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FINAL 2013 SITE MANAGEMENT PLAN INCLUDING SCHEDULES AND ACTIVITIES FOR FISCAL YEAR 2014 NIROP ROCKET CENTER WV

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CH2M HILL

Final

2013 Site Management Plan
Including Schedules and Activities for Fiscal Year 2014

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
DCE	Dichloroethylene
DNAPL	Dense Non-aqueous Phase Liquid
DoD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
ERD	Enhanced Reductive Dechlorination
ERN	Environmental Restoration Navy
FFA	Federal Facility Agreement
FFS	Focused Feasibility Study
FS	Feasibility Study
F-Well	Production Well F
FY	Fiscal year
GIS	Geographic Information System
gpm	gallons per minute
GWTP	Groundwater Treatment Plant
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
LNAPL	light non-aqueous phase liquid
LTM	Long-Term Monitoring
LUC	Land Use Control
MDE	Maryland Department of the Environment
MIP	membrane interface probe
MNA	Monitored Natural Attenuation
µg/L	Micrograms per liter
NACIP	Navy Assessment and Control of Installation Pollutants Program
NAVFAC	Naval Facilities Engineering Command Atlantic Division
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
NPDES	National Pollutant Discharge Elimination System (
NPL	National Priorities List
OU	Operable Unit
O&M	Operations and Maintenance
PA/SI	Preliminary Assessment/Site Inspection
PCB	Polychlorinated biphenyl
PDB	passive diffusion bag
P/E	Propellants and Explosive
Phase II RI	Phase II Remedial Investigation
PR	Preliminary Review
PRAP	Proposed Remedial Action Plan
PRG	Preliminary Remediation Goal
PRB	Permeable Reactive Barrier
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/RA	Remedial Design/Remedial Action
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RFA	RCRA Facility Assessment
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
SMP	Site Management Plan
SRG	Site Remediation Goal
SSA	Site Screening Area
SSP	Site Screening Process
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
TCE	Trichloroethene
TSCA	Toxic Substance Control Act
USEPA	U.S. Environmental Protection Agency
UFP SAP	Uniform Federal Policy Sampling and Analysis Plan
VC	vinyl chloride
VOC	volatile organic compound
VSI	Visual Site Inspection
WVDEP	West Virginia Department of Environmental Protection

SECTION 1

Introduction

This document is the 2013 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 Mid- 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. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Process Activities – This section summarizes the process for investigation, feasibility study (FS), and remedial action for CERCLA Installation Restoration Program (IRP) sites. It also describes how team partnering has been applied to streamline the CERCLA process.
3. Unit Descriptions and Tracking Matrix - This section summarizes activities conducted to date including removal activities, and documents the status of each unit.
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. This SMP focuses on activities and schedules for response actions planned from Fiscal Year 2014 through 2019.

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 October 2012, which will be updated again with the finalization of the 2013 SMP document. 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.

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, Production Well "A" (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). Solid Waste Management Unit (SWMU) 27A Range Road Area was identified as Site 13 Operable Unit (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 and previous investigations and remedial activities of active Sites, SWMUs, and AOCs and Plant 1. Section 3 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 (Environmental Science and Engineering, 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 trichloroethene (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. The IAS concluded that Sites 7, 8 and 9 were not considered a significant source of potential contamination due to the small waste quantities and were not recommended for further study. The IAS also recommended continued groundwater monitoring at PWA and PWC (later named Site 10).

A Confirmation Study (CS) was initiated in June 1984 and completed in August 1987. Despite the recommendation of the IAS, Site 7 was added for study under the Confirmation Study. 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 Production Well "C" [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 Preliminary Remediation Goals (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 a environmental planning tool for CERCLA sites currently under investigation or with a remedy in place requiring land use controls to prevent receptor exposure hazards. This document is a guide to communicate land use controls (LUCs) at the facility in accordance with the LUC Remedial Designs for the respective sites (**Figure 1-4)**.

1.3.5 Site Specific Investigations and Remediation Activities

Attachment A of this SMP provides a comprehensive list of active Sites, SWMUs, and AOCs at Plant 1 documented in the FFA (and later added), their status, and anticipated additional activities, where appropriate. 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, Site 10, and Sites 11/12 have a ROD and remedy in place. Response is complete for Sites 2, 3, 4, 6, 7, and 9 through a NFA 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. This section does not include descriptions for Sites, SWMUs, and AOCs that have been listed as requiring 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

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 (**Figure 1-5 and 1-6**)

1.3.5.2. 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 1-5**. 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.

1.3.5.3. 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 1-5**. 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 Active 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).

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 Applicable or Relevant and Appropriate Requirement (ARARs).

1.3.5.4. 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 and is considered to be the primary source of groundwater VOC contamination at Site 1.

1.3.5.5. Debris Area

The debris area is a portion of the debris landfill containing visible waste. This area is located east of the Former Open Burn Area.

Site 1 was part of a number of investigations conducted at ABL in the 1980s and early-1990s. 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).

Information gathered during the RI and Focused RI indicated that VOCs (specifically TCE, 1,2-Dichloroethylene (DCE), 1,1,1-Trichlorethene, methylene chloride, 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. A draft FFS was prepared to develop remedial action alternatives for all Site 1 media (CH2M HILL, October 1995), however, due to the size and complexity of the site, the site was subdivided into OUs for remedial action (RA). 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.

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 *Final Focused Remedial Investigation for Site 1 Soil, Operable Unit 4* report was completed in July 2006 (CH2M HILL, July 2006).

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 the *Draft In Situ Chemical Oxidation Pilot Study at the Solvent Disposal Pit Area of Site 1* report (CH2M HILL, May 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 constituent of concern (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 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.

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 were intended to 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.

1.3.5.6. Site 5

The Site 5 inert landfill operated from the early-1960s to 1985, accepting wastes generated by ABL and deemed to be inert (**Figure 1-7**). 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.

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 general, the IAS, RI, Phase II RI, and Monitored Natural Attenuation (MNA) Investigations performed to evaluate the nature and extent of contamination in environmental media at Site 5 concluded low levels of VOCs, semi-volatile organic compound (SVOCs), pesticides, and inorganics were detected in soil samples collected around the perimeter of the landfill. In addition, TCE concentrations up to approximately 100 micrograms/Liter (μg/l) have been detected in Site 5 groundwater.

In October 1996, the Navy issued a Proposed Remedial Action Plan (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 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.

1.3.5.7. Site 10

Site 10 consists of the area around Building 157 and is located within the developed portion of Plant 1, as shown in **Figure 1-8 and Figure 1-9**. 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.

Site 10 was part of a number of investigations conducted at ABL in the 1980s and early-1990s. Information gathered during 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 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 Navy issued the PRAP for groundwater at Site 10 in March 1998 and signed an interim ROD in August 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. 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.

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 NFA ROD was signed for Site 10 Soil in July 2007.

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 a fourth alluvial extraction well and three 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.

1.3.5.8. Site 11

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 (**Figure 1-9)**. 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 Production Well F (F-Well) and a former oil pit at the construction site for Building 421. 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 was conducted in June 2012 to assess the site conditions and achieve an understanding of the current site plume configurations, contaminant concentrations, and existing geochemical properties prior to remedy implementation. The results of the groundwater sampling completed in June 2012 demonstrated a reduction in concentrations of TCE and methylene chloride below site remediation goals (SRGs) in

the bedrock aquifer. Injection of enhanced reductive dechlorination (ERD) in the alluvial aquifer took place in November 2012. Long –term groundwater monitoring is currently ongoing at Site 11.

1.3.5.9. Site 12

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 1-9**. 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-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 EE/CA 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 was conducted in June 2012 to assess the site conditions and achieve an understanding of the current site plume configurations, contaminant concentrations, and existing geochemical properties prior to remedy implementation. The results of the groundwater sampling completed in June 2012 demonstrated a reduction in concentrations of TCE and methylene chloride below SRGs in the bedrock aquifer. Injection of ERD in the alluvial aquifer took place in November 2012. Long –term groundwater monitoring is currently ongoing at Site 12.

1.3.5.10. Site 13

The Site 13 Range Road Area consists of an area of TCE contamination in alluvial groundwater, at an area where the SWMU 27A 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 1-10**.

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 National Pollutant Discharge Elimination System (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 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).

The Site 13 UFP SAP (CH2M HILL, November 2011) included the sample collection and evaluation of surface water and sediment from the site drainage ditch system. Subsequently EPA, WVDEP, and the Navy determined this sampling was not necessary based on the following:

- TCE has not been detected in NPDES permit sampling conducted in the drainage ditch since late 2007
- Water level data collected in accordance with the November 2011 UFP SAP suggest that the alluvial groundwater is not discharging to the drainage ditch
- Available data indicate that if a transport pathway from groundwater to surface water and sediment exists, it is intermittent and infrequent and does not present a risk to human health or the environment
- The decrease in groundwater concentrations following the injections of biostimulating substrate during the pilot study decreases the potential for significant transport should discharge occur

The preparation for a groundwater remedial investigation at Site 13 is currently underway and discussed in Section 3.1.6.

1.3.5.11. 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 1-11**). Site topography is relatively flat consisting of high density development and urban landscaping; future land use is expected to remain the same.

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).

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 Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) and octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (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.

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.” Groundwater associated with SWMU 37E and 37W were investigated as part of a Preliminary Assessment/Site Inspection (PA/SI) as a result of VOCs and explosive constituents detected in soil and groundwater during previous investigations. In June and November 2011, groundwater samples were collected and evaluation of the results is ongoing.

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

Site/AOC Number	Site Identification	Operable Unit Number	Operable Unit Description	CERCLA Process Status
1	Northern Riverside Waste Disposal Area	4	Soil	RI completed in July 2006. EE/CA completed in 2012. FS is planned for FY13.
13*	Range Road Area	15	Groundwater	RI field work currently being conducted. RI report is planned for FY15.
AOC M	Small Scattered Debris Areas	App B	Debris	Debris may be addressed during Site 1 remedial action.

Abbreviations:
AOC = Area of Concern
FS = Feasibility Study
OU = Operable Unit
RI = Remedial Investigation
SWMU = Solid Waste Management Unit

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

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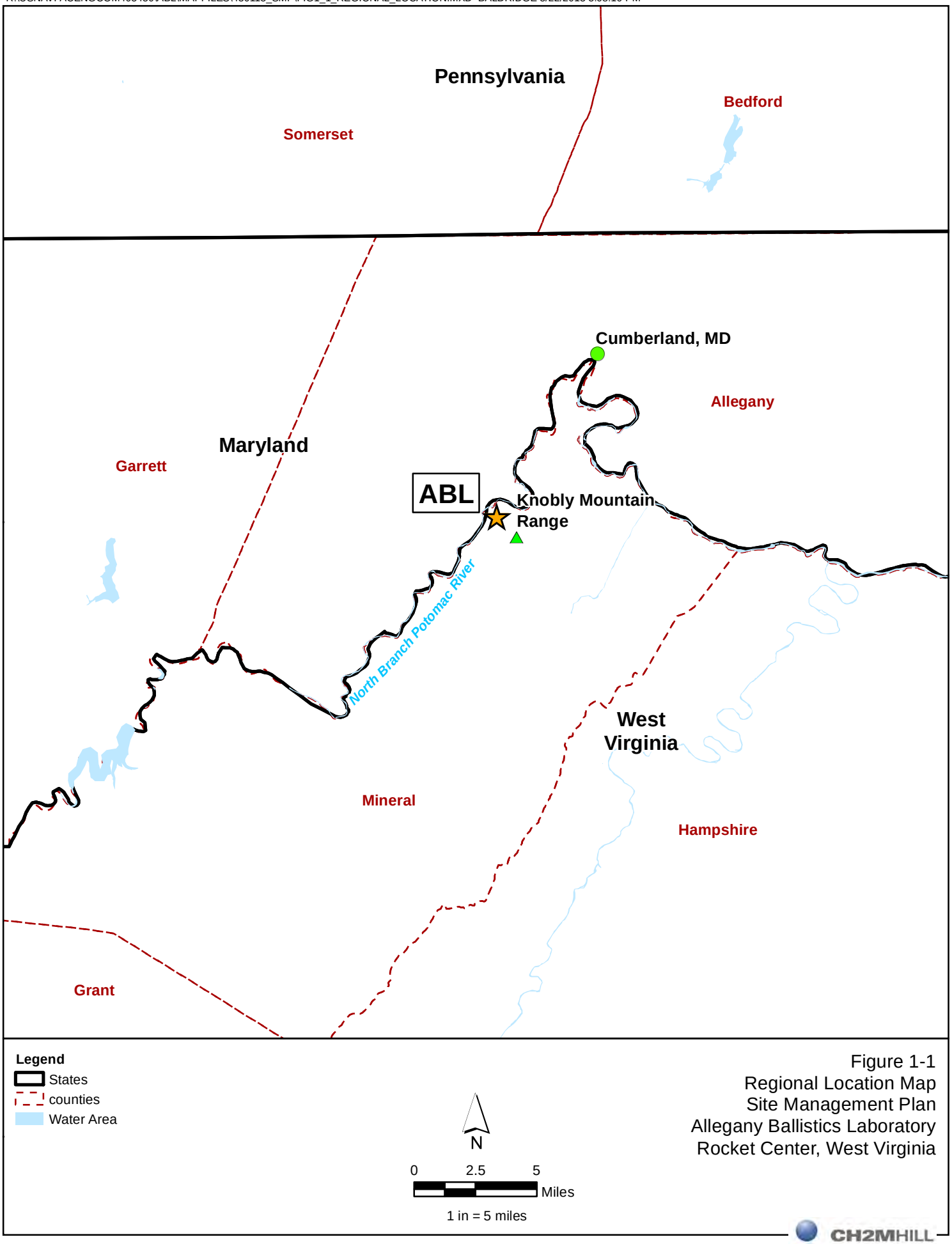

Figure 1-1
Regional Location Map
Site Management Plan
Allegany Ballistics Laboratory
Rocket Center, West Virginia

CH2MHILL

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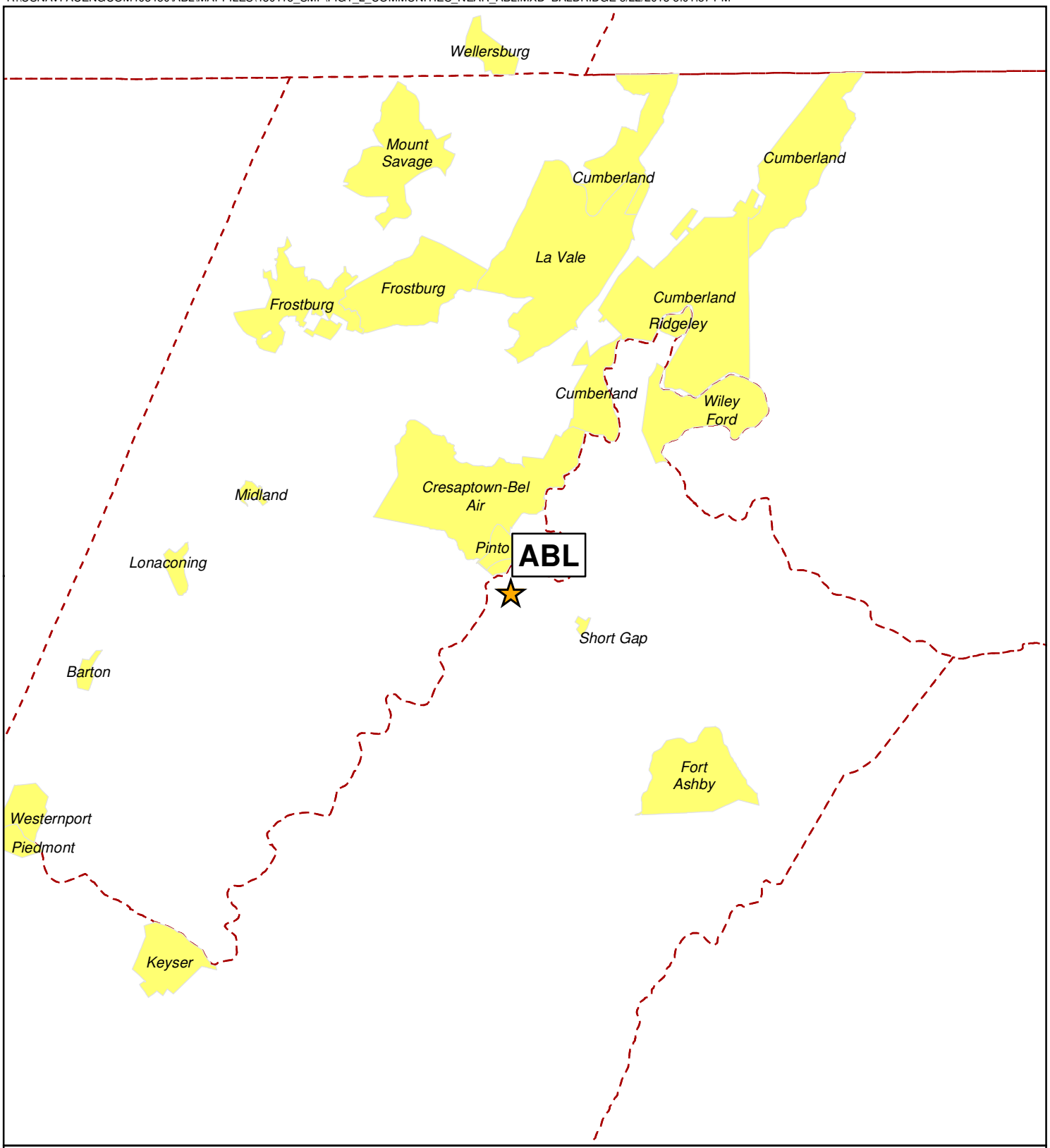

Legend

Counties

Populated Areas

N

0 1.5 3 Miles

1 in = 3 miles

Figure 1-2
Communities Near ABL
Site Management Plan
Allegany Ballistics Laboratory
Rocket Center, West Virginia

CH2MHILL

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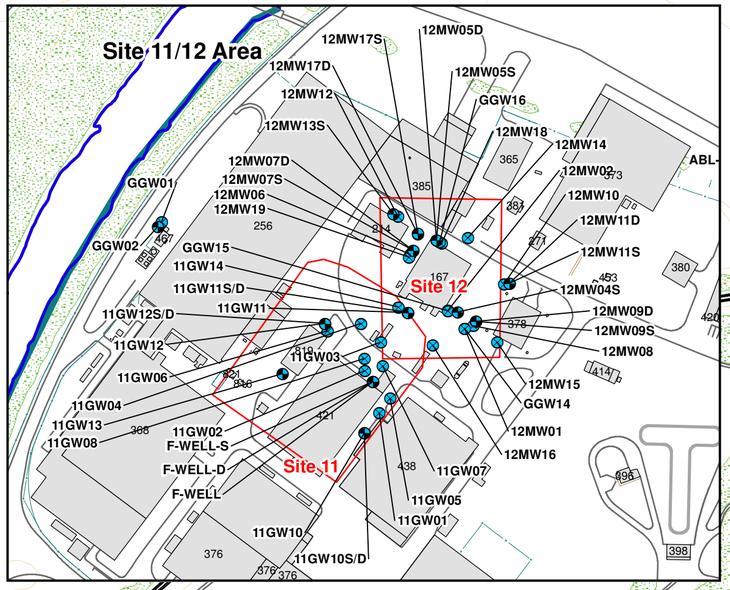

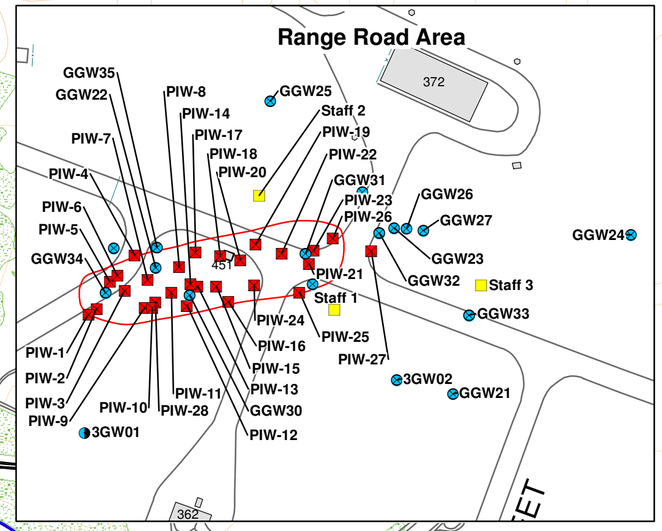

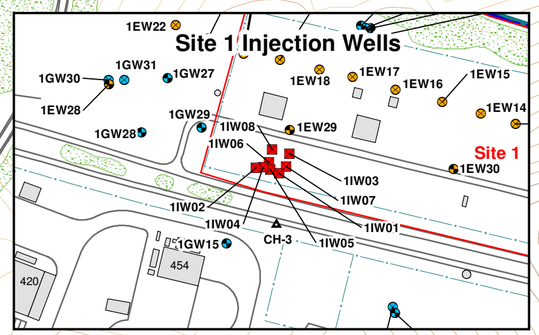

Legend

- Extraction Well - Alluvial
- Extraction Well - Bedrock
- Monitroing Well - Alluvial
- Monitoring Well - Bedrock
- Monitoring Well - Hybrid
- Former Production Well
- Injection Wells
- Survery Control Points
- Gauges
- Active IRP Site
- Closed IRP Site
- Structures
- Vegetation
- Plant 1
- Plant 1 - Undeveloped Area
- Plant 2

