1/1/06-00472

Final

Action Memorandum for Site 19

St. Juliens Creek Annex
Chesapeake, Virginia

NAVFAC
Naval Facilities Engineering Command
NAVFAC MID-ATLANTIC

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Contract No. N62470-02-D-3052
CTO-0057

January 2006

Prepared by

CH2MHILL

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FINAL

ACTION MEMORANDUM

FOR SITE 19

ST. JULIENS CREEK ANNEX, CHESAPEAKE, VIRGINIA

DATE: December 9, 2005

SUBJECT: Removal Action at Site 19 – St. Juliens Creek Annex, Chesapeake, Virginia

FROM: Commander, Mid-Atlantic Division, Naval Facilities Engineering Command

TO: S. D. Bailey, CAPT, USN
Chief of Staff

This Action Memorandum documents approval for the removal action as described herein for Site 19 at St. Juliens Creek Annex, Chesapeake, Virginia. This Action Memorandum serves as the Decision Document for the Engineering Evaluation/Cost Analysis for Site 19 prepared under separate cover.

This Decision Document represents the selected removal action for Site 19 and was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended, and is consistent with the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for the site.

Conditions at Site 19 meet the NCP section 300.415(b)(2) criteria for removal. Naval Facilities Engineering Command recommends approval of the proposed removal action. The total project ceiling if approved will be $100,849. Response actions should commence as soon as practical to expedite remediation at the sites.

Approved by:

S. D. Bailey, CAPT, USN
Chief of Staff

25 JAN 06
Date

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Final EE/CA for Site 19

Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act of 1980
CFR	Code of Federal Regulations
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
EE/CA	Engineering Evaluation/Cost Analysis
IAS	Initial Assessment Study
IR	Installation Restoration
LUC	land use controls
MARMC	Mid-Atlantic Regional Maintenance Center
NCP	National Oil & Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Agency
NFA	No Further Action
NTCRA	Non-Time-Critical Removal Action
PAH	polycyclic aromatic hydrocarbon
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RRR	Relative Risk Ranking
SARA	Superfund Amendments & Reauthorization Act of 1986
SI	Site Investigation
SJCA	St. Juliens Creek Annex
SPAWAR	Space and Naval Warfare Systems Command
SSA	Site Screening Assessment
SSI	Supplemental Site Investigation
USC	United States Code
USEPA	United States Environmental Protection Agency
VDEQ	Virginia Department of Environmental Quality

I. Purpose

This Action Memorandum documents approval of the proposed removal action for Site 19, former Building 190, at St. Juliens Creek Annex (SJCA) in Chesapeake, Virginia. A non-time critical removal action (NTCRA) is proposed at Site 19 to address contaminants that have been identified in soil, through previous investigations, as potentially posing a risk to human health and/or the environment. The two areas addressed through this Action Memorandum are the Metallic Slag Area and the Elevated Subsurface Polycyclic Aromatic Hydrocarbons (PAHs) Area. A separate Engineering Evaluations/Cost Analyses (EE/CA) was prepared for a NTCRA at Site 19, and is included as Attachment A. This Action Memorandum serves as the Decision Document for this EE/CA, and for the Navy to conduct the work proposed therein. The alternatives evaluated the EE/CA are summarized below.

- Alternative #1 – No Action
- Alternative #2 – Excavation of impacted soils and backfill with imported clean material
- Alternative #3 – Construction of soil covers over the impacted soils

This Action Memorandum was completed in accordance with the remedial program requirements defined by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended, the Superfund Amendments and Reauthorization Act of 1986 (SARA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and United States Environmental Protection Agency's (USEPA) *Superfund Removal Procedures - Action Memorandum Guidance* (USEPA, 1990).

II. Background and Site Conditions

Facility Background

SJCA is a 490-acre facility situated at the confluence of St. Juliens Creek and the Southern Branch of the Elizabeth River in the City of Chesapeake, in southeastern Virginia (Figure 1). SJCA began operations as a Naval facility in 1849. The Annex was one of the largest ammunition depots in the United States involving wartime transfer of ammunitions to various other Naval facilities. Specific ordnance operations and processes conducted at SJCA included stockpiling Explosive D (ammonium picrate or picrate acid) for use in projectiles, manufacturing MARK VI mines, assembling small caliber guns and ammunition, storing torpedoes, filling shells, and testing ordnance. In 1975, all ordnance operations were transferred to the Yorktown Naval Weapons Station. As a result, decontamination was performed in, around, and under ordnance-handling facilities at SJCA in 1977.

SJCA has also been involved in non-ordnance operations, including degreasing, paint shops, machine shops, vehicle and locomotive maintenance shops, pest control shops, battery shops, print shops, electrical shops, boiler plant operations, wash rack operations, potable water storage, saltwater fire-protection systems, fire-fighter training operations, and oil and chemical storage.

Activity at SJCA has decreased in recent years and many of the aging structures are being demolished. The current primary mission of SJCA is to provide a radar-testing range and

warehousing facilities for nearby Norfolk Naval Shipyard and other local Naval activities. SJCA also provides administrative offices, light industrial shops, and storage facilities for several tenant commands; including Defense Reutilization and Marketing Office (DRMO), Space and Naval Warfare Systems (SPAWAR), Mid-Atlantic Regional Maintenance Center (MARMC), and a cryogenics school.

Site 19 Background

Site 19 consists of former Building 190 and the surrounding area. Building 190 was located just south of the mouth of Blows Creek at the confluence of the Southern Branch of the Elizabeth River (Figure 2). The building was heavily used for loading explosives into ammunition. From the 1940s to the 1970s, Explosive D and Composition A-3 were reportedly used.

In mid-1977, all ordnance-handling buildings were decontaminated by flushing with chemical solutions and water. Prior to decontamination, Naval Ammunition Production Engineering Center (NAPEC) visually inspected the facilities and collected samples for chemical analysis to develop appropriate decontamination procedures for each building. At the conclusion of the decontamination process, NAPEC visually reinspected each building, collected samples for chemical analysis, and certified that the facilities were decontaminated. However, since the level of decontamination was not specified, there remained a potential for ordnance residues.

The 1989 Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) reported that various ordnance items had been disposed of in the area between Building M-5 and Building 190 during past ordnance management activities. The area was noted to contain a variety of construction rubble and facility personnel reported no knowledge of residual contamination from ordnance management operations.

Building 190 was demolished sometime after 2000 and the site is now a grass-covered field. Two concrete drainage culverts remain on site, leading underground from former Building 190 to the Southern Branch of the Elizabeth River. Building M-5 and former Building 190 are illustrated in Figure 3.

Summary of Actions to Date

Site 19 has been characterized under numerous investigations and studies between 1981 and the present. Previous facility-wide investigations and site-specific investigations conducted at SJCA related to Site 19 are listed below.

- Initial Assessment Study (IAS) – Naval Energy and Environmental Support Agency (NEESA), August 1981
- Phase II RFA – A.T. Kearney, March 1989
- Aerial Photographic Site Analysis – USEPA, February 1995
- Relative Risk Ranking (RRR) – CH2M HILL, April 1996
- Hazard Ranking System (HRS) Documentation Record – Tetra Tech, January 2000
- Background Investigation – CH2M HILL, October 2001 and August 2004
- Site Screening Assessment (SSA) – CH2M HILL, April 2002
- Site Investigation (SI) – CH2M HILL, June 2004
- Supplemental Site Investigation (SSI) – CH2M HILL, September 2005

Although no explosives or ordnance-related compound were detected in the investigations, the SSI concluded that cadmium and chromium in the Metallic Slag Area and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene in the elevated subsurface PAHs Area presented unacceptable human health risks. As a result, the removal action described in this Decision Document was recommended.

III. Proposed Actions

The Site 19 EE/CA was completed to address potential risk associated with impacted soils at Site 19. The EE/CA supports a NTCRA removal action for Site 19 and prepares the site for closeout under CERCLA with No Further Action (NFA).

Three alternatives were assessed for Site 19. These alternatives were evaluated and compared based on their effectiveness, implementability, and cost. The EE/CA for Site 19 (Attachment A) describes the alternatives considered for each site in greater detail, and the process by which the alternatives were evaluated, compared, and selected.

The preferred removal action alternative for Site 19 is the removal of impacted soils from the Elevated Subsurface PAHs Area and the Metallic Slag Area followed by backfill of the areas with imported clean soil (Figure 3). The Elevated Subsurface PAHs area covers approximately 1,084 square feet (ft^2) and extends to a depth of 4 feet (ft). Excavation of the area plus additional perimeter excavation for stability sloping will result in 203 cubic yards (cy) of excavated material (Figure 4-1, Attachment A). The Metallic Slag Area covers 2,866 ft^2 and extends to a depth of 1.5 ft, which will result in the excavation of 160 cy of material (Figure 4-2, Attachment A). The excavated materials will be hauled off-site for disposal at an approved disposal facility. Both excavations will be backfilled to the pre-existing grade with imported clean fill then seeded with a native seed mixture for stabilization.

Contribution to Remedial Performance

The NTCRA for Site 19 will mitigate potential risks to human health and/or the environment while satisfying project implementation and cost requirements. Results of previous investigations for Site 19 (Section 2) have delineated the nature and extent of contamination and identified potential unacceptable risks.

During the SSI, several samples were collected in the Elevated Subsurface PAHs Area and the Metallic Slag Area to delineate the horizontal and vertical extent of contamination for potential removal. These results were significantly lower than the initial concentrations identified as posing potential human health risks during the SI and either lower or similar to dredge fill background upper tolerance limits (UTLs) for SJCA.

Based on the results, the SJCA Tier I Partnering Team (Navy, USEPA, Virginia Department of Environmental Quality [VDEQ]) agreed that the SSI samples and/or physical boundaries would define the extent of removal at Site 19 and the establishment of a clean up goal for soil was unnecessary. Furthermore, the SJCA Tier I Partnering Team concluded that, if implemented, the removal action would reduce the low risk to an acceptable level, and additional confirmation sampling would not be required. Accordingly, the vertical and

horizontal extent of removal for the Elevated Subsurface PAHs Area and the Metallic Slag Area were defined as follows.

Excavation of the impacted soil at Site 19 will mitigate the potential risks posed as well as the potential for contaminant release and migration to other site media and off-site. The NTCRA will complete the clean up of the site and will allow for site closeout with NFA. Because no waste will remain in place, land use controls (LUCs) and long term monitoring will not be required.

Applicable or Relevant and Appropriate Requirements

The NCP requires that removal actions attain Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) with limited exception, to the extent practicable. Analysis of the removal action alternatives for Site 19 with the Federal and State ARARs are presented in Appendix A of the attached EE/CA (Attachment A). The removal action set forth in this Action Memorandum will comply with ARARs to the extent practicable.

Project Schedule

The Draft Site 19 EE/CA was made available to the public for comment for 30 days on October 17, 2005. No comments were received from the public during the comment period.

The proposed project schedule for is:

Preparation of Work Plan	January 2005
Subcontracting and Mobilization	February 2006
Removal Action	March 2006
Construction Completion Report	April 2006

Estimated Costs

The NCP 40 Code of Federal Regulations (CFR) Part 300.415 dictates statutory limits of $2 million and 12 months of USEPA fund-financed removal actions, with statutory exemption for emergencies and actions consistent with the removal action to be taken. These removal actions will not be USEPA fund-financed. The Navy/Marine Corps Installation Restoration (IR) Manual does not limit the cost or duration of the removal action.

Response Action Contract

The Navy will contract with environmental remediation contractors to perform the required work associated with Site 19. The estimated costs are itemized in Table 1.

TABLE 1
Site 19 Removal Action Cost

Excavation & Disposal	$49,962
Backfill and site restoration	$6,823
Subtotal	**$56,785**
Contingency (20%)	$11,357
Subtotal	**$67,714**
Project Management (10%)	$6,814
Work Plan and Closeout Report (30%)	$20,442
Construction Oversight (8%)	$5,451
Subtotal	**$100,849**
Total present value of Alternative	$100,849

State and Local Authority's Role

Under Executive Order 12580, the President delegates authority to undertake CERCLA response actions to the Department of Defense (DoD). Congress further outlined this authority in the Defense Environmental Restoration Program (DERP) Amendments, under 10 United States Code (USC) Sections 2701 through 2705. CERCLA Section 120 requires the Navy to apply state removal and remedial action law requirements at its facilities.

The Navy will continue to be the lead agency and the Navy's environmental restoration program will continue to be the exclusive source of funding for remedial actions on SJCA property. As members of the SJCA Tier I Partnering Team, the USEPA and VDEQ will continue to be consulted until actions addressing the contaminated area are complete.

IV. Threats to Public Health, Welfare or the Environment, and Statutory and Regulatory Authorities

Section 300.415 of the NCP lists the factors to be considered in determining the appropriateness of a NTCRA. Paragraphs (b)(2)(i), (iv), and (v) of Section 300.415 apply to the conditions as follows:

300.415(b)(2)(i) "Actual or potential exposures to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants."

At Site 19, PAHs are present in subsurface soil and metals are present in surface soil at concentrations that pose potential unacceptable risks to human health and/or the environment.

300.415(b)(2)(ii) "Actual or potential contamination of drinking water supplies or sensitive ecosystems."

At Site 19, PAHs are present in subsurface soil and metals are present in surface soil at concentrations that have the potential to migrate into the groundwater or adjacent surface water.

300.415(b)(2)(v) "Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released."

Because of its proximity to the mid-Atlantic coastline, SJCA is subject to storms throughout the late summer and early fall. Winter storms that move along the eastern seaboard are often associated with high winds and precipitation, which could cause the migration of contaminants from the site via fugitive dust or storm water runoff. In addition, Site 19 is within the floodplain of the Southern Branch of the Elizabeth River. Flooding could lead to the potential migration of contaminants from the site.

V. Endangerment Determination

Actual or threatened releases of pollutants and contaminants from Site 19, if not addressed by implementing the response action discussed in this Action Memorandum, may present an endangerment to public health, welfare, or the environment.

VI. Expected Change in the Situation Should Action Be Delayed or Not Taken

If no action is taken or the action is delayed, the potential for direct contact with the contaminants and the threat of migration of contaminants from Site 19 will remain.

VII. Outstanding Policy Issues

There are no outstanding policy issues regarding this action.

VIII. Enforcement

The Navy can and will perform the proposed response promptly and properly.

IX. Recommendation

This Decision Document represents the selected removal actions for Site 19 at SJCA, Chesapeake, Virginia, developed in accordance with CERCLA as amended, and is consistent with the NCP. This decision is based on the Administrative Record file for SJCA Site 19.

Conditions at the site meet the NCP section 300.415(b)(2) criteria for removal action. The Naval Facilities Engineering Command, in cooperation with the USEPA and VDEQ, recommends approval of the proposed remedial action. If approved, the total project ceiling for Site 19 will be $100,849. Response actions should commence as soon as practical, due to the potential threat to human health and/or the environment from Site 19.

X. References

A.T. Kearney, Inc., and K.W. Brown and Associates, Inc. (A.T. Kearney), March 1989. *Phase II RCRA Facility Assessment of the St. Juliens Creek Annex Facility*, Chesapeake, Virginia.

CH2M HILL, April 1996. *Final Relative Risk Ranking System Data Collection Report.* St. Juliens Creek Annex to the Norfolk Naval Base, Chesapeake, Virginia.

