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NAVFAC
Naval Facilities Engineering Command

Site Management Plan Fiscal Years 2014—2015

Naval Weapons Station Yorktown
Yorktown, Virginia

November 2013

Contract No. N62470-11-D-8012 | CTO-WE73

prepared by CH2MHILL®

Site Management Plan
Fiscal Years 2014—2015

Naval Weapons Station Yorktown
Yorktown, Virginia

Contract Task Order WE73

November 2013

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Under the

NAVFAC CLEAN 8012 Program
Contract N62470-11-D-8012

Prepared by

CH2MHILL®

Virginia Beach, Virginia

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Acronyms and Abbreviations

µg/kg	microgram per kilogram
µg/L	microgram per liter
amsl	above mean sea level
AOC	Area of Concern
AST	aboveground storage tank
BEHP	bis-2-ethylhexyl phthalate BERA Baseline Ecological Risk Assessment
bgs	below ground surface
BHC	beta-benzene hexachloride
bio-cell	bioremediation cell
BTAG	Biological Technical Assistance Group
CAX	Cheatham Annex
CCR	Construction Completion Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIP	Community Involvement Plan
COC	contaminant of concern
COPC	contaminant of potential concern
cPAH	carcinogenic polyaromatic hydrocarbon
CTE	central tendency exposure
DCA	dichloroethane
DCE	dichloroethene
DD	Decision Document
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DNAPL	dense non-aqueous-phase liquid
DNT	dinitrotoluene
DoD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EI	ecological index
EOD	Explosive Ordnance Disposal
ER	Environmental Restoration
ER-L	effects range-low
ER-M	effects range-medium
ERA	Ecological Risk Assessment
ERI	Expanded Remedial Investigation
ERP	Environmental Restoration Program
ESD	Explanation of Significant Differences
ESV	ecological screening value
FFA	Federal Facilities Agreement
FS	Feasibility Study
ft/day	foot per day
ft^2/day	square feet per day
FY	Fiscal Year

HHRA	Human Health Risk Assessment
HHRS	Human Health Risk Screening
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
IRP	Installation Restoration Program
LTM	long-term monitoring
LUC	land use control
MCL	maximum contaminant level
MEC	munitions and explosives of concern
mg/kg	milligram per kilogram
mg/L	milligram per liter
MIP	membrane interface probe
MRP	Munitions Response Program
MWR	Morale, Welfare, and Recreation
NACIP	Navy Assessment and Control of Installation Pollutants
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCP	National Contingency Plan
NEDED	Naval Explosives Development Engineering Department
NERP	Navy Environmental Restoration Program
NFA	no further action
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NTCRA	non-time-critical removal action
PA	Preliminary Assessment
PAH	polyaromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PP	Proposed Plan
PRAP	Proposed Remedial Action Plan
RA	remedial action
RAB	Restoration Advisory Board
RACR	Remedial Action Completion Report
RAWP	Remedial Action Work Plan
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
RME	reasonable maximum exposure

ROD	Record of Decision
RSL	regional screening level
SARA	Superfund Amendments and Reauthorization Act
SERA	Screening Ecological Risk Assessment
SI	Site Investigation
SMP	Site Management Plan
SSA	Site Screening Area
SSL	soil screening level
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
TM	Technical Memorandum
TNB	trinitrobenzene
TNT	trinitrotoluene
TPH	total petroleum hydrocarbon
UCL	upper confidence limit
UFP-SAP	Uniform Federal Policy-Sampling and Analysis Plan
UNITEC	Universe Technologies, Inc.
USEPA	United States Environmental Protection Agency
UST	underground storage tank
UXO	unexploded ordnance
VC	vinyl chloride
VDEQ	Virginia Department of Environmental Quality
VOC	volatile organic compound
WPNSTA	Naval Weapons Station
WQC	Water Quality Criteria
yd^3	cubic yard

SECTION 1

Introduction

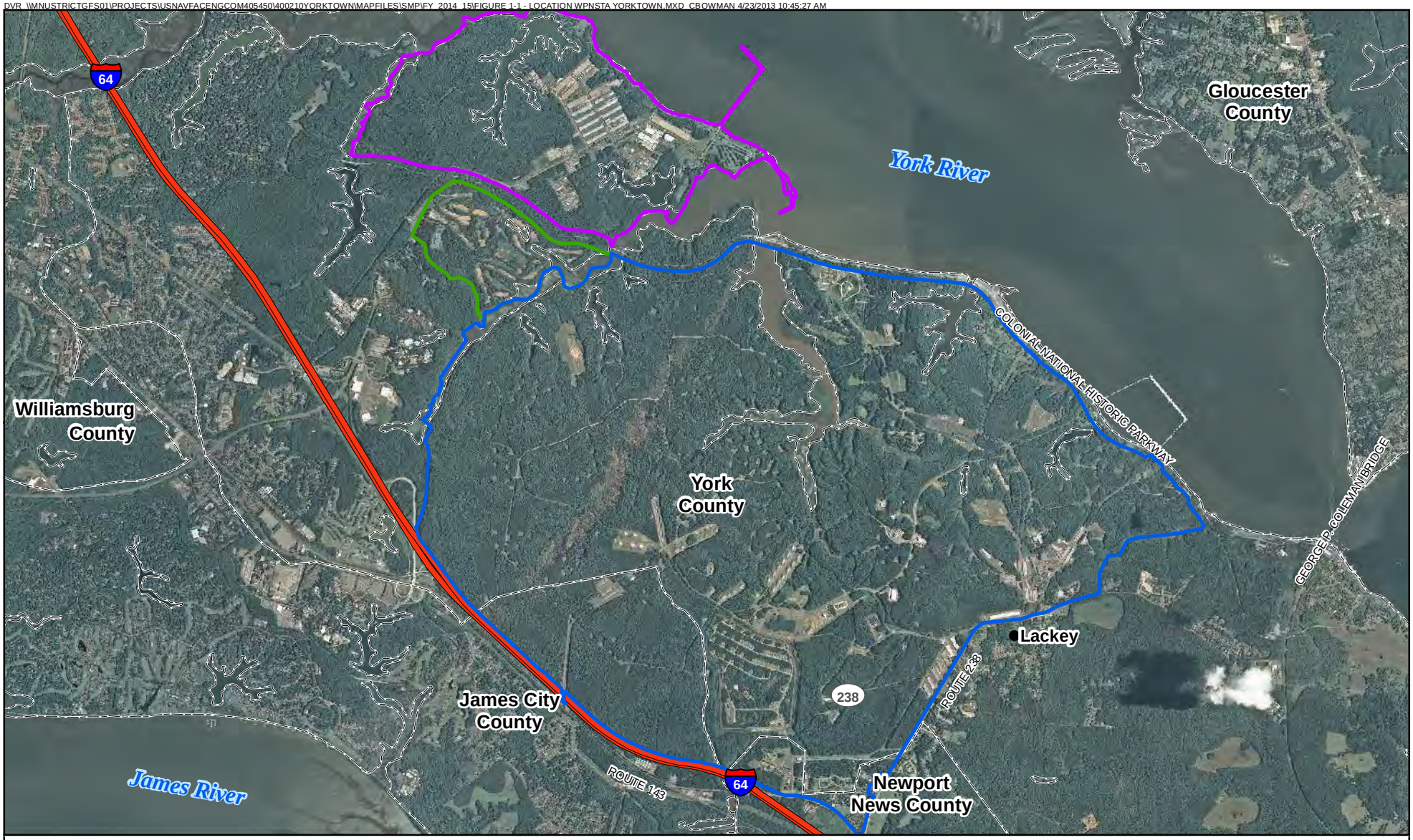
This document presents the Fiscal Years (FYs) 2014 through 2015 annual amendment to the Site Management Plan (SMP) for Naval Weapons Station (WPNSTA) Yorktown, Yorktown, Virginia. This SMP meets the requirements of the Federal Facilities Agreement (FFA) (USEPA, 1994) between the Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Division, Commonwealth of Virginia Department of Environmental Quality (VDEQ), and Region 3 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 Department of the Navy (Navy), USEPA, and VDEQ on the basis of goals agreed to by all parties.

The SMP is a working document that is updated annually. The development of this SMP was completed in August 2013. Comments received from the USEPA and VDEQ were incorporated into this SMP. However, in accordance with the WPNSTA Yorktown FFA, this SMP will not be considered a final document until funds authorized and appropriated by Congress are received by the ER and Navy Account.

This annual SMP amendment supersedes the FY2013-2014 SMP (CH2M HILL, 2012a).

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 1-1 - LOCATION WPNSTA YORKTOWN.MXD CBOWMAN 4/23/2013 10:45:27 AM



Legend

- Yorktown Base Boundary
- Kings Creek Commerce Park
- Cheatham Annex
- County Boundary

N
W E
S

0 2,750 5,500
Feet

Imagery: 2011

Figure 1-1
Location of WPNSTA Yorktown
Site Management Plan for FY 2014 to 2015
Naval Weapons Station Yorktown
Yorktown, Virginia

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SECTION 2

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 (CAX) 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 United States 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 United States WPNSTA Yorktown. 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 ER activities at WPNSTA Yorktown began in 1984 under the Navy Assessment and Control of Installation Pollutants (NACIP) and Environmental Restoration Programs (ERPs). The purpose of the NACIP and ERPs was to identify, assess, characterize, and cleanup or control contamination from past waste management activities. The NACIP program was modified into the ERP in 1986 to reflect the requirements of CERCLA as amended by the Superfund Amendments and Reauthorization Act (SARA). The Navy is committed to cleanup 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. An FFA between the Navy and the USEPA was signed in August 1994, and incorporated the Resource Conservation and Recovery Act (RCRA) Solid Waste Management Units (SWMUs) at WPNSTA Yorktown, as 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 under CERCLA. Based on the results of the SSP, SSA 1 (currently Site 23), SSA 6 (currently Site 24), SSA 7 (currently Site 25), SSA 10 (currently Site 28), SSA 16 (currently Site 16), SSA 18 (currently Site 26), SSA 20 (currently Site 29), and SSA 24 (currently Site 30) were determined to warrant RI/Feasibility Study (FS) efforts under CERCLA. Appendix B of the FFA identified 21 Areas of Concern (AOCs) (AOCs 1 – 21) 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, currently Site 31) was added in 2007 when it was determined that groundwater in the industrial area upgradient of Site 12 was contaminated with trichloroethene (TCE). In addition, in 2007, the Navy initiated investigations of numerous Munitions Response Program (MRP) sites including the Morale, Welfare, and Recreation (MWR) Skeet Range. Although Site 31, the MWR Skeet Range, and Unexploded Ordnance (UXO) 3 were not included in the FFA,

investigations at these sites have been or will be conducted following CERCLA guidance and are included in this document.

Table 2-1 identifies 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 and SSAs are discussed in Section 3. Additional background information for sites and SSAs with no action or NFA determinations prior to 2008 is provided in previous SMPs.

Partnering

The Navy works in partnership with USEPA and VDEQ and has established a formal WPNSTA Yorktown Partnering Team to implement CERCLA. Partnering Team decisions are documented through consensus statements and partnering meeting minutes; a summary of Team[1] 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 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 Yorktown. The upper-most geologic formations consist 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/semiconfining 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.

Across the northern part of the Base near 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.; as a result, the upper units are missing and either the Yorktown-Eastover 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 between 5 and 10 feet, with horizontal hydraulic conductivity between about 0.4 to 8 feet per day (ft/day) and vertical hydraulic conductivity between 1.7×10^{-4} and 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 feet 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 between 60 and 100 feet thick. Horizontal hydraulic conductivity ranges from 0.004 to 3 ft/day and vertical hydraulic conductivity ranges between 1.7×10^{-5} and 4.8×10^{-1} ft/day. Transmissivity of the aquifer ranges from 0.5 to 40 square feet per day (ft^2/day), with groundwater flow from west-to-east.

[1] WPNSTA Yorktown and CAX conducted joint Partnering between 2000 and September 2008, when the bases split into separate Partnering Teams.

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 (RAs) in order to protect human health and the environment. The major elements of the CERCLA process are identified as follows 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 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 (MEC) 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 has developed a Community Involvement Plan (CIP) (CH2M HILL, 2009b) 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 (May and November) to keep the community informed on environmental issues at WPNSTA Yorktown.

The documents prepared for the program are maintained in the Administrative Record file for review by the public. The index of the WPNSTA Yorktown Administrative Record is available at the information repository, the York County Public Library at 8500 George Washington Memorial Highway, Yorktown, Virginia. Documents from the Administrative Record are available through the WPNSTA Yorktown public website: http://go.usa.gov/yFb

Additional information regarding RAB meetings or environmental cleanup programs at Yorktown may also be obtained from the WPNSTA Yorktown Public Affairs Officer at:

Mr. Mark Piggott, Public Affairs Officer
160 Main Road
Yorktown, VA 23691-0160
(757) 887-4939

TABLE 2-1
Site Summary WPNSTA Yorktown
FY2014-15 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 (2013) GW/SW/SD investigation on going LUC RD after additional investigation*
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 2017
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) FS for groundwater is being developed
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	NFA ROD (September 2005) for soil/waste GW/SW/SD RI (2010) PP GW/SW/SD (2010) ROD GW/SW/SD (2011)
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 (GW/soil/SW/SD) RI/FS (Soil/GW/SW/SD)	ROD (October 1998) for soil/SD LTM of GW/SW/SD RA soil/sediment completed (2007), CCR (2008) Site Inspections/Five-Year Review (2013) Soil/GW/SW/SD 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 *ex-situ* Bioremediation Pilot Study (soil). Expanded site area includes all of former Plant 3.	Findings of Fact RI/FS	Post-ROD (soil/SW/SD/GW) RI/FS (soil/GW/SW/SD)	ROD (October 1998) for soil/SW/SD/GW Site Inspections/Five-Year Review (2013) LTM GW completed (2010) Expanded RI for GW/Soil/SW/SD for area of former plant ongoing*
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	Pre-FS Data Gap Investigation FS (GW)	NFA consensus statement (May 2008) for soil/SD GW RI (2011) GW/soil investigation ongoing*
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 (soil/GW)	NFA ROD (March 1998) for soil/SW/SD GW/soil investigation ongoing*
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 (all media)	NFA ROD (September 2010) for all media RACR completed February 2012
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 ESD to remove GW VOCs from LTM (2011) Site Inspections/Five-Year Review (2013) LTM GW planned for 2013 LUC RD (2013) RACR is being developed
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 scrap metal storage area)	Findings of Fact RI/FS	Response Complete (soil) Post-ROD (GW)	ROD (September 1995) for soil/GW Tech Memo for risk management of GW HH risk complete (2013) Site Inspections/Five-Year Review (2012) ESD is being developed to remove LUCs (all media then NFA)

TABLE 2-1
Site Summary WPNSTA Yorktown
FY2014-15 SMP

Site Identification	Other Identification		Site Name	Site Description	FFA Status	Current CERCLA Status	Comments/Notes
	IAS (1984) RCRA (1992)	FFA					
Site 17	IAS Site 17	Site 17	Holm Road Landfill	2 acre landfill; 2000 removal action of soil	Findings of Fact RI/FS	Response Complete (all media)	NFA ROD (September 2010) for all media RACR completed February 2012
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 Since 1998 ROD, investigation area has expanded to include area of former Building 5.	Findings of Fact RI/FS	Post-ROD (soil) RI/FS (GW/soil)	ROD (March 1998) for soil Site Inspections/Five-Year Review (2007) GW/soil investigation ongoing* ESD (if necessary) after additional investigation LUC RD pending completion of ESD
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)	NFA ROD (September 2003) for soil/waste GW/SW/SD RI (2010) PP GW/SW/SD (2010) ROD GW/SW/SD (2011)
Site 22	Not Identified	Not Identified	Burn Pad	9 acre burn pad; 2002 removal action of soil	Not identified	Response Complete (soil/SW/SD) Post-ROD (GW)	NFA ROD (September 2003) for soil GW/SW/SD RI (2010) PP SW/SD (2010) ROD SW/SD (2011) FS completed 2011 (GW) ROD GW (2012) LUC RD (2013) UFP-SAP for Pre-Design Investigation ongoing
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) All media investigations ongoing (2013)
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) RI (all media) (2013)
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) All media investigations ongoing (2013)
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) All media investigations ongoing (2013)
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
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	Response Complete (all media)	NFA ROD (2011) all media Draft BERA (2008) Draft Final ROD (2011) PP/ROD (2011) all media
Site 29	Not Identified	Not Identified	Lee Pond (SSA 20)	4.1 acre pond No soil/GW associated with site	Not identified	Response Complete (all media)	NFA ROD (2009) for all media
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	Response Complete (all media)	NFA ROD (2011) for all media

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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 31 / 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	RI/FS (GW/SW/SD/VI)	GW/VI/SW/SD investigation ongoing RI ongoing (2013)
Site 32 (SSA 25)	Not Identified	Not Identified	Wetlands Downgradient of Beaver Pond Upland Soil and Groundwater	5.6 acre wetland consisting of 2 impoundment areas of Ballard Creek. 2009 removal action of contaminated sediments	Not Identified	Response Complete (SW/SD) SI (soil/GW)	BERA (2008) EE/CA (2008) NFA ROD (2011) for SD/SW SI documenting NFA for upgradient Soil/GW (2013)
Site 33 (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. 2011 Team found waste disposal area	Not Identified	SSP NFA (soil) RI/FS (GW/soil/debris)	NFA for soil Site Screening Process Report 2001 AR# 01350 GW/soil/debris investigation on going (2013)
Site 34 (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	Supplemental RI (SD/SW/GW/soil)	EE/CA (2005) for soil/SD Post Construction Tech Memo (2008) GW RI (2011) GW FS ongoing Soil/GW/SW/SD investigation on-going
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 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	NFA	NFA (August 2010)
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

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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					
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 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
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	NFA	NFA Desk Top Audit Decision Document 1997 AR# 01.10-09/23/97 00909
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

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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 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 Drainage ways	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
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
MWR Skeet Range	Not Identified	Not Identified	MWR Skeet Range	30 acre small arms range	Not identified	MRP	NFA ESI 2008 AR# 02180
UXO 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 2017
UXO 3			NMC Munitions Loading Pier	Current and former munitions loading pier along the shoreline of the York River; surrounded by ESQD arcs	Not identified	Preliminary Assessment	PA ongoing (2013) Site Inspection expected to begin 2013

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 site media that have previously been documented in a ROD, but have been reopened in order to investigate areas not previously investigated

Indicates NFA Site/SSA

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

TABLE 2-2

WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary

FY2014-15 SMP

Number	Consensus Statement Number	Date	Facility	Site 16/SSA 16	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).

TABLE 2-2

WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary

FY2014-15 SMP

Number	Consensus Statement Number	Date	Facility	Site 16/SSA 16	AOC	Topic	Consensus Statement
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
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.

TABLE 2-2

WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary

FY2014-15 SMP

Number	Consensus Statement Number	Date	Facility	Site 16/SSA 16	AOC	Topic	Consensus Statement
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.
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, and acceptable.
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.

TABLE 2-2

WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary

FY2014-15 SMP

Number	Consensus Statement Number	Date	Facility	Site 16/SSA 16	AOC	Topic	Consensus Statement
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 25		Planned action for SSA 25	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.
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.	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. 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. 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.
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.

TABLE 2-2

WPNSTA Yorktown/CAX Partnering Team Consensus Statement Summary

FY2014-15 SMP

Number	Consensus Statement Number	Date	Facility	Site 16/SSA 16	AOC	Topic	Consensus Statement
		3/14/2008	WPNSTA	3		LUC not necessary	The Partnering Team agrees to the following: 1. Residual levels of cPAHs in the PAH hot-spot are are below clean up levels that are protctive 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 sitel and 4. The entire site meets the criteria for UUUE Therefore land use controls are not necessary to protect human health and the environment from exposure to soil at Site 3.
		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 resluts, 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, therfore NFA is warranted for groundwater at Sites 11 and 17.
	9-23-09-1	9/26/2009	WPNSTA	Site 16/SSA 16		Withdrawl of ESD and continuation of ICs	The partnering team agreed that the Site 16/SSA 16 Risk Management Technical Memorandum and ESD will be withdrawn and the Institutional Controls, along with Five-Year Reviews, will continue at the site.

TABLE 2-3

Major Elements of the CERCLA Process

FY2014-15 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). For an NTCRA, an EE/CA is prepared rather than the more extensive FS. An EE/CA focuses only on the substances to be removed rather than on all contaminated substances at the site. It is possible for a removal action to become the final remedial action if the risk assessment results indicate that no further remedial action is required in order to protect human health and the environment.
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 and additional field investigations. This phased approach encourages the continual scoping of the site characterization effort, which minimizes the collection of unnecessary data and maximizes data quality.

TABLE 2-3
Major Elements of the CERCLA Process
FY2014-15 SMP

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 protect human health and the environment. All parties directly involved in the restoration program (Navy, EPA, and VDEQ) must agree on the selected alternative.
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 performed 5 years after the initiation of a CERCLA response action, and are conducted every 5 years as long as future uses remain restricted. Five-year reviews for WPNSTA Yorktown are performed by the Navy, the lead agency for the site, but EPA retains responsibility for determining the protectiveness of the remedy.

Legend

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

N W E S

0 1,800 3,600 Feet

Figure 2-1
Sites/SSA Locations/AOC Locations/MMRP sites and CERCLA Status
Site Management Plan for FY 2014 to 2015
Naval Weapons Station Yorktown
Yorktown, Virginia

CH2MHILL

SECTION 3

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, RAs, and CERCLA path forward for each of the sites and the one SSA at WPNSTA Yorktown. Schedules for this FY 2014-2015 SMP illustrate ongoing and planned CERCLA activities for 2014 and 2015.

3.1 Base-wide Studies

WPNSTA Yorktown initiated its environmental investigation and restoration efforts in 1984 under the NACIP 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 (Dames & Moore, 1986). The 1988 sampling effort consisted of additional analysis of groundwater, sediment, and soil (Dames & Moore, 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).

Five-Year Reviews were conducted in 2002, 2007, and 2012 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 Reviews included an evaluation of Sites 1, 6, 7, 12, 16/SSA 16, and 19 (Baker, 2002; CH2M HILL, 2007b). The 2007 Five-Year Review also 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 an Explanation 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/SSA 16, and 17. The 2012 Five-Year Review included an evaluation of Sites 1, 6, 7, 12, 16/SSA 16, and 19 (CH2M HILL, 2013a), and concluded that remedies for Sites 7, 12, and 16/SSA 16 are currently protective of human health and the environment, and that remedies for Sites 1, 6, and 19 are protective of human health and the environment in the short-term. The 2013 Five-Year Review recommended that additional investigations be completed for Sites 1, 6, and 19 to evaluate future protectiveness. The next Five-Year Review will be completed in 2018; projections of the Sites that will be evaluated are identified in this SMP within individual site CERCLA path forward sections.

In March 2009, a draft update to the WPNSTA Yorktown and CAX CIP was prepared to assist the Navy in meeting the needs of the local community for information about, and participation in, the ongoing investigation and remedial processes (CH2M HILL, 2009a). The CIP identifies community concerns about the investigation and restoration of potentially contaminated sites at WPNSTA Yorktown and CAX and outlines community involvement

activities to be conducted during the ongoing and anticipated future restoration activities. In general, the local populace trusts the Navy and feels that the Navy has a good relationship with the community.

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

Document Title /Milestone	Author/Date	Administrative Record (AR) Document Number
Initial Assessment Study of Naval Weapons Station Yorktown	C.C. Johnson/ CH2M HILL, 1984	000247
Confirmation Study Step 1A (Verification), Round One	Dames and Moore, 1986	000256
Confirmation Study Step 1A (Verification), Round Two	Dames and Moore, 1988	000259
Remedial Investigation Interim Report	Versar, 1991	000812
Focused Biological Sampling and Preliminary Risk Evaluation	Baker and Weston, 1993	000310
Five-Year Review Report for Sites 1, 6, 7, 12, 16, and 19	Baker, 2002	001310
Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA 16, 17, and 19	CH2M HILL, 2007	002155
Community Involvement Plan	CH2M HILL, 2009	000007
Five-Year Review Report for Sites 1, 6, 7, 12, 16/SSAs 16 and 19	CH2M HILL, 2013	002568

3.2 Site Descriptions

Background information for sites, SSAs, and AOCs with no action or NFA decisions prior to 2007 is provided in the "baseline" FY08-09 SMP. Sites included in this category are comprised of: 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, as well as sites with no action or NFA decisions since 2007, is included in **Table 2-1.**

3.2.1 Site 1—Dudley Road Landfill

3.2.1.1 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 between 3 and 10 feet 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 (approximately 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. Disposed waste 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 disposal quantities of 17 tons per 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 following table.

Site 1 - Documents and Milestones

Document Title /Milestone	Author/Date	Administrative Record (AR) Document Number
Round One Remedial Investigation Report for Site 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	000313
Round Two Remedial Investigation Report, Sites 1 and 3	Baker, 1998	000998
Hot Spot Delineation	Baker, 1997	N/A
Feasibility Study for Sites 1 and 3	Baker, 1997	001158
Record of Decision, Operable Unit Nos. VIII and IX, Site 1 and Site 3	Baker, 1999	001000
Remedial Action Report for Sites 1 and 3 and SSA 22	OHM, 2001	001091
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	002075
Phase I Remedial Investigation Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	002158
Phase II Remedial Investigation Report Sites 1 and 3	CH2M HILL, 2012	Pending

3.2.1.2 Nature and Extent of Potential Contamination

The buried waste at Site 1 is the source of contamination to soil, groundwater, sediment, and surface water. Previous investigations included analysis of soil, groundwater, sediment, and surface water for the target compound list (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), explosives, and target analyte list (TAL) inorganic constituents. Sediment pore water was also sampled for TCL VOCs. The most recent soil data available are from the *Remedial Action Report for Sites 1 and 3 and SSA 22* (OHM, 2001). The most recent groundwater, surface water, sediment, and sediment pore water data available are from the Phase II RI report for Sites 1 and 3 (CH2M HILL, 2012b). Groundwater samples were collected from new and existing monitoring wells at Site 1. Surface water and sediment samples were collected near Site 1 as part of an overall evaluation of surface water related to Sites 1 and 3, as they are adjacent to each other and contribute runoff and groundwater discharge to the Indian Field Creek. The current nature and extent of contamination for each medium at Site 1, as documented in the previously presented reports, are summarized as follows.

Soil

During the development of the FS (Baker, 1997b), a remediation goal (RG) was developed for arsenic, the contaminant of concern (COC), identified in soil during previous investigations, to be protective of human and ecological receptors under a future commercial/industrial land use scenario. A removal action was conducted beginning in July 1999 to remove and dispose of arsenic contaminated soil and surface debris. Waste at the site remains under a soil cover.

Following the completion of removal activities in April 2000, post-removal confirmation samples indicated that concentrations of the COC (arsenic) were below established RGs.

Groundwater

Detected concentrations were screened against maximum base-wide background concentrations, regional screening levels (RSLs) for tap water, and maximum contaminant levels (MCLs) in order to aid in evaluating risks to human and ecological receptors and to determine if a detected constituent is a COC during the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b).

Columbia Aquifer

- No pesticides or PCBs were detected and no SVOCs were detected exceeding associated screening values.
- Fifteen VOCs were detected in groundwater, of which three exceeded associated screening values. Detected concentrations of TCE (56 micrograms per liter [µg/L]), cis-1,2-dichloroethene (DCE) (4.3 µg/L), and chloroform (0.35J µg/L) exceeded the tap water RSL and/or federal MCL in one or more samples.
- Sixteen total and 15 dissolved inorganic constituents were detected, of which 9 total and 9 dissolved inorganic constituents exceeded associated screening criteria. Detected concentrations of dissolved aluminum (1,810 µg/L), total antimony (9.9J µg/L), total (26.6 µg/L) and dissolved (38.6 µg/L) arsenic, total (11.4 µg/L) and dissolved (13 µg/L) cadmium, total (2.9J µg/L) and dissolved (0.89J µg/L) chromium, total (11 µg/L) and dissolved (13.7 µg/L) cobalt, total (11,800 µg/L) and dissolved (8,000 µg/L) iron, total (238 µg/L) and dissolved (233 µg/L) manganese, dissolved selenium (19.3K µg/L), total vanadium (16.7J µg/L), and total (2,210 µg/L) and dissolved (2,470 µg/L) zinc, exceeded either the maximum base-wide background concentration or federal MCL, and/or tap water RSL in one or more samples.

Yorktown-Eastover Aquifer

- No pesticides or PCBs were detected. Additionally, no SVOCs were detected exceeding associated screening values.
- Fourteen VOCs were detected in groundwater, of which eight exceeded associated screening values. Detected concentrations of TCE (18,000 µg/L), 1,1,2-trichloroethane (TCA) (1.7 µg/L), 1,1- DCE (8.6 µg/L), 1,2- DCE total (3,000 µg/L), cis-1,2- DCE (3,000 µg/L), tetrachloroethene (PCE) (0.21J µg/L), vinyl chloride (VC) (3.6 µg/L), and chloroform (0.74 µg/L) exceeded the tap water RSL and/or federal MCL in one or more samples.
- Fourteen total and 14 dissolved inorganic constituents were detected, of which 9 total and 6 dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total aluminum (4,960 µg/L), total antimony (10.1 µg/L), total (19.1 µg/L) and dissolved (5.4J µg/L) arsenic, total cadmium (2.9J µg/L), total (35.2 µg/L) and dissolved (1.4J µg/L) chromium, total (5.5 µg/L) and dissolved (0.67J µg/L) cobalt, total (13,500 µg/L) and dissolved (1,500J µg/L) iron, total (705 µg/L) and dissolved (125 µg/L) manganese, dissolved (13.9K µg/L) and total (33.5 µg/L) vanadium exceeded the maximum base-wide background concentration or federal MCL, and/or tap water RSL in one or more samples.

Surface Water

Detected concentrations were screened against RSLs for tap water (adjusted x10) and ecological screening values (ESVs) in order to aid in evaluating risks to human and ecological receptors and to determine if a detected constituent is a COC during the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b). Surface water, sediment, and sediment pore-water samples were collected from the unnamed tributary between Sites 1 and 3 and Indian Field Creek to assess the potential for contamination in surface water or sediment resulting from groundwater discharge from both sites.

Indian Field Creek

No VOCs exceeded screening criteria in surface water at Sites 1 and 3. Detections below screening criteria comprised carbon disulfide, chloromethane, and toluene concentrations in surface water. Carbon disulfide is a naturally occurring constituent commonly observed in marsh sediments. The principal Site 1 groundwater contaminants of potential concern (COPCs), TCE, 1,2-DCE, and VC, were not observed in surface water.

Of the eight inorganics detected in surface water at Sites 1 and 3, only three exceeded ecological screening criteria or RSLs. Dissolved arsenic (4.4J µg/L), total copper (9.6L µg/L), and total (235 µg/L) and dissolved (202 µg/L) manganese exceeded the surface water screening values.

Sediment

Indian Field Creek

No VOCs exceeded screening criteria in sediment at Sites 1 and 3. Detections below screening criteria were of carbon disulfide, and styrene in sediment, and carbon disulfide, cyclohexane, and toluene in sediment pore-water. Carbon disulfide is a naturally occurring constituent commonly observed in marsh sediments. The principal Site 1 groundwater COPCs, TCE, 1,2-DCE, and VC, were not observed in sediment and sediment pore-water.

Of the 14 inorganics detected in sediment, 8 were detected above ESVs for sediment at Sites 1 and 3. Aluminum (27,800 µg/L), arsenic (11.6L µg/L), barium (51.4J µg/L), beryllium (51.6L µg/L), chromium (55.1L milligrams per kilogram [mg/kg]), manganese (349L µg/L), nickel (26.6 mg/kg), and vanadium (73.8 mg/kg) exceeded one or more of the sediment screening values.

3.2.1.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

A ROD was finalized in June 1999 (Baker, 1999) to address debris and contaminants identified in surface soil. The removal action conducted at Site 1 reduced concentrations of arsenic below the established RGs previously agreed upon by the Navy and the USEPA, in partnership with the VDEQ. Following the removal action, land use controls (LUCs) were implemented prohibiting residential development of Site 1 and disturbance of the soil cover. LUCs will be required as long as subsurface waste remains in place in order to remain protective of human health and the environment.

Groundwater

The Human Health Risk Assessment (HHRA) conducted as part of the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b) assessed risk to receptors through ingestion, dermal contact, and inhalation of vapors under a potable use scenario.

Columbia Aquifer and Yorktown-Eastover Aquifer

Potential unacceptable carcinogenic and non-carcinogenic hazards were identified for exposure routes to receptors that included current/future trespassers or visitors, future adult and child residents, and industrial workers. Estimated carcinogenic risks associated with exposure for future construction workers are within the acceptable risk range. The risk associated with all other exposure scenarios exceeded the acceptable non-carcinogenic hazard index (HI) of 1.0 and carcinogenic risk range of 10^{-6} to 10^{-4}. The reasonable maximum exposure (RME) non-carcinogenic hazards are primarily associated with TCE, cis-1,2-DCE, and cobalt (the only constituents with individual HIs above 1 for any of the potential receptors). Additional constituents (1,1,2-TCA, arsenic, iron, and manganese) contribute HIs above 0.1, but below 1.0. The carcinogenic risk is primarily associated with TCE, with smaller contributions from arsenic, chromium, and additional chlorinated VOCs between 10^{-6} and 10^{-4}. The central tendency exposure (CTE) scenarios for these potential future receptors also exceeded the acceptable non-carcinogenic HI of 1.0 or the carcinogenic risk range of 10^{-6} to 10^{-4}. The future residential land use scenario evaluated in this assessment, and the future potable use of groundwater by industrial workers, is very conservative, because it is assumed that land use at the site will not change in the future, and if it did it is unlikely that the groundwater would be used as a potable water supply.

The vapor intrusion pathway was not further quantified because the site is a former landfill and LUCs will be used to prohibit future development of the site.

The Ecological Risk Assessment (ERA) conducted as part of the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b) did not assess risk posed to ecological receptors due to groundwater exposure because no complete exposure pathway was identified.

Surface Water and Sediment

Indian Field Creek

The HHRA for surface water and sediment was conducted as part of the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b). No COPCs were identified for surface water samples from Sites 1 and 3. Estimated non-carcinogenic hazards and carcinogenic risks associated with exposure to sediment for all potential current or future receptors were less than or within the acceptable risk range.

The ERA conducted as part of the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b), did not identify any COCs for surface water or sediment at Sites 1 and 3. Similarly, no COCs were identified for food web exposures. Therefore, risks to ecological receptors are considered acceptable, based on the 2009 RI samples. However, additional surface water, sediment, and pore water samples will be collected in the unnamed tributary to address the spatial data gaps before completing an FS for groundwater at Site 1.

3.2.1.4 Remedial Action(s)

A non-time-critical removal action (NTCRA) was initiated in July 1999 to excavate soil posing potential risks to human health and the environment. Post-excavation samples were collected and compared to RGs. Based on post-removal analytical results, concentrations of arsenic in the remaining soil were below the RG. In total, 413 tons of contaminated soil/debris was removed. The excavated area of arsenic-contaminated soil was backfilled with on-base borrow material. Additionally, a 4-inch layer of topsoil was placed on the excavated area and then re-graded to provide natural contours and enhance runoff from Site 1. Eighteen inches of fill soil and six inches of topsoil were placed on the northern area of the landfill (OHM, 2001). Following the completion of the NTCRA, LUCs for soil and long-term monitoring (LTM) of groundwater, surface water, and sediment was initiated (Baker, 1999).

3.2.1.5 Activities Completed in FY2013

A Uniform Federal Policy-Sampling and Analysis Plan (UFP-SAP) was finalized in March 2013 as part of the Site 1 RI (CH2M HILL, 2013b). Field work in association with the UFP-SAP, including surface water, sediment, pore water, and seep sampling, was conducted in April and May 2013. Monitoring well installation, groundwater sampling, and test pitting was completed in June 2013. In addition, a Technical Memorandum (TM) documenting the extent of the landfill cover for the LUC RD is currently being developed. LUC Inspections were performed on a quarterly basis in September 2012 and December 2012, and were performed on an annual basis starting in July 2013.

3.2.1.6 CERCLA Path Forward

- Finalize LUC RD Technical Memorandum
- Routine Annual LUC Inspections
- TM to develop LUC RD
- Five-Year Review Addendum
- LUC RD for soil
- RI Report
- FS/PP/ROD for groundwater, surface water, and sediment, as appropriate
- LUC RD, as appropriate
- Remedial Action Work Plan (RAWP)
- RA Field Work
- Construction Completion Report (CCR)
- Five-Year Review (2018)
- LTM Work Plan and Implementation
- Remedial Action Completion Report (RACR)

Schedule 3-1 presents the FY2014-15 schedule for Site 1.

3.2.2 Site 3—Group 16 Magazine Landfill

3.2.2.1 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 that lead into Indian Field Creek.

The site was originally used for sand mining and consisted of one borrow pit to a depth of 10 feet bgs. Between 1940 and 1970, Site 3 was operated as a landfill. Approximately 90 tons of waste were 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 estimated as part of previous investigations that included 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 following table.

Site 3 - 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	000313
Round Two Remedial Investigation Report, Sites 1 and 3	Baker, 1998	000998
Feasibility Study for Sites 1 and 3	Baker, 1997	001158
Record of Decision, Operable Unit Nos. VIII and IX, Site 1 and Site 3	Baker, 1999	001000
Remedial Action Report for Sites 1 and 3 and SSA 22	OHM, 2001	001091
Long-Term Monitoring Report for Sites 1, 3, and 7	Baker, 2006	002075
Phase I Remedial Investigation Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	002158
Post-Remedial Action Site Conditions Technical Memorandum, Site 3	Baker, 2008	002200
Explanation of Significant Differences, Site 3	CH2M HILL, 2008	002351
Phase II Remedial Investigation Report Sites 1 and 3	CH2M HILL, 2012	Pending

3.2.2.2 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 analysis of soil, groundwater, sediment, and surface water for TCL VOCs, TCL SVOCs, pesticides, PCBs, explosives, and TAL inorganic constituents. Sediment pore-water was also sampled for TCL VOCs. The most recent extensive soil data available are from the *Remedial Action Report for Sites 1 and 3 and SSA 22* (OHM, 2001). The most recent groundwater, surface water, sediment, sediment pore-water, and limited soil data are available from the Phase II RI report for Sites 1 and 3 (CH2M HILL, 2012b). Groundwater samples were collected from new and existing monitoring wells at Site 3. Surface water and sediment samples were collected near Site 3 as part of an overall evaluation of surface water related to Sites 1 and 3, as they are adjacent to each other and contribute runoff and groundwater discharge to the Indian Field Creek. The current nature and extent of contamination for each medium at Site 3, as documented in the previously presented reports, are summarized as follows.

Soil

During the development of the FS (Baker, 1997b), RGs were developed for carcinogenic polyaromatic hydrocarbons (cPAHs), the COCs identified in soil during previous investigations, to be protective of human and ecological receptors under a future commercial/industrial land use scenario. A removal action was conducted beginning in July 1999 to remove and dispose of contaminated soil and waste.

Following the completion of removal activities in July 1999, post-removal confirmation samples indicated that concentrations of all COCs were below established RGs.

During the Phase II RI field activities, possible contamination in the unsaturated zone was observed during the membrane interface probe (MIP) study. Two soil samples were collected from MIP-5 (12 to 16 feet bgs and 15 to 19 feet bgs) and analyzed for VOCs, SVOCs, total inorganics, pesticides, PCBs, and total petroleum hydrocarbon (TPH). The samples were collected based on elevated photoionization detector and ECD responses from the MIP log. No VOCs, SVOCs, pesticides, or PCBs concentrations exceeded the screening criteria. TPH within the diesel range was observed at a concentration of 350,000 micrograms per kilogram (µg/kg). Five inorganic constituents exceeded one or more criteria, including aluminum (12,700E mg/kg), arsenic (30.5E mg/kg), chromium (35.1E mg/kg), cobalt (17.4E mg/kg), and iron (30,600E mg/kg). However, only arsenic, chromium, and cobalt exceeded their respective background concentrations of 5.54 mg/kg, 33.7 mg/kg, and 5.18 mg/kg.

Groundwater

Detected concentrations were screened against maximum base-wide background concentrations, RSLs for tap water, and MCLs in order to aid in evaluating risks to human and ecological receptors and to determine if a detected constituent is a COC during the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b).

Yorktown-Eastover Aquifer

- Twelve VOCs were detected in groundwater, of which seven exceeded associated screening values. Detected concentrations of TCE (400 µg/L), cis-1,2-DCE (1,400 J µg/L), total 1,2-DCE (1,400 µg/L), 1,1-DCE (12 J µg/L), 1,1- dichloroethane (DCA) (8.2 J µg/L), 1,4-dichlorobenzene (0.56 J µg/L), and VC (1,200 µg/L) exceeded the tap water RSLs and/or federal MCLs in one or more sampling locations.
- Fifteen total and 14 dissolved inorganic constituents were detected in groundwater, of which 10 total and 5 dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (19,300 µg/L) and dissolved (2,040 µg/L) aluminum, total (60.7 µg/L) and dissolved (34.7 µg/L) arsenic, total (524 µg/L) chromium, total (10.9 µg/L) cobalt, total (49,600 µg/L) and dissolved (2,010 µg/L) iron, total (17 µg/L) lead, total (1,320 µg/L) and dissolved (1,260 µg/L) manganese, dissolved (4.1J µg/L), total (77.6 µg/L) vanadium, and total (2,780 µg/L) zinc exceeded the maximum base-wide background concentration in one or more samples, and exceeded the federal MCL or tap water RSL. Surface Water

Detected concentrations were screened against RSLs for tap water (adjusted x10) and ESVs in order to aid in evaluating risks to human and ecological receptors and to determine if a detected constituent is a COC during the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b). Surface water, sediment, and sediment pore-water samples were collected from the unnamed tributary between Sites 1 and 3 and Indian Field Creek to assess the potential for contamination in surface water or sediment resulting from groundwater discharge from both sites.

Indian Field Creek

No VOCs exceeded screening criteria in surface water at Sites 1 and 3. Detections below screening criteria were of carbon disulfide, chloromethane, and toluene in surface water. Carbon disulfide is a naturally occurring constituent commonly observed in marsh sediments. The principal Site 3 groundwater COPCs, TCE, 1,2-DCE, and VC, were not observed in surface water.

Of the eight inorganics detected in surface water at Sites 1 and 3, only three exceeded ecological screening criteria or RSLs. Dissolved arsenic (4.4J µg/L), total copper (9.6L µg/L), and total (235 µg/L) and dissolved (202 µg/L) manganese exceeded the surface water screening values.

Sediment

Indian Field Creek

No VOCs exceeded screening criteria in sediment at Sites 1 and 3. Detections below screening criteria were of carbon disulfide, and styrene in sediment, and carbon disulfide, cyclohexane, and toluene in sediment pore-water. Carbon disulfide is a naturally occurring constituent commonly observed in marsh sediments. The principal Site 1 groundwater COPCs, TCE, 1,2-DCE, and VC, were not observed in sediment and sediment pore-water.

Of the 14 inorganics detected in sediment, 8 were detected above ESVs for sediment at Sites 1 and 3. Aluminum (27,800 µg/L), arsenic (11.6L µg/L), barium (51.4J µg/L), beryllium (51.6L µg/L), chromium (55.1L mg/kg), manganese (349L µg/L), nickel (26.6 mg/kg), and vanadium (73.8 mg/kg) exceeded one or more of the sediment screening values.

3.2.2.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

A ROD was finalized in July 1999 (Baker, 1999) to address debris and contaminants identified in surface soil. The removal action conducted at Site 3 reduced concentrations of all COCs to below established RGs previously agreed upon by the Navy and the USEPA, in partnership with the VDEQ. Following the removal action, LUCs were implemented prohibiting residential development of Site 3. However, a review of post-excavation analytical results presented in *Post-Remedial Action Site Conditions Technical Memorandum, Site 3* indicated that the 95 percent upper confidence limit (UCL) for the total cPAHs remaining in soil was below the level allowing for unrestricted land use (1 mg/kg). An ESD to the ROD was subsequently signed in December 2008 to document the removal of LUCs for soil and the determination that NFA is required to address soil at Site 3.

Groundwater

The HHRA conducted as part of the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b) assessed risk to receptors through ingestion, dermal contact, and inhalation of vapors under a potable use scenario. The groundwater data were also screened against concentrations protective of vapor intrusion into a future residential home.

Yorktown-Eastover Aquifer

The future construction worker RME non-carcinogenic hazard associated with exposure to groundwater exceeded the acceptable HI of 1.0; however, there are no individual COPCs or target organ/effects with HIs exceeding 1.0. The risk assessment assumed that a future construction worker could be exposed to groundwater through dermal contact and inhalation of volatiles during excavation and construction activities. The CTE non-carcinogenic hazard is also above the acceptable HI of 1.0; however, there are no target organ/effects with HIs exceeding 1.0. The future construction worker RME carcinogenic risk (1.7×10^{-5}) is within the acceptable risk range of 10^{-6} to 10^{-4}. All estimated non-carcinogenic hazards and carcinogenic risks associated with future residential and industrial receptors exposed to groundwater at Site 3 exceeded acceptable levels. The risk assessment assumed that a future adult resident, future child resident, and future lifetime child/adult resident could be exposed to groundwater through ingestion and dermal contact and inhalation while bathing, and inhalation of vapors that have migrated from the groundwater to indoor air through vapor intrusion. For the future adult resident, future child resident, and future lifetime child/adult resident, the hazards associated with potable use of the water (ingestion and dermal contact and inhalation while showering) and with inhalation of indoor air from vapor intrusion are each above the acceptable HI. The risk assessment assumed that a future industrial worker could be exposed to groundwater used as a potable water supply through ingestion and inhalation of vapors that have migrated from groundwater to indoor air through vapor intrusion. For the future industrial worker, the hazards associated with ingestion of potable water and with inhalation of indoor air from vapor intrusion are both above the acceptable HI.

The RME non-carcinogenic hazards are primarily associated with TCE, cis-1,2-DCE, VC, arsenic, and manganese (the only constituents with individual HIs above 1.0 for any of the potential receptors). The carcinogenic risk is primarily associated with VC, TCE, and arsenic. The CTE scenarios for these potential future receptors also exceeded the acceptable non-carcinogenic HI of 1.0 or the carcinogenic risk range of 10^{-6} to 10^{-4}. The future residential land use scenario evaluated in this assessment is very conservative because it is assumed that land use will not change in the future, and if it did, it is unlikely that the Yorktown-Eastover aquifer groundwater would be used as a potable water supply. The ERA conducted as part of the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b) did not assess risk posed to ecological receptors from groundwater exposure because no complete exposure pathway was identified.

Surface Water and Sediment

Indian Field Creek

The HHRA for surface water and sediment was conducted as part of the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b). No COPCs were identified for surface water samples from Sites 1 and 3. Estimated non-carcinogenic hazards and carcinogenic risks associated with exposure to sediment for all potential current or future receptors were less than or within the acceptable risk range.

The ERA conducted as part of the Phase II RI for Sites 1 and 3 (CH2M HILL, 2012b) did not identify any COCs for surface water or sediment at Sites 1 and 3. Similarly, no COCs were identified for food web exposures. Therefore, risks to ecological receptors are considered acceptable, based on the 2009 RI samples.

3.2.2.4 Remedial Action(s)

A removal action was initiated in July 1999 to excavate soil posing potential risks to human health and the environment. Based on post-removal analytical results, concentrations of all COCs remaining were below RGs. In total, 284 tons of polyaromatic hydrocarbon (PAH)-contaminated soil and landfill waste, consisting of 2,700 tons of galley waste, 50 drums of solidified resin (22 tons), and 127 tons of abandoned dry cell batteries were removed. The excavated area was backfilled with on-base borrow material and re-graded (OHM, 2001). Following the completion of the NTCRA, LUCs for soil and groundwater and LTM of groundwater, surface water, and sediment were initiated (Baker, 1999). However, a review of the confirmation samples collected during the removal action revealed that the removal action had reduced concentrations of COCs to levels protective of unrestricted land use. An ESD was finalized in 2008 rescinding LUC and LTM requirements established in the ROD for soil, surface water, and sediment (CH2M HILL, 2008a).

3.2.2.5 Activities Completed in FY2013

An FS Report for groundwater and a Pre-RD UFP-SAP are currently being developed.

3.2.2.6 CERCLA Path Forward

- Finalize FS Report for Groundwater
- Finalize Pre-RD UFP-SAP
- FS/PP/ROD for groundwater, surface water, and sediment, as appropriate
- LUC RD
- Pre-RD Field Work
- RD
- RAWP
- RA Field Work
- CCR
- LTM Work Plan and Implementation
- RACR
- Five-Year Review (2018)

Schedule 3-2 presents the FY2014-15 schedule for Site 3.

3.2.3 Site 6—Explosives Contaminated Wastewater Impoundment, Flume Area and Excavation Area

3.2.3.1 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 Area (**Figure 3-3**).

Flume Area

The Flume Area is a network of concrete flumes that transported wastewater from Building 109 to a downgradient wetland area. The wastewater, possibly containing explosives (TNT, hexahydro-1,3,5-trinitro-1,3,5-triazine [RDX], and 2,4-dinitrotoluene [DNT]) and solvents (TCE, 1,1,1--TCA, and cyclohexanone), was discharged between 1942 and 1975. The wastewater was generated from explosives reclamation at Building 109 (R-1) and from explosives loading, mixing, and casting at Building 110 (Plant 2).

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 carbon adsorption tower was diverted to the sanitary sewer and ultimately to the Hampton Roads Sanitation District (HRSD) (Baker, 1998c).

Impoundment Area

The Site 6 Impoundment Area is the wetland area located behind the coffer dam along a small tributary to the main branch of Felgates Creek. The surface 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 area between 1942 and 1975. After 1986, the surface 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, 1998c).

Excavated Area

The Excavated Area was originally identified via aerial photography where concrete rubble and other debris was evident (Baker, 1994e). However, there were no records to document historical activities or former use. Previous reports suggest that the area may have been 1) used as the soil borrow pit for construction of the coffer dam, 2) used to contain packed explosives, or 3) used for disposal of unknown types of materials and debris (Baker, 1998c and CH2M HILL, 2007a). Based on historical photographs, soil boring logs, and analytical soil and groundwater data collected during SIs, the Excavated Area was most likely used only for surface storage and not for any of the previously suggested uses. On the western side of the site lie an unnamed tributary and the Eastern Branch of Felgates Creek. The study area also includes three former buildings (Building 109, Building 110, and Building 501), which have been demolished.

While refining the Operable Unit boundaries, a cleared area was identified to the west of the Excavated Area in historical aerial photographs and subsequent site visits (CH2M HILL, 2012d). Initially, it was suspected that this might have been the actual location of the Excavated Area instead of the area specified in the ROD. However, after further review of historical photographs, the location of the Excavated Area is believed to have been defined correctly in the ROD. There is no documentation or photographs to suggest that disposal or storage activities were conducted at the cleared area.

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

The surface geology at Site 6 is consistent with Yorktown-Eastover aquifer lithology. The depth to groundwater mimics topography and ranges from 1 to 35 feet bgs. Groundwater generally flows westward toward the

impoundment and Felgates Creek. The Yorktown-Eastover aquifer is approximately 80 feet 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 following table.

Site 6 - 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	000313
Round Two Remedial Investigation Report, Sites 6 and 7	Baker, 1998	001294 (Volume I) 001295 (Volume II) 001346 (Volume III) 001347 (Volume IV)
Feasibility Study, v2, Sites 6 and 7	Baker, 1998	001077
Proposed Remedial Action Plan, v2, Sites 6 and 7	Baker, 1998	001838
Record of Decision, Operable Unit Nos. XII, XIII, XIV, and XV, Sites 6 and 7	Baker, 1998	001001
Contractor Closeout Report for Site 6 Remediation	OHM, 1999	001221
Remedial Design for Naval Weapons Station Yorktown Sites 6 and 7	Baker, 2006	002268
Phase I Remedial Investigation Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	002158
Final Construction Closeout Report for Site 6 Bioremediation	Shaw, 2008	002354
Final Phase II Remedial Investigation Report, Site 6	CH2M HILL, 2011	002488
Suspension of Site 6 Long-term Monitoring Requirements for Operable Unit XV Identified in the 1998 Record of Decision, Technical Memorandum	CH2M HILL, 2012	002527
Memo to File Documentation of Non-significant Difference to Record of Decision for Site 6 and 7 Record of Decision, Clarification of Site 6 Areas	CH2M HILL, 2012	Pending

3.2.3.2 Nature and Extent of Potential Contamination

The sources of potential contamination at Site 6 are related to the wastewater discharge from the network of 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 inorganic constituents. In addition, soil and groundwater were analyzed for pesticides and PCBs. Sediment pore-water was also analyzed for VOCs. The most recent soil data available are from the 2008 *Construction Closeout Report for Site 6 Bioremediation* (Shaw, 2008). The most recent groundwater, surface water, sediment, and sediment pore-water data available is from the 2011 *Phase II RI, Site 6* (CH2M HILL, 2011a). The current nature and extent of contamination for each medium at Site 6, as documented in the previously detailed reports, are summarized as follows.

Soil

During the development of the FS (Baker, 1998d), RGs were developed for cadmium and zinc in soil at the Excavated Area during previous investigations to be protective of human and ecological receptors under a future commercial/ industrial land use scenario. A removal action was conducted beginning in August 1998 to remove and treat contaminated soil. Post-removal confirmation samples indicated that concentrations of all COCs were below established RGs following the completion of removal activities in June 2007. Although the RAs specified in the ROD included installation of a soil cover within the excavated area, and LUCs have been maintained since the ROD was signed, no documentation can be found to confirm that the ROD-required cover was installed. Therefore, there is some uncertainty as to whether it is present.

Groundwater

Detected concentrations were screened against base-wide background criteria, MCLs, and adjusted tap-water during the Phase II RI.

Yorktown-Eastover Aquifer

- PCBs were not historically detected in groundwater at Site 6.
- Five pesticides were historically detected in groundwater, of which, one exceeded associated screening values. Detected concentrations of heptachlor epoxide (13 µg/L) exceeded the federal MCL at three sample locations.
- One SVOC was detected in groundwater historically, which exceeded associated screening values. Detected concentrations of bis-2-ethylhexyl phthalate (BEHP) (13 µg/L) exceeded the federal MCL at one sample location; however, BEHP is a common laboratory contaminant and is not likely to be site-related.
- Twenty five VOCs were detected in groundwater, of which ten exceeded associated screening values. TCE is the most widespread VOC. TCE concentrations above 11,000 µg/L generally indicate the likely presence of TCE as dense non-aqueous-phase liquid (DNAPL) (Bedient et al., 1994). Two monitoring wells contained TCE concentrations above 11,000 µg/L (280,000 µg/L at 6GW13 and 22,000 µg/L at 6GW08). It is unknown if these concentrations indicative of DNAPL extend continuously from wells 6GW13 to 6GW08, as there are no monitoring wells located between these two data points. Other VOCs exceeding screening criteria include cis-1,2-DCE (max concentration 7,800J µg/L), VC (max concentration of 73L µg/L), 1,1-DCE (max concentration of 9.2 µg/L), trans-1,2-DCE (max concentration of 28J µg/L), PCE (max concentration of 3,000J µg/L), 1,1-DCA (5.5 µg/L), 1,2-DCA (maximum concentration of 0.25J µg/L), and benzene (max concentration of1.6J µg/L).
- Fourteen explosives were detected in groundwater, of which seven exceeded associated screening values. Maximum concentrations of explosives exceeding one or more screening criteria listed in order of most frequently observed were 2,4-DNT (51K µg/L), RDX (70K µg/L), nitrobenzene (1.4K µg/L), 1,3-dinitrobenzene (18K µg/L), 2-aDNT (7,400 µg/L), 3-NT (2.7 µg/L), and 4-NT (5.9K µg/L).
- Thirteen inorganic constituents were observed above one or more screening criteria. Elevated inorganic concentrations observed in monitoring wells located adjacent to Felgates Creek may be related to the intrusion of brackish water. Maximum total and/or dissolved inorganic constituents that exceeded screening criteria in four or more wells, listed from most frequently observed to less frequent, were dissolved arsenic (20.8 µg/L), dissolved iron (19,900 µg/L), total chromium (353 µg/L), dissolved manganese (551 µg/L), dissolved antimony (97.6 µg/L), dissolved cobalt (88.9 µg/L), and dissolved zinc (5,290 µg/L). Other inorganic constituents that exceeded a screening criterion at three monitoring wells or less included aluminum, beryllium, cadmium, lead, nickel, selenium, thallium, and vanadium. Dissolved concentrations of aluminum, lead, and nickel were below screening criteria.

Surface Water

- No VOCs exceeding screening criteria in surface water were detected at Site 6 during the Phase II RI. Only carbon disulfide was detected in surface water, which is a naturally occurring constituent commonly observed in marsh sediments.
- Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) and 2-NT were the only explosives detected; however, they did not exceed screening criteria.
- Four inorganic constituents detected in surface water exceeding screening criteria include total/dissolved arsenic, total chromium, total/dissolved manganese, and total/dissolved silver. Maximum concentrations of the dissolved inorganic constituents and total chromium listed above were 6.9J µg/L, 3.8J µg/L, 175 µg/L, and 1.1L µg/L, respectively.

Sediment

- No VOCs exceeding screening criteria in sediment were detected at Site 6 during the Phase II RI. Detected concentrations in sediment include carbon disulfide and trans-1,2-DCE. The concentrations of trans-1,2-DCE (7.4J µg/kg from SD77) was significantly below the adjusted residential soil RSL (150,000 µg/kg).
- Nitrobenzene and tetryl were observed in one sediment sample location above a screening criterion with concentrations of 120J µg/kg and 150J µg/kg, respectively. Other detected explosives included 2,6-DNT and 2-NT, but concentrations were below screening criteria.
- Seven inorganic constituents detected above screening criteria with sediments include aluminum, arsenic, chromium, manganese, nickel, selenium, and vanadium with maximum concentrations of 24,100 mg/kg, 10.8 mg/kg, 47.8 mg/kg, 322 mg/kg, 22.5 mg/kg, 1.2L mg/kg, and 66.9 mg/kg, respectively.

Sediment Pore-Water

A total of 11 VOCs were observed in the sediment pore-water samples. Carbon disulfide is likely naturally occurring and 2-butanone, acetone, cyclohexane, methylene chloride, and toluene are likely laboratory related contaminants and not site related. Total, cis-, and trans-1,2-DCE, VC, and chloroethane concentrations were higher within the surface impoundment area and were significantly lower or not detected adjacent to or within Felgates Creek. TCE was not observed in any of the sediment pore-water samples, including sample WN01 that was collected adjacent to elevated TCE concentrations observed in the historical surface water sample SW060 and sample WN03 that was collected in the area where potential DNAPL is suspected. The absence of TCE and the presence of TCE daughter compounds in sediment pore-water suggest that significant biodegradation may be occurring within the plume prior to discharge to surface water.

3.2.3.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

A ROD was finalized in October 1998 (Baker, 1998f) to address debris and contaminants identified in surface soil. The NTCRA conducted at Site 6 reduced concentrations of all COCs to below established RGs previously agreed upon by the Navy and the USEPA, in partnership with the VDEQ. Following the removal action, LUCs were implemented prohibiting residential development of Site 6 and disturbance of the soil cover (if present) at the excavated area. Annual inspections of LUCs and yearly reporting are required in order to ensure that the RIP remains protective of human health and the environment. The LUCs will be maintained until they are no longer required to protect human health or the environment.

Groundwater

Yorktown-Eastover Aquifer

The most recent HHRA was conducted as part of the Phase II RI, Site 6 (CH2M HILL, 2011a).

Exposure routes for quantitative evaluation included future industrial worker, future construction worker, and future resident (adult and child) from ingestion of, dermal contact with, and inhalation exposure (based on receptor). Future residential exposure scenarios are hypothetical since no buildings can be developed at the site because it is within the explosive safety quantity distance (ESQD) arcs associated with the base activities.

The non-carcinogenic hazards and carcinogenic risks to the future construction worker exposed to groundwater from well GW09 are all below USEPA target risk levels. Potable use of groundwater (ingestion and use of water for showering) by residents and industrial worker from the groundwater plume and construction worker exposure to groundwater from the plume would result in non-carcinogenic hazards and carcinogenic risks above USEPA's acceptable levels. The RME non-carcinogenic hazards are primarily associated with 2a-DNT, 2,4-DNT, cis-1,2-DCE, PCE, and several metals. The carcinogenic risks are primarily associated with PCE, TCE, VC, 2,4-DNT, and arsenic. The CTE scenarios for these potential future receptors also exceed the acceptable non-carcinogenic HI of 1.0 or

the carcinogenic risk range of 10^{-6} to 10^{-4}. The future residential land use scenario evaluated in this assessment is very conservative because it is assumed that land use will not change in the future, and if it did, it is unlikely that the Yorktown-Eastover aquifer groundwater would be used as a potable water supply.

Potable use of groundwater (ingestion and use of water for showering) by residents and industrial worker from GW09 exceed USEPA acceptable risk levels. With the exception of the carcinogenic risk to the industrial worker, the CTE scenarios for these potential future receptors also exceed the acceptable non-carcinogenic HI of 1.0 or the carcinogenic risk range of 10^{-6} to 10^{-4}. The hazards and risks are associated with 2,4-DNT, 1,3-dinitrobenzene, and RDX.

The ERAs conducted as part of the 1998 *Round Two RI, Sites 6 and 7* (Baker, 1998c) and *Phase II RI, Site 6* (CH2M HILL, 2011a) did not assess risk posed to ecological receptors due to groundwater exposure because no complete exposure pathway was identified.

Surface Water

In the HHRA current/future trespasser/visitor (adult and adolescent) and construction workers were evaluated from ingestion of and dermal contact with surface water. Estimated non-carcinogenic hazards and carcinogenic risks to current/future adult trespasser/visitor and future construction workers exposed to surface water are less than the acceptable risk levels.

A Screening Ecological Risk Assessment (SERA) comprising Steps 1 and 2 of the ERA process and the first step (Step 3A) of a Baseline Ecological Risk Assessment (BERA) were conducted for aquatic and wetland habitats at Site 6. No unacceptable ecological risks were identified in surface water and no further evaluation is warranted for ecological receptors.

Sediment

In the HHRA current/future trespasser/visitor (adult and adolescent) and construction workers were evaluated from ingestion of and dermal contact with sediment. Estimated non-carcinogenic hazards and carcinogenic risks to the current/future adult trespasser/ visitor and future construction workers exposed to sediment are less than the acceptable risk levels.

A SERA comprising Steps 1 and 2 of the ERA process and the first step (Step 3A) of a BERA were conducted for aquatic and wetland habitats at Site 6. Therefore, no unacceptable ecological risks were identified in sediment and no further evaluation is warranted for ecological receptors.

Sediment Pore-Water

No unacceptable ecological risks were identified in sediment pore-water and no further evaluation is warranted for ecological receptors.

3.2.3.4 Remedial Action(s)

Implementation of the selected remedy was initiated in 1999. The initial phase of remediation consisted of the construction of a bioremediation cell (bio-cell) at Site 24, excavation of PAH and explosives contaminated soil to approximately 4 feet bgs, disposal of PAH contaminated soil/sediment, transportation of explosives contaminated soil to the bio-cell, flume and drain decontamination, and site restoration (OHM, 1999). A soil cover was also placed over the Excavated Area. Soil and sediment from the Flume Area that exceeded the RGs, and sediment from the Impoundment Area that exceeded the RGs were excavated and transported to the bio-cell where they were 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 between 1999 and 2006 in the bio-cell (Shaw, 2008). Treatment was deemed complete once two consecutive sampling events confirmed soil and sediment contained VOC and explosive concentrations below RGs.

LUCs prohibiting residential development of the Site 6 area and disturbance of the excavated area's soil cover have been maintained through routine inspections. A LUC RD is currently being developed for the impoundment

area and a separate LUC RD will be developed for the excavated area following a data gap investigation. Site 6 is inaccessible to the general public. Access to the Site 6 impoundment area is restricted by a cable gate located at the entrance to the plant area (off Poe Road). Signs are posted at the site. The LUCs will be maintained until they are no longer required to protect human health or the environment (Baker, 1998f).

LTM of the Impoundment Area surface water and sediment and Site 6 groundwater began in May 2000. Following the baseline round of sampling, LTM at Site 6 was suspended pending completion of the RA and additional investigation activities. Suspension of the LTM is documented in a TM (CH2M HILL, 2012c)

3.2.3.5 Activities Completed FY2013

A UFP-SAP in association with Phase III of the RI is currently being developed as part of the Site 6 Data Gap Investigation. Fieldwork in association with the data gap investigation UFP-SAP is anticipated to be completed in two phases. The results of the data gap investigation will be used to determine if any revisions to the 1998 ROD are required to address the site boundary and site risks. LUC inspections were performed on a quarterly basis in September 2012 and December 2012, and were performed on an annual basis starting in July 2013.

3.2.3.6 CERCLA Path Forward

- Routine Annual LUC Inspections
- Technical Memorandum detailing LUC and data gap investigation needs
- Finalize 2002 Draft LUCIP
- Complete UFP-SAP data gap investigation
- Phase 1 data gap investigation Field Work/Report
- TM documenting the findings in the excavated area and impoundment area
- Phase 2 data gap investigation Field Work/Report
- Resume LTM
- FS for soil, groundwater, surface water, and sediment, as appropriate
- Revise PP/ROD for soil, groundwater, surface water, and sediment, as appropriate
- LUC RD, as appropriate
- RAWP
- RA Field Work
- CCR
- Five-Year Review (2018)
- LTM Work Plan and Implementation
- RACR

Schedule 3-3 presents the FY2014-15 schedule for Site 6.

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

3.2.4.1 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 3-4**), 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-foot 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 between approximately 15 and 25 feet 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 chlorinated solvents (C. C. Johnson & Associates, Inc., and CH2M HILL, 1984). Between 1975 and 1986, the wastewater was treated in an activated carbon unit, which was designed to remove dissolved explosives from the wastewater prior to discharge. 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. In 2009, all buildings at Site 7 were demolished; however, the earthen berms adjacent to the former buildings remain in place, resulting in uneven, and in places, steep terrain, ranging from 20 to 50 feet amsl. Additional soil, sediment, surface water, groundwater, pore water, and seep data are being collected as part of the Site 7 Expanded Remedial Investigation (ERI), currently ongoing. The purpose of this ERI is to further evaluate the nature and extent of CERCLA-related contamination at Site 7, due to the potential for releases in the vicinity of the former buildings associated with Plant 3. This investigation will provide additional information within the footprint of the former buildings, conveyor areas, and locations of loading/unloading zones, and areas downgradient from the former building footprints, to help identify and delineate any contamination present as a result of Plant 3 operations. This investigation will be conducted in a phased approach with two sampling events, the first of which occurred in November 2012. The second sampling event is anticipated to occur in FY2013. A summary of relevant documents and action milestones is presented in the following table.

Site 7 - 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	000313
Report for Field Scale Treatability Study for Site 7 and 22	OHM, 1997	000887
Pilot Study Report for the Explosives-Contaminated Soil at Naval Weapons Station Yorktown	Baker, 1997	001088
Round Two Remedial Investigation Report, Sites 6 and 7	Baker, 1998	001294 (Volume I) 001295 (Volume II) 001346 (Volume III) 001347 (Volume IV)
Feasibility Study, v2, Sites 6 and 7	Baker, 1998	001077
Record of Decision, Operable Unit Nos. XII, XIII, XIV, and XV, Sites 6 and 7	Baker, 1998	001001
Long-Term Monitoring Report Sites 1, 3, and 7	Baker, 2006	002075
Remedial Design for Naval Weapons Station Yorktown Sites 6 and 7	Baker, 2006	002268
Phase I Remedial Investigation Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	002158
Final Long-Term Monitoring Report for Site 7	CH2M HILL, 2010	000148
Suspension of Site 7 Long-term Monitoring Requirements for Operable Unit XV Identified in the 1998 Record of Decision, Technical Memorandum	CH2M HILL, 2012	002529

3.2.4.2 Nature and Extent of Potential Contamination

The wastewater discharged from Plant 3 was the source of potential contamination at Site 7. Previous investigations included analysis of soil, surface water, sediment, and groundwater for VOCs, SVOCs, explosives, and inorganic constituents. In addition, soil and groundwater were analyzed for pesticides and PCBs. The most recent soil data available are from the *Round Two RI Report, Sites 6 and 7* (Baker, 1998c). The most recent surface water and sediment data available are from the 2006 *LTM Report Sites 1, 3, and 7* (Baker, 2006b). The most recent groundwater data available are from the 2007 *Phase I RI for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25* (CH2M HILL, 2007a). Additional groundwater data for explosives are available from the 2010 *LTM Report for Site 7* (CH2M HILL, 2010b).

Primary contaminants previously identified that are associated with Site 7 are explosives and inorganic constituents in soil, sediment, and groundwater. Additional soil, sediment, surface water, groundwater, pore water, and seep data are being collected as part of the Site 7 ERI, currently ongoing. The nature and extent of potential contamination will be reevaluated during the ERI based on the new sampling data.

Soil

As part of a pilot study, which began in September 1996 (Baker, 1997c), treatment goals were developed for COCs (explosives) in the drainage area soil and sediment to be protective of future industrial/commercial land use. Soil from the drainage area of Site 7 was excavated and sent to a bio-cell located at Site 22 for biological remediation.

Following the completion of the pilot study in January 1997, concentrations of all COCs in the drainage area soil and sediment were found to be below established treatment goals.

Soil within and surrounding the footprint of the former Plant 3 buildings was sampled as part of the ongoing investigation, and is being evaluated as part of the ERI.

Groundwater

Yorktown-Eastover Aquifer

Historically, explosives and metals have been detected above screening values and background concentrations (where available) in Site 7 groundwater. The current nature and extent of contamination in groundwater are being evaluated as part of the ERI.

Surface Water

Felgates Creek Tributary

The current nature and extent of contamination in surface water are being evaluated as part of the ERI.

Sediment

Felgates Creek Tributary

The current nature and extent of contamination in sediment are being evaluated as part of the ERI.

3.2.4.3 Potential Risks

Potential unacceptable risks were previously identified for the drainage area soil and sediment. Potential risks associated with the remaining soil, groundwater, surface water, and sediment at Site 7 will be reevaluated during the ERI. The data collected during the ERI will be used to support the completion of an HHRA and ERA to determine if further RA is required. A summary of the historical risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

A ROD was finalized in October 1998 (Baker, 1998f) to address contaminants identified in the drainage area soil. The pilot study conducted at Site 7 reduced concentrations of all COCs to below established treatment goals previously agreed upon by the Navy and USEPA, in partnership with the VDEQ, to be protective of future industrial/commercial land use receptors. Because contaminants were not reduced to levels allowing unrestricted land use, LUCs were implemented prohibiting residential development of Site 7. Annual inspections of LUCs and yearly reporting are required in order to ensure that the RIP remains protective of human health and the environment.

Potential risk associated with surface and subsurface soil within and in the vicinity of the former Plant 3 buildings is being evaluated as part of the ERI.

Groundwater

Yorktown-Eastover Aquifer

Potential risk associated with groundwater is currently being evaluated as part of the ERI.

Surface Water

Felgates Creek Tributary

Potential risk associated with surface water is being evaluated as part of the ERI.

Sediment

Felgates Creek Tributary

A ROD was finalized in October 1998 (Baker, 1998f) to address contaminants identified in drainage area sediment. The pilot study conducted at Site 7 reduced concentrations of all COCs to below established RGs previously agreed upon by the Navy and the USEPA, in partnership with the VDEQ, to be protective of future industrial/commercial land use receptors. Because contaminants were not reduced to a level allowing unrestricted land use, LUCs were implemented prohibiting residential development of Site 7. Annual inspections of LUCs, LTM, and yearly reporting are required in order to ensure that the RIP remains protective of human health and the environment.

Potential risk associated with sediment is being evaluated as part of the ERI.

3.2.4.4 Remedial Action(s)

In 1996, a field-scale pilot study to treat explosives-contaminated soil and sediment at Site 7 was conducted. Approximately 770 cubic yards (yd^3) 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 bio-cell located at Site 22 (Baker, 1997c).

A ROD was signed in October 1998 for site soil 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 that LTM was not the final remedy for these media. The ROD specified no additional RA for soil and sediment in the drainage way because the field-scale pilot study mitigated potential human health risks and ecological concerns in these media under industrial/commercial land use (Baker, 1998f). LTM of surface water and sediment in Felgates Creek and groundwater associated with the site was conducted between 2000 and 2005 and included VOCs, explosives, and inorganic constituent analysis. Although groundwater monitoring is included in the LTM program, further investigations of groundwater are currently ongoing. Suspension of LTM until additional investigation activities are completed is documented in a TM (CH2M HILL, 2012e). LUCs prohibiting residential use within and around the Site 7 drainage area have been maintained through routine inspections.

3.2.4.5 Activities Completed in FY2013

A Final UFP-SAP for additional investigation of soil, sediment, surface water, and groundwater associated with the former Plant 3 Area as part of the Site 7 ERI was finalized in August 2012. The first round of field work in association with the ERI UFP-SAP was conducted in October and November 2012, and the second round was completed in July 2013. In addition, a TM recommending suspension of the LTM requirements specified in the ROD until after the ERI activities are completed was finalized and signed in September 2012 (CH2M HILL, 2012e). The Partnering Team agreed to remove further LTM because addition investigation is required at the site, and the TM documented this decision. Based on the results of the ERI, a PP and ROD will be developed for Site 7 and any further LTM requirements will be incorporated in the next ROD. The Partnering Team also determined that revision to the 1998 ROD are required that will address the site boundary and site media. LUC inspections were performed on a quarterly basis in September 2012 and December 2012, and were performed on an annual basis starting in July 2013.

3.2.4.6 CERCLA Path Forward

- Routine Annual LUC Inspections
- Field Work and Report for the former Plant 3 area
- Resume LTM
- FS for all media, as appropriate
- Revise PP/ROD for all media, as appropriate
- LUC RD, as appropriate
- RAWP
- RA Field Work
- CCR
- Five-Year Review for Soil (2018)

- LTM Work Plan and Implementation
- RACR

Schedule 3-4 presents the FY2014-15 schedule for Site 7.

3.2.5 Site 8—NEDED Explosives-Contaminated Wastewater Discharge Area

3.2.5.1 Site Description

Site 8 consists of a 300-foot drainage way and its surrounding area (including Building 456), located along the Eastern Branch of Felgates Creek, approximately 1.5 miles from the confluence of Felgates Creek and the York River (**Figure 3-5**). The drainage way 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, which is situated in a ravine with steeply sloping sides. Surface water run-off at the site likely flows into the drainage channel and then into the Eastern Branch of Felgates Creek. The drainage channel contains standing water and has a soft ground surface. The ground surface is paved with the exception of the wooded western and northern portions of the site. The surficial aquifer beneath the drainage way at the site is encountered at approximately 6 feet bgs, and flows towards Felgates Creek.

The Site 8 discharge area received wastewater from the NEDED complex (Building 456) from 1940 until 1986. Prior to 1975, the wastewater reportedly contained solvents (including TCE), spent/neutralized acids, and explosives. After 1975, a carbon adsorption tower was used to treat the contaminated wastewater prior to discharge into the drainage area. An NPDES permit was granted by USEPA to allow this discharge. In 1986, the effluent from the tower was diverted to the sanitary sewer and ultimately to HRSD. Since 1986, the discharge area has reverted to a natural drainage area. In 2012, the operations at Building 456 were terminated, and the building is scheduled to complete the decontamination process in early 2014. A summary of relevant documents and action milestones is presented in the following table.

Site 8 - 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 (Volume I) 01549 (Volume II)
Engineering Evaluation/Cost Analysis for Contaminated Soil and Sediment at Site 8 and SSA 14	Baker, 2005	02076
Action Memorandum for Contaminated Soil and Sediment at Site 8 and SSA 14	Baker, 2005	01871
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
Construction Completion Report	Shaw, 2009	Pending
Final Remedial Investigation Report for Groundwater at Sites 8 and 34	CH2M HILL, 2011	000246

3.2.5.2 Nature and Extent of Potential Contamination

Historical wastewater discharge from the NEDED complex (Building 456) was the source of potential contamination to soil, sediment, surface water, and groundwater at Site 8. Previous investigations have included analysis of soil, groundwater, sediment, and surface water samples for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. The most recent soil data available are from the 2009 *Construction Completion Report* (Shaw, 2009a). The most recent groundwater, surface water, and sediment data available are from the 2011 Final RI for Groundwater (CH2M HILL, 2011b). Surface water and sediment samples were collected near Site 8 as part of an overall evaluation of surface water related to Sites 8 and 34, as they are adjacent to each other and contribute runoff and groundwater discharge to the Eastern Branch of Felgates Creek. The current nature and

extent of contamination for each medium at Site 8, as documented in the previously presented reports, are summarized as follows.

Soil

During the development of the EE/CA (Baker, 2005a), RGs were developed for COCs identified in soil during previous investigations to be protective of human and ecological receptors under an unrestricted land use scenario. A removal action was conducted beginning in February 2007 to remove and dispose of contaminated soil.

Post-removal confirmation samples indicated that concentrations of all COCs were below established RGs following the completion of removal activities in September 2008.

Groundwater

Yorktown-Eastover Aquifer

- No pesticides or PCBs were detected.
- Seven VOCs were detected in groundwater, of which four exceeded associated screening values. Detected concentrations of chloroform (3.7 J µg/L), PCE (7.4 J µg/L), TCE (2 J µg/L), and VC (1.2 J µg/L) exceeded the tap water RSL and/or the federal MCL in one or more sample locations. All wells in which VOCs were detected are located west of Building 456.
- One SVOC was detected in groundwater, which exceeded associated screening values. Detected concentrations of BEHP (96 µg/L) exceeded the tap water RSL and MCL in one sample location.
- Ten explosives were detected in groundwater, four of which exceeded associated screening values. Detected concentrations of 2,4,6- TNT (55 µg/L), 4-amino-2,6-DNT (73 µg/L), 2-amino-4,6-DNT (82 µg/L), and RDX (300 µg/L) exceeded the tap water RSL in one or more sample locations. Detected concentrations of explosives were most extensive in the shallow portion of the aquifer between Building 456 and the drainage outfall.
- Eighteen total and fifteen dissolved inorganic constituents were detected in groundwater, of which one total and one dissolved inorganic exceeded associated screening values. Detected concentrations of total (11.5 µg/L) or dissolved (5.8 J µg/L) arsenic exceeded the associated tap water RSL and/or MCL at one or more sample locations.

Surface Water

Eastern Branch of Felgates Creek

- No VOCs, SVOCs, pesticides, or PCBs were detected. No detected explosives exceeded associated screening values.
- Nineteen total and twelve dissolved inorganic constituents were detected in surface water, of which three total and three dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (574 µg/L) and dissolved (315 K µg/L) aluminum, total (3.7 J µg/L) and dissolved (5.9 J µg/L) arsenic, and total (36.9 µg/L) and dissolved (35.3 J µg/L) barium exceeded the tap water RSL multiplied by 10 and/or the ESV at one or more sample locations. However, concentrations of all inorganic constituents were comparable to upstream reference or groundwater samples and, therefore, are unlikely to be site-related.

Sediment

During the development of the EE/CA, RGs were developed for COCs, BEHP and Aroclor-1260, identified in sediment during previous investigations to be protective of human and ecological receptors under an unrestricted land use scenario. A removal action was conducted beginning in February 2007 to remove and dispose of contaminated sediment.

Post-removal confirmation samples revealed that concentrations of Aroclor-1260 still exceed its RG in the western portion of the site adjacent to the Eastern Branch of Felgates Creek in August 2007. As part of the *RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b), additional sediment samples were collected and analyzed for full TCL/TAL analysis within the Eastern Branch of Felgates Creek in order to determine the potential transport of contaminants from groundwater to nearby sediment. A summary is provided as follows:

- No PCBs were detected in any samples collected.
- Three VOCs were detected in sediment, of which only one exceeded associated screening values. Detected concentrations of carbon disulfide (15 J µg/kg) exceeded the ESV at one sample location. Carbon disulfide is a naturally occurring substance that is commonly found in marsh sediments. In addition, this chemical was also detected in a sample from one upstream reference location at similar concentrations. Consequently, concentrations of carbon disulfide are not believed to be site-related.
- Twenty inorganic constituents were detected in sediment, of which three exceeded associated screening values. Detected concentrations of aluminum (26,500 µg/kg), arsenic (13.4 µg/kg), and manganese (412 J µg/kg) exceeded the residential soil RSL multiplied by 10 and ESV in one or more sample locations. However, concentrations of all inorganic constituents were comparable to upstream reference samples and are unlikely to be site-related.

3.2.5.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

Following the removal action conducted at Site 8, the concentrations of all identified COCs were reduced to below the established RGs. The Navy and the USEPA, in partnership with the VDEQ, reached consensus in May 2008 that NFA for soil is required (April 2007 Partnering Meeting).

Groundwater

The HHRA conducted as part of the 2011 *Final RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) assessed risk to receptors through ingestion, dermal contact, and inhalation of vapors under a potable use scenario. As per USEPA guidance, carcinogenic risks were only calculated for lifetime child/adult residents. Potential unacceptable non-cancer hazards were identified for future adult and child residents.

Yorktown-Eastover Aquifer

Potential unacceptable cancer risks were identified for lifetime child/adult residents. The RME non-carcinogenic hazard for future adult residents associated with exposure to groundwater (HI = 8.5) is above the acceptable HI of 1.0. The hazard is primarily associated with ingestion of 2, 4, 6-TNT (hazard quotient [HQ] = 3.0), 2- amino-4, 6-DNT (HQ = 1.0), 3, 5-dinitroaniline (HQ = 1.2), and 4-amino-2, 6-DNT (HQ = 1.1). The CTE non-carcinogenic hazard (HQ = 0.74) is less than the acceptable HI of 1.0. The RME non-carcinogenic hazard for future child residents associated with exposure to groundwater (HI = 20) exceeds the acceptable HI of 1.0. The hazard is primarily associated with ingestion of 2, 4, 6- TNT (HQ = 7.0), 2-amino-4,6-DNT (HQ = 2.3), 3,5-dinitroaniline (HQ = 2.8), 4-amino-2,6-DNT (HQ = 2.6), and RDX (HQ = 2.2). The CTE non-carcinogenic hazard (HQ = 2.4) also exceeds the acceptable HI of 1.0, however, under the CTE scenario, there are no target organ HQs greater than 1.0. The RME carcinogenic risk for lifetime child/adult residents associated with exposure to groundwater (CR = 3.4×10^{-4}) is above USEPA's target risk range of 10^{-6} to 10^{-4}. The risk is primarily associated with ingestion of RDX (CR = 1.7×10^{-4}), and ingestion and dermal contact with PCE (CR = 9.4×10^{-5}). The CTE carcinogenic risk associated with exposure to groundwater (6.1×10^{-5}) is within USEPA's target risk range.

The ERA conducted as part of the 2011 *Final RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) did not assess risk posed to ecological receptors due to groundwater exposure because no complete exposure pathway was identified.

Surface Water

Eastern Branch of Felgates Creek

The HHRA conducted as part of the 2011 *Final RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) assessed risk to receptors through incidental ingestion and dermal absorption. No unacceptable cancer risks or non-cancer hazards resulting from exposure to surface water along the unnamed tributary to the Eastern Branch of Felgates Creek were identified for any receptor.

The ERA conducted as part of the 2011 *Final RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) identified no COCs due to direct contact or food web exposure associated with surface water. Thus, risks to ecological receptors are considered acceptable.

Sediment

Eastern Branch of Felgates Creek

Following the removal action conducted at Site 8, concentrations of PCBs remained above the RG; however, based on risk management considerations presented in the 2008 *Removal Action and Post-Removal Confirmation Sampling Summary Technical Memorandum* (CH2M HILL, 2008b), the Navy and the USEPA, in partnership with the VDEQ reached consensus that NFA for sediment is required. The HHRA conducted as part of the 2011 *Final RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) assessed risk to receptors through incidental ingestion and dermal absorption. No unacceptable cancer risks or non-cancer hazards resulting from exposure to sediment along the unnamed tributary to the Eastern Branch of Felgates Creek were identified for any receptor.

The ERA conducted as part of the 2011 *Final RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) identified no COCs due to direct contact or food web exposure associated with sediment. Thus, risks to ecological receptors are considered acceptable.

3.2.5.4 Remedial Action(s)

A removal action was initiated in February 2007 to excavate contaminated soil and sediments in the drainage channel posing potential risks to human health and the environment. Excavation was completed in cells, progressing westward from the source area toward Felgates Creek. Post-excavation samples were collected from each cell and compared to RGs and to background values for naturally occurring and anthropogenic chemicals. Post-removal PCB confirmation samples indicated that PCB concentrations exceeded the sediment RG along the western excavation boundary, and in August 2007, the Navy and the USEPA, in partnership with the VDEQ, agreed to halt excavation at the Felgates Creek channel if PCB concentrations continued to exceed the RG. Post-removal confirmation samples and pre-removal grab samples collected from the boundary of Felgates Creek contained elevated levels of PCBs in exceedance of RGs and excavation activities were discontinued. In total, 1,193 tons of contaminated soil/sediment and 44 tons of PCB-contaminated soil were removed (Shaw, 2009a). Following a review of the concentrations remaining onsite and the conservative nature of the established RG for PCBs, a TM was written to acknowledge the risk-management of potentially unacceptable ecological risks associated with PCBs in Site 8 sediment (CH2M HILL, 2008b).

3.2.5.5 Activities Completed in FY2013

A UFP-SAP in association with the Site 8 Data Gap Investigation for soil and groundwater is currently being developed. The FS for Site 8 groundwater was initiated in 2012, but put on hold pending completion of the Data Gap Investigation. The Data Gap Investigation will be used to determine whether the FS for groundwater at Site 8 should be expanded to other parts of the site and whether soil should be included as a medium requiring remediation in the FS. The Data Gap Investigation field activities are on hold until building demolition is complete at Site 8, estimated to be completed in February 2014.

3.2.5.6 CERCLA Path Forward

- Complete UFP-SAP for Data Gap Investigation
- Field Work/Report for Data Gap Investigation
- FS

- PP/ROD for all media, as appropriate
- LUC RD
- RAWP
- RA field work for groundwater
- LTM Work Plan and Implementation
- RACR

Schedule 3-5 presents the FY2014-15 schedule for Site 8.

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

3.2.6.1 Site Description

Site 9 and Site 19 are both part of the former Plant 1 operations area. Although these sites were originally identified as two separate sites, Site 9 and Site 19 are being investigated together as one overall study area. Site 9 is a discharge area that consists of a 600-foot drainage way and the immediate surrounding area (**Figure 3-6**). Site 9 is located east of Lee Pond and topographically downgradient of Site 19. The drainage way flows 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 feet bgs within the shallow Cornwallis Cave aquifer and flows to the southwest toward Lee Pond. Within the deeper Yorktown-Eastover aquifer, groundwater is encountered between approximately 39 and 51 feet bgs and flows west/southwest.

Between the late 1930s and 1975, Site 9 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 a NPDES permit. In 1986, the effluent from the carbon adsorption 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 upstream of where it flows under Bollman Road. In addition, on the downstream 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, 1994a). The weapon casings, railroad ties and drums were removed along with contaminated soil and sediment in 1994. Between 2010 and 2012, all of the former buildings located at Sites 9 and 19 were demolished. Currently, the site has reverted to a natural drainage way for surface runoff from surrounding areas and receives no wastewater discharge from the Plant 1 complex. A summary of relevant documents and action milestones is presented in the following table.

Site 9 - 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	000313
Action Memorandum and EE/CA	Baker, 1994	000615
Closeout Report, Sites 2 and 9 and Site Screening Area 4, Mine Casing and Debris Removal Action	IT Corporation, 1995	000646
Site 19 and Composites of Site 9, Site 19, SSA 6 & SSA7 Independent Sampling and Risk Screening Report	Black & Veatch, 1996	000781
Round Two Remedial Investigation Report, Sites 9 and 19	Baker, 1997	000889
Feasibility Study Sites 9 and 19	Baker, 1997	000966
Record of Decision,v3, Operable Unit Nos. VI and VII, Sites 9 and 19	Baker, 1998	002077

3.2.6.2 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 have included analysis of soil, groundwater, sediment, and surface water for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. The most recent soil, groundwater, surface

water, and sediment data available are from the 1997 *Round Two RI, Sites 9 and 19 (*Baker, 1997d*)*. The current nature and extent of contamination for each medium at Site 9, as documented in the previously presented reports, are summarized as follows.

Soil

Surface Soil

- No VOCs, pesticides, or explosives were detected exceeding associated screening values.
- Twenty-one SVOCs were detected in surface soil, of which thirteen exceeded associated screening values. Detected concentrations of acenaphthene (120 J µg/kg), anthracene (310 J µg/kg), benzo(a)anthracene (1,100 µg/kg), benzo(a)pyrene (1,200 µg/kg), benzo(b)fluoranthene (2,200 µg/kg), benzo(g,h,i)perylene (770 µg/kg), benzo(k)fluoranthene (2,520 µg/kg), chrysene (1,200 µg/kg), dibenzo(a,h)anthracene (0.16 J mg/kg), fluoranthene (2,200 µg/kg), ideno(1,2,2-cd)pyrene (550 µg/kg), phenathrene (1,600 µg/kg) and pyrene (2,000 µg/kg) exceeded the residential risk-based concentrations (RBCs) and/or ESVs in one or more sample location.
- Nineteen inorganic constituents were detected in surface soil, of which ten exceeded associated screening values. Detected concentrations of aluminum (7,750 mg/kg), arsenic (23.3 K mg/kg), beryllium (0.47 mg/kg), chromium (29.8 mg/kg), manganese (204 mg/kg), nickel (11 mg/kg), and vanadium (68.6 J mg/kg) exceeded the ESV and/or residential RBCs; however, all detected concentrations were below maximum background concentrations. Detected concentrations of copper (26.1 mg/kg), iron (20,200 mg/kg), and lead (68.4 mg/kg) exceeded the maximum background concentration, as well as the ESV and/or residential RBCs at one or more sample locations.

Subsurface Soil

- No VOCs or pesticides were detected exceeding associated screening values.
- Twenty SVOCs were detected in subsurface soil, of which five exceeded associated screening values. Detected concentrations of benzo(a)anthracene (1,700 µg/kg), benzo(b)fluoranthene (2,500 µg/kg), benzo(a)pyrene (1,700 µg/kg), ideno(1,2,3-cd)pyrene (1,000 µg/kg) and dibenzo(a,h)anthracene (270 J µg/kg) exceeded the residential RBCs at one or more sample location.
- Three explosives were detected in subsurface soil, of which two exceeded associated screening values. Detected concentrations of 2,4,6-TNT (33,000 µg/kg) and amino-DNT (42,000 NJ µg/kg) exceeded the residential RBCs at one or more sample location.
- Twenty inorganic constituents were detected in subsurface soil, of which nine exceeded associated screening values. Detected concentrations of aluminum (17,000 mg/kg), antimony (5.3 L mg/kg), arsenic (54.7 K mg/kg), beryllium (4.1 mg/kg), cadmium (4.5 mg/kg), chromium (46.5 mg/kg), iron (97,000 mg/kg), manganese (755 J mg/kg), and vanadium (219 J mg/kg) exceeded the residential RBCs at one or more sample locations.

Groundwater

Cornwallis-Cave Aquifer

- No VOCs and SVOCs were detected exceeding screening values in surface or subsurface groundwater.
- Three explosives were detected in groundwater, all of which exceeded associated screening values. Detected concentrations of 2,4-DNT (2 J µg/L), amino-DNT (4,400 µg/L), and 2,4,6-DNT (880 µg/L) exceeded tap water RBCs in one or more samples.
- Seventeen total and twelve dissolved inorganic constituents were detected in groundwater, of which six total and two dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (11,800 J µg/L) aluminum, total (28.4 µg/L) and dissolved (25.9 µg/L) arsenic, total (432 J µg/L) and dissolved (419 µg/L) barium, total (34.3 J µg/L) chromium, total (227 µg/L) cyanide, and total (41.2 µg/L) vanadium exceeded tap water RBCs and/or state and federal MCLs at one or more sample locations. In deep

groundwater, eleven total and eleven dissolved inorganic constituents were detected, of which one total and one dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (2.2 L µg/L) and dissolved (1.8 µg/L) arsenic exceeded the tap water RBC, each at one sample location.

Yorktown-Eastover Aquifer

- Two explosives were detected in groundwater, both of which exceeded screening values. Detected concentrations of 1,3,5-trinitrobenzene (TNB) (0.79 µg/L) and amino-DNT (2.6 µg/L) exceeded the tap water RBC, each in one sample.
- Eleven total and eleven dissolved inorganic constituents were detected in groundwater, of which one total and one dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (2.2 L µg/L) and dissolved (1.8 µg/L) arsenic exceeded the tap water RBC, each at one sample location.

Surface Water

Drainage to Lee Pond

- No VOCs or SVOCs were detected exceeding screening values in surface water.
- One pesticide was detected in surface water that exceeded screening values. Detected concentrations of heptachlor epoxide (0.08 K µg/L) exceeded state and/or federal Water Quality Standards at one sample location.
- Eight explosives were detected in surface water, all of which exceeded associated screening values. Detected concentrations of 1,3,5-TNB (0.44 NJ µg/L), 1,3-dinitrobenzene (0.46 NJ µg/L), 2,4-DNT (6 J µg/L), 2,4,6- TNT (480 µg/L), 2,6-DNT (4 J µg/L), amino-DNT (1,000 µg/L), HMX (14 µg/L), and RDX (6.1 µg/L) exceeded ESV and state and/or federal Water Quality Criteria (WQC) for human health at one or more sample locations.
- Fourteen total and fourteen dissolved inorganic constituents were detected, of which three total and two dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (4.6 µg/L) and dissolved (2.1 µg/L) arsenic, total (27.7 µg/L) cyanide, and total (231 µg/L) and dissolved (218 µg/L) manganese exceeded the tap water RBC×10 or the ESV at one or more sample location.

Sediment

Drainage to Lee Pond

- No VOCs were detected above associated screening values.
- Twenty SVOCs were detected in sediment, of which nine exceeded associated screening values. Detected concentrations of acenaphthene (220 J µg/kg), acenaphthylene (150 J µg/kg), anthracene (750 J µg/kg), benzo(a)anthracene (2,400 J µg/kg), benzo(b)fluoranthene (2,600 µg/kg), benzo(k)fluoranthene (970 µg/kg), benzo(a)pyrene (2,100 µg/kg), dibenzo(a,b)anthracene (300 J µg/kg), ideno(1,2,3-cd)pyrene (1,300 µg/kg), chrysene (2,600 µg/kg), dibenzo(a,h)anthracene (300 J µg/kg), phenathrene (3,200 J µg/kg), fluoranthene (4,600 µg/kg), fluorene (420 J µg/kg), phenathrene (3,200 J µg/kg), and pyrene (3,300 µg/kg) exceeded the sediment effects range-lows (ER-Ls) and/or the residential RBC×10 at one or more sample locations.
- Three explosives were detected, all of which exceeded associated screening values. Detected concentrations of 2,4-DNT (3,700 µg/kg), amino-DNT (2,300 µg/kg), and 2,4,6-DNT (620 µg/kg) exceeded residential soil RBCs×10 at one or more location.
- Nineteen inorganic constituents were detected in sediment, of which four exceeded associated screening values. Detected concentrations of arsenic (55.5 J mg/kg), beryllium (0.85 mg/kg), chromium (47.3 mg/kg), and lead (109 mg/kg) exceeded the sediment ER-Ls and residential soil RBCs×10 at one or more location.

3.2.6.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

In March 1998, a ROD was signed indicating that the Navy and the USEPA, in partnership with the VDEQ agreed that NFA was required for site soil as potential human health and ecological risks were considered acceptable or manageable for this medium (Baker, 1998g).

Groundwater

The HHRA conducted as part of the *Round Two RI Report, Sites 9 and 19* (Baker, 1997d) assessed risk to receptors through ingestion, dermal contact, and inhalation of vapors under a potable use scenario.

Cornwallis-Cave Aquifer

The RME carcinogenic risk for future adult residents associated with exposure to groundwater (incremental lifetime cancer risk [ILCR] = 6.3×10^{-4}) is above USEPA's target risk range of 10^{-6} to 10^{-4}. The risk is primarily associated with exposure to 2,4,6-TNT (CR = 2.5×10^{-4}) and dissolved arsenic (CR = 3.6×10^{-4}). The CTE carcinogenic risk (ILCR = 6.8×10^{-5}) is within the target risk range. The RME non-carcinogenic hazard for future adult residents associated with exposure to groundwater (HI = 51) is above the acceptable HI of 1.0. The hazard is primarily associated with exposure to 2,4,6-TNT (HQ = 48) and dissolved arsenic (HQ = 2.4). The CTE non-carcinogenic hazard (HI = 12) also exceeded the target level. The RME carcinogenic risk for future child residents associated with exposure to groundwater (ILCR = 3.6×10^{-4}) is above USEPA's target risk range of 10^{-6} to 10^{-4}. The risk is primarily associated with exposure to 2,4,6-TNT (CR = 1.4×10^{-4}) and dissolved arsenic (CR = 2.1×10^{-4}). The CTE carcinogenic risk (ILCR = 1.5×10^{-4}) also exceeds the target risk range. The RME non-carcinogenic hazard for future adult residents associated with exposure to groundwater (HI = 120) is above the acceptable HI of 1.0. The hazard is primarily associated with exposure to 2,4,6-TNT (HQ = 110) and dissolved arsenic (HQ = 5.5). The CTE non-carcinogenic hazard (HI = 39) also exceeded the target level.

Yorktown-Eastover Aquifer

No unacceptable cancer risks or non-cancer hazards to future adult residents were identified from exposure to deep groundwater. The RME carcinogenic risk for future child residents associated with exposure to groundwater (ILCR = 1.5×10^{-5}) is within the USEPA's target risk range of 10^{-6} to 10^{-4}. The RME non-carcinogenic hazard for future adult residents associated with exposure to groundwater (HI = 1.4) is above the acceptable HI of 1.0. The hazard is primarily associated with exposure to 1,3,5-TNB (HQ=1.0). The CTE non-carcinogenic hazard (HI = 0.93) is below the target level.

The ERA conducted as part of the *Round Two RI Report, Sites 9 and 19* (Baker, 1997d) did not assess risk posed to ecological receptors due to groundwater exposure because no complete exposure pathway was identified.

Surface Water

Drainage to Lee Pond

In March 1998, a ROD was signed indicating that the Navy and the USEPA, in partnership with the VDEQ agreed NFA was required for site surface water as potential human health and ecological risks were considered acceptable or manageable for this medium (Baker, 1998g).

Sediment

Drainage to Lee Pond

In March 1998, a ROD was signed indicating that the Navy and the USEPA, in partnership with the VDEQ, agreed that NFA was required for site sediment as potential human health risks were considered acceptable or manageable for this medium. Although conservative modeling predicted some potential for ecological risk at Site 9, it was determined that remediation of the site would generate more harm to the surrounding ecology by destroying habitat and potentially creating erosion problems in the Site 9 drainage ditch. Accordingly, it was determined that NFA was required for ecological receptors (Baker, 1998g).

3.2.6.4 Remedial Action(s)

A removal action was completed in December 1994 to address surface and subsurface debris. The removal action included the concurrent removal of ordnance and railroad ties to a depth of 4 feet bgs at the lower end of the drainage way before it crosses Bollman Road. The excavated area was backfilled with on-base borrow topsoil and re-graded (IT Corporation, 1995b). Following the additional sampling conducted as part of the *Round Two RI, Sites 9 and 19* (Baker, 1997d), an NFA ROD for soil, surface water, and sediment was signed in March 1998 (Baker, 1998g).

3.2.6.5 Activities Completed FY2013

The UFP-SAP is currently being developed for Sites 9 and 19 to fill current data gaps in the dataset to help determine the nature and extent of impacted groundwater and soil in the Site 9 wastewater discharge area and the Site 19 conveyor belt area.

3.2.6.6 CERCLA Path Forward

- Finalize RI UFP-SAP for Sites 9 and 19
- RI Field Work for Sites 9 and 19
- RI/FS/PP/ROD for Sites 9 and 19
- LUC RD for Sites 9 and 19, as appropriate
- RAWP for Sites 9 and 19
- RA Field Work for Sites 9 and 19
- CCR for Sites 9 and 19
- LTM Work Plan and Implementation for Sites 9 and 19, if required
- RACR for Sites 9 and 19

Schedule 3-6 presents the FY2014-15 schedule for Site 9.

3.2.7 Site 12—Barracks Road Landfill

3.2.7.1 Site Description

Site 12, the Barracks Road Landfill, is located in the eastern portion of WPNSTA Yorktown and consists of three areas - Area A, Area B/C, and the Wood/Debris Disposal Area (**Figure 3-7**). Area A is partially wooded and covers approximately 4.4 acres. An incinerator building and smokestack were formerly located in Area A; ash from the incinerator was disposed of in the topographic low area immediately southwest of the building, adjacent to Ballard Creek. Area B/C covers approximately 1.6 acres and consists mostly of an open field, but also has wooded areas with steep slopes and ravines; ash may have been disposed of in this area. The Wood/Debris Disposal Area consists of a ravine near Ballard Creek in which wood and construction debris were formerly disposed. The ROD, ESD, and Administrative Record file demonstrate that only Area A (Operable Units III and V) requires a remedy.

Site 12 - Documents and Milestones

Document Title/Milestone	Author/Date	AR Document Number
Study Area Analysis	USEPA, 1992	000289
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	000313
Operable Unit Evaluation Report	Baker, 1993	001060
Round Two RI Report Site 12	Baker, 1996	000640
AOC 22, Site 12, and SSA 2, SSA 19 and King Creek Independent Sampling and Risk Screening Report	Black & Veatch, 1996	000669
Feasibility Study Report Site 12	Baker, 1996	000647
Record of Decision, Operable Unit Nos. III, IV, and V, Site 12	Baker, 1997	000871
Construction Closeout Report for Site 12 – Area A	OHM, 1998	001154
Long-Term Monitoring Report, Site 12	Baker, 2000	001219
Site 12 Long-Term Monitoring Report - 1998-2003	Baker, 2005	002078

Document Title/Milestone	Author/Date	AR Document Number
Partnering Team Consensus Statement 9-1-06-45	-----	N/A
Final Long-Term Monitoring Report	CH2M HILL, 2008	002272
Explanation of Significant Differences	CH2M HILL, 2012	000157
Land Use Control Remedial Design, Site 12: Barracks Road Landfill	NAVFAC, 2013	Pending

3.2.7.2 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 have included analysis of soil, groundwater, sediment, and surface water for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. The most recent soil data available are from the 2000 *Construction Closeout Report for Site 12 – Area A* (OHM, 1998). The most recent groundwater and sediment data available are from the 2008 *Final Long-Term Monitoring Report* (CH2M HILL, 2008c). The current nature and extent of contamination for each medium at Site 12, as documented in the previously presented reports, are summarized as follows.

Soil

During the development of the FS (Baker, 1996b), RGs protective of future commercial/industrial use receptors were developed for lead identified in Area A soil during the previous investigations. A removal action was conducted beginning in July 1997 to remove and dispose of contaminated soil.

Following the completion of removal activities in November 1997, post-removal action confirmation samples indicated that concentrations of lead were below established RGs.

Groundwater

Cornwallis-Cave Aquifer

Elevated concentrations of VOCs and explosives were detected in groundwater samples collected at Site 12.During LTM, four of the eight total RCRA 8 metals were detected in groundwater samples, of which two exceeded screening values. Arsenic (10.3 µg/L) and chromium (549 µg/L) exceeded the RBCs and/or federal MCLs, both in one sample. The exceedances of metals may be attributable to high turbidity in the sample and may not accurately reflect groundwater quality at the site. No RCRA 8 dissolved inorganic constituents were detected above respective screening values.

Surface Water

Ballard Creek

During development of the Work Plan for Site 12, LTM Years Two and Three (Baker, 2000), the Navy and the USEPA, in partnership with the VDEQ, agreed to discontinue LTM sampling of surface water because historically detected concentrations of TCE, ranging from non-detect to 6.5 µg/L, were far below the Virginia Water Quality Standard for surface water of 807 µg/L.

Sediment

Ballard Creek

During LTM, a total of six RCRA 8 metals were detected in the sediment samples, of which only two exceeded screening values. Arsenic (11.8 mg/kg) and selenium (3.6 mg/kg) exceeded both the RBC and/or Biological Technical Assistance Group (BTAG) criteria in one or more samples. A concentration of selenium exceeding screening values was not detected in an associated duplicate sample. Although the concentrations of these two metals exceeded screening values, overall concentration trends have decreased since a landfill cap was installed (see Section 3.2.8.4).

3.2.7.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

The ROD was finalized in April 1997 (Baker, 1997g) to address contaminants identified in Area A soil. The removal action conducted at Site 12 reduced concentrations of all COCs to below established RGs previously agreed upon by the Navy and the USEPA, in partnership with the VDEQ, to be protective of future industrial/commercial land use receptors. Because contaminants were not reduced to a level allowing unrestricted land use, LUCs were implemented prohibiting residential development or disturbance of the soil cover at Site 12. Annual inspections of LUCs and yearly reporting are required in order to ensure that the RIP remains protective of human health and the environment. Because no unacceptable risks were identified for Area B/C and the Wood/Debris Disposal Area, no action is required to address soil at these areas.

Groundwater

Cornwallis-Cave Aquifer

Elevated concentrations of VOCs and explosives were detected in groundwater samples collected at Site 12; however, the VOCs have been attributed to past operations at Site 31. The WPNSTA Yorktown Partnering Team signed a consensus statement on October 3, 2006 (Consensus Statement 9-1-06-45), agreeing that this area would be investigated as its own site. Explosives were not determined to pose unacceptable risks.

As part of the remedy selected in the 1997 ROD (Baker, 1997g) and clarified in the ESD (CH2M HILL, 2012f), LUCs are maintained for groundwater throughout Area A to prohibit the use of groundwater as a potable source and to prohibit disturbance of the landfill cover. In addition, groundwater monitoring of shallow and deep wells was initiated across the Site 12 Study Area. Because LTM data do not show any significant increases in concentrations, and because there are no exceedances of screening values for dissolved metals in groundwater (exceedances of total metals are attributed to sampling turbidity), the Site 12 remedy has been determined to be protective of human health and the environment.

Surface Water

Ballard Creek

Following a review of the available data, the WPNSTA Yorktown Partnering Team agreed that current concentrations of VOCs in surface water did not present a risk to human health or the environment (Consensus Statement 9-1-06-45).

Sediment

Ballard Creek

The Ecological Risk Screening conducted as part of the *AOC 22, Site 12, and SSA 2, SSA 19 and King Creek Independent Sampling and Risk Screening Report* (Black & Veatch, 1996b) identified potential risk to the benthic community due to pesticides/PCBs in sediments. However, sediment in Ballard Creek was not considered for active remediation because it was determined that dredging would result in greater adverse ecological impact than potentially posed under existing conditions. The ROD finalized in April 1997 (Baker, 1997g) required LTM of sediment in order to ensure that the RIP remains protective of human health and the environment. LTM data show concentrations in sediment were decreasing and the Site 12 remedy has been determined to be protective of human health and the environment, minimizing potential migration of contaminants from the landfill. The ESD documents that LTM for sediment is no longer required and will not be performed (CH2M HILL, 2012f).

3.2.7.4 Remedial Action(s)

RA construction for Area A began in July 1997 and consisted of monitoring well abandonment; demolition of the incinerator facility, incinerator stack, and a one-story maintenance shed; and implementation of erosion and sediment controls. Metal debris, found 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 liner and covered with soil. Finally, a surface drainage channel (i.e., Tri-Lock Block) and settling pond were installed and the site was revegetated and restored.

3.2.7.5 Activities Completed in FY2013

A LUC RD was developed and finalized in FY2013. In addition, it is anticipated that a RACR will be developed and completed in 2013. LUC inspections were performed on a quarterly basis in September 2012 and December 2012, and were performed on an annual basis starting in July 2013. An LTM sampling UFP-SAP was developed in 2012 in accordance with the ESD to amend the LTM program for Site 12, and is currently in progress.

3.2.7.6 CERCLA Path Forward

- Complete LTM Sampling UFP-SAP
- Routine Annual LUC Inspections
- UFP-SAP/Field Work/Summary Report for LTM
- RACR
- Five-Year Review (2018)

Schedule 3-7 presents the FY2014-15 schedule for Site 12.

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

3.2.8.1 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 the Site 16 landfill; consequently these sites have been studied together (**Figure 3-8**). The Site 16 disposal area is approximately 8 acres and received waste between 1950 and the early-1960s at an estimated rate of 9 tons per year. Received waste included dry carbon batteries, banding materials, pressure transmitting fluid, other chemicals, and 55-gallon drums with unknown contents (C.C. Johnson & Associates, Inc., and CH2M HILL, 1984). SSA 16 is an area approximately 0.4 acre in size and was 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, 1995c).

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, 1995c). A summary of relevant documents and action milestones is presented in the following table.

Site 16 and SSA 16 - Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Engineering Estimate/Cost Analysis for Sites 4, 16, and 21 Removal Actions	Baker and Weston, 1993	000311
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	000313
Site 16: West Road Landfill Clearance Sampling and Polychlorinated Biphenyl Screening Report	Black & Veatch, 1994	000676
Closeout Report Sites 4, 16, and 21	IT Corporation, 1995	000616
Round Two Remedial Investigation and Baseline Risk Assessment Site 16 and Site Screening Area 16	Baker, 1995	000635 (Volume I) 001177 (Volume II)
Record of Decision, Operable Unit Nos. II, Site 16 and Site Screening Area 16	Baker, 1995	000671
Draft Remedial Design for Land Use Controls for Site 16 and SSA 16	Baker, 2006	(Draft – No AR No.)
Consideration for Risk Management at Site 16/Site Screening Area 16 Technical Memorandum	CH2M HILL, 2013	Pending

3.2.8.2 Nature and Extent of Potential Contamination

The source of potential contamination is landfill materials from Site 16 / SSA 16. Previous investigations have included analysis of soil, groundwater, sediment, and surface water for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. The most recent comprehensive soil, groundwater, surface water, and sediment data available are from the 1995 *Round Two RI and Baseline Risk Assessment Site 16 and SSA 16* (Baker, 1995c) and *Considerations for Risk Management at Site 16/SSA 16 Technical Memorandum* (CH2M HILL, 2013c). Additional antimony samples were collected in 2012 to evaluate previous MCL exceedances. The current nature and extent of contamination for each medium at Site 16/SSA 16, as documented in the previously presented reports, are summarized as follows.

Soil

Surface Soil

- No VOCs or pesticides were detected exceeding associated screening values.
- Sixteen SVOCs were detected in surface soil, of which one exceeded associated screening values. Detected concentrations of benzo(a)pyrene (100 J µg/kg) exceeded the residential RBC in one sample location.
- Two PCBs were detected in surface soil, both of which exceeded associated screening values. Detected concentrations of Arolclor-1254 (2,100 J µg/kg) and Aroclor-1260 (1,400 J µg/kg) exceeded both residential and industrial RBCs and BTAG screening values at one or more sample locations.
- Twenty-three inorganic constituents were detected in surface soil, of which twelve exceeded associated screening values. Detected concentrations of aluminum (14,900 J mg/kg), antimony (63.8 J mg/kg), arsenic (20 mg/kg), beryllium (0.79 J mg/kg), cadmium (66.5 mg/kg), chromium (1,060 mg/kg), copper (1,440 mg/kg), iron (217,000 mg/kg), lead (2,160 mg/kg), manganese (875 mg/kg), mercury (3.3 J mg/kg), silver (12.4 mg/kg), and vanadium (60.8 mg/kg) exceeded site-specific background concentrations, residential and industrial RBCs, and BTAG screening values at one or more sample locations.

Subsurface Soil

- No pesticides or PCBs were detected. No VOCs or SVOCs were detected at concentrations exceeding associated screening values.
- Twenty inorganic constituents were detected in subsurface soil, of which seven exceeded associated screening values. Detected concentrations of aluminum (28,400 mg/kg), antimony (10.1 L mg/kg), arsenic (38.2 L mg/kg), beryllium (2 mg/kg), chromium (56.5 mg/kg), manganese (466 J mg/kg), and vanadium (62.8 mg/kg) exceeded site-specific background concentrations, as well as residential and industrial RBCs at one or more sample locations.

Groundwater

Cornwallis-Cave Aquifer

- Six VOCs were detected in groundwater, of which one exceeded associated screening values. Detected concentrations of 1,1-DCE (2 µg/L) exceeded the tap water RSL at two sample locations.
- Two SVOCs were detected in groundwater, of which one exceeded associated screening values. Detected concentrations of 1,4-dichlorobenzene (2 J µg/L) exceeded the tap water RBC at one sample location.
- Three pesticides were detected in groundwater, of which two exceeded associated screening values. Detected concentrations of 4,4- dichlorodiphenyltrichloroethane (DDT) (0.058 J µg/L) and aldrin (0.043 J µg/L) exceeded the tap water RBC and/or state MCLs, each at one sample location.
- Nineteen inorganic constituents were detected in groundwater, of which four exceeded associated screening values. Detected concentrations of antimony (19.3 J µg/L), arsenic (5.9 K µg/L), beryllium (0.34 J µg/L), and manganese (114 µg/L) exceeded tap water RBCs and/or federal MCLs at one or more sample locations.

- Two additional groundwater samples were collected in August 2012 and analyzed for total and dissolved antimony. Total and dissolved antimony were not detected in either of the samples collected.

Surface Water

Felgates Creek

- No SVOCs, PCBs, or pesticides were detected. No VOCs or pesticides were detected at concentrations exceeding associated screening values.
- Twelve total inorganic constituents were detected in surface water, of which five exceeded associated screening values. Detected concentrations of total (99 J µg/L) aluminum, total (2.9 L µg/L) arsenic, total (2,000 J µg/L) iron, and total (374 µg/L) manganese exceeded tap water RBCs×10, federal WQC for human health, and/or BTAG screening values in one or more samples; however, all detected concentrations were below site-specific background. Detected concentrations of total lead (5.9 µg/L) exceeded both site-specific background concentrations and BTAG screening values.

Sediment

Felgates Creek

- No SVOCs were detected. No VOCs or pesticides were detected at concentrations that exceeded associated screening values.
- One PCB was detected in sediment at concentrations that exceeded associated screening values. Detected concentrations of Aroclor-1260 (45 J µg/kg) exceeded the BTAG screening value at one sample location.
- Twenty inorganic concentrations were detected in sediment, of which five exceeded associated screening values. Detected concentrations of aluminum (22,500 mg/kg), arsenic (12.2 mg/kg), beryllium (0.93 mg/kg), manganese (145 L mg/kg), and vanadium (57.6 mg/kg) exceeded the residential RBC×10; however no concentration detected exceeded site-specific background concentrations.

3.2.8.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

A ROD for soil and groundwater was signed in September 1995 (Baker, 1995e). The selected remedy for Site 16/SSA 16 was NFA with LUCs prohibiting residential development (Baker, 1995d). Periodic inspections are required to ensure that the RIP remains protective of human health and the environment.

The HHRA conducted as part of the 2013 *Considerations for Risk Management at Site 16/SSA 16* (CH2M HILL, 2013c) assessed risks to receptors through ingestion and dermal contact.

Surface Soil

Potentially unacceptable non-cancer hazards were identified to future child residents. The RME non-carcinogenic hazard for future adult residents associated with exposure to surface soil (HI = 1.6) is above the target HI. The hazard is primarily associated with exposure to antimony (HQ = 0.28), arsenic (HQ = 0.26), cadmium (HQ = 0.24), chromium (HQ = 0.31), and Aroclor-1254 (HQ = 0.23). None of the individual HQs or those summed for cumulative effects is greater than 1; therefore, there are no cumulative target organ effects and soil does not warrant the need for LUCs.

Subsurface Soil

As part of the 2013 *Considerations for Risk Management at Site 16/SSA 16* (CH2M HILL, 2013c), subsurface samples collected from greater than 15 feet bgs were removed from risk considerations, as a complete exposure pathway at this depth was unlikely.

The total carcinogenic risk ($1x10^{-4}$) for the child resident is within USEPA's target risk range of 10^{-4} to 10^{-6}. Although the total noncarcinogenic hazard (3) exceeds USEPA's target HI of 1.0, none of the target organs have HIs above 1. The total carcinogenic risk ($2x10^{-4}$) for the adult resident slightly exceeds USEPA's target risk range of 10^{-4} to 10^{-6}. The carcinogenic risk is primarily associated with chromium. The analytical data for chromium are for total chromium. However, the cancer slope factor used to calculate the carcinogenic risk is for hexavalent chromium, the more toxic (and carcinogenic) valence state of this metal. In the past, prior to including the New Jersey Environmental Protection Agency oral cancer slope factor for hexavalent chromium, USEPA's RSL table presented a Residential Soil RSL for total chromium assuming a one to six (1:6) ratio of hexavalent chromium to trivalent chromium. Assuming this ratio is applicable to soil at Site 16/SSA 16, the maximum concentration of hexavalent chromium (the total measured chromium concentration multiplied by 1/6, or 4.5 mg/kg) would not result in an unacceptable risk associated with exposure to chromium and the total carcinogenic risk for the adult resident would be within USEPA's target risk range. The total noncarcinogenic hazard ($9x10^{-1}$) does not exceed USEPA's target HI of 1.0.The ERA conducted as part of the 1995 *Round Two RI and Baseline Risk Assessment Site 16 and SSA 16* (Baker, 1995c) identified potential for risk to terrestrial receptors at Site 16/ SSA 16. This risk is driven primarily by aluminum, antimony, cadmium and, iron, which may be site-related. However, background concentrations of aluminum, cadmium, and iron were also found to pose risk, indicating that natural conditions are also contributing to potential risks. In addition, a majority of calculated risk levels had a low degree of confidence due to the lack of diversity of test species evaluated.

Groundwater

A ROD for Site 16/SSA 16 for groundwater was signed in September 1995 and included LUCs prohibiting residential development and the placement of potable supply wells within the area.

The HHRA conducted as part of the *Considerations for Risk Management at Site 16/SSA 16* (CH2M HILL, 2013c) assessed risk to receptors through ingestion, dermal contact, and inhalation of vapor under a potable use scenario. Potentially unacceptable non-cancer hazards were identified to future adult and child residents.

Cornwallis-Cave Aquifer

The *Considerations for Risk Management at Site 16/SSA 16* (CH2M HILL, 2013c), including a revised human health risk evaluation, was finalized in April 2013. As calculated in the 1995 HHRA (Baker, 1995e), the RME non-carcinogenic hazard for future adult residents associated with exposure to groundwater (HI = 1.3) is above the target HI. The hazard is primarily associated with exposure to antimony (HQ = 0.74), arsenic (HQ = 0.24), and manganese (HQ = 0.27). The RME non-carcinogenic hazard for future child residents associated with exposure to groundwater (HI = 3) is above the target HI. The hazard is primarily associated with exposure to antimony (HQ = 1.7), arsenic (HQ = 0.55), and manganese (HQ = 0.64). However, all concentrations of antimony detected were below background concentrations. In addition, the maximum daily intake of manganese (0.003 mg/kg-day) is less than is 0.13 mg/kg-day, a threshold under which no adverse effects are expected (National Academy of Sciences, 2001). Furthermore, two additional groundwater samples were collected in August 2012 and analyzed for total and dissolved antimony. Total and dissolved antimony were not detected in either of the samples collected. The Considerations for Risk Management at Site 16/SSA 16 TM concluded that based on these findings, there are no potential unacceptable risks associated with groundwater at Site 16/SSA 16, and LUCs and aquifer restrictions at Site 16/SSA 16 are no longer necessary in order for the site constituent concentrations to be adequately protective of human health and the environment (CH2M HILL, 2013c).

The ERA conducted as part of the 1995 *Round Two RI and Baseline Risk Assessment Site 16 and SSA 16* (Baker, 1995c) did not assess risk posed to ecological receptors due to groundwater exposure because no complete exposure pathway was identified.

Surface Water

Felgates Creek

The HHRA conducted as part of the 1995 *Round Two RI and Baseline Risk Assessment Site 16 and SSA 16* (Baker, 1995c) assessed risks to receptors through incidental ingestion and dermal absorption. No unacceptable cancer risks or non-cancer hazards resulting from exposure to sediment were identified for any receptor.

The ERA conducted as part of the 1995 *Round Two RI and Baseline Risk Assessment Site 16 and SSA 16* (Baker, 1995c) identified potential risks due to exposure to manganese. Quotient index (QI) ratios for chronic manganese exceeded one, but quotient index ratios for acute manganese were below one. Sediment at Site 16/SSA 16 contained elevated levels of carbon disulfide, toluene, Aroclor-1260, endrin aldehyde, and inorganic constituents. However, the risk to fish and benthic macroinvertebrate populations at Site 16/SSA 16 are low and these populations did not appear to be adversely impacted by these risk levels when compared to background stations. In addition, the quotient index ratios calculated for effects range-medium (ER-M) comparisons were all below one.

Sediment

Felgates Creek

The HHRA conducted as part of the 1995 *Round Two RI and Baseline Risk Assessment Site 16 and SSA 16* (Baker, 1995c) assessed risk to receptors through incidental ingestion and dermal absorption. No unacceptable cancer risks or non-cancer hazards resulting from exposure to sediment were identified for any receptor.

The ERA conducted as part of the 1995 *Round Two RI and Baseline Risk Assessment Site 16 and SSA 16* (Baker, 1995c) identified potential risk due to exposure to carbon disulfide, toluene, Aroclor-1260, endrin aldehyde, and inorganic constituents. However, the risk to fish and benthic macroinvertebrate populations at Site 16/SSA 16 are low and these populations do not appear to be adversely impacted by these risk levels when compared to background stations. In addition, the QI ratios calculated for ER-M comparisons were all below one.

3.2.8.4 Remedial Action(s)

In 1992, 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 were removed from the site, including 420 tons of batteries, 60 tons of debris, 125 tons of silica gel, ordnance, and other miscellaneous debris and buried waste (IT Corporation, 1995a). Post-removal soil samples were collected for analysis of VOCs, SVOCs, pesticides, PCBs, and inorganic constituents. Risk-based screening values were exceeded for arsenic, beryllium, manganese, benzo(a)pyrene, dieldrin, Aroclor-1254, and Aroclor-1260. However, none of the individual HQs or those summed for cumulative effects is greater than 1; therefore, there are no cumulative target organ effects and soil does not warrant the need for LUCs.

3.2.8.5 Activities Completed in FY2013

Additional groundwater samples were collected in August 2012. The results and recommendation for an NFA path forward were documented in the TM*, Considerations for Risk Management at Site 16 and Site Screening Area 16, Naval Weapons Station Yorktown, Yorktown, Virginia* (CH2M HILL, 2013c), which was finalized in February 2013. An ESD will be developed to document the removal of LUCs and the need for further Five Year Reviews from Site 16 and SSA 16.

3.2.8.6 CERCLA Path Forward

- Complete ESD
- Routine Annual LUC Inspections
- ESD to remove LUCs

It is anticipated that the ESD to remove the LUCs at Site 16/SSA 16 will be completed in 2013. Once the ESD is finalized, the site will be NFA and completion of Five-Year Reviews and annual LUC inspections will no longer be

necessary. Therefore, upon completion of the ESD, CERCLA documentation will be complete and Site 16/SSA 16 will be removed from subsequent SMPs.

Schedule 3-8 presents the FY2014-15 schedule for Site 16/SSA16.

3.2.9 Site 19—Conveyor Belt Soils at Building 10

3.2.9.1 Site Description

Site 9 and Site 19 are both part of the former Plant 1 operations area. Although these sites were originally identified as two separate sites, Site 9 and Site 19 are being investigated together as one overall study area. Site 19 includes soil beneath and surrounding a 500-foot 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 feet south of Site 9 (**Figure 3-9**). The topography of Site 19 slopes downward 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 either infiltrates the subsurface or flows through drainage channels connecting Site 19 to Site 9 and ultimately discharges to nearby Lee Pond. Depth to groundwater for the Cornwallis-Cave aquifer is typically between 14 and 20 feet bgs with flow generally southwest toward Lee Pond. Groundwater for the Yorktown-Eastover aquifer is typically encountered between 39 and 51 feet bgs with flow generally west to southwest, also toward Lee Pond.

The conveyor belt was used for transport of packaged TNT between the 1940s and 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. Between 2010 and 2012, all of the former buildings located at Sites 9 and 19 were demolished. A summary of relevant documents and action milestones is presented in the following table.

Site 19 - 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	000313
Site 19 and Composites of Site 9, Site 19, SSA 6 & SSA 7 Independent Sampling and Risk Screening Report	Black & Veatch, 1996	000781
Round Two Remedial Investigation Report, Sites 9 and 19	Baker, 1997	000889
Feasibility Study Sites 9 and 19	Baker, 1997	000966
Record of Decision,v3, Operable Unit Nos. VI and VII, Sites 9 and 19	Baker, 1998	002077
Closeout Report Site 19 Bioremediation	OHM, 2000	001556

3.2.9.2 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 soil and groundwater proximal to the conveyor belt, and sediment located in the concrete drainage way west of the conveyor belt. Previous investigations have included analysis of soil and groundwater for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL inorganic constituents. The most recent groundwater data available are from 1997 *Round Two RI Report, Sites 9 and 19* (Baker, 1997d). The most recent soil data available are from the 2000 *Closeout Report Site 19 Bioremediation* (OHM, 2000). No surface water or sediment features are present on-site. The current nature and extent of contamination for each medium at Site 19, as documented in the previously presented reports, are summarized as follows.

Soil

During the development of the FS (Baker, 1997e), RGs protective of commercial/industrial use scenario receptors were developed for COCs (2,4,6-TNT, RDX, and aluminum) identified in soil during the previous investigations. A removal action was conducted beginning in April 1998 to remove and dispose of contaminated soil.

Post-removal confirmation samples indicated that concentrations of all COCs were below established RGs following the completion of removal activities in July 1998.

Groundwater

Cornwallis-Cave Aquifer

- No VOCs and SVOCs were detected exceeding screening values in surface or subsurface groundwater.
- Three explosives were detected in groundwater, all of which exceeded associated screening values. Detected concentrations of 1,3,5-TNB (8.5 NJ µg/L), 2,4,6-TNT (38 NJ µg/L), 2,4/2,6-DNT (0.66 NJ µg/L), amino-DNT (130 µg/L), and RDX (1.1 µg/L) exceeded the tap water RBC in one or more sample. In deep groundwater, no explosives were detected.
- Eighteen total and twelve dissolved inorganic constituents were detected in groundwater, of which eight total and one dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (28,000 J µg/L) aluminum, total (41.8 L µg/L) arsenic, total (2.7 L µg/L) beryllium, total (4.4 µg/L) cadmium, total (132 J µg/L) chromium, total (60.5 µg/L) lead, total (2,850 µg/L) and dissolved (2,820 µg/L) manganese, and total (285 µg/L) vanadium above the tap water RBC and/or state and federal MCLs at one or more sample location.

Yorktown-Eastover Aquifer

No explosives were detected. No VOCs, SVOCs, or inorganic constituents were detected at concentrations that exceeded screening values.

Surface Water

No surface water is associated with Site 19.

Sediment

No sediment is associated with Site 19.

3.2.9.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

A ROD was finalized in October 1998 (Baker, 1998g) to address contaminants identified in surface soil. The RA conducted at Site 19 reduced concentrations of all COCs to below established RGs previously agreed upon by the Navy and the USEPA, in partnership with the VDEQ, to be protective of future industrial/ commercial land use receptors. Because contaminants were not reduced to a level allowing unrestricted land use, LUCs were implemented prohibiting residential development or disturbance of the soil cover at Site 19.

Groundwater

The HHRA conducted as part of the *Round Two RI Report, Sites 9 and 19* (Baker, 1997d) assessed risk to receptors through ingestion, dermal contact, and inhalation of vapors under a potable use scenario.

Cornwallis-Cave Aquifer

The RME carcinogenic risk for future adult residents associated with exposure to groundwater (ILCR = 7.1×10^{-6}) is within the USEPA's target risk range of 10^{-6} to 10^{-4}. The RME non-carcinogenic hazard for future adult residents

associated with exposure to groundwater (HI = 2.8) is above the acceptable HI of 1.0. The hazard is primarily associated with exposure to 1,3,5-TNB (HQ = 1.7) The CTE non-carcinogenic hazard (HI = 0.88) below the target level. The RME carcinogenic risk for future child residents associated with exposure to groundwater (ILCR = 4.2×10^{-6}) is within the USEPA's target risk range of 10^{-6} to 10^{-4}. The RME non-carcinogenic hazard for future child residents associated with exposure to groundwater (HI = 6.4) is above the acceptable HI of 1.0. The hazard is primarily associated with exposure to 1,3,5-TNB (HQ = 4.1) and 2,4,6-TNT (HQ=1.9) The CTE non-carcinogenic hazard (HI = 2.1) also exceeded the target level.

Surface Water

No surface water is associated with Site 19.

Sediment

No sediment is associated with Site 19.

3.2.9.4 Remedial Action(s)

A ROD for soil was signed in March 1998 (Baker, 1998g) that included a remedy to mitigate the potential for direct contact of 2,4,6-TNT and RDX in soil by human receptors, to prevent ecological effects to terrestrial receptors from exposure to aluminum in soil, and to eliminate the potential migration of these contaminants to other environmental media.

The remedy was initiated in April 1998 and included the removal of transite panels and asbestos insulated piping, dismantling and disposal of the conveyor system, excavation of explosives contaminated soil, and confirmation sampling. Approximately 1,000 yd^3 of explosives-contaminated soil were excavated to a depth of 4 feet bgs within the conveyor belt trench. The excavated soil was transported to the bio-cell located at Site 22 for treatment. Following treatment, this soil was distributed to the ground surface surrounding the bio-cell. Approximately 60 yd^3 of soil with elevated aluminum concentrations were excavated and placed in the conveyor belt trench excavation and covered with clean fill. The site was then restored with topsoil and revegetated to prevent ecological exposure to elevated aluminum in soil (OHM, 2000).

3.2.9.5 Activities Completed in FY2013

LUC Inspections were performed on a quarterly basis in September 2012 and December 2012, and were performed on an annual basis starting in July 2013. A UFP-SAP is currently being developed for additional investigation at Sites 9 and 19 to fill in current data gaps in the dataset to help determine the nature and extent of impacted groundwater and soil.

3.2.9.6 CERCLA Path Forward

- Routine Annual LUC Inspections for Sites 9 and 19
- Finalize RI UFP-SAP for Sites 9 and 19 RI
- RI Field Work
- TM documenting conveyor belt data for Site 19
- ESD for Site 19 conveyor belt area (if necessary based on RI investigation)
- LUC RD for Site 19 conveyor belt area
- RI/FS/PP/ROD for Sites 9 and 19
- LUC RD, as appropriate for Site 9 and 19
- RAWP for Sites 9 and 19
- RA Field Work for Sites 9 and 19
- CCR for Site 9 and 19
- LTM Work Plan and Implementation for Sites 9 and 19, if required
- RACR for Sites 9 and 19
- Five-Year Review for Sites 9 and 19 (2018)

Schedule 3-9 presents the FY2014-15 schedule for Site 19.

3.2.10 Site 22—Burn Pad

3.2.10.1 Site Description

Site 22 (**Figure 3-10**), the Burn Pad, consists of a nine acre area located south of Site 4. 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 once contained a 150-foot-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. In addition, Site 22 was also used for the treatment of nitramine-contaminated soil and TNT-contaminated soil from Sites 7 and 19 in a 153-foot by 86-foot bio-cell constructed onsite. Bio-cell operations ceased in 1998 and treated (clean) soil was dewatered by being pumped into an impoundment area in a topographical low area directly southeast of the existing bio-cell. Erosion control measures were implemented in 1999 to prevent discharge to the wetlands west of the bio-cell. 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 following table.

Site 22 - 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	001088
Round Two Remedial Investigation Report, Sites 4, 21, and 22	Baker, 2001	001296 001297
Feasibility Study, Sites 4, 21, and 22	Baker, 2001	001160
Closeout Report Sites 21 and 22	Shaw, 2003	001779
Record of Decision, Site 22 – Burn Pad	Baker, 2003	001375
Remedial Investigation Report for Groundwater at Sites 4, 21, and 22	CH2M HILL, 2009	000024
Final Feasibility Study for Groundwater at Site 22	CH2M HILL, 2011	000181
Final Record of Decision at Sites 4,21, and 22 *	CH2M HILL, 2011	000262
Final Record of Decision for Site 22 Groundwater	CH2M HILL, 2012	002532
Final Land Use Control Remedial Design, Site 22: Burn Pad	NAVFAC, 2013	Pending

*Final ROD from 2011 for Site 22 was NFA for surface water and sediment

3.2.10.2 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, inorganic constituents, and explosives. The most recent soil data are from the 2003 *Closeout Report Sites 21 and 22* (Shaw, 2003). The most recent groundwater, surface water, and sediment data are from the 2009 *Remedial Investigation Report for Groundwater at Sites 4, 21, and 22* (CH2M HILL, 2009c). Surface water and sediment samples were collected near Site 22 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. The current nature and extent of contamination for each medium at Site 22, as documented in the previously presented reports, are summarized as follows.

Soil

During the development of the FS (Baker, 2001b), RGs protective of unrestricted land use scenario receptors were developed for COCs identified in soil during the previous investigations. A removal action was conducted beginning in 2002 to remove and dispose of contaminated soil.

Post-removal action confirmation samples indicated that concentrations of all COCs were below established RGs.

Groundwater

Yorktown-Eastover Aquifer

- No SVOCs or PCBs were detected.
- Thirteen VOCs were detected in groundwater, of which eight exceeded associated screening values. Detected concentrations of carbon tetrachloride (3.8 J µg/L), chloroform (1.6 J µg/L), benzene (4.8 J µg/L), PCE (3.9 J µg/L), TCE (650 µg/L), cis-1,2-DCE (320 µg/L), 1,1-DCE (200 µg/L), and VC (17 µg/L) exceeded tap water RSL or MCLs at one or more sample locations.
- One pesticide was detected in groundwater, which exceeded associated screening values. Detected concentrations of heptachlor epoxide (0.21 µg/L) exceeded the tap water RSL and/or MCL at one or more sample locations.
- Thirteen explosives were detected in groundwater, of which two exceeded associated screening values. Detected concentrations of 1,3-dinitrobenzene (5.9 µg/L) and RDX (150 µg/L) exceeded the tap water RSL, each at multiple sample locations.
- Nineteen total and sixteen dissolved inorganic constituents were detected in groundwater, of which two total and one dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (15.5 µg/L) and dissolved (8.8 J µg/L) arsenic and total (1,070 µg/L) manganese exceeded the tap water RSL and/or MCL at one or more sample locations.

Surface Water

Eastern Branch of Felgates Creek

- No SVOCs or PCBs were detected. No VOCs or pesticides were detected at concentrations exceeding associated screening values.
- Six explosives were detected in surface water, of which one exceeded associated screening values. Detected concentrations of RDX (8.8 µg/L) exceeded the human health screening at one sample location.
- Twenty-two total and fourteen dissolved inorganic constituents were detected in surface water, of which eight total and five dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (56,200 µg/L) and dissolved (362 µg/L) aluminum, total (26.5 µg/L) and dissolved (5.5 J µg/L) arsenic, total (124 J µg/L) and dissolved (33 µg/L) barium, total (88,800 µg/L) iron, total (64.5 µg/L) lead, total (1,000 µg/L) and dissolved (292 µg/L) manganese, total (5.6 J µg/L) and dissolved (5.7 J µg/L) thallium, and total (118 µg/L) vanadium exceeded the human health or ESV in one or more samples. Overall, total metals concentrations in surface water are elevated at the mouth of the unnamed tributary relative to the upstream reference sample concentrations. No source for metals contamination has been identified based on the site data.

Sediment

Eastern Branch of Felgates Creek

No SVOCs, pesticides, PCBs, or explosives were detected. No VOCs or inorganic constituents were detected at concentrations exceeding associated screening values.

3.2.10.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

The removal action conducted at Site 22 reduced concentrations of all COCs to below established RGs previously agreed upon by the Navy and USEPA, in partnership with VDEQ, to be protective of a future unrestricted land use scenario. An NFA ROD for soil was signed in September 2003 (Baker, 2003b).

Groundwater

The HHRA conducted as part of the RI for Groundwater at Sites 4, 21, and 22 (CH2M HILL, 2009c) assessed risk to receptors through ingestion, dermal contact, and inhalation of vapors. In accordance with USEPA guidance, carcinogenic risks were only calculated for lifetime child/adult residents.

Yorktown-Eastover Aquifer

Potential unacceptable non-cancer hazards were identified for future adult and child residents and future construction workers. Potential unacceptable cancer risks were identified for lifetime child/adult residents. The RME non-carcinogenic hazard for future adult residents associated with exposure to groundwater (HI = 3.8) is above the acceptable HI of 1.0. There are no individual COPCs with HQs exceeding unity. The CTE non-carcinogenic hazard (HQ = 0.9) is less than the acceptable HI of 1.0. The RME non-carcinogenic hazard for future child residents associated with exposure to groundwater (HI = 8.7) exceeds the acceptable HI of 1.0. The hazard is primarily associated with ingestion of arsenic (HQ = 1.5), heptachlor epoxide (HQ = 2.1), and RDX (HQ = 2). The CTE non-carcinogenic hazard (HQ = 1.5) also exceeds the acceptable HI; however, there are no individual target organ/ effects with HIs exceeding 1.0. The RME non-carcinogenic hazard for future construction worker associated with exposure to groundwater (HI = 3.7) exceeds the acceptable HI of 1.0. The hazard is primarily associated with exposure to TCE (HI = 1.3), 1,1-DCE (HI = 0.91), and VC (HI = 0.61). The CTE non-carcinogenic hazard (HQ = 0.45) also exceeds the acceptable HI; however, there are no individual target organ/effects with HIs exceeding 1.0. The RME carcinogenic risk for lifetime child/adult residents associated with exposure to groundwater (CR = 7.6×10^{-4}) is above USEPA's target risk range of 10^{-6} to 10^{-4}. This risk is primarily associated with ingestion of VC (CR = 1.8×10^{-4}), RDX (CR = 1.5×10^{-4}), and arsenic (CR = 1.6×10^{-4}). The CTE carcinogenic risk associated with exposure to groundwater (CR = 1.1×10^{-4}) is also above the USEPA's target risk range. Arsenic, heptachlor epoxide, TCE, VC, and RDX were the main risk drivers in groundwater. However, concentrations of arsenic did not pose risk under the CTE exposure scenario, and dissolved concentrations did not exceed the MCL. Detections may be a result of geochemical conditions rather than a site-related source. Therefore, no additional action is recommended for arsenic. Heptachlor epoxide was detected in a number of samples, but the concentration in only one sample was just slightly greater than the MCL. There is no known historical source of this chemical in groundwater at the site and it is likely a result of routine base pesticide treatment activities. Therefore, no additional action is recommended to address this chemical. Concentrations of TCE, VC, and RDX are widespread across the site that pose risk, and exceed MCLs. Additional action is necessary to address these chemicals.

The ERA conducted as part of the RI for Groundwater at Sites 4, 21, and 22 (CH2M HILL, 2009c) did not assess risk posed to ecological receptors due to groundwater exposure because no complete exposure pathway was identified.

Surface Water

Eastern Branch of Felgates Creek

The HHRA conducted as part of the RI for Groundwater at Sites 4, 21, and 22 (CH2M HILL, 2009c) assessed risk to receptors through incidental ingestion and dermal absorption. No unacceptable cancer risks or non-cancer hazards resulting from exposure to surface water were identified for any receptor.

The ERA conducted as part of the RI for Groundwater at Sites 4, 21, and 22 (CH2M HILL, 2009c) identified no COCs due to direct contact or food web exposure associated with surface water. Thus, risks to ecological receptors are considered acceptable.

Sediment

Eastern Branch of Felgates Creek

The HHRA conducted as part of the RI for Groundwater at Sites 4, 21, and 22 (CH2M HILL, 2009c) assessed risk to receptors through incidental ingestion and dermal absorption. No unacceptable cancer risks or non-cancer hazards resulting from exposure to sediment were identified for any receptor.

The ERA conducted as part of the RI for Groundwater at Sites 4, 21, and 22 (CH2M HILL, 2009c) identified no COCs due to direct contact or food web exposure associated with sediment. Thus, risks to ecological receptors are considered acceptable.

3.2.10.4 Remedial Action(s)

A removal action in 2002 consisted of excavation and disposal of 3,540 yd^3 of contaminated soil. Based on the removal action conducted and confirmation sampling results, the Navy and the USEPA, in partnership with the VDEQ, agreed that 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 (Baker, 2003b). Based on RME calculations, no unacceptable human health risks were identified to any receptor from exposure to sediment or surface water at Site 22, and because any potential sources of contamination related to the waste and soil were removed in previous removal actions, a NFA ROD for surface water and sediment was signed in August 2011(CH2M HILL, 2011e).

3.2.10.5 Activities Completed in FY2013

A Proposed Remedial Action Plan (PRAP) and ROD for groundwater at Site 22 were completed and finalized in July 2012 (CH2M HILL, 2012g) and September 2012 (CH2M HILL, 2012h), respectively. The PRAP and ROD documented the selected remedy of enhanced in-situ bioremediation in addition to Monitored Natural Attenuation, LTM, and LUCs at Site 22. A LUC RD for Site 22 was developed and finalized in FY2013. In addition, a Pre-RD Work Plan to facilitate design development is currently in progress.

3.2.10.6 CERCLA Path Forward

- Complete Pre-RD UFP-SAP
- Pre-RD Field Work
- Pre-RD Summary Report
- RD/RAWP/RA/CCR
- LTM Implementation
- RACR
- Five-Year Review (2018)

Schedule 3-10 presents the FY2014-15 schedule for Site 22.

3.2.11 Site 23—Building 428 Teague Road Disposal Area

3.2.11.1 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 WPNSTA Yorktown property boundary (**Figure 3-11**). 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 RI. This drainage lies about 300 feet east-southeast of the site disposal areas and trends to the York River about 1,000 feet east of Site 23. Depth to groundwater (Cornwallis Cave aquifer) is between 8 and 15 feet bgs with flow directed toward the York River.

Disposal activities at the site reportedly began in 1940 and ceased in 1960 and included the disposal of debris from a pier fire in the mid 1950s. Aerial photography suggests the area was also used for waste storage in 1945. In 1993, a land survey was conducted, 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 following table.

Site 23 - Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Waste Characterization Sampling, SSAs 1, 2, and 5	Baker, 1993	000313
Engineering Evaluation/Cost Analysis and Action Memorandum SSA 1, 2, and 5	Baker, 1994	000625
Soil and Debris Removal Action Site Screening Areas 1, 2, and 5	OHM, 1996	000648
Site Screening Process Report Site Screening Areas 1, 6, 7, and 15	Baker, 1996	000663
Final Ecological Cleanup Goals for Soil, Site 23, Teague Road Disposal Area	Baker, 2003	002269
Construction Closeout Report for Site 23	J.A. Jones, 2003	002415
Excavation and Off-site Landfill Disposal, Site 23	UNITEC, 2006	002283
Draft Final Round One Remedial Investigation Report for Sites 23, 24, 25, and 26	Baker, 2008	Will not be finalized - No AR No.
Final Work Plan, Removal Action at Site 23	Shaw, 2009	002423
Final Construction Completion Report at Site 23	Shaw, 2011	000167

3.2.11.2 Nature and Extent of Potential Contamination

Disposed waste material at Site 23 was the source of potential contamination to soil, groundwater, sediment, and surface water. Previous investigations have included analysis of soil, groundwater, surface water, and sediment for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. The most recent soil, groundwater, surface water, and sediment data available are from the 1996 *SSP for SSAs 1, 6, 7, and 15* (Baker, 1996d). A Round One RI was completed in 2008; however, in accordance with partnering team agreement, this document will not be finalized and is not discussed further. A UFP-SAP is currently being developed as part of the ongoing RI to determine the nature and extent of groundwater, remaining debris, residual soil contamination, and contaminated backfill (if present) following the removal actions completed from 1994 to 2009. The nature and extent of contamination at Site 23 is currently being evaluated. A brief overview for each medium at Site 23 is summarized as follows.

Soil

Historically, SVOCs, explosives, and inorganic constituents have been detected in surface soils and SVOCs and inorganics have been detected in subsurface soils at values exceeding one or more screening criteria. The current nature and extent of contamination in surface soil are being evaluated as part of the ongoing RI.

Groundwater

Cornwallis Cave Aquifer

Historically, explosives and inorganic constituents have been detected in groundwater at concentrations exceeding one or more screening criteria. The current nature and extent of contamination in groundwater are being evaluated as part of the ongoing RI.

Surface water

Tributary to York River

Historically, explosives and inorganic constituents were detected in surface water at concentrations exceeding one or more screening criteria. The current nature and extent of contamination in surface water are being evaluated as part of the ongoing RI.

Sediment

Tributary to York River

Historically, SVOCs, pesticides, and inorganic constituents were detected in sediment at concentrations exceeding one or more screening criteria. The current nature and extent of contamination in sediment are being evaluated as part of the ongoing RI.

3.2.11.3 Potential Risks

The most current HHRS was conducted as part of the *SSP for SSAs 1, 6, 7, and 15* (Baker, 1996d) and assessed risks to receptors through ingestion. A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

Surface Soil

Potential unacceptable cancer risks (CR = 1.1×10^{-4}) resulting from exposure to surface soil were identified in the SSP (Baker, 1996d). This risk is primarily associated with a combination of the cPAHs detected in surface soil. No potential unacceptable non-cancer hazards (HI = 0.77) resulting from surface soil were identified.

An ERA has not been conducted for site surface soil. Potential risk associated with surface soil is being evaluated as part of the ongoing RI.

Subsurface Soil

No unacceptable cancer risks (CR = 3.5×10^{-5}) or non-cancer hazards (HI = 0.72) were identified for subsurface soil in the SSP (Baker, 1996d).

An ERA has not been conducted for site subsurface soil. Potential risk associated with subsurface soil is being evaluated as part of the ongoing RI.

Groundwater

Cornwallis Cave Aquifer

Unfiltered groundwater was analyzed independently of other filtered groundwater collected during the risk assessment in the SSP (Baker, 1996d). No unacceptable cancer risks (CR = 1.1×10^{-5}) resulting from exposure to unfiltered groundwater were identified. Potential unacceptable non-cancer hazards (HI = 11) identified were primarily associated with exposure to aluminum (HQ = 1.3) and manganese (HQ = 8.3) in unfiltered groundwater. No unacceptable cancer risks (CR = 1.1×10^{-5}) resulting from exposure to filtered groundwater were identified. Potential unacceptable non-cancer hazards (HI = 1.6) identified were primarily associated with exposure to thallium (HQ = 1.3) in filtered groundwater.

An ERA will not be conducted for groundwater because no complete exposure pathway exists. Potential risk associated with groundwater is being evaluated as part of the ongoing RI.

Surface Water

Tributary to York River

An HHRA has not been conducted for surface water.

The Ecological Risk Screening conducted as part of the *SSP* (Baker, 1996d) identified potential unacceptable risk to ecological receptors. The risk (ecological index [EI] = 110) is associated with exposure to cadmium (EQ = 2.2), chromium (EQ = 1.7), copper (EQ = 4.8), iron (EQ = 39), lead (EQ = 35), mercury (EQ = 26), and zinc (EQ = 5).

Potential risk associated with surface water is being evaluated as part of the ongoing RI.

Sediment

Tributary to York River

An HHRA has not been conducted for sediment.

The Ecological Risk Screening conducted as part of the *SSP for SSAs 1, 6, 7, and 15* (Baker, 1996d) identified potential unacceptable risk to ecological receptors. The risk (EI = 3) is associated with exposure to benzo(b)fluoranthene (EQ = 1), 4, 4-DDT (EQ = 1.1), and mercury (EQ = 0.93).

Potential risk associated with sediment is being evaluated as part of the ongoing RI.

3.2.11.4 Remedial Action(s)

A removal action was conducted during the summer and early fall of 1994 by OHM to address surface debris present at Site 23. Items removed from the site during the removal action included two 55-gallon drums of paint cans/spilled paint; 443 tons of wooden creosote timbers (remains of the burnt pier); 763 tons of ordinary nonhazardous debris; 1,119 tons of debris containing non-friable asbestos; 1,680 pounds of pipe wrapped with friable asbestos; 31 tons of recyclable metal; and two truck batteries. Approximately 5,815 tons of TNT- and TNB-contaminated ash/soil also were removed from an area north of the railroad tracks at the northeast portion of the site. Confirmatory soil samples were collected and the excavated area was backfilled and re-graded (OHM, 1996).

A second removal action was conducted by J.A. Jones in the spring of 2003 to address eight identified hotspots (Areas A - H). During the March 2003 Yorktown Partnering Meeting, the Partnering Team agreed not to include Area G because the concentration of the COC at this location, arsenic, was consistent with Station background concentrations. In total, the removal action included the excavation and off-site disposal of approximately 1,025 tons of contaminated soil and buried debris from seven areas (J.A. Jones, 2003).

A third removal action was conducted by Universe Technologies, Inc. (UNITEC) in January 2004 to address approximately 2,816 tons of zinc-contaminated soil and debris that remained in Area F following the 2003 action. Floor composite confirmation samples were collected from six grid areas prior to backfilling. Confirmation samples indicated that the zinc cleanup goal was met in the western three grids, but was slightly exceeded in the eastern three grids. This area was backfilled and on January 7, 2004, the WPNSTA Yorktown Partnering Team agreed (Consensus Statement 1-07-04-33) that there were no unacceptable ecological risks from exposure to zinc that remained in eastern grids. The final removal closeout report was finalized in June 2006 (UNITEC, 2006).

At the request of the Navy, Baker conducted a review of the 2003 Draft Removal Action Construction Closeout Report (J.A. Jones, 2003) after it was discovered that J.A. Jones had used an incorrect cleanup goal for mercury, 24.0 mg/kg instead 0.24 mg/kg. Baker's evaluation confirmed that mercury remained in soil above the cleanup goal. This evaluation also revealed that some of the COCs for which cleanup goals were developed for the 2003 removal (cPAHs, nitrated PAHs [nPAHs], N-nitrosodi-n-propylamine, 2,4,6-TNT, arsenic, mercury, and zinc) were not included in the confirmation sampling. Based on these discoveries, a further investigation of soil remaining within the footprint of the 2003 removal action areas (Areas A-F and H) was warranted.

In July 2006, Baker conducted an investigation of surface and subsurface soil within the footprint of areas addressed during this removal action (Areas A-F and H) in order to recharacterize the footprint of the 2003 removal actions areas (Areas A-F and H) and to investigate a small depression in the central portion of the site. Samples were analyzed for total metals, low-level PAHs, N-nitrosodi-n-propylamine, and 2, 4, 6-TNT. The results of this soil investigation indicated that contaminants for which cleanup goals were established exceeded their respective goals within Areas A-C (Grids 1-28) and within the small depression. All other former 2003 removal areas (D, E, F, and H) were confirmed to have met cleanup goals.

In June 2009, Shaw Environmental conducted an additional soil removal action to address the remaining contaminated soil left in place after the 2003 removal action, as identified by the 2006 investigation. A total of 4,513 yd^3 (6,770 tons) of contaminated soil was excavated from eighteen grids and disposed of off-site. Confirmation samples indicated that COCs remained in exceedance of remedial goals; however, due to funding constraints, excavation activities were discontinued. Excavation walls that had not yet been addressed were covered with six mil plastic as an interface between the clean backfill and existing sidewall. Additional waste was identified during the removal action, consisting of concrete pieces, whole trees, wood, metal pieces, and roofing material. These remaining areas will be addressed in the future during a second phase of the removal action (Shaw, 2010a).

3.2.11.5 Activities Completed in FY2013

A UFP-SAP in association with the Site 23 RI is being developed to address data gaps is currently being developed.

3.2.11.6 CERCLA Path Forward

- Finalize UFP-SAP
- RI field activities
- RI Reporting
- EE/CA and Action Memo for all media, as appropriate
- Removal Action Work Plan
- Removal Action Field Work
- CCR
- NFA PP/ROD

Schedule 3-11 presents the FY2014-15 schedule for Site 23.

3.2.12 Site 24—Aviation Field

3.2.12.1 Site Description

Site 24, the Aviation Field (formerly Site 14, SSA 6, and SWMU 27), includes approximately 14 acres of an open, grassy field surrounding the helicopter landing-pad in the northern portion of WPNSTA Yorktown, just south of the York River (**Figure 3-12**). The site is bounded by the WPNSTA Yorktown installation fence line to the north, former railroad tracks to the east and Main Road to the south. A Joint Improvised Explosive Device Defeat Organization battle course (formerly storage areas) is located in the western portion of the site and along the western perimeter of the site. The depth to first encountered groundwater is approximately between 11 and 14 feet bgs. The surface water bodies surrounding the site (the York River, Felgates Creek, and Indian Field Creek) influence the groundwater flow directions across the site, and groundwater flow within the Columbia aquifer generally flows toward the closest water body. A topographic 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. A review of aerial photographs indicates that peak surface storage occurred in 1968. Areas of surface debris are no longer evident at the site. In addition, 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 (STP) #1 was reportedly dried in the eastern portion of the site. A Daramend greenhouse/bio-cell 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 following table.

Site 24 - 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	000663
Phase I Remedial Investigation Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	002158
Draft Final Round One Remedial Investigation for Sites 23, 24, 25, and 26	Baker, 2008	(Will Not Be Finalized – No AR No.)

3.2.12.2 Nature and Extent of Potential Contamination

Several areas of buried debris at Site 24 are the source of potential contamination to soil and groundwater. Based on the results of a geophysical survey and test pitting activities, buried debris is located within six discontinuous areas at the site. Historical investigations have included analysis of surface and subsurface soil and groundwater samples, for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. Additional field activities, completed in 2010 as part of a RI, included analysis of surface and subsurface soil, drainage soil, and groundwater samples for VOCs, SVOCs, explosives, pesticides, PCBs, and metals. The results of historical soil sampling (conducted during the 1996 SSP and the 2008 Round One RI) and the 2010 soil (surface, subsurface, drainage) and groundwater sampling will be included in the 2012 RI report. The RI report summarizing the results of the 2010 investigation is currently being developed; however, the preliminary results from this investigation, in combination with previous investigations, are the most recent data and are summarized as follows.

Soil

The current nature and extent of contamination in surface and subsurface soil are being evaluated as part of the ongoing RI. Preliminary results from the 2010 investigation for surface and subsurface soil are summarized in the following subsections.

Surface Soil – Inside Buried Debris Boundaries

- No VOCs or pesticides were detected at concentrations exceeding associated screening values. No explosives were detected in any surface soil sample within the buried debris boundary.
- Eight SVOCs were detected in surface soil within the buried debris boundary, of which one exceeded associated screening values. Detected concentrations of benzo(a)pyrene (40J g/kg) exceeded the residential RSL in one surface soil sample.
- Two PCBs were detected in surface soil within the buried debris boundary, of which one exceeded associated screening values. Detected concentrations of Aroclor-1254 (590 µg/kg) exceeded the residential RSL in one surface soil sample.
- Twenty-two metals were detected in surface soil within the buried debris boundary, of which 11 exceeded associated screening values. The maximum detected concentrations of aluminum (11,600 mg/kg), arsenic (5.6 mg/kg), cobalt (6 mg/kg), and iron (11,000 mg/kg) exceeded their respective residential RSL and ESVs; however, these concentrations were below base background concentrations. The maximum detected concentrations of chromium (20.6 mg/kg) and selenium (0.62 mg/kg) exceeded their respective residential RSL and/or ESVs; however these concentrations were below maximum base background concentrations. The maximum detected concentrations of cadmium (786 mg/kg), copper (74.4 mg/kg), lead (344 mg/kg), mercury (1.3 mg/kg) and zinc (1,190 mg/kg) exceeded their respective base background concentration and residential RSL and/or ESVs.

Surface Soil – Outside Buried Debris Boundaries

- No VOCs were detected at concentrations exceeding associated screening values. No PCBs or explosives were detected in any surface soil sample outside the buried debris boundary.

- Eighteen SVOCs were detected in surface soil outside the buried debris boundary, of which one exceeded associated screening values. Detected concentrations of benzo(a)pyrene (140J µg/kg) exceeded the residential RSL in eight surface soil samples.
- Twenty pesticides were detected in surface soil outside the buried debris boundary, of which two exceeded associated screening values. Detected concentrations of alpha-Chlordane (74 J µg/kg) and gamma-Chlordane (76 µg/kg) exceeded their respective ESV in one surface soil sample. Pesticides, however, were not known to be disposed of at Site 24; therefore, these low detected concentrations are likely attributable to normal pesticide use at DoD facilities to control pests and weeds, and not from the site disposal of pesticides.
- Twenty-four inorganic constituents were detected in surface soil outside the buried debris boundary, of which nine exceeded associated screening values. The maximum detected concentrations of aluminum (9,980 mg/kg), cobalt (8.7 mg/kg), and iron (14,100 mg/kg) exceeded their respective residential RSL and ESVs; however, these concentrations were below base background concentrations. The maximum detected concentrations of chromium (18.4 mg/kg), and selenium (0.78K mg/kg) exceeded their respective residential RSLs and/or ESVs; however, these concentrations were below maximum base background concentrations. The maximum detected concentrations of arsenic (70.4 mg/kg) and manganese (963 mg/kg) exceeded the residential RSL and ESVs, these concentrations are only slightly above the maximum base background concentrations and therefore are likely attributable to naturally-occurring conditions. The maximum detected concentrations of copper (139 mg/kg) and mercury (4.7 mg/kg) exceeded their respective base background concentration and residential RSL and/or ESVs.

Surface Soil – Sludge Area

- No VOCs, SVOCs, or pesticides were detected at concentrations exceeding associated screening values. No PCBs or explosives were detected in any surface soil sample within the sludge area.
- Seventeen inorganic constituents were detected in surface soil within the sludge area, of which three exceeded associated screening values. The maximum detected concentrations of chromium (6.2 mg/kg), cobalt (8.7 mg/kg), and manganese (245 mg/kg) exceeded their respective residential RSLs; however these concentrations were below base background concentrations.

Subsurface Soil – Inside Buried Debris Boundaries

- No VOCs were detected exceeding associated screening values.
- Fourteen SVOCs were detected in subsurface soil within the buried debris boundaries, of which two exceeded associated screening values. Detected concentrations of 2,4-DNT (2,100J µg/kg) and n-Nitroso-di-n-propylamine (93J µg/kg) exceeded their respective residential RSL in two subsurface soil samples.
- Two explosives were detected in subsurface soil within the buried debris boundaries, of which one exceeded the associated screening value. Detected concentrations of 2,4,6-TNT (4,100J µg/kg) exceeded the residential RSL in one subsurface soil sample.
- Seventeen pesticides were detected in subsurface soil within the buried debris boundaries, of which three exceeded the associated screening value. Detected concentrations of Alpha-beta-benzene hexachloride (BHC) (460 µg/kg), dieldrin (90J µg/kg), and heptachlor (200 µg/kg) exceeded their respective residential RSLs in two subsurface soil samples.
- Two PCBs were detected in subsurface soil within the buried debris boundaries at concentrations that exceeded the associated screening value. Maximum detected concentrations of Aroclor-1254 (79,000 µg/kg) and Aroclor-1260 (4,900 µg/kg) exceeded their respective residential RSLs in three subsurface soil samples.
- Twenty-one inorganic constituents were detected in subsurface soil within the buried debris boundaries, of which eight exceeded the associated screening value. The maximum detected concentrations of barium (27.7 mg/kg) and iron (21,300 mg/kg) exceeded their respective residential RSLs; however, these concentrations were below base background concentrations. The maximum detected concentration of arsenic

(5.6 mg/kg) exceeded the residential RSL; however this concentration is below maximum base background concentrations. The maximum detected concentration of cobalt (7.9 mg/kg) exceeded the residential RSL; however, this concentration is only slightly above the maximum base background concentrations and therefore are likely attributable to naturally occurring conditions. The maximum detected concentrations of aluminum (344,000 mg/kg) cadmium (575 mg/kg), chromium (64.6 mg/kg), and copper (15,500 mg/kg) exceeded their respective base background concentration and residential RSLs.

Subsurface Soil – Outside Buried Debris Boundaries

- No VOCs, pesticides, PCBs, or explosives were detected at concentrations exceeding associated screening values.
- Sixteen SVOCs were detected in subsurface soil outside the buried debris boundaries, of which three exceeded associated screening values. Detected concentrations of benzo(a)pyrene (180J g/kg), benzo(b)fluoranthene (300 µg/kg), and dibenz(a,h)anthracene (45J µg/kg) exceeded their respective residential RSLs in two subsurface soil samples.
- Twenty-three inorganic constituents were detected in subsurface soil outside the buried debris boundaries, of which seven exceeded associated screening values. The maximum detected concentrations of aluminum (12,400 mg/kg) and chromium (30.9 mg/kg) exceeded their respective residential RSLs and ESVs; however, these concentrations were below base background concentrations. The maximum detected concentrations of arsenic (113 mg/kg) and iron (35,800 mg/kg) exceeded their respective residential RSLs; however, these concentrations are slightly above the maximum base background concentrations and therefore are likely attributable to naturally occurring conditions. The maximum detected concentrations of antimony (3.1 mg/kg) and vanadium (99.3 mg/kg) exceeded their respective base background concentration and residential RSL.

Subsurface Soil – Sludge Area

- No VOCs, SVOCs, pesticides, PCBs or explosives were detected in any surface soil sample within the sludge area.
- Seventeen inorganic constituents were detected in subsurface soil within the sludge area, of which three exceeded associated screening values. The maximum detected concentrations of chromium (6.9 mg/kg), cobalt (2.9 mg/kg), and iron (5,820 mg/kg) exceeded their respective residential RSL; however, these concentrations were below maximum base background concentrations.

Groundwater

The current nature and extent of contamination in groundwater are being evaluated as part of the ongoing RI. Preliminary results from the 2010 investigation for groundwater are summarized in the following subsections.

Columbia Aquifer

- No VOCs were detected at concentrations exceeding associated screening values. No SVOCs or PCBs were detected in any shallow groundwater samples.
- Seven pesticides were detected in the shallow groundwater, of which four exceeded the associated screening value. Maximum detected concentrations of endosulfan I (0.026J µg/L), gamma-chlordane (0.0061J µg/L), heptachlor epoxide (0.028 µg/L), and methoxychlor (0.036J µg/L) exceeded their respective tap water RSL and/or ESV in two monitoring wells.
- Four explosives were detected in shallow groundwater, of which one exceeded the associated screening value. The detected concentration of RDX (1.78J µg/L) exceeded the ESV in one monitoring well.
- Eight total inorganic constituents and nine dissolved inorganic constituents were detected in the shallow groundwater, of which one total inorganic and one dissolved inorganic constituent exceeded the associated screening value. Detected concentrations of cyanide (5.4 µg/L) and dissolved copper (4.2J µg/L) exceeded their respective ESV in three monitoring wells

Yorktown Aquifer

- No VOCs were detected at concentrations exceeding associated screening values. No explosives were detected in any of the Yorktown aquifer groundwater samples.
- Three SVOCs were detected in the Yorktown aquifer, of which one exceeded the associated screening value. The detected concentration of di-n-octylphthalate (7.1 µg/L) exceeded the tap water RSL in one monitoring well.
- Three pesticides were detected in the Yorktown aquifer, of which two exceeded their associated screening values. The detected concentrations of endodulfan I (0.084J µg/L) and heptachlor epoxide (0.0098J µg/L) exceeded the tap water RSL and/or ESVs in two monitoring wells.
- Nine total inorganic constituents and eight dissolved inorganic constituents were detected in the Yorktown aquifer, of which one total and one dissolved inorganic constituent exceeded the associated screening value. Detected concentrations of total manganese (113 µg/L) and dissolved manganese (110 µg/L) exceeded the tap water RSL and ESV; however, the manganese detected in groundwater is likely naturally occurring.

Drainage Soil

The current nature and extent of contamination in drainage soil are being evaluated as part of the ongoing RI. Preliminary results from the 2010 investigation for drainage soil are summarized in the following subsections.

USEPA Region 3 BTAG personnel identified four distinctive grassy surface water drainage features at Site 24 during a site visit on December 6, 2007. These drainage areas support surface water only during heavy rain events and are comprised of typically dry sediment that is considered for analytical purposes to be soil. Drainage soil samples collected during the 2010 RI activities are discussed as follows.

- No VOCs, pesticides, or PCBs were detected at concentrations exceeding associated screening values. No explosives were detected in any drainage soil samples.
- Fourteen SVOCs were detected in the drainage soil samples, of which four exceeded the associated screening value. Maximum detected concentrations of benzo(a)pyrene (180J µg/kg), benzo(a)anthracene (160J µg/kg), benzo(b)fluoranthene (250 µg/kg), and dibenz(a,h)anthracene (45J µg/kg) exceeded their respective residential RSLs in three drainage soil samples.
- Twenty-two inorganic constituents were detected in the drainage soil samples, of which five exceeded the associated screening value. Maximum detected concentrations of aluminum (11,900 mg/kg), cobalt (5.1 mg/kg), and iron (15,100 mg/kg) exceeded their respective residential RSL and ESV; however, these concentrations were below maximum base background concentrations. The maximum detected concentration of chromium (24.6J mg/kg) exceeded the residential RSL; however, this concentration is below the maximum base background concentration. The maximum detected concentration of arsenic (151 mg/kg) exceeded the maximum base-wide background concentration; however, the arsenic is likely attributable to its natural occurrence in soil in the region.

Surface Water

No surface water features exist at Site 24.

Sediment

No sediment exists at Site 24.

3.2.12.3 Potential Risks

A summary of the most current risk assessments and risk management considerations from the 1996 SSP for exposure to each site medium is provided as follows. Data from the 2010 investigation will be summarized in a RI Report and will be used to further evaluate risk associated with Site 24.

Soil

The Human Health Risk Screening (HHRS) conducted as part of the *SSP for SSAs 1, 6, 7 and 15* (Baker, 1996d) assessed risks to receptors through ingestion. No unacceptable cancer risks (CR = 1.4×10^{-5}) or non-cancer hazards (HI = 0.79) resulting from exposure to surface soil were identified. Subsurface soil collected from the test pits was analyzed independently of other subsurface soil during the risk assessment. Potential unacceptable cancer risks (CR = 1.9×10^{-4}) and unacceptable non-cancer hazards (HI = 13) identified were primarily associated with exposure to Aroclor-1254 (HQ = 8.5) and cadmium (HQ = 3.5) in test pit subsurface soil. No unacceptable cancer risks (CR = 2.5×10-5) or non-cancer hazards (HI = 0.89) resulting from exposure to other subsurface soil were identified.

An ERA has not been completed for site soil.

Potential risk associated with soil is being evaluated as part of the ongoing RI.

Groundwater

Columbia Aquifer

Existing groundwater data collected from temporary wells as part of the SSP for SSAs 1, 6, 7, and 15 (Baker, 1996d) are not considered representative of aquifer conditions and should not be used for the purposes of a risk assessment because the temporary wells were not constructed with filter packs and were not developed (CH2M HILL, 2007a).

Potential risk associated with groundwater is being evaluated as part of the ongoing RI.

Surface Water

No surface water features exist at Site 24.

Sediment

No sediment exists at Site 24.

3.2.12.4 Remedial Action(s)

No CERCLA RAs have taken place at Site 24.

3.2.12.5 Activities Completed in FY2013

A Draft Final RI report was prepared in FY2012. As part of the responses to regulators' comments on the Draft Final RI, the Partnering Team agreed to install one additional monitoring well at Site 24, and collect a groundwater sample from the newly installed well, in accordance with the 2010 RI SAP (CH2M HILL, 2010c). The details of the Team decision and monitoring well installation are detailed in the responses to comments for the Draft Final RI. The additional monitoring well was installed in June 2013 and sampled in July 2013. The results of the groundwater sample will be used to finalize the RI report that is currently being developed.

3.2.12.6 CERCLA Path Forward

- Finalize RI Report
- EE/CA
- AM
- RAWP
- Removal action field work
- CCR
- NFA PP/NFA ROD

Schedule 3-12 presents the FY2014-15 schedule for Site 24.

3.2.13 Site 25—Building 373 Rocket Plant

3.2.13.1 Site Description

Site 25, the Rocket Plant (formerly SWMU 25 and SSA 7), is located at the end of Main Road, just east of Felgates Creek (**Figure 3-13**). 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 the 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 to a pipe, which outfalled in a dirt drainage swale that discharged into Felgates Creek. This discharge line 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 treatment unit and discharged to the sanitary sewer system. The use of the UST was curtailed in the early 1980s when it was replaced with an aboveground storage tank (AST), 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 1996 *SSP for SSAs 1, 6, 7, and 15* (Baker, 1996d). A summary of relevant documents and action milestones for Site 25 is presented in the following table.

Site 25 - 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	000663
Final Report at Site Screening Areas 3 and 7	OHM, 1997	000893 000892 (Appendix D)
Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25	CH2M HILL, 2007	002158
Draft Final Round One Remedial Investigation for Sites 23, 24, 25, and 26	Baker, 2008	(Will not be finalized – No AR No.)

3.2.13.2 Nature and Extent of Potential Contamination

The wash/rinse water from the cleanup of formulation/pouring equipment was the source of potential contamination at Site 25. Previous investigations have included analysis of soil, groundwater, surface water, and sediment for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. The most recent data available for soil are from the 1996 *SSP for SSAs 1, 6, 7, and 15* (Baker, 1996d). The most recent data available for groundwater are from the 2007 *Phase I RI Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25* (CH2M HILL, 2007a). A Round One RI was completed in 2008; however, in accordance with partnering team agreement, this document will not be finalized and is not discussed further. The initial SSP report identified detectable concentrations of VOCs, SVOCs, one PCB (Aroclor-1260), explosives, and metals in site media at concentrations exceeding screening levels. A UFP-SAP is currently being developed as part of the ongoing RI to further characterize soil and groundwater in the vicinity of Building 373, the former UST and associated piping, and the abandoned discharge line, and to evaluate potential transport and contaminant discharge from the site to Felgates Creek. The nature and extent of contamination at Site 25 is currently being evaluated. A brief overview for each medium at Site 25 is summarized as follows.

Soil

Surface Soil

Historically, SVOCs and inorganic constituents have been detected in surface soil at values exceeding one or more screening criteria. The current nature and extent of contamination in surface soil are being evaluated as part of the ongoing RI.

Surface and Subsurface Soil – Soil Borings

Historically, one PCB (Aroclor-1260) and inorganic constituents have been detected in subsurface soil at values exceeding one or more screening criteria. The current nature and extent of contamination in subsurface soil are being evaluated as part of the ongoing RI.

Surface and Subsurface Soil – Test Pits

Historically, one PCB (Aroclor-1260) and inorganic constituents have been detected in surface and subsurface soil collected from test pits at values exceeding one or more screening criteria. The current nature and extent of contamination in surface and subsurface soil are being evaluated as part of the ongoing RI.

Groundwater

Detected concentrations were screened against maximum base-wide background concentrations and MCLs in order to aid in determining which sites required further investigation. Groundwater was only sampled for explosives and inorganic constituents based on historical information.

Yorktown-Eastover Aquifer

Historically, two explosives and inorganic constituents have been detected in groundwater at values exceeding one or more screening criteria. The current nature and extent of contamination in groundwater are being evaluated as part of the ongoing RI.

Surface Water

Tributary to Felgates Creek

No concentrations of constituents have been detected in exceedance of screening values in surface water samples. The current nature and extent of contamination in surface water are being evaluated as part of the ongoing RI.

Sediment

Tributary to Felgates Creek

Historically, one SVOC and inorganic constituents have been detected in sediment at values exceeding one or more screening criteria. The current nature and extent of contamination in sediment are being evaluated as part of the ongoing RI.

3.2.13.3 Potential Risks

An HHRS was conducted as part of the 1996 SSP (Baker, 1996d) and assessed risk to receptors through ingestion. A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

Surface Soil

No unacceptable cancer risks (CR = 1.1×10^{-5}) resulting from other surface soil were identified in the SSP (Baker, 1996d). The RME non-carcinogenic hazard for future adult residents associated with exposure to surface soil (HI = 1.1) exceeded the USEPA target value.

Potential risk associated with surface soil is being evaluated as part of the ongoing RI.

Subsurface Soil- Soil Borings

No unacceptable cancer risks (CR = 3.7×10^{-5}) resulting from other subsurface soil were identified in the SSP (Baker, 1996d). The RME non-carcinogenic hazard for future adult residents associated with exposure to subsurface soil (HI = 1.2) exceeded the USEPA target value.

Potential risk associated with subsurface soil is being evaluated as part of the ongoing RI.

Subsurface Soil- Test Pits

No unacceptable cancer risks (CR = 3.2×10^{-5}) resulting from exposure to test pit subsurface soil were identified in the SSP (Baker, 1996d). The RME non-carcinogenic hazard for future adult residents associated with exposure to test pit subsurface soil (HI = 1.6) exceeded the USEPA target value.

Potential risk associated with subsurface soil is being evaluated as part of the ongoing RI.

An ERA has not been conducted for site soil.

Groundwater

Yorktown-Eastover Aquifer

In the SSP (Baker, 1996d), potential unacceptable risk was identified for groundwater, primarily associated with exposure to 1,1-DCE and several inorganic constituents. A risk assessment was not conducted as part of the Phase I RI (CH2M HILL, 2007a).

The ERA conducted as part of the SSP (Baker, 1996d) did not evaluate groundwater because no complete exposure pathway exists.

Potential risk associated with groundwater is being evaluated as part of the ongoing RI.

Surface Water

Tributary to Felgates Creek

An HHRA has not been conducted for surface water.

The Ecological Risk Screening conducted as part of the SSP (Baker, 1996d) identified no COCs due to exposure associated with surface water. Thus, risks to ecological receptors are considered acceptable.

Potential risk associated with surface water is being evaluated as part of the ongoing RI.

Sediment

Tributary to Felgates Creek

An HHRA has not been conducted for sediment.

The Ecological Risk Screening conducted as part of the SSP (Baker, 1996d) identified potential unacceptable risk to ecological receptors. The risk (EI = 3.4) is associated with exposure to benzo(k)fluoranthene (EQ = 1.3), arsenic (EQ = 1.4), and nickel (EQ = 0.75).

Potential risk associated with sediment is being evaluated as part of the ongoing RI.

3.2.13.4 Remedial Action(s)

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

3.2.13.5 Activities Completed FY2013

Decontamination of the buildings at Site 25 was completed in 2013. A UFP-SAP supporting an RI is currently being developed to further characterize soil and groundwater in the vicinity of Building 373, the former UST and associated piping, and the abandoned discharge line, and to evaluate potential transport and contaminant discharge from the site to sediment and surface water in Felgates Creek.

3.2.13.6 CERCLA Path Forward

- Finalize UFP-SAP
- RI field activities
- RI Reporting
- FS/PP/ROD for all media as appropriate
- LUC RD, as appropriate
- RAWP
- RA Field Work
- CCR
- LTM Work Plan and Implementation, if required
- RACR
- Five-Year Review (2018)

Schedule 3-13 presents the FY2014-15 schedule for Site 25.

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

3.2.14.1 Site Description

Site 26 (formerly SSA 18) is located in the central portion of the WPNSTA, and consists of a waste Otto fuel management process area that took place in the northern portion of Building 1816 from the mid-1970s to the mid-1990s, before the southern portion of the building was construction and operations in the northern portion ceased (**Figure 3-14**). 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 metals. 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 fuel oil UST, were removed from the site. In addition, a 12,000-gallon #2 heating oil UST was located in the southern portion of the site, and was removed in 1998. 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 feet to the shallow Cornwallis Cave aquifer. The Yorktown confining unit is approximately 25 feet 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 feet amsl. A summary of relevant documents and action milestones is presented in the following table.

Site 26 - Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Action Memorandum, Site Screening Area 18	Environmental and Safety Designs, Inc., 1994	000612
Soil Assessment Report for Site Screening Area 18	Baker, 1994	000619
Site Screening Progress Report for Site Screening Areas 2, 17, 18 and 19	Baker, 1996	000666 (Volume I) 000667 (Volume II)
Draft Final Round One Remedial Investigation Report for Sites 23, 24, 25, and 26	Baker, 2008	(Will not be finalized – No AR No.)

3.2.14.2 Nature and Extent of Potential Contamination

The source of contamination to site media was the contents of the UST that was removed in 1995. Previous investigations have included analysis of soil and groundwater for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. No surface water or sediment analyses were identified at Site 26. The most recent soil data available are from the 2008 CCR. The most recent soil and groundwater data available are from the 1996 *SSP for SSAs 2, 17, 18, and 19* (Baker, 1996e). An RI was completed in 2008; however, in accordance with partnering team agreement, this document will not be finalized and the results are not discussed herein. A UFP-SAP is currently

being developed as part of the ongoing RI to further understand the hydraulic characteristics of Site 26 and to characterize the nature and extent of soil contamination associated with the release from the former UST source area, any soil that may have been impacted by industrial operations at the site, and groundwater contamination. In addition, subslab soil gas samples from under Building 1816 will be collected to characterize subslab soil gas in the vicinity of the former UST. The nature and extent of contamination at Site 26 is currently being evaluated. A brief overview for each medium at Site 26 is summarized as follows.

Soil

Historically, SVOCs and inorganic constituents have been detected in soil at values exceeding one or more screening criteria; however, SVOC concentrations did not exceed maximum base-wide background concentrations. The current nature and extent of contamination in soil are being evaluated as part of the ongoing RI.

Groundwater

Cornwallis Cave Aquifer

Historically, VOCs and inorganic constituents have been detected in groundwater at values exceeding one or more screening criteria. The current nature and extent of contamination in surface soil are being evaluated as part of the ongoing RI.

Surface Water

No surface water exists at Site 26.

Sediment

No sediment exists at Site 26.

3.2.14.3 Potential Risks

The HHRS conducted as part of the SSP (Baker, 1996d) assessed risks to receptors through ingestion. A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

No unacceptable cancer risks or non-cancer hazards resulting from exposure to surface soil were identified for any receptor in the SPP (Baker, 1996d).

An Ecological Risk Screening (ERS) has not been conducted for site soil.

Potential risk associated with soil is being evaluated as part of the ongoing RI.

Groundwater

Cornwallis Cave Aquifer

Potentially unacceptable cancer risks (CR = 3.6×10^{-3}) were identified in the SSP (Baker, 1996d) associated with exposure to 1, 1-DCE (CR = 3.6×10^{-3}). No unacceptable non-cancer hazards (HI = 0.24) resulting from exposure to groundwater were identified.

The ERA conducted as part of the SSP (Baker, 1996d) did not evaluate groundwater because no complete exposure pathway exists.

Potential risk associated with groundwater is being evaluated as part of the ongoing RI.

Surface Water

No surface water exists at Site 26.

Sediment

No sediment exists at Site 26.

3.2.14.4 Remedial Action(s)

No CERCLA RAs have taken place at Site 26.

3.2.14.5 Activities Completed in FY2013

A UFP-SAP is currently being developed to further evaluate potential impacts from the former waste Otto fuel management processes that occurred in the northern portion of Building 1816.

3.2.14.6 CERCLA Path Forward

- Finalize UFP-SAP
- RI field activities
- RI Reporting
- FS/PP/ROD for all media as appropriate
- LUC RD, as appropriate
- RAWP
- RA Field Work
- CCR
- LTM Work Plan and Implementation, if required
- RACR
- Five-Year Review (2018)

Schedule 3-14 presents the FY2014-15 schedule for Site 26.

3.2.15 Site 31—Barracks Road Landfill Industrial Area

3.2.15.1 Site Description

Site 31 (formerly AOC 23) consists of an industrial area west of Site 12 and SSA 15 (**Figure 3-15**). The topography of Site 31 slopes to the northwest toward an unnamed creek. The area is predominantly paved with 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 (Sheds 3 through 6) and several smaller buildings. Shed 3 is currently unoccupied due to concerns related to TCE in indoor air. It formerly housed a paint booth, blast booth, satellite accumulation area for aerosol paint cans, and parts washer and was used for wing and fin repair until it was evacuated in February 2012 due to vapor intrusion concerns. The building was also historically used as a missile component rework facility and a boiler plant. Shed 4 is currently used as a storage warehouse. The building was historically used for container repair and testing. Shed 5 is currently used for administrative and training purposes and the former Shed 6 operations. Shed 5 was historically used for mine and depth charge rework. Shed 6 was most recently used to support public works and utilities maintenance and was historically used for missile component rework and equipment maintenance, but like Shed 3, was evacuated in February 2012 due to vapor intrusion concerns, and is currently unoccupied. Railroad tracks lie to the northwest of the buildings. A UST that used to contain waste oil was previously located by the northern corner of Shed 5, but was removed in December 1993 (Baker, 1997g). Two other USTs and one AST were also located onsite and were used for storage of heating oil.

Site 31 was formerly known as either AOC 23 or the area upgradient of Site 12 and was associated with Site 12 until September 2006. At that time a consensus statement was signed indicating the VOC concentrations detected in groundwater were 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 and the area is being investigated independently of Site 12 as Site 31. The site is bounded on the east and west sides by surface drainage features and the site topography that slopes downward toward these surface water features. The site is located on a groundwater divide with groundwater flowing in both westerly and easterly directions. A summary of relevant documents and action milestones is presented in the following table.

Site 31 - Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Study Area Analysis	USEPA, 1992	000289
Round One RI Report for Sites 1-9, 11, 12, 16-19, and 21	Baker and Weston, 1993	000313
Operable Unit Evaluation Report	Baker, 1993	001060
Round Two RI Report Site 12	Baker, 1996	000640
AOC 22, Site 12, and SSA 2, SSA 19 and King Creek Independent Sampling and Risk Screening Report	Black & Veatch, 1996	000669
Feasibility Study Report Site 12	Baker, 1996	000647
Proposed Remedial Action Plan Site 12	Baker, 1996	000654
Record of Decision, Operable Unit Nos. III, IV, and V, Site 12	Baker, 1997	000871
Construction Closeout Report for Site 12 – Area A	OHM, 1998	001154
Long-Term Monitoring Report, Site 12	Baker, 2000	001219
Site 12 Long-Term Monitoring Report - 1998-2003	Baker, 2005	002078
Partnering Team Consensus Statement 9-1-06-45	-----	N/A
Work Plan, Site Assessment, Area Upgradient of Site 12	CH2M HILL, 2007	002150
Site Assessment Report Area of Concern 23	CH2M HILL, 2008	002425
Site 31 Action Memorandum	Navy, 2012	Pending

3.2.15.2 Nature and Extent of Potential Contamination

Previous investigations included VOC analysis of surface water, sediment, and groundwater for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. The most recent groundwater, surface water, and sediment data available are from the 2009 Site Assessment Report AOC 23 (CH2M HILL, 2008c); however, investigation is currently ongoing to evaluate indoor/ outdoor air, subslab soil gas, subsurface soil, groundwater, surface water, and sediment samples as part of the current RI.

A UFP-SAP for Site 31 was completed in October 2011 to collect samples from the following media: surface water, sediment, soil, indoor air, outdoor air, and subslab soil vapor. All surface water, sediment, and soil samples were collected in January and February 2012. The vapor intrusion investigation (Phase I) began in January 2012; the Phase I investigation included building surveys of Sheds 3 through 6 and Buildings 371, 1803, and 1804, followed by the collection of subslab soil gas samples from beneath each building. Additionally, indoor and outdoor air samples were collected associated with the occupied buildings at the site (Sheds 3, 5, and 6 and Building 371).

The nature and extent of contamination at Site 31 is currently being evaluated. A brief overview for each medium at Site 31 is summarized as follows.

Soil

The current nature and extent of contamination in soil are being evaluated as part of the ongoing RI. The most recent data collected during Phase II of the RI identified landfill waste, possible DNAPL, and sorbed contaminant mass in fine-grained soil of the Yorktown-Eastover confining unit as potential continuing sources of contamination. A number of data gaps were identified during the Phase II RI that prevented the completion of an HHRA or ERA.

Groundwater

Columbia Aquifer

Historically, VOCs, SVOCs, explosives, and inorganic constituents have been detected in groundwater samples. Primary contaminants are VOCs, including PCE, TCE, cis-1,2-DCE, 1,1-DCE, VC, and chloromethane, and have been detected at concentrations exceeding their respective RSLs and/or MCL in one or more samples.

The current nature and extent of contamination in groundwater are being evaluated as part of the ongoing RI. The most recent data collected during Phase II of the RI identified chlorinated VOCs and metals as primary contaminants in groundwater. Unacceptable risks to future human receptors were identified due to potential exposure to contamination in groundwater due to PCE, TCE, 1,2-DCE, and VC; however, a number of data gaps were identified during the Phase II RI that prevented the completion of an HHRA or ERA

Groundwater Seeps

Historically, groundwater seep samples were only analyzed for the presence of VOCs. Two VOCs, TCE (130 µg/L), and VC (1 J µg/L) were detected at concentrations exceeding their respective RSL and/or MCL in one or more samples. These results indicated the migration of groundwater contaminants toward surface water bodies to the east and west of the industrial area, further confirming the groundwater divide at the site and the groundwater flow to the east and west. However, the current nature and extent of contamination in groundwater seeps are being evaluated as part of the ongoing RI.

Surface Water

Tributary to Ballard Creek

Historically, surface water samples collected were analyzed for VOCs only; no VOCs were detected at concentrations above associated screening values.

The current nature and extent of contamination in surface water are being evaluated as part of the ongoing RI. Results collected during Phase II of the RI indicated that TCE was identified in exceedance of human health screening criteria and close to the ESV.

Sediment

Tributary to Ballard Creek

Historically, sediment samples were collected and analyzed for VOCs and acid-volatile sulfide and simultaneously extracted metals only; no VOCs were detected at concentrations exceeding associated screening criteria.

The current nature and extent of contamination in sediment are being evaluated as part of the ongoing RI. Results collected during Phase II of the RI indicated that TCE was identified in exceedance of human health screening criteria and close to the ESV.

Indoor Air and Subslab Soil Gas

Indoor air and subslab soil gas samples were collected as part of the initial RI investigation in January 2012. Following the preliminary lab results received in mid-February 2012, the workers in Shed 3, Shed 6, and Building 371 were immediately evacuated based on the USEPA Region 3 recommendation, as documented in the Site 31 Action Memorandum for the time-critical removal action (Navy, 2012). The maximum concentrations of TCE in indoor air in Shed 3, Shed 6, and Building 371 were 170 micrograms per cubic meter [µg/m^3], 83 µg/m^3, and 61 µg/m^3 respectively, which exceeded 26.4 µg/m^3 (three times the non-cancer RSL of 8.8 µg/m^3). Currently, Sheds 3 and 6 remain unoccupied, and the current nature and extent of contamination in the buildings are being evaluated as part of the ongoing RI.

3.2.15.3 Potential Risks

At the present time, neither an HHRA nor an ERA have been completed for groundwater, surface water, sediment, or soil associated with Site 31. Indoor air and subslab soil gas vapor intrusion samples were collected in January

2012. The maximum concentrations of TCE in indoor air in Shed 3, Shed 6, and Building 371 exceeded the USEPA Region 3 indoor air threshold value of 26.4 µg/m^3, which is three times the non-cancer RSL of 8.8 µg/m^3; therefore, those buildings were evacuated and the workers were relocated (Navy, 2012). However, potential risk associated with indoor air and subslab soil gas samples is still being evaluated as part of the ongoing vapor intrusion investigation included in the ongoing RI.

3.2.15.4 Remedial Action(s)

Based on indoor air samples collected in January and March 2012, which indicated short-term exposure to TCE in air, the Navy removed occupants from Sheds 3 and 6 and Building 371. An RA contractor was tasked with sealing cracks that were identified as potential pathways. Resampling following this task indicated that indoor air levels for TCE in Sheds 3 and 6 remained above unacceptable levels, while levels in Building 371 were below acceptable USEPA RSLs. Both Sheds 3 and 6 remain unoccupied as the Navy continues to evaluate long-term actions for these sheds.

3.2.15.5 Activities Completed in FY2013

A Revised UFP-SAP consisting of the Phase II Work Plan was prepared and finalized in 2012 to identify the soil source areas, further delineate the groundwater plume, and identify the impacts to surface water and sediment. Field work was conducted between September and November 2012 to collect MIP, surface and subsurface soil, surface water, sediment, and limited groundwater samples. The Navy is currently evaluating options for treatment of surface water entering Ballard Creek. In addition, a vapor intrusion investigation was conducted within buildings located at Site 31. Vapor intrusion samples were collected in July and August 2012, and again in January 2013 and July 2013. Vapor intrusion sampling/monitoring will continue and is planned to be conducted again in January 2014 (FY2014). A UFP-SAP for Phase III of the RI is currently being developed. The Phase III field work is currently planned to consist of surface and subsurface soil, surface water, sediment, and groundwater samples.

3.2.15.6 CERCLA Path Forward

- Complete Phase III RI UFP-SAP
- Phase III RI field activities
- RI Reporting
- Vapor Intrusion monitoring for Shed 5 in January 2014
- FS/PP/ROD for all media as appropriate
- LUC RD, as appropriate
- RAWP
- RA Field Work
- CCR
- LTM Work Plan and Implementation, if required
- RACR
- Five-Year Review (2018)

Schedule 3-15 presents the FY2014-15 schedule for Site 31.

3.2.16 Site 32—Wetlands Downgradient of Beaver Pond

3.2.16.1 Site Description

Site 32 (formerly SSA 25) is located in the eastern-most portion of WPNSTA Yorktown, bordered by dense tree cover to the north, the York River further to the east, and Ballard Creek to the south (**Figure 3-16**). The wetland portion of Site 32 was formerly identified as SSA 25. The site was later expanded to include the other areas previously utilized as STP #2. The approximate centerline of Ballard Creek, which meanders throughout the downgradient wetland portion of Site 32, represents the property boundary between WPNSTA Yorktown and the National Park Service's Colonial National Historic Park (CH2M HILL, 2008e). The terrestrial portion of Site 32 encompasses the footprint of the former STP #2 and is approximately 1.4 acres, while the total site study area is approximately 5.6 acres in size. Currently, the study area is cleared and slopes moderately from the north to the

south at elevations ranging from 30 to 20 feet amsl. Beyond the WPNSTA Yorktown perimeter fenceline, the site slopes steeply towards the downgradient wetlands. The wetland area represents a freshwater, low-energy, bottomland depositional habitat, and is characterized by a broad, flat area between steep, upland slopes (CH2M HILL, 2008e).

STP #2 was installed in 1952, and formerly consisted of a clarifier (Imhoff) tank with two chambers, a trickling filter, chlorination unit, and sludge drying beds, located on the upland portion of the site, north of Impoundment No. 1. STP #2 reportedly received and managed only sanitary wastewater from the base (CH2M HILL, 2012i). Although no historical releases were reported or documented during the operation of the STP, beaded elemental mercury was discovered at the base of the trickling filter when STP #2 was dismantled and removed in 2000. The source of this mercury was likely the mercury-containing bearings located in the distributor arms of the trickling filter tank. Based on anecdotal evidence, a total of 12 drums of mercury-contaminated soil were reportedly excavated and disposed of during the removal of the trickling filter, and the site was backfilled and regraded. No documentation of the removal activities, confirmation samples, or the depth of fill currently exists; however, anecdotal information reports that post-removal confirmation samples were collected and results indicated that no residual mercury-contaminated soil remained following the removal action.

Previous investigations have fully characterized the wetland portions of the site, and an NTCRA was conducted for sediment in the downgradient area of Site 32. The NTCRA was conducted from July to October 2009 to address potential ecological risks associated with cadmium, mercury, and silver in the wetland sediment downgradient of STP #2. During the NTCRA, approximately 2,041 tons of contaminated sediment was removed from Site 32, as documented in the CCR (Shaw, 2010b). Following excavation, confirmation samples were collected and analyzed for cadmium, mercury, and silver, and additional excavation was conducted until the confirmation sample results confirmed that the RGs established in the EE/CA had been achieved (Shaw, 2010b). Following the NTCRA, no unacceptable risk to human health or the environment associated with exposure to surface water or sediment remained at Site 32. NFA for surface water and sediment at Site 32 was required and NFA was selected as the remedy, as documented in the ROD for Site 32 Wetlands Area Downgradient of Beaver Pond, which was signed in August 2011 (CH2M HILL, 2011e).A summary of relevant documents and action milestones is presented in the following table.

Site 32 - Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Consensus Statement 5-18-04-37	May 18, 2004	N/A
Consensus Statement 8-17-05-42	September 26, 2005	001739
Final Project Plans Step 3B and 4 of the BERA	Baker, 2005	001873
Site 12 Final Long-term Monitoring Report (1998-2003)	Baker, 2005	002078
Final Steps 6 and 7 of the Aquatic BERA	CH2M HILL, 2008	002412
Final Engineering Evaluation/Cost Analysis Site Screening Area 25	CH2M HILL, 2009	000104
Final Construction Completion Report Removal Action at Site 32	Shaw, 2010	000113
No Further Action ROD for Site 32 Wetlands Area Downgradient of Beaver Pond*	Navy, 2011	000255
Final Site Investigation Report for Site 32**	CH2M HILL, 2013	Pending

*Final ROD from 2011 for Site 32 was NFA for surface water and sediment

**Final SI Report from 2013 is for soil and groundwater

3.2.16.2 Nature and Extent of Potential Contamination

Historical discharge from the former STP No. 2 was the source of potential contamination to sediment and surface water at Site 32. Because discharge occurred directly into the wetland area, soil and groundwater were not

considered media of concern at the Site. Previous investigations have included analysis of sediment, and surface water for VOCs, SVOCs, explosives, pesticides, PCBs, and inorganic constituents. The most recent surface water data are from the *Steps 6 and 7 of the Aquatic Baseline Ecological Risk Assessment* (CH2M HILL, 2008e). The most recent sediment data available are from the 2009 *CCR Removal Action at Site 32* (Shaw, 2010b). Mercury is considered to be the primary COC at Site 32. The current nature and extent of contamination for each medium at Site 32, as documented in the previously presented reports, are summarized as follows. After STP No. 2 was demolished, mercury-contaminated soil beneath the trickling filter was removed. However, documentation of confirmation samples is not available. Therefore, the Navy agreed to collect soil and groundwater samples from the area upgradient of the wetlands of Site 32. The additional soil and groundwater samples were evaluated as part of the SI Report (CH2M HILL, 2013d).

Soil

Discrete Surface and Subsurface Soil Samples

- Discrete surface soil samples were analyzed for cadmium, mercury, and silver. Cadmium and mercury were detected at concentrations exceeding one or more screening criteria; however, silver concentrations did not exceed any screening criteria. No constituent concentrations exceeded the adjusted residential soil RSLs.
- Discrete subsurface soil samples were analyzed for cadmium, mercury, and silver. Cadmium, mercury, and silver were detected at concentrations exceeding one or more screening criteria.

Composite Surface and Subsurface Soil Samples

One five-point composite surface soil and one five-point composite subsurface soil sample was collected from within the footprint of the former sludge drying beds, and were analyzed for TCL VOCs, TCL SVOCs, pesticides and PCBs, and TAL metals.

- Surface Soil - No VOCs or SVOCs were detected. One pesticide (4,4'- dichlorodiphenyldichloroethene [DDE]) was detected above the background concentration but below all of the screening criteria. One PCB (Aroclor-1268) was detected, but was below the ESV (there are no established soil screening level (SSL), RSL, or background value). Fourteen inorganic constituents were detected at concentrations that exceeded one or more screening criteria; however, only barium, iron, and lead exceeded background values.
- Subsurface Soil - No VOCs were detected. Two SVOCs (benzo[a]anthracene and benzo[a]pyrene) were detected at levels that exceeded the risk-based SSLs. Two pesticides (4,4'-dichlorodiphenyldichloroethane [DDD] and 4,4'- DDT) were detected above background values but below the screening criteria. One PCB (Aroclor-1268) was detected above the ESV (there are no established SSL, RSL, or background value). Thirteen inorganic constituents were detected at concentrations that exceeded one or more screening criteria; however, lead was the only constituent detected above background values.

Groundwater

Five groundwater samples were analyzed for cadmium, mercury, and silver. There were no detections of any of the constituents in any of the samples collected.

Surface Water

Ballard Creek

Total mercury (0.126J µg/L) was detected at one sample location, at concentrations exceeding the BTAG screening value. No dissolved mercury was detected at any sample location.

Sediment

Ballard Creek

During the development of the EE/CA (CH2M HILL, 2009d), RGs were developed for cadmium, mercury, and silver to be protective of a future unrestricted land use scenario. A removal action was conducted beginning in July 2009 to remove and dispose of contaminated sediment.

Post-removal action confirmation samples indicated that concentrations of all COCs were below established RGs following the completion of removal activities in September 2009.

3.2.16.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

An HHRS was conducted as part of the SI (CH2M HILL, 2013d). The HHRS concluded that there are no potential unacceptable human health risks associated with exposure to surface or subsurface soil. Therefore, unrestricted use of the site would not result in any unacceptable human health risks.

A SERA and Step 3A of the BERA (referred to as the SERA + 3A), was conducted as part of the SI (CH2M HILL, 2013d). For terrestrial habitats, risks for both upper- and lower-trophic-level receptors are acceptable on a site-wide basis.

Groundwater

A human health risk evaluation and a SERA + 3A was completed as part of the SI (CH2M HILL, 2013d). None of the target analytes were detected above the reported sample quantitation limits for groundwater, and the reported sample quantitation limits were all below the tap water RSLs. Therefore, there are no unacceptable risks associated with potential exposure to groundwater.

Although ecological receptors do not typically have direct exposure to groundwater, groundwater data collected as part of the SI were also evaluated in the SERA + 3A conducted in the SI (CH2M HILL, 2013d). Based upon the results of this evaluation, groundwater does not appear to be a significant transport medium for site-related constituents to the downgradient wetlands, and site-related constituents that might reach these water bodies via groundwater would not pose an unacceptable risk to aquatic biota.

Surface Water

Ballard Creek

The HHRA conducted as part of the EE/CA (CH2M HILL, 2009d) assessed risk to receptors from exposure to inorganic constituents. The full suite inorganic dataset collected as part of the 2008 BERA (CH2M HILL, 2008e) was compared to the freshwater federal WQC, tap water RSLs × 10, and MCLs. This evaluation identified no chemicals that are present in surface water above any of these screening criteria, and, as such, there are no potential human health risks from exposure to surface water.

The BERA conducted as part of the EE/CA (CH2M HILL, 2009f) found negligible risk for benthic invertebrates, amphibians, and fish indicator species based on a comparison of date to screening values. Thus, risks to ecological receptors are considered acceptable.

Sediment

Ballard Creek

The removal action conducted at Site 32 reduced concentrations of all COCs to below established RGs previously agreed upon by the Navy and the USEPA, in partnership with the VDEQ. Concentrations of COCs on site have been reduced to levels allowing for unrestricted land use.

3.2.16.4 Remedial Action(s)

An NTCRA was initiated in 2009 to remove contaminated sediment. A total of 1,361 yd^3 (2,041 tons) of contaminated sediment was disposed of from Site 32. Following excavation, the area was backfilled with a 3:1 mixture of sand and topsoil, graded, and revegetated with Smooth Alder, Buttonbush, and Bald Cypress. Restoration activities for the embankment and hillside included backfilling, compacting, grading, fertilizing, and seeding with a grass seed mixture of Annual Rye Grass, Partridge Pea, Switchgrass, and Virginia Wild Rye Grass (Shaw, 2010b).

3.2.16.5 Activities Completed in FY2013

A UFP-SAP was completed for an upgradient soil and groundwater SI, and field work, including surface and subsurface soil sampling and groundwater sampling, was performed in FY2012. The SI report recommending NFA was developed in FY2013.The SI report, which includes an NFA Decision Statement, was finalized and signed in May 2013.

3.2.16.6 CERCLA Path Forward

The SI Report was finalized and signed in May 2013, and included an NFA Decision Statement concluding that NFA is required at Site 32, and CERCLA documentation for Site 32 is complete. Therefore, Site 32 will be removed from subsequent SMPs.

3.2.17 Site 33—Sand Blasting Grit Area

3.2.17.1 Site Description

Site 33 (formerly SSA 22 and AOC 4) consists of approximately 0.5 acres located in the eastern portion of WPNSTA Yorktown. Site 33 is bounded to the east and north by Bollman Road, to the south by a surface water drainage ditch, and to the north by an intermittent drainage ditch (**Figure 3-17**). The eastern portion of the site is a vacant lot, and the western portion of the site is wooded. Site 33 is the former Building 530 Paint Shop and Sand Blasting Operations, which operated between 1945 and 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 and painted within Building 530. 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 was deposited on the ground surface north of Building 530. Waste dumping areas have also been observed within the wooded portion of the site to the northeast and southwest of former Building 530. The northern waste dumping area consists of metal slag, drum fragments, and construction debris, while the southern waste dumping area consists primarily of railroad ties and other related materials. Site 33 is a mostly cleared grassy area that is generally flat in topography. A summary of relevant documents and action milestones is presented in the following table.

Site 33 - Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Navy Final Recommendation for Areas of Concern (SSA 22 is identified as Area of Concern 4)	P.A. Rakowski, P.E., 1995	000355
Site Screening Process Report for Site Screening Areas 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24	Baker, 2001	001350 (Volume I) 001351 (Volume II) 001352 (Volume III)
Remedial Action Report for Sites 1 and 3 and Site Screening Area 22	OHM, 2001	001091

3.2.17.2 Nature and Extent of Potential Contamination

Potential contamination at Site 33 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. Previous investigations have included analysis of soil and groundwater for VOCs, SVOCs, explosives, pesticides, PCBs, and metals. The most recent soil and groundwater data available are from the 2001 *SSP for SSAs 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24* (Baker, 2001c).

The current nature and extent of contamination for each medium at Site 33, as documented in the previously presented reports, are summarized as follows.

Soil

A removal action was conducted beginning in July 1999 to remove and dispose of lead contaminated soil.

Post-removal action confirmation samples indicated that concentration of lead was below established RG and allowed for the unrestricted use of the site following the completion of removal activities in August 1999. An NFA Decision Summary for soil was signed in May 2004 (Baker, 2004b).

Groundwater

Only one monitoring well was installed at Site 33; however, it was abandoned as part of the removal action.

Cornwallis-Cave Aquifer

- No SVOCs, pesticides, or PCBs were detected.
- Four VOCs were detected in groundwater at concentrations exceeding associated screening values. 1,1-DCE (2 J µg/L), total 1,2-DCE (6 J µg/L), chloroform (5 J µg/L), and TCE (200 µg/L) were detected at concentrations exceeding the associated RBC values.
- Seven inorganic constituents were detected in groundwater at concentrations exceeding associated screening values. Total (45,000 µg/L) and dissolved (4, 120 µg/L) aluminum, dissolved (5.3 µg/L) arsenic, dissolved (28.8 µg/L) barium, total (3.8 µg/L) beryllium, total (137 µg/L) chromium, total (88,500 µg/L) and dissolved (7,230 µg/L) iron, total (48.5 µg/L) lead, total (756 µg/L) and dissolved (210 µg/L) manganese, and total (210 µg/L) vanadium were detected at concentrations exceeding the associated background and RBC values.

Surface Water

No surface water features are present at Site 33.

Sediment

No sediment is present at Site 33.

3.2.17.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

The HHRA conducted as part of the 2001 *SSP for SSAs 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24* (Baker, 2001c) assessed risk to receptors through ingestion of surface and subsurface soil. Potential unacceptable non-cancer hazards were identified for future residents. The non-carcinogenic hazard for future residents associated with exposure to surface soil (HI = 14) is above the acceptable HI of 1.0. The hazard is primarily associated with ingestion of antimony (HQ = 4), cadmium (HQ = 1.1), chromium (HQ = 2), and iron (HQ = 5.1). The non-carcinogenic hazard for future residents associated with exposure to subsurface soil (HI = 1.3) exceeds the acceptable HI of 1.0. The hazard is primarily associated with ingestion of arsenic (HQ = 0.43) and iron (HQ = 0.83); however, the maximum detected concentrations for these constituents were less than maximum base-wide background concentrations.

No ERA has been completed to date.

Groundwater

The HHRA conducted as part of the 2001 *SSP for SSAs 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24* (Baker, 2001c) assessed risk to receptors through ingestion of filtered and unfiltered groundwater.

Cornwallis-Cave Aquifer

Potential unacceptable non-cancer hazards and cancer risks were identified for future residents. The non-carcinogenic hazard for future residents associated with exposure to unfiltered groundwater (HI = 19) is above the acceptable HI of 1.0. The hazard is primarily associated with ingestion of total aluminum (HQ = 1.2), arsenic (HQ = 7.7), chromium (HQ = 0.76), iron (HQ = 8), manganese (HQ = 0.9), and vanadium (HQ = 0.81). In addition, the carcinogenic risk for future residents associated with exposure to unfiltered groundwater (CR = 2.1×10^{-3}) is above USEPA's target risk range of 10^{-6} to 10^{-4}. The risk is primarily associated with ingestion of TCE (CR = 1.4×10^{-4}) and total arsenic (CR = 1.9×10^{-3}). The non-carcinogenic hazard for future residents associated with exposure to filtered groundwater (HI = 1.5) is above the acceptable HI of 1.0. The hazard is primarily associated with ingestion of dissolved aluminum (HQ = 0.11), arsenic (HQ = 0.48), iron (HQ = 0.66) and manganese (HQ = 0.25). In addition, the carcinogenic risk for future residents associated with exposure to filtered groundwater (CR = 3.4×10^{-4}) is above USEPA's target risk range of 10^{-6} to 10^{-4}. The risk is primarily associated with ingestion of TCE (CR = 1.4×10^{-4}) and dissolved arsenic (CR = 1.2×10^{-4}).

The ERA conducted as part of the 2001 SSP for SSAs 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24 (Baker, 2001c) did not assess risk posed to ecological receptors due to groundwater exposure because no complete exposure pathway was identified.

Surface Water

No surface water features are present at Site 33.

Sediment

No sediment is present at Site 33.

3.2.17.4 Remedial Action(s)

A removal action was initiated in July 1999 to excavate lead-contaminated soil and sandblasting grit between 6 inches and 2 feet bgs. Post-excavation samples were collected from the floor of the excavation areas and compared to the established RG. Based on post-removal analytical results and comparison to the RGs, the RG was met and excavation was discontinued. In total 649 tons of contaminated soil and grit were removed (OHM, 2001a). Although a NFA Decision Summary for soil was signed in May 2004 (Baker, 2004b), a reevaluation of site activities and building drawings indicated that additional characterization is required.

3.2.17.5 Activities Completed in FY2013

Site 33 is currently in the SI phase. A UFP-SAP is being developed to investigate if soil, groundwater, surface water, and/or sediment have been impacted by activities at Building 530 and by the waste debris areas.

3.2.17.6 CERCLA Path Forward

- Finalize UFP-SAP for Site 33
- Field work/sample collection for SI
- SI Report
- EE/CA
- AM
- Removal Action
- CCR
- NFA PP/NFA ROD

Schedule 3-16 presents the FY2014-15 schedule for Site 33.

3.2.18 Site 34—Building 537 Discharge to Felgates Creek

3.2.18.1 Site Description

Site 34 (formerly SSA 14), the Building 537 Discharge to Felgates Creek, is approximately 3 acres in size and is located in the north-central portion of WPNSTA Yorktown (**Figure 3-18**). During its operation, the site was used for

industrial activities related to ordnance. The site is no longer active and buildings at the site will be decontaminated (contents removal and cleaning) beginning in 2013. 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. Site 34 consists of potential discharges from Building 537 as well as a distinct discharge pipe which originates at Building 537 and extends south to Felgates Creek. Nitramine-contaminated wastewater was reportedly discharged through the pipe. South of the road, the sparsely wooded terrain slopes steeply to a flat, vegetated wetland area north of the main channel of the Eastern Branch of Felgates Creek.

The surface geology at Site 34 consists of approximately ten feet 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 ten feet thick clay lens between 30 and 40 feet bgs at Site 34. Depth to groundwater at the site is between 10 and 12 feet 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 following table.

Site 34 - Documents and Milestones

Document Title /Milestone	Author/Date	AR Document Number
Relative Risk Ranking System, Data Collection Investigation	Baker, 1995	000675
Round Two Remedial Investigation Report for Sites 2, 8, 18, and Site Screening Area 14	Baker, 2004	001548 (Volume I) 001549 (Volume II)
EE/CA for Contaminated Soil and Sediment at Site 8 and SSA 14	Baker, 2005	002076
Action Memorandum for Contaminated Soil and Sediment at Site 8 and SSA 14	Baker, 2005	001871
Work Plan Interim Removal Action at Site 8 and SSA 14	Shaw, 2006	001890
Draft Final Construction Completion Report	Shaw, 2009	Draft – No AR No.
SSA 14 Removal Action and Confirmation Sampling Summary Technical Memorandum	CH2M HILL, 2009	Draft – No AR No.
Final Remedial Investigation Report for Groundwater at Sites 8 and 34	CH2M HILL, 2011	000246

3.2.18.2 Nature and Extent of Potential Contamination

The primary source of contamination was wastewater discharged from the Building 537 pipeline. Previous investigations have included analysis of soil, groundwater, sediment, and surface water for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL metals. The most recent soil data available are from the 2009 *Construction Completion Report* (Shaw, 2009a). The most recent groundwater, surface water, and sediment data available are from the *RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b). Surface water and sediment samples were collected near Site 34 as part of an overall evaluation of surface water related to Sites 8 and 34, as they are adjacent to each other and contribute runoff and groundwater discharge to the Eastern Branch of Felgates Creek. The current nature and extent of contamination for each medium at Site 34, as documented in the previously presented reports, are summarized as follows.

Soil

During the development of the EE/CA (Baker, 2005a), RGs protective of unrestricted land use scenario receptors were developed for COCs identified in soil during the previous investigations. A removal action was conducted beginning in February 2007 to remove and dispose of contaminated soil.

Post-removal action confirmation samples indicated that concentrations of all COCs were below established RGs following the completion of removal activities in September 2008.

Groundwater

Groundwater at Site 34 was not analyzed for SVOCs, pesticides, or PCBs during the RI for groundwater based on historical information indicating that these contaminants are not of concern at this site.

Yorktown-Eastover Aquifer

- Eleven VOCs were detected in groundwater, of which six exceeded their respective MCL. Detected concentrations of 1,1,2- TCA (1.6 J µg/L), 1,1-DCA (47 µg/L), 1,2-DCA (2.5 J µg/L), PCE (4.2 J µg/L), TCE (1,400 µg/L), and cis-1,2-DCE (130 µg/L) exceeded the tap water RSL and/or MCL at one or more sample locations. Data indicates that VOCs are limited to the upper portions of the aquifer.
- Six explosives were detected in groundwater, of which two exceeded associated screening values. Detected concentrations of nitrobenzene (13 µg/L) and RDX (34 µg/L) exceeded the tap water RSL at one or more locations. One or more of the six explosives were detected in every shallow well at the site.
- Eighteen total and twelve dissolved inorganic constituents were detected in groundwater, of which two total and one dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (33.1 µg/L) and dissolved (4.9 J µg/L) arsenic and total (151 µg/L) chromium were detected concentrations greater than the corresponding RSL and/or federal MCLs.

Surface Water

Eastern Branch of Felgates Creek

- No SVOCs, pesticides, or PCBs were detected. No explosives were detected at concentrations exceeding associated screening values.
- Four VOCs were detected in surface water, of which one exceeded associated screening values. Detected concentrations of TCE (43 µg/L) exceeded the tap water RSL multiplied by 10.
- Eighteen total and twelve dissolved inorganic constituents were detected in surface water, of which five total and three dissolved inorganic constituents exceeded associated screening values. Detected concentrations of total (2,520 µg/L) and dissolved (317 µg/L) aluminum, total (7.9 J µg/L) and dissolved (4.7 K µg/L) arsenic, total (42.8 J µg/L) and dissolved (38 J µg/L) barium, total (2,880 K µg/L) iron, and total (1.2 J µg/L) silver exceeded ESVs and/or tap water RSLs×10 at one or more sample location.

Sediment

Eastern Branch of Felgates Creek

During the development of the EE/CA (Baker, 2005a), RGs were developed for BEPH and selenium, the identified COCs in sediment during the previous investigations. A removal action was conducted beginning in February 2007 to remove and dispose of contaminated soil and sediment.

Following the completion of removal activities, post-removal action confirmation samples indicated that all COCs were below established RGs. Additional sediment samples were collected within the Eastern Branch of Felgates Creek as part of the *RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) in order to assess potential transport of contaminants from groundwater to nearby sediment.

- No pesticides, PCBs, or explosives were detected.
- Three VOCs were detected in sediment, one of which exceeded associated screening values. Detected concentrations of carbon disulfide (13 J µg/kg) exceeded the ESV in one sample. These chemicals were also detected in a sample from one upstream reference location. Consequently, these chemicals are not believed to be site-related.
- Twenty inorganic constituents were detected, of which five exceeded associated screening values. Detected concentrations of aluminum (26,500 µg/kg), arsenic (13 µg/kg), manganese (389 J µg/kg), mercury (1.2 µg/kg), and silver (1.2 J µg/kg) exceeded the ESV at one or more sample locations.

3.2.18.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

The removal action conducted at Site 34 reduced concentrations of all COCs to below established RGs previously agreed upon by the Navy and USEPA, in partnership with the VDEQ. Following the completion of the removal action, no unacceptable risk is posed to current or future receptors due to exposure to soil and NFA for soil is required.

Groundwater

The HHRA conducted as part of the *RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) assessed risk to receptors through ingestion, dermal contact, and inhalation of vapors. Per USEPA guidance, carcinogenic risks were only calculated for lifetime child/adult residents.

Yorktown-Eastover Aquifer

Potential unacceptable non-cancer hazards were identified for future adult and child residents. Potential unacceptable cancer risks were identified for lifetime child/adult residents. The RME non-carcinogenic hazard for future adult residents associated with exposure to groundwater (HI = 1.4) is above the acceptable HI of 1.0. However, there are no individual COPCs or target organ/effects with HIs exceeding 1.0. In addition, the CTE non-carcinogenic hazard (HI = 0.47) is below the acceptable HI. The RME non-carcinogenic hazard for future child residents associated with exposure to groundwater (HI = 3.0) exceeds the acceptable HI of 1.0. This hazard is primarily associated with ingestion of arsenic (HQ = 1.0). The CTE non-carcinogenic hazard (HI = 1.2) also exceeds the acceptable HI of 1.0; however, there are no individual COPCs or target organ/effects with HIs exceeding 1.0. The RME carcinogenic risk for lifetime child/adult residents associated with exposure to groundwater ($CR = 6.0\times10^{-4}$), associated with primarily with ingestion of TCE and arsenic, exceeds the acceptable risk range of 10^{-6} to 10^{-4}. The CTE carcinogenic risk ($CR = 1.2\times10^{-4}$) also exceeds the acceptable risk range.

The ERA did not assess risk posed to ecological receptors due to groundwater exposure because no complete exposure pathway was identified.

Surface Water

Eastern Branch of Felgates Creek

The HHRA conducted as part of the *RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) assessed risk to receptors through incidental ingestion and dermal absorption. No unacceptable cancer risks or non-cancer hazards resulting from exposure to surface water were identified for any receptor.

The ERA conducted as part of the *RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) identified no COCs due to direct contact or food web exposure associated with surface water. Thus, risks to ecological receptors are considered acceptable.

Sediment

Eastern Branch of Felgates Creek

The removal action conducted at Site 34 reduced concentrations of all COCs to below established RGs previously agreed upon by the Navy and the USEPA, in partnership with the VDEQ. The HHRA conducted as part of the RI Report for Groundwater assessed risk to receptors through incidental ingestion and dermal absorption. No unacceptable cancer risks or non-cancer hazards resulting from exposure to sediment were identified for any receptor. Therefore, no unacceptable risk is posed to current or future receptors due to exposure to soil and NFA for sediment is required.

The ERA conducted as part of the *RI for Groundwater at Sites 8 and 34* (CH2M HILL, 2011b) identified no COCs due to direct contact or food web exposure associated with sediment. Thus, risks to ecological receptors are considered acceptable. However, the purpose of this RI was specifically to address discharges from groundwater into other media and direct impacts to groundwater itself. Mercury was detected at elevated levels in sediment; however, it was not considered a groundwater contaminant at this site. It is believed that the mercury in

sediment is a result of runoff from contaminated soil, which has since been removed to accepted cleanup levels. Consequently, the two sediment samples located in this area (YSA14-SD04 and YSA14-SD06) were not included in the risk assessment in the RI. Instead, the Navy agreed to further assess mercury in sediment near Site 34 where the elevated mercury was detected (YSA14-SD04) as a separate investigation.

3.2.18.4 Removal Action(s)

A removal action was initiated in February 2007 to excavate soil and sediment within the drainage channel downstream of the discharge pipe posing potential risks to human health and the environment. Excavation was completed in cells and post-excavation samples were collected from each cell and compared to RGs and to base-wide background values for naturally occurring and anthropogenic chemicals. Based on post-removal analytical results and comparison to all RGs and background values, RGs were met and excavation was discontinued. In total 1,061 tons of contaminated soil/sediment were removed. The Navy and the USEPA, in partnership with the VDEQ, agreed that confirmation sampling data demonstrated that cleanup goals and/or background concentrations were achieved.

3.2.18.5 Activities Completed in FY2013

A UFP-SAP for data gap sediment and soil sampling and an FS report for groundwater were initiated in 2012. During the May 2012 partnering meeting, the Partnering Team agreed to include soil, sediment, and groundwater sampling in the data gap UFP-SAP to fully evaluate Building 537 as the source of contamination, and agreed to put the FS on hold until the investigation is completed. The UFP-SAP for the data gap investigation at Site 34, including groundwater, sediment, and soil sampling, is currently being developed. The field work in association with the data gap investigation is put on hold until building demolition is complete.

3.2.18.6 CERCLA Path Forward

- Finalize UFP-SAP for groundwater, soil, and sediment sampling
- Field Work/ TM Report for groundwater/sediment/surface water data gap investigation
- Complete FS
- PP/ROD (for all media)
- LUC RD
- RD
- RAWP/ Field work
- CCR
- RACR
- LTM
- Five-Year Review (2018)

Schedule 3-17 presents the FY2014-15 schedule for Site 34.

3.3 MRP Sites

The MRP sites identified at Yorktown are comprised of the MWR Skeet Range, the Turkey Road Landfill (formerly ERP Site 2; now known as UXO 2), and the NMC Munitions Loading Pier (UXO 3). The MWR Skeet Range was identified in a draft 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. A TM was developed in December 2010 that summarized the recommendations for these three locations based upon the findings of the PA (CH2M HILL, 2010d). No additional activities beyond the PA are recommended for the Detonator Blast Pit Area and the Detonator Pit. However, once the Demolition Range is closed (no longer active), this area should be reevaluated by the MRP.

3.3.1 UXO 2 —Turkey Road Landfill

3.3.1.1 Site Description

UXO 2 (former Site 2) is a five-acre landfill located east of Turkey Road adjacent to a wetland area on the Southern Branch of Felgates Creek and two unnamed tributaries that border Site 2 (**Figure 3-19**). 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 following table.

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

UXO 2 - 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	000313
Action Memorandum and Engineers Estimate/Cost Analysis	Baker, 1994	000615
Closeout Report, Sites 2 and 9 and Site Screening Area 4, Mine Casing and Debris Removal Action	IT Corporation, 1995	000646
Round Two Remedial Investigation Report for Sites 2, 8, 18, and Site Screening Area 14	Baker, 2004	001548
Work Plan for the Pre-Removal Characterization of Soil, Site 2, Site 8, and Site Screening Area 14	Baker, 2005	001687
Final Technical Memorandum Summary Report for Non-Intrusive Geophysical Investigation of Turkey Road Landfill (Formerly Site 2), Naval Weapons Station Yorktown, Yorktown, Virginia	CH2M HILL, 2010	000129

3.3.1.2 Nature and Extent of Potential Contamination

The source of potential contamination is the waste disposed of in the landfill. Previous investigations have included analysis of soil, groundwater, sediment, and surface water for TCL VOCs, TCL SVOCs, explosives, pesticides, PCBs, and TAL inorganic constituents. The most recent data available for all media are from the 2004 *Round Two RI for Sites 2, 8, 18, and SSA 14* (Baker, 2004a). The nature and extent of contamination for each medium at UXO 2, as documented in the previously presented reports, are summarized as follows.

Soil

Soil samples were not compared against ESVs.

Surface Soil

- No VOCs were detected. No pesticides or explosives were detected at concentrations exceeding associated screening values.
- Twenty-two SVOCs were detected in surface soil, eight of which exceeded the associated screening values. Detected concentrations of benzo(a)anthracene (48,000 µg/kg), benzo(a)pyrene (40,000 µg/kg), benzo(b)fluoranthene (35,000 µg/kg), benzo(k)fluoranthene (33,000 µg/kg), carbazole (6,600J µg/kg), chrysene (50,000 µg/kg), dibenz(a,h) anthracene (11,000J µg/kg), and indeno(1,2,3-cd)pyrene (28,000 µg/kg) exceeded residential RBCs at a majority of sample locations.
- One PCB was detected in surface soil, which exceeded screening values. Detected concentrations of Aroclor-1254 (6,200 µg/kg) exceeded the residential RBCs at one sample location.
- Twenty-one inorganic constituents were detected in surface soil, of which nine exceeded associated screening values. Detected concentrations of aluminum (11,400 mg/kg), antimony (24.3 mg/kg), arsenic (8.4 mg/kg), cadmium (2,460 mg/kg), copper (14,700 mg/kg), iron (34,500 mg/kg), manganese (307 mg/kg), mercury (16.6 mg/kg), and thallium (26.8 mg/kg) exceeded residential RBCs in one or more samples.

Subsurface Soil

- No VOCs were detected. No pesticides were detected at concentrations exceeding associated screening values.
- Nineteen SVOCs were detected in subsurface soil, five of which exceeded the associated screening values. Detected concentrations of benzo(a)anthracene (5,000 µg/kg), benzo(a)pyrene (4,700 µg/kg), benzo(b)fluoranthene (5,900 µg/kg), dibenz(a,h)anthracene (800J µg/kg), and indeno(1,2,3-cd)pyrene (3,100J µg/kg) exceeded residential RBCs in a majority of samples locations.
- One PCB was detected in subsurface soil, which exceeded screening values. Detected concentrations of Aroclor-1254 (440 µg/kg) exceeded the residential RBC at in two sample locations.
- Twenty-two inorganic constituents were detected in subsurface soil, of which seven were detected at concentrations exceeding the associated screening values. Detected concentrations of aluminum (11,600 mg/kg), arsenic (13.6 mg/kg), cadmium (7.6 mg/kg), chromium (26.8 mg/kg), iron (22,300 mg/kg), manganese (478 mg/kg), and thallium (0.96 K mg/kg) were detected at concentrations exceeding the residential RBCs in one or more samples.

Groundwater

Cornwallis-Cave Aquifer

- No SVOCs, pesticides, PCBs, or explosives were detected.
- Two VOCs were detected in groundwater, both of which exceeded associated screening values. Detected concentrations of 1, 2-DCE (28 µg/L) and VC (17 µg/L) exceeded tap water RBCs, both at one sample location located at the toe of the landfill.
- Fifteen inorganic constituents were detected in groundwater, of which seven exceeded associated screening values. Detected concentrations of aluminum (16,400 milligrams per liter [mg/L]), arsenic (3.7 mg/L), barium (344 mg/L), cadmium (2.2 mg/L), iron (163,000 mg/L), manganese (7,670 mg/L), and thallium (7.1 K mg/L) exceeded the tap water RBCs and/or federal MCL at one or more sample location.

Surface Water

Felgates Creek

- No VOCs, SVOCs, pesticides, or PCBs were detected. No explosives were detected above associated screening values.
- Sixteen total inorganic constituents were detected in surface water, of which two exceeded associated screening values. Detected concentrations of aluminum (1/280 mg/L), arsenic (3.2 mg/L), beryllium (3.5 K mg/L), cadmium (5.1 K mg/L), copper (9.7 mg/kg), iron (3,930 mg/L), manganese (282 J mg/L), and nickel (21.9 K mg/L) exceeded the ecological and/or human health screening value at one or more sample locations.

Sediment

Felgates Creek

- No VOCs, pesticides, or PCBs were detected at concentrations exceeding screening values in sediment samples.
- Eighteen SVOCs were detected in sediment, of which ten exceeded associated screening values. Detected concentrations of BEHP (1,100 µg/kg), benzo(a)anthracene (1,400 µg/kg), benzo(b)fluoranthene (1,600 µg/kg), benzo(k)fluoranthene (720 µg/kg), benzo(a)pyrene (1,300 µg/kg), carbazole (300 J µg/kg), chrysene (1,400 µg/kg), dibenz(a,h,)anthracene (190 J µg/kg), indeno(1,2,3-cd)pyrene (890 µg/kg), and phenanthrene (1,800 µg/kg) were detected at concentrations exceeding the ecological and/or the residential RBC×10, predominately at one sample location.

- Twenty-three inorganic constituents were detected in sediment, of which thirteen exceeded associated screening values. Detected concentrations of aluminum (23,000 mg/kg), arsenic (21.5 mg/kg), barium (109 mg/kg), cadmium (1.5 K mg/kg), cobalt (8.7 mg/kg), iron (45,300 mg/kg), lead (31.8 mg/kg),manganese (673 mg/kg), mercury (0.33 mg/kg), nickel (15.6 mg/kg), selenium (1.9 K mg/kg), silver (24.6 mg/kg), and vanadium (50.4 mg/kg) exceeded the ecological and/or residential RBC×10 at one or more sample locations.

3.3.1.3 Potential Risks

A summary of the most current risk assessments and risk management considerations for exposure to each site medium is provided as follows.

Soil

The HHRA conducted as part of the 2004 *Round Two RI for Sites 2, 8, 18, and SSA 14* (Baker, 2004a) assessed risk to receptors through ingestion and dermal contact with soil. Potential unacceptable non-cancer hazards were identified for future adult and child residents. No unacceptable cancer risks to any receptor were identified due to exposure to soil. The RME non-carcinogenic hazard for future adult residents associated with exposure to soil (HI = 1.4) is above the acceptable HI of 1.0. The hazard is primarily associated with dermal contact with and ingestion of cadmium (HQ = 1.08). However, the CTE non-carcinogenic hazard (HQ = 0.24) is less than the acceptable HI of 1.0. The RME non-carcinogenic hazard for future adult residents associated with exposure to soil (HI = 5.4) is above the acceptable HI of 1.0. The hazard is primarily associated with dermal contact with and ingestion of cadmium (HQ = 3.5).

The ERA conducted as part of the 2004 *Round Two RI for Sites 2, 8, 18, and SSA 14* (Baker, 2004a) did not assess risk posed to terrestrial ecological receptors due to soil exposure.

Groundwater

Cornwallis-Cave Aquifer

The HHRA conducted as part of the 2004 *Round Two RI for Sites 2, 8, 18, and SSA 14* (Baker, 2004a) assessed risk to receptors through ingestion, dermal contact, and inhalation of vapors under a non-potable, beneficial use scenario. No unacceptable cancer risks or non-cancer hazards resulting from exposure to groundwater were identified for any receptors evaluated.

The ERA conducted as part of the 2004 *Round Two RI for Sites 2, 8, 18, and SSA 14* (Baker, 2004a) did not assess risk posed to ecological receptors due to groundwater exposure because no complete exposure pathway was identified.

Surface Water

Felgates Creek

The HHRA conducted as part of the 2004 *Round Two RI for Sites 2, 8, 18, and SSA 14* (Baker, 2004a) assessed risk to receptors through ingestion of and dermal contact with surface water. No unacceptable cancer risks or non-cancer hazards resulting from exposure to surface water were identified for any of the receptors evaluated.

The ERA conducted as part of the 2004 *Round Two RI for Sites 2, 8, 18, and SSA 14* (Baker, 2004a) identified no COCs due to direct contact or food web exposure associated with surface water. Thus, risks to ecological receptors evaluated are considered acceptable.

Sediment

Felgates Creek

The HHRA conducted as part of the 2004 *Round Two RI for Sites 2, 8, 18, and SSA 14* (Baker, 2004a) assessed risk to receptors through ingestion of and dermal contact with sediment. No unacceptable cancer risks or non-cancer hazards resulting from exposure to sediment were identified for any of the receptors evaluated.

The ERA conducted as part of the 2004 *Round Two RI for Sites 2, 8, 18, and SSA 14* (Baker, 2004a) identified no COCs due to direct contact or food web exposure associated with sediment. Thus, risks to ecological receptors evaluated are considered acceptable. Though current levels of exposure do not indicate the potential for unacceptable risk to aquatic receptors from PAHs, 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.

3.3.1.4 Remedial Action(s)

A removal action was conducted at Site 2 from September through December 1994. The main objectives of the removal action were the removal of all surface and near surface wastes from the designated areas at Site 2 and to restore the site to pre-removal action conditions. Based on historical photographs, waste disposal appears to have been limited to the perimeter of the site. Based on the Closeout Report, 676 tons of non-ordnance wastes and soil were removed from Site 2. Approximately 4,327 ordnance items also were removed from Sites 2, 9, and SSA 4. The closeout report did not distinguish between sites, but indicated that 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 by the UXO superintendent, the items were either transferred to the NEDED laboratory onsite and verified as inert, or were transferred offsite by the Station Explosive Ordnance Disposal (EOD) staff for final disposition. Excavated areas were backfilled, including a six-inch layer of topsoil, seeded, and mulched (IT Corporation, 1995b). During the field investigations in June 2005 to determine the extent of contamination from PAHs, PCBs, cadmium, and mercury in subsurface soil at the site, an ordnance item was discovered. The item was determined to be inert by EOD; however, because of the identification of a potential MEC item, the site was designated as a Munitions Response Site.

3.3.1.5 Activities Completed in FY2013

None.

3.3.1.6 Path Forward

- SI Work Plan and ESS Determination
- SI Fieldwork
- SI Report
- RI UFP-SAP and ESS
- RI Field Work
- RI Report
- FS/PP/ROD
- LUC RD
- RAWP
- RA Field Work
- CCR
- LTM Implementation, if required
- RACR
- Five-Year Review, if required (2018)

As the site is now part of the MRP, no further CERCLA activity is currently scheduled. All Navy MRP sites will be prioritized and funding for future work may become available in FY14, but potentially may not be available until 2017.

3.3.2 UXO 3 —NMC Munitions Loading Pier

3.3.2.1 Site Description

MRP Site UXO 3 is the current and former piers and pier area along the shoreline of the York River, comprising approximately 289 acres of water and including approximately 5,400 linear feet of standing pier (**Figure 3-20**). The

site is separated from the Base by the Colonial National Historic Parkway, which borders the southwestern edge of the site. Access to UXO 3 is restricted to Navy personnel.

A current pier and former pier occupy the site. Pier R-1 (the former pier) was constructed in 1919, the year after the United States Mine Depot opened, to facilitate munitions loading. Prior to the construction of the pier, munitions loading and handling occurred in the York River from barge to boat. The wooden pier was badly damaged by the Chesapeake-Potomac hurricane in 1933.

In the 1940s construction began on a concrete pier immediately adjacent to Pier R-1. The new pier (Pier R-3, the current pier) was originally L-shaped, consisting only of the southern arm of the current pier and a portion of the crossbar, but in the 1950s was completed to the current U-shape. In 1954 the wooden Pier R-1 suffered damage due to a fire. Pier R-3 has eclipsed Pier R-1 for use as a munitions loading, unloading, and handling facility, and continues in service for that purpose.

In the 1990s Pier R-1 was referred to as a recreational pier by the USACE. This pier was standing until the mid 2000s, after which time the pier was no longer present with the exception of remaining pilings.

No formal environmental investigations have been conducted at UXO 3. However, in 1993, in support of developing a long-term strategy for the disposal of dredging material from the pier area, the USACE collected eight sediment samples immediately outboard and inboard of Pier R-3. Low levels of metals and pesticides were found, and no environmental action was initiated. Because the site history indicates a potential presence of MEC, in 2011 the pier area was identified as MRP Site UXO 3.

3.3.2.2 Activities Completed in FY2013

The desktop investigation and Final PA Report were completed in May 2013 (CH2M HILL, 2013e). The Munitions Response Site Prioritization Protocol scoring was noticed to the public in the Virginia Gazette on July 13, 2013 and the Daily Press on July 14, 2013. Onsite and offsite sources were researched to evaluate the potential for munitions to have been dropped or mishandled during munitions loading operations. The two areas of UXO 3 include Pier R-1 (operated from 1920 to the 1970s) and Pier R-3 (operated from 1941 to the present), the pier-associated trestles, and sediment associated with these areas. The desktop review included both record searches and interviews. Although documentation of a release was not identified during the PA, the potential exists for MEC to be present at UXO 3 as a result of undocumented releases during historical loading operations. It is recommended that a Site Inspection be performed for the inactive portions of UXO 3, former Pier R-1, to further evaluate the potential presence or absence of MEC. However, because active pier sites used for munitions-related activities are typically not investigated until munitions activities have ceased or unless the site is causing contamination at other areas, it is recommended that Site Inspection activities for Pier R-3, which is currently active, not be performed until all munitions loading operations in this area have ceased. A SI Work Plan and ESS-DR are currently being developed.

3.3.2.3 CERCLA Path Forward

- SI Work Plan and ESS-DR
- SI Field Work
- SI Report

A schedule of planned activities is shown in **Schedule 3-18.** Additional funding to address any potential concerns identified in the PA/SI may not be available until at least 2017.

3.4 FFA Document Review Summary

Table 3-1 summarizes the document review timeframes for primary and secondary documents, as presented in the FFA.

3.5 Records of Decision

As part of the FFA, 15 source areas were identified at WPNSTA Yorktown as requiring closeout documentation prior to base closeout:

- Site 1—Dudley Road Landfill
- Site 2—Turkey Road Landfill
- Site 3—Group 16 Magazine Landfill
- Site 4—Burning Pad Residue Landfill
- Site 6—Explosives Contaminated Wastewater Impoundment, Flume Area and Excavation Area, Buildings 109, 110 and 501
- Site 7—Plant 3 Explosives-Contaminated Wastewater Discharge Area
- Site 8—NEDED Explosives-Contaminated Wastewater Discharge Area
- Site 9—Plant 1 Explosives-Contaminated Wastewater Discharge Area
- Site 11—Abandoned Explosives Burning Pits
- Site 12—Barracks Road Landfill
- Site 16—West Road Landfill and SSA 16 – Building 402 Metal Disposal Area and Environs
- Site 17—Holm Road Landfill
- Site 19—Conveyor Belt Soils at Building 10
- Site 21—Battery and Drum Disposal Area
- Site 22—Burn Pad

Table 3-2 provides a list of those documents that currently have a ROD in place for one or more media, the LTM requirements as applicable, modifications proposed, and recently completed ESDs.

TABLE 3-2
Record of Decision Summary

Site	ROD Media	Analytes for LTM	Proposed ESD Modification
Site 1	Soil, Waste	GW, SW, and SD – VOCs	No ESD
Site 3	Soil, Waste	GW - VOCs	Remove LUCs
Site 4	All Media	No LTM	No ESD
Site 5	All Media	No LTM	No ESD
Site 6	Soil, SW, SD	GW - VOCS, inorganic constituents SD – inorganic constituents	Document more stringent cleanup levels Removal of LTM from SW and SD
Site 7	Soil, GW, SW, SD	Explosives SW/SD - Full Suite	Document more stringent cleanup levels Removal of LTM from SW and SD
Site 9	Soil, SW, SD	No LTM	No ESD
Site 11	All Media	No LTM	No ESD
Site 12	Soil, GW	GW - VOCS, inorganic constituents SD – inorganic constituents	No LUC inspections for Areas B/C and Wood/Debris Disposal Area LTM requirements deferred to work plan No Analysis of VOCs in site media Clarify LUCs around Area A landfill
Site 16/SSA 16	All Media	No LTM	Remove LUCs

Site	ROD Media	Analytes for LTM	Proposed ESD Modification
Site 17	All Media	No LTM	Remove LUCs
Site 19	Soil	No LTM	Identify areas were industrial/commercial RGs were not achieved, if necessary
Site 21	All Media	No LTM	No ESD
Site 22	All media (action ROD for GW)	GW – to be determined	No ESD
Site 28	All Media	No LTM	No ESD
Site 29	All Media	No LTM	No ESD
Site 30	All Media	No LTM	No ESD
Site 32	SW, SD	No LTM	No ESD

A Five-Year Review is required to evaluate and document the effectiveness of remedies and RAs at sites with RODs or DDs. The next Five-Year Review will be conducted in 2017 and is anticipated to include the following sites, at a minimum (based upon most recent Five-Year Review sites):

- Site 1 – Dudley Road Landfill
- Site 6 – Explosives Contaminated Wastewater Impoundment, Flume Area and Excavation Area, Buildings 109, 110, and 501
- Site 7 – Plant 3 Explosives-Contaminated Wastewater Discharge Area
- Site 12 - Barracks Road Landfill
- Site 19 – Conveyor Belt Soils at Building 10
- Site 22 – Burn Pad

Additional sites may be included based upon the findings of remaining investigations to be performed. Five-Year reviews will be required for these sites as long as waste remains in place or hazardous substances, pollutants, or contaminants remain above levels allowing for unrestricted land use.

TABLE 3-1
Federal Facilities Agreement Document Review Summary
FY2014-15 SMP
Naval Weapons Station Yorktown, Yorktown, Virginia

Primary Documents	Draft					Draft Final		Final
	EPA/State Review	EPA/State may request extension of regulatory review period	Navy response to regulator review period extension request	Navy addresses regulatory comments	Navy may request extension of period to issue responses or Draft Final	EPA/State Review	Navy addresses regulatory comments	Navy Preparation
	up to 60 days to review	up to 20 days upon written request	up to 7 days to accept extension request or invoke dispute; no response implies acceptance	up to 60 days to issue responses and issue Draft Final	up to 20 days upon written request	up to 30 days to review changes or invoke dispute	up to 30 days to produce Final or issue dispute; Draft Final become Final if no party invokes dispute; if dispute is invoked, a Revised Draft Final will be issued within 35 days from issuing dispute	A primary final document may be modified only if there is significant new information AND need to evaulate potential impacts to public health or the environemnt; party may seek to modify by submitting a concise written request that details the reason for the mod request; if parties do not agree to the mod, any party may invoke dispute
Site Screening Process Work Plans								
Site Screening Proce Reports								
Remedial Investigation/Feasibility Study (including Baseline Risk Assessment) and Focused Feasibility Study Work Plans								
Remedial Investigation Reports (including baseline Risk Assessments)								
Feasibility Study and Focused Feasibility Study Reports								
Proposed Plans	Draft PRAP will be submitted within 30 days of the final FS or FFS Report							within 7 days of EPA acceptance and receiving State comments, Navy shall notice the PRAP for 45 days, and during which time shall hold a public meeting; after the public comment period, EPA, State, and Navy will decide if the plan needs to be modified and/or noticed again
Record of Decision	submit draft w/in 30 days of close of public comment period including any extension on finalization of the PRAP, ROD will include responsiveness summary; up to 30 days to attempt to select a remedy		RODs are not subject to dispute; if a remedy agreement can't be reached, EPA will select the remedy and issue the final ROD			RODs are not subject to dispute; if a remedy agreement can't be reached, EPA will select the remedy and issue the final ROD	RODs are not subject to dispute; if a remedy agreement can't be reached, EPA will select the remedy and issue the final ROD	
Final Remedial Designs						up to 14 days; but can request additional 14 days if signficant changes exist from the Preliminary Redmedial Design		
Remedial Action Work Plans								
Remedial Action Completion Reports								
Operations and Maintenance Plans								
Site Management Plans	up to 30 days			30 days		up to 30 days		
Community Relations Plans	Considered primary for submittal purposes, but secondary for review purposes							
Long-Term Remedial Action Monitoring Plans								

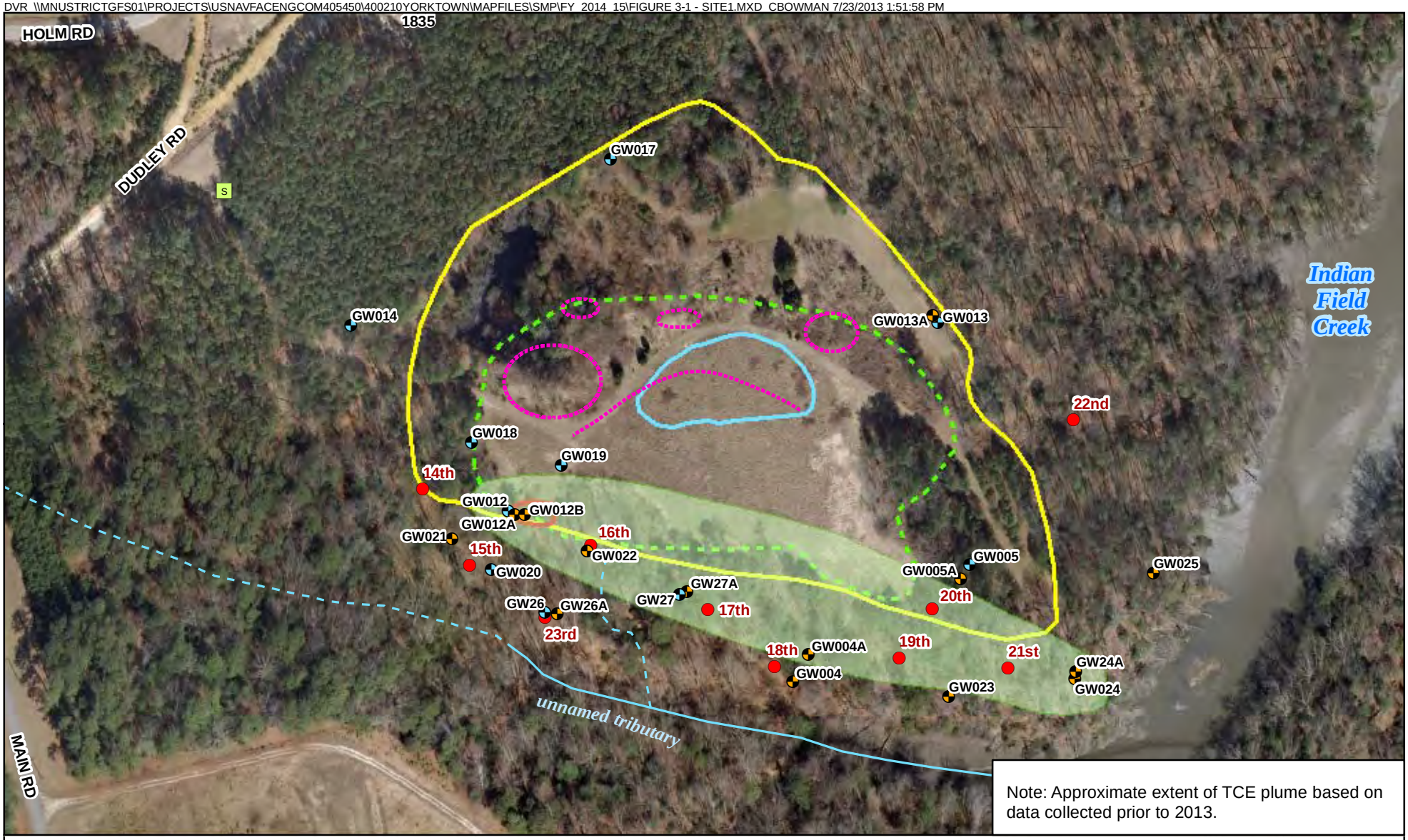
TABLE 3-1
Federal Facilities Agreement Document Review Summary
FY2014-15 SMP
Naval Weapons Station Yorktown, Yorktown, Virginia

Secondary Documents	Draft					Draft Final		Final
	EPA/State Review	EPA/State may request extension of regulatory review period	Navy response to regulator review period extension request	Navy addresses regulatory comments	Navy may request extension of period to issue responses or Draft Final	EPA/State Review	Navy addresses regulatory comments	Navy Preparation
Health and Safety Plans								
Non-Time Critical Removal Action Plans								
Pilot/Treatability Study Work Plans								
Pilot/Treatability Study Reports								
Engineering Evaluation/Cost Analysis Report								
Well Closure Methods and Procedures								
Preliminary/Conceptual Remedial Designs or Equivalents	up to 45 days							
Prefinal Remedial Designs								
Periodic Review Assessment Reports								
Removal Action Memorandums								
Community Relations Plans	Considered primary for submittal purposes, but secondary for review purposes							
Long-Term Remedial Action Monitoring Plans								
Other[2]	up to 30 days			up to 30 days		up to 30 days	up to 30 days	

ESDs
LUC RDs
Five-Year Reviews

1: Reference: USEPA, 1994. Federal Facility Agreement under CERCLA 120, Naval Weapons Station Yorktown, Yorktown, Virginia. September.
2: Not referenced in the 1994 FFA

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY 2014 15\FIGURE 3-1 - SITE1.MXD CBOWMAN 7/23/2013 1:51:58 PM



Note: Approximate extent of TCE plume based on data collected prior to 2013.

Legend

- S Site Sign
- Columbia Aquifer Monitoring Well
- Yorktown-Eastover Aquifer Monitoring Well
- MIP Locations
- Tributary
- Intermittent Tributary
- Interpreted (Geophysical Survey) Northern Extent of Main Disposal Area (Roy F. Weston, Inc., 1993)
- Approximate Extent of TCE Plume
- Approximate Area of Excavation of Arsenic Contaminated Soil
- Landfill Area with New Cap (2001 Remedial Action, OHM)
- Study Area Boundary
- Inferred LUC Boundary (includes estimated extent of the landfill cover)

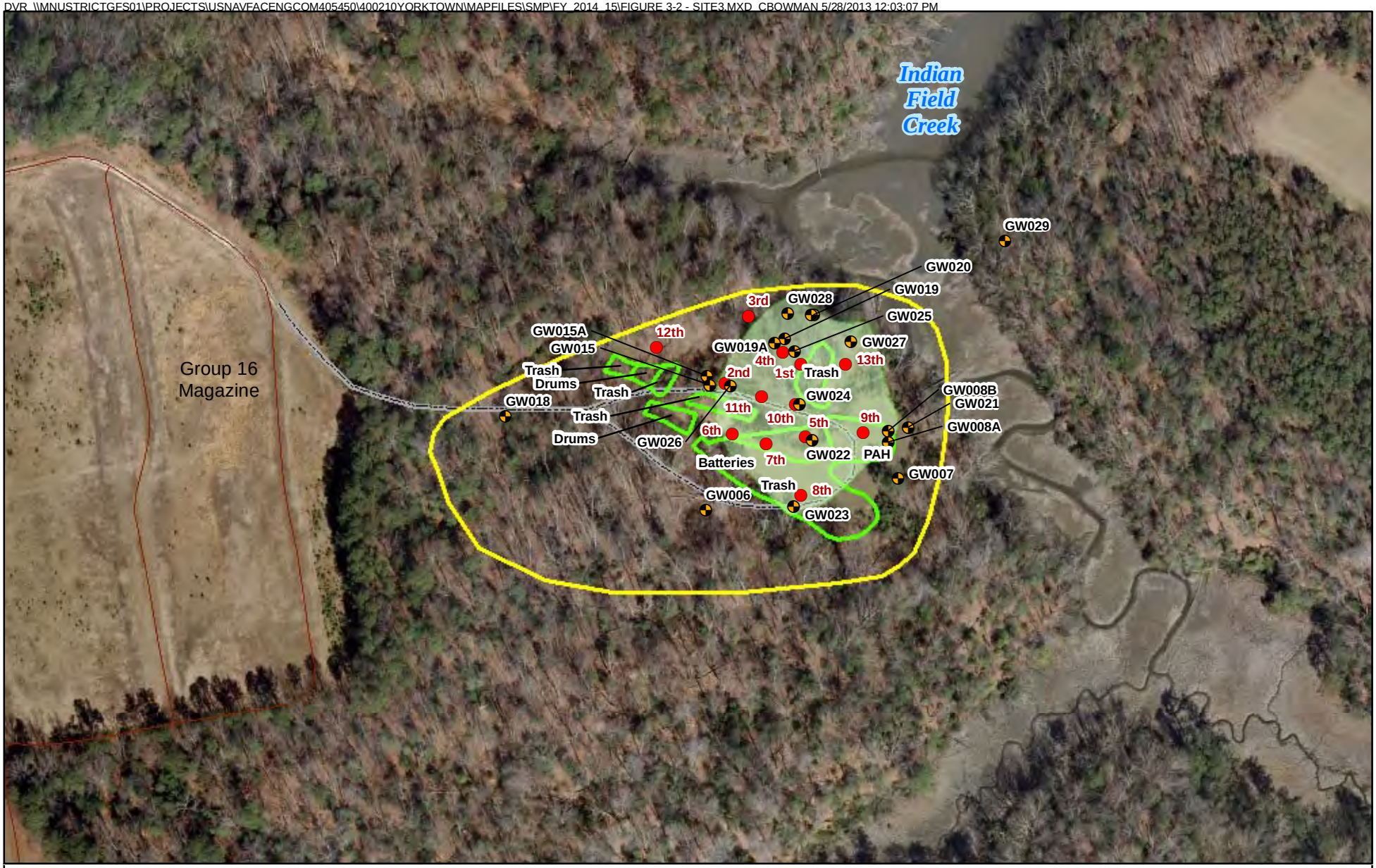
N W E S

0 100 200 Feet

Figure 3-1
Site 1 - Dudley Road Landfill
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-2 - SITE3.MXD CBOWMAN 5/28/2013 12:03:07 PM



Legend

- Yorktown Monitoring Wells
- MIP Locations
- Landfill Access Road
- Approximate Extent of TCE Plume
- 1999 Soil and Waste Removal Area
- Study Area Boundary

N
W E
S

0 100 200
Feet

Figure 3-2
Site 3 - Former Group 16 Magazine Landfill
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-3 -SITE6.MXD CBOWMAN 7/23/2013 1:54:53 PM

Legend

- Yorktown Monitoring Wells
- Approximate Drainage
- Approximate Location of Access Road
- Impoundment Area/Inferred LUC Boundary
- Coffer Dam
- Oil/Water Treatment Unit (OWTU)
- Carbon Adsorption Tower
- 1998 & 2007 Removal Area
- Cleared Area
- Excavation Area/Inferred LUC Boundary
- Flume Area
- Demolished Building
- Site 6 Study Area Boundary(under review)
- Approximate Extent of TCE Plume
- Approximate Extent of RDX Plume

BLDG 109 - Ordnance Demilitarization and Decontamination Plant
BLDG 110 - Explosives Loading Plant

N
W E
S

0 125 250 Feet

1 inch = 250 feet

Figure 3-3
Site 6 - Explosives Contaminated Wastewater Impoundment
Site Management Plan for FY 2014-2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-4- SITE7.MXD CBOWMAN 7/23/2013 1:56:51 PM

Legend

- Site Sign
- Deep Piezometer
- Yorktown-Eastover Monitoring Well
- Building Drain
- Culvert
- Drop Inlet
- Outfall
- Storm Sewer
- Former Buildings
- Rip Rap Area
- Site 7 Removal Area (1996)
- Inferred LUC Boundary
- Area of Excavation of Nitroamine / Nitroaromatic Compounds of Contaminated Soil
- Study Area
- Approximate Extent of RDX in Groundwater
- Approximate Extent of Perchlorate in Groundwater

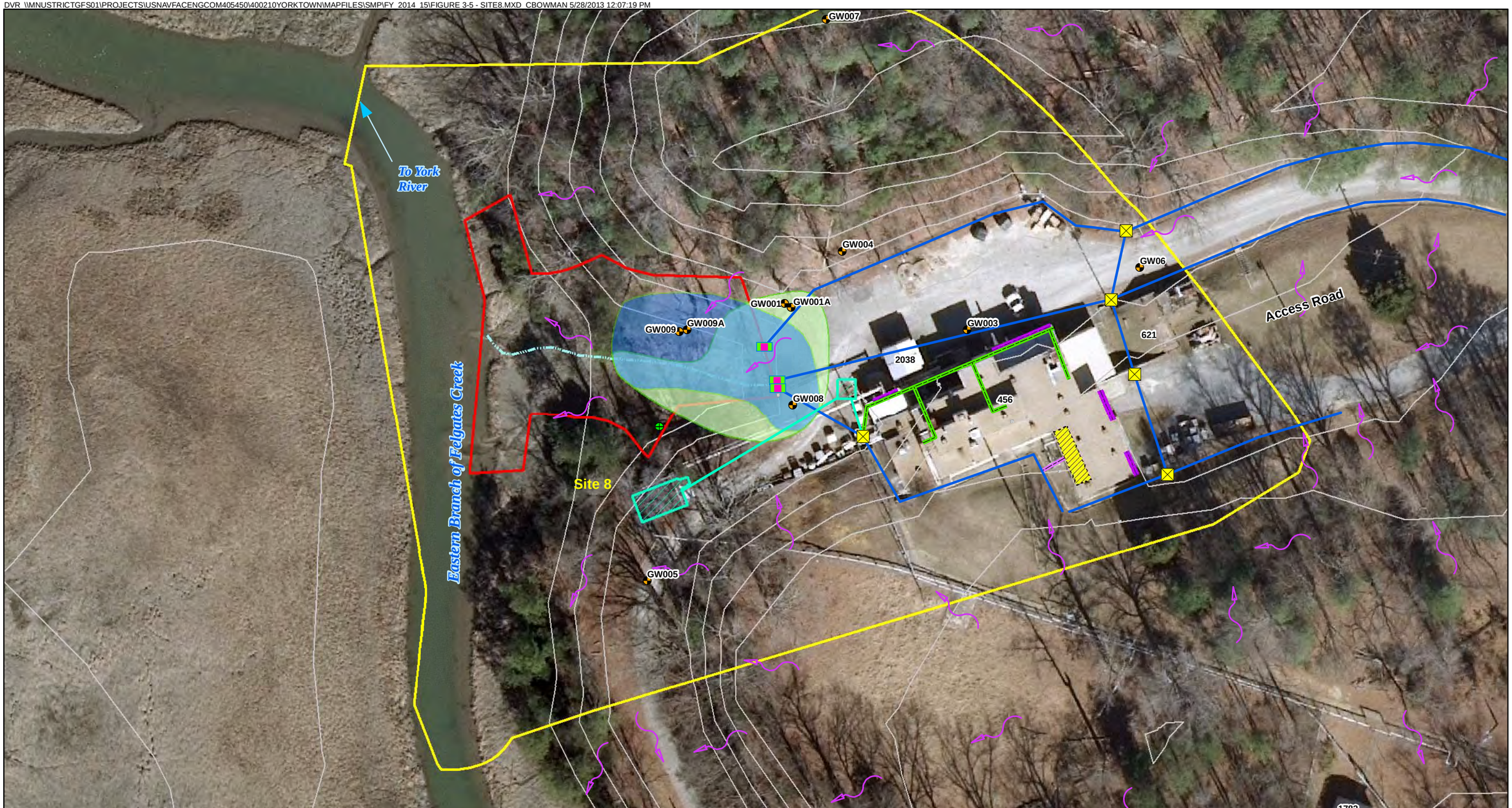
N W E S

0 150 300 Feet

Figure 3-4
Site 7 - Plant 3 Explosives Contaminated Wastewater Discharge Area
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-5 - SITE8.MXD CBOWMAN 5/28/2013 12:07:19 PM



Legend

- Unable to locate well since Spring 2003, possibly graded over
- Monitoring Well
- Yorktown-Eastover Monitoring Wells
- Outfall
- Drop Inlet
- Wastewater Treatment Line
- Overland Flow
- Storm Water Drainage
- Building Drain
- Drainage Trench
- Approximate Extent of VOCs in Groundwater
- Approximate Extent of RDX in Groundwater
- Excavated Area
- Study Area Boundary
- Elevation Contour (5 ft interval)
- Drainage Channel
- Loading Dock
- Wastewater Treatment Structure
- Wash Basin

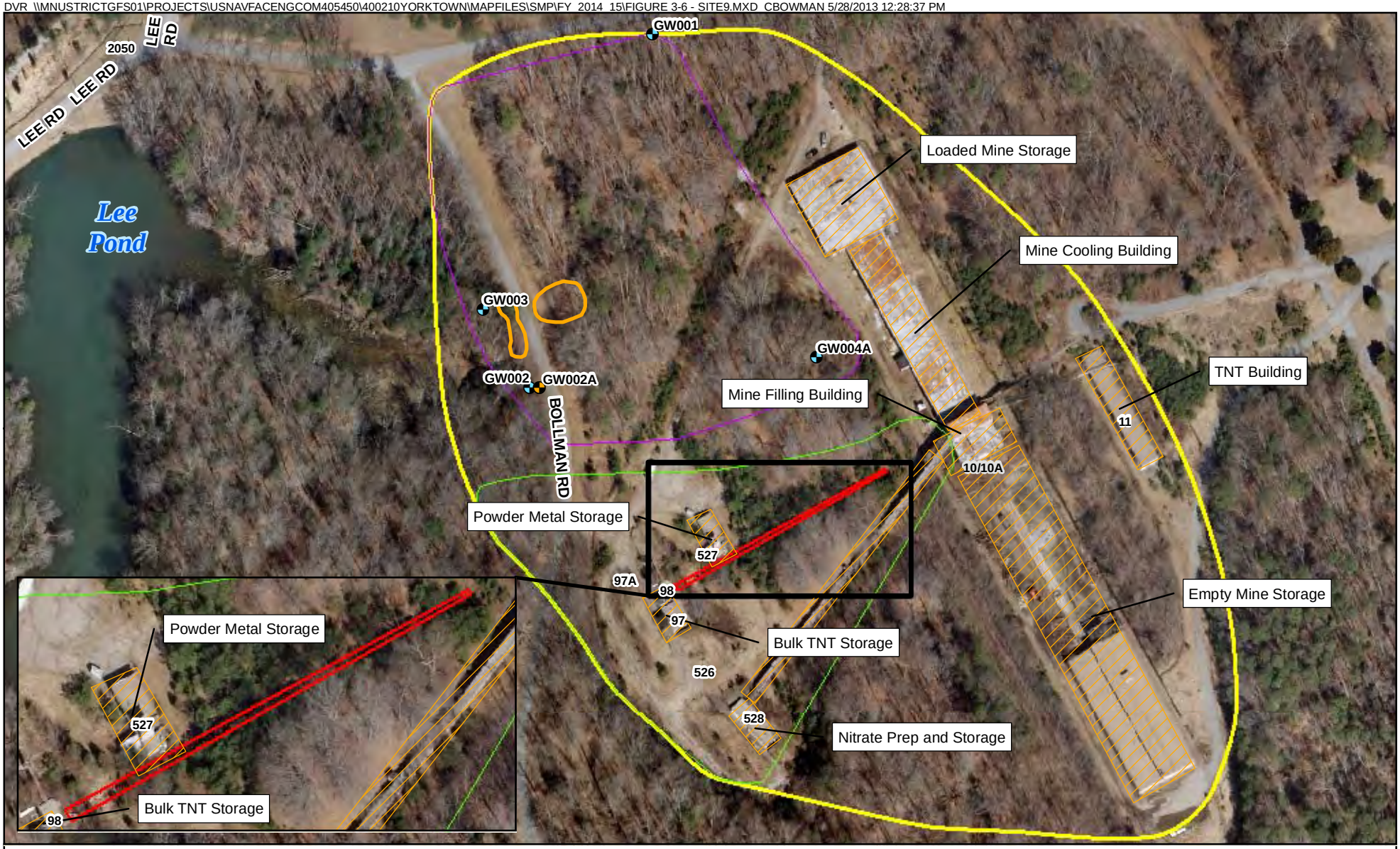
N W E S

0 50 100 Feet

Figure 3-5
Site 8 - NEDED Explosives-Contaminated Watewater Discharge Area
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY 2014 15\FIGURE 3-6 - SITE9.MXD CBOWMAN 5/28/2013 12:28:37 PM



Legend

- Cornwallis-Cave Aquifer Monitoring Wells
- Yorktown-Eastover Monitoring Wells
- Site 19 Original Study Area Boundary
- Site 9 Original Study Area Boundary
- Inferred Soil LUC Area
- Current Site 9 & 19 Study Area Boundary
- Approximate Area of December 1994 Removal Action
- Former Site Structures (demolished 2010-2012)

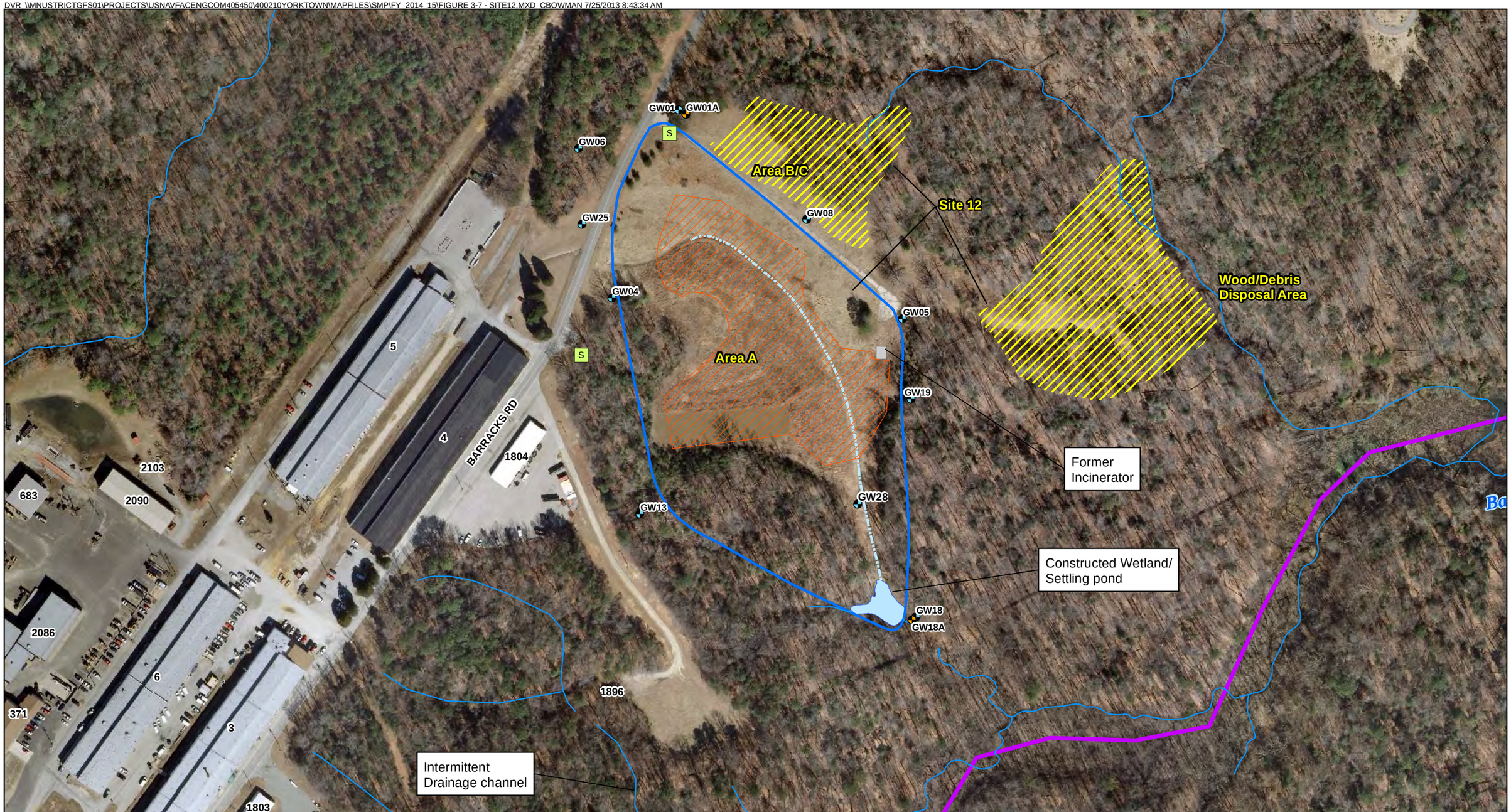
N
W E
S

0 110 220
Feet

Figure 3-6
Site 9 - Plant 1 Explosives Contaminated
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-7 - SITE12.MXD CBOWMAN 7/25/2013 8:43:34 AM



Legend

- S Site Sign
- Yorktown-Eastover Monitoring Well
- Cornwallis Cave Monitoring Well
- WPNSTA Boundary
- Area A Groundwater LUC
- Extent of Landfill Cap (installed in 1997) and Area A Soil LUC
- Approximate NFA Areas

N W E S

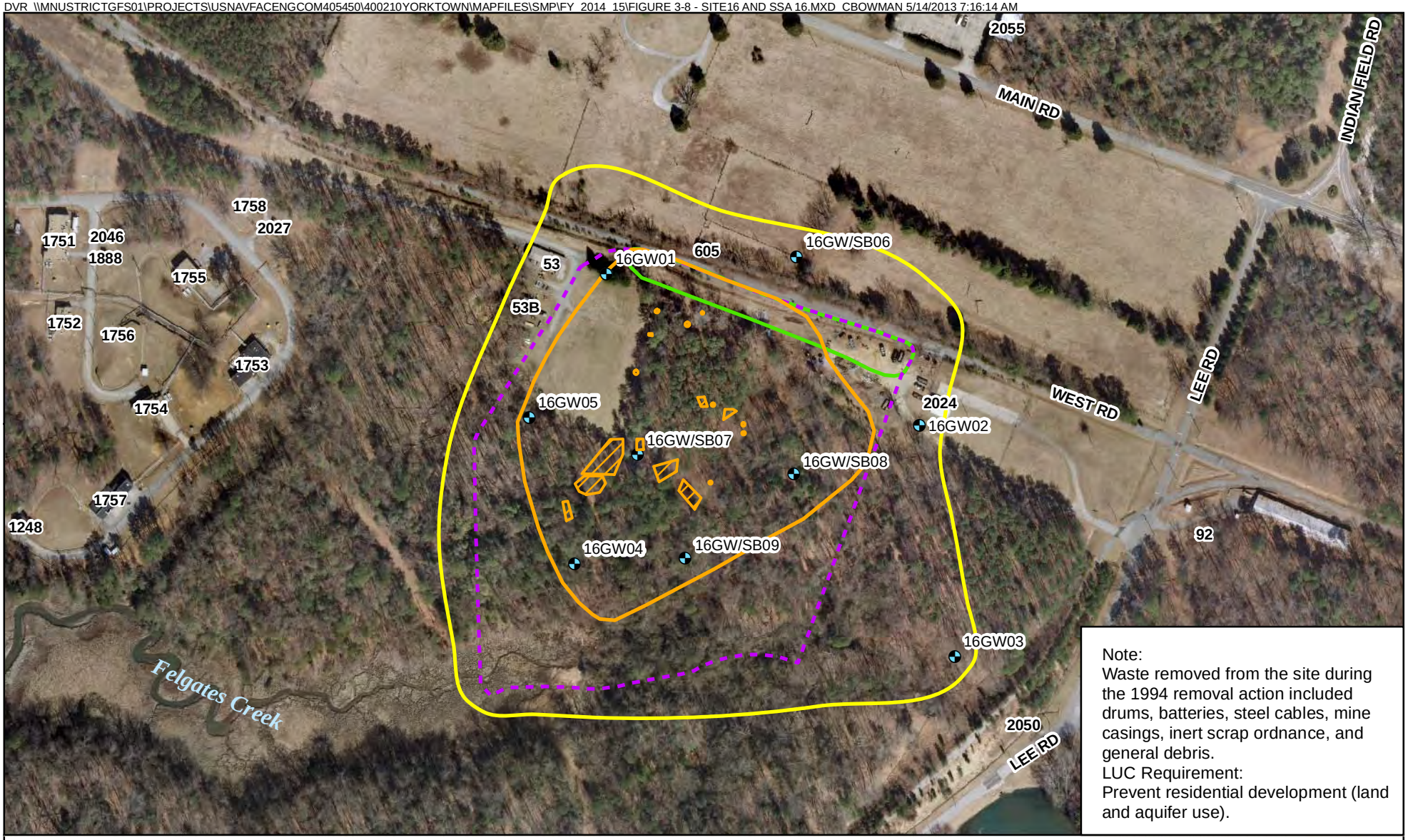
0 100 200 Feet

LUC Requirement: Maintain cap, prevent residential development, and prohibit potable use of groundwater.

Figure 3-7
Site 12 - Barracks Road Landfill
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY 2014 15\FIGURE 3-8 - SITE16 AND SSA 16.MXD CBOWMAN 5/14/2013 7:16:14 AM



Note:
Waste removed from the site during the 1994 removal action included drums, batteries, steel cables, mine casings, inert scrap ordnance, and general debris.
LUC Requirement:
Prevent residential development (land and aquifer use).

Legend

- Monitoring Well
- SSA 16 Original Study Area Boundary
- Site 16 Original Study Area Boundary
- Approximate Waste Removal Area (Removed During 1994 Removal Action)
- Inferred Site 16/SSA 16 LUC Boundary
- Study Area Boundary

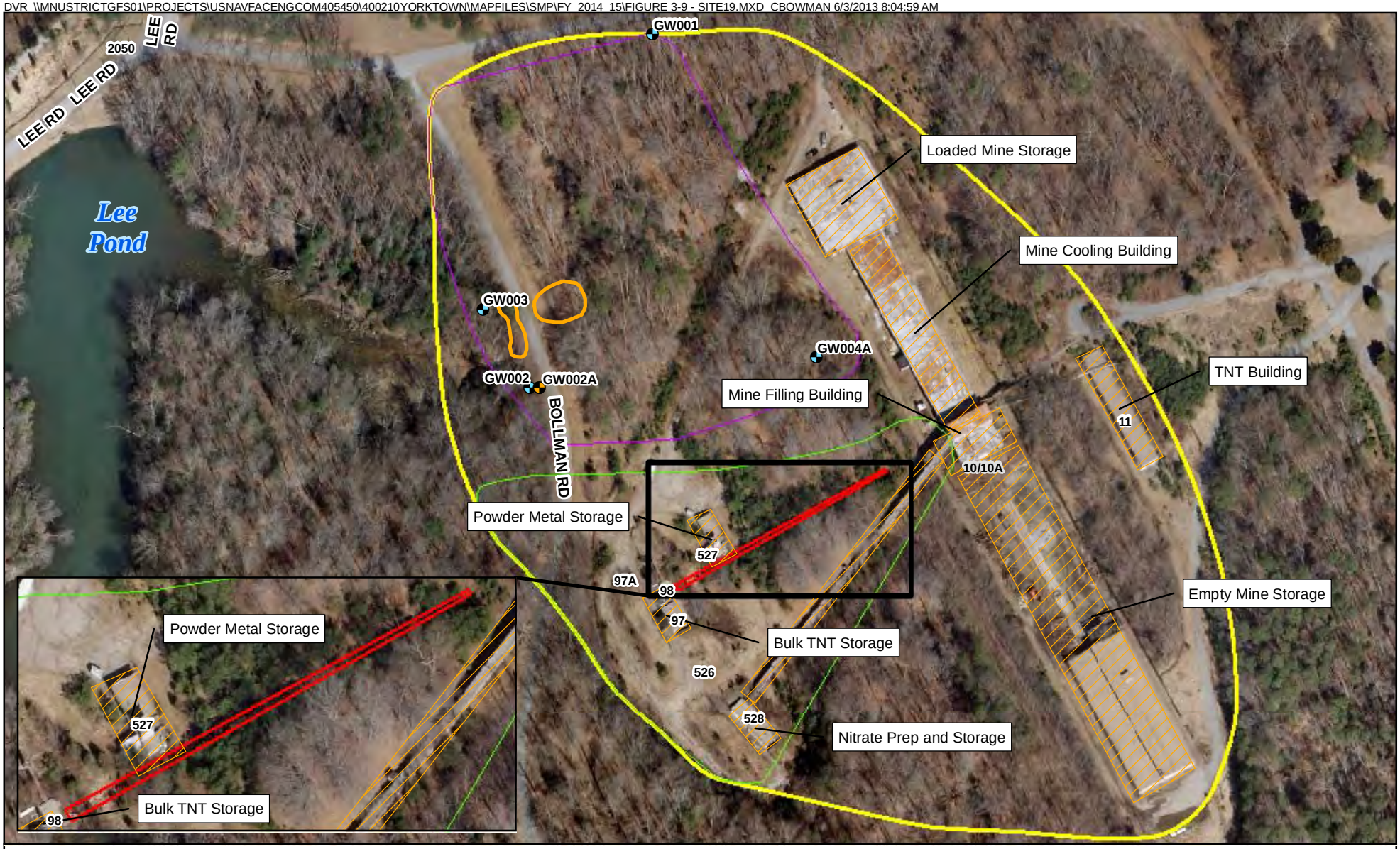
N
W E
S

0 150 300
Feet

Figure 3-8
Site 16/SSA 16 - West Road Landfill
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY 2014 15\FIGURE 3-9 - SITE19.MXD CBOWMAN 6/3/2013 8:04:59 AM



Legend

- Cornwallis-Cave Aquifer Monitoring Wells
- Yorktown-Eastover Monitoring Wells
- Site 19 Original Study Area Boundary
- Site 9 Original Study Area Boundary
- Inferred Soil LUC Area
- Current Site 9 & 19 Study Area Boundary
- Approximate Area of December 1994 Removal Action
- Former Site Structures (demolished 2010-2012)

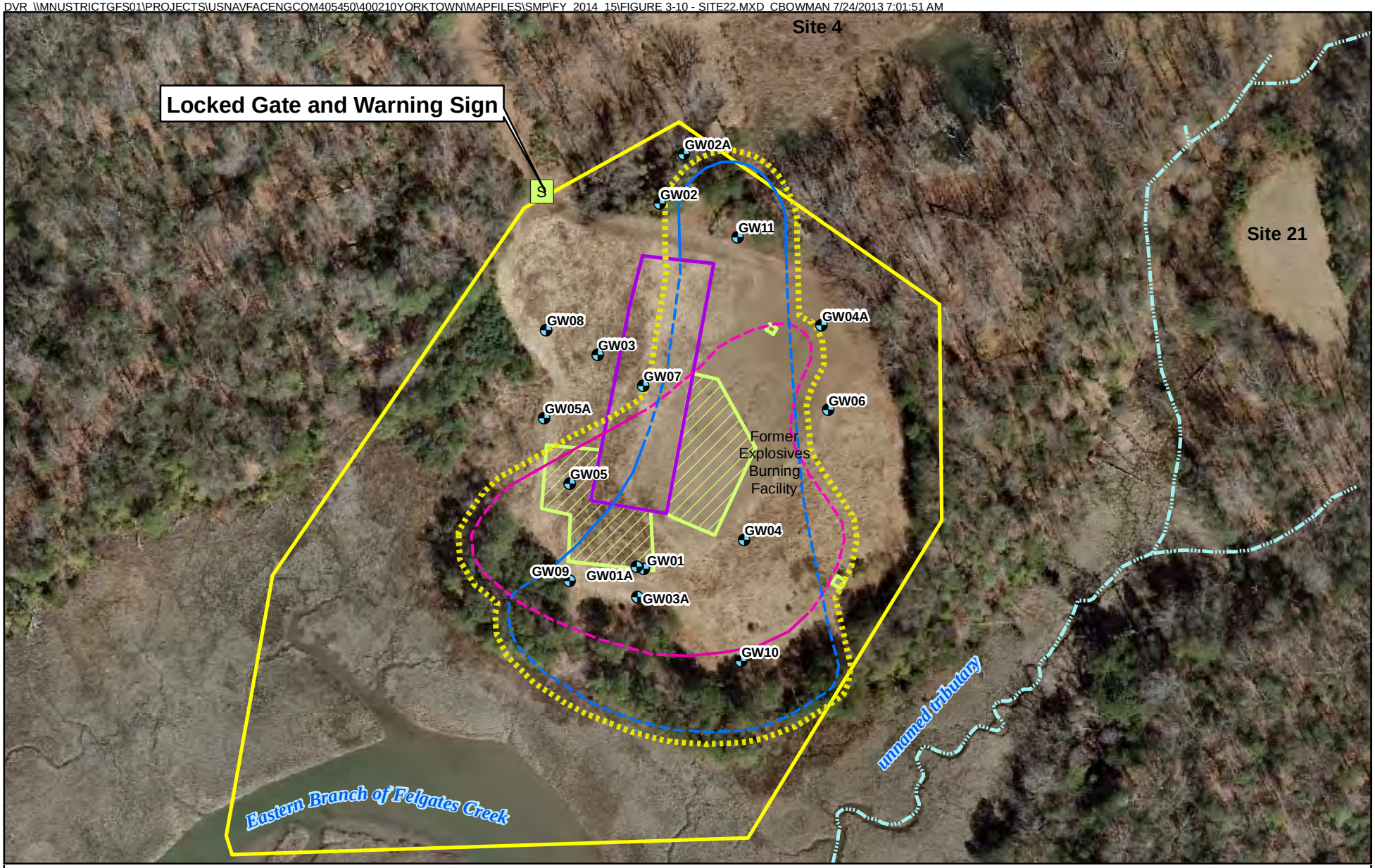
N
W E
S

0 110 220
Feet

Figure 3-9
Site 19 - Conveyor Belt Soils at Building 10
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-10 - SITE22.MXD CBOWMAN 7/24/2013 7:01:51 AM



Legend

- S Site Sign
- Monitoring Well
- Approximate Extent of TCE in Groundwater
- Approximate Extent of RDX in Groundwater
- Drainage
- Groundwater LUC Boundary
- Study Area Boundary
- Former Biocell Location
- Removal Action Area (2003)

N
W E
S

0 75 150
Feet

Figure 3-10
Site 22 - Burn Pad
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-11 - SITE23.MXD CBOWMAN 7/23/2013 2:00:38 PM

Legend

- Monitoring Well
- Fence
- Surface Water Centerline
- Elevation Contour (4 ft interval)
- Former Railroad
- 18" Corrugated Metal Pipe
- Unpaved Road
- Approximate Extent of Surface Debris Removal Area
- Other Removal Areas
- 2003 (J.A. Jones) Soil Removal Area
- 1994 (OHM) Surface Debris Removal and Soil/Debris Removal Area
- 2004 (UNITEC) Soil Removal Area
- 2009 (Shaw) Soil/Debris Removal Area
- WPNSTA Boundary

N W E S

0 60 120 240 Feet

1 inch = 120 feet

Figure 3-11
Site 23 - Building 428 Teague Road Disposal Area
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-12 - SITE24.MXD CBOWMAN 7/25/2013 7:01:43 AM

Legend

- Ecological Screening Value Exceedance Locations
- Monitoring Well (Yorktown-Eastover Aquifer)
- Monitoring Well (Columbia Aquifer)
- JIEDDO Battle Course
- Site 24 Study Area Boundary (former SSA 6 Helicopter Landing Pad)
- Drainage Swales
- Fences
- Waste Areas
- Former Building
- WPNSTA Boundary

N
W E
S

0 300 600
Feet

Figure 3-12
Site 24 - Aviation Field
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY 2014 15\FIGURE 3-13 - SITE25.MXD CBOWMAN 7/24/2013 7:38:20 AM

Legend

- Monitoring Well (unconfined Yorktown-Eastover Aquifer)
- Drop Inlet
- Door
- Wall
- Former Discharge Line
- Building 373 Drainage Trench
- Elevation Contour (4 ft interval)
- 12" Buried Corrugated Pipe
- Concrete-lined Drainage Swale
- Dirt-lined Drainage Swale
- Limits of 1996 Excavation (excavation included UST, UST piping, and associated soils)
- Study Area Boundary
- Loading Dock
- Buildings
- Building Exterior Wall
- Concrete Tank

N W E S

0 40 80 Feet

Figure 3-13
Site 25 - Building 373 Rocket Plant
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

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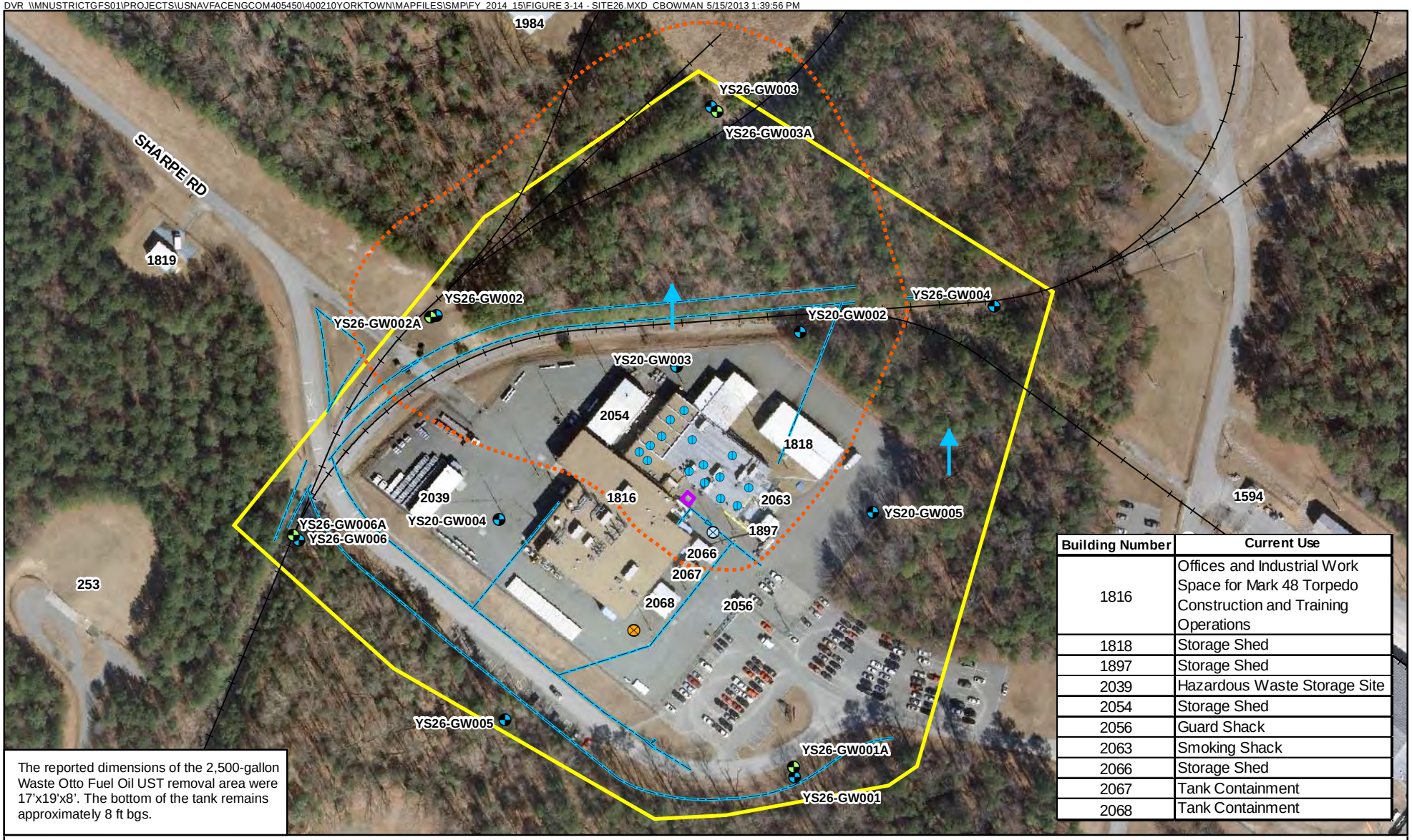
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY 2014 15\FIGURE 3-14 - SITE26.MXD CBOWMAN 5/15/2013 1:39:56 PM



The reported dimensions of the 2,500-gallon Waste Otto Fuel Oil UST removal area were 17'x19'x8'. The bottom of the tank remains approximately 8 ft bgs.

Building Number	Current Use
1816	Offices and Industrial Work Space for Mark 48 Torpedo Construction and Training Operations
1818	Storage Shed
1897	Storage Shed
2039	Hazardous Waste Storage Site
2054	Storage Shed
2056	Guard Shack
2063	Smoking Shack
2066	Storage Shed
2067	Tank Containment
2068	Tank Containment

Legend

- Existing Shallow Monitoring Well (unconfined Cornwallis Cave Aquifer)
- Existing Deep Monitoring Well (confined Yorktown-Eastover Aquifer)
- Approximate Location of Floor Drain (Source: EDF DWG No. 114173)
- Approximate location of former 8,000-gallon Fuel Oil UST removed in 1995
- Approximate location of 12,000 gallon #2 heating oil UST removed in 1998 (orientation unknown)
- Approximate location of Storm Sewer
- Former Railroad
- Study Area Boundary
- Approximate location of former 2,500-gallon Waste Otto Fuel Oil UST removed in 1995
- Approximate Extent of CVOC Plume (1997)

N W E S

0 90 180 Feet

Imagery: 2010

Figure 3-14
Site 26 - Building 1816 Mark 47 Waste Otto Fuel Tank
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

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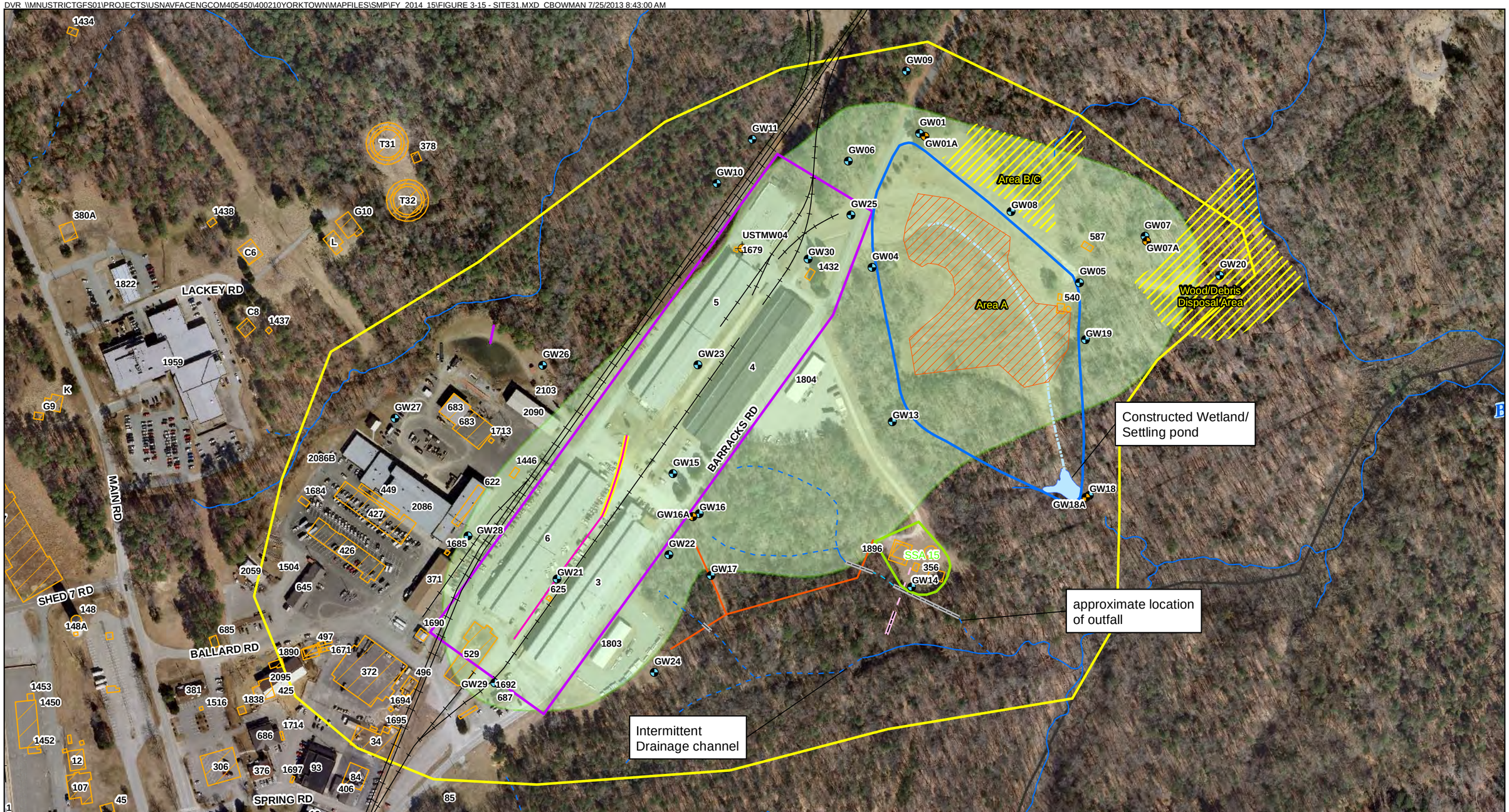
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-15 - SITE31.MXD CBOWMAN 7/25/2013 8:43:00 AM



Legend

Site 31

- Yorktown-Eastover Monitoring Well
- Cornwallis Cave Monitoring Well
- UST Well
- Trilock Block Drainage Ditch
- Railroad
- surface_water_body_area
- Former Drainage Ditch Location - not graded over
- Drainage Ditch Location
- Underground Former Treatment Plant Discharge Pipe
- Exposed Former Treatment Plant Discharge Pipe
- Sanitary Sewer Easement
- Storm Water Conveyance
- Demolished Building
- Approximate IR Site 12 Boundary
- SSA 15 Boundary
- WPNSTA Boundary
- Study Area Boundary
- Site 31 Barracks Road Industrial Area

Site 12

- Area A Groundwater LUC
- Extent of Landfill Cap (installed in 1997) and Area A Soil LUC
- Approximate NFA Areas
- Approximate Extent of TCE Plume

N W E S

0 140 280 Feet

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.

Figure 3-15
Site 31 - Barracks Road Landfill Industrial Area
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

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DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-16- SITE32.MXD CBOWMAN 4/30/2013 10:43:57 AM

Legend

- Monitoring Well Location
- discharge pipe 10 in
- gate 24
- Fence
- Former Structures
- Impoundment Area
- Property Boundary Line
- 2009 Removal Area Mixing Cell
- Extent of 2009 Sediment Removal
- Study Area Boundary

N W E S

0 50 100 Feet

1 inch = 100 feet

Figure 3-16
Site 32 - Wetlands Downgradient of Beaver Pond
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

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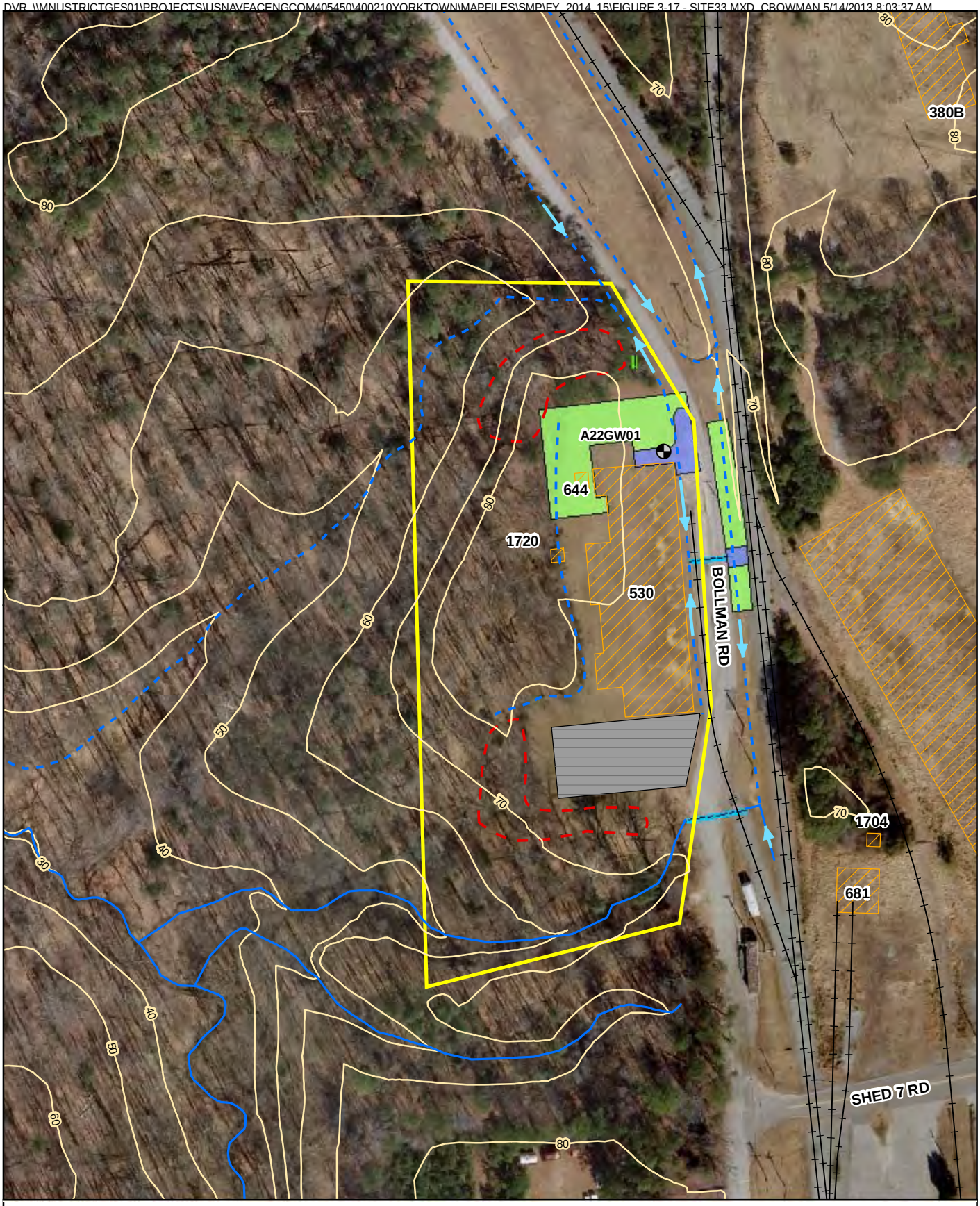

Legend

- Abandoned Monitoring Well
- Culvert
- Discharge Pipe of Unknown Origin
- Drainage Flow Direction
- Drainage Ditch
- Intermittent Drainage Ditch
- Former Railroad
- Elevation Contour (10 ft interval)
- Historical Parking Lot
- Approximate Area of Debris
- Demolished Building
- 1999/2000 Soil Removal Area (0-24")
- 1999/2000 Soil Removal Area (0-6")
- Study Area Boundary

N W E S

0 60 120 Feet

Figure 3-17
Site 33 - Sand Blasting Grit Pile
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

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DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-18 - SITE34.MXD CBOWMAN 5/14/2013 8:19:43 AM

Legend

- Drop Inlet
- Discharge Pipe
- Approximate Retaining Wall Location
- Wastewater Force Main
- Top of Slope
- Terrain Elevation Contour (4 ft interval)
- Approximate Welands Boundary
- Building 537 Weir Box
- Building 537 Building Concrete Ditch
- Buildings
- Paved Area
- 2007 Removal Action
- Approximate Extent of TCE Plume

N W E S

0 85 170 Feet

Figure 3-18
Site 34 - Building 537 Discharge to Felgates Creek
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

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DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-19 - SITE UXO2.MXD CBOWMAN 4/9/2013 1:27:52 PM

Legend

- Monitoring Well
- Study Area Boundary

N
W E
S

0 175 350
Feet

Figure 3-19
UXO 2 - Turkey Road Landfill
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

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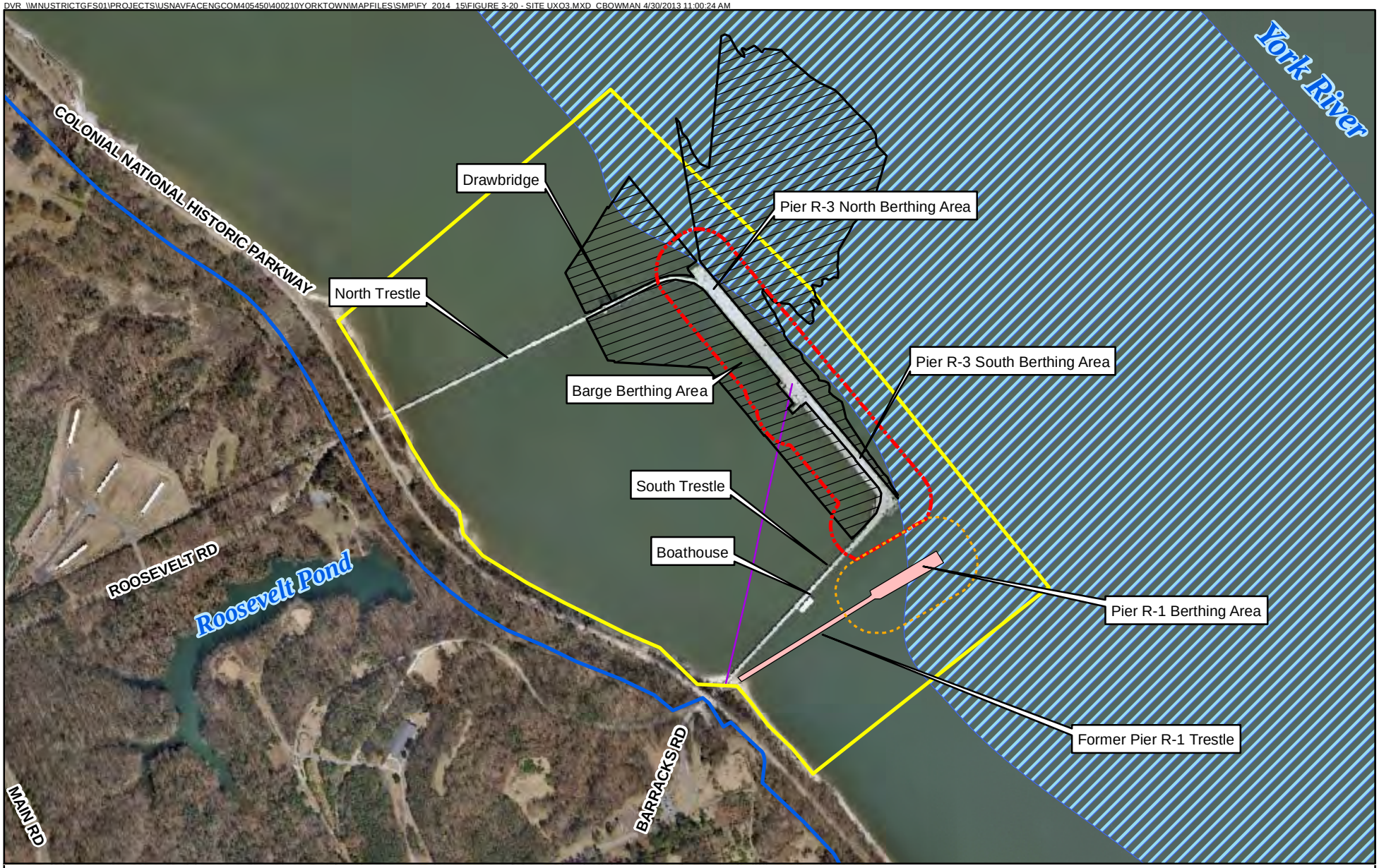
DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY_2014_15\FIGURE 3-20 - SITE UXO3.MXD CBOWMAN 4/30/2013 11:00:24 AM



Legend

- Area Recommended for SI
- Area Recommended for SI once munitions loading operations have ceased
- Former Dredged Area
- Yorktown Base Boundary
- Study Area Boundary
- Location of former pier known as Pier R-1 (submerged pilings remain)
- York River Main Channel
- Sewer Utility (Submerged)

N
W E
S

0 500 1,000
Feet

Figure 3-20
UXO 3 NMC Munitions Loading Pier
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

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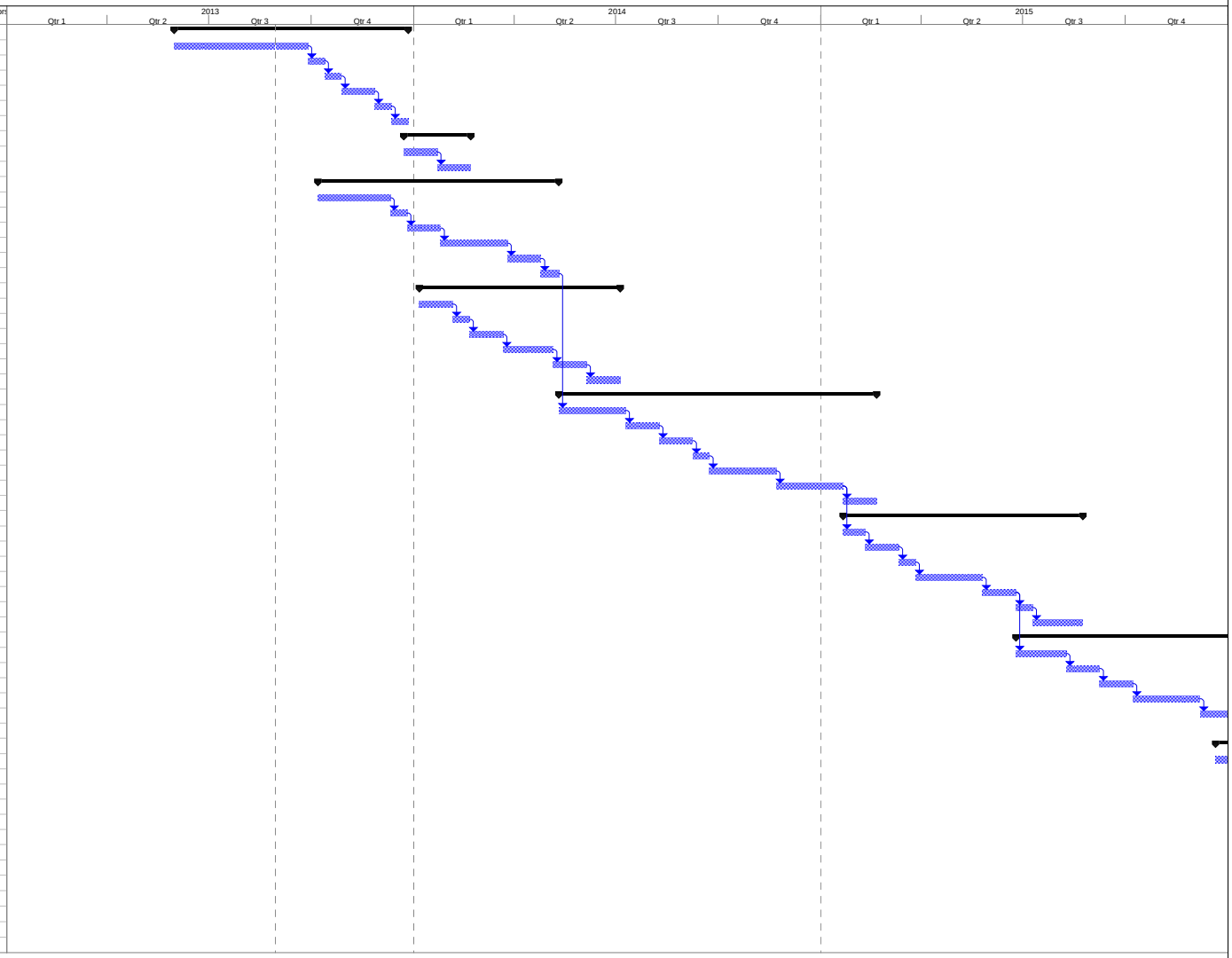
Schedule 3-1
Site 1 SMP FY14-15

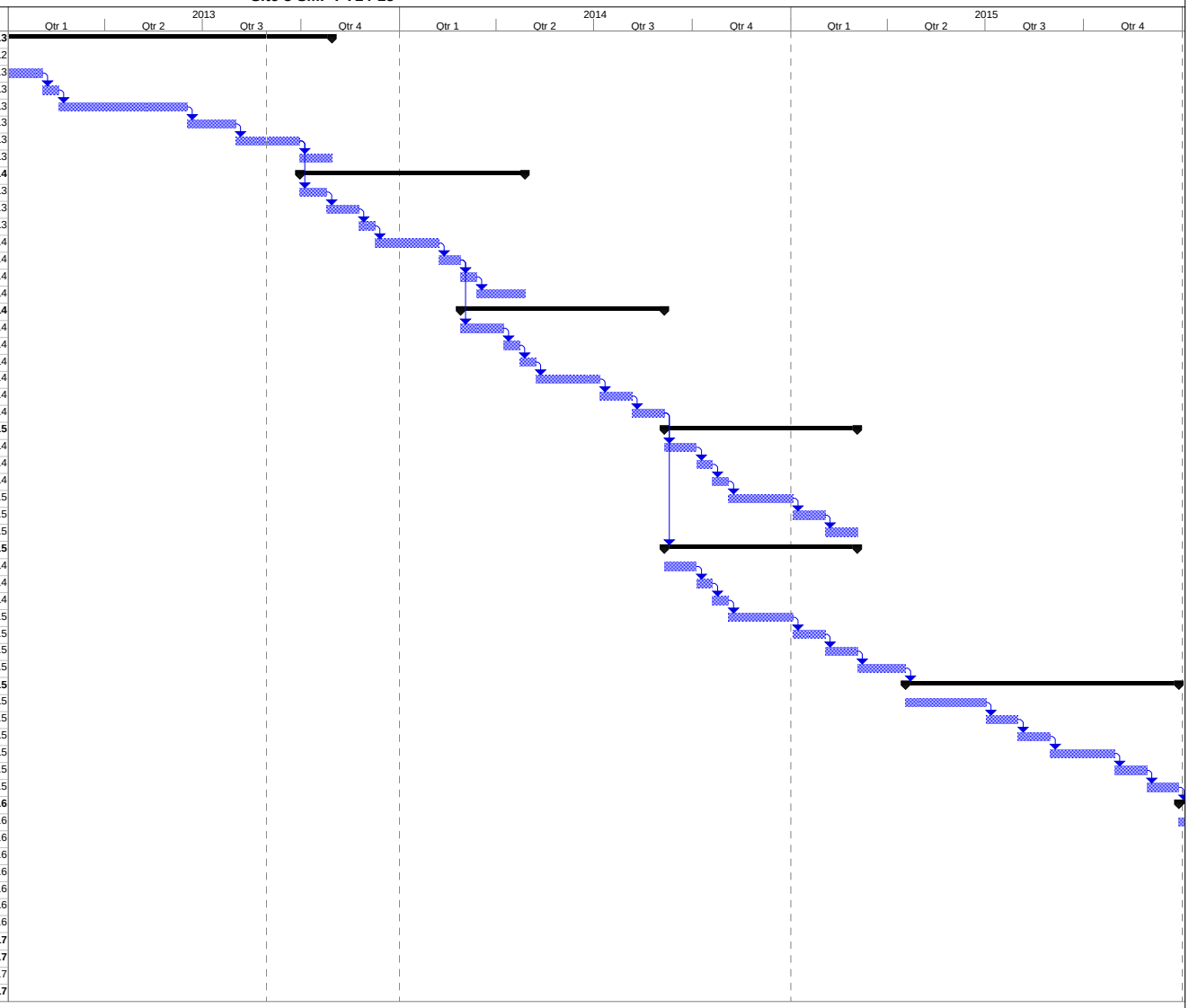
ID	Task Name	Duration	Start	Finish	Predecessors
1	**Tech Memo for LUC RD**	**210 days**	**Fri 5/31/13**	**Thu 12/26/13**	
2	Preliminary Draft LUC RD	120 days	Fri 5/31/13	Fri 9/27/13	
3	Gov't Comments	15 days	Sat 9/28/13	Sat 10/12/13	2
4	Issue Draft LUC RD	15 days	Sun 10/13/13	Sun 10/27/13	3
5	Regulatory Review	30 days	Mon 10/28/13	Tue 11/26/13	4
6	Issue Draft Final LUC RD	15 days	Wed 11/27/13	Wed 12/11/13	5
7	Issue Final LUC RD	15 days	Thu 12/12/13	Thu 12/26/13	6
8	**Five Year Review Addendum**	**60 days**	**Mon 12/23/13**	**Thu 2/20/14**	
9	Draft Five Year Review Addendum	30 days	Mon 12/23/13	Tue 1/21/14	
10	Final Five Year Review Addendum	30 days	Wed 1/22/14	Thu 2/20/14	9
11	**Phase 3 RI Report for GW/SW/SD**	**216 days**	**Mon 10/7/13**	**Sat 5/10/14**	
12	Preliminary RI	65 days	Mon 10/7/13	Tue 12/10/13	
13	Gov't Comments	15 days	Wed 12/11/13	Wed 12/25/13	12
14	Issue Draft RI report	30 days	Thu 12/26/13	Fri 1/24/14	13
15	Regulatory Review	60 days	Sat 1/25/14	Tue 3/25/14	14
16	Issue Draft Final RI report	30 days	Wed 3/26/14	Thu 4/24/14	15
17	Issue Final RI report	16 days	Fri 4/25/14	Sat 5/10/14	16
18	**LUC RD (interim)**	**180 days**	**Mon 1/6/14**	**Fri 7/4/14**	
19	Preliminary Draft LUC RD (interim)	30 days	Mon 1/6/14	Tue 2/4/14	
20	Gov't Comments	15 days	Wed 2/5/14	Wed 2/19/14	19
21	Issue Draft LUC RD (interim)	30 days	Thu 2/20/14	Fri 3/21/14	20
22	Regulatory Review	45 days	Sat 3/22/14	Mon 5/5/14	21
23	Issue Draft Final LUC RD (interim)	30 days	Tue 5/6/14	Wed 6/4/14	22
24	Issue Final LUC RD (interim)	30 days	Thu 6/5/14	Fri 7/4/14	23
25	**FS Report**	**285 days**	**Sun 5/11/14**	**Thu 2/19/15**	
26	RAA	60 days	Sun 5/11/14	Wed 7/9/14	17
27	Preliminary FS	30 days	Thu 7/10/14	Fri 8/8/14	26
28	Gov't Comments	30 days	Sat 8/9/14	Sun 9/7/14	27
29	Issue Draft FS	15 days	Mon 9/8/14	Mon 9/22/14	28
30	Regulatory Review	60 days	Tue 9/23/14	Fri 11/21/14	29
31	Issue Draft Final FS	60 days	Sat 11/22/14	Tue 1/20/15	30
32	Issue Final FS	30 days	Wed 1/21/15	Thu 2/19/15	31
33	**PP**	**215 days**	**Wed 1/21/15**	**Sun 8/23/15**	
34	Preliminary PP	20 days	Wed 1/21/15	Mon 2/9/15	31
35	Gov't Comments	30 days	Tue 2/10/15	Wed 3/11/15	34
36	Issue Draft PP	15 days	Thu 3/12/15	Thu 3/26/15	35
37	Regulatory / Legal Review	60 days	Fri 3/27/15	Mon 5/25/15	36
38	Issue Draft Final PP	30 days	Tue 5/26/15	Wed 6/24/15	37
39	Issue Final PP	15 days	Thu 6/25/15	Thu 7/9/15	38
40	Public Comment Period	45 days	Fri 7/10/15	Sun 8/23/15	39
41	**ROD**	**225 days**	**Thu 6/25/15**	**Thu 2/4/16**	
42	Preliminary ROD	45 days	Thu 6/25/15	Sat 8/8/15	38
43	Navy Review	30 days	Sun 8/9/15	Mon 9/7/15	42
44	Issue Draft ROD	30 days	Tue 9/8/15	Wed 10/7/15	43
45	Regulatory / Legal Review	60 days	Thu 10/8/15	Sun 12/6/15	44
46	Issue Draft Final ROD	30 days	Mon 12/7/15	Tue 1/5/16	45
47	Issue ROD for Signature	30 days	Wed 1/6/16	Thu 2/4/16	46
48	**RA Design**	**210 days**	**Mon 12/21/15**	**Sun 7/17/16**	
49	Preliminary RA Design	60 days	Mon 12/21/15	Thu 2/18/16	
50	Navy Review	30 days	Fri 2/19/16	Sat 3/19/16	49
51	Issue Draft RA Design	15 days	Sun 3/20/16	Sun 4/3/16	50
52	Regulatory Review	45 days	Mon 4/4/16	Wed 5/18/16	51
53	Issue Draft Final RA Design	30 days	Thu 5/19/16	Fri 6/17/16	52
54	Final RA Design	30 days	Sat 6/18/16	Sun 7/17/16	53
55	**RA Work Plan & HASP**	**255 days**	**Mon 7/18/16**	**Wed 3/29/17**	**54**
62	RA Field Work	60 days	Sun 1/29/17	Wed 3/29/17	61
63	**CCR**	**225 days**	**Thu 3/30/17**	**Thu 11/9/17**	**62**
70	**LUC RD GW/Cover/etc**	**195 days**	**Mon 1/18/16**	**Sat 7/30/16**	
77	**Groundwater LTM WP & HASP**	**218 days**	**Tue 12/12/17**	**Tue 7/17/18**	
83	**RACR**	**240 days**	**Wed 9/13/17**	**Thu 5/10/18**	
90	**Five Year Review (2017)**	**343 days**	**Tue 8/16/16**	**Mon 7/24/17**	



Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Schedule 3-2
Site 3 SMP FY14-15

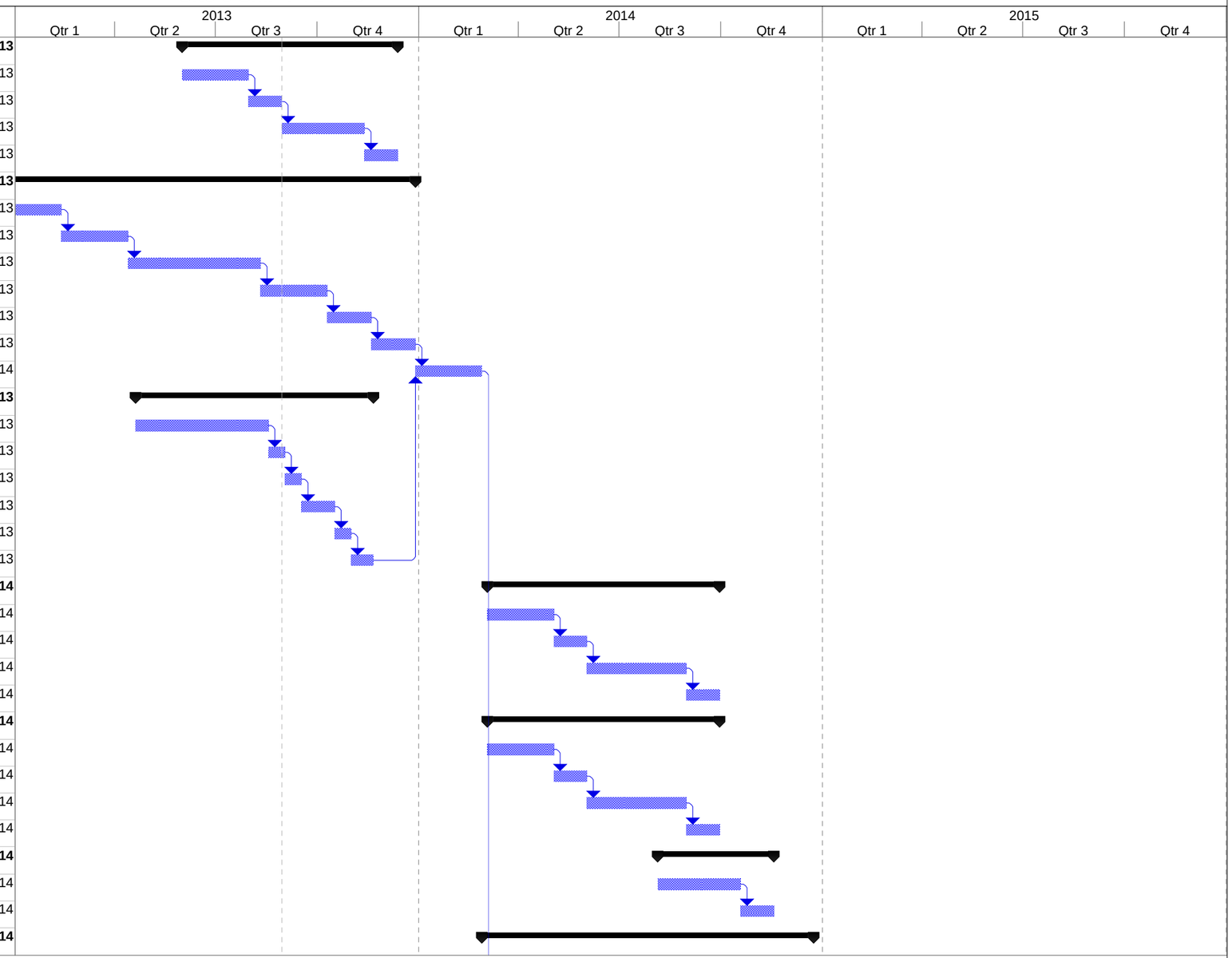
ID	Task Name	Duration	Start	Finish
1	**FS Report**	**455 days**	**Wed 8/1/12**	**Tue 10/29/13**
2	RAA	60 days	Wed 8/1/12	Sat 9/29/12
3	Preliminary FS	90 days	Sun 11/4/12	Fri 2/1/13
4	Gov't Comments	15 days	Sat 2/2/13	Sat 2/16/13
5	Issue Draft FS	120 days	Sun 2/17/13	Sun 6/16/13
6	Regulatory Review	45 days	Mon 6/17/13	Wed 7/31/13
7	Issue Draft Final FS	60 days	Thu 8/1/13	Sun 9/29/13
8	Issue Final FS	30 days	Mon 9/30/13	Tue 10/29/13
9	**PP (GW)**	**210 days**	**Mon 9/30/13**	**Sun 4/27/14**
10	Preliminary PP	25 days	Mon 9/30/13	Thu 10/24/13
11	Gov't Comments	30 days	Fri 10/25/13	Sat 11/23/13
12	Issue Draft PP	15 days	Sun 11/24/13	Sun 12/8/13
13	Regulatory / Legal Review	60 days	Mon 12/9/13	Thu 2/6/14
14	Issue Draft Final PP	20 days	Fri 2/7/14	Wed 2/26/14
15	Issue Final PP	15 days	Thu 2/27/14	Thu 3/13/14
16	Public Comment Period	45 days	Fri 3/14/14	Sun 4/27/14
17	**ROD (GW)**	**190 days**	**Thu 2/27/14**	**Thu 9/4/14**
18	Preliminary ROD	40 days	Thu 2/27/14	Mon 4/7/14
19	Navy Review	15 days	Tue 4/8/14	Tue 4/22/14
20	Issue Draft ROD	15 days	Wed 4/23/14	Wed 5/7/14
21	Regulatory / Legal Review	60 days	Thu 5/8/14	Sun 7/6/14
22	Issue Draft Final ROD	30 days	Mon 7/7/14	Tue 8/5/14
23	Issue ROD for Signature	30 days	Wed 8/6/14	Thu 9/4/14
24	**LUC RD**	**180 days**	**Fri 9/5/14**	**Tue 3/3/15**
25	Preliminary LUC RD	30 days	Fri 9/5/14	Sat 10/4/14
26	Navy Review	15 days	Sun 10/5/14	Sun 10/19/14
27	Issue Draft LUC RD	15 days	Mon 10/20/14	Mon 11/3/14
28	Regulatory / Legal Review	60 days	Tue 11/4/14	Fri 1/2/15
29	Issue Draft Final LUC RD	30 days	Sat 1/3/15	Sun 2/1/15
30	Issue Final LUC RD	30 days	Mon 2/2/15	Tue 3/3/15
31	**Pre-RD Work Plan**	**180 days**	**Fri 9/5/14**	**Tue 3/3/15**
32	Preliminary Pre-RD WP	30 days	Fri 9/5/14	Sat 10/4/14
33	Navy Review	15 days	Sun 10/5/14	Sun 10/19/14
34	Issue Draft Pre-RD WP	15 days	Mon 10/20/14	Mon 11/3/14
35	Regulatory Review	60 days	Tue 11/4/14	Fri 1/2/15
36	Issue Draft Final Pre-RD WP	30 days	Sat 1/3/15	Sun 2/1/15
37	Final Pre-RD WP	30 days	Mon 2/2/15	Tue 3/3/15
38	Pre-RD Field Work	45 days	Wed 3/4/15	Fri 4/17/15
39	**RA Design**	**255 days**	**Sat 4/18/15**	**Mon 12/28/15**
40	Preliminary RA Design	75 days	Sat 4/18/15	Wed 7/1/15
41	Navy Review	30 days	Thu 7/2/15	Fri 7/31/15
42	Issue Draft RA Design	30 days	Sat 8/1/15	Sun 8/30/15
43	Regulatory Review	60 days	Mon 8/31/15	Thu 10/29/15
44	Issue Draft Final RA Design	30 days	Fri 10/30/15	Sat 11/28/15
45	Final RA Design	30 days	Sun 11/29/15	Mon 12/28/15
46	**RA Work Plan & HASP**	**180 days**	**Tue 12/29/15**	**Sat 6/25/16**
47	Preliminary RAWP & HASP	15 days	Tue 12/29/15	Tue 1/12/16
48	Navy Review	30 days	Wed 1/13/16	Thu 2/11/16
49	Issue Draft RAWP	15 days	Fri 2/12/16	Fri 2/26/16
50	Regulatory Review	60 days	Sat 2/27/16	Tue 4/26/16
51	Issue Draft Final RAWP	30 days	Wed 4/27/16	Thu 5/26/16
52	Final RAWP	30 days	Fri 5/27/16	Sat 6/25/16
53	RA Field Work	30 days	Mon 8/1/16	Tue 8/30/16
54	**CCR**	**185 days**	**Tue 11/1/16**	**Thu 5/4/17**
61	**Groundwater LTM Work Plan & HASP**	**195 days**	**Fri 5/5/17**	**Wed 11/15/17**
68	RA Field Work	45 days	Thu 11/16/17	Sat 12/30/17
69	**RACR**	**224 days**	**Sun 4/23/17**	**Sat 12/2/17**



Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Schedule 3-3
Site 6 SMP FY14-15

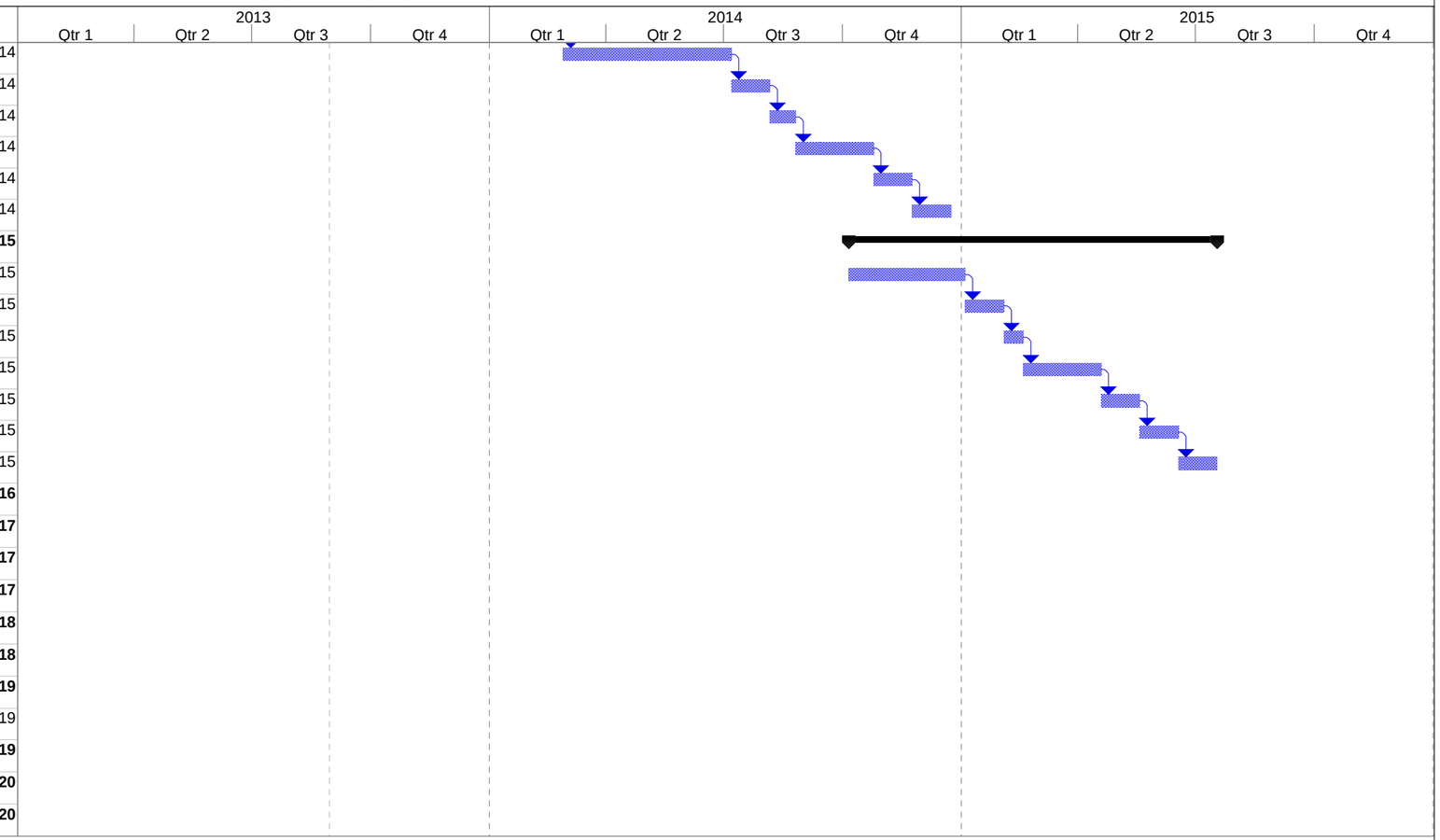
ID	Task Name	Duration	Start	Finish
1	**Tech Memo for Site Status**	**195 days**	**Sat 6/1/13**	**Thu 12/12/13**
2	Preliminary TM	60 days	Sat 6/1/13	Tue 7/30/13
3	Issue Draft TM	30 days	Wed 7/31/13	Thu 8/29/13
4	Issue Draft Final TM	75 days	Fri 8/30/13	Tue 11/12/13
5	Issue Final TM	30 days	Wed 11/13/13	Thu 12/12/13
6	Phase 3 UFP-SAP - Plant 1	**500 days**	**Thu 8/16/12**	**Sat 12/28/13**
7	Preliminary SAP and HASP	180 days	Thu 8/16/12	Mon 2/11/13
8	Client Review of SAP	60 days	Tue 2/12/13	Fri 4/12/13
9	Draft SAP	120 days	Sat 4/13/13	Sat 8/10/13
10	Regulatory Review	60 days	Sun 8/11/13	Wed 10/9/13
11	Draft Final SAP	40 days	Thu 10/10/13	Mon 11/18/13
12	Final SAP	40 days	Tue 11/19/13	Sat 12/28/13
13	Pre-FS Field Work	60 days	Sun 12/29/13	Wed 2/26/14
14	LUCIP	**215 days**	**Sat 4/20/13**	**Wed 11/20/13**
15	Preliminary Draft LUCIP	120 days	Sat 4/20/13	Sat 8/17/13
16	Navy Review	15 days	Sun 8/18/13	Sun 9/1/13
17	Draft LUCIP	15 days	Mon 9/2/13	Mon 9/16/13
18	Regulatory Review	30 days	Tue 9/17/13	Wed 10/16/13
19	Draft Final LUCIP	15 days	Thu 10/17/13	Thu 10/31/13
20	Final LUCIP	20 days	Fri 11/1/13	Wed 11/20/13
21	**Tech Memo for Excavated Area**	**210 days**	**Tue 3/4/14**	**Mon 9/29/14**
22	Preliminary TM	60 days	Tue 3/4/14	Fri 5/2/14
23	Issue Draft TM	30 days	Sat 5/3/14	Sun 6/1/14
24	Issue Draft Final TM	90 days	Mon 6/2/14	Sat 8/30/14
25	Issue Final TM	30 days	Sun 8/31/14	Mon 9/29/14
26	**Tech Memo for Impoundment Area**	**210 days**	**Tue 3/4/14**	**Mon 9/29/14**
27	Preliminary TM	60 days	Tue 3/4/14	Fri 5/2/14
28	Issue Draft TM	30 days	Sat 5/3/14	Sun 6/1/14
29	Issue Draft Final TM	90 days	Mon 6/2/14	Sat 8/30/14
30	Issue Final TM	30 days	Sun 8/31/14	Mon 9/29/14
31	**Five Year Review Addendum**	**105 days**	**Tue 8/5/14**	**Mon 11/17/14**
32	Draft Five Year Review Addendum	75 days	Tue 8/5/14	Sat 10/18/14
33	Final Five Year Review Addendum	30 days	Sun 10/19/14	Mon 11/17/14
34	**Phase 3 RI Report for GW/SW/SD**	**300 days**	**Thu 2/27/14**	**Tue 12/23/14**



Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

Schedule 3-3
Site 6 SMP FY14-15

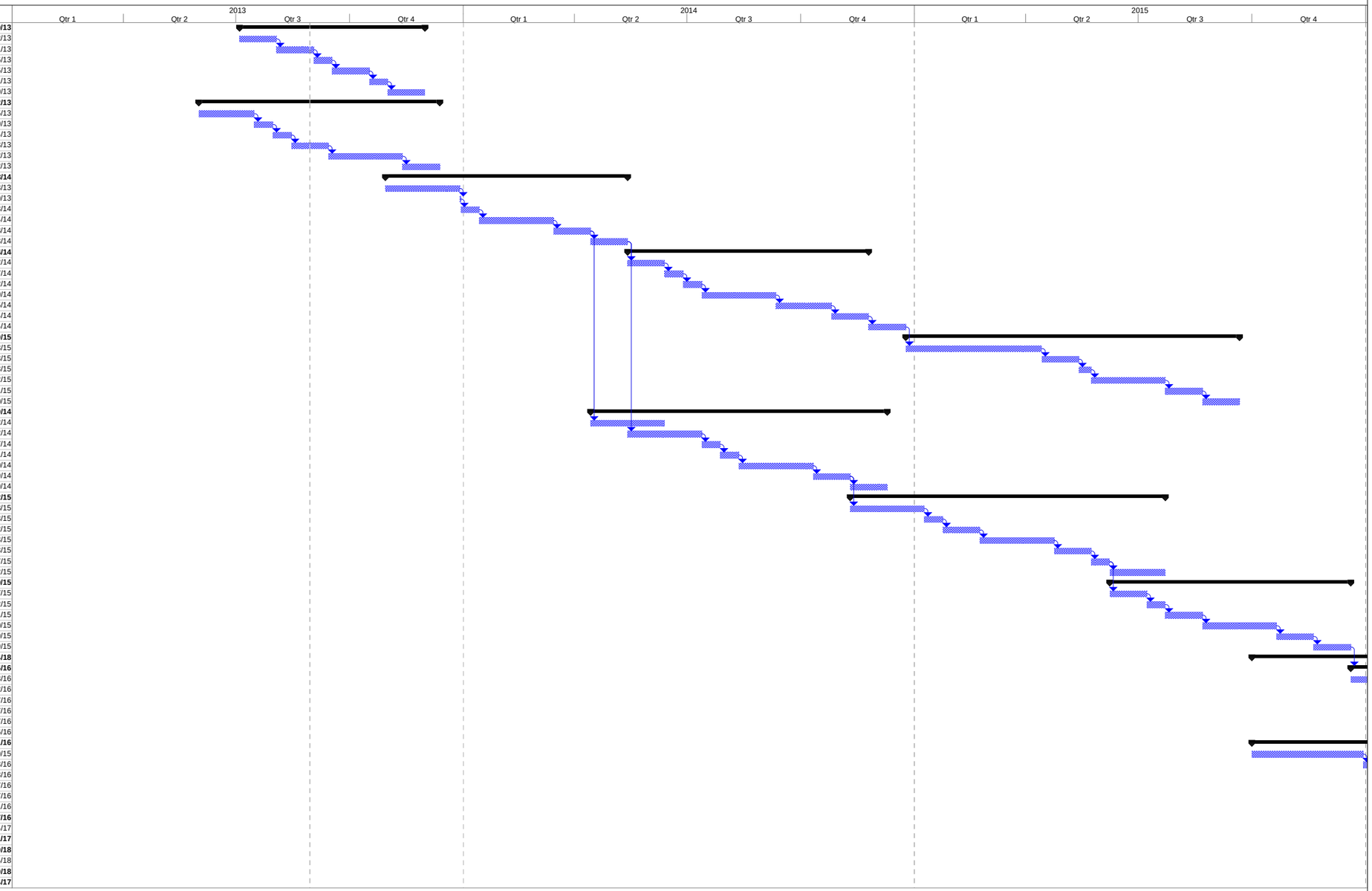
ID	Task Name	Duration	Start	Finish
35	Preliminary RI	130 days	Thu 2/27/14	Sun 7/6/14
36	Gov't Comments	30 days	Mon 7/7/14	Tue 8/5/14
37	Issue Draft RI Report	20 days	Wed 8/6/14	Mon 8/25/14
38	Regulatory Review	60 days	Tue 8/26/14	Fri 10/24/14
39	Issue Draft Final RI Report	30 days	Sat 10/25/14	Sun 11/23/14
40	Issue Final RI Report	30 days	Mon 11/24/14	Tue 12/23/14
41	**Phase 2 UFP-SAP - Plant 2**	**285 days**	**Mon 10/6/14**	**Fri 7/17/15**
42	Preliminary SAP and HASP	90 days	Mon 10/6/14	Sat 1/3/15
43	Client Review of SAP	30 days	Sun 1/4/15	Mon 2/2/15
44	Draft SAP	15 days	Tue 2/3/15	Tue 2/17/15
45	Regulatory Review	60 days	Wed 2/18/15	Sat 4/18/15
46	Draft Final SAP	30 days	Sun 4/19/15	Mon 5/18/15
47	Final SAP	30 days	Tue 5/19/15	Wed 6/17/15
48	Phase 2 Field Work	30 days	Thu 6/18/15	Fri 7/17/15
49	**LTM Work Plan**	**285 days**	**Mon 3/7/16**	**Fri 12/16/16**
57	**FS Report**	**255 days**	**Mon 5/9/16**	**Wed 1/18/17**
65	**LTM Report**	**271 days**	**Thu 1/19/17**	**Mon 10/16/17**
72	**PP**	**278 days**	**Thu 1/19/17**	**Mon 10/23/17**
86	**ROD**	**400 days**	**Sun 6/18/17**	**Sun 7/22/18**
100	**RA Design**	**180 days**	**Wed 1/24/18**	**Sun 7/22/18**
107	**RA Work Plan & HASP**	**185 days**	**Mon 7/23/18**	**Wed 1/23/19**
114	RA Field Work	30 days	Tue 3/5/19	Wed 4/3/19
115	**CCR**	**260 days**	**Thu 4/4/19**	**Thu 12/19/19**
122	**Groundwater LTM WP & HASP**	**210 days**	**Fri 12/20/19**	**Thu 7/16/20**
128	**RACR**	**165 days**	**Fri 7/17/20**	**Mon 12/28/20**



Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Progress
Deadline

Schedule 3-4
Site 7 SMP FY14-15

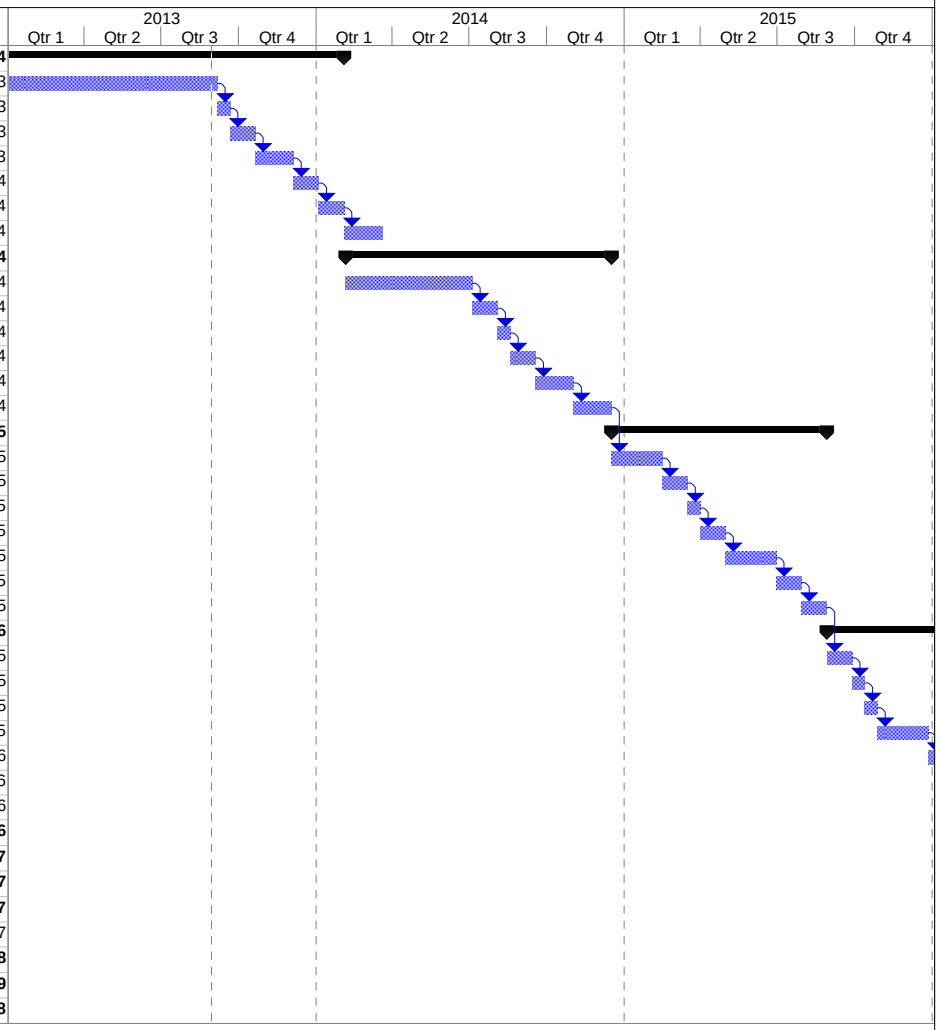
ID	Task Name	Duration	Start	Finish
1	**LUCIP (Drainage Area)**	**150 days**	**Thu 7/4/13**	**Sat 11/30/13**
2	Pre-Draft LUCIP	30 days	Thu 7/4/13	Fri 8/2/13
3	Navy Review	30 days	Sat 8/3/13	Sun 9/1/13
4	Draft LUCIP	15 days	Mon 9/2/13	Mon 9/16/13
5	Regulatory Review	30 days	Tue 9/17/13	Wed 10/16/13
6	Draft Final LUCIP	15 days	Thu 10/17/13	Thu 10/31/13
7	Final LUCIP	30 days	Fri 11/1/13	Sat 11/30/13
8	**TM to Document Site Status**	**195 days**	**Sat 6/1/13**	**Thu 12/12/13**
9	Pre-Draft TM	45 days	Sat 6/1/13	Mon 7/15/13
10	Navy Review	15 days	Tue 7/16/13	Tue 7/30/13
11	Draft TM	15 days	Wed 7/31/13	Wed 8/14/13
12	Regulatory Review	30 days	Thu 8/15/13	Fri 9/13/13
13	Draft Final TM	60 days	Sat 9/14/13	Tue 11/12/13
14	Final TM	30 days	Wed 11/13/13	Thu 12/12/13
15	**Phase 3 Remedial Investigation Reporting**	**196 days?**	**Wed 10/30/13**	**Tue 5/13/14**
16	Preliminary RI Report	60 days	Wed 10/30/13	Sat 12/28/13
17	Client Review	1 day?	Sun 12/29/13	Sun 12/29/13
18	Draft RI Report	15 days	Mon 12/30/13	Mon 1/13/14
19	Regulatory Review	60 days	Tue 1/14/14	Fri 3/14/14
20	Draft Final RI Report	30 days	Sat 3/15/14	Sun 4/13/14
21	Final RI Report	30 days	Mon 4/14/14	Tue 5/13/14
22	**LTM Work Plan**	**195 days**	**Wed 5/14/14**	**Mon 11/24/14**
23	Preliminary WP Preparation	30 days	Wed 5/14/14	Thu 6/12/14
24	Gov't Comments	15 days	Fri 6/13/14	Fri 6/27/14
25	Issue Draft WP	15 days	Sat 6/28/14	Sat 7/12/14
26	Regulatory Review	60 days	Sun 7/13/14	Wed 9/10/14
27	Issue Draft Final WP	45 days	Thu 9/11/14	Sat 10/25/14
28	Issue Final WP	30 days	Sun 10/26/14	Mon 11/24/14
29	Fieldwork (2 Mobilizations)	30 days	Tue 11/25/14	Wed 12/24/14
30	**LTM Report for GW/Soil**	**270 days**	**Thu 12/25/14**	**Sun 9/20/15**
31	Preliminary LTM report	110 days	Thu 12/25/14	Mon 4/13/15
32	Gov't comments	30 days	Tue 4/14/15	Wed 5/13/15
33	Issue Draft LTM report	10 days	Thu 5/14/15	Sat 5/23/15
34	Regulatory Review	60 days	Sun 5/24/15	Wed 7/22/15
35	Issue Draft Final LTM report	30 days	Thu 7/23/15	Fri 8/21/15
36	Issue Final LTM report	30 days	Sat 8/22/15	Sun 9/20/15
37	**FS Report**	**240 days**	**Mon 4/14/14**	**Tue 12/9/14**
38	RAA	60 days	Mon 4/14/14	Thu 6/12/14
39	Preliminary FS	60 days	Wed 5/14/14	Sat 7/12/14
40	Gov't Comments	15 days	Sun 7/13/14	Sun 7/27/14
41	Issue Draft FS	15 days	Mon 7/28/14	Mon 8/11/14
42	Regulatory Review	60 days	Tue 8/12/14	Fri 10/10/14
43	Issue Draft Final FS	30 days	Sat 10/11/14	Sun 11/9/14
44	Issue Final FS	30 days	Mon 11/10/14	Tue 12/9/14
45	**PP (all media)**	**255 days**	**Mon 11/10/14**	**Wed 7/22/15**
46	Preliminary PP	60 days	Mon 11/10/14	Thu 1/8/15
47	Gov't Comments	15 days	Fri 1/9/15	Fri 1/23/15
48	Issue Draft PP	30 days	Sat 1/24/15	Sun 2/22/15
49	Regulatory / Legal Review	60 days	Mon 2/23/15	Thu 4/23/15
50	Issue Draft Final PP	30 days	Fri 4/24/15	Sat 5/23/15
51	Issue Final PP	15 days	Sun 5/24/15	Sun 6/7/15
52	Public Comment Period	45 days	Mon 6/8/15	Wed 7/22/15
53	**ROD (all media)**	**195 days**	**Mon 6/8/15**	**Sat 12/19/15**
54	Preliminary ROD	30 days	Mon 6/8/15	Tue 7/7/15
55	Navy Review	15 days	Wed 7/8/15	Wed 7/22/15
56	Issue Draft ROD	30 days	Thu 7/23/15	Fri 8/21/15
57	Regulatory / Legal Review	60 days	Sat 8/22/15	Tue 10/20/15
58	Issue Draft Final ROD	30 days	Wed 10/21/15	Thu 11/19/15
59	Issue ROD for Signature	30 days	Fri 11/20/15	Sat 12/19/15
60	**Remedial Action**	**998 days**	**Thu 10/1/15**	**Sun 6/24/18**
61	**LUC RD (final)**	**180 days**	**Sun 12/20/15**	**Thu 6/16/16**
62	Preliminary LUC RD	30 days	Sun 12/20/15	Mon 1/18/16
63	Navy Review	15 days	Tue 1/19/16	Tue 2/2/16
64	Issue Draft LUC RD	15 days	Wed 2/3/16	Wed 2/17/16
65	Regulatory / Legal Review	60 days	Thu 2/18/16	Sun 4/17/16
66	Issue Draft Final LUC RD	30 days	Mon 4/18/16	Tue 5/17/16
67	Issue Final LUC RD	30 days	Wed 5/18/16	Thu 6/16/16
68	**RA Design**	**255 days**	**Thu 10/1/15**	**Sat 6/11/16**
69	Preliminary RA Design	90 days	Thu 10/1/15	Tue 12/29/15
70	Navy Review	15 days	Wed 12/30/15	Wed 1/13/16
71	Issue Draft RA Design	15 days	Thu 1/14/16	Thu 1/28/16
72	Regulatory Review	30 days	Fri 1/29/16	Sat 2/27/16
73	Issue Draft Final RA Design	60 days	Sun 2/28/16	Wed 4/27/16
74	Final RA Design	45 days	Thu 4/28/16	Sat 6/11/16
75	**RA Work Plan & HASP**	**199 days**	**Sun 6/12/16**	**Tue 12/27/16**
82	RA Field Work	45 days	Sun 1/1/17	Tue 2/14/17
83	**CCR**	**270 days**	**Wed 2/15/17**	**Sat 11/11/17**
90	**Groundwater LTM Work Plan & HASP**	**180 days**	**Sun 11/12/17**	**Thu 5/10/18**
97	Groundwater LTM Field Work	45 days	Fri 5/11/18	Sun 6/24/18
98	**RACR**	**180 days**	**Sun 11/12/17**	**Thu 5/10/18**
105	**Five Year Review (2017)**	**343 days**	**Tue 8/16/16**	**Mon 7/24/17**



Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Schedule 3-5
Site 8 SMP FY14-15

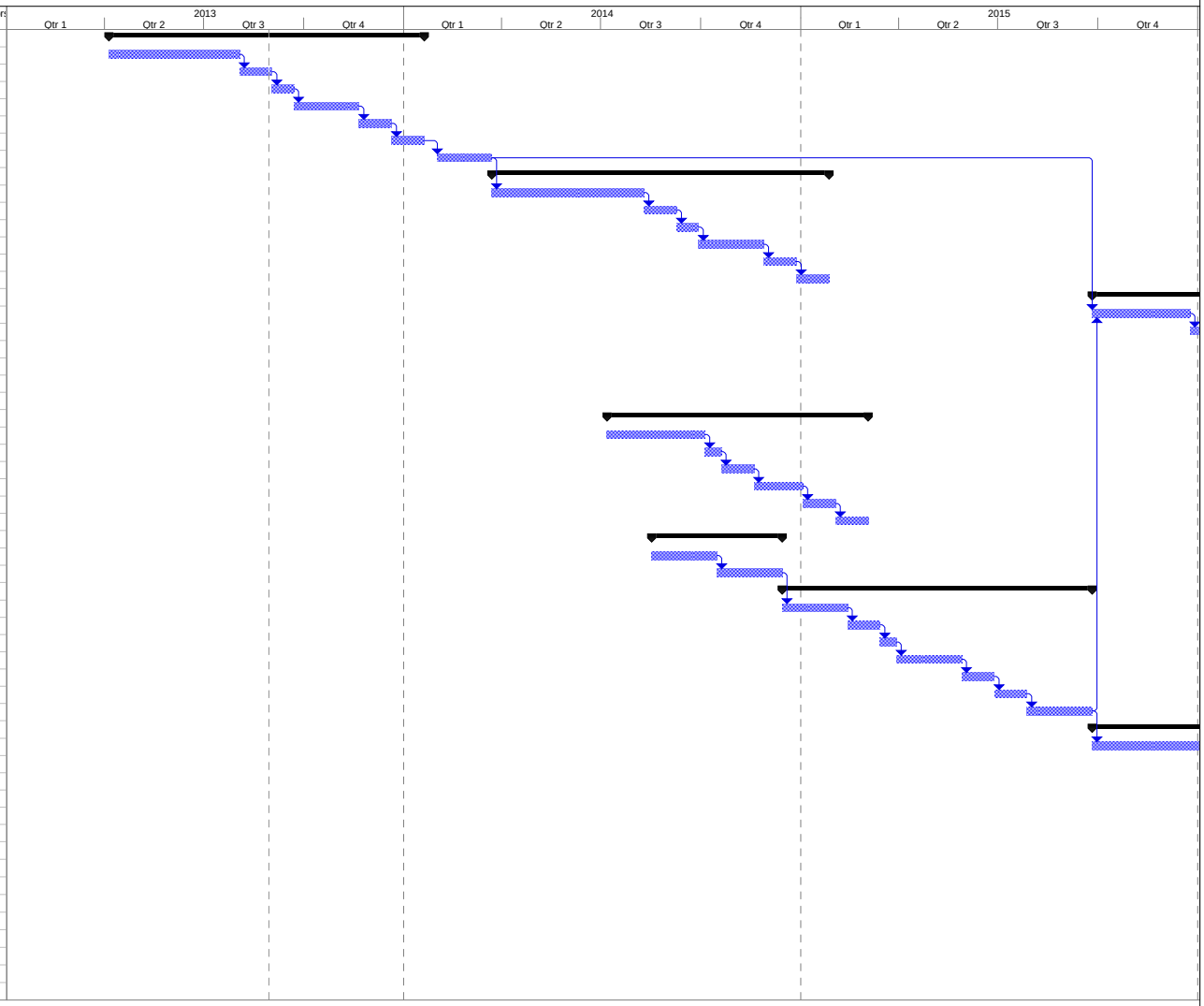
ID	Task Name	Duration	Start	Finish
1	**SAP and HASP Preparation - Soil/groundwater**	**420 days**	**Mon 12/10/12**	**Sun 2/2/14**
2	Preliminary SAP and HASP - Site 8 Soil	270 days	Mon 12/10/12	Thu 9/5/13
3	Client Review of Preliminary SAP - Site 8 Soil	15 days	Fri 9/6/13	Fri 9/20/13
4	Draft SAP to Regulators - Site 8 Soil	30 days	Sat 9/21/13	Sun 10/20/13
5	Regulatory Review of Draft SAP - Site 8 Soil	45 days	Mon 10/21/13	Wed 12/4/13
6	Draft Final SAP to Regulators - Site 8 Soil	30 days	Thu 12/5/13	Fri 1/3/14
7	Final SAP - Site 8 Soil	30 days	Sat 1/4/14	Sun 2/2/14
8	Field Work	45 days	Mon 2/3/14	Wed 3/19/14
9	**RI (soil/groundwater)**	**315 days**	**Wed 2/5/14**	**Tue 12/16/14**
10	Preliminary RI (soil/groundwater)	150 days	Wed 2/5/14	Fri 7/4/14
11	Navy Review	30 days	Sat 7/5/14	Sun 8/3/14
12	Issue Draft RI (soil/groundwater)	15 days	Mon 8/4/14	Mon 8/18/14
13	Regulatory Review	30 days	Tue 8/19/14	Wed 9/17/14
14	Issue Draft Final RI (soil/groundwater)	45 days	Thu 9/18/14	Sat 11/1/14
15	Issue Final RI (soil/groundwater)	45 days	Sun 11/2/14	Tue 12/16/14
16	**FS Report**	**255 days**	**Wed 12/17/14**	**Fri 8/28/15**
17	RAA	60 days	Wed 12/17/14	Sat 2/14/15
18	Preliminary FS	30 days	Sun 2/15/15	Mon 3/16/15
19	Gov't Comments	15 days	Tue 3/17/15	Tue 3/31/15
20	Issue Draft FS	30 days	Wed 4/1/15	Thu 4/30/15
21	Regulatory Review	60 days	Fri 5/1/15	Mon 6/29/15
22	Issue Draft Final FS	30 days	Tue 6/30/15	Wed 7/29/15
23	Issue Final FS	30 days	Thu 7/30/15	Fri 8/28/15
24	**PP all Media**	**225 days**	**Sat 8/29/15**	**Sat 4/9/16**
25	Preliminary PP	30 days	Sat 8/29/15	Sun 9/27/15
26	Gov't Comments	15 days	Mon 9/28/15	Mon 10/12/15
27	Issue Draft PP	15 days	Tue 10/13/15	Tue 10/27/15
28	Regulatory / Legal Review	60 days	Wed 10/28/15	Sat 12/26/15
29	Issue Draft Final PP	30 days	Sun 12/27/15	Mon 1/25/16
30	Issue Final PP	30 days	Tue 1/26/16	Wed 2/24/16
31	Public Comment Period	45 days	Thu 2/25/16	Sat 4/9/16
32	**ROD all Media**	**210 days**	**Tue 1/26/16**	**Mon 8/22/16**
39	**LUC RD**	**180 days**	**Tue 8/23/16**	**Sat 2/18/17**
46	**Remedial Design**	**179 days**	**Tue 8/23/16**	**Fri 2/17/17**
53	**Remedial Action Work Plan & HASP**	**195 days**	**Sat 2/18/17**	**Thu 8/31/17**
60	Remedial Action Field Work	30 days	Wed 9/13/17	Thu 10/12/17
61	**Constructions Closeout Report**	**257 days**	**Fri 10/13/17**	**Tue 6/26/18**
68	**Groundwater LTM WP & HASP**	**210 days**	**Wed 6/27/18**	**Tue 1/22/19**
74	**RACR**	**165 days**	**Wed 6/27/18**	**Sat 12/8/18**



Task		External Tasks		Duration-only		External Tasks	
Split		External Milestone		Manual Summary Rollup		External Milestone	
Milestone		Inactive Milestone		Manual Summary		Progress	
Summary		Inactive Summary		Start-only		Deadline	
Project Summary		Manual Task		Finish-only			

