegany Ballistics Laboratory, Rocket Center, West Virginia* was developed as an environmental planning tool for CERCLA sites currently under investigation or with a remedy in place requiring land use controls to prevent receptor exposure hazards. For sites with a final ROD, this document will be used as a guide to communicate land use controls (LUCs) the interim as a protectiveness measure until the Land Use Control Remedial Design is finalized. Sites with LUCs in place are shown on Figure 1-4.

1.3.5 Site Specific Investigations and Remediation Activities

Attachment A of this SMP provides a comprehensive list of all Sites, SWMUs, and AOCs at Plant 1 documented in the FFA (and later added), their status, and anticipated additional activities, where appropriate. Two sites and 3 SWMUs/AOCs are currently under investigation at ABL and their current status is provided on Table 1-1. The sites, SWMUs, and AOCs currently under investigation consist of Site 1 soil and Site 13 groundwater, sediment, and surface water. The remedies for these sites will be documented in a ROD. Site 1 groundwater, surface water, and sediment, Site 5, and Site 10 have a ROD and remedy in place. The Final Sites 11 and 12 Groundwater ROD was signed in January 2012 and a remedial action is expected to occur in Fall 2012. Response is complete for Sites 2, 3, 4, 6, 7, and 9 through a No Further Action ROD. To date, 88 of the 92 SWMUs and AOCs identified at ABL during the 1993 RFA and further evaluations have been investigated and/or remediated and closed out with No Further Action. SWMU 37E and 37W groundwater are currently under investigation as part of Building 8 Lab Row. AOC M will be evaluated in future investigations.

1.3.5.1. Site 1

A Focused Remedial Investigation (Focused RI) was conducted in 1994 to fill data gaps that remained at Site 1 after the completion of the RI and to evaluate risk to human health and the environment from Site 1 media (CH2M HILL, August 1995). The results of the Focused RI for Site 1 indicated that volatile organic compounds (VOCs) were the most widespread contaminants detected in Site 1 media, with trichloroethene (TCE) detected most often and at the highest concentrations in soil and groundwater. The Focused RI indicated specific areas and media at Site 1 where remedial action alternatives should be evaluated in a Focused Feasibility Study (FFS). These included areas of contaminated soil around the solvent disposal pits, north of the east and west ends of the Burning Ground along the river, in the open and inert burn area landfills; contaminated groundwater in both the alluvial and bedrock aquifers; and contaminated surface water and sediment in the North Branch Potomac River, adjacent to Site 1.

In November and December 1994, a residential well sampling event was conducted to determine if constituents of concern detected at ABL had affected the groundwater potentially utilized by residents on the opposite side of the North Branch Potomac River from ABL. Groundwater samples were collected from eight wells at seven residences located along McKenzie Tower Road, directly across the river from Site 1. The Residential Well Sampling Report concluded that it was unlikely residential well water had been affected by groundwater contamination at ABL because VOCs (the primary constituents of concern in groundwater at ABL) were not detected in the residential well samples (CH2M HILL, March 1995).

Based upon the findings of the Site 1 Focused RI, a draft FFS was prepared to develop remedial action alternatives for all Site 1 media (CH2M HILL, October 1995). Due to the size and complexity of the site, the site was subdivided

into operable units (OUs) for remedial action. Therefore, the draft FFS was never finalized. Instead, a final Site 1 FFS for groundwater, surface water, and sediment (OU3) was prepared to expedite remedial action for these media (CH2M HILL, September 1996). The selected remedy for Site 1 groundwater and the surface water and sediment of the North Branch Potomac River was site-wide groundwater containment and extraction with subsequent onsite treatment and discharge of treated water to the river. The Site 1 water treatment plant operations and maintenance activities have focused on obtaining hydrologic capture in the bedrock and alluvial aquifers at Site 1. A combined Five Year Review Report will be prepared in September 2013 and will evaluate the effectiveness of the remedy.

Using soil data gathered during the Focused RI and previous investigations, a subsequent soil sampling effort was conducted in October 1998 to fill existing data gaps and better delineate areas potentially requiring soil remediation at Site 1. While evaluating available data for human health and ecological risk assessment additional data gaps were identified. Therefore, a supplemental investigation was conducted for the surface and subsurface soil at Site 1 in October 2001 and September 2004. A Focused Remedial Investigation Report for Site 1 Soil was completed in July 2006 (CH2M HILL, July 2006).

In the Spring of 2008, a test pitting was conducted along the river front at Site 1 in an attempt to better quantify the extent of debris buried in the soil. The results showed that the bulk of the surface and subsurface debris is buried in the western and eastern region of the OABG area. The central region showed no surface or subsurface debris based upon the visual observations and test pits completed in this region. In addition, the results showed a general correlation between elevated COC levels and areas where debris was observed in the subsurface. A draft feasibility study (FS) is being prepared for Site 1 soil to evaluate remedial alternatives for long-term protection of human health and the environment, including protection against contaminants leaching to groundwater. Additionally, an Engineering Evaluation and Cost Analysis (EE/CA) has been prepared to address unsaturated soil in the former disposal pits and is intended to supplement the selected remedy for Site 1 soil (CH2M HILL, 2012). This interim action is also intended to augment the existing groundwater treatment system, by reducing potential VOC source mass to prevent future leaching to groundwater. The Draft EE/CA is currently in regulatory review

A pumping test was conducted in Spring 2012 to determine the hydraulic characteristics (e.g., hydraulic conductivity and specific capacity) of the alluvial aquifer for possible optimization alternatives to the Site 1 existing pump and treat groundwater system. The results of the test will be used to assess the feasibility of expanding the existing groundwater pump and treat system to include groundwater extraction from the FDP 1 source area in order to maximize contaminant mass removal.

1.3.5.2. Site 2

A supplemental groundwater investigation was completed at Site 2 in 2004 to evaluate the potential for additional source areas upgradient of the site. The soil and groundwater data from these investigations were used to revise the human health and ecological risk assessments for sites 2 and 3 and a Risk Assessment Report was produced (CH2M HILL, July 2005). Two additional alluvial groundwater monitoring wells were installed at Site 2 in 2008. These new wells and the existing alluvial monitoring wells were sampled in order to confirm the arsenic concentrations in alluvial groundwater at Site 2 and to determine whether the arsenic concentrations in the alluvial groundwater could be attributable to historic releases at Site 2. Arsenic was not detected and a ROD requiring No Further Action (NFA) for Site 2 was issued in July 2008.

1.3.5.3. Site 3

A supplemental groundwater investigation was completed at Site 2 in 2004 to evaluate the potential for additional source areas upgradient of the site. The soil and groundwater data from these investigations were used to revise the human health and ecological risk assessments for sites 2 and 3 and a Risk Assessment Report was produced (CH2M HILL, July 2005). A No Further Action (NFA) ROD was signed for Site 3 in July 2007.

1.3.5.4. Site 4

A pilot study was initiated at Site 4B in October 2003. The principal object of the pilot study is to demonstrate the usefulness of XRF technology to provide real-time soil metals concentrations relative to established PRGs at Site

4B. The data from this investigation are presented in a Pilot Study Report (CH2M HILL, March 2006). A No Further Action (NFA) ROD was signed for Site 4B in November 2007.

Piping schematics and design drawings of Building 231 were inspected and analytical data were reviewed for Site 4A, the Spent X-Ray Developing Solution Disposal Site (referred to as SWMU 19 in the FFA) as part of the final RFA report. The evaluation did not indicate that solutions would have been discharged to the ground and no contaminants were detected in composite soil samples so no further action was recommended for this unit. The site was closed out in the FFA under Findings of Fact Page 19.

1.3.5.5. Site 5

Based upon the results of the RI and Phase II RI activities at Site 5, an FFS for Site 5 Landfill Contents and Surface Soil was prepared (CH2M HILL, August 1996). In addition, an FFS for Site 5 Groundwater was drafted to develop and evaluate alternatives to address risk associated with Site 5 groundwater; however, this document was never submitted because the regulatory agencies requested that groundwater data be evaluated for 5 years following implementation of the landfill cap. Additional evaluation of groundwater, surface water, and sediment at Site 5 was conducted between 2000 and 2003. A Focused RI/FS was completed in 2004 (CH2M HILL, September 2004), and a ROD for Site 5 groundwater, surface water, and sediment was signed in February 2006. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedies for the landfill contents and surface soil (OU1) and groundwater, surface water, and sediment (OU2) were functioning as intended by the ROD. Review of the Site 5 groundwater data from 2006 to 2011 during the preparation of the draft Interim Remedial Action Completion Report (IRACR) determined that the TCE concentrations at Site 5 show an overall decreasing trend, with a substantial decrease in the well immediately downgradient of the PRB wall (5GW18), following the installation of the PRB. The next combined Five Year Review Report will be prepared in September 2013 and will further evaluate the effectiveness of the remedy.

1.3.5.6. Site 6

In order to evaluate the presence of potential constituents of concern at Site 6, sediment samples were collected in 2001. The data from these samples were evaluated and it was determined that site conditions are protective of human health and the environment. Because Site 6 was not recommended for further investigation in the FFA, the sampling results, risk evaluation, and site closure was documented in a no further action closeout document in February 2002.

1.3.5.7. Site 7

The Interim RI and the RI found low levels of inorganic constituents in soil and groundwater at Site 7. Following a soil removal action, a Streamlined RI/FS report was prepared for Site 7 (CH2M HILL, April 2001). A No Further Action (NFA) ROD was signed for Site 7 in September 2001.

1.3.5.8. Site 8

Site 8, the Explosive Wastewater Sumps/Catch Basins, is comprised of SWMUs 37E, 37F, 37I, 37J, 37K, 37L, and 37M. Human health and ecological risks have been evaluated for these SWMUs, and with the exception of groundwater at SWMU 37E, have been formally closed as documented in closeout reports approved by WVDEP and USEPA between 1999 and 2002. Additional groundwater investigations are being completed at SWMU 37E (the Building 15 Wastewater Sump) to evaluate the presence of explosives, including HMX and RDX, in shallow groundwater.

1.3.5.9. Site 9

As stated in the FFA, the final RFA report issued in August 1993 reviewed existing data for Site 9, the Former Acid Disposal Pit (referred to as AOC F in the RFA), and recommended no further action for this unit. This site was closed out in the FFA under Findings of Fact, Page 19.

1.3.5.10. Site 10

To remain consistent with the designation of sites at ABL, Site PWA was renamed Site 10 in 1995. In order to evaluate the hydraulic properties of the alluvial and bedrock aquifers at sites 1 and 10 and to determine the optimal number, configuration, and withdrawal rates of extraction wells, Phase I Aquifer Testing and Phase II

Aquifer Testing at Site 1 and Site 10 were conducted in 1995 and 1996, respectively (CH2M HILL, December 1998, September 1999a, and September 1999b).

Based on the conclusions and recommendations of the Phase II RI and Phase I Aquifer Testing, a draft FFS was prepared to develop remedial action alternatives for Site 10 soil and groundwater. In order to expedite containment of the groundwater contamination plume, the site was subdivided into operable units (OUs) for remedial action. Therefore, the draft FFS was never finalized. Instead, a final Site 10 FFS for groundwater (OU5) was prepared to implement an interim remedial action (CH2M HILL, March 1998). The selected interim remedy for Site 10 groundwater was “hot-spot” groundwater extraction with subsequent onsite treatment and discharge of treated water to the river.

Additional soil sampling was performed at Site 10 in June 2000 to further delineate the extent of soil contamination associated with the former TCE still and supplement existing data. The results of supplemental sampling were incorporated into a Risk Assessment Report (CH2M HILL, July 2005). A No Further Action (NFA) ROD was signed for Site 10 Soil in July 2007.

Phase III Aquifer Testing was conducted in 2001, in part to evaluate the hydraulic interconnection between Site 1 and Site 10 and the likelihood of being able to hydraulically contain the groundwater contaminant plume at Site 10 containing VOC concentrations above MCLs. Based on the results of the Phase III Aquifer Testing activities, it was determined that the addition of a fourth alluvial extraction well and four bedrock extraction wells to the existing Site 10 extraction well alignment would likely meet the containment objectives in both the alluvial and bedrock aquifers. These changes to the extraction system were proposed as the final remedial alternative for Site 10 groundwater in a November 2001 PRAP. Construction of the Site 10 groundwater extraction system modification and the installation of four additional monitoring wells (three bedrock and one alluvial) was completed and the modified system activated in February 2003. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedy for Site 10 (OU5) was functioning as intended by the ROD. The next combined Five Year Review Report will be prepared in September 2013 and will further evaluate the effectiveness of the remedy.

1.3.5.11. Site 11

Previous Investigations at Site 11 In 1995, an Advanced Site Inspection (ASI) was conducted to characterize potential groundwater and soil contamination in and around Production Well F (F-Well) and a former oil pit at the construction site for Building 421, the existing building adjacent to F-Well. The ASI identified a limited area of soil contamination and a broader area of groundwater contamination in the alluvial and bedrock aquifers. Furthermore, a light non-aqueous-phase liquid (LNAPL) and a dense non-aqueous-phase liquid (DNAPL) were detected in F-Well. Prior to the ASI, the facility removed the former oil pit and any visibly contaminated soil.

Based on the findings of the ASI, an RI was initiated at Site 11 in June 1998 to delineate the nature and extent of contamination in the soil and alluvial and bedrock aquifers in the vicinity of F-Well. The groundwater monitoring phase of the RI was extended to include quarterly groundwater sampling for 1 year. An RI Report was completed in January 2005 that included human health and ecological risk assessments for Site 11 (CH2M HILL, January 2005). A Feasibility Study for the combined areas of Site 11 and Site 12 was completed in 2010. The PRAP was finalized in March 2011 and identifies the preferred remedial alternative for Site 11 as source zone removal (already complete), focused enhanced anaerobic biodegradation, monitored natural attenuation, and institutional controls. The ROD for Sites 11 and 12 was signed in January 2012. Baseline groundwater sampling at Sites 11 and 12 was conducted in June 2012. Remedial action will commence in the fall of 2013 followed by quarterly monitoring for a year to assess the effectiveness of the remedy.

1.3.5.12. Site 12

During Phase III SWMU/AOC Investigation activities at AOC N, VOC contamination was discovered in the alluvial aquifer in the vicinity of Building 167 and below and adjacent to the former SWMU 37N wastewater sump. Because of the relatively large area and high levels of contamination, AOC N was designated IR Site 12. A draft Remedial Investigation report for Site 12 was submitted in February 2008. A Feasibility Study for the combined areas of Site 11 and Site 12 was completed in 2010. The PRAP was finalized in March 2011, which identifies the

preferred remedial alternative for Site 12 as source zone removal (already complete), focused enhanced anaerobic biodegradation, monitored natural attenuation, and institutional controls. The ROD for Sites 11 and 12 was signed in January 2012. Baseline groundwater sampling at Sites 11 and 12 was conducted in June 2012. Remedial action will commence in the fall of 2013 followed by quarterly monitoring for a year to assess the effectiveness of the remedy.

1.3.5.13. Site 13

The Phase III Investigation for Site 13 (Formerly known as SWMU 27A) in part sought to identify the source of TCE which had been sporadically detected in various outfalls during the NPDES monitoring program (CH2M HILL, 2005). In the sediment sampling conducted during the Phase III Investigation, TCE was detected in one of the samples collected from the drainage ditch downstream of Site 13, monitored as part of the facility's National Pollutant Discharge Elimination System (NPDES) program, resulting in the collection and analysis for VOCs of additional surface water samples from the main drainage channel and its tributaries upstream of the sampling location. TCE was consistently detected (at concentrations between 11 µg/L and 140 µg/L in surface water samples. Because TCE is no longer used at the facility, contaminated groundwater near the Range Road intersection was believed to be the source of TCE in the drainage ditch. Groundwater samples were collected in 2002 and 2003 to identify the TCE source and better define the extent of VOCs in alluvial groundwater. These grab samples identified an elongated area of dissolved TCE in groundwater, trending to the east-northeast and roughly parallel to the Plant 1 drainage system near the Range Road–H Street intersection. Though there are no known potential sources of TCE at SWMU 27A, a search of historical information conducted during the Phase III Investigation revealed that there was a boiler (Building 106A) northeast of the Range Road and H Street intersection where degreasing operations dating to 1952 were conducted. No potential source of TCE southwest of the intersection was identified. TCE migration along the facility sewer lines from other IRP sites was ruled out because there are no sewer lines located in the immediate vicinity of the intersection.

Additional soil and groundwater studies were conducted as part of Phase IV investigations (CH2M HILL, 2004) which focused on the potential source area of TCE in the vicinity of the former boiler. An initial pilot study was conducted to evaluate the effectiveness of an in situ injection in alluvial groundwater to enhance aerobic degradation of VOCs (CH2M HILL, 2008b). Groundwater analytical results of the pilot study and follow-up sampling events showed that TCE concentrations were significantly reduced, and TCE anaerobic breakdown products increased in the pilot study area (CH2M HILL, 2008). A similar pattern of reduction in TCE concentrations was observed in SWMU 27A surface water downgradient of the pilot study area. Subsequent to identifying the area for pilot study, higher TCE concentrations were discovered in the area upgradient of the initial pilot study area.

Additional characterization activities were conducted in 2006 following the initial pilot study to delineate the higher concentrations of VOCs in the alluvial aquifer hydraulically upgradient and cross-gradient of the initial pilot study area (CH2M HILL, 2006). Results from the additional characterization activities indicated the highest groundwater concentrations of VOCs in the area between G Street, Range Road, H Street, and the Plant 1 drainage ditch as suggested by previous investigations. It was concluded that additional data would be needed to confirm that TCE in groundwater was adequately characterized.

Additional data were collected from the alluvial aquifer in February 2008 using multiple passive diffusion bag (PDB) samplers within select individual monitoring wells (CH2M HILL, 2008). These samples were collected to examine the vertical stratification of VOCs within the alluvial aquifer. The results of the PDB sampling did not identify significant vertical stratification of VOC concentrations.

Because no specific historical source or release event has been identified for VOCs at Site 13, a membrane interface probe (MIP) survey was performed to determine if there was a yet-undefined VOC source related to LNAPL or TPHs in the vadose zone near the highest concentrations of TCE in groundwater. The soil results of this investigation (CH2M HILL, 2008d), suggest that the vadose zone source of TCE in groundwater at Site 13 has either degraded or been leached from the soil.

A second pilot study at Site 13 was conducted in 2008 to evaluate the effectiveness of an in situ injection in alluvial groundwater to enhance reductive dechlorination of VOCs, including TCE, to concentrations approaching

their respective MCLs. When compared to the results of the baseline sampling event conducted in August 2008, the reduction in TCE ranged between 80 and 99.9 percent (CH2M HILL 2009b).

An RI is currently underway for Site 13 to assess the nature and extent of contamination (including vertical migration of VOCs within the bedrock) and to assess potential risks to human health and the environment. [The RI Report is anticipated for completion in FY 2013, following the conclusion of sampling.](#)

1.3.5.14. Building 8/Lab Row Area

The RFA identified fifteen SWMUs within the Building 8/Lab Row Area. SWMUs 24F, 24H, 25A, and 30 within Building 8 and SWMUs 24I, 24K and 29A, were recommended for NFA in the RFA and were subsequently closed in 2002 with no action (CH2M HILL, 2002).

The Phase I SWMU investigation was conducted to determine if releases had resulted from prior area activities at a number of SWMUs throughout the facility including six Building 8/ Lab Row Area SWMUs (24J, 37C, 37D, 37E, 37T, and 40). Direct push soil samples were collected from SWMUs 37C, 37D, 37E, 37T, and 40 for screening purposes. In addition, one wipe sample for polychlorinated biphenyls (PCBs) was collected from SWMU 24J. Sample results indicate no volatile organic compounds (VOC) or explosives were detected in the samples collected from SWMU 37D and 37T. Although explosives were detected at SWMU 37E, detected concentrations were below risk based criteria (RBC). Low levels of VOCs and/or explosives were detected at SWUM 37C. PCBs were not found to exceed Toxic Substance Control Act (TSCA) cleanup levels at SWMU 24J.

The Phase II SWMU investigation was conducted in 2005 to determine if releases had resulted from prior area activities at a number of SWMUs throughout the facility that had not been investigated during Phase II, including, among five total Building 8/Lab Row Area SWMUs, SWMUs 37V and 37W. In addition, SWMUs 37C, 37E, 37T, and 40 were further investigated (CH2M HILL, 2005). Direct push groundwater samples were collected from SWMUs 37E, 37V, 37W, while monitoring wells were installed to investigate groundwater at SWMU 37C (GGW11 and GGW12), and SWMU 37T (GGW13). In addition, one groundwater sample was collected from 10GW08 because of its proximity to SWMU 37E.

A Phase III/IV investigation was conducted in 2005 to determine if constituent releases from past practices at the SWMUs pose a potentially unacceptable risk to human health and the environment (CH2M HILL, 2005b). During the Phase III/ IV investigation, samples were collected from 37E and 37V to supplement data collected during Phase I and Phase II investigations. One monitoring well sample was collected from GGW-20 near 37E; both RDX and HMX were detected, at 41 and 7.1 µg/L respectively. At SWMU 37V, soil, direct push groundwater, and monitoring well samples were collected, but no constituent concentrations exceeded RBCs or MCLs.

Groundwater sampling for a PA/SI at Building 8/Lab Row Area has been completed. Results from the PA/SI are being evaluated and will be used to determine if a Remedial Investigation is warranted.

TABLE 1-1
Further Investigation Sites, SWMUs, and AOCs
Allegany Ballistics Laboratory (ABL)

Site/AOC Number	Site Identification	Operable Unit Number	Operable Unit Description	ROD Signed (Yes/No)	CERCLA Process Status
1	Northern Riverside Waste Disposal Area	4	Soil	No	RI completed in July 2006. EE/CA completed in 2012. FS is planned for FY13.
13*	Range Road Area	15	Groundwater	No	RI field work currently being conducted. RI report is planned for FY13.
SWMU 37E	Building 15 Wastewater Sump	App B	Groundwater	No	Identified and described in the SMP as Building 8/Lab Row Area; Groundwater investigation completed and data currently being evaluated. Site closeout or future investigation activities planned for FY13.
SWMU 37W	Building 8 Wastewater Sump	App B	Groundwater	No	Identified and described in the SMP as Building 8/Lab Row Area; Groundwater investigation completed and data currently being evaluated. Site closeout or future investigation

TABLE 1-1
 Further Investigation Sites, SWMUs, and AOCs
Allegany Ballistics Laboratory (ABL)

Site/AOC Number	Site Identification	Operable Unit Number	Operable Unit Description	ROD Signed (Yes/No)	CERCLA Process Status activities planned for FY13.
AOC M	Small Scattered Debris Areas	App B	Debris	No	Debris may be addressed during Site 1 remedial action.

Abbreviations:

AOC = Area of Concern

FS = Feasibility Study

OU = Operable Unit

RI = Remedial Investigation

ROD = Record of Decision

SWMU = Solid Waste Management Unit

* Indicates units not listed in the FFA for further investigation.

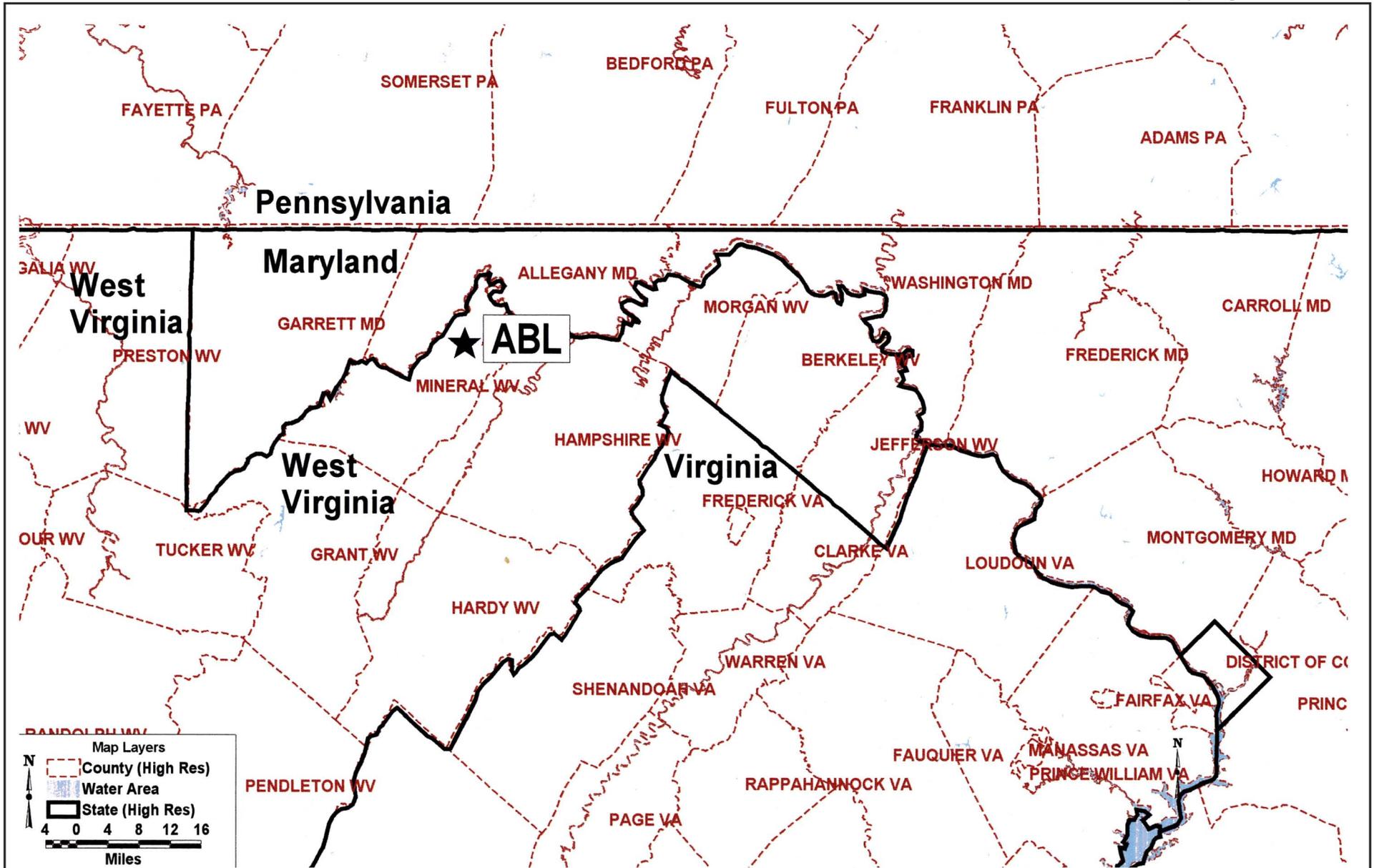


Figure 1-1
VICINITY MAP
Allegany Ballistics Laboratory

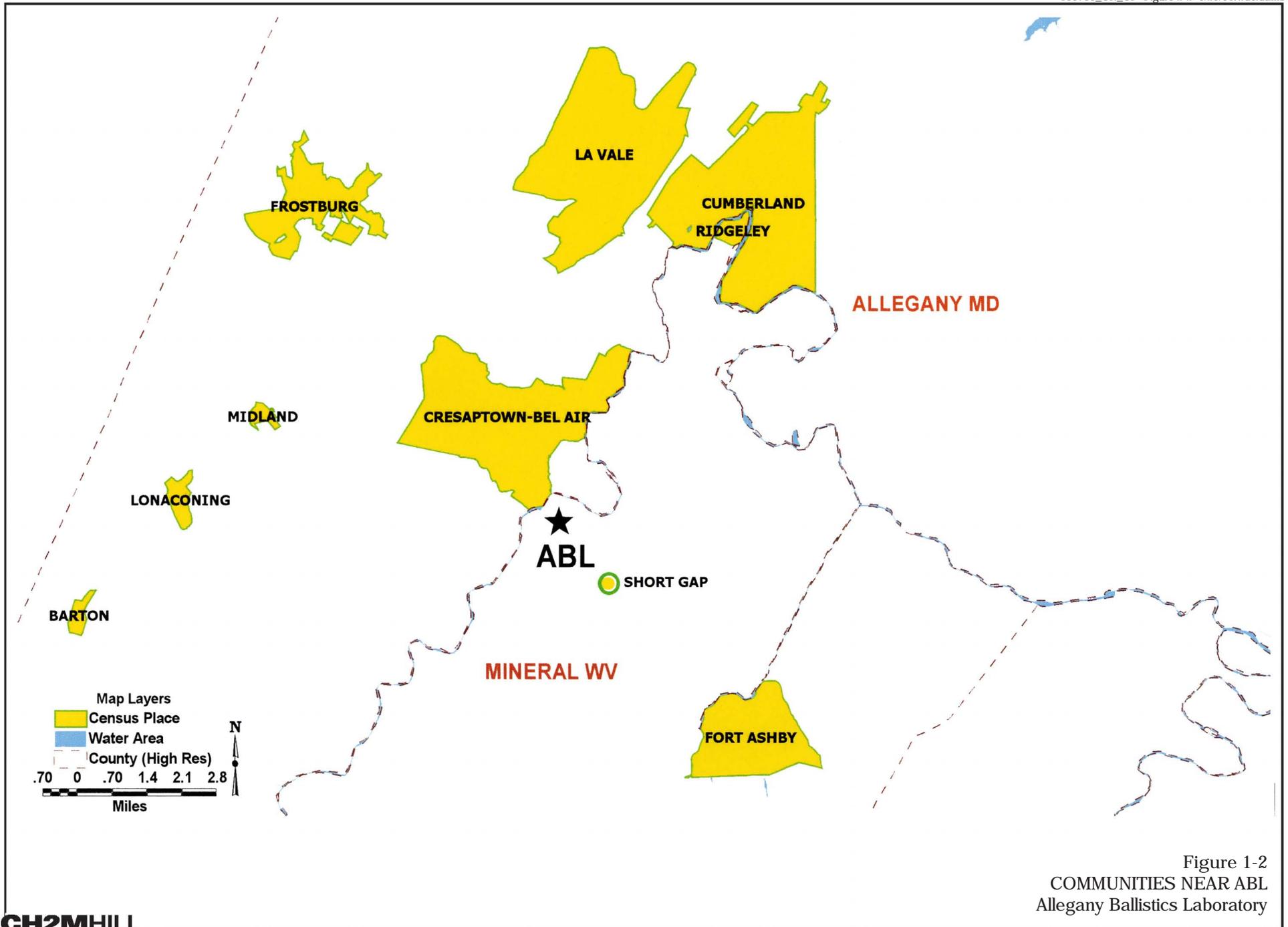
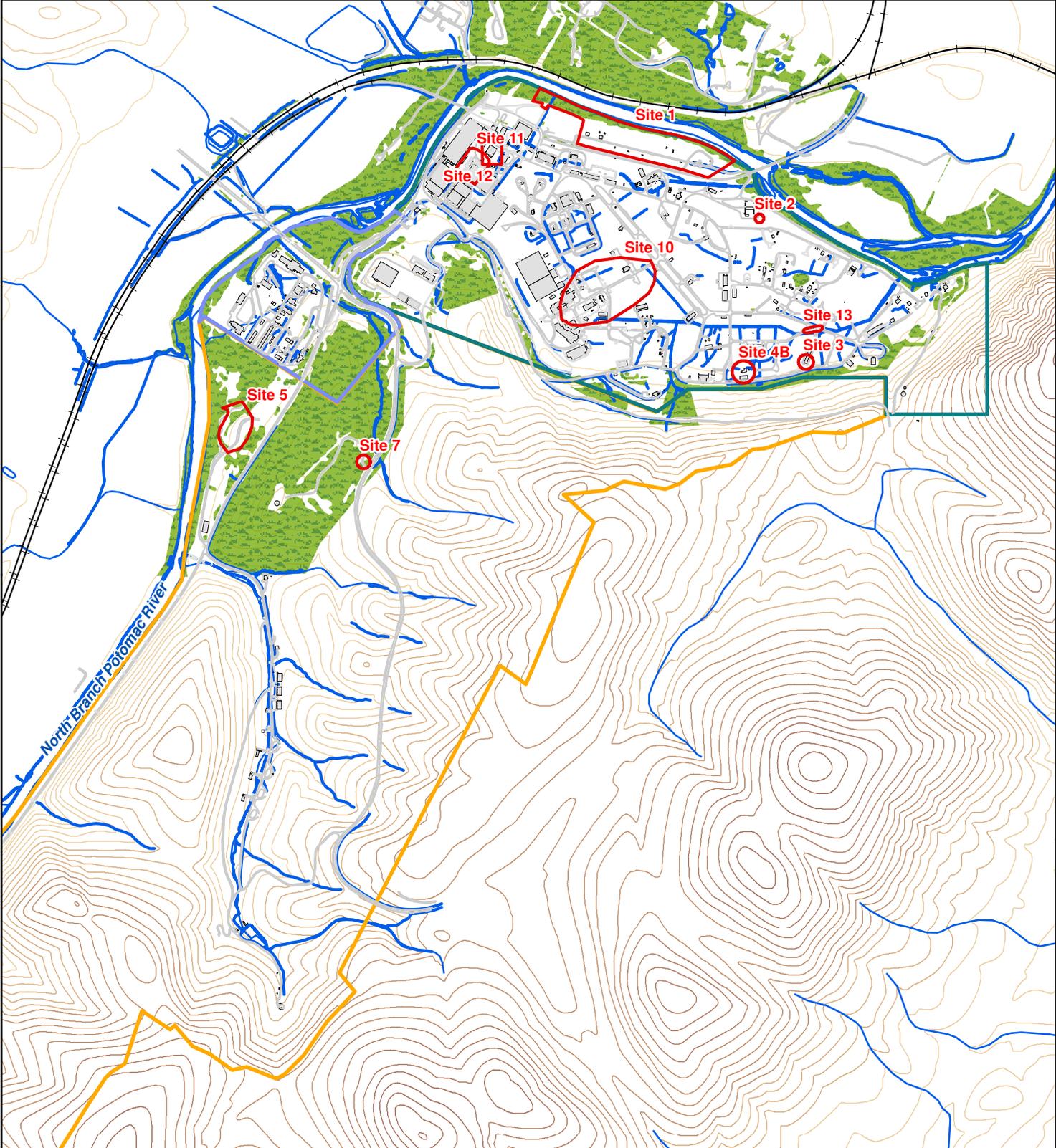


Figure 1-2
COMMUNITIES NEAR ABL
Allegheny Ballistics Laboratory



Legend

- +— Railroad
- Roads
- ~ Surface Water
- IR Site Boundary
- Buildings
- Vegetation Area
- Plant 1
- Plant 1 - Undeveloped Area
- Plant 2

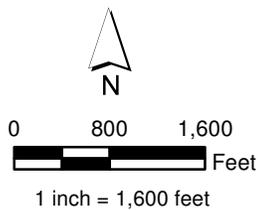
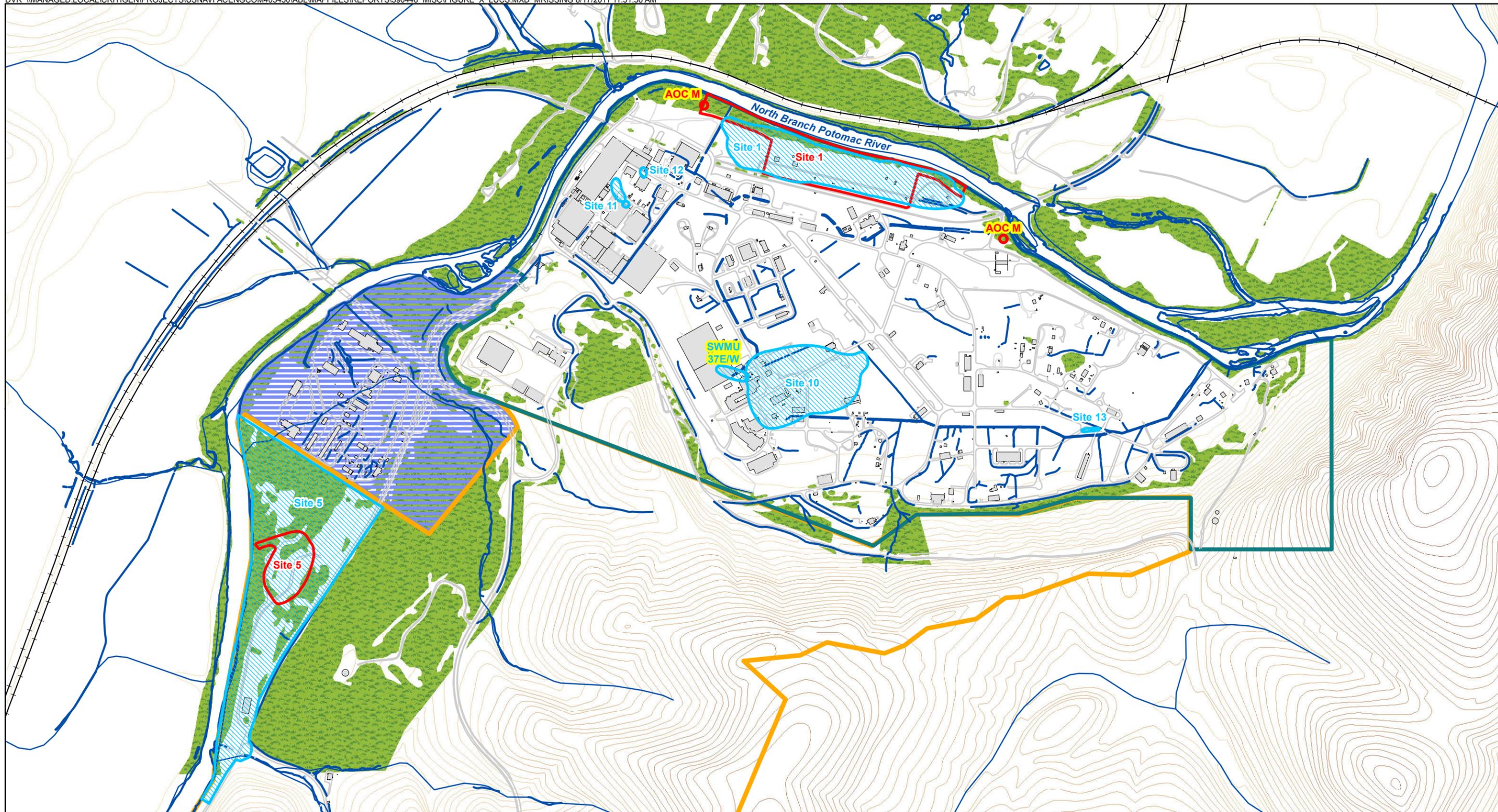


Figure 1-3
Location of IRP Sites
Allegany Ballistics Laboratory
Rocket Center, West Virginia





Legend

- +— Railroad
- Roads
- Surface Water
- Buildings
- Vegetation Area
- Groundwater Land Use Control Boundary
- Soil Land Use Control Boundary

Activity Boundary

- Plant 1 - Undeveloped Area
- Plant 1
- Plant 2 (not included on the National Priorities List)

AOC M - Shading indicates site is still under investigation and therefore land use is restricted

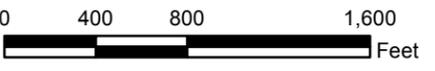


Figure 1-4
Land Use Control Sites
Allegany Ballistics Laboratory, Rocket Center, West Virginia

SECTION 2

Unit Descriptions and Tracking Matrix

This SMP is intended to cover all units (i.e., IRP sites, SSAs, and AOCs) listed in the FFA. The site-specific information provided in this section includes physical characteristics, a description of past activities conducted, and known contaminants by media. However, inactive units that are either closed through a consensus agreement or recommended for no further action are not included.

Because the various environmental investigative programs have used different unit nomenclature throughout the environmental history of the facility, summary tables have been prepared to act as a tracking aid for each unit. The tables include the designation of each unit (name), location, historical dates of operation (if known), a description of the wastes managed, and the current status of each unit. [Attachment A](#) summarizes this information for the IRP sites and SWMU/AOC units, respectively. [Attachment B](#) shows the locations of all monitoring wells at the ABL facility.

2.1 Installation Restoration Program Sites

The IRP sites currently in the CERCLA remedial process are described below. The following site descriptions include physical characteristics, past activities, detected constituents, and planned activities.

2.1.1 Site 1: Northern Riverside Waste Disposal Area

Site 1 is an 11-acre area that consists of several disposal units, including an active 8-acre, fenced burning ground for reactive wastes including propellants and explosive (P/E) wastes; three inactive disposal pits for spent solvents and acids; a former drum storage area for drums containing hazardous wastes; a former landfill for ash; and a former burning area for inert substances. The three disposal pits have been backfilled, all drums have been removed from the drum storage area, and both the ash landfill and the inert burning ground are overgrown with vegetation.

As noted in Section 1, Site 1 was part of a number of investigations conducted at ABL in the 1980s and early-1990s. Information gathered during the RI and Focused RI indicates that VOCs (specifically TCE, 1,2-DCE, 1,1,1-TCA, MC, and acetone) were the most widespread constituents of potential concern (COPCs) detected at Site 1 in soil, alluvial and bedrock groundwater, surface water, and sediment. Based upon risks identified for Site 1 media during the Focused RI, an FFS for Site 1 groundwater was completed in September 1996.

The Navy issued a PRAP for groundwater, surface water, and sediment in October 1996 and signed the ROD for interim remedial action in May 1997. The selected remedy for Site 1 groundwater and the surface water and sediment of the North Branch Potomac River adjacent to Site 1 was site-wide alluvial and bedrock groundwater containment (i.e., capture and removal) with subsequent onsite treatment and discharge of treated water to the river.

In order to evaluate the hydraulic properties of the alluvial and bedrock aquifers at Site 1 and to determine the optimal number, configuration, and withdrawal rates of extraction wells, Phase I Aquifer Testing, Phase II Aquifer Testing, and Phase III Aquifer Testing were conducted in 1995, 1996, and 2001, respectively.

Construction of a groundwater treatment facility to remove hazardous constituents from the extracted groundwater at Site 1 began in September 1997. The treatment plant began continuous operation in September 1998 and has treated an average of more than 100 gallons per minute (gpm) of groundwater extracted from Site 1 since that time. Currently, treated groundwater is utilized by the ABL boiler plant, with excess water being discharged to the river.

A pilot study was conducted in 2005 to evaluate the effectiveness of using in situ chemical oxidation to reduce contaminant mass in the alluvial and bedrock aquifers in the vicinity of the former solvent pits. The results of the study were presented in a draft report in 2006.

As described in Section 1, soil data at Site 1 were collected during the RI, Focused RI, and 1998, 2001, and 2004 supplemental soil sampling efforts to better delineate areas of contamination. An RI report for Site 1 soil was finalized in 2006, and included revised human health and ecological risk assessments.

In 2012, an EE/CA was completed to address unsaturated soil in the former disposal pits and is intended to supplement the selected remedy for Site 1 soil. A Draft FS is currently being revised to address soil contamination at Site 1 to evaluate remedial alternatives for long-term protection of human health and the environment, including protection against contaminants leaching to groundwater.

Site 1 consists of several areas, each with a unique history, as described below. These areas were originally defined based upon suspected areas of contamination and may be redefined based on the revised risk assessments and ARARs. Consequently, areas with similar health risks and contaminants may be addressed in the same EECA.

2.1.1.1. Former Open Burn Area

The Former Open Burn Area is located at the far northwestern end of Site 1 and includes the Open Burn Area Landfill, Former Burn Cages and Ash Landfill [SWMUs 11, 22C and 22D], the Open Burn Area Landfill Drainage Ditch, and the Former Hazardous Waste Storage Area [SWMU 1], as shown in [Figure 2-1](#). The Open Burn Area Landfill Drainage Ditch is a man-made earthen drainage culvert that cuts through this area and is used to drain surface/storm water from Plant 1. Landfilled material and trash are visible in the cuts of this culvert and in the Open Burn Area Landfill.

2.1.1.2. Inert Burning Ground (SWMU 7)

The Former Inert Burning Ground and associated landfill are located on the far northeastern end of Site 1, as shown in [Figure 2-2](#). The following text is extracted from the Phase II RCRA Facility Assessment; “Waste materials contaminated with explosives, including explosive contaminated waste rags, were burned at the Inert Burning Ground (SWMU 7) between 1958 and approximately 1985. These rags may also have been contaminated with solvents, including methylene chloride and TCE. This unit was located near the bank of the North Branch Potomac River outside the fenced area of the Current Burning Ground (SWMU 6) site. Ash from this unit was deposited at the site. Waste material profiles from the facility’s contracted waste hauler indicate that current ash residues potentially contain aluminum oxide and residual solvents such as methylene chloride and 1,1,1-TCA. Paper and combustible containers were also burned at the unit. Historical waste profiles are not available” (USEPA, August 1993).

2.1.1.3. Eastern TCE “Hot Spot”

This area is adjacent to the eastern end of the fenced open burning grounds, between the fence line and the North Branch Potomac River, as shown in [Figure 2-3](#). The site is in a wooded setting and is likely the result of isolated dumping or spilling.

2.1.1.4. Central TCE “Hot Spot”

This area is adjacent to the central portion of the fenced open burning grounds, between the fence line and the North Branch Potomac River, as shown in [Figure 2-4](#). Again, the site is in a wooded setting and is likely the result of isolated dumping or spilling.

2.1.1.5. Western TCE “Hot Spot”

This area is a TCE hot spot within the debris landfill adjacent to the western end of the fenced open burning ground, between the fence line and the North Branch Potomac River, as shown in [Figure 2-4](#). Partially buried drums, which are still present, are believed to be the source of the TCE hot spot.

2.1.1.6. Solvent Disposal Pit Area

This area consists of the former solvent disposal pit area (includes SWMUs 6, 8, and 20). This area is located approximately 250 feet from the river (see [Figure 2-4](#)) and is considered to be the primary source of groundwater VOC contamination at Site 1.

2.1.1.7. Debris Area

The debris area is a portion of the debris landfill containing visible waste, but with significantly lower concentrations of detected VOCs than the western TCE hotspot. This area is located east of the Former Open Burn Area, as shown in [Figure 2-1](#).

2.1.1.8. Perchlorate

Perchlorate has been detected in selected Site 1 groundwater monitoring wells, the effluent from the Site 1 Groundwater Treatment Plant and in runoff from the Plant 1 drainage ditch at sampling location SSL-2. Ammonium perchlorate is used as a primary component in solid propellant for rockets and missiles.

Perchlorate (ClO_4^-) is an anion that originates as a contaminant in groundwater and surface waters when the perchlorate salts of ammonium, potassium, magnesium, or sodium dissolve in water. The West Virginia and Maryland State governments as well as the Federal government have not established cleanup standards for perchlorate, as of this time. However, West Virginia established a discharge limit for perchlorate from the ABL Groundwater Treatment Plant on August 13, 2009, at CERCLA outfall 001. The compliance schedule developed to meet this requirement is presented in Section 4 of this SMP.

2.1.2 Site 2: Previous Burning Ground (1942-1949)

Site 2 was an open burning ground reportedly utilized from 1942 to 1949 in a manner similar to the Site 1 open burning ground. Based upon aerial photographs, the former burn pad area is suspected to be southeast of Building 361, as shown in [Figure 2-5](#). In addition, a solvent storage shed was identified near Building 100 during the RI. Past sampling events at Site 2 have targeted both of these areas. The area adjacent to the solvent shed was subsequently identified as AOC Q and was closed in 2005. The amount of wastes disposed of at Site 2 cannot be determined due to the lack of historical records about past disposal practices.