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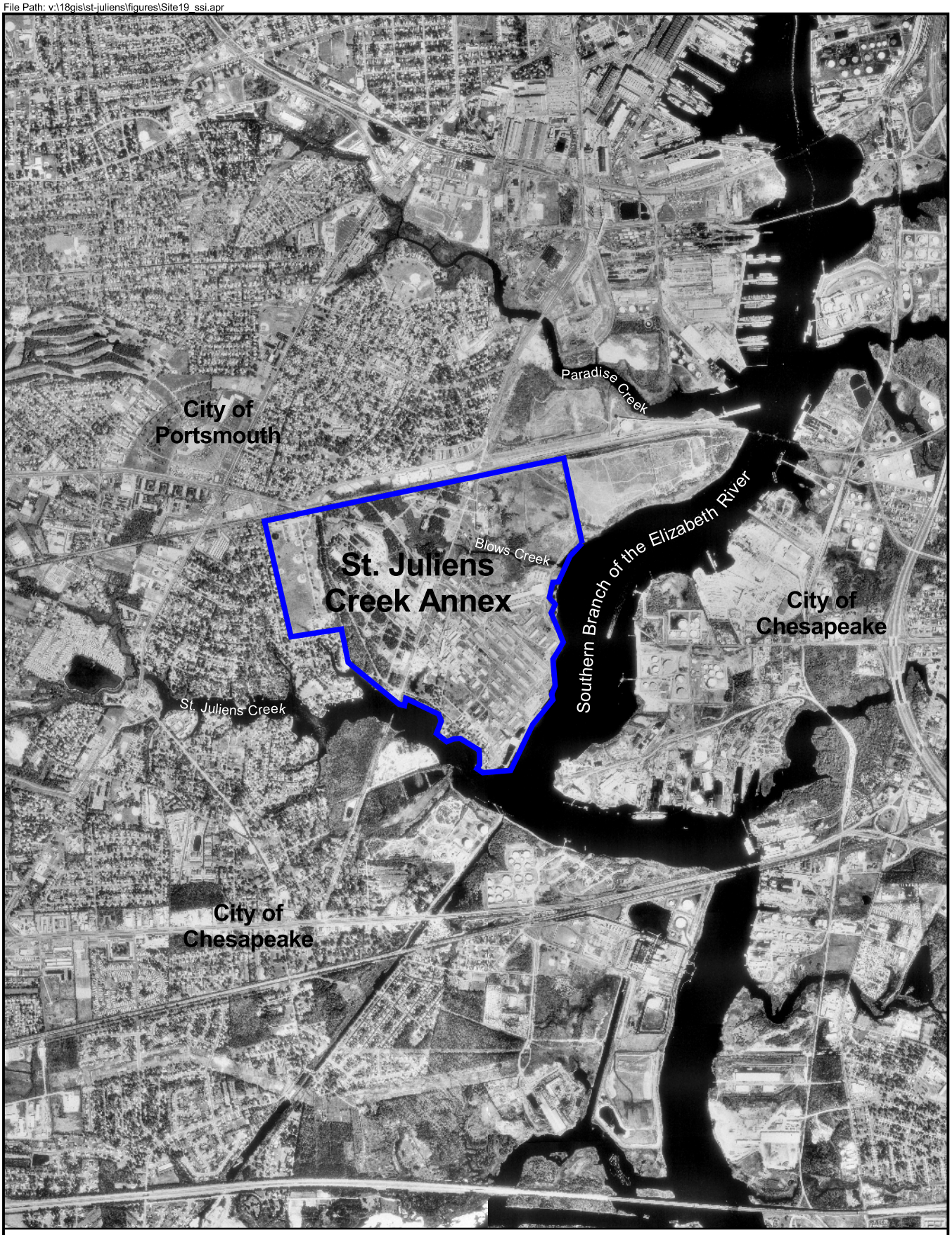

LEGEND

St. Juliens Creek Annex

N

0 2500 5000 Feet

Figure 1
Location of St. Juliens Creek Annex
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

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LEGEND

Site Location

Facility Boundary

N

0 500 1000 1500 Feet

Figure 2
Location of Site 19
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

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LEGEND

- SI Surface Soil Sample Location
- SI Subsurface Soil Sample Location
- SSI Surface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Extent of PAH Removal (Area = 1,084 sq.ft.)
- Extent of Metallic Slag Removal (Area = 2,866 sq.ft.)
- Site Boundary

N

0 35 70 Feet

Figure 3
Site 19 Proposed Removal Areas
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

Attachment A

Final EE/CA for Site 19

Final

Engineering Evaluation/Cost Analysis for Site 19

St. Juliens Creek Annex
Chesapeake, Virginia

Contract Task Order 0057

November 2005

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Under the

CLEAN III Program
Contract N62470-02-D-3052

Prepared by

CH2MHILL

Virginia Beach, Virginia

Executive Summary

This report presents an Engineering Evaluation/Cost Analysis (EE/CA) for a non-time-critical removal action (NTCRA) at Site 19, St. Juliens Creek Annex, Chesapeake, Virginia. Site 19 consists of former Building 190 and the surrounding area. Building 190 was located just south of the mouth of Blows Creek into the Southern Branch of the Elizabeth River. Previous site investigations detected polycyclic aromatic hydrocarbons (PAHs) in subsurface soils and metals in surface soils that exceed background upper tolerance limits (UTLs) and United States Environmental Protection Agency (USEPA) Region III Risk Based Concentrations (RBCs). Two distinct areas of Site 19 are being addressed in this EE/CA as part of the NTCRA for this site; 1) the Elevated Subsurface PAHs Area and 2) the Metallic Slag Area.

The purpose of this NTCRA is to eliminate exposure of receptors to potential risk associated with impacted soils at Site 19 and to prepare the site for closeout under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) with no further action (NFA). The following three removal action alternatives were evaluated for both areas:

1. No action.
2. Excavation of impacted soils and backfill with import material.
3. Construction of soil covers over the Metallic Slag Area and Elevated Subsurface PAHs Area

Alternative 1 (No Action) does not meet the objectives of the NTCRA to eliminate risk to human health and the environment. As such, implementation of this alternative is not recommended.

Alternative 2, excavation of impacted soils and backfill with import material, is the preferred alternative. Implementation of this alternative will result in the complete removal of impacted soil from the site. As such, this meets the goals of the EE/CA to mitigate risk to human health and the environment and to prepare the site for no further action (NFA).

Alternative 3 is effective in reducing exposure to human health and the environment. However since the metallic slag and PAH-impacted soil will remain in place, this alternative requires LUCs and long-term operation and maintenance (O&M) to control future land use and to provide for future cover maintenance, inspections, and groundwater monitoring. As such, Alternative 3 is not recommended.

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Acronyms and Abbreviations

ARAR	applicable or relevant and appropriate requirement
ASTM	American Society of Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action Navy
CTO	Contract Task Order
cy	cubic yard(s)
DPT	Direct Push Technology
DRMO	Defense Reutilization and Marketing Office
EE/CA	Engineering Evaluation/Cost Analysis
ft	foot, feet
ft^2	square feet
HRS	Hazard Ranking System
IAS	Initial Assessment Study
IR	Installation Restoration
LUC	land use control
MARMC	Mid-Atlantic Regional Maintenance Center
mg/kg	milligrams per kilogram
NAPEC	Naval Ammunition Production Engineering Center
NAVFAC	Naval Facilities Engineering Command, Mid-Atlantic Division
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NFA	No Further Action
NPL	National Priorities List
NTCRA	non-time-critical removal action
O&M	Operations and Maintenance
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
ppm	parts per million
RAO	Removal Action Objective
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RRR	Relative Risk Ranking

SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SJCA	St. Juliens Creek Annex
SPAWAR	Space and Naval Warfare Systems Command
SSA	Site Screening Assessment
SSI	Supplemental Site Investigation
SVOC	semivolatile organic compound
TAL	Target Analyte List
TBC	to–be-considered
TCL	Target Compound List
TPH	Total Petroleum Hydrocarbons
US	United States
USEPA	United States Environmental Protection Agency
UTL	Upper Threshold Limit
VDEQ	Virginia Department of Environmental Quality
VOC	volatile organic compound

SECTION 1

Introduction

This report presents an Engineering Evaluation/Cost Analysis (EE/CA) for a non-time-critical removal action (NTCRA) for Installation Restoration (IR) Site 19, Building 190 at St. Juliens Creek Annex (SJCA), Chesapeake, Virginia. The EE/CA is prepared under the Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract Number N62470-02-D-3052, Contract Task Order (CTO) 0057.

1.1 Regulatory Background

This document is issued by the United States (US) Department of the Navy, lead agency responsible for remediation of SJCA, Site 19, in partnership with the United States Environmental Protection Agency (USEPA) Region III and the Virginia Department of Environmental Quality (VDEQ), under Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA) of 1986.

Section 104 of CERCLA and SARA allows an authorized agency to take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release relating to hazardous substances, pollutants, or contaminants at any time, or to take any other response measures consistent with the National Oil and Hazardous Substance Pollution Contingency Plan (NCP) as deemed necessary to protect public health or welfare and the environment.

The NCP, 40 Code of Federal Regulations (CFR) 300, provides regulations for implementing CERCLA and SARA, and regulations specific to removal actions. The NCP defines a removal action as the "cleanup or removal of released hazardous substances from the environment, such actions as may be necessary to monitor, assess, and evaluate the threat of release of hazardous substances; the disposal of removed material; or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release." Removal actions for Site 19 are not time-critical. NTCRAs are defined in 40 CFR Section 300.415(b)(4) as actions pertaining to an imminent threat to human health and the environment and that have planning periods of 6 months or more.

The 40 CFR Section 300.415 requires the lead agency to conduct an EE/CA when a NTCRA is planned for a site. The goals of an EE/CA are to identify the objectives of the removal action and to analyze the effectiveness, implementability, and cost of various alternatives that may satisfy these objectives. An EE/CA documents the removal action alternatives and selection process. Where the extent of the contamination is well defined and limited in extent, NTCRAs also allow for the expedited cleanup of sites in comparison to the remedial action process under CERCLA.

Community involvement requirements for NTCRAs include preparing an EE/CA and making it available for public review and comment for a period of 30 days. An announcement entitled "Public Notice of the Navy's Invitation for Public Comment on the Engineering Evaluation/Cost Analysis for Site 19 at St. Juliens Creek Annex" was published in the Virginia Pilot on October 16, 2005. The EE/CA was made available for public review at the Major Hill Library in Chesapeake, Virginia from October 17, 2005 until November 16, 2005. Written responses to significant comments will be summarized in an Action Memorandum and included in the Administrative Record.

1.2 Purpose and Objectives

Submittal of this document fulfills the requirements for NTCRAs defined by CERCLA, SARA, and the NCP. This EE/CA has been prepared in accordance with USEPA's guidance document *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA*, PB93-963402, August 1993.

The EE/CA compares removal alternatives based on their technical feasibility, ability to protect human health and the environment, ability to prevent the potential release of hazardous constituents, and cost. Individual goals of this EE/CA are to: (1) satisfy environmental review and public information requirements for removal actions, (2) satisfy Administrative Record requirements for documenting the removal action selection, and (3) provide a framework for evaluating and selecting alternative technologies.

The objective of this NTCRA is to evaluate the removal alternatives to address the limited risk at Site 19 and to prepare the site for closeout under CERCLA with no further action (NFA).

The following information is presented within this EE/CA:

Section 2: Site Description and Previous Investigations

Section 3: Identification of Removal Action Objectives

Section 4: Removal Action Alternatives

Section 5: Comparative Analysis of Removal Action Alternatives

Section 6: Recommended Removal Alternative

SECTION 2

Site Description and Previous Investigations

This section provides a brief summary of background information for SJCA and Site 19. It also discusses previous environmental investigations that took place at Site 19.

2.1 SJCA Description and History

SJCA is a 490-acre facility situated at the confluence of St. Juliens Creek and the Southern Branch of the Elizabeth River in the City of Chesapeake, in southeastern Virginia (Figure 2-1). The facility is bordered to the north by the Norfolk and Western Railroad, the City of Portsmouth, and residential areas; to the west by residential areas; to the south by St. Juliens Creek; and to the east by the Southern Branch of the Elizabeth River. Most surrounding areas are developed and include residences, schools, recreational areas, and shipping facilities for several large industries.

SJCA began operations as a Naval facility in 1849. The Annex was one of the largest ammunition depots in the United States involving wartime transfer of ammunitions to various other Naval facilities. Specific ordnance operations and processes conducted at SJCA included stockpiling Explosive D (ammonium picrate or picrate acid) for use in projectiles, manufacturing MARK VI mines, assembling small caliber guns and ammunition, storing torpedoes, filling shells, and testing ordnance. In 1975, all ordnance operations were transferred to the Yorktown Naval Weapons Station. As a result, decontamination was performed in, around, and under ordnance-handling facilities at SJCA in 1977.

SJCA has also been involved in nonordnance operations, including degreasing, paint shops, machine shops, vehicle and locomotive maintenance shops, pest control shops, battery shops, print shops, electrical shops, boiler plant operations, wash rack operations, potable water storage, saltwater fire-protection systems, fire-fighter training operations, and oil and chemical storage.

Activity at SJCA has decreased in recent years and many of the aging structures are being demolished. The current primary mission of SJCA is to provide a radar-testing range and warehousing facilities for nearby Norfolk Naval Shipyard and other local Naval activities. SJCA also provides administrative offices, light industrial shops, and storage facilities for several tenant commands; including Defense Reutilization and Marketing Office (DRMO) storage, Space and Naval Warfare Systems Command (SPAWAR), Mid-Atlantic Regional Maintenance Center (MARMC), and a cryogenics school.

2.2 Site 19 Description and History

Site 19 consists of former Building 190 and the surrounding area. Building 190 was located just south of the mouth of Blows Creek at the confluence of the Southern Branch of the Elizabeth River (Figure 2-2). The building was heavily used for loading explosives into

ammunition. From the 1940s to the 1970s, Explosive D and Composition A-3 were reportedly used.

In mid-1977, all ordnance-handling buildings were decontaminated by flushing with chemical solutions and water. Prior to decontamination, Naval Ammunition Production Engineering Center (NAPEC) visually inspected the facilities and collected samples for chemical analysis to develop appropriate decontamination procedures for each building. At the conclusion of the decontamination process, NAPEC visually reinspected each building, collected samples for chemical analysis, and certified that the facilities were decontaminated. However, since the level of decontamination was not specified, there remained a potential for ordnance residues.

The 1989 Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) reported that various ordnance items had been disposed of in the area between Building M-5 and Building 190 during past ordnance management activities. The area was noted to contain a variety of construction rubble and facility personnel reported no knowledge of residual contamination from ordnance management operations.

Building 190 was demolished sometime after 2000 and the site is now a grass-covered field. Two concrete drainage culverts remain on site, leading underground from former Building 190 to the Southern Branch of the Elizabeth River. Building M-5 and former Building 190 are illustrated in Figure 2-3.

2.3 Previous Investigations

Previous facility-wide investigations and site-specific investigations conducted at SJCA related to Site 19 are listed below. A more detailed description of these activities is located in the Site Investigation (SI) Report (CH2M HILL, June 2004).

- Initial Assessment Study (IAS) – NEESA, August 1981
- Phase II RFA – A.T. Kearney, March 1989
- Aerial Photographic Site Analysis – USEPA, February 1995
- Hazard Ranking System (HRS) Documentation Record – Tetra Tech, January 2000
- Background Investigation – CH2M HILL, October 2001 and August 2004
- Relative Risk Ranking (RRR) – CH2M HILL, April 1996
- Site Screening Assessment (SSA) – CH2M HILL, April 2002

A description on the SI and the Supplemental Site Investigation (SSI) conducted at Site 19 is provided in the following subsections.

2.3.1 Site Investigation – CH2M HILL, June 2004

Based on the results and recommendations of the SSA, a SI was completed at Site 19. Ten co-located surface and subsurface soil samples were collected by direct-push technology (DPT) and two sediment samples were collected by hand auger. The two sediment samples were collected immediately downstream of the two stormwater drainage channels that discharge to the Southern Branch of the Elizabeth River. All samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), TCL pesticides/polychlorinated biphenyls (PCBs), Target Analyte

List (TAL) inorganics, cyanide, and explosives. The site boundary and SI sample locations are shown on Figure 2-3.

Potential human health risks from polycyclic aromatic hydrocarbons (PAHs) and inorganics in soil were identified. The SI recommended further delineation of PAHs in surface soil in the former Parking Lot Area (SJS19-SS03) and inorganics in surface soil adjacent to a Metallic Slag Area (SJS19-SS11) to determine the potential impact to site soils. Groundwater sampling was also recommended to assess the potential impact of the elevated PAHs found in subsurface soil (SJS19-SB12).

The compounds detected in Site 19 sediment were similar to those frequently detected in urban water bodies such as the Elizabeth River, and although these compounds may be in part related to historic site activities, the presence of these chemicals more likely reflects input from a variety of anthropogenic sources, therefore, no further evaluation of sediment was recommended.

2.3.2 Supplemental Site Investigation – CH2M HILL, June 2005

Following the SI, a SSI was conducted to determine if PAHs in the gravel parking lot were related to site processes, to establish the horizontal and vertical extent of PAH-impacted subsurface soil for potential removal, and to delineate the horizontal and vertical extent of the metallic slag-impacted soil for potential removal. The SSI field activities were conducted in November 2004 and April 2005 and included the collection of surface soil and groundwater samples. Based on the field activities, the Elevated Subsurface PAHs Area and the Metallic Slag Area were identified as the site's areas of concern. The results of the investigation of those two areas are provided below.

2.3.2.1 Elevated Subsurface PAHs Area

The PAH-impacted soil is surrounding previous sample SJS19-SB12, which was collected from 1 to 3 feet (ft) below ground surface (bgs). To delineate the extent of the PAHs for potential removal, four subsurface soil samples were collected in the vicinity of SI sample SJS19-SB12 (Figure 2-3). Three subsurface soil samples were collected from 1 to 3 ft bgs to delineate the horizontal extent (SJS19-SB14, SJS19-SB16, and SJS19-SB17), and one subsurface soil sample was collected from 4 to 6 ft bgs near SJS19-SB12 to delineate the vertical extent (SJS19-SB15). The samples were analyzed for TCL PAHs. Constituents detected at concentrations exceeding background upper tolerance limits (UTLs) and USEPA Region III Risk Based Concentrations (RBCs) for residential use (adjusted by 0.1 for noncarcinogens) are summarized on Table 2-1 and Figure 2-4.

Additionally, one groundwater sample was collected to assess the potential impact of elevated PAHs to shallow (Columbia Aquifer) groundwater. No PAHs were detected in the groundwater sample.