Schedule 3-6
Site 9 SMP FY14-15

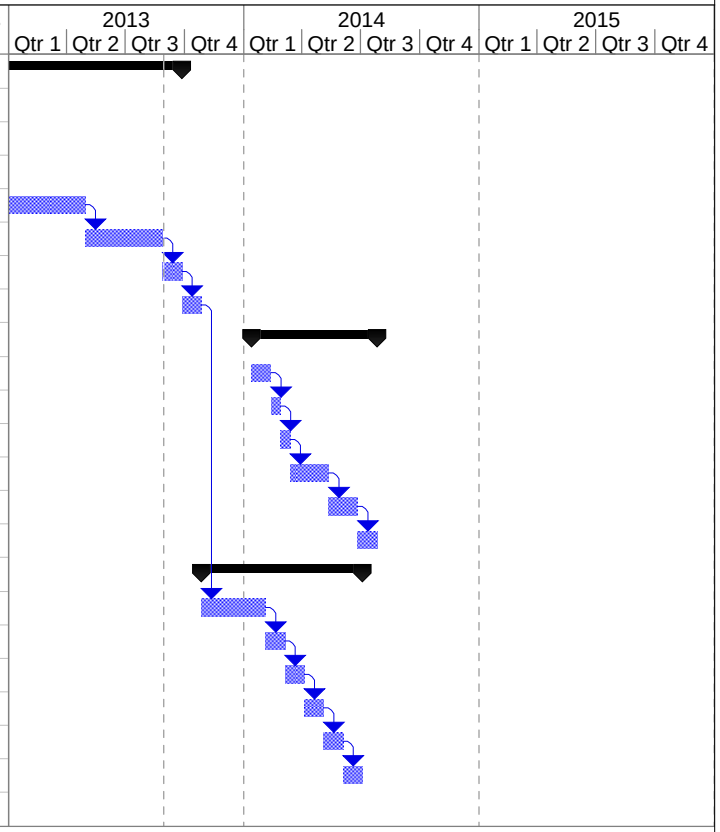
ID	Task Name	Duration	Start	Finish	Predecessors
1	**Phase 3 UFP-SAP for Data Gap Investigation**	***290 days***	***Fri 4/5/13***	***Sun 1/19/14***	
2	Preliminary UFP-SAP & HASP Preparation	120 days	Fri 4/5/13	Fri 8/2/13	
3	Gov't Comments	30 days	Sat 8/3/13	Sun 9/1/13	2
4	Issue Draft WP	20 days	Mon 9/2/13	Sat 9/21/13	3
5	Regulatory Review	60 days	Sun 9/22/13	Wed 11/20/13	4
6	Issue Draft Final WP	30 days	Thu 11/21/13	Fri 12/20/13	5
7	Issue Final WP	30 days	Sat 12/21/13	Sun 1/19/14	6
8	Fieldwork	50 days	Sat 2/1/14	Sat 3/22/14	7
9	**Phase 3 RI Report**	**310 days**	**Sun 3/23/14**	**Mon 1/26/15**	
10	Preliminary RI	140 days	Sun 3/23/14	Sat 8/9/14	8
11	Gov't Comments	30 days	Sun 8/10/14	Mon 9/8/14	10
12	Issue Draft RI report	20 days	Tue 9/9/14	Sun 9/28/14	11
13	Regulatory Review	60 days	Mon 9/29/14	Thu 11/27/14	12
14	Issue Draft Final RI report	30 days	Fri 11/28/14	Sat 12/27/14	13
15	Issue Final RI report	30 days	Sun 12/28/14	Mon 1/26/15	14
16	**Tech Memo for Conveyor Area**	**210 days**	**Sat 9/26/15**	**Fri 4/22/16**	
17	Preliminary Draft Tech Memo for Conveyor Area	90 days	Sat 9/26/15	Thu 12/24/15	8,40
18	Gov't Comments	15 days	Fri 12/25/15	Fri 1/8/16	17
19	Issue Draft Tech Memo for Conveyor Area	15 days	Sat 1/9/16	Sat 1/23/16	18
20	Regulatory Review	30 days	Sun 1/24/16	Mon 2/22/16	19
21	Issue Draft Final Tech Memo for Conveyor Area	30 days	Tue 2/23/16	Wed 3/23/16	20
22	Issue Final Tech Memo for Conveyor Area	30 days	Thu 3/24/16	Fri 4/22/16	21
23	**LUC RD (Conveyor Area)**	**240 days**	**Mon 7/7/14**	**Tue 3/3/15**	
24	Preliminary Draft LUC RD (Conveyor Belt)	90 days	Mon 7/7/14	Sat 10/4/14	
25	Gov't Comments	15 days	Sun 10/5/14	Sun 10/19/14	24
26	Issue Draft LUC RD (Conveyor Belt)	30 days	Mon 10/20/14	Tue 11/18/14	25
27	Regulatory Review	45 days	Wed 11/19/14	Fri 1/2/15	26
28	Issue Draft Final LUC RD (Conveyor Belt)	30 days	Sat 1/3/15	Sun 2/1/15	27
29	Issue Final LUC RD (Conveyor Belt)	30 days	Mon 2/2/15	Tue 3/3/15	28
30	**Five Year Review Addendum**	**120 days**	**Sun 8/17/14**	**Sun 12/14/14**	
31	Draft Five Year Review Addendum	60 days	Sun 8/17/14	Wed 10/15/14	
32	Final Five Year Review Addendum	60 days	Thu 10/16/14	Sun 12/14/14	31
33	**UFP-SAP for Pre-FS Investigation**	***285 days***	***Mon 12/15/14***	***Fri 9/25/15***	
34	Preliminary UFP-SAP & HASP Preparation	60 days	Mon 12/15/14	Thu 2/12/15	32
35	Gov't Comments	30 days	Fri 2/13/15	Sat 3/14/15	34
36	Issue Draft WP	15 days	Sun 3/15/15	Sun 3/29/15	35
37	Regulatory Review	60 days	Mon 3/30/15	Thu 5/28/15	36
38	Issue Draft Final WP	30 days	Fri 5/29/15	Sat 6/27/15	37
39	Issue Final WP	30 days	Sun 6/28/15	Mon 7/27/15	38
40	Fieldwork	60 days	Tue 7/28/15	Fri 9/25/15	39
41	**Pre-FS Report**	**305 days**	**Sat 9/26/15**	**Tue 7/26/16**	
42	Preliminary Pre-FS Report	140 days	Sat 9/26/15	Fri 2/12/16	40
43	Gov't Comments	30 days	Sat 2/13/16	Sun 3/13/16	42
44	Issue Draft Pre-FS Report	15 days	Mon 3/14/16	Mon 3/28/16	43
45	Regulatory Review	60 days	Tue 3/29/16	Fri 5/27/16	44
46	Issue Draft Final Pre-FS Report	30 days	Sat 5/28/16	Sun 6/26/16	45
47	Issue Final Pre-FS Report	30 days	Mon 6/27/16	Tue 7/26/16	46
48	**FS Report**	**240 days**	**Wed 7/27/16**	**Thu 3/23/17**	
56	**PP**	**240 days**	**Wed 2/22/17**	**Thu 10/19/17**	
64	**ROD**	**210 days**	**Mon 8/21/17**	**Sun 3/18/18**	
71	**Five Year Review (2017)**	**343 days**	**Tue 8/16/16**	**Mon 7/24/17**	
77	**RA Design**	**442 days**	**Mon 3/12/18**	**Mon 5/27/19**	
92	**CCR**	**240 days**	**Tue 5/28/19**	**Wed 1/22/20**	**91**
99	**LUC RD (final)**	**195 days**	**Mon 3/12/18**	**Sat 9/22/18**	
106	**Groundwater LTM WP & HASP**	**224 days**	**Mon 1/20/20**	**Sun 8/30/20**	
112	**RACR**	**210 days**	**Thu 1/2/20**	**Wed 7/29/20**	



Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Schedule 3-7
Site 12 SMP FY14-15

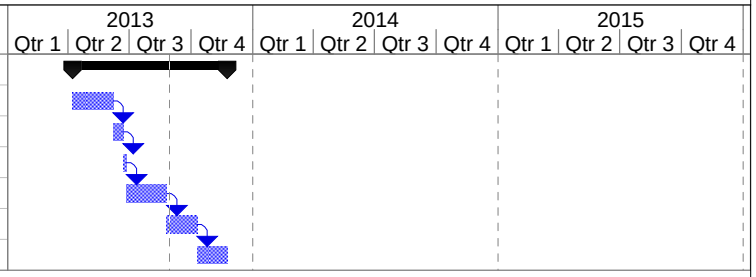
ID	Task Name	Duration	Start	Finish	Predecessors
1	**LTM Work Plan**	**500 days**	**Tue 5/15/12**	**Thu 9/26/13**	
2	Preliminary WP & HASP Preparation	60 days	Tue 5/15/12	Fri 7/13/12	
3	Gov't Comments	30 days	Sat 7/14/12	Sun 8/12/12	2
4	Issue Draft WP	60 days	Mon 8/13/12	Thu 10/11/12	3
5	Regulatory Review	200 days	Fri 10/12/12	Mon 4/29/13	4
6	Issue Draft Final WP	120 days	Tue 4/30/13	Tue 8/27/13	5
7	Issue Final WP	30 days	Wed 8/28/13	Thu 9/26/13	6
8	LTM Fieldwork	30 days	Fri 9/27/13	Sat 10/26/13	7
9	**RACR**	**195 days**	**Mon 1/13/14**	**Sat 7/26/14**	
10	Preliminary RACR	30 days	Mon 1/13/14	Tue 2/11/14	
11	Gov't Comments	15 days	Wed 2/12/14	Wed 2/26/14	10
12	Issue Draft RACR	15 days	Thu 2/27/14	Thu 3/13/14	11
13	Regulatory Review	60 days	Fri 3/14/14	Mon 5/12/14	12
14	Issue Draft Final RACR	45 days	Tue 5/13/14	Thu 6/26/14	13
15	Issue Final RACR	30 days	Fri 6/27/14	Sat 7/26/14	14
16	**LTM Report**	**250 days**	**Sun 10/27/13**	**Thu 7/3/14**	
17	Preliminary Draft Report	100 days	Sun 10/27/13	Mon 2/3/14	8
18	Gov't Comments	30 days	Tue 2/4/14	Wed 3/5/14	17
19	Issue Draft Report	30 days	Thu 3/6/14	Fri 4/4/14	18
20	Regulatory Review	30 days	Sat 4/5/14	Sun 5/4/14	19
21	Issue Draft Final Report	30 days	Mon 5/5/14	Tue 6/3/14	20
22	Issue Final Report	30 days	Wed 6/4/14	Thu 7/3/14	21
23	**Five Year Review (2017)**	**343 days**	**Tue 8/16/16**	**Mon 7/24/17**	



Task		Inactive Milestone		Finish-only	
Split		Inactive Summary		External Tasks	
Milestone		Manual Task		External Milestone	
Summary		Duration-only		Progress	
Project Summary		Manual Summary Rollup		Deadline	
External Tasks		Manual Summary			
External Milestone		Start-only			

Schedule 3-8
Site 16 SMP FY14-15

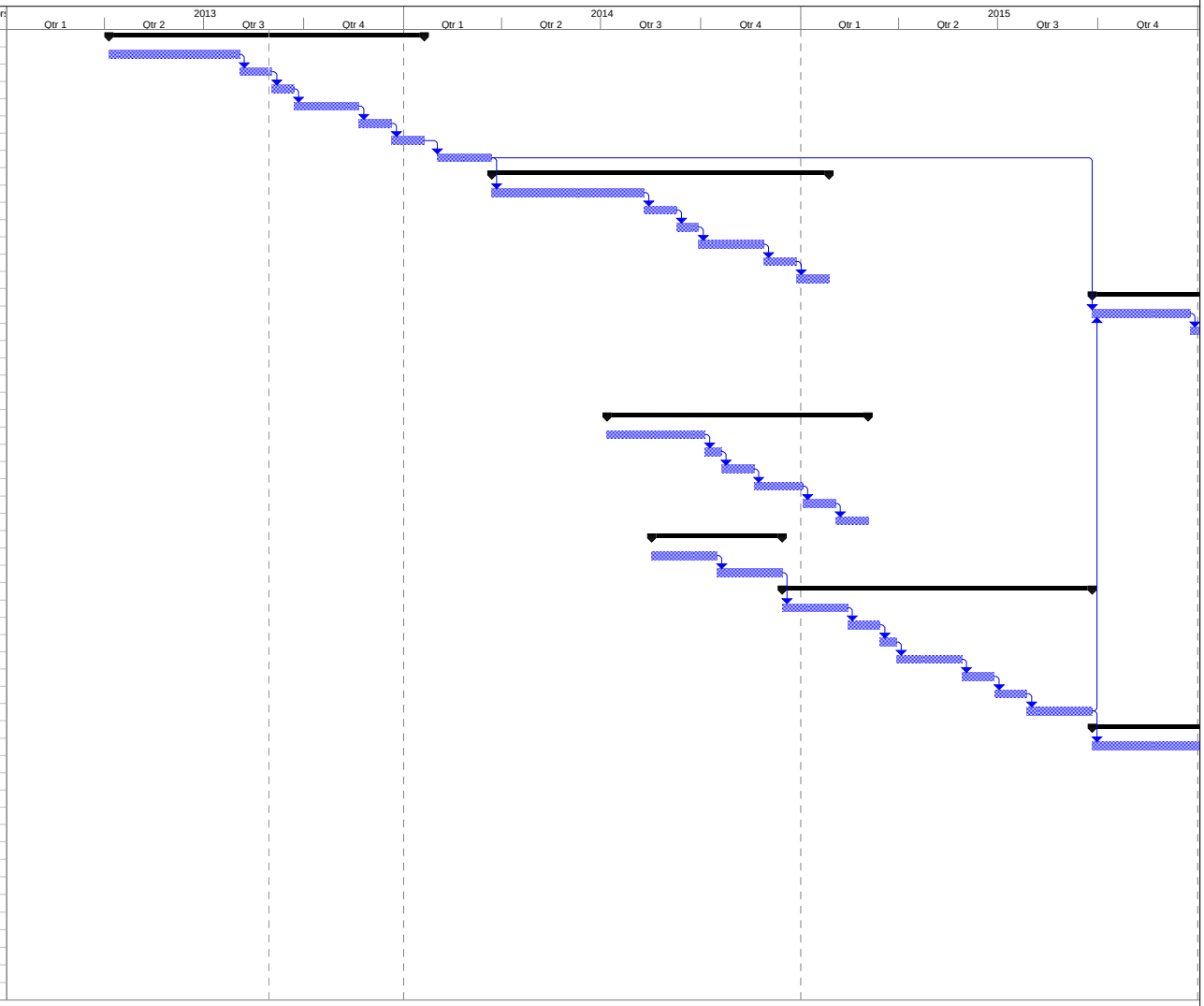
ID	Task Name	Duration	Start	Finish	Predecessors
1	**ESD to remove LUCs**	**230 days**	**Mon 4/8/13**	**Sat 11/23/13**	
2	Preliminary	60 days	Mon 4/8/13	Thu 6/6/13	
3	Gov't Comments	15 days	Fri 6/7/13	Fri 6/21/13	2
4	Issue Draft	5 days	Sat 6/22/13	Wed 6/26/13	3
5	Regulatory Review	60 days	Thu 6/27/13	Sun 8/25/13	4
6	Issue Draft Final	45 days	Mon 8/26/13	Wed 10/9/13	5
7	Issue Final	45 days	Thu 10/10/13	Sat 11/23/13	6



Task		Inactive Milestone		Finish-only	
Split		Inactive Summary		External Tasks	
Milestone		Manual Task		External Milestone	
Summary		Duration-only		Progress	
Project Summary		Manual Summary Rollup		Deadline	
External Tasks		Manual Summary			
External Milestone		Start-only			

Schedule 3-9
Site 19 SMP FY14-15

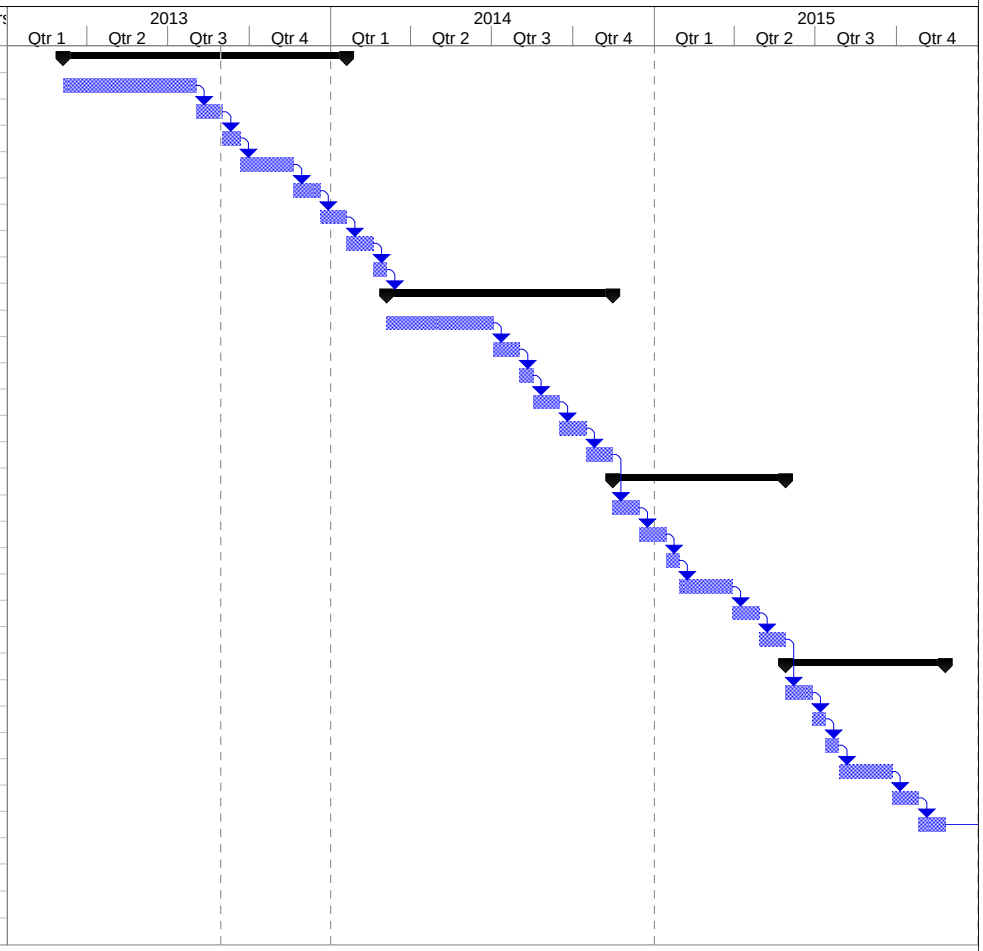
ID	Task Name	Duration	Start	Finish	Predecessors
1	**Phase 3 UFP-SAP for Data Gap Investigation**	***290 days***	***Fri 4/5/13***	***Sun 1/19/14***	
2	Preliminary UFP-SAP & HASP Preparation	120 days	Fri 4/5/13	Fri 8/2/13	
3	Gov't Comments	30 days	Sat 8/3/13	Sun 9/1/13	2
4	Issue Draft WP	20 days	Mon 9/2/13	Sat 9/21/13	3
5	Regulatory Review	60 days	Sun 9/22/13	Wed 11/20/13	4
6	Issue Draft Final WP	30 days	Thu 11/21/13	Fri 12/20/13	5
7	Issue Final WP	30 days	Sat 12/21/13	Sun 1/19/14	6
8	Fieldwork	50 days	Sat 2/1/14	Sat 3/22/14	7
9	**Phase 3 RI Report**	**310 days**	**Sun 3/23/14**	**Mon 1/26/15**	
10	Preliminary RI	140 days	Sun 3/23/14	Sat 8/9/14	8
11	Gov't Comments	30 days	Sun 8/10/14	Mon 9/8/14	10
12	Issue Draft RI report	20 days	Tue 9/9/14	Sun 9/28/14	11
13	Regulatory Review	60 days	Mon 9/29/14	Thu 11/27/14	12
14	Issue Draft Final RI report	30 days	Fri 11/28/14	Sat 12/27/14	13
15	Issue Final RI report	30 days	Sun 12/28/14	Mon 1/26/15	14
16	**Tech Memo for Conveyor Area**	**210 days**	**Sat 9/26/15**	**Fri 4/22/16**	
17	Preliminary Draft Tech Memo for Conveyor Area	90 days	Sat 9/26/15	Thu 12/24/15	8,40
18	Gov't Comments	15 days	Fri 12/25/15	Fri 1/8/16	17
19	Issue Draft Tech Memo for Conveyor Area	15 days	Sat 1/9/16	Sat 1/23/16	18
20	Regulatory Review	30 days	Sun 1/24/16	Mon 2/22/16	19
21	Issue Draft Final Tech Memo for Conveyor Area	30 days	Tue 2/23/16	Wed 3/23/16	20
22	Issue Final Tech Memo for Conveyor Area	30 days	Thu 3/24/16	Fri 4/22/16	21
23	**LUC RD (Conveyor Area)**	**240 days**	**Mon 7/7/14**	**Tue 3/3/15**	
24	Preliminary Draft LUC RD (Conveyor Belt)	90 days	Mon 7/7/14	Sat 10/4/14	
25	Gov't Comments	15 days	Sun 10/5/14	Sun 10/19/14	24
26	Issue Draft LUC RD (Conveyor Belt)	30 days	Mon 10/20/14	Tue 11/18/14	25
27	Regulatory Review	45 days	Wed 11/19/14	Fri 1/2/15	26
28	Issue Draft Final LUC RD (Conveyor Belt)	30 days	Sat 1/3/15	Sun 2/1/15	27
29	Issue Final LUC RD (Conveyor Belt)	30 days	Mon 2/2/15	Tue 3/3/15	28
30	**Five Year Review Addendum**	**120 days**	**Sun 8/17/14**	**Sun 12/14/14**	
31	Draft Five Year Review Addendum	60 days	Sun 8/17/14	Wed 10/15/14	
32	Final Five Year Review Addendum	60 days	Thu 10/16/14	Sun 12/14/14	31
33	**UFP-SAP for Pre-FS Investigation**	***285 days***	***Mon 12/15/14***	***Fri 9/25/15***	
34	Preliminary UFP-SAP & HASP Preparation	60 days	Mon 12/15/14	Thu 2/12/15	32
35	Gov't Comments	30 days	Fri 2/13/15	Sat 3/14/15	34
36	Issue Draft WP	15 days	Sun 3/15/15	Sun 3/29/15	35
37	Regulatory Review	60 days	Mon 3/30/15	Thu 5/28/15	36
38	Issue Draft Final WP	30 days	Fri 5/29/15	Sat 6/27/15	37
39	Issue Final WP	30 days	Sun 6/28/15	Mon 7/27/15	38
40	Fieldwork	60 days	Tue 7/28/15	Fri 9/25/15	39
41	**Pre-FS Report**	**305 days**	**Sat 9/26/15**	**Tue 7/26/16**	
42	Preliminary Pre-FS Report	140 days	Sat 9/26/15	Fri 2/12/16	40
43	Gov't Comments	30 days	Sat 2/13/16	Sun 3/13/16	42
44	Issue Draft Pre-FS Report	15 days	Mon 3/14/16	Mon 3/28/16	43
45	Regulatory Review	60 days	Tue 3/29/16	Fri 5/27/16	44
46	Issue Draft Final Pre-FS Report	30 days	Sat 5/28/16	Sun 6/26/16	45
47	Issue Final Pre-FS Report	30 days	Mon 6/27/16	Tue 7/26/16	46
48	**FS Report**	**240 days**	**Wed 7/27/16**	**Thu 3/23/17**	
56	**PP**	**240 days**	**Wed 2/22/17**	**Thu 10/19/17**	
64	**ROD**	**210 days**	**Mon 8/21/17**	**Sun 3/18/18**	
71	**Five Year Review (2017)**	**343 days**	**Tue 8/16/16**	**Mon 7/24/17**	
77	**RA Design**	**442 days**	**Mon 3/12/18**	**Mon 5/27/19**	
92	**CCR**	**240 days**	**Tue 5/28/19**	**Wed 1/22/20**	**91**
99	**LUC RD (final)**	**195 days**	**Mon 3/12/18**	**Sat 9/22/18**	
106	**Groundwater LTM WP & HASP**	**224 days**	**Mon 1/20/20**	**Sun 8/30/20**	
112	**RACR**	**210 days**	**Thu 1/2/20**	**Wed 7/29/20**	



Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Schedule 3-10
Site 22 SMP FY14-15

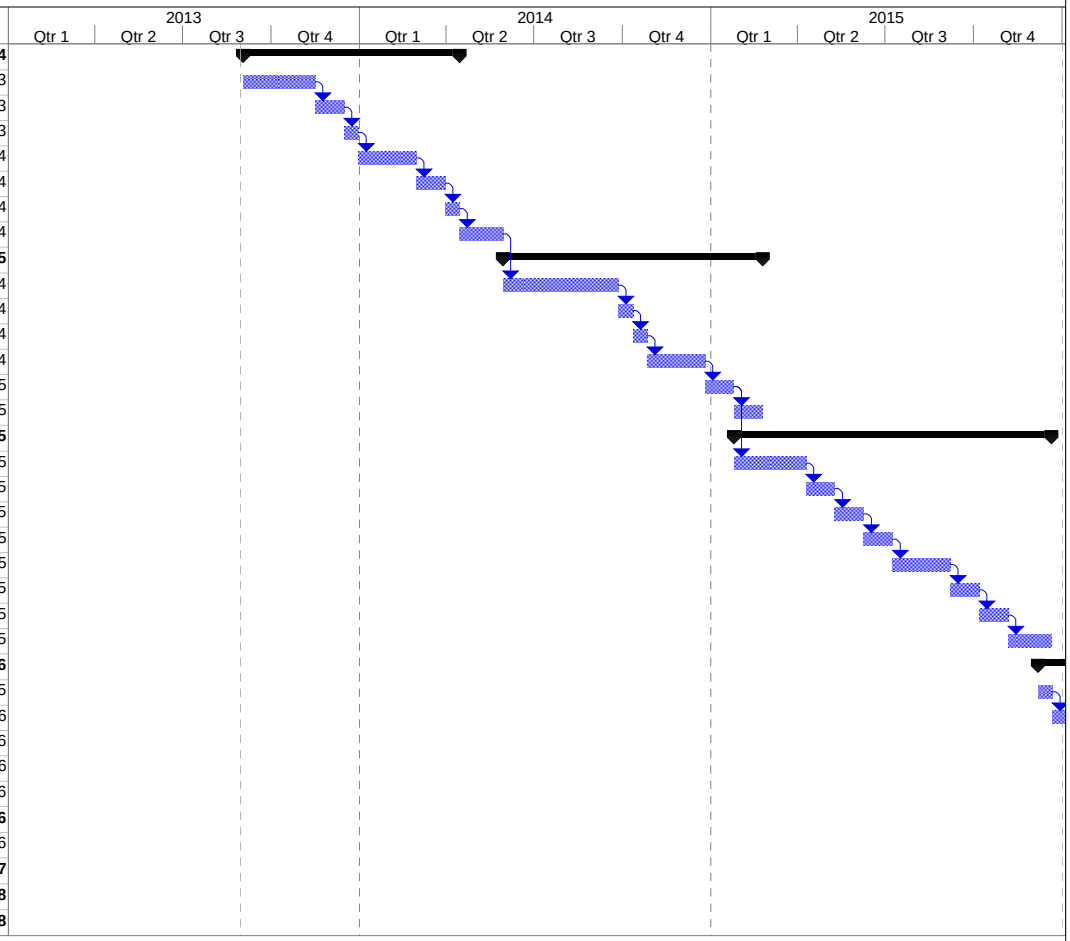
ID	Task Name	Duration	Start	Finish	Predecessors
1	**Pre-RD Work Plan**	**320 days**	**Tue 3/5/13**	**Sat 1/18/14**	
2	Preliminary Pre- RD WP & HASP	150 days	Tue 3/5/13	Thu 8/1/13	
3	Gov't Comments	30 days	Fri 8/2/13	Sat 8/31/13	2
4	Issue Draft Pre-RD WP	20 days	Sun 9/1/13	Fri 9/20/13	3
5	Regulatory Review	60 days	Sat 9/21/13	Tue 11/19/13	4
6	Issue Draft Final Pre-RD WP	30 days	Wed 11/20/13	Thu 12/19/13	5
7	Issue Final Pre-RD WP	30 days	Fri 12/20/13	Sat 1/18/14	6
8	Pre-RD Field Work	30 days	Sun 1/19/14	Mon 2/17/14	7
9	Pre-RD GW Sampling	15 days	Tue 2/18/14	Tue 3/4/14	8
10	**Pre-RD Summary Report**	**255 days**	**Wed 3/5/14**	**Fri 11/14/14**	**9**
11	Preliminary Draft	120 days	Wed 3/5/14	Wed 7/2/14	
12	Gov't Comments	30 days	Thu 7/3/14	Fri 8/1/14	11
13	Issue Draft	15 days	Sat 8/2/14	Sat 8/16/14	12
14	Regulatory Review	30 days	Sun 8/17/14	Mon 9/15/14	13
15	Issue Draft Final	30 days	Tue 9/16/14	Wed 10/15/14	14
16	Issue Final	30 days	Thu 10/16/14	Fri 11/14/14	15
17	**Remedial Design**	**195 days**	**Sat 11/15/14**	**Thu 5/28/15**	
18	Preliminary RD	30 days	Sat 11/15/14	Sun 12/14/14	16
19	Gov't Comments	30 days	Mon 12/15/14	Tue 1/13/15	18
20	Issue Draft RD	15 days	Wed 1/14/15	Wed 1/28/15	19
21	Regulatory Review	60 days	Thu 1/29/15	Sun 3/29/15	20
22	Issue Draft Final RD	30 days	Mon 3/30/15	Tue 4/28/15	21
23	Issue Final RD	30 days	Wed 4/29/15	Thu 5/28/15	22
24	**Work Plan for Remedial Action**	**180 days**	**Fri 5/29/15**	**Tue 11/24/15**	
25	Preliminary WP & HASP Preparation	30 days	Fri 5/29/15	Sat 6/27/15	23
26	Gov't Comments	15 days	Sun 6/28/15	Sun 7/12/15	25
27	Issue Draft WP	15 days	Mon 7/13/15	Mon 7/27/15	26
28	Regulatory Review	60 days	Tue 7/28/15	Fri 9/25/15	27
29	Issue Draft Final WP	30 days	Sat 9/26/15	Sun 10/25/15	28
30	Issue Final WP	30 days	Mon 10/26/15	Tue 11/24/15	29
31	Remedial Action Fieldwork	60 days	Mon 2/1/16	Thu 3/31/16	30
32	**CCR**	**240 days**	**Fri 4/1/16**	**Sat 11/26/16**	**30,31**
39	**Groundwater LTM WP & HASP**	**216 days**	**Sun 11/27/16**	**Fri 6/30/17**	**38**
45	**RACR**	**196 days**	**Mon 11/7/16**	**Sun 5/21/17**	



Task		External Tasks		Duration-only		External Tasks	
Split		External Milestone		Manual Summary Rollup		External Milestone	
Milestone		Inactive Milestone		Manual Summary		Progress	
Summary		Inactive Summary		Start-only		Deadline	
Project Summary		Manual Task		Finish-only			

Schedule 3-11
Site 23 SMP FY14-15

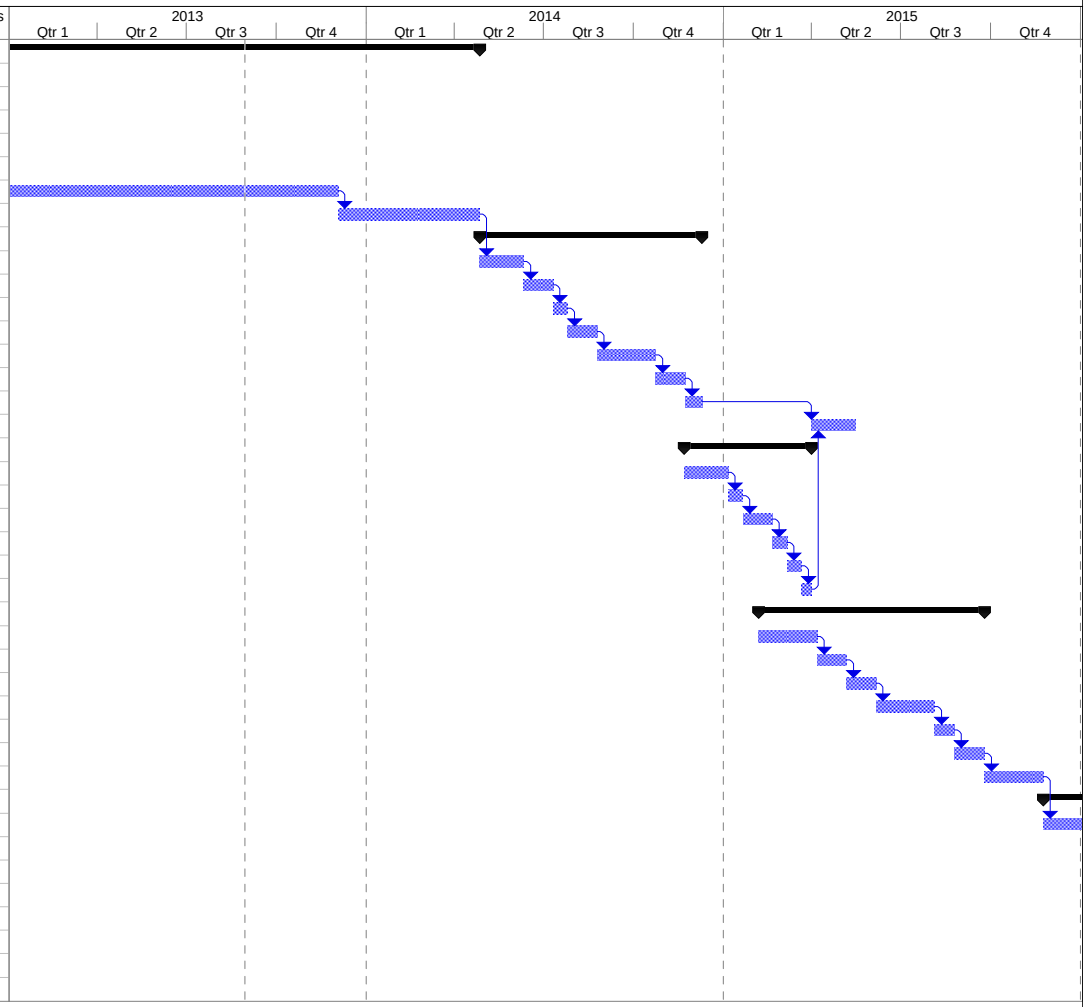
ID	Task Name	Duration	Start	Finish
1	**Work Plan for Additional RI Activities**	**225 days**	**Mon 9/2/13**	**Mon 4/14/14**
2	Preliminary UFP-SAP & HASP	75 days	Mon 9/2/13	Fri 11/15/13
3	Gov't Comments	30 days	Sat 11/16/13	Sun 12/15/13
4	Issue Draft UFP-SAP	15 days	Mon 12/16/13	Mon 12/30/13
5	Regulatory Review	60 days	Tue 12/31/13	Fri 2/28/14
6	Issue Draft Final UFP-SAP	30 days	Sat 3/1/14	Sun 3/30/14
7	Issue Final UFP-SAP Report	15 days	Mon 3/31/14	Mon 4/14/14
8	RI Field Work	45 days	Tue 4/15/14	Thu 5/29/14
9	**RI Report**	**270 days**	**Fri 5/30/14**	**Mon 2/23/15**
10	Preliminary RI	120 days	Fri 5/30/14	Fri 9/26/14
11	Gov't Comments	15 days	Sat 9/27/14	Sat 10/11/14
12	Issue Draft RI report	15 days	Sun 10/12/14	Sun 10/26/14
13	Regulatory Review	60 days	Mon 10/27/14	Thu 12/25/14
14	Issue Draft Final RI report	30 days	Fri 12/26/14	Sat 1/24/15
15	Issue Final RI report	30 days	Sun 1/25/15	Mon 2/23/15
16	**EE/CA**	**330 days**	**Sun 1/25/15**	**Sun 12/20/15**
17	RAA	75 days	Sun 1/25/15	Thu 4/9/15
18	Preliminary EE/CA	30 days	Fri 4/10/15	Sat 5/9/15
19	Gov't Comments	30 days	Sun 5/10/15	Mon 6/8/15
20	Issue Draft EE/CA	30 days	Tue 6/9/15	Wed 7/8/15
21	Regulatory Review	60 days	Thu 7/9/15	Sun 9/6/15
22	Issue Draft Final EE/CA	30 days	Mon 9/7/15	Tue 10/6/15
23	Issue Final EE/CA	30 days	Wed 10/7/15	Thu 11/5/15
24	Public Review & AM	45 days	Fri 11/6/15	Sun 12/20/15
25	**Removal AM**	**75 days**	**Mon 12/7/15**	**Fri 2/19/16**
26	Perliminary Removal AM	15 days	Mon 12/7/15	Mon 12/21/15
27	Gov't Comments	15 days	Tue 12/22/15	Tue 1/5/16
28	Issue Draft Removal AM	15 days	Wed 1/6/16	Wed 1/20/16
29	Regulatory Review	15 days	Thu 1/21/16	Thu 2/4/16
30	Issue Final Removal AM	15 days	Fri 2/5/16	Fri 2/19/16
31	**Removal Action Work Plan**	**180 days**	**Sat 2/20/16**	**Wed 8/17/16**
38	Removal Action Field Work	60 days	Thu 8/18/16	Sun 10/16/16
39	**Construction Completion Report**	**270 days**	**Mon 10/17/16**	**Thu 7/13/17**
46	**NFA PRAP**	**225 days**	**Fri 7/14/17**	**Fri 2/23/18**
54	**NFA ROD**	**195 days**	**Wed 1/10/18**	**Mon 7/23/18**



Task		External Tasks		Duration-only		External Tasks	
Split		External Milestone		Manual Summary Rollup		External Milestone	
Milestone		Inactive Milestone		Manual Summary		Progress	
Summary		Inactive Summary		Start-only		Deadline	
Project Summary		Manual Task		Finish-only			

Schedule 3-12
Site 24 SMP FY14-15

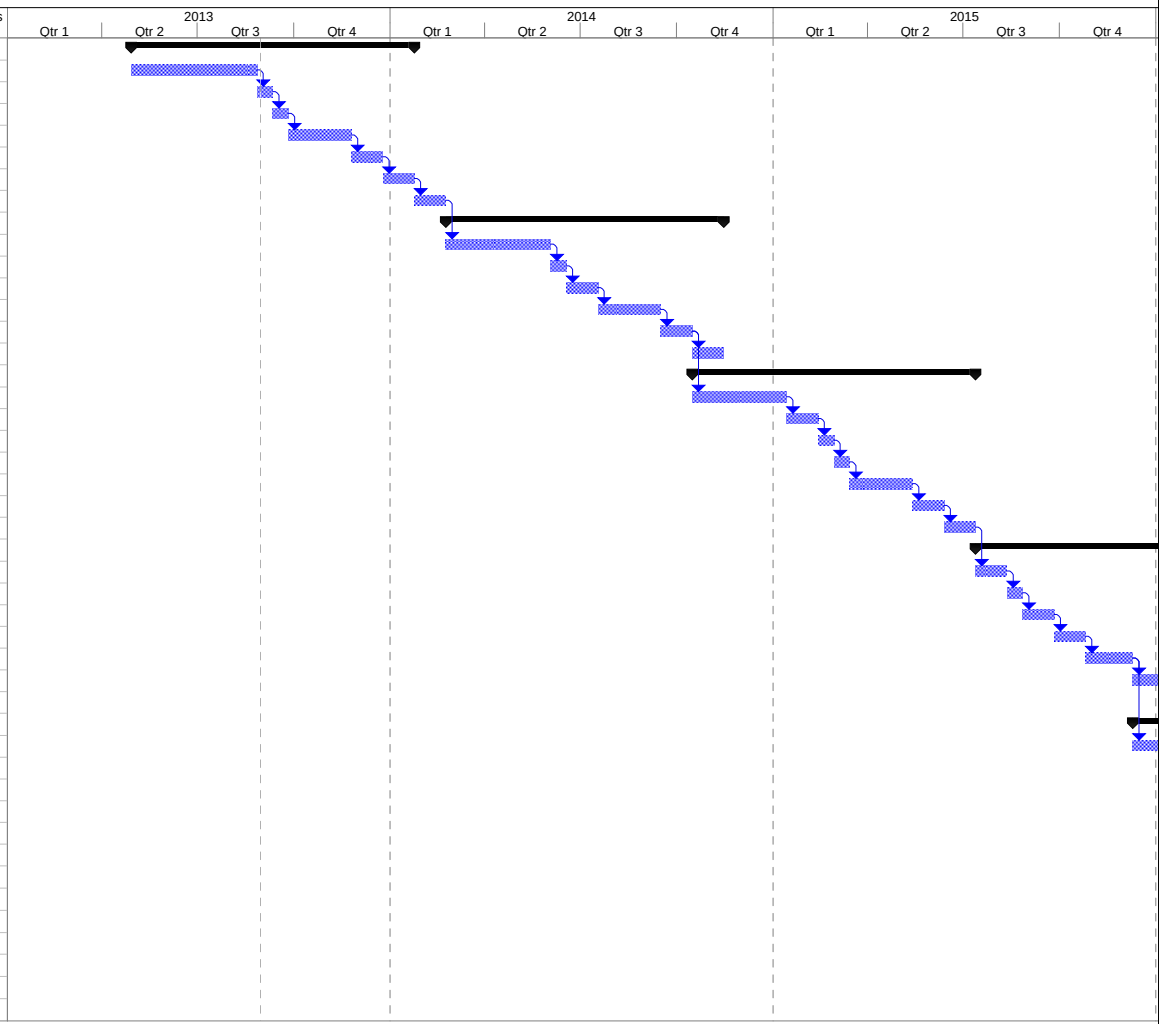
ID	Task Name	Duration	Start	Finish	Predecessors
7	**RI Report for Additional Activities**	**1315 days**	**Mon 9/20/10**	**Sat 4/26/14**	
8	Preliminary RI	346 days	Mon 9/20/10	Wed 8/31/11	
9	Gov't Comments	31 days	Thu 9/1/11	Sat 10/1/11	8
10	Issue Draft RI report	90 days	Wed 10/12/11	Mon 1/9/12	9
11	Regulatory Review	60 days	Tue 1/10/12	Fri 3/9/12	10
12	Resolve regulatory comments	100 days	Sat 3/10/12	Sun 6/17/12	11
13	Issue Draft Final RI report	450 days	Sun 9/9/12	Mon 12/2/13	12
14	Issue Final RI report	145 days	Tue 12/3/13	Sat 4/26/14	13
15	**EE/CA**	**227 days**	**Sun 4/27/14**	**Tue 12/9/14**	
16	RAA	45 days	Sun 4/27/14	Tue 6/10/14	14
17	Preliminary EE/CA	30 days	Wed 6/11/14	Thu 7/10/14	16
18	Gov't Comments	15 days	Fri 7/11/14	Fri 7/25/14	17
19	Issue Draft EE/CA	30 days	Sat 7/26/14	Sun 8/24/14	18
20	Regulatory Review	60 days	Mon 8/25/14	Thu 10/23/14	19
21	Issue Draft Final EE/CA	30 days	Fri 10/24/14	Sat 11/22/14	20
22	Issue Final EE/CA	17 days	Sun 11/23/14	Tue 12/9/14	21
23	Public Review & AM	45 days	Wed 4/1/15	Fri 5/15/15	22,32
26	**Action Memo**	**130 days**	**Sat 11/22/14**	**Tue 3/31/15**	
27	Preliminary AM	45 days	Sat 11/22/14	Mon 1/5/15	
28	Gov't Comments	15 days	Tue 1/6/15	Tue 1/20/15	27
29	Issue Draft AM	30 days	Wed 1/21/15	Thu 2/19/15	28
30	Regulatory Review	15 days	Fri 2/20/15	Fri 3/6/15	29
31	Issue Draft Final AM	15 days	Sat 3/7/15	Sat 3/21/15	30
32	Issue Final AM	10 days	Sun 3/22/15	Tue 3/31/15	31
33	**Removal Action Work Plan**	**231 days**	**Fri 2/6/15**	**Thu 9/24/15**	
34	Preliminary Work Plan & HASP	60 days	Fri 2/6/15	Mon 4/6/15	
35	Gov't Comments	30 days	Tue 4/7/15	Wed 5/6/15	34
36	Issue Draft Work Plan	30 days	Thu 5/7/15	Fri 6/5/15	35
37	Regulatory Review	60 days	Sat 6/6/15	Tue 8/4/15	36
38	Issue Draft Final Work Plan	20 days	Wed 8/5/15	Mon 8/24/15	37
39	Issue Final Work Plan	31 days	Tue 8/25/15	Thu 9/24/15	38
40	Removal Action Field Work	60 days	Fri 9/25/15	Mon 11/23/15	39
41	**Construction Completion Report**	**210 days**	**Tue 11/24/15**	**Mon 6/20/16**	
42	Preliminary CCR	60 days	Tue 11/24/15	Fri 1/22/16	40
43	Gov't Comments	15 days	Sat 1/23/16	Sat 2/6/16	42
44	Issue Draft CCR	15 days	Sun 2/7/16	Sun 2/21/16	43
45	Regulatory Review	60 days	Mon 2/22/16	Thu 4/21/16	44
46	Issue Draft Final CCR	30 days	Fri 4/22/16	Sat 5/21/16	45
47	Issue Final CCR	30 days	Sun 5/22/16	Mon 6/20/16	46
48	**NFA PRAP (all media)**	**240 days**	**Sun 5/22/16**	**Mon 1/16/17**	
56	**ROD**	**240 days**	**Thu 11/3/16**	**Fri 6/30/17**	

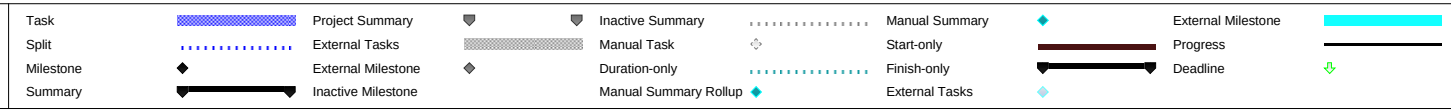


Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Schedule 3-13
Site 25 SMP FY14-15

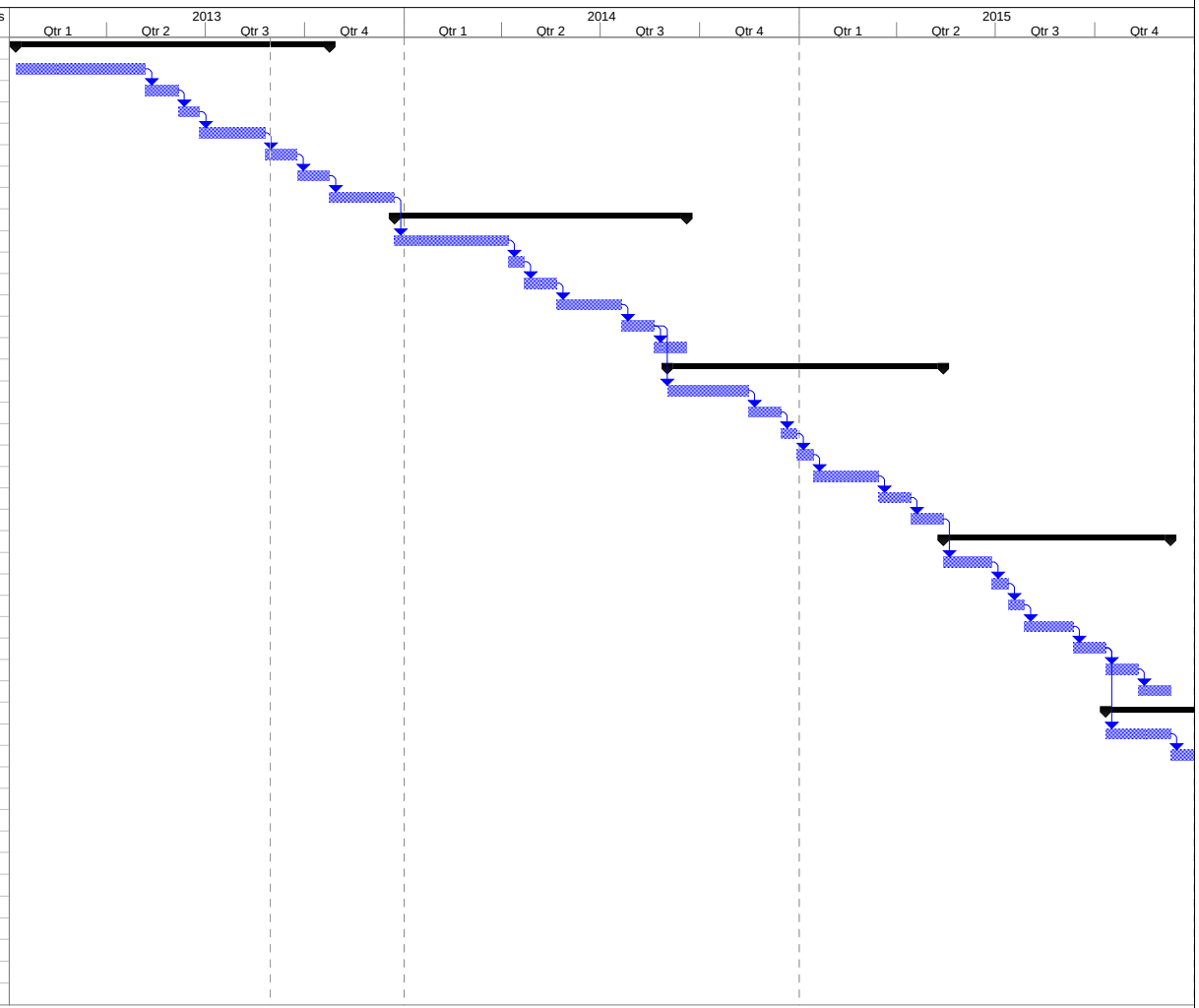
ID	Task Name	Duration	Start	Finish	Predecessors
1	**Work Plan for Additional RI Activities**	**270 days**	**Mon 4/29/13**	**Thu 1/23/14**	
2	Preliminary UFP-SAP & HASP	120 days	Mon 4/29/13	Mon 8/26/13	
3	Gov't Comments	15 days	Tue 8/27/13	Tue 9/10/13	2
4	Issue Draft UFP-SAP	15 days	Wed 9/11/13	Wed 9/25/13	3
5	Regulatory Review	60 days	Thu 9/26/13	Sun 11/24/13	4
6	Issue Draft Final UFP-SAP	30 days	Mon 11/25/13	Tue 12/24/13	5
7	Issue Final UFP-SAP Report	30 days	Wed 12/25/13	Thu 1/23/14	6
8	RI Field Work	30 days	Fri 1/24/14	Sat 2/22/14	7
9	**RI Report**	**265 days**	**Sun 2/23/14**	**Fri 11/14/14**	
10	Preliminary RI	100 days	Sun 2/23/14	Mon 6/2/14	8
11	Gov't Comments	15 days	Tue 6/3/14	Tue 6/17/14	10
12	Issue Draft RI report	30 days	Wed 6/18/14	Thu 7/17/14	11
13	Regulatory Review	60 days	Fri 7/18/14	Mon 9/15/14	12
14	Issue Draft Final RI report	30 days	Tue 9/16/14	Wed 10/15/14	13
15	Issue Final RI report	30 days	Thu 10/16/14	Fri 11/14/14	14
16	**FS Report**	**270 days**	**Thu 10/16/14**	**Sun 7/12/15**	
17	RAA	90 days	Thu 10/16/14	Tue 1/13/15	14
18	Preliminary FS	30 days	Wed 1/14/15	Thu 2/12/15	17
19	Gov't Comments	15 days	Fri 2/13/15	Fri 2/27/15	18
20	Issue Draft FS	15 days	Sat 2/28/15	Sat 3/14/15	19
21	Regulatory Review	60 days	Sun 3/15/15	Wed 5/13/15	20
22	Issue Draft Final FS	30 days	Thu 5/14/15	Fri 6/12/15	21
23	Issue Final FS	30 days	Sat 6/13/15	Sun 7/12/15	22
24	**PRAP (all media)**	**225 days**	**Mon 7/13/15**	**Mon 2/22/16**	
25	Preliminary PP	30 days	Mon 7/13/15	Tue 8/11/15	23
26	Gov't Comments	15 days	Wed 8/12/15	Wed 8/26/15	25
27	Issue Draft PP	30 days	Thu 8/27/15	Fri 9/25/15	26
28	Regulatory / Legal Review	30 days	Sat 9/26/15	Sun 10/25/15	27
29	Issue Draft Final PP	45 days	Mon 10/26/15	Wed 12/9/15	28
30	Issue Final PP	30 days	Thu 12/10/15	Fri 1/8/16	29
31	Public Comment Period	45 days	Sat 1/9/16	Mon 2/22/16	30
32	**ROD**	**215 days**	**Thu 12/10/15**	**Mon 7/11/16**	
33	Preliminary ROD	60 days	Thu 12/10/15	Sun 2/7/16	29
34	Navy Review	30 days	Mon 2/8/16	Tue 3/8/16	33
35	Issue Draft ROD	20 days	Wed 3/9/16	Mon 3/28/16	34
36	Regulatory / Legal Review	30 days	Tue 3/29/16	Wed 4/27/16	35
37	Issue Draft Final ROD	45 days	Thu 4/28/16	Sat 6/11/16	36
38	Issue ROD for Signature	30 days	Sun 6/12/16	Mon 7/11/16	37
39	**LUC RD**	**195 days**	**Tue 7/12/16**	**Sun 1/22/17**	
46	**RA Design**	**225 days**	**Sun 6/12/16**	**Sun 1/22/17**	
53	**RA Work Plan**	**251 days**	**Sat 12/24/16**	**Thu 8/31/17**	
60	RA Field Work	30 days	Fri 9/1/17	Sat 9/30/17	59
61	**CCR**	**240 days**	**Sun 10/1/17**	**Mon 5/28/18**	
68	**Groundwater LTM WP & HASP**	**225 days**	**Tue 5/29/18**	**Tue 1/8/19**	**61**
74	**RACR**	**338 days**	**Wed 2/1/17**	**Thu 1/4/18**	





Schedule 3-14
Site 26 SMP FY14-15

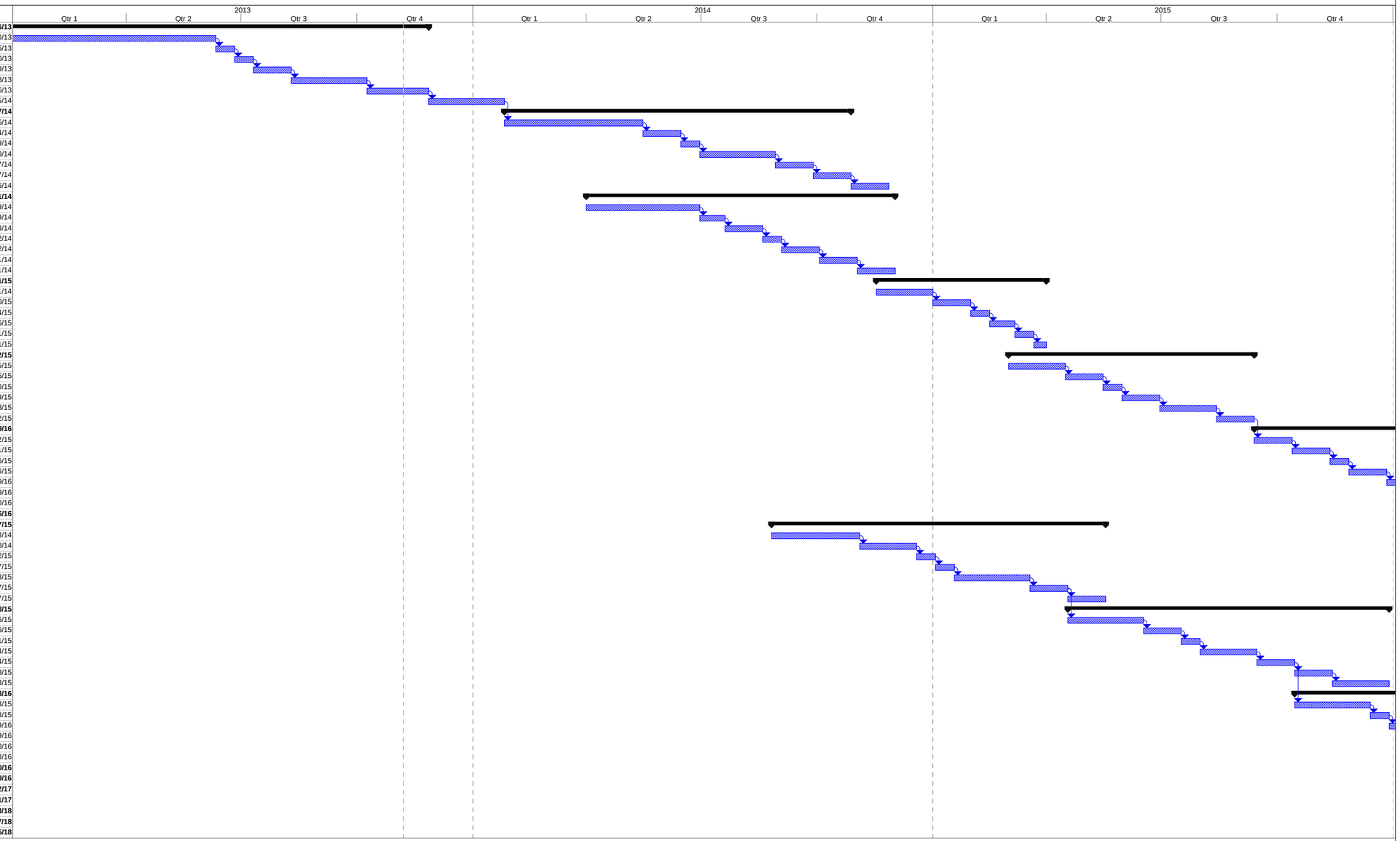
ID	Task Name	Duration	Start	Finish	Predecessors
1	**RI SAP**	**290 days**	**Mon 1/7/13**	**Wed 10/23/13**	
2	Preliminary UFP-SAP & HASP	120 days	Mon 1/7/13	Mon 5/6/13	
3	Gov't Comments	30 days	Tue 5/7/13	Wed 6/5/13	2
4	Issue Draft UFP-SAP	20 days	Thu 6/6/13	Tue 6/25/13	3
5	Regulatory Review	60 days	Wed 6/26/13	Sat 8/24/13	4
6	Issue Draft Final UFP-SAP	30 days	Sun 8/25/13	Mon 9/23/13	5
7	Issue Final UFP-SAP Report	30 days	Tue 9/24/13	Wed 10/23/13	6
8	RI Field Work	60 days	Thu 10/24/13	Sun 12/22/13	7
9	**RI Report**	**270 days**	**Mon 12/23/13**	**Thu 9/18/14**	
10	Preliminary RI	105 days	Mon 12/23/13	Sun 4/6/14	8
11	Gov't Comments	15 days	Mon 4/7/14	Mon 4/21/14	10
12	Issue Draft RI report	30 days	Tue 4/22/14	Wed 5/21/14	11
13	Regulatory Review	60 days	Thu 5/22/14	Sun 7/20/14	12
14	Issue Draft Final RI report	30 days	Mon 7/21/14	Tue 8/19/14	13
15	Issue Final RI report	30 days	Wed 8/20/14	Thu 9/18/14	14
16	**FS Report**	**255 days**	**Mon 9/1/14**	**Wed 5/13/15**	
17	RAA	75 days	Mon 9/1/14	Fri 11/14/14	14
18	Preliminary FS	30 days	Sat 11/15/14	Sun 12/14/14	17
19	Gov't Comments	15 days	Mon 12/15/14	Mon 12/29/14	18
20	Issue Draft FS	15 days	Tue 12/30/14	Tue 1/13/15	19
21	Regulatory Review	60 days	Wed 1/14/15	Sat 3/14/15	20
22	Issue Draft Final FS	30 days	Sun 3/15/15	Mon 4/13/15	21
23	Issue Final FS	30 days	Tue 4/14/15	Wed 5/13/15	22
24	**PP**	**210 days**	**Thu 5/14/15**	**Wed 12/9/15**	
25	Preliminary PP	45 days	Thu 5/14/15	Sat 6/27/15	23
26	Gov't Comments	15 days	Sun 6/28/15	Sun 7/12/15	25
27	Issue Draft PP	15 days	Mon 7/13/15	Mon 7/27/15	26
28	Regulatory / Legal Review	45 days	Tue 7/28/15	Thu 9/10/15	27
29	Issue Draft Final PP	30 days	Fri 9/11/15	Sat 10/10/15	28
30	Issue Final PP	30 days	Sun 10/11/15	Mon 11/9/15	29
31	Public Comment Period	30 days	Tue 11/10/15	Wed 12/9/15	30
32	**ROD**	**390 days**	**Sun 10/11/15**	**Thu 11/3/16**	
33	Preliminary ROD	60 days	Sun 10/11/15	Wed 12/9/15	29
34	Navy Review	30 days	Thu 12/10/15	Fri 1/8/16	33
35	Issue Draft ROD	15 days	Sat 1/9/16	Sat 1/23/16	34
36	Regulatory / Legal Review	45 days	Sun 1/24/16	Tue 3/8/16	35
37	Issue Draft Final ROD	30 days	Wed 3/9/16	Thu 4/7/16	36
38	Issue ROD for Signature	30 days	Fri 4/8/16	Sat 5/7/16	37
39	**LUC RD**	**180 days**	**Sun 5/8/16**	**Thu 11/3/16**	
46	**RA Design**	**225 days**	**Fri 4/8/16**	**Fri 11/18/16**	
53	**RA Work Plan**	**224 days**	**Thu 10/20/16**	**Wed 5/31/17**	
60	RA Field Work	60 days	Thu 6/1/17	Sun 7/30/17	59
61	**CCR**	**240 days**	**Mon 7/31/17**	**Tue 3/27/18**	**60**
68	**Groundwater LTM WP & HASP**	**217 days**	**Wed 3/28/18**	**Tue 10/30/18**	**61**
74	**RACR**	**225 days**	**Sun 2/11/18**	**Sun 9/23/18**	



Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Progress
Deadline

Schedule 3-15
Site 31 SMP FY14-15

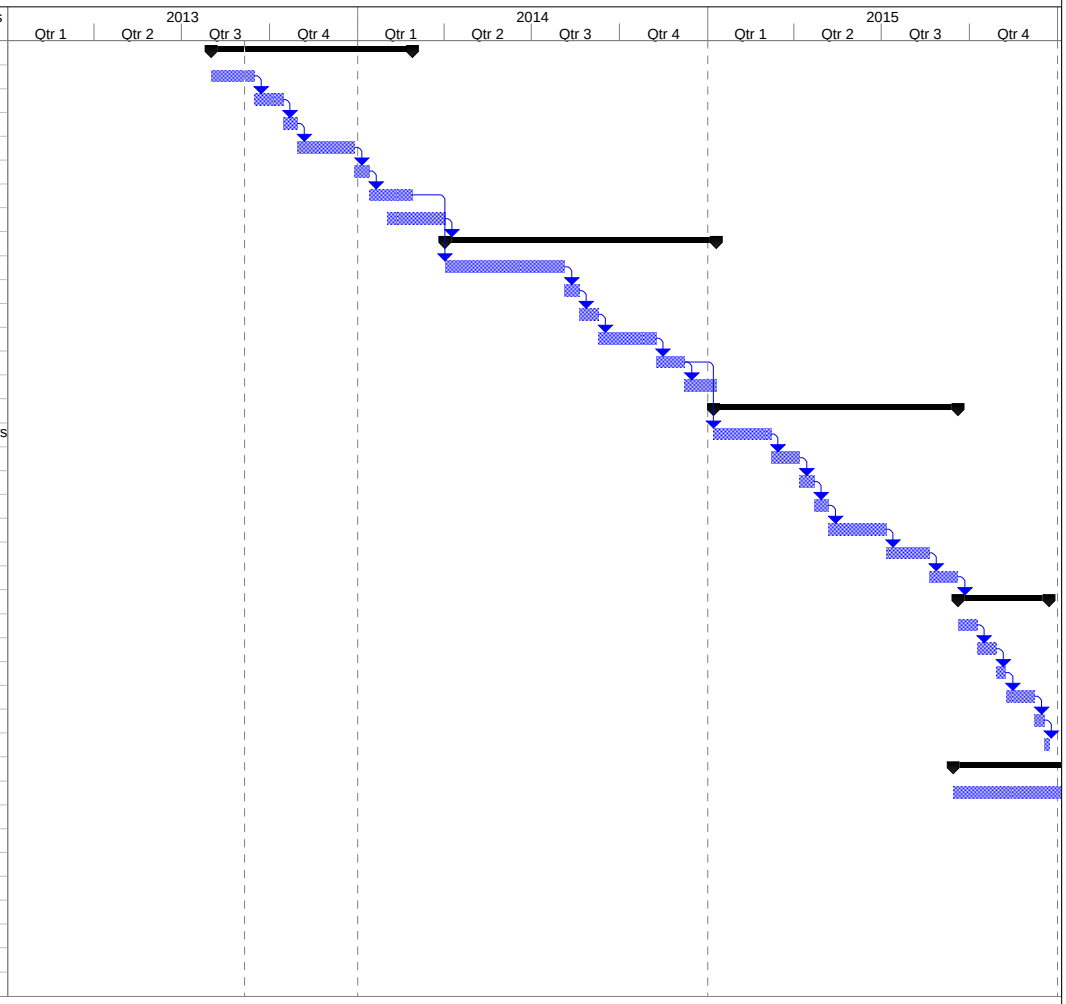
ID	Task Name	Duration	Start	Finish
1	**Supplemental Remedial Investigation**	**546 days**	**Wed 5/30/12**	**Tue 11/26/13**
2	Preliminary Revised UFP-SAP Preparation	377 days	Wed 5/30/12	Mon 6/10/13
3	Gov't Comments	15 days	Tue 6/11/13	Tue 6/25/13
4	Issue Draft Revised UFP-SAP	15 days	Wed 6/26/13	Wed 7/10/13
5	Regulatory Review	30 days	Thu 7/11/13	Fri 8/9/13
6	Issue Draft Final Revised UFP-SAP	60 days	Sat 8/10/13	Tue 10/8/13
7	Issue Final Revised UFP-SAP	49 days	Wed 10/9/13	Tue 11/26/13
8	Supplemental RI Field Work	60 days	Wed 11/27/13	Sat 1/25/14
9	**RI Report**	**275 days**	**Sun 1/26/14**	**Mon 10/27/14**
10	Preliminary RI	110 days	Sun 1/26/14	Thu 5/15/14
11	Gov't Comments	30 days	Fri 5/16/14	Sat 6/14/14
12	Issue Draft RI Report	15 days	Sun 6/15/14	Sun 6/29/14
13	Regulatory Review	60 days	Mon 6/30/14	Thu 8/28/14
14	Issue Draft Final RI Report	30 days	Fri 8/29/14	Sat 9/27/14
15	Issue Final RI Report	30 days	Sun 9/28/14	Mon 10/27/14
16	Public Review and AM	30 days	Tue 10/28/14	Wed 11/26/14
17	**Surface Water Interim Removal Action EECA**	**245 days**	**Tue 4/1/14**	**Mon 12/1/14**
18	RAA	90 days	Tue 4/1/14	Sun 6/29/14
19	Pre-Draft Removal EECA	20 days	Mon 6/30/14	Sat 7/19/14
20	Gov't Comments	30 days	Sun 7/20/14	Mon 8/18/14
21	Draft Removal EECA	15 days	Tue 8/19/14	Tue 9/2/14
22	Regulatory Review	30 days	Wed 9/3/14	Thu 10/2/14
23	Draft Final Removal EECA	30 days	Fri 10/3/14	Sat 11/1/14
24	Final Removal EECA	30 days	Sun 11/2/14	Mon 12/1/14
25	**Surface Water Interim Removal Action AM**	**135 days**	**Mon 11/17/14**	**Tue 3/31/15**
26	Pre-Draft Removal AM	45 days	Mon 11/17/14	Wed 12/31/14
27	Gov't Comments	30 days	Thu 1/1/15	Fri 1/30/15
28	Draft Removal AM	15 days	Sat 1/31/15	Sat 2/14/15
29	Regulatory Review	20 days	Sun 2/15/15	Fri 3/6/15
30	Draft Final Removal AM	15 days	Sat 3/7/15	Sat 3/21/15
31	Final Removal AM	10 days	Sun 3/22/15	Tue 3/31/15
32	**Surface Water Interim Removal Action - Design**	**195 days**	**Mon 3/2/15**	**Sat 9/12/15**
33	Pre-Draft Removal Design	45 days	Mon 3/2/15	Wed 4/15/15
34	Gov't Comments	30 days	Thu 4/16/15	Fri 5/15/15
35	Draft Removal Design	15 days	Sat 5/16/15	Sat 5/30/15
36	Regulatory Review	30 days	Sun 5/31/15	Mon 6/29/15
37	Draft Final Removal Design	45 days	Tue 6/30/15	Thu 8/13/15
38	Final Removal Design	30 days	Fri 8/14/15	Sat 9/12/15
39	**Surface Water Interim Removal Action WP**	**230 days**	**Sun 9/13/15**	**Fri 4/29/16**
40	Pre-Draft Removal WP	30 days	Sun 9/13/15	Mon 10/12/15
41	Gov't Comments	30 days	Tue 10/13/15	Wed 11/11/15
42	Draft Removal WP	15 days	Thu 11/12/15	Thu 11/26/15
43	Regulatory Review	30 days	Fri 11/27/15	Sat 12/26/15
44	Draft Final Removal WP	45 days	Sun 12/27/15	Tue 2/9/16
45	Final Removal WP	30 days	Thu 3/31/16	Fri 4/29/16
46	Removal Action Field Work	30 days	Tue 3/1/16	Wed 3/30/16
47	**Surface Water Interim Removal Action Report**	**180 days**	**Thu 3/31/16**	**Mon 9/26/16**
54	**FS Report**	**265 days**	**Tue 8/26/14**	**Sun 5/17/15**
55	RAA	70 days	Tue 8/26/14	Mon 11/3/14
56	Preliminary FS	45 days	Tue 11/4/14	Thu 12/18/14
57	Gov't Comments	15 days	Fri 12/19/14	Fri 1/2/15
58	Issue Draft FS	15 days	Sat 1/3/15	Sat 1/17/15
59	Regulatory Review	60 days	Sun 1/18/15	Wed 3/18/15
60	Issue Draft Final FS	30 days	Thu 3/19/15	Fri 4/17/15
61	Issue Final FS	30 days	Sat 4/18/15	Sun 5/17/15
62	**PP**	**255 days**	**Sat 4/18/15**	**Mon 12/28/15**
63	Preliminary PP	60 days	Sat 4/18/15	Tue 6/16/15
64	Gov't Comments	30 days	Wed 6/17/15	Thu 7/16/15
65	Issue Draft PP	15 days	Fri 7/17/15	Fri 7/31/15
66	Regulatory / Legal Review	45 days	Sat 8/1/15	Mon 9/14/15
67	Draft Final PP	30 days	Tue 9/15/15	Wed 10/14/15
68	Issue Final PP	30 days	Thu 10/15/15	Fri 11/13/15
69	Public Comment Period	45 days	Sat 11/14/15	Mon 12/28/15
70	**ROD**	**207 days**	**Thu 10/15/15**	**Sun 5/8/16**
71	Preliminary ROD	60 days	Thu 10/15/15	Sun 12/13/15
72	Navy Review	15 days	Mon 12/14/15	Mon 12/28/15
73	Issue Draft ROD	12 days	Tue 12/29/15	Sat 1/9/16
74	Regulatory / Legal Review	60 days	Sun 1/10/16	Wed 3/9/16
75	Issue Draft Final RD	30 days	Thu 3/10/16	Fri 4/8/16
76	Issue ROD for Signature	30 days	Sat 4/9/16	Sun 5/8/16
77	**LUC RD**	**165 days**	**Mon 5/9/16**	**Thu 10/20/16**
84	**RD**	**225 days**	**Mon 5/9/16**	**Mon 12/19/16**
91	**RA Work Plan & HASP**	**225 days**	**Sun 11/20/16**	**Sun 7/2/17**
98	**Remedial Action Fieldwork**	**60 days**	**Mon 7/3/17**	**Thu 8/31/17**
100	**CCR**	**240 days**	**Fri 9/1/17**	**Sat 4/28/18**
107	**Groundwater LTM WP & HASP**	**210 days**	**Sun 4/1/18**	**Sat 10/27/18**
113	**RACR**	**210 days**	**Wed 2/28/18**	**Tue 9/25/18**



Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Schedule 3-16
Site 33 SMP FY14-15

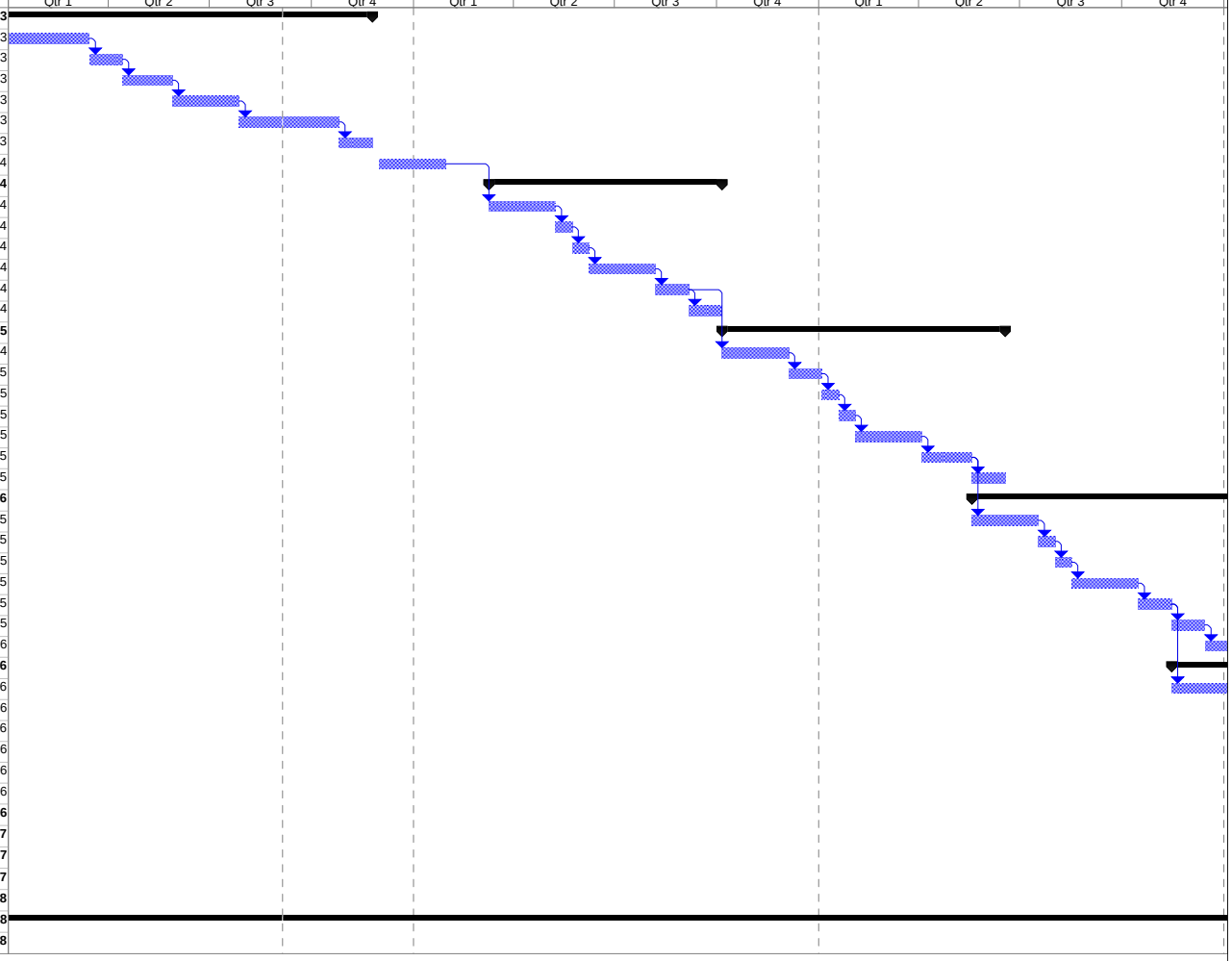
ID	Task Name	Duration	Start	Finish	Predecessors
1	**SI SAP**	**210 days**	**Thu 8/1/13**	**Wed 2/26/14**	
2	Preliminary WP Preparation	45 days	Thu 8/1/13	Sat 9/14/13	
3	Gov't Comments	30 days	Sun 9/15/13	Mon 10/14/13	2
4	Issue Draft WP	15 days	Tue 10/15/13	Tue 10/29/13	3
5	Regulatory Review	60 days	Wed 10/30/13	Sat 12/28/13	4
6	Issue Draft Final WP	15 days	Sun 12/29/13	Sun 1/12/14	5
7	Issue Final WP	45 days	Mon 1/13/14	Wed 2/26/14	6
8	SI Field Investigation	60 days	Sat 2/1/14	Tue 4/1/14	
9	**SI Report for GW**	**283 days**	**Wed 4/2/14**	**Fri 1/9/15**	**8**
10	Preliminary RI Report	125 days	Wed 4/2/14	Mon 8/4/14	7
11	Gov't Comments	15 days	Tue 8/5/14	Tue 8/19/14	10
12	Issue Draft RI Report	20 days	Wed 8/20/14	Mon 9/8/14	11
13	Regulatory Review	60 days	Tue 9/9/14	Fri 11/7/14	12
14	Issue Draft Final RI Report	30 days	Sat 11/8/14	Sun 12/7/14	13
15	Issue Final RI report	33 days	Mon 12/8/14	Fri 1/9/15	14
16	**EE/CA**	**255 days**	**Wed 1/7/15**	**Fri 9/18/15**	
17	RAA	60 days	Wed 1/7/15	Sat 3/7/15	14FS+30 days
18	Preliminary EE/CA	30 days	Sun 3/8/15	Mon 4/6/15	17
19	Gov't Comments	15 days	Tue 4/7/15	Tue 4/21/15	18
20	Issue Draft EE/CA	15 days	Wed 4/22/15	Wed 5/6/15	19
21	Regulatory Review	60 days	Thu 5/7/15	Sun 7/5/15	20
22	Issue Draft Final EE/CA	45 days	Mon 7/6/15	Wed 8/19/15	21
23	Issue Final EE/CA	30 days	Thu 8/20/15	Fri 9/18/15	22
24	**AM**	**95 days**	**Sat 9/19/15**	**Tue 12/22/15**	**23**
25	Preliminary AM	20 days	Sat 9/19/15	Thu 10/8/15	
26	Gov't Comments	20 days	Fri 10/9/15	Wed 10/28/15	25
27	Issue Draft AM	10 days	Thu 10/29/15	Sat 11/7/15	26
28	Regulatory Review	30 days	Sun 11/8/15	Mon 12/7/15	27
29	issue Draft Final AM	10 days	Tue 12/8/15	Thu 12/17/15	28
30	Issue Final AM	5 days	Fri 12/18/15	Tue 12/22/15	29
31	**Removal Action Work Plan & HASP**	**285 days**	**Mon 9/14/15**	**Fri 6/24/16**	
32	Preliminary Work Plan	120 days	Mon 9/14/15	Mon 1/11/16	
33	Gov't Comments	30 days	Tue 1/12/16	Wed 2/10/16	32
34	Issue Draft Work Plan & HASP	15 days	Thu 2/11/16	Thu 2/25/16	33
35	Regulatory Review	60 days	Fri 2/26/16	Mon 4/25/16	34
36	Issue Draft Final Work Plan	30 days	Tue 4/26/16	Wed 5/25/16	35
37	Issue Final Work Plan	30 days	Thu 5/26/16	Fri 6/24/16	36
38	Removal Action Field Work	60 days	Sat 6/25/16	Tue 8/23/16	37
39	**Construction Completion Report**	**230 days**	**Wed 8/24/16**	**Mon 4/10/17**	
46	**NFA Decision Document**	**280 days**	**Tue 12/27/16**	**Mon 10/2/17**	



Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Progress | Deadline

Schedule 3-17
Site 34 SMP FY14-15

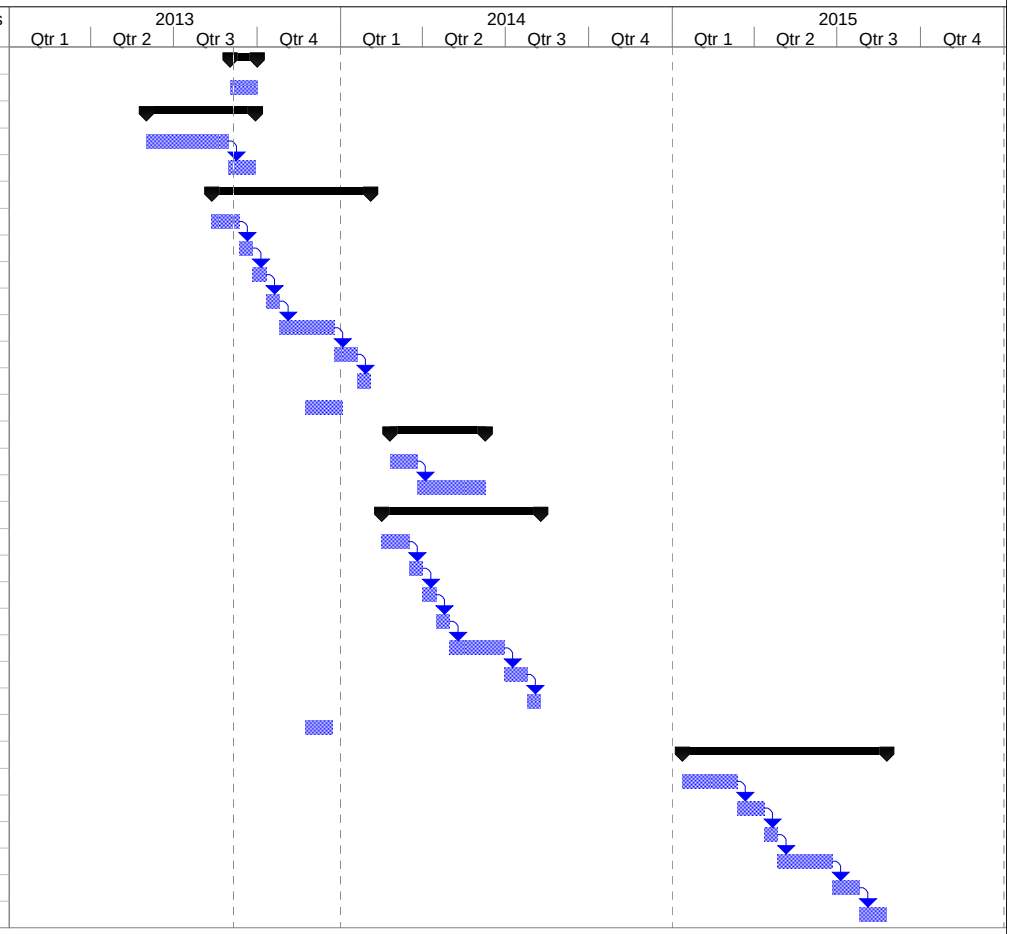
ID	Task Name	Duration	Start	Finish
1	**Data Gap UFP-SAP**	**345 days**	**Sat 12/15/12**	**Sun 11/24/13**
2	Preliminary UFP-SAP	90 days	Sat 12/15/12	Thu 3/14/13
3	Gov't Comments	30 days	Fri 3/15/13	Sat 4/13/13
4	Issue Draft UFP-SAP & HASP	45 days	Sun 4/14/13	Tue 5/28/13
5	Regulatory Review	60 days	Wed 5/29/13	Sat 7/27/13
6	Issue Draft Final UFP-SAP	90 days	Sun 7/28/13	Fri 10/25/13
7	Issue Final UFP-SAP Report	30 days	Sat 10/26/13	Sun 11/24/13
8	Data Gap Field Work	60 days	Sun 12/1/13	Wed 1/29/14
9	**Data Gap Report**	**210 days**	**Mon 3/10/14**	**Sun 10/5/14**
10	Preliminary Report	60 days	Mon 3/10/14	Thu 5/8/14
11	Gov't Comments	15 days	Fri 5/9/14	Fri 5/23/14
12	Issue Draft Report	15 days	Sat 5/24/14	Sat 6/7/14
13	Regulatory Review	60 days	Sun 6/8/14	Wed 8/6/14
14	Issue Draft Final Report	30 days	Thu 8/7/14	Fri 9/5/14
15	Issue Final Report	30 days	Sat 9/6/14	Sun 10/5/14
16	**FS Report**	**255 days**	**Mon 10/6/14**	**Wed 6/17/15**
17	RAA	60 days	Mon 10/6/14	Thu 12/4/14
18	Preliminary FS	30 days	Fri 12/5/14	Sat 1/3/15
19	Gov't Comments	15 days	Sun 1/4/15	Sun 1/18/15
20	Issue Draft FS	15 days	Mon 1/19/15	Mon 2/2/15
21	Regulatory Review	60 days	Tue 2/3/15	Fri 4/3/15
22	Issue Draft Final FS	45 days	Sat 4/4/15	Mon 5/18/15
23	Issue Final FS	30 days	Tue 5/19/15	Wed 6/17/15
24	**PP (all media)**	**255 days**	**Tue 5/19/15**	**Thu 1/28/16**
25	Preliminary PP	60 days	Tue 5/19/15	Fri 7/17/15
26	Navy Review	15 days	Sat 7/18/15	Sat 8/1/15
27	Issue Draft PP	15 days	Sun 8/2/15	Sun 8/16/15
28	Regulatory / Legal Review	60 days	Mon 8/17/15	Thu 10/15/15
29	Issue Draft Final PP	30 days	Fri 10/16/15	Sat 11/14/15
30	Issue Final PP	30 days	Sun 11/15/15	Mon 12/14/15
31	Public Comment Period	45 days	Tue 12/15/15	Thu 1/28/16
32	**ROD (all media)**	**210 days**	**Sun 11/15/15**	**Sat 6/11/16**
33	Preliminary ROD	60 days	Sun 11/15/15	Wed 1/13/16
34	Navy Review	15 days	Thu 1/14/16	Thu 1/28/16
35	Issue Draft ROD	15 days	Fri 1/29/16	Fri 2/12/16
36	Regulatory / Legal Review	60 days	Sat 2/13/16	Tue 4/12/16
37	Issue Draft Final ROD	30 days	Wed 4/13/16	Thu 5/12/16
38	Issue ROD for Signature	30 days	Fri 5/13/16	Sat 6/11/16
39	**LUC RD**	**194 days**	**Sun 6/12/16**	**Thu 12/22/16**
46	**RD**	**224 days**	**Sun 6/12/16**	**Sat 1/21/17**
53	**RA Work Plan & HASP**	**192 days**	**Sun 1/22/17**	**Tue 8/1/17**
60	**Remedial Action Fieldwork**	**30 days**	**Wed 8/2/17**	**Thu 8/31/17**
62	**CCR**	**240 days**	**Fri 9/1/17**	**Sat 4/28/18**
69	**Groundwater LTM WP & HASP**	**4203 days**	**Fri 6/29/07**	**Sun 12/30/18**
75	**RACR**	**195 days**	**Fri 3/30/18**	**Wed 10/10/18**



Task		Project Summary		Inactive Summary		Manual Summary		External Milestone	
Split		External Tasks		Manual Task		Start-only		Progress	
Milestone		External Milestone		Duration-only		Finish-only		Deadline	
Summary		Inactive Milestone		Manual Summary Rollup		External Tasks			

Schedule 3-18
UXO-3 SMP FY14-15

ID	Task Name	Duration	Start	Finish	Predecessors
1	**PA Prioritization Score**	**30 days**	**Sun 9/1/13**	**Mon 9/30/13**	
2	Load score for QA Panel Review	30 days	Sun 9/1/13	Mon 9/30/13	
3	**ESS-DR**	**120 days**	**Sat 6/1/13**	**Sat 9/28/13**	
4	Draft ESS-DR	90 days	Sat 6/1/13	Thu 8/29/13	
5	Final ESS-DR	30 days	Fri 8/30/13	Sat 9/28/13	4
6	**SI Work Plan & HASP**	**175 days**	**Mon 8/12/13**	**Sun 2/2/14**	
7	Preliminary WP Preparation	30 days	Mon 8/12/13	Tue 9/10/13	
8	Gov't Comments	15 days	Wed 9/11/13	Wed 9/25/13	7
9	Comment Resolution	15 days	Thu 9/26/13	Thu 10/10/13	8
10	Issue Draft WP & HASP	15 days	Fri 10/11/13	Fri 10/25/13	9
11	Regulatory Review	60 days	Sat 10/26/13	Tue 12/24/13	10
12	Issue Draft Final WP	25 days	Wed 12/25/13	Sat 1/18/14	11
13	Issue Final WP	15 days	Sun 1/19/14	Sun 2/2/14	12
14	SI Fieldwork	41 days	Sat 11/23/13	Thu 1/2/14	
15	**ESS**	**105 days**	**Mon 2/24/14**	**Sun 6/8/14**	
16	Draft ESS	30 days	Mon 2/24/14	Tue 3/25/14	
17	Final ESS	75 days	Wed 3/26/14	Sun 6/8/14	16
18	**SI Work Plan Addendum**	**175 days**	**Sat 2/15/14**	**Fri 8/8/14**	
19	Preliminary WP Preparation	30 days	Sat 2/15/14	Sun 3/16/14	
20	Gov't Comments	15 days	Mon 3/17/14	Mon 3/31/14	19
21	Comment Resolution	15 days	Tue 4/1/14	Tue 4/15/14	20
22	Issue Draft WP	15 days	Wed 4/16/14	Wed 4/30/14	21
23	Regulatory Review	60 days	Thu 5/1/14	Sun 6/29/14	22
24	Issue Draft Final WP	25 days	Mon 6/30/14	Thu 7/24/14	23
25	Issue Final WP	15 days	Fri 7/25/14	Fri 8/8/14	24
26	SI Fieldwork	30 days	Sat 11/23/13	Sun 12/22/13	
27	**SI Report**	**225 days**	**Mon 1/12/15**	**Mon 8/24/15**	
28	Preliminary SI Report	60 days	Mon 1/12/15	Thu 3/12/15	
29	Gov't Comments	30 days	Fri 3/13/15	Sat 4/11/15	28
30	Issue Draft SI Report	15 days	Sun 4/12/15	Sun 4/26/15	29
31	Regulatory Review	60 days	Mon 4/27/15	Thu 6/25/15	30
32	Issue Draft Final SI Report	30 days	Fri 6/26/15	Sat 7/25/15	31
33	Issue Final SI report	30 days	Sun 7/26/15	Mon 8/24/15	32



Task		External Tasks		Duration-only		External Tasks	
Split		External Milestone		Manual Summary Rollup		External Milestone	
Milestone		Inactive Milestone		Manual Summary		Progress	
Summary		Inactive Summary		Start-only		Deadline	
Project Summary		Manual Task		Finish-only			

SECTION 4

Land Use Planning

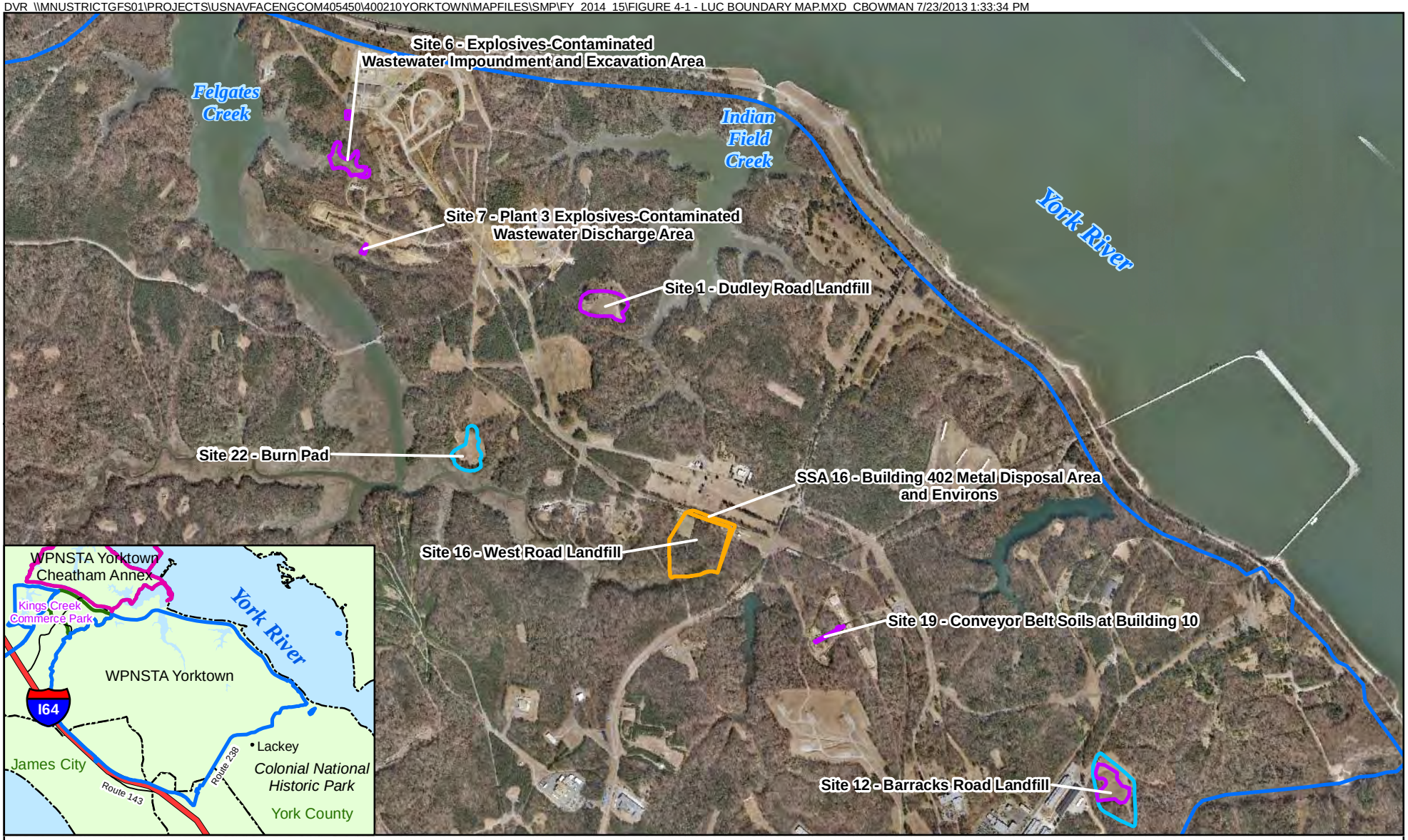
Sites with LUCs and the boundaries of potential environmental impact areas are shown on **Figure 4-1**. The Sites with LUCs in place are:

- Site 1 – Dudley Road Landfill
- Site 6 – Explosive Impoundment, Flume Area and Excavation Area
- Site 7 – Plant 3 Explosives-Contaminated Wastewater Discharge Area
- Site 12 – Barracks Road Landfill
- Site 16/SSA 16 – West Road Landfill
- Site 19 – Conveyor Belt Soils at Building 10
- Site 22 – Burn Pad

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

Mr. Jim Gravette
Naval Facilities Engineering Command, Mid-Atlantic
9742 Maryland Ave. Bldg N-26
Norfolk, VA 23511-3095

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\400210YORKTOWN\MAPFILES\SMP\FY 2014 15\FIGURE 4-1 - LUC BOUNDARY MAP.MXD CBOWMAN 7/23/2013 1:33:34 PM



Legend

- Soil LUC Boundary
- Groundwater LUC Boundary
- Soil and Groundwater LUC Boundary
- WPNSTA Boundary

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Feet

Figure 4-1
WPNSTA LUC Boundary Map
Site Management Plan for FY 2014 to 2015
WPNSTA Yorktown
Yorktown, Virginia

CH2MHILL

SECTION 5

References

A. T. Kearney, Inc. 1992. *Final RCRA Solid Waste Management Unit Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia*. December. (Admin Record (AR) No.: 00780)

Baker. 1993a. *Final Operable Unit Evaluation Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. June. (AR No.: 01060)

Baker. 1993b. *Final Waste Characterization Sampling, SSAs 1, 2, and 5, Naval Weapons Station Yorktown, Yorktown, Virginia*. November. (AR No.: 00313)

Baker. 1994a. *Final Action Memorandum, Sites 2 and 9 and Site Screening Area 4, Naval Weapons Station Yorktown, Yorktown, Virginia*. May. (AR No.: 00615)

Baker. 1994b. *Final Engineering Evaluation/Cost Analysis and Action Memorandum SSA 1, 2, and 5, Naval Weapons Station Yorktown, Yorktown, Virginia*. July. (AR No.: 00625)

Baker. 1994c. *Final Soil Assessment Report for Site Screening Area 18, Naval Weapons Station Yorktown, Yorktown, Virginia*. July. (AR No.: 00619)

Baker. 1994d. *Action Memorandum and EE/CA, Site 2 – Turkey Road Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia*. May. (AR No.: 00615)

Baker. 1994e. *Final Work Plan for Sites 6, 7. 12, 16, Site Screening Area 16, and Background, Naval Weapons Station Yorktown, Yorktown, Virginia.* June.

Baker. 1995a. *Final Habitat Evaluation Report, Sites 1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 16, 17, 18, 19, and 21, Naval Weapons Station Yorktown, Yorktown, Virginia*. July. (AR No.: 00609)

Baker. 1995b. *Final Post-Removal Confirmation Sampling Report and Baseline Ecological Risk Assessment, Naval Weapons Station Yorktown, Yorktown, Virginia*. November. (AR No.: 00660, 00661, and 00662)

Baker. 1995c. *Final Round Two Remedial Investigation Report and Baseline Risk Assessment for Site 16 and Site Screening Area 16, Naval Weapons Station Yorktown, Yorktown, Virginia.* July. (AR No.: 00635 and 01177)

Baker. 1995d. *Final Proposed Remedial Action Plan Site 16 and Site Screening Area 16, Naval Weapons Station Yorktown, Yorktown, Virginia.* July. (AR No.: 00672)

Baker. 1995e. *Final Record of Decision for Site 16 and SSA 16, Naval Weapons Station Yorktown, Yorktown, Virginia.* September. (AR No.: 00671)

Baker. 1995f. *Final Relative Risk Ranking System, Data Collection Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia.* November. (AR No.: 00675)

Baker. 1996a. *Final Round Two RI Report Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia.* June. (AR No.: 00640)

Baker. 1996b. *Final Feasibility Study Report Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia.* June. (AR No.: 00647)

Baker. 1996c. *Final Proposed Remedial Action Plan Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia.* June. (AR No.: 00654)

Baker. 1996d. *Final Site Screening Process Report for Site Screening Areas 1, 6, 7, and 15, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (AR No.: 00663, 00664, and 00665)

Baker. 1996e. *Final Site Screening Progress Report for Site Screening Areas 2, 17, 18 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (AR No.: 00666 and 00667)

Baker. 1997a. *Hot Spot Delineation, Naval Weapons Station Yorktown, Yorktown, Virginia.* (No AR No.)

Baker. 1997b. *Final Feasibility Study Sites 1 and 3, Naval Weapons Station Yorktown, Yorktown, Virginia.* (AR No.: 01158)

Baker. 1997c. *Pilot Study Report for the Explosives-Contaminated Soil at the Naval Weapons Station Yorktown, Yorktown, Virginia*. July. (AR No.: 01088)

Baker. 1997d. *Final Round Two RI Report, Sites 9 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* January. (AR No.: 00889)

Baker. 1997e. *Final Feasibility Study Sites 9 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* June. (AR No.: 00889)

Baker. 1997f. *Final Proposed Plan Sites 9 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* July. (AR No.: 00889)

Baker. 1997g. *Final Record of Decision, Operable Unit Nos. III, IV, and V, Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia*. May. (AR No.: 00871)

Baker. 1998a. *Final v.2 Round Two Remedial Investigation Report for Sites 1 and 3, Naval Weapons Station Yorktown, Yorktown, Virginia.* May. (AR No.: 00998)

Baker. 1998c. *Final Round Two Remedial Investigation Report for Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* May. (AR No.: 01294, 01295, 01346, and 01347)

Baker. 1998d. *Final Feasibility Study, v2, Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* May. (AR No.: 01077)

Baker. 1998e. *Final Proposed Remedial Action Plan, v2, Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* May. (AR No.: 01838)

Baker. 1998f. *Final Record of Decision, Operable Unit Nos. XII, XIII,XIV, and XV, Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia.* October. (AR No.: 01001)

Baker. 1998g. *Final Record of Decision, v3, Operable Unit Nos. VI and VII, Sites 9 and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (AR No.: 02077)

Baker. 1999. *Final Proposed Remedial Action Plan for Sites 1 and 3, Naval Weapons Station Yorktown, Yorktown, Virginia.* May. (AR No.: 01840)

Baker. 1999. *Final Record of Decision, Operable Unit Nos. VIII and IX, Site 1 and Site 3, Naval Weapons Yorktown, Yorktown, Virginia.* June. (AR No.: 01000)

Baker. 2000. *Final Long-Term Monitoring Report, Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (AR No.: 01219)

Baker. 2001a. *Final Round Two Remedial Investigation Report, Sites 4, 21, and 22, Naval Weapons Station Yorktown, Yorktown, Virginia.* January. (AR No.: 01296, 01297, and 01298)

Baker. 2001b. *Final Feasibility Study, Sites 4, 21, and 22, Naval Weapons Station Yorktown, Yorktown, Virginia.* April. (AR No.: 01160)

Baker. 2001c. *Final Site Screening Process Report for Site Screening Areas 3, 4, 5, 9, 10, 20, 21, 22, 23, and 24, Naval Weapons Station Yorktown, Yorktown, Virginia.* October. (AR No.: 01350, 01351, and 01352)

Baker. 2002. *Final Five-Year Review Report for Sites 1, 6, 7, 12, 16, and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.

Baker. 2003b. *Final Record of Decision, Operable Unit Nos. XVII, Site 22 – Burn Pad, Naval Weapons Yorktown, Yorktown, Virginia.* September. (AR No.: 01375)

Baker. 2003c. *Final Ecological Cleanup Goals for Soil, Site 23,Teague Road Disposal Area, Naval Weapons Station Yorktown, Yorktown, Virginia.* February. (AR No.: 02269)

Baker. 2004a. *Final Round Two Remedial Investigation Report for Sites 2, 8, 18, and Site Screening Area 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* June. (AR No.: 01548)

Baker. 2004b. *Final Additional Evaluation of Site Screening Areas 3, 4, 5, and 21, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (AR No.: 01427)

Baker. 2005a. *Final EE/CA for Contaminated Soil and Sediment at Site 8 and SSA 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* December. (AR No.: 02076)

Baker. 2005b. *Final Action Memorandum for Contaminated Soil and Sediment at Site 8 and SSA 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* December. (AR No.: 01871)

Baker. 2005c. *Final Site 12 Long-Term Monitoring Report - 1998-2003, Naval Weapons Station Yorktown, Yorktown, Virginia.* December. (AR No.: 02078)

Baker. 2005d. *Final Round One Remedial Investigation for Sites 27, 28, 29, and 30. Naval Weapons Station Yorktown, Yorktown, Virginia.* July. (AR No.: 02079)

Baker. 2005e. *Final Project Plans Step 3B and 4 of the Baseline Ecological Risk Assessment, Site 32 — Wetlands Downgradient of Beaver Pond, Naval Weapons Station Yorktown, Yorktown, Virginia.* (AR No.: 01873)

Baker. 2005f. *Final Work Plan for the Pre-Removal Characterization of Soil, Site 2, Site 8, and SSA 14, Naval Weapons Station Yorktown, Yorktown, Virginia*. June. (AR No.: 01687)

Baker. 2006a. *Final Remedial Design for Naval Weapons Station Yorktown Site 1, Naval Weapons Station Yorktown, Yorktown, Virginia*. March. (AR No.: 02075)

Baker. 2006b. *Final Long-Term Monitoring Report, Sites 1, 3 and 7. Naval Weapons Station Yorktown, Yorktown, Virginia*. October. (AR No.: 02075)

Baker. 2006c. *Final Remedial Design for Naval Weapons Station Yorktown Sites 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia*. March. (AR No.: 02268)

Baker. 2006d. *Draft Remedial Design for Land Use Controls for Site 16 and SSA 16, Naval Weapons Station Yorktown, Yorktown, Virginia*. (Draft – No AR No.)

Baker. 2008a. *Final Post-Remedial Action Site Conditions TM, Site 3, Naval Weapons Station Yorktown, Yorktown, Virginia.* (AR No.: 02200)

Baker. 2008b. *Revised Draft Final Round One Remedial Investigation Report for Sites 23, 24, 25, and 26, Naval Weapons Yorktown, Yorktown, Virginia.* January. (Will Not be Finalized – No AR No.)

Baker Environmental, Inc. and Roy F. Weston, Inc. (Baker and Weston). 1993a. *Final Focused Biological Sampling and Preliminary Risk Evaluation, Naval Weapons Station Yorktown, Yorktown, Virginia*. April. (AR No.: 00310)

Baker and Weston. 1993b. *Final Round One Remedial Investigation Report for Sites 1-9, 11, 12, 16-19, and 21, Naval Weapons Station Yorktown, Yorktown, Virginia*. July. (AR No.: 00313)

Baker and Weston. 1993c. *Final Engineering Evaluation/Cost Analysis (EE/CA) for Sites 4, 16, and 21 Removal, Naval Weapons Station Yorktown, Yorktown, Virginia*. December. (AR No.: 00331)

Baker and Weston. 1993d. *Final Focused Biological Sampling and Preliminary Risk Evaluation Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. July. (AR No.: 00310)

Bedient, P.B., H.S. Rifai, and C.J. Newell. 1994. *Groundwater Contamination, Transport and Remediation.* Prentice Hall PTR, Englewood Cliffs, New Jersey.

Black & Veatch Waste Science, Inc. (Black & Veatch). 1994. *Site 16: West Road Landfill, Clearance Sampling and Polychlorinated Biphenyl (PCB) Screening Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. August. (AR No. 00676)

Black & Veatch. 1996a. *Final Site 19 and Composites of Site 9, Site 19, SSA 6, and SSA7 Independent Sampling and Risk Screening Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. April. (AR No. 00781)

Black & Veatch. 1996b. *Final AOC 22, Site 12, and SSA 2, SSA 19 and King Creek Independent Sampling and Risk Screening Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. April. (AR No. 00669)

Brockman, A. R., D. L. Nelms, G. E. Harlow Jr., and J. J. Gildea. 1997. *Geohydrology of the Shallow Aquifer System. Naval Weapons Station Yorktown, Yorktown, Virginia*. Prepared in cooperation with the Naval Weapons Station Yorktown Base Civil Engineer, Environmental Directorate. USGS Water Resources Investigation Report 97-4188.

C. C. Johnson & Associates, Inc., and CH2M HILL. 1984. *Final Initial Assessment Study of Naval Weapons Station Yorktown, Yorktown, Virginia*. July. (AR No.: 00247)

CH2M HILL. 2007a. *Phase I Remedial Investigation Report for Groundwater at Sites 1, 3, 6, 7, 11, 17, 24, and 25, Naval Weapons Station Yorktown, Yorktown, Virginia.* September (AR No.: 02158)

CH2M HILL. 2007b. *Final Five-Year Review Report for Sites 1, 3, 6, 7, 11, 12, 16/SSA16, 17, and 19, Naval Weapons Station Yorktown, Yorktown, Virginia.* September (AR No.: 02155)

CH2M HILL. 2007c. *Final Work Plan Site Assessment, Area Upgradient of Site 12, Naval Weapons Station Yorktown, Yorktown, Virginia*. July.

CH2M HILL. 2008a. *Final Explanation of Significant Differences, Site 3 – Group 16 Magazines Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia.* October. (AR. No.: 002351)

CH2M HILL. 2008b. *Final Site 8 Removal Action and Post-Removal Confirmation Sampling Summary, Naval Weapons Station Yorktown, Yorktown, Virginia*. February. (AR No.: 02202)

CH2M HILL. 2008c. *Final Long-Term Monitoring Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. April. (AR No.: 02272)

CH2M HILL. 2008d. *Final Site Assessment Report AOC 23, Weapons Station Yorktown, Yorktown, Virginia.* December. (AR No.: 02425)

CH2M HILL. 2008e*. Final Steps 6 and 7 of the Aquatic Baseline Ecological Risk Assessment, Site Screening Area 25, Naval Weapons Station Yorktown, Yorktown, Virginia.* (AR No.: 02412)

CH2M HILL. 2009a. *Final Five-Year Review Report, Naval Weapons Station Yorktown, Yorktown, Virginia.* November. (AR No.: 02155)

CH2M HILL. 2009b. *Final Community Involvement Plan, Naval Weapons Station Yorktown and Cheatham Annex.* August. (AR No.: 000007)

CH2M HILL. 2009c. *Remedial Investigation Report for Groundwater at Sites 4, 21, and 22, Naval Weapons Station Yorktown, Yorktown, Virginia.* November. (AR No. 000024)

CH2M HILL. 2009d. *Final Engineering Evaluation/Cost Analysis Site Screening Area 25, Naval Weapons Station Yorktown, Yorktown, Virginia.* July. (AR No. Pending)

CH2M HILL. 2009e. *Final SSA 14 Removal Action and Confirmation Sampling Summary Technical Memorandum, Naval Weapons Station Yorktown, Yorktown, Virginia*. January. (AR No. Pending)

CH2M HILL. 2009f. *Final Engineering Evaluation/Cost Analysis Site Screening Area 25, Naval Weapons Station Yorktown, Yorktown, Virginia*. July. (AR No. 000104)

CH2M HILL. 2010. *Final Long Term Monitoring Report at Site 7, Naval Weapons Station Yorktown, Yorktown, Virginia*. September. (AR No.: 000148)

CH2M HILL. 2010c. *Final Sampling and Analysis Plan, Site 24 Remedial Investigation Work Plan, Naval Weapons Station Yorktown, Yorktown, Virginia*. January.

CH2M HILL. 2010d. *Preliminary Assessment Review and Potential MEC/MC Site Summary, Yorktown Naval Weapons Station and Cheatham Annex*. December.

CH2M HILL. 2010e. *Technical Memorandum Summary Report for Non-Intrusive Geophysical Investigation of Turkey Road Landfill (Formerly Site 2), Naval Weapons Station Yorktown, Yorktown, Virginia*. July.

2011a. *Final Phase II Remedial Investigation, Site 6. Naval Weapons Station Yorktown, Yorktown, Virginia. March.*

CH2M HILL. 2011b. *Final Remedial Investigation Report for Groundwater at Sites 8 and 34, Naval Weapons Station Yorktown, Yorktown, Virginia*. June

CH2M HILL. 2011c. *Final Feasibility Study Report for Groundwater at Site 22. Naval Weapons Station Yorktown, Yorktown, Virginia. September.*

CH2M HILL. 2011d. *Final Record of Decision, Site 4-Burning Pad Residue Landfill, Site 21-Battery and Drum Disposal Areas, and Site 22-Burn Pad, Naval Weapons Station, Yorktown, Virginia.* August.

CH2M HILL. 2011e. *Final Record of Decision. Site 32 Wetlands Area Downgradient of Beaver Pond. Naval Weapons Station Yorktown, Yorktown, Virginia*. August.

CH2M HILL. 2012a. *Site Management Plan Fiscal Years 2013-2014, Naval Weapons Station Yorktown, Yorktown, Virginia, August.*

CH2M HILL. 2012b. *Phase II Remedial Investigation Report for Sites 1 and 3*. *Naval Weapons Station Yorktown, Yorktown, Virginia.* June.

CH2M HILL. 2012c. *Suspension of Site 6 Long-term Monitoring Requirements for Operable Unit XV Identified in the 1998 Record of Decision Technical Memorandum, Naval Weapons Station Yorktown, Yorktown, Virginia. September.*

CH2M HILL. 2012d. *Memo to File Documentation of Non-significant Differenceto the Record of Decision for Site 6 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia, Clairification of Site 6 Areas.* July.

CH2M HILL. 2012e. *Suspension of Site 7 Long-term Monitoring Requirements for Operable Unit XV Identified in the 1998 Record of Decision Technical Memorandum, Naval Weapons Station Yorktown, Yorktown, Virginia. September.*

CH2M HILL. 2012f. *Revised Final Explanation of Significant Difference, Site 12 – Barracks Road Landfill, Naval Weapons Station Yorktown, Yorktown, Virginia.* August.CH2M HILL. 2012g. *Final Proposed Plan, Site 22 Groundwater – Burn Pad, Naval Weapons Station Yorktown, Yorktown, Virginia.* July.

CH2M HILL. 2012g. *Final Proposed Plan, Site 22 Groundwater – Burn Pad, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.

CH2M HILL. 2012h. *Final Record of Decision, Site 22 Groundwater – Burn Pad, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.

CH2M HILL. 2012i. *Final Sampling and Analysis Plan, Site 32, Sewage Treatment Plant #2, Sludge Drying Bed Site Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia.* January.

CH2M HILL. 2013a. *Final Five-Year Review Report for Site 1, 6, 7, 12, 16/SSA 16, and 19, Naval Weapons Station Yorktown, Yorktown, Virginia*. February.

CH2M HILL. 2013b. *Final Sampling and Analysis Plan, Site 1 Pre-Feasibility Study Investigation, Naval Weapons Station Yorktown, Yorktown, Virginia.* March.

CH2M HILL. 2013c. *Considerations for Risk Management at Site 16/Site Screening Area 16 Technical Memorandum, Naval Weapons Station Yorktown, Yorktown, Virginia*. February.

CH2M HILL. 2013d. *Final Site Investigation Report for Site 32, Naval Weapons Station Yorktown, Yorktown, Virginia*. May.

CH2M HILL. 2013e. *Final Preliminary Assessment Report, UXO 3 Munitions Loading Piers, Naval Weapons Station Yorktown, Yorktown, Virginia.* May.

Dames & Moore. 1986. *Final Confirmation Study Step 1A (Verification), Round One, Naval Weapons Station Yorktown, Yorktown, Virginia*. June. (AR No.: 00256)

Dames & Moore. 1988. *Final Confirmation Study Step 1A (Verification), Round Two, Naval Weapons Station Yorktown, Yorktown, Virginia*. June. (AR No.: 00259)

Department of the Navy (Navy). 2011. *No Further Action ROD for Site 32 Wetlands Area Downgradient of Beaver Pond, Naval Weapons Station Yorktown, Yorktown, Virginia*. August.

Navy. 2012. *Action Memorandum Site 31 Barracks Road Industrial Area, Naval Weapons Station Yorktown, Yorktown, Virginia.* September.

Environmental and Safety Designs, Inc. 1994. *Final Action Memorandum, Site Screening Area 18, Naval Weapons Station Yorktown, Yorktown, Virginia*. March. (AR No.: 00612)

International Technology Corporation (IT Corporation). 1995a. *Closeout Report, Sites 4, 16, and 21, Battery and Drum Disposal Area, Naval Weapons Station Yorktown, Yorktown, Virginia*. June. (AR No.: 00616)

IT Corporation. 1995b. *Closeout Report, Sites 2 and 9, Site Screening Area 4, Mine Casing and Debris Removal Action, Naval Weapons Station, Yorktown, Virginia*. October. (AR No.: 00646)

J.A. Jones Environmental Services. 2003. *Construction Closeout Report for Site 23, Naval Weapons Station, Yorktown, Virginia*. October. (AR No.: 02415)

Malcolm Pirnie. 2005. *Revised Draft Final Preliminary Assessment, Naval Weapons Station Yorktown, Yorktown, Virginia*. December. (AR No.: 01942)

Meng, A. A., III and J. F. Harsh. 1988. *Hydrogeologic Framework of the Virginia Coastal Plain*. U.S. Geological Survey Professional Paper. 1404-C. 82 p.

National Academy of Sciences. 2001. D*ietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc. Food and Nutrition Board, Institute of Medicine.* National Academy Press, Washington, D.C.

Naval Facilities Engineering Command (NAVFAC). 2013a. Land Use Control Remedial Design, Site 12: Barracks Road Landfill. *Naval Weapons Station Yorktown, Yorktown, Virginia*. April.

NAVFAC. 2013b. Final Land Use Control Remedial Design, Site 22: Burn Pad. *Naval Weapons Station Yorktown, Yorktown, Virginia*. April.

OHM Remediation Services Corp (OHM). 1996. *Soil and Debris Removal Action Site Screening Areas 1, 2, and 5, Naval Weapons Station, Yorktown, Virginia*. January. (AR No.: 00648)

OHM. 1997a. *Final Report for Field-Scale Treatability Study at Sites 7 and 22, Naval Weapons Station Yorktown, Yorktown, Virginia*. April. (AR No.: 00887)

OHM. 1997b. *Final Report at Site Screening Areas 3 and 7, Naval Weapons Station Yorktown, Yorktown, Virginia*. March. (AR No.: 00893)

OHM. 1998. *Final Report for Site 12 – Area A, Naval Weapons Station Yorktown, Yorktown, Virginia*. January. (AR No.: 01154)

OHM. 1999. *Contractor Closeout Report for Site 6 Remediation, Naval Weapons Station Yorktown, Yorktown, Virginia*. December. (AR No.: 01221)

OHM. 2000. *Draft Contractor Closeout Report for Site 19 Bioremediation, Naval Weapons Station Yorktown, Yorktown, Virginia*. April. (AR No.: 01556)

OHM. 2001. *Final Report, Remedial Action, Sites 1 and 3 and SSA 22, Naval Weapons Station Yorktown, Yorktown, Virginia*. June. (AR No.: 01091)

P.A. Rakowski, P.E. 1995. *Navy Final Recommendation for Areas of Concern, Naval Weapons Station Yorktown, Yorktown, Virginia*. (AR No.: 00355)

Shaw Infrastructure and Environmental, Inc. (Shaw). 2003. *Project Closeout Report for Sites 21 and 22 Naval Weapons Station Yorktown, Yorktown, Virginia.* June. (AR No.: 01779)

Shaw. 2006*. Final Work Plan Interim Removal Action at Site 8 and SSA 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (AR No.: 01890)

Shaw. 2008*. Final Construction Close-Out Report For Site 6, Naval Weapons Station Yorktown, Yorktown, Virginia.* October*.* (AR No.: 02354)

Shaw. 2009a. Draft *Final Construction Close-Out Report For Site 8 and SSA 14, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (Draft – No AR No.)

Shaw. 2009b. *Final Work Plan, Removal Action at Site 23, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (AR No.: 02423)

Shaw. 2010a. *Draft Final Construction Completion Report at Site 23, Naval Weapons Station Yorktown, Yorktown, Virginia.* March. (Draft – No AR No.)

Shaw. 2010b. *Final Construction Completion Report Removal Action at Site 32, Naval Weapons Station Yorktown, Yorktown, Virginia.* August.

Shaw. 2011. Final Construction Completion Report at Site 23 *Naval Weapons Station Yorktown, Yorktown, Virginia.* March.

Universe Technologies, Inc. (UNITEC). 2006. *Excavation and Offsite Landfill Disposal Site 23, Naval Weapons Station Yorktown, Yorktown, Virginia.* April. (AR No.: 02283)

United States Environmental Protection Agency (USEPA). 1992. *Study Area Analysis, Naval Weapons Station Yorktown, Yorktown, Virginia*. November. (AR No.: 00289)

USEPA. 1994. *Federal Facility Agreement for Naval Weapons Station Yorktown, Yorktown, Virginia*. September. (AR No.: 01003)

Versar. 1991. *Remedial Investigation Interim Report, Naval Weapons Station Yorktown, Yorktown, Virginia*. July 1991. [Revision of Dames & Moore's 1989 *Draft Remedial Investigation Interim Report, Naval Weapons Station, Yorktown, Virginia*.] (AR No.: 00812)