As described in Section 1, several investigations (i.e., IAS, CS/Interim RI, RI, and Phase II RI) have been performed to evaluate the nature and extent of contamination in environmental media at Site 2. Generally, low estimated concentrations of only a few VOCs (i.e., TCE, 1,1-DCE, carbon disulfide, and xylenes) and SVOCs (mostly PAHs) were detected in the soil at Site 2. Several inorganic constituents (i.e., mercury, nickel, aluminum, arsenic, manganese, and silver) were identified as COPCs for Site 2 soil in the risk assessments conducted during the Phase II RI (CH2M HILL, August 1996). VOCs have been detected in groundwater up- and side- gradient (near AOC Q) and downgradient of Site 2. Groundwater sampling conducted during the Phase II RI and in January 2003 indicates that TCE concentrations in these wells are decreasing.

Previous data suggested that Site 2 does not pose a significant risk to human health or the environment. However, because data gaps were identified supplementary surface and subsurface soil sampling activities were conducted in October 2001 and supplementary groundwater investigations were completed in 2004. These data were evaluated and are presented in a Risk Assessment Report (CH2M HILL, July 2005). This report concludes that Site 2 does not present an unacceptable risk to human health or the environment. In 2006 a PRAP was prepared for Site 2 that indicated that the preferred alternative for this site is no further action (NFA). However, during a review of the Site 2 ROD, USEPA raised a concern associated with exposure to arsenic in groundwater, primarily as the result of the arsenic concentration in the hybrid well (2GW01). Because of the unusual construction of 2GW01, which was installed across the alluvial/bedrock contact, it was abandoned and replaced with a new alluvial well. A second well was installed immediately adjacent to Site 2. The analytical results from the two new wells, together with the analytical results from resampling other existing alluvial wells, were then evaluated and incorporated into a revised human health risk assessment for groundwater at Site 2. It was found that groundwater does not pose an unacceptable risk to human health or the environment and an NFA ROD was issued in July 2008.

2.1.3 Site 3: Previous Burning Ground (1950-1958)

Similar to Site 2, Site 3 was an open burning ground reportedly utilized from 1950 to 1958. Two areas of disturbed soil and four linear features at the approximate location of current southern end of Building 362 were identified in aerial photographs. In addition, an attached solvent storage shed was identified on the west-end of

Building 151 during the RI. The area adjacent to the solvent shed was subsequently identified as AOC R and was closed in 2007. Past sampling events at Site 3 are shown in [Figure 2-6](#). The quantities of wastes that were disposed of in this area cannot be determined due to a lack of historical records about past disposal practices.

As described in Section 1, several investigations (i.e., IAS, CS/Interim RI, RI, and Phase II RI) have been performed to evaluate the nature and extent of contamination in environmental media at Site 3. VOCs (i.e., TCE, MC, cis-1,2-DCE, 1,2-DCE [total], and acetone) were detected in the sample (i.e., HCS-S3-1) collected just south of the solvent storage shed at much higher concentrations than elsewhere at Site 3. Generally, low estimated concentrations of only a few VOCs were detected in all other samples collected at Site 3. Bis(2-ethylhexyl phthalate), a common laboratory contaminant, was the only SVOC detected in the soil at Site 3. No COPCs were identified for Site 3 surface soil. Two organic constituents (i.e., 1,2-DCE [total] and TCE) and three inorganic constituents (i.e., arsenic, barium, and manganese) were identified as COPCs for Site 3 media in the human health risk assessment conducted during the Phase II RI (CH2M HILL, August 1996). Existing data suggest Site 3 does not pose a significant risk to human health or the environment. However, like Site 2, data gaps were identified, so supplementary surface and subsurface soil sampling activities were conducted in October 2001 to revise the human health and ecological risk assessments for the site. These data were evaluated and are presented in a Risk Assessment Report (CH2M HILL, July 2005). This report concludes that Site 3 does not present an unacceptable risk to human health or the environment. In 2006 a PRAP was prepared for Site 3 that indicated that the preferred alternative for this site is NFA. A NFA ROD was signed in 2007.

2.1.4 Site 4B: Spent Photographic Developing Solution Site

Site 4B, the Spent Photographic Developing Solution Site, is located in the southeastern portion of Plant 1, approximately 3,000 feet from the North Branch Potomac River. The site is composed of the area adjacent to the southeast corner of Building 181 where spent photographic solutions (containing silver, cyanide, and phenols) were reportedly discharged through a fire hose, into a concrete drainage channel, and then underground into a French drain that extends from the end of the concrete drainage channel to an open stormwater drainage ditch in an adjacent grassed area ([Figure 2-7](#)). Elevated concentrations of silver were detected in surface soil samples collected at Site 4B during the CS. Additional soil sampling was performed at the site during the Phase II RI where the concrete drainage channel enters the French drain and in the adjacent drainage ditch. Elevated levels of silver were again detected, in addition to low levels of several VOCs and SVOCs. The risk assessment performed using data gathered during the Phase II RI and previous investigations suggested that silver concentrations in soil may pose a risk to human health.

Additional soil sampling was conducted at Site 4B in June 2000 to evaluate the potential impacts to soil due to the discharge of spent photographic solutions from Building 181. These data were also used to determine if concentrations of silver (the primary COPC) or any other inorganic constituents at the site pose a risk to human health or the environment.

The results of the risk assessments were used to determine PRGs for soil contamination at Site 4B. A soil removal pilot study using X-ray fluorescence (XRF) technology was initiated in November 2003 for iron, manganese, silver, and thallium following the establishment of background inorganics concentrations for soil. Most of the impacted soil was removed during the first phase of the pilot study, however, some additional excavation and confirmatory sampling was conducted in 2004 and 2005. Results of the study are presented in the *Final Site 4B pilot Study Report* (CH2M HILL, March 2006). In 2007, a PRAP was prepared for Site 4B that indicated that the preferred alternative for this site is NFA. An NFA ROD was signed in November 2007.

2.1.5 Site 5: Inert (Non-Ordnance) Landfill

The Site 5 inert landfill operated from the early-1960s to 1985, accepting wastes generated by ABL and deemed to be inert. The landfill is located on a terrace above the North Branch Potomac River southwest of Plant 1 and south of Plant 2. Inert wastes were defined as wastes not contaminated with explosives nor generated at an area on the facility where explosives were managed. Wastes reported to have been disposed of at Site 5 include drums that previously contained TCE, methylene chloride, and acetone; fluorescent tubes (potential mercury

source); unknown laboratory and photographic chemicals; fiberglass and other resin-coated fibers; metal and plastic machining wastes; and construction and demolition debris.

As described in Section 1, several investigations (i.e., IAS, RI, Phase II RI, and MNA Investigation) have been performed to evaluate the nature and extent of contamination in environmental media at Site 5 (see [Figure 2-8](#)). In general, low levels of VOCs, SVOCs, pesticides, and inorganics were detected in soil samples collected around the perimeter of the landfill. In addition, TCE concentrations up to approximately 100 µg/l have been detected in Site 5 groundwater.

In October 1996, the Navy issued a PRAP for Landfill Contents and Soil for Site 5 and signed a ROD in February 1997. The accepted remedy was landfill capping and long-term monitoring of groundwater and storm water at the site and sediment adjacent to the site. A landfill cap was designed and constructed during the summer of 1997 and was completed in September 1997. A long-term monitoring program for groundwater was implemented in 1998 as part of the operations and maintenance of the landfill cap remedy.

In November 1999, the Navy implemented a monitored natural attenuation (MNA) study to evaluate its feasibility as a remedial alternative for Site 5 groundwater. A preliminary assessment was conducted using existing groundwater data from the long-term monitoring program, and based on this screening, an MNA assessment field investigation was conducted. The purpose of this MNA investigation was to delineate the TCE plume boundaries and to collect MNA indicator parameter data. During the investigation, six additional alluvial monitoring wells were installed, following TCE plume delineation using direct-push technology and onsite VOC screening analysis. A groundwater sampling event that included natural attenuation parameters was performed at Site 5 in July 2000 in conjunction with the scheduled long-term monitoring event.

The Site 5 human health and ecological risk assessments were revised for groundwater, surface water, and sediment, because a substantial amount of additional data were collected since the risk assessments were last prepared during the 1994 Phase II RI. The updated risk assessments and an evaluation of remedial alternatives for Site 5 groundwater are documented in the *Focused Remedial Investigation and Feasibility Study for Site 5 Groundwater, Surface Water, and Sediment* (CH2M HILL, September, 2004). A ROD for Site 5 groundwater, surface water, and sediment was signed in February 2006. The remedy selected by the ROD includes installation of a permeable reactive barrier (PRB) wall filled with zero-valent iron to treat alluvial groundwater downgradient of the Site 5 landfill. This remedy was installed in June 2006. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008. The next combined Five Year Review Report will be prepared in September 2013 and will evaluate the effectiveness of the remedy.

2.1.6 Site 7: Former Beryllium Landfill

In the early 1960s, ABL requested and obtained a permit from the State of West Virginia (Permit 3324) to establish a landfill for beryllium waste disposal. ABL was conducting research on propellants containing beryllium and required disposal facilities for both beryllium-containing propellants and elemental beryllium. A small (10 feet by 15 feet by 6 feet deep) earthen pit was excavated to the limestone bedrock, which was used intermittently in the 1960s to dispose of beryllium and beryllium-contaminated waste. The former beryllium landfill is located outside of Plant 1, as shown in [Figure 1-3](#). Research involving beryllium power at ABL ceased in the late 1960s.

- Records documenting the material disposed of at the landfill (Site 7) were not kept and identification of material disposed of was based on conversations with facility personnel who were present at the time the site was active. The following information was gathered from these personnel:
- Beryllium-containing wastes included wiping tissues, gloves, emptied containers, and respirator cartridges which might have been contaminated with metallic beryllium or beryllium oxide.
- The total quantity of waste disposed of in the landfill was considered “small” because the landfill was approximately 150 square feet and 6 feet deep. Waste was placed in the pit and covered with a few shovels of dirt.
- A small quantity of laboratory chemicals also was placed in the landfill; however, no personnel were able to provide information as to the specific chemicals or chemical types.

Site 7 was evaluated during a number of investigations. The Interim RI and the RI found only relatively low levels of inorganic constituents in soil and groundwater at the site. In June 1994, the material from Site 7 was excavated and placed into steel storage containers. The results from the Interim RI were used initially to characterize the waste as non-hazardous. The excavation and backfilling of the Site 7 landfill was completed on June 30, 1994. In 1997, the excavated soil was shipped offsite for disposal.

A Streamlined RI/FS report was prepared for Site 7 in 2001 to document the history of investigation and remedial action activities, the nature and extent of contamination, potential risks to human health and the environment from site media, and evaluate potential remedial alternatives for the site.

A No Further Action (NFA) ROD was signed for Site 7 in September 2001.

2.1.7 Site 10: Former TCE Still at Building 157

Site 10 consists of the area around Building 157 and is located within the developed portion of Plant 1, as shown in [Figure 2-9](#). In order to maintain consistency with other numbered IRP sites at ABL, Site PWA was renamed Site 10 in 1995. Site PWA had been defined and investigated during the CS, RI, and Phase II RI because contamination had been detected in production well "A" (PWA), which was used in the past to supply potable, boiler, and fire-fighting water to the plant. Because VOCs were detected in the well as early as 1980, PWA's use as a water source was discontinued. It is now believed that contamination in PWA originated, at least in part, from the former TCE still that operated adjacent to Building 157 during 1959 and the early-1960s.

As noted in Section 1, Site 10 was part of a number of investigations conducted at ABL in the 1980s and early-1990s and a supplemental soil investigation conducted in July 2000. Information gathered these investigations indicated that limited VOC soil contamination exists in the vicinity of the former TCE still, but a VOC plume (specifically TCE) is present in both the alluvial and bedrock aquifers at Site 10. Based upon the risks identified for Site 10 groundwater during the Phase II RI, an FFS for Site 10 groundwater was completed in March 1998.

The Navy issued the PRAP for groundwater at Site 10 in March 1998 and signed an interim ROD in August 1998. The selected remedy, which was a modification of one of the alternatives listed in the FFS, was considered an interim action because it did not address the full extent of alluvial and bedrock aquifer contamination. The interim action was intended to contain and remove the most highly contaminated portion of the alluvial aquifer (i.e., TCE contamination greater than 100 µg/l) before further downgradient migration could occur while other remedial actions (e.g., monitored natural attenuation) were considered for the less contaminated portion of the aquifers.

As noted above, a treatment facility was designed and constructed to remove hazardous constituents from the extracted groundwater at Site 1. The treatment plant began continuous operation in September 1998. Implementation of the interim remedial action at Site 10 (i.e., installation of three groundwater extraction wells) was completed in February 1999, at which time groundwater extraction at Site 10 with subsequent treatment at the Site 1 treatment plant began.

After several months of groundwater monitoring at Site 10, it became evident that the existing extraction-well configuration was capturing all but the most northeastern portion of the alluvial-aquifer TCE plume and that the installation of one additional alluvial extraction well might achieve complete plume capture. A direct-push groundwater investigation was performed in June 2000 to further delineate the northeastern extent of the alluvial-aquifer TCE plume and determine the best location for installation of an additional alluvial extraction well. To achieve capture of the alluvial groundwater VOC contamination above MCLs at Site 10, a fourth alluvial extraction well was installed in the suspected northeastern tip of the TCE plume in July 2000. A monitoring well was also installed at the downgradient edge of the alluvial aquifer contaminant plume to verify hydraulic containment.

Hydraulic head data gathered prior to and following extraction system startup at Site 1 has indicated that the vertical hydraulic gradient between the alluvium and bedrock at Site 10 has reversed (i.e., became downward), potentially under the influence of bedrock groundwater extraction at Site 1. To test this hypothesis and to evaluate the need for bedrock extraction at Site 10, an aquifer test was performed in July 2001.

The results of aquifer testing and modeling performed during Phase III Aquifer Testing indicate that bedrock groundwater extraction at Site 1 is limiting the effectiveness of the alluvial extraction wells at Site 10 in capturing the bedrock groundwater contamination. Groundwater modeling was used to evaluate the most effective way of overcoming the influence of groundwater pumping at Site 1 and determined that the addition of four bedrock extraction wells at Site 10 would result in groundwater contamination being contained at Site 10. These changes to the extraction system were implemented in February 2003 in accordance with the *Final Work Plan Site 10 Groundwater Extraction System Modification Allegany Ballistics Laboratory* (CH2M HILL, October 2002). This modified extraction/treatment system was selected as the final remedial alternative for Site 10 groundwater (as a modification of the interim action) in a ROD signed in September 2005.

Additional soil sampling was conducted at Site 10 in June 2000 to further delineate the extent of soil contamination associated with the former TCE still. Soil data collected at Site 10 during the RI, Phase II RI, and June 2000 soil sampling event were evaluated to determine the potential ecological and human health risk posed by the site. These data were evaluated and are presented in a Risk Assessment Report (CH2M HILL, July 2005). This report concludes that soil at Site 10 does not present an unacceptable risk to human health or the environment. In 2006 a PRAP was prepared for Site 10 soil that indicated that the preferred alternative for this media is NFA. A NFA ROD was signed for Site 10 soil in 2007.

2.1.8 Site 11: Production Well “F” (F-Well)

The historical significance of Site 11 is the former existence of a boiler house (Building 215), fuel oil storage area, and a deep bedrock production well known as F-Well. The original boiler house, built in the late-1950s, was approximately 1,000 square feet and housed a single boiler unit. In 1961, F-Well was installed adjacent to Building 215 to provide potable water to Plant 1 as well as to the boiler housed in 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 never put into production. However, it also was never properly abandoned. In 1962, an addition was added to the boiler house that doubled its size and number of boilers. During this expansion, F-Well was covered by the building addition’s foundation.

In the late-1980s, the boiler house was decommissioned. Decommissioning activities included removal of the boilers and two 10,000 gallon aboveground storage tanks (ASTs). Prior to removal of the 55-gallon oil pit and dike walls in 1994, four soil samples were collected from within the diked oil storage area to evaluate the extent of impacted soil. The analytical results suggested soil within the diked area had been impacted by petroleum hydrocarbons. Soil samples collected after removal of the dike wall, oil pit, and all soil within the diked area and demolition of the former boiler house (Building 215) suggest that sufficient soil cleanup had been achieved. Subsequent to soil removal, Building 421 was constructed adjacent to F-Well. An asphalt parking lot was constructed around F-Well and over the former diked fuel storage area and oil pit.

In 1995, an Advanced Site Inspection (ASI) was conducted to characterize potential groundwater and soil contamination in and around F-Well (see [Figure 2-10](#)) and a former oil pit at the construction site for Building 421, the existing building adjacent to F-Well (CH2M HILL, February 1996). The ASI identified a limited area of soil contamination and an area of alluvial and bedrock groundwater contamination. Furthermore, LNAPL and DNAPL were detected in F-Well.

Based on the findings of the ASI, a RI was initiated at Site 11 in June 1998 to delineate the nature and extent of contamination in the soil and alluvial and bedrock aquifers in the vicinity of F-Well. It is believed that while over-drilling F-well during the RI, the LNAPL and DNAPL were removed. Based on this, quarterly sampling was initiated prior to preparation of the RI report. The fourth round of quarterly sampling was completed in February 2001. An RI Report was completed in January 2005 that included human health and ecological risk assessments for Site 11 (CH2M HILL, January 2005). A single FS for Site 11 and Site 12 was completed in 2010. These sites are being evaluated together because the COCs identified at Site 11 and the Site 12 RI are similar, the alluvial and bedrock aquifers are the media where COCs are present at both sites, the sites are located adjacent to each other, and hydrogeologic connectivity likely occurs between the sites. The PRAP, which identifies the preferred remedial alternative for Site 11 as, focused enhanced anaerobic biodegradation, monitored natural attenuation and institutional controls, was finalized in March 2011. The ROD for Sites 11 and 12 was signed in January 2012.

Baseline groundwater sampling at Sites 11 and 12 occurred in June 2012. Remedial action will commence in the fall of 2012 followed by quarterly monitoring for a year following injections to assess the effectiveness of the remedy.

2.1.9 Site 12: Building 167 SWMUs (formerly AOC N)

There are five SWMUs (SWMUs 12, 14, 24S, 37N, and 52) located in the vicinity of Building 167 that are considered part of Site 12 (formerly AOC N). Site 12 is located in the northwestern portion of Plant 1, just north of Site 11, as shown in [Figure 2-11](#). A list of the SWMUs associated with Building 167 is provided below.

- SWMU 12 Former Alodine Treatment Tank
- SWMU 14 Current Alodine Waste Storage Area I (no longer in use)
- SWMU 24S Building 167 Satellite Accumulation Area I (outside building)
- SWMU 37N Building 167 Wastewater Sump
- SWMU 52 Current Alodine Treatment Tank (no longer in use)

Several investigations have been conducted at two of these units. SWMU 37N and SWMU 52 were included in the scope of the Phase I and Phase II SWMU/AOC Investigations. In addition, a removal action was performed in November 2000 to remove the wastewater sump (SWMU 37N), its contents, and potentially contaminated soil immediately surrounding the unit. The results of the SWMU/AOC Investigations and post-confirmatory soil sampling indicated that several inorganic constituents (i.e., antimony, cadmium, chromium, iron, mercury, and thallium) and several organic constituents (i.e., TCE, 1,4-dichlorobenzene, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene) were present in soil above risk-based screening criteria. Several inorganic constituents (i.e., aluminum, arsenic, cadmium, chromium, cobalt, iron, manganese, nickel, vanadium, and zinc) and several organic constituents (i.e., 1,1-dichloroethylene [1,1-DCE], TCE, vinyl chloride [VC], 1,2-dichlorobenzene, 1,4-dichlorobenzene, and benzene) were also detected in groundwater above risk-based screening criteria. Therefore, AOC N was recommended for further investigation during a Phase III SWMU/AOC Investigation to further define the nature and extent of contamination at the unit.

During the Phase III SWMU/AOC Investigation, VOC contamination was discovered in the alluvial aquifer. A large area of the plume is centered around Building 167, and contains primarily TCE. The smaller area of the plume is centered around the former SWMU 37N wastewater sump, and exhibits high levels of methylene chloride. Based upon these findings, the recommendation was made that AOC N be designated IR Site 12.

Though the horizontal extent of VOCs in the alluvial groundwater at AOC N were well defined during the course of Phase III investigation activities, the vertical and horizontal extent of bedrock groundwater contamination was not. Therefore, an RI is currently being conducted at Site 12 to fill the data gaps identified during the Phase III SWMU/AOC Investigation. The proposed RI activities for Site 12 are presented in the Final Work Plan Addendum for Phase III Investigations at SWMUs 27A and 37V and for Remedial Investigation of Site 12 (CH2M HILL, January 2003).

Field investigations were initiated in 2003 as part of an RI designed to address data gaps identified following the Phase III SWMU/AOC Investigation. Remedial investigation activities at Site 12 included the installation and sampling of six alluvial and bedrock groundwater monitoring locations, downhole geophysical surveying, including flow logging and limited packer testing, and dye tracer testing. Groundwater sampling and data evaluation activities are expected to be completed in 2005.

Results of the field investigation identified human health and ecological risks from chromium, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in the soil at the site. In addition, cadmium, mercury, and 1,2-dichlorobenzene were identified as additional COCs for the ecological receptors. Therefore, an EECA was prepared in August 2004 that recommended excavating the contaminated soil at Site 12 and disposing of it in an off-site landfill. These activities were completed in 2005 and are documented in *Final Site 12 Soil Removal Action Report* (CH2M HILL, November 2005). Groundwater data were evaluated in a draft RI report for Site 12 that was issued in February 2007. The RI was finalized in 2009. A single FS for Site 11 and Site 12 was completed in 2010, as discussed above. The PRAP, which identifies the preferred remedial alternative for Site 11 as, focused enhanced anaerobic biodegradation, monitored natural attenuation and institutional controls was finalized in March 2011. The ROD for Sites 11 and 12 was signed in January 2012. Baseline groundwater sampling at

Sites 11 and 12 occurred in June 2012. Remedial action will commence in the fall of 2012 followed by quarterly monitoring for a year to assess the effectiveness of the remedy.

2.1.10 Site 13: OU15 Range Road Area (formerly SWMU 27A)

The Range Road Area of SWMU 27A consists of an area of TCE contamination in alluvial groundwater, at an area where the SWMU27A drainage ditch crosses Range Road. The range Road Area is located in the southeastern portion of Plant 1. The current sampling locations for the Range Road Area are shown in [Figure 2-12](#).

The Range Road Area was initially identified by tracking TCE detected at stream-sampling locations during routine analyses conducted for ABL's NPDES permit. Follow-up surface water sampling detected TCE in the Plant 1 drainage ditch system near where it intersects Range Road. These surface water detections led to the installation of direct push temporary piezometers, which identified an area where TCE and other VOCs were detected in groundwater. The results of the direct push investigation were used to guide the installation of groundwater monitoring wells. A pilot study was completed in the area where the highest concentrations of TCE were detected in alluvial groundwater. This involved enhanced bioremediation using an emulsified oil substrate that was demonstrated to be successful in treating the TCE.

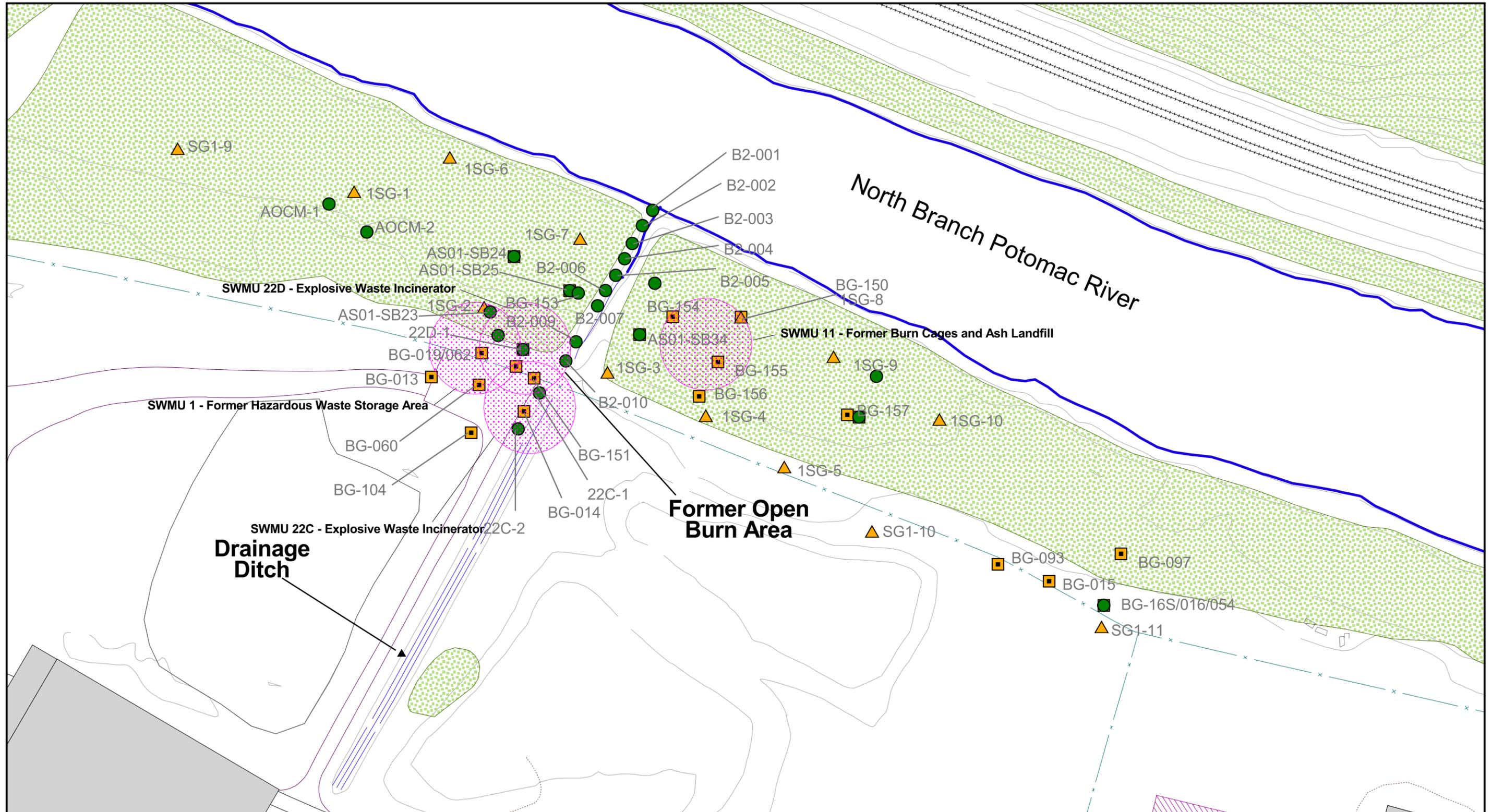
Following the initial pilot study, field work was completed to further delineate the extent of VOCs in the alluvial aquifer. Results from this sampling event identified the highest groundwater concentrations of VOCs in the area between G Street, Range Road, H Street, and the Plant 1 drainage ditch. During the execution of this field work light non-aqueous phase liquid (LNAPL) was observed at the ground surface near well GGW23. Subsequent sampling detected total petroleum hydrocarbon (TPH)—gasoline range organics (GRO) and TPH—diesel range organics (DRO) in some wells. Because no specific historical source or release event has been identified for VOCs in the Range Road Area, a membrane interface probe (MIP) survey was performed to determine if there was a VOC source related to LNAPL or TPH in the vadose zone. The results of the investigation did not identify a continuing source area and suggested that the vadose zone source of TCE in groundwater in the Range Road Area has either degraded or been leached from the soil.

In 2008, the Range Road Area of SWMU 27A was designated as Site 13, OU-15. A second stage pilot study of enhanced bioremediation in the alluvial aquifer was conducted in October 2008 to address VOCs. Currently, a remedial investigation of Site 13 is underway.

2.1.11 Building 8/Lab Row Area

The Building 8/Lab Row Area is located in the southwestern developed portion of Plant 1 and has been used for a variety of research and development purposes ([Figure 2-13](#)). Site topography is relatively flat consisting of high density development and urban landscaping; future land use is expected to remain the same. Groundwater in the Building 8/Lab Row Area is not used as a potable drinking water source, nor is it expected to be used as a potable drinking water source in the future. Currently, groundwater in the area is believed to be captured by the nearby Site 10 extraction well network.

A variety of research and development activities have been conducted in the buildings and former buildings of the Building 8/Lab Row Area since the 1940s. The area encompasses a number of active and closed SWMUs related to former area activities that were identified during the Phase II RCRA Facility Assessment (A.T. Kerny, 1993). Removal actions were conducted as necessary to reach closure status for soil. The groundwater however, has only been investigated at SWMUs where there was an expected complete pathway to the groundwater. The ABL Partnering Team concurred in 2009 that the groundwater in the Building 8/Lab Row area and downgradient needed to be evaluated and could be done as one "unit." Therefore groundwater associated with SWMU 37E and 37W are currently under investigation as part of a PA/SI as a result of VOCs and explosive constituents detected in soil and groundwater during previous investigations. Results from the PA/SI will be used to determine if a Remedial Investigation is warranted.



- LEGEND**
- Surface Soil Sample Location
 - ▲ Soil-Gas Sample Location
 - Subsurface Soil Samples

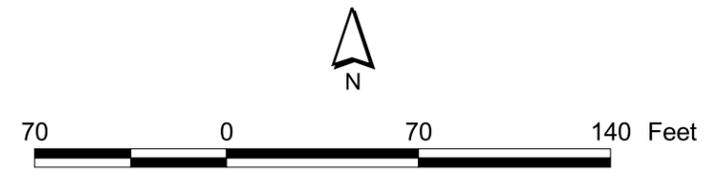
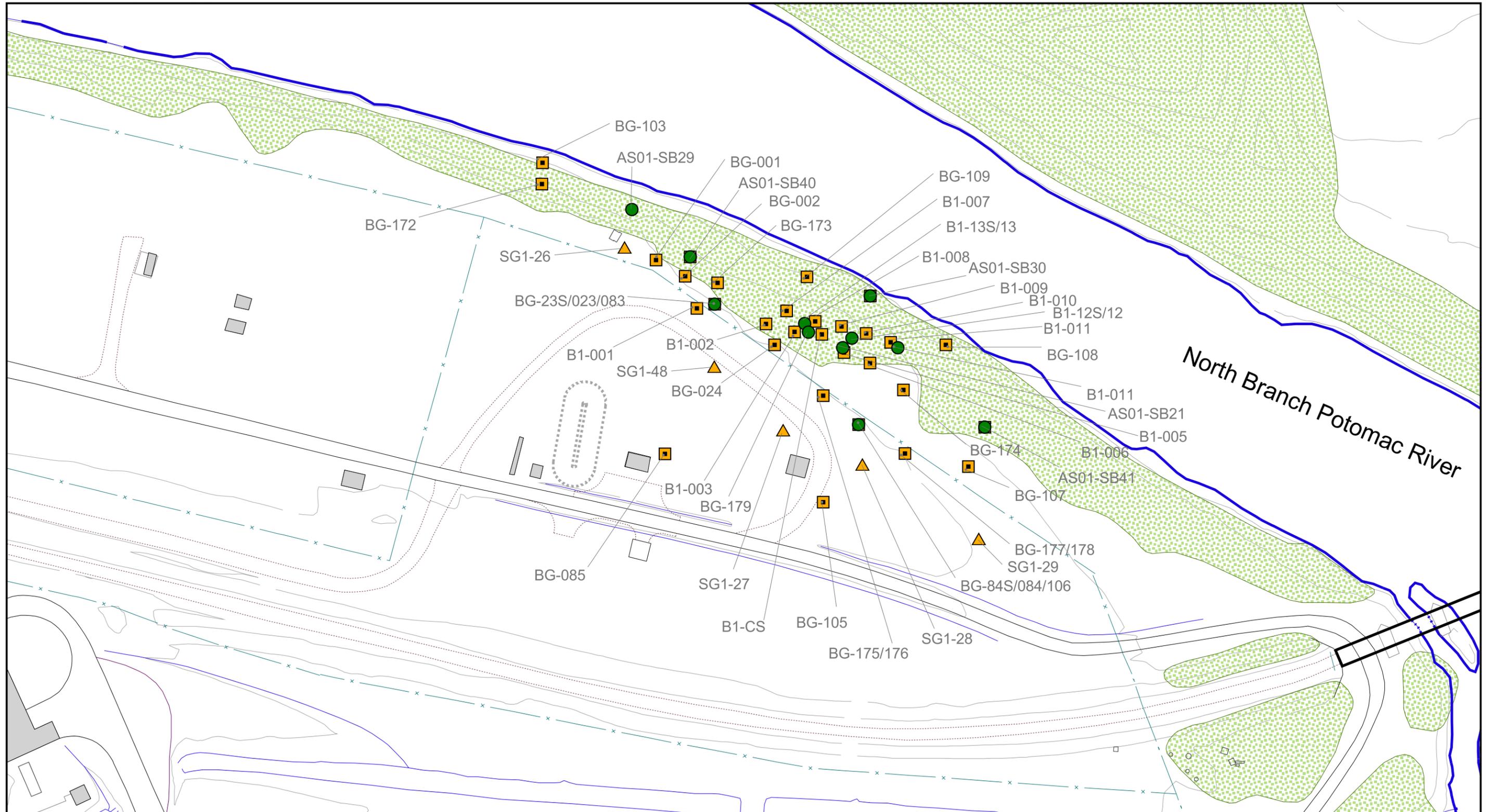


Figure 2-1
Former Open Burn Area, Open Burn Area Ditch,
Former Hazardous Waste Area (SWMU 1)
and Debris Area at Site 1
Allegany Ballistics Laboratory



LEGEND

- Surface Soil Sample Location
- Subsurface Soil Samples
- ▲ Soil-Gas Sample Location

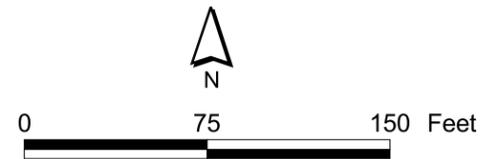
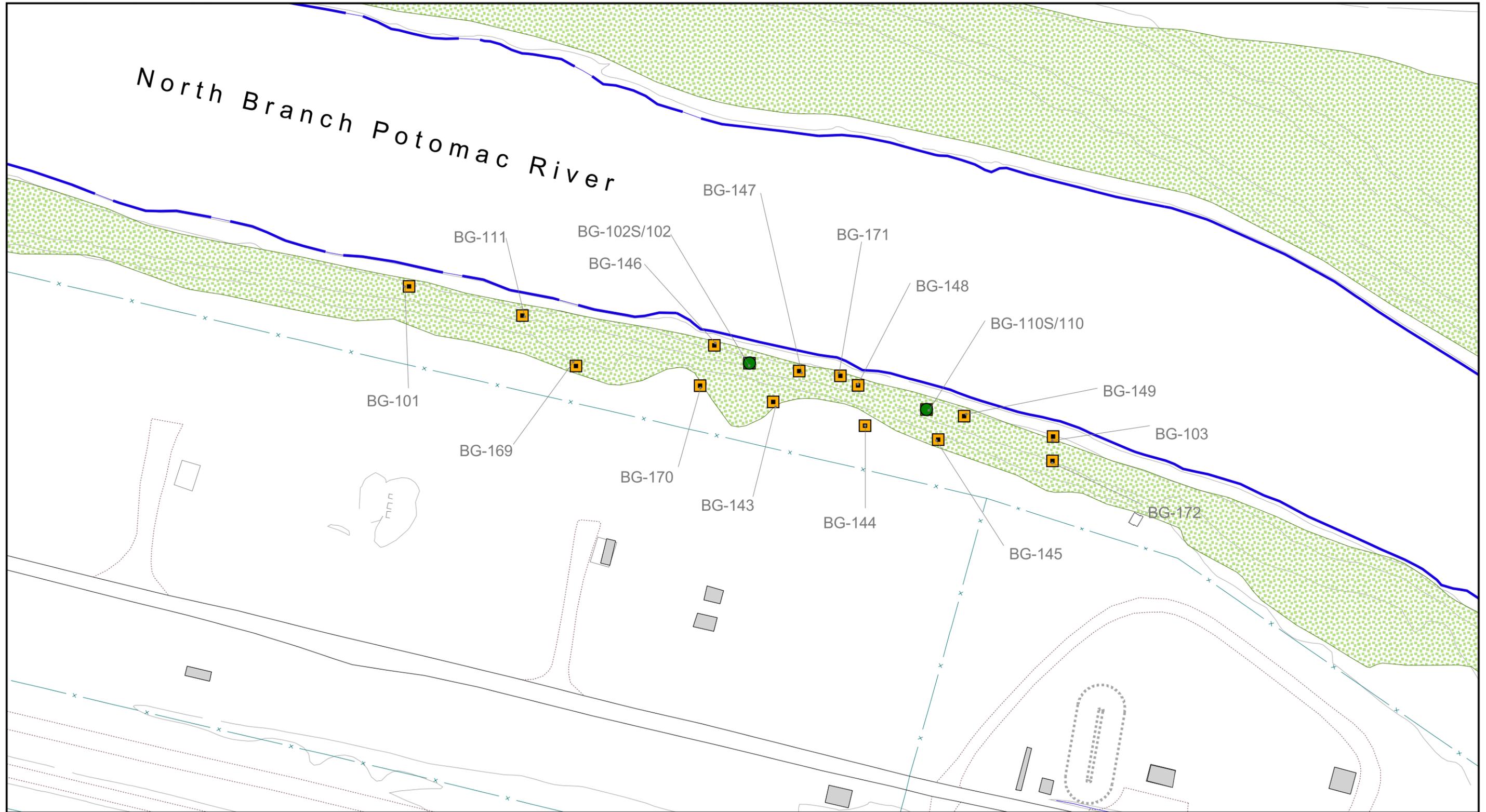


Figure 2-2
Inert Burning Ground (SWMU 7) and Former
Inert Burning Ground at Site 1
Allegany Ballistics Laboratory



- LEGEND**
- Surface Soil Sample Location
 - Subsurface Soil Samples

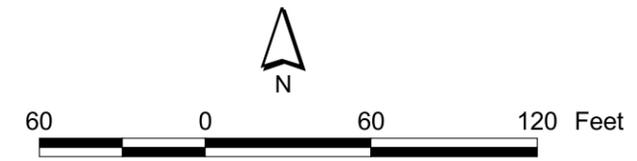
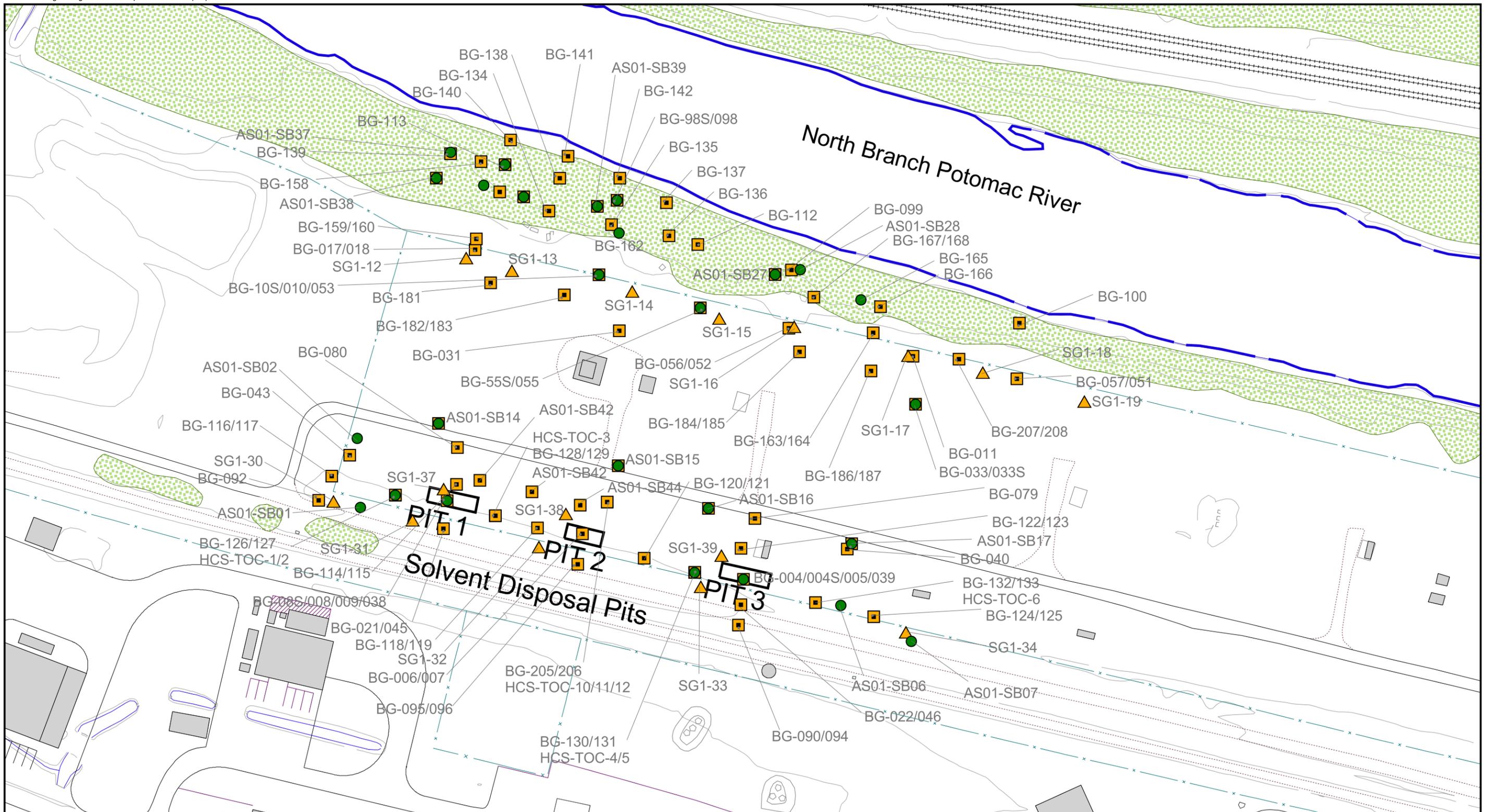


Figure 2-3
Eastern TCE Hot Spot at Site 1
Allegany Ballistics Laboratory



- LEGEND**
- Surface Soil Sample Location
 - Subsurface Soil Samples
 - ▲ Soil-Gas Sample Location
 - Solvent Disposal Pits

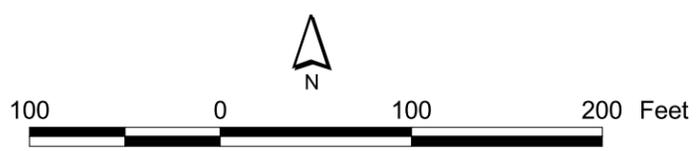
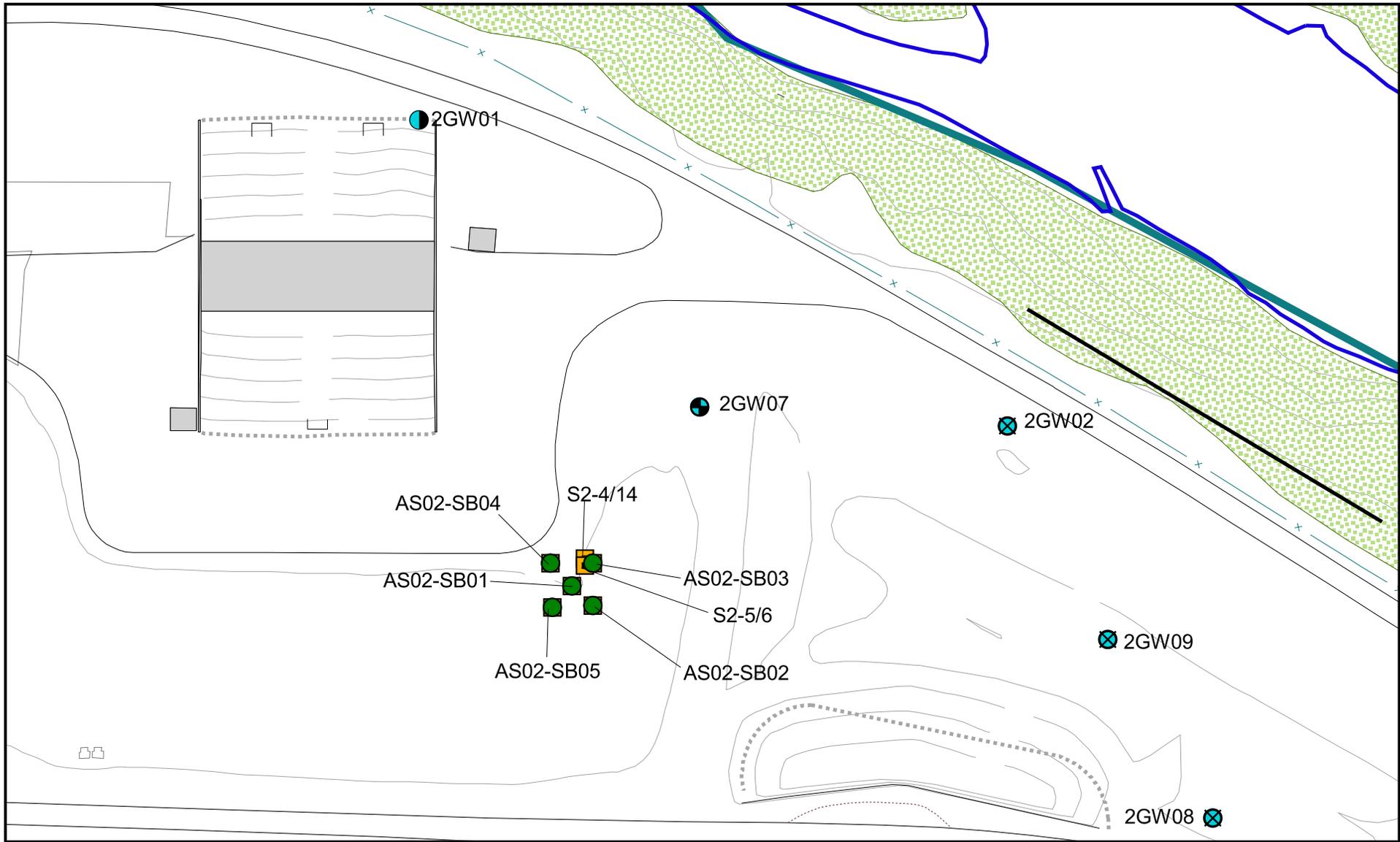


Figure 2-4
Central TCE Hot Spot,
Western TCE Hot Spot, and
Solvent Disposal Pit Area at Site 1
Location Map
Allegany Ballistics Laboratory



LEGEND

-  Monitoring Well - Alluvial
-  Monitoring Well - Hybrid
-  Monitoring Well - Bedrock
-  Surface Soil Sample Location
-  Subsurface Soil Sample Location

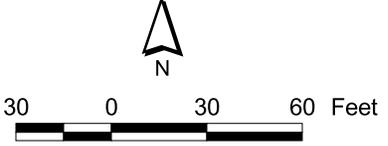
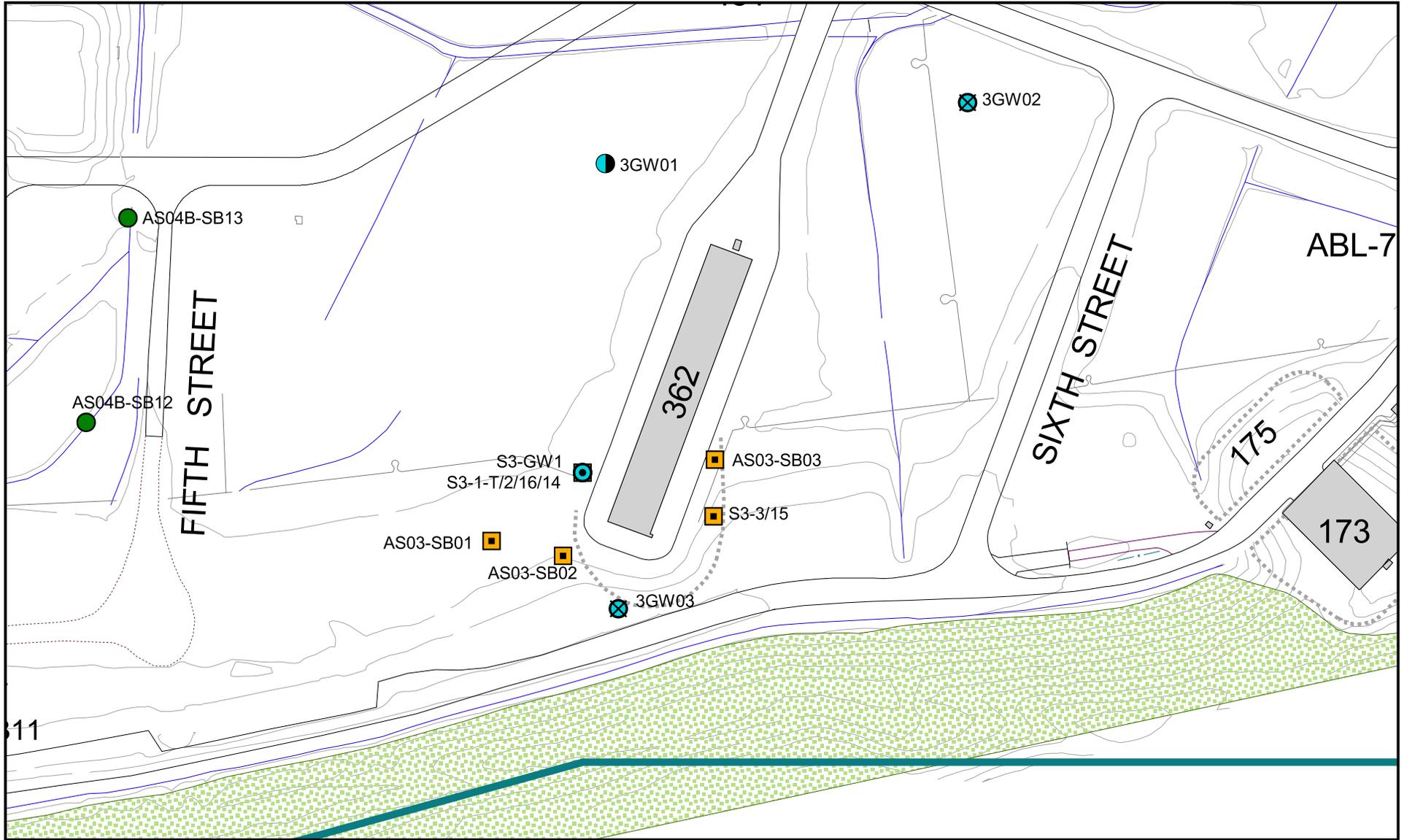


Figure 2-5
Site 2 - Former Burning Ground (1942-1949)
Location Map
Allegany Ballistics Laboratory

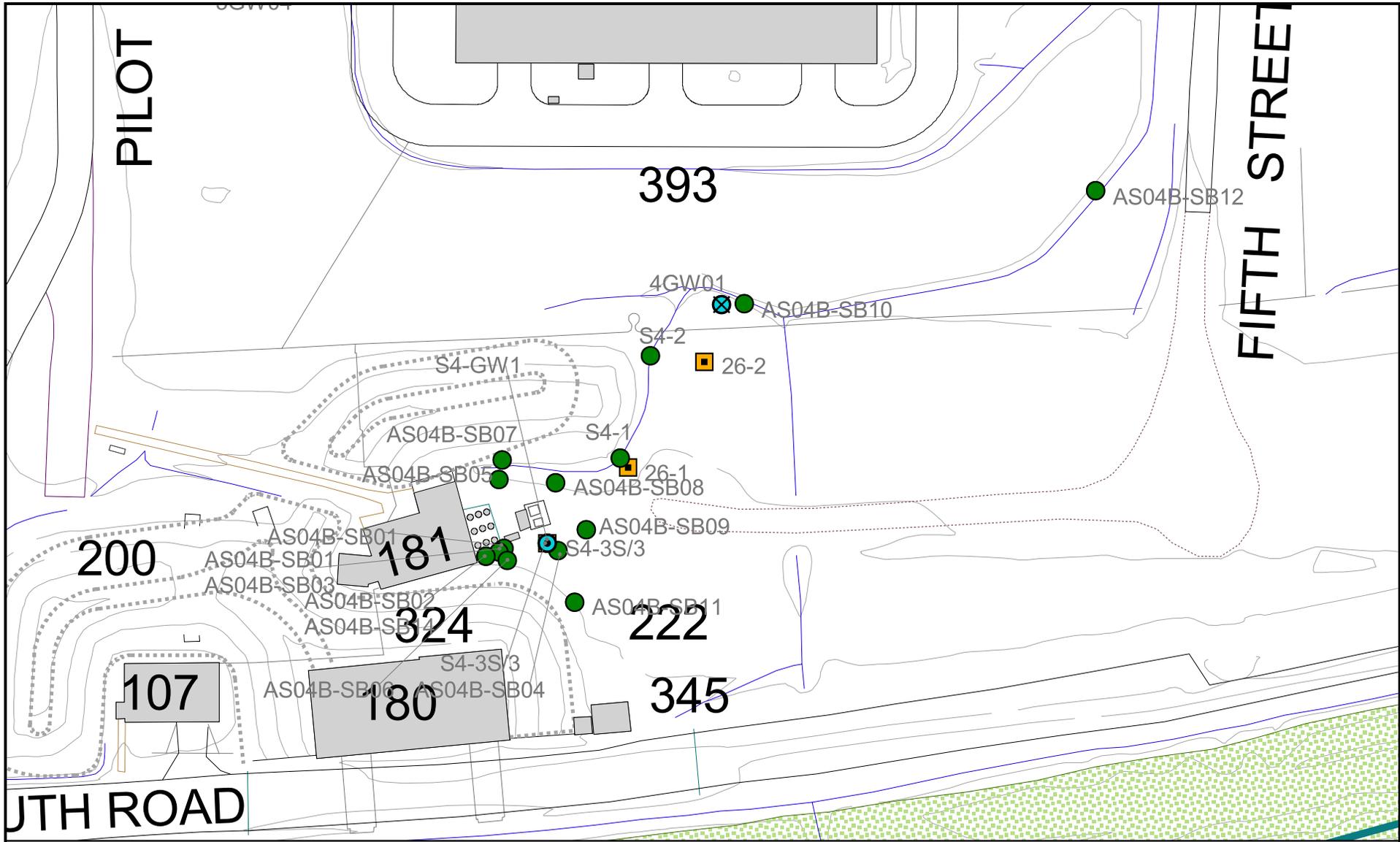


LEGEND

-  Direct Push - Groundwater
-  Surface Soil Sample Location
-  Monitoring Well - Alluvial
-  Subsurface Soil Sample Location
-  Monitoring Well - Hybrid



Figure 2-6
Site 3 - Former Burning Ground (1950 - 1958)
Location Map
Allegany Ballistics Laboratory



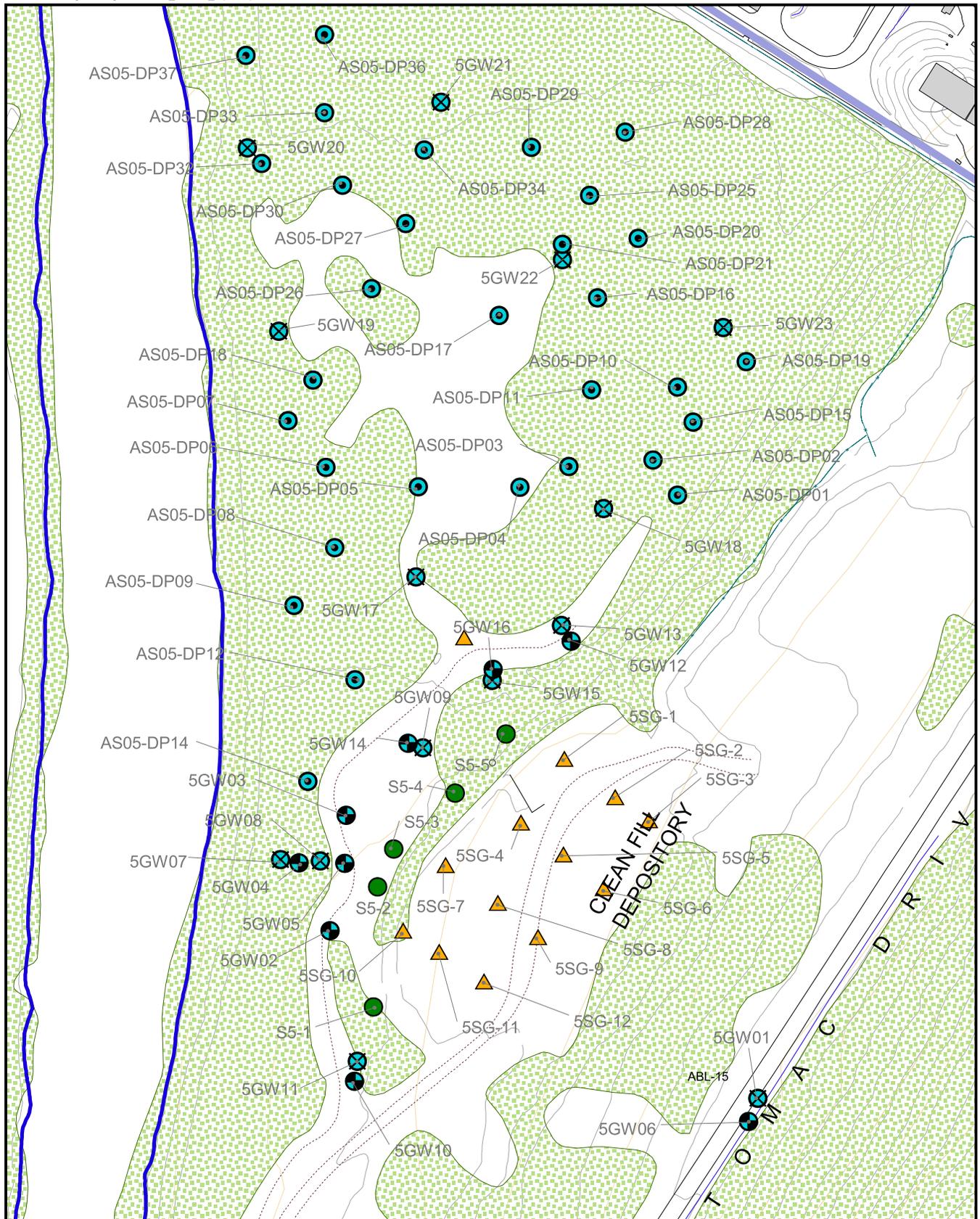
LEGEND

-  Direct Push - Groundwater
-  Monitoring Well - Alluvial
-  Surface Soil Sample Location
-  Samples: Subsurface Soil



Figure 2-7

Site 4B - Spent Photographic Solution
Disposal Site Location Map
Allegany Ballistics Laboratory



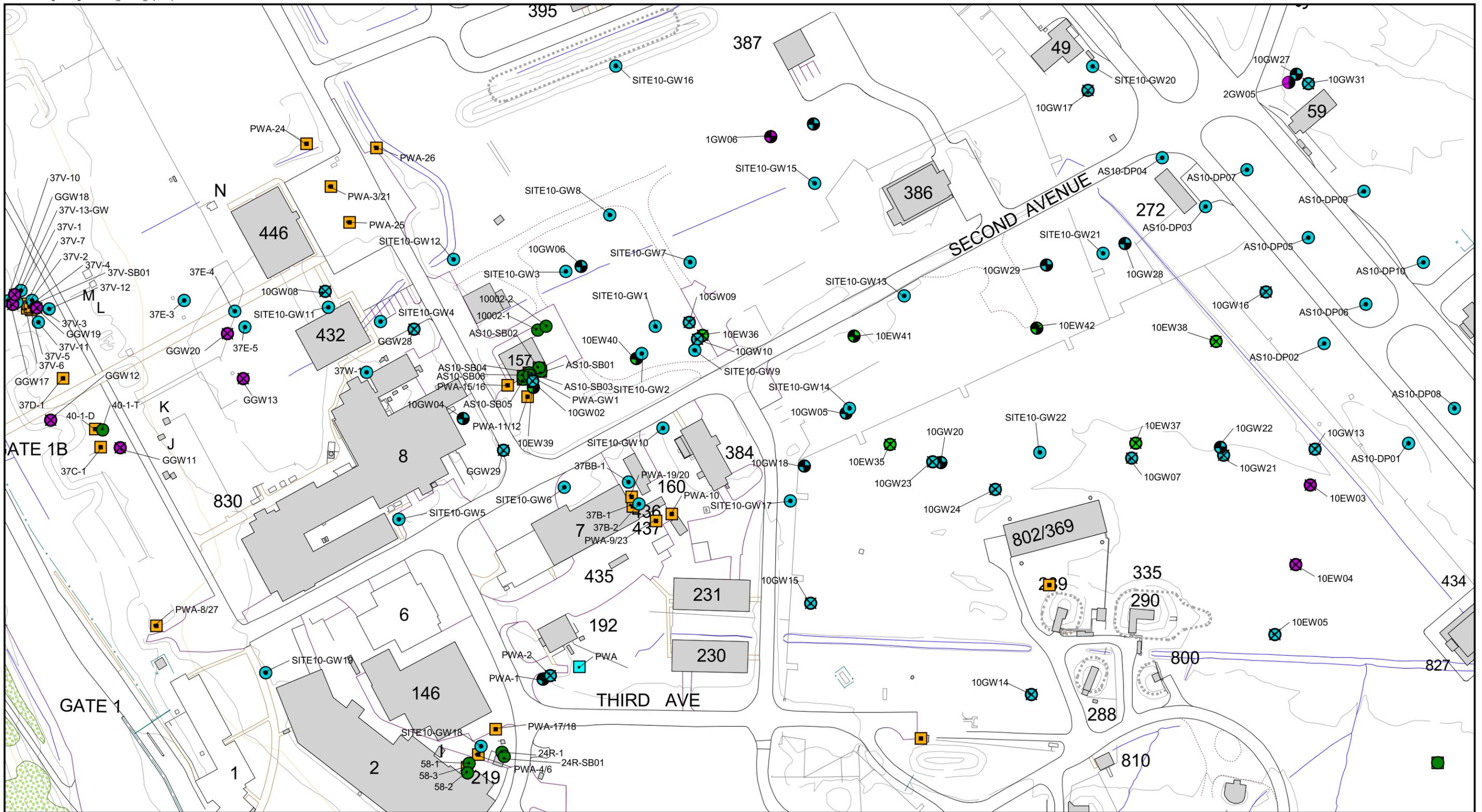
LEGEND

- Direct Push - Groundwater
- Monitoring Well - Alluvial
- Monitoring Well - Bedrock
- Surface Soil Sample Location
- Soil-Gas Sample Location



60 0 60 120 Feet

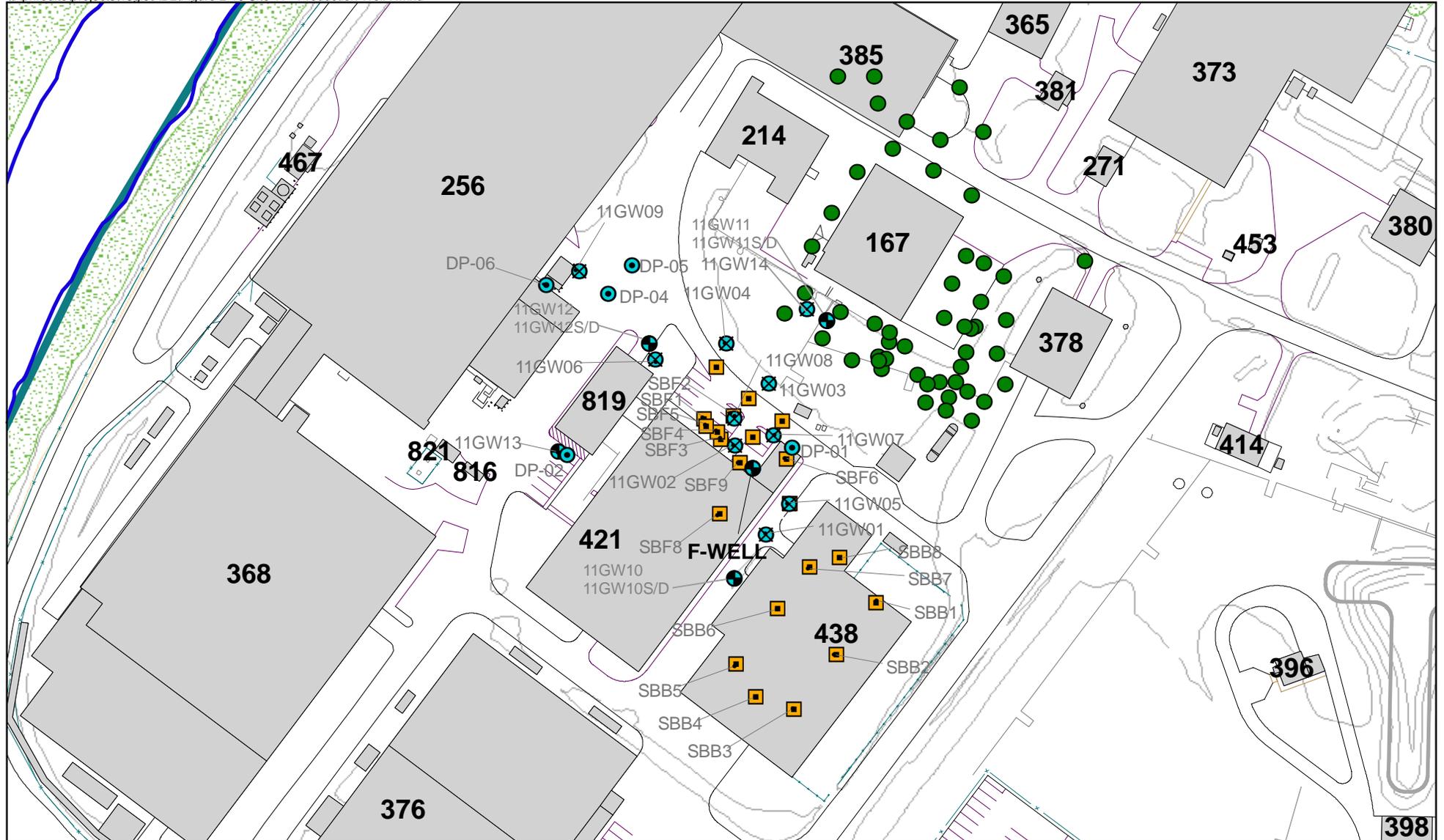
Figure 2-8
Site 5 - Inert Landfill Location Map
Allegany Ballistics Laboratory



LEGEND

Direct Push - Groundwater	Production Well
Extraction Well - Alluvial	Surface Soil Sample Location
Monitoring Well - Alluvial	Samples: Subsurface Soil
Extraction Well - Bedrock	
Monitoring Well - Bedrock	
Abandoned Monitoring Well - Bedrock	
Abandoned Monitoring Well - Alluvial	

Figure 2-9
 Site 10 - Former TCE Spill at Building 157
 Location Map
 Allegany Ballistics Laboratory

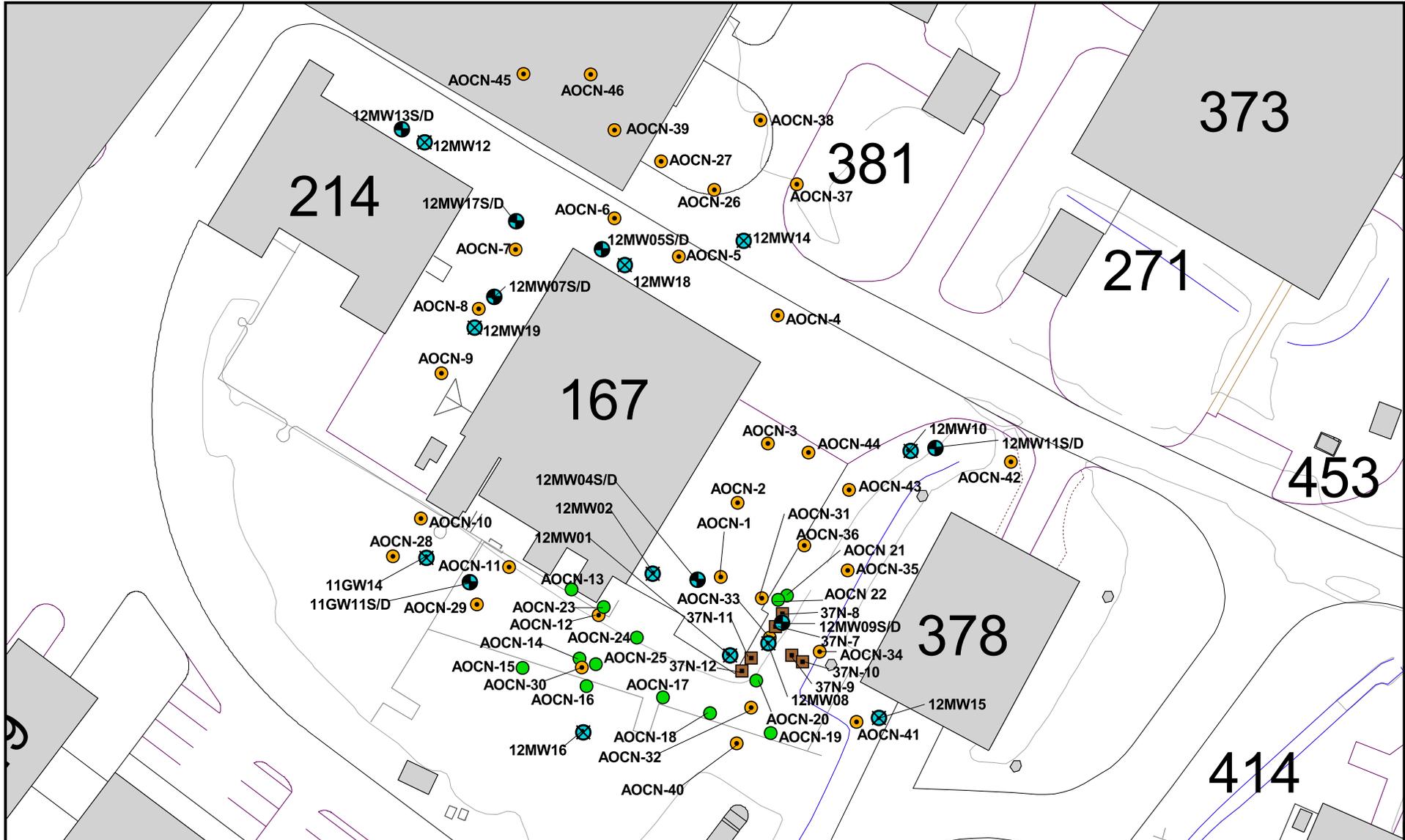


Legend

-  Direct Push - Groundwater
-  Monitoring Well - Alluvial
-  Monitoring Well - Bedrock
-  Samples: Surface Soil
-  Samples: Subsurface Soil



Figure 2-10
Site 11 - Production Well "F"
Allegany Ballistics Laboratory



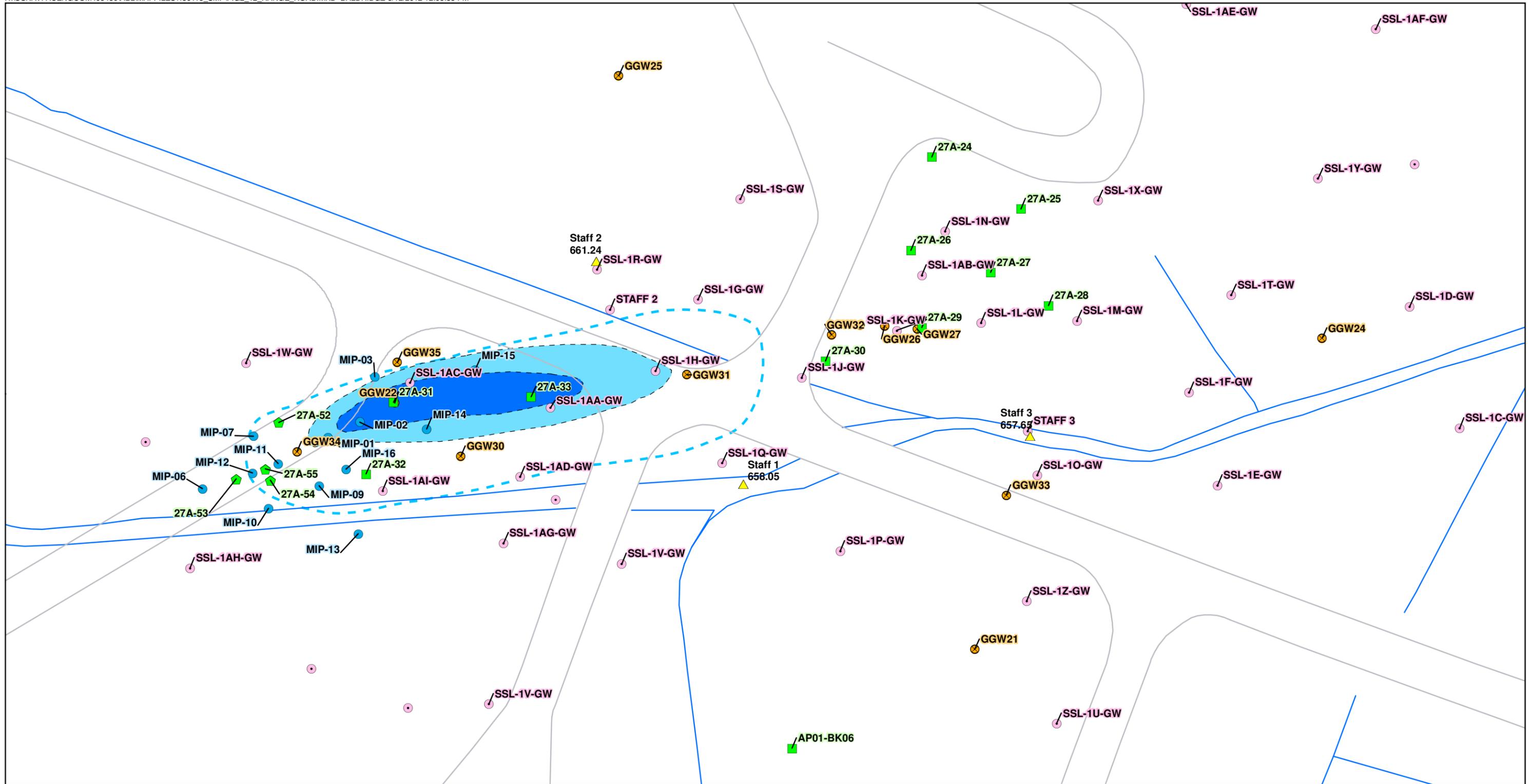
LEGEND

- Direct Push - Groundwater
- ⊗ Monitoring Well - Alluvial
- ⊗ Groundwater - Multimedia
- Surface Soil Sample Location
- Samples: Subsurface Soil
- Bedrock Boreholes



0 75 150 Feet

Figure 2-11
Site 12 - Sample Locations
Allegany Ballistics Laboratory



- Legend**
- Soil Boring Locations
 - Alluvial Monitoring Wells
 - ◆ MIP and Confirmatory Soil Boring Locations
 - ▲ Steam Gages
 - MIP Boring Locations
 - DPT Locations
 - 5 - 50 µg/L January 2012 TCE Concentration
 - >50 µg/L January 2012 TCE Concentrations
 - 100- 50 µg/L Baseline TCE Concentration

Note:
 - PDB samples taken in Jan 2012
 - TCE MCL = 5 µg/L
 - Isoconcentration contour projections based on interpretation of alluvial groundwater monitoring well and PDB sampling data

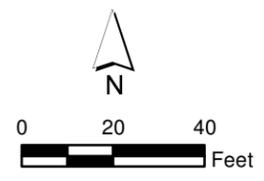


Figure 2-12
 Site 13 Range Road Area
 Allegany Ballistics Laboratory
 Rocket Center, West Virginia

CERCLA Process Activities

CERCLA activities at ABL are currently conducted through the IRP. Since 1986, the Navy's IRP has followed the process prescribed by CERCLA regulations and guidance for investigating and addressing environmental contamination. This multi-step process is followed regardless of whether or not a facility is listed on the NPL, unless otherwise directed by a RCRA consent order or other legal instrument.

3.1 CERCLA Process

Because the Navy structured the IRP to be consistent with the terminology and structure of the CERCLA program, the placement of Plant 1 on the NPL has had a limited effect on the cleanup processes that were already established. The IRP at ABL is being implemented in accordance with applicable federal and state environmental regulations and requirements. The CERCLA cleanup process is described below.

3.1.1 CERCLA RI/FS Process

The CERCLA RI/FS process refers to the process of site investigation and remedial action that is used for CERCLA sites.

The objectives of the CERCLA RI/FS process are to evaluate the nature and extent of contamination at a site and to identify, develop, and implement appropriate remedial actions in order to protect human health and the environment. The RI/FS process includes the following major elements:

1. **Preliminary Assessment /Site Inspection (PA/SI):** The PA is the initial process of collecting and reviewing existing information, including historical records; aerial photographs; field inspections; and personnel interviews, to identify specific potentially-contaminated sites. If such sites are identified, limited sampling is conducted under the SI to either confirm or deny the presence of contaminants.
2. **Remedial Investigation/Feasibility Study (RI/FS):** If the PA/SI confirms the presence of contamination, a RI is conducted to further evaluate the nature and extent of contamination and to perform a risk assessment for human health and the environment. This process is also called "characterization." Using the RI data, a FS is then prepared to evaluate a range of options for environmental remediation, analyzing both available technologies and estimated costs.
3. **Proposed Remedial Action Plan (PRAP or Proposed Plan):** As a public participation requirement under CERCLA, the preferred environmental restoration strategy, rationale, and the remedial alternatives evaluated in the FS are summarized, either as a fact sheet or as a separate PRAP document. Public review and comment on the fact sheet or PRAP are actively solicited.
4. **Record of Decision (ROD):** The ROD is a public document that explains which remedial alternative was selected for a specific site, on the basis of the technical analysis in the RI/FS and consideration of public comments and concerns about the PRAP. All parties directly involved in the restoration program (Navy, USEPA, and WVDEP in the case of ABL) must agree on the selected alternative.
5. **Remedial Design/Remedial Action (RD/RA):** The RD is the detailed engineering design and the RA is the actual construction and/or implementation of the remedy that has been selected for a site. Where no further action is required at a site, a no-action ROD would be signed and the site removed from the program.

The PA/SI, RI/FS, and PRAP documents are maintained by the Navy in the administrative record. A formal public comment period and a public meeting (if required) generally follow the issuance of the Final PRAP. Public comments received on the Final PRAP are addressed as part of the Responsiveness Summary in the ROD. Subsequent to completion of the ROD, RD/RA activities are initiated. Remedial Action is currently in progress at three ABL sites: Site 1 (groundwater), Site 5 (landfill contents and surface soil), Site 5 (groundwater) and Site 10 (groundwater).

3.1.2 Removal Action Process

Removal actions are implemented to cleanup or remove hazardous substances from the environment at a site in order to mitigate the spread of contamination. Removal actions may be implemented at any time during the CERCLA process.

Removal actions are classified as either time-critical or non-time-critical. Actions taken immediately to mitigate an imminent threat to human health and the environment, such as the removal of corroded or leaking drums, are classified as time-critical removal actions. Removal actions that may be delayed for 6 months or more without significant additional harm to human health or the environment are classified as non-time-critical removal actions.

For non-time-critical removal actions, an Engineering Evaluation/Cost Analysis (EE/CA) is prepared rather than the more extensive FS. An EE/CA focuses only on the substances to be removed rather than on all contaminants at the site. It is possible for a removal action to become the final remedial action if the risk assessment results indicate that no further remedial action is required in order to protect human health and the environment.

3.1.3 Remedial Action Process

Remedial actions may be considered interim remedial actions or final remedial actions. Interim remedial actions are implemented to provide temporary mitigation of human health risks or to mitigate the spread of contamination in the environment. Similar to removal actions, they may be implemented at any time during the RI/FS process. An interim remedial action is implemented to attain applicable or relevant and appropriate requirements (ARARs) to the extent required by CERCLA or the NCP. It is also consistent with and contributes to the efficient performance of a final remedial action taken at a site or Operable Unit. Examples of interim remedial actions include installation of a pump-and-treat system for groundwater "hotspot" capture or installation of a fence to prevent direct contact with hazardous materials.

For interim remedial actions, an FFS may be prepared rather than the more extensive FS. As with the removal action, an interim remedial action may become the final remedial action if the risk assessment results indicate that no further remedial action is required in order to protect human health and the environment. In this case, a no further action ROD would be signed and the site removed from the program upon completion of the interim remedial action.

If the more extensive FS process is followed, a preliminary/conceptual remedial design, a prefinal remedial design, and then a final remedial design are developed for final remedial action at an area or Operable Unit. After completion of the remedial action at each area or Operable Unit, a Remedial Action Completion Report is prepared. If necessary, a Long-term Monitoring Plan (LTMP) and an Operation and Maintenance (O&M) Plan also are prepared for each remedial action site.

3.1.4 Treatability Studies

Treatability studies are performed to assist in the evaluation of a potentially promising remedial technology. The primary objectives of treatability testing are:

- To provide sufficient data to allow treatment alternatives to be fully developed and evaluated during the FS, and/or
- To support the remedial design of a selected alternative

Treatability studies may be conducted at any time during the RI/FS process. The need for a treatability study is generally identified during the FS.

Treatability studies may be classified as either bench-scale (laboratory) or pilot-scale (field studies). Bench-scale studies are often sufficient to evaluate performance for technologies that are well developed and tested. For innovative technologies, pilot tests may be required to obtain the desired information. Pilot tests simulate the physical and chemical parameters of the full-scale process, and are designed to bridge the gap between bench-scale and full-scale operations.

3.2 FFA CERCLA Integration Process

The Federal Facility Agreement (FFA) developed for ABL by the Navy, USEPA Region III, and WVDEP is intended to assist the Navy in meeting the provisions of CERCLA, RCRA, and applicable State law. The FFA establishes a procedural framework and provides detailed guidance on all phases of the remediation process from investigation through remedial action.

3.2.1 AOC Evaluation

Areas identified as Areas of Concern (AOCs) in the FFA, undergo a document evaluation. This document evaluation involves a thorough review of existing or easily obtainable documentation and information on the identified areas. If the Navy, USEPA, and WVDEP agree, the evaluation could include obtaining discrete samples from the AOC.

The document evaluation also involves assessing information concerning the handling of hazardous wastes at each AOC, the actions taken at each AOC, or actions that will occur under other regulatory programs at each AOC. Based upon the AOC evaluation, a decision is made by the management team of which AOC will proceed to the Site Screening Process as SSAs and which AOCs will require no further action and can be closed out. For those AOCs requiring no further action, an AOC closeout document is prepared.

3.2.2 Site Screening Process

The Site Screening Process (SSP) refers to the process described in the FFA that is used to identify whether SSAs should proceed into the RI/FS process under CERCLA. SSAs are those areas that may pose a threat or that do pose a threat to public health, welfare, or the environment. SSAs can be identified by the Navy, WVDEP, or the USEPA. An SSP work plan is then prepared outlining the activities necessary to determine if there have been releases of hazardous substances, pollutants, contaminants, hazardous waste, or other hazardous constituents to the environment from the SSAs. After investigation activities have been performed, an SSP report is prepared. The report provides a basis for a determination that either (1) an RI/FS be performed at the SSA or (2) the area does not pose a threat to public health, welfare, or the environment and therefore should be removed from further study. For SSAs that do not warrant an RI/FS under CERCLA, a brief decision document is prepared and signed by the Navy, USEPA, and WVDEP, in the case of ABL.

Site Management Plan Schedules

This section presents schedules for response actions planned from 2010 through the ABL project end date. Project-specific schedules for active projects will be updated periodically in the SMP. For projects that are active, the current project schedules are presented. For projects that have not yet been initiated or for which project schedules have not been developed, scheduling assumptions are discussed below.

4.1 Partnering Team at ABL

Team partnering was introduced to ABL to streamline the cleanup of former disposal sites by using consensus-based site management strategies during the CERCLA process. Originally, the partnering team (the Team) consisted of the Navy, restoration advisory board (RAB), USEPA, WVDEP, MDE, and Navy's contractors. However, MDE is no longer actively involved with the Team. The implementation of the streamlined oversight process has promoted a higher degree of communication, understanding, and cooperation among all of the involved groups to help reduce costs and expedite cleanup and closure of IR sites.

The scheduling assumptions presented below represent an ideal flow of work for sites that are addressed through conventional cleanup approach. These assumptions do not account for how the streamlined oversight process may affect schedules and potentially affect the sequence of tasks, as the Team evaluates project progress on an accelerated basis, and expedites the decision-making process. The goal of the streamlined oversight process is to streamline the regulatory review processes of implementation, decision-making, reporting, and other environmental regulatory documentation, and to achieve significant savings of time and funds.

4.2 Scheduling Assumptions

Assumptions regarding duration of field investigations, laboratory analyses, data validation, document preparation, document review, and remedial design/remedial action are discussed below.

4.2.1 Field Investigation and Laboratory Analysis/Validation

The time required for RI field investigations depends upon the size and complexity of the site and the overall scope of the field investigation (e.g., types of field investigation activities, number of sampling rounds, etc.). Field investigations generally require several weeks to several months to complete.

Twenty-eight days is the standard turnaround time for approved laboratories under the current Navy CLEAN Contracts. Therefore, a 28-day turnaround time and a 14-day duration are generally assumed for standard laboratory analysis and for full validation of laboratory data, respectively. Depending on individual field events, laboratory and validation durations may vary slightly from the standard durations described above.

4.2.2 Document Preparation and Document Review

The time required for document preparation under the RI/FS process has been estimated based on prior experience in preparing the various types of documents. A summary of the estimated times required for development of the various types of documents typically prepared during the RI/FS process is presented in [Table 4-1](#). The durations presented in [Table 4-1](#) represent the time required to prepare the initial draft document and do not include time required for review and subsequent revisions of the document.

The time required for document review generally will vary according to the length and complexity of the document, as well as the availability of resources on the part of the reviewing agencies. In accordance with the FFA, unless mutually agreed upon by the partnering Team, all draft documents will be subject to a 60-day review and comment period. There are two exceptions to the time periods required for review and comment on documents in the FFA. According to the FFA, prefinal remedial designs will be subject to a 45-day review and comment period and final remedial designs will be subject to a 14-day review and comment period. In the event that significant changes are made to the design between the prefinal and final designs, the USEPA may extend the review period for another 14-days. As discussed in the FFA, in some cases the review and comment period on

draft remedial designs and remedial action work plans may need to be expedited for the Navy to satisfy CERCLA requirements.

In many cases, the Navy may choose to have a concurrent review period for draft documents. In those cases, no initial NAVFAC/Activity review would be required for the draft document.

For this SMP, it was assumed that the Navy and regulatory agencies will conduct concurrent reviews on documents. If an initial Navy review is required the schedules will need to be extended. Also, it was assumed that 15 days would be required by the consultant to address the regulator comments on the draft final document and to prepare and submit the final document.

4.2.3 Remedial Design/Remedial Action

The time required for remedial design/remedial action (RD/RA) depends on the type and complexity of the proposed remedial action. For example, the remedial design of a groundwater pump-and-treat system generally is much more complex than the remedial design for soil removal/offsite disposal. Therefore, the groundwater pump-and-treat remedial design process may require up to 1 year, whereas soil removal/off-site disposal remedial design may require less than 3 months. Similarly, the groundwater pump-and-treat system may operate for a long time (e.g., 10 to 30 years), whereas the soil removal/off-site disposal remedial action may be completed in less than 1 year. Therefore, schedules for RD/RA activities are only provided for projects where the type of remedial action to be performed is known. The remaining sites are only scheduled up through the ROD phase of the RI/FS process.

4.3 IRP Project Schedules

Project-specific schedules for ABL IRP projects that are or potentially will be active in FY 2013 are summarized in [Table 4-2](#). The site specific schedules are provided in Figures 4-1 through 4-6. The basic strategy used during development of the IRP project schedules was to overlap the RI/FS and RD/RA activities to the maximum extent practicable. By overlapping activities, the overall project schedules are compressed without compromising the interdependencies of the various tasks and documents in the RI/FS process. The amount of overlap of tasks was based on the degree of dependency between the various tasks and documents. Key dependencies and related assumptions are outlined below.

- Remedial Investigation (RI): Preparation of the draft RI was assumed to start once all of the validated analytical data have been received. Certain RI tasks can begin before the data are validated; however, in order to prevent duplication of effort, this overlap was assumed to be only 2 weeks.
- Feasibility Study (FS): Preparation of the draft FS was assumed to begin approximately 4 months following the start of the RI. Many FS tasks are dependent on the nature and extent of contamination, which are generally defined in the RI report. Where appropriate to facilitate document review and improve efficiency, a combined RI/FS may be prepared rather than separate RI and FS documents.
- Proposed Remedial Action Plan (PRAP) and Record of Decision or Decision Document (ROD): A Preparation of the draft PRAP was assumed to start following receipt of agency comments of the draft Final FS, because selection of the proposed remedial action(s) in the PRAP/ROD is contingent upon agency approval of the recommended alternative.
- Because public comments received during the public comment period must be responded to in the Responsiveness Summary, preparation of the final ROD would not begin until closure of the public comment period.

TABLE 4-1
Document Preparation Durations
Allegany Ballistics Laboratory

Document	Duration (Months) ¹
AOC Close-Out Document	1
SSP Work Plan	1
SSP Report	1-2
Preliminary Assessment/Site Inspection	2
Engineering Estimate/Cost Analysis	1-2
RI/FS Work UFP SAP	3
Remedial Investigation Report	1-2
Supplemental Investigation UFP SAP	3
Supplemental Investigation Report	1-2
Feasibility Study	2-3
Proposed Plan	1-2
Record of Decision	1-2
Preliminary/Conceptual Remedial Design	2
Pre-Final Remedial Design	2
Final Design	1-2
Treatability Study Work Plan	2
Treatability Study Report	1-2
Removal Action Work Plan	2
Removal Action Completion Report	1-2

¹ Durations represent estimated time required to complete draft documents.

TABLE 4-2
 Comprehensive Document Submittal Schedule
 Allegheny Ballistics Laboratory
 Site Management Plan Summary Schedule

	2012												2013												2014													
	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December		
Long Term Monitoring (Sites 1, 5, and 10 Groundwater) and Groundwater Treatment Plant O&M		Draft Jan 2011 LTM Report				Site 1 Biota Sampling Final Jan 2011 LTM Report	Oct 2011 Progress LTM Report	Conduct LTM Groundwater Sampling					Aug 2012 LTM Report																									
Site 1 Soil						Final Site 1 Soil EECA for the FDPs Action Memorandum		Draft Site 1 FS					Draft Final Site 1 FS	Final Site 1 Soil FS Draft PRAP		Final PRAP			Draft ROD 30% Remedial Design (Phase 1) 30% Remedial Design (Phase 2)			90% Remedial Design (Phase 1) 90% Remedial Design (Phase 2)	Final ROD	Final Remedial Design (Phase 1) Final Remedial Design (Phase 2)			Draft Remedial Action Work Plan (Phase 1) Draft Remedial Action Work Plan (Phase 2)			Final Remedial Action Work Plan (Phase 1) Final Remedial Action Work Plan (Phase 2)								
Site 11 and Site 12	Site 11 and 12 ROD Signed Draft SAP				Final UFP SAP	Baseline Groundwater Sampling			Remedial Action - Substrate Injection			3 Month Post Injection Monitoring			6 Month Post Injection Monitoring			9 Month Post Injection Monitoring				12 Month Post Injection Monitoring																
Range Road Area						Revised UFP SAP				Final UFP SAP	RI Groundwater Sampling				Draft RI/FS report							Final RI/FS report		Draft PRAP			Final PRAP Draft ROD					Final ROD						
Building 8 (Lab Row) Groundwater Investigation										Draft Report of Findings					Final Report of Findings																							
Site Management Plan and Land Use Controls						Draft ABL 2012 SMP	Submit Final IRACR	Final ABL 2012 SMP	Draft Sites 1, 5, and 10 LUC RD Draft Sites 11 and 12		Final Sites 1, 5, and 10 LUC RD Final Sites 11 and 12 LUC				Draft LUCIP for Sites 1, 5, 10, 12, and 12		Final LUCIP for Sites 1, 5, 10, 12, and 12		Draft 5 Year Review Draft ABL				Draft LUC Implementation Plan (31) Final 5 Year Review		Final LUC Implementation Plan (1)													
5 Year ROD Review													Draft 5 Year ROD Review					Draft Final 5 Year ROD Review		Final 5 Year ROD Review			Signed 5 Year ROD Report															

Figure 4-1
Site 1 - Northern Riverside Waste Disposal Area Schedule
Allegany Ballistics Laboratory