2.3.2.2 Metallic Slag Area

The metallic slag is located near previous sample SJS19-SS11 where elevated inorganics were found to pose a potential risk to human health (Figure 2-3). To delineate the horizontal extent of the Metallic Slag Area for potential removal, four surface soil samples were collected from 0 to 0.5 ft bgs around the perimeter of the metallic slag. To delineate the

vertical extent of the metallic slag for potential removal, one subsurface soil sample was collected from beneath the extent of the metallic slag (14 to 16 inches bgs). The samples were analyzed for TAL inorganics. Constituents detected at concentrations exceeding background UTLs and EPA Region III RBCs for residential use (adjusted by 0.1 for noncarcinogens) are summarized on Table 2-2 and Figure 2-5.

2.3.2.3 Extent of Removal

Since the results of the SSI samples were significantly lower than those of samples collected during the initial SI, and are consistent with dredge fill background UTLs for the St. Juliens Creek Annex, the SJCA Tier I Partnering team (Navy, USEPA, Virginia Department of Environmental Quality [VDEQ]) agreed to use these sample locations to define a protective extent of the removal action. Furthermore, the SJCA Tier I Partnering Team concluded that, if implemented, the removal action (extent based on SSI sample locations) would reduce the risk posed by the site to an acceptable level, and confirmation sampling would not be required. Accordingly, the vertical and horizontal extent of removal for the Elevated Subsurface PAHs Area and the Metallic Slag Area were defined as follows.

The vertical extent of the Elevated Subsurface PAHs Area is to 4 ft bgs. The horizontal extent of the Elevated Subsurface PAHs Area is demarcated by subsurface soil sample locations to the north, south, and west of SJS19-SB12 and to the east by the adjacent roadway. The Elevated Subsurface PAHs Area encompasses approximately 1,084 square feet (ft^2) and is illustrated in Figure 2-6.

The vertical extent of the Metallic Slag Area was established to be 1.5 ft bgs. The horizontal extent is demarcated by the soil sample locations to the west, south, and east of the slag, and to the north by the adjacent roadway. The Metallic Slag Area and the surrounding soil encompass an area of approximately 2,866 ft^2 as illustrated in Figure 2-6.

Table 2-1
Site 19 Elevated Subsurface PAHs Area
Subsurface Soil Exceedances of Screening Criteria
St. Juliens Creek Annex
Chesapeake, Virginia

			SI Sample	SSI Samples			
Station ID	**Soil Residential Adjusted RBC**	**Subsurface Soil Dredge Fill Background UTL (1-3 ft bgs)**	SJS19-SO12	SJS19-SO14	SJS19-SO15	SJS19-SO16	SJS19-SO17
Sample ID			SJS19-SB12-03-03C[1]	SJS19-SB14-03-05B	SJS19-SB15-06-05B	SJS19-SB16-03-05B	SJS19-SB17-03-05B
Sample Depth			1-3 ft bgs	1-3 ft bgs	4-6 ft bgs	1-3 ft bgs	1-3 ft bgs
Sample Date			08/13/03	04/20/05	04/20/05	04/20/05	04/20/05
Chemical Name							
Semivolatile Organic Compounds (UG/KG)							
1,1-Biphenyl	390,000	--	72 J	370 U	380 U	81 J	42 J
2-Methylnaphthalene	31,000	--	320 J	370 U	380 U	190 J	150 J
Acenaphthene	470,000	592	860	370 U	380 U	320 J	230 J
Acenaphthylene	160,000	131	610 J	370 U	380 U	190 J	390 U
Acetophenone	780,000	--	760 U	370 U	380 U	400 U	390 U
Anthracene	2,300,000	462	2,000	370 U	380 U	720	390 J
Benzaldehyde	780,000	--	79 J	370 UJ	380 UJ	400 UJ	390 UJ
Benzo(a)anthracene	870	2,027	**9,400**	370 U	380 U	**2,200**	**1,200 J**
Benzo(a)pyrene	87	1,785	**9,400**	370 U	380 U	**1,700**	**890 J**
Benzo(b)fluoranthene	870	2,335	**7,100**	370 U	380 U	**1,900**	**920 J**
Benzo(g,h,i)perylene	230,000	2,099	3,700	370 U	380 U	1,100	540 J
Benzo(k)fluoranthene	8,700	2,038	2,100	370 U	380 U	880	310 J
Carbazole	32,000	--	660 J	370 U	380 U	320 J	120 J
Chrysene	87,000	3,487	12,000	370 U	380 U	2,200	1,100 J
Di-n-octylphthalate	310,000	--	760 U	370 U	380 U	400 U	390 U
Dibenz(a,h)anthracene	87	708	**1,800**	370 U	380 U	400 U	390 U
Dibenzofuran	16,000	--	420 J	370 U	380 U	450	170 J
Fluoranthene	310,000	2,766	19,000	370 U	380 U	4,300	1,800 J
Fluorene	310,000	602	1,000	370 U	380 U	600	360 J
Indeno(1,2,3-cd)pyrene	870	1,769	**4,300**	370 U	380 U	**910**	380 J
Naphthalene	160,000	485	580 J	370 U	380 U	320 J	410 J
Phenanthrene	230,000	913	15,000	370 U	380 U	4,700	2,500 J
Pyrene	230,000	2,590	22,000	370 U	380 U	3,900	2,200 J
n-Nitrosodiphenylamine	130,000	--	130 J	370 U	380 U	400 U	390 U

Notes:

COPCs identified in HHRS conducted during the SI (CH2M HILL, June 2004)

Exceeds Background UTL

Exceeds RBC

[1] A duplicate was collected for this sample and the results provided are the maximum concentration between the sample and the duplicate.

-- No criteria available

NA - Not analayzed

ND - Not detected

J - Reported value is estimated

U - Not detected

Table 2-2
Site 19 Metallic Slag Area
Surface and Subsurface Soil Exceedances of Screening Criteria
St. Juliens Creek Annex
Chesapeake, Virginia

				SI Samples		SSI Samples				
Station ID	**Soil Residential Adjusted RBC**	**Surface Soil Dredge Fill Background UTL (0-0.5 ft bgs)**	**Subsurface Soil Dredge Fill Background UTL (1 3 ft bgs)**	SJS19-SO11		SJS19-SO13	SJS19-SS17	SJS19-SS18	SJS19-SS19	SJS19-SS20
Sample ID				SJS19-SS11-00-03C	SJS19-SB11-03-03C	SJS19-SB13-04D	SJS19-SS17-00-04D	SJS19-SS18-00-04D[1]	SJS19-SS19-00-04D	SJS19-SS20-00-04D
Sample Depth				0-0.5 ft bgs	1-3 ft bgs	14-16 inches bgs	0-0.5 ft bgs	0-0.5 ft bgs	0-0.5 ft bgs	0-0.5 ft bgs
Sample Date				08/13/03	08/13/03	11/12/04	11/09/04	11/09/04	11/09/04	11/09/04
Chemical Name										
Total Metals (MG/KG)										
Aluminum	7,800	22,786	18,839	2,860	6,310	5,310	6,520	4,240	3,900	4,830
Antimony	3.1	1.47	1.47	**5.3 J**	0.63 U	0.67 UL	1 L	**7.1 L**	0.72 UL	0.87 UL
Arsenic	0.43	24	14	**5.5**	**2.1 J**	0.54 U	3.6 B	**15.6**	1.8 B	2.1 B
Barium	550	98	50	241	30.5 J	12.5 J	24.1 J	264	26.7 J	19.7 J
Beryllium	16	1	0.81	0.1 B	0.13 B	0.15 J	0.22 B	0.5 J	0.19 B	0.17 B
Boron	1,600	--	--	NA	NA	0.77 B	1.8 B	4.6	1.1 B	1 B
Cadmium	7.8	ND	ND	**52.5**	1.7	0.11 J	0.36 J	**32.2**	2.7	0.11 B
Calcium	--	3,251	3,251	1,610	503 J	320 J	225 J	1,120	302 J	155 J
Chromium	23	45	39	**195**	14.6	5.9	12.3	**110**	6.6	6.9
Cobalt	160	13	13	4.3 J	1.2 J	0.59 J	1.3 L	6.4 J	0.83 L	0.75 L
Copper	310	58	40	**1,780**	98	8.8	27.2	**1,570**	17	8.6
Cyanide	160	ND	ND	8.1	0.59 B	0.16 U	0.22 U	0.18 U	0.19 U	0.18 U
Iron	2,300	45,805	36,585	**34,200**	**7,220**	**2,970**	**5,870**	**55,100**	**3,330**	**3,030**
Lead	400	147	86	**885**	28.8	4.9 K	34.7	**497**	36.1	14.4
Magnesium	--	4,507	3,847	422 J	705 J	430 J	669 J	1,180	396 J	456 J
Manganese	160	198	151	**419**	41.4	13 L	27	**596**	37.3	15
Mercury	2.3	1.3	0.62	0.18	0.044 U	0.016 U	0.034 J	0.27	0.035	0.021 J
Molybdenum	39	--	--	NA	NA	0.4 B	0.86 B	9.6	0.37 B	0.35 U
Nickel	160	19	15	25.1	5.6 J	2.6 J	4 J	51	2.9 B	2.7 B
Potassium	--	4,577	3,465	306 J	577 J	204 J	452 J	877	197 J	291 J
Selenium	39	2.2	1.5	0.71 U	0.72 U	0.53 U	0.58 U	1	0.56 U	0.68 U
Silver	39	0.67	0.67	1.3 J	0.29 U	0.19 U	0.2 UL	0.72 L	0.2 UL	0.24 UL
Sodium	--	620	203	184 J	289 J	68 J	219 L	195 L	214 L	150 L
Vanadium	7.8	70	42	**8.4 J**	**15.8**	7.3	**14.3**	**17.1**	6.8 J	**8.9 J**
Zinc	2,300	137	87	1,100	62.3	21.6	52.8	672	195	22.3

Notes:

COPCs identified in HHRS conducted during the SI (CH2M HILL, June 2004)

Exceeds Background UTL

Exceeds RBC

[1] A duplicate was collected for this sample and the results provided are the maximum concentration between the sample and the duplicate.

-- No criteria available

NA - Not analayzed

ND - Not detected

B - Blank contamination

J - Reported value is estimated

L - Reported value is bised low

U - Not detected

SECTION 3

Identification of Removal Action Objectives

3.1 Statutory Limits on Removal Action

The NCP 40 CFR Part 300.415 dictates statutory limits of $2 million and 12 months of CERCLA fund-financed removal actions, with statutory exemptions for emergencies and actions consistent with the removal action to be taken. This removal action will not be CERCLA fund-financed; it will be financed by the Navy. The Navy/Marine Corps IR Manual does not limit the cost or duration of the removal action; however, cost-effectiveness is a recommended criterion for the evaluation of removal action alternatives.

3.2 Removal Action Objectives

Following are the proposed Removal Action Objectives (RAOs) for Site 19.

- Implement measures that would eliminate potential unacceptable risk to human health and the environment posed by the elevated PAH concentrations detected in subsurface soils in the Elevated Subsurface PAHs Area and elevated metals concentrations in surface soil in the Metallic Slag Area.
- Prepare the site for closeout under CERCLA with NFA.

In preparation of this EE/CA, several removal action alternatives were scoped and developed to meet the objectives listed above. The scope of the engineering measures for each removal alternative developed is discussed in Section 4.

3.3 Determination of Removal Schedule

Once the EE/CA has been drafted, it is placed in the information repository and notice of its availability, along with a brief summary, are published in the local newspaper for public review. The EE/CA is then subjected to a 30-day public comment period. A public information session will be held during or immediately following the public comment period, if requested. If public comments are received following the public comment period, a Responsiveness Summary addressing significant comments will be prepared and included in the Administrative Record, along with the Final EE/CA.

Since this removal action has been designated non-time critical, the start date will be determined by factors other than the urgency of the threat. Possible factors include weather conditions, the availability of resources, and site constraints.

The total project period is predicted to last approximately 8 months from the end of the of the public comment period through completion of CERCLA documentation. Critical milestone periods related to the EE/CA are summarized below:

- EE/CA Public Comment Period—1 month
- Work Plan, Subcontracting and Mobilization—2 months
- Removal Action—2 weeks
- CERCLA Documentation—4 months

The estimated timeframe includes the time required for mobilization and setup of equipment and performing the selected removal actions.

3.4 Applicable or Relevant and Appropriate Requirements

As required by Section 121 of CERCLA, remedial actions carried out under Section 104 or secured under Section 106 must attain the levels of standards of control for hazardous substances, pollutants, or contaminants specified by the applicable or relevant and appropriate requirements (ARARs) of federal and state environmental laws and state facility-siting laws, unless waivers are obtained. The requirements of CERCLA generally apply as a matter of law only to remedial actions. However, as required by EPA's policy 40 CFR Section 300.415(j), ARARs will be identified and attained for removal actions to the extent practicable. Three factors will be applied to determine whether the identification and attainment of ARARs is practicable in a particular removal situation: (1) the exigencies of the situation; (2) the scope of the removal action to be taken; and (3) the effect of ARAR attainment on the statutory limits for removal action duration and cost.

ARARs are identified by the USEPA as either being applicable to a situation or relevant and appropriate to it. These distinctions are critical to understanding the constraints imposed on response alternatives by environmental regulations other than CERCLA. The definitions of ARARs below are from the USEPA guidance (USEPA, October 1988).

"Applicable requirements" are standards and other environmental protection requirements of federal or state law dealing with a hazardous substance, pollutant, contaminant, action being taken, location, or other circumstance at a CERCLA site.

"Relevant and appropriate requirements" are standards and environmental protection criteria of federal or state law that, although not "applicable" to a hazardous substance, pollutant, contaminant, action being taken, location, or other circumstance, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. The procedure to determine if a requirement is relevant and appropriate is a two-step process. A requirement is "relevant" if it addresses problems or situations sufficiently similar to the circumstances of the proposed response action. A requirement is "appropriate" if it would also be well suited to the conditions of the site.

A requirement may be "relevant" to a particular situation but not "appropriate", given site-specific circumstances; such a requirement would not be an ARAR for the site. A requirement that is relevant and appropriate must be met as if it were applicable. Relevant and appropriate requirements that are more stringent than applicable requirements take precedence. However, more discretion is allowed in determining relevant and appropriate requirements than in determining applicable requirements.

"To-be-considered" (TBC) are non-promulgated advisories or guidance issued by federal or state government that are not legally binding, and do not have the status of potential ARARs. TBCs are evaluated along with ARARs and may be implemented by USEPA when ARARs are not fully protective of human health and the environment.

Another factor in determining which response requirement must be met is whether the requirement is substantive or administrative. Onsite CERCLA response actions must meet substantive requirements but not administrative requirements. Substantive requirements are those dealing directly with actions or with conditions in the environment. Administrative requirements implement the substantive requirements by prescribing procedures such as fees, permitting, and inspection that make substantive requirements effective. This distinction applies to onsite actions only; offsite response actions are subject to all applicable standards and regulations, including administrative requirements such as permits.

Three classifications of requirements are defined by USEPA in the ARAR determination process: chemical-specific, location-specific, and action-specific.

Chemical-specific ARARs are health or risk management-based numbers or methodologies that result in the establishment of numerical values for a given medium that would meet the NCP "threshold criterion" of overall protection of human health and the environment. These requirements generally set protective cleanup concentrations for the chemicals of concern in the designated media, or set safe concentrations of discharge for response activity. Chemical-specific requirements are generally set for a single chemical or closely–related group of chemicals and do not typically consider mixtures of chemicals. When chemical-specific requirements do not adequately protect human health or the environment, cleanup goals may be set below the TBC value. Federal and Commonwealth of Virginia chemical-specific regulations that have been reviewed are summarized in Appendix A.

Location-specific ARARs restrict response activities and media concentrations based on the characteristics of the surrounding environments. Location-specific ARARs may include restrictions on response actions within wetlands or floodplains, near locations of known endangered species, or on protected waterways. Federal and Commonwealth of Virginia location-specific regulations that have been reviewed are summarized in Appendix A.

Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous substances. Federal and Commonwealth of Virginia action-specific ARARs that may affect the development and conceptual arrangement of response alternatives are summarized in Appendix A.

SECTION 4

Removal Action Alternatives

4.1 Description of Removal Action Alternatives

The removal actions discussed in this EE/CA address the Elevated Subsurface PAHs Area and the Metallic Slag Area at Site 19. The alternatives for this NTCRA were considered using professional judgment and information from previous investigations. The no action alternative was evaluated for comparative purposes.

4.1.1 Alternative 1-No Action

The no action alternative implies that no removal work will be done at this site. The site will be left as it currently exists, leaving the impacted soils in place. Under this alternative, no controls or removal technologies will be implemented. CERCLA (Section 121(c)), as amended by SARA (1986), requires that the site be reviewed every 5 years since the impacted soils would remain on site. It is assumed that the current level of maintenance would be sustained.

4.1.2 Alternative 2-Excavation and Backfill

Alternative 2 includes excavation and backfill with imported clean material in both the Elevated Subsurface PAHs Area and the Metallic Slag Area. As indicated in Section 2.3.4, the Elevated Subsurface PAHs Area and the Metallic Slag Area were delineated in the SSI. The samples used for delineation in the SSI will serve as pre-excavation confirmation samples and the removal actions will require excavation to those limits in both areas. The Elevated Subsurface PAHs Area is approximately 1,084 ft^2 and extends to a depth of 4 ft bgs. To comply with safe excavation protocol, in addition to the 1,084 ft^2 area, soil around the perimeter of this area will be excavated using a maximum 1H:1V slope to provide stability. The total volume of soil to be excavated in the Elevated Subsurface PAHs Area is 203 cubic yards (cy) and includes the PAH-impacted soil as well as the material associated with the sloped excavation. Figure 4-1 illustrates the limits of the area to be excavated in the Elevated Subsurface PAHs Area. The Metallic Slag Area is approximately 2,866 ft^2 and extends to a depth of 1.5 feet for a total excavation volume of 160 cy. Figure 4-2 illustrates the limits of the area to be excavated in the Metallic Slag Area.

The total amount of impacted soil excavated under Alternative 2 would be approximately 363 cy. The excavated material is assumed to be non-hazardous and will be characterized for waste disposal. Following characterization, an appropriate disposal facility will be selected and the excavated materials will be manifested and transported off site for disposal.

Upon removal of the soil, the excavated areas would be backfilled to their original grades. Backfill material will be certified clean through analytical testing for VOCs, SVOCs, pesticides/PCBs, and inorganics and comparison to USEPA RBCs and SJCA dredge fill background UTLs (CH2M HILL, October 2001). Additionally, backfill material will contain less than 50 milligrams per kilogram (mg/kg) total petroleum hydrocarbons (TPH) and less than 10 mg/kg total benzene, toluene, ethylbenzene, and xylene (BTEX). Backfill material

will consist of general fill and topsoil. General fill will be used to fill the excavations to within six inches of the surrounding grade and topsoil will be used for the top six inches. General fill will be placed in each excavation in 6- to 8-inch lifts and will have a maximum particle size of three inches. Topsoil will be used for the remaining six inches, returning the site to its original grade. Acceptable topsoil is defined as native or amended soils with an organic salt concentration less than 500 parts per million (ppm), organic content at a minimum of 1.5 percent, and a pH of 6 to 7.5. Site restoration will also include re-vegetation with native seed. Figures 4-3 and 4-4 show typical cross sections of the restored excavations for the Elevated Subsurface PAHs Area and the Metallic Slag Area, respectively.

4.1.3 Alternative 3-Soil Cover

Alternative 3 provides for the construction of a soil cover over each of the areas of concern: the Elevated Subsurface PAHs Area and the Metallic Slag Area. Figures 4-5 and 4-6 show the conceptual layout for placing a soil cover in the Elevated Subsurface PAHs Area and the Metallic Slag Area, respectively. Figures 4-7 and 4-8 present a schematic of a typical soil cover that would be used in the Elevated Subsurface PAHs Area and the Metallic Slag Area, respectively. Major components to the soil cover are as follows:

- Cover material will be certified clean through analytical testing of VOCs, SVOCs, pesticides/PCBs and inorganics and comparison to USEPA RBCs and SJCA dredge fill background UTLs (CH2M HILL, October 2001). Additionally, cover material will contain less than 50 mg/kg TPH and less than 10 mg/kg BTEX.
- The soil covers will consist of a minimum 2 percent slope in order to promote surface water drainage.
- Final slopes of the soil covers will not exceed 3H:1V.
- Cover materials will consist of the following layers (listed from top to bottom):
  - **Topsoil Layer.** The performance standards require the upper 6 inches of the final cover system to consist of topsoil or similar materials capable of sustaining vegetation. Acceptable topsoil is defined as native or amended soils with an organic salt concentration less than 500 ppm, organic content at a minimum of 1.5 percent, and a pH of 6 to 7.5. Topsoil shall be classified as a loam, sandy loam, silt loam, sandy clay loam, or clay loam and have a maximum particle size of ¾ inch.
  - **Vegetative Support Layer.** The vegetative support layer will consist of a minimum of 18 inches of clean soil fill with a maximum particle size of 3 inches. Based on surface soil testing in the Elevated Subsurface PAHs Area, it is assumed that the top 6 inches of existing soil in the area can be considered to be part of the soil cover. Therefore, only 12 additional inches of soil will be required at the Elevated Subsurface PAHs area to achieve the 18-inch requirement (Figure 4-7). Since there are no onsite borrow sources for this material, it is expected that the vegetative support layer will be constructed of imported soil materials. These materials will be trucked to the site, spread, and compacted to provide a stable base for the overlying topsoil layer. Below this layer will be the compacted soil base layer, as required, to establish proper slopes for drainage and stability.

- A stand of vegetation will be established on top of the final cover. Temperature- and drought-resistant vegetation indigenous to the area will be planted. The vegetation will have a root system that does not extend past the vegetative support layer, will require minimal maintenance, will survive in low-nutrient soil, and will have sufficient density to control the rate of erosion to recommended levels (less than 2 tons/acre/year).
- Land use controls (LUCs) will be incorporated into the Navy's planning documents to prevent future disturbance of the contents beneath the soil cover.
- Groundwater monitoring and annual site reviews will be conducted to ensure the effectiveness of the removal action. A groundwater monitoring plan will be created during the design phase and will imply a 30-year project life.
- An operation and maintenance (O&M) plan will be implemented and will consist primarily of maintaining cover vegetation and preventing erosion.
- This alternative would incorporate actions for erosion protection, re-vegetation (site restoration), maintenance and performance monitoring (groundwater assessment and soil cover inspection), and LUCs (future land use management).

4.2 Evaluation Criteria

The evaluation criteria are based on the USEPA guidance document *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA* (EPA/540-R-93-057).

4.2.1 Effectiveness

The *effectiveness* criterion addresses the expected results of the removal alternatives. It includes two major subcategories: protectiveness and ability to achieve the removal objectives.

4.2.1.1 Protectiveness

To be protective, the removal alternative must be:

- Protective of public health and community;
- Protective of workers during implementation;
- Protective of the environment; and
- Compliant with ARARs.

4.2.1.2 Ability to Achieve Removal Objectives

To successfully achieve the removal objectives, the removal alternative must:

- Meet the expected level of treatment or containment;
- Have no residual effect concerns; and
- Maintain long-term control.

4.2.2 Implementability

The *implementability* criterion encompasses the technical and administrative feasibility of the removal action. It includes three subcategories: technical feasibility, availability of resources, and administrative feasibility.

4.2.2.1 Technical Feasibility

Technical feasibility includes:

- Construction and operational consideration;
- Demonstrated performance and useful life;
- Adaptability to environmental conditions;
- Contribution to performance of long-term removal actions; and
- Implementation within the allotted time.

4.2.2.2 Availability of Resources

Availability of resources includes:

- Availability of equipment;
- Availability of personnel and services;
- Laboratory testing capacity;
- Offsite treatment and disposal capacity; and
- Post-removal site control.

4.2.2.3 Administrative Feasibility

Administrative feasibility includes:

- Required permits and/or easement or rights-of-way;
- Impacts on adjoining property;
- Ability to impose institutional controls; and
- Likelihood of obtaining exemptions from statutory limits (if needed).

4.2.3 Cost

The *cost* criterion encompasses the life-cycle costs of a project, including the projected implementation costs and the long-term operational and maintenance costs of the remedial action. For the detailed cost analysis, the expenditures required to complete each alternative were estimated in terms of capital costs, including direct and indirect costs, to complete initial construction activities. Direct costs include the cost of construction, equipment, land and site development, treatment, transportation, and disposal. Indirect costs include engineering expenses and contingency allowances.

Annual O&M costs, which are post-construction costs required to ensure the continued effectiveness of the removal action, are applicable to Alternative 3, and are incorporated into the cost estimate. Expenditures that occur over a time period are analyzed using present worth, which discounts all future costs to a common base year. Present worth analyses allows the cost of the removal action to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the life of the removal action.

Assumptions associated with present worth calculations include a discount rated of 3.1percent (OMB Circular No. A-94, Appendix C, Revised January 2003), cost estimates in the planning years in constant dollars, and a period of performance that would vary on the activity, but would not exceed 30 years.

The costs estimates are provided to an accuracy of +50 percent and -30 percent. The alternative cost estimates are in 2005 dollars and based on information published by R.S. Means *Site Work and Landscape Cost Data* (2005). Where R.S. Means data were not available or not applicable, phone quotes, similar projects, or engineering estimates were used for unit pricing. Appendix B provides cost estimate details pertaining to each alternative discussed in the following sections.

4.3 Evaluation of Alternatives

Table 4-1 presents a comparison of these alternatives with respect to effectiveness, ease of implementation, and present worth cost over 30 years. Site restoration will take place following the completion of the selected alternative for all but the "no action" alternative.

4.3.1 Alternative 1—No Action

The no action alternative implies that no removal work will be conducted at this site and the site will be left as it currently exists. This alternative is straightforward, easy to implement, and has no associated cost. However, the impacted soils will be left on site and contaminants may infiltrate further into the surrounding media. This alternative is not effective; it is not protective of human health or the environment, does not comply with ARARs, and does not meet the RAOs. Although this alternative is the least expensive, it does not satisfy the objectives of this EE/CA. Consequently, selection of this alternative is not desirable.

4.3.2 Alternative 2—Excavation and Backfill

This alternative proposes the Elevated Subsurface PAHs Area and the Metallic Slag Area be excavated and backfilled. Since the impacted soils will be removed from the site, Alternative 2 is highly effective. This alternative complies with chemical, action, and location specific ARARs (see Appendix A), is protective of public health and the environment, and achieves the RAOs to eliminate potential unacceptable risk to human health and the environment and to prepare the site for closeout under CERCLA with NFA.

Taking into consideration the excavation and restoration of the site, Alternative 2 is technically feasible and moderate to implement. It provides a long term solution which, based on technical feasibility, availability of equipment, personnel, laboratory, and disposal facilities, and administrative considerations, can be implemented with in the desired time frame.

The capital cost to complete the excavation and backfill of both areas is approximately $101,000. The cost provided includes the removal of the railroad tracks from the Metallic Slag Area, characterization and offsite disposal of excavated soil, complete backfill of removed material, restoration of site to original grade, and re-vegetation with native seed. This cost assumes excavated soils are non-hazardous. If the soil disposal characterization

shows otherwise, a significant cost increase will occur due to handling and disposal of hazardous materials.

There is no annual O&M associated with this option. Therefore, the present worth of Alternative 2 is approximately $101,000. Appendix B contains a preliminary cost estimate for this alternative.

4.3.3 Alternative 3—Soil Cover

The construction of a soil cover over the impacted soil is only moderately effective. This alternative minimizes risk posed by surface exposure and meets the ARARs (see Appendix A). However, impacted soils will remain on site and, over time, may infiltrate into the surrounding media. Consequently, this alternative does not meet the RAOs of this EE/CA, which are to eliminate potential unacceptable risk to human health and the environment and to prepare the site for closeout under CERCLA with NFA.

Based on the technical feasibility, and the availability of equipment and personnel, Alternative 3 is moderate to implement. However, since impacted soils will remain on site, this alternative will require continual O&M to maintain the integrity of the soil cover, regularly scheduled groundwater monitoring to ensure the effectiveness of the removal action, and LUCs, including a perimeter fence, to prevent unauthorized access to the site.

The capital cost to complete the construction of soil covers for the Elevated Subsurface PAHs Area and the Metallic Slag Area is approximately $85,000. The annual cost, which includes groundwater monitoring as well as monitoring and maintenance of the soil cover, is approximately $31,400.

The total present worth of the soil cover for the Elevated Subsurface PAHs Area and the Metallic Slag Area is approximately $692,000 and was established as discussed in Section 4.2.3. Although the present worth cost estimate for this EE/CA was based on 30 years, monitoring would be required indefinitely while waste remains in place. Appendix B contains a preliminary cost estimate for this alternative.

Table 4-1

Evaluation of Removal Alternatives

Site 19, St. Juliens Creek Annex

Chesapeake, Virginia

Alternative	Description	Effectiveness	Ease of Implementation	Present Worth Cost
Alternative No. 1 **No Action**		**Not Effective.**	**Straightforward.**	**No Cost.**
	No removal work performed. Site is left "as is".	This alternative is not effective. The contaminated soil is left onsite, and constituents may migrate into surrounding environmental media over time. This alternative is not protective of human health and the environment, does not comply with ARARs, and does not meet the RAOs.	No action to Implement.	$0
Alternative No. 2 **Excavation & Backfill**		**Highly Effective.**	**Moderate.**	**Moderate.**
	Excavate soils in Elevated Subsurface PAHs Area and Metallic Slag Area, backfill with import material, and restore site (grading and seeding).	Since contaminated soils are removed from the site, risk is eliminated. Thus, this alternative is protective of human health and the environment, complies with ARARs, and achieves the RAOs. This is a long-term solution to address the contaminated soil at this site.	Implementation would be moderate. This alternative is technically and administratively feasible. A general contractor specializing in excavation/earth work would readily perform the removal action and site restoration.	$101,000
Alternative No. 3 **Soil Cover**		**Moderately Effective.**	**Moderate.**	**Expensive.**
	Construct soil cover for Elevated Subsurface PAHs Area and Metallic Slag Area. Post-construction activities, including O&M of cover, groundwater monitoring, and LUCs will be required.	This alternative complies with ARARs and is moderately effective. Contaminated soil remains onsite and is covered to prevent future surface exposure. Constituents have the potential to infiltrate surrounding media. Long-term maintenance (inspection and monitoring) is required to verify the effectiveness of the alternative.	Implementation would be moderate. This alternative is technically and administratively feasible. A general contractor specializing in excavation/earth work would readily perform the removal action and site restoration.	$692,000

SECTION 5

Comparative Analysis of Removal Action Alternatives

5.1 Comparative Criteria

Section 4 provided an evaluation of the alternatives based on their effectiveness, ease of implementation, and cost. In this section, the alternatives are directly compared to one another for each of these three criteria.

From this analysis, it should become clear which alternative is preferable in each category and, consequently, which will be selected for implementation at Site 19.

5.2 Removal Action Comparison

The removal actions are summarized for comparison in Table 4-1.

Alternative 1—No Action is not effective in that it does not accomplish the goals of protecting human health and the environment. Although this alternative is easy to implement and there is a no cost associated with it, it is not a desirable alternative because the overall objectives are not met.

Alternative 2—Excavation and backfill is moderate to implement and moderate in cost. Direct excavation will result in the removal of impacted soils from the site and as such, further monitoring, continual O&M, and LUCs are not necessary. Since this alternative is highly effective in achieving the goals of this EE/CA, which are to eliminate risk to human health and the environment and to prepare the site for NFA, this is the preferred alternative.

Alternative 3 – Similarly to Alternative 2, Alternative 3 is moderate to implement. However, the cost for the construction of soil covers over the Elevated Subsurface PAHs Area and the Metallic Slag Area is greater than the cost associated with Alternative 2. Additionally, the soil cover is not as effective at mitigating risk since the impacted soils will remain on site. Moreover, as a result of the impacted soils remaining on site, the areas would require the implementation of LUCs, monitoring, and O&M to ensure the effectiveness of the action is maintained. As such, this is not the preferred alternative.

SECTION 6

Recommended Removal Alternative

This EE/CA is prepared in accordance with current USEPA and Navy guidance documents for a NTCRA under CERCLA. The purpose of this EE/CA is to identify and analyze alternatives to address the impacted soils at SJCA Site 19. Three alternatives were identified during this EE/CA.

The comparative analysis of the alternatives included evaluating the effectiveness, implementability, and cost of each. The evaluation of effectiveness included reviewing the protectiveness of the alternative; compliance with ARARs to the extent practical; long-term effectiveness and permanence; and its ability to meet the RAOs. Implementability included looking at the technical feasibility, availability, and administrative feasibility support agency acceptance, and community acceptance of the alternatives. The cost analysis included an estimate of capital cost for all three alternatives, as well as O&M cost for Alternative 3.

The path forward for Site 19 is implementation of the removal action and NFA following construction closeout, pending any unforeseen issues. Based on the comparative analysis of the removal alternatives provided in this EE/CA, the recommended removal action is Alternative 2 – Excavation and Backfill. This recommend alternative effectively meets the goals of this EE/CA, while satisfying project implementation and cost requirements.

SECTION 7

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Figures

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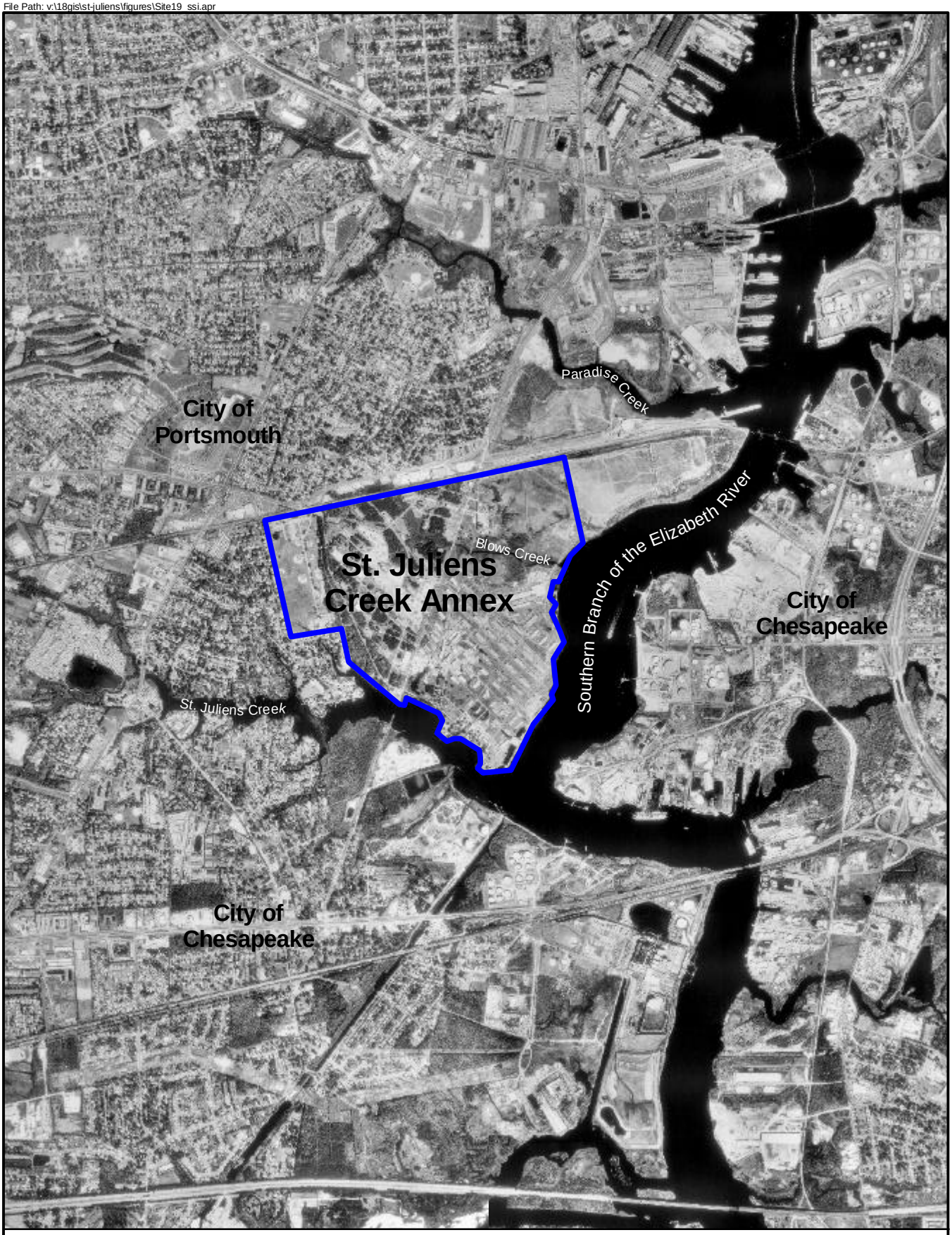

LEGEND

St. Juliens Creek Annex

N

0 2500 5000 Feet

Figure 2-1
Location of St. Juliens Creek Annex
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

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LEGEND

Site Location

Facility Boundary

N

0 500 1000 Feet

Figure 2-2
Location of Site 19
St. Juliens Creek Annex
Chesapeake, Virginia

CH2MHILL

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LEGEND

- SI Surface and Subsurface Soil Sample Locations
- SI Sediment Sample Locations
- SSI Surface Soil Sample Locations
- SSI Subsurface Soil Sample Locations
- SSI Groundwater Sample Location
- RRR Surface Soil Sample Locations

- Current Site Boundary
- Historical Site Boundary
- Railroad

N

0 37.5 75 Feet

Figure 2-3
Site 19 Sample Locations
St. Juliens Creek Annex
Chesapeake, Virginia

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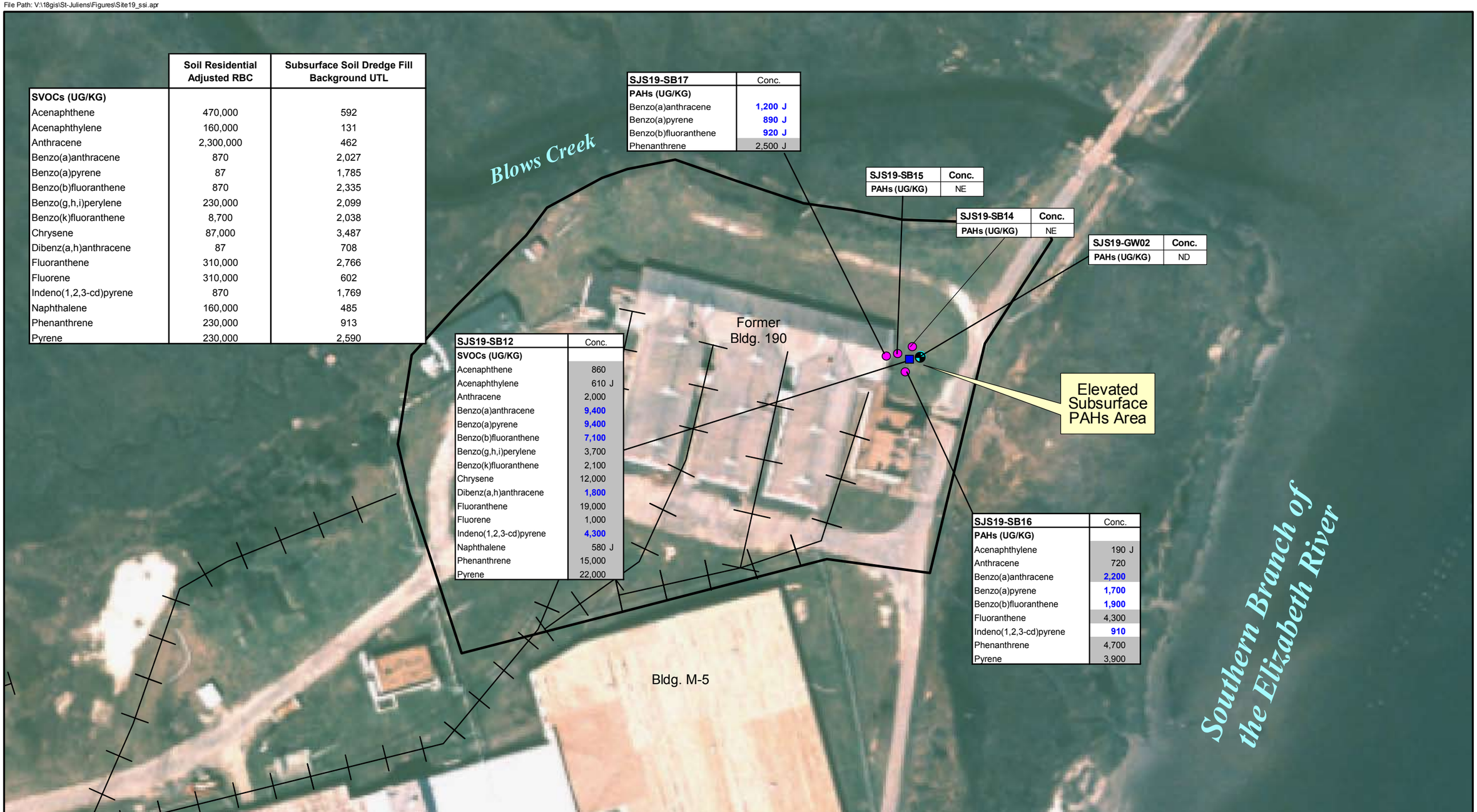

	Soil Residential Adjusted RBC	Subsurface Soil Dredge Fill Background UTL
SVOCs (UG/KG)		
Acenaphthene	470,000	592
Acenaphthylene	160,000	131
Anthracene	2,300,000	462
Benzo(a)anthracene	870	2,027
Benzo(a)pyrene	87	1,785
Benzo(b)fluoranthene	870	2,335
Benzo(g,h,i)perylene	230,000	2,099
Benzo(k)fluoranthene	8,700	2,038
Chrysene	87,000	3,487
Dibenz(a,h)anthracene	87	708
Fluoranthene	310,000	2,766
Fluorene	310,000	602
Indeno(1,2,3-cd)pyrene	870	1,769
Naphthalene	160,000	485
Phenanthrene	230,000	913
Pyrene	230,000	2,590

SJS19-SB17	Conc.
PAHs (UG/KG)	
Benzo(a)anthracene	**1,200 J**
Benzo(a)pyrene	**890 J**
Benzo(b)fluoranthene	**920 J**
Phenanthrene	2,500 J

SJS19-SB15	Conc.
PAHs (UG/KG)	NE

SJS19-SB14	Conc.
PAHs (UG/KG)	NE

SJS19-GW02	Conc.
PAHs (UG/KG)	ND

SJS19-SB12	Conc.
SVOCs (UG/KG)	
Acenaphthene	860
Acenaphthylene	610 J
Anthracene	2,000
Benzo(a)anthracene	**9,400**
Benzo(a)pyrene	**9,400**
Benzo(b)fluoranthene	**7,100**
Benzo(g,h,i)perylene	3,700
Benzo(k)fluoranthene	2,100
Chrysene	12,000
Dibenz(a,h)anthracene	**1,800**
Fluoranthene	19,000
Fluorene	1,000
Indeno(1,2,3-cd)pyrene	**4,300**
Naphthalene	580 J
Phenanthrene	15,000
Pyrene	22,000

SJS19-SB16	Conc.
PAHs (UG/KG)	
Acenaphthylene	190 J
Anthracene	720
Benzo(a)anthracene	**2,200**
Benzo(a)pyrene	**1,700**
Benzo(b)fluoranthene	**1,900**
Fluoranthene	4,300
Indeno(1,2,3-cd)pyrene	**910**
Phenanthrene	4,700
Pyrene	3,900

LEGEND

- SI Subsurface Soil Sample Location
- SSI Subsurface Soil Sample Locations
- Railroad
- Site Boundary

J - estimated value
NE - compound detected but not above screening criteria
ND - not detected

Exceeds Background UTL
Exceeds RBC

N

0 75 150 Feet

Figure 2-4
Site 19 Elevated Subsurface PAHs Area
Subsurface Soil Exceedances of Screening Criteria
St. Juliens Creek Annex
Chesapeake, Virginia

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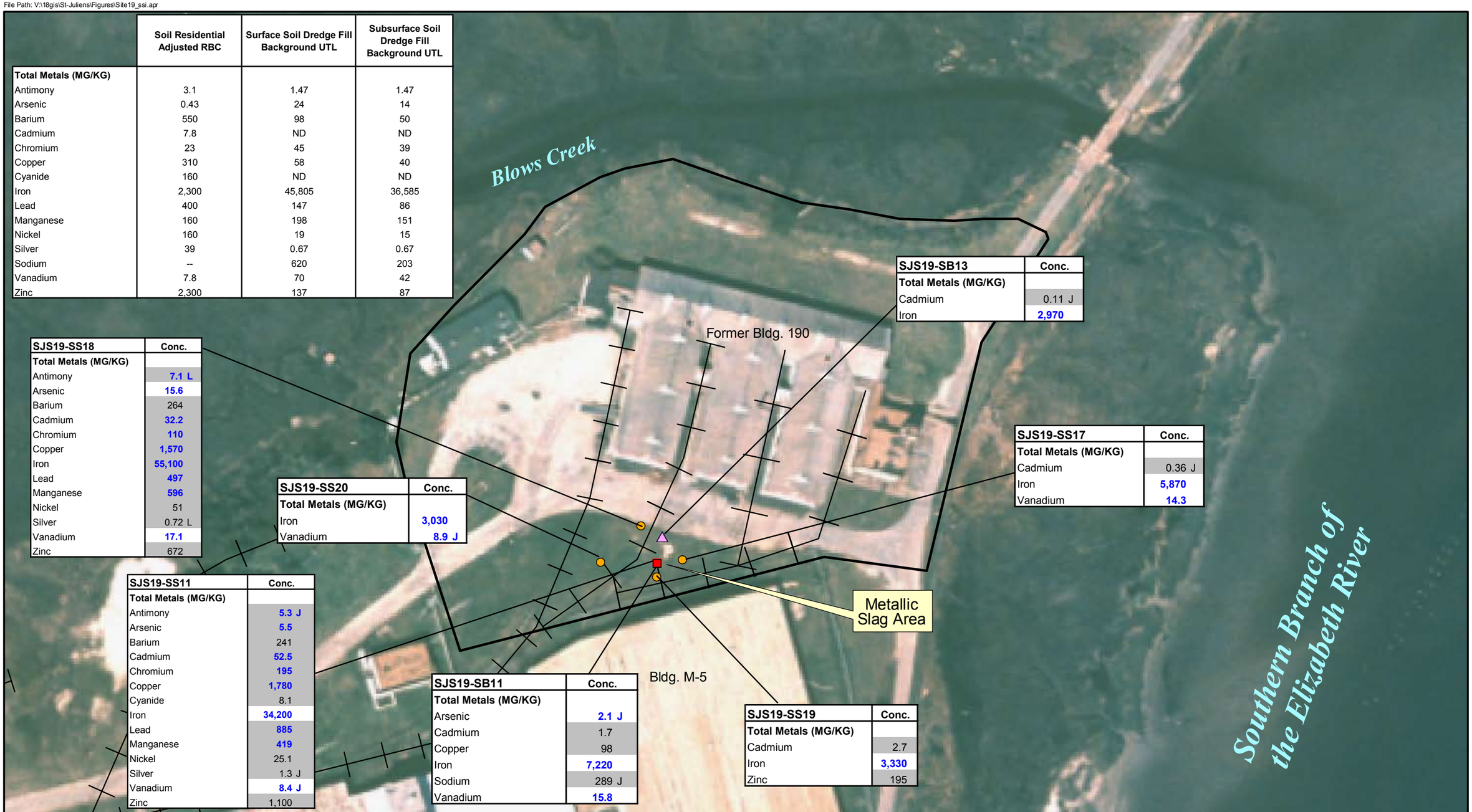

	Soil Residential Adjusted RBC	Surface Soil Dredge Fill Background UTL	Subsurface Soil Dredge Fill Background UTL
Total Metals (MG/KG)			
Antimony	3.1	1.47	1.47
Arsenic	0.43	24	14
Barium	550	98	50
Cadmium	7.8	ND	ND
Chromium	23	45	39
Copper	310	58	40
Cyanide	160	ND	ND
Iron	2,300	45,805	36,585
Lead	400	147	86
Manganese	160	198	151
Nickel	160	19	15
Silver	39	0.67	0.67
Sodium	--	620	203
Vanadium	7.8	70	42
Zinc	2,300	137	87

SJS19-SB13	Conc.
Total Metals (MG/KG)	
Cadmium	0.11 J
Iron	2,970

SJS19-SS18	Conc.
Total Metals (MG/KG)	
Antimony	7.1 L
Arsenic	15.6
Barium	264
Cadmium	32.2
Chromium	110
Copper	1,570
Iron	55,100
Lead	497
Manganese	596
Nickel	51
Silver	0.72 L
Vanadium	17.1
Zinc	672

SJS19-SS17	Conc.
Total Metals (MG/KG)	
Cadmium	0.36 J
Iron	5,870
Vanadium	14.3

SJS19-SS20	Conc.
Total Metals (MG/KG)	
Iron	3,030
Vanadium	8.9 J

SJS19-SS11	Conc.
Total Metals (MG/KG)	
Antimony	5.3 J
Arsenic	5.5
Barium	241
Cadmium	52.5
Chromium	195
Copper	1,780
Cyanide	8.1
Iron	34,200
Lead	885
Manganese	419
Nickel	25.1
Silver	1.3 J
Vanadium	8.4 J
Zinc	1,100

SJS19-SB11	Conc.
Total Metals (MG/KG)	
Arsenic	2.1 J
Cadmium	1.7
Copper	98
Iron	7,220
Sodium	289 J
Vanadium	15.8

SJS19-SS19	Conc.
Total Metals (MG/KG)	
Cadmium	2.7
Iron	3,330
Zinc	195

LEGEND

- SI Surface Soil Sample Location
- SSI Surface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Railroad
- Site Boundary

L - reported value is biased low
J - estimated value
ND - not detected

Exceeds Background UTL
Exceeds RBC

N

0 75 150 Feet

Figure 2-5
Site 19 Metallic Slag Area
Surface and Subsurface Soil Exceedances of Screening Criteria
St. Juliens Creek Annex
Chesapeake, Virginia

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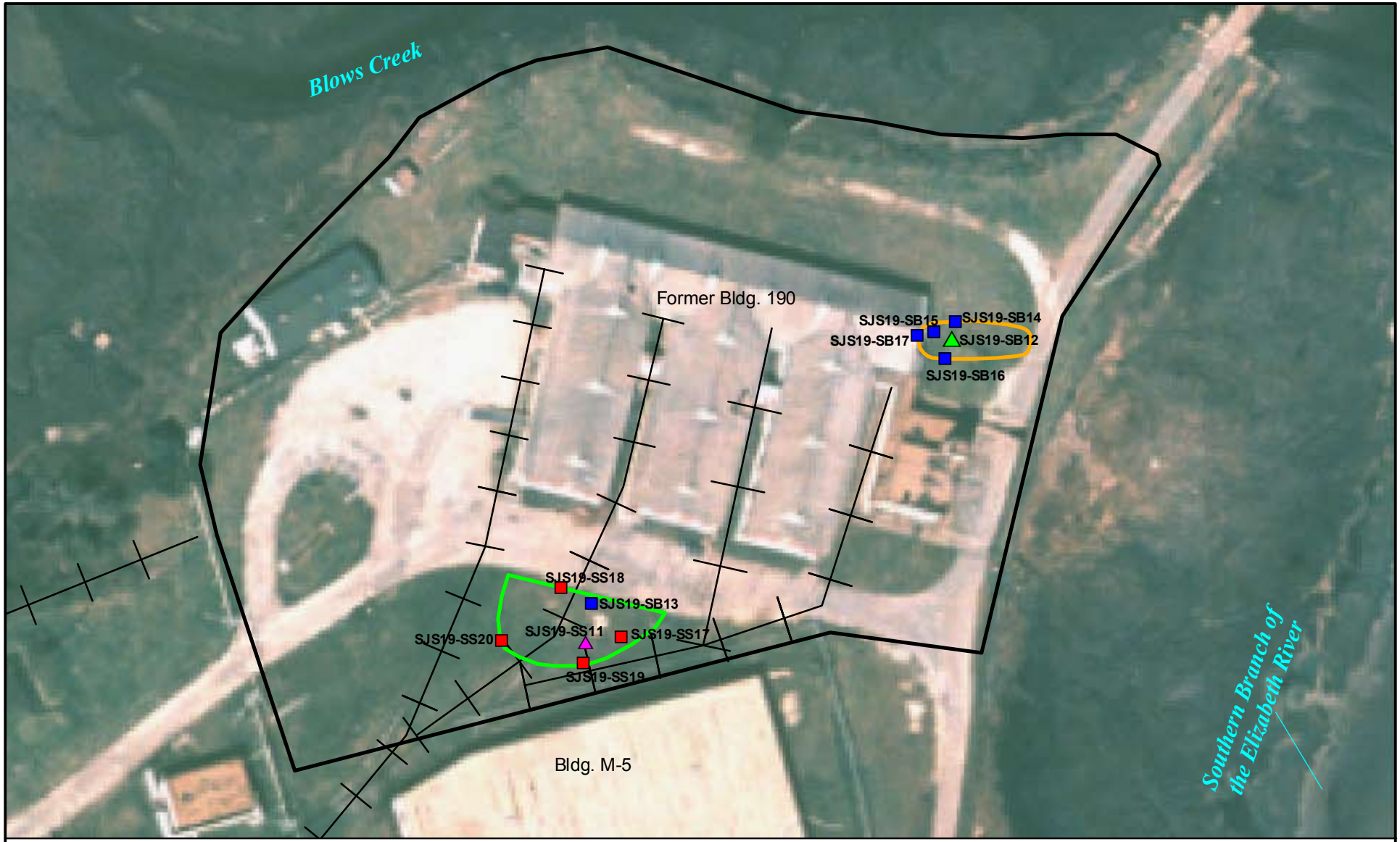

LEGEND

- SI Surface Soil Sample Location
- SI Subsurface Soil Sample Location
- SSI Surface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Extent of PAH Removal (Area = 1,084 sq.ft.)
- Extent of Metallic Slag Removal (Area = 2,866 sq.ft.)
- Site Boundary

N

0 37.5 75 Feet

Figure 2-6
Site 19 Proposed Removal Areas
St. Juliens Creek Annex
Chesapeake, Virginia

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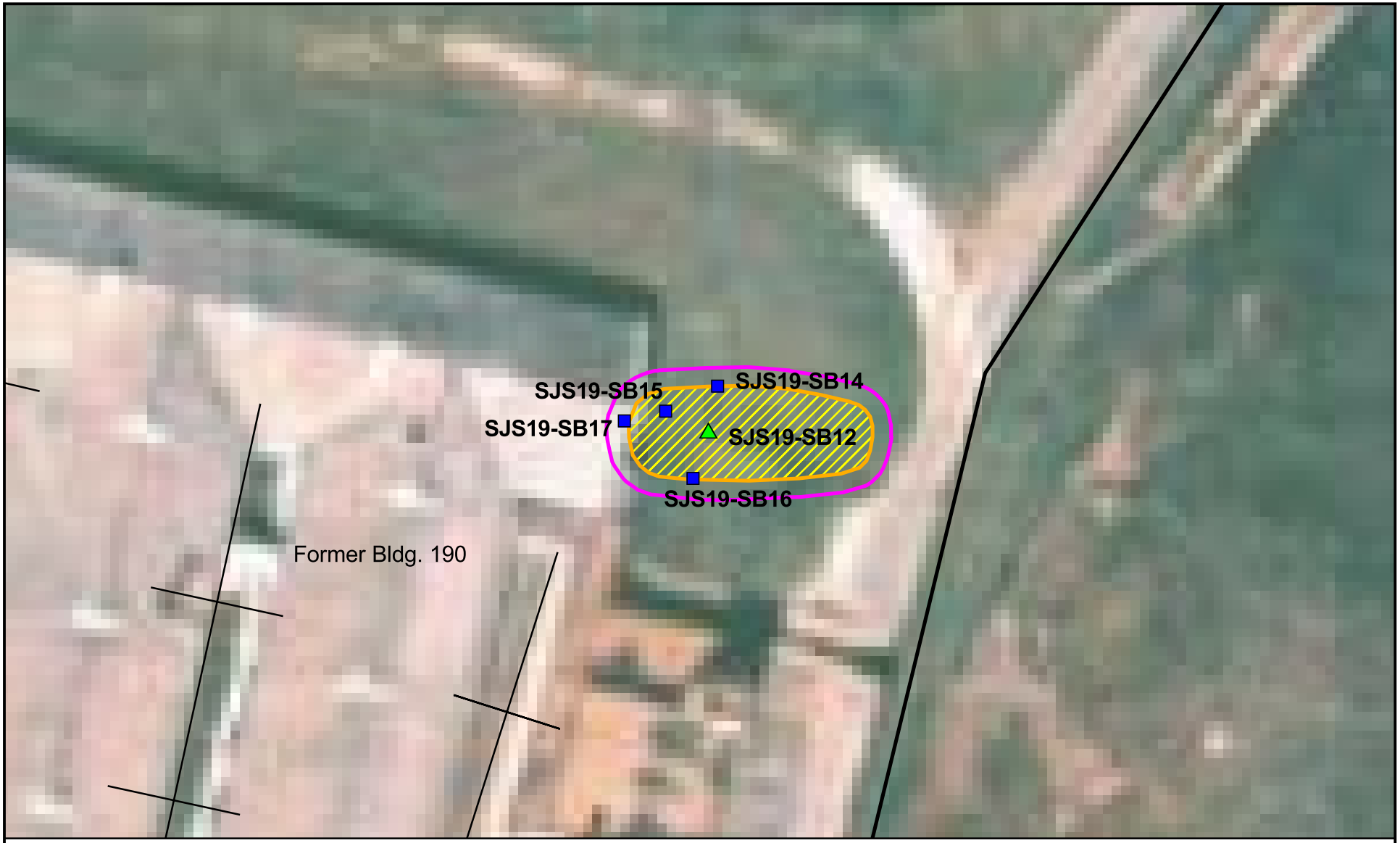

LEGEND

- SI Subsurface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Elevated Subsurface PAHs Area (Area = 1,084 sq. ft)
- Limits of Excavation
- Site Boundary

N

0 15 30 Feet

Figure 4-1
Site 19 Elevated Subsurface PAHs Area
Limits of Excavation
St. Juliens Creek Annex
Chesapeake, Virginia

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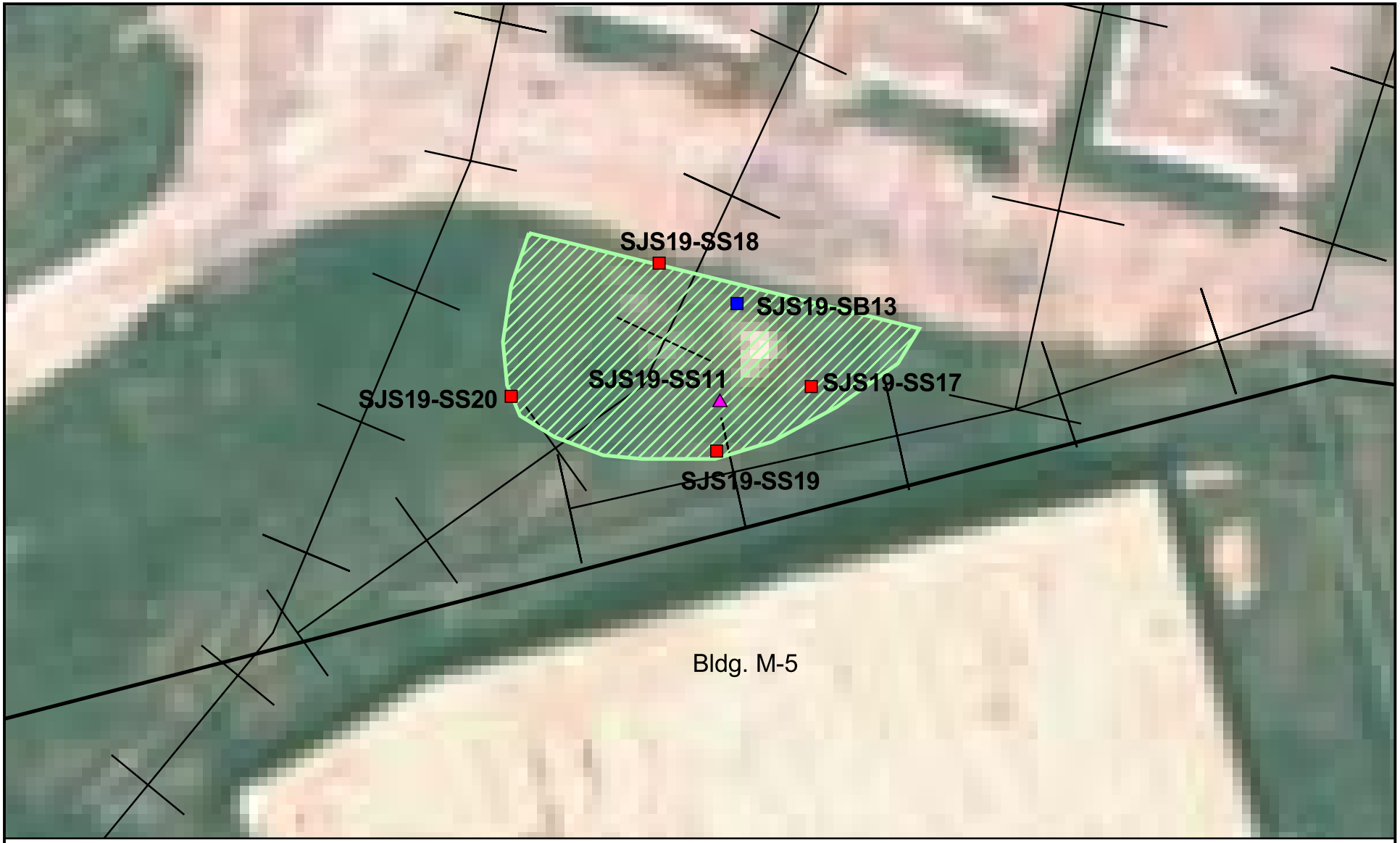

LEGEND

- SI Surface Soil Sample Location
- SSI Surface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Extent of Metallic Slag Removal (Area = 2,866 sq.ft.)
- Site Boundary

N

0 15 30 Feet

Figure 4-2
Site 19 Metallic Slag Area
Limits of Excavation
St. Juliens Creek Annex
Chesapeake, Virginia

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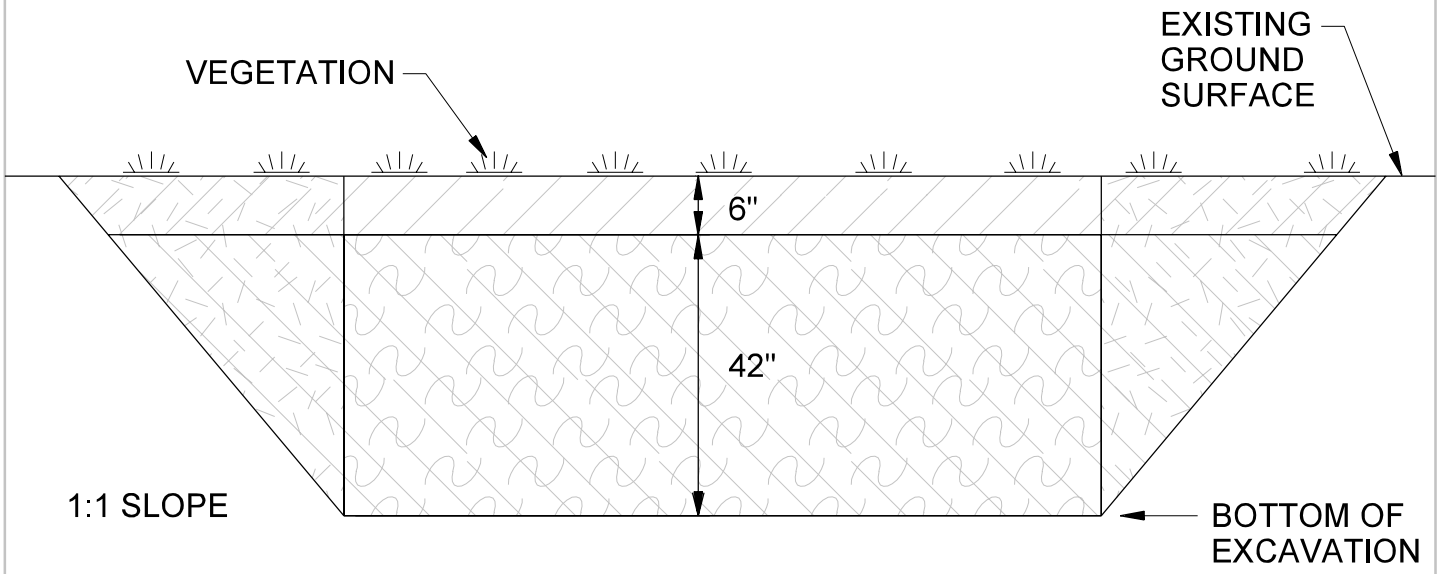

LEGEND

- PAH - IMPACTED SOIL
- SLOPED EXCAVATION (FOR STABILITY)
- GENERAL FILL
- TOPSOIL

FIGURE 4-3
SITE 19 ELEVATED SUBSURFACE PAHS AREA
EXCAVATION AND BACKFILL CROSS SECTION

ST. JULIENS CREEK ANNEX
CHESAPEAKE, VA

CH2MHILL

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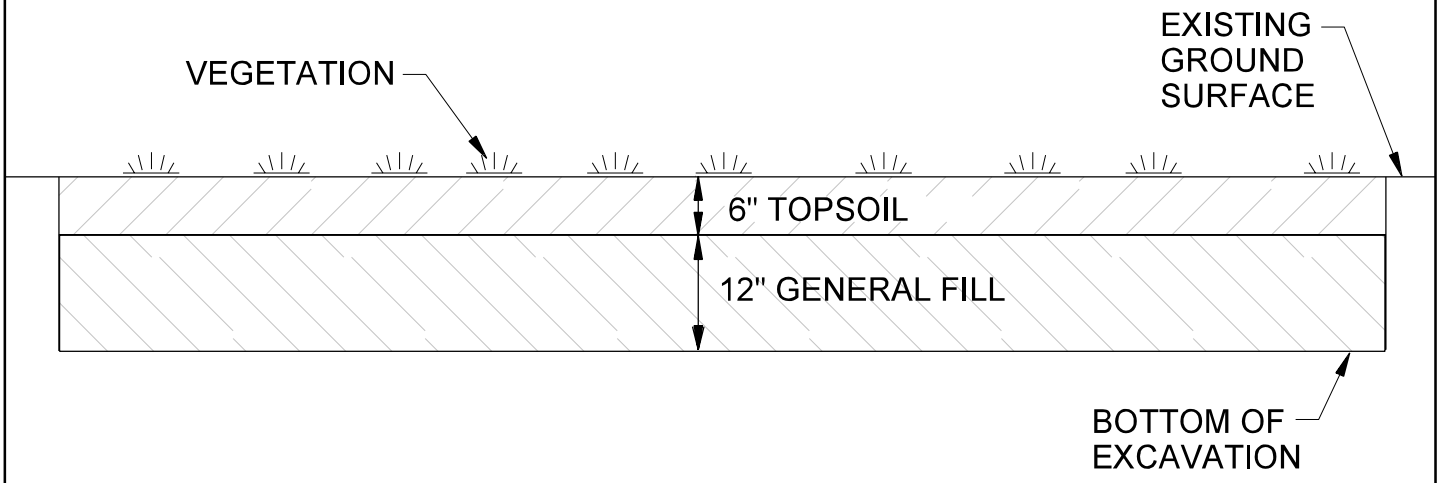

FIGURE 4-4
SITE 19 METALLIC SLAG AREA
EXCAVATION AND BACKFILL CROSS SECTION

ST. JULIENS CREEK ANNEX
CHESAPEAKE, VA

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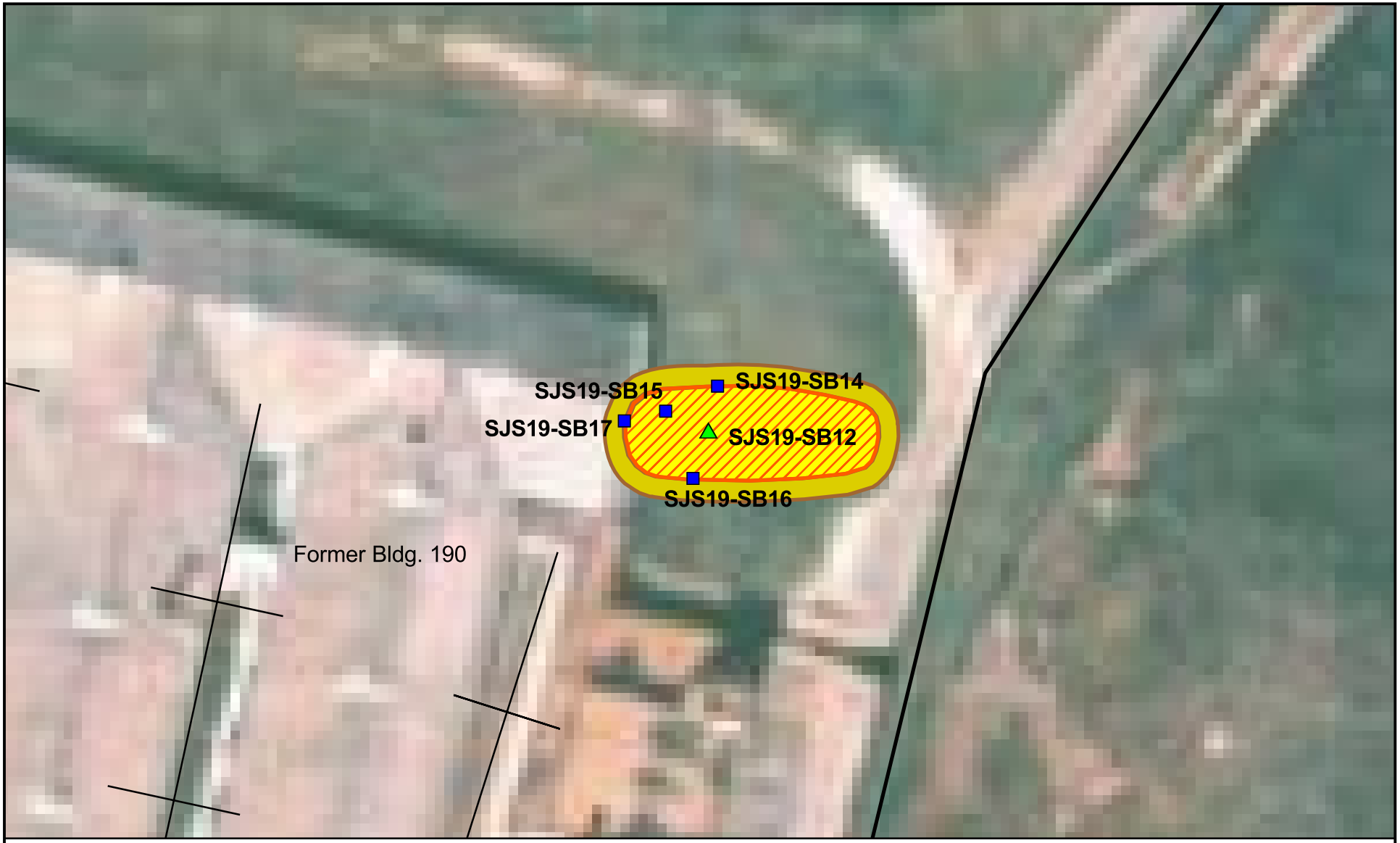

LEGEND

- SI Subsurface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Elevated Subsurface PAHs Area (Area = 1,084 sq. ft.)
- Limits of Soil Cover
- Site Boundary

N

0 15 30 Feet

Figure 4-5
Site 19 Elevated Subsurface PAHs Area
Conceptual Layout for Soil Cover
St. Juliens Creek Annex
Chesapeake, Virginia

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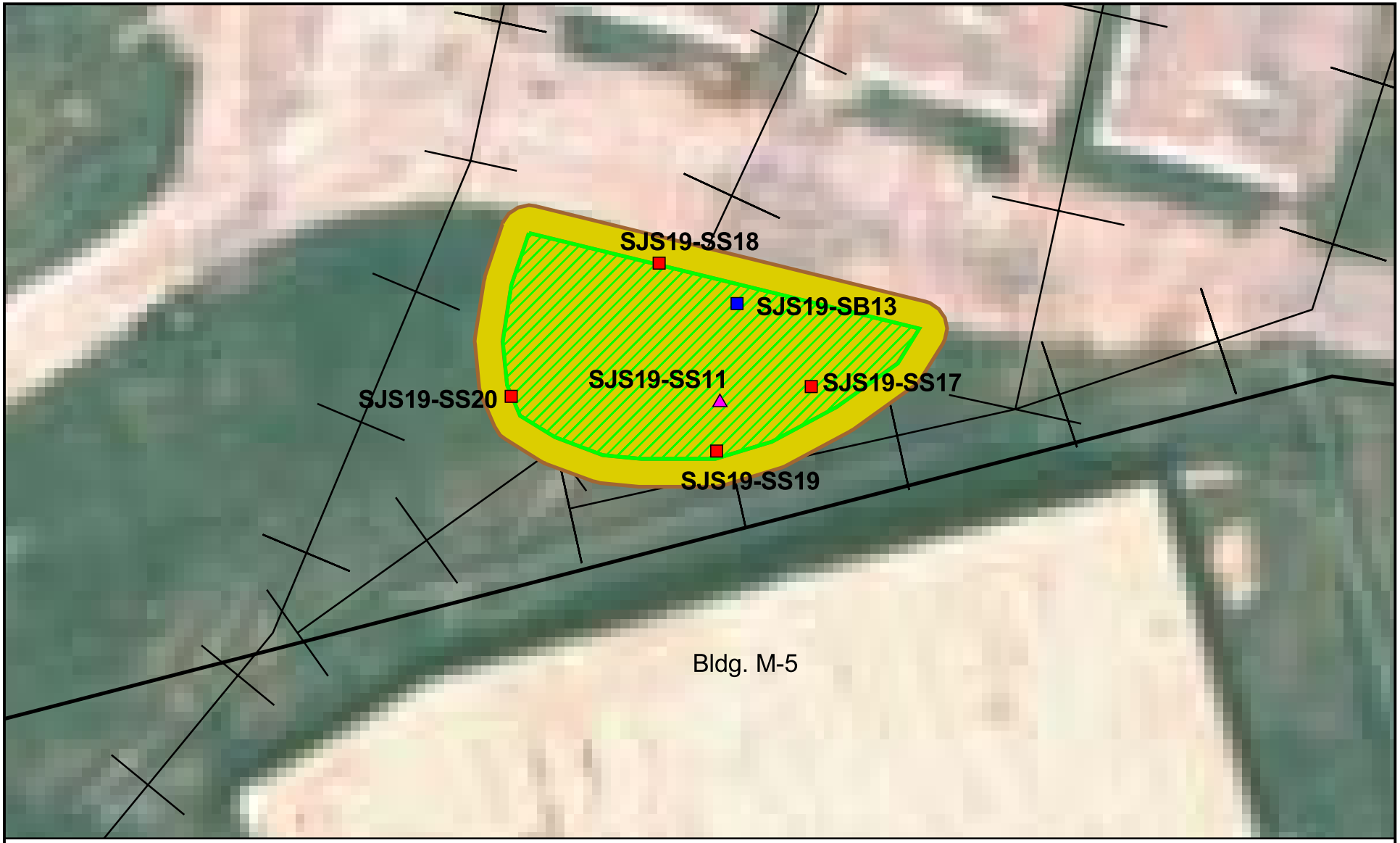

LEGEND

- SI Surface Soil Sample Location
- SSI Surface Soil Sample Location
- SSI Subsurface Soil Sample Location
- Metallic Slag Area (Area = 2,866 sq. ft.)
- Limits of Soil Cover
- Site Boundary

N

0 15 30 Feet

Figure 4-6
Site 19 Metallic Slag Area
Conceptual Layout for Soil Cover
St. Juliens Creek Annex
Chesapeake, Virginia

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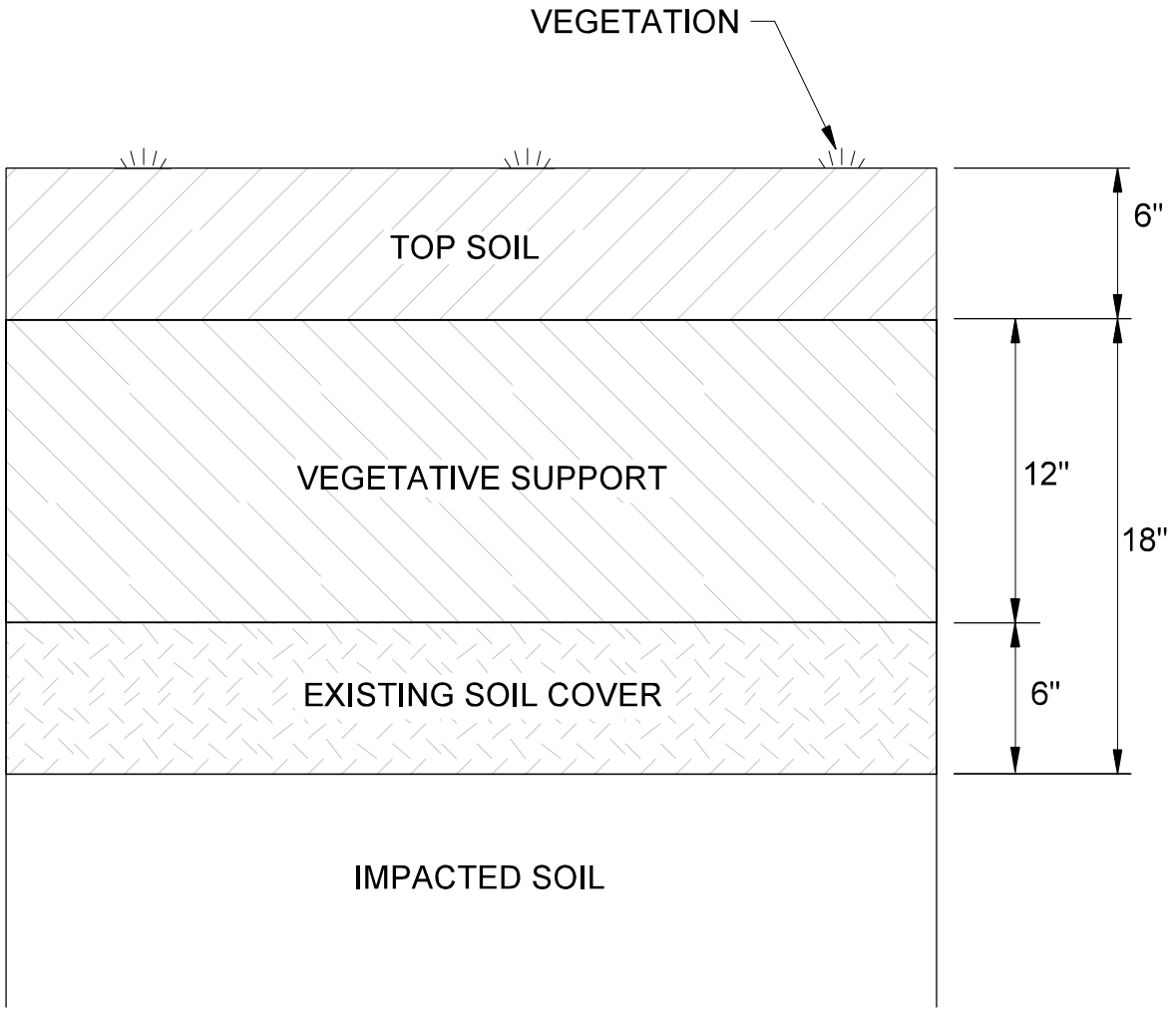

FIGURE 4-7
SITE 19 ELEVATED SUBSURFACE PAHS AREA
SOIL COVER - TYPICAL SECTION

ST. JULIENS CREEK ANNEX
CHESAPEAKE, VA

CH2MHILL

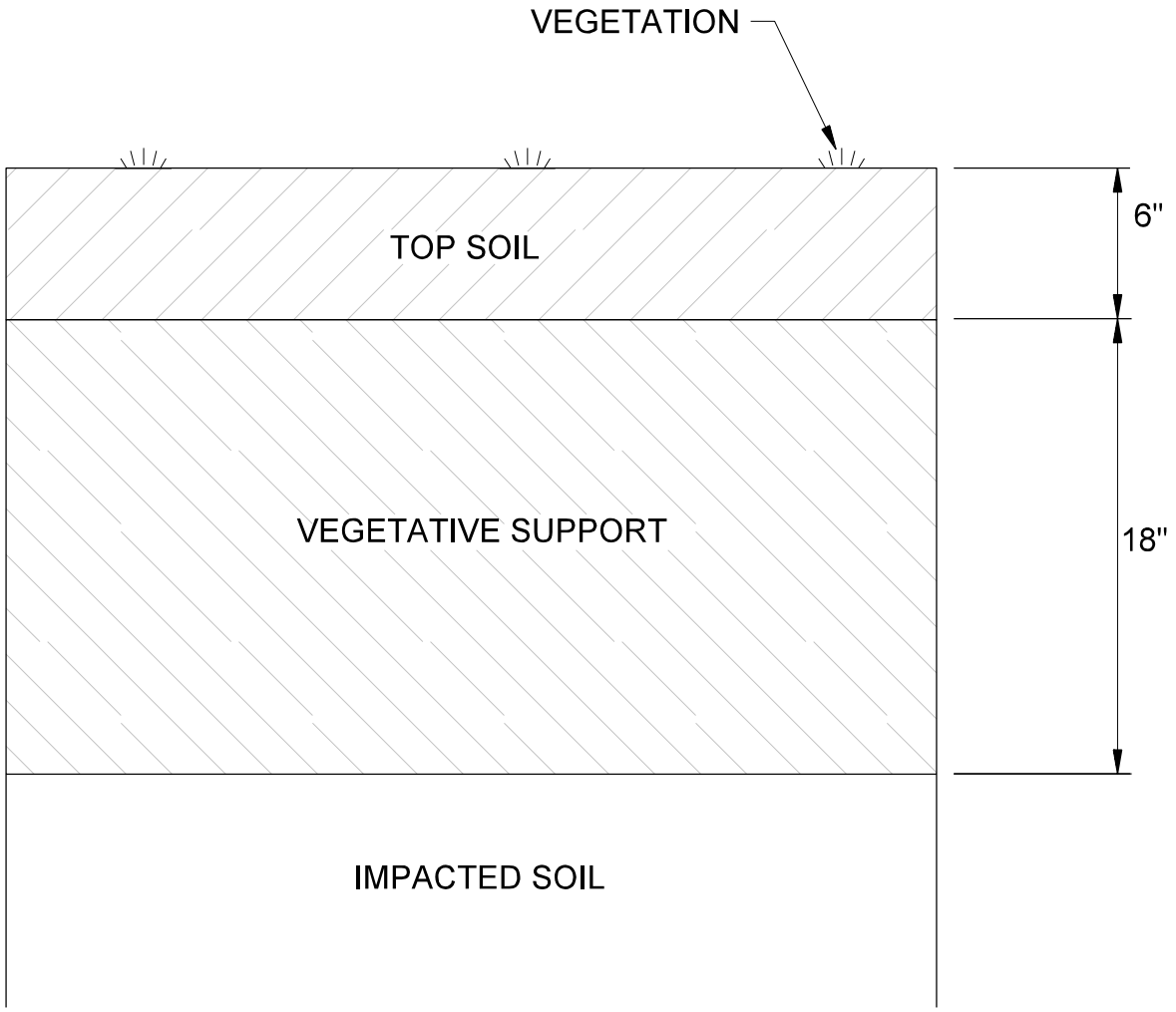

FIGURE 4-8
SITE 19 METALLIC SLAG AREA
SOIL COVER - TYPICAL SECTION

ST. JULIENS CREEK ANNEX
CHESAPEAKE, VA

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Appendix A
ARAR Tables

Acronyms and Abbreviations

ARAR	Applicable or relevant and appropriate requirement
BTAG	Biological Technical Assistance Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
DCR	Virginia Department of Conservation and Recreation
DNH	Division of Natural Heritage
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NAAQS	National Ambient Air Quality Standards
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System
NSDWRs	National Secondary Drinking Water Regulations
NSPS	New Source Performance Standards
OSWER	Office of Solid Waste and Emergency Response
PCB	Polychlorinated biphenyls
PMCL	Primary Maximum Contaminant Level
POTW	Publicly Owned Treatment Works
ppm	Parts per Million
RBC	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SMCL	Secondary Maximum Contaminant Level
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substance Control Act
UIC	Underground Injection Control
USACE	US Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
VAC	Virginia Administrative Code
VMRC	Virginia Marine Resource Commission
VPA	Virginia Pollutant Abatement
VPDES	Virginia Pollutant Discharge Elimination System

References

Commonwealth of Virginia, 2004. Preliminary Identification, Applicable or Relevant and Appropriate Requirements.

USEPA, 1998. *CERCLA Compliance with Other Laws Manual: Interim Final* Office of Emergency and Remedial Response. EPA/540/G-89/006.

USEPA, 1998. *CERCLA Compliance with Other Laws Manual: Part II. Clean Air Act and Other Environmental Statutes* Office of Emergency and Remedial Response. EPA/540/G-89/009.

USEPA, 1998. RCRA, Superfund & EPCRA Hotline Training Manual. Introduction to Applicable or Relevant and Appropriate Requirements. EPA540-R-98-020.

Table A-1
Federal Chemical-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Media	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Clean Air Act						
Air	NAAQS specify the maximum concentration of each criteria pollutant (carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, sulfur dioxide) which is to be permitted in the ambient air, as averaged over a period of time. Requirements differ for new sources of air pollutant emissions and existing sources. Requirements also differ based on the air quality designation of the site's location (i.e., attainment, non-attainment, unclassified, or transport) (*see Federal Location-Specific ARARs*).	Emissions of criteria pollutants during the response action, or during the operation and maintenance of the response action. NAAQSs are not enforceable in and of themselves. Any substantive standards contained within the State Implementation Plan are, however, federally enforceable.	40 CFR 50.4 to 50.12	2	TBC	Federal NAAQS are non-enforceable standards. No discharges to air are anticipated other than fugitive dust during excavation and backfill.
				3	TBC	Federal NAAQS are non-enforceable standards. No discharges to air are anticipated other than fugitive dust during soil cover placement.
Air	NSPS are emission standards to ensure that new sources are designed, built, and operated in a manner that reflects the best demonstrated technology and retain economic feasibility in a uniform manner across the country. Four designated pollutants (fluorides, sulfuric acid mist, total reduced sulfur, and municipal waste combustor emissions) have been designated. To-date NSPSs have been promulgated for over 50 source categories.	Emissions of designated pollutants from a major new stationary source or major modifications to an existing source.	40 CFR 60.1 to 60.2875	2	Not Applicable	This removal action does not employ a new stationary source or existing source that will discharge pollutants to air.
				3	Not Applicable	The soil cover installation does not employ a new stationary source or existing source that will discharge pollutants to air.
Air	NESHAPS are point-source standards for hazardous air pollutants. These standards address both new and existing sources at the point of emission. Eight hazardous air pollutants (asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride) were initially designated. The 1990 amendments greatly expanded the list of hazardous air pollutants, including 189 new pollutants and designating 174 source categories. Maximum Achievable Control Technology standards were developed for all source categories that emit hazardous air pollutants.	Emissions of hazardous air pollutants from a point source.	40 CFR 61.01 to 61.359	2	Not Applicable	This removal action does not employ one of the specific source categories regulated.
				3	Not Applicable	This soil cover does not employ one of the specific source categories regulated.

Table A-1
Federal Chemical-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Media	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Clean Water Act						
Surface water	Both on-site and off-site direct discharges of pollutants (126 pollutants are listed) to surface waters are required to meet the substantive requirements of the NPDES program. These substantive requirements include discharge limitations (both technology and water quality based), certain monitoring requirements, and best management practices. Ambient water quality standards include Federal water quality criteria and State water quality standards.	Direct discharges to surface waters.	*Clean Water Act* , §303, 304, and 402	2	Not Applicable	This removal action does not involve point source discharge of pollutants to surface waters.
				3	Not Applicable	This soil cover does not involve point source discharge of pollutants to surface waters.
Safe Drinking Water Act						
Groundwater	SDWA standards serve to protect public water systems. Primary drinking water standards consist of federally enforceable MCLs. MCLs are the highest level of a contaminant that is allowed in drinking water.	Impact to public water systems that have at least 15 service connections or serve at least 25 year-round residents. May also be cleanup standards for on-site ground or surface waters that are current or potential sources of drinking water.	40 CFR 141.11 to 141.16 and 141.61 to 141.66	2	Not Applicable	This removal action is being completed to address contaminated soil. No site-related contaminants were detected in groundwater.
				3	Relevant and Appropriate	Contaminated soil will be left onsite. Groundwater monitoring will be conducted to monitor the effectiveness of the soil cover.
Groundwater	SDWA standards serve to protect public water systems. The MCLG is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.	Impact to public water systems that have at least 15 service connections or serve at least 25 year-round residents. May also be cleanup standards for on-site ground or surface waters that are current or potential sources of drinking water.	40 CFR 141.50 to 141.55	2	Not Applicable	This removal action is being completed to address soil. No site-related contaminants were detected in groundwater.
				3	Relevant and Appropriate	Contaminated soil will be left onsite. Groundwater monitoring will be conducted to monitor the effectiveness of the soil cover.
Groundwater	National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water.	Impact to public water systems that have at least 15 service connections or serve at least 25 year-round residents. May also be cleanup standards for on-site ground or surface waters that are current or potential sources of drinking water.	40 CFR 143	2	Not Applicable	This removal action is being completed to address soil. No site-related contaminants were detected in groundwater.
				3	TBC	Contaminated soil will be left onsite. Groundwater monitoring will be conducted to monitor the effectiveness of the soil cover.

Table A-1
Federal Chemical-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Media	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Resource Conservation and Recovery Act Subtitle C						
Waste	Wastes to be managed must be sampled for TCLP analyses to determine the appropriate waste characterization.	Treatment, storage, and/or disposal of wastes (i.e., soil, water, solid waste).	40 CFR 261	2	Applicable	Excavated soil will require waste characterization prior to disposal.
				3	Not Applicable	Installation of a soil cover will not result in waste disposal.
USEPA Region III RBC Tables						
Water, air, fish tissue, soil	Chemical concentrations corresponding to fixed levels of human health risk (i.e., a hazard quotient of 1, or lifetime cancer risk of 10^{-6}, whichever occurs at a lower concentration).	Assessment of potential human health risks.	USEPA Region III RBC Tables	2	TBC	RBCs for soil were used to screen against site concentrations as a preliminary indicator of risk. Site-specific clean-up goals will be used for implementation of this removal action.
				3	TBC	RBCs for soil were used to screen against site concentrations as a preliminary indicator of risk.
USEPA Region III BTAG Screening Values						
Soil, sediment, surface water	Chemical concentrations corresponding to fixed levels of risks to ecological receptors (flora and/or fauna).	Assessment of potential ecological risks.	USEPA Region III BTAG Screening Values	2	Not Applicable	Site 19 is highly developed and provides minimal habitat for ecological receptors.
				3	Not Applicable	Site 19 is highly developed and provides minimal habitat for ecological receptors.

Table A-2
Virginia Chemical-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Media	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
State Water Control Law	**[VA Code Ann. §§ 62.1-44.2 to 62.1-44.34:28 (2003)]**					
Groundwater, decontamination water, or other materials to be discharged to surface waters	Must meet effluent discharge limits established. Site-specific limits may be established following receipt of estimated discharge rates and initial design documents.	VPDES Permit.	*Virginia Pollutant Discharge Elimination System (VPDES) Permit Regulation* , 9 VAC 25-31-10 to 940	2	Not Applicable	This removal action will not involve or require discharges to surface water and a VPDES permit is not required.
				3	Not Applicable	The soil cover will not involve or require discharges to surface water and a VPDES permit is not required.
Surface water	Mandates the protection of existing high-quality state waters and provides for the restoration of all other state waters so they will permit reasonable public uses and will support the growth of aquatic life. Water quality standards consist of statements that describe water quality requirements. They also contain numeric limits for specific physical, chemical, biological or radiological characteristics of water. These statements and numeric limits describe water quality necessary to meet and maintain uses such as swimming and other water-based recreation, public water supply, and the propagation and growth of aquatic life.	State surface waters designated for aquatic life or human uses.	*Water Quality Standards* , 9 VAC 25-260-5 to 550	2	Not Applicable	The action is being completed to address contaminated soil.
				3	Not Applicable	The action is being completed to address contaminated soil. No site-related contaminants were detected in groundwater.
Groundwater	Establishes groundwater quality standards to protect the public health or welfare and enhance the quality of water.	Standards are used when no MCL is available.	*Groundwater Quality Standards* , 9 VAC 25-280	2	Not Applicable	The action is being completed to address contaminated soil. No site-related contaminants were detected in groundwater.
				3	Relevant and Appropriate	Contaminated soil will be left onsite. Groundwater monitoring will be conducted to monitor the effectiveness of the soil cover.

Table A-2
Virginia Chemical-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Media	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Environmental Health Services **[VA Code Ann. §§ 32.1-163 to 248.2]**						
Groundwater	Ensures that all water supplies destined for public consumption be pure water. Cleanup levels for potential drinking water sources must be based on PMCLs. In the absence of PMCLs, other health-based standards or criteria, or best professional judgment based on risk assessment, may be employed. Where groundwater that is a potential drinking water source discharges to surface water, the cleanup level at the discharge point would be the more stringent of either the PMCL or a discharge limit based on the *Water Quality Standards* .	Potential drinking water source.	*Waterworks Regulations* , 12 VAC 5-590-10 to 1280	2	Not Applicable	The action is being completed to address contaminated soil. No site-related contaminants were detected in groundwater.
				3	Relevant and Appropriate	Contaminated soil will be left onsite. Groundwater monitoring will be conducted to monitor the effectiveness of the soil cover.
Groundwater	SMCLs are guidelines pertaining to aesthetic qualities of drinking water (i.e., color, odor, and taste).	Potential drinking water source.	*Waterworks Regulations* , 12 VAC 5-590-10 to 1280	2	Not Applicable	The action is being completed to address contaminated soil. No site-related contaminants were detected in groundwater.
				3	Relevant and Appropriate	Contaminated soil will be left onsite. Groundwater monitoring will be conducted to monitor the effectiveness of the soil cover.
Virginia Waste Management Act **[VA Code Ann. §§ 10.1-1400 to 1457 (2004)]**						
Waste	Wastes to be managed must be sampled to determine the appropriate waste characterization.	Management of wastes.	H*azardous Waste Regulations* , 9 VAC 20-60-12 to 1505 *Solid Waste Management Regulations,* 9 VAC 20-80-10 to 790	2	Applicable	Excavated soil will be characterization prior to disposal.
				3	Not Applicable	Installation of a soil cover will not result in wastes to be managed.
Air Pollution Control Board **[VA Code Ann. §§ 10.1-1300 to 1326 (1998)]**						
Air	Assures that ambient concentrations of air pollutants are consistent with established criteria and serves as the basis for effective and reasonable management of the air resources of the Commonwealth. Primary ambient air quality standards define levels of air quality which, allowing an adequate margin of safety, are necessary to protect the public health. Secondary ambient air quality standards define more stringent levels of air quality which are necessary to protect the public welfare from any known or anticipated adverse effects associated with the presence of air pollutants in the ambient air.	Air emission from disturbance of soil, treatment of soil or water, or other pollutant management activities.	*Ambient Air Quality Standards* , 9 VAC 5-30-10 to 80	2	Applicable	Disturbance of soil is anticipated for this removal action. No discharges to air are anticipated other than fugitive dust during excavation and backfill.
				3	Applicable	No discharges to air are anticipated other than fugitive dust during soil cover placement.

Table A-3
Federal Location-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Clean Air Act						
Attainment area	New major stationary sources shall apply best available control technology for each pollutant, subject to regulation under the Clean Air Act, that the source would have potential to emit in significant amounts. Owner or operator of proposed source or modification shall demonstrate that allowable emissions increases or reductions (including secondary emissions) will not cause or contribute to a violation of the NAAQS or applicable maximum allowable increase over baseline concentrations.	Major stationary sources that emits, or has the potential to emit, 100 tons per year or more of any regulated pollutant; any other stationary source that emits, or has the potential to emit, 250 tons per year or more of any regulated pollutant.	40 CFR 52.21(j)	2	Not Applicable	This removal action does not employ a new stationary source or existing source that will discharge pollutants to air.
				3	Not Applicable	The soil cover does not employ a new stationary source or existing source that will discharge pollutants to air.
Non-attainment area	Source must obtain emissions offsets in Air Quality Control Region of greater than one-to-one. Source subject to "lowest achievable emission rate". All major stationary sources owned or operated by the person in the State are in compliance, or on a schedule for compliance, with all applicable emission standards.	Any stationary facility or source of air pollutants that directly emits, or has the potential to emit, 100 tons per year or more of any air pollutant (including any major emitting facility or source of fugitive emissions of any such pollutants).	*Clean Air Act* , Part D §173(1) to (3); 40 CFR 51.18(j)	2	Not Applicable	This removal action does not employ a new stationary source or existing source that will discharge pollutants to air.
				3	Not Applicable	The soil cover does not employ a new stationary source or existing source that will discharge pollutants to air.
Clean Water Act						
Wetlands	Avoid adverse effects, minimize potential harm, and preserve and enhance wetlands, to the extent possible.	Action involving construction of facilities or management of property in wetlands. Wetland as defined by Executive Order 11990 Section 7 (protection of Wetlands).	*Clean Water Act,* §404; Executive Order 11990; 40 CFR 6, Appendix A	2	Not Applicable	Wetlands are not located within the areas addressed by this removal action.
				3	Not Applicable	Wetlands are not located within the areas addressed by this soil cover.

Table A-3
Federal Location-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Safe Drinking Water Act						
Sole source aquifer	SDWA prevents federal funding from being committed to any project that may contaminate a "sole source aquifer," meaning any USEPA-designated aquifer that is the only principal drinking water supply for a given area which, if contaminated, would present a significant human health hazard.	Generally, CERCLA activities do not in and of themselves increase pre-existing contamination of sole source aquifers. Although it is unlikely that CERCLA activities would be subject to funding restrictions, a review of potential problems associated with sole source aquifers should be conducted.	40 CFR 149	2	Applicable	Although the underlying Columbia and Yorktown Aquifers are sole source aquifers, this removal action at Site 19 is not anticipated to impact the groundwater. No site-related contaminants have been detected in groundwater.
				3	Applicable	Although the underlying Columbia and Yorktown Aquifers are sole source aquifers, the soil cover installation at Site 19 is not anticipated to impact the groundwater. No site-related contaminants have been detected in groundwater.
National Historic Preservation Act						
Historic district, site, building, structure, or object	Avoid impacts on cultural resources; recover and preserve artifacts and historic properties. Where impacts are unavoidable, mitigate through design and data recovery. Plan action to minimize harm to National Historic Landmarks.	Properties listed in the National Register of Historic Places, or eligible for such listing. Alteration of terrain that threatens significant scientific, prehistorical, historical or archaeological data.	*National Historic Preservation Act* , 16 USC 469 to 470; 36 CFR 65; 36 CFR 800	2	Not Applicable	Site 19 is not located in a known historic district or in the vicinity of historical structures or artifacts.
				3	Not Applicable	Site 19 is not located in a known historic district or in the vicinity of historical structures or artifacts.

Table A-3
Federal Location-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Endangered Species Act						
Critical habitat of/or presence of an endangered or threatened species	Identify activities that may affect listed species. Actions must not threaten the continued existence of a listed species. Actions must not destroy critical habitat.	Presence of species or habitat listed as endangered or threatened.	*Endangered Species Act* , 16 USC 1531 et. seq.; 50 CFR 200; 50 CFR 402; *Fish and Wildlife Coordination Act* (16 USC 661 et seq.); 33 CFR 320 to 330	2	Not Applicable	Except for the potential of occasional transient individuals, no rare, threatened, or endangered wildlife species are known to occur at Site 19.
				3	Not Applicable	Except for the potential of occasional transient individuals, no rare, threatened, or endangered wildlife species are known to occur at Site 19.
Wild and Scenic Rivers Act						
Wild, scenic, or recreational river	Determine if project will affect the free-flowing characteristics, scenic, or natural values of a designated river; not authorize any water project or any other project that would directly or indirectly impact any designated river without notifying the Department of Energy or Forest Service.	Any river, and the bordering adjacent land, designated as "wild and scenic or recreational."	*Wild and Scenic Rivers Act* , 16 USC 1271 et. seq.; 36 CFR 297.4; 40 CFR 6.302(e)	2	Not Applicable	Site 19 does not border a wild and scