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Final

Site Management Plan Fiscal Years 2009-2010

Naval Weapons Station Yorktown
Yorktown, Virginia



Prepared for

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Contract No. N62470-02-D-3052
CTO-0210

December 2008

Prepared by

CH2MHILL

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Fiscal Years 2009 – 2010**

**Naval Weapons Station Yorktown
Yorktown, Virginia**

Contract Task Order 210

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Under the

**NAVFAC CLEAN III Program
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Prepared by



Virginia Beach, Virginia

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Acronyms and Abbreviations

AOC	Area of Concern
AM	Action Memorandum
amsl	above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
BEHP	bis 2-Ethylhexyl phthalate
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BHC	beta-benzene hexachloride
BTAG	Biological Technical Assistance Group
CAX	Cheatham Annex
CCR	Construction Completion Report
CEC	cation exchange capacity
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
COC	Contaminant of Concern
cPAH	Carcinogenic Polycyclic Aromatic Hydrocarbon
CVOC	Chlorinated Volatile Organic Compound
cy	cubic yards
DCA	dichloroethane
DCE	dichloroethene
DD	Decision Document
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DNT	dinitrotoluene
DoD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EI	Ecological Index
EOD	Explosive Ordnance Disposal
ER	Environmental Restoration
ER-M	Effects Range-Median
ESD	Explanation of Significant Difference
ESI	Expanded Site Inspection
FFA	Federal Facilities Agreement
FS	Feasibility Study
ft	feet
FY	Fiscal Year
GIS	Geographical Information System

HHRA	Human Health Risk Assessment
HI	Hazard Index
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HQ	Hazard Quotient
HRS	Hazard Ranking System
HRSD	Hampton Roads Sanitation District
IAS	Initial Assessment Study
ILCR	Incremental Lifetime Cancer Risk
IRACR	Interim Remedial Action Completion Report
IRA	Interim Removal Action
IRP	Installation Restoration Program
LOAEL	Lowest Observed Adverse Effects Level
LTM	Long-term Monitoring
LUC	Land Use Control
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
µg/L	micrograms per Liter
MRP	Munitions Response Program
MWR	Morale, Welfare, and Recreation
NACIP	Navy Assessment and Control of Installation Pollutants
NAVFAC	Naval Facilities Engineering Command
NCP	National Contingency Plan
NEDED	Naval Explosives Development Engineering Department
NERP	Navy Environmental Restoration Program
NFA	No Further Action
NOAEL	No Observed Adverse Effects Level
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Parks Service
NTCRA	non-time-critical Removal Action
OU	Operable Unit
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	tetrachloroethene
PP	Proposed Plan
ppm	parts per million
PRG	Preliminary Remediation Goals
RA	Remedial Action
RAB	Restoration Advisory Board
RACR	Remedial Action Completion Report

RBC	risk-based concentration
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RG	Remediation Goal
RI	Remedial Investigation
RIP	Remedy in Place
RL	remediation level
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SERA	Screening Ecological Risk Assessment
SI	Site Investigation
SMP	Site Management Plan
sq	square
SSA	Site Screening Areas
SSP	Site Screening Process
STP	Sewage Treatment Plant
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCA	Trichloroethane
TCE	Trichloroethene
TCL	Target Compound List
TDS	Total Dissolved Solids
TM	Technical Memorandum
TNB	Trinitrobenzene
TNT	Trinitrotoluene
TPH	Total Petroleum Hydrocarbon
TSS	Total Suspended Solids
UCL	Upper Confidence Limit
UFP-SAP	Uniform Federal Policy-Sample Analysis Plan
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UU/UE	Unlimited Use Unrestricted Exposure
UXO	Unexploded Ordnance
VDEQ	Virginia Department of Environmental Quality
VOC	Volatile Organic Compound
WPNSTA	Naval Weapons Station

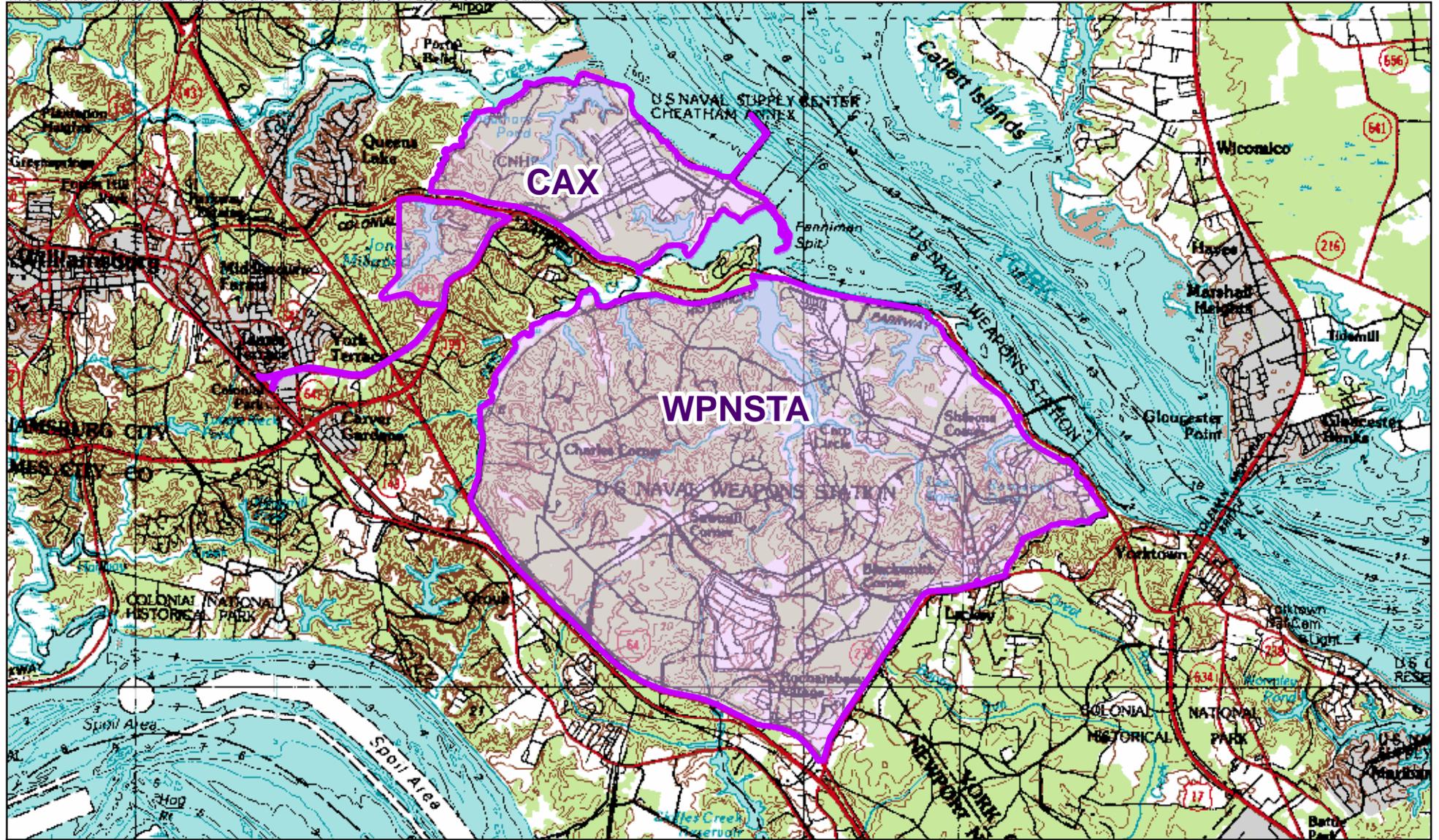
SECTION 1

Introduction

This document presents the fiscal years (FY) 2009 through 2010 annual amendment to the Site Management Plan (SMP) for Naval Weapons Station (WPNSTA) Yorktown, Yorktown, Virginia. This SMP meets the requirements of the Federal Facilities Agreement (FFA) (USEPA, 1994) between the Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Division, Commonwealth of Virginia Department of Environmental Quality (VDEQ), and Region III of the United States Environmental Protection Agency (USEPA) under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). This annual amendment to the SMP is being submitted per the requirements of the FFA. **Figure 1-1** illustrates the location of the Installation within the Commonwealth of Virginia.

The purpose of the SMP is to provide a management tool for NAVFAC Mid-Atlantic, WPNSTA Yorktown, VDEQ, USEPA, and their consultants to use in planning, reviewing, and setting priorities for all response activities to be conducted at WPNSTA Yorktown. The SMP establishes schedules and conceptual approaches for continued CERCLA activities at WPNSTA Yorktown Environmental Restoration (ER) sites. The prioritization of activities, proposed schedules, and work descriptions were jointly developed by the Navy, USEPA, and VDEQ on the basis of goals agreed to by all parties.

The SMP is a working document that is updated annually. This annual SMP amendment will supersede the 2008-2009 SMP finalized in February 2008.



Legend

 Activity Boundaries



0 0.65 1.3
Miles

Figure 1-1
Location of WPNSTA Yorktown and CAX
Site Management Plan for FY 2009 to 2010
WPNSTA Yorktown, Yorktown, Virginia
CAX, Williamsburg, Virginia

Background and Regulatory Framework

2.1 Activity Description

WPNSTA Yorktown is a 10,624-acre installation located on the Virginia Peninsula in York and James City Counties Virginia ([Figure 1-1](#)). WPNSTA Yorktown is bounded on the northwest by Cheatham Annex and the King's Creek Commerce Center; on the northeast by the York River and the Colonial National Historic Parkway; on the southwest by Route 143 and Interstate 64; and on the southeast by Route 238 and the town of Lackey.

Originally named the U.S. Mine Depot, WPNSTA Yorktown was established in 1918 to support the laying of mines in the North Sea during World War I. For 20 years after World War I, the depot continued to receive, reclaim, store, and issue mines, depth charges, and related materials. During World War II, the facility was expanded to include three trinitrotoluene (TNT) loading plants and new torpedo overhaul facilities. A research and development laboratory for experimentation with high explosives was established in 1944. In 1947, a quality evaluation laboratory was developed to monitor special tasks assigned to the facility which included the design and development of depth charges and advanced underwater weapons. On August 7, 1959, the depot was renamed the U.S. Naval Weapons Station. Today, the primary mission of WPNSTA Yorktown is to provide ordnance, technical support, and related services to sustain the war-fighting capability of the armed forces in support of national military strategy.

2.2 Environmental History

2.2.1 Regulatory History

Comprehensive environmental restoration activities at WPNSTA Yorktown began in 1984 under the Navy Assessment and Control of Installation Pollutants (NACIP) and ER Programs. The purpose of the NACIP and ER programs was to identify, assess, characterize, and clean up or control contamination from past waste management activities. The NACIP program was modified into the ER program in 1986 to reflect the requirements of CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA). The Navy is committed to clean up sites that pose a threat to human health or the environment and implementing environmental stewardship practices that ensures Navy waste management operations are in compliance with all federal and state regulations and Navy policy.

On October 15, 1992, WPNSTA Yorktown was added to the National Priorities List (NPL) based on a Hazard Ranking System (HRS) score of 50. The FFA between the Navy and the USEPA was signed August 1994, and incorporated Resource Conservation and Recovery Act (RCRA) Solid Waste Management Units (SWMUs) at WPNSTA Yorktown identified in a 1992 RCRA SWMU Investigation Report (A.T. Kearney, 1992). The FFA Findings of Fact identified 16 Sites (Sites 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 16, 17, 18, 19, and 21) for Remedial

Investigation (RI). Appendix A of the FFA identified 19 Site Screening Areas (SSAs) [SSAs 1-19] for the Site Screening Process (SSP). Subsequent to the FFA, six additional SSAs (SSA 20 - SSA 25) were identified for consideration in CERCLA. Based on the results of the SSP, SSA 1 (now Site 23), SSA 6 (now Site 24), SSA 7 (now Site 25), SSA 10 (now Site 28), SSA 16 (now Site 16), SSA 18 (now Site 26), SSA 20 (now Site 29), and SSA 24 (now Site 30) were determined to warrant Remedial Investigation/Feasibility Study (RI/FS) efforts under CERCLA. Appendix B of the FFA identified 21 Areas of Concern (AOCs) for desktop audits under CERCLA to determine if the AOCs warranted further consideration in the SSP. With the exception of AOCs 5, 6, and 7 which are associated with SSA 15, the Navy in partnership with USEPA and VDEQ agreed that no action was warranted for all other AOCs (Baker, 1997a). However, one additional AOC (AOC 23) was added in 2007 when it was determined that groundwater in the industrial area upgradient of Site 12 was contaminated with trichloroethene (TCE). Additionally, in 2007, the Navy initiated investigation of numerous Munitions Response Program (MRP) sites including the Morale, Welfare, and Recreation (MWR) Skeet Range. Although AOC 23 and the MWR Skeet Range were not included in the FFA, investigations at these sites have been or will be conducted following CERCLA guidance and are thus included in this document.

Table 2-1 identifies both active sites, SSAs, and AOCs addressed under CERCLA at WPNSTA Yorktown and those in which it was determined that no action or no further action (NFA) is required. **Figure 2-1** shows the location of each site at WPNSTA. Active sites, SSAs, and AOCs are discussed in Section 3. Additional background information for sites and SSAs with no action or NFA determinations is provided in the FY08-09 SMP.

Partnering

The Navy works in partnership with USEPA and VDEQ and has established a formal Yorktown/Cheatham Annex (CAX) Partnering Team to implement CERCLA. Partnering Team decisions are documented through consensus statements; a summary of Team consensus statements is presented in **Table 2-2**.

2.2.2 Hydrogeologic Setting

WPNSTA Yorktown is situated within the Virginia Coastal Plain Physiographic Province, which is characterized by unconsolidated sediments several thousand feet (ft) in thickness (Meng and Harsh, 1988). Deposition and erosion associated with fluctuating sea levels resulted in terraces that decrease in topographic elevation in a stair-step pattern with scarps, oriented north to south, that delineate the eroded shoreline along the toe of each terrace. Two terraces (Lackey Plain and Croaker Flat) are divided by one scarp (the Camp Peary Scarp) within the boundaries of WPNSTA Yorktown.

A total of ten geologic formations have been identified (Brockman et al., 1997) beneath WPNSTA. The upper most geologic formations consists of alluvial, colluvial, and marsh deposits composed of silt, sand, and pebbles with some clay. The geologic units are grouped into hydrostratigraphic units based upon hydraulic characteristics. The lithologic sequence of aquifers and confining/semi-confining units relevant to CERCLA investigations at WPNSTA are, from youngest to oldest; the Columbia aquifer, the Cornwallis Cave confining unit, the Cornwallis Cave aquifer, the Yorktown confining unit, and the Yorktown-Eastover

aquifer. The groundwater flow is locally controlled by topography with discharge to nearby surface water bodies and a primary flow and discharge direction toward the York River.

In the vicinity of Sites 1, 3, 6, 7, 11, 17, 24, and 25, the Camp Peary Scarp truncates the Columbia aquifer, the Cornwallis Cave confining unit, the Cornwallis Cave aquifer, and some to all of the Yorktown confining unit; hence, the upper units are missing and either the Yorktown aquifer or a thin portion of the Yorktown confining unit, occurs at the surface. In some areas, the Cornwallis Cave aquifer and confining unit are absent and the Columbia aquifer overlies the Yorktown confining unit. Where present, the Columbia aquifer ranges in thickness from 5 to 10 ft thick, with horizontal hydraulic conductivity between about 0.4 to 8 ft/day and vertical hydraulic conductivity between 1.7×10^{-4} to 1.7×10^{-1} ft/day (Brockman et. al., 1997). The dark greenish gray clay and silt of the Yorktown confining unit is absent north of Turkey Road between the west and south branches of Felgates Creek, along the streambeds of Felgates Creek, Indian Field Creek and their unnamed tributaries (Brockman et al., 1997). Where present, the unit is up to 36 ft thick. Vertical hydraulic conductivity of the confining unit ranges from 1.3×10^{-5} ft/day to 7.4×10^{-3} ft/day.

The Yorktown-Eastover aquifer extends across all of WPNSTA Yorktown and ranges from 60 to 100 ft thick. Horizontal hydraulic conductivity ranges from 0.004 to 3 ft/day and vertical hydraulic conductivity ranges from 1.7×10^{-5} to 4.8×10^{-1} ft/day. Transmissivity of the aquifer ranges from 0.5 to 40 ft²/day, with groundwater flow from west-to-east.

2.3 CERCLA Process

The following sections provide an overview of the CERCLA process. The objectives of the CERCLA 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 major elements of the CERCLA process are identified below and described in greater detail in [Table 2-3](#):

- Preliminary Assessment (PA)
- Site Investigation (SI)
- RI/FS
- Treatability Study
- Engineering Evaluation/Cost Analysis (EE/CA) and Removal Action (may be implemented at any time in the CERCLA process)
- Proposed Plan (PP) and Record of Decision (ROD)
- Five Year Review
- Remedial Design (RD) and Remedial Action (RA)
- Post-RA Monitoring and Reporting
- Response Complete (RC)/Remedy In Place (RIP)

2.3.1 Munitions Response Program

The Department of Defense (DoD) has established the MRP under the Navy Environmental Restoration Program (NERP) to address munitions and explosives of concern at other than operational ranges. The DoD and the Navy are establishing policy and guidance for munitions and response actions under the MRP; however, the key program drivers developed to date conclude that munitions response action will be conducted under the process outlined in the National Contingency Plan (NCP) as authorized by CERCLA.

2.3.2 Community Participation

WPNSTA Yorktown and CAX have developed a Community Involvement Plan and established a Restoration Advisory Board (RAB) comprised of members of the community, local environment group members, and state and federal officials, who meet semi-annually to keep the community informed on environmental issues at WPNSTA.

The documents prepared for the program are maintained in the administrative record files for review by the public. The index of WPNSTA Yorktown Administrative Records is available at the information repository.

Documents from the administrative record are available through the NAVFAC ATLANTIC Public Affairs Officer at:

Public Affairs Officer
Naval Facilities Engineering Command
6506 Hampton Boulevard
Norfolk, Virginia 23508-1278
Phone: (757) 322-8005
NFECL_PMO@navy.mil

**Table 2-1
Site Summary WPNSTA Yorktown
FY09-10 SMP**

Site Identification	Other Identification		Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA					
Site 1	IAS Site 1	Site 1	Dudley Road Landfill	10 acre landfill with soil cover in place; 1999 removal action of soil/waste	Findings of Fact RI/FS	Post-ROD (soil/waste) RI/FS (GW/SW/SD)	ROD (June 1999) for soil/waste Site Inspections/Five-Year Review (2007) LUC RD is being negotiated with EPA GW/SW/SD investigation on going
Site 2	IAS Site 2	Site 2	Turkey Road Landfill	5 acre landfill; 1994 partial removal action of waste	Findings of Fact RI/FS	MRP	Site was transferred to MRP on June 19, 2007 Funding for MRP site is anticipated for 2011
Site 3	IAS Site 3	Site 3	Group 16 Magazine Landfill	2 acre landfill with soil cover in place; 1999 removal action of soil/waste; 2000 two foot soil cover installed	Findings of Fact RI/FS	Post-ROD (soil/waste) RI/FS (GW/SW/SD)	ROD (June 1999) for soil/waste; Draft ESD (2008) Site Inspections/Five-Year Review (2007) LUC RD is being negotiated with EPA GW/SW/SD investigation on-going
Site 4	IAS Site 4	Site 4	Burning Pad Residue Landfill	10 acre landfill; 1994 removal of action waste, 2003 removal action of soil/waste, 2005 removal action of soil	Findings of Fact RI/FS	Response Complete (soil/waste) RI/FS (GW/SW/SD)	NFA ROD (September 2005) for soil/waste GW/SW/SD investigation on going
Site 5	IAS Site 5	Site 5	Surplus Transformer Storage Area	1000 square foot area, stored surplus transformers; 1982 removal action of soil/waste	Findings of Fact RI/FS	Response Complete	NFA ROD (September 1994) for Site 5 all media
Site 6	IAS Site 6	Site 6	Explosives-Contaminated Wastewater Impoundment	Includes the following three areas: flume area, impoundment and excavated area; 2000 removal action of bioremediation cell; wetlands created in impoundment area	Findings of Fact RI/FS	Post-ROD (soil/SW/SD) RI/FS (GW)	ROD (October 1998) for soil/SD LTM of GW/SW/SD (not final remedy for these media) Site Inspections/Five-Year Review (2007) LUC RD is being negotiated with EPA RA soil/sediment completed (2007), CCR (2008) GW investigation on going
Site 7	IAS Site 7	Site 7	Plant 3 Explosives-Contaminated Wastewater Discharge Area	300 foot long drainage and surrounding area; 1996 <i>ex-situ</i> Bioremediation Pilot Study (soil)	Findings of Fact RI/FS	Post-ROD (soil/SW/SD/GW)	ROD (October 1998) for soil/SW/SD/GW Site Inspections/Five-Year Review (2007) LUC RD is being negotiated with EPA LTM GW on going
Site 8	IAS Site 8	Site 8	NEDED Explosives-Contaminated Wastewater Discharge Area	300 foot drainage way and surrounding area; 2007 removal action of soil/SD	Findings of Fact RI/FS	RI/FS/PP/ROD (soil/SW/SD/GW)	NFA consensus statement (May 2008) for soil/SD GW currently under investigation
Site 9	IAS Site 9	Site 9	Plant 1 Explosives-Contaminated Wastewater Discharge Area	600 foot natural drainage way; 1994 removal action of soil/SD/waste	Findings of Fact RI/FS	Response Complete (soil/SW/SD) RI/FS (GW)	NFA ROD (March 1998) for soil/SW/SD GW not yet investigated Five-Year Review (2007)
Site 11	IAS Site 11	Site 11	Abandoned Explosives Burning Pits	0.5 acre waste disposal/burning area; 2000 removal action of waste ash/soil	Findings of Fact RI/FS	Response Complete (soil/SW/SD) RI/FS (GW)	ROD (October 2000) for waste ash/soil Response Complete SW/SD Five-Year Review (2007) RI Addendum Tech Memo HHRA for potable GW use (2008)

**Table 2-1
Site Summary WPNSTA Yorktown
FY09-10 SMP**

Site Identification	Other Identification		Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA					
Site 12	IAS Site 12	Site 12	Barracks Road Landfill	Includes the following 3 areas; Area A (4 acres), Area B (1.6 acres), Area C (3.3 acres); 1997 removal action of surface debris/onsite buildings and installation of geosynthetic landfill cover	Findings of Fact RI/FS	Post-ROD (soil/SW/SD/GW)	ROD (April 1997) for soil Site Inspections/Five-Year Review (2007) LUC RD is being negotiated with EPA ESD Draft to remove GW VOCs from LTM (2008) LTM GW/SD on going
Site 16 / SSA 16	IAS Site 16	Site 16	West Road Landfill	5 acre landfill; 1992 removal action of surface debris; 1994 removal action of waste/surface debris Site addressed with SSA16 (0.4 acre scarp metal storage area)	Findings of Fact RI/FS	Post-ROD (soil/GW)	ROD (September 1995) for soil/GW Tech Memo for risk management of soil/GW HH risk (February 2007) NFA ESD for soil/GW (2008) Five-Year Review (2007)
Site 17	IAS Site 17	Site 17	Holm Road Landfill	2 acre landfill; 2000 removal action of soil	Findings of Fact RI/FS	Post-ROD (soil) PP/ROD (GW)	ROD (October 2000) for soil/waste Five-Year Review (2007) Test Pit Tech Memo (2008) demonstrate no waste in place NFA Draft ESD for soil (2008) RI Addendum Tech Memo HHRA for potable GW use (2008)
Site 18	IAS Site 18	Site 18	Building 476 Discharge Area	1320 feet unlined drainage ditch	Findings of Fact RI/FS	Response Complete (all media)	NFA ROD (September 2005) for all media
Site 19	IAS Site 19	Site 19	Conveyor Belt Soils at Building 10	Area beneath and surrounding former location of conveyor belt; 1998 removal action of soil/conveyor system and backfilled with aluminum-contaminated soil No SD/SW associated with site	Findings of Fact RI/FS	Post-ROD (soil) RI/FS (GW)	ROD (March 1998) for soil Site Inspections/Five-Year Review (2007) LUC RD is being negotiated with EPA GW not yet investigated
Site 21	SWMU 21	Site 21	Battery and Drum Disposal Area	1 acre disposal area; 1994 removal action of waste/soil; 2002 removal action of soil	Findings of Fact RI/FS	Response Complete (soil) RI/FS (GW)	NFA ROD (September 2003) for soil/waste GW/SW/SD investigation on-going
Site 22	Not Identified	Not Identified	Burn Pad	9 acre burn pad; 2002 removal action of soil	Not identified	Response Complete (soil) RI/FS (GW/SW/SD)	NFA ROD (September 2003) for soil GW/SW/SD investigation on-going
Site 23	SWMU 99 EPIC 37	SSA 1	Building 428 Teague Road Disposal Area	10.5 acre disposal area; 1994 removal action of surface debris/ash/soil; 2003 removal action of surface debris/soil; 2004 removal action of soil	Appendix A SSA/SSP	RI/FS (all media)	Revised Draft Final Round I RI (2008)
Site 24	IAS Site 14 SWMU 28 EPIC 25	SSA 6	Aviation Field	14 acre grassy storage area with five discontinuous buried debris areas No SD/SW associated with site	Appendix A SSA/SSP	RI/FS (all media)	Revised Draft Final Round I RI (2008) UFP SAP for Supplemental RI (2008)
Site 25	SWMU 25 AOC A, EPIC 22 & 23	SSA 7	Building 373 Rocket Plant	0.14 acres around 500-gallon UST and associated piping; 1996 removal action of tank/piping/soil	Appendix A SSA/SSP	RI/FS (all media)	Revised Draft Final Round I RI (2008)
Site 26	SWMU 87	SSA 18	Building 1816 Mark 48 Waste Otto Fuel Tank	6.7 acres around 2,500-gallon UST and associated piping; 1995 removal action of UST Retained as an IRP site because of VOCs in GW	Appendix A SSA/SSP	RI/FS (all media)	Revised Draft Final Round I RI (2008)
Site 27	SWMU 80 & 81	SSA 9	Building 1751 Chemistry Laboratory Neutralization Unit and Drainage Area	1.9 acres around 4 underground septic tanks and a below-grade cylindrical unit	Appendix A SSA/SSP	Response Complete (all media)	NFA ROD (September 2006) all media

**Table 2-1
Site Summary WPNSTA Yorktown
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Site Identification	Other Identification		Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA					
Site 28	SWMU 107	SSA 10	Building 28 X-Ray Facility Tank Drain Field	5.8-acre drain field; septic tank/drain field	Appendix A SSA/SSP	RI/FS (all media)	Draft BERA (2008)
Site 29	Not Identified	Not Identified	Lee Pond (SSA 20)	4.1 acre pond No soil/GW associated with site	Not identified	PP/ROD (all media)	Final RI 2005 NFA TM all media Draft PP (2008)
Site 30 / AOC 22	Not Identified	Not Identified	Bracken Road Incinerator and Environs (former SSA 24)	0.1 acres around former incinerator location; 2008 removal action of soil	Not identified	RI/FS (all media)	EE/CA (2007) for soil
SSA 2	SWMU 54	SSA 2	Former EOD Burning/Disposal Area	4.1 acre storage area for 2 small (3 yd ³) dumpsters; 1994 removal action of surface debris	Appendix A SSA/SSP	SSP NFA	NFA 1992 RCRA SWMU Investigation
SSA 3	SWMU 56, 57, 58, 59	SSA 3	Fire Training Pits and Vicinity	2.7 acre fire training area; 1996 removal action of soil/tanker trailer	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
SSA 4	SWMU 102	SSA 4	Weapons Casing/Drum Disposal Area	0.5 acre former disposal area; 1994 removal action of surface debris	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
SSA 5	SWMU 101	SSA 5	Bypass Road Landfill	0.9 acre disposal area; 1994 removal action of surface debris	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
SSA 8	SWMU 122, 123	SSA 8	Building 350 Rail Roadhouse Maintenance Area Trench Outfall	0.4 acre underground oil/water separator	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (July 1997) AR# 01.10-07/29/97 0905
SSA 11	SWMU 113	SSA 11	Building 3 Neutralization Unit	0.2 acre drainage system (rectangular tank, trench, and sump)	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (July 1997) AR# 01.10-07/29/97 0906
SSA 12	SWMU 133, 134; EPIC 41, 42	SSA 12	Public Works Storage Yard/Building 683 Vicinity	1.5 acre storage area comprised of 2 waste accumulation areas (open field and fenced area)	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (July 1997) AR# 01.10-07/29/97 0907
SSA 13	AOC R	SSA 13	Building 529 Battery Drainage Area	0.5 acre paved area for discharge of washwater into storm drain	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (July 1997) AR# 01.10-07/29/97 0908
SSA 14	SWMU 72	SSA 14	Building 537 Discharge to Felgates Creek	0.4 acre pipe from Bldg 537; 2007 removal action of soil/SD	Appendix A SSA/SSP	SSA/SSP (all media)	EE/CA (2005) for soil/SD Post Construction Tech Memo (2008) GW under investigation
SSA 15	SWMU 127	SSA 15	Sewage Treatment Plant #1 Sludge Drying Beds and Discharge Area	0.3 acre sewage treatment plant; 2001 removal action of imhoff tank, trickling filter, sludge drying bed, and chlorination unit	Appendix A SSA/SSP	SSA/SSP (all media)	Ballard Creek watershed data collected Site 12 LTM Desktop audit to confirm CERCLA documentation for NFA
SSA 17	SWMU 74	SSA 17	Building 1456 Mark 46 Waste Otto Fuel Tank	2.35 acre area around UST and associated piping; 1995 removal action of UST system	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (March 1996) AR# 03.13-03/18/96 00666
SSA 19	SWMU 31, 32, AOC B	SSA 19	Beaver Road/Ponds 11 and 12 Drainage Area and Environs	164 acres surrounding the open burn/open detonation area	Appendix A SSA/SSP	SSP NFA	NFA Site Screening Process Report (March 1996) AR# 03.13-03/18/96 00667
SSA 21	Not Identified	Not Identified	Roosevelt Pond	22.2 acre pond receiving storm water from industrial area	Not Identified	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
SSA 22 / AOC 4	Not Identified	Not Identified	Sand Blasting Grit Pile	0.5 acre ordinance sand blast grit area; 1998 removal action of soil/grit	Not Identified	SSP NFA (soil) SSA/SSP (GW)	NFA for soil Site Screening Process Report 2001 AR# 01350 GW investigation on going
SSA 23	Not Identified	Not Identified	Coal Storage Area	1 acre coal storage area surrounded by 9-inch thick reinforced concrete wall	Not Identified	SSP NFA	NFA Site Screening Process Report 2001 AR# 01350
SSA 25	Not Identified	Not Identified	Wetlands Downgradient of Beaver Pond	5.6 acre wetland consisting of 2 impoundment areas of Ballard Creek No soil/GW associated with SSA	Not Identified	SSA/SSP (SW/SD)	BERA (2008) EE/CA (2008)

**Table 2-1
Site Summary WPNSTA Yorktown
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Site Identification	Other Identification		Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA					
AOC 1	AOC O	AOC 1	Building 350 Rail Roadhouse Transformer Pad	Fenced concrete pad outside Building 350	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 2	SWMU 128	AOC 2	Building 372 - PW Vehicle Maintenance O/W Separator	Below grade two chambered concrete oil/water separator	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 3	AOC J	AOC 3	Blasting Grit Spill Area	Area near Building 1347 where black powdery/glassy material was observed (may result from previous sandblasting activities)	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 4	AOC S	AOC 4	Paint Shop Grit Disposal Area	Area of soil and pavement outside building 530 where a container of metal grit was previously stored. Pavement was badly worn and contains staining	Appendix B Desktop Audit	NFA	Desk Top Audit determined site as SSA 22, NFA in SSP
AOC 7	SWMU 177	AOC 7	STP # 4 Sludge Drying Beds	Inactive sewage treatment plant (clarifier, settling tanks, and sludge drying beds); unit managed sanitary waste and possibly explosive contaminated wastewater	Appendix B Desktop Audit	Desk Top Audit	CERCLA status determination pending findings for SSA 15 Addressed in July 1997 Partnering Meeting
AOC 8	SWMU 37	AOC 8	Building 118 Waste Oil O/W Separator	One or two underground oil/water separators of unknown size and construction.	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 9	SWMU 147 & 148	AOC 9	Building 683 O/W Separator	50 feet by 50 feet concrete pad used for washing heavy equipment. Wastewater drains to below grade two chambered oil/water separator	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 10	EPIC 45	AOC 10	Stoney Point Road Disposal Area (STP # 2)	Area of soil where construction debris from barracks demolition was disposed.	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 11	SWMU 174	AOC 11	Building 710 Waste O/W Separator	Below grade two chambered concrete oil/water separator	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 12	SWMU 71	AOC 12	Building 457 O/W Separator	Below grade two chambered oil/water separator that received discharge from boiler operations. May be near/assoc/w SSA 14	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 13	SWMU 98	AOC 13	Building 370 O/W Separator	Underground oil/water separator; Liquid contents unknown, but suspected to be oil contaminated wastewater from boiler activities	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 14	SWMU 160	AOC 14	Building 1811 - Supply Storage Yard	Concrete storage pad where usable materials and waste was stored on and around pad.	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 15		AOC 15	Building 1744 Explosive Burning Silo	Building 1744 Explosive Burning Silo	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 16	SWMU 107	AOC 16	X-Ray Facility Tank	Below grade two chambered oil/water separator that received discharge from X-ray facility	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 17	SWMU 29 EPIC 34	AOC 17	Dredge Material Disposal Area	Vegetated area where dredge spoils from the York River were deposited	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 18	AOC M	AOC 18	Code 17 Contaminated Soil Runoff Drainageways	Area of pavement where oil contaminated soil was placed on plastic. Discolored area of pavement caused by drainage from this area and SWMU 104 was observed	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
AOC 19	SWMU 104	AOC 19	Code 17 Storage Compound	Two fenced-in areas of pavement where contaminated liquid and soil are stored in drums. Discolored area of pavement caused by drainage from this area and AOC M was observed	Appendix B Desktop Audit	NFA	Consensus for NFA September 1997 Partnering Meeting
AOC 20	SWMU 72	AOC 20	NEDED Discharge areas to Felgates Creek	Two pipes discharged explosive contaminated wastewater to Felgates Creek	Appendix B Desktop Audit	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909

**Table 2-1
Site Summary WPNSTA Yorktown
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Site Identification	Other Identification		Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA					
AOC 21	SWMU 181, 97, 168	AOC 21	West Road Coal Storage Area/Buildings 370 & 708 Coal Storage Piles	Currently known as SSA 23	Appendix B Desktop Audit	NFA	Portion of AOC became SSA 23; Remainder of site NFA as documented in EPA letter July 11, 1995
AOC 23	Not Identified	Not Identified	Barracks Road Landfill Industrial Area	Industrial area (Buildings 3, 4, 5, and 6) VOC GW plume; formerly investigated as Site 12	Appendix B Desktop Audit	SSP	GW investigation ongoing Evaluation pending
MWR Skeet Range	Not Identified	Not Identified	MWR Skeet Range	30 acre small arms range	Not identified	MRP	PA (2005) ESI (2008)

Note: Sites 10, 13, 14, and 15 went NFA prior to the FFA. They are listed in the IAS (C.C. Johnson & Associates, Inc. and CH2M HILL, 1984).

Site 20 is documented in the Dames and Moore Confirmation studies (1986 and 1988), It became SSA 18 during an SSP investigation (Baker, 1996 - AR No. 00666) and is later designated as Site 26.

Indicates NFA Site/SSA

- IAS - Initial Assessment Study
- RCRA - Resource Conservation and Recovery Act
- FFA - Federal Facilities Agreement
- SSP - Site Screening Process
- SSA - Site Screening Area
- AOC - Area of Concern
- SWMU - Solid Waste Management Unit
- SD - sediment
- SW - Surface Water
- GW - Groundwater
- NFA - No Further Action
- VOC - Volatile Organic Compound
- UST - Underground Storage Tank
- STP - Sewage Treatment Plant
- RI - Remedial Investigation
- FS - Feasibility Study
- PP - Proposed Plan
- ROD - Record of Decision
- RD - Remedial Design
- LUC - Land Use Control
- O/W - Oil/Water

**Table 2-2
WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary
FY 09-10 SMP**

NUMBER	CONSENSUS STATEMENT NUMBER	DATE	FACILITY	SITE	AOC	TOPIC	CONSENSUS STATEMENT
	NA	10/23/2001	WPNSTA	18		Site 18	The Team agreed to separate the Mercury issue from the Site 18 ROD.
	NA	10/23/2001	WPNSTA			Dec. 2002 Partnering Meeting	The team agreed to start at 12:00 noon Monday, December 3, 01 (lunch on own prior to starting) and meet through Wednesday evening with site visits Thursday December 6, 2001.
	NA	12/3/2001	WPNSTA	6, 7		LUCIP Review Sites 6 & 7	state the site size and then the size of the restricted area, annotate Global Position Coordinates (GPS) of restricted area on figures.
	NA	12/3/2001	WPNSTA/CAX			Define Metrics in Partnering Deliverable	Keep as stated in deliverable.
	NA	12/4/2001	WPNSTA	6		Site 6 – Explosives-Contaminated Wastewater Impoundment	This site is former cache where TNT was placed in a hole and stored. The hole was later backfilled. Soil with concentrations of cadmium and zinc were left in the hole and then backfilled with 4 feet of soil. After discussing the conditions of the site, the team agreed to evaluate whether further action was required at this site.
	NA	2/5/2002	WPNSTA	18		Site 18	Because Site 18 is NFA, the team proposed to schedule preparation of documents for this site on the same schedule as Sites 23-26.
	NA	2/5/2002	WPNSTA	2, 8, 14		Sites 2, 8, and SSA 14	Sites 2, 8, and SSA 14 (2 will be a ROD, 8 & SSA 14 will be a ROD) will track on a later schedule than Sites 23-26.
	NA	2/5/2002	WPNSTA	8, 18, SSA 14		RI Sites 8, 18 & SSA 14	Baker will update the report and resubmit for review and comment.
		2/5/2002	WPNSTA/CAX	12		5-Year Review	The team agreed to form a subgroup to research and report out at the March meeting on this issue. The subgroup consists of Bob Stroud and Jennifer Davis.
	NA	2/5/2002	WPNSTA/CAX			2002 Goals Update	The team agreed to include the Goals as part of each meeting's minutes.
	NA	2/5/2002	WPNSTA/CAX			Consensus Statement Documentation	The team agreed to document Consensus Statements by site as an addendum to the Site Management Plan. Mary is to evaluate possible methods (by site, chronologically, etc.) and report back to the team during the March Meeting.
	NA	2/5/2002	WPNSTA/CAX			Draft FFA	Scott Park/Jennifer Davis to prepare Draft FFA Addendum for counsel review and submittal to EPA and DEQ.
1	3/13/2002-1	3/13/2002	WPNSTA/CAX			Documentation of Consensus Statements	The team agreed to document Consensus Statements by site as an addendum to the Site Management Plan. A tracking number will be used to track the documents consisting of date and numerical sequence (i.e.: Month/Day/Year-Number – 3/13/02-1).
2	3/13/2002-2	3/13/2002	WPNSTA	4		Clean-up level	If Site 4 removal action cannot achieve residential levels then Sites 4 and 22 ROD will split into two separate RODS.
3	4/23/2002-3	4/23/2002	WPNSTA/CAX			Identification of new sites	The Team agrees that the FFA (Sections 9.3a and 9.3b) gives the team the authority to add newly identified sites to the SMP.
4	4/24/2002-4	4/24/2002	WPNSTA/CAX			Site Management Plan	The team agreed to go final with the FY 2002/2003 Draft SMP and revise text for the FY 2003/2004 submittal. Baker will provide Final covers for the FY 2002/2003 SMP.
7	4/24/2002-7	4/24/2002	WPNSTA/CAX			Community Relations Plan	The Team agrees to go final with the Community Relations Plan. If appropriate, final covers and spines will be submitted.
8	6/03/2002-8	6/3/2002	WPNSTA	GWOU 1		Groundwater Operable Unit 1 – Work Plan	The Team agrees to investigate and install groundwater monitoring wells if a removal action(s) at site 24 within Groundwater Operable Unit I shows contamination or materials that pose a potential risk to receptors with the potential of exposure to groundwater (waste left in place or confirmatory samples detections exceed PRG).
10	8/6/2002-10	8/6/2002	WPNSTA			Five Year Review Report, WPNSTA Yorktown Sites 1, 6, 7, 12, 16, and 19	The team agrees with the 5-year review Report findings and agrees to go final with the document. Jeff Harlow to pursue signature of the document by Admiral.
12	9/18/2002-12	9/18/2002	WPNSTA/CAX			New technical team member	The Team agreed to add Marlene Ivester as a technical member to the team.
13	9/18/2002-13	9/18/2002	WPNSTA/CAX			Facilitator	The team agreed a facilitator is needed for a few meetings.
14	10/22/2002-14	10/22/2002	WPNSTA			LUCIPs	The Team agreed to revise the LUCIP to incorporate two sections: Site Environmental History and References. Also, the LUCIP will include a brief executive summary of the ROD (about 1 paragraph, similar to the Camp Allen Landfill LUCIP). The numbers of signs for each site is as follows: - Site 12: At least four signs, placed at egress points to the site (of the ten proposed, four will be mandatory) - Site 19: At least three signs, placed at egress points to the site - Site 1: At least three signs, placed at egress points to the site - Sites 6 & 7: At least three signs for Site 6 at egress points and one sign at Site 7 egress point

**Table 2-2
WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary
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NUMBER	CONSENSUS STATEMENT NUMBER	DATE	FACILITY	SITE	AOC	TOPIC	CONSENSUS STATEMENT
15	10/23/2002-15	10/23/2002	WPNSTA/CAX			N/A	The Team agreed to add a goal to the FY03 Team Goals to be self-facilitating by end of third Quarter 2003 (5 additional meetings).
16	10/23/2002-16	10/23/2002	WPNSTA			GWOU I	The Team agreed that Baker can proceed with submitting the response to comments and with submitting a revised Draft Final Work Plan for GWOU I to the normal distribution list.
17	10/23/2002-17	12/4/2002 Revised	WPNSTA/CAX			WPNSTA-SSAs 3-24; 23-26; 2, 8, 18 & SSA 14; GWOU I, 27-30 CAX-1, 4 & 9, 11, Background Study, NFRAP 2, 3, 5, 6, 9, 10 & 12	The WPNSTA Yorktown/CAX Partnering Team empowers the ecological technical support team to address and resolve ecological issues for various sites at WPNSTA Yorktown/CAX (see table below) to meet the dates and priority specified by the WPNSTA Yorktown/CAX Team, with Ed Corl to take the lead on meeting the schedule determined by the Team. WPNSTA: SSAs 3-24 SSP; 23-26 DF RI; 2, 8, 18 & SSA 14 DF RI; GWOU I Draft WP; 27-30 Draft RI CAX: 1 DF RI; 4 & 9 Draft RI (SERA); 11 Draft RI, Draft Background Study; 2, 3, 5, 6, 9, 10 & 12 Draft NFRAP
18	12/5/2002-18	12/5/2002	WPNSTA/CAX	21, 22		WPNSTA Sites 21 & 22	Based upon EPA Region III comments, Sites 21 and 22 RODs will be rewritten as No Further Action (NFA) RODs with no institutional controls (ICs) because they were remediated to residential levels.
19	12/5/2002-19	12/5/2002	WPNSTA/CAX			Site Action Status Report	The Team agrees to use the SASR as a tracking tool and add it to the standard meeting format.
20	12/5/2002-20	12/5/2002	WPNSTA/CAX			Action Item List	The Team agreed that the Action Item List will be addressed during the Agenda Building Call with respect to whether or not the Action Item has been completed. If completed, a "C" will be put in the Outcome column of the Action Item list and the item will not be addressed during the subsequent Partnering Team Meeting.
21	1/29/2003-21	1/29/2003	WPNSTA/CAX			CAX Site 1 Baseline Risk Assessment	The eco subgroup discussed the issues for the CAX Site 1 RI and determined that a baseline risk assessment was warranted for the wetland area based upon a conference call prior to the December Partnering Meeting. The Navy RPM determined that based upon the existing ROD schedule and funding execution for the site, it was determined that (revised per team concurrence by MM 3/12/03) the ROD and funding schedule could not be met. Therefore, the Navy recommended that an EECA for soils/debris removal at CAX Site 1 would be the best approach. The Team agrees upon this approach.
22	3/13/2003-22	3/13/2003	WPNSTA	23		Confirmation sampling during removal action	At Yorktown Site 23, the Team agrees that the removal action should meet the following goals: Areas A and C are large areas and confirmation sampling will include multiple bottom samples as proposed in the confirmation sampling plan. All other sample locations that exceed cleanup goals at this time will be removed as hot spots.
24	3/13/2003-24	3/13/2003	WPNSTA	4		Site clean-up goals	The team agrees that the ROD for Site 4 should be drafted upon completion of the on-going non-time critical removal action (NTCRA) to ensure that the ROD will be most appropriate in light of final conditions following the NTCRA. The team understands that \$600,000 will be committed in March 2003 to fund the NTCRA and that the Navy RPM projects that the NTCRA may require additional funding at the start of FY04 to complete the clean up.
26	6/17/2003-26	6/17/2003	WPNSTA	24		Groundwater investigation at WPNSTA Site 24 – Aviation Field	Based upon past sample results and the reported solid waste disposed of at WPNSTA Site 24 – Aviation Field, the Partnering Team agrees that a groundwater investigation is not warranted at this time unless the planned removal action at WPNSTA Site 24 can not meet human health or ecological clean-up goals that have yet to be determined for sediment and soil.
30	6/19/2003-30	6/18/2003	WPNSTA	12		Long term monitoring program at WPNSTA Site 12	Based upon the information presented on June 19, 2003 at the Partnering Meeting on the long term monitoring program at WPNSTA Site 12 (years one through five), the Partnering Team agreed to the following: 1. Eliminate LTM monitoring at wells 12GW13 and 12GW4 (located upgradient of site) and collect one round of samples during the next 5 year LTM period at wells 12GW8, 12GW19, 12GW18 and 12GW 18A and analyze for 8 RCRA metals (total metals only). 2. The team agreed to install a new monitoring well, 12GW20, down gradient of well 12GW07 at the site to identify the migration pathway for VOCs. 3. Eliminate sampling at wells 12GW01A, 12GW06 for VOCs because: a. 12GW01A is screened in the deeper aquifer and has no history of detections; b. 12GW06 – concentrations have decreased over time and it is recommended that monitoring at 12GW01 will adequately monitor groundwater pathway. 4. Collect samples from at 10 wells (12GW01, 12GW05, 12GW07, 12GW09, 12GW13, 12GW14, 12GW17, 12GW15, 12GW16, and 12GW20 (new well) every two years and analyze for all VOCs. 5. The team agreed to collect 4 or 5 sediment samples at locations 12SDCWL, 12SD32, 12SD34, 12SD37, and RI sample location SD17 and analyze for the 8 RCRA metals once (in year 9 or 10) in the next 5-year review cycle.