N

0 400 800 Feet

1 inch = 400 feet

CH2MHILL

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

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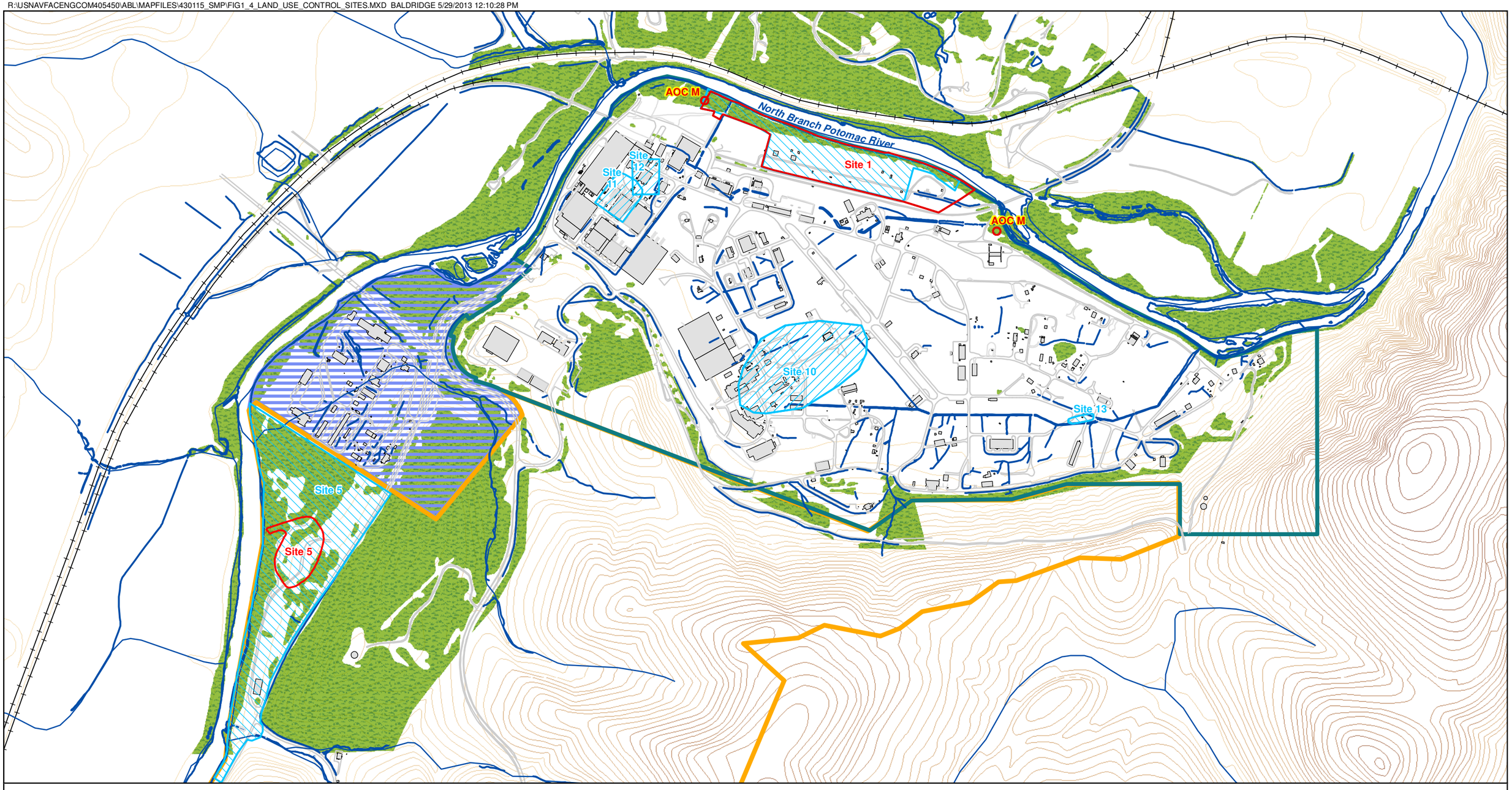

Legend

- 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

N

0 400 800 Feet

1 inch = 800 feet

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

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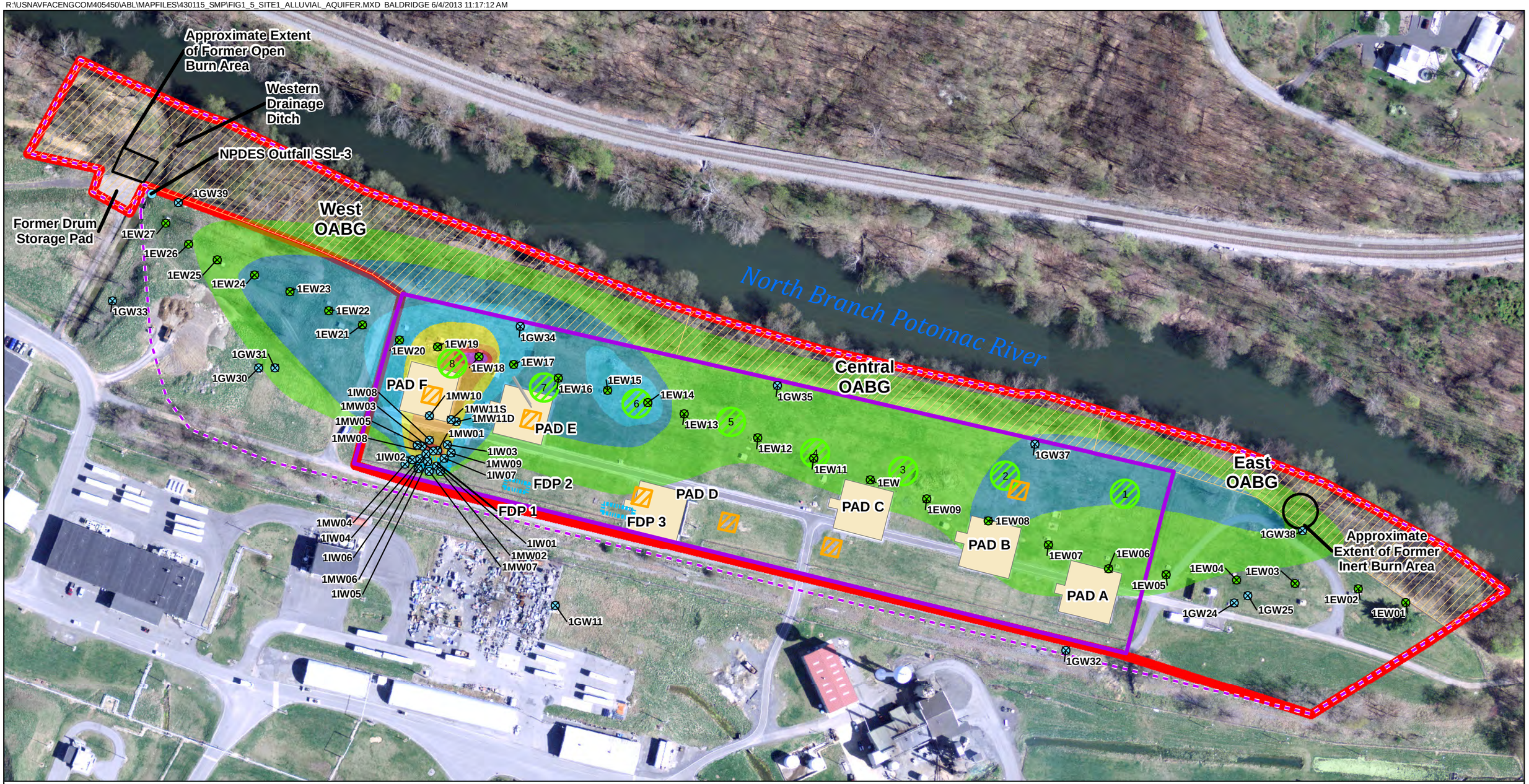

Legend

- Monitoring Well - Alluvial
- Extraction Well - Alluvial
- NPDES Outfall SSL-3
- LUC Boundary
- Former Inert and Open Burn Area
- Former Disposal Pits (FDP)
- Active Burning Ground
- Outside Active Burning Ground (OABG)
- Approximate location of former burn pans
- Former Earthen Burn Pads
- Current Concrete Burn Pads
- Site 1 Boundary

Alluvial TCE Plume - 2012

- 5 - 99 µg/L
- 100 - 999 µg/L
- 1000 - 4999 µg/L
- 5000 - 9999 µg/L
- 10000 - 14999 µg/L
- 15000 - 24999 µg/L
- >25000 µg/L

N

0 75 150 Feet

1 inch = 150 feet

Figure 1-5
Site 1 Alluvial Aquifer
Site Management Plan
Allegany Ballistics Laboratory
Rocket Center, West Virginia

CH2MHILL

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Legend

- Monitoring Well - Bedrock
- Extraction Well - Bedrock
- NPDES Outfall SSL-3
- LUC Boundary
- Former Inert and Open Burn Area
- Former Disposal Pits (FDP)
- Active Burning Ground
- Outside Active Burning Ground (OABG)
- Approximate location of former burn pans
- Former Earthen Burn Pads
- Current Concrete Burn Pads
- Site 1 Boundary

Bedrock TCE Plume - 2013

- 5 - 99 µg/L
- 100 - 999 µg/L
- 1000 - 4999 µg/L

N

0 75 150 Feet

1 inch = 150 feet

Figure 1-6
Site 1 Bedrock Aquifer
Site Management Plan
Allegany Ballistics Laboratory
Rocket Center, West Virginia

CH2MHILL

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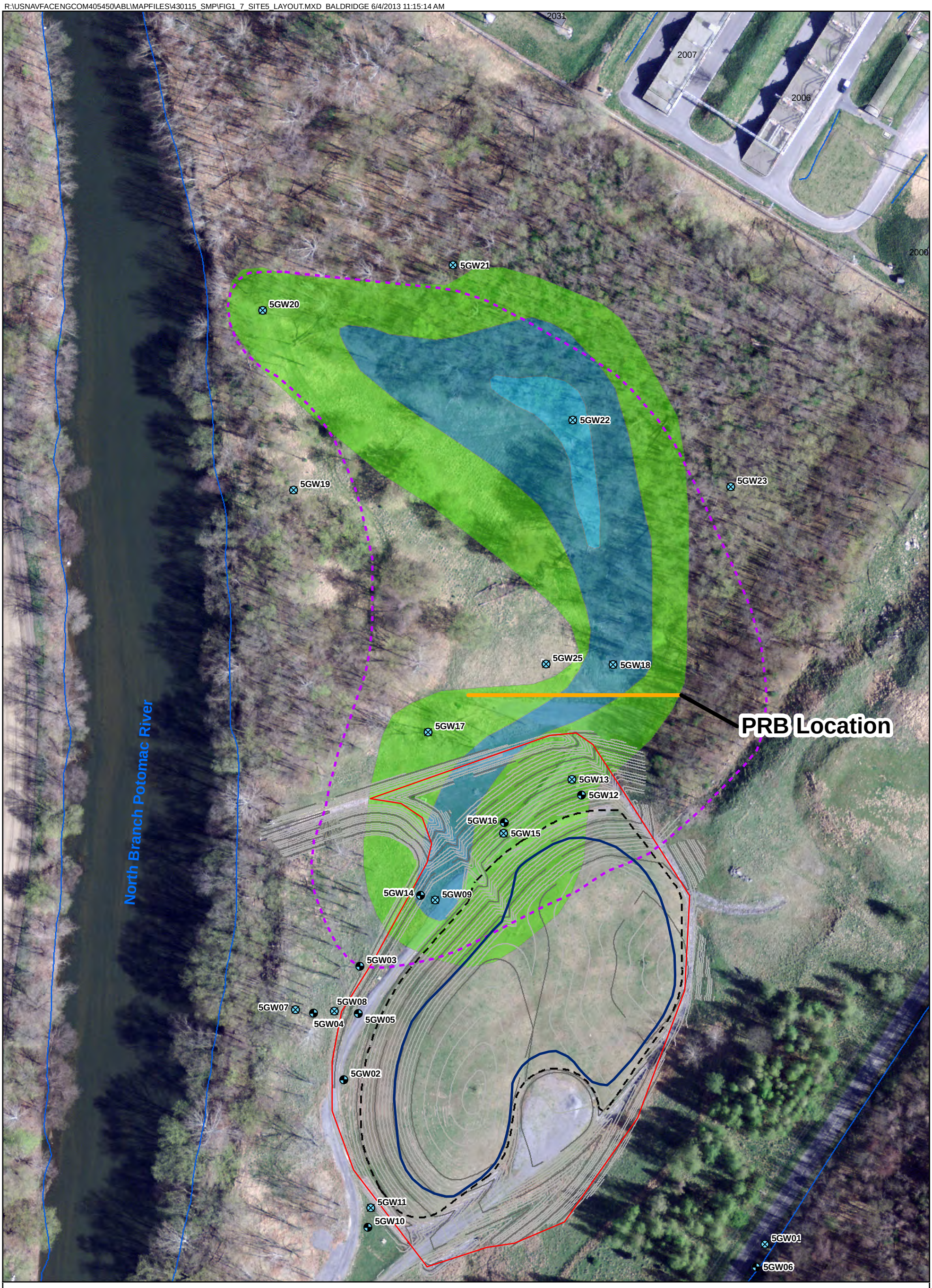


Legend

- Monitoring Well - Alluvial
- Monitoring Well - Bedrock
- PRB (Installed 2006)
- Edge of Waste
- Area of Restricted Groundwater Use
- Site 5 Boundary
- Buildings
- Edge of Landfill Cap
- Water Body

Estimated TCE Plume - 2012

- 5 - 20 µg/L
- 20 - 40 µg/L
- 40 - 60 µg/L

N

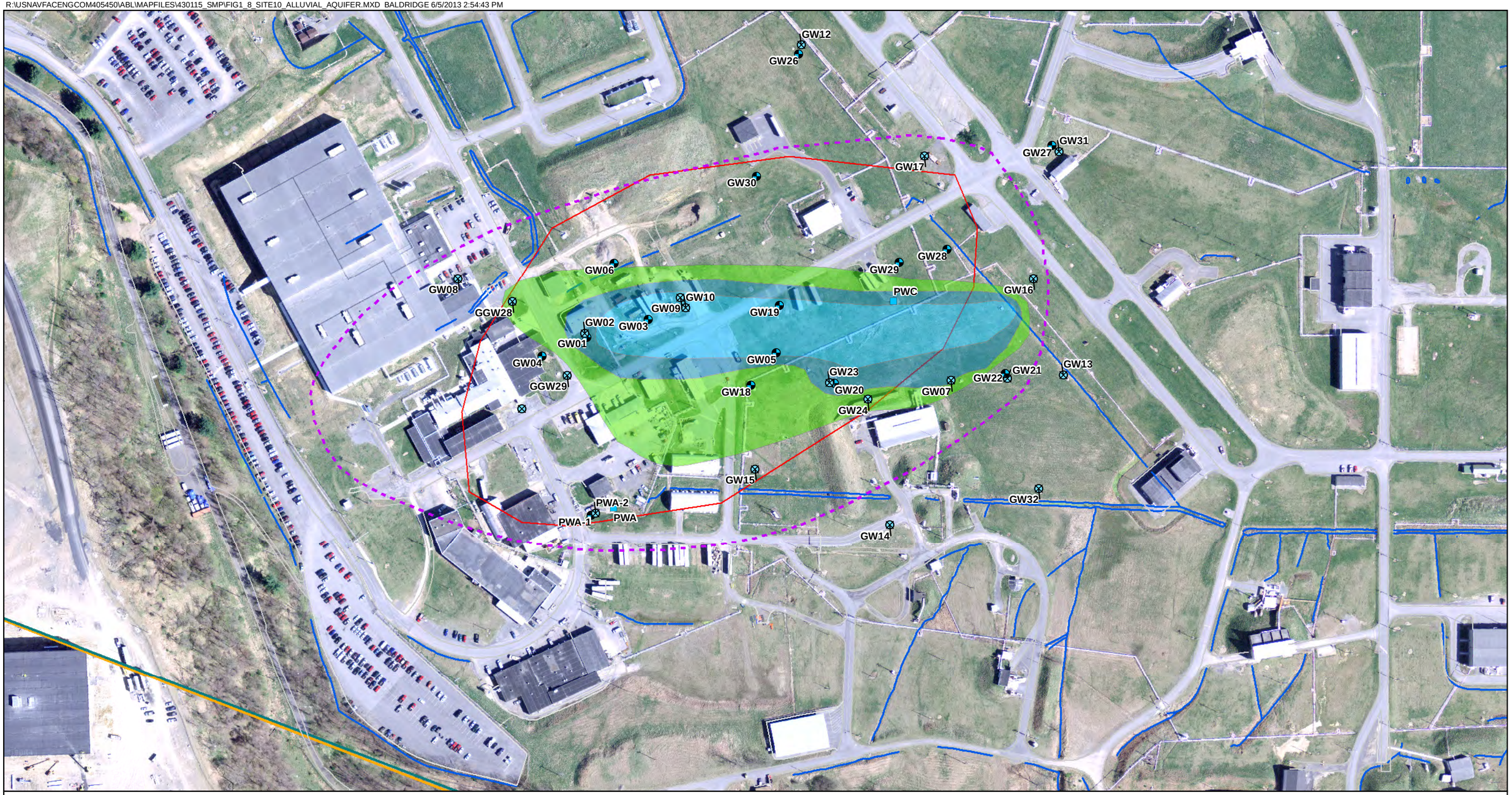
0 50 100 Feet

1 inch = 100 feet

Figure 1-7
Site 5 Layout
Site Management Plan
Allegany Ballistics Laboratory
Rocket Center, West Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\ABL\MAPFILES\430115_SMP\FIG1_8_SITE10_ALLUVIAL_AQUIFER.MXD BALDRIDGE 6/5/2013 2:54:43 PM



Legend

- Former Production Wells
- Monitoring Well - Alluvial
- Monitoring Well - Bedrock
- Roads
- Surface Water
- Area of Restricted Groundwater Use
- Site 10 Boundary
- Plant 1
- Plant 1 - Undeveloped Area

Estimated Alluvial TCE Plume - 2012

- 5 - 25 µg/L
- 25 - 50 µg/L
- 50 - 100 µg/L

N

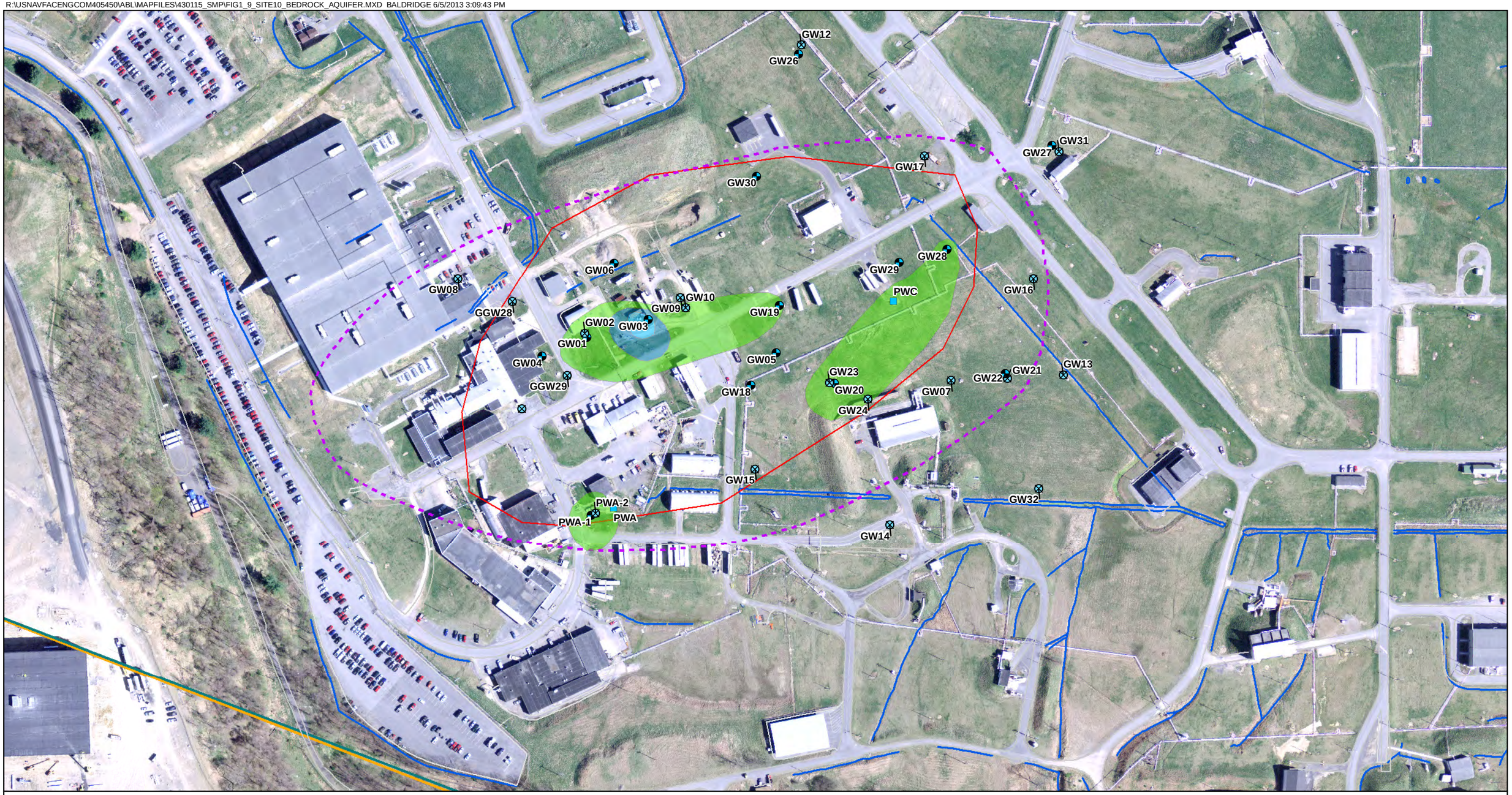
0 100 200 Feet

1 inch = 200 feet

Figure 1-8
Site 10 Alluvial Aquifer
Site Management Plan
Allegany Ballistics Laboratory
Rocket Center, West Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\ABL\MAPFILES\430115_SMP\FIG1_9_SITE10_BEDROCK_AQUIFER.MXD BALDRIDGE 6/5/2013 3:09:43 PM



Legend

- Former Production Wells
- Monitoring Well - Alluvial
- Monitoring Well - Bedrock
- Roads
- Surface Water
- Area of Restricted Groundwater Use
- Site 10 Boundary
- Plant 1
- Plant 1 - Undeveloped Area