ID	Task Name	Duration	Start	Finish	Predecessors	2013												2014			
						Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2				
1	Site 1 Soil	735 days	Tue 8/21/12	Mon 8/25/14		[Gantt bar spanning from Tue 8/21/12 to Mon 8/25/14]															
2	SRG Tech Memo	49 days	Tue 8/21/12	Mon 10/8/12		[Gantt bar spanning from Tue 8/21/12 to Mon 10/8/12]															
3	Discuss and Resolve Comments (at partnering meeting)	2 days	Tue 8/21/12	Wed 8/22/12		[Task bar from Tue 8/21/12 to Wed 8/22/12]															
4	Prepare and Submit Redlined Final TM	37 days	Thu 8/23/12	Fri 9/28/12	3	[Task bar from Thu 8/23/12 to Fri 9/28/12]															
5	Obtain approval to finalize	7 days	Sat 9/29/12	Fri 10/5/12	4	[Task bar from Sat 9/29/12 to Fri 10/5/12]															
6	Submit Final Tech Memo	3 days	Sat 10/6/12	Mon 10/8/12	5	[Task bar from Sat 10/6/12 to Mon 10/8/12]															
7	Feasibility Study	186 days	Sat 10/6/12	Tue 4/9/13		[Gantt bar spanning from Sat 10/6/12 to Tue 4/9/13]															
8	Prepare and Submit Pre-Draft FS (Rev 01)	60 days	Sat 10/6/12	Tue 12/4/12	5	[Task bar from Sat 10/6/12 to Tue 12/4/12]															
9	Navy Review	14 days	Wed 12/5/12	Tue 12/18/12	8	[Task bar from Wed 12/5/12 to Tue 12/18/12]															
10	Response to Comments	7 days	Wed 12/19/12	Tue 12/25/12	9	[Task bar from Wed 12/19/12 to Tue 12/25/12]															
11	Prepare and Submit Draft FS (Rev 01)	7 days	Wed 12/26/12	Tue 1/1/13	10	[Task bar from Wed 12/26/12 to Tue 1/1/13]															
12	Regulatory Review (EPA, WVDEP)	30 days	Wed 1/2/13	Thu 1/31/13	11	[Task bar from Wed 1/2/13 to Thu 1/31/13]															
13	Response to Comments	21 days	Fri 2/1/13	Thu 2/21/13	12	[Task bar from Fri 2/1/13 to Thu 2/21/13]															
14	Discuss and Resolve Comments (if necessary)	7 days	Fri 2/22/13	Thu 2/28/13	13	[Task bar from Fri 2/22/13 to Thu 2/28/13]															
15	Prepare and Submit Draft Final FS	21 days	Fri 3/1/13	Thu 3/21/13	14	[Task bar from Fri 3/1/13 to Thu 3/21/13]															
16	Obtain approval to finalize	14 days	Fri 3/22/13	Thu 4/4/13	15	[Task bar from Fri 3/22/13 to Thu 4/4/13]															
17	Submit Final FS	5 days	Fri 4/5/13	Tue 4/9/13	16	[Task bar from Fri 4/5/13 to Tue 4/9/13]															
18	Pre-Design Data Collection	378 days	Sat 10/6/12	Fri 10/18/13		[Gantt bar spanning from Sat 10/6/12 to Fri 10/18/13]															
19	Prepare sampling options to present to Team	40 days	Sat 10/6/12	Wed 11/14/12	5	[Task bar from Sat 10/6/12 to Wed 11/14/12]															
20	Scoping Session #1 (during October Partnering meeting)	1 day	Thu 11/15/12	Thu 11/15/12	19	[Task bar from Thu 11/15/12 to Thu 11/15/12]															
21	UFP-SAP	128 days	Fri 11/16/12	Sat 3/23/13		[Gantt bar spanning from Fri 11/16/12 to Sat 3/23/13]															
22	Prepare and Submit Pre-Draft UFP-SAP	30 days	Fri 11/16/12	Sat 12/15/12	20	[Task bar from Fri 11/16/12 to Sat 12/15/12]															
23	Navy and Navy Chemist Review	30 days	Sun 12/16/12	Mon 1/14/13	22	[Task bar from Sun 12/16/12 to Mon 1/14/13]															
24	Response to Comments	7 days	Tue 1/15/13	Mon 1/21/13	23	[Task bar from Tue 1/15/13 to Mon 1/21/13]															
25	Prepare and Submit Draft UFP-SAP	7 days	Tue 1/22/13	Mon 1/28/13	24	[Task bar from Tue 1/22/13 to Mon 1/28/13]															
26	Regulatory Review (EPA, WVDEP)	30 days	Tue 1/29/13	Wed 2/27/13	25	[Task bar from Tue 1/29/13 to Wed 2/27/13]															
27	Response to Comments	7 days	Thu 2/28/13	Wed 3/6/13	26	[Task bar from Thu 2/28/13 to Wed 3/6/13]															
28	Prepare and Submit Draft Final UFP-SAP	7 days	Thu 3/7/13	Wed 3/13/13	27	[Task bar from Thu 3/7/13 to Wed 3/13/13]															
29	Obtain approval to finalize	7 days	Thu 3/14/13	Wed 3/20/13	28	[Task bar from Thu 3/14/13 to Wed 3/20/13]															
30	Submit Final UFP-SAP	3 days	Thu 3/21/13	Sat 3/23/13	29	[Task bar from Thu 3/21/13 to Sat 3/23/13]															
31	Field Work	121 days	Thu 3/7/13	Fri 7/5/13		[Gantt bar spanning from Thu 3/7/13 to Fri 7/5/13]															
32	Prepare and Submit ESSDR to NOSSA	7 days	Thu 3/7/13	Wed 3/13/13	27	[Task bar from Thu 3/7/13 to Wed 3/13/13]															
33	Planning and Preparation for Field Event	45 days	Thu 3/7/13	Sat 4/20/13	27	[Task bar from Thu 3/7/13 to Sat 4/20/13]															
34	Mobilization	1 day	Sun 4/21/13	Sun 4/21/13	33	[Task bar from Sun 4/21/13 to Sun 4/21/13]															
35	Field Event (Utility Clearance, UXO oversight, Sampling)	14 days	Mon 4/22/13	Sun 5/5/13	34	[Task bar from Mon 4/22/13 to Sun 5/5/13]															
36	Demobilization	1 day	Mon 5/6/13	Mon 5/6/13	35	[Task bar from Mon 5/6/13 to Mon 5/6/13]															
37	Laboratory Analysis (Standard 27-dat TAT)	30 days	Tue 5/7/13	Wed 6/5/13	36	[Task bar from Tue 5/7/13 to Wed 6/5/13]															
38	Data Review and Management	30 days	Thu 6/6/13	Fri 7/5/13	37	[Task bar from Thu 6/6/13 to Fri 7/5/13]															
39	Reporting	105 days	Sat 7/6/13	Fri 10/18/13		[Gantt bar spanning from Sat 7/6/13 to Fri 10/18/13]															
40	Prepare and Submit Draft TM	30 days	Sat 7/6/13	Sun 8/4/13	38	[Task bar from Sat 7/6/13 to Sun 8/4/13]															
41	Navy and Regulatory review	30 days	Mon 8/5/13	Tue 9/3/13	40	[Task bar from Mon 8/5/13 to Tue 9/3/13]															
42	Responses to Comments	21 days	Wed 9/4/13	Tue 9/24/13	41	[Task bar from Wed 9/4/13 to Tue 9/24/13]															
43	Prepare and Submit redlined TM	14 days	Wed 9/25/13	Tue 10/8/13	42	[Task bar from Wed 9/25/13 to Tue 10/8/13]															
44	Obtain approval to finalize	7 days	Wed 10/9/13	Tue 10/15/13	43	[Task bar from Wed 10/9/13 to Tue 10/15/13]															
45	Submit final TM	3 days	Wed 10/16/13	Fri 10/18/13	44	[Task bar from Wed 10/16/13 to Fri 10/18/13]															
46	PRAP (expedited)	169 days	Fri 3/22/13	Fri 9/6/13		[Gantt bar spanning from Fri 3/22/13 to Fri 9/6/13]															
47	Prepare and Submit Pre-Draft PRAP	21 days	Fri 3/22/13	Thu 4/11/13	15	[Task bar from Fri 3/22/13 to Thu 4/11/13]															
48	Navy and Navy Legal Review	10 days	Fri 4/12/13	Sun 4/21/13	47	[Task bar from Fri 4/12/13 to Sun 4/21/13]															
49	Response to Comments	7 days	Mon 4/22/13	Sun 4/28/13	48	[Task bar from Mon 4/22/13 to Sun 4/28/13]															

Project: Site 1
Date: Wed 9/19/12

Task		Summary		Rolled Up Progress		External Milestone	
Split		Rolled Up Task		External Tasks		External Milestone	
Progress		Rolled Up Split		Project Summary		External Milestone	
Milestone		Rolled Up Milestone		External Milestone		Deadline	

Figure 4-2
 Sites 1, 5, and 10 Long Term Groundwater Monitoring Schedule
 Allegany Ballistics Laboratory

ID	Task Name	Physical % Complete	Duration	Start	Finish	Predecessors	2012	
							Qtr 2	Qtr 3
1	Site 1 LTM Sampling/5 Year Review Sampling	0%	66 days	Mon 8/20/12	Tue 11/20/12			
2	Sample Collection	80%	19 days	Mon 8/20/12	Fri 9/14/12			
3	Sample Analysis	0%	20 days	Mon 9/17/12	Fri 10/12/12	2		
4	Data Validation	0%	14 days	Mon 10/15/12	Thu 11/1/12	3		
5	Data Evaluation/QC	0%	10 days	Fri 11/2/12	Thu 11/15/12	4		
6	Uploading to NIRIS Website	0%	3 days	Fri 11/16/12	Tue 11/20/12	5		
7	Site 5 LTM Sampling/5-Year Review Sampling	0%	66 days	Mon 8/20/12	Tue 11/20/12			
8	Sample Collection	80%	19 days	Mon 8/20/12	Fri 9/14/12	2SS		
9	Sample Analysis	0%	20 days	Mon 9/17/12	Fri 10/12/12	8		
10	Data Validation	0%	14 days	Mon 10/15/12	Thu 11/1/12	9		
11	Data Evaluation/QC	0%	10 days	Fri 11/2/12	Thu 11/15/12	10		
12	Uploading to NIRIS Website	0%	3 days	Fri 11/16/12	Tue 11/20/12	11		
13	Site 10 LTM Sampling/5-Yr Review Sampling	0%	66 days	Mon 8/20/12	Tue 11/20/12			
14	Sample Collection	80%	19 days	Mon 8/20/12	Fri 9/14/12	2SS		
15	Sample Analysis	0%	20 days	Mon 9/17/12	Fri 10/12/12	14		
16	Data Validation	0%	14 days	Mon 10/15/12	Thu 11/1/12	15		
17	Data Evaluation/QC	0%	10 days	Fri 11/2/12	Thu 11/15/12	16		
18	Uploading to NIRIS Website	0%	3 days	Fri 11/16/12	Tue 11/20/12	17		
19	Site 1 Biota Sampling	0%	115 days	Mon 6/25/12	Wed 12/5/12			
20	Sample Collection	100%	32 days	Mon 6/25/12	Wed 8/8/12			
21	Sample Analysis	40%	56 days	Thu 8/9/12	Fri 10/26/12	20		
22	Data Validation	0%	14 days	Mon 10/29/12	Thu 11/15/12	21		
23	Data Evaluation/QC	0%	10 days	Fri 11/16/12	Fri 11/30/12	22		
24	Uploading to NIRIS Website	0%	3 days	Mon 12/3/12	Wed 12/5/12	23		
25	January 2011 Interim LTM Report (2011 Scope)	0%	311 days	Mon 7/11/11	Wed 9/26/12			
26	Report Preparation	100%	141 days	Mon 7/11/11	Fri 1/27/12			
27	NAVFAC Review	100%	9 days	Mon 1/30/12	Thu 2/9/12	26		
28	Address NAVFAC comments & submit to Navy & Regulators	100%	1 day	Fri 2/10/12	Fri 2/10/12	27		
29	Regulatory Review	100%	30 days	Mon 2/13/12	Fri 3/23/12	28		

Project: ABL O&M
 Date: Tue 9/25/12

Task: Progress: Summary: External Tasks: Split:

Split: Milestone: Project Summary: External MileTask:

Figure 4-2
 Sites 1, 5, and 10 Long Term Groundwater Monitoring Schedule
 Allegany Ballistics Laboratory

ID	Task Name	Physical % Complete	Duration	Start	Finish	Predecessors	2012	
							Qtr 2	Qtr 3
30	Draft Comment Resolution	100%	86 days	Mon 4/23/12	Wed 8/22/12	29FS+20 days		
31	Distribute Final Interim LTM Report	0%	24 days	Thu 8/23/12	Wed 9/26/12	30		
32	October 2011 Interim LTM Report (2011 Scope)	0%	155 days	Mon 8/20/12	Fri 3/29/13			
33	LTM template development	100%	11 days	Mon 8/20/12	Tue 9/4/12	8SS		
34	NAVFAC LTM template review	0%	10 days	Wed 9/5/12	Tue 9/18/12	33		
35	Address NAVFAC comments & submit LTM template to regulators	0%	5 days	Wed 9/19/12	Tue 9/25/12	34		
36	Regulatory Review	0%	30 days	Wed 9/26/12	Tue 11/6/12	35		
37	Draft Comment Resolution	0%	15 days	Wed 11/7/12	Wed 11/28/12	36		
38	Develop Draft October 2011 Interim LTM Report	0%	15 days	Thu 11/29/12	Wed 12/19/12	37		
39	Navy review	0%	10 days	Thu 12/20/12	Mon 1/7/13	38		
40	Incorporate Navy comments and submit Draft Final to Regulators for review	0%	10 days	Tue 1/8/13	Mon 1/21/13	39		
41	Regulatory review	0%	30 days	Tue 1/22/13	Mon 3/4/13	40		
42	Submit Final Report	0%	19 days	Tue 3/5/13	Fri 3/29/13	41		
43	August 2012 LTM Report	0%	84 days	Thu 11/29/12	Fri 3/29/13			
44	LTM Report Preparation	0%	15 days	Thu 11/29/12	Wed 12/19/12	37		
45	NAVFAC LTM Report review	0%	10 days	Thu 12/20/12	Mon 1/7/13	44		
46	Address NAVFAC comments & submit LTM Report to regulators	0%	10 days	Tue 1/8/13	Mon 1/21/13	45		
47	Regulatory review of LTM Report	0%	30 days	Tue 1/22/13	Mon 3/4/13	46		
48	Draft comment resolution	0%	10 days	Tue 3/5/13	Mon 3/18/13	47		
49	Distribute Final Interim LTM Report	0%	9 days	Tue 3/19/13	Fri 3/29/13	48		

Project: ABL O&M
 Date: Tue 9/25/12

Task Progress Summary External Tasks Split

 Split Milestone Project Summary External MileTask

Figure 4-3
 Building 8 Area, Groundwater Investigation
 Allegany Ballistics Laboratory

ID	Task Name	Duration	Start	Finish	Predecessors	2012	2013	2014	2015
1	Building 8/Lab Row Groundwater Assessment	685 days	Mon 8/27/12	Fri 4/10/15					
2	Report of Findings	45 days	Mon 8/27/12	Fri 10/26/12					
3	Technical Memorandum	45 days	Mon 8/27/12	Fri 10/26/12					
4	Building 8/Lab Row UFP-SAP revision	169 days	Mon 2/25/13	Thu 10/17/13					
5	Prepare and Submit Revised Site 13 UFP SAP	30 days	Mon 2/25/13	Fri 4/5/13					
6	Navy Review	30 days	Mon 4/8/13	Fri 5/17/13	5				
7	Prepare and Submit Revised UFP SAP	14 days	Mon 5/20/13	Thu 6/6/13	6				
8	Regulatory Review	60 days	Fri 6/7/13	Thu 8/29/13	7				
9	Response to Comments	15 days	Fri 8/30/13	Thu 9/19/13	8				
10	Prepare and Submit Final Revised UFP SAP	20 days	Fri 9/20/13	Thu 10/17/13	9				
11	Implement Remedial Investigation at Site 13	366 days	Fri 11/15/13	Fri 4/10/15	10				
12	1st Quarterly Monitoring Well Sampling	5 days	Fri 11/15/13	Thu 11/21/13	10FS+20 days				
13	2nd Quarterly Monitoring Well Sampling	5 days	Fri 3/28/14	Thu 4/3/14	12FS+3 mons				
14	3rd Quarterly Monitoring Well Sampling	5 days	Fri 8/1/14	Thu 8/7/14	12FS+6 mons				
15	4th Quarterly Monitoring Well Sampling	5 days	Fri 12/5/14	Thu 12/11/14	12FS+9 mons				
16	Evaluate Data	30 days	Mon 3/2/15	Fri 4/10/15	15FS+56 days				

Task		Project Summary	
Split		External Tasks	
Progress		External Milestone	
Milestone		Deadline	
Summary			

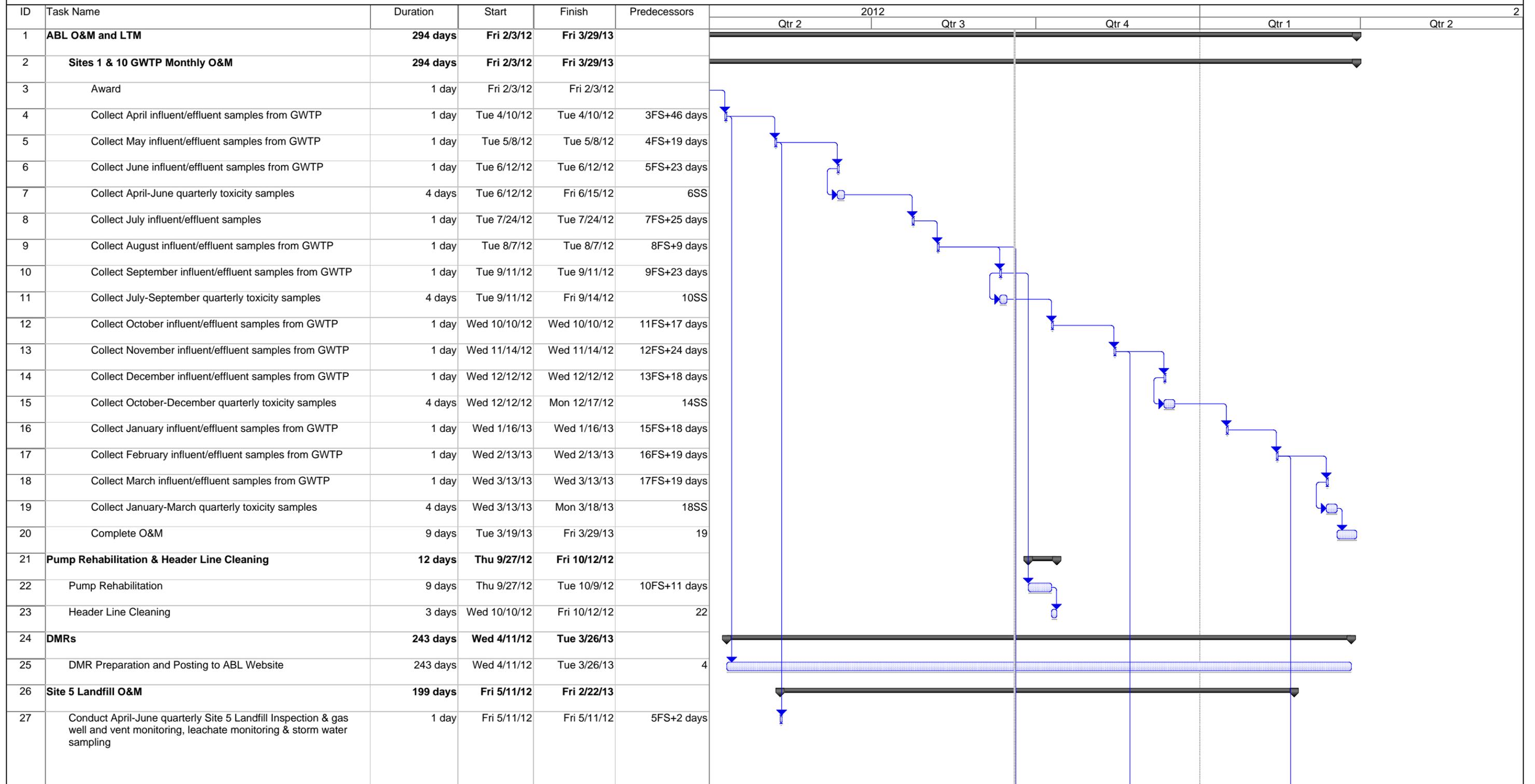
Figure 4-5
 Site 13 (Range Road Area) Schedule
 Allegany Ballistics Laboratory

ID	Task Name	Duration	Start	Finish	2011			2012				2013					
					Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
30	Prepare and Submit Draft ROD	30 days	Sat 6/7/14	Sun 7/6/14													
31	Navy, Regulatory Review	60 days	Mon 7/7/14	Thu 9/4/14													
32	Response to Comments	10 days	Fri 9/5/14	Sun 9/14/14													
33	Prepare and Submit Final ROD	30 days	Mon 9/15/14	Tue 10/14/14													
34	Prepare and Distribute Signed Final ROD	30 days	Wed 10/15/14	Thu 11/13/14													

Project: CTO-110
 Date: Wed 9/19/12

Task		Milestone		Rolled Up Split		External Tasks		External Milestone		Deadline	
Split		Summary		Rolled Up Milestone		Project Summary		External Milestone			
Progress		Rolled Up Task		Rolled Up Progress		External Milestone		External Milestone			

Figure 4-6
Groundwater Treatment Plant Schedule
Allegany Ballistics Laboratory



Project: ABL O&M
Date: Wed 9/19/12

Task Progress Summary External Tasks Split
 Split Milestone Project Summary External MileTask

Figure 4-6
Groundwater Treatment Plant Schedule
Allegany Ballistics Laboratory

ID	Task Name	Duration	Start	Finish	Predecessors	2012			
						Qtr 2	Qtr 3	Qtr 4	Qtr 1
28	Conduct July-Sept quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	2 days	Thu 9/20/12	Fri 9/21/12	9FS+30 days				
29	Conduct October-December quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	2 days	Fri 11/23/12	Mon 11/26/12	13FS+5 days				
30	Conduct January-March quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	2 days	Thu 2/21/13	Fri 2/22/13	17FS+5 days				
31	Well Cleaning at Sites 1 & 10	80 days	Fri 2/24/12	Fri 6/15/12		[Summary bar]			
34	GWTP Process Pipeline Cleaning	49 days	Mon 8/20/12	Fri 10/26/12		[Summary bar]			
35	Video inspect process pipelines	5 days	Mon 8/20/12	Fri 8/24/12					
36	Provide pipeline cleaning/replacment recommendations to Navy	10 days	Tue 9/11/12	Mon 9/24/12	35FS+10 days				
37	Subcontractor pipeline cleaning procurement/receive subcontractor submittals	8 days	Tue 9/25/12	Thu 10/4/12	36				
38	Amend HASP and APP (EM385 format)	5 days	Thu 9/20/12	Wed 9/26/12	36SS+7 days				
39	Submit Revised HASP & APP	2 days	Thu 9/27/12	Fri 9/28/12	38				
40	Cleaning of GWTP process pipelines and water tower interior pipelines	10 days	Mon 10/15/12	Fri 10/26/12	39FS+10 days				
41	Water Tower Rehab and Repair	37 days	Thu 9/20/12	Fri 11/9/12		[Summary bar]			
42	Receive/review subcontractor submittals	5 days	Tue 9/25/12	Mon 10/1/12	36				
43	Amend HASP and APP (EM385 format)	5 days	Thu 9/20/12	Wed 9/26/12	38SS				
44	Submit Revised HASP & APP	2 days	Thu 9/27/12	Fri 9/28/12	39SS				
45	Cleaning and painting of tank exterior	10 days	Mon 10/15/12	Fri 10/26/12	44FS+10 days				
46	Cleaning of tank interior	5 days	Mon 10/22/12	Fri 10/26/12	40SS+5 days				
47	Cleaning and painting of interior dry area	5 days	Mon 10/29/12	Fri 11/2/12	40				
48	Retrofit new drainage line	4 days	Mon 11/5/12	Thu 11/8/12	47				
49	Seal foundation	1 day	Fri 11/9/12	Fri 11/9/12	48				

Project: ABL O&M
Date: Wed 9/19/12

Task  Progress  Summary  External Tasks  Split 
 Split  Milestone  Project Summary  External MileTask 

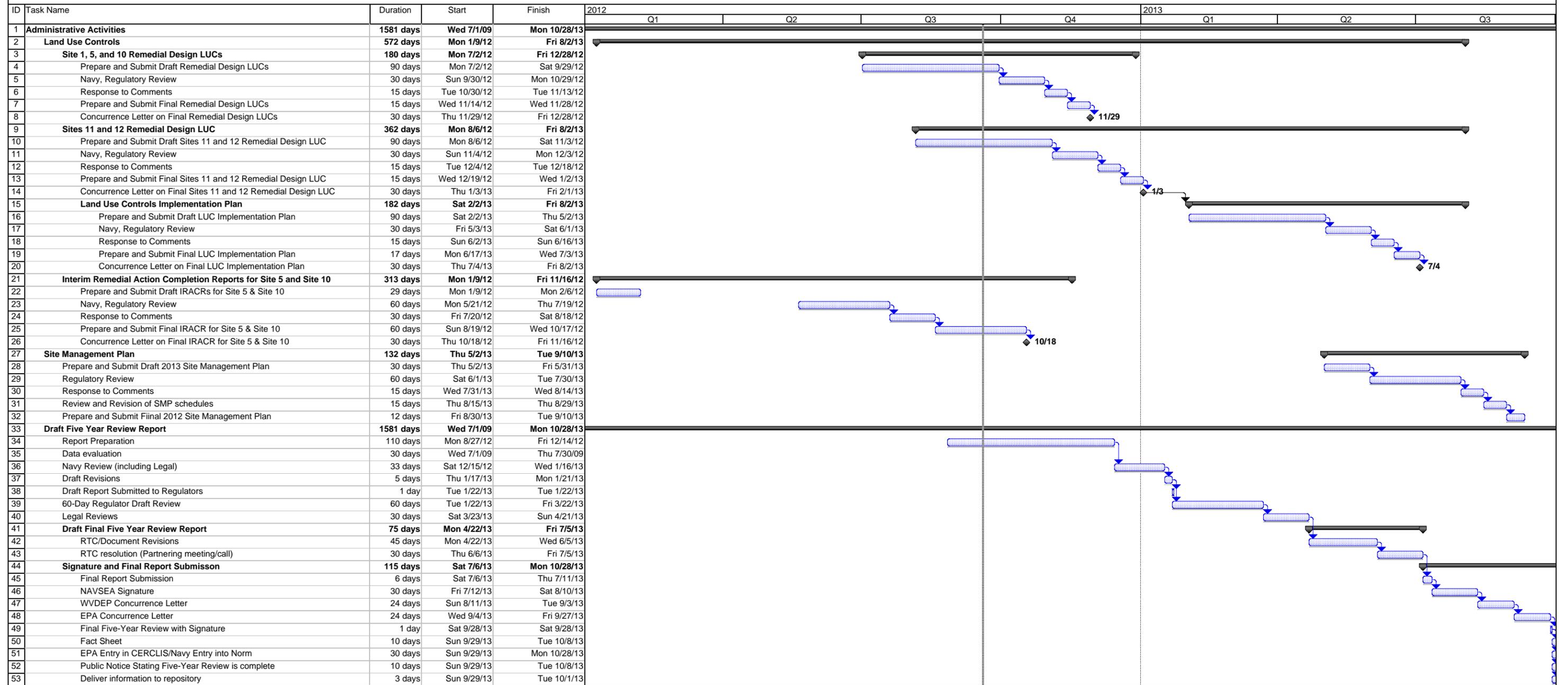
Table 4-7
 Facility-Wide Vapor Intrusion Assessment Schedule
 Allegany Ballistics Laboratory

ID	Task Name	Duration	Start	Finish	Predecessors	Qtr 3, 2012						Qtr 4, 2012			
						Jun	Jul	Aug	Sep	Oct	Nov	Dec			
1	Facility-Wide Vapor Intrusion Assessment	203 days	Tue 8/28/12	Mon 3/18/13											
2	Vapor Intrusion Building Surveys	53 days	Tue 8/28/12	Fri 10/19/12											
3	Prepare for and Coordinate Building Surveys	45 days	Tue 8/28/12	Thu 10/11/12											
4	Conduct Building Surveys	8 days	Fri 10/12/12	Fri 10/19/12	3										
5	Preliminary Vapor Intrusion Assessment Technical Memorandum	150 days	Sat 10/20/12	Mon 3/18/13											
6	Prepare and Submit Draft Technical Memorandum	60 days	Sat 10/20/12	Tue 12/18/12	4										
7	Regulatory Review	60 days	Wed 12/19/12	Sat 2/16/13	6										
8	Response to Comments	15 days	Sun 2/17/13	Sun 3/3/13	7										
9	Prepare and Submit Final Technical Memorandum	15 days	Mon 3/4/13	Mon 3/18/13	8										

Date: Wed 9/19/12



Figure 4-8
Administrative Activities Schedule
Allegany Ballistics Laboratory



Project: CTO-110
Date: Wed 9/19/12

Task Progress Summary Rolled Up Split Rolled Up Progress Project Summary Deadline

Split Milestone Rolled Up Task Rolled Up Milestone External Tasks External Milestone

SECTION 5

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Attachment A
SWMU, AOC, and IR Site Description and Status

ATTACHMENT A-1

**SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS
for AREAS UNDER CERCLA INVESTIGATION
ALLEGANY BALLISTICS LABORATORY
ROCKET CENTER, WEST VIRGINIA**

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 1	<p>SWMU 1, Former Hazardous Waste Storage Area I</p> <p>(The soil at this SWMU is part of IR Site 1 western end subsite (also includes SWMUs 11, 22C, and 22D))</p>	West of the Current Burning Ground	Late 1970s - 1981	<p>Approximately 360-square-foot pad used for the storage of 55-gallon drums of hazardous waste prior to disposal off site. The unit managed hazardous wastes F001, F002, F003, F005, D001, D002, and F019 including chlorinated solvents, still bottoms, metal plating pretreatment sludge, and waste acids and bases. A pilot study of a fluidized bed incinerator was conducted on the pad during the early 1980s for the disposal of propellants and explosives. Propellants and explosives were tested at the pilot test incinerator; reportedly the only wastes generated were aluminum oxide, aluminum, potassium chloride, and carbon.</p>	<p><u>Status</u></p> <p>The RFA recommended no further action for this SWMU. A ROD for Site 1 groundwater remediation was signed in April 1997. Construction of a groundwater treatment plant for treatment of VOCs was completed and has been operational since September 1998. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedy for groundwater is functioning as intended by the ROD.</p> <p><u>Anticipated</u></p> <p>Soil at the SWMU is currently under investigation as part of Site 1. A Final RI was issued in July 2006. A Draft FS was issued in July 2010 and a Draft EE/CA for a removal action in the former disposal pits was issued in June 2011 for regulatory review. An action memorandum is expected to be finalized in 2012.</p>

ATTACHMENT A-1

**SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS
for AREAS UNDER CERCLA INVESTIGATION
ALLEGANY BALLISTICS LABORATORY
ROCKET CENTER, WEST VIRGINIA**

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 1	SWMU 6, Current Burning Ground	Within the fenced portion of the Current Burning Ground	1958 - present	A fenced area measuring 280 feet by 1,250 feet, consisting of 13 current and former burning locations (pads). Typical wastes managed include: nitroglycerin, nitrocellulose, ammonium perchlorate, butanetriol trinitrate, HMX, RDX, and various propellants and explosives manufactured from the above. Approximately 1,000 to 1,750 pounds per day of waste materials are estimated to be burned. The unit currently operates under RCRA Permit# WV0170023691.	<p><u>Status</u></p> <p>This SWMU is being operated under a RCRA Part B permit.</p> <p>Soil and groundwater at this SWMU have been investigated as they pertain to IR Site 1. Historical investigations comprise the RI; Focused RI; Phase I and II Aquifer Testing; 1998 supplemental soil investigation; 2001 supplemental soil, surface water, and sediment investigation, and 2004 supplemental soil investigation. In addition, soil at the SWMU was investigated as part of the requirements for preparing the Part B permit application.</p> <p>A ROD for Site 1 groundwater remediation was signed in April 1997. Construction of a groundwater treatment plant was completed for treatment of VOCs and has been operational since September 1998. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedy for groundwater is functioning as intended by the ROD.</p> <p>An RI for Site 1 soil was completed in July 2006. A draft FS was issued in July 2010 to address potential unacceptable risks associated with exposure to soil. An EE/CA was also prepared and issued for regulatory review in Jun 2011 to conduct a removal action in the former disposal pit areas.</p> <p><u>Anticipated</u></p> <p>Finalize the FS and EE/CA in 2014 and</p>

ATTACHMENT A-1

**SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS
for AREAS UNDER CERCLA INVESTIGATION
ALLEGANY BALLISTICS LABORATORY
ROCKET CENTER, WEST VIRGINIA**

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
1					<p>the FS in 2013. -e Conduct the interim removal action for the FDPs and prepare a PRAP and ROD for Site 1 soil in 2013.</p>

ATTACHMENT A-1

**SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS
for AREAS UNDER CERCLA INVESTIGATION
ALLEGANY BALLISTICS LABORATORY
ROCKET CENTER, WEST VIRGINIA**

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 1	SWMU 7, Inert Burning Ground	East of the fenced area containing the Current Burning Ground	1958 – 1985	Approximately 20-foot by 20-foot area located outside the fenced area of the current Burning Ground. The unit managed waste materials contaminated with explosives, including explosive contaminated waste rags. These rags may also have been contaminated with solvents including methylene chloride and TCE. Open burning of these wastes was conducted here and the ash was deposited at the unit and in the Inert Landfill (SWMU 9).	<p><u>Status</u></p> <p>The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI.</p> <p>See remainder of discussion under SWMU 1.</p> <p><u>Anticipated</u></p> <p>See discussion under SWMU 1.</p>
Site 1	SWMU 8, Acid Disposal Pits	In the southwestern portion of the fenced area containing the Current Burning Ground	1972 - 1982	Two unlined, crushed-limestone-filled, earthen pits approximately 20 feet by 5 feet in area and 4 feet in depth. Waste acids and bases generated by laboratory operations were poured into the pit and allowed to percolate through the limestone. It is estimated that approximately 1 gallon of acid per month was disposed of at this unit.	<p><u>Status</u></p> <p>The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI.</p> <p>See remainder of discussion under SWMU 1.</p> <p><u>Anticipated</u></p> <p>See discussion under SWMU 1.</p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 5	SWMU 9, Inert (Non-ordnance) Landfill	South of Plant 2	1964 - 1988	Landfill approximately 420 feet long, 110 feet wide, and 20 feet deep. This unit received empty drums, unknown lab and photographic chemicals, scrap metal and plastic, large quantities of broken fluorescent tubes containing mercury, sandblasting grit, wood products, construction debris, fiberglass, and other resin-coated fibers. The empty drums were formerly used to store chemicals such as methylene chloride, TCE, acetone, and ammonium perchlorate. Chunk metallic lead potentially may have been disposed of here.	<p><u>Status</u></p> <p>The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI.</p> <p>A ROD was signed for soil and waste remediation on January 1997. Construction of a landfill cap was completed in October 1997. A long-term groundwater monitoring program was implemented at that time and currently is conducted on a tri-quarterly basis.</p> <p>A draft Focused RI Report for groundwater, surface water, and sediment was submitted in September 2003. A technical memorandum evaluating the results of the Site 5 MNA study was submitted in January 2004.</p> <p>Remedial alternatives for groundwater, surface water, and sediment, as appropriate, are evaluated in the FFS. The RI/FS for Site 5 was completed in September 2004.</p> <p>A PRAP and ROD were prepared in 2005 for Site 5 groundwater, surface water, and sediment. Construction of a permeable reactive barrier through the alluvial aquifer was completed in June 2006.</p> <p>A combined Five-Year ROD Review report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedies are functioning as intended by the ROD.</p> <p><u>Anticipated</u></p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
					Long term monitoring and operations and maintenance activities are ongoing.
Site 1	SWMU 11, Former Burn Cages and Ash Landfill	Northwest portion of Plant 1 between the fence and North Branch Potomac River	prior to 1970 until the 1970s	Unit consists of an ash landfill and at least two burn cages. The landfill measures approximately 100 feet by 60 feet in area and 12 feet in depth. During the 1960s and 1970s the facility burned paper, cafeteria garbage, packaging materials, and non-explosive materials in open wire mesh cages. The ash generated from the burning was disposed at the landfill located adjacent to the cage areas. The landfill also contains demolition debris, empty solvent drums, and rocket motor casings.	<p><u>Status</u></p> <p>The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI.</p> <p>See remainder of discussion under SWMU 1.</p> <p><u>Anticipated</u></p> <p>See discussion under SWMU 1.</p>
Site 12	SWMU 12, Former Alodine Treatment Tank	Outside of Bldg. 167	1978 – 1982	The unit was a 1,000-gallon, open-top, vertical cylinder. Industrial wastewater from the Alodine process (aluminum surface chemical conversion process) was pre-treated at the unit for chromium reduction and precipitation. As of 1980, 4,200 gallons of Alodine process wastewater were treated at this unit on a monthly basis.	<p><u>Status</u></p> <p>The RFA recommended no further action for this SWMU. AOC N was part of the Phase I Phase II and Phase III SWMU/AOC investigations. Based upon the results of the Phase III, AOC N has been designated as IR Site 12. No further action is planned for SWMU 12, The ROD for Site 12 was issued for regulatory review insigned in June-January 2011.</p> <p><u>Anticipated</u></p> <p><u>The remedial action, in-situ bioremediation, is planned for 2012. Performance monitoring and LTM will continue until the remediation goals are achieved.</u></p>
Site 12	SWMU 14, Current (no longer in use) Alodine Waste Storage Area I	Bldg. 167	1991 - 1998	Concrete area used to store Alodine waste and Alodine contaminated rags in 55-gallon drums. The unit measures approximately 20	<p><u>Status</u></p> <p>The RFA recommended no further action for this SWMU. The regulatory agencies</p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
				feet by 10 feet.	<p>agreed with this recommendation under the condition that possible releases from this tank be considered in the investigation of SWMU 52.</p> <p>AOC N was part of the Phase I, Phase II, and Phase III SWMU/AOC investigations. Based upon the results of the Phase III, AOC N has been designated as IR Site 12. No further action is planned for SWMU 14. See discussion under SWMU 12.</p> <p>Anticipated</p> <p>See discussion under SWMU 12.</p>
Site 1	SWMU 20, Solvent Disposal Pit	In the southwestern portion of the fenced area containing the Current Burning Ground	Unknown - 1978	Unlined earthen pit used for the disposal of explosive-contaminated solvents such as TCE, PCE, and 1,1,1-TCA. The wastes were poured into the pit and allowed to percolate into the soil or evaporate; the waste in the pit was then ignited.	<p>Status</p> <p>See discussion under SWMU 1.</p> <p>Anticipated</p> <p>See discussion under SWMU 1.</p>
Site 11	SWMU 36, Oil Pit	Bldg. 215	1960s – 1995	A below grade circular pit measuring 2 feet in diameter and 2 feet in depth. This unit contained a dark, highly viscous petroleum substance during the RFA site visit. It is assumed that the unit was used as a transfer hose drip catchment.	<p>Status</p> <p>The RFA recommended that the integrity of the oil pit be evaluated, and if impaired, soil sampling should be performed. A 55-gallon drum filled with No. 5 fuel oil and adjacent soils were removed to clean the area. Confirmatory soil samples indicated no contamination. Additional soil samples were collected during the Advanced Site Inspection and the Site 11 RI.</p> <p>A RI for Site 11 was completed in January 2005. A FS for the combined areas of Site 11 and 12 was completed in 2010. The Draft Final ROD was <u>approved and issued signed in January 2012 for</u></p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
1					<p>regulatory/legal review.</p> <p><u>Anticipated</u></p> <p>The ROD is expected to be finalized by September 2011. The remedy will be implemented in 2012. Performance monitoring and LTM of groundwater will continue until the remediation goals are achieved.</p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
<p>SWMU 37N is part of IR Site 12.</p> <p>Other SWMUs in this series are not associated with an IR site.</p>	<p>SWMU 37, Wastewater Sumps [37A through 37Q, 37S through 37X]</p> <p>SWMU 41 was evaluated with SWMU 37B per FFA.</p>	<p>Buildings. 4 (37A), 7 (37B and BB), 12 (37C), 13 (37D), 15 (37E), 22 (37F), 27 (37G), 32 (37H), 49 (37I), 100 (37J), 103 (37K), 105 (37L), 105A (37M), 167 (37N), 226 (37O), 248 (37P), 256 (37Q), 280 (37S), 11 (37T), 22 (37U), 14 (37V), 8 (37W), 214 (37X)</p>	<p>Various dates from the 1940s – 1999</p>	<p>Currently 23 units have been identified. These units have received or have potentially received contact cooling water from propellant machining operations, building washdown water from structures at which solid explosives are processed, wastewater containing materials other than propellants and explosives, coolants, oil, solvents, Alodine wastewater, salts, sands, and sediment.</p>	<p>Status</p> <p>SWMUs 37B, 37BB, 37C, 37E, 37F, 37G, 37J, 37N, 37T, 37U, 37V, 37W, and 37X were investigated during the Phase I and/or Phase II SWMU/AOC Investigation. SWMU 37N was investigated as part of AOC N.</p> <p>SWMUs 37C, D, E, T and U were removed in June 1998. SWMUs 37A, 37B, 37BB, 37N, 37V, and 37X were removed in 2000/2001.</p> <p>SWMUs 37H, 37K, 37M, and 37O were closed out in September 1999 via closeout reports.</p> <p>SWMUs 37C (soil), 37D (soil), 37I, 37L, and 37P were closed out in September 2000 via closeout reports.</p> <p>SWMUs 37C (groundwater), 37F, 37G, and 37S were closed out in September 2001 via closeout reports</p> <p>SWMU 37Q closed out in FFA under findings of fact p. 19.</p> <p>SWMUs 37A and 37X were closed out in February 2002 via closeout reports.</p> <p>SWMUs 37B, 37BB, 37J, 37T, and 37U were closed out in July 2002 via closeout reports. SWMU 37E (soil) was closed out in March 2004 via closeout report. SWMU 37ii and 37V were closed out in 2005.</p> <p>SWMU 37W (soil) was closed in April 2010. In 2011, groundwater in the vicinity of several SWMUs near Building 8 was investigated to assess potential impacts. Results from this investigation will be used to determine if an RI is warranted or if NFA is warranted.</p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
					<p><u>Anticipated</u> Summary memo of groundwater data with site closeout or recommendations of a full RI. Groundwater area has been consolidated into one unit for investigation referred to as Building 8/Lab Row Area.</p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 12	SWMU 52, Current (no longer in use) Alodine Treatment Tank	South of Bldg. 167	1991 - 1995	A treatment tank which was open on top with a plastic containment structure (6 feet in diameter by 2 feet deep) beneath it. The tank and containment structure were on a concrete pad. This treatment tank operated at the same location as the former Alodine treatment tank (see SWMU 12 description). This unit managed spent Alodine.	<p><u>Status</u></p> <p>SWMU 52, part of AOC N, was part of the Phase I, Phase II, and Phase III SWMU/AOC investigations. Based upon the results of the Phase III, AOC N has been redesignated as IR Site 12.</p> <p>An RI for Site 12 was completed in June 2008. A draft FS for the combined areas of Site 11 and 12 was submitted in August 2008.</p> <p><u>Anticipated</u></p> <p>No further action is planned for SWMU 52, but further investigation is ongoing for IR Site 12.</p>
Site 12	AOC N, Building 167 SWMUs	Bldg. 167	Primarily 1970s – present	This AOC comprises five SWMUs (12, 14, 24S, 37N, and 52). See specific descriptions under each of these SWMUs.	<p><u>Status</u></p> <p>AOC N was investigated during the Phase I, Phase II, and Phase III SWMU/AOC investigations. Based on the findings of the Phase III investigation, AOC N has been designated as IR Site 12, which is under investigation.</p> <p>A non-time critical removal action was performed for soil at Site 12 soil in 2005.</p> <p>An RI for Site 12 was completed in June 2008. A FS for the combined areas of Site 11 and 12 was completed in 2010.</p> <p><u>Anticipated</u></p> <p>A PRAP for combined Site 11 and Site 12 is expected to be completed in 2010¹. The ROD was approved and signed in January 2012 is expected to be completed</p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
					in 2011.

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 1	IR Site 1 - Northern Riverside Waste Disposal Area Includes SWMUs 1, 7, 8, 11, & 20	Northern perimeter of Plant 1	Late 1950s – 1960s	See SWMUs 1, 6, 7, 8, 11, 20, and 22C and 22D descriptions.	See SWMUs 1, 6, 7, 8, 11, 20, and 22C and 22D descriptions.
Site 2	IR Site 2 - Previous Burning Ground (1942 – 1949) (This IR site is also SWMU 4)	On the north side of I Street southeast of Bldg. 361	1942 – 1949	See SWMU 4 description	See SWMU 4 description
Site 5	IR Site 5 - Inert Landfill (This IR site is also SWMU 9)	South of Plant 1	1964 – 1988	See SWMU 9 description	See SWMU 9 description
Site 10	IR Site 10 – Former TCE Still and Production Well A (PWA)	Near Bldg. 157	1959 – early 1960s	A TCE groundwater plume has been detected near Building 157. The source is believed to be a former still which operated adjacent to Building 157.	<u>Status</u> Soil and groundwater at this SWMU have been investigated during the RI; Phase II RI; Phase I and II Aquifer Testing; and 2001 supplemental soil investigation. An interim ROD was signed for groundwater remediation in August 1998. Construction of a groundwater treatment plant was completed and has been operational since September 30, 1998. Groundwater extraction at Site 10 began in February 1999. The groundwater extraction system was modified in February 2003 based on results of the Phase III Aquifer Testing to include an additional alluvial extraction well and four bedrock extraction wells. A Final ROD for Site 10 groundwater was signed in 2005. A Groundwater extraction

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
					<p>and treatment system is currently being operated and maintained. A Final NFA ROD for Site 10 soil was signed in 2007.</p> <p>A combined Five-Year ROD Review report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedy is functioning as intended by the ROD.</p> <p><u>Anticipated</u></p> <p>Long term monitoring and operations and maintenance activities are ongoing.</p>
Site 11	IR Site 11 - Building 215 (Production Well F)	Eastern portion of Plant 1; north of Buildings. 421 and 438.	1961	This site is the area surrounding and including a 8-inch-diameter water supply well that was never put into production because of sand accumulation. The well was uncovered during demolition of Building 215. Petroleum hydrocarbons and solvents have been found in the well.	<p><u>Status</u></p> <p>The RI activities, including a year of quarterly sampling, have been completed. The anticipated source of contamination (i.e., DNAPL) has been removed from F-Well.</p> <p>A Final RI Report for Site 11 was completed in January 2005. A FS for the combined areas of Site 11 and 12 was completed in 2010. The Draft Final ROD was issued in June 2011 for regulatory/legal review.</p> <p><u>Anticipated</u></p> <p>The ROD was approved and signed in January 2012is expected to be finalized by September 2011. The remedy will be implemented in 2012. Performance monitoring and LTM of groundwater will continue until the remediation goals are achieved.</p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 12	IR Site 12 – Building 167 SWMUs (This IR site was formally known as AOC N, which includes SWMUs 12, 14, 24S, 37N and 52)	Outside of Bldg. 167	1978 – 1982	This site comprises five SWMUs (12, 14, 24S, 37N, and 52). See specific descriptions under each of these SWMUs.	<p><u>Status</u></p> <p>Field investigations were initiated in 2003 as part of an RI designed to address data gaps identified following the Phase III SWMU/AOC Investigation of AOC N. Ongoing RI activities at Site 12 are evaluating the nature and extent of groundwater contamination in the alluvial and bedrock aquifers.</p> <p>A non-time critical removal action was performed for soil at Site 12 soil in 2005.</p> <p>An RI for Site 12 was completed in June 2008. A FS for the combined areas of Site 11 and 12 was completed in 2010. The Draft Final ROD was issued in June 2011 for regulatory/legal reviewThe ROD was approved and signed in January 2012.</p> <p><u>Anticipated</u></p> <p>The ROD is expected to be finalized by September 2011.The remedy will be implemented in 2012. Performance monitoring and LTM of groundwater will continue until the remediation goals are achieved.</p>

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 13	Range Road Area	Near Range Road–H Street Intersection	1952	No reports regarding wastes managed, but boiler operations at Former Building 106A may be the source of contamination in groundwater	<p><u>Status</u></p> <p>Phase I through IV soil, groundwater, sediment investigation activities were conducted at the Site. Anticipated source is no longer present (former boiler building)</p> <p>Pilot Study was implemented in 2004 with in-situ bioremediation to treat the groundwater near the former boiler.</p> <p>Subsequent groundwater delineation activities have been conducted to characterize the nature and extent of contamination. Currently an RI for all media (soil, groundwater, surface water, and sediment is ongoing).</p> <p><u>Anticipated</u></p> <p>Complete the RI in 2013⁴; FS in 2012 to evaluate remedial alternatives.</p>

Notes:

ABL = Allegany Ballistics Laboratory

1,1,1-TCA = 1,1,1-trichloroethane

TCE = Trichloroethene

HMX = Octahydro-1, 3, 5, 7-tetranitro-1, 3, 5, 7,-tetrazocine

RDX = Hexahydro-1, 3, 5-trinitro-1, 3, 5-triazine

PCE = Tetrachloroethene

PCB = Polychlorinated Biphenyl

MEK = Methyl Ethyl Ketone

MIBK = Methyl Isobutyl Ketone

TCL = Target Compound List

VOC = Volatile Organic Compound

NA = Not Available

NG = Nitroglycerin

NC = Nitrocellulose

AP = Ammonium perchlorate

RFA = RCRA Facility Assessment

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes

TPH = Total Petroleum Hydrocarbon

ppb = Parts per billion

ppm = Parts per million

UST = Underground Storage Tank

RFI = RCRA Facility Investigation

ROD = Record of Decision

RBC = Risk-Based Concentration

Attachment B
Extraction, Monitoring, and Production Well
Locations – Plant 1 and Site 5