**Table 2-2
WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary
FY 09-10 SMP**

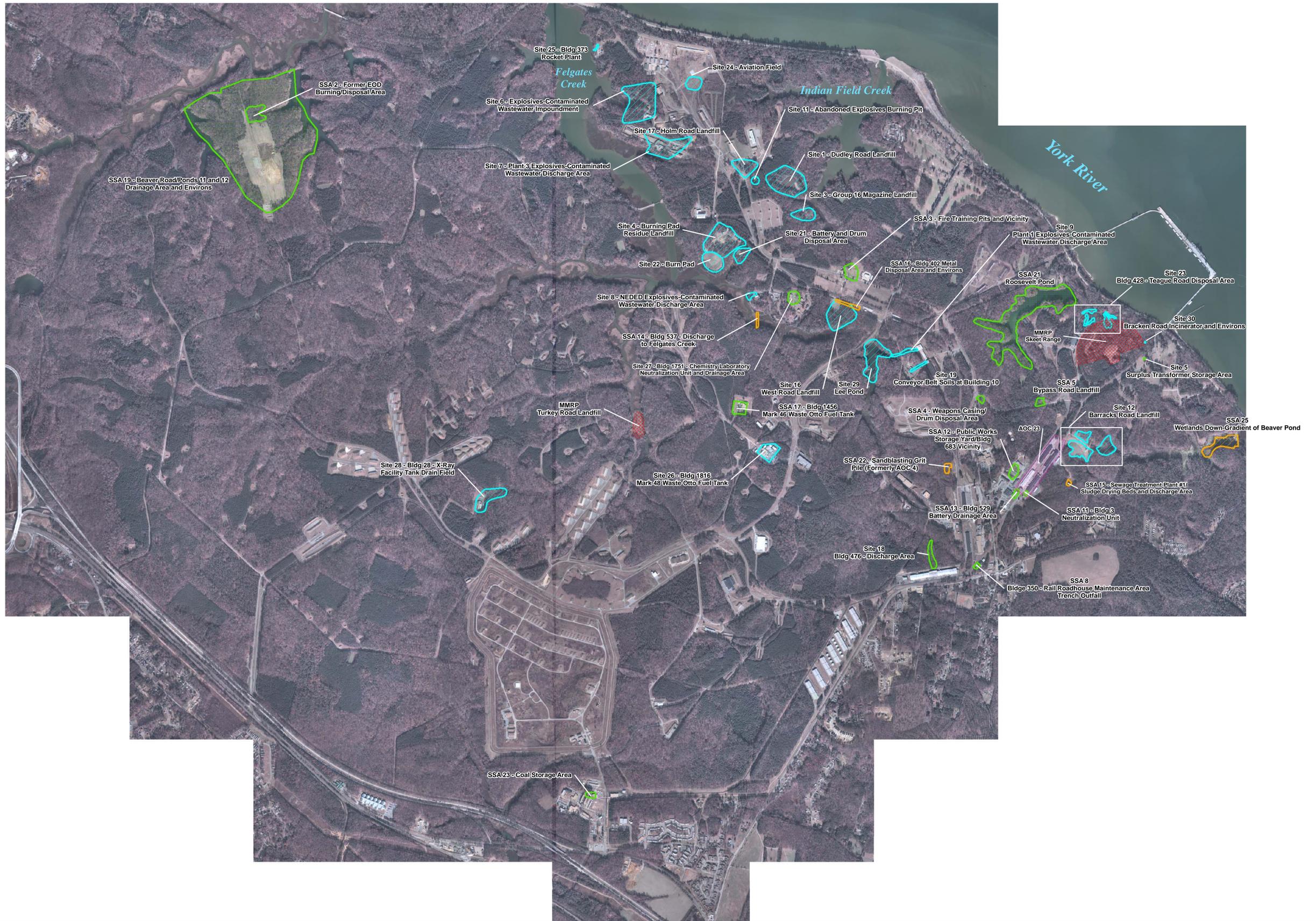
NUMBER	CONSENSUS STATEMENT NUMBER	DATE	FACILITY	SITE	AOC	TOPIC	CONSENSUS STATEMENT
32	12-2-03-32	Dec. 2, 2003	WPNSTA	WPNSTA OB/OD Range		OB/OD Groundwater Monitoring Program	The Partnering Team agrees that the RCRA groundwater monitoring program conducted at the OB/OD Range Site should be discontinued as the CERCLA program will be conducting a media-wide investigation of the site.
33	1-07-04-33	1/7/2004	WPNSTA	23		Site 23 TCRA	With respect to zinc-contaminated soil at Site 23, the Team agrees to stop excavating at Grids 1 through 6, and to place a minimum of 2 feet of clean backfill. We agree that with a minimum of 2 foot of clean fill, there are no current unacceptable ecological risks presented by the soils. With respect to grids 4, 5, and 6, confirmation sampling indicates that zinc concentrations at the bottom of the excavated grids exceed the cleanup goal of 200 mg/kg. The Team agrees that based on the current mission of the WPNSTA, and the location of Site 23 within the blast arc of the pier, it is unlikely that the site would be redeveloped. However, should the soil at grids 4, 5, and 6 be excavated in the future, there is a chance of future ecological risks from zinc in the soil, should this soil be brought back to the surface. However, this potential risk ecological risk is small, given that the overall size of grids 4 5, and 6 is relatively small, and given that if excavation occurred, soil would be mixed with clean fill, and this mixing with the clean fill would lower the overall zinc concentrations. Therefore, the actual chance of potential future ecological risks is minimal.
34	3-9-04-34	3/9/2004	WPNSTA	4		Site 4 Draft ROD	The team will move forward with the preparation of the Draft ROD for WPNSTA Site 4 as cited in the FY 2004 team goals. The document will be for internal team review only pending completion of removal activities at WPNSTA Site 4.
35	3-9-04-35	3/11/2004	CAX	12		Site 12 NFRAP	The team agrees with the NFA remedy for CAX Site 12 – Disposal Site Water Tower based upon the no further action remedy recommended in the Technical Memorandum submitted for review on January 12, 2004. A No Further Response Action Planned (NFRAP) Decision Document with a Final Technical Memorandum as an appendix will be prepared for submittal by March 31, 2004 in accordance with the annual team 2004 goals.
36	3-22-04-36	3/22/2004	CAX	7		CAX Site 7	Based upon the field investigation conducted at CAX Site 7N, as summarized in the Draft Trenching Letter Report dated 19 March 2004, the team has agreed to move forward with a TCRA Action Memorandum as an interim action that will recommend appropriate erosion control and shoreline stabilization for the site. The team also agrees that removal of the CAX Site 7N landfill will be accomplished under an Engineering Evaluation/Cost Analysis (EE/CA) when funding is available. While the team agreed that an esthetic clean up of the beach in the vicinity of the landfill does little to mitigate risk, the team agreed to move forward with a beach cleanup at the request of the Navy.
37	5-18-04-37	5/18/2004	WPNSTA	SSA 15 Beaver Pond		Planned action for SSA 15 Beaver Pond	The team agrees, based upon the 2003 limited field investigation, to develop a work plan for the continued investigation of mercury associated with the former STP 2 area, when funding becomes available. The team agrees that the proposed continued investigation is a high priority. The work plan will include a sampling program of sediment and tissue samples of small fish and amphibians or frogs to further assess nature and extent (vertical and lateral) of mercury in Ballard Creek from the Beaver Dam to the next downstream impoundment structure.
38	5-19-04-38	5/19/2004	WPNSTA/CAX			BTAG	The Yorktown/CAX Partnering Team agrees that the role of USEPA BTAG members will be changed from Adjunct Member to Technical Member.
39	6-24-04-39	6/24/2004	WPNSTA	18		Site 18 NFA	Team agrees with No Further Action for WPNSTA Yorktown Site 18.
40	6-24-04-40	6/24/2004	WPNSTA	2, 8, SSA 14		Planned action for Sites 2, 8, SSA 14	Team agrees to perform pre-characterization sampling for WPNSTA Yorktown Sites 2 and 8 and SSA 14. If the sampling shows that the extent of contamination at the sites can be well defined, then the Navy will complete an EE/CA with a removal action and go for a NFA ROD. However, if the sampling indicates that extent of contamination at the sites cannot be well defined, then the Team agrees to go forward with a BERA and follow on FS/PRAP with a ROD with remedy.
41	5-18-05-41	5/18/2005	WPNSTA	OB/OD		Path forward for sampling for planned RI	As presented on May 18, 2005, the Team agrees with Sampling Option 2 for the upcoming field investigation. Sampling Option 2: collect 15 surface soil and 15 subsurface soil samples from within the tree line area, and collect 30 surface soil samples outside the tree line. This option will capture the greatest extent of exposure points for ecological receptors.
42	8-17-05-42	9/26/2005	WPNSTA	SSA 25		Team approval of Draft Work Plan for SSA 25 Mercury Investigation	The Team agrees that the Work Plan for the SSA 25 investigation can be finalized and that field work can be scheduled.

Table 2-2
 WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary
 FY 09-10 SMP

NUMBER	CONSENSUS STATEMENT NUMBER	DATE	FACILITY	SITE	AOC	TOPIC	CONSENSUS STATEMENT
43	4-4-06-43	4/4/2006	WPNSTA	1, 3, 11		Team approval of post-ROD documentation that addresses minor changes in the remedies at Sites 1, 3 and 11 at WPNSTA Yorktown.	<p>The Team understands that the selected remedy documented in the Sites 1 and 3 ROD (Baker, 1999) and the Site 11 ROD (Baker, 2000) estimate an amount of soil that would be removed during the execution of the selected remedies, as noted above. The remedial action closeout reports (OHM, 2001a and 2001b) document that the actions resulted in the removal of 413 tons (260 cy) of soil from Site 1, 284 tons (800 cy) of soil from Site 3, and 655 tons (400 cy) of soil from Site 11.</p> <p>While these increases in quantity constitute changes in the remedy, they are considered minor changes in terms of USEPA guidance on post-ROD changes (USEPA, 1999). A minor change is considered a change that does not have a significant impact on scope, performance, or cost of the remedy, such as a small volume change or a change in the long term monitoring frequency.</p> <p>The Team, therefore, agrees that a Memo to File is appropriate to document these minor changes for Sites 1, 3 and 11. The Memo to File will become part of the WPNSTA Yorktown Administrative Record.</p>
44	7-24-06-44	7/24/2006	WPNSTA	GWOUs		Elimination of GWOU designations	Groundwater at WPNSTA Yorktown will be addressed on a site-specific basis.
45	9-1-06-45	9/1/2006	WPNSTA	12		LTM at Site 12	Elimination of VOC sampling from LTM sampling program at Site 12.
		3/14/2008	WPNSTA	3		LUC not necessary	<p>The Partnering Team agrees to the following:</p> <ol style="list-style-type: none"> 1. Residual levels of cPAHs in the PAH hot-spot are below clean up levels that are protective of human health (4.1 mg/kg) and the environment (44 mg/kg) for UUUE. 2. Soils at the entire site poses no unacceptable risks to human health or the environment 3. No waste material remains at the site and 4. The entire site meets the criteria for UUUE <p>Therefore land use controls are not necessary to protect human health and the environment from exposure to soil at Site 3.</p>
		5/15/2008	WPNSTA	8		NFA for soil and sediment	The Partnering team agrees that, based on the removal action and post-removal confirmation sampling results, no further action for soil or sediment is required at Site 8.
		5/20/2008	WPNSTA	11 and 17		NFA for groundwater	The Partnering team agrees groundwater poses no unacceptable human health or ecological risks, therefore NFA is warranted for groundwater at Sites 11 and 17.

**Table 2-3
Major Elements of the CERCLA Process
FY09-10 SMP**

Preliminary Assessment (PA)	Initiation of concern about a site, area, or potential contaminant source. The PA is a limited-scope assessment designed to distinguish between sites that clearly pose little or no threat to human health or the environment and sites that may pose a threat and require further investigation. Environmental samples are rarely collected during a PA. The PA also identifies sites requiring assessment for possible response actions. If the PA results in a recommendation for further investigation, an SI is conducted.
Site Investigation (SI)	Some sites warrant preliminary or interim investigations, studies, or removal/remedial actions. If it is unclear as to whether a site should be included in the CERCLA RI/FS process, an SI is sometimes conducted to make a general determination if activities at the site have impacted environmental media. SIs typically include the collection of environmental and waste samples to determine which hazardous substances are present at a site and to determine if these substances have been released to the environment.
Remedial Investigation (RI)	During an RI, data is collected to characterize site conditions, determine the nature of the waste, assess risk to human health and the environment, and, if necessary, conduct treatability testing to evaluate the potential performance and cost of the treatment technologies being considered.
Treatability Study (TS)	Treatability studies may be conducted at any time during the CERCLA process. The need for a treatability study generally is identified during the FS. Treatability studies may be classified as either bench-scale (laboratory study) or pilot-scale (field studies). For technologies that are well-developed and tested, bench-scale studies are often sufficient to evaluate performance. 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. 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 support the remedial design of a selected alternative.
Engineering Evaluation/Cost Analysis (EE/CA) and Interim Removal Action (IRA)	Removal actions are implemented to clean up or remove hazardous substances from the environment at a specific 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. Actions taken immediately to mitigate an imminent threat to human health or 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 (NTCRA).
Feasibility Study (FS)	The FS is the mechanism for the development, screening, and detailed evaluation of alternative remedial actions. The RI and FS can be conducted concurrently; data collected in the RI influences the development of remedial alternatives in the FS, which in turn affect the data needs and scope of treatability studies
Proposed Plan (PP)	A PP presents the remedial alternatives developed in the FS and recommends a preferred remedial alternative. The public has an opportunity to comment on the PP during an announced formal public comment period. Site information is compiled in an administrative record and placed in the general IR program information repositories established at local libraries for public review. The public comments are reviewed and the responses are recorded in a document called a Responsiveness Summary. At the end of the public comment period, an appropriate remedial alternative is chosen to
Record of Decision (ROD)	The ROD document is issued to explain the selected remedial action. Public comments received during the PP are addressed as part of the responsiveness summary in the ROD. A notice to the public is issued when the ROD is signed by Navy and EPA following State concurrence.
Remedial Design/Remedial Action (RD/RA)	The final stage in the process is the RD/RA. The technical specifications for cleanup remedies and technologies are designed in the RD phase. If land use controls are a component of the remedy, the Land Use Control Remedial Design is generated during this phase. The RA is the actual construction or implementation phase of the cleanup process.
Remedy In Place	For long-term remedies where it is anticipated that remedial action objectives will be achieved over a long period, the RIP milestone signifies the completion of the remedial action construction phase, and that the remedy has been implemented and has been demonstrated to be functioning as designed (i.e., all testing has been accomplished and the remedy will function properly). Once all RCs and RIPs have been documented for every site at the facility and the terms of the FFA have been met, site closeout and NPL deletion is completed.
Response Complete	Within the CERCLA process there are multiple points at which a decision can be made that no further response action is required; properly documented (necessary regulatory notification or application for concurrence has occurred) these decisions constitute response complete and/or site closeout. RC is the point at which the remedy has achieved the required reduction in risk to human health and the environment (cleanup goals have been met). Response complete is followed by site closeout.
Five Year Review	Five-year reviews generally are required by CERCLA or program policy when hazardous substances remain on site above levels that permit unrestricted use and unlimited exposure. Five-year reviews provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. Generally, reviews are



Legend

- Active RI/FS Sites (one or more media)
- Action SSP SSAs (one or more media)
- No Further Action RI/FS Sites and SSP SSAs
- MMRP Sites
- Active AOC

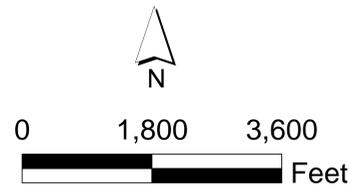


Figure 2-1
 Sites/SSA Locations/AOC Locations/MMRP sites and CERCLA Status
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia

WPNSTA Yorktown Site and SSA Descriptions

This section provides a summary of base-wide investigations as well as a brief history of CERCLA activities (chronology of significant CERCLA documents and milestones), a summary of the nature and extent of potential contamination, potential unacceptable risks, remedial actions, and CERCLA path forward for each of the sites, SSAs, and AOCs at WPNSTA. Schedules for this FY 2009-2010 SMP illustrate planned CERCLA activities through 2010.

3.1 Base-wide Studies

WPNSTA Yorktown initiated its environmental investigation and restoration efforts in 1984 under the Navy Assessment and Control of Installation Pollutants program by conducting an Initial Assessment Study (IAS). The purpose of the IAS was to identify and assess sites posing a potential threat to human health and/or the environment due to contamination from past operations. A total of 19 sites were identified based on information from historical records, aerial photographs, field inspections, and personnel interviews. The IAS concluded that 15 of the 19 sites posed a sufficient threat to human health or the environment to warrant Confirmation Studies (C.C. Johnson & Associates, Inc. and CH2M HILL, 1984).

Confirmation Studies included the collection and analysis of groundwater, sediment, and soil in 1986 and 1988. In 1986, samples were collected from the 15 sites identified in the IAS. The 1988 sampling effort consisted of additional analysis of groundwater, sediment, and soil (Dames & Moore, 1986 and 1988). In 1992, an RI Interim Report summarized confirmation study results and recommended further RI activities at 14 of the 15 sites (Versar, 1991).

A Focused Biological Sampling and Preliminary Risk Evaluation was completed in 1993 summarizing results of a limited biological tissue, surface water, and sediment sampling effort to evaluate the potential human health risk associated with consumption of fish and shellfish taken from select waters within WPNSTA Yorktown, including Lee Pond, Roosevelt Pond, Felgates Creek, and Indian Field Creek (Baker and Weston, 1993a). A Habitat Evaluation was completed at WPNSTA Yorktown in 1995 that characterized the aquatic and terrestrial habitats at Sites 1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 16, 17, 18, 19, and 21. The evaluation described the major habitat types on or surrounding each site, provided an inventory of vegetative species, and a record of any animal species encountered or suspected to be present (Baker, 1995a).

A Five-Year Review was conducted in both 2002 and 2007 to evaluate the effectiveness of the remedies at sites for which there is a ROD or Decision Document (DD) in place to determine if the remedies continue to be protective of human health and the environment. The 2002 and 2007 Five-Year Review included an evaluation of Sites 1, 6, 7, 12, 16, and 19. The 2007 Five-Year Review additionally included an evaluation of Sites 3, 11, and 17. Both documents concluded that all site remedies were found to be properly implemented and protective of human health and the environment. The 2007 Five-Year Review recommended

Explanations of Significant Differences (ESD), documenting the change in scope, performance, and cost of the remedies selected in the RODs, for Sites 3, 6, 12, 16, and 17.

A summary of the aforementioned documents is presented in the table below.

Document Title /Milestone	Author/Date	Administrative Record (AR) Document Number
Initial Assessment Study of Naval Weapons Station Yorktown	C.C. Johnson/ CH2M HILL ,1984	00247
Confirmation Study Step 1A (Verification), Round One	Dames and Moore, 1986	00256
Confirmation Study Step 1A (Verification), Round Two	Dames and Moore, 1988	00259
Remedial Investigation Interim Report	Versar, 1991	00812
Focused Biological Sampling and Preliminary Risk Evaluation	Baker/Weston, 1993	00310
Five-Year Review Report for Sites 1, 6, 7, 12, 16, and 19	Baker, 2002	01310
Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL , 2007	02155

3.2 Site Descriptions

Background information for sites, SSAs, and AOCs with no action or NFA decisions prior to 2007 is provided in the FY08-09 SMP. Sites included in this category comprise: Site 5, Site 18, Site 27, SSA 2, SSA 3, SSA 4, SSA 5, SSA 8, SSA 11, SSA 12, SSA 13, SSA 17, SSA 19, SSA 21, SSA 23, AOC 1, AOC 2, AOC 3, AOC 4, AOC 8, AOC 9, AOC 10, AOC 11, AOC 12, AOC 13, AOC 14, AOC 15, AOC 16, AOC 17, AOC 18, AOC 19, AOC 20, and AOC 21. Additional information on these sites, SSAs, and AOCs is also included in [Table 2-1](#).

3.2.1 Site 1—Dudley Road Landfill

Site Description

Site 1 is a 10-acre landfill located in the northern portion of WPNSTA Yorktown west of Indian Field Creek and north of an unnamed tributary to the creek ([Figure 3-1](#)). Site 1 is generally level and grassy with topography that gently slopes to the east with more pronounced slopes east and south toward Indian Field Creek and the unnamed tributary to Indian Field Creek. The area surrounding the soil-covered landfill is wooded and acts as a riparian buffer for the adjacent Indian Field Creek. Depth to groundwater is approximately 3-10 ft below ground surface (bgs). Groundwater in both the Columbia and Yorktown-Eastover aquifers flows primarily toward Indian Field Creek and its tributary. Indian Field Creek discharges to the York River (~ 1 mile) downstream of Site 1.

Site 1 was historically used for sand mining activities, resulting in the construction of two borrow pits, which were subsequently filled with waste materials. Between 1965 and 1979,

Site 1 was operated as a landfill under a VDEQ Conditional Permit (No. 287) for disposal of solid waste materials in the borrow pits. Waste disposed of included asbestos from insulation on steam piping; empty oil, grease, paint, and solvent containers; nitramine-contaminated carbon; household appliances; scrap metal banding; construction debris; tree limbs; lumber, packaging wastes; electrical wires; waste oil; and plastic lens grinding waste. These wastes were estimated at quantities of 17 tons/year for approximately 15 years. In 1979, the landfill was closed except for the disposal of plastic lens grinding residues, which continued for two years after the closure of the main landfill. In 1985, the landfill was closed to the receipt of all waste materials. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	Administrative Record (AR) Document Number
Round One Remedial Investigation Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Round Two Remedial Investigation Report, Sites 1 and 3	Baker, 1998	00998
Hot Spot Delineation	Baker, 1997	N/A
Feasibility Study for Sites 1 and 3	Baker, 1997	01158
Proposed Remedial Action Plan for Sites 1 and 3	Baker, 1998	01840
Record of Decision, Operable Unit Nos. VIII and IX, Site 1 and Site 3	Baker, 1999	01000
Remedial Action Report for Sites 1 and 3 and SSA 22	OHM, 2001	01091
Remedial Design for Naval Weapons Station Yorktown Site 1	Baker, 2006	(Draft – no AR No.)
Long-Term Monitoring Report for Sites 1, 3, and 7	Baker, 2006	02075
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	02158
Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL, 2007	02155

Nature and Extent of Potential Contamination

The waste at Site 1 is the source of contamination to soil, groundwater, sediment, and surface water. Previous investigations included full suite analysis [target compound list (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, explosives, and target analyte list (TAL) inorganics] of soil, surface water, sediment, and groundwater. The primary contaminants identified in soils at Site 1 during previous investigations consisted of arsenic, beryllium, and iron. Maximum concentrations of these chemicals were 141 mg/kg, 0.55 mg/kg, and 11,700 mg/kg, respectively. The primary contaminants identified in groundwater were

metals (antimony, arsenic, chromium, manganese, and iron) and chlorinated VOCs. Cadmium exceeded the maximum contaminant level (MCL) [5 micrograms per Liter ($\mu\text{g}/\text{L}$)] in Site 1 Columbia aquifer unfiltered groundwater ($8.6 \mu\text{g}/\text{L}$) and chromium exceeded the MCL ($100 \mu\text{g}/\text{L}$) in Yorktown-Eastover aquifer unfiltered groundwater at $154 \mu\text{g}/\text{L}$. VOCs were detected in groundwater with concentrations of TCE at $850 \mu\text{g}/\text{L}$, detected in 1GW12B, which is screened in the Yorktown confining unit. Additionally, in the Columbia aquifer pair for this well (1GW12), TCE was detected at a concentration of $17 \mu\text{g}/\text{L}$ during the latest round of sampling (Baker, 2006 LTM). Chlorinated VOCs [TCE and 1,2-dichloroethene (DCE)] and metals (aluminum, copper, and iron) were also detected in surface water. Metals (cadmium, iron, and manganese) were detected in sediment of Indian Field Creek and its tributary.

Potential Risks

The Human Health Risk Assessment (HHRA) identified unacceptable child resident cancer risks (1.5×10^{-3}) and non cancer hazard (4.2) from exposure to arsenic, beryllium, and iron in surface and subsurface soil at Site 1. No risk was identified to human receptors from surface water or sediment from Indian Field Creek and its tributary adjacent to Site 1. Cancer risks and non-cancer hazards for the future adult and child resident were identified based on exposure to chlorinated VOC contamination in Columbia and Yorktown-Eastover aquifer groundwater at Site 1. Based on a screening ecological risk assessment (SERA), concentrations of aluminum, copper, and iron exceeded ecological risk screening values in surface water; however, only copper exceeded the background upper confidence limit (UCL) concentration. Concentrations of cadmium, iron, and manganese in sediment exceeded ecological risk screening values; however, aluminum and manganese are below background UCL concentrations (Baker, 1998a).

Further investigations are being conducted in a Phase II RI at Site 1, to better understand nature, extent, and risk associated with potential contamination of groundwater and surface water/sediment of Indian Field Creek and its tributary adjacent to Site 1.

Remedial Action(s)

A ROD for Site 1 soil was signed June 1999 to address soil and surface debris. Groundwater, surface water, and sediment were not addressed in this ROD and are currently under further investigation.

Remedial actions for soil and waste included the removal of metal surface debris and excavation and off-site disposal of 413 tons of waste and soil. Analysis following confirmation soil samples verified arsenic concentrations remaining in place were below the removal action clean-up goal ($63 \text{ mg}/\text{kg}$). The excavated area was backfilled with on-base borrow material and re-graded. Land use controls (LUCs) prohibiting residential development of Site 1 and disturbance of the soil cover have been maintained by the Navy through routine inspections.

Review of documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and site inspections demonstrate that the soil cover placed at Site 1 is functioning as intended by the ROD.

Activities Completed 2007-2008

The Navy is currently negotiating a draft LUC RD with the USEPA. The 2007 Five-Year Review concluded the remedy was protective of human health and the environment. A Phase II groundwater, surface water, and sediment work plan was drafted and field activities are anticipated for fall 2008.

CERCLA Path Forward

- Quarterly Inspections (soil cover maintenance as needed)
- Phase II RI for groundwater, surface water, and sediment
- FS/PP/ROD for groundwater, surface water, and sediment, as appropriate
- Five-Year Review (2012)
- Remedial Action Completion Report (RACR)

[Schedule 3-1](#) presents the FY09-10 schedule for Site 1.

3.2.2 Site 3—Group 16 Magazine Landfill

Site Description

Site 3, the Group 16 Magazines Landfill is a two-acre wooded area behind the former Group 16 Magazines located in the northern portion of WPNSTA Yorktown west of Indian Field Creek ([Figure 3-2](#)). Site 3 is named for its proximity to the Group 16 Magazines; however, the history of this landfill is unrelated to operations at the magazines. Surface water and groundwater flow to the north/northeast toward Indian Field Creek. The area adjacent to Indian Field Creek is covered by woods that act as a riparian buffer for surface water runoff. North and south of Site 3 are two unnamed tributaries leading to Indian Field Creek.

The site was originally used for sand mining and consisted of one borrow pit to a depth of 10 ft bgs. Between 1940 and 1970, Site 3 was operated as a landfill. Approximately 90 tons of waste was disposed of in the borrow pit and reportedly included solvents, sludge from boiler cleaning operations, grease trap wastes, Imhoff tank skimmings (containing oil and grease), and animal carcasses. The Site 3 waste boundary was approximated as part of previous investigations including a geophysical survey. Test pit investigations performed in 1997 confirmed the presence of scrap metal, 55-gallon metal drums, grease, wax, lumber, banding, concrete blocks, plastic sheeting, and surface debris. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One Remedial Investigation Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Round Two Remedial Investigation Report, Sites 1 and 3	Baker, 1998	00998
Feasibility Study for Sites 1 and 3	Baker, 1997	01158
v2 Proposed Remedial Action Plan for Sites 1 and 3	Baker, 1998	01840
Record of Decision, Operable Unit Nos. VIII and IX, Site 1 and Site 3	Baker, 1999	01000

Document Title /Milestone	Author/Date	AR Document Number
Remedial Action Report for Sites 1 and 3 and SSA 22	OHM, 2001	01091
Long-Term Monitoring Report for Sites 1, 3, and 7	Baker, 2006	02075
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL , 2007	02158
Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL , 2007	02155
Post-Remedial Action Site Conditions TM, Site 3	Baker, 2008	02200

Nature and Extent of Potential Contamination

The waste at Site 3 was the source of potential contamination to soil, groundwater, sediment, and surface water. Previous investigations included full suite analysis of soil, surface water, sediment, and groundwater. A polycyclic aromatic hydrocarbon (PAH) soil “hot spot” area (total PAHs > 100 mg/kg) was identified in the northeastern portion of the site (Baker, 1998a). VOCs were detected in groundwater during the latest round of sampling with the highest concentration of TCE (140 µg/L) detected at monitoring well 3GW19. The concentration of TCE in deep well pair 3GW19A was 2 J µg/L during the same sampling event (Baker, 2006). The concentration of TCE in groundwater from 3GW19 has declined over time while daughter products have remained stable or increased, indicating that at least partial reductive dechlorination of TCE may be occurring in this area. Chlorinated VOCs were detected in Indian Field Creek surface water, but it has not been determined whether these chemicals are related to Site 1 or Site 3. Metals including aluminum, copper, and iron were detected in surface water adjacent to the site. Additionally, aluminum, cadmium, iron and manganese were detected in sediment.

Potential Risks

Human health risks were evaluated separately for the Site 3 “proper” area (excluding the PAH “hot spot”) and from the Site 3 PAH “hot spot” area and concluded: no unacceptable cancer risks or noncancer hazards to potential current receptors (adult and adolescent trespassers) in Site 3 proper from exposure to surface soil; the Site 3 “Hot Spot” area posed unacceptable risk to potential current receptors from exposure to PAHs [mainly benzo(a)pyrene] in surface soil; surface water and sediment from Indian Field Creek (adjacent to Site 1 and 3) posed no unacceptable human health cancer risk or non-cancer hazards to the future child resident; and unacceptable cancer risks and non-cancer hazards for the future adult and child residents were identified from the potable use of groundwater from chlorinated VOCs in the Yorktown-Eastover aquifer (Baker, 1998a).

The SERA determined that potential risks for the terrestrial ecosystem (with the exception of the PAH hot spot area) were not significant enough to warrant further consideration for remedial action. Potential ecological risks were identified from exposure to PAHs in the “hot spot” area that warranted remedial action. Based on the SERA, concentrations of aluminum, copper, and iron exceeded ecological risk screening values in surface water; however only copper exceeded the background UCL concentration. Concentrations of aluminum, cadmium, iron, and manganese in sediment exceeded ecological risk screening

values; however, aluminum and manganese are below background UCL concentrations (Baker, 1998a).

Further investigations are being conducted in a Phase II RI at Site 1, to better understand nature, extent, and risk associated with potential contamination of groundwater and surface water and sediment of Indian Field Creek and its tributary adjacent to Site 3.

Remedial Action(s)

A ROD for Site 3 soil was signed June 1999 to address soil and surface debris. Groundwater, surface water, and sediment are not addressed in this ROD and are currently under further investigation and have not yet been addressed by any remedial actions.

Post-ROD remedial actions included the removal of metal surface debris and excavation and off-site disposal of 284 tons of PAH contaminated soil and landfill waste (2,700 tons of galley waste, 50 drums of solidified resin (22 tons), and 127 tons of abandoned dry cell batteries) (OHM, 2001a). Following confirmation soil samples that verified PAH concentrations remaining in place were below the removal action clean-up goal (10 mg/kg industrial and 4 mg/kg for the child resident), the excavated area was backfilled with on-base borrow material and re-graded. LUCs prohibiting residential development of Site 3 and disturbance of the soil cover have been maintained by the Navy through routine inspections.

LTM of surface water, sediment, and groundwater was initiated in 2000 to further assess VOCs detected in these media. Additional investigations will be conducted at Site 3, to better understand nature, extent, and risk associated with potential contamination of groundwater and surface water and sediment of Indian Field Creek and its tributaries.

Because all waste was removed during implementation of the remedy, and post-removal confirmation soil samples (<1 mg/kg) are below levels that allow for unlimited use unrestricted exposure (UU/UE) (4 mg/kg), there are no unacceptable risks from exposure to soil or waste that remain at the site. The Navy has prepared a technical memorandum (TM) demonstrating that no unacceptable human health or ecological risks from exposure to soil and waste remain at Site 3. This TM was approved by USEPA and VDEQ and finalized in March 2008. A draft ESD for the ROD will be prepared to document that NFA is required to address site soils and waste.

Activities Completed 2007-2008

The Navy is currently negotiating a draft LUC RD with the USEPA. The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment. A Phase II groundwater, surface water, and sediment work plan was drafted and field activities are anticipated for fall 2008.

CERCLA Path Forward

- Quarterly Inspections
- ESD (document NFA for waste and soil)
- Phase II RI for groundwater, surface water, and sediment
- FS/PP/ROD for groundwater, surface water, and sediment, as appropriate

- Five-Year Review (2012, pending approval of ESD)
- RACR

Schedule 3-2 presents the FY09-10 schedule for Site 3.

3.2.3 Site 4—Burning Pad Residue Landfill

Site Description

Site 4, the Burning Pad Residue Landfill, consists of a ten acre open field surrounded by woods in the north-central portion of WPNSTA Yorktown (**Figure 3-3**). The site is bordered by Site 22 to the south and Site 21 and an unnamed tributary leading to the Eastern Branch of Felgates Creek to the southeast, and an intermittent drainage channel on the east side. The topography of Site 4 is relatively flat, sloping gently to the south and southwest toward Site 22 and the Eastern Branch of Felgates Creek. Topography to the southeast slopes sharply toward the tributary to the Eastern Branch of Felgates Creek.

Site 4 received an estimated 17 tons of waste per year from 1940 to approximately 1975. Materials reportedly disposed at Site 4 included: carbon-zinc batteries from underwater weapons; burning pad residues [possibly containing aluminum, hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), TNT, 2,4- dinitrotoluene (2,4-DNT), and octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)]; tree stumps; fly ash from coal-fired boilers; mine casings; electrical equipment; and transformers. Limits of waste disposal were estimated based on 28 test pits and a geophysical survey (Baker and Weston, 1993b). Depth of fill material was estimated to be 5 to 10 ft bgs (Baker and Weston, 1993b). An ash pile [estimated to be 6 ft thick and covering an area of approximately 3,000 square (sq) ft] from the burning of explosives and VOCs at Site 22 was located in the northeast corner of the site.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One Remedial Investigation Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Engineering Evaluation/Cost Analysis (EE/CA) For Sites 4, 16, and 21 Removal Actions	Baker and Weston, 1993	00331
Closeout Report, Sites 4, 16, and 21, Battery and Drum Disposal Area	IT, 1995	00616
Post-Removal Confirmation Sampling Report and Baseline Ecological Risk Assessment	Baker, 1995	00661 00662
Round Two Remedial Investigation Report, Sites 4, 21, and 22	Baker, 2001	01296 01297
Feasibility Study, Sites 4, 21, and 22	Baker, 2001	01160
Proposed Remedial Action Plan, Sites 4 and 22	Baker, 2001	01290
Project Closeout Report For Site 4 – Burn Pad Residue Landfill	Shaw, 2005	01680
Record of Decision, Site 4 – Burning Pad Residue Landfill	Baker, 2005	02026

Nature and Extent of Potential Contamination

The waste at Site 4 was the source of potential contamination to soil, groundwater, sediment, and surface water. Previous investigations included analysis of soil, groundwater, sediment, and surface water for VOCs, SVOCs, PCBs, explosives, and inorganics. Additionally, surface soil samples were collected for dioxin and dibenzofuran. An area of elevated PAHs (> 10 mg/kg) and arsenic (63 mg/kg) was identified in surface soil. Explosives [HMX; RDX; 1,3,5-trinitrobenzene (TNB); and 2,4,6-TNT] were detected in surface soil near the ash pile. Dioxin and dibenzofuran were not detected in surface soil.

Explosives were also detected in surface water collected from the tributary to Eastern Branch of Felgates Creek southeast of the site. In groundwater, TCE (maximum concentration 9 µg/L), pesticides and several explosives were detected downgradient of Site 4 and in surface water upstream and downstream of where Sites 4 and 22 border the Eastern Branch of Felgates Creek. SVOCs and PCBs were not detected in any groundwater samples. Inorganics, including arsenic, barium, lead, nickel, selenium, and zinc, were detected in groundwater, surface water, and sediment. Dissolved arsenic was detected at a concentration of 13.9 µg/L in one well, greater than the MCL of 10 µg/L.

Potential Risks

Following a 1994 removal action, samples were collected and an HHRA and SERA were performed. Unacceptable cancer risks (1.5×10^{-3}) and non-cancer hazards [hazard index (HI) = 25] were identified for exposure to arsenic and carcinogenic PAHs (cPAHs) in soil. Although no acceptable risks were identified from exposure to the Yorktown aquifer groundwater (based on data from one well under a non-potable use scenario), potential groundwater risks were not calculated for potable residential use exposure to either Columbia or Yorktown aquifers. No potential human health risks were identified for exposure to surface water or sediment under a residential scenario. Potential ecological risks were identified for terrestrial and aquatic habitats related to concentrations of PAHs, explosives, and inorganics.

The Round Two RI evaluated data from previous investigations (Round One RI in 1993 and Post Removal Action Sampling in 1994) as well as the Round Two RI data. The evaluation segregated data into two areas, a "Hot Spot" area and Site 4 Proper. Since a soil removal was planned for the Hot Spot, the current scenarios utilized Hot Spot data in the risk evaluation, while the future scenarios were run with data from the Hot Spot removed from the calculations. Unacceptable cancer risks (6.5×10^{-4}) and non-cancer hazard (HI=9.6) were identified from exposure to of Yorktown aquifer (from one well under a non-potable use scenario). Unacceptable non-cancer hazard (HI=5.8) were identified for exposure to arsenic and cPAHs in soil. The data did not change the results of the HHRA conducted during the Round One RI. No potential human health risks were identified for exposure to surface water or sediment under a residential scenario.

The SERA identified potential adverse effects to terrestrial receptors from SVOCs, 4,4'-dichlorodiphenyltrichloroethane (4,4'-DDT), Endosulfan II, and inorganics from soils within the Hot Spot area. Terrestrial risks associated with soil concentrations of PAHs, pesticides/PCBs, explosives, and inorganics in the Site 4 proper were also identified. Potential adverse impacts to the future aquatic habitat from groundwater were identified for 2,4-DNT/2,6-DNT, TNT, amino-DNTs, RDX, and inorganics.

Remedial Action(s)

In 1994, surface debris, the ash pile, and buried batteries were removed as part of a non-time-critical removal action (NTCRA). Wastes removed included concrete, drums, batteries, inert ordnance, cables, construction debris, and roofing shingles.

A second NTCRA was begun in 2001 (Shaw, 2005) whereby approximately 57,600 tons of waste (construction debris, transformers, drums, and ordnance items) and contaminated soil were excavated. Due to an increase in the extent of the excavation, funding limitations prohibited the removal of all material. Final removal of all remaining soil and waste which was stockpiled on site was completed in 2005.

Since soil samples were determined to have met remediation goals, an NFA ROD for soil at Site 4 was signed September 2005 (Baker, 2005a). This ROD did not address groundwater, surface water, or sediment at the site. Groundwater, surface water, and sediment are currently under further investigation and have not yet been addressed by any remedial actions.

Activities Completed 2007-2008

A Groundwater RI work plan was completed; field activities were conducted during 2007-2008. The investigation included full suite and explosives analysis of groundwater, seeps, surface water, and sediment. Results of the investigation will be documented in an RI Report currently in production.

CERCLA Path Forward

- RI for groundwater, surface water, and sediment
- NFA PP/ROD for groundwater, surface water, and sediment, as appropriate
- RACR

Schedule 3-3 presents the FY09-10 schedule for Site 4.

3.2.4 Site 6—Explosives Contaminated Wastewater Impoundment, Flume Area and Excavation Area, Buildings 109, 110 and 501

Site Description

Site 6 is located in the northern portion of WPNSTA Yorktown and consists of three areas: an impoundment area, a flume area, and an excavated pit (**Figure 3-4**).

Flume Area. Wastewater possibly containing explosives (TNT, RDX, and 2,4-DNT) and solvents [TCE, trichloroethane (TCA), and cyclohexanone] generated in Building 109 for explosives reclamation, and Building 110 for explosives loading, mixing, and casting, was discharged through a network of flumes into the Site 6 impoundment area from 1942 to 1975 (Baker, 1998b). In 1975, a carbon adsorption tower was installed to treat the contaminated wastewater prior to discharge into the drainage way. A National Pollutant Discharge Elimination System (NPDES) permit was granted to allow the discharge of effluent from the carbon adsorption tower containing acceptable concentrations of nitramines/nitroaromatics. In 1986, the effluent from the tower was diverted to the sanitary sewer and ultimately to the Hampton Roads Sanitation District (HRSD) (Baker, 1998b).

Impoundment Area The Site 6 impoundment is a 3-acre, unlined, surface impoundment adjacent to wetlands along a small tributary to the main branch of Felgates Creek. The impoundment was created by building a coffer dam across the headwaters of the small tributary. Wastewater (containing explosives and solvents) was discharged to this area from the flume network from 1942 to 1975. After 1986, the impoundment collected only surface runoff from the area around Buildings 109 and 110. Wastewater discharges ceased in 2003 when operations in Buildings 109 and 110 terminated (Baker, 1998b).

Excavated Area Although not well documented, the Site 6 excavated area may have been the soil borrow pit for construction of the coffer dam for the impoundment; it may have also been used to contain packed explosives. This area is northwest of former Building 501 and is currently wooded.

Site 6 is generally wooded with some open areas near buildings. Site 6 topography generally slopes from east to west toward the impoundment area with ground surface elevations from approximately 40 ft above mean sea level (amsl) near Main Road to less than 10 ft amsl at the impoundment area. Surface water runoff from the site is conveyed to Felgates Creek either directly by overland flow, or via tributaries adjacent to Site 6.

The surface geology at Site 6 is consistent with Yorktown-Eastover aquifer lithology. The depth to groundwater mimics topography ranging from 1 to 35 ft bgs. Groundwater generally flows westward toward the impoundment and Felgates Creek. The Yorktown-Eastover aquifer is approximately 80 ft thick in the vicinity of Site 6 and is underlain by the Eastover-Calvert confining unit (Brockman et al., 1997).

A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Feasibility Study, v2, Sites 6 and 7	Baker, 1998	01077
Record of Decision, Operable Unit Nos. XII, XIII, XIV, and XV, Sites 6 and 7	Baker, 1998	01001
Round Two RI Report, Sites 7 and 6	Baker, 1998	01294
Proposed Remedial Action Plan, v2, Sites 6 and 7	Baker, 1998	01838
Contractor Closeout Report for Site 6 Remediation	OHM, 1999	01221
Five-Year Review Report for Sites 1, 6, 7, 12, 16, and 19	Baker, 2002	01310
Remedial Design for Naval Weapons Station Yorktown Sites 6 and 7	Baker, 2006	02268
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	02158
Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL, 2007	02155
Construction Closeout Report for Site 6 Bioremediation	Shaw, 2008	(AR No. - pending)

Nature and Extent of Potential Contamination and Potential Risks

The sources of potential contamination at Site 6 are related to the wastewater discharge from the flumes at the site and the possible storage of explosives within the excavated area. Previous investigations included analysis of soil, surface water, sediment, and groundwater for TCL VOCs, TCL SVOCs, explosives, and TAL inorganics; additionally soil and groundwater were analyzed for TCL pesticides and PCBs. A summary of the results of the investigations is provided below.

Site 6 Flume and Impoundment Area Soil. Surface and subsurface soil samples were collected in the area surrounding Buildings 109 and 110 and on the banks of the slopes leading to the impoundment during previous investigations. These samples were analyzed for VOCs, SVOCs, pesticides/PCBs, explosives, and inorganics.

With the exception of low levels of common laboratory contaminants (bis(2-ethylhexyl)phthalate and acetone), there were no organics detected in surface soils in the impoundment and flume areas. VOCs were detected in subsurface soil near Building 109. In general, concentrations of VOCs in this area increased with depth bgs. Maximum concentrations of TCE (3,400 µg/kg), vinyl chloride (4,700 µg/kg), and cis-1,2-DCE (3,100 µg/kg) were detected in a sample collected near the discharge point from the flumes to the impoundment. 1,1-DCE; trans-1,2-DCE; 1,1,2-TCA, and tetrachloroethene (PCE) were also detected at lower concentrations in this area. VOCs were also detected just south of the impoundment area, in the vicinity of Building 110, and just south of the excavated area.

HMX and RDX were detected in one surface soil sample collected in the vicinity of Building 109 at concentrations of 5,600 micrograms per kilogram (µg/kg) and 2,900 µg/kg, respectively during the Round One RI. There were no explosives detected during subsequent rounds of sampling or at any other surface soil sample locations. Explosives were detected in subsurface soils during the Round One and Round Two RIs. During the Round One RI, a number of explosives were detected in the vicinity of the flume area at maximum concentrations of 61,000 µg/kg (HMX), 160,000 µg/kg (RDX), 21,000 µg/kg (1,3,5-TNB), 1,000 µg/kg (nitrobenzene), 640,000 µg/kg (2,4,6-TNT), 5,600 µg/kg (2,4-DNT), and 46 J µg/kg (2,6-DNT). Explosives were also detected in one subsurface soil sample collected at the discharge point from the flume to the impoundment during the Round Two RI. 4-amino-DNT and 2-amino-DNT were both detected in a sample from this area at a concentration of 2,500 µg/kg (both chemicals).

Several inorganics were detected in surface and subsurface soils around the impoundment and flume areas. Maximum concentrations of antimony (13.8 mg/kg), chromium (27.5 mg/kg), and mercury (0.09 mg/kg) in surface soil exceeded corresponding background and ecological and/or human health screening values. There were no inorganics detected in Site 6 subsurface soils at concentrations greater than background concentrations.

SVOCs (with the exception of low levels of common phthalate laboratory contaminants), pesticides, and PCBs were not detected in impoundment area soils (Baker, 1998b).

Unacceptable non-cancer HIs of 1.1 and 1.9 were identified for future child resident dermal contact with and accidental ingestion of surface soils due primarily to concentrations of antimony. However, there were no individual hazard quotients (HQs) greater than 1.0. There were also no unacceptable cancer risks associated with future child resident exposure

to impoundment/flume area soils. An unacceptable non-cancer hazard was identified for the future construction worker (HI=4.4) primarily due to potential exposure to 2,4,6-TNT in subsurface soils (dermal HQ = 2.2 and ingestion HQ = 2.2). There were no unacceptable cancer risks to the hypothetical construction worker. Future residential exposure to subsurface soils was not evaluated. Based on the SERA, concentrations of RDX, antimony, and mercury exceeded ecological screening values in the impoundment area/drainage area.

Site 6 Flume and Impoundment Area Groundwater. Groundwater samples were collected within and around the impoundment and flume areas during previous investigations. Several chlorinated VOCs were detected in Site 6 groundwater (Yorktown-Eastover). The highest concentrations of these constituents were detected from the impoundment area. TCE; cis-1,2,-DCE; and VC were detected at maximum concentrations of 37,000 µg/L; 26,000 µg/L; and 21,000 µg/L; respectively. Chlorinated VOCs were also detected at lower concentrations across the site. Explosives (4-amino-2,6-DNT; tetryl; HMX; and RDX) were detected in groundwater at concentrations of 1.2 µg/L, 4.9 µg/L, 3.2 µg/L, and 63 µg/L, respectively.

Several inorganics were detected at concentrations above background in groundwater including aluminum, arsenic, cadmium, chromium, cobalt, copper, lead, manganese, and zinc. Arsenic was detected at a maximum concentration of 37.1 µg/L, above the corresponding MCL for this constituent. Pesticides, PCBs, and SVOCs (with the exception of low levels of common laboratory contaminants) were not detected in site groundwater (Baker, 1998b).

There were no unacceptable risks for human receptors exposed to groundwater under a non-potable, beneficial use scenario (lawn watering and car washing). Risks to future residents from potable groundwater use have not been calculated. Because surface water was evaluated directly, ecological risks associated with groundwater discharge to surface water were also not calculated. A summary of previous investigations including sampling and analysis of groundwater is provided in the Phase I Groundwater RI Report (CH2M HILL, 2007d). Further investigations of groundwater are on-going.

Site 6 Flume and Impoundment Area Sediment. Sediment samples were collected from the drainage area leading to the impoundment (flume area and areas near Buildings 109 and 110), the impoundment, the tributary, and Felgates Creek during previous Site 6 investigations. VOCs, SVOCs, explosives, and inorganics were detected in sediment from the impoundment area and SVOCs and inorganics were detected from the drainage leading to the impoundment. TCE; 1,1-dichloroethane (DCA); total 1,2-DCE; VC; and fluoromethane were detected at maximum concentrations of 5 µg/kg, 52 µg/kg, 27 µg/kg, 63 µg/kg, and 15 µg/kg, respectively within the impoundment area. PAHs with a maximum concentration of 3,900 µg/kg (fluoranthene) were also detected within the impoundment area and drainage. Explosives (1,3,5-TNB; 1,3-dinitrobenzene; TNT; 4-amino-DNT; 2-amino-DNT; tetryl; HMX; RDX) were detected at maximum concentrations 450 µg/kg; 210 µg/kg; 93,000,000 µg/kg; 520,000 µg/kg; 160,000 µg/kg; 5,200 µg/kg; 730,000 µg/kg; and 3,900,000 µg/kg, respectively within the impoundment area. Inorganics detected in sediment from the impoundment, the drainage, the tributary, and Felgates Creek were generally comparable to background concentrations (Baker, 1998b).

Unacceptable cumulative non-cancer hazards to the current adult (HI=4.4) and adolescent (HI=5.7) trespasser were identified for sediments within the Site 6 impoundment area. These hazards were primarily due to potential dermal contact with 4-amino-2,6-DNT (adolescent HQ=3.8, adult HQ = 3.0). The HHRA also identified a potential unacceptable cumulative non-cancer hazard to the hypothetical future child resident (HI = 3.2), primarily due to exposure to 4-amino-2,6-DNT in sediments (dermal HI = 1.5 and ingestion HI =0.74) within the impoundment area. There were no unacceptable cancer risks identified for impoundment area sediments. There were also no unacceptable human health hazards or risks identified for the drainage area (surrounding Buildings 109 and 110), the tributary, or Felgates Creek.

TNT, RDX, chlorinated VOCs, PAHs, beryllium, cadmium, iron, mercury, nickel, selenium, vanadium and zinc produced mortality in chronic sediment toxicity tests on the Amphipoda *Hyalella azteca* in the flume area. Additionally, concentrations of TCE, PAHs, bis(2-ethylhexyl)phthalate, beryllium, copper, lead, and zinc from sediment in the impoundment area produced unacceptable HQ values and exceeded background values. In sediments taken from the tributary to Felgates Creek, phenol was detected in one sediment sample at 0.895 mg/kg. This value produced a maximum sediment HQ value of 2.12. Beryllium also produced an unacceptable HQ value and exceeded its background value in Felgates Creek sediment (Baker, 1998b). Further investigations of sediment are on-going.

Site 6 Flume and Impoundment Area Surface Water. Surface water samples were collected from the drainage area, the impoundment area, the tributary at the site, and from Felgates Creek. Three VOCs (1,1-DCA; 1,1,-DCE; 1,1-TCA) were detected in surface water at concentrations at 4 µg/L, 5 µg/L, and 98 µg/L, respectively, in the drainage area downstream of Building 110. 1,1-TCA was also detected in surface water from the impoundment area at a concentration of 6 µg/L. One SVOC (phenol) was detected at a concentration of 5 µg/L in surface water at the mouth of the tributary leading to Felgates Creek. Inorganics detected in surface water were generally comparable to background concentrations. No other SVOCs, pesticides, or PCBs were detected in surface water. Although explosives were detected during the Round One RI, they were not detected in surface water during the Round Two RI sampling. VOCs (with the exception of low level concentrations of common laboratory contaminants), SVOCs (with the exception of phenol), and explosives were not detected in the mouth of the tributary leading to Felgates Creek or in Felgates Creek sediment or surface water samples (Baker, 1998b).

No unacceptable human health risks were identified from surface water at Site 6. However, potential risks to aquatic receptors associated with explosives and inorganics were identified from within the impoundment/drainage area during the SERA. Additionally, inorganics in surface water were determined to pose potential risk to aquatic receptors in the tributary leading to Felgates Creek (Baker, 1998b). Further investigations of surface water are on-going.

Site 6 Excavated Area Soil and Groundwater. Surface soil samples were collected in the excavated area during the Round Two RI. There were no VOCs, SVOCs, pesticides/PCBs, or explosives detected in these surface soil samples. Maximum concentrations of aluminum (27,000 mg/kg), antimony (11.9 L mg/kg), cadmium (18.4 L mg/kg), chromium (52.2

mg/kg), iron (35,300 mg/kg), and zinc (2,340 mg/kg) exceeded background values and ecological and/or residential risk-based concentration (RBC) values.

Subsurface soils were collected in the excavated area during the Round Two RI. With the exception of common laboratory contaminants, 1,1,1-TCA was the only VOC detected in subsurface soil. This constituent was detected at a concentration of 18 µg/kg which does not exceed any human health or ecological screening values. The maximum concentration of chromium (43.8 mg/kg) in excavated area subsurface soil exceeded the maximum background concentration and the corresponding ecological screening value.

The HHRA identified potential dermal and accidental ingestion non-cancer hazards to the hypothetical future child resident of 1.2 and 2.5, respectively, primarily due to potential exposure to iron in surface soil (dermal HQ=0.68 and ingestion HQ = 1.4). There were no unacceptable cancer risks to the hypothetical future child resident associated with surface soils in the excavated area. Potential ecological risks for the terrestrial receptor associated with aluminum, cadmium, chromium, and zinc in soil were identified (Baker, 1998b). There are no monitoring wells within the excavated area, therefore risks associated with groundwater were not evaluated.

Further investigations are being conducted in a Phase II RI at Site 6, to better understand nature, extent, and risk associated with potential contamination of groundwater and surface water and sediment of Felgates Creek and its tributary adjacent to Site 6.

Remedial Action(s)

The ROD for Site 6 soil and sediment, and flume area residue was signed in October 1998. Although the ROD required long-term monitoring (LTM) of surface water, sediment, and groundwater, it was specified this would not be the final remedy for these media. Groundwater, surface water, and sediment are currently under investigation.

Implementation of the selected remedy was initiated in 1999. The initial phase of remediation consisted of the construction of a bio-cell, excavation of PAH and explosives contaminated soil to approximately four ft bgs, disposal of PAH contaminated soil/sediment, transportation of explosives contaminated soil to the biocell, flume and drain decontamination, and site restoration (OHM, 1999). A soil cover was placed over the excavated area during the 1999 remedial actions. Soil and sediment that exceeded the remediation levels (RLs) was excavated and transported to the biocell where it was treated by *ex situ* biological treatment. To allow for adequate treatment time in the bio-cell, implementation of the remedy (removal of soil and sediment and treatment in the bio-cell) continued into 2006. Approximately 11,800 tons of sediment and soil were treated from 1999 to 2006 in the bioremediation cells (Shaw, 2008). Treatment was deemed complete once two consecutive sampling events confirmed soil and sediment contained VOC and explosive concentrations below RLs.