Estimated Bedrock TCE Plume - 2012

- 5 - 25 µg/L
- 25 - 50 µg/L
- 50 - 100 µg/L

N

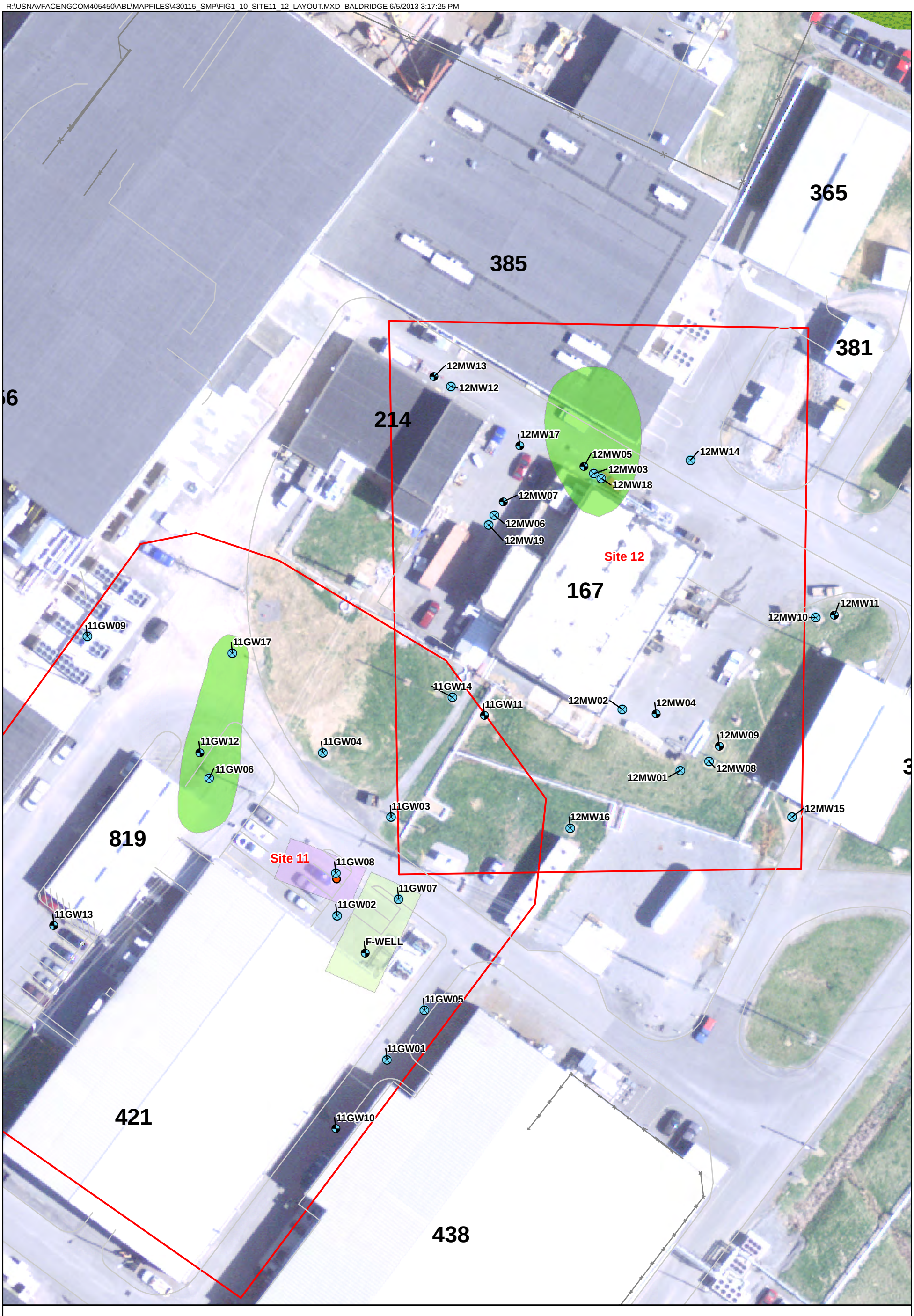
0 100 200 Feet

1 inch = 200 feet

Figure 1-9
Site 10 Bedrock Aquifer
Site Management Plan
Allegany Ballistics Laboratory
Rocket Center, West Virginia

CH2MHILL

R:\USNAVFACENGCOM405450\ABL\MAPFILES\430115_SMP\FIG1_10_SITE11_12_LAYOUT.MXD BALDRIDGE 6/5/2013 3:17:25 PM



Legend

- Bedrock Monitoring Well
- Alluvial Monitoring Well
- Former Oil Pit
- Former Building 215
- Former Diked Fuel Storage Area
- Site Boundary

Estimated Alluvial TCE Plume (Baseline event June 2012)

- 5 - 50 µg/L

Note

COCs were not detected in the Bedrock aquifer during the June 2012 Baseline sampling event.

N

0 25 50

Feet

1 inch = 50 feet

Figure 1-10
Sites 11 and 12 Layout
Site Management Plan
Allegany Ballistics Laboratory
Rocket Center, West Virginia

CH2MHILL

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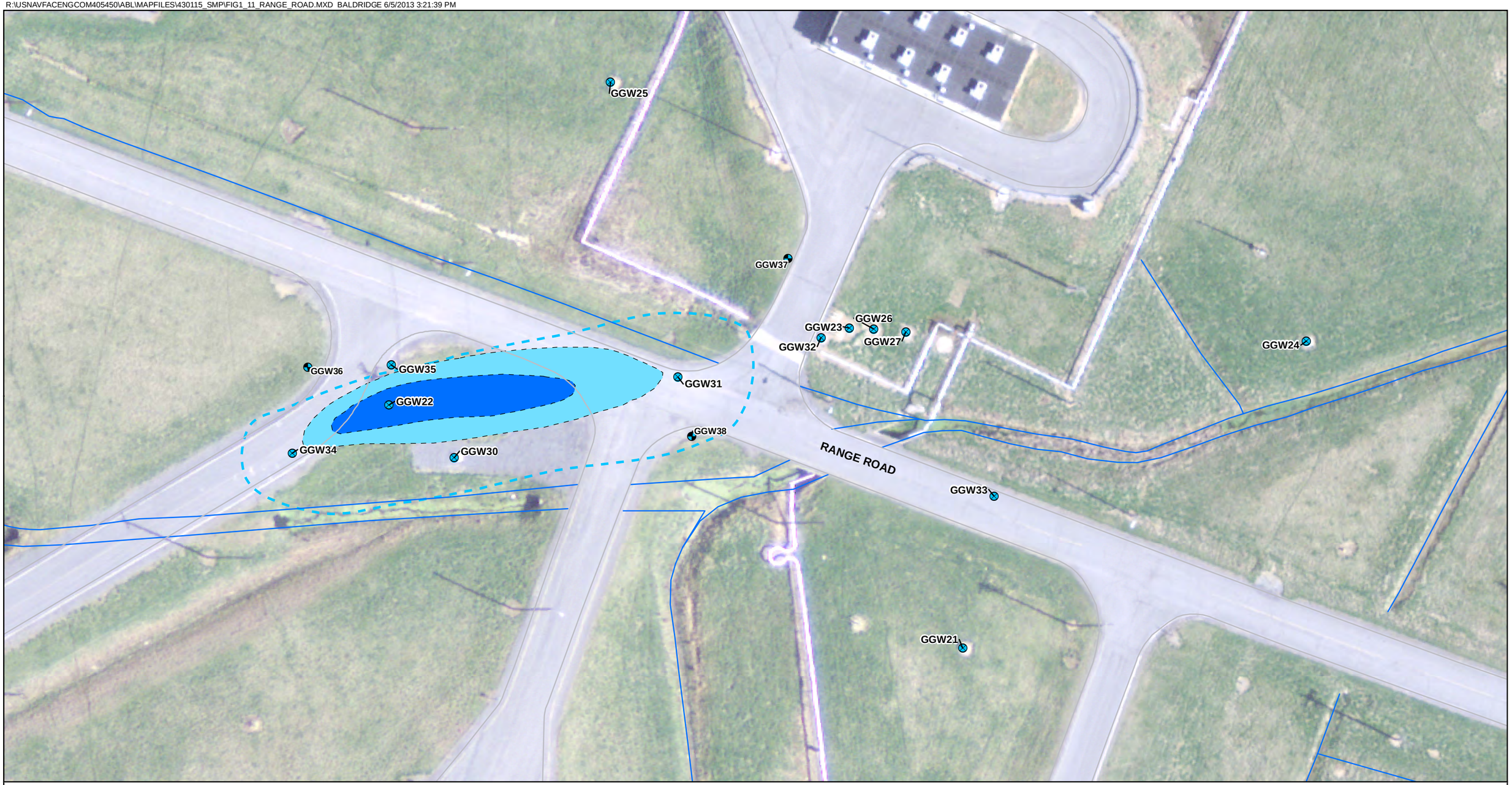


Legend

- Bedrock Monitoring Well
- Alluvial Monitoring Well
- 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

N

0 20 40 Feet

1 inch = 40 feet

Figure 1-11
Site 13 Range Road Area
Site Management Plan
Allegany Ballistics Laboratory
Rocket Center, West Virginia

CH2MHILL

SECTION 2

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.

2.1 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.

2.1.1 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 five ABL sites: Site 1 (groundwater), Site 5 (landfill contents and surface soil), Site 5 (groundwater), Site 10 (groundwater), and Sites 11 and 12 groundwater.

2.1.2 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.

2.1.3 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 (LTM) Plan and an Operation and Maintenance (O&M) Plan also are prepared for each remedial action site.

2.1.4 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.

2.2 FFA CERCLA Integration Process

The 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.

2.2.1 Area of Concern (AOC) Evaluation

Areas identified as 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.

2.2.2 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.

SECTION 3

Unit Descriptions and Tracking Matrix

This SMP is intended to cover active units (i.e., IRP sites, SSAs, and AOCs) listed in the FFA. The site-specific information provided in this section include a description of current and planned activities. 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. **Figure 1-3** shows the locations of all monitoring wells at the ABL facility.

3.1 Installation Restoration Program Sites

The IRP sites currently in the CERCLA remedial process and a discussion of ongoing work and planned activities of these sites are described below. The current status of IRP Sites is also provided on Table 1-1. The fourth Five-Year Review report, to evaluate the effectiveness of remedies in place at Sites 1, 5, 10, 11 and 12 is currently being developed and will be finalized in September 2013.

3.1.1 Site 1: Northern Riverside Waste Disposal Area

Site 1 Groundwater

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. 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. Currently, treated groundwater is utilized by the ABL boiler plant, with excess water being discharged to the river.

In accordance with the *Final Sampling and Analysis Plan for Sites 1, 5, and 10* (CH2M HILL, 2011), LTM includes sampling a subset of wells on a tri-quarterly basis, with an expanded set of wells sampled during the event that coincides with each Five-Year Review. Bi-annual biota sampling, monthly hydraulic head monitoring, and monthly influent and effluent monitoring of the treatment system also continues to be conducted. Operations and maintenance of the groundwater treatment plant consist of maintenance of the plant components and tracking of additional preventive maintenance, air-stripper emissions calculations based on the VOC content of the Groundwater Treatment Plant (GWTP) influent and effluent, monthly and quarterly sampling and analysis of GWTP influent and effluent (conducted under the LTM plan), and inspection and maintenance of groundwater extraction wells to ensure that they are capable of meeting pumping rates and other required set points.

The next two LTM sampling events are expected to take place in June 2013 and March 2014. A combined Five Year Review Report, which will evaluate the effectiveness of the remedy, is expected to be finalized in September 2013.

O&M is conducted at Site 1 and the GWTP and consist of the following:

- Maintenance of the treatment plant components and tracking of additional preventive maintenance
- Air-stripper emissions calculations based on the VOC content of the GWTP influent and effluent
- Monthly and quarterly sampling and analysis of GWTP influent and effluent (conducted under the LTM plan)
- Inspection and maintenance of groundwater extraction wells to ensure that they are capable of meeting pumping rates and other required set points

Site 1 Soil

A Feasibility Study report for Site 1 Soil is currently being developed to address the remaining 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. It was determined that additional data collection is necessary to refine assumptions in the FS prior to implementation of a final remedy, therefore a pre-design soil sampling Uniform Federal Policy Sampling and Analysis Plan (UFP SAP) is currently being developed for an upcoming sampling event. If soil removal is a chosen component of the final remedy, and the dimensions of the target remediation areas have been sufficiently defined as part of the sampling efforts, the soil data will be used as post-removal confirmation data. Soil sampling is anticipated to take place in August 2013. A non-time critical removal action (NTCRA) consisting of excavation and proper off-site soil disposal of Former Disposal Pits 1 and 3 (FDP 1 and FDP 3) located within the Active Burning Grounds at Site 1 are planned to begin in August 2013. The soil excavation will be to the water table. A pre-construction event took place in April 2013, which included geotechnical sampling and pre-excavation sidewall sampling.

3.1.2 Site 5: Inert (Non-Ordnance) Landfill

The construction of the landfill cap for Site 5 soil was completed in September 1997 and a LTM program for groundwater was implemented as part of the operations and maintenance of the landfill cap remedy. The groundwater remedy was implemented in June 2006 to treat alluvial groundwater downgradient of the Site 5 landfill. The PRB wall to treat alluvial groundwater downgradient of the landfill was installed in June 2006.

LTM is currently performed in accordance with the *Final Sampling and Analysis Plan for Sites 1, 5, and 10* (CH2M HILL, 2011), the following components of LTM are conducted routinely:

- Landfill Gas Sampling (Quarterly and Annually) – Landfill gas sampling for methane, lower explosive limit, and oxygen and carbon dioxide is being performed on a quarterly basis at seven locations (four landfill gas monitoring wells and three landfill gas vents) in order to determine whether explosive gas is migrating toward nearby facility structures or beyond the facility property boundary. Emissions of VOCs are also measured annually at the three landfill gas vents to ensure that emissions do not exceed 3,000 pounds per year.
- Leachate Monitoring - Visual leachate monitoring is conducted on a quarterly basis to assess the presence of any leachate from the landfill.
- Stormwater Sampling – Stormwater runoff associated with the landfill is monitored on a quarterly basis (as precipitation events allow) with the collection of precipitation-dependent samples at the North Branch Potomac River outfall and analyzed for general chemistry, metals, and VOCs.
- Groundwater Sampling – Groundwater monitoring is conducted at Site 5 to evaluate the effectiveness of both the landfill cap (OU-1) and the PRB wall (OU-2).
- Groundwater Hydraulic Head Monitoring – Groundwater elevation data were collected and evaluated for several years after the installation of the PRB to confirm that the PRB wall was not adversely affecting the potentiometric surface and groundwater flow direction in the alluvial aquifer.

O&M activities of the site and landfill cap are also required at site 5 and consist of:

- Inspection for signs of settling, subsidence, displacement, and erosion
- Drainage system inspection for signs of standing water, erosion, and obstructions
- Inspection of the groundwater monitoring system, landfill gas venting system, and landfill gas monitoring well(s) for signs of damage and tampering
- Inspection of signs for damage, fading, and viewing obstructions
- Roadway inspection for signs of erosion, rutting, physical damage, and obstructions

3.1.3 Site 10: Former TCE Still at Building 157

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.

In accordance with the *Final Sampling and Analysis Plan for Sites 1, 5, and 10* (CH2M HILL, 2011) water level measurements are collected from the alluvial and bedrock extraction and monitoring wells in order to evaluate the effectiveness of the system to hydraulically contain contaminated portions of the alluvial and bedrock aquifers in order to prevent further migration of contaminated groundwater. Measurements are collected manually on a monthly basis and prior to each groundwater LTM sampling event. In addition, groundwater samples are collected on a tri-quarterly basis from select monitoring wells, with an expanded set of wells sampled during the event that coincides with each Five-Year Review. The next two LTM sampling events are expected to take place in June 2013 and March 2014.

O&M is conducted routinely at Site 10 and the GWTP and consist of inspection and maintenance of groundwater extraction wells to ensure that they are capable of meeting pumping rates and other required set points and visual inspection of signage.

3.1.4 Site 11: Production Well "F" (F-Well)

In November 2012 injection of ERD in the alluvial aquifer took place at Site 11. The site is currently in quarterly monitoring of the alluvial and bedrock monitoring wells through November 2013 to assess the effectiveness of the remedy. Following review of bedrock groundwater monitoring data, the Navy, USEPA, and WVDEP will evaluate if injection of ERD substrate is necessary in the bedrock aquifer. A LTM plan will be developed in FY2014 and it is anticipated that at that time annual LTM will be conducted at Site 11.

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

In November 2012 injection of ERD in the alluvial aquifer took place at Site 12. The site is currently in quarterly monitoring of the alluvial and bedrock monitoring wells through November 2013 to assess the effectiveness of the remedy. Following review of bedrock groundwater monitoring data, the Navy, USEPA, and WVDEP will evaluate if injection of ERD substrate is necessary in the bedrock aquifer. A LTM plan will be developed in FY2014 and it is anticipated that at that time annual LTM will be conducted at Site 12.

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

The UFP SAP for remedial investigation at Site 13 is currently being revised to conduct additional sampling to further evaluate the nature and extent of site related contamination in groundwater and to determine whether contaminant levels pose a potentially unacceptable risk to human health or the environment. The UFP SAP revision is anticipated to be finalized in October 2013 and the RI sampling event to evaluate the nature and extent of contamination is anticipated to begin in November 2013. Following the RI evaluation a PRAP and ROD are anticipated to take place in FY 2015.

3.1.7 Building 8/Lab Row Area

The closure report for Building 8/Lab Row is currently being developed. No additional investigation is planned at this time.

SECTION 4

Site Management Plan Schedules

This section presents schedules for response actions planned from FY 2014 through FY 2019. 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, Maryland Department of Environment (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 Fiscal Year (FY) 2014 are summarized in **Table 4-2**. The site specific schedules are provided in Figures 4-1 through 4-5. 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
Allegany Ballistics Laboratory
Site Management Plan Summary Schedule

	2013			2014											
	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			June 2013 LTM Report									March 2014 LTM Report			
Site 1 Soil	Final Feasibility Study		Draft PRAP	Draft Pre-Design Data Collection Memo 30% Remedial Design Draft Site 1 FDP Construction Completion Report	Draft ROD Draft Final Site 1 FDP Construction Completion Report	Final PRAP 90% Remedial Design	Final ROD Final Pre-Design Data Collection Memo Draft Remedial Action WP Final Site 1 FDP Construction Completion Report	Draft Remedial Action Work Plan	Final Remedial Design 100%		Final Remedial Action WP				Remedial Action Completion Report
Site 11 and Site 12							Draft Remedial Action Evaluation Memorandum		Final Remedial Action Evaluation Memorandum				Draft Sites 11 and 12 LTM Plan		
Site 13			Final UFP SAP								Draft RI/FS			Final RI/FS	Draft PRAP
Site Management Plan and Land Use Controls							Draft Sites 11 and 12 LUC RD		Final Sites 11 and 12 LUC RD Draft ABL 2014 SMP		Final ABL 2014 SMP				
5 Year ROD Review															
Basewide Vapor Intrusion Assessment															

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

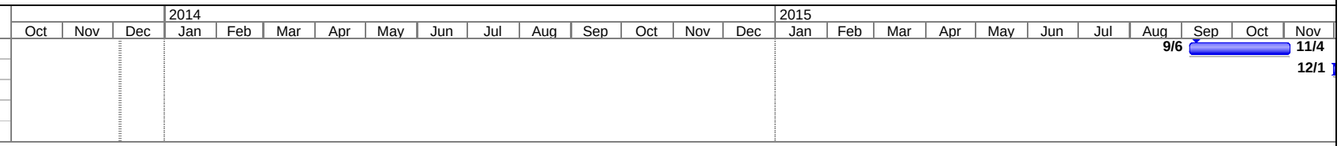
ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	Site 1 Soil	1909 days	Tue 9/10/13	Sat 12/1/18		
2	Feasibility Study	50 days	Tue 10/1/13	Tue 11/19/13		
3	Submit Response to Comments Package	0 days	Mon 10/7/13	Mon 10/7/13		
4	Government Shutdown Period	16 days	Tue 10/1/13	Wed 10/16/13		
5	Obtain approval to finalize	27 days	Thu 10/17/13	Tue 11/12/13	4	
6	Submit Final FS	7 days	Wed 11/13/13	Tue 11/19/13	5	
7	Pre-Design Data Collection	208 days	Tue 9/10/13	Sat 4/5/14		
8	Field Work	91 days	Tue 9/10/13	Mon 12/9/13		
13	Reporting	117 days	Tue 12/10/13	Sat 4/5/14		
14	Prepare and Submit Draft TM	45 days	Tue 12/10/13	Thu 1/23/14	12	
15	Navy and Regulatory review	45 days	Fri 1/24/14	Sun 3/9/14	14	
16	Responses to Comments	10 days	Mon 3/10/14	Wed 3/19/14	15	
17	Prepare and Submit redlined TM	7 days	Thu 3/20/14	Wed 3/26/14	16	
18	Obtain approval to finalize	7 days	Thu 3/27/14	Wed 4/2/14	17	
19	Submit final TM	3 days	Thu 4/3/14	Sat 4/5/14	18	
20	PRAP (expedited)	155 days	Thu 10/17/13	Thu 3/20/14		
21	Prepare and Submit Pre-Draft PRAP	47 days	Thu 10/17/13	Mon 12/2/13	4	
22	Navy and Regulatory (EPA, EPA Legal, WVDEP) Review	22 days	Tue 12/3/13	Tue 12/24/13	21	
23	Christmas Holiday/New Years Holiday	9 days	Tue 12/24/13	Wed 1/1/14		
24	Regulatory Review (EPA, EPA Legal, WVDEP) cont'd	9 days	Thu 1/2/14	Fri 1/10/14	23	
25	Prepare and Submit Draft Final PRAP	10 days	Sat 1/11/14	Mon 1/20/14	24	
26	Obtain approval to finalize	7 days	Tue 1/21/14	Mon 1/27/14	25	
27	Public Notice	1 day	Tue 1/28/14	Tue 1/28/14	26	
28	Public Review and Comment/Public Meeting	45 days	Wed 1/29/14	Fri 3/14/14	27	
29	Incorporate any public comments	3 days	Sat 3/15/14	Mon 3/17/14	28	
30	Submit Final PRAP	3 days	Tue 3/18/14	Thu 3/20/14	29	
31	ROD (expedited)	184 days	Wed 11/13/13	Thu 5/15/14		
32	Prepare and Submit Pre-Draft ROD	45 days	Wed 11/13/13	Fri 12/27/13	5	
33	Navy and Navy Legal Review	30 days	Sat 12/28/13	Sun 1/26/14	32	
34	Response to Comments	7 days	Mon 1/27/14	Sun 2/2/14	33	
35	Identification and Determination of Potential ARARs	7 days	Mon 2/3/14	Sun 2/9/14	34	
36	Prepare and Submit Draft ROD	14 days	Mon 2/10/14	Sun 2/23/14	35	
37	Regulatory Review (EPA, WVDEP)	30 days	Mon 2/24/14	Tue 3/25/14	36	
38	Prepare and submit Draft ROD	21 days	Wed 3/26/14	Tue 4/15/14	37	
39	Regulatory Legal Review (EPA, WVDEP)	30 days	Wed 4/16/14	Thu 5/15/14	38	
40	Prepare and Submit Draft Final ROD	10 days	Sat 3/15/14	Mon 3/24/14	28	
41	Obtain approval to finalize	10 days	Tue 3/25/14	Thu 4/3/14	40	
42	Submit Final ROD	3 days	Fri 4/4/14	Sun 4/6/14	41	
43	Signed Final ROD for Site 1 Soil	30 days	Mon 4/7/14	Tue 5/6/14	42	
44	Public Notice	3 days	Wed 5/7/14	Fri 5/9/14	43	
45	Site 1 Soil Remedial Design for ABG and OABG	164 days	Sat 12/28/13	Mon 6/9/14		
46	Prepare and Submit Draft Remedial Design (30%)	30 days	Sat 12/28/13	Sun 1/26/14	32	
47	Navy Review (NAVSEA, NAVFAC, ATK) - expedited	30 days	Mon 1/27/14	Tue 2/25/14	46	
48	Response to Comments	14 days	Wed 2/26/14	Tue 3/11/14	47	
49	Submit Draft Remedial Design (30%)	5 days	Wed 3/12/14	Sun 3/16/14	48	
50	Regulatory Review	30 days	Mon 3/17/14	Tue 4/15/14	49	
51	Responses to Comments	13 days	Wed 4/16/14	Mon 4/28/14	50	
52	Prepare and Submit Pre-Final Remedial Design (90%)	45 days	Fri 1/24/14	Sun 3/9/14	14	
53	Regulatory Review (EPA, WVDEP)	45 days	Mon 3/10/14	Wed 4/23/14	52	
54	Response to Comments	10 days	Thu 4/24/14	Sat 5/3/14	53	
55	Prepare and Submit Redlined Final Remedial Design (100%)	21 days	Sun 5/4/14	Sat 5/24/14	54	
56	Obtain approval to finalize	10 days	Sun 5/25/14	Tue 6/3/14	55	
57	Submit Final Remedial Design (100%)	3 days	Wed 6/4/14	Fri 6/6/14	56	
58	Public Notice	3 days	Sat 6/7/14	Mon 6/9/14	57	
59	Site 1 Soil Remedial Action Work Plans	166 days	Mon 3/10/14	Fri 8/22/14		
60	Procurement of Remedial Action Contractor	45 days	Mon 3/10/14	Wed 4/23/14	52	
61	Draft Remedial Action Work Plan	30 days	Thu 4/24/14	Fri 5/23/14	60	
62	Navy and Regulatory Review	60 days	Sat 5/24/14	Tue 7/22/14	61	
63	Final Remedial Action Work Plan	21 days	Wed 7/23/14	Tue 8/12/14	62	
64	Obtain approval to finalize	7 days	Wed 8/13/14	Tue 8/19/14	63	
65	Submit Final Remedial Action Work Plan	3 days	Wed 8/20/14	Fri 8/22/14	64	
66	Site 1 Soil Remedial Action (ABG)	45 days	Mon 9/22/14	Wed 11/5/14	65FS+30 days	
67	Site 1 Soil Remedial Action (OABG)	180 days	Tue 3/10/15	Sat 9/5/15		