LUCs prohibiting residential development of the Site 6 area and disturbance of the excavated area's soil cover have been maintained through routine inspections. Site 6 is inaccessible to the general public. Access to the Site 6 impoundment area is restricted by a fence and locked gates at both roads leading into the Building 109 compound area. Signs are posted at both entrances. The LUCs will be maintained until they are no longer required to protect human health or the environment. The Draft RD includes periodic inspections and

LTM of surface water, sediment, and groundwater (Baker, 2005b). An ESD will be drafted to document more stringent cleanup levels, to remove LUCs from some areas, and to address groundwater separate from other media.

Activities Completed 2007-2008

The Navy is currently negotiating with USEPA a draft LUC RD. The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment. A Phase II groundwater, surface water, and sediment work plan was drafted; field activities are anticipated for fall 2008.

CERCLA Path Forward

- Quarterly Inspections
- ESD
- Phase II RI for groundwater
- Treatability Study
- FS/PP/ROD for groundwater, surface water, and sediment, as appropriate
- Five-Year Review (2012)
- RACR

[Schedule 3-4](#) presents the FY09-10 schedule for Site 6.

3.2.5 Site 7—Plant 3 Explosives-Contaminated Wastewater Discharge Area

Site Description

Site 7 is located in the northern portion of WPNSTA Yorktown in the vicinity of Poe Road and adjacent to an unnamed tributary leading to Felgates Creek ([Figure 3-5](#)), approximately one mile upstream from the confluence of Felgates Creek and the York River. The site consists of the Plant 3 Explosives-Contaminated Discharge Area, including an approximately 300-ft long drainage area located adjacent to wetlands surrounding an unnamed tributary to Felgates Creek. Depth to groundwater (Yorktown-Eastover aquifer) at the site is variable with topography and ranges from approximately 15 to 25 ft bgs and generally flows westward toward the tributary and Felgates Creek.

Plant 3 was used as a weapons loading facility beginning in 1945. Between 1945 and 1975, wastewater from the Plant was discharged directly into the drainage area. The wastewater possibly contained RDX, TNT, cyclohexane, and TCE (C. C. Johnson & Associates from CH2M HILL, 1984). From 1975 to 1986, the wastewater was treated in an activated carbon unit, which removed dissolved explosives from the water prior to discharge to the site. After 1986, the carbon treated wastewater was directed to the sanitary sewer system and ultimately to HRSD. The site has reverted to a natural drainage area and received no discharge from the Plant 3 complex after 1986. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Report for Field Scale Treatability Study for Site 7 and 22	OHM, 1997	00887
Pilot Study Report for the Explosives-Contaminated Soil at Naval Weapons Station Yorktown	Baker, 1997	01088
Round Two RI Report, Sites 6 and 7	Baker, 1998	01294 (Volume I) 01295 (Volume II) 01346 (Volume III) 01347 (Volume IV)
Feasibility Study, v2, Sites 6 and 7	Baker, 1998	01077
Proposed Remedial Action Plan, v2, Sites 6 and 7	Baker, 1998	01838
Record of Decision, Operable Unit Nos. XII, XIII, XIV, and XV, Sites 6 and 7	Baker, 1998	01001
Five-Year Review Report for Sites 1, 6, 7, 12, 16, and 19	Baker, 2002	01310
Long-Term Monitoring Report Sites 1, 3, and 7	Baker, 2006	02075
Remedial Design for Naval Weapons Station Yorktown Sites 6 and 7	Baker, 2006	(Draft – no AR No.)
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	02158
Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL, 2007	02155

Nature and Extent of Potential Contamination

The nitromine-contaminated wastewater discharged from Plant 3 was the source of potential contamination. Previous investigations included analysis of soil, surface water, sediment, and groundwater for TCL VOCs, TCL SVOCs, explosives, and TAL inorganics. Additionally soil and groundwater were analyzed for TCL pesticides and PCBs.

Soils. No pesticides or PCBs were detected in Site 7 soils. VOCs and SVOCs (with the exception of low levels of common laboratory contaminants) were not detected in surface or subsurface soils. The inorganics detected in soils include aluminum, antimony, arsenic, cadmium, iron, lead, manganese, and zinc. Arsenic exceeded the residential RBC. Explosives including HMX; RDX; 1,3,5-TNB; nitrobenzene; 2,4,6-TNT; and 2,4-DNT were detected at maximum concentrations of 61,000 µg/kg, 160,000 µg/kg, 21,000 µg/kg, 1,000 µg/kg, 640,000 µg/kg, and 2,300 µg/kg, respectively in soils (Baker and Weston, 1993b).

Unnamed Tributary to Felgates Creek Surface water and Sediment. No VOCs, SVOCs, or explosives were detected in surface water from the unnamed tributary during the 1994 investigation. VOCs (1,1-DCA; carbon disulfide; 1,1,1-TCA) and explosives (HMX; and RDX) were detected in the upstream portion of the tributary during the 1993 investigation. VOCs and SVOCs detected in sediment included acetone, di-n-butylphthalate, and 2-butanone at maximum concentrations 300 J µg/kg, 2,700 µg/kg, and 23 µg/kg, respectively.

Additionally, phenol was detected in one sample at the mouth of the tributary to Felgates Creek at a concentration of 660 J $\mu\text{g}/\text{L}$. No explosives were detected in sediment.

Felgates Creek Surface Water and Sediment. Felgates Creek surface water and sediment samples were collected adjacent to, upstream, and downstream of Sites 6 and 7. No VOCs, SVOCs, or explosives were detected in surface water. Aluminum, cobalt, iron, manganese, and nickel were detected in surface water at concentrations above screening values. Concentrations of inorganics were consistent with background. In Felgates Creek sediment, 1,1,1-TCA; chlorobenzene; and xylenes were detected at concentrations of 28 $\mu\text{g}/\text{kg}$, 26 $\mu\text{g}/\text{kg}$, and 15 $\mu\text{g}/\text{kg}$ upstream of Site 7. Additionally, one or more sediment samples had concentrations of di-n-butylphthalate, beryllium, iron, manganese, and/or selenium at levels above based screening values for aquatic receptors.

Groundwater. VOCs comprising 1,1,1-TCA; 1,1-DCA; and 1,1-DCE were detected at maximum concentrations 200 $\mu\text{g}/\text{L}$, 58 $\mu\text{g}/\text{L}$, and 33 $\mu\text{g}/\text{L}$, respectively in Site 7 groundwater. Additionally, explosives HMX; RDX; 4-amino-2,6-DNT; and TNT were detected at concentrations of 34 $\mu\text{g}/\text{L}$, 180 $\mu\text{g}/\text{L}$, 37 $\mu\text{g}/\text{L}$, and 56 $\mu\text{g}/\text{L}$, respectively. No SVOCs, pesticides, or PCBs were detected in groundwater. There are currently no groundwater wells within or close to the drainage area which received the contaminated wastewater. Groundwater monitoring at Site 7 is on-going.

Potential Risks

Human health risks were evaluated for Site 7 and concluded: exposure to iron in surface soils posed potential unacceptable non-cancer hazards to the future child resident; no unacceptable cancer risks or non-cancer hazards to potential current receptors (construction workers) at Site 7 from exposure to subsurface soil; however, potential risks were not calculated for the future resident from exposure to subsurface soils. Additionally, no unacceptable human health risks were identified from exposure to surface water or sediment from the unnamed tributary or Felgates Creek and no unacceptable risks from exposure to groundwater under a non-potable, beneficial use scenario (lawn watering and car washing). Risks from potable groundwater use by future residents have not been calculated.

The SERA determined: surface soil concentrations of aluminum, antimony, cadmium, chromium, copper, iron, lead, mercury, vanadium, and zinc presented potential unacceptable risks to ecological receptors; aluminum, iron, manganese, and nickel were detected at concentrations posing potential unacceptable risk to aquatic ecological receptors in surface water from the unnamed tributary leading to Felgates Creek; however, these constituents were below their respective background values; sediment collected from the Site 7 unnamed tributary posed potential unacceptable risk to benthic macroinvertebrates or aquatic receptors from di-n-butylphthalate, aluminum, beryllium, iron, and manganese. Sediment concentrations of aluminum, beryllium, iron, and manganese were detected within background sediment concentrations. Additionally in Felgates Creek sediment, di-n-butylphthalate, beryllium, iron, manganese, and/or selenium potentially pose unacceptable risk to aquatic receptors; however, selenium was the only chemical that exceeded background concentrations (Baker, 1998b).

In 1996, following the Round Two RI, a field-scale pilot study to treat explosives-contaminated soil and sediment at Site 7 was conducted. Approximately 770 cubic yards (cy) of soil and sediment were excavated from the drainage area leading to the tributary at Site 7. TNT contaminated soil was excavated and sent to the newly-constructed biocell at Site 22. The TNT concentrations in the soils entering the biocell averaged over 1,000 parts per million (ppm). After treatment, the TNT concentrations ranged from less than 1 ppm to 4 ppm (Baker, 1997b).

Remedial Action(s). A ROD was signed in October 1998 for site soils and drainage area sediment. The ROD included proposed LUC boundaries. Although the ROD indicated LTM would be conducted for surface water and groundwater, it specified LTM was not the final remedy for these media. The ROD specified no additional action for soil and sediment in the drainage way because the bioremediation full-scale pilot study, conducted in 1996, mitigated potential human health risks and ecological concerns in these media under industrial/commercial land use (Baker, 1998c). LTM of surface water and sediment in Felgates Creek, and groundwater associated with the site was conducted from 2000-2005 and included VOCs, explosives, and inorganic analysis (Baker, 2006). The 2007 Five-Year Review addressed LTM data and remedy protectiveness. Although groundwater monitoring is included in the LTM program, further investigations of groundwater are currently on-going. LUCs prohibiting residential use within and around the Site 7 drainage area have been maintained through routine inspections.

Activities Completed 2007-2008

The Navy is currently negotiating with USEPA a draft LUC RD. The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment. A draft work plan for LTM at Site 7 is currently undergoing regulatory review; field activities are anticipated for fall 2008.

CERCLA Path Forward

- Quarterly Inspections
- LTM of groundwater, surface water, and sediment
- FS/PP/ROD for groundwater, as appropriate
- Five-Year Review (2012)
- RACR

[Schedule 3-5](#) presents the FY09-10 schedule for Site 7.

3.2.6 Site 8—NEDED Explosives-Contaminated Wastewater Discharge Area

Site Description

Site 8 is a 300-ft drainage way located along the Eastern Branch of Felgates Creek, approximately 1.5 miles from the confluence of the creek and the York River ([Figure 3-6](#)). The drainage area lies east of the Naval Explosives Development Engineering Department (NEDED) complex (Building 456). The topography is generally level around Building 456, but slopes steeply into the drainage way. The ground surface is paved with the exception of the wooded western and northern portions of the site. The surficial aquifer within the drainage way at the site is encountered at approximately 6 ft bgs, flowing towards Felgates Creek.

From 1940 to 1975, Site 8 received wastewater from the NEDED complex. The wastewater reportedly contained unspecified solvents, spent/neutralized acids, and nitramine compounds. In 1974, a carbon adsorption tower was installed to treat the contaminated wastewater prior to discharge. In 1986, the effluent from the tower was diverted to the sanitary sewer serviced by HRSD. Since 1986, the site has reverted to a natural drainage area. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One Remedial Investigation Report for Sites 1-9, 11, 12, 16-19, and 21,	Baker and Weston, 1993	00313
Round Two Remedial Investigation Report for Sites 2, 8, 18, and SSA 14	Baker, 2004	01548
EE/CA and AM for Contaminated Soil and Sediment at Site 8 and SSA 14	Baker, 2005	02076
Work Plan Interim Removal Action at Site 8 and SSA 14	Shaw, 2006	01890
Removal Action and Post-Removal Confirmation Sampling Summary Technical Memorandum	CH2M HILL, 2008	02202

Nature and Extent of Potential Contamination

Historical wastewater discharge was the source of potential contamination to soil, sediment, surface water, and groundwater.

Surface Soil. Several inorganics, VOCs, SVOCs, explosives, pesticides, and one PCB were detected in soils with maximum concentrations generally located on the banks of the drainage way. Maximum concentrations of aluminum (26,300 mg/kg), arsenic (13.8 mg/kg), chromium (61.5 mg/kg), copper (68.4 mg/kg), cyanide (3.1 mg/kg), iron (31,700 mg/kg), lead (129 mg/kg), mercury (0.91 mg/kg), nickel (12.7 mg/kg), and zinc (249 mg/kg) were above background and residential soil RBCs and/or ecological screening values. PAHs, including fluoranthene (1,400 µg/kg), were detected at concentrations above residential RBCs and/or ecological screening values. 2,4,6-TNT, amino-DNTs, and RDX were the only explosives detected at concentrations exceeding human health risk screening values in surface soils, at maximum concentrations of 2,000 µg/kg, 4,900 µg/kg, and 30,000 µg/kg, respectively. HMX was detected in surface soils at a maximum concentration of 14,000 µg/kg, below the residential RBC. Arochlor-1260 was detected at maximum concentration of 10,000 µg/kg, which is above the residential and industrial RBCs and the ecological risk screening value. There were no VOCs or pesticides detected in surface soils at concentrations exceeding ecological or human health screening values.

Subsurface Soil. Several inorganics, SVOCs, pesticides, and explosives were detected in subsurface soils. There were no VOCs or PCBs detected in subsurface soil. The maximum concentrations of chromium (57.7 mg/kg), iron (58,500 mg/kg), thallium (1.6 mg/kg), and vanadium (79.9 mg/kg) were above background and ecological screening values.

Concentrations of iron and thallium also exceeded residential RBCs. Three PAHs were detected at maximum concentrations above ecological screening values: fluoranthene (140 µg/kg), phenanthrene (130 µg/kg), and pyrene (110 µg/kg). There were no pesticides or explosives detected at concentrations greater than corresponding human health and ecological screening values.

Groundwater. Several inorganics, VOCs, SVOCs, pesticides, and explosives were detected in groundwater. There were no inorganic exceedances of background and RBCs and/or MCLs. Maximum VOC concentrations of 1,1-DCE (12 µg/L), chloroform (10 µg/L), and TCE (8 µg/L) slightly exceeded MCLs and/or RBCs. Maximum explosives concentrations of 2,4,6-TNT (170 µg/L), amino-DNTs (200 µg/L), and RDX (300 µg/L) exceeded tap water RBCs. There were no other organics detected at concentrations greater than corresponding MCLs and/or RBCs.

Sediment. Several inorganics, VOCs, SVOCs, and explosives were detected in surface and/or subsurface sediment. The maximum concentrations of cadmium (1.6 mg/kg), cobalt (9.5 mg/kg), copper (60.5 mg/kg), iron (40,800 mg/kg), lead (51.4 mg/kg), nickel (20.6 mg/kg), and vanadium (51.6 mg/kg) exceeded background and adjusted residential RBCs and/or conservatively adjusted ecological screening values. Bis 2-Ethylhexyl phthalate (BEHP) was detected at a maximum concentration (34,000 µg/kg) greater than the screening value of 1,300 µg/kg. 2,4,6-TNT, 2-Amino-4,6-DNT, and 4-amino-2,6-DNT were detected at maximum concentrations of 12.11 µg/kg, 3.366 µg/kg, and 2.738 µg/kg. There were no explosives detected at concentrations exceeding adjusted RBCs. There were also no VOCs detected at concentrations exceeding human health or ecological screening values.

Surface Water. Several inorganics, VOCs, SVOCs, and explosives were detected in surface water. Maximum concentrations of antimony and nickel were greater than background and corresponding adjusted residential RBCs and/or conservatively adjusted ecological screening values. 2,4,6-TNT, 4-nitrotoluene, HMX, RDX, and tetryl were detected in surface water at maximum concentrations of 118.6 µg/L, 13.12 µg/L, 69.47 µg/L, 102.6 µg/L, and 4.65 µg/L, respectively. The maximum concentrations of 2,4,6-TNT and RDX were greater than the adjusted residential RBC values. There are no ecological screening values associated with explosives.

Potential Risks

Human health and ecological risks were assessed for all media at Site 8.

No unacceptable human health risks were identified for the adult and adolescent recreational users or for the construction worker from exposure to any site media. A hazard index of 3.1 was calculated for maintenance worker exposure to surface water due primarily to accidental ingestion and dermal exposure to 4-amino-2,6-DNT, and 2-amino-4,6-DNT. A cumulative hazard index of 4.38 was calculated for the future child resident due primarily to the ingestion of amino-DNTs (HQ = 0.57), iron (HQ = 1.02), and arsenic (HQ = 0.39) and dermal contact with amino-DNTs (HQ = 0.94) in surface soils. Accidental ingestion of amino-DNTs (HQ = 1.07) in groundwater under a beneficial use scenario (lawn watering and car washing) also contributed to the total risk. Under the future residential scenario, risks associated with potable use of groundwater and exposure to subsurface soils were not evaluated.

A SERA and Step 3a refinement identified potential unacceptable risks for terrestrial receptors due to concentrations of amino-DNTs, HMX, RDX, Arochlor-1260, BEHP, chromium, iron, mercury, vanadium, and zinc in soils. Potentially unacceptable risks were identified for aquatic receptors due to concentrations of 2,4,6-TNT and 4-amino-2,6-DNT in surface water. Because concentrations of 2,4,6-TNT in soils could be impacting surface water, this constituent was also identified as posing a potential risk for terrestrial receptors. Potentially unacceptable risks were identified for aquatic receptors due to concentrations of BEHP in sediment.

Remedial Action(s)

Pre-removal confirmation sampling was conducted in the drainage area from the discharge point to the Felgates Creek channel to determine the extent of chemicals posing potential risk (Baker, 2005c). The EE/CA recommended excavation and off-site disposal of contaminated soil and sediment (Baker, 2005d) based on established remediation goals (RGs). A sediment RG for Arochlor-1260 was established in the event that the contamination extended beyond the soil/sediment interface.

The removal action was initiated in March 2007. Upon completion, 1,193 tons of contaminated soils/sediment and 44 tons of PCB-contaminated soils were removed. Post-removal confirmation samples collected indicated that all explosives were either non-detect or below the established RG. Additionally, chromium, iron, mercury, vanadium, and zinc detected in confirmation samples were either below their established RGs or consistent with background values. Total PCBs (0.61 mg/kg) in soils exceeded the RG (0.1 mg/kg) at the transition of soil to sediment along the western excavation towards Felgates Creek. The Navy, in partnership with the USEPA and VDEQ reached consensus (April 2007 Partnering meeting) that NFA for explosives and inorganics in soil or sediment was required. Further removal of PCBs in sediment at the western boundary toward Felgates Creek continued out to the creek channel. Post-removal confirmation samples and pre-removal grab samples collected from the western boundary contained elevated levels of PCBs (0.145 mg/kg at F53659-4 and 0.130 mg/kg at F53659-12) in exceedance of RGs. A TM was written to risk-manage the elevated levels of PCBs in sediment. In May 2008, the Navy, in consensus with the USEPA and VDEQ reached consensus that NFA for soils and sediment is required.

Activities Completed 2007-2008

A consensus statement declaring NFA for soils and sediment was finalized in May 2008. It is anticipated that the Construction Completion Report (CCR), documenting the removal action, will be finalized in 2008.

CERCLA Path Forward

- Annual Inspections
- RI for groundwater
- FS/PP/ROD for all media, as appropriate
- RACR

Schedule 3-6 presents the FY09-10 schedule for Site 8.

3.2.7 Site 9—Plant 1 Explosives-Contaminated Wastewater Discharge Area

Site Description

Site 9 is a discharge area that consists of a 600-ft drainage way and the immediate surrounding area located east of Lee Pond and topographically downgradient of Site 19 (Figure 3-7). The drainage way runs from the northwest portion of Building 10 westward, underneath Bollman Road, and discharges to Lee Pond. Wooded areas immediately surround the drainage way and rip-rap is present along the top of the relatively steep slope leading down into the site. Groundwater is encountered at a depth of 10 to 29 ft bgs within the shallow Cornwallis Cave aquifer and flows to the southwest toward Lee Pond. Within the deeper Yorktown-Eastover aquifer, groundwater is encountered approximately 39 to 51 ft bgs and flows west/southwest.

From the late 1930s to 1975, the discharge area was used as a drainage way for Plant 1 (Building 10) explosives-contaminated wastewater and (possibly) organic solvents. A carbon adsorption tower was installed in 1974 to treat the wastewater prior to discharge in accordance with an NPDES permit. In 1986, the effluent from the tower was diverted to the sanitary sewer and ultimately to HRSD. Wastes including weapons casings and railroad ties were discarded along the drainage way bank prior to flowing under Bollman Road. Additionally, on the other side of Bollman Road, several drums were discarded along the drainage way. No information is available regarding the date(s) this material was disposed (Baker, 1994). The weapon casings, railroad ties and drums were removed along with contaminated soils and sediment in 1994. Currently, the site has reverted to a natural drainage way for surface runoff from surrounding areas and receives no discharge from the Plant 1 complex. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Action Memorandum and EE/CA	Baker, 1994	00615
Closeout Report, Sites 2 and 9 and Site Screening Area 4, Mine Casing and Debris Removal Action	IT Corporation, 1995	00646
Site 19 and Composites of Site 9, Site 19, SSA 6 & SSA7 Independent Sampling and Risk Screening Report	Black & Veatch, 1996	00781
Round Two RI Report, Sites 9 and 19	Baker, 1997	00889
Feasibility Study Sites 9 and 19	Baker, 1997	00966
Proposed Remedial Action Plan Sites 9 and 19	Baker, 1997	00967
Record of Decision, v3, Operable Unit Nos. VI and VII, Sites 9 and 19	Baker, 1998	02077

Nature and Extent of Potential Contamination

The Plant 1 wastewater discharge was the source of potential contamination to soil, sediment, surface water, and groundwater. Previous investigations included full suite analysis for soils, groundwater, surface water, and sediment.

Soil. VOCs were not detected in surface or subsurface soils with the exception of acetone (a common laboratory contaminant) at 120 µg/kg. SVOCs detected in surface soils exceeding residential RBCs comprised benzo(a)anthracene at 1,100 µg/kg, benzo(b)fluoranthene at 2,200 µg/kg, benzo(k)fluoranthene at 520 µg/kg, benzo(a)pyrene at 1,200 µg/kg, indeno(1,2,3-cd)pyrene at 550 µg/kg, and dibenzo(a,h)anthracene at 160 J µg/kg. The same SVOCs were detected in subsurface soils, but at higher concentrations. Maximum concentrations detected were 1,700 µg/kg, 2,500 µg/kg, 980 µg/kg, 1,700 µg/kg, 1,000 µg/kg, 270 J µg/kg, respectively. Pesticide and explosives were detected in both surface and subsurface soil, however, not above residential RBCs. Inorganics detected in surface soils exceeding maximum background values comprised cadmium, at 1.8 K mg/kg, lead at 68.4 mg/kg, vanadium at 68.6 J mg/kg, and zinc at 133 mg/kg; all below residential RBCs. Arsenic was detected at a maximum concentration of 23.3 K mg/kg in excess of the residential RBC; however it did not exceed maximum background in soils. Additionally, inorganics detected in subsurface soils exceeding maximum background values comprised arsenic at 54.7 K, barium at 119 mg/kg, beryllium at 4.1 mg/kg, cadmium at 4.5 mg/kg, chromium at 46.5 mg/kg, cobalt at 41.4 mg/kg, copper at 81.9 mg/kg, iron at 170,000 mg/kg, lead at 124 L mg/kg, manganese at 755 J mg/kg, selenium at 1.5 K mg/kg, vanadium at 219 J mg/kg, and zinc at 400 mg/kg. Of these, arsenic, iron, and vanadium exceeded residential RBCs and lead exceeded the established USEPA soil action level (Baker, 1997c).

Groundwater. No VOCs (with the exception of chloroform, a common laboratory contaminant, at a maximum concentration of 11 µg/L) or pesticides were detected in groundwater at Site 9. Phenol (44 µg/L), 2,4-DNT (2 J µg/L) and bis(2-ethylhexyl)phthalate (10 µg/L) were the only SVOCs detected in groundwater. Explosives detected in groundwater comprised amino-DNTs (4,400 µg/L), 2,4,6-TNT (880 µg/L), and 1,3,5-TNB (0.79 µg/L). The following inorganics were detected at maximum concentrations above background levels: arsenic (25.9 µg/L), barium (78.8 µg/L), copper (7.2 µg/L), vanadium (12 µg/L), and total cyanide (10.5 µg/L). There were no MCL exceedences in groundwater.

Sediment. Other than low concentrations of common laboratory contaminants, toluene at 2 J µg/kg was the only other VOC detected in sediment. No pesticides were detected in the sediment. A number of SVOCs exceeded maximum background concentrations, however, only benzo(a)anthracene (2,400 J µg/kg), benzo(b)fluoranthene (2,600 µg/kg), benzo(a)pyrene (2,100 µg/kg), and dibenzo(a,h)anthracene (300 J µg/kg) exceeded residential RBCs. Explosives detected comprised amino-DNTs (2,300 µg/kg) and 2,4,6-TNT (620 µg/kg). The following inorganics were detected above maximum background levels: arsenic at 55.5 J mg/kg, cadmium at 1.9 K mg/kg, chromium at 47.3 mg/kg, copper at 22 mg/kg, iron at 54,400 mg/kg, silver at 0.55 mg/kg, vanadium at 43.4 mg/kg, and zinc at 147 mg/kg. Of these, arsenic exceeded the residential RBC.

Surface Water. Of the surface water samples collected at Site 9, the only VOC detected was chloroform at 3 J µg/L (a common laboratory contaminant). BEHP at 2 J µg/L was the only

SVOC detected above background levels in surface water, however, it was below its established Biological Technical Assistance Group (BTAG) screening value. The only pesticide detected in surface water was heptachlor epoxide at a concentration of 0.08 K µg/L. The detection was above background levels and its surface water BTAG screening value. Explosive detections in surface water comprised RDX (6.1 µg/L), 1,3,5-TNB (0.44 NJ µg/L), 1,3-dinitrobenzene (0.46 NJ µg/L), 2,6-dinitrotoluene (2 J µg/L), 2,4-dinitrotoluene (6 J µg/L), amino-DNTs (1,000 µg/L), HMX (14 µg/L), and 2,4,6-TNT (880 µg/L). 2,4-dinitrotoluene fell below the BTAG screening value. Maximum concentrations of inorganics above background in surface water comprised the following: arsenic (4.6 µg/L), barium (45.3 µg/L), chromium (5.6 µg/L), cobalt (2.6 µg/L), iron (2,960 µg/L), lead (1.4 K µg/L), manganese (231 µg/L), vanadium (4.5 µg/L), zinc (10.7 µg/L), and total cyanide (27.7 µg/L). Of these, manganese and cyanide exceeded surface water BTAG screening values. Additionally, while total aluminum did not exceed the maximum background concentration, it was detected at a maximum concentration of 200 µg/L, in excess of the BTAG screening value (25 µg/L). Dissolved aluminum was not detected in any surface water samples.

Potential Risks

The human health risks were evaluated for the future adult/child resident and current civilian worker from exposure to surface soil, surface water, and sediment. Additionally, risks were calculated for the future onsite resident for exposure to potable groundwater and shallow subsurface soil. Potential risks to the future construction worker were also evaluated from exposure to shallow subsurface soil.

A reasonable maximum exposure (RME) non-cancer HI of 1.2 from ingestion (HI = 0.91) and dermal contact (HI = 0.31) with arsenic in surface soil for the future child resident was identified. An RME non-cancer hazard (HI = 1.5) from ingestion (HI = 0.96) and dermal contact (HI = 0.51) with 2,4,6-TNT in surface water for the future child resident was also identified.

The following potential unacceptable risks were identified in relation to groundwater: RME non-cancer hazards (HI=120), primarily from 2,4,6-TNT (HQ=110) and dissolved arsenic (HQ=5.5) and cancer risks (total incremental lifetime cancer risk (ILCR)= 3.6×10^{-4}), primarily from 2,4,6-TNT (ILCR= 1.4×10^{-4}) and dissolved arsenic (ILCR= 2.1×10^{-4}) were identified for the future child resident from ingestion of shallow groundwater; RME non-cancer hazards (HI=51), primarily from 2,4,6-TNT (HQ=48) and dissolved arsenic (HQ=2.4) and cancer risks (total ILCR= 6.3×10^{-4}), primarily from 2,4,6-TNT (ILCR= 2.5×10^{-4}) and dissolved arsenic (ILCR= 3.6×10^{-4}) were identified for the future adult resident from ingestion of shallow groundwater; RME non-cancer hazard (HI=1.4), due to 1,3,5-TNB (HQ=1.0), was identified for the future child resident from ingestion of deep groundwater.

- Ecological risks were evaluated for the terrestrial and aquatic ecosystems. Potential ecological risks to terrestrial receptors were identified with exposure to heptachlor epoxide, nitramines, aluminum, chromium, iron, lead, and vanadium in soil. However, it was determined that NFA was necessary to address concentrations of aluminum, chromium, lead, iron, and vanadium based on a comparison of detections to background values. Additionally, it was determined the heptachlor epoxide is not a site-related compound. It is noted that heptachlor epoxide and 2,4,6-TNT were not retained

as soil COCs; however, due to the surface water contamination, these constituents were included in the models.

- Surface water concentrations of amino-DNTs, aluminum, cyanide, and iron may adversely impact the aquatic environment in the drainage way at Site 9. The sediment contained elevated levels of SVOCs, nitramines, and inorganics (Baker, 1997c). Sediment concentrations of iron produced an HQ of 45.7 to the great blue heron (in the least conservative model); however, iron was detected in deeper ditch sediments (4 to 8 inches bgs) to which the heron is unlikely to be exposed. Although arsenic concentrations in Site 9 ditch sediments exceeded background freshwater stream sediment concentrations, they did not produce unacceptable HQ values when using the Effects Range-Median (ER-M) value for arsenic. It is noted that the nitramines detected in the sediment during the Round Two investigation were not detected in any previous investigations in the drainage way, indicating that the surface water concentrations of nitramines are possibly beginning to influence the quality of the sediment. Additionally, it was determined that remediation of ditch sediments would cause greater harm to the local ecology than leaving contaminants such as arsenic, iron, vanadium, and lead in place (Baker, 1998d).

Remedial Action(s)

A removal action was completed in December 1994 to address contaminated soils and sediments, as well as, surface and subsurface debris. The RA included the concurrent removal of ordnance and railroad ties to a depth of four ft bgs at the lower end of the drainage way before it crosses Bollman Road (Baker, 1997d). Following the excavation of contaminated media and debris, confirmation soil samples were collected and analyzed for VOCs, SVOCs, inorganics, pesticides/PCBs, and explosives (IT Corporation, 1995a). The excavated area was backfilled with on-base borrow topsoil and re-graded.

A ROD for soil, surface water, and sediment was signed in March 1998 and documented the decision for no further RA. NFA was selected for soil, surface water, and sediment as potential human health risks were considered acceptable or manageable. The Navy, USEPA, and VDEQ agreed that remediation would result in greater ecological harm than leaving the drainage undisturbed for the concentrations remaining in soil and sediment.

Activities Completed 2007-2008

The Navy is currently negotiating a draft LUC RD with USEPA. The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment.

CERCLA Path Forward:

- RI/FS/PP/ROD for groundwater
- Five-Year Review (2012)
- RACR

Schedule 3-7 presents the FY09-10 schedule for Site 9.

3.2.8 Site 11—Abandoned Explosives Burning Pits

Site Description

Site 11, Abandoned Explosives Burning Pits, is a 0.5-acre area located east of Main Road, north of a steep ravine which leads to Indian Field Creek, and just south of Site 17 and west of Site 1 ([Figure 3-8](#)). Site 11 is primarily a grass-covered cleared area surrounded by woods with level topography at approximately 30 ft amsl. Railroad tracks run along the western and northern portions of the site. Surface runoff is southeast to a drainage ditch that is no more than 2 ft deep and is only wet following storm events (groundwater does not recharge the drainage ditch). This intermittent drainage ditch continues eastward and becomes a tributary to Indian Field Creek.

Explosives burning was conducted in pits at Site 11 from 1930 to 1950. Solid waste explosives (e.g., TNT, RDX, and HMX), explosives-contaminated sludges, and packaging contaminated with explosives were placed in pits and ignited. Burning of waste residue may have resulted in potential releases to soil, groundwater, and the intermittent drainage ditch through surface water runoff during storm events. It is assumed that approximately 200 pounds of explosive residues may have been deposited at the site after 20 years of burning disposal activities (C.C. Johnson & Associates, Inc. and CH2M HILL, 1984). A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One Remedial Investigation Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Round Two Remedial Investigation Report Sites 11 and 17	Baker, 1998	01553
Feasibility Study Report Sites 11 and 17	Baker, 1999	01573
Proposed Remedial Action Plan Sites 11 and 17	Baker, 1999	01600
Record of Decision, Operable Unit Nos. X and XI, Site 11 and Site 17	Baker, 2000	01094
Remedial Action Report Sites 11 and 17	OHM, 2001	01090
Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL, 2007	02115
Phase I RI Report for GROUNDWATER at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	02158
Evaluation of Human Health Risk Associated with Potable Use of Groundwater at WPNSTA, Sites 11 and 17 Technical Memorandum	CH2M HILL, 2008	02274

Nature and Extent of Potential Contamination

Previous investigations included full suite analysis of soil, surface water, sediment, and groundwater.

Surface water samples from the intermittent drainage ditch contained arsenic, copper, lead, mercury, nickel, and zinc at concentrations exceeding various aquatic chronic criteria, however, most were comparable to background concentrations. The drainage was dry in subsequent field investigations (Baker and Weston, 1993b). No VOCs, SVOCs, pesticides, PCBs, or explosives were detected above applicable criteria in sediment. Mercury in sediment was the only inorganic detected above applicable screening criteria (Baker and Weston, 1993b). No VOCs, SVOCs, pesticides, or explosives were detected in soils at concentrations above applicable screening criteria. Arsenic (in surface and subsurface soils) and beryllium (in surface soils) were the only inorganics detected above applicable screening criteria. No chemicals exceeded applicable criteria were detected in groundwater (Baker, 1998e).

Potential Risks

The HHRA included in the Round Two RI indicated no unacceptable cancer risks or non-cancer hazards from soils and non-potable exposure (watering lawns, car washing, etc.) to groundwater for adult/child residents. An additional TM was completed in 2007 to assess risks associated with potable use of groundwater (CH2M HILL, 2008), and no unacceptable risks were identified.

The SERA identified concentrations of aluminum, chromium, copper, iron, lead, mercury, and vanadium in soil exceeding ecological risk screening values. However, copper (max concentration of 220 mg/kg) and mercury (max concentration of 1.6 mg/kg) were the only constituents that exceeded background concentrations (Baker, 1998e). Possible adverse effects [lowest observed adverse effects level (LOAEL)] to aquatic receptors may exist from exposure to aluminum, cobalt, and vanadium in sediment. However, for less conservative model inputs and mean sediment exposure concentrations there are no HQs greater than 1 for LOAEL. Furthermore, the drainage ditch is intermittent and there is no viable aquatic habitat at Site 11.

Remedial Action(s)

A ROD for Site 11 soil was signed in October 2000 to address risks to ecological receptors from elevated levels of copper and mercury in site soil. The selected remedy was excavation and off-site disposal of an estimated 45 cy of soil, confirmatory sampling, followed by backfilling, addition of topsoil and site restoration. However, in order to achieve clean up goals, the actual removal action consisted of excavation and off-site disposal of 400 cy (655 tons) of copper and mercury contaminated soil and ash material. Following excavation, clean fill from an on-base source and a minimum of 4-inches of topsoil was placed over the removal area and a vegetative cover was established (OHM, 2001b). Confirmation sample results demonstrated soil concentrations of copper were below 1.2 mg/kg, below the established RG. Mercury was not detected (OHM, 2001b). No unacceptable human health risks were identified in soil for Site 11 and the remedial action mitigated the potential unacceptable ecological risks related to site soils.

NFA was necessary to address site soils and ash following the removal action. Other media at the site were not included in the ROD and are still being addressed.

Activities Completed 2007-2008

The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment. Additional sampling of groundwater for explosives not previously analyzed was completed in March of 2008. There were no detections of any of these chemicals. A draft TM to evaluate human health risk associated with potable use of groundwater at Site 11 was submitted in April 2008. The memorandum concluded that based on the absence of risk from exposure to groundwater, an NFA PP and ROD for groundwater should be prepared.

CERCLA Path Forward

- PP/ROD for groundwater
- RACR

[Schedule 3-8](#) presents the FY09-10 schedule for Site 11.

3.2.9 Site 12—Barracks Road Landfill

Site Description

Site 12, the Barracks Road Landfill, currently consists of three former disposal areas: Area A, Area B/C, and the Wood/Debris Disposal Area ([Figure 3-9](#)). Area A was the former location of an industrial and non-industrial waste incinerator facility. Ash from the incinerator facility was disposed throughout Area A. Area B/C is located adjacent to the access road leading to the former incinerator facility. Area B/C is an area of uneven terrain where ash may have been disposed. The Wood/Debris Disposal Area was created when lumber, wood pallets, and miscellaneous construction debris were disposed of and pushed into a ravine that leads to Ballard Creek.

Area A is 4.4 acres, partially wooded, and formerly included an incinerator building and smoke stack that were razed in 1997. The former incinerator building contained two incinerators (SWMUs 142 and 143) to burn wastes. Incinerator ash was disposed of in a topographic low area immediately southwest of the incinerator building that drains to Ballard Creek.

- Area B/C east of Barracks Road and adjacent to the access road to the incinerator in Area A is a 1.6 acre open field with wooded steep slopes and ravines.
- The Wood/Debris Disposal Area (formerly identified as Site 22 and SWMU 164) east of Areas A and B/C, is a 3.3 acre open field with protruding construction debris visible adjacent to Ballard Creek. A ditch with an intermittent stream channel is located adjacent to the Wood/Debris Disposal Area (Baker, 1997e).

The topography of Site 12 disposal areas slope to the south-southeast from Barracks Road toward Ballard Creek. With the exception of some relatively flat, grassy field areas, Site 12 is predominantly wooded. An industrial area is located west and north of the Site 12 disposal areas. The former disposal areas at Site 12 operated from 1925 to the mid-1960s and received an estimated 1,400 tons of waste, including general refuse, scrap wood, piping, steel containers, and nitramine-contaminated packaging. Wastes were transported to Area A by truck and railcar and open-burned in two incinerators prior to disposal. Incinerator ash was

disposed of on the hillside behind the incinerator and spread across the top of Area A. Scrap metal, charred wood, cloth, and glass have been observed in the ash. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Study Area Analysis	USEPA, 1992	00289
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Operable Unit Evaluation Report	Baker, 1993	01060
Round Two RI Report Site 12	Baker, 1996	00640
AOC 22, Site 12, and SSA 2, SSA 19 and King Creek Independent Sampling and Risk Screening Report	Black & Veatch, 1996	00669
Feasibility Study Report Site 12	Baker, 1996	00647
Proposed Remedial Action Plan Site 12	Baker, 1996	00654
Record of Decision, Operable Unit Nos. III, IV, and V, Site 12	Baker, 1997	00871
Construction Closeout Report for Site 12 – Area A	OHM, 1998	01154
Long-Term Monitoring Report, Site 12	Baker, 2000	01219
Site 12 Long-Term Monitoring Report - 1998-2000	Baker, 2005	02078
Partnering Team Consensus Statement 9-1-06-45	-----	N/A
Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL, 2007	02115
Final Long-Term Monitoring Report	CH2M HILL, 2008	02272

Nature and Extent of Potential Contamination

The waste materials burned/disposed of in the Site 12 disposal areas are the sources of potential contamination to site media. Previous investigations of Site 12 included sampling and full suite analysis of surface and subsurface soil, groundwater, and surface water and sediment of Ballard's Creek and tributaries. Several inorganics were detected in Area A surface soils at concentrations exceeding background levels, with lead, mercury, and zinc being the most common. PAHs and low levels of pesticides and VOCs were also detected in Area A soils. 2,4,6-TNT was also detected at a maximum concentration of 15,000 µg/kg. In general these constituents were also detected in subsurface soil but at lower concentrations and less frequently. Only low levels of PAHs and pesticides were detected in soils from Area B/C and the Wood/Debris Disposal Area. Inorganic concentrations in these areas were consistent with background levels.

In groundwater, low concentrations of VOCs (maximum concentration 55 µg/L TCE) and nitramine (maximum concentration 4.4 µg/L RDX) compounds were detected. However, their presence in groundwater is attributed to past operations at AOC 23 – Barracks Road

Landfill Industrial Area, which is upgradient of Site 12. Concentrations of inorganics were similar to background, and no SVOCs, pesticides or PCBs were detected in groundwater samples. The deeper Yorktown-Eastover Aquifer does not appear to have been affected by past operations at Site 12 disposal areas.

In a seep sample, TCE was detected at a maximum concentration of 3,300 µg/L (near the drainage to Ballard Creek between the upgradient industrial area suggesting surface runoff from the Site 12 disposal area is not the likely source of VOCs in surface water. Pesticides were detected upstream of Site 12. PAHs, PCBs, and nitramine compounds were not detected in surface water samples. Concentrations of dissolved copper, mercury, and nickel exceeded surface water criteria.

In sediment, PAHs, PCBs, and inorganics were the primary constituents detected. The only VOCs detected in sediment samples consisted of low levels of common laboratory contaminants (acetone at 49 µg/kg and 2-butanone at 140 µg/kg). Elevated concentrations of SVOCs, pesticides, and PCBs were detected above screening values (effect range-medium values). Several inorganics (beryllium, barium, cadmium, lead, manganese, mercury, silver, and zinc) were detected above background concentrations in sediment, with cadmium, lead, mercury, silver, and/or zinc exceeding screening values in at least one sample.

Potential Risks

Unacceptable human health risks were identified for exposure to lead in Area A surface soil for a trespasser (HI = 1.5) and child resident (HI = 5.9). The potable use of groundwater also poses unacceptable human health risks from TCE exposure. There are no unacceptable human health risks from residential use exposure to surface water or sediment.

Potential terrestrial ecological risks were identified due to the presence of inorganics (lead and cadmium) in Area A surface soils. Pesticides, PCBs, PAHs, and inorganics pose potential risks to aquatic ecological receptors in Ballard Creek surface water and sediment.

Remedial Action(s)

As noted in the FS and PP, it was determined that only soil in Area A required active remediation, and that active remediation of groundwater was not considered because TCE in groundwater did not exceed a non-potable use (car washing and lawn watering) risk-based RL (16,000 µg/L) since it was determined that groundwater would not likely be used as a potable supply. Sediment in Ballard Creek was not considered for active remediation because it was determined that dredging would result in greater adverse ecological impact than those potential posed under existing conditions. Based on the absence of unacceptable risk in Area B/C and the Wood/Debris Disposal Area, no remedial action was determined necessary for these disposal areas.

The ROD for Site 12 was signed in April 1997 to address lead in soil in Area A, TCE in shallow groundwater, and inorganics and PAHs in sediment in Ballard Creek watershed. The remedy for soil was excavating soil, removing surface debris, spreading excavated soil over flat portions of Area A, and backfilling the excavated area with clean soil, followed by a clay cap over the landfill area. For groundwater, the selected remedy is LUCs consisting of restrictions throughout Area A, Area B/C, and the Wood/Debris Disposal Area to prohibit the use of groundwater as a drinkable source and groundwater monitoring of shallow and

deep wells across the Site 12 Study Area. The remedy for surface water and sediment was LTM of Ballard Creek and its tributaries.

Remedial action construction for Area A began in July 1997 and consisted of well abandonment; demolition of the incinerator facility, incinerator stack, and a one-story maintenance shed; and implementation of erosion and sediment controls. Metal debris scattered throughout the site was removed and sent to a recycling facility (OHM, 1998). In addition, the limits of the landfill were defined and contaminated material located outside the limits of the landfill were placed within the landfill. The landfill was subsequently capped with a geosynthetic clay liner and covered with soil. Finally, a surface drainage channel (i.e., Tri-Lock Block) and settling pond was installed and the site was revegetated and restored.

LTM was completed in 2007, consistent with the ROD and a draft LTM Report was submitted for review in March 2008. Because the industrial area upgradient of Site 12 (now AOC 23) is the source of VOCs in groundwater, the Navy has initiated investigation of this area. Consequently, the objective of LTM for Site 12 is now focused on monitoring for the detection of potential releases from waste remaining in place in the Site 12 Disposal Areas.

Activities Completed 2007-2008

The Navy is currently negotiating with USEPA a draft LUC RD. The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment. The Draft LTM report was submitted in March 2008. An ESD is currently being drafted to eliminate the ROD's requirement to sample for VOCs in groundwater since these contaminants are being addressed under AOC 23.

CERCLA Path Forward

- Quarterly Inspections (soil cover maintenance, as needed)
- ESD to remove VOCs from groundwater LTM
- LTM for groundwater and sediment
- Five-Year Review (2012)
- RACR

[Schedule 3-9](#) presents the FY09-10 schedule for Site 12.

3.2.10 Site 16—West Road Landfill and Site Screening Area 16 – Building 402 Metal Disposal Area and Environs

Site Description

Site 16, the West Road Landfill, is located adjacent to West Road near Lee Road on WPNSTA Yorktown. SSA 16, Building 402 Metal Disposal Area and Environs (former SWMU 69), overlies the northern portion of Site 16 landfill; consequently these sites have been studied together ([Figure 3-10](#)). Site 16 disposal area is approximately 8 acres and received waste from 1950 to the early-1960s at an estimated 9 tons per year, including dry carbon batteries, banding materials, pressure transmitting fluid, other chemicals, and 55-gallon drums with unknown contents (C.C. Johnson & Associates and CH2M HILL, 1984). SSA 16 is approximately 0.4 acres used for scrap metal storage. SSA 16 was also used for

waste container storage prior to the remodeling and conversion of Building 402 into a hazardous waste storage facility (Baker, 1995b).

The northern portion of Site 16 (including SSA 16), south of railroad tracks, is level and predominantly covered with grass. The remaining portion of Site 16 is wooded. Site 16 is located upgradient of a wetland adjacent to Felgates Creek that drains into the York River approximately 1.5 miles from Site 16 (Baker, 1995b). A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Engineering Estimate/Cost Analysis for Sites 4, 16, and 21 Removal Actions	Baker, 1993	00311
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Site 16: West Road Landfill Clearance Sampling and Polychlorinated Biphenyl (PCB) Screening Report	Black & Veatch, 1994	00676
Closeout Report Sites 4, 16, and 21	IT Corporation, 1995	00616
Round Two RI and Baseline Risk Assessment Site 16 and Site Screening Area 16	Baker, 1995	00635 (Volume I) 01177 (Volume II)
Proposed Remedial Action Plan Site 16 and Site Screening Area 16	Baker, 1995	00672
Record of Decision, Operable Unit Nos. II, Site 16 and Site Screening Area 16	Baker, 1995	00671
Five-Year Review Report for Sites 1, 6, 7, 12, 16, and 19	Baker, 2002	01310
Draft Remedial Design for Land Use Controls for Site 16 and SSA 16	Baker, 2006	(Draft – No AR No.)
Considerations for Risk Management at Site 16/Site Screening Area 16	CH2M HILL, 2007	(Draft – No AR No.)
Five-Year Review Report for Site 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL, 2007	02115

Nature and Extent of Potential Contamination

The source of potential contamination is landfill materials from Site 16. Previous investigations included a full suite analysis of soil, surface water, sediment, and groundwater.

Surface Soil. Inorganics detected with maximum concentrations above background are antimony, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc. Of these, chromium (1,060 mg/kg), iron (217,000 mg/kg), and lead (2,610 mg/kg) exceeded residential RBCs, and silver (12.4 mg/kg) exceeded the BTAG screening criterion. The maximum concentration of arsenic (20 mg/kg) exceeded the residential RBC, but was below background.

Pesticides and PCBs detected above background consisted of beta-benzene hexachloride (BHC), heptachlor, dieldrin, 4,4'-dichlorodiphenyldichloroethene (DDE), 4,4'-dichlorodiphenyldichloroethane (DDD), 4,4'-DDT, methoxychlor, endrin ketone, alpha-chlordane, Aroclor-1254, and Aroclor-1260. Aroclor-1254 (2,100 J $\mu\text{g}/\text{kg}$) and Aroclor-1260 (1,400 J $\mu\text{g}/\text{kg}$) also exceeded residential RBCs and BTAG screening criterion.

No VOCs were detected in surface soil, with the exception of low levels of methylene chloride and acetone, which are both common laboratory contaminants.

Maximum concentrations of the SVOCs: fluoranthene (1,500 $\mu\text{g}/\text{kg}$), pyrene (1,300 $\mu\text{g}/\text{kg}$), chrysene (1,100 $\mu\text{g}/\text{kg}$), and benzo(b)fluoranthene (1,700 $\mu\text{g}/\text{kg}$) were detected above background and BTAG screening criteria. Of these, only benzo(b)fluoranthene exceeded the residential RBC.

Subsurface Soil. Aluminum, antimony, arsenic, beryllium, chromium, cobalt, iron, nickel, and zinc were detected at concentrations above background; however, only arsenic (38.2 mg/kg) and iron (57,000 mg/kg) exceeded residential RBCs.

There were no pesticides or PCBs detected in subsurface soils. With the exception of low levels of acetone, a common laboratory contaminant, there were no VOCs detected in subsurface soils, and there were no SVOCs detected in subsurface soils at concentrations exceeding background or residential RBCs.

There were no constituents detected in subsurface soils that exceeded the BTAG screening criteria.

Groundwater. Total inorganics detected at concentrations exceeding background consisted of aluminum, arsenic copper, iron, lead, and selenium. There were no total inorganics detected at concentrations exceeding MCLs.

Dissolved inorganics detected at concentrations exceeding background consisted of arsenic, beryllium, chromium, copper, lead, manganese, nickel, and zinc. None of these constituents exceeded residential tap water RBCs or MCLs. Antimony (19.3 J $\mu\text{g}/\text{L}$) exceeded the MCL and the adjusted residential RBC value for tap water; however, it was below background (21.1 $\mu\text{g}/\text{L}$).

Pesticides consisting of aldrin (0.043 J $\mu\text{g}/\text{L}$), endrin (0.02 J $\mu\text{g}/\text{L}$), and 4,4'-DDT (0.058 J $\mu\text{g}/\text{L}$); VOCs consisting of acetone (0.6 J $\mu\text{g}/\text{L}$), 1,1-DCE (2 $\mu\text{g}/\text{L}$), 1,1-DCA (1 $\mu\text{g}/\text{L}$), 1,1,1-TCA (7 $\mu\text{g}/\text{L}$), TCE (0.7 J $\mu\text{g}/\text{L}$), and PCE (0.6 J $\mu\text{g}/\text{L}$); and SVOCs consisting of 1,4-dichlorobenzene (2 J $\mu\text{g}/\text{L}$) and di-n-butylphthalate (1 J $\mu\text{g}/\text{L}$) were detected at low concentrations. However, no pesticides, VOCs, or SVOCs were detected at concentrations exceeding MCLs.

Surface Water. Total inorganics detected above background were lead and selenium. Total inorganics aluminum (99 J $\mu\text{g}/\text{L}$), iron (2,000 J $\mu\text{g}/\text{L}$), lead (5.9 $\mu\text{g}/\text{L}$), and manganese (374 $\mu\text{g}/\text{L}$) exceeded BTAG screening values.

Dissolved inorganics consisting of aluminum, manganese, and zinc exceeded background. Dissolved aluminum (129 J $\mu\text{g}/\text{L}$), iron (419 J $\mu\text{g}/\text{L}$), and manganese (382 J $\mu\text{g}/\text{L}$) exceeded BTAG screening criteria. Only manganese exceeded an adjusted (times 10) tap water RBC.

Pesticides, PCBs, and SVOCs were not detected in surface water. Additionally, with the exception of low levels of toluene, a common laboratory contaminant, VOCs were not detected in surface water.

Sediment. Inorganics detected at concentrations exceeding background consisted of cadmium, copper, and silver. However, none exceeded their respective residential RBCs or BTAG screening values.

Pesticides and PCBs consisting of heptachlor epoxide, endrin aldehyde, were detected at concentrations above background. Aroclor-1260 (45 J $\mu\text{g}/\text{kg}$) was detected above BTAG screening criteria. No pesticides or PCBs were detected at concentrations exceeding RBCs.

VOC detected were chloromethane, 2-butanone, and toluene. However, none exceeded residential RBCs or BTAG screening values. There were no SVOCs detected in sediment.

Potential Risks

In the Round Two RI (Baker, 1995b), potential risks were evaluated for the civilian worker for surface soil, surface water, sediment; the future adult construction worker for subsurface soil; and the future adult resident and future child resident for surface soil, surface water, and sediment. Although a non-cancer hazard (HI = 2.0) from ingestion (HI = 1.6) and dermal contact (HI = 0.39) with surface soils exceeded the acceptable HI threshold of 1 for the future child resident, no individual constituents had HQ values greater than 1.0 and there are no cumulative target organ effects, and risk management is warranted. Although a non-cancer hazard (HI = 3.0) from ingestion (HI = 3.0) and dermal contact (HI = 0.04) with potable use of groundwater, primarily from exposure to antimony (HQ = 1.7) was identified for the future child resident, no other individual constituents had an HQ of greater than 1.0, there are no cumulative target organ effects, and risk management is warranted. Although a non-cancer hazard (HI = 1.3) from ingestion (HI = 1.3) and dermal contact (HI = 0.019) with groundwater was identified, no individual constituents had HQ values greater than 1.0 and risk management is warranted.

With the exception of antimony, no constituents contributed an individual HQ greater than 1.0; and, antimony concentrations in groundwater were less than background. All other constituents contributing to potential unacceptable non-cancer hazards are non-additive since they affect different target organs. Therefore, potential hazards to the future adult resident and future child resident warrant risk management for (Baker, 1995b; CH2M HILL, 2007b).

Cancer risks and non-cancer hazards to potential future residents via exposure to subsurface soils were evaluated in *Considerations for Risk Management at Site 16/ SSA 16* (CH2M HILL, 2007b), since this scenario was not completed during the Round Two RI. No potential unacceptable cancer risks were identified for the future adult resident or future child resident from exposure to subsurface soils. A potential unacceptable non-cancer hazard (HI = 1.7) from ingestion (HI = 0.21) and dermal contact (HI = 1.5) with subsurface soils was identified for the future adult resident. However, there are no target organs with an HI value of greater than 1.0. A potential unacceptable non-cancer hazard (HI = 4.7) from ingestion (HI = 2.0) and dermal contact (HI = 2.7) with subsurface soils was identified for the future child resident. With the exception of vanadium (HQ = 1.8 for dermal exposure and 0.45 for ingestion), no individual constituents had HQ values greater than 1.0. Since the

maximum concentration of vanadium detected in subsurface soils (58.3 mg/kg) is below the background (70.3 mg/kg), there are no unacceptable non-cancer hazards associated with subsurface soil.

A SERA was completed for soil, groundwater, surface water, and sediment in the Round Two RI. A few inorganics in soil and sediment, a few organic compounds in sediment, and manganese in surface water were further evaluated in the SERA. Based on the results of the SERA, and taking into consideration background concentrations and the conservative nature of the ecological risk assessment models, the Navy in partnership with USEPA and VDEQ agreed there are no unacceptable risks to ecological receptors at Site 16/SSA 16 (Baker, 1995c).

Remedial Action(s)

A ROD for soil and groundwater was signed in September 1995 with institutional controls, including land-use and aquifer-use restrictions (Baker, 1995a). The selected remedy for Site 16/SSA 16 was NFA with Institutional Controls, following a removal action completed in 1994.

Scrap metal was partially removed from the surface along the northeastern section of Site 16. The area was backfilled with soil and revegetated (Black & Veatch, 1994). In 1994, the landfill wastes and debris including 420 tons of batteries, 60 tons of debris, 125 tons of silica gel, ordnance, and other miscellaneous debris and buried waste were removed from the site (IT Corporation, 1995b). Post-removal soil samples were collected for analysis of for VOCs, SVOCs, pesticides/PCBs, and inorganics. Risk based screening values were exceeded for arsenic, beryllium, manganese, benzo(a)pyrene, dieldrin, Aroclor-1254, and Aroclor-1260. Post removal confirmation sample results were included in the risk assessment evaluation.

Activities Completed 2007-2008

The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment. Based on the conclusions from the *Considerations for Risk Management at Site 16/SSA 16* (CH2M HILL, 2007b), the Navy is proposing an ESD to the ROD that will allow for unrestricted land use at Site 16/SSA 16.

CERCLA Path Forward

- Quarterly Inspections
- ESD to remove LUCs
- Five-Year Review (2012)
- RACR

[Schedule 3-10](#) presents the FY09-10 schedule for Site 16/SSA16.

3.2.11 Site 17—Holm Road Landfill

Site Description

Site 17, Holm Road Landfill, is a 2-acre [former] disposal area located south of Holm Road and east of Main Road ([Figure 3-11](#)). Most of the area is cleared, with woodlands to the south and east and cleared areas with industrial buildings to the north and west. The site lies on a topographically high area with a small (~ 0.5 acre) low lying isolated wetland area

created following a soil removal action in 2000 in the north-central part of the site. Surface runoff is overland to off-site drainage ditches that feed tributaries of Indian Field Creek east of the site and to the isolated wetland. Former railroad tracks (now gravel) bisect the western third of the site. Additionally, railroad tracks lie along the eastern boundary of the site.

Disposal activities at Site 17 occurred for approximately 10 years from the 1950s to the 1960s. Wastes reportedly disposed included acid batteries from underwater weapons, hydraulic fluids (Dolconik) from the de-milling of torpedoes, other types of hydraulic fluids, drums, and scrap metal. An estimated 60 tons of waste were deposited in the disposal area over 10 years (C.C. Johnson & Associates, Inc. and CH2M HILL, 1984).

There is no documentation of activities conducted at Site 17 since the cessation of landfill operations until the site was identified during the 1984 IAS. Investigations included sampling and analysis of surface and subsurface soils and groundwater, geophysical surveying and test pitting. No waste was identified in monitoring well borings or test pits excavated during remedial investigation activities between 1993 and 1998 (Baker, 1998e). Interviews with Navy personnel report the landfill waste had been removed; however, there is no documentation of construction of a soil cover on the landfill or removal of landfill waste. Test pits activities were conducted in 2007 in an area of previously identified geophysical anomaly to verify the presence or absence of waste at Site 17; no waste observed in the 2007 test pits. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Round Two RI Report Sites 11 and 17	Baker, 1998	01553
Feasibility Study Report Sites 11 and 17	Baker, 1999	01573
Proposed Remedial Action Plan Sites 11 and 17	Baker, 1999	01600
Record of Decision, Operable Unit Nos. X and XI, Site 11 and Site 17	Baker, 2000	01094
Remedial Action Report Sites 11 and 17	OHM, 2001	01090
Statistical Evaluation of Post-Excavation Soil Sampling Data, Site 17 – Holm Road Landfill	Baker, 2005	02212
Phase I RI Report for GROUNDWATER at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2006	02158
Five-Year Review Report for Site 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL, 2007	02115
Technical Memorandum – Test Pits	CH2M HILL, 2007	02203

Document Title /Milestone	Author/Date	AR Document Number
Evaluation of Human Health Risk Associated with Potable Use of Groundwater at WPNSTA, Sites 11 and 17 Technical Memorandum	CH2M HILL, 2008	02274
ESD	CH2M HILL, 2008	02205

Nature and Extent of Potential Contamination

Previous investigations included full surface and subsurface soil samples for full suite parameter analysis, cyanide, pH, TOC, and cation exchange capacity (CEC). Elevated PAHs (total PAHs = 10 to 42 mg/kg) were detected in soil in the north central portion of Site 17. The area of elevated PAHs covered approximately 17,650 sq ft and was detected down to a depth of 2 ft. Zinc and mercury were the only inorganics detected above background concentrations in the area of potential PAH contamination (Baker, 1998e).

Groundwater samples were analyzed for TCL VOCs, SVOCs, pesticides/PCBs, explosives, filtered and unfiltered TAL inorganics, cyanide, nitrate, nitrite, dissolved gases, bromide, chloride, sulfate, orthophosphate, total dissolved solids (TDS), and total suspended solids (TSS). No organic or inorganic compounds were identified in groundwater above MCLs.

Potential Risks

PAHs in soil in the north central portion of Site 17 posed unacceptable risk to the child and adolescent resident. No unacceptable risk was identified from non-potable exposure (watering lawns, car washing, etc.) to groundwater for the most conservative (child resident) exposure scenario (Baker, 1998e). Based on the SERA, concentrations in soil of aluminum, chromium, iron, mercury, vanadium, and zinc exceeded ecological risk screening values.

Remedial Action(s)

A ROD for soil was signed in October 2000 to address human health risks associated with exposure to PAHs. Groundwater was not addressed in this ROD and is under further investigation and has not been addressed by any remedial actions. Remedial activities completed in August 2000 included the excavation of approximately 940 tons of PAH-contaminated soil to a depth of 2 ft (OHM, 2001b). The material was classified as non-hazardous for off-site disposal. Clean fill from an on-base source was placed within the excavated area and imported topsoil was placed over the impacted area.

Total cPAH concentrations in post-removal confirmation samples ranged from less than 1 mg/kg to 6 mg/kg, which are below the industrial preliminary remediation goal (PRG) of 10 mg/kg. The remedial action mitigated unacceptable human health risks for current land use. Potential ecological risks from zinc and mercury in soil were assumed to be mitigated from the removal of the PAH contaminated area.

LUCs prohibiting residential development at the site have been maintained by the Navy through routine inspections. During development of the remedial design for LUCs and following review of post-removal confirmation sample results, it was determined that the need for LUCs warranted reconsideration. A *Final Site 17 Statistical Evaluation of Post-*

Excavation Soil Sampling Data (Baker, 2005f) compared the 16 post-excavation confirmation samples to residential soil cleanup goal for cPAHs of 4.0 mg/kg. With the exception of one sample (total cPAHs at 5.8 mg/kg), all post-removal soil concentrations were below the RG of 4.0 mg/kg for the child resident. The USEPA statistical software package, ProUCL, calculated the 95 percent UCL for total cPAHs in soil at 0.8 mg/kg. Therefore, risk management consideration that no unacceptable risk for UU/UE remains at the site from exposure to soil is warranted, because only one sample exceeded the child resident RG and the 95 percent UCL for total cPAHs across Site 17 is 0.8 mg/kg, well-below the child resident RG.

Activities Completed 2007-2008

A TM was completed to document test pitting activities and absence of waste in June 2007. The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment. A draft NFA groundwater TM was completed in April 2008. An ESD to remove LUCs was signed was finalized in July 2008.

CERCLA Path Forward:

- Quarterly Inspections
- ESD to remove LUCs
- NFA PP /ROD for groundwater
- RACR

[Schedule 3-11](#) presents the FY09-10 schedule for Site 17.

3.2.12 Site 19—Conveyor Belt Soils at Building 10

Site Description

Site 19 includes soils beneath and surrounding a 500-ft long conveyor belt formerly used to transport packaged TNT from Building 10 to Building 98. Site 19 is located west of Building 10 and 300 ft south of Site 9 ([Figure 3-12](#)). The topography of Site 19 decreases to the north towards Site 9. A topographic low formed by a trench beneath the former conveyor belt bisects the site and receives surface water runoff that infiltrates the subsurface or flows through drainage channels connecting Site 19 to Site 9, ultimately discharging to nearby Lee Pond. Depth to groundwater for the Cornwallis-Cave aquifer is typically between 14-20 ft bgs with flow generally southwest toward Lee Pond. Groundwater for the Yorktown-Eastover aquifer is typically encountered between 39-51 ft bgs with flow generally west to southwest also toward Lee Pond.

The conveyor belt was used for transport of packaged TNT from the 1940s to the 1970s. As documented in the Round Two RI, holes were observed along the floors and walls of the conveyor belt and in the conveyor belt enclosure. The walls and floor of the conveyor belt were periodically sprayed with water to control dust. Although the area has not been active for any other land use since operations ceased in the 1970's, the site remains relatively cleared and has not been excessively overgrown with vegetation. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Site 19 and Composites of Site 9, Site 19, SSA 6 & SSA7 Independent Sampling and Risk Screening Report	Black & Veatch, 1996	00781
Feasibility Study Sites 9 and 19	Baker, 1997	00966
Round Two RI Report, Sites 9 and 19	Baker, 1997	00889
Proposed Remedial Action Plan Sites 9 and 19	Baker, 1997	00967
Record of Decision,v3, Operable Unit Nos. VI and VII, Sites 9 and 19	Baker, 1998	02077
Closeout Report Site 19 Bioremediation	OHM, 2000	01556
Five-Year Review Report for Sites 1, 6, 7, 12, 16, and 19	Baker, 2002	01310
Five-Year Review Report for Site 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19	CH2M HILL, 2007	02115

Nature and Extent of Potential Contamination

Fine particulates released through the holes and the rinse water sprayed on the conveyor belt were a source of potential contamination to soils and groundwater proximal to the conveyor belt, and sediment located in the concrete drainage way west of the conveyor belt. Previous investigations included full suite analysis for soils. VOCs were not detected above residential RBCs. Benzo(a)pyrene (140 µg/kg) and benzo(b)fluoranthene (230 µg/kg) were the only SVOCs detected exceeding their respective soil residential RBCs. RDX, HMX, TNT and its breakdown products were detected in soils. Maximum concentrations were TNT (35,000 mg/kg), RDX (230 mg/kg), and HMX (34 mg/kg) (Baker, 1997c). Inorganics detected above background levels in surface and/or subsurface soils comprised aluminum (90,600 mg/kg), cadmium (2.2 mg/kg), chromium (52.4 J mg/kg), copper (41.6 mg/kg), iron (114,000 mg/kg), lead (392 J mg/kg), vanadium (74 J mg/kg), and zinc (365 J mg/kg) (Baker, 1997c).

Groundwater was analyzed for TCL VOCs, TCL SVOCs, TAL inorganics, PCBs, pesticides, and explosives. No VOCs or SVOCs (with the exception of low concentrations of common laboratory contaminants), pesticides, or PCBs were detected in groundwater. The following inorganics were detected above background levels: chromium (2.5 µg/L), copper (17 µg/L), iron (1,370 µg/L), manganese (2,820 µg/L), and nickel (6.4 µg/L). There were no MCL exceedences of inorganics in groundwater. Explosives detected comprised RDX; 1,3,5-TNB; amino-DNTs; and 2,4,6-TNT at maximum concentrations 1.1 µg/L, 5.8 µg/L, 130 µg/L, and 38 µg/L, respectively. Further investigations of groundwater are on-going (Baker, 1997c).

Potential Risks

Human health risks were evaluated for the future adult/child resident and current commercial worker from exposure to surface soils and potable use of groundwater. Potential unacceptable non-cancer hazards were identified for the future child resident and adult resident from exposure to shallow groundwater under a potable use scenario. 1,3,5-TNB (HQ=1.7) contributed to the overall HI of 2.8 for a non-cancer hazard to the future adult resident and 1,3,5-TNB (HQ=4.1) and 2,4,6-TNT (HQ=1.9) contributed to the overall HI of 6.4 non-cancer hazards to the future child resident. The ILCR value (4.8×10^{-4}) and the HI value (92.0) indicated the potential for unacceptable cancer risks and hazards from exposure to 2,4,6-TNT in soils.

No aquatic habitats are associated with Site 19. Ecological risks were evaluated for the terrestrial ecosystem. Concentrations of inorganics posing potential ecological risks (aluminum, iron, lead, and vanadium) were evaluated against background concentrations. Although concentrations exceed background, HQs for iron, lead, and vanadium are similar to HQs calculated for background concentrations. Average Site 19 aluminum concentrations produced ecological HQ values similar to background values. However, it was determined in partnering meetings that concentrations of aluminum in soil exceeding 14,830 mg/kg should be addressed to mitigate potential impact to ecological receptors (Baker, 1997c).

Remedial Action(s)

Removal of an undocumented quantity of soil from beneath the conveyor belt and the surrounding area was conducted between 1973 and 1974. A ROD for soils was signed in March 1998 to mitigate the potential for direct contact of 2,4,6-TNT and RDX in soils by human receptors, to prevent ecological effects to terrestrial receptors from exposure to aluminum in soils, and to eliminate the potential migration of these contaminants to other environmental media (Baker, 1997f).

The remedy was initiated April 1998 and included the removal of transite panels and asbestos insulated piping, dismantling and disposal of the conveyor system, excavation of explosives contaminated soils, and confirmation sampling. The RLs established for 2,4,6-TNT and RDX were 15 mg/kg and 5 mg/kg, respectively. Approximately 1,000 cubic yards of explosives-contaminated soil were excavated to a depth of 4 ft in the conveyor belt trench, and excavated soils were placed in a biocell at Site 22 (OHM, 2000). Following treatment, these soils were placed at Site 22 in the area surrounding the biocell.

Soil concentrations of aluminum in excess of 14,850 mg/kg were excavated from around Building 527 (Baker, 1997f). Approximately 60 cy of soil with elevated aluminum concentrations were excavated from the area surrounding Building 527 and placed in the conveyor belt trench excavation and covered with clean fill. The site was then restored with topsoil and revegetated, preventing ecological exposure to elevated aluminum in soil. A total of 2 wall samples (south wall 350 ft at 610 mg/kg (later re-sampled and analyzed below the RL) and west wall at 111 mg/kg) and one floor sample (993.82 mg/kg) were reported above the cleanup level for 2,4,6-TNT. All other samples were reported below cleanup levels, ranging from non-detect for all analytes to 13 mg/kg for 1,3,5-TNB, 6.57 mg/kg for 2-amino-4,6-dinitrotoluene, 8.9 mg/kg for 4-amino-2,6-DNT, and 0.6 mg/kg for RDX (OHM, 2000).

LUCs prohibiting residential development of Site 19 and disturbance of the soil cover have been maintained by the Navy through routine inspections. Site 19 is inaccessible to the general public with controlled access by the Navy. A Remedial Design for LUCs is currently being negotiated with the USEPA. The Navy intends to further assess the nature, extent, and potential risk associated with groundwater.

Activities Completed 2007-2008

The Navy is in the process of drafting a LUC RD. The 2007 Five-Year Review concluded that the remedy was protective of human health and the environment.

CERCLA Path Forward

- Quarterly Inspections (soil cover maintenance, as needed)
- FI/FS/PP/ROD for groundwater
- Five-Year Review (2012)
- RACR

[Schedule 3-12](#) presents the FY09-10 schedule for Site 19.

3.2.13 Site 21—Battery and Drum Disposal Area

Site Description

Site 21, the Battery and Drum Disposal Area, covers approximately one acre in the north-central portion of WPNSTA Yorktown ([Figure 3-13](#)). Site 21 is an open field surrounded by trees and brush. The site is located immediately adjacent to an unnamed tributary leading southeast to the Eastern Branch of Felgates Creek. West Road marks the northeast boundary of the site, and Sites 4 and 22 are located northwest and southwest of the site, respectively. A gravel access road extends from West Road to the central portion of the site. The topography of Site 21 is relatively flat in the central portion of the site with steep slopes toward the un-named tributary along the northern, western, and southern boundaries; and a gentle slope toward the gravel access road along the northeastern boundary. Site elevations range from 5 to 45 ft amsl. Depth to groundwater (Columbia aquifer) is approximately 15 ft bgs with flow to the west toward the unnamed tributary to Felgates Creek.

Site 21 was identified as a battery and drum disposal area in November 1990. Site 21 was reportedly used as a land disposal area in the 1950s during which it received an estimated 7,000 tons of waste. Filling operations reportedly occurred three to four times a week. A site reconnaissance conducted in October 1991 identified exposed waste throughout the site with several areas of concentrated waste disposal (batteries and drums). Empty solvent containers and scrap metal were observed. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Draft Final Site Inspection Report, Site 21	Baker, 1992	00213
Round One RI Report, Sites 1-9, 11, 12, 16-19, and 21	Baker, 1993	00313
Engineering Estimate/Cost Analysis for Sites 4, 16, and 21 Removal Actions	Baker, 1993	00311
Closeout Report Sites 4, 16, and 21	IT Corporation, 1995	00616
Post-Removal Confirmation Sampling Report and Baseline Risk Assessments Sites 4 and 21	Baker, 1995	00660
Round Two RI Report, Sites 4, 21, and 23	Baker, 2001	01296 (Volume I) 01297 (Volume II)
Feasibility Study Sites 4, 21, and 22	Baker, 2001	01160
Closeout Report Sites 21 and 22	Shaw, 2003	01779
Record of Decision, Operable Unit Nos. XVIII, Site 21	Baker, 2003	01374

Nature and Extent of Potential Contamination

Waste disposed of at Site 21 is the source of potential contamination to site media. Investigations have consisted of analysis of groundwater, surface and subsurface soils, surface water and sediment for VOCs, SVOCs, pesticides/PCBs, inorganics, and explosives (nitramines), and total petroleum hydrocarbons (TPH). Surface water and sediment samples were collected near Site 21 as part of an overall evaluation of surface water related to Sites 4, 21, and 22 as they are adjacent to each other and contribute runoff and groundwater discharge to the Eastern Branch of Felgates Creek.

Surface Soil. Four VOCs were detected in surface soil with none exceeding their residential RBCs; methylene chloride (0.06 mg/kg), acetone (0.007 J mg/kg), toluene (0.001 J to 0.003 J mg/kg), and styrene (0.001 J mg/kg). Thirteen SVOCs were detected with only two; benzo(a)fluoranthene (0.91 mg/kg) and benzo(a)pyrene (0.14 J) exceeding the residential RBCs. Thirteen pesticides were detected with only dieldrin (0.000085 J to 0.046 mg/kg) exceeding the residential RBC. Twenty-three inorganics were detected with nine; aluminum (938 to 43,300 mg/kg), arsenic (0.34 J to 11.6 mg/kg), cadmium (1.5 J to 38.4 J mg/kg), chromium (2.5 to 32.3 mg/kg), iron (1,400 to 31,100 mg/kg), manganese (3.7 J to 1,310 mg/kg), mercury (0.06 J to 4.4 J mg/kg), thallium (1.8 mg/kg), and zinc (7.8 to 6,780 mg/kg) exceeding residential RBCs. TPHs were detected in surface soils ranging from non-detected to 17,200 mg/kg. No nitramines were detected in any of the surface soil samples.

Subsurface Soil. Several PAHs, pesticides, and VOCs were detected in subsurface soils; however, there were no organics detected above corresponding residential RBCs. Fourteen inorganics were detected, four at concentrations above residential RBCs and background. No nitramines were detected in the subsurface soil samples.

Groundwater. Two VOCs, 1, 2-DCE (4 J $\mu\text{g/L}$) and TCE (2 J $\mu\text{g/L}$), were detected in groundwater; TCE exceeded the tap water RBC. Heptachlor (0.023 J $\mu\text{g/L}$) was the only pesticide detected and exceeded its tap water RBC. No organic compounds exceeded MCLs. Sixteen inorganics were detected, of these, eight, aluminum (8,250 iron $\mu\text{g/L}$), arsenic (8.6L $\mu\text{g/L}$), cadmium (79.5 $\mu\text{g/L}$), chromium (37 $\mu\text{g/L}$), iron (40 J to 11,800 J $\mu\text{g/L}$), manganese (10.4 to 3,010 $\mu\text{g/L}$), vanadium (50.2 $\mu\text{g/L}$), and zinc (14.3 L to 14,300 L $\mu\text{g/L}$) exceeded their tap water RBCs and only cadmium exceeded the MCL. No SVOCs, PCBs, or nitramines were detected in groundwater.

Surface Water. One SVOC, bis(2-ethylhexyl)phthalate (1 J to 66 L $\mu\text{g/L}$), was detected in surface water at concentrations above ten times the tap water RBC. Eight nitramines were detected; 1,3-dinitrobenzene (2 $\mu\text{g/L}$), 2,4/2,6-DNT (2.4 $\mu\text{g/L}$), HMX (11 $\mu\text{g/L}$), nitrobenzene (2 NJ $\mu\text{g/L}$), amino-DNTs (0.28 to 5.2 $\mu\text{g/L}$), RDX (0.32 J to 58 $\mu\text{g/L}$), and 1,3,5-TNB (0.59 $\mu\text{g/L}$). Three explosives, 2,4/2,6-DNT, amino-DNTs, and RDX exceeded ten times the tap water RBC. Sixteen inorganics were detected in surface water with two; antimony (24.9 $\mu\text{g/L}$) and arsenic (1.6 to 3 $\mu\text{g/L}$) exceeding ten times the tap water RBC. Both nitramines and inorganics were detected in the surface water above the Clean Water Act salt water chronic criteria.

Sediment. There were no organics detected at concentrations greater than adjusted residential RBCs. Nine inorganics were detected above the residential RBCs: aluminum (2,580 to 26,600 mg/kg), antimony (3.9K to 26.7 L mg/kg), arsenic (0.67 to 18.6 mg/kg), cadmium (0.76 L to 4.4 mg/kg), chromium (5 to 51.1 mg/kg), iron (1,990 to 45,300 mg/kg), manganese (11.9 to 447 mg/kg), thallium (0.78 L mg/kg), and vanadium (2.8 to 79.9 mg/kg). Antimony, arsenic, cadmium, iron, thallium, and vanadium were also detected above background.

Potential Risks

No unacceptable cancer risks were identified for any media. Potential unacceptable total non-cancer hazards were identified for adult (HI=1.5) and adolescent (HI=2.0) trespassers, future older child resident (HI=1.5), and young child residents (HI=2.8) from exposure to benzo(b)fluoranthene, benzo(a)pyrene, dieldrin, and inorganics in surface soils. A potential non-cancer hazard was also identified due to non-potable exposure to groundwater from both the Columbia and Yorktown aquifers for adult (HI=1.4 and 1.5, respectively), adolescent child (HI=2.2 and 2.3, respectively), and young child (HI=4.1 and 4.2, respectively). While potential unacceptable non-cancer hazards to current adolescent trespassers were identified from exposure to inorganics in sediment (HI=1.2), no individual inorganics contributed an HQ greater than 1.

A SERA identified potential adverse impacts to terrestrial receptors from exposure to SVOCs, 4,4'-DDD, and inorganics in soils. Based on combined data from Sites 4, 21, and 22, freshwater flora and fauna are at risk due to 1,3-dinitrobenzene, 2,4-DNT/2,6-DNT, 2,4,6-TNT, HMX, amino-DNTs, RDX, 1,3,5-TNB, aluminum and iron in surface water and from mercury in sediment. Tidal freshwater flora and fauna may be at potential risk from RDX, and aluminum, cadmium, iron, lead, and manganese in surface water and carbon disulfide and benzene, 4,4'-DDE, alpha- and gamma-chlordane, 2,4,6-TNT, and inorganics in sediment. Upper trophic level receptors are at potential risk due from exposure to di-n-

butylphthalate, aluminum, antimony, arsenic, barium, lead, manganese, selenium, thallium and vanadium in surface water and/or sediment.

Remedial Action(s)

A removal action in 1994 consisted of excavation and disposal of 6,070 tons of batteries and screened soils, 650 tons of debris, drums, and 90 tons of soils. With the exception of the contents of the drums that contained elevated lead, the waste and soils were disposed off-site as non-hazardous wastes. Following the removal action, the area was re-graded and re-vegetated (IT Corporation, 1995b).

A removal action was completed in 2002 consisting of the excavation and off-site disposal of approximately 145 cy of soils. Confirmation samples indicated that all potential human health and ecological risks in surface soil at Site 21 were mitigated (Shaw, 2003). An NFA ROD for soils was signed in September 2003.

Activities Completed 2007-2008

A Phase I RI work plan was completed for groundwater, surface water, and sediment; field activities were conducted during 2007-2008. The investigation included full suite and explosives analysis of groundwater, seeps, surface water, and sediment. Results of the investigation will be documented in an RI Report currently in progress.

CERCLA Path Forward

- RI for groundwater, surface water and sediment
- Interim RACR (IRACR) for soil/waste
- PP/ROD for groundwater, surface water and sediment, as appropriate

[Schedule 3-13](#) presents the FY09-10 schedule for Site 21.

3.2.14 Site 22—Burn Pad

Site Description

Site 22, the Burn Pad, consists of a nine acre area located south of Site 4 ([Figure 3-14](#)). The site is on a flat, elevated plateau with topography sloping steeply to the east, south, and southwest toward the Eastern Branch of Felgates Creek. An access road runs north to south along the west side of Site 4 and provides vehicle access to Site 22 from the north. The site consists of a grassy field surrounded by woods.

Site 22 contained a 150-ft diameter circular array of 11 steel burning pans which were used for burning waste plastic explosives and spent solvents. Open burning operations at the burn pads ceased in 1994. Site 22 was also used for the treatment of nitramine-contaminated soils and TNT-contaminated soils from Site 7. A 153-ft by 86-ft biocell was constructed and 770 cy of contaminated soils from Sites 7 and 19 were treated. biocell operations ceased in 1998 and treated (clean) soils were pumped into an impoundment area in a topographical low area directly southeast of the existing biocell to dewater treated soils. Erosion control measures were implemented in 1999 to prevent discharge to the wetlands west of the biocell. An earthen dam built to hold clean soil and water in the impoundment area was

also opened to prevent rainwater from overflowing into Felgates Creek. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Pilot Study Report for the Explosives-Contaminated Soil At The Naval Weapons Station Yorktown	Baker, 1997	01088
Round Two Remedial Investigation Report, Sites 4, 21, and 22	Baker, 2001	01296 01297
Feasibility Study, Sites 4, 21, and 22	Baker, 2001	01160
Proposed Remedial Action Plan, Sites 4 and 22	Baker, 2001	01290
Closeout Report Sites 21 and 22	Shaw, 2003	01779
Record of Decision, Site 22 – Burn Pad	Baker, 2003	01375

Nature and Extent of Potential Contamination

Historical burning operations are the source for potential contamination of site media. Investigations have consisted of analysis of groundwater, soil, surface water and sediment for VOCs, SVOCs, pesticides/PCBs, inorganics, and explosives (nitramines). In surface soils, PAHs (total PAHs < 3,000 µg/kg), explosives [HMX (140,000 µg/kg), RDX (3,500 µg/kg), 2,4,6-TNT (220 µg/kg), and amino-DNTs (270 µg/kg)], were detected with the highest concentrations generally found in samples from the northeast central portion of the site. The concentrations of inorganics detected in soils were below background. VOCs, explosives and inorganics were also detected in groundwater. The highest concentrations of VOCs (TCE at 1,200 µg/L, 1,1,1-TCA at 1,700 µg/L, and 1,1-DCE at 1,700 µg/L) and explosives (HMX at 49 µg/L and RDX at 110 µg/L) were detected in samples from the southern (downgradient) portion of the site. In sediment, relatively low concentrations estimated below reporting limits of VOCs, SVOCs, and pesticides were detected. The only explosive detected in sediment was 2,4,6-TNT in one sample at 930 N µg/kg. The concentrations of inorganics in sediment were within background levels.

Potential Risks

No unacceptable cancer risks were identified for the child resident from exposure to site media. Unacceptable non-cancer hazards (HI=9.1) were identified for a child resident from exposure to arsenic and iron in soils. Although no acceptable risks were identified from exposure to the Yorktown Eastover aquifer for non-potable use, risks were not calculated for residential potable groundwater use from either Columbia or Yorktown Eastover aquifers. No potential human health risks were identified for exposure to surface water or sediment under a residential scenario.

The SERA identified potential adverse effects to terrestrial receptors from SVOCs, 2,4,6-TNT, HMX, amino-DNTs, RDX, 1,3,5-TNB, and inorganics in soils. Potential adverse impacts to the future aquatic habitat from potential groundwater discharge (without dilution) were identified for 1,1-DCE, TCE, di-n-butylphthalate, aldrin, HMX, RDX, tetryl and inorganics. Risks to aquatic ecological receptors (both freshwater and tidal freshwater

habitats) were identified due to concentrations of VOCs, SVOCs, explosives, and inorganics in surface water and sediment.

Remedial Action(s)

In 2002, 3,540 cy of soil were removed based on the following remediation goals: HMX (5.7 mg/kg), cadmium (4 mg/kg), copper (100 mg/kg), lead (48.7 mg/kg), and cPAHs (1 mg/kg). Confirmation samples were collected that demonstrated concentrations in soils remaining in place were below remediation goals. Based on the removal actions conducted and confirmation sampling results, the Navy in partnership with the USEPA and VDEQ agreed all potential human health and ecological risks for soil at Site 22 were mitigated and an NFA ROD for soil was signed in September 2003. The ROD did not address groundwater, surface water or sediment.

Activities Completed 2007-2008

A Phase I RI groundwater, surface water, and sediment work plan was completed; field activities were conducted during 2007-2008. The investigation included full suite and explosives analysis of groundwater, surface water, and sediment. Results of the investigation will be documented in an RI Report currently in progress.

CERCLA Path Forward

- RI for groundwater surface water and sediment
- IRACR for soil/waste
- FS/PP/ROD for groundwater surface water and sediment, as appropriate
- RD/RA, as appropriate

[Schedule 3-14](#) presents the FY09-10 schedule for Site 22.

3.2.15 Site 23—Building 428 Teague Road Disposal Area

Site Description

Site 23 (formerly SSA 1), the Building 428 Teague Road Disposal Area, is located northeast of Building 428 along the eastern portion of the installation property boundary ([Figure 3-15](#)). The site encompasses 10.5 acres bisected by a former railroad track. The railroad track was constructed in 1919 and operated until 1989. The track has since been removed and only the ballast and a gravel road that parallels the former track remain. The site generally consists of open, maintained grass-covered areas where disposed materials were removed surrounded by mixed hardwood/pine forest. South of the former railroad tracks, surface runoff flows toward an intermittent unnamed tributary that was dry during the 1997-1998 remedial investigation. This drainage lies about 300 ft east-southeast of the site disposal areas and trends to the York River about 1,000 ft east of Site 23. Depth to groundwater (Cornwallis Cave aquifer) is between 8 and 15 ft bgs with flow toward the York River.

Disposal activities reportedly began at the site in 1940 and ceased in 1960 and included debris from a pier fire in the mid 1950s. Aerial photography suggests the area was also used for waste storage in 1945. From 1960 to the present, there is no evidence of additional waste storage/disposal or release, with the exception of a land survey in 1993 where discrete piles of surface and partially buried debris were identified (concrete rubble; scrap metal; wooden pilings and railroad ties; empty fuel cans; empty, open, and corroded drums; asbestos pipe

insulation; and shingles). A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Waste Characterization Sampling, SSAs 1, 2, and 5	Baker, 1993	00313
Engineering Evaluation Cost Analysis and Action Memorandum SSA 1, 2, and 5	Baker, 1994	00625
Soil and Debris Removal Action Site Screening Areas 1, 2, and 5	OHM, 1996	00648
Site Screening Process Report Site Screening Areas 1, 6, 7, and 15	Baker, 1996	00663
Final Ecological Cleanup Goals for Soil, Site 23, Teague Road Disposal Area	Baker, 2003	02269
Construction Closeout Report for Site 23	J.A. Jones, 2003	(Draft - No AR No.)
Excavation and Off-site Landfill Disposal, Site 23	UNITEC, 2006	(No AR No.)
Draft Final Round One Remedial Investigation Report for Sites 23, 24, 25, and 26	Baker, 2008	(Draft - No AR No.)

Nature and Extent of Potential Contamination

Waste materials disposed of at Site 23 were the source of potential contamination to soil, groundwater, sediment, and surface water. Initial investigations (mid 1990's) included full suite analysis of soils, groundwater, and sediment in the unnamed intermittent tributary. Surface water samples were not collected because the tributary was dry at the time of the investigation. To address debris and elevated PAHs in soils, removal actions were completed in 1994, 2003, and 2004. A draft 2002 RI is currently being updated to assess risk based on-site conditions following the removal actions and to incorporate additional 2006 soil data for updated risk evaluations.

Soil. VOCs (including TCE, PCE, toluene, and xylenes), PAHs, pesticides (4,4'-DDE, 4,4'-DDT, and dieldrin), explosives (TNT and TNB), and inorganics were detected in surface soils. PAHs were significantly elevated (> 100,000 µg/kg) near the former railroad tracks. TNT had the highest explosive concentration of 260 mg/kg in subsurface soils along the former railroad track, but in general the explosives were detected sporadically at low concentrations. Low concentrations of pesticides were detected in soils, however only dieldrin (87 µg/kg) exceeded a residential RBC; the average dieldrin concentration (32 µg/kg) was below the RBC (40 µg/kg). Arsenic and lead were the only inorganics to exceed the residential RBC and action level, respectively.

Groundwater. Explosives were detected in groundwater samples from one well (23GW05), co-located with maximum concentration of explosives in soil. This area is downgradient of the former explosive-contaminated ash pile which was removed in 1994. Groundwater concentrations of TNT, 4-amino-2,6-DNT, and 2-amino-4,6-DNT were 4.1 µg/L, 6.4 µg/L, and 6.1 µg/L, respectively. With the exception of the laboratory artifact detection of

chloroform (0.6 J $\mu\text{g}/\text{l}$), no other organic compounds were detected in groundwater. Arsenic was detected at a maximum concentration of 15 $\mu\text{g}/\text{L}$ and represented the only MCL exceedence in groundwater.

Sediment. Organic compounds detected in sediment include carbon disulfide (3 J to 37 $\mu\text{g}/\text{kg}$), pyrene (66 J to 93 J $\mu\text{g}/\text{kg}$), chrysene (61 J to 95 J $\mu\text{g}/\text{kg}$), benzo(b)fluoranthene (78 J to 120 J $\mu\text{g}/\text{kg}$), 4,4'-DDE (0.34 J to 25 $\mu\text{g}/\text{kg}$), and methoxychlor (8.4 J $\mu\text{g}/\text{kg}$). The most frequently detected inorganics included aluminum, barium, lead, manganese, and vanadium, with the highest concentrations for iron (54,100 mg/kg) and aluminum (21,200 mg/kg).

Potential Risks

Unacceptable human health risks were identified for the future adult and child resident from exposure to soil and groundwater. Child cancer risks (7×10^{-4}) were unacceptable from exposure to arsenic and benzo(a)pyrene in soil and arsenic in groundwater. While the total non-cancer hazard (HI= 1.79) for the child resident from exposure to inorganics in soil exceeded the threshold of 1, no individual inorganics contributed a hazard greater than 1 and non-cancer hazards based on central tendency exposures are acceptable. Although potable use of groundwater resulted in an unacceptable non-cancer hazard (2.77) from exposure to arsenic, chromium, iron, and vanadium in groundwater, concentrations are consistent with background and no central tendency risks were identified for these inorganics.

Based on a SERA, concentrations of arsenic, cyanide, mercury, and zinc in soil and sediment of the unnamed tributary to the York River exceed ecological screening values and could pose risk to terrestrial and lower trophic level aquatic receptors. No unacceptable food web risks were identified. Following all removal actions and mercury soil sampling and analysis in 2006, several locations remain with mercury concentrations in soil above the established clean-up goal of 0.24 mg/kg .

Remedial Action(s)

The first removal action at Site 23 was completed in 1994 and consisted of the removal of drums, 443 tons of creosote timbers, 763 tons of non-hazardous debris, 1,119 tons of non-friable asbestos debris, 680 pounds of pipe wrapped with friable asbestos, 31 tons of recyclable metal, and 5,815 tons of TNT-and TNB-contaminated ash/soil from an area north of the railroad tracks. Prior to completion of the RI, two removal actions were completed, one in 2003 and the other in 2004. In 2003, debris and soil (1,025 tons) were removed based on cleanup goals developed in partnership with the USEPA for ecological receptors for total PAHs (10 mg/kg), arsenic (14.8 mg/kg), mercury (0.24 mg/kg), and zinc (200 mg/kg). Human health clean up goals for the removal action were established for cPAHs (1 mg/kg), N-nitrosodi-n-propylamine (0.0613 mg/kg), and 2,4,6-TNT (14.3 mg/kg). A third removal action in 2004 was conducted to remove 2,800 tons of zinc-contaminated soil south of the railroad tracks. Although zinc exceeded the clean up goal of 200 mg/kg in samples from three of six grids laid out for excavation and confirmation samples, because soil was excavated to depths of four to six ft bgs and backfilled with clean material, it was determined that no current unacceptable ecological risks remained in this area (Consensus Statement 1-07-04-3). A review of the J.A. Jones CCR performed by Baker concluded that a

cleanup goal of 24 mg/kg had been used in place of the established cleanup goal of 0.24 mg/kg (Baker, 2005g). Additionally total PAHs were not analyzed as part of the confirmation sampling following the removal actions; therefore it is unknown whether PAHs above PRGs have been removed. Furthermore, the analytical results for cPAHs at one sample location were entered incorrectly into a sample summary table, indicating that there was no exceedance of the PRGs for cPAHs. However, this location did exceed the cleanup goal of 1 mg/kg. Additional confirmation sampling in 2006 identified elevated mercury (above 0.24 mg/kg) remaining in soil at several locations.

Activities Completed 2007-2008

A revised Draft Final Round I RI was completed in February 2008 for all media.

CERCLA Path Forward

- Annual Inspections
- Removal action of soils above PRGs
- RACR
- Finalize RI
- FS/PP/ROD for all media

[Schedule 3-15](#) presents the FY09-10 schedule for Site 23.

3.2.16 Site 24—Aviation Field

Site Description

Site 24, Aviation Field (formerly Site 14, SSA 6, and SWMU 27), is an open grassy area around the helicopter landing pad at WPNSTA Yorktown, just south of the York River ([Figure 3-16](#)). The site is bounded by Bellfield Road to the north, former railroad tracks to the east, Main Road to the south, and storage areas to the west. Although no groundwater wells are present at the site and a water level survey has not been completed, groundwater is expected to flow north toward the river. A divide runs north to south through the middle of the site causing surface water runoff to flow toward a drainage ditch in the east and toward a drainage ditch in the west. Due to the small elevation change across the site, surface runoff is minimal even after a storm event.

Historically, the site was utilized as an aviation field until 1927, after which it was used for storage of munitions on the surface and in underground caches. The site was also used for storage of miscellaneous debris including batteries and cables. Aerial photographs indicate that peak surface storage occurred in 1968. Areas of surface debris are no longer evident at the site. The area where the helicopter landing pad is currently located may also have been used briefly as an explosives burning area. Sludge from WPNSTA Sewage Treatment Plant #1 was reportedly dried in the eastern portion of the site. A Daramend™ greenhouse/biocell was constructed in 1999 to treat explosive-contaminated soil and sediment from Site 6, and was removed in August 2006 once treatment was complete. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Site Screening Process Report for Site Screening Areas 1, 6, 7 and 15	Baker, 1996	00663
Draft Final Round One Remedial Investigation for Sites 23, 24, 25, and 26	Baker, 2008	(Draft – No AR No.)
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	HILL, 2007	02158

Nature and Extent of Potential Contamination

Several areas of buried debris are present at Site 24 based on the results of a geophysical survey and test pitting conducted as part of the SSP (Baker, 1996). Based on the geophysical survey results, the debris is located in five discontinuous areas. The existing test pit data set is limited and does not provide enough spatial coverage to confirm the lateral extent of the waste, determine the thickness of soil cover, or evaluate the total depth of the waste.

Previous investigations identified PAHs, pesticides, PCBs, and inorganics at concentrations above the residential and/or industrial RBC values or ecological screening values in surface and subsurface soils. Elevated concentrations were generally detected in samples east of Diggs Road and surrounding the helicopter landing pad. Arochlor-1254 (4,200 µg/kg) was detected in surface soils east of Diggs Road, and in subsurface soils (79,000 µg/kg) south of the helicopter landing pad. Although organics and inorganics were detected in Hydropunch™ groundwater samples collected at the site, there were no organic exceedances of tap water RBCs or MCLs and dissolved inorganic concentrations were comparable to background. However, there were no groundwater wells placed downgradient or adjacent to the areas of soil contamination, so concentrations in these areas are unknown.

Potential Risks

The HHRA identified a cumulative risk to the future adult construction worker from ingestion of and dermal contact with cadmium and PCBs in subsurface soils. No other unacceptable human health risks were identified. However, future residential receptor contact with subsurface soils was not evaluated. Additionally, SSP surface soil samples collected in the area of elevated PCBs, PAHs, pesticides and inorganics east of Diggs Road were not included in the risk assessment. Potential risks associated with groundwater have not been evaluated.

Based on a SERA, terrestrial receptors may be adversely impacted by soil concentrations of aluminum, chromium, copper, iron, mercury, silver, and vanadium.

Remedial Action(s)

No CERCLA remedial actions have taken place at Site 24.

Activities Completed 2007-2008

A revised Draft Final Round I RI was completed in February 2008 for all media. A Uniform Federal Policy – Sample Analysis Plan (UFP-SAP) for Supplemental RI field activities is in progress.

CERCLA Path Forward

- Finalize RI
- Supplemental RI (2009)
- FS/PP/ROD as appropriate

Schedule 3-16 presents the FY09-10 schedule for Site 24.

3.2.17 Site 25—Building 373 Rocket Plant

Site Description

Site 25, the Rocket Plant (formerly SWMU 25 and AOC 7), is located at the end of Main Road, just east of Felgates Creek (**Figure 3-17**). Site 25 is relatively flat with a surface depression west of Building 373. The majority of the site consists of paved or grassy areas; however, a wooded area lies just west of the surface depression and separates the site from Felgates Creek. Groundwater flows westward toward Felgates Creek. Surface water generally flows toward Felgates Creek and the surface depression west of Building 373.

Building 373 is an explosives loading plant. Prior to the 1960's, wash/rinse water from cleanup of formulation/pouring equipment drained into a settling basin within the building for removal of suspended solids. The solids were incinerated and dumped at Site 4 (Burning Pad Residue Landfill). The wash/rinse water was then discharged through discharge pipe towards Felgates Creek. The discharge line to the creek was plugged in the early 1980s and a 220-gallon underground storage tank (UST) was installed to contain the wash/rinse water. The UST was a pre-cast concrete pipe installed vertically into the ground with a bottom section cast in the concrete pipe. Once the tank was filled, the water was filtered through a carbon unit and discharged to the sanitary sewer system. The use of the UST was curtailed in the early 1980s and an aboveground storage tank (AST) was installed at the north end of the building. Materials contained within the tanks included binders, stabilizers, and explosives.

AOC 7 included what is now the Site 25 Rocket Plant in addition to the Group 18 Magazine and the Main Road Disposal Area. However, these areas were not recommended for further investigation in the SSP Report (Baker, 1996). A summary of relevant documents and action milestones for Site 25 is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Site Screening Process Report for Site Screening Areas 1, 6, 7 and 15	Baker, 1996	00663
Final Report for Removal Action at Site Screening Areas 3 and 7	OHM, 1997	00893 00892 (Appendix D)

Document Title /Milestone	Author/Date	AR Document Number
Draft Final Round One Remedial Investigation for Sites 23, 24, 25, and 26	Baker, 2008	(Draft – No AR No.)
Phase I RI Report for GROUNDWATER at Sites 1, 3, 6, 7, 11, 17, 24, and 25	HILL, 2007	02158

Nature and Extent of Potential Contamination

Soils. One pesticide (endrin ketone) and one VOC (methylene chloride) were detected at low concentrations (less than 5 µg/kg) in surface soils. These were the only organic constituents detected in surface soils. Arsenic was the only inorganic detected in surface soils at a concentration greater than the residential RBC. However, the highest concentration of arsenic (13.8 mg/kg) was below the maximum background concentration. The only constituent in surface soil which exceeded both background and an ecological screening value was copper, detected at a concentration of 21.9 mg/kg in one sample adjacent to Building 373. In general, surface soil data indicate that this medium was not adversely impacted by site activities.

Methylene chloride, acetone, 1,1,1-TCA, TCE, toluene, xylenes, di-n-butylphthalate, bis(2-ethylhexyl)phthalate, methoxychlor, RDX, and HMX were detected in Site 25 subsurface soils. Concentrations were lower than corresponding residential soil RBCs and ecological screening values for these constituents. Only two inorganics exceeded both an ecological screening value or residential RBC and a background concentration: mercury and arsenic. Mercury was detected at a concentration of 0.1 mg/kg in exceedance of the BTAG screening value for soil of 0.058 mg/kg. Arsenic was detected at a concentration of 59.5 mg/kg in exceedance of the residential RBC value of 0.43 mg/kg. However, this concentration is only slightly above maximum background (42.7 mg/kg). In general, subsurface soil data indicate minimal impacts to this medium.

Groundwater. The only organic compounds detected in groundwater at concentrations greater than their respective tap water RBC values were chloroform (37 µg/L), bromodichloromethane (4 µg/L), and RDX (22 µg/L). Tap water RBC values for these constituents are 0.15 µg/L, 0.17 µg/L, and 0.61 µg/L, respectively. Concentrations of chloroform and bromodichloromethane do not exceed the MCLs for these chemicals (100 µg/L for both compounds). RDX was detected in one sample in the vicinity of Building 373. There were no MCL exceedances of dissolved inorganics in groundwater.

Surface Water. BEHP (a common laboratory contaminant) and 3-nitrotoluene were detected in Felgates Creek surface water adjacent to Site 25 at maximum concentrations of 8 µg/L and 0.27 µg/L, respectively. However, because BEHP and 3-nitrotoluene were not detected in site soils or groundwater, it is unlikely that they are related to the site. These were the only organic constituents detected in surface water. Several inorganics were also detected in surface water, however concentrations were also below background and/or ecological and human health screening values. In general, surface water data indicate minimal impacts from Site 25 to this medium.