Project: CTO-002 Site 1 Soil Remediat
Date: Thu 12/5/13

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
Progress | Summary | Rolled Up Milestone | Split | Project Summary | Deadline

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

ID	Task Name	Duration	Start	Finish	Predecessors	Resource Names
68	Site 1 Construction Completion Report	60 days	Sun 9/6/15	Wed 11/4/15	67	
69	Annual Site Inspection 2015	1 day	Tue 12/1/15	Tue 12/1/15		
70	Annual Site Inspection 2016	1 day	Thu 12/1/16	Thu 12/1/16		
71	Annual Site Inspection 2017	1 day	Fri 12/1/17	Fri 12/1/17		
72	Annual Site Inspection 2018	1 day	Sat 12/1/18	Sat 12/1/18		

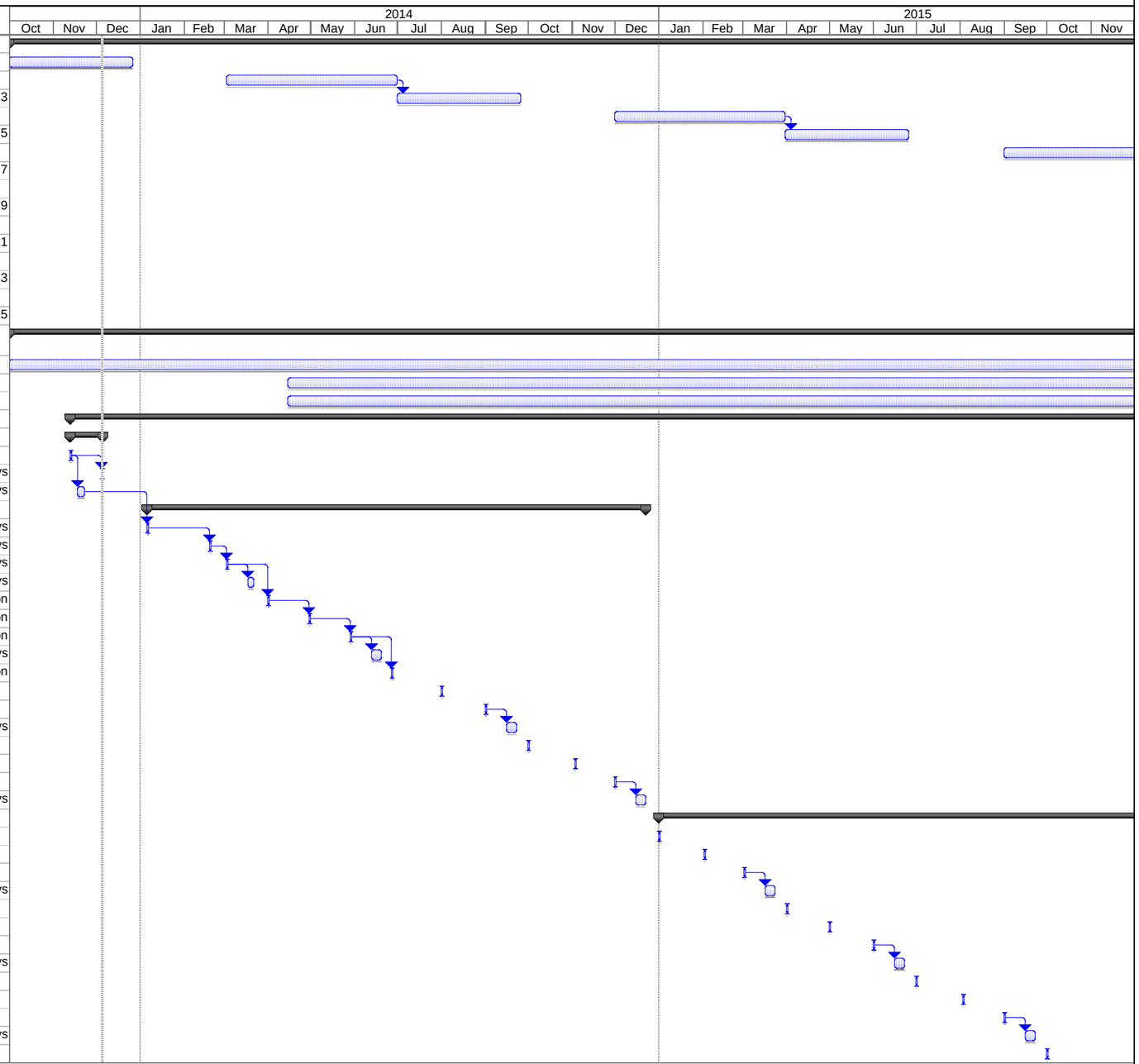


Project: CTO-002 Site 1 Soil Remediat
Date: Thu 12/5/13

Task | Milestone | Rolled Up Task | Rolled Up Progress | External Tasks | Group By Summary
Progress | Summary | Rolled Up Milestone | Split | Project Summary | Deadline

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

ID	Task Name	Duration	Start	Finish	Predecessors
1	**ABL O&M and LTM**	**1433 days**	**Tue 10/1/13**	**Thu 3/28/19**	
2	June 2013 LTM Report	63 days	Tue 10/1/13	Thu 12/26/13	
3	Sites 1, 5, 10 LTM Sampling (March 2014)	86 days	Mon 3/3/14	Mon 6/30/14	
4	March 2014 LTM Report	63 days	Tue 7/1/14	Thu 9/25/14	3
5	Sites 1, 5, 10 LTM Sampling (December 2014)	86 days	Mon 12/1/14	Mon 3/30/15	
6	December 2014 LTM Report	63 days	Tue 3/31/15	Thu 6/25/15	5
7	Sites 1, 5, 10 LTM Sampling (September 2015)	86 days	Tue 9/1/15	Tue 12/29/15	
8	September 2015 LTM Report	63 days	Wed 12/30/15	Fri 3/25/16	7
9	Sites 1, 5, 10 LTM Sampling (June 2016)	86 days	Wed 6/1/16	Wed 9/28/16	
10	June 2016 LTM Report	63 days	Thu 9/29/16	Mon 12/26/16	9
11	Sites 1, 5, 10 LTM Sampling (March 2017)	86 days	Wed 3/1/17	Wed 6/28/17	
12	March 2017 LTM Report	63 days	Thu 6/29/17	Mon 9/25/17	11
13	Sites 1, 5, 10 LTM Sampling (December 2017)	86 days	Fri 12/1/17	Fri 3/30/18	
14	December 2017 LTM Report	63 days	Mon 4/2/18	Wed 6/27/18	13
15	Sites 1, 5, 10 LTM Sampling (September2018)	86 days	Mon 9/3/18	Mon 12/31/18	
16	September 2018 LTM Report	63 days	Tue 1/1/19	Thu 3/28/19	15
17	**Groundwater Treatment Plant Operations and Maintenance and Routine Optimization**	**1304 days**	**Tue 10/1/13**	**Fri 9/28/18**	
18	Routine Monthly GWTP Optimization	1304 days	Tue 10/1/13	Fri 9/28/18	
19	GWTP Process Control Replacement	644 days	Tue 4/15/14	Fri 9/30/16	
20	GWTP Correction Maintenance Activities	644 days	Tue 4/15/14	Fri 9/30/16	
21	**Sites 1 & 10 GWTP Monthly O&M**	**1268 days**	**Wed 11/13/13**	**Fri 9/21/18**	
22	**2013 Monthly O&M**	**17 days**	**Wed 11/13/13**	**Thu 12/5/13**	
23	Collect November 2013 influent/effluent samples from GWTP	1 day	Wed 11/13/13	Wed 11/13/13	
24	Collect December 2013 influent/effluent samples from GWTP	1 day	Thu 12/5/13	Thu 12/5/13	23FS+15 days
25	Collect October-December 2013 quarterly toxicity samples	5 days	Mon 11/18/13	Fri 11/22/13	23FS+2 days
26	**2014 Monthly O&M**	**251 days**	**Mon 1/6/14**	**Mon 12/22/14**	
27	Collect January 2014 influent/effluent samples from GWTP	1 day	Mon 1/6/14	Mon 1/6/14	25FS+30 days
28	Collect February 2014 influent/effluent samples from GWTP	1 day	Wed 2/19/14	Wed 2/19/14	27FS+31 days
29	Collect March 2014 influent/effluent samples from GWTP	1 day	Mon 3/3/14	Mon 3/3/14	28FS+7 days
30	Collect January-March 2014 quarterly toxicity samples	4 days	Tue 3/18/14	Fri 3/21/14	29FS+10 days
31	Collect April 2014 influent/effluent samples from GWTP	1 day	Tue 4/1/14	Tue 4/1/14	29FS+1 mon
32	Collect May 2014 influent/effluent samples from GWTP	1 day	Wed 4/30/14	Wed 4/30/14	31FS+1 mon
33	Collect June 2014 influent/effluent samples from GWTP	1 day	Thu 5/29/14	Thu 5/29/14	32FS+1 mon
34	Collect April-June 2014 quarterly toxicity samples	5 days	Fri 6/13/14	Thu 6/19/14	33FS+10 days
35	Collect July 2014 influent/effluent samples	1 day	Fri 6/27/14	Fri 6/27/14	33FS+1 mon
36	Collect August 2014 influent/effluent samples from GWTP	1 day	Fri 8/1/14	Fri 8/1/14	
37	Collect September2014 influent/effluent samples from GWTP	1 day	Mon 9/1/14	Mon 9/1/14	
38	Collect July-September 2014 quarterly toxicity samples	5 days	Tue 9/16/14	Mon 9/22/14	37FS+10 days
39	Collect October 2014 influent/effluent samples from GWTP	1 day	Wed 10/1/14	Wed 10/1/14	
40	Collect November 2014 influent/effluent samples from GWTP	1 day	Mon 11/3/14	Mon 11/3/14	
41	Collect December 2014 influent/effluent samples from GWTP	1 day	Mon 12/1/14	Mon 12/1/14	
42	Collect October-December 2014 quarterly toxicity samples	5 days	Tue 12/16/14	Mon 12/22/14	41FS+10 days
43	**2015 Monthly O&M**	**254 days**	**Thu 1/1/15**	**Tue 12/22/15**	
44	Collect January 2015 influent/effluent samples from GWTP	1 day	Thu 1/1/15	Thu 1/1/15	
45	Collect February 2015 influent/effluent samples from GWTP	1 day	Mon 2/2/15	Mon 2/2/15	
46	Collect March 2015 influent/effluent samples from GWTP	1 day	Mon 3/2/15	Mon 3/2/15	
47	Collect January-March 2015 quarterly toxicity samples	5 days	Tue 3/17/15	Mon 3/23/15	46FS+10 days
48	Collect April 2015 influent/effluent samples from GWTP	1 day	Wed 4/1/15	Wed 4/1/15	
49	Collect May 2015 influent/effluent samples from GWTP	1 day	Fri 5/1/15	Fri 5/1/15	
50	Collect June 2015 influent/effluent samples from GWTP	1 day	Mon 6/1/15	Mon 6/1/15	
51	Collect April-June 2015 quarterly toxicity samples	5 days	Tue 6/16/15	Mon 6/22/15	50FS+10 days
52	Collect July 2015 influent/effluent samples	1 day	Wed 7/1/15	Wed 7/1/15	
53	Collect August 2015 influent/effluent samples from GWTP	1 day	Mon 8/3/15	Mon 8/3/15	
54	Collect September2015 influent/effluent samples from GWTP	1 day	Tue 9/1/15	Tue 9/1/15	
55	Collect July-September 2015 quarterly toxicity samples	5 days	Wed 9/16/15	Tue 9/22/15	54FS+10 days
56	Collect October 2015 influent/effluent samples from GWTP	1 day	Thu 10/1/15	Thu 10/1/15	



Project: ABL O&M
Date: Thu 12/5/13

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
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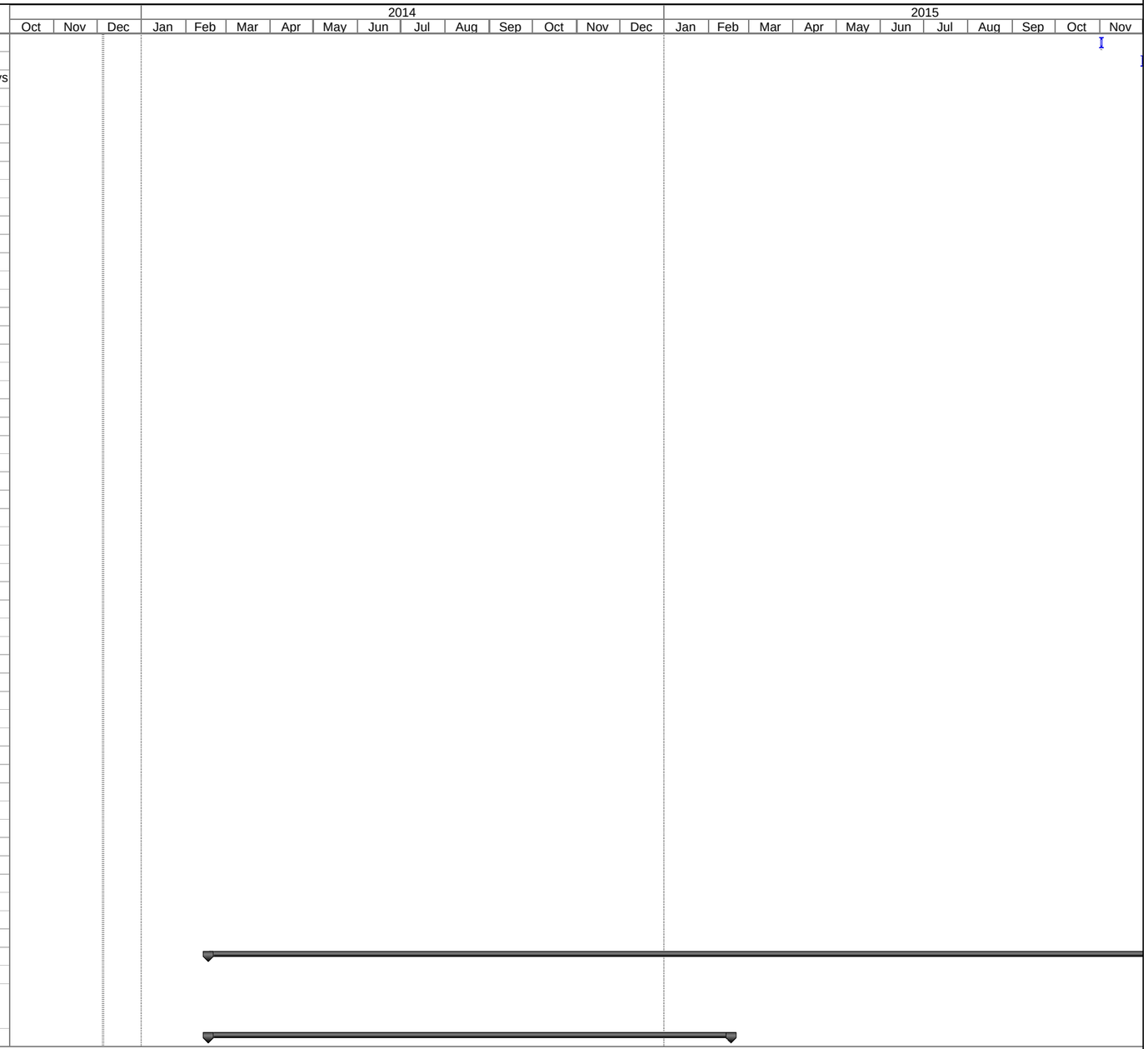
Split

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

ID	Task Name	Duration	Start	Finish	Predecessors
57	Collect November 2015 influent/effluent samples from GWTP	1 day	Mon 11/2/15	Mon 11/2/15	
58	Collect December 2015 influent/effluent samples from GWTP	1 day	Tue 12/1/15	Tue 12/1/15	
59	Collect October-December 2015 quarterly toxicity samples	5 days	Wed 12/16/15	Tue 12/22/15	58FS+10 days
60	**2016 Monthly O&M**	**255 days**	**Fri 1/1/16**	**Thu 12/22/16**	
61	Collect January 2016 influent/effluent samples from GWTP	1 day	Fri 1/1/16	Fri 1/1/16	
62	Collect February 2016 influent/effluent samples from GWTP	1 day	Tue 2/2/16	Tue 2/2/16	
63	Collect March 2016 influent/effluent samples from GWTP	1 day	Wed 3/2/16	Wed 3/2/16	
64	Collect January-March 2016 quarterly toxicity samples	5 days	Thu 3/17/16	Wed 3/23/16	
65	Collect April 2016 influent/effluent samples from GWTP	1 day	Fri 4/1/16	Fri 4/1/16	
66	Collect May 2016 influent/effluent samples from GWTP	1 day	Mon 5/2/16	Mon 5/2/16	
67	Collect June 2016 influent/effluent samples from GWTP	1 day	Wed 6/1/16	Wed 6/1/16	
68	Collect April-June 2016 quarterly toxicity samples	5 days	Thu 6/16/16	Wed 6/22/16	
69	Collect July 2016 influent/effluent samples	1 day	Fri 7/1/16	Fri 7/1/16	
70	Collect August 2016 influent/effluent samples from GWTP	1 day	Wed 8/3/16	Wed 8/3/16	
71	Collect September2016 influent/effluent samples from GWTP	1 day	Thu 9/1/16	Thu 9/1/16	
72	Collect July-September 2016 quarterly toxicity samples	5 days	Fri 9/16/16	Thu 9/22/16	
73	Collect October 2016 influent/effluent samples from GWTP	1 day	Mon 10/3/16	Mon 10/3/16	
74	Collect November 2016 influent/effluent samples from GWTP	1 day	Wed 11/2/16	Wed 11/2/16	
75	Collect December 2016 influent/effluent samples from GWTP	1 day	Thu 12/1/16	Thu 12/1/16	
76	Collect October-December 2016 quarterly toxicity samples	5 days	Fri 12/16/16	Thu 12/22/16	
77	**2017 Monthly O&M**	**255 days**	**Mon 1/2/17**	**Fri 12/22/17**	
78	Collect January 2017 influent/effluent samples from GWTP	1 day	Mon 1/2/17	Mon 1/2/17	
79	Collect February 2017 influent/effluent samples from GWTP	1 day	Thu 2/2/17	Thu 2/2/17	
80	Collect March 2017 influent/effluent samples from GWTP	1 day	Thu 3/2/17	Thu 3/2/17	
81	Collect January-March 2017 quarterly toxicity samples	5 days	Fri 3/17/17	Thu 3/23/17	
82	Collect April 2017 influent/effluent samples from GWTP	1 day	Mon 4/3/17	Mon 4/3/17	
83	Collect May 2017 influent/effluent samples from GWTP	1 day	Mon 5/1/17	Mon 5/1/17	
84	Collect June 2017 influent/effluent samples from GWTP	1 day	Thu 6/1/17	Thu 6/1/17	
85	Collect April-June 2017 quarterly toxicity samples	5 days	Fri 6/16/17	Thu 6/22/17	
86	Collect July 2017 influent/effluent samples	1 day	Mon 7/3/17	Mon 7/3/17	
87	Collect August 2017 influent/effluent samples from GWTP	1 day	Thu 8/3/17	Thu 8/3/17	
88	Collect September2017 influent/effluent samples from GWTP	1 day	Fri 9/1/17	Fri 9/1/17	
89	Collect July-September 2017 quarterly toxicity samples	5 days	Mon 9/18/17	Fri 9/22/17	
90	Collect October 2017 influent/effluent samples from GWTP	1 day	Mon 10/2/17	Mon 10/2/17	
91	Collect November 2017 influent/effluent samples from GWTP	1 day	Thu 11/2/17	Thu 11/2/17	
92	Collect December 2017 influent/effluent samples from GWTP	1 day	Fri 12/1/17	Fri 12/1/17	
93	Collect October-December 2017 quarterly toxicity samples	5 days	Mon 12/18/17	Fri 12/22/17	
94	**2018 Monthly O&M**	**190 days**	**Mon 1/1/18**	**Fri 9/21/18**	
95	Collect January 2018 influent/effluent samples from GWTP	1 day	Mon 1/1/18	Mon 1/1/18	
96	Collect February 2018 influent/effluent samples from GWTP	1 day	Fri 2/2/18	Fri 2/2/18	
97	Collect March 2018 influent/effluent samples from GWTP	1 day	Fri 3/2/18	Fri 3/2/18	
98	Collect January-March 2018 quarterly toxicity samples	5 days	Mon 3/19/18	Fri 3/23/18	
99	Collect April 2018 influent/effluent samples from GWTP	1 day	Mon 4/2/18	Mon 4/2/18	
100	Collect May 2018 influent/effluent samples from GWTP	1 day	Tue 5/1/18	Tue 5/1/18	
101	Collect June 2018 influent/effluent samples from GWTP	1 day	Fri 6/1/18	Fri 6/1/18	
102	Collect April-June 2018 quarterly toxicity samples	5 days	Mon 6/18/18	Fri 6/22/18	
103	Collect July 2018 influent/effluent samples	1 day	Mon 7/2/18	Mon 7/2/18	
104	Collect August 2018 influent/effluent samples from GWTP	1 day	Fri 8/3/18	Fri 8/3/18	
105	Collect September 2018 influent/effluent samples from GWTP	1 day	Mon 9/3/18	Mon 9/3/18	
106	Collect July-September 2018 quarterly toxicity samples	5 days	Mon 9/17/18	Fri 9/21/18	
107	**Site 5 Landfill O&M**	**1196 days**	**Mon 2/17/14**	**Mon 9/17/18**	
108	**2013 Site 5 O&M**	**1 day**	**Wed 12/16/15**	**Wed 12/16/15**	
109	Conduct October-December quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Wed 12/16/15	Wed 12/16/15	
110	**2014 Site 5 O&M**	**261 days**	**Mon 2/17/14**	**Mon 2/16/15**	



Project: ABL O&M
Date: Thu 12/5/13

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

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

ID	Task Name	Duration	Start	Finish	Predecessors
111	Conduct January-March quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	2 days	Mon 3/17/14	Tue 3/18/14	
112	Optimization Study of Site 5 Landfill O&M	261 days	Mon 2/17/14	Mon 2/16/15	
113	Conduct April-June quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Mon 6/16/14	Mon 6/16/14	
114	Conduct July-September quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Mon 9/15/14	Mon 9/15/14	
115	Conduct October-December quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Mon 12/15/14	Mon 12/15/14	
116	**2015 Site 5 O&M**	**197 days**	**Mon 3/16/15**	**Tue 12/15/15**	
117	Conduct January-March quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Mon 3/16/15	Mon 3/16/15	
118	Conduct April-June quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Mon 6/15/15	Mon 6/15/15	
119	Conduct July-September quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Tue 9/15/15	Tue 9/15/15	
120	Conduct October-December quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Tue 12/15/15	Tue 12/15/15	
121	**2016 Site 5 O&M**	**198 days**	**Tue 3/15/16**	**Thu 12/15/16**	
122	Conduct January-March quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Tue 3/15/16	Tue 3/15/16	
123	Conduct April-June quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Wed 6/15/16	Wed 6/15/16	
124	Conduct July-September quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Thu 9/15/16	Thu 9/15/16	
125	Conduct October-December quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Thu 12/15/16	Thu 12/15/16	
126	**2017 Site 5 O&M**	**198 days**	**Wed 3/15/17**	**Fri 12/15/17**	
127	Conduct January-March quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Wed 3/15/17	Wed 3/15/17	
128	Conduct April-June quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Thu 6/15/17	Thu 6/15/17	
129	Conduct July-September quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Fri 9/15/17	Fri 9/15/17	
130	Conduct October-December quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Fri 12/15/17	Fri 12/15/17	
131	**2018 Site 5 O&M**	**133 days**	**Thu 3/15/18**	**Mon 9/17/18**	
132	Conduct January-March quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Thu 3/15/18	Thu 3/15/18	
133	Conduct April-June quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Fri 6/15/18	Fri 6/15/18	
134	Conduct July-September quarterly Site 5 Landfill Inspection & gas well and vent monitoring, leachate monitoring & storm water sampling	1 day	Mon 9/17/18	Mon 9/17/18	

Project: ABL O&M
Date: Thu 12/5/13

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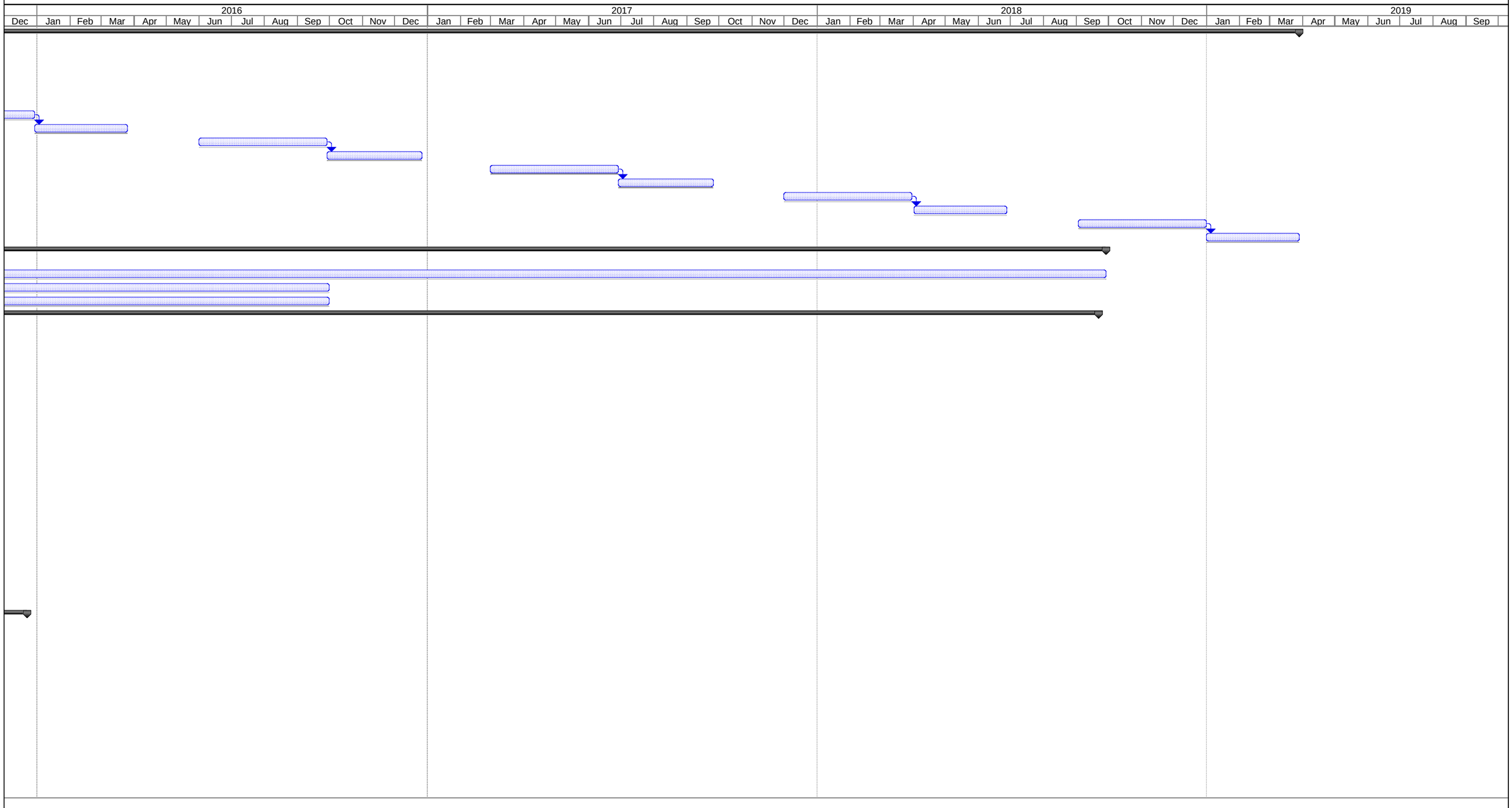
Figure 4-2
Sites 1, 5, and 10 Long Term Groundwater Monitoring and Operations and Maintenance Schedule
Allegany Ballistics Laboratory



Project: ABL O&M
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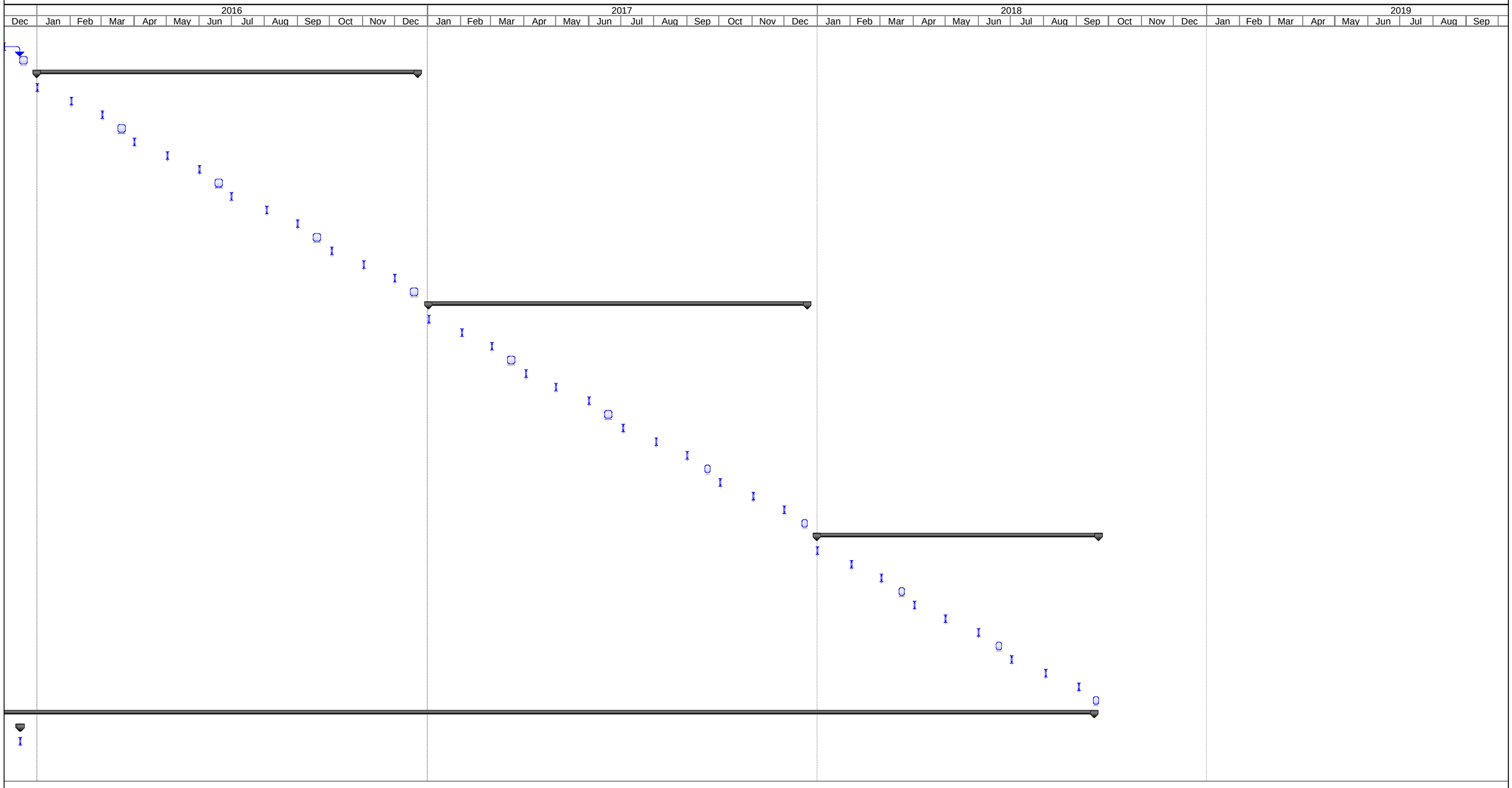
Figure 4-2
Sites 1, 5, and 10 Long Term Groundwater Monitoring and Operations and Maintenance Schedule
Allegany Ballistics Laboratory



Project: ABL O&M
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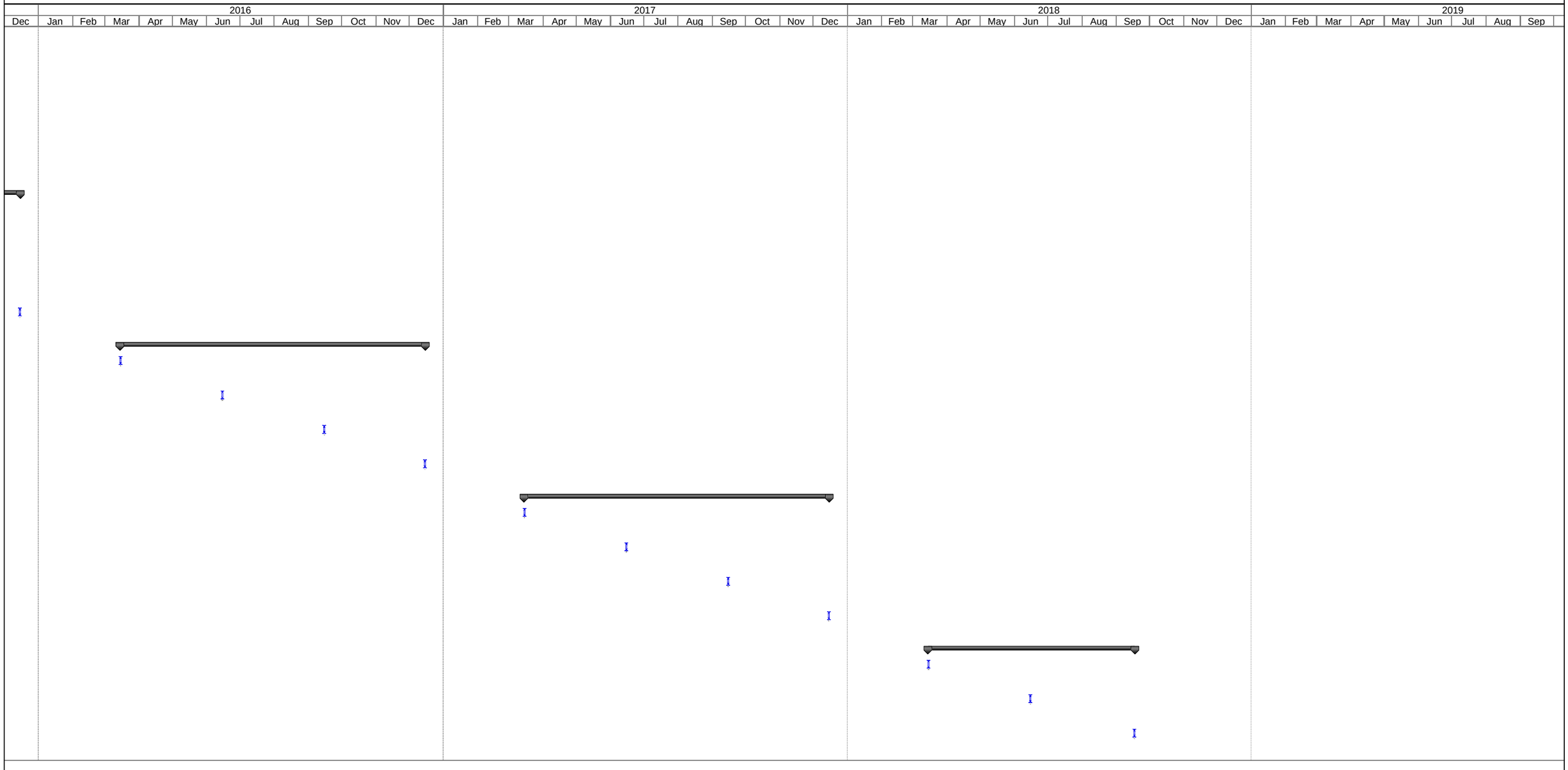
Figure 4-2
Sites 1, 5, and 10 Long Term Groundwater Monitoring and Operations and Maintenance Schedule
Allegany Ballistics Laboratory



Project: ABL O&M
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Task | Progress | Summary | External Tasks | Split
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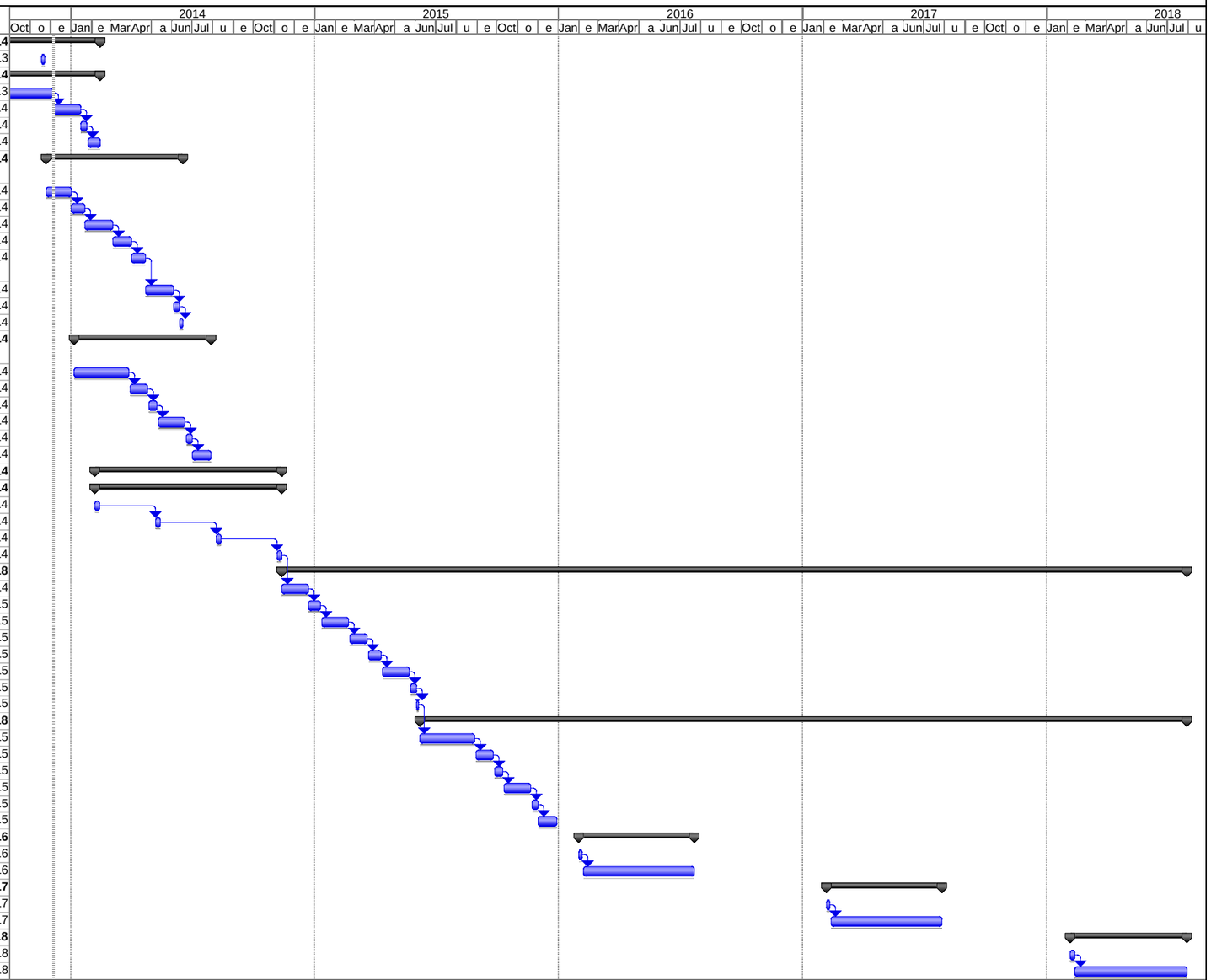
Figure 4-3
Sites 11 and 12 Schedule
Allegany Ballistics Laboratory

ID	Task Name	Duration	Start	Finish
1	**Remedial Action Construction and Performance Monitoring**	**141 days**	**Thu 8/1/13**	**Thu 2/13/14**
2	12 month post-injection performance monitoring	5 days	Mon 11/18/13	Fri 11/22/13
3	**Interim Remedial Action Report**	**141 days**	**Thu 8/1/13**	**Thu 2/13/14**
4	Prepare and Submit Draft IRACR to Regulators	90 days	Thu 8/1/13	Wed 12/4/13
5	Partnering Regulatory Review	30 days	Thu 12/5/13	Wed 1/15/14
6	Response to Comments	7 days	Thu 1/16/14	Fri 1/24/14
7	Prepare and Submit Final IRACR	14 days	Mon 1/27/14	Thu 2/13/14
8	**Post-Injection Groundwater Sampling Results and Evaluation Report**	**147 days**	**Mon 11/25/13**	**Tue 6/17/14**
9	Laboratory Analysis of 12 month data	28 days	Mon 11/25/13	Wed 1/1/14
10	Data Validation	14 days	Thu 1/2/14	Tue 1/21/14
11	Prepare and Submit Draft Report to Navy	30 days	Wed 1/22/14	Tue 3/4/14
12	Navy Review	20 days	Wed 3/5/14	Tue 4/1/14
13	Prepare and Submit Draft Report to Regulators	15 days	Wed 4/2/14	Tue 4/22/14
14	Partnering Regulatory Review	30 days	Wed 4/23/14	Tue 6/3/14
15	Response to Comments	7 days	Wed 6/4/14	Thu 6/12/14
16	Submit Final Report	3 days	Fri 6/13/14	Tue 6/17/14
17	**Update UPF-SAP for Additional Post-Injection Groundwater Sampling**	**147 days**	**Mon 1/6/14**	**Tue 7/29/14**
18	Prepare and Submit Draft UFP-SAP	60 days	Mon 1/6/14	Fri 3/28/14
19	Navy Review	20 days	Mon 3/31/14	Fri 4/25/14
20	Prepare and Submit Draft UFP-SAP to Regulators	10 days	Mon 4/28/14	Fri 5/9/14
21	Partnering Regulatory Review	30 days	Mon 5/12/14	Fri 6/20/14
22	Response to Comments	7 days	Mon 6/23/14	Tue 7/1/14
23	Prepare and Submit Final UFP-SAP	20 days	Wed 7/2/14	Tue 7/29/14
24	**Annual Post-Injection Groundwater Sampling and Evaluation**	**200 days**	**Thu 2/6/14**	**Wed 11/12/14**
25	**2014 Long-Term Monitoring**	**200 days**	**Thu 2/6/14**	**Wed 11/12/14**
26	2014 Round 1 Post-Injection Sampling	5 days	Thu 2/6/14	Wed 2/12/14
27	2014 Round 2 Post-Injection Sampling	5 days	Thu 5/8/14	Wed 5/14/14
28	2014 Round 3 Post-Injection Sampling	5 days	Thu 8/7/14	Wed 8/13/14
29	2014 Round 4 Post-Injection Sampling	5 days	Thu 11/6/14	Wed 11/12/14
30	**Post-Injection Groundwater Sampling Results and Evaluation Report**	**968 days**	**Thu 11/13/14**	**Mon 7/30/18**
31	Laboratory Analysis of Round 4 Data	28 days	Thu 11/13/14	Mon 12/22/14
32	Data Validation	14 days	Tue 12/23/14	Fri 1/9/15
33	Prepare and Submit Draft Report to Navy	30 days	Mon 1/12/15	Fri 2/20/15
34	Navy Review	20 days	Mon 2/23/15	Fri 3/20/15
35	Prepare and Submit Draft Report to Regulators	15 days	Mon 3/23/15	Fri 4/10/15
36	Partnering Regulatory Review	30 days	Mon 4/13/15	Fri 5/22/15
37	Response to Comments	7 days	Mon 5/25/15	Tue 6/2/15
38	Submit Final Report	3 days	Wed 6/3/15	Fri 6/5/15
39	**Long Term Monitoring Plan**	**821 days**	**Mon 6/8/15**	**Mon 7/30/18**
40	Prepare and Submit Draft UFP-SAP	60 days	Mon 6/8/15	Fri 8/28/15
41	Navy Review	20 days	Mon 8/31/15	Fri 9/25/15
42	Prepare and Submit Draft LTM Plan to Regulators	10 days	Mon 9/28/15	Fri 10/9/15
43	Partnering Regulatory Review	30 days	Mon 10/12/15	Fri 11/20/15
44	Response to Comments	7 days	Mon 11/23/15	Tue 12/1/15
45	Perpare and Submit Final LTM Plan	20 days	Wed 12/2/15	Tue 12/29/15
46	**2016 Long-Term Monitoring**	**125 days**	**Mon 2/1/16**	**Fri 7/22/16**
47	2016 Annual Post-Injection Sampling	5 days	Mon 2/1/16	Fri 2/5/16
48	2016 Annual Groundwater Reporting	120 days	Mon 2/8/16	Fri 7/22/16
49	**2017 Long-Term Monitoring**	**125 days**	**Mon 2/6/17**	**Fri 7/28/17**
50	2017 Annual Post-Injection Sampling	5 days	Mon 2/6/17	Fri 2/10/17
51	2017 Annual Groundwater Reporting	120 days	Mon 2/13/17	Fri 7/28/17
52	**2018 Long-Term Monitoring**	**125 days**	**Tue 2/6/18**	**Mon 7/30/18**
53	2018 Annual Post-Injection Sampling	5 days	Tue 2/6/18	Mon 2/12/18
54	2018 Annual Groundwater Reporting	120 days	Tue 2/13/18	Mon 7/30/18



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Date: Thu 12/5/13

Task | Progress | Summary | External Tasks | Deadline
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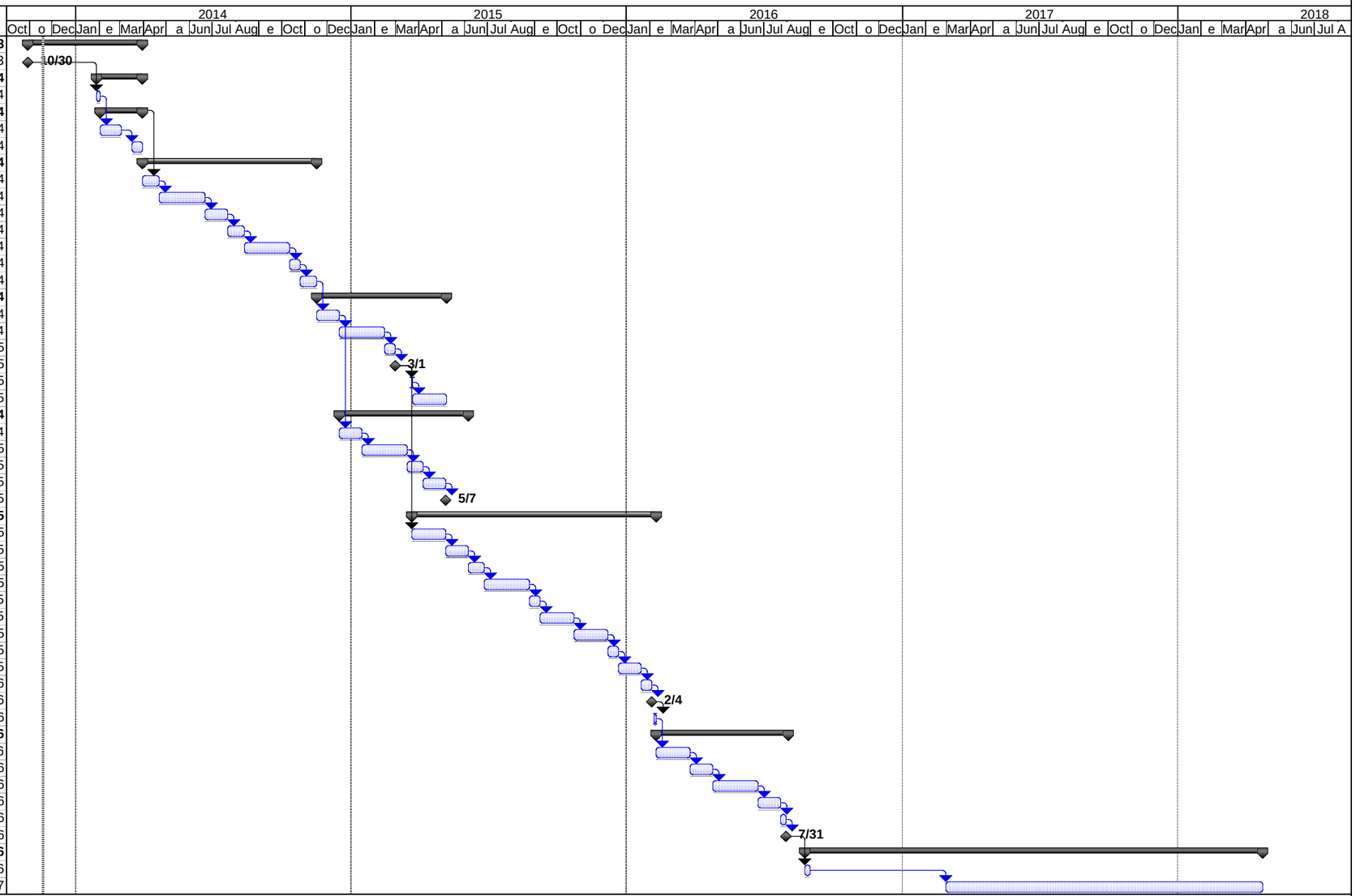
Figure 4-4
SIte 13 (Range Road Area) Schedule
Allegany Ballistics Laboratory

ID	Task Name	Duration	Start
1	**Site 13 UFP SAP Addendum**	**152 days**	**Wed 10/30/13**
2	Prepare and Submit Final Revised UFP SAP	61 days	Wed 10/30/13
3	**Implement Remedial Investigation at Site 13**	**61 days**	**Wed 1/29/14**
4	Monitoring Well Sampling	5 days	Wed 1/29/14
5	**Sample Management & Data Validation**	**56 days**	**Mon 2/3/14**
6	Analysis	28 days	Mon 2/3/14
7	Validation	14 days	Mon 3/17/14
8	**Remedial Investigation and Feasibility Study Site 13**	**231 days**	**Mon 3/31/14**
9	Data Review and Evaluation	22 days	Mon 3/31/14
10	Prepare and Submit Draft RI/FS Report	61 days	Tue 4/22/14
11	Navy Review	30 days	Sun 6/22/14
12	Prepare and Submit Draft RI/FS Report	22 days	Tue 7/22/14
13	Regulatory Review	60 days	Wed 8/13/14
14	Response to Comments	14 days	Sun 10/12/14
15	Prepare and Submit Final RI/FS Report	22 days	Sun 10/26/14
16	**PRAP for Site 13**	**172 days**	**Mon 11/17/14**
17	Prepare and Submit Draft PRAP	30 days	Mon 11/17/14
18	Navy, Regulatory Review	60 days	Wed 12/17/14
19	Response to Comments	14 days	Sun 2/15/15
20	Prepare and Submit Final PRAP	22 days	Sun 3/1/15
21	Public Notice	1 day	Mon 3/23/15
22	Public Comment/Public Meeting	45 days	Tue 3/24/15
23	**ROD for Site 13**	**171 days**	**Wed 12/17/14**
24	Prepare and Submit Draft ROD	30 days	Wed 12/17/14
25	Navy, Regulatory Review	60 days	Fri 1/16/15
26	Response to Comments	21 days	Tue 3/17/15
27	Prepare and Submit Final ROD	30 days	Tue 4/7/15
28	Prepare and Distribute Signed Final ROD	30 days	Thu 5/7/15
29	**Site 13 Remedial Design for Groundwater Remediation**	**324 days**	**Mon 3/23/15**
30	Prepare and Submit Draft Remedial Design (30%)	45 days	Mon 3/23/15
31	Navy Review (NAVSEA, NAVFAC)	30 days	Thu 5/7/15
32	Response to Navy Comments and submit Draft Remedial Design	21 days	Sat 6/6/15
33	Regulatory Review	60 days	Sat 6/27/15
34	Response to regulartory comments	14 days	Wed 8/26/15
35	Prepare and Submit Pre-Final Remedial Design (90%)	45 days	Wed 9/9/15
36	Regulatory Review (EPA, WVDEP)	45 days	Sat 10/24/15
37	Response to Comments	14 days	Tue 12/8/15
38	Prepare and Submit Redlined Final Remedial Design (100%)	30 days	Tue 12/22/15
39	Obtain approval to finalize	14 days	Thu 1/21/16
40	Submit Final Remedial Design (100%)	3 days	Thu 2/4/16
41	Public Notice	3 days	Sun 2/7/16
42	**Site 13 Remedial Action Work Plan**	**175 days**	**Wed 2/10/16**
43	Procurement of Remedial Action Contractor	45 days	Wed 2/10/16
44	Draft Remedial Action Work Plan	30 days	Sat 3/26/16
45	Navy and Regulatory Review	60 days	Mon 4/25/16
46	Final Remedial Action Work Plan	30 days	Fri 6/24/16
47	Obtain approval to finalize	7 days	Sun 7/24/16
48	Submit Final Remedial Action Work Plan	3 days	Sun 7/31/16
49	**Site 13 Remedial Action**	**607 days**	**Thu 8/25/16**
50	Implementation by Remedial Action Contractor	7 days	Thu 8/25/16
51	Remedial Action Performace Monitoring	21 mons	Tue 2/28/17



Project: CTO-110
Date: Mon 11/18/13

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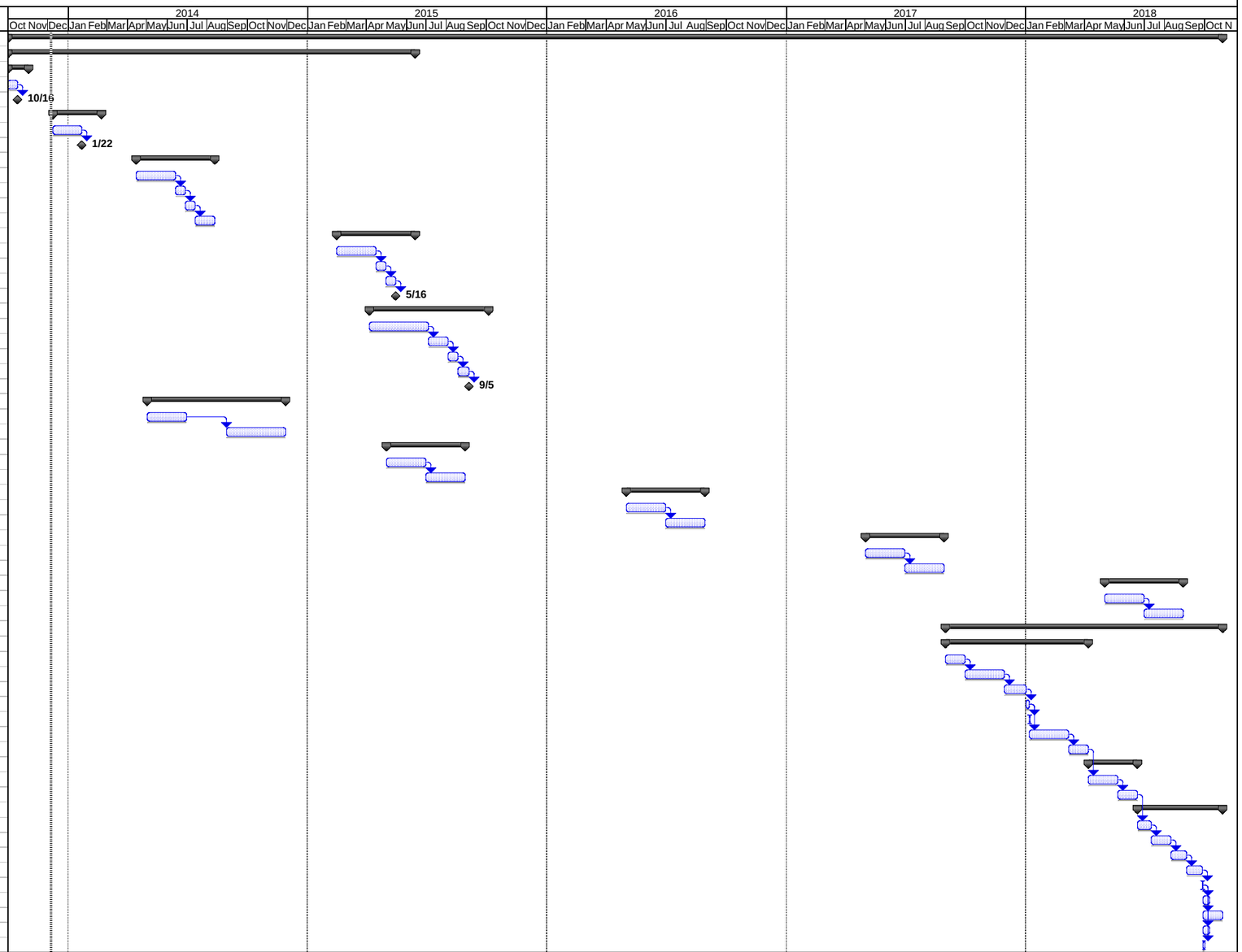
Figure 4-5
Administrative Activities Schedule
Allegany Ballistics Laboratory

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Administrative Activities**	**1854 days**	**Tue 10/1/13**	**Sun 10/28/18**	
2	**Land Use Controls**	**622 days**	**Tue 10/1/13**	**Sun 6/14/15**	
3	**Site 10 Remedial Design LUC**	**32 days**	**Tue 10/1/13**	**Fri 11/1/13**	
4	Submit Final Remedial Design LUCs	15 days	Tue 10/1/13	Tue 10/15/13	
5	Concurrence Letter on Final Remedial Design LUCs	17 days	Wed 10/16/13	Fri 11/1/13	4
6	**Site 5 Remedial Design LUC**	**74 days**	**Mon 12/9/13**	**Thu 2/20/14**	
7	Prepare and Submit Final Remedial Design LUCs	44 days	Mon 12/9/13	Tue 1/21/14	
8	Concurrence Letter on Final Remedial Design LUCs	30 days	Wed 1/22/14	Thu 2/20/14	7
9	**Site 11 and 12 Remedial Design LUCs**	**120 days**	**Tue 4/15/14**	**Tue 8/12/14**	
10	Navy, Regulatory Review	60 days	Tue 4/15/14	Fri 6/13/14	
11	Response to Comments	15 days	Sat 6/14/14	Sat 6/28/14	10
12	Prepare and Submit Final Remedial Design LUCs	15 days	Sun 6/29/14	Sun 7/13/14	11
13	Concurrence Letter on Final Remedial Design LUCs	30 days	Mon 7/14/14	Tue 8/12/14	12
14	**Site 1 Remedial Design LUCs**	**120 days**	**Sun 2/15/15**	**Sun 6/14/15**	
15	Navy, Regulatory Review	60 days	Sun 2/15/15	Wed 4/15/15	
16	Response to Comments	15 days	Thu 4/16/15	Thu 4/30/15	15
17	Prepare and Submit Final Remedial Design LUCs	15 days	Fri 5/1/15	Fri 5/15/15	16
18	Concurrence Letter on Final Remedial Design LUCs	30 days	Sat 5/16/15	Sun 6/14/15	17
19	**Land Use Controls Implementation Plan**	**182 days**	**Mon 4/6/15**	**Sun 10/4/15**	
20	Prepare and Submit Draft LUC Implementation Plan	90 days	Mon 4/6/15	Sat 7/4/15	
21	Navy, Regulatory Review	30 days	Sun 7/5/15	Mon 8/3/15	20
22	Response to Comments	15 days	Tue 8/4/15	Tue 8/18/15	21
23	Prepare and Submit Final LUC Implementation Plan	17 days	Wed 8/19/15	Fri 9/4/15	22
24	Concurrence Letter on Final LUC Implementation Plan	30 days	Sat 9/5/15	Sun 10/4/15	23
25	**Site Management Plan 2014**	**211 days**	**Fri 5/2/14**	**Fri 11/28/14**	
26	Prepare and Submit Draft Site Management Plan	60 days	Fri 5/2/14	Mon 6/30/14	
27	Prepare and Submit Fiinal Site Management Plan	90 days	Sun 8/31/14	Fri 11/28/14	26
28	**Site Management Plan 2015**	**120 days**	**Sat 5/2/15**	**Sat 8/29/15**	
29	Prepare and Submit Draft Site Management Plan	60 days	Sat 5/2/15	Tue 6/30/15	
30	Prepare and Submit Fiinal Site Management Plan	60 days	Wed 7/1/15	Sat 8/29/15	29
31	**Site Management Plan 2016**	**120 days**	**Mon 5/2/16**	**Mon 8/29/16**	
32	Prepare and Submit Draft Site Management Plan	60 days	Mon 5/2/16	Thu 6/30/16	
33	Prepare and Submit Fiinal Site Management Plan	60 days	Fri 7/1/16	Mon 8/29/16	32
34	**Site Management Plan 2017**	**120 days**	**Tue 5/2/17**	**Tue 8/29/17**	
35	Prepare and Submit Draft Site Management Plan	60 days	Tue 5/2/17	Fri 6/30/17	
36	Prepare and Submit Fiinal Site Management Plan	60 days	Sat 7/1/17	Tue 8/29/17	35
37	**Site Management Plan 2018**	**120 days**	**Wed 5/2/18**	**Wed 8/29/18**	
38	Prepare and Submit Draft Site Management Plan	60 days	Wed 5/2/18	Sat 6/30/18	
39	Prepare and Submit Fiinal Site Management Plan	60 days	Sun 7/1/18	Wed 8/29/18	38
40	**2018 Five Year Review Report**	**423 days**	**Fri 9/1/17**	**Sun 10/28/18**	
41	**Draft Five Year Review Report**	**218 days**	**Fri 9/1/17**	**Fri 4/6/18**	
42	Data evaluation	30 days	Fri 9/1/17	Sat 9/30/17	
43	Preparation of Draft Report	60 days	Sun 10/1/17	Wed 11/29/17	42
44	Navy Review (including Legal)	33 days	Thu 11/30/17	Mon 1/1/18	43
45	Draft Revisions	5 days	Tue 1/2/18	Sat 1/6/18	44
46	Draft Report Submitted to Regulators	1 day	Sun 1/7/18	Sun 1/7/18	45
47	60-Day Regulator Draft Review	60 days	Sun 1/7/18	Wed 3/7/18	45
48	Legal Reviews	30 days	Thu 3/8/18	Fri 4/6/18	47
49	**Draft Final Five Year Review Report**	**75 days**	**Sat 4/7/18**	**Wed 6/20/18**	
50	RTC/Document Revisions	45 days	Sat 4/7/18	Mon 5/21/18	48
51	RTC resolution (Partnering meeting/call)	30 days	Tue 5/22/18	Wed 6/20/18	50
52	**Signature and Final Report Submisson**	**130 days**	**Thu 6/21/18**	**Sun 10/28/18**	
53	Final Report Submission	21 days	Thu 6/21/18	Wed 7/11/18	51
54	NAVSEA Signature	30 days	Thu 7/12/18	Fri 8/10/18	53
55	WVDEP Concurrence Letter	24 days	Sat 8/11/18	Mon 9/3/18	54
56	EPA Concurrence Letter	24 days	Tue 9/4/18	Thu 9/27/18	55
57	Final Five-Year Review with Signature	1 day	Fri 9/28/18	Fri 9/28/18	56
58	Fact Sheet	10 days	Sat 9/29/18	Mon 10/8/18	57
59	EPA Entry in CERCLIS/Navy Entry into Norm	30 days	Sat 9/29/18	Sun 10/28/18	57
60	Public Notice Stating Five-Year Review is complete	10 days	Sat 9/29/18	Mon 10/8/18	57
61	Deliver information to repository	3 days	Sat 9/29/18	Mon 10/1/18	57



Project: CTO-110
Date: Thu 12/5/13

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

IR Site ID and Associated SWMUs	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
IR Site 1 - Northern Riverside Waste Disposal Area:			
IR Site 1, OU3 (Groundwater, Surface Water, and Sediment) Site 1 includes SWMUs 1, 6, 7, 8, 11, 20, and 22C (NFA) and 22D (NFA)	Northern perimeter of Plant 1	Late 1950s – 1960s	**Description and Wastes Managed** See SWMUs 1, 6, 7, 8, 11, 20, and 22C and 22D descriptions on Attachment A-1 and A-2. **Status: Remedial Action Operations (RA-O)** 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 showed that the remedy for groundwater is functioning as intended by the ROD. A combined Five Year Review Report for Sites 1, 5, 10, 11 and 12 is in progress for completion in September 2013. **Anticipated** Optimization for Site 1 remediation will be evaluated. Corrective maintenance for the groundwater treatment plant. Continued Optimization. Resolution of issues identified in the Five-Year Review.
IR Site 1, OU4 (Soil)	Northern perimeter of Plant 1	Late 1950s – 1960s	**Description and Wastes Managed** See SWMUs 1, 6, 7, 8, 11, 20, and 22C and 22D descriptions on Attachment A-1 and A-2. **Status: Remedial Investigation/ Feasibility Study (RI/FS)** An RI for Site 1 soil was completed in July 2006. An EE/CA was finalized for regulatory review in June 2011 to conduct a removal action in the former disposal pit areas. An action memorandum was finalized in 2012. An FS report and a UFP SAP for pre-confirmation soil sampling are currently being developed. A combined Five Year Review Report for Sites 1, 5, 10, 11 and 12 is in progress for completion in September 2013. **Anticipated** Prepare a PRAP and ROD for Site 1 soil in 2014. A soil removal action in the former disposal pits is anticipated to begin in August 2013. A pre-confirmation soil sampling event is anticipated to take place in September 2013.

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IR Site ID and Associated SWMUs	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
SWMU 1, Former Hazardous Waste Storage Area I (The soil at this SWMU is part of IR Site 1 western end subsite (also includes SWMUs 11, 22C, and 22D))	West of the Active Burning Ground	Late 1970s - 1981	**Description and Wastes Managed** 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. **Status** The RFA recommended no further action for this SWMU. The soil at this SWMU is part of IR Site 1, OU4, western end subsite (also includes SWMUs 11, 22C, and 22D)
SWMU 6, Active Burning Ground	Within the fenced portion of the Active Burning Ground	1958 - present	**Description and Wastes Managed** 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. **Status** This SWMU is being operated under a RCRA Part B permit. Soil and groundwater at this SWMU have been investigated as they pertain to IR Site 1, OU3 and OU4, respectively.
SWMU 7, Inert Burning Ground	East of the fenced area containing the Active Burning Ground	1958 – 1985	**Description and Wastes Managed** Approximately 20-foot by 20-foot area located outside the fenced area of the Active 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). **Status** The RFA recommended an RFI and that the RFI be coordinated with the ongoing activities of the RI. See remainder of discussion under IR Site 1, OU3 and OU4.

ATTACHMENT A-1
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER CERCLA INVESTIGATION
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IR Site ID and Associated SWMUs	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
SWMU 8, Acid Disposal Pits	In the southwestern portion of the fenced area containing the Active Burning Ground	1972 - 1982	**Description and Wastes Managed** 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. **Status** The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. See remainder of discussion under IR Site, OU4.
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	**Description and Wastes Managed** 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. **Status** The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. See remainder of discussion under IR Site 1, OU4.
SWMU 20, Solvent Disposal Pit	In the southwestern portion of the fenced area containing the Active Burning Ground	Unknown - 1978	**Description and Wastes Managed** 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. **Status** See discussion under IR Site 1, OU4. **Anticipated** See discussion under IR Site 1, OU4.

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IR Site ID and Associated SWMUs	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
IR Site 5 - Inert (Non-ordnance) Landfill			
IR Site 5, OU1 (Landfill contents and Surface Soil) Previously known as SWMU 9	South of Plant 2	1964 - 1988	**Description and Wastes Managed** 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. **Status: RA-O** The RFA recommended an RFI for SWMU 9 and that the RFI be coordinated with the ongoing activities of the RI. 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. A combined Five-Year ROD Review report for Sites 1, 5, and 10 is in progress for completion in September 2013. **Anticipated** Long term monitoring and operations and maintenance activities are ongoing. Resolution of issues identified in the Five-Year Review.
IR Site 5, OU2 (Groundwater, Surface Water, and Sediment) Previously known as SWMU 9	South of Plant 2	1964 - 1988	**Description and Wastes Managed** 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. **Status: RA-O** 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. 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. A combined Five-Year ROD Review report for Sites 1, 5, and 10 is in progress for completion in September 2013. **Anticipated** Long term monitoring and operations and maintenance activities are ongoing. Resolution of issues identified in the Five-Year Review.

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IR Site ID and Associated SWMUs	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
IR Site 10 – Former TCE Still and Production Well A (PWA)			
IR Site 10, OU5 (Groundwater)	Near Bldg. 157	1959 – early 1960s	**Description and Wastes Managed** 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. **Status: RA-O** 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 and treatment system is currently being operated and maintained. A Final NFA ROD for Site 10 soil was signed in 2007. A combined Five Year Review Report for Sites 1, 5, 10, 11 and 12 is in progress for completion in September 2013. **Anticipated** Long term monitoring and operations and maintenance activities are ongoing. Corrective maintenance for the groundwater treatment plant. Resolution of issues identified in the Five-Year Review.

ATTACHMENT A-1
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER CERCLA INVESTIGATION
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IR Site ID and Associated SWMUs	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
IR Site 11 - Building 215 (Production Well F)			
IR Site 11, OU 11 (Groundwater) Includes SWMU 36	Eastern portion of Plant 1; north of Buildings. 421 and 438	1961	**Description and Wastes Managed** 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. **Status: RA-O** 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 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 ROD was approved and signed in January 2012. The remedial action, ERD injections, took place in November 2012 and the site is currently in quarterly LTM until November 2013. A combined Five Year Review Report for Sites 1, 5, 10, 11 and 12 is in progress for completion in September 2013. **Anticipated** Long term monitoring and operations and maintenance activities are ongoing. Resolution of issues identified in the Five-Year Review.
SWMU 36	Bldg. 215	1960s – 1995	**Description and Wastes Managed** 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. **Status** 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. **Anticipated** See further discussion under IR Site 11, OU11.

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IR Site ID and Associated SWMUs	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
IR Site 12 - Building 167 SWMUs			
IR Site 12, OU 8 (Groundwater) This IR site was formally known as AOC N, which includes SWMUs 12, 14, 24S, 37N and 52	Outside of Bldg. 167	1978 – 1982	**Description and Wastes Managed** This site was previously known as AOC N and comprised of five SWMUs (12, 14, 24S, 37N, and 52). See specific descriptions under each of these SWMUs. **Status: RA-O** 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. A non-time critical removal action was performed for soil at Site 12 soil in 2005. 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 ROD was approved and signed in January 2012. The remedial action, ERD injections, took place in November 2012 and the site is currently in quarterly LTM until November 2013. A combined Five Year Review Report for Sites 1, 5, 10, 11 and 12 is in progress for completion in September 2013. **Anticipated** Develop an LTM Plan for semi-annual followed by annual groundwater sampling, which will continue until the remediation goals are achieved. Resolution of issues identified in the Five-Year Review.
SWMU 12, Former Alodine Treatment Tank	Bldg. 167	1991 - 1998	**Description and Wastes Managed** 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. **Status** The RFA recommended no further action for this SWMU. SWMU 12 was part of the AOC N investigation.

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IR Site ID and Associated SWMUs	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
SWMU 37N – Wastewater Sump	Building 226	Between 1940s and 1999	**Description and Wastes Managed** Unit 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. **Status** See discussion under IR Site 12, OU8.
SWMU 52, Current (no longer in use) Alodine Treatment Tank	South of Bldg. 167	1991 - 1995	**Description and Wastes Managed** 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. **Status** 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. **Anticipated** No further action is planned for SWMU 52, but further investigation is ongoing for IR Site 12, OU8.

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SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER CERCLA INVESTIGATION
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IR Site ID and Associated SWMUs	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
IR Site 13 - Range Road Area			
IR Site 13, OU15 (Groundwater) Previously part of the SWMU 27A investigation. SWMU 27A is closed.	Near Range Road–H Street Intersection	1952	**Description and Wastes Managed** No reports regarding wastes managed, but boiler operations at Former Buiding106A may be the source of contamination in groundwater. SWMU 27A was closed out in December 2006 via closeout report. In 2008 USEPA identified the Range Road Area of SWMU 27A as Site 13, Operable Unit 15. **Status: RI/FS** Phase I through IV soil, groundwater, sediment investigation activities were conducted for SWMU 27A. Anticipated source is no longer present (former boiler building). Pilot Study was implemented in 2004 with in-situ bioremediation to treat the groundwater near the former boiler. 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. **Anticipated** Complete an RI/FS Report in 2014; FS in 2015 to evaluate remedial alternatives.

ATTACHMENT A-1
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER CERCLA INVESTIGATION
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AOC	Location	Dates of Operation	Description and Wastes Managed Status and Anticipated Additional Activities
AOC M - Debris Landfill			
AOC M - Debris Landfill	Along northern perimeter of Plant 1	Unknown	**Description and Wastes Managed** This AOC comprises three areas along the northern perimeter of Plant 1 where debris from demolished, exploded buildings and fired rocket hardware have been placed. **Status** Soil sampling was conducted at AOC M in October 2001. **Anticipated** The data are being evaluated to determine whether the AOC can be closed with no further action.

*Vapor Intrusion pathways have not been fully evaluated at ABL. A basewide Vapor Intrusion evaluation is ongoing. It is expected that the Vapor Intrusion assessment will be completed by September 2016. Site-specific status of Vapor Intrusion will be added in the next SMP update.

ATTACHMENT A-2
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER RCRA CORRECTIVE ACTION
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
NA	SWMU 2, Former Hazardous Waste Storage Area II	Southern portion of Plant 1, adjacent to Bldg. 360	1981 - June 1990	Approximately 40-foot by 100-foot concrete pad designed to manage drums of waste from satellite accumulation areas throughout the plant prior to being shipped off site. Typical wastes managed included: still bottoms (F001, F002), paint removers (F001, F002, F003, F005), paint related materials (D001, F001, F002, F003, F005), chromium containing wastes (D007), lead containing wastes (D008), and corrosive waste (D002).	**Status** SWMU 2 was closed out in November 2004 via closeout report. A deed notation was issued in 2005 indicating that SWMU 2 was formerly used as a hazardous waste storage area. **Anticipated** None.
NA	SWMU 3, Current Hazardous Waste Storage Area	Bldg. 366	June 1990 – present	Concrete pad consisting of 40 individually diked and recessed concrete cells (maximum capacity 300 55-gallon drums) for the storage of hazardous wastes. Wastes include: still bottoms (F001, F002), paint removers (F001, F002, F003, F005), paint-related materials (D001, F001, F002, F003, F005), corrosive waste (D002), chromium-containing waste (D007), lead-containing waste (D008), ash from Burning Grounds. In addition, spent solvents, waste motor oil, coolant, antifreeze, cured and uncured resin, waste alcohol, asbestos, waste silver, Alodine solids, and PCB-contaminated materials are also managed in this unit.	**Status** The RFA recommended no further action for this SWMU. This pad is permitted and managed under RCRA. **Anticipated** Hazardous waste management permit renewal and continued operation.

ATTACHMENT A-2
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER RCRA CORRECTIVE ACTION
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
NA	SWMU 27A, Plant 1 Drainage Ditch System (Includes SWMU 39)	Throughout the facility	1940s - present	A stormwater drainage system of open earthen drainage ditches, catch basins, and culverts throughout the facility. This system also receives washdown from some of the process buildings (e.g. Bldg. 181) and discharge from the settling basin (SWMU 44, which was removed in 1993).	**Status** The RFA recommended collecting samples at certain points in the drainage ditch. Additional Plant 1sediment and surface water samples and background samples were collected in 2002 and 2003 as part of the Phase III SWMU/AOC Investigations. In 2004, soil samples were collected adjacent to SWMU 27A at the Range Road Area to identify potential sources of chlorinated VOCs in alluvial groundwater. Five alluvial monitoring wells were installed at the Range Road Area. Additional sediment samples were collected in 2005 from SWMU 27A to further characterize this area. A Pilot study was also conducted in 2005 adjacent to SWMU 27A at the Range Road Area to evaluate methods to encourage microbial degradation of VOCs in groundwater. SWMU 27A was closed out in December 2006 via closeout report. In 2008 USEPA identified the Range Road Area of SWMU 27A as Site 13, Operable Unit 15. **Anticipated** SWMU 27A is currently regulated under the facility RCRA permit. The Range Road Area of SWMU 27A will be continue to be addressed under CERCLA as Site 13 (Operable Unit 15).

ATTACHMENT A-2
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER RCRA CORRECTIVE ACTION
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
NA	SWMU 34A and B, Oil/Water Separators for air compressors	Bldg. 252 (34A) and 341 (34B)	1991 and 1992 – 2001	Five units located in Buildings 215 (two units), 252, 300, and 341. The primary waste managed by these units is waste lubricating oil from air compressors. The units separate the water from the oil and discharge the water through floor drains to the wastewater treatment plant (SWMU 16).	**Status** These SWMUs were part of the Phase II SWMU/AOC Investigation. Screening of the data suggest there were TPH levels in the soil and groundwater that required additional evaluation. The air compressor buildings associated with these SWMUs were demolished in 2003. A soil removal action was completed at each SWMU in 2007 as part of the RCRA Corrective Action program by ATK. Groundwater at each SWMU is currently being evaluated. **Anticipated** SWMUs 34A and 34B are being addressed under RCRA corrective action. Soil removal actions have been completed at these SWMUS, no further action is anticipated for soil, Additional groundwater data is currently being collected for evaluation.
NA	AOC G, X Range Area	Undeveloped test area east of Plant 1	1944 - present	Area is a static test firing range for rocket motors and igniters that are produced at ABL. This unit manages explosive residuals, which are generated as a result of the rocket motor and igniter testing procedures. Propellants may contain AP, aluminum, NG, nitrate esters, NC, RDX, and HMX as primary ingredients. Firing has lead to erosion of the hillside, and residues from fired materials may have reached the soil. Occasionally, rocket motors being tested explode; burning propellant and motor parts are discharged onto the hillside generating small fires.	**Status** The RFA recommended that soil samples be collected n the vicinity of test firing bays at Buildings 77, 193, 194, and 242. **Anticipated** The unit is still in operation. Investigations are anticipated per the requirements of the RCRA subpart B permit.

ATTACHMENT A-2
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER RCRA CORRECTIVE ACTION
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 6	AOC I, Sensitivity Test Area and Pond	500 Area	1970s	The sensitivity test area is located approximately 100 feet up-slope of the pond. Since 1989, .50-caliber bullet impact testing and flammability testing of rocket motors have been conducted in this area. This unit includes a pond, which serves as a catch basin for runoff from the sensitivity area. The unit manages explosive residuals transported by stormwater runoff from this area. Water from this pond would flow via tributaries to the North Branch Potomac River. RDX and other explosive constituents were detected in surface water samples.	**Status** A portion of AOC I (Site 6, the pond) was closed out in February 2002 via closeout report. **Anticipated** Investigations of this unit are anticipated per the requirements of the RCRA Corrective Action permit.
NA	AOC S, Fenced Westernmost Sensitivity Test Area (formerly a portion of AOC I)	500 Area	Late 1980s – 2002	AOC S, the sensitivity test area, is located on the hillside about 100 feet west of the Site 6 pond. The area was used for .50-caliber bullet impact testing and flammability testing of rocket motors.	**Anticipated** Investigations of this unit are anticipated per the requirements of the RCRA Corrective Action permit.
Site 6	IR Site 6 - Sensitivity Test Area Surface Water Impoundment (This IR site is part of AOC I)	500 Area	1970s	See AOC I description	See AOC I description

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 A-3
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS WITH NO FURTHER ACTON
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 2	SWMU 4, Former Burning Ground I	On the north side of I Street; southeast of Bldg. 361	1942 – 1949	A former burning ground of approximately 20 feet by 40 feet (gravel covered surface), used for burning waste propellant components and explosives. The exact location and configuration of the burning ground and details of the material burned there are not known. It is assumed that approximately 50 pounds of waste materials per day are estimated to have been burned.	**Status** The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. A final Risk Assessment Report for Sites 2, 3, and 10 was submitted in 2005. A NFA PRAP was prepared in 2006 and an NFA ROD was issued in July 2008.
Site 3	SWMU 5, Former Burning Ground II	West side of Bldg. 362	1950 - 1958	A former burning ground of approximately 40 feet by 200 feet (clay covered surface), used for burning reactive wastes consisting of propellants and explosives. At least a portion of the former burning ground is covered by Building 362. It is assumed that approximately 200 pounds of waste materials per day are estimated to have been burned.	**Status** The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. A final Risk Assessment Report for Sites 2, 3, and 10 was submitted in 2005. A NFA PRAP was prepared in 2006. A NFA ROD for Site 3 was signed in 2007.
Site 7	SWMU 10, Beryllium Landfill	Adjacent to Route 956, southwest of Bldg. 300, the main administration building	1964 – late 1960s	Earthen pit measuring approximately 10 feet by 10 feet in area and 6 feet in depth. A maximum of two pounds of beryllium and 100 pounds of excess lab chemicals were disposed of here. Reportedly, the unit contained several hundred pounds of beryllium-contaminated wiping tissues, gloves, and sample containers. Glassware from the labs was also disposed of at this unit.	**Status** Soil removal at this site/SWMU was completed under the IR Program in 1994, with final disposition of the wastes in March 1997. A streamlined RI/FS report and PRAP were submitted in June 2001 and a public meeting was held in July 2001. A No Further Action ROD was signed in September 2001.

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	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 feet by 10 feet.	**Status** The RFA recommended no further action for this SWMU. The regulatory agencies agreed with this recommendation under the condition that possible releases from this tank be considered in the investigation of SWMU 52. No further action is planned for SWMU 14.
NA	SWMU 16, Plant 1 Wastewater Treatment System	Bldg. 294	1962 - December 1996	Wastewater treatment plant which treated all of the facility's sanitary wastewater along with some industrial wastes from photographic processing and several chemical laboratories. Approximately 1,500 gallons per month of filtered wastewater containing residual RDX (less than 100 mg/l), pre-treated wastewater from the Alodine process, and some water from oil/water separators was discharged to this unit. Also, a portion of the facility's stormwater sewer system was routed to this unit from 1970 until 1984.	**Status** The RFA recommended that soil samples be collected in the overflow area. These samples were collected during the Phase II RI. The analytical results indicated that no analytes were detected above the EPA Region III RBC values. Confirmatory soil samples were collected from beneath the treatment plant when it was demolished in May 1998. The data suggested that releases did not occur beneath the treatment plant. **Anticipated** Based on the information above, no further action is planned for this SWMU.

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 4B	SWMU 18, Photo Solution Discharge Area I	Adjacent to Bldg. 181	1959 - 1971	An unlined drainage ditch which received discharges of spent photographic and x-ray solutions from developing and processing operations. These solutions likely contained silver, cyanide, and phenol.	**Status** Surface soil samples were collected during a supplementary investigation in 2001. These data, together with historical and background data, were used to calculate PRGs for soil constituents at the Site. In November 2003, a soil removal pilot study removed the majority of the impacted soil at the site. Additional excavation and confirmatory sampling was completed in 2004. A pilot study report for Site4B was issued in 2005. A NFA PRAP was prepared in 2007. **Anticipated** A NFA ROD was signed for Site 4B in 2007.
Site 4A	SWMU 19, Photo Solution Discharge Area II	Adjacent to Bldg. 231	1959 - 1965	Originally thought to have been a shallow gravel-lined pit (french drain) which received spent photographic and x-ray solutions from developing and processing operations. This SWMU was later determined not to have received any of these wastes.	**Status** The RFA recommended that soil samples be collected around the unit at Building 231. Possible releases from this area have been considered in the investigation of SWMU 26. The building drainage was always connected to the sewage treatment plant and soil testing has confirmed no release. The SWMU was closed out in FFA under Findings of Fact p 19.

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 21, Building 241 Catch Basin	Bldg. 241	1960s - 1980s	The unit managed water, which may have contained residual explosive materials from testing operations in the Building 241 bunker. The unit is a metal catch basin, the bottom and sides of which consisted of a fine screen which filtered the particulate residue and allowed water to pass through.	**Status** SWMU 21 was closed out in August 2001 via closeout report.
NA	SWMU 22, Incinerators SWMU 22A – Explosive Waste Incinerator SWMU 22B - Classified Document Incinerator SWMU 22C - Pilot Fluidized Bed Incinerator SWMU 22D - Non-Explosive Combustible Incinerator (SWMUs 22C and 22D are part of IR Site 1, SWMU 22D is also SWMU 11)	SWMU 22A is located in the south central portion of Plant 1. SWMU 22B is west of Bldg. 385 in the northeast portion of Plant 1 SWMUs 22C and 22D are in the northwest portion of Plant 1	1942 - 1980s	Comprises an explosive waste incinerator (1942 - 1950s) which treated explosive wastes; classified document incinerator (1942 - 1980s) for scrap paper; pilot fluidized bed incinerator (1980s) for specially prepared propellant and explosive material; and non-explosive combustible incinerator (1960s - 1970s) for facility refuse and non-explosive combustible materials.	**Status** SWMU 22 (22A, 22B, 22C, and 22D) was closed out in September 2000 via closeout reports.
NA	SWMU 23, Salvage Yard	East of Bldg. 270	1950s - present	Unit managed scrap metals including aluminum and copper, also stored outdated equipment such as compressors, empty drums, and, at one point, spent automotive batteries. In the mid-1990s the western half of this SWMU was deactivated and a building was constructed in that area.	**Status** SWMU 23 was closed out in September 2000 via closeout report.

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
SWMU 24S is Part of Site 12; Other SWMUs in this series are not associated with an IR site.	SWMU 24, Satellite Accumulation Areas [24A through 24BB]	Throughout the facility	1940s - present	Several areas throughout the facility used to accumulate waste materials before they are transferred to the current hazardous waste storage area (SWMU 3).	**Status** SWMU 24G was deleted during the RFA. Based on the October 22, 1997 and the October 14, 1998 agency meetings, no further action was planned for SWMUs 24A, 24B, 24C, 24D, 24F, 24H, 24J through 24Q, 24U, 24W, 24Y, 24Z, 24AA, and 24BB. Further action is planned for SWMU 24S under AOC N (See discussion under SWMU 12). SWMUs 24J and 24V were closed out in September 2000 via closeout reports. SWMUs 24A, 24B, 24C, 24D, 24E, 24F, 24H, 24I, 24K, 24L, 24M, 24N, 24O, 24P, 24Q, 24R, 24T, 24U, 24X, 24Y, 24Z, 24AA, and 24BB were closed out in February 2002 via closeout reports. SWMU 24W was closed out in July 2002 via closeout report 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. **Anticipated** No further action is planned for SWMU 24S, but further investigation at IR Site 12 (see further details under SWMU 12).
NA	SWMU 25, Solvent Recovery Stills [25A, 25B,	Bldg. 8 (25A), Bldg.	Various start-up dates from	Three solvent recovery stills located inside buildings 8 (25A), 167 (25B), and	**Status**

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	and 25C]	167 (25B), and Bldg. 256 (25C)	1970s – mid-1990s	256 (25C). All SWMUs managed methylene chloride still bottoms.	SWMU 25 (25A, 25B, and 25C) was closed out in February 2002 via closeout report.
NA	SWMU 26, Septic Tank	South of Bldg. 369	1940s - 1960s	Unit managed primarily sanitary wastewater, but did manage some industrial wastewater. Industrial wastewater was generated from photographic processes and lab glassware washing. Industrial wastewater potentially contained organic constituents, including acetone and photographic solutions.	**Status** The contents of the septic tank were characterized, removed, and disposed of as non-hazardous and the tank was closed in place by filling with inert material in 2001. SWMU 26 was closed out in July 2002 via closeout report.
NA	SWMU 28, Silver Recovery Units	Buildings. 181 and 300	Bldg. 181, 1971 - present Bldg. 300, 1960s – mid-1990s	Two units that are used to reclaim silver from photographic and x-ray development waste. Once the silver is precipitated, the wastewater is discharged to the plant wastewater treatment system (i.e., SWMU 16).	**Status** SWMU 28 was closed out in February 2002 via closeout report.
NA	SWMU 29, Dust Collectors and Baghouses [29A through 29K]	Buildings. 2 (29A), 8 (29B), 35 (29C), 36 (29D), 145 (29E), 167 (29F), 256 (29G and 29H), 262 (29I), 300 (29J), and 344 (29K)	Various start-up dates from 1955 - present	Comprises dust collection systems to collect material from grit blasting, grinding, and sanding. The material collected consisted primarily of metal grindings and sawdust. Boiler fly ash is collected in the SWMU 29K baghouse. RDX and HMX product are collected in the SWMU 29I baghouse and used for propellant manufacture.	**Status** SWMU 29 (29A through 29K) was closed out in February 2002 via closeout report.

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 30, Spray Booth Filters	Buildings 8, 167, and 361.	Between 1978 and 1991 - 1995	The facility operates several paint and coating spray booths for painting and lining rocket motor cases, wooden signs, and other components. According the waste profiles, paint wastes contain paint resins, enamels, epoxides, and urethanes. In addition, MEK, MIBK, xylenes, toluene, petroleum distillates, 1,1,1-TCA, and TCE are present in these wastes.	**Status** SWMU 30 was closed out in February 2002 via closeout report.
NA	SWMU 32, PCB Rags Storage Area	Bldg. 23	1970s - 1980s	An accumulation area measuring approximately 10 feet by 7 feet. The area was located on the 2nd floor of Building 23 and fully enclosed by wooden plank walls and floor. The unit managed one drum of PCB-contaminated rags and one drum containing a PCB capacitor. In addition, a drum containing PCB fluid used for topping off electrical equipment was stored here.	**Status** SWMU 32 was closed out in February 2002 via closeout report.
NA	SWMU 33, Dumpsters	Throughout the facility	1988 - present	Leased side-loading and top roll-off dumpsters that receive non-hazardous general refuse, including kitchen refuse, paper refuse, non-hazardous cured resin and composite materials, shop waste, waste tires, and non-hazardous ash from burning activities. Spray Booth filters are also disposed in these units.	**Status** SWMU 33 was closed out in February 2002 via closeout report.
NA	SWMU 35, Paper Mulcher Waste Accumulation Area	Bldg. 1	1983 – 1998	A temporary storage area for paper mulch generated by the facility's SEM Security Disintegrator machine. The unit manages paper mulch generated from classified documents and scrap paper.	**Status** SWMU 35 was closed out in February 2002 via closeout report.

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 37 - Wastewater Sumps 37A through 37Q, 37S through 37X SWMU 37N – Building 167 was investigated as part of AOC N and is included in Site 11 (see Attachment A-1). SWMU 41 was evaluated with SWMU 37B per FFA.	**Building#/ SWMU#:** 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 226 / 37O 248 / 37P 256 / 37Q 280 / 37S 11 / 37T 22 / 37U 14 / 37V 8 / 37W 214 / 37X	Various dates from the 1940s – 1999	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.	SWMUs 37C, D, E, T and U were removed in June 1998SWMUs 37A, 37B, 37BB, 37N, 37V, and 37X were removed in 2000/2001. SWMUs 37H, 37K, 37M, and 37O were closed out in September 1999 via closeout reports. SWMUs 37C (soil), 37D (soil), 37I, 37L, and 37P were closed out in September 2000 via closeout reports. SWMUs 37C (groundwater), 37F, 37G, and 37S were closed out in September 2001 via closeout reports SWMU 37Q closed out in FFA under findings of fact p. 19. SWMUs 37A and 37X were closed out in February 2002 via closeout reports. 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. 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.
NA	SWMU 38, Parts Cleaners	Buildings. 7, 145, 224, and SWMU 24	Various dates from the 1960s - present	Approximately 5-gallon capacity units used to degrease and clean tools and small metal parts. Solvents used in the cleaning process include 1,1,1-TCA and Varsol solvent.	**Status** SWMU 38 was closed out in February 2002 via closeout report.

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 39, Weir	Near Bldg. 344	1988 - present	A concrete skimmer located along a part of the drainage ditch system (SWMU 27A). This unit was constructed as a contingency measure in the event of a fuel oil release from a boiler at Building 344.	**Status** The RFA recommended that soil samples be collected around and upstream of the unit. Because these weirs are part of the drainage ditch system on Plant 1, they are associated with SWMU 27A. **Anticipated** See discussion under SWMU 27A.
NA	SWMU 40, Laboratory Exhaust Filter	Bldg. 12	1960s (possibly as early as 1940s) – 1998	Disposable filter mechanism located outside of the Strand Bomb Testing Laboratory. It was approximately 18 inches above ground surface, and the majority of the surrounding ground surface was covered with cement. This unit managed combustion products from propellant testing.	**Status** SWMU 40 was removed June 1998. The SWMU was included in the Phase II SWMU/AOC Investigation. Screening of the confirmatory data suggested the remaining constituent concentrations do not exceed applicable regulatory screening criteria. Therefore SWMU 40 was closed out in July 2002 via closeout report.
NA	SWMU 41, Automotive Maintenance Area Drain	Bldg. 7	1940s – 1998	Below grade collection drain located at Building 7. This unit managed washdown water and liquids from inside the building. Waste oil, coolants, and solvents are used regularly in this area.	**Status** SWMU 41 was closed out in February 2002 via closeout report
NA	SWMU 42 is now listed as AOC F	See AOC F	See AOC F	See AOC F	See AOC F

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 43, Soil Pile	Bldg. 7	1992	Soil was excavated from the area behind Building 7 in 1992 when seven USTs were removed. The soil was land farmed on a plastic liner in an open area east of Building 7. The soil was reportedly contaminated with diesel and gasoline fuel components from the UST cleanup operations.	**Status** SWMU 43 was closed out in February 2002 via closeout report.
NA	SWMU 44, Settling Basin	Bldg. 7	1992	When the USTs and surrounding soil were removed from behind Building 7, the excavation pits filled with water. Air stripping was conducted on the water and then the water was pumped to a manmade basin 300 feet north of the former tank area. Here, solids were allowed to settle and water then discharged to the drainage ditch system (SWMU 27A).	**Status** The RFA recommended water samples be collected at this SWMU. Effluent water samples were collected and evaluated. The WVDEP branch overseeing the activities at this SWMU agreed that no further action was necessary. This SWMU was closed out under FFA findings of fact, p. 19.
NA	SWMU 45, Air Stripper	Bldg. 7	1992	An air stripper was temporarily installed in the excavation pits behind Bldg. 7 (see SWMU 43 and 44 description). The unit received water from the excavation area with a TPH content of less than 10 ppb. The unit was a fully contained, enclosed, above-ground structure.	**Status** SWMU 45 was closed out in February 2002 via closeout report.
NA	SWMU 46 is now listed as AOC G	See AOC G	See AOC G	See AOC G	See AOC G
NA	SWMU 47 is now listed as AOC H	See AOC H	See AOC H	See AOC H	See AOC H
NA	SWMU 48 is now listed as AOC I	See AOC I	See AOC I	See AOC I	See AOC I
NA	SWMU 49 is now listed as AOC J	See AOC J	See AOC J	See AOC J	See AOC J
NA	SWMU 50 is now listed as AOC K	See AOC K	See AOC K	See AOC K	See AOC K

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 51 is now listed as AOC L	See AOC L	See AOC L	See AOC L	See AOC L
NA	SWMU 53, Former PCB Storage Area	Bldg. 25	1980s - 1990	Fully enclosed wooden shed with a concrete base. 55-gallon drums of PCB material and hydraulic equipment units, which contained PCB oil, were stored at this unit.	**Status** SWMU 53 was closed out in February 2002 via closeout report.
NA	SWMU 54, Building 7 UST Removal Site	Bldg. 7	1950s - 1992	Former location of seven USTs which held gasoline and diesel. These tanks were removed as part of the facility UST removal program in 1992. This unit was found to contain contaminated soil and water (BTEX associated with gasoline and diesel fuel oil from the former tanks). This SWMU is associated with SWMUs 43, 44, and 45.	**Status** SWMU 54 was closed out in February 2002 via closeout report.
NA	SWMU 55, Building 2 UST Removal Site	Bldg. 2	1946 - 1991	Former location of two 550-gallon USTs, which were used to store heating oil. These tanks were removed as part of the facility UST removal program in 1991. This unit was found to contain contaminated soil (TPH associated with the heating oil from the former tanks). The contaminated soil was removed and thermally treated to remove the petroleum contamination.	**Status** The RFA recommended that an RFI be conducted to assess the nature and extent of contamination. A data package including documentation of pre-removal sampling, the removal action taken, confirmatory sampling, and groundwater monitoring was provided to WVDEP and reviewed. The tanks were not regulated, so no formal reporting of the removal effort was required. The work was monitored by the WVDEP and verbal authorization was given to close the excavation. Confirmatory soil sample results were evaluated. Based on the data, the agencies agreed that no further actions were necessary for this SWMU. This SWMU was closed out under FFA findings of fact, p. 19.
NA	SWMU 56, Building 3 UST Removal Site	Bldg. 3	1966 - 1991	Former location of four USTs, which were used to store No. 5 fuel, oil. These tanks were removed as part of the facility UST removal program in 1991. This unit was found to contain contaminated soil from No. 5 fuel oil	**Status** The RFA recommended that an RFI be conducted to assess the nature and extent of

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
				spill from the former tanks (TPH levels less than 50 ppm). The contaminated soil was removed and thermally treated to remove the petroleum contamination.	contamination. A data package including confirmatory sampling was provided to WVDEP and reviewed. The tanks were not regulated, so no formal reporting of the removal effort was required. The work was monitored by the WVDEP and verbal authorization was given to close the excavation providing that a groundwater monitoring well was installed in the excavation of Tank 3-1. The well was installed and sampled. The groundwater results were reviewed. Based on the data, the agencies agreed that no further actions were necessary for this SWMU. This SWMU was closed out under FFA findings of fact, p. 19.
NA	SWMU 57, Building 300 UST Removal Site	Bldg. 300	1964 - 1991	Former location of one 15,000-gallon UST which was used to store No. 5 fuel oil. This tank was removed as part of the facility UST removal program in 1991. This unit was found to contain soil with less than 100 ppm TPH.	**Status** The RFA recommended that an RFI be conducted to assess the nature and extent of contamination. A data package including confirmatory sampling was provided to WVDEP and reviewed. The tank was not regulated, so no formal reporting of the removal effort was required. The work was monitored by the WVDEP. The agencies agreed that no further actions were necessary for this SWMU. This SWMU was closed out under FFA findings of fact, p. 19.
NA	SWMU 58, Building 2 PCB Spill Area	Bldg. 2	Unknown	A PCB spill was reported from hydraulics associated with a large hydraulic press, which had once operated in the building.	**Status** SWMU 58 was closed out in February 2002 via closeout report.

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 59, Building 3 Drain	Bldg. 3	Unknown	Unknown	**Status** SWMU 59 was closed out in February 2002 via closeout report.
NA	SWMU 60, Building 23 Pesticide Storage Area	Bldg. 23	Unknown	Storage area used by a former maintenance supervisor to store tools. Two pesticide spray pump canisters were observed in the area. According to the former maintenance supervisor, the canisters were old fire extinguishers obtained when the fire department disallowed the use of carbon tetrachloride. The extinguishers were filled with methylene chloride and used to remove wasps from work areas. He stated that pesticides were never stored in this area.	**Status** SWMU 60 was closed out in February 2002 via closeout report.
NA	SWMU CCT, Condensate Catch Tank	Former Large Motor Manufacturing Bldg.	1958 - 1963	SWMU CCT was the condensate collection sump for the steam lines associated with the former Large Motor Manufacturing Building that exploded in 1963.	**Status** SWMU CCT was removed in 2001 and was closed out in February 2002 via closeout report.
NA	AOC A, Underground Storage Tanks	Several locations in Plant 1	1960s – 1980s	This AOC comprises 14 USTs that were used to store primarily fuel oil. One 1,000-gallon tank adjacent to Bldg. 100 was used to store heptane during experiments conducted in 1972 and 1973. Several of the USTs have been removed and/or closed in place. Seven USTs remain in service; six of these tanks are regulated.	**Status** AOC A was closed out in February 2002 via closeout report.
NA	AOC B, PCB Transformers Storage Area	East of Bldg. 157	Unknown - 1991 and 1992	Concrete pad measuring approximately 20 feet by 30 feet. This unit served as a staging area for transformers which were designated for reuse at the facility. The transformers contained PCBs. All transformers were removed from the area in 1991 and 1992.	**Status** AOC B (SWMU 10002) was closed out in September 2000 via closeout report.
NA	AOC C, Condensate Discharge Area	East of Bldg. 105	Present during RFA site visit (1993)	An earthen area, partially vegetated, which measures approximately 4 feet by 5 feet. A pipe extending from Building 105 discharges warm water with a high iron oxide content.	**Status** The RFA recommended that soil samples be collected from around the unit. The analytical data from these samples indicated that the

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
					condensate comes from steam generated in the boilers at Building 344. The agencies agreed that no further actions are required at this AOC because the condensate discharge will be regulated as Class 5 injection wells or under the NPDES for the facility. This AOC was closed out under FFA findings of fact, p. 20.
NA	AOC D, Building 181 Pit	Adjacent to Bldg. 181	Present during RFA site visit (1993)	Round, vertical, below-grade terracotta pipe located near Building 181, which appeared to be a possible discharge outlet. There was no historical information regarding this unit, but it is believed to be part of the facility's drainage system.	**Status** The RFA recommended that the integrity of the pit be tested, and if unsound, soil samples be collected around the pit. Documentation and visual inspection of the "pit" by the agencies determined that the "pit" was a manhole for a sewer line to a now-abandoned septic tank and no cracks or evidence of leaking was observed. Therefore, the agencies agreed that no further action was required for this AOC providing that the septic tank and drainage field be included as part of the facility septic tank investigation. This AOC was closed out under FFA findings of fact, p. 20.
NA	AOC E, Above Ground Storage Tanks Spills Area	Bldg. 344	Present during RFA site visit (1993)	These above-ground storage tanks are surrounded by concrete berm that extends 4 feet above ground and 3 feet below ground. During an EPA inspection, an oil spill was noted within the bermed area. During the RFA site visit, standing water, believed to be	**Status** The RFA suggested that a sampling and monitoring program be implemented. ABL has already completed work (with EPA Region

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Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
				condensate discharge, was observed within the bermed area.	III concurrence) to remove contamination from the area. For this reason, the agencies have agreed that no further action is required for this AOC. This SWMU was closed out under FFA findings of fact, p. 20.
Site 9	AOC F, Acid Neutralization Pit	Near Bldg. 344	1970s - 1992 (however, not used until 1988)	Served as a contingency discharge area for sulfuric acid from a nearby storage tank. In August 1992, the facility replaced the sulfuric acid tank with a self-contained tank; during the replacement operation, a release of approximately 600 gallons of sulfuric acid occurred. The release was neutralized and reported to the National Response Center. The pit was backfilled in late 1992 and no contamination was found.	**Status** The RFA recommended that soil samples be collected from the pit area and between the pit area and the drainage ditch. Following the collection of samples and an inspection by the WVDEP, the agencies agreed that no further action was required for this AOC. This SWMU was closed out under FFA findings of fact, p. 20.
NA	AOC H, Centrifuge	Undeveloped test area east of Plant 1. Former Bldg. 78	Unknown – 1998	The centrifuge was a circular structure with concrete walls and floor. The centrifuge was used for test firing of rocket motors. The centrifuge was driven by hydraulic pumps that were in turn driven by a diesel motor. For each test, the motor was carried into the centrifuge using a forklift. Once the centrifuge was activated, the motor was fired and performance data were collected. Periodically, a motor would explode, but the majority of the explosion was contained within the centrifuge. Following an explosion, remains that were dispersed outside the unit were collected for evaluation purposes and disposed of elsewhere. The centrifuge and motor house were demolished in December 1998.	**Status** AOC H was closed out in February 2002 via closeout report.
NA	AOC J, A and B Ranges	Adjacent to Bldg. 3	1940s - 1970s	This unit consists of two subscale rocket motor static test firing ranges. These ranges likely received propellant residue as a result of rocket motor test firing operations.	**Status** SWMU 49/AOC J (SWMU 10006) was closed out in September 2000 via closeout report.

ATTACHMENT A-3
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS WITH NO FURTHER ACTON
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
NA	AOC K, C Range	Current location of Bldg. 4	1940s	This unit was used for test firing of .50-caliber machine gun ammunition during World War II. Bullets were fired into a sand filled backstop (Building 43) during testing operations. The composition of the bullets is not known. The facility stated that it must be assumed that all projectiles hit a backstop and were contained. Sand from this backstop has been removed and its disposition is not known. Excavations in the area have not shown evidence of projectiles as were found in connection with H Range. The area is now partially paved with the remainder of the area vegetated.	**Status** The material in the AOC has been removed and the AOC was closed out in September 1999 via closeout report.
NA	AOC L, H Range	North of Bldg. 275	1940s	The unit is believed to have been used as a mortar testing range during World War II. The ballistics characteristics of mortar propellant were tested by firing the materials toward the hillside. This range potentially received propellant and explosive constituents during testing operations.	**Status** AOC L was closed out in September 1999 via closeout report.
NA	AOC O, Impact Area for Ranges F, G, and H	Hillside at eastern end of Plant 1	mid-1940s	AOC O is the hillside at the eastern end of Plant 1 to where mortars and other munitions were fired. The area is now completely vegetated and bears no readily observable evidence of mortar impact. According to historical information, no explosive warheads were used at F, G, and H Ranges. However, no release controls were associated with the units. Several concrete-filled mortar shells were unearthed in 1991 during construction and found to be inert.	**Status** AOC O was closed out in July 2001 via closeout report.

ATTACHMENT A-3
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS WITH NO FURTHER ACTON
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
NA	AOC P, Former ground Scar Area	North of former Building 294	Unknown	During the 1992 Aerial Photographic Site Analysis (APSA) EPA identified a probable burn area located about 500 feet northwest of Site 2 which has been identified as AOC P. Based on the results of the APSA, soil sampling was conducted in this area. AOC P was added to Appendix B of the FFA in April 2002.	**Status** AOC P was closed out in 2005 via closeout report.
NA	AOC Q, Former Solvent Shed	Near Building 805	Unknown	AOC Q has been identified as the former solvent storage shed area. AOC Q was added to Appendix B of the FFA in April 2002.	**Status** AOC Q was closed out in 2005 via closeout report.
NA	AOC R, Former Solvent Shed	Near Building 151	Unknown	AOC R has been identified as the former solvent storage shed area. AOC R was added to Appendix B of the FFA in April 2002.	**Status** AOC R was closed out in 2007 via closeout report.
Site 3	IR Site 3 - Previous Burning Ground (1950 – 1958) (This IR site is also SWMU 5)	West of Bldg. 362 and east of Fifth Street	1950 - 1958	See SWMU 5 description	See SWMU 5 description
Site 4A and Site 4B	IR Sites 4A and 4B – Spent Photographic Developing Solutions Disposal Sites (IR Site 4B is also SWMU 18 IR Site 4A is also SWMU 19)	4B is adjacent to Bldg. 181; 4A is adjacent to Bldg. 231	1959 – 1971	See SWMUs 18 and 19 descriptions	See SWMUs 18 and 19 descriptions
Site 7	IR Site 7 - Beryllium Landfill (This IR site is also SWMU 10)	Off of Route 956	1964 – 1974	See SWMU 10 description	See SWMU 10 description

ATTACHMENT A-3
SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS WITH NO FURTHER ACTON
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 8	IR Site 8 - Explosives Wastewater Sumps/Catch Basin (This IR includes SWMU 37)	Throughout the facility	1940s – 1999	See SWMU 37 description	See SWMU 37 description
Site 9	IR Site 9 - Former Acid Disposal Pit (This IR site is also AOC F)	Near Bldg. 344	1972 – 1992	See AOC F description	See AOC F description

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