Sediment. Several VOCs, SVOCs, pesticides, and one PCB (Arochlor-1260) were detected in sediment samples from Felgates Creek adjacent to Site 25. With the exception of carbon

disulfide, a naturally occurring chemical, there were no organic constituents detected in surface sediment which exceeded human health or ecological risk screening values. Carbon disulfide was detected at a concentration of 14 µg/kg in Felgates Creek surface sediment. Benzo(b)fluoranthene and 2,4-dinitrotoluene were detected in subsurface sediment at concentrations of 110 µg/kg and 130 µg/kg respectively, greater than ecological screening values. However, these constituents were detected in a duplicate sample and were not detected in the parent sample collected at the same location. There were no inorganics detected in sediment at concentrations greater than background and risk screening values.

Potential Risks

There were no unacceptable human health or ecological risks associated with exposure to site media based on the human health and ecological risk assessments included in the 2002 Draft Round One RI Report. However, groundwater risks associated with potable use and risks to future residential receptors from subsurface soil were not evaluated. The human health risk and ecological risk assessments are currently being updated using current guidance and considering the most conservative residential human exposure scenarios.

Remedial Action(s)

The UST, associated piping, and surrounding soils at Site 25 were removed in 1996 (OHM, 1997).

Activities Completed 2007-2008

A revised Draft Final Round I RI was completed in February 2008 for all media.

CERCLA Path Forward

- Annual Inspections
- Finalize RI
- FS/PP/ROD as appropriate

[Schedule 3-17](#) presents the FY09-10 schedule for Site 25.

3.2.18 Site 26—Building 1816 Mark 48 Waste Otto Fuel Tank

Site Description

Site 26 (formerly SSA 18) is located in the central portion of the WPNSTA, outside Building 1816 ([Figure 3-18](#)). Site 26 includes a 2,500-gallon concrete UST and network of ancillary drain pipes that were formerly used to store waste Otto fuel. This fuel consisted of a mixture of Otto fuel and water, which may have also contained oil, denatured ethyl alcohol, detergent, and trace amounts of cyanide, halogenated hydrocarbons, and heavy inorganics. In late 1987, waste Otto fuel was discovered leaking from the tank. The fuel was removed, the tank was cleaned, and a RCRA closure permit was filed. In March 1995, the 2,500-gallon waste Otto fuel UST and a nearby 8,000-gallon UST were removed. Site 26 has been retained as an Installation Restoration Program (IRP) site because of chlorinated VOCs detected in shallow groundwater. Depth to groundwater in this area is generally 30 ft to the shallow Cornwallis Cave aquifer. The Yorktown confining unit is approximately 25 ft thick at Site 26 and separates the Yorktown-Eastover aquifer from the Cornwallis Cave aquifer. The

topography at the site is generally flat at about 70 ft msl. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Action Memorandum, Site Screening Area 18	Environmental and Safety Designs, Inc, 1994	00612
Soil Assessment Report for Site Screening Area 18	Baker, 1994	00619
Site Screening Progress Report for Site Screening Areas 2, 17, 18 and 19	Baker, 1996	00666 (Volume I) 00667 (Volume II)
Draft Final Round One Remedial Investigation Report for Sites 23, 24, 25, and 26	Baker, 2008	(Draft – No AR No.)

Nature and Extent of Potential Contamination

The source of contamination to site media was the product contained in the USTs that were removed in 1995. Previous investigations included full suite analysis of soil and groundwater. Surface water and sediment are not associated with Site 26.

Soil. The only VOCs detected in soil were carbon disulfide and methylene chloride, which are common laboratory artifacts. Fluoranthene was detected in one surface soil sample at a concentration of 36 J µg/kg. Three pesticides [methoxychlor (3.4 µg/kg), alpha-chloradane (0.56 µg/kg), and gamma-chloradane (0.57 µg/kg)] were detected in one surface soil sample. No inorganics were detected above residential RBCs, with the exception of arsenic (53 mg/kg) and iron (129,000) with maximum concentrations in deep (37 ft bgs) subsurface samples.

Groundwater. *Shallow Groundwater (Cornwallis Cave Aquifer).* The chlorinated VOCs 1,1 DCE, 1,1 DCA, and 1,1,1 TCA were detected in the Cornwallis Cave aquifer at maximum concentrations of 100 µg/L, 10 µg/L, and 130 µg/L, respectively. No other organic compounds were detected in shallow groundwater. Total inorganics were elevated in shallow groundwater, including MCL (maximum concentrations) exceedences of: arsenic (206 µg/L), beryllium (11 µg/L), chromium (1,890 µg/L), and lead (90 µg/L). Concentrations of dissolved inorganics were significantly less than the total fraction, with maximum arsenic at 6.8 µg/L and chromium at 28.9 µg/L, both of which are below the MCLs. Lead and beryllium were not detected in the dissolved analysis.

Deep Groundwater (Yorktown-Eastover Aquifer). One VOC (chloroform) was detected in one groundwater sample at a concentration of 0.9 J µg/L; no chlorinated VOCs were detected. Pesticides were detected at trace levels estimated below laboratory limits. No other organic compounds were detected in deep groundwater. Inorganics were not elevated over background in the deeper aquifer, and there were no total or dissolved metal MCL exceedences.

Potential Risks

No unacceptable human health risks were identified for any receptors, including future child resident, from exposure to soil and shallow and deep groundwater for potable use.

Based on a comparison of surface soil and groundwater concentrations to established screening values and toxicological data, statistical comparisons to background concentrations, and on confirmation that there is no “dilution” of maximum concentrations requiring further investigation, risks to terrestrial receptors associated with the site and to potential down-gradient aquatic receptors are acceptable. The conclusion of the assessment is that the levels of chemicals in site media pose an acceptable potential for risk to ecological receptor populations.

Based on the absence of risk identified for both human health and ecological receptors from exposure to all media (soil and groundwater), NFA at Site 26 is warranted.

Remedial Action(s)

No CERCLA remedial actions have taken place at Site 26.

Activities Completed 2007-2008

A revised Draft Final Round I RI was completed in February 2008 for all media.

CERCLA Path Forward

- Annual Inspections
- Finalize RI
- PP/ROD as appropriate

[Schedule 3-18](#) presents the FY09-10 schedule for Site 26.

3.2.19 Site 28—Building 28 X-Ray Facility Tank Drain Field

Site Description

Site 28 (formerly SSA 10) is a 5.8 acre drain field adjacent to Building 28 and an unnamed tributary that drains into the southern branch of Felgates Creek in the south central portion of WPNSTA Yorktown ([Figure 3-19](#)). The ground surface consists of landscaped lawn and asphalt parking lot. The topography ranges from approximately 65 to 40-ft amsl and slopes northeast toward the shallow creek bed tributary with steep eroded sides. The site receives surface water run-off from the access road and surrounding wooded area, which drains into the tributary. Depth to groundwater (Cornwallis aquifer) is between 5 and 14 ft bgs with flow northeast towards an unnamed tributary.

Site 28 consists of a septic tank drain field that received sanitary wastewater from the X-Ray Facility at Building 28 beginning in the late 1960s until 1998, when wastewater was diverted to the sanitary sewer and ultimately to HRSD. Before silver recovery units were installed, the tanks may have stored hazardous wastes (Baker, 2005h). A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Relative Risk Ranking System, Data Collection Investigation	Baker, 1995	00675
Site Screening Process Report for Site Screening Areas 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24	Baker, 2001	01350 (Volume I) 01351 (Volume II) 01352 (Volume III)
Round One Remedial Investigation for Sites 27, 28, 29 and 30	Baker, 2005	02079

Nature and Extent of Potential Contamination

Silver is considered a site related release and was detected in surface soil (21.1 mg/kg), surface water (4.5 J mg/kg), and sediment (47.7 mg/kg). In surface soil, silver was consistently detected in the drainage leading from the site, increasing from 11.9 mg/kg proximal to the drain field to 21.1 mg/kg 1,500 ft downgradient. The concentrations of silver in sediment increased from 9.3 mg/kg immediately downgradient of the drain field to 47.7 mg/kg 800-ft downgradient. The concentrations then decreased to 6.5 mg/kg at the furthest downgradient sample (28SD08-01). Silver was detected consistently in surface water samples at concentrations ranging from 0.69 J to 4.5 J µg/L. Silver was not detected in subsurface soils or groundwater.

VOCs, SVOCs, and pesticides were detected in surface soils at concentrations below residential RBCs. Arsenic was detected in surface water above the tap water RBC, however, no SVOCs were detected in surface water. Pesticides (methoxychlor and gamma chlordane), inorganics (including arsenic, cadmium, chromium, cobalt, copper, iron, manganese, vanadium, and zinc), and acetone were detected in sediment. No VOCs or SVOCs were detected in groundwater. All dissolved inorganics detected in groundwater were at concentrations below tap water RBCs and only low, estimated levels of chromium (0.57 J µg/L) and iron (21.3 J µg/L) were detected above the tap water RBC. There were no groundwater MCL exceedences.

Potential Risks

A total HI for the child resident was calculated to be 4.05 from exposure to chromium and iron in groundwater; iron, arsenic, and vanadium in subsurface soils; and iron, vanadium and arsenic in surface soils. Although risks were identified for the ingestion of soils and groundwater by future child resident, all inorganics posing potential risk in surface soils, subsurface soils, and groundwater were below background. Therefore, it was determined that no additional evaluation or action was warranted for human health.

Silver was identified as a chemical posing potential ecological risk based on a SERA for both terrestrial and aquatic lower trophic level receptors. Additional evaluation of potential ecological risks from silver exposure was recommended. A Baseline Ecological Risk Assessment (BERA) was finalized in September 2008.

Remedial Action(s)

No CERCLA remedial actions have taken place at Site 28.

Activities Completed 2007-2008

Final BERA (through Step 7) was completed in September 2008.

CERCLA Path Forward

- Annual Inspections
- PRAP/ROD
- RD/RA as appropriate

Schedule 3-19 presents the FY09-10 schedule for Site 28.

3.2.20 Site 29—Lee Pond

Site Description

Site 29 (formerly SSA 20) is an approximately 4.1 acre pond located in the east central portion of WPNSTA (**Figure 3-20**). The pond receives storm water runoff from Building 10 by way of Site 9 located adjacent to the pond and approximately 900 ft from the industrial area containing Sites 18, 19, SSA 8 and SSA 22 which are addressed individually under CERCLA. Lee Pond empties into a channel, which in turn flows around Site 16/SSA 16 into Felgates Creek. Depth to groundwater (Cornwallis aquifer) varies with topography and is between 3 and 33 ft bgs. Groundwater generally flows radially toward the pond across most of the site. In the northwest portion of the site, an engineered dam prevents water from flowing into an unnamed tributary that drains into the Eastern Branch of Felgates Creek. In this area, the surface elevation of the pond is artificially higher than the surrounding groundwater, and there may be some groundwater seepage out of the pond. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Lee Pond Independent Fish Sampling	Black & Veatch, 1995	00668
Site Screening Process Report for Site Screening Areas 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24	Baker, 2001	01350 (Volume I) 01351 (Volume II) 01352 (Volume III)
Round One Remedial Investigation for Sites 27, 28, 29 and 30	Baker, 2005	02079
Final TM; Supplemental Ecological Risk Assessment, Site 29	CH2M HILL, 2008	02211

Nature and Extent of Potential Contamination

There is no history indicating a source of contamination in Lee Pond. Soil and groundwater data from monitoring wells installed adjacent to the pond both as part of the SSP for Lee Pond and as part of nearby CERCLA investigations at Sites 9 and 19 were included in the

RI. CERCLA sites within the drainage areas to Lee Pond (Sites 9, 18, 19, SSA 8 and SSA 22) are addressed individually.

Soil. Three surface soil samples were collected downgradient of Lee Pond on the northwest side of Lee Road. In surface soil, VOCs, SVOCs, pesticides and inorganics were detected. The only VOC detected was carbon disulfide (0.9 J mg/kg), below its respective residential RBC. One SVOC, benzo(a)pyrene, was detected in one sample at 170 J mg/kg, above the residential RBC, but did not exceed background. The pesticides 4,4'-DDT (0.31 J to 0.67 µg/kg), beta-BHC (13 J µg/kg), dieldrin (2.4 J to 3.3 J µg/kg), heptachlor (0.077 J to 0.15 J µg/kg), and heptachlor epoxide (1.1 J to 2.9 J µg/kg) were detected at concentrations below their respective residential RBCs. The inorganics arsenic (2.1 J to 11.8 mg/kg), iron (3,730 to 21,100 mg/kg), manganese (38.1 J to 269 mg/kg), thallium (4.4 to 6.4 mg/kg), and vanadium (6.2 J to 31 mg/kg) were detected; however, only arsenic exceeded the residential RBC.

Subsurface soil samples were collected from three of four SSP monitoring wells (A20GW01, A20GW03, and A20GW04) installed adjacent to the pond. A few VOCs, SVOCs, and pesticides were detected at low, estimated concentrations below laboratory reporting limits. The inorganic compounds aluminum (5,980 J to 9,130 mg/kg), arsenic (3 J to 3.7 J mg/kg), iron (11,300 J to 11,500 J mg/kg), and vanadium (16.9 J to 23.6 J mg/kg) were detected above their residential RBCs, but none exceeded background.

Groundwater. In groundwater, chloroform (1 J to 4 J µg/L), a common laboratory artifact, was the only VOC detected above the tap water RBC. The inorganics, aluminum (84.5 K µg/L to 28,000 µg/L), arsenic (3.1 L µg/L to 41.8 L µg/L), barium (57.7 µg/L to 529 µg/L), cadmium (4.4 µg/L), chromium (31.9 µg/L to 132 J µg/L), iron (20,600 µg/L to 160,000 µg/L), lead (4.1 J µg/L to 60.5 µg/L), manganese (116 µg/L to 1,290 µg/L), and vanadium (23.6 J µg/L to 258 µg/L) were detected above tap water RBCs. Of these, arsenic, chromium, and lead also exceeded MCLs and background. Arsenic, at 40 µg/L in monitoring well A20GW02 and thallium at 7.6B µg/L in monitoring well A20GW01 were the only compounds which exceeded their respective MCLs for Site 29 monitoring wells.

Chloroform (0.3 J to 2 µg/L), was the only VOC detected at a concentration exceeding the adjusted tap water RBC. Inorganics detected in surface water greater than the adjusted tap water RBC and background included: arsenic (5.9 J to 7.8 J µg/L), iron (425 to 7,000 µg/L), manganese (3.9 J to 725 µg/L), and vanadium (1 J to 8.5 J µg/L). The explosives 2-amino-4,6-DNT (40 µg/L), 4-amino-2,6-DNT (0.33 to 55 µg/L), and 3-nitrotoluene (0.22 to 1.6 µg/L) were detected.

Sediment. SVOCs, predominantly PAHs, were detected above the adjusted residential RBCs in sediment. Three explosives, 2,4,6-TNT (0.12 mg/kg to 0.42 mg/kg), amino-DNTs (0.12 mg/kg to 0.42 mg/kg), and HMX (1 mg/kg) were detected. The inorganics aluminum (16,900 mg/kg to 29,700 mg/kg), antimony (4.7 L mg/kg to 8.4 L mg/kg), arsenic (1.9 J mg/kg to 38.8 J mg/kg), chromium (5.5 mg/kg to 60.5 mg/kg), iron (3,410 mg/kg to 39,800 mg/kg), manganese (18 mg/kg to 533 mg/kg), and vanadium (8.9 J mg/kg to 103 mg/kg) exceeded their residential RBC, with manganese and vanadium exceeding background.

Potential Risks

Unacceptable total site cancer risks were identified for the adult (4.8×10^{-4}) and child (2.9×10^{-4}) resident due to ingestion of arsenic from potable groundwater use. The total site cancer risk is acceptable for the adult (8.4×10^{-5}) based on central tendency exposures, but remains unacceptable for the child resident (1.9×10^{-4}). A total HI for the child resident was calculated to be 27, due primarily to the ingestion of iron and arsenic in groundwater with lesser contributions from ingestion of thallium; iron, arsenic and vanadium in surface soil. However, the concentrations of arsenic, iron, and vanadium in the surface soils are all below background.

No potential risks were identified based on the SERA for terrestrial upper trophic level receptors and further evaluation is not warranted for this pathway/receptor. For exposures to Lee Pond sediments, potential ecological risks based on the SERA are considered acceptable and no further investigation of sediment in Lee Pond is warranted.

Based on data presented in the RI, total aluminum, iron, and zinc exceeding ecological screening values and National Ambient Water Quality Criteria may pose potential risk for aquatic lower trophic level receptors. However, because there was large uncertainty associated with these total inorganics data, additional sampling and supplemental screening ecological risk assessment was conducted in 2006/2007; results are presented in a TM. This supplemental assessment concluded that based upon the results of the dissolved surface water samples, no unacceptable risks are likely for aquatic receptors in Lee Pond. In addition, the 2006 data do not indicate that the inorganics evaluated are migrating to downgradient habitats at significant concentrations that would result in unacceptable impacts.

The TM documenting the need for NFA for all media at Lee Pond was completed in May 2008 based upon the results of the 2005 SERA (terrestrial receptors, upper trophic level aquatic receptors, bottom water, and sediment), the results of the 2007 supplemental investigation (surface water) (CH2M HILL, 2007c) and the results of existing soil and groundwater data from the RI. A follow-up PP is currently in progress.

Remedial Action(s)

No CERCLA remedial actions have taken place at Site 29.

Activities Completed 2007-2008

The TM documenting the consensus for NFA at Site 29 was completed in May 2008.

CERCLA Path Forward

- Annual Inspections
- NFA PP/ROD for all media

[Schedule 3-20](#) presents the FY09-10 schedule for Site 29.

3.2.21 Site 30—Bracken Road Incinerator and Environs

Site Description

Site 30 (formerly SSA 24 and AOC 22) is a former incinerator area approximately 0.1 acres in size and located north of Site 5 (Surplus Transformer Storage Area), and south of a former railroad tracks (Figure 3-21). The site is situated within a forested area, and the topography ranges from 40-ft amsl to 20-ft amsl north toward the former railroad tracks. The site receives surface water run-off from surrounding wooded areas and drains into a culvert that runs beneath the former railroad tracks and ultimately into the York River. Depth to groundwater (Cornwallis Cave aquifer) is between 9 and 22 ft bgs, with flow northwest towards to the York River. The incinerator was used to burn unknown waste for an unknown period of time. Historical information was found which indicates that Venezuelan crude oil may have been burned at the site in the mid-1970s. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
AOC 22, Site 12, and SSA 2, SSA 19 and King Creek Independent Sampling and Risk Screening Report	Black & Veatch, 1996	00669
Site Screening Process Report for Site Screening Areas 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24	Baker, 2001	01350 (Volume I) 01351 (Volume II) 01352 (Volume III)
Round One Remedial Investigation for Sites 27, 28, 29 and 30	Baker, 2005	02079
Engineering Evaluation Cost Analysis Site 30	Baker, 2007	02037

Nature and Extent of Potential Contamination

Ash residue from incinerator operations is the source of potential contamination of site media. The primary concern at Site 30 is vanadium in soil and its potential migration to groundwater and sediment.

Surface Soil. Eighteen inorganics were widely detected across the site in surface soil; nine exceeded the residential RBCs comprising: aluminum (1,640 to 9,720 mg/kg), antimony (0.47 J to 57.7 L mg/kg), arsenic (1.6 J to 59.4 mg/kg), chromium (3.3 to 38.2 mg/kg), iron (2,980 to 81,200 mg/kg), manganese (134 to 532 mg/kg), nickel (3.5 J to 7,490 mg/kg), thallium (13.1 J to 40,900 mg/kg), and vanadium (13.1 J to 40,900 mg/kg). Of these nine, antimony, arsenic, chromium, iron, manganese, nickel, and vanadium also exceeded background. The highest concentrations of these inorganics were generally located southeast of the incinerator.

Subsurface Soil. Seven inorganics were detected above residential RBCs: aluminum (2,040 J to 10,300 mg/kg), arsenic (1.5 J to 15.2 mg/kg), chromium (5.1 to 24.9 mg/kg), iron (5,180 to 51,900 mg/kg), manganese (33.9 to 391 mg/kg), thallium (0.83 J to 7.2 mg/kg), and

vanadium (8.6 J to 736 mg/kg). Of these, only iron, thallium and vanadium also exceeded background.

Groundwater. Trichloroethene (6 J $\mu\text{g/L}$) slightly exceeded the MCL of 5 $\mu\text{g/L}$ in one groundwater sample. Nine inorganics were detected in groundwater; of these, only iron (980 to 1,740 $\mu\text{g/L}$) and vanadium (4.2 J $\mu\text{g/L}$) exceeded their tap water RBCs, but neither exceeded background.

Sediment. Of the twenty-four inorganics detected in sediment, five exceed residential RBCs: aluminum (2,190 to 8,330 mg/kg), arsenic (2.6 to 32.5 mg/kg), chromium (6.9 to 29.9 mg/kg), iron (4,680 to 39,000 mg/kg), and manganese (12.2 to 254 mg/kg).

Potential Risks

There were no unacceptable cancer risks identified for all media at Site 30. A total non-cancer hazard was determined for adult residents (HI = 19) and child residents (HI = 112) due primarily to exposure to vanadium in surface soil (which contributed HQs of 18 and 106, respectively, to the total HI). The vanadium HQ exceeded 1.0 in all the current and future receptors evaluated (industrial/construction worker, trespasser, and resident), and vanadium concentrations in surface and subsurface soil exceed background. The only potential unacceptable risk from potable use of groundwater by a child resident was identified as a slight non-cancer hazard (due primarily to TCE). However, this potential risk warrants risk management consideration.

Based on a SERA, potential risks are identified in soil for lower trophic level terrestrial receptors from chromium, iron, lead, mercury, nickel, thallium, vanadium, and zinc. Additional evaluation was recommended in Step 3b of a BERA. No risk drivers were identified for terrestrial upper trophic level consumers. In addition, risks are acceptable and NFA is warranted for the downgradient wetland habitat.

Removal Action(s)

A Final EE/CA was completed in April 2007 (Baker, 2007) identifying remedial alternatives for the removal of surface soils at Site 30. An Action Memorandum was completed in November 2007 documenting the approval of contaminated soil removal at Site 30. A work plan was subsequently completed by Shaw in March 2008. The removal action began in April 2008 and is currently in progress.

Activities Completed 2007-2008

The Action Memorandum was completed in November 2007 and resulting work plan was completed in March 2008. The removal action is currently in progress.

CERCLA Path Forward

- Annual Inspections
- IRA
- CCR
- TM for Groundwater
- PP/ROD for all media

[Schedule 3-21](#) presents the FY09-10 schedule for Site 30.

3.2.22 Site Screening Area 14 – Building 537 Discharge to Felgates Creek

Site Description

SSA 14, The Building 537 Discharge to Felgates Creek, is approximately 0.4 acres in the north-central portion of WPNSTA Yorktown (Figure 3-22). A one-lane asphalt road circles around Buildings 458, 459, 460, 537, and 651, which are concrete bunkers set into a hillside. South of the road, the sparsely wooded terrain slopes steeply to a flat marsh wetland area north of the main channel of the Eastern Branch of Felgates Creek. SSA 14 consists of a pipe which originates at Building 537 and extends south to Felgates Creek. Nitramine contaminated wastewater was reportedly discharged through the pipe.

The surface geology at SSA 14 consists of approximately 10 ft of silt and clay consistent with the Yorktown confining unit. This clay unit overlies the Yorktown-Eastover aquifer which consists predominantly of sand, but includes an approximately 10 ft thick clay lense at 30-40 ft bgs at SSA 14. Depth to groundwater at the site is between 10 and 12 ft bgs. Groundwater and surface water flow south toward the Eastern Branch of Felgates Creek. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Relative Risk Ranking System, Data Collection Investigation	Baker, 1995	00675
Round Two Remedial Investigation Report for Sites 2, 8, 18, and Site Screening Area 14	Baker, 2004	01548 (Volume I) 01549 (Volume II)
Engineering Evaluation/Cost Analysis for Contaminated Soil and Sediment Site 8 and SSA 14	Baker, 2005	02076
Work Plan Interim Removal Action At Site 8 and SSA 14	Shaw, 2005	01890

Nature and Extent of Potential Contamination

The primary source of contamination was wastewater discharged from the Building 537 pipeline. Previous investigations included full suite analysis of soil, surface water, sediment, and groundwater.

Soil. Explosives (HMX and 2,6-DNT) were detected in the discharge drainage ditch surface soils with a maximum concentration of HMX of 1,700,000 µg/kg. 2,6-DNT was detected at concentrations below 1 µg/kg. Various PAHs were also detected in surface soils at concentrations up to 570 µg/kg (chrysene). BEHP was detected at a maximum concentration of 2,400 µg/kg in surface soil. No organics were detected in subsurface soils at SSA 14. Barium, chromium, iron, mercury, thallium, vanadium and zinc were detected in surface soils at concentrations exceeding maximum background values. Thallium was the only inorganic detected at a concentration above maximum background in subsurface soils (Baker, 2004b).

Surface Water and Sediment. Felgates Creek flows due west in the vicinity of SSA 14; approximately 250 ft downstream the creek abruptly turns northward and receives runoff from Site 8. Due to proximity of Site 8 and SSA 14 to each other and Felgates Creek, surface water, sediment, and aquatic ecological investigations have been combined. Explosives (2,4,6-TNT and 4-amino-2,6-DNT) were detected in Felgates Creek surface water in the vicinity of Site 8. Aluminum (1,990 µg/L), arsenic (2.7 µg/L), iron (2,990 µg/L), manganese (405 µg/L), and vanadium (7.2 µg/L) were detected in surface water above background concentrations. One explosive (RDX) was detected in sediment in the SSA 14 drainage way at a concentration of 627 µg/kg. No other explosives were detected in sediments. Several PAHs and vinyl chloride were detected in sediment. BEHP was detected at a maximum concentration of 6,200 µg/kg. Inorganics detected above maximum background concentrations in sediment comprised the following: aluminum at 29,300 mg/kg, arsenic at 13 mg/kg, beryllium at 1.6 mg/kg, chromium at 57.6 mg/kg, cobalt at 9.9 mg/kg, copper at 45.7 mg/kg, iron at 42,500 mg/kg, manganese at 450 mg/kg, mercury at 0.14 mg/kg, silver at 3.7 mg/kg, and vanadium at 56.1 mg/kg. Of the constituents detected above background concentrations, chromium, copper, and silver exceeded their respective low BTAG values (Baker, 2004b).

Groundwater Chlorinated VOCs were detected in groundwater at concentrations of up to 4,200 µg/L (TCE). The highest concentrations were localized to the area just downgradient of Building 537. Explosives (HMX, RDX, nitrobenzenes, and amino-DNTs) were also detected in site groundwater at concentrations below 10 µg/L. Inorganics were detected in groundwater, however, only thallium (6.9 K µg/L) was detected above the background and also exceeds the MCL. Groundwater is currently under further investigations (Baker, 2004). Preliminary MIP data indicates that the presence of VOCs in the vicinity of Building of 537 may not be related to the discharge pipe.

Potential Risks

Human health risks were evaluated for the current maintenance worker and the adolescent and adult recreational user and trespasser from exposure to surface soil, surface water, and sediment. Additionally risks were evaluated for the construction worker from exposure to subsurface soil. Potential risks for future on-site residents were evaluated from exposure to surface soil and shallow groundwater (beneficial use scenario - car washing and lawn watering). Potable groundwater use was not evaluated in the risk assessment. The only unacceptable risks identified in the HHRA were associated with exposure to surface soil. Potential unacceptable risks to the future adolescent recreational user or trespasser were identified from exposure to surface soils (HI = 1.06). This risk was primarily driven by HMX (HQ = 1.02). Potential unacceptable non-cancer hazards were identified for the future child resident (HI = 16.1) due to potential ingestion (7.1) and dermal exposure (9.0) to surface soils. The ingestion pathway risk drivers were HMX (HQ = 4.35) and iron (HQ = 1.1). HMX (HQ = 8.72) was the primary risk driver in the dermal absorption pathway. Potential unacceptable non-cancer hazards were identified for the future adult resident (HI = 5.9) from dermal exposure to HMX (HQ = 4.9) in surface soil.

A SERA was completed to evaluate potential risks to terrestrial and aquatic receptors from soil, sediment, and surface water at SSA 14. HMX, chromium, iron, mercury, vanadium, and zinc were identified as risk drivers for terrestrial lower trophic level receptors due to

concentrations in soil. BEHP and selenium were also identified as risk drivers for aquatic organisms due to concentrations in sediment. Concentrations of these constituents were greater than background.

Removal Action(s)

A removal action was completed in 2007 (Shaw) to address concentrations of HMX, chromium, iron, mercury, vanadium and zinc in SSA 14 soils and selenium and BEHP in site sediment. The total volume of soil and sediment removed was 1,139 cubic yards. The Navy in partnership with the USEPA and VDEQ agree confirmation sample data demonstrate that clean up goals and/or background concentrations were achieved.

Activities Completed 2007-2008

A draft SSA 14 Removal Action and Confirmation Sampling Summary TM recommending NFA for soil and sediment was submitted to the Navy in May 2008. Construction completion documentation of the removal action is in progress.

CERCLA Path Forward

- CCR (documenting 2007 removal action)
- TM (soil and sediment)
- RI for groundwater and surface water
- FS/PP/ROD (for all media)

[Schedule 3-22](#) presents the FY09-10 schedule for SSA 14.

3.2.23 Site Screening Area 15—Sewage Treatment Plant #1/Sludge Drying Beds and Discharge Area

Site Description

SSA 15 is situated on about 0.3 acres and comprises the sewage treatment plant (STP) #1/Sludge Drying Beds and Discharge Area. It is located in the southeast corner of the WPNSTA, east of Buildings 3 and 4 and south of Site 12 (Barracks Road Landfill) ([Figure 3-23](#)). An Imhoff tank, a trickling filter, a sludge drying bed, and a chlorination unit were located at SSA 15. Wastewater reportedly entered the Imhoff tank, which operated as a primary settling basin for the waste. The water then was passed through the trickling filter for biological treatment and pumped back to the Imhoff tank for secondary settling. The water was chlorinated in the chlorination unit and discharged to a tributary of Ballard Creek. Sludge from the Imhoff tank was periodically removed and placed in the sludge drying bed. STP #1 received and managed only sanitary waste from physical plants and the Officers' Club located nearby, but may have treated nitramine-containing and other industrial wastewater. WPNSTA personnel have reported that during the operation of STP #1, a mercury-containing bearing on the trickling filter cracked, allowing mercury to be released. Also, WPNSTA personnel indicated that sludge from SSA 15 was transported to SSA 6 and land farmed.

SSA 15 represents AOCs 5, 6, and 7, which are the drying beds for former STPs 2, 3, and 4, respectively. The Navy, in partnership with USEPA and VDEQ, agreed that the SSP

determination for SSA 15 would be applicable to AOCs 5, 6, and 7. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Site Screening Process Report for Site Screening Areas 1, 6, 7, and 15	Baker, 1996	00663 (Volume I) 00664 (Volume II) 00665 (Volume III)

Nature and Extent of Potential Contamination

Surface soil, subsurface, soil, groundwater, surface water, and sediment samples were collected and analyzed for VOCs, SVOCs, pesticides, PCBs, nitramine compounds, and inorganics. Mercury was not detected in soil, groundwater, or surface water, but was detected in sediment (0.44 mg/kg). SVOCs and pesticides were detected in soil below screening levels. Inorganics detected in soil were consistent with background. No SVOCs or PCBs were detected in groundwater, and generally only low VOC and pesticide concentrations were estimated below reporting limits. Dissolved inorganics were generally detected at concentrations consistent with background. Vinyl chloride (2 µg/L) and TCE (500 µg/L) were detected in surface water. Inorganics were detected in surface water generally consistent with background. Only low VOC and SVOC concentrations were estimated below reporting limits in sediment. Pesticides detected in sediment included DDT (86 µg/kg), DDD (40 µg/kg), and DDE (31 µg/kg).

Potential Risks

There were no unacceptable risks identified for the potable use of groundwater. Although there was an unacceptable HI of 2 from exposure to arsenic and manganese in soil, concentrations were similar to background. An Ecological Index (EI) value of 99 was determined for sediments, attributable to pesticides. The source of TCE elevated in surface water is attributable to potential sources in the industrial area upgradient of SSA 15 (now AOC 23).

Because SSA 15 does not appear to be the source of contamination to surface water and sediment, no further investigation was recommended in the SSP (Baker, 1996). (CERCLA status determinations for AOCs 5, 6, and 7, as identified in the *Area of Concern Decision Signature Page with Attachments* (Baker, 1997a), are pending the CERCLA status decision for SSA 15.)

Removal Action(s)

In 2001, the Imhoff tank, trickling filter, sludge drying bed, and chlorination unit were removed.

Activities Completed 2007-2008

No actions have been completed at SSA 15.

CERCLA Path Forward

- Desktop audit

[Schedule 3-23](#) presents the FY09-10 schedule for SSA 15.

3.2.24 Site Screening Area 22 – Sand Blasting Grit Area

Site Description

SSA 22 (formerly AOC 4) consists of approximately 0.5 acres in the eastern portion of WPNSTA Yorktown. SSA 22 is bounded to the east and north by Bollman Road to the south by the former location of Building 530, and to the west by unused land ([Figure 3-24](#)). A sand blast grit area was adjacent to Building 530, which operated from 1945 until the early to mid 1980s. Bomb fins and wings, inert bomb casings, and various other inert ordnance items were grit blasted in a blasting booth inside Building 530, and outside at the northern end of the building. Grit blasting material may have been composed of coal slag or steel grit. The blasting booth within the building used a dust collector; accumulated dust may have been deposited in the vicinity of the northern side of Building 530.

The general topography at SSA 22 is flat. The area is mostly a cleared grassy area, bounded by woods to the west, south, and north and Bollman Road to the east. There are no surface water bodies associated with this SSA. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Navy Final Recommendation for Areas of Concern (SSA 22 is identified as AOC#4)	P.A. Rakowski, P.E., 1995	00355
Remedial Action Report for Sites 1 and 3 and SSA 22	OHM, 2001	01091
Site Screening Process Report for Site Screening Areas 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24	Baker, 2001	01350 (Volume I) 01351 (Volume II) 01352 (Volume III)

Nature and Extent of Potential Contamination

Potential contamination at SSA 22 is related to sand blasting activities within and near former Building 530 and the grit pile that was possibly located in the north corner of Building 530. The contaminants of concern at SSA 22 are VOCs in groundwater (note: only one monitoring well has been installed at SSA 22). Surface water and sediment are not associated with SSA 22. No SVOCs, pesticides, or PCBs were detected in the groundwater. Dissolved inorganics were significantly lower than total inorganics and were detected at concentrations below tap water RBC values. The VOCs 1,1-DCE (2 J $\mu\text{g}/\text{L}$), total 1,2-DCE (6 J $\mu\text{g}/\text{L}$), TCE (220 $\mu\text{g}/\text{L}$), and total xylenes (2 J $\mu\text{g}/\text{L}$) were detected in groundwater. Of the VOCs, only TCE exceeded its respective MCL and tap water RBC (Baker, 2001). These detections are located downgradient of a UST; however historical records indicate that only #2 fuel oil (which does not contain any VOCs) was stored in the UST. Therefore, it is most

likely that the potential VOC contamination be associated with the use of solvents and degreasers as part of Building 530 activities.

Potential Risks

A cumulative non-cancer hazard (HI=19) for the future resident from ingestion of unfiltered groundwater was due to exposure to aluminum, arsenic, chromium, iron, manganese, and vanadium. HQs of these inorganics were below 1 except for aluminum (HQ = 1.2), arsenic (HQ = 7.7), and iron (HQ = 8.0). Additionally an unacceptable cumulative cancer risk of 2.1×10^{-3} was calculated from exposure to TCE (ILCR = 1.4×10^{-4}) and total arsenic (ILCR = 1.9×10^{-3}).

A cumulative non-cancer hazard (HI=1.5) for the future resident from ingestion of filtered groundwater was due to exposure to dissolved aluminum, arsenic, iron, and manganese. There were no individual HQs greater than 1 and these inorganics affect different target organs; therefore their effects are not cumulative. An unacceptable cancer risk of 3.4×10^{-4} was calculated from exposure to TCE (ILCR = 1.4×10^{-4}) and dissolved arsenic (ILCR = 1.2×10^{-4}).

Potential terrestrial ecological risks were not evaluated.

Remedial Action(s)

In 1998, a remedial action consisted of the removal of lead contaminated soil and sandblasting grit from 6 inches to 2 ft below grade. Following the removal action, post excavation soil samples demonstrated lead concentrations in soil remaining at the site were below 200 mg/kg (OHM, 2001a).

An NFA Decision Summary for soil was signed May 2004 (Baker, 2004a).

Activities Completed 2007-2008

No activities were completed at SSA 22

CERCLA Path Forward

CERCLA documentation for soil is complete with the SSP and Decision Signature Page. The SSP concluded further evaluation of groundwater was warranted. Further evaluation of groundwater has not been scheduled at this time.

[Schedule 3-24](#) presents the FY09-10 schedule for SSA 22.

3.2.25 SSA 25—Wetlands Downgradient of Beaver Pond

Site Description

SSA 25 is located in the extreme eastern portion of the facility property ([Figure 3-25](#)). The area is approximately 5.6 acres, and is located between two impounded portions of Ballard Creek: a natural beaver dam (Impoundment No. 1) which forms the eastern edge of Beaver Pond and a second impoundment approximately 750 ft downgradient (Impoundment No. 2), whose history of construction is unclear. Ballard Creek is hydraulically connected for its entire length. Water flows from the erosive, upgradient areas down to Beaver Pond, then over a low area along the northern edge of the beaver dam into the downgradient wetlands,

and then through a break in the southern edge of the second impoundment towards the York River. The second impoundment restricts tidal influences from the York River, though the break allows some interaction, the magnitude of which has varied over time. The centerline of Ballard Creek, which meanders throughout the area, marks the property boundary between WPNSTA and the National Parks Service's (NPS) Colonial National Historic Park. Based on its location on Ballard Creek between two impoundments, the wetlands represent a low energy, bottomland depositional habitat. The topography is characterized by a broad, flat area between steep upland slopes with elevations on the order of 30 to 50 ft amsl.

During its operational period, the STP No. 2 trickling filter discharged via a regulated outfall directly to the wetland area. The unit was installed in 1952 and reportedly managed sanitary waste. The trickling filter used elemental mercury (approximately 4 to 6 ounces) as a water seal in the pivot point. Though this seal was maintained, it is likely that mercury leaked into the trickling filter tank and was subsequently discharged to SSA 25 via the STP outfall. It is assumed that treatment operations ceased in the early 1970s, as mercury-sealed trickling filters were banned from use in the state of Virginia in 1971. STP No. 2, prior to being dismantled and removed in 2000, was an inactive treatment plant consisting of a clarifier, settling tanks, and sludge drying beds. The STP No. 2 clarifier and settling tanks were filled with rainwater and substantial vegetation was growing in drying beds during early assessment activities associated with the WPNSTA IRP (early 1990s). Beaded elemental mercury was discovered around the base of the trickling filter during the demolition process. Twelve drums of mercury-contaminated soils were disposed of and confirmation samples indicated no residual mercury contamination following the removal of the STP buildings and infrastructure. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Draft Steps 6 & 7 of the Aquatic Baseline Ecological Risk Assessment, Site Screening Area 25 – Wetlands Downgradient of Beaver Pond	Baker, 2007	(Draft – No AR No.)

Nature and Extent of Potential Contamination

Sediment analytical data collected from Ballard Creek and historical records indicate that the primary source of mercury contamination to the wetlands is STP No. 2, formerly located northwest and immediately up-slope of the wetlands area. Sediment samples located near the former STP discharge pipe detected mercury at 5.9 mg/kg, which led to additional surface and subsurface sediment sampling throughout SSA 25 where mercury concentrations were found to range from 0.031 J to 15.3 mg/kg to 0.037 J to 19.5 mg/kg, respectively. Based on this information and potential for unacceptable impacts to aquatic ecological receptors from mercury exposures in SSA 25, the Navy in partnership with USEPA and VDEQ agreed to identify mercury as the sole contaminant of concern (COC) and move directly to a BERA (May 2004 Partnering meeting). A BERA was implemented that included surface water, sediment and tissue samples were collected and analyzed for

mercury, methylmercury, pH, total organic carbon, sulfate, sulfide, ammonia, dissolved organic carbon, and grain size, as appropriate.

Potential Risks

The risk evaluation concluded that mercury concentrations in sediment at SSA 25 may impair growth of aquatic invertebrates, and that additional evaluation (BERA Step 8) in the form of remedy development and evaluation is recommended. To aid in the evaluation of potential remedies, a PRG of 4.2 mg/kg (total mercury) was developed for surface and subsurface sediment. This value is the site-specific No Observed Adverse Effects Level (NOAEL) established from the 42-day *Hyalella azteca* survival, growth, and reproduction tests but should also be protective of other ecological receptors based upon the results of the BERA.

Human health risks have not been assessed.

Remedial Action(s)

No CERCLA remedial actions have taken place at SSA 25.

Activities Completed 2007-2008

The SSA 25 Draft BERA was submitted for review in May 2007.

CERCLA Path Forward

- EE/CA and Action Memorandum
- IRA
- Decision Document

[Schedule 3-25](#) presents the FY09-10 schedule for SSA 25.

3.2.26 AOC 23 — Barracks Road Landfill Industrial Area

Site Description

AOC 23 consists of an industrial area northwest of Site 12 and SSA 15 ([Figure 3-26](#)). The topography of AOC 23 slopes to the northwest toward an unnamed creek. The area is predominantly paved asphalt or covered in gravel. Wooded areas are present on both the northwest and southeast sides of the study area. The industrial area consists of four large buildings (Buildings 3 through 6) and several smaller buildings. Building 3 houses a paint booth, blast booth, satellite accumulation area for aerosol paint cans, and part washer and is currently used for wing and fin repair. The building was also historically used as a missile component rework facility and a boiler plant. Building 4 is currently used as a storage warehouse. The building was historically used for container repair and testing. Building 5 is currently used for administrative and training purposes and was historically used for mine and depth charge rework. Building 6 is currently used to support public works and utilities maintenance and was historically used for missile component rework and equipment maintenance. Railroad tracks lie to the northwest of the buildings. A UST used to contain waste oil was previously located by the northern corner of Building 5, but was removed in December 1993 (Baker, 1997e). Two other USTs and one AST were also located on-site and were used for storage of heating oil.

AOC 23 was formerly known as the area upgradient of Site 12 and associated with that site until September 2006. At that time a consensus statement was signed indicating the VOC concentrations detected in groundwater was unrelated to Site 12 based on historical site use and spatial distribution. The presence of VOCs was attributed to the industrial area operations upgradient of Site 12. This area is being investigated independently of Site 12. A summary of relevant documents and action milestones is presented in the table below.

Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Study Area Analysis	USEPA, 1992	00289
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Operable Unit Evaluation Report	Baker, 1993	01060
Round Two RI Report Site 12	Baker, 1996	00640
AOC 22, Site 12, and SSA 2, SSA 19 and King Creek Independent Sampling and Risk Screening Report	Black & Veatch, 1996	00669
Feasibility Study Report Site 12	Baker, 1996	00647
Proposed Remedial Action Plan Site 12	Baker, 1996	00654
Record of Decision, Operable Unit Nos. III, IV, and V, Site 12	Baker, 1997	00871
Construction Closeout Report for Site 12 – Area A	OHM, 1998	01154
Long-Term Monitoring Report, Site 12	Baker, 2000	01219
Site 12 Long-Term Monitoring Report - 1998-2000	Baker, 2005	02078
Partnering Team Consensus Statement 9-1-06-45	----	N/A
Work Plan, Site Assessment, Area Upgradient of Site 12	CH2M HILL, 2007	02150

Nature and Extent of Potential Contamination

In groundwater, low concentrations of VOCs (TCE at 55 µg/L) and nitramine compounds (RDX at 4.4 µg/L) were detected in the 1996 Round II RI for Site 12. Their presence in groundwater was attributed to past operations at AOC 23. In a seep sample, TCE was detected at a maximum concentration of 3,300 µg/L (near the drainage to Ballard Creek between the upgradient industrial area and Site 12) suggesting surface runoff from the Site 12 disposal area is not the likely source of VOCs in surface water.

Potential Risks

The potable use of groundwater poses unacceptable human health risks from TCE exposure. Because AOC 23 is the source of VOCs in groundwater, the Navy initiated investigation of groundwater, surface water, and sediment associated with this area.

Remedial Action(s)

No remedial actions have been conducted for AOC 23.

Activities Completed 2007-2008

A Phase I SI groundwater, surface water, and sediment work plan was completed and field activities were conducted during 2007-2008. The investigation included VOC analysis of groundwater, surface water, and sediment. Results of the investigation will be documented in a TM currently in progress.

CERCLA Path Forward

- TM for groundwater, surface water, and sediment
- RI/FS/PP/ROD for groundwater, surface water, and sediment, as appropriate
- RD/RA, as appropriate

[Schedule 3-26](#) presents the FY09-10 schedule for AOC 23.

3.3 MRP Sites

The MRP sites identified at Yorktown comprises the MWR Skeet Range and the Turkey Road Landfill (formerly IRP Site 2). The MWR Skeet Range was identified in a final PA (Malcolm Pirnie, 2005) that also identified three areas as potential MRP sites: the Demolition Range, the Detonator Blasting Pit Area, and the Detonator Pit.

3.3.1 MWR Skeet Range

The MWR Skeet Range is approximately 30 acres used exclusively for recreational purposes from 1980 to 1982 (weekends only); after 1982, the range was used sporadically until it was dismantled in 1994 ([Figure 3-27](#)). Activities were limited to skeet shooting with shotguns from a launching pad, with a 900-ft arc safety danger zone. The site currently is not maintained and not in use. There are no munitions and explosives of concern on the site, as only small-caliber ammunition was used. Munitions constituents on the site include lead, antimony, copper, zinc, arsenic, and PAHs from bullets, fragments, bullet jackets, and related sporting material such as clay targets.

Documents and Milestones

Document Title/ Milestone	Author/Date	AR Document Number
Preliminary Assessment, Naval Weapons Station Yorktown	Malcolm Pirnie, 2006	01942
Expanded Site Inspection Report for the Closed MWR Skeet Range and the Closed Marine Pistol and Rifle Range	HILL, March 2008	02180

Nature and Extent of Potential Contamination

The source of potential contamination is the spent ammunition (specifically lead shot) and clay targets used at the range. A metal detector survey and sieve analysis for lead shot was

also conducted during the 2007 Expanded Site Inspection (ESI). Additionally, surface and subsurface soil samples were collected during the ESI and analyzed for lead and PAHs. Exceedances of residential RBCs and background levels existed for both PAHs and lead in surface soils. PAHs exceeding risk screening criteria comprised benzo(a)anthracene (920 µg/kg), benzo(a)pyrene (1,400 µg/kg), benzo(a)fluoranthene (620 µg/kg), and indeno(1,2,3-cd)pyrene (330 µg/kg) at sample YR01-SS78. Benzo(a)pyrene exceeded risk screening criteria at one additional location (YR01-SS75). Lead exceeded the ecological screening value at two locations: YR01-SS50 (218 mg/kg) and YR01-SS59 (210 mg/kg). There were no exceedances of the risk screening criteria for subsurface soils.

Potential Risks

Although current and future anticipated land use is industrial, based on the conservative risk screening process potential human health risks from exposure to soils were considered acceptable for the following reasons: The cumulative carcinogenic risk (6.5×10^{-5}) from soil exposure only slightly exceeded the conservative threshold of 5×10^{-5} for UU/UE, individually, only benzo(a)pyrene carcinogenic risk (5.8×10^{-5}) slightly exceeded the conservative screening threshold, because potential risk based on RME only slightly exceeded the threshold, a CTE would not be expected to result in unacceptable risk, and the sporadic distribution of detected concentrations did not indicate a release.

Only two of 24 surface soil sample locations (SS50 and SS59) contained concentrations of lead (218 and 210 mg/kg, respectively) above both background and the ecological screening value. The magnitude of the screening value exceedances, however, was low, with the highest detected concentration of 218 mg/kg exceeding the screening value (120 mg/kg) by a HQ of only 1.8. In addition, the screening value (120 mg/kg) was based upon potential effects to terrestrial plants. The site is completely vegetated with no obvious signs of stress to the vegetation. Soil screening values based upon other terrestrial receptors are higher than the maximum measured concentration on the site. Also, the site wide mean surface soil concentration for lead (29.8 mg/kg) was considerably less than the ecological screening value of 120 mg/kg (HQ of 0.25). This, in combination with the low magnitude and frequency of screening value exceedances, and the lack of lead shot in sieve samples, indicates that potential ecological risks on a site-wide basis are acceptable.

Removal Action(s)

- No CERCLA remedial actions have taken place at the MWR Skeet Range.

Activities Completed 2007-2008

The ESI, including sampling (2007) and reporting (2008) was finalized for the MWR Skeet Range.

Path Forward

CERCLA documentation is complete. No action is necessary and the site is closed under the MRP.

3.3.2 Site 2—Turkey Road Landfill

Site Description

Site 2 is a five-acre landfill located east of Turkey Road adjacent to a wetland area of the Southern Branch of Felgates Creek and two unnamed tributaries that border Site 2 (Figure 3-28). Operations at the landfill reportedly began in the 1940s and ceased in 1981. Wastes disposed in this landfill reportedly included mercury and carbon-zinc batteries, tree stumps and limbs, construction rubble, missile hardware (e.g., wings, fins and power packs), electrical devices, and unidentified drums and/or tanks. An estimated 240 tons of waste were disposed during the period of use. Waste material (e.g. mine casings) was primarily located along the tributaries to the Southern Branch of Felgates Creek. A summary of relevant documents and milestones is presented in the table below.

The Turkey Road Landfill was transferred to the MRP on June 19, 2007.

Documents and Milestones

Document Title/ Milestone	Author/Date	AR Document Number
Round One Remedial Investigation Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	00313
Action Memorandum and EE/CA	Baker, 1994	00615
Closeout Report, Sites 2 and 9 and Site Screening Area 4, Mine Casing and Debris Removal Action	IT Corporation, 1995	00646
Round Two Remedial Investigation Report for Sites 2, 8, 18, and Site Screening Area 14, Naval Weapons Station Yorktown, Yorktown, Virginia	Baker, 2004	01548
Work Plan for the Pre-Removal Characterization of Soil, Site 2, Site 8, and SSA 14,	Baker, 2005	01687

Nature and Extent of Potential Contamination

The source of potential contamination is the waste disposed of in the landfill. Surface and near-surface debris, including large concrete masses, asphalt, scrap metal, empty drums, miscellaneous construction/demolition debris, scrap ordnance, and batteries, were removed from the site in 1994. Landfill waste remains in place. Following a removal action in 1994, investigations at Site 2 included sampling of soil, groundwater, surface water and sediment for analysis of VOCs, SVOCs, pesticides/PCBs, inorganics and explosives. The 2004 RI identified inorganics, PAHs, PCBs, and nitramine compounds in surface soils. Additional soil sampling in 2005 unearthed an ordnance item that resulted in suspension of sampling activities pending ordnance characterization by explosives safety personnel. Following resolution of explosive ordnance characterization and limitations on field activities to ensure explosive safety measures are maintained, additional characterization of site media is anticipated.

Potential Risks

The HHRA identified potentially unacceptable RME risks for future residents associated with exposure to cadmium in surface soil; however, there is no unacceptable risk based on CTE to cadmium. The SERA identified silver as a potential risk to aquatic ecological receptors. Additional evaluation of silver was recommended in Step 3b of an aquatic BERA. Though current levels of exposure do not indicate the potential for unacceptable risk to aquatic receptors from PAHs, the PCB Aroclor-1254, cadmium, and mercury, the potential for continued source release and future exposures elevated above those measured in the current dataset warrants additional investigation.

Remedial Action(s)

In 1994, 676 tons of non-ordnance waste and soils were removed from Site 2. Approximately 4,327 ordnance items also were removed from Sites 2, 9, & SSA 4 (closeout report did not distinguish between sites but reported the majority of ordnance came from Site 2). Wastes removed at Site 2 included large concrete masses, asphalt, scrap metal, empty drums, miscellaneous construction/demolition debris, batteries, and ordnance. All ordnance items were certified inert either by the unexploded ordnance (UXO) superintendent, were transferred to the NEDED laboratory on site and verified as inert, or were transferred off site by the Station Explosive Ordnance Disposal (EOD) staff for final disposition. Post-removal soil samples from the floor of excavations and outside the designated limits of excavation were collected and analyzed for VOCs, SVOCs, pesticides/PCBs, inorganics, and explosives. Excavated areas were backfilled, including a six-inch layer of topsoil, seeded, and mulched.

Activities Completed 2007-2008

The Navy transferred Site 2 to the MRP program on June 19, 2007.

Path Forward

- Annual Inspections
- MRP Prioritization

[Schedule 3-27](#) presents the FY09-10 schedule for Site 2.



Legend

-  Columbia Monitoring Wells
-  Yorktown-Eastover Monitoring Wells
-  Study Area Boundary
-  Area of Excavation of Arsenic Contaminated Soil
-  Interpreted (Geophysical Survey) Northern Extent of Main Disposal Area (Roy F. Weston, Inc., 1993)

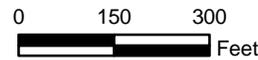
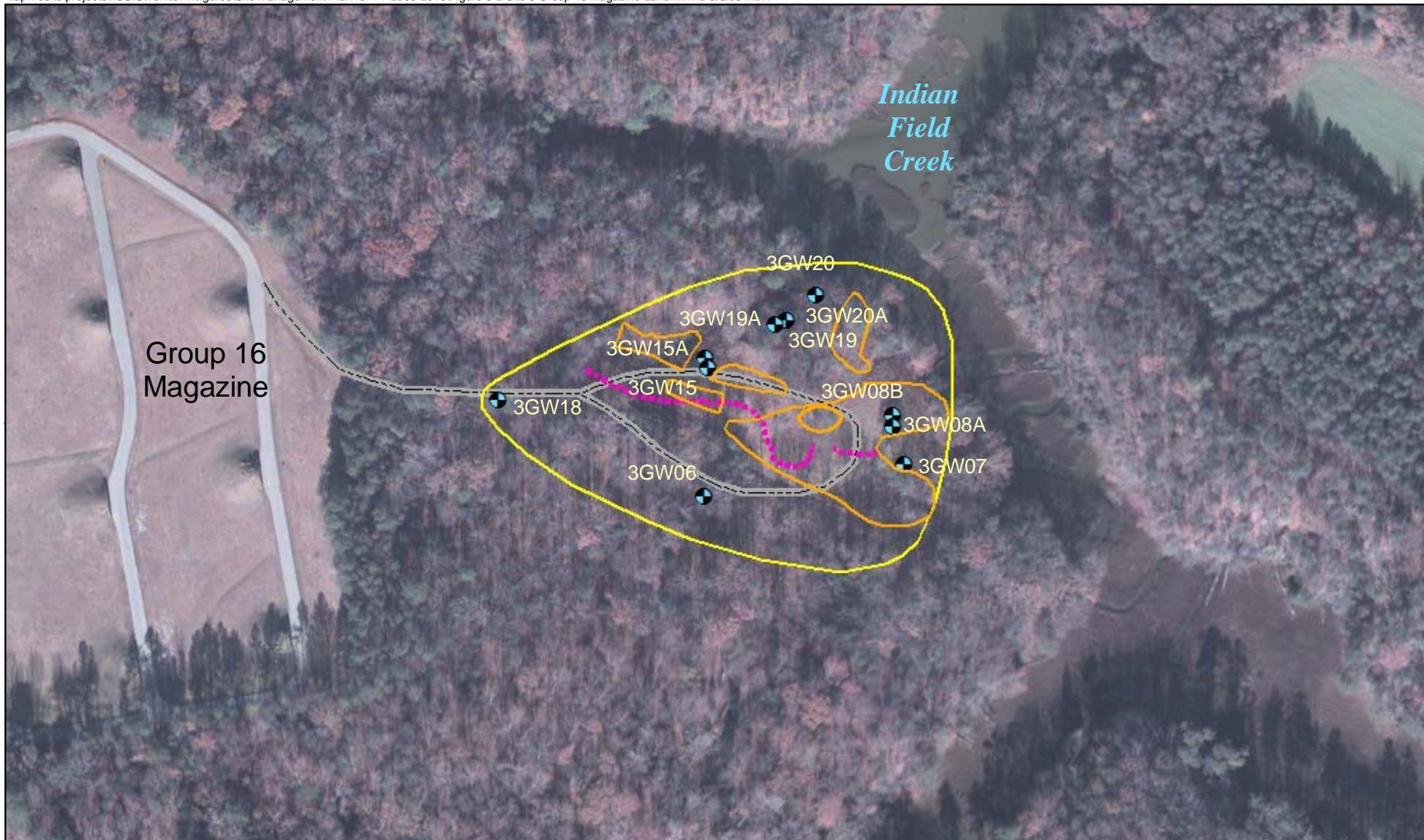


Figure 3-1
Site 1 - Dudley Road Landfill
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



Legend

-  Yorktown-Eastover Monitoring Wells
-  Study Area Boundary
-  1999 Removal Area (Soil and Waste)/ Area of Excavation of PAH Contaminated Soil
-  Landfill Access Road
-  Interpreted (Geophysical Survey) Southern Extent of Waste Boundary (Roy F. Weston, Inc., 1993)

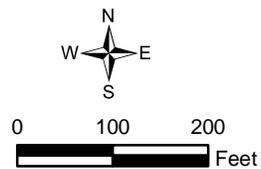
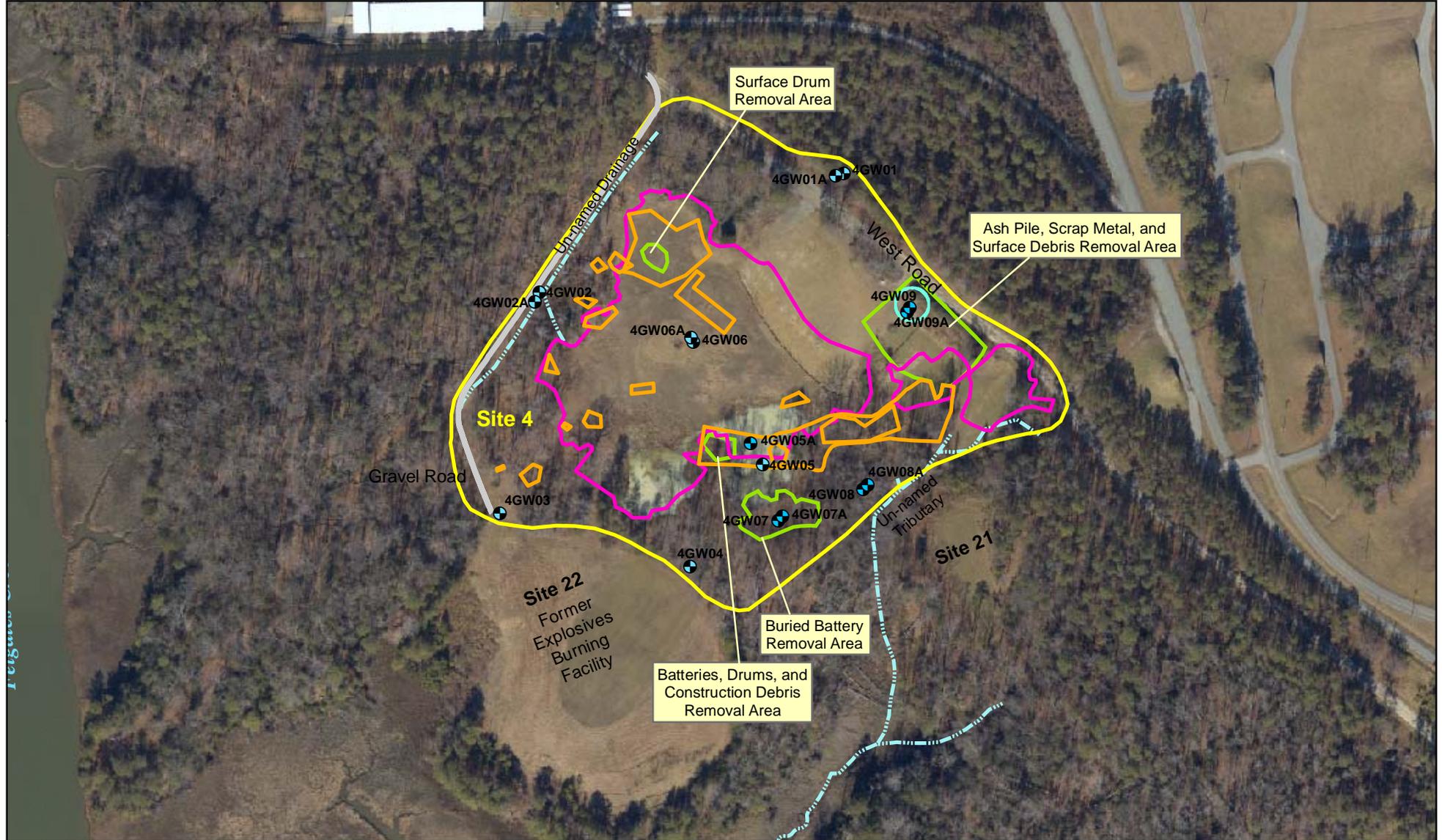


Figure 3-2
 Site 3 - Former Group 16 Magazine Landfill
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia



Legend

- Study Area Boundary
- 1994 NTCRA surface Battery/Soil and Surface Debris Removal Area
- Location of Former Ash Pile
- 1994 NTCRA Removal Areas
- Drainage
- Gravel Access Road
- Monitoring Well
- 2005 NTCRA Removal Areas

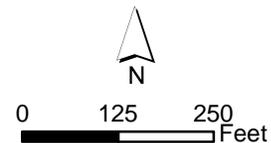
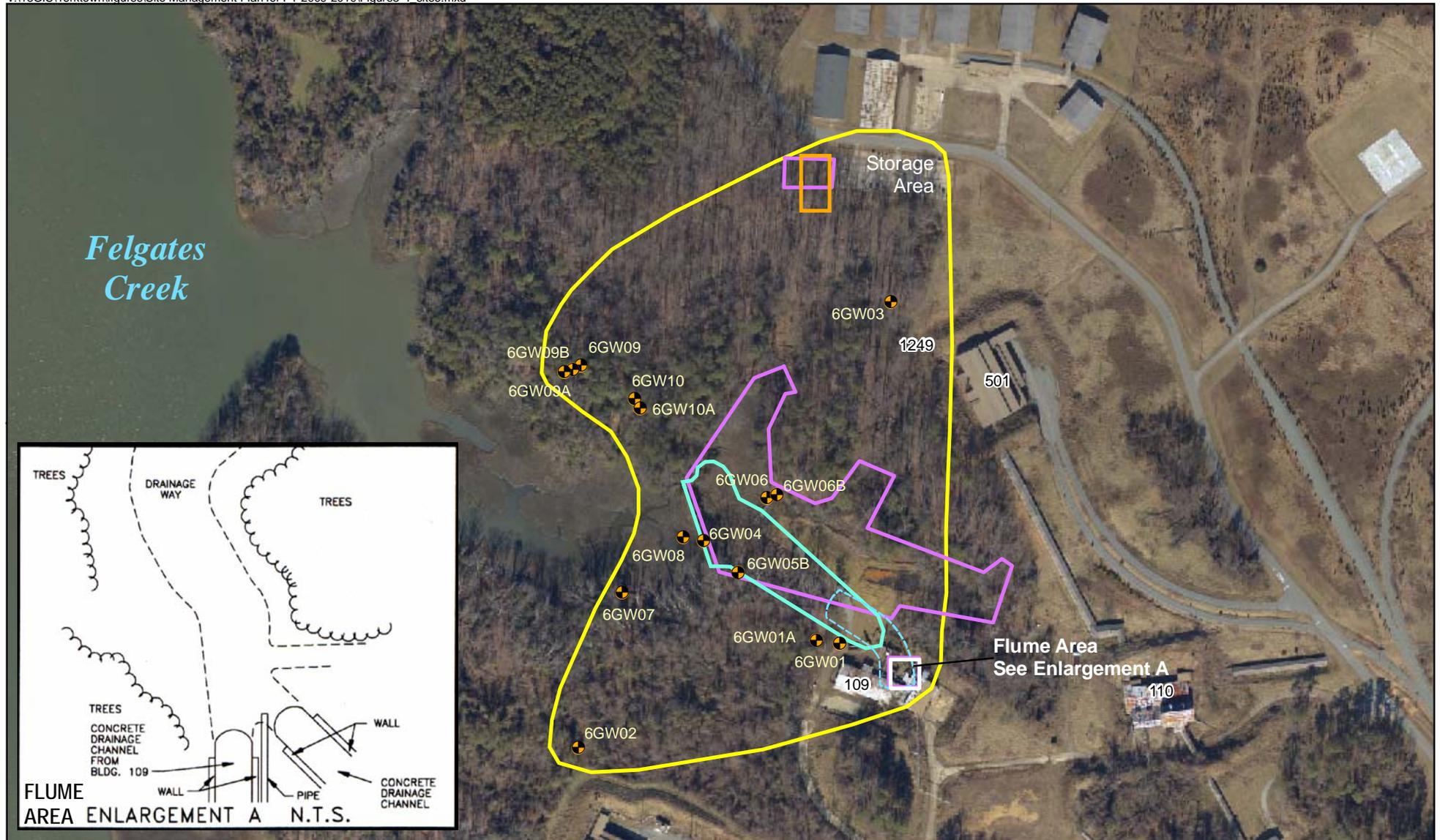


Figure 3-3
 Site 4 - Burning Pad Residue Landfill
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia



Legend

- Yorktown-Eastover Monitoring Wells
- Study Area Boundary
- Surface Impoundment Area
- Drainage
- Excavated Area
- LUC Boundary

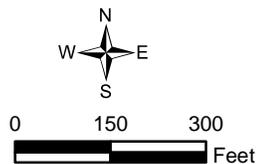


Figure 3-4
 Site 6 - Explosives Contaminated Wastewater Impoundment
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia



Legend

-  Yorktown-Eastover Monitoring Wells
-  Study Area Boundary
-  Drainage
-  Area of Excavation of Nitroamine / Nitroaromatic Compounds of Contaminated Soil

-  Approximate Excavation Area
-  LUC Boundary



Figure 3-5
 Site 7 - Plant 3 Explosives Contaminated Wastewater Discharge Area
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia



LEGEND

-  Study Area Boundary
-  Excavated Area
-  Drainage Way
-  Monitoring Well
-  Unable to locate well since Spring 2003, possibly graded over

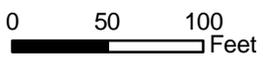


Figure 3-6
Site 8 NEDED Explosives-Contaminated Wastewater Discharge Area
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

- Study Area Boundary
- Approximate Area of Removal Action
- Cornwallis-Cave Aquifer Monitoring Wells
- Yorktown-Eastover Aquifer Monitoring Wells

*All study area boundaries are solely for the purpose of showing general site locations. They are not intended to connote the extent of contamination, boundaries of investigation, or delineation of media associated with a particular site.

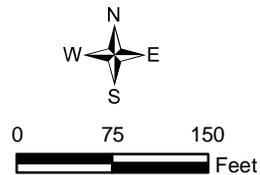


Figure 3-7
 Site 9-Plant 1 Explosives Contaminated
 Wastewater Discharge Area
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia



Legend

-  Columbia Monitoring Wells
-  Yorktown-Eastover Monitoring Wells
-  Study Area Boundary
-  Area of Excavation to Remove Copper and Mercury Contaminated Soil
-  Burn Pit Area
-  Unnamed Tributary to Indian Field Creek

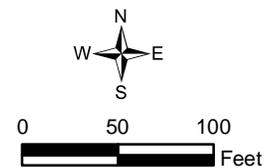
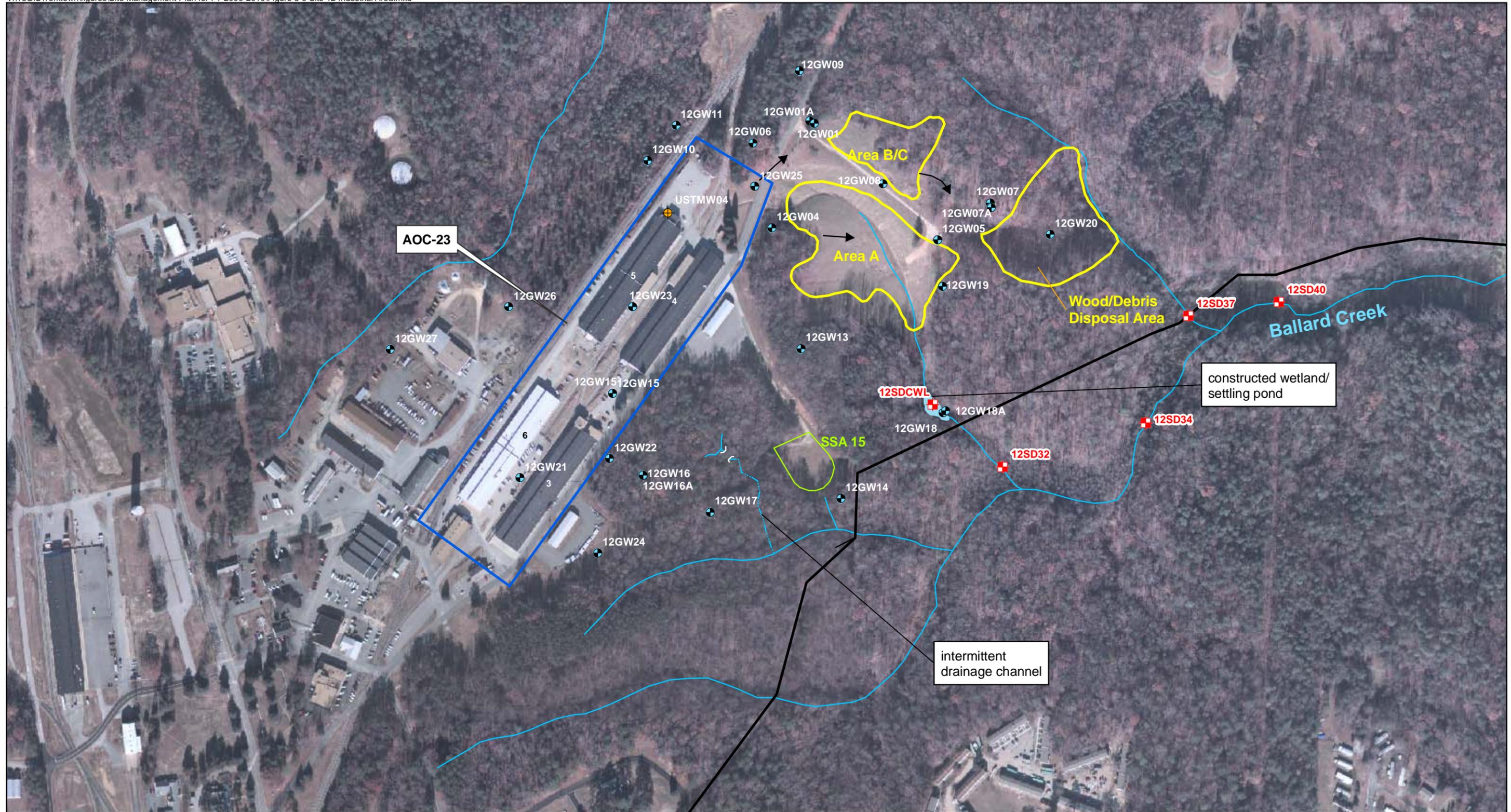


Figure 3-8
Site 11 - Abandoned Explosives Burning Pits
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



- Legend**
- Sediment Sample Location
 - ⊕ Underground Storage Tank Monitoring Well
 - IRP Monitoring Wells
 - ▭ Industrial Area
 - ▬ Yorktown Boundary
 - ▭ Study Area Boundary
 - ▭ SSA 15 Boundary

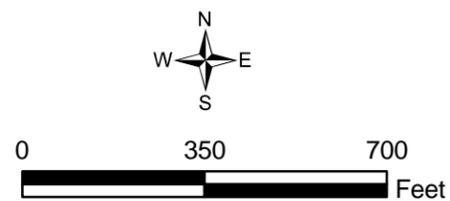
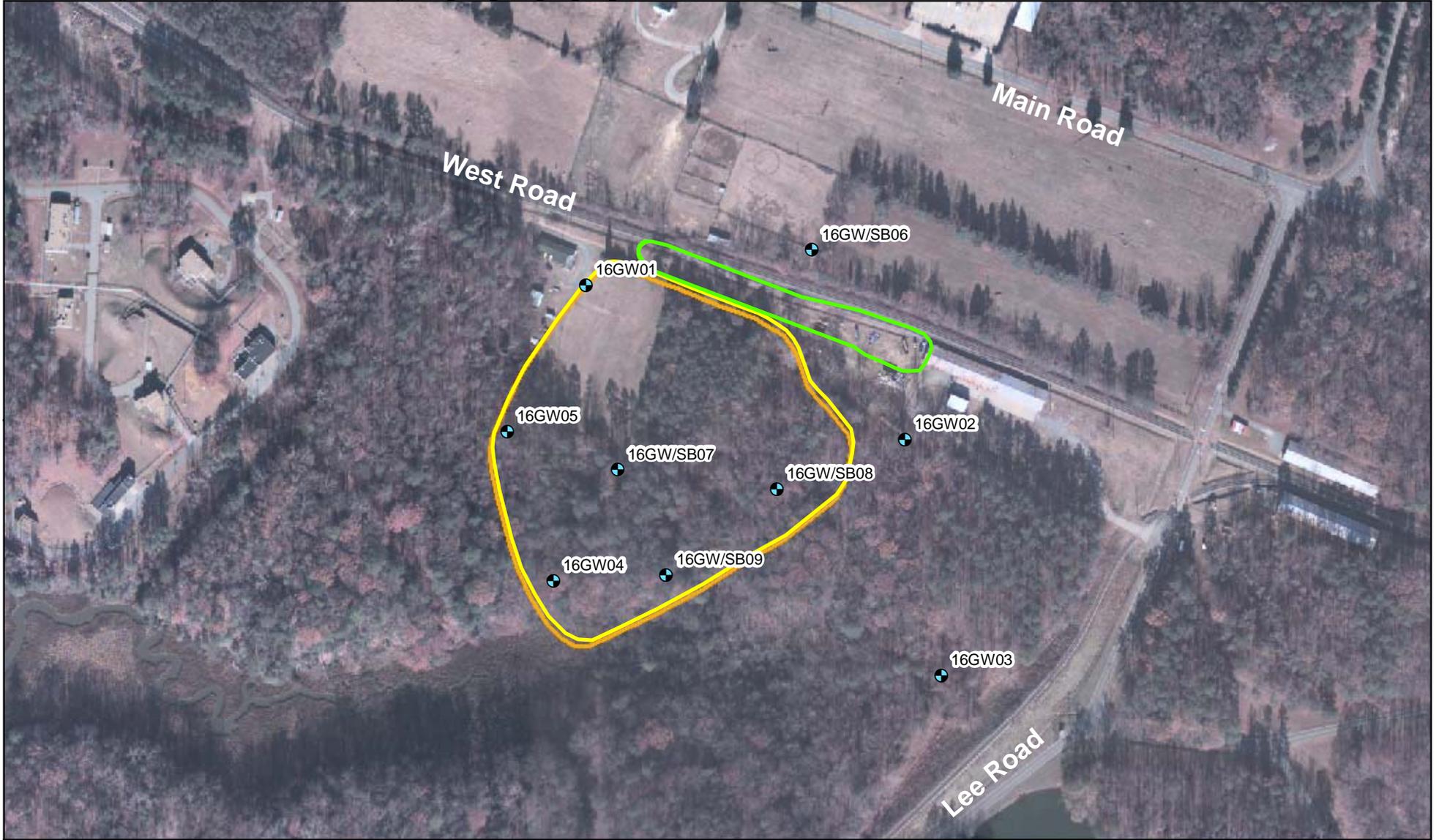


Figure 3-9
 Site 12 - Barracks Road Landfill
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station, Yorktown
 Yorktown, Virginia



Legend

-  Monitoring Well
-  SSA 16 Study Area Boundary
-  Site 16 Study Area Boundary
-  1994 Removal Action Excavation

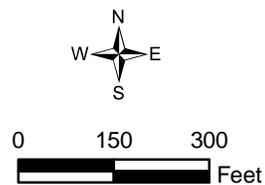
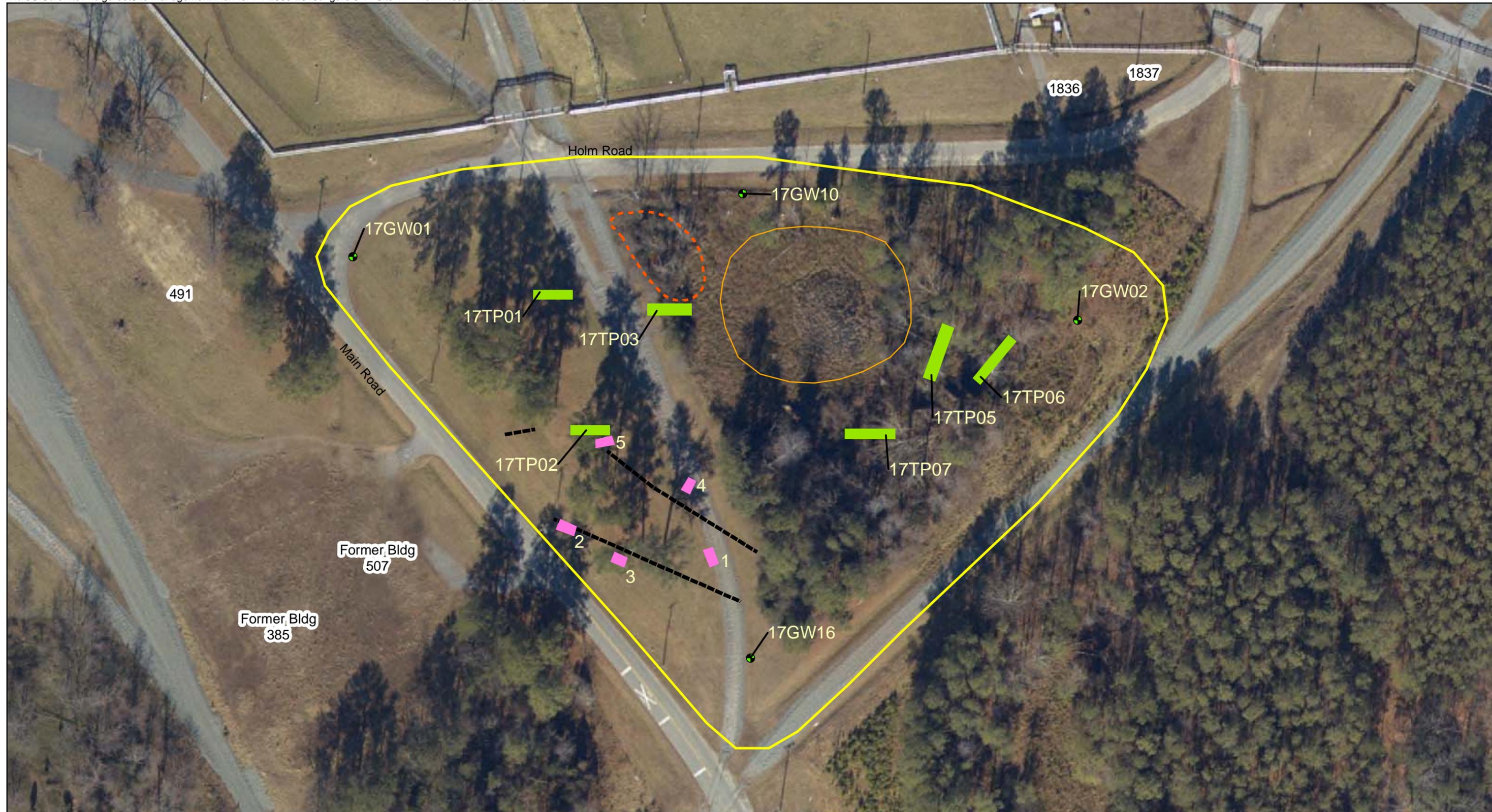


Figure 3-10
Site 16/SSA 16 - West Road Landfill
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



Legend

- Round 2 RI Monitoring Wells
- Columbia Monitoring Wells
- Yorktown Monitoring Wells
- Test Pit Locations (2007)
- Study Area Boundary
- Depression Surface Water
- 2001 Removal Action
- Interpreted Waste Boundary from 1992 geophysical survey (area of anomalies - potential metallic waste)



Figure 3-11
 Site 17 - Holm Road Landfill
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia
CH2MHILL



LEGEND

 Study Area Boundary

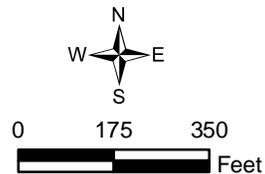
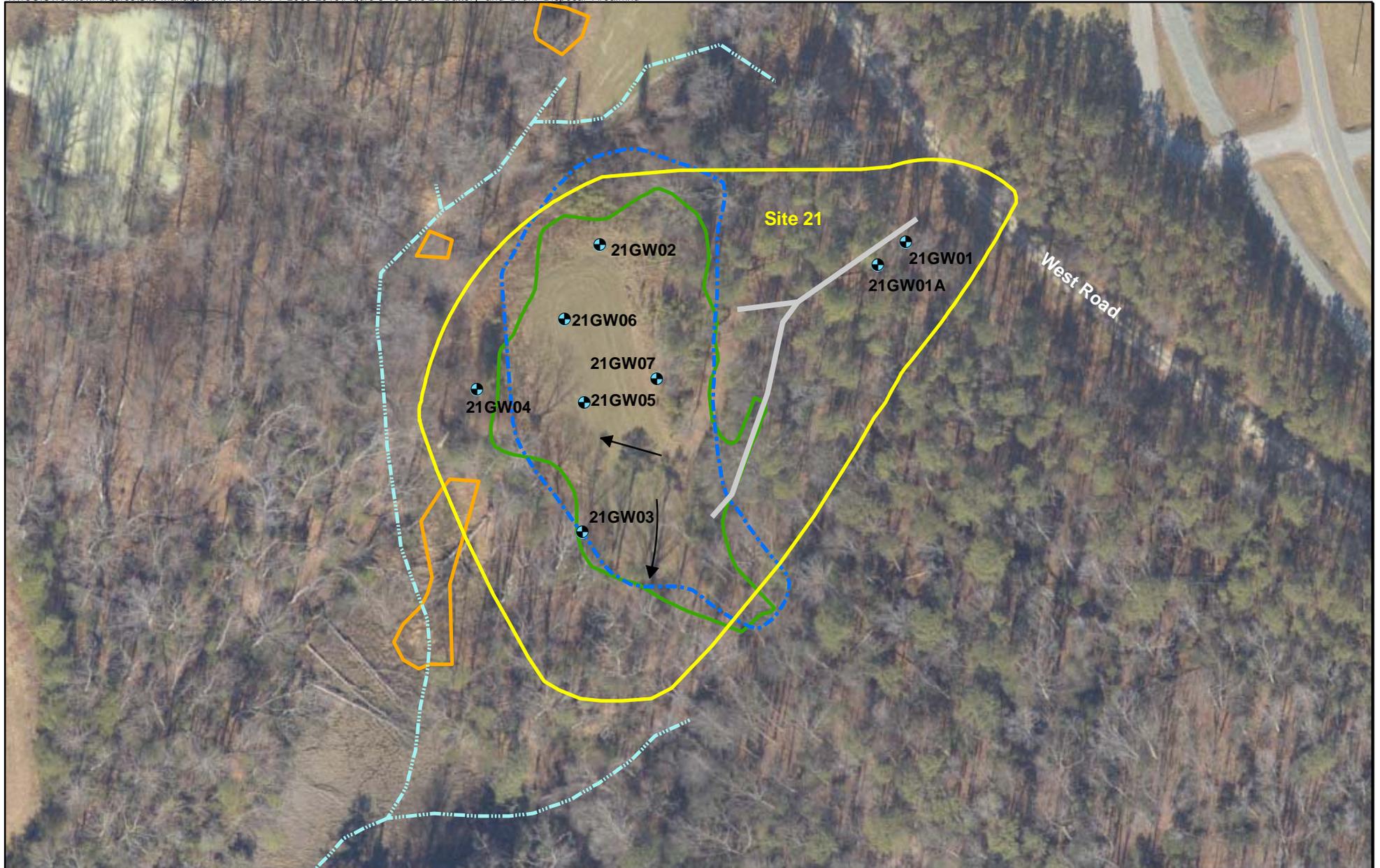


Figure 3-12
Site 19 - Conveyor Belt Soils at Building 10
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



Legend

- Study Area Boundary
- Approximate Waste Boundary (1992)
- 1994 NTCRA Battery/Soil and Surface Debris Removal Area
- 2002 NTCRA Removal Area
- Drainage
- Gravel Access Road
- Existing Monitoring Well (location surveyed)
- Estimated Groundwater Flow Direction

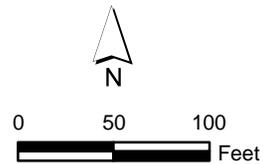
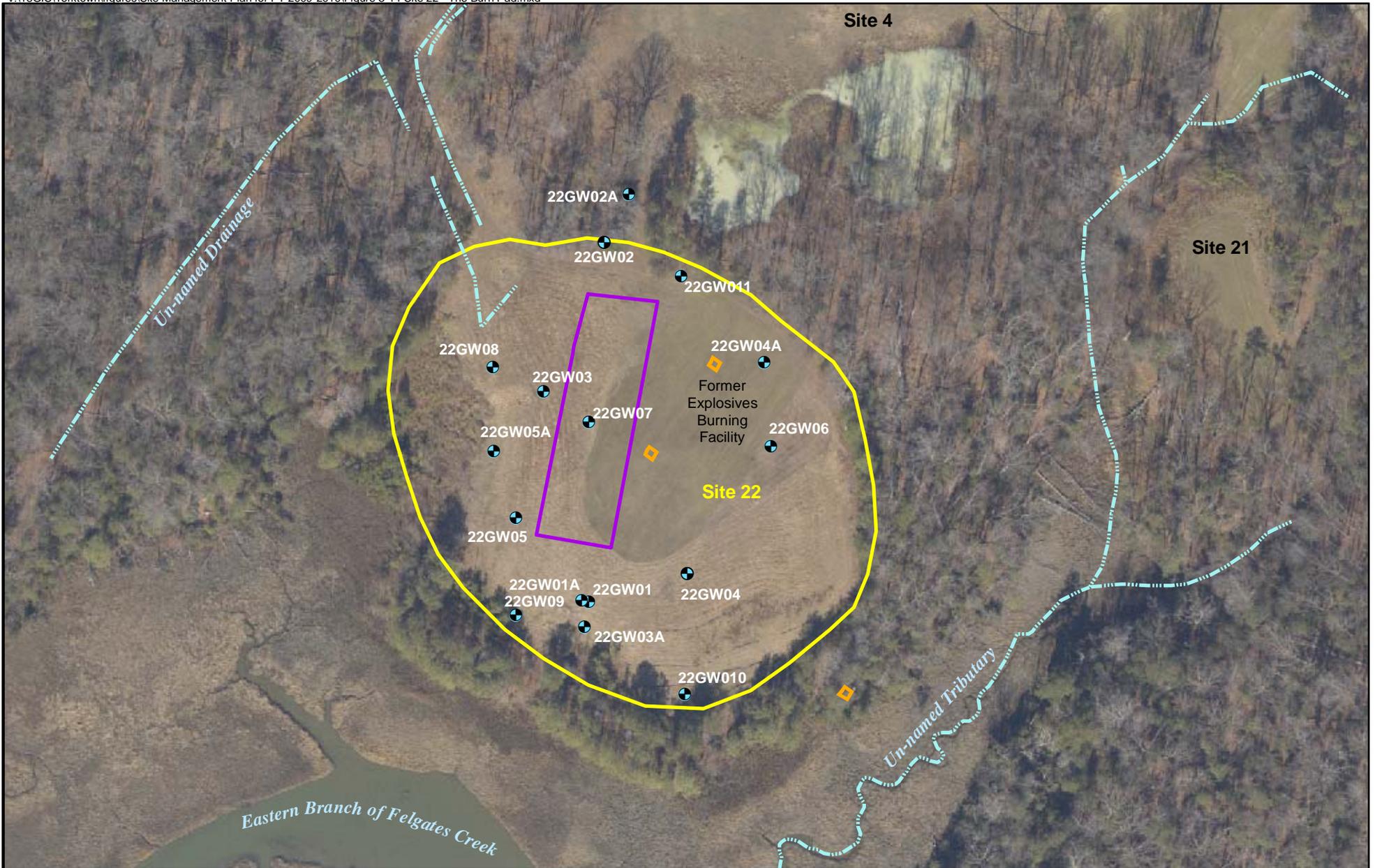


Figure 3-13
 Site 21 - Battery and Drum Disposal Area
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia



- LEGEND**
- Study Area Boundary
 - 2002 Removal Action Area
 - Former Biocell Location
 - Drainage
 - Monitoring Well

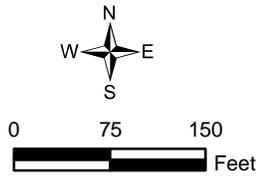
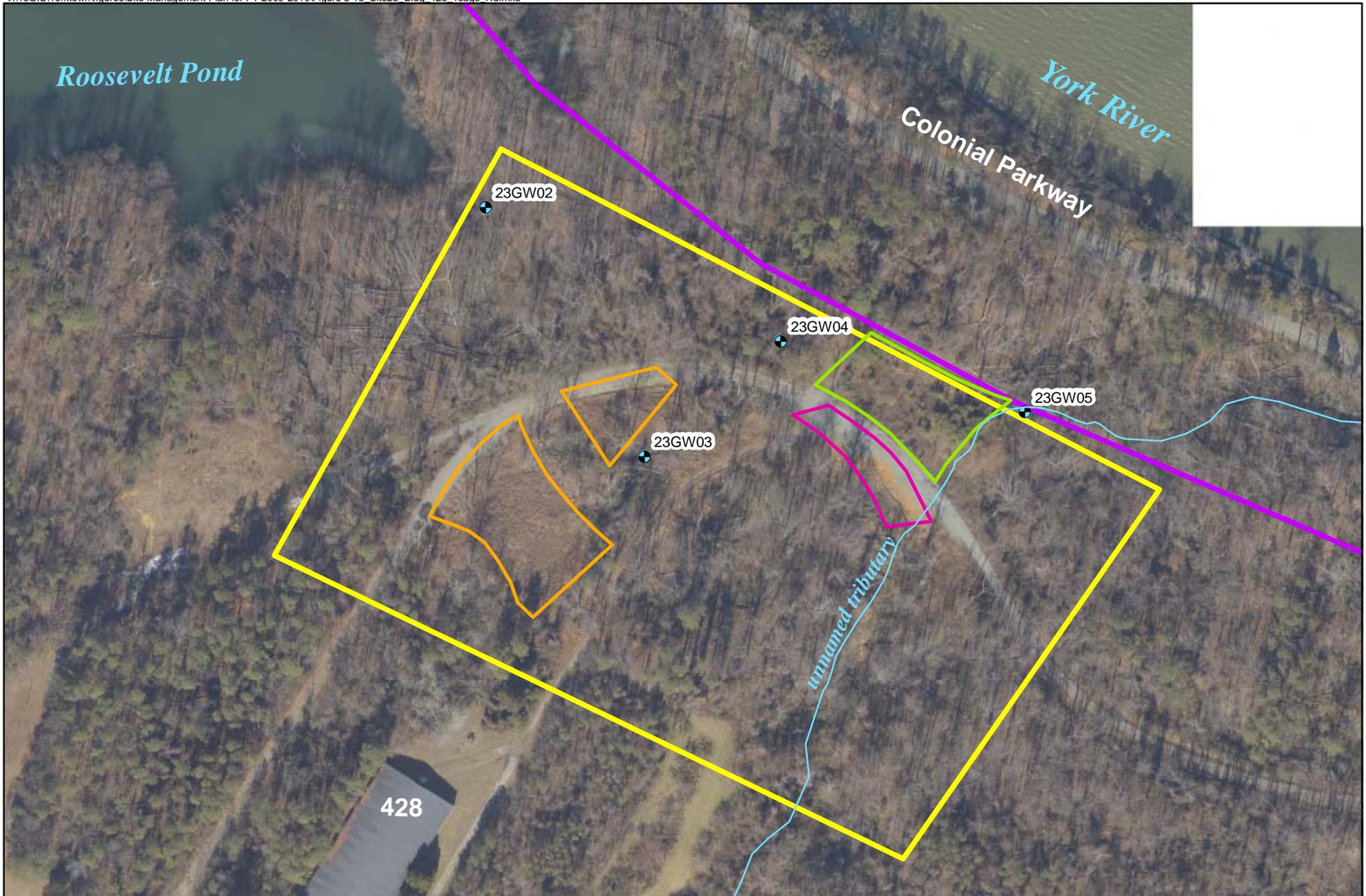


Figure 3-14
 Site 22 - Burn Pad
 Site Management Plan for FY 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia



LEGEND

-  Monitoring Wells
-  JA. Jones Removal Area - 2003
-  Approximate 1994 Removal Area
-  Unitec Removal Area - 2004
-  Study Area Boundary
-  WPNSTA Boundary

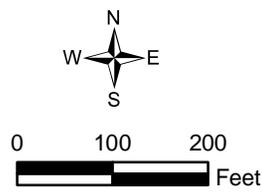
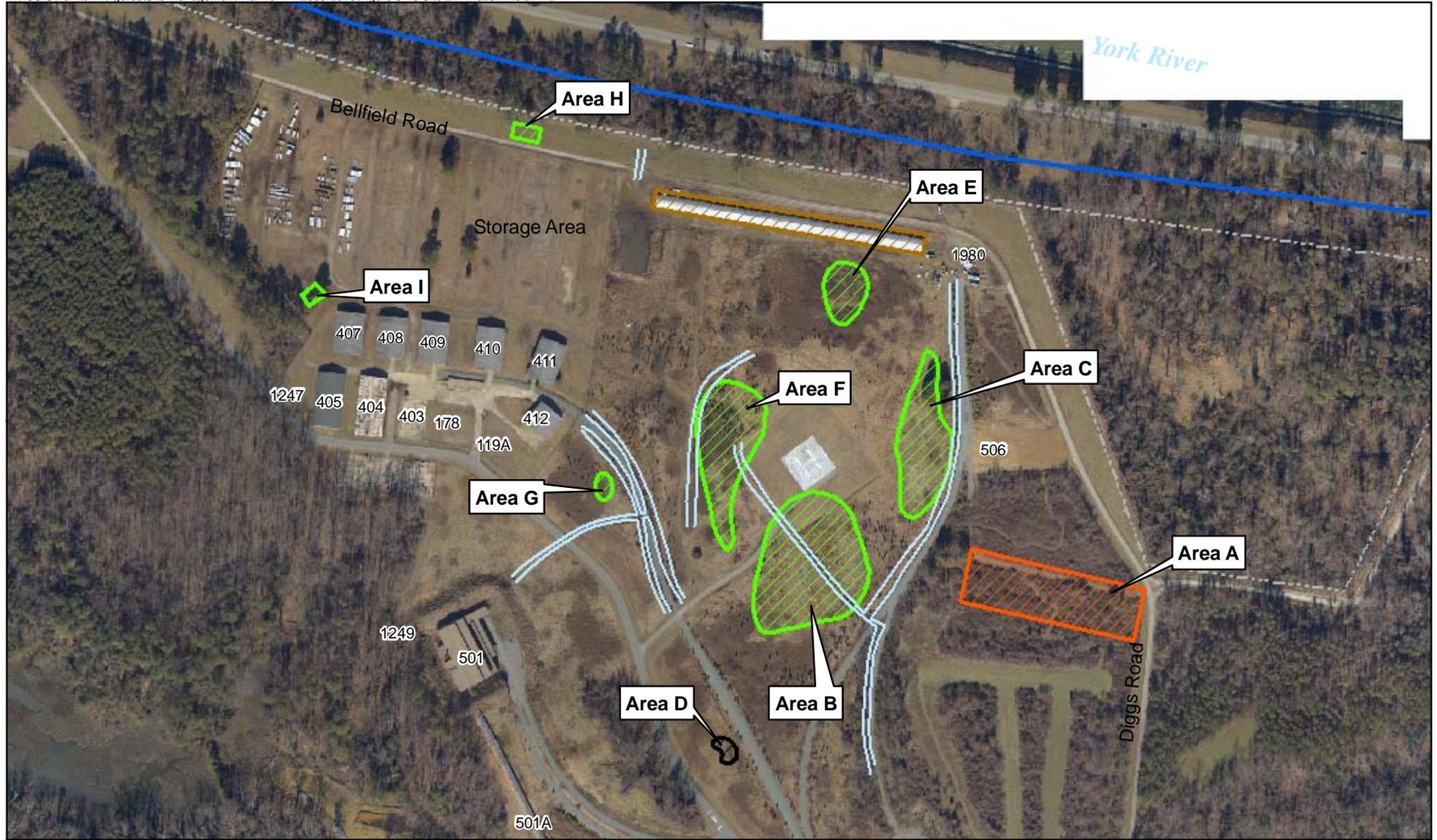


Figure 3-15
Site 23 - Building 428 Teague Road Disposal Area
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



- Legend**
- Yorktown Base Boundary
 - Location of Identified Magnetic Anomalies (possible waste areas)
 - Black Sludge-like Material
 - Sludge Disposal Area
 - Former Site 6 Bioremediation Treatment Cell Location
 - Fences
 - Drainage Swales



During the SSP investigation, areas G, H, and I were determined not to represent areas where materials were buried at the site.

Figure 3-16
Site 24 - Aviation Field
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



Legend

-  Yorktown-Eastover Monitoring Wells
-  Study Area Boundary
-  Limits of Excavation
-  Former Discharge Line

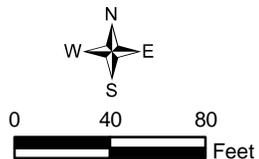
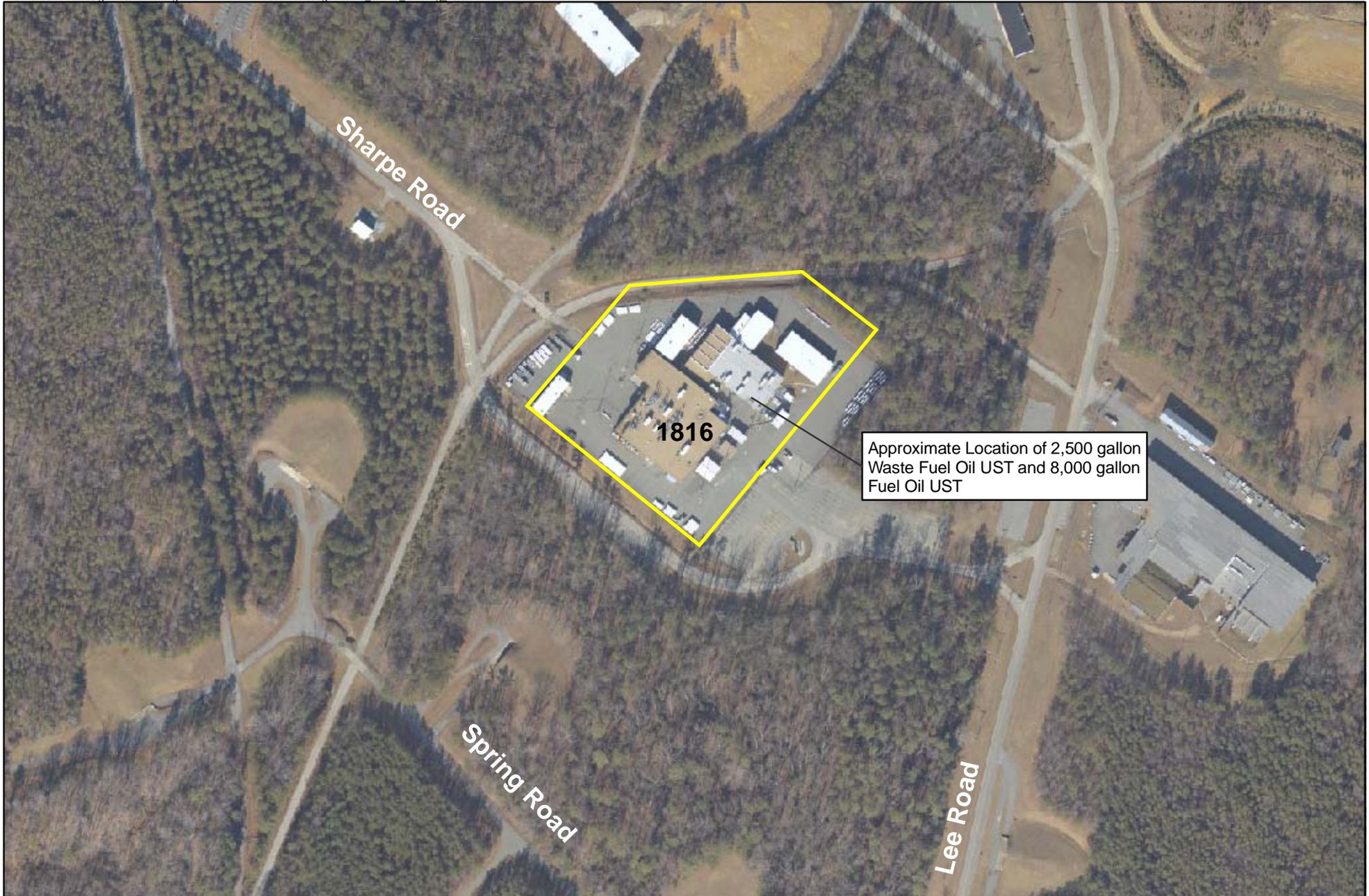


Figure 3-17
Site 25 - Building 373 Rocket Plant
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

 Study Area Boundary

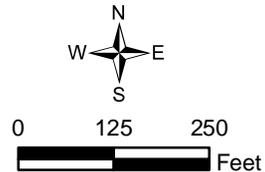


Figure 3-18
Site 26 - Building 1816 Mark 48 Waste Otto Fuel Tank
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

 Study Area Boundary

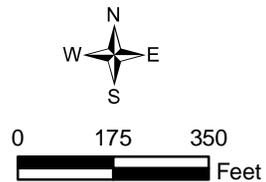


Figure 3-19
Site 28 - Building 28 X-Ray Facility Tank Drain Field
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

-  Monitoring Wells
-  Study Area Boundary

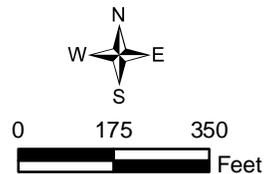


Figure 3-20
Site 29 - Lee Pond
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

 Study Area Boundary

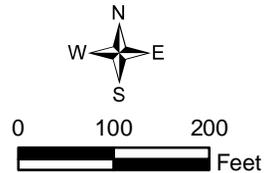
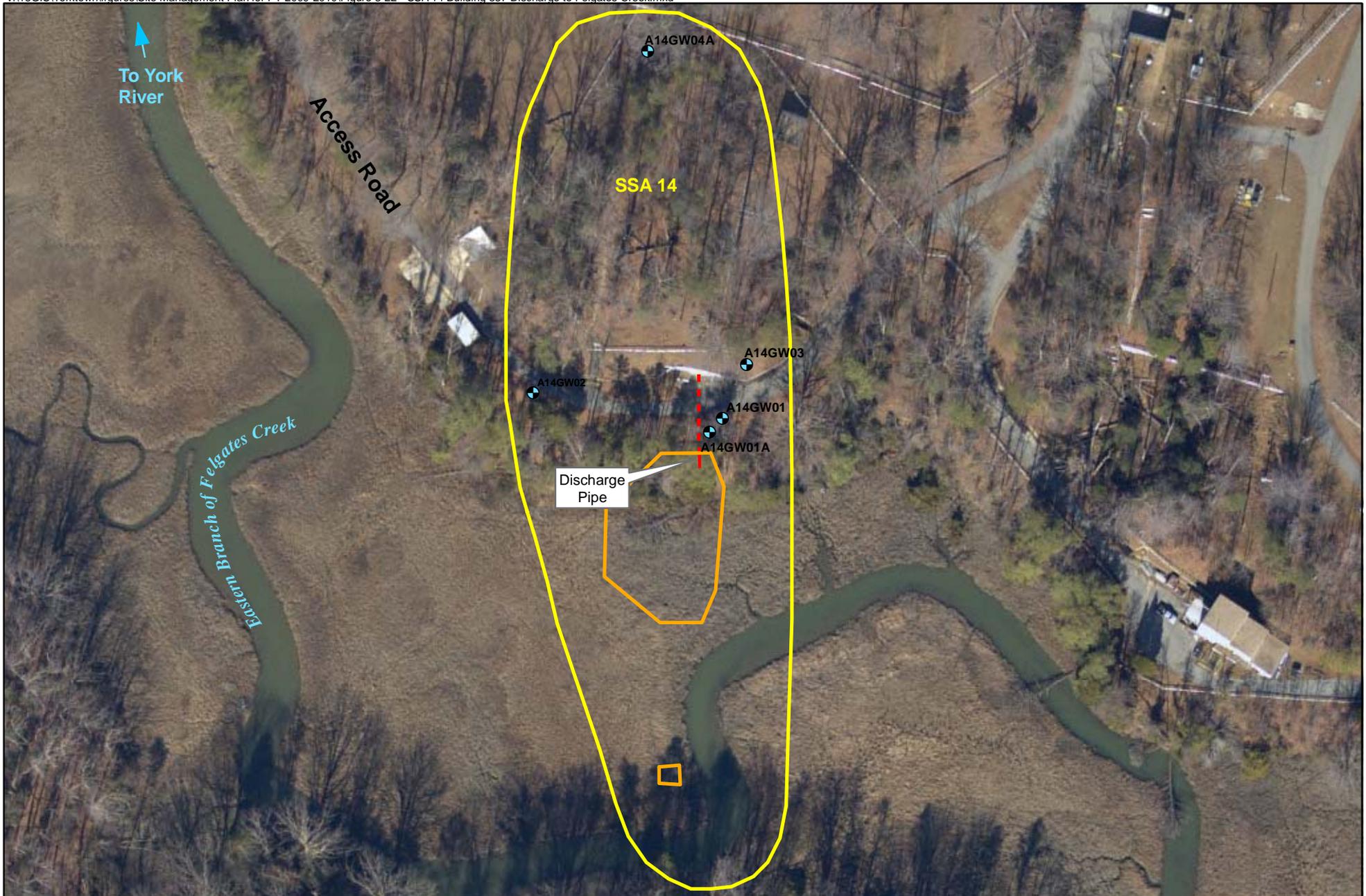


Figure 3-21
Site 30 - Bracken Road Incinerator and Environs
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

-  Monitoring Well
-  Approximate location of Discharge Pipe
-  Study Area Boundary
-  2007 Removal Action

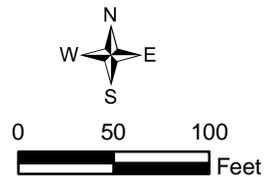


Figure 3-22
SSA 14 - Building 537 Discharge to Felgates Creek
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

-  Study Area Boundary
-  Monitoring Wells
-  AOC 23 Boundary

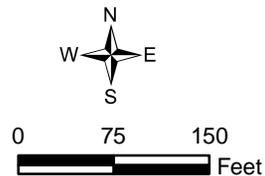


Figure 3-23
SSA 15 - Sewage Treatment Plant #1
Sludge Drying Beds and Discharge Area
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

-  Study Area Boundary
-  Approximate Location of Former Bldg. 530

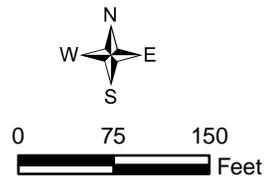


Figure 3-24
SSA 22 - Sand Blasting Grit Area
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

 Study Area Boundary

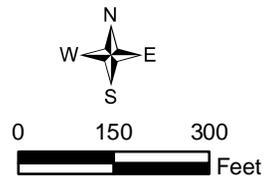


Figure 3-25
SSA 25 - Wetlands Downgradient of Beaver Pond
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



- Legend**
- IRP Monitoring Wells
 - Underground Storage Tank Monitoring Well
 - Former location of well removed during remedy implementation
 - ▭ Study Area Boundary*
 - WPNSTA Yorktown Boundary

Note:
 "Industrial Area" referred to during this investigation consists of Buildings 3, 4, 5, and 6 and the surrounding area that is upgradient of Site 12.

*All study area boundaries are solely for the purpose of showing general site locations. They are not intended to connote the extent of contamination, boundaries of investigation, or delineation of media associated with a particular site.

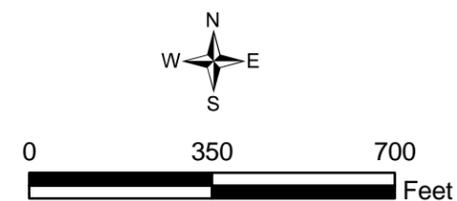
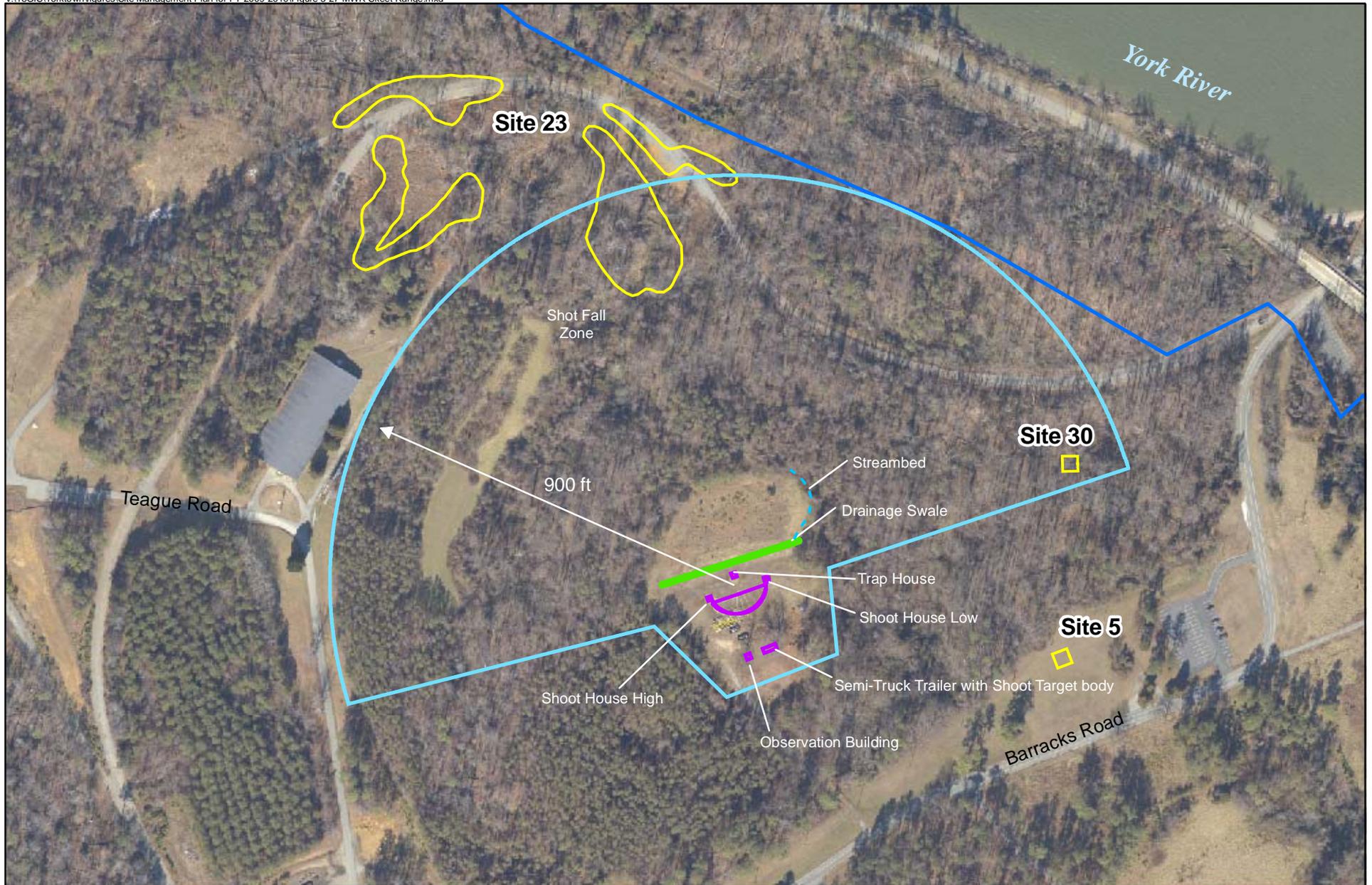


Figure 3-26
 AOC 23 - Barracks Road Landfill Industrial Area
 Site Management Plan for 2009 to 2010
 Naval Weapons Station Yorktown
 Yorktown, Virginia



LEGEND

- Yorktown Naval Weapons Station Base Boundary
- Drainage Swale
- MWR Skeet Range
- Skeet Range Site Features
- Study Area Boundary

Note:
All structures associated with the Skeet Range
have been demolished.

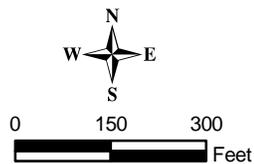


Figure 3-27
MWR Skeet Range
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia



LEGEND

 Study Area Boundary

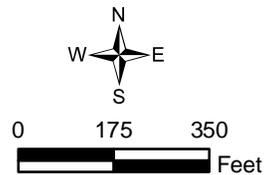


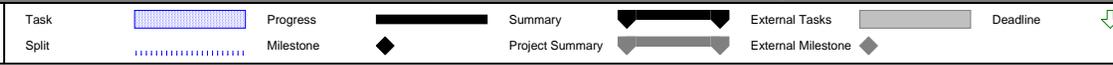
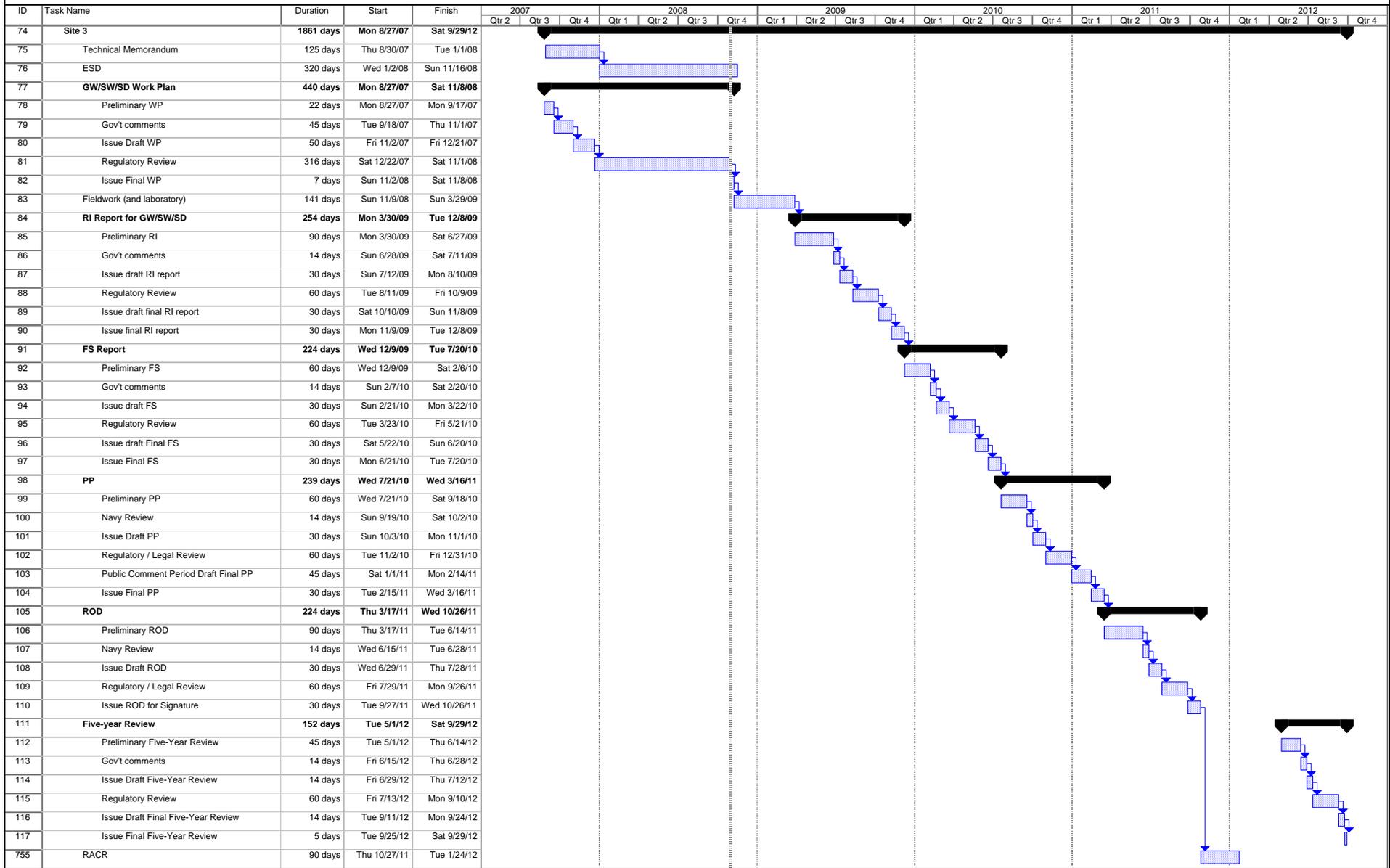
Figure 3-28
Turkey Road Landfill
Site Management Plan for FY 2009 to 2010
Naval Weapons Station Yorktown
Yorktown, Virginia

**Schedule 3-1
Site 1 SMP FY09-10**

ID	Task Name	Duration	Start	Finish	2008												2009				2010				2011				2012			
					Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4		
2	Site 1	1861 days	Mon 8/27/07	Sat 9/29/12	[Summary bar]																											
3	GW/SW/SD Work Plan	440 days	Mon 8/27/07	Sat 11/8/08	[Summary bar]																											
4	Preliminary WP	22 days	Mon 8/27/07	Mon 9/17/07	[Task bar]																											
5	Gov't comments	45 days	Tue 9/18/07	Thu 11/1/07	[Task bar]																											
6	Issue Draft WP	50 days	Fri 11/2/07	Fri 12/21/07	[Task bar]																											
7	Regulatory Review	316 days	Sat 12/22/07	Sat 11/1/08	[Task bar]																											
8	Issue Final WP	7 days	Sun 11/2/08	Sat 11/8/08	[Task bar]																											
9	Fieldwork (and laboratory)	141 days	Sun 11/9/08	Sun 3/29/09	[Task bar]																											
10	RI Report for GW/SW/SD	254 days	Mon 3/30/09	Tue 12/8/09	[Summary bar]																											
11	Preliminary RI	90 days	Mon 3/30/09	Sat 6/27/09	[Task bar]																											
12	Gov't comments	14 days	Sun 6/28/09	Sat 7/11/09	[Task bar]																											
13	Issue Draft RI	30 days	Sun 7/12/09	Mon 8/10/09	[Task bar]																											
14	Regulatory Review	60 days	Tue 8/11/09	Fri 10/9/09	[Task bar]																											
15	Issue Draft Final RI	30 days	Sat 10/10/09	Sun 11/8/09	[Task bar]																											
16	Issue Final RI	30 days	Mon 11/9/09	Tue 12/8/09	[Task bar]																											
17	FS Report	224 days	Wed 12/9/09	Tue 7/20/10	[Summary bar]																											
18	Preliminary FS	60 days	Wed 12/9/09	Sat 2/6/10	[Task bar]																											
19	Gov't comments	14 days	Sun 2/7/10	Sat 2/20/10	[Task bar]																											
20	Issue Draft FS	30 days	Sun 2/21/10	Mon 3/22/10	[Task bar]																											
21	Regulatory Review	60 days	Tue 3/23/10	Fri 5/21/10	[Task bar]																											
22	Issue Draft Final FS	30 days	Sat 5/22/10	Sun 6/20/10	[Task bar]																											
23	Issue Final FS	30 days	Mon 6/21/10	Tue 7/20/10	[Task bar]																											
24	PP	239 days	Wed 7/21/10	Wed 3/16/11	[Summary bar]																											
25	Preliminary PP	60 days	Wed 7/21/10	Sat 9/18/10	[Task bar]																											
26	Navy Review	14 days	Sun 9/19/10	Sat 10/2/10	[Task bar]																											
27	Issue Draft PP	30 days	Sun 10/3/10	Mon 11/1/10	[Task bar]																											
28	Regulatory / Legal Review	60 days	Tue 11/2/10	Fri 12/31/10	[Task bar]																											
29	Public Comment Period Draft Final PP	45 days	Sat 1/1/11	Mon 2/14/11	[Task bar]																											
30	Issue Final PP	30 days	Tue 2/15/11	Wed 3/16/11	[Task bar]																											
31	ROD	224 days	Thu 3/17/11	Wed 10/26/11	[Summary bar]																											
32	Preliminary ROD	90 days	Thu 3/17/11	Tue 6/14/11	[Task bar]																											
33	Navy Review	14 days	Wed 6/15/11	Tue 6/28/11	[Task bar]																											
34	Issue Draft ROD	30 days	Wed 6/29/11	Thu 7/28/11	[Task bar]																											
35	Regulatory / Legal Review	60 days	Fri 7/29/11	Mon 9/26/11	[Task bar]																											
36	Issue ROD for Signature	30 days	Tue 9/27/11	Wed 10/26/11	[Task bar]																											
37	Five-year Review	152 days	Tue 5/1/12	Sat 9/29/12	[Summary bar]																											
38	Preliminary Five-Year Review	45 days	Tue 5/1/12	Thu 6/14/12	[Task bar]																											
39	Gov't comments	14 days	Fri 6/15/12	Thu 6/28/12	[Task bar]																											
40	Issue Draft Five-Year Review	14 days	Fri 6/29/12	Thu 7/12/12	[Task bar]																											
41	Regulatory Review	60 days	Fri 7/13/12	Mon 9/10/12	[Task bar]																											
42	Issue Draft Final Five-Year Review	14 days	Tue 9/11/12	Mon 9/24/12	[Task bar]																											
43	Issue Final Five-Year Review	5 days	Tue 9/25/12	Sat 9/29/12	[Task bar]																											
755	RACR	90 days	Thu 10/27/11	Tue 1/24/12	[Task bar]																											

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

**Schedule 3-2
Site 3 FY09-10**



Schedule 3-3 Site 4 FY09-10

ID	Task Name	Duration	Start	Finish	2007			2008			2009			Qtr 1				
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2		Qtr 3	Qtr 4		
122	Site 4	896 days	Tue 5/1/07	Mon 10/12/09														
123	Fieldwork	331 days	Tue 5/1/07	Wed 3/26/08														
124	Laboratory Analysis	58 days	Thu 3/27/08	Fri 5/23/08														
125	RI Report for GW/SW/SD	239 days	Sat 5/24/08	Sat 1/17/09														
126	Preliminary RI	84 days	Sat 5/24/08	Fri 8/15/08														
127	Gov't comments	24 days	Sat 8/16/08	Mon 9/8/08														
128	Issue draft RI report	11 days	Tue 9/9/08	Fri 9/19/08														
129	Regulatory Review	60 days	Sat 9/20/08	Tue 11/18/08														
130	Issue draft final RI report	30 days	Wed 11/19/08	Thu 12/18/08														
131	Issue final RI report	30 days	Fri 12/19/08	Sat 1/17/09														
132	PP GW/SW/SD - NFA	239 days	Wed 11/19/08	Wed 7/15/09														
133	Preliminary PP	60 days	Wed 11/19/08	Sat 1/17/09														
134	Navy Review	14 days	Sun 1/18/09	Sat 1/31/09														
135	Issue Draft PP	30 days	Sun 2/1/09	Mon 3/2/09														
136	Regulatory / Legal Review	60 days	Tue 3/3/09	Fri 5/1/09														
137	Public Comment Period Draft Final PP	45 days	Sat 5/2/09	Mon 6/15/09														
138	Issue Final PP	30 days	Tue 6/16/09	Wed 7/15/09														
139	ROD GW/SW/SD - NFA	224 days	Tue 3/3/09	Mon 10/12/09														
140	Preliminary ROD	90 days	Tue 3/3/09	Sun 5/31/09														
141	Navy Review	14 days	Mon 6/1/09	Sun 6/14/09														
142	Issue Draft ROD	30 days	Mon 6/15/09	Tue 7/14/09														
143	Regulatory / Legal Review	60 days	Wed 7/15/09	Sat 9/12/09														
144	Issue ROD for Signature	30 days	Sun 9/13/09	Mon 10/12/09														
745	RACR	90 days	Tue 10/13/09	Sun 1/10/10														

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

**Schedule 3-4
Site 6 FY09-10**

ID	Task Name	Duration	Start	Finish	2008																2009				2010				2011				2012			
					Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4						
154	Site 6	1861 days	Mon 8/27/07	Sat 9/29/12	[Summary bar]																															
155	ESD	145 days	Mon 6/30/08	Fri 11/21/08	[Task bar]																															
156	GW Investigation Work Plan	440 days	Mon 8/27/07	Sat 11/8/08	[Summary bar]																															
157	Preliminary WP	22 days	Mon 8/27/07	Mon 9/17/07	[Task bar]																															
158	Gov't comments	45 days	Tue 9/18/07	Thu 11/1/07	[Task bar]																															
159	Issue Draft WP	50 days	Fri 11/2/07	Fri 12/21/07	[Task bar]																															
160	Regulatory Review	316 days	Sat 12/22/07	Sat 11/1/08	[Task bar]																															
161	Issue Final WP	7 days	Sun 11/2/08	Sat 11/8/08	[Task bar]																															
162	GW Investigation Fieldwork	141 days	Sun 11/9/08	Sun 3/29/09	[Task bar]																															
163	RI Report for GW	254 days	Mon 3/30/09	Tue 12/8/09	[Summary bar]																															
164	Preliminary RI	90 days	Mon 3/30/09	Sat 6/27/09	[Task bar]																															
165	Gov't comments	14 days	Sun 6/28/09	Sat 7/11/09	[Task bar]																															
166	Issue draft RI report	30 days	Sun 7/12/09	Mon 8/10/09	[Task bar]																															
167	Regulatory Review	60 days	Tue 8/11/09	Fri 10/9/09	[Task bar]																															
168	Issue draft final RI report	30 days	Sat 10/10/09	Sun 11/8/09	[Task bar]																															
169	Issue final RI report	30 days	Mon 11/9/09	Tue 12/8/09	[Task bar]																															
170	TS	365 days	Wed 12/9/09	Wed 12/8/10	[Summary bar]																															
171	Treatability Study	365 days	Wed 12/9/09	Wed 12/8/10	[Task bar]																															
172	FS Report	192 days	Thu 12/9/10	Sat 6/18/11	[Summary bar]																															
173	Preliminary FS	60 days	Thu 12/9/10	Sun 2/6/11	[Task bar]																															
174	Gov't comments	14 days	Mon 2/7/11	Sun 2/20/11	[Task bar]																															
175	Issue draft FS	14 days	Mon 2/21/11	Sun 3/6/11	[Task bar]																															
176	Regulatory Review	60 days	Mon 3/7/11	Thu 5/5/11	[Task bar]																															
177	Issue draft Final FS	14 days	Fri 5/6/11	Thu 5/19/11	[Task bar]																															
178	Issue Final FS	30 days	Fri 5/20/11	Sat 6/18/11	[Task bar]																															
179	PP	179 days	Sun 6/19/11	Wed 12/14/11	[Summary bar]																															
180	Preliminary PP	60 days	Sun 6/19/11	Wed 8/17/11	[Task bar]																															
181	Navy Review	14 days	Sun 6/19/11	Sat 7/2/11	[Task bar]																															
182	Issue Draft PP	30 days	Sun 7/3/11	Mon 8/1/11	[Task bar]																															
183	Regulatory / Legal Review	60 days	Tue 8/2/11	Fri 9/30/11	[Task bar]																															
184	Public Comment Period Draft Final PP	45 days	Sat 10/1/11	Mon 11/14/11	[Task bar]																															
185	Issue Final PP	30 days	Tue 11/15/11	Wed 12/14/11	[Task bar]																															
186	ROD	134 days	Thu 12/15/11	Thu 4/26/12	[Summary bar]																															
187	Preliminary ROD	90 days	Thu 12/15/11	Tue 3/13/12	[Task bar]																															
188	Navy Review	14 days	Thu 12/15/11	Wed 12/28/11	[Task bar]																															
189	Issue Draft ROD	30 days	Thu 12/29/11	Fri 1/27/12	[Task bar]																															
190	Regulatory / Legal Review	60 days	Sat 1/28/12	Tue 3/27/12	[Task bar]																															
191	Issue ROD for Signature	30 days	Wed 3/28/12	Thu 4/26/12	[Task bar]																															
192	Five-year Review	152 days	Tue 5/1/12	Sat 9/29/12	[Summary bar]																															
751	RACR	90 days	Fri 4/27/12	Wed 7/25/12	[Task bar]																															

Task Progress Summary External Tasks Deadline

 Split Milestone Project Summary External Milestone

Schedule 3-5 Site 7 FY09-10

ID	Task Name	Duration	Start	Finish	2008				2009				2010				2011				2012			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
203	Site 7	600 days	Mon 6/30/08	Fri 2/19/10																				
204	LTM for GW	600 days	Mon 6/30/08	Fri 2/19/10																				
205	FS Report	192 days	Sat 2/20/10	Mon 8/30/10																				
206	Preliminary FS	60 days	Sat 2/20/10	Tue 4/20/10																				
207	Gov't Comments	14 days	Wed 4/21/10	Tue 5/4/10																				
208	Issue Draft FS	14 days	Wed 5/5/10	Tue 5/18/10																				
209	Regulatory Review	60 days	Wed 5/19/10	Sat 7/17/10																				
210	Issue Draft Final FS	14 days	Sun 7/18/10	Sat 7/31/10																				
211	Issue Final FS	30 days	Sun 8/1/10	Mon 8/30/10																				
212	PP	239 days	Tue 8/31/10	Tue 4/26/11																				
213	Prelliminary PP	60 days	Tue 8/31/10	Fri 10/29/10																				
214	Navy Review	14 days	Sat 10/30/10	Fri 11/12/10																				
215	Issue Draft PP	30 days	Sat 11/13/10	Sun 12/12/10																				
216	Regulatory/Legal Review	60 days	Mon 12/13/10	Thu 2/10/11																				
217	Public Commnet Period Draft Final PP	45 days	Fri 2/11/11	Sun 3/27/11																				
218	Issue/Final PP	30 days	Mon 3/28/11	Tue 4/26/11																				
219	ROD	522 days	Wed 4/27/11	Sat 9/29/12																				
220	Preliminary ROD	90 days	Wed 4/27/11	Mon 7/25/11																				
221	Navy Review	14 days	Tue 7/26/11	Mon 8/8/11																				
222	Issue Draft ROD	30 days	Tue 8/9/11	Wed 9/7/11																				
223	Regulatory/Legal Review	60 days	Thu 9/8/11	Sun 11/6/11																				
224	Issue ROD for Signature	30 days	Mon 11/7/11	Tue 12/6/11																				
225	Five-year Review	152 days	Tue 5/1/12	Sat 9/29/12																				
226	Preliminary Five-Year Review	45 days	Tue 5/1/12	Thu 6/14/12																				
227	Gov't comments	14 days	Fri 6/15/12	Thu 6/28/12																				
228	Issue Draft Five-Year Review	14 days	Fri 6/29/12	Thu 7/12/12																				
229	Regulatory Review	60 days	Fri 7/13/12	Mon 9/10/12																				
230	Issue Draft Final Five-Year Review	14 days	Tue 9/11/12	Mon 9/24/12																				
231	Issue Final Five-Year Review	5 days	Tue 9/25/12	Sat 9/29/12																				
232	RACR	90 days	Wed 12/7/11	Mon 3/5/12																				

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

**Schedule 3-6
Site 8 FY09-10**

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010				2011			
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
213	Site 8	1287 days	Fri 6/29/07	Wed 1/5/11																				
214	Construction Completion Report	603 days	Fri 6/29/07	Fri 2/20/09																				
215	GW/SW/SD RI Fieldwork	260 days	Wed 10/31/07	Wed 7/16/08																				
216	Technical Memorandum - NFA for soils/SD	76 days	Thu 7/17/08	Tue 9/30/08																				
217	RI Report for GW/SW	307 days	Wed 7/16/08	Mon 5/18/09																				
218	Preliminary RI	143 days	Wed 7/16/08	Fri 12/5/08																				
219	Gov't comments	14 days	Sat 12/6/08	Fri 12/19/08																				
220	Issue Draft RI	30 days	Sat 12/20/08	Sun 1/18/09																				
221	Regulatory Review	60 days	Mon 1/19/09	Thu 3/19/09																				
222	Issue Draft Final RI	30 days	Fri 3/20/09	Sat 4/18/09																				
223	Issue Final RI	30 days	Sun 4/19/09	Mon 5/18/09																				
224	FS Report	224 days	Tue 5/19/09	Mon 12/28/09																				
225	Preliminary FS	60 days	Tue 5/19/09	Fri 7/17/09																				
226	Gov't comments	14 days	Sat 7/18/09	Fri 7/31/09																				
227	Issue Draft FS	30 days	Sat 8/1/09	Sun 8/30/09																				
228	Regulatory Review	60 days	Mon 8/31/09	Thu 10/29/09																				
229	Issue Draft Final FS	30 days	Fri 10/30/09	Sat 11/28/09																				
230	Issue Final FS	30 days	Sun 11/29/09	Mon 12/28/09																				
231	PP	239 days	Tue 12/29/09	Tue 8/24/10																				
232	Preliminary PP	60 days	Tue 12/29/09	Fri 2/26/10																				
233	Gov't comments	14 days	Sat 2/27/10	Fri 3/12/10																				
234	Issue Draft PP	30 days	Sat 3/13/10	Sun 4/11/10																				
235	Regulatory / Legal Review	60 days	Mon 4/12/10	Thu 6/10/10																				
236	Public Comment Period Draft Final PP	45 days	Fri 6/11/10	Sun 7/25/10																				
237	Issue Final PP	30 days	Mon 7/26/10	Tue 8/24/10																				
238	ROD	134 days	Wed 8/25/10	Wed 1/5/11																				
239	Preliminary ROD	90 days	Wed 8/25/10	Mon 11/22/10																				
240	Gov't comments	14 days	Wed 8/25/10	Tue 9/7/10																				
241	Issue Draft ROD	30 days	Wed 9/8/10	Thu 10/7/10																				
242	Regulatory / Legal Review	60 days	Fri 10/8/10	Mon 12/6/10																				
243	Issue ROD for Signature	30 days	Tue 12/7/10	Wed 1/5/11																				
756	RACR	90 days	Thu 1/6/11	Tue 4/5/11																				

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

**Schedule 3-7
Site 9 FY09-10**

ID	Task Name	Duration	Start	Finish	2009				2010				2011				2012			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
246	Site 9	1217 days	Mon 6/1/09	Sat 9/29/12																
247	GW Investigation Work Plan	254 days	Mon 6/1/09	Tue 2/9/10																
248	Preliminary WP	90 days	Mon 6/1/09	Sat 8/29/09																
249	Gov't comments	14 days	Sun 8/30/09	Sat 9/12/09																
250	Issue Draft WP	30 days	Sun 9/13/09	Mon 10/12/09																
251	Regulatory Review	60 days	Tue 10/13/09	Fri 12/11/09																
252	Issue Draft Final WP	30 days	Sat 12/12/09	Sun 1/10/10																
253	Issue Final WP	30 days	Mon 1/11/10	Tue 2/9/10																
254	Fieldwork & Laboratory	90 days	Wed 2/10/10	Mon 5/10/10																
255	RI Report for GW	344 days	Tue 5/11/10	Tue 4/19/11																
256	Preliminary RI	90 days	Tue 5/11/10	Sun 8/8/10																
257	Gov't comments	14 days	Mon 8/9/10	Sun 8/22/10																
258	Issue Draft RI report	30 days	Mon 8/23/10	Tue 9/21/10																
259	Regulatory Review	60 days	Wed 9/22/10	Sat 11/20/10																
260	Issue Draft Final RI report	30 days	Sun 11/21/10	Mon 12/20/10																
261	Issue Final RI report	30 days	Tue 12/21/10	Wed 1/19/11																
262	RACR	90 days	Thu 1/20/11	Tue 4/19/11																
263	FS Report	224 days	Thu 1/20/11	Wed 8/31/11																
264	Preliminary FS	60 days	Thu 1/20/11	Sun 3/20/11																
265	Gov't comments	14 days	Mon 3/21/11	Sun 4/3/11																
266	Issue Draft FS	30 days	Mon 4/4/11	Tue 5/3/11																
267	Regulatory Review	60 days	Wed 5/4/11	Sat 7/2/11																
268	Issue Draft Final FS	30 days	Sun 7/3/11	Mon 8/1/11																
269	Issue Final FS	30 days	Tue 8/2/11	Wed 8/31/11																
270	PP	239 days	Thu 9/1/11	Thu 4/26/12																
271	Preliminary PP	60 days	Thu 9/1/11	Sun 10/30/11																
272	Gov't comments	14 days	Mon 10/31/11	Sun 11/13/11																
273	Issue Draft PP	30 days	Mon 11/14/11	Tue 12/13/11																
274	Regulatory / Legal Review	60 days	Wed 12/14/11	Sat 2/11/12																
275	Public Comment Period Draft Final PP	45 days	Sun 2/12/12	Tue 3/27/12																
276	Issue Final PP	30 days	Wed 3/28/12	Thu 4/26/12																
277	ROD	134 days	Fri 4/27/12	Fri 9/7/12																
278	Preliminary ROD	90 days	Fri 4/27/12	Wed 7/25/12																
279	Navy Review	14 days	Fri 4/27/12	Thu 5/10/12																
280	Issue Draft ROD	30 days	Fri 5/11/12	Sat 6/9/12																
281	Regulatory / Legal Review	60 days	Sun 6/10/12	Wed 8/8/12																
282	Issue ROD for Signature	30 days	Thu 8/9/12	Fri 9/7/12																
283	Five-year Review	152 days	Tue 5/1/12	Sat 9/29/12																
284	Preliminary Five-Year Review	45 days	Tue 5/1/12	Thu 6/14/12																
285	Gov't comments	14 days	Fri 6/15/12	Thu 6/28/12																
286	Issue Draft Five-Year Review	14 days	Fri 6/29/12	Thu 7/12/12																
287	Regulatory Review	60 days	Fri 7/13/12	Mon 9/10/12																
288	Issue Draft Final Five-Year Review	14 days	Tue 9/11/12	Mon 9/24/12																
289	Issue Final Five-Year Review	5 days	Tue 9/25/12	Sat 9/29/12																
757	RACR	90 days	Sat 9/8/12	Thu 12/6/12																
758	Implement RACR	90 days	Sat 9/8/12	Thu 12/6/12																

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

Schedule 3-8 Site 11 FY09-10

ID	Task Name	Duration	Start	Finish	2008				2009				2010			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
291	Site 11	124 days	Sat 3/15/08	Wed 7/16/08												
292	Technical Memorandum (GW Risk)	124 days	Sat 3/15/08	Wed 7/16/08												
293	PP for GW (NFA)	261 days	Mon 3/2/09	Tue 11/17/09												
294	Preliminary PP	82 days	Mon 3/2/09	Fri 5/22/09												
295	Navy Review	14 days	Sat 5/23/09	Fri 6/5/09												
296	Issue Draft PP	30 days	Sat 6/6/09	Sun 7/5/09												
297	Regulatory / Legal Review	60 days	Mon 7/6/09	Thu 9/3/09												
298	Public Comment Period Draft Final PP	45 days	Fri 9/4/09	Sun 10/18/09												
299	Issue Final PP	30 days	Mon 10/19/09	Tue 11/17/09												
300	ROD for GW (NFA)	224 days	Wed 11/18/09	Tue 6/29/10												
301	Preliminary ROD	90 days	Wed 11/18/09	Mon 2/15/10												
302	Navy Review	14 days	Tue 2/16/10	Mon 3/1/10												
303	Issue Draft ROD	30 days	Tue 3/2/10	Wed 3/31/10												
304	Regulatory / Legal Review	60 days	Thu 4/1/10	Sun 5/30/10												
305	Issue ROD for Signature	30 days	Mon 5/31/10	Tue 6/29/10												
736	RACR	90 days	Wed 6/30/10	Mon 9/27/10												
737	Implement RACR	90 days	Wed 6/30/10	Mon 9/27/10												

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

**Schedule 3-9
Site 12 FY09-10**

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010				2011				2012			
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
308	Site 12	1825 days	Mon 10/1/07	Fri 9/28/12																								
309	LTM (for GW) - Every Five Years	1825 days	Mon 10/1/07	Fri 9/28/12																								
310	ESD	200 days	Mon 6/2/08	Thu 12/18/08																								
311	Five-year Review	154 days	Tue 5/1/12	Mon 10/1/12																								
312	Preliminary Five-Year Review	45 days	Tue 5/1/12	Thu 6/14/12																								
313	Gov't comments	14 days	Fri 6/15/12	Thu 6/28/12																								
314	Issue Draft Five-Year Review	14 days	Fri 6/29/12	Thu 7/12/12																								
315	Regulatory Review	60 days	Fri 7/13/12	Mon 9/10/12																								
316	Issue Draft Final Five-Year Review	14 days	Tue 9/11/12	Mon 9/24/12																								
317	Issue Final Five-Year Review	7 days	Tue 9/25/12	Mon 10/1/12																								
738	RACR	90 days	Fri 12/19/08	Wed 3/18/09																								
739	Implement RACR	90 days	Fri 12/19/08	Wed 3/18/09																								

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

**Schedule 3-11
Site 17 FY09-10**

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010			
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
328	Site 17	857 days	Mon 9/3/07	Wed 1/6/10																
329	Technical Memorandum (all waste removed)	332 days	Mon 9/3/07	Wed 7/30/08																
330	ESD for Soil/Waste (NFA)	218 days	Tue 12/4/07	Tue 7/8/08																
331	PP for GW (NFA)	289 days	Mon 10/27/08	Tue 8/11/09																
332	Preliminary PP	30 days	Mon 10/27/08	Tue 11/25/08																
333	Gov't Comments	14 days	Mon 3/2/09	Sun 3/15/09																
334	Issue Draft PP	14 days	Mon 3/16/09	Sun 3/29/09																
335	Regulatory / Legal Review	60 days	Mon 3/30/09	Thu 5/28/09																
336	Public Comment Period Draft Final PP	45 days	Fri 5/29/09	Sun 7/12/09																
337	Issue Final PP	30 days	Mon 7/13/09	Tue 8/11/09																
338	ROD for GW (NFA)	148 days	Wed 8/12/09	Wed 1/6/10																
339	Preliminary ROD	30 days	Wed 8/12/09	Thu 9/10/09																
340	Gov't Comments	14 days	Fri 9/11/09	Thu 9/24/09																
341	Issue Draft ROD	14 days	Fri 9/25/09	Thu 10/8/09																
342	Regulatory / Legal Review	60 days	Fri 10/9/09	Mon 12/7/09																
343	Issue ROD for Signature	30 days	Tue 12/8/09	Wed 1/6/10																
715	RACR	90 days	Thu 1/7/10	Tue 4/6/10																

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

**Schedule 3-12
Site 19 SMP FY09-10**

ID	Task Name	Duration	Start	Finish	2009		2010				2011				2012				2013				2	
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2		
346	Site 19	1195 days	Mon 6/1/09	Fri 12/27/13																				
347	GW Investigation Work Plan	344 days	Mon 6/1/09	Thu 9/23/10																				
348	Preliminary WP	90 days	Mon 6/1/09	Fri 10/2/09																				
349	Gov't comments	14 days	Mon 10/5/09	Thu 10/22/09																				
350	Issue Draft WP	30 days	Fri 10/23/09	Thu 12/3/09																				
351	Regulatory Review	60 days	Fri 12/4/09	Thu 2/25/10																				
352	Issue Draft Final WP	30 days	Fri 2/26/10	Thu 4/8/10																				
353	Issue Final WP	30 days	Fri 4/9/10	Thu 5/20/10																				
354	GW Investigation Fieldwork and Laboratory	90 days	Fri 5/21/10	Thu 9/23/10																				
355	RI Report for GW	344 days	Fri 9/24/10	Wed 1/18/12																				
356	Preliminary RI	90 days	Fri 9/24/10	Thu 1/27/11																				
357	Gov't comments	14 days	Fri 1/28/11	Wed 2/16/11																				
358	Issue Draft RI	30 days	Thu 2/17/11	Wed 3/30/11																				
359	Regulatory Review	60 days	Thu 3/31/11	Wed 6/22/11																				
360	Issue Draft Final RI	30 days	Thu 6/23/11	Wed 8/3/11																				
361	Issue Final RI	30 days	Thu 8/4/11	Wed 9/14/11																				
362	RACR	90 days	Thu 9/15/11	Wed 1/18/12																				
363	FS Report for GW	224 days	Thu 9/15/11	Tue 7/24/12																				
364	Preliminary FS	60 days	Thu 9/15/11	Wed 12/7/11																				
365	Gov't comments	14 days	Thu 12/8/11	Tue 12/27/11																				
366	Issue Draft FS	30 days	Wed 12/28/11	Tue 2/7/12																				
367	Regulatory Review	60 days	Wed 2/8/12	Tue 5/1/12																				
368	Issue Draft Final FS	30 days	Wed 5/2/12	Tue 6/12/12																				
369	Issue Final FS	30 days	Wed 6/13/12	Tue 7/24/12																				
370	PP for GW	239 days	Wed 7/25/12	Mon 6/24/13																				
371	Preliminary PP	60 days	Wed 7/25/12	Tue 10/16/12																				
372	Navy Review	14 days	Wed 10/17/12	Mon 11/5/12																				
373	Issue Draft PP	30 days	Tue 11/6/12	Mon 12/17/12																				
374	Regulatory / Legal Review	60 days	Tue 12/18/12	Mon 3/11/13																				
375	Public Comment Period Draft Final PP	45 days	Tue 3/12/13	Mon 5/13/13																				
376	Issue Final PP	30 days	Tue 5/14/13	Mon 6/24/13																				
377	ROD for GW	134 days	Tue 6/25/13	Fri 12/27/13																				
378	Preliminary ROD	90 days	Tue 6/25/13	Mon 10/28/13																				
379	Navy Review	14 days	Tue 6/25/13	Fri 7/12/13																				
380	Issue Draft ROD	30 days	Mon 7/15/13	Fri 8/23/13																				
381	Regulatory / Legal Review	60 days	Mon 8/26/13	Fri 11/15/13																				
382	Issue ROD for Signature	30 days	Mon 11/18/13	Fri 12/27/13																				
383	Five-year Review	152 days	Tue 5/1/12	Wed 11/28/12																				
384	Preliminary Five-Year Review	45 days	Tue 5/1/12	Mon 7/2/12																				
385	Gov't comments	14 days	Tue 7/3/12	Fri 7/20/12																				
386	Issue Draft Five-Year Review	14 days	Mon 7/23/12	Thu 8/9/12																				
387	Regulatory Review	60 days	Fri 8/10/12	Thu 11/1/12																				
388	Issue Draft Final Five-Year Review	14 days	Fri 11/2/12	Wed 11/21/12																				
389	Issue Final Five-Year Review	5 days	Thu 11/22/12	Wed 11/28/12																				
715	RACR	90 days	Mon 12/30/13	Fri 5/2/14																				
716	Implement RACR	90 days	Mon 12/30/13	Fri 5/2/14																				

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

Schedule 3-13 Site 21 FY09-10

ID	Task Name	Duration	Start	Finish	2007			2008			2009				
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	
122	Site 21	896 days	Tue 5/1/07	Mon 10/12/09											
123	Fieldwork	331 days	Tue 5/1/07	Wed 3/26/08											
124	Laboratory Analysis	58 days	Thu 3/27/08	Fri 5/23/08											
125	RI Report for GW/SW/SD	239 days	Sat 5/24/08	Sat 1/17/09											
126	Preliminary RI	84 days	Sat 5/24/08	Fri 8/15/08											
127	Gov't comments	24 days	Sat 8/16/08	Mon 9/8/08											
128	Issue draft RI report	11 days	Tue 9/9/08	Fri 9/19/08											
129	Regulatory Review	60 days	Sat 9/20/08	Tue 11/18/08											
130	Issue draft final RI report	30 days	Wed 11/19/08	Thu 12/18/08											
131	Issue final RI report	30 days	Fri 12/19/08	Sat 1/17/09											
132	PP GW/SW/SD - NFA	239 days	Wed 11/19/08	Wed 7/15/09											
133	Preliminary PP	60 days	Wed 11/19/08	Sat 1/17/09											
134	Navy Review	14 days	Sun 1/18/09	Sat 1/31/09											
135	Issue Draft PP	30 days	Sun 2/1/09	Mon 3/2/09											
136	Regulatory / Legal Review	60 days	Tue 3/3/09	Fri 5/1/09											
137	Public Comment Period Draft Final PP	45 days	Sat 5/2/09	Mon 6/15/09											
138	Issue Final PP	30 days	Tue 6/16/09	Wed 7/15/09											
139	ROD GW/SW/SD - NFA	224 days	Tue 3/3/09	Mon 10/12/09											
140	Preliminary ROD	90 days	Tue 3/3/09	Sun 5/31/09											
141	Navy Review	14 days	Mon 6/1/09	Sun 6/14/09											
142	Issue Draft ROD	30 days	Mon 6/15/09	Tue 7/14/09											
143	Regulatory / Legal Review	60 days	Wed 7/15/09	Sat 9/12/09											
144	Issue ROD for Signature	30 days	Sun 9/13/09	Mon 10/12/09											
745	RACR	90 days	Tue 10/13/09	Sun 1/10/10											

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

**Schedule 3-14
Site 22 SMP FY09-10**

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010			
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
122	Site 22	1100 days	Wed 10/31/07	Wed 11/3/10																
123	Fieldwork (and laboratory)	160 days	Wed 10/31/07	Mon 4/7/08																
124	RI Report for GW/SW/SD	239 days	Sat 5/24/08	Sat 1/17/09																
125	Preliminary RI	84 days	Sat 5/24/08	Fri 8/15/08																
126	Gov't comments	24 days	Sat 8/16/08	Mon 9/8/08																
127	Issue Draft RI report	11 days	Tue 9/9/08	Fri 9/19/08																
128	Regulatory Review	60 days	Sat 9/20/08	Tue 11/18/08																
129	Issue Draft Final RI	30 days	Wed 11/19/08	Thu 12/18/08																
130	Issue final RI report	30 days	Fri 12/19/08	Sat 1/17/09																
131	IRACR	90 days	Sat 11/1/08	Thu 1/29/09																
132	FS Report GW/SW/SD	192 days	Sun 1/18/09	Tue 7/28/09																
133	Preliminary FS	60 days	Sun 1/18/09	Wed 3/18/09																
134	Gov't comments	14 days	Thu 3/19/09	Wed 4/1/09																
135	Issue Draft FS	14 days	Thu 4/2/09	Wed 4/15/09																
136	Regulatory Review	60 days	Thu 4/16/09	Sun 6/14/09																
137	Issue Draft Final FS	14 days	Mon 6/15/09	Sun 6/28/09																
138	Issue Final FS	30 days	Mon 6/29/09	Tue 7/28/09																
139	PP GW/SW/SD	239 days	Wed 7/29/09	Wed 3/24/10																
140	Preliminary PP	60 days	Wed 7/29/09	Sat 9/26/09																
141	Gov't comments	14 days	Sun 9/27/09	Sat 10/10/09																
142	Issue Draft PP	30 days	Sun 10/11/09	Mon 11/9/09																
143	Regulatory / Legal Review	60 days	Tue 11/10/09	Fri 1/8/10																
144	Public Comment Period Draft Final PP	45 days	Sat 1/9/10	Mon 2/22/10																
145	Issue Final PP	30 days	Tue 2/23/10	Wed 3/24/10																
146	ROD GW/SW/SD	224 days	Thu 3/25/10	Wed 11/3/10																
147	Preliminary ROD	90 days	Thu 3/25/10	Tue 6/22/10																
148	Navy Review	14 days	Wed 6/23/10	Tue 7/6/10																
149	Issue Draft ROD	30 days	Wed 7/7/10	Thu 8/5/10																
150	Regulatory / Legal Review	60 days	Fri 8/6/10	Mon 10/4/10																
151	Issue ROD for Signature	30 days	Tue 10/5/10	Wed 11/3/10																

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

Schedule 3-15 Site 23 FY09-10

ID	Task Name	Duration	Start	Finish	2008				2009				2010			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
505	Site 23	821 days	Fri 3/14/08	Sat 6/12/10												
506	RI Report	285 days	Fri 3/14/08	Tue 12/23/08												
507	Issue final RI report	285 days	Fri 3/14/08	Tue 12/23/08												
508	Remedial Action	235 days	Wed 12/24/08	Sat 8/15/09												
509	Implement Remedial Action	145 days	Wed 12/24/08	Sun 5/17/09												
510	RACR	90 days	Mon 5/18/09	Sat 8/15/09												
511	FS	161 days	Wed 12/24/08	Tue 6/2/09												
512	Preliminary FS	60 days	Wed 12/24/08	Sat 2/21/09												
513	Navy Review	14 days	Sun 2/22/09	Sat 3/7/09												
514	Issue Draft FS	14 days	Sun 3/8/09	Sat 3/21/09												
515	Regulatory Review	45 days	Sun 3/22/09	Tue 5/5/09												
516	Issue Draft Final FS	14 days	Wed 5/6/09	Tue 5/19/09												
517	Issue Final FS	14 days	Wed 5/20/09	Tue 6/2/09												
518	PP	203 days	Wed 6/3/09	Tue 12/22/09												
519	Preliminary PP	60 days	Wed 6/3/09	Sat 8/1/09												
520	Navy Review	10 days	Sun 8/2/09	Tue 8/11/09												
521	Issue Draft PP	14 days	Wed 8/12/09	Tue 8/25/09												
522	Regulatory / Legal Review	60 days	Wed 8/26/09	Sat 10/24/09												
523	Public Comment Period Draft Final PP	45 days	Sun 10/25/09	Tue 12/8/09												
524	Issue Final PP	14 days	Wed 12/9/09	Tue 12/22/09												
525	ROD	172 days	Wed 12/23/09	Sat 6/12/10												
526	Preliminary ROD	60 days	Wed 12/23/09	Sat 2/20/10												
527	Navy Review	14 days	Sun 2/21/10	Sat 3/6/10												
528	Issue Draft ROD	14 days	Sun 3/7/10	Sat 3/20/10												
529	Regulatory / Legal Review	60 days	Sun 3/21/10	Wed 5/19/10												
530	Issue ROD for Signature	24 days	Thu 5/20/10	Sat 6/12/10												

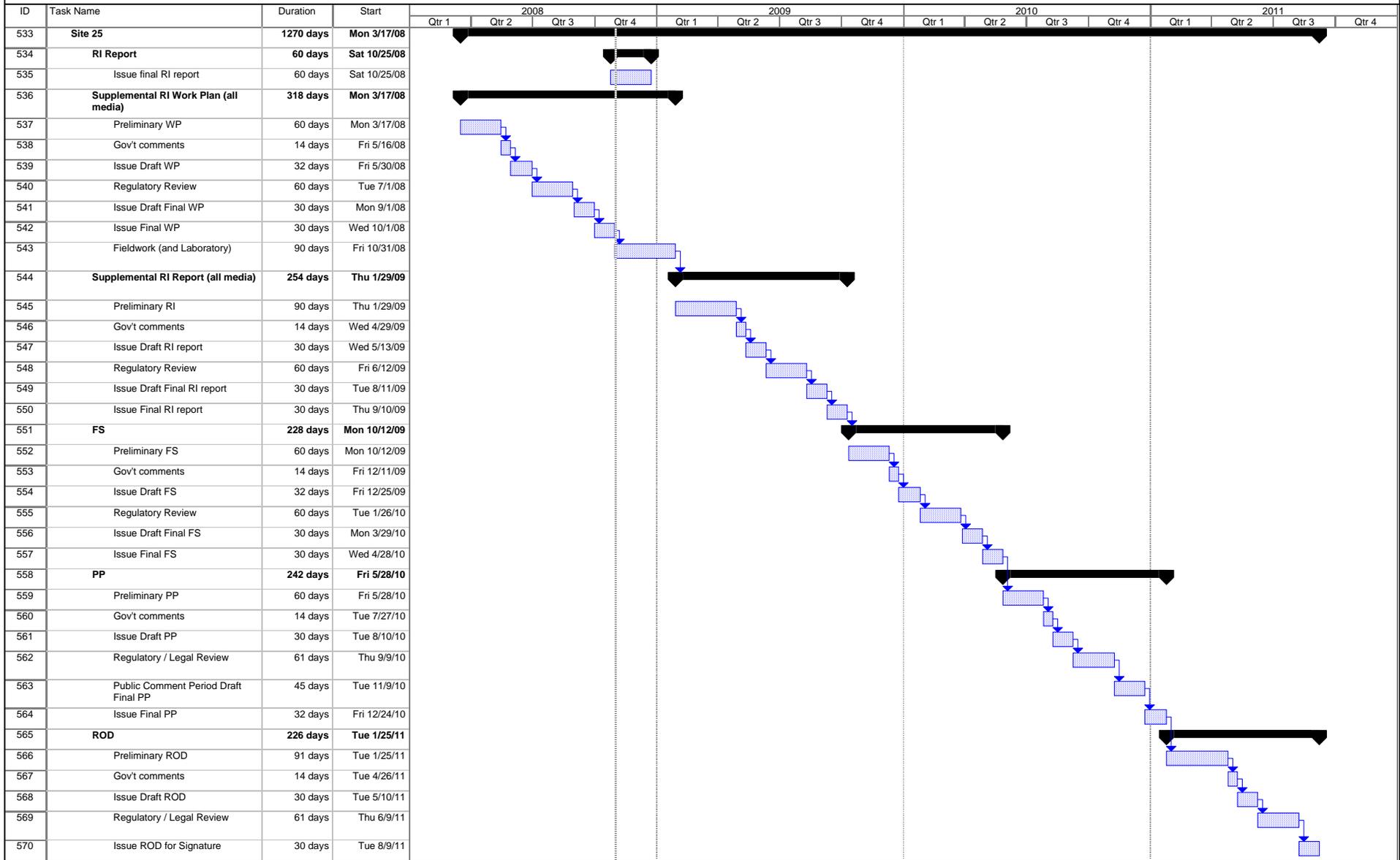
Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

**Schedule 3-16
Site 24 FY09-10**

ID	Task Name	Duration	Start	Finish	2008				2009				2010				2011			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
533	Site 24	1270 days	Mon 6/30/08	Wed 12/21/11																
534	RI Report	60 days	Sat 10/25/08	Tue 12/23/08																
535	Issue final RI report	60 days	Sat 10/25/08	Tue 12/23/08																
536	Supplemental RI Work Plan (all media)	318 days	Mon 6/30/08	Wed 5/13/09																
537	Preliminary WP	60 days	Mon 6/30/08	Thu 8/28/08																
538	Gov't comments	14 days	Fri 8/29/08	Thu 9/11/08																
539	Issue Draft WP	32 days	Fri 9/12/08	Mon 10/13/08																
540	Regulatory Review	60 days	Tue 10/14/08	Fri 12/12/08																
541	Issue Draft Final WP	30 days	Mon 12/15/08	Tue 1/13/09																
542	Issue Final WP	30 days	Wed 1/14/09	Thu 2/12/09																
543	Fieldwork (and Laboratory)	90 days	Fri 2/13/09	Wed 5/13/09																
544	Supplemental RI Report (all media)	254 days	Thu 5/14/09	Fri 1/22/10																
545	Preliminary RI	90 days	Thu 5/14/09	Tue 8/11/09																
546	Gov't comments	14 days	Wed 8/12/09	Tue 8/25/09																
547	Issue Draft RI report	30 days	Wed 8/26/09	Thu 9/24/09																
548	Regulatory Review	60 days	Fri 9/25/09	Mon 11/23/09																
549	Issue Draft Final RI report	30 days	Tue 11/24/09	Wed 12/23/09																
550	Issue Final RI report	30 days	Thu 12/24/09	Fri 1/22/10																
551	FS Report	228 days	Mon 1/25/10	Thu 9/9/10																
552	Preliminary FS	60 days	Mon 1/25/10	Thu 3/25/10																
553	Gov't comments	14 days	Fri 3/26/10	Thu 4/8/10																
554	Issue Draft FS	32 days	Fri 4/9/10	Mon 5/10/10																
555	Regulatory Review	60 days	Tue 5/11/10	Fri 7/9/10																
556	Issue Draft Final FS	30 days	Mon 7/12/10	Tue 8/10/10																
557	Issue Final FS	30 days	Wed 8/11/10	Thu 9/9/10																
558	PP	242 days	Fri 9/10/10	Mon 5/9/11																
559	Preliminary PP	60 days	Fri 9/10/10	Mon 11/8/10																
560	Gov't comments	14 days	Tue 11/9/10	Mon 11/22/10																
561	Issue Draft PP	30 days	Tue 11/23/10	Wed 12/22/10																
562	Regulatory / Legal Review	61 days	Thu 12/23/10	Mon 2/21/11																
563	Public Comment Period Draft Final PP	45 days	Tue 2/22/11	Thu 4/7/11																
564	Issue Final PP	32 days	Fri 4/8/11	Mon 5/9/11																
565	ROD	226 days	Tue 5/10/11	Wed 12/21/11																
566	Preliminary ROD	91 days	Tue 5/10/11	Mon 8/8/11																
567	Gov't comments	14 days	Tue 8/9/11	Mon 8/22/11																
568	Issue Draft ROD	30 days	Tue 8/23/11	Wed 9/21/11																
569	Regulatory / Legal Review	61 days	Thu 9/22/11	Mon 11/21/11																
570	Issue ROD for Signature	30 days	Tue 11/22/11	Wed 12/21/11																

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

**Schedule 3-17
Site 25 FY09-10**



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

Schedule 3-18 Site 26 FY09-10

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2		
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2		
533	Site 26	920 days	Mon 10/1/07	Wed 4/7/10															
534	RI Report	450 days	Mon 10/1/07	Tue 12/23/08															
535	Issue final RI report	450 days	Mon 10/1/07	Tue 12/23/08															
536	PP for GW	244 days	Wed 12/24/08	Mon 8/24/09															
537	Preliminary PP	61 days	Wed 12/24/08	Sun 2/22/09															
538	Gov't Comments	15 days	Mon 2/23/09	Mon 3/9/09															
539	Issue Draft PP	30 days	Tue 3/10/09	Wed 4/8/09															
540	Regulatory / Legal Review	61 days	Thu 4/9/09	Mon 6/8/09															
541	Public Comment Period Draft Final PP	45 days	Tue 6/9/09	Thu 7/23/09															
542	Issue Final PP	32 days	Fri 7/24/09	Mon 8/24/09															
543	ROD for GW	226 days	Tue 8/25/09	Wed 4/7/10															
544	Preliminary ROD	91 days	Tue 8/25/09	Mon 11/23/09															
545	Gov't Comments	14 days	Tue 11/24/09	Mon 12/7/09															
546	Issue Draft ROD	30 days	Tue 12/8/09	Wed 1/6/10															
547	Regulatory / Legal Review	61 days	Thu 1/7/10	Mon 3/8/10															
548	Issue ROD for Signature	30 days	Tue 3/9/10	Wed 4/7/10															

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

Schedule 3-19 Site 28 FY09-10

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010			
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
533	Site 28	842 days	Tue 9/11/07	Wed 12/30/09																
534	Supplemental RI BERA Report	364 days	Tue 9/11/07	Mon 9/8/08																
535	Preliminary RI BERA	60 days	Tue 9/11/07	Fri 11/9/07																
536	Gov't comments	26 days	Mon 11/12/07	Fri 12/7/07																
537	Issue Draft BERA	30 days	Mon 12/10/07	Tue 1/8/08																
538	Regulatory Review	150 days	Mon 1/28/08	Wed 6/25/08																
539	Issue Draft Final BERA	30 days	Thu 6/26/08	Fri 7/25/08																
540	Issue Final BERA	45 days	Sat 7/26/08	Mon 9/8/08																
541	PP	252 days	Tue 9/9/08	Mon 5/18/09																
542	Preliminary PP	70 days	Tue 9/9/08	Mon 11/17/08																
543	Gov't comments	14 days	Tue 11/18/08	Mon 12/1/08																
544	Issue Draft PP	30 days	Tue 12/2/08	Wed 12/31/08																
545	Regulatory / Legal Review	61 days	Thu 1/1/09	Mon 3/2/09																
546	Public Comment Period Draft Final PP	45 days	Tue 3/3/09	Thu 4/16/09																
547	Issue Final PP	32 days	Fri 4/17/09	Mon 5/18/09																
548	ROD	226 days	Tue 5/19/09	Wed 12/30/09																
549	Preliminary ROD	91 days	Tue 5/19/09	Mon 8/17/09																
550	Gov't comments	14 days	Tue 8/18/09	Mon 8/31/09																
551	Issue Draft ROD	30 days	Tue 9/1/09	Wed 9/30/09																
552	Regulatory / Legal Review	61 days	Thu 10/1/09	Mon 11/30/09																
553	Issue ROD for Signature	30 days	Tue 12/1/09	Wed 12/30/09																
735	Remedial Design/Remedial Action (1096 days	Fri 6/29/07	Mon 6/28/10																
736	Implement RA	180 days	Thu 12/31/09	Mon 6/28/10																
737	RACR	90 days	Fri 6/29/07	Wed 9/26/07																

Project: WPNSTA Master Schedule Date: Fri 10/31/08	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	

Schedule 3-20 Site 29 FY09-10

ID	Task Name	Duration	Start	Finish	2007			2008						
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	
346	Site 29	577 days	Fri 8/17/07	Sun 3/15/09										
347	Technical Memorandum (All Media NFA Documentation)	284 days	Fri 8/17/07	Mon 5/26/08										
348	PP (NFA All Media)	219 days	Fri 3/28/08	Sat 11/1/08										
349	Preliminary PP	61 days	Fri 3/28/08	Tue 5/27/08										
350	Gov't comments	6 days	Wed 5/28/08	Mon 6/2/08										
351	Issue Draft PP	17 days	Tue 6/3/08	Thu 6/19/08										
352	Regulatory / Legal Review	60 days	Fri 6/20/08	Mon 8/18/08										
353	Public Comment Period Draft Final PP	45 days	Tue 8/19/08	Thu 10/2/08										
354	Issue Final PP	30 days	Fri 10/3/08	Sat 11/1/08										
355	ROD (NFA All Media)	134 days	Sun 11/2/08	Sun 3/15/09										
356	Preliminary ROD	90 days	Sun 11/2/08	Fri 1/30/09										
357	Gov't comments	14 days	Sun 11/2/08	Sat 11/15/08										
358	Issue Draft ROD	30 days	Sun 11/16/08	Mon 12/15/08										
359	Regulatory / Legal Review	60 days	Tue 12/16/08	Fri 2/13/09										
360	Issue ROD for Signature	30 days	Sat 2/14/09	Sun 3/15/09										

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

Schedule 3-21 Site 30 FY09-10

ID	Task Name	Duration	Start	Finish	2007			2008				2009							
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4				
505	Site 30	787 days	Mon 10/29/07	Wed 12/23/09															
506	EE/CA	102 days	Mon 10/29/07	Thu 2/7/08															
507	Issue Draft Final EE/CA	18 days	Mon 10/29/07	Thu 11/15/07															
508	Public Comment Period	42 days	Fri 11/16/07	Thu 12/27/07															
509	Issue Final EE/CA/AM	42 days	Fri 12/28/07	Thu 2/7/08															
510	IRA	252 days	Fri 2/8/08	Thu 10/16/08															
511	Implement IRA	252 days	Fri 2/8/08	Thu 10/16/08															
512	CCR	90 days	Fri 10/17/08	Wed 1/14/09															
513	TM (for groundwater)	60 days	Fri 10/17/08	Mon 12/15/08															
514	PP	193 days	Tue 12/2/08	Fri 6/12/09															
515	Preliminary PP	30 days	Tue 12/2/08	Wed 12/31/08															
516	Gov't Comments	14 days	Thu 1/1/09	Wed 1/14/09															
517	Issue Draft PP	30 days	Thu 1/15/09	Fri 2/13/09															
518	Regulatory / Legal Review	60 days	Sat 2/14/09	Tue 4/14/09															
519	Public Comment Period Draft Final PP	45 days	Wed 4/15/09	Fri 5/29/09															
520	Issue Final PP	14 days	Sat 5/30/09	Fri 6/12/09															
521	ROD	194 days	Sat 6/13/09	Wed 12/23/09															
522	Preliminary ROD	60 days	Sat 6/13/09	Tue 8/11/09															
523	Navy Review	14 days	Wed 8/12/09	Tue 8/25/09															
524	Issue Draft ROD	30 days	Wed 8/26/09	Thu 9/24/09															
525	Regulatory / Legal Review	60 days	Fri 9/25/09	Mon 11/23/09															
526	Issue ROD for Signature	30 days	Tue 11/24/09	Wed 12/23/09															

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

**Schedule 3-22
SSA 14 SMP FY09-10**

ID	Task Name	Duration	Start	Finish	2008				2009				2010				2011				2012			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
213	SSA 14	1568 days	Sat 4/5/08	Fri 7/20/12																				
214	Construction Completion Report	240 days	Sat 4/5/08	Sun 11/30/08																				
215	Technical Memorandum	162 days	Mon 6/2/08	Mon 11/10/08																				
216	Remedial Investigation Work Plan	297 days	Mon 5/4/09	Wed 2/24/10																				
217	Preliminary RI Work Plan	90 days	Mon 5/4/09	Sat 8/1/09																				
218	Gov't comments	14 days	Sun 8/2/09	Sat 8/15/09																				
219	Issue Draft RI Work Plan	14 days	Sun 8/16/09	Sat 8/29/09																				
220	Regulatory Review	60 days	Sun 8/30/09	Wed 10/28/09																				
221	Issue Draft Final RI Work Plan	14 days	Thu 10/29/09	Wed 11/11/09																				
222	Issue Final RI Work Plan	30 days	Thu 11/12/09	Fri 12/11/09																				
223	Remedial Investigation Field Work	75 days	Sat 12/12/09	Wed 2/24/10																				
224	RI Report for GW/SW/SD	222 days	Thu 2/25/10	Mon 10/4/10																				
225	Preliminary RI	90 days	Thu 2/25/10	Tue 5/25/10																				
226	Gov't comments	14 days	Wed 5/26/10	Tue 6/8/10																				
227	Issue Draft RI	14 days	Wed 6/9/10	Tue 6/22/10																				
228	Regulatory Review	60 days	Wed 6/23/10	Sat 8/21/10																				
229	Issue Draft Final RI	14 days	Sun 8/22/10	Sat 9/4/10																				
230	Issue Final RI	30 days	Sun 9/5/10	Mon 10/4/10																				
231	FS Report	192 days	Tue 10/5/10	Thu 4/14/11																				
232	Preliminary FS	60 days	Tue 10/5/10	Fri 12/3/10																				
233	Gov't comments	14 days	Sat 12/4/10	Fri 12/17/10																				
234	Issue Draft FS	14 days	Sat 12/18/10	Fri 12/31/10																				
235	Regulatory Review	60 days	Sat 1/1/11	Tue 3/1/11																				
236	Issue Draft Final FS	14 days	Wed 3/2/11	Tue 3/15/11																				
237	Issue Final FS	30 days	Wed 3/16/11	Thu 4/14/11																				
238	PP	239 days	Fri 4/15/11	Fri 12/9/11																				
239	Preliminary PP	60 days	Fri 4/15/11	Mon 6/13/11																				
240	Gov't comments	14 days	Tue 6/14/11	Mon 6/27/11																				
241	Issue Draft PP	30 days	Tue 6/28/11	Wed 7/27/11																				
242	Regulatory / Legal Review	60 days	Thu 7/28/11	Sun 9/25/11																				
243	Public Comment Period Draft Final PP	45 days	Mon 9/26/11	Wed 11/9/11																				
244	Issue Final PP	30 days	Thu 11/10/11	Fri 12/9/11																				
245	ROD	224 days	Sat 12/10/11	Fri 7/20/12																				
246	Preliminary ROD	90 days	Sat 12/10/11	Thu 3/8/12																				
247	Gov't comments	14 days	Fri 3/9/12	Thu 3/22/12																				
248	Issue Draft ROD	30 days	Fri 3/23/12	Sat 4/21/12																				
249	Regulatory / Legal Review	60 days	Sun 4/22/12	Wed 6/20/12																				
250	Issue ROD for Signature	30 days	Thu 6/21/12	Fri 7/20/12																				

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

**Schedule 3-23
SSA 15 SMP FY09-10**

ID	Task Name	Duration	Start	Finish	2008			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4
213	SSA 15	151 days	Tue 7/1/08	Fri 11/28/08				
214	Desktop Audit	151 days	Tue 7/1/08	Fri 11/28/08				

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

Schedule 3-24 SSA 22 SMP FY09-10

ID	Task Name	Duration	Start	Finish	Predeces	2007			2008				2009			
						Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	
213	SSA 22	151 days	Tue 7/1/08	Fri 11/28/08												
214	Desktop Audit	151 days	Tue 7/1/08	Fri 11/28/08												

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

Schedule 3-25 SSA 25 SMP FY09-10

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010				2011			
					Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3
533	SSA 25	1087 days	Mon 1/1/07	Tue 3/1/11																				
534	BERA Report	486 days	Mon 1/1/07	Mon 11/10/08																				
535	Preliminary BERA	86 days	Mon 1/1/07	Mon 4/30/07																				
536	Gov't comments	4 days	Tue 5/1/07	Fri 5/4/07																				
537	Issue Draft BERA	1 day	Mon 5/7/07	Mon 5/7/07																				
538	Regulatory Review	79 days	Tue 5/8/07	Fri 8/24/07																				
539	Issue Draft Final BERA	46 days	Mon 8/27/07	Mon 10/29/07																				
540	Issue Final BERA report	270 days	Tue 10/30/07	Mon 11/10/08																				
541	EE/CA & AM	239 days	Fri 10/17/08	Wed 9/16/09																				
542	Preliminary EE/CA	30 days	Fri 10/17/08	Thu 11/27/08																				
543	Gov't comments	14 days	Fri 11/28/08	Wed 12/17/08																				
544	Issue Draft EE/CA	30 days	Thu 12/18/08	Wed 1/28/09																				
545	Regulatory Review	60 days	Thu 1/29/09	Wed 4/22/09																				
546	Issue Draft Final EE/CA	30 days	Thu 4/23/09	Wed 6/3/09																				
547	Public Comment Period	45 days	Thu 6/4/09	Wed 8/5/09																				
548	Issue Final EE/CA	30 days	Thu 8/6/09	Wed 9/16/09																				
549	IRA	335 days	Thu 1/29/09	Wed 5/12/10																				
550	RA Work Plan	215 days	Thu 1/29/09	Wed 11/25/09																				
551	Implement IRA	30 days	Thu 11/26/09	Wed 1/6/10																				
552	Construction Completion Report	90 days	Thu 1/7/10	Wed 5/12/10																				
553	DD	209 days	Thu 5/13/10	Tue 3/1/11																				
554	Preliminary DD	30 days	Thu 5/13/10	Wed 6/23/10																				
555	Gov't comments	14 days	Thu 6/24/10	Tue 7/13/10																				
556	Issue Draft DD	30 days	Wed 7/14/10	Tue 8/24/10																				
557	Regulatory / Legal Review	60 days	Wed 8/25/10	Tue 11/16/10																				
558	Public Comment Period Draft Final DD	45 days	Wed 11/17/10	Tue 1/18/11																				
559	Issue Final DD	30 days	Wed 1/19/11	Tue 3/1/11																				

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

**Schedule 3-26
AOC 23 SMP FY09-10**

ID	Task Name	Duration	Start	Finish	2008				2009				2010				2011				2012			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
213	AOC 23	1485 days	Mon 5/12/08	Mon 6/4/12																				
214	Technical Memorandum for SW/SD/GW	245 days	Mon 5/12/08	Sun 1/11/09																				
215	Remedial Investigation Work Plan	342 days	Mon 2/2/09	Sat 1/9/10																				
216	Preliminary RI Work Plan	90 days	Mon 2/2/09	Sat 5/2/09																				
217	Gov't comments	14 days	Sun 5/3/09	Sat 5/16/09																				
218	Issue Draft RI Work Plan	14 days	Sun 5/17/09	Sat 5/30/09																				
219	Regulatory Review	60 days	Sun 5/31/09	Wed 7/29/09																				
220	Issue Draft Final RI Work Plan	14 days	Thu 7/30/09	Wed 8/12/09																				
221	Issue Final RI Work Plan	30 days	Thu 8/13/09	Fri 9/11/09																				
222	Remedial Investigation	120 days	Sat 9/12/09	Sat 1/9/10																				
223	RI Report for GW/SW/SD	222 days	Sun 1/10/10	Thu 8/19/10																				
224	Preliminary RI	90 days	Sun 1/10/10	Fri 4/9/10																				
225	Gov't comments	14 days	Sat 4/10/10	Fri 4/23/10																				
226	Issue Draft RI	14 days	Sat 4/24/10	Fri 5/7/10																				
227	Regulatory Review	60 days	Sat 5/8/10	Tue 7/6/10																				
228	Issue Draft Final RI	14 days	Wed 7/7/10	Tue 7/20/10																				
229	Issue Final RI	30 days	Wed 7/21/10	Thu 8/19/10																				
230	FS Report	192 days	Fri 8/20/10	Sun 2/27/11																				
231	Preliminary FS	60 days	Fri 8/20/10	Mon 10/18/10																				
232	Gov't comments	14 days	Tue 10/19/10	Mon 11/1/10																				
233	Issue Draft FS	14 days	Tue 11/2/10	Mon 11/15/10																				
234	Regulatory Review	60 days	Tue 11/16/10	Fri 1/14/11																				
235	Issue Draft Final FS	14 days	Sat 1/15/11	Fri 1/28/11																				
236	Issue Final FS	30 days	Sat 1/29/11	Sun 2/27/11																				
237	PP	239 days	Mon 2/28/11	Mon 10/24/11																				
238	Preliminary PP	60 days	Mon 2/28/11	Thu 4/28/11																				
239	Gov't comments	14 days	Fri 4/29/11	Thu 5/12/11																				
240	Issue Draft PP	30 days	Fri 5/13/11	Sat 6/11/11																				
241	Regulatory / Legal Review	60 days	Sun 6/12/11	Wed 8/10/11																				
242	Public Comment Period Draft Final PP	45 days	Thu 8/11/11	Sat 9/24/11																				
243	Issue Final PP	30 days	Sun 9/25/11	Mon 10/24/11																				
244	ROD	224 days	Tue 10/25/11	Mon 6/4/12																				
245	Preliminary ROD	90 days	Tue 10/25/11	Sun 1/22/12																				
246	Gov't comments	14 days	Mon 1/23/12	Sun 2/5/12																				
247	Issue Draft ROD	30 days	Mon 2/6/12	Tue 3/6/12																				
248	Regulatory / Legal Review	60 days	Wed 3/7/12	Sat 5/5/12																				
249	Issue ROD for Signature	30 days	Sun 5/6/12	Mon 6/4/12																				
762	RD/RA (as appropriate)	120 days	Tue 6/5/12	Tue 10/2/12																				

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

**Schedule 3-27
Site 2 SMP FY09-10**

ID	Task Name	Duration	Start	Finish	2008				
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	
213	Site 2	170 days	Tue 6/3/08	Wed 11/19/08					
214	MMRP Prioritization	170 days	Tue 6/3/08	Wed 11/19/08					

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

SECTION 4

Land Use Planning

Sites with LUCs and the boundaries of potential environmental impact areas are shown on [Figure 4-1](#). The Sites with LUCs in place are:

- Site 1 – Dudley Road Landfill
- Site 3 – Group 16 Magazine Landfill
- Site 6 – Explosive Impoundment, Flume Area and Excavation Area
- Site 7 – Plant 3 Explosives-Contaminated Wastewater Discharge Area
- Site 12 – Barracks Road Landfill
- Site 16 – West Road Landfill
- Site 17 – Holm Road Landfill
- Site 19 – Conveyor Belt Soils at Building 10

This information is made available on the NAVFAC MIDLANT GeoReadiness website to address environmental considerations during planning and decision making. Contact information is listed below:

Ms. Linda Cole

Naval Facilities Engineering Command, Mid Atlantic
9742 Maryland Ave. Bldg N-26, Room 3208
Norfolk, VA 23511-3095



Legend

-  Land Use Control Boundary (Draft LUC RD Prepared)
-  Base Boundary

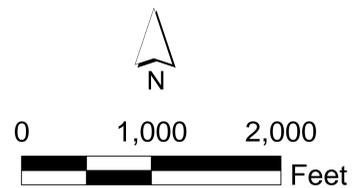


Figure 4-1
WPNSTA LUC Boundary Map
Site Management Plan for FY 2009 to 2010
WPNSTA Yorktown
Yorktown, Virginia

SECTION 5

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Responses to Comments

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Fax 757.497.6885



CH2MHILL

September 17, 2008

370301.SP.SP

Mr. Wade Smith
Remedial Project Manager
Office of Remediation Programs
Virginia Department of Environmental Quality (VDEQ)
P.O. Box 1105
Richmond, Virginia 23218

Subject: Response to VDEQ Comments on *Draft Site Management Plan, Fiscal Years 2009-2010* (Draft SMP) for Naval Weapons Station Yorktown, Yorktown, Virginia.

Dear Mr. Smith,

On behalf of the U.S. Department of the Navy's Naval Facilities Engineering Command (NAVFAC), this letter is in response to your September 4, 2008 comments regarding the subject document. Comments are presented, shown in italics, followed by Navy's responses.

1. Comment: *Please verify that Schedules 3-1 through 3-27 have been accurately established and consistently detailed (including Duration, Start, and Finish) according to the "Path Forward" for each site.*

Response: The following revisions will be made to the schedules and their respective text sections:

- Schedule 3-3: The Finish time and RACR were accidentally omitted from the schedule. The schedule will be adjusted to reflect the Duration, Start, and Finish times for the CERCLA path forward as proposed in the text.
- Schedule 3-4: The Treatability Study will be added to the text of the CERCLA path forward for Site 6. Additionally, the RACR will be added to the schedule.
- Schedule 3-5: The schedule will be adjusted to reflect that an FS/PP/ROD for groundwater will be added performed if appropriate.
- Schedule 3-10 and 3-11: The RACR will be added to the schedule.
- Schedule 3-13: The RD/RA (as appropriate) will be removed from the text as it is expected that Site 21 will be no further action based on the recent RI.
- Schedule 3-21: The CCR and groundwater TM will be added to the schedule.
- Schedule 3-25: The PP/ROD in the schedule will be changed to DD as proposed in the text.
- Schedule 3-26: The RD/RA (as appropriate) will be added to the schedule.

- Additionally, it is anticipated that expedited reviews may be requested for AOC 23 and Site 23 in order to meet NAVY RIP goals.

2. Comment: *Contents, Schedules: Please change to: (Schedules are located at the end of Sections 3-and-4.)*

Response: The document will be revised as follows:

- Page v, Contents Section: The text will read: “**Schedules (Schedules are located at the end of Section 3.)**”

3. Comment: *3.3.1 MWR Skeet Range, Path Forward: Please delete: Schedule 3-27 presents the FY09-10 schedule for the MWR Skeet Range.*

Response: The document will be revised as follows:

- Page 3-73, Section 3.3.1, Path Forward. The aforementioned sentence will be deleted and the text will read, “**CERCLA documentation is complete. No action is necessary and the site is closed under the MRP.**”

4. Comment: *3.3.2 Site 2-Turkey Road Landfill, Path Forward: Please change to: Schedule ~~3-28~~ 3-27 presents the FY09-10 schedule for Site 2.*

Response: The document will be revised as follows:

- Page 3-75, Section 3.3.2, Path Forward. The text will read “**Schedule 3-27 presents the FY09-10 schedule for Site 2.**”

If you have any questions or comments regarding the above response to comments, please feel free to contact me at 757-671-6235.

Sincerely,

CH2M HILL



Rebekah Klyukin
Project Manager

cc: Ms. Linda Cole/NAVFAC
Mr. Christopher Murray/NAVFAC
Mr. Robert Thomson/USEPA
Mr. William Friedmann/CH2M HILL
Mr. Jim Gravette/CH2M HILL

**Schedule 3-3
Site 4 FY09-10**

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010				
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	
122	Site 4	1330 days	Tue 5/1/07	Mon 12/20/10																	
123	Fieldwork	331 days	Tue 5/1/07	Wed 3/26/08																	
124	Laboratory Analysis	58 days	Thu 3/27/08	Fri 5/23/08																	
125	RI Report for GW/SW/SD	344 days	Sat 5/24/08	Sat 5/2/09																	
126	Preliminary RI	90 days	Sat 5/24/08	Thu 8/21/08																	
127	Gov't comments	14 days	Fri 8/22/08	Thu 9/4/08																	
128	Issue draft RI report	30 days	Fri 9/5/08	Sat 10/4/08																	
129	Regulatory Review	60 days	Sun 10/5/08	Wed 12/3/08																	
130	Issue draft final RI report	30 days	Thu 12/4/08	Fri 1/2/09																	
131	Issue final RI report	30 days	Sat 1/3/09	Sun 2/1/09																	
132	RACR	90 days	Mon 2/2/09	Sat 5/2/09																	
133	FS Report GW/SW/SD	224 days	Mon 2/2/09	Sun 9/13/09																	
134	Preliminary FS	60 days	Mon 2/2/09	Thu 4/2/09																	
135	Gov't comments	14 days	Fri 4/3/09	Thu 4/16/09																	
136	Issue draft FS	30 days	Fri 4/17/09	Sat 5/16/09																	
137	Regulatory Review	60 days	Sun 5/17/09	Wed 7/15/09																	
138	Issue draft Final FS	30 days	Thu 7/16/09	Fri 8/14/09																	
139	Issue Final FS	30 days	Sat 8/15/09	Sun 9/13/09																	
140	PP GW/SW/SD	239 days	Mon 9/14/09	Mon 5/10/10																	
141	Preliminary PP	60 days	Mon 9/14/09	Thu 11/12/09																	
142	Navy Review	14 days	Fri 11/13/09	Thu 11/26/09																	
143	Issue Draft PP	30 days	Fri 11/27/09	Sat 12/26/09																	
144	Regulatory / Legal Review	60 days	Sun 12/27/09	Wed 2/24/10																	
145	Public Comment Period Draft Final PP	45 days	Thu 2/25/10	Sat 4/10/10																	
146	Issue Final PP	30 days	Sun 4/11/10	Mon 5/10/10																	
147	ROD GW/SW/SD	224 days	Tue 5/11/10	Mon 12/20/10																	
148	Preliminary ROD	90 days	Tue 5/11/10	Sun 8/8/10																	
149	Navy Review	14 days	Mon 8/9/10	Sun 8/22/10																	
150	Issue Draft ROD	30 days	Mon 8/23/10	Tue 9/21/10																	
151	Regulatory / Legal Review	60 days	Wed 9/22/10	Sat 11/20/10																	
152	Issue ROD for Signature	30 days	Sun 11/21/10	Mon 12/20/10																	
753	RACR	90 days	Tue 12/21/10	Sun 3/20/11																	

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

**Schedule 3-4
Site 6 FY09-10**

ID	Task Name	Duration	Start	Finish	2008												2009				2010				2011				2012			
					Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4		
154	Site 6	1861 days	Mon 8/27/07	Sat 9/29/12																												
155	ESD	90 days	Mon 6/30/08	Sat 9/27/08																												
156	GW Investigation Work Plan	308 days	Mon 8/27/07	Sun 6/29/08																												
157	Preliminary WP	22 days	Mon 8/27/07	Mon 9/17/07																												
158	Gov't comments	45 days	Tue 9/18/07	Thu 11/1/07																												
159	Issue Draft WP	50 days	Fri 11/2/07	Fri 12/21/07																												
160	Regulatory Review	178 days	Sat 12/22/07	Mon 6/16/08																												
161	Issue Final WP	13 days	Tue 6/17/08	Sun 6/29/08																												
162	GW Investigation Fieldwork	141 days	Mon 6/30/08	Mon 11/17/08																												
163	RI Report for GW	314 days	Tue 11/18/08	Sun 9/27/09																												
164	Preliminary RI	90 days	Tue 11/18/08	Sun 2/15/09																												
165	Gov't comments	14 days	Mon 2/16/09	Sun 3/1/09																												
166	Issue draft RI report	30 days	Mon 3/2/09	Tue 3/31/09																												
167	Regulatory Review	60 days	Wed 4/1/09	Sat 5/30/09																												
168	Issue draft final RI report	30 days	Sun 5/31/09	Mon 6/29/09																												
169	Issue final RI report	30 days	Tue 6/30/09	Wed 7/29/09																												
170	RACR	90 days	Tue 6/30/09	Sun 9/27/09																												
171	TS	365 days	Thu 7/30/09	Thu 7/29/10																												
172	Treatability Study	365 days	Thu 7/30/09	Thu 7/29/10																												
173	FS Report	192 days	Fri 7/30/10	Sun 2/6/11																												
174	Preliminary FS	60 days	Fri 7/30/10	Mon 9/27/10																												
175	Gov't comments	14 days	Tue 9/28/10	Mon 10/11/10																												
176	Issue draft FS	14 days	Tue 10/12/10	Mon 10/25/10																												
177	Regulatory Review	60 days	Tue 10/26/10	Fri 12/24/10																												
178	Issue draft Final FS	14 days	Sat 12/25/10	Fri 1/7/11																												
179	Issue Final FS	30 days	Sat 1/8/11	Sun 2/6/11																												
180	PP	179 days	Mon 2/7/11	Thu 8/4/11																												
181	Preliminary PP	60 days	Mon 2/7/11	Thu 4/7/11																												
182	Navy Review	14 days	Mon 2/7/11	Sun 2/20/11																												
183	Issue Draft PP	30 days	Mon 2/21/11	Tue 3/22/11																												
184	Regulatory / Legal Review	60 days	Wed 3/23/11	Sat 5/21/11																												
185	Public Comment Period Draft Final PP	45 days	Sun 5/22/11	Tue 7/5/11																												
186	Issue Final PP	30 days	Wed 7/6/11	Thu 8/4/11																												
187	ROD	134 days	Fri 8/5/11	Fri 12/16/11																												
188	Preliminary ROD	90 days	Fri 8/5/11	Wed 11/2/11																												
189	Navy Review	14 days	Fri 8/5/11	Thu 8/18/11																												
190	Issue Draft ROD	30 days	Fri 8/19/11	Sat 9/17/11																												
191	Regulatory / Legal Review	60 days	Sun 9/18/11	Wed 11/16/11																												
192	Issue ROD for Signature	30 days	Thu 11/17/11	Fri 12/16/11																												
193	Five-year Review	152 days	Tue 5/1/12	Sat 9/29/12																												
752	RACR	90 days	Sat 12/17/11	Thu 3/15/12																												

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

Schedule 3-5 Site 7 FY09-10

ID	Task Name	Duration	Start	Finish	2008				2009				2010				2011				2012			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
203	Site 7	600 days	Mon 6/30/08	Fri 2/19/10																				
204	LTM for GW	600 days	Mon 6/30/08	Fri 2/19/10																				
205	FS Report	192 days	Sat 2/20/10	Mon 8/30/10																				
206	Preliminary FS	60 days	Sat 2/20/10	Tue 4/20/10																				
207	Gov't Comments	14 days	Wed 4/21/10	Tue 5/4/10																				
208	Issue Draft FS	14 days	Wed 5/5/10	Tue 5/18/10																				
209	Regulatory Review	60 days	Wed 5/19/10	Sat 7/17/10																				
210	Issue Draft Final FS	14 days	Sun 7/18/10	Sat 7/31/10																				
211	Issue Final FS	30 days	Sun 8/1/10	Mon 8/30/10																				
212	PP	239 days	Tue 8/31/10	Tue 4/26/11																				
213	Prelliminary PP	60 days	Tue 8/31/10	Fri 10/29/10																				
214	Navy Review	14 days	Sat 10/30/10	Fri 11/12/10																				
215	Issue Draft PP	30 days	Sat 11/13/10	Sun 12/12/10																				
216	Regulatory/Legal Review	60 days	Mon 12/13/10	Thu 2/10/11																				
217	Public Commnet Period Draft Final PP	45 days	Fri 2/11/11	Sun 3/27/11																				
218	Issue/Final PP	30 days	Mon 3/28/11	Tue 4/26/11																				
219	ROD	522 days	Wed 4/27/11	Sat 9/29/12																				
220	Preliminary ROD	90 days	Wed 4/27/11	Mon 7/25/11																				
221	Navy Review	14 days	Tue 7/26/11	Mon 8/8/11																				
222	Issue Draft ROD	30 days	Tue 8/9/11	Wed 9/7/11																				
223	Regulatory/Legal Review	60 days	Thu 9/8/11	Sun 11/6/11																				
224	Issue ROD for Signature	30 days	Mon 11/7/11	Tue 12/6/11																				
225	Five-year Review	152 days	Tue 5/1/12	Sat 9/29/12																				
226	Preliminary Five-Year Review	45 days	Tue 5/1/12	Thu 6/14/12																				
227	Gov't comments	14 days	Fri 6/15/12	Thu 6/28/12																				
228	Issue Draft Five-Year Review	14 days	Fri 6/29/12	Thu 7/12/12																				
229	Regulatory Review	60 days	Fri 7/13/12	Mon 9/10/12																				
230	Issue Draft Final Five-Year Review	14 days	Tue 9/11/12	Mon 9/24/12																				
231	Issue Final Five-Year Review	5 days	Tue 9/25/12	Sat 9/29/12																				
232	RACR	90 days	Wed 12/7/11	Mon 3/5/12																				

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

Schedule 3-11 Site 17 FY09-10

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010			
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
328	Site 17	955 days	Mon 9/3/07	Wed 4/14/10																
329	Technical Memorandum (all waste removed)	332 days	Mon 9/3/07	Wed 7/30/08																
330	ESD for Soil/Waste (NFA)	218 days	Thu 7/31/08	Thu 3/5/09																
331	PP for GW (NFA)	245 days	Tue 12/30/08	Mon 8/31/09																
332	Preliminary PP	60 days	Tue 12/30/08	Fri 2/27/09																
333	Gov't Comments	15 days	Mon 3/2/09	Mon 3/16/09																
334	Issue Draft PP	30 days	Tue 3/17/09	Wed 4/15/09																
335	Regulatory / Legal Review	61 days	Thu 4/16/09	Mon 6/15/09																
336	Public Comment Period Draft Final PP	45 days	Tue 6/16/09	Thu 7/30/09																
337	Issue Final PP	32 days	Fri 7/31/09	Mon 8/31/09																
338	ROD for GW (NFA)	226 days	Tue 9/1/09	Wed 4/14/10																
339	Preliminary ROD	91 days	Tue 9/1/09	Mon 11/30/09																
340	Gov't Comments	14 days	Tue 12/1/09	Mon 12/14/09																
341	Issue Draft ROD	30 days	Tue 12/15/09	Wed 1/13/10																
342	Regulatory / Legal Review	61 days	Thu 1/14/10	Mon 3/15/10																
343	Issue ROD for Signature	30 days	Tue 3/16/10	Wed 4/14/10																
715	RACR	90 days	Thu 4/15/10	Tue 7/13/10																

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

Schedule 3-21 Site 30 FY09-10

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010			
					Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
505	Site 30	1063 days	Mon 10/29/07	Sat 9/25/10	[Summary bar spanning all quarters from 2007 to 2010]															
506	EE/CA	102 days	Mon 10/29/07	Thu 2/7/08	[Task bar]															
507	Issue Draft Final EE/CA	18 days	Mon 10/29/07	Thu 11/15/07	[Task bar]															
508	Public Comment Period	42 days	Fri 11/16/07	Thu 12/27/07	[Task bar]															
509	Issue Final EE/CA/AM	42 days	Fri 12/28/07	Thu 2/7/08	[Task bar]															
510	IRA	252 days	Fri 2/8/08	Thu 10/16/08	[Summary bar]															
511	Implement IRA	252 days	Fri 2/8/08	Thu 10/16/08	[Task bar]															
512	CCR	90 days	Fri 10/17/08	Wed 1/14/09	[Task bar]															
513	TM (for groundwater)	60 days	Fri 10/17/08	Mon 12/15/08	[Task bar]															
514	PP	335 days	Tue 12/16/08	Sun 11/15/09	[Summary bar]															
515	Preliminary PP	84 days	Tue 12/16/08	Mon 3/9/09	[Task bar]															
516	Gov't Comments	20 days	Tue 3/10/09	Sun 3/29/09	[Task bar]															
517	Issue Draft PP	42 days	Mon 3/30/09	Sun 5/10/09	[Task bar]															
518	Regulatory / Legal Review	84 days	Mon 5/11/09	Sun 8/2/09	[Task bar]															
519	Public Comment Period Draft Final PP	63 days	Mon 8/3/09	Sun 10/4/09	[Task bar]															
520	Issue Final PP	42 days	Mon 10/5/09	Sun 11/15/09	[Task bar]															
521	ROD	314 days	Mon 11/16/09	Sat 9/25/10	[Summary bar]															
522	Preliminary ROD	126 days	Mon 11/16/09	Sun 3/21/10	[Task bar]															
523	Navy Review	20 days	Mon 3/22/10	Sat 4/10/10	[Task bar]															
524	Issue Draft ROD	42 days	Sun 4/11/10	Sat 5/22/10	[Task bar]															
525	Regulatory / Legal Review	84 days	Sun 5/23/10	Sat 8/14/10	[Task bar]															
526	Issue ROD for Signature	42 days	Sun 8/15/10	Sat 9/25/10	[Task bar]															

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

Schedule 3-25 SSA 25 SMP FY09-10

ID	Task Name	Duration	Start	Finish	2007				2008				2009				2010				2011			
					Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3
533	SSA 25	1114 days	Mon 1/1/07	Thu 4/7/11																				
534	BERA Report	396 days	Mon 1/1/07	Mon 7/7/08																				
535	Preliminary BERA	86 days	Mon 1/1/07	Mon 4/30/07																				
536	Gov't comments	4 days	Tue 5/1/07	Fri 5/4/07																				
537	Issue Draft BERA	1 day	Mon 5/7/07	Mon 5/7/07																				
538	Regulatory Review	79 days	Tue 5/8/07	Fri 8/24/07																				
539	Issue Draft Final BERA	46 days	Mon 8/27/07	Mon 10/29/07																				
540	Issue Final BERA report	180 days	Tue 10/30/07	Mon 7/7/08																				
541	EE/CA & AM	269 days	Tue 7/8/08	Fri 7/17/09																				
542	Preliminary EE/CA	60 days	Tue 7/8/08	Mon 9/29/08																				
543	Gov't comments	14 days	Tue 9/30/08	Fri 10/17/08																				
544	Issue Draft EE/CA	30 days	Mon 10/20/08	Fri 11/28/08																				
545	Regulatory Review	60 days	Mon 12/1/08	Fri 2/20/09																				
546	Issue Draft Final EE/CA	30 days	Mon 2/23/09	Fri 4/3/09																				
547	Public Comment Period	45 days	Mon 4/6/09	Fri 6/5/09																				
548	Issue Final EE/CA	30 days	Mon 6/8/09	Fri 7/17/09																				
549	IRA	210 days	Mon 7/20/09	Fri 5/7/10																				
550	Implement IRA	120 days	Mon 7/20/09	Fri 1/1/10																				
551	Construction Completion Report	90 days	Mon 1/4/10	Fri 5/7/10																				
552	DD	239 days	Mon 5/10/10	Thu 4/7/11																				
553	Preliminary DD	60 days	Mon 5/10/10	Fri 7/30/10																				
554	Gov't comments	14 days	Mon 8/2/10	Thu 8/19/10																				
555	Issue Draft DD	30 days	Fri 8/20/10	Thu 9/30/10																				
556	Regulatory / Legal Review	60 days	Fri 10/1/10	Thu 12/23/10																				
557	Public Comment Period Draft Final DD	45 days	Fri 12/24/10	Thu 2/24/11																				
558	Issue Final DD	30 days	Fri 2/25/11	Thu 4/7/11																				

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

**Schedule 3-26
AOC 23 SMP FY09-10**

ID	Task Name	Duration	Start	Finish	2008				2009				2010				2011				2012			
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
213	AOC 23	1485 days	Mon 5/12/08	Mon 6/4/12																				
214	Technical Memorandum for SW/SD/GW	135 days	Mon 5/12/08	Tue 9/23/08																				
215	Remedial Investigation Work Plan	342 days	Mon 2/2/09	Sat 1/9/10																				
216	Preliminary RI Work Plan	90 days	Mon 2/2/09	Sat 5/2/09																				
217	Gov't comments	14 days	Sun 5/3/09	Sat 5/16/09																				
218	Issue Draft RI Work Plan	14 days	Sun 5/17/09	Sat 5/30/09																				
219	Regulatory Review	60 days	Sun 5/31/09	Wed 7/29/09																				
220	Issue Draft Final RI Work Plan	14 days	Thu 7/30/09	Wed 8/12/09																				
221	Issue Final RI Work Plan	30 days	Thu 8/13/09	Fri 9/11/09																				
222	Remedial Investigation	120 days	Sat 9/12/09	Sat 1/9/10																				
223	RI Report for GW/SW/SD	222 days	Sun 1/10/10	Thu 8/19/10																				
224	Preliminary RI	90 days	Sun 1/10/10	Fri 4/9/10																				
225	Gov't comments	14 days	Sat 4/10/10	Fri 4/23/10																				
226	Issue Draft RI	14 days	Sat 4/24/10	Fri 5/7/10																				
227	Regulatory Review	60 days	Sat 5/8/10	Tue 7/6/10																				
228	Issue Draft Final RI	14 days	Wed 7/7/10	Tue 7/20/10																				
229	Issue Final RI	30 days	Wed 7/21/10	Thu 8/19/10																				
230	FS Report	192 days	Fri 8/20/10	Sun 2/27/11																				
231	Preliminary FS	60 days	Fri 8/20/10	Mon 10/18/10																				
232	Gov't comments	14 days	Tue 10/19/10	Mon 11/1/10																				
233	Issue Draft FS	14 days	Tue 11/2/10	Mon 11/15/10																				
234	Regulatory Review	60 days	Tue 11/16/10	Fri 1/14/11																				
235	Issue Draft Final FS	14 days	Sat 1/15/11	Fri 1/28/11																				
236	Issue Final FS	30 days	Sat 1/29/11	Sun 2/27/11																				
237	PP	239 days	Mon 2/28/11	Mon 10/24/11																				
238	Preliminary PP	60 days	Mon 2/28/11	Thu 4/28/11																				
239	Gov't comments	14 days	Fri 4/29/11	Thu 5/12/11																				
240	Issue Draft PP	30 days	Fri 5/13/11	Sat 6/11/11																				
241	Regulatory / Legal Review	60 days	Sun 6/12/11	Wed 8/10/11																				
242	Public Comment Period Draft Final PP	45 days	Thu 8/11/11	Sat 9/24/11																				
243	Issue Final PP	30 days	Sun 9/25/11	Mon 10/24/11																				
244	ROD	224 days	Tue 10/25/11	Mon 6/4/12																				
245	Preliminary ROD	90 days	Tue 10/25/11	Sun 1/22/12																				
246	Gov't comments	14 days	Mon 1/23/12	Sun 2/5/12																				
247	Issue Draft ROD	30 days	Mon 2/6/12	Tue 3/6/12																				
248	Regulatory / Legal Review	60 days	Wed 3/7/12	Sat 5/5/12																				
249	Issue ROD for Signature	30 days	Sun 5/6/12	Mon 6/4/12																				
762	RD/RA (as appropriate)	120 days	Tue 6/5/12	Tue 10/2/12																				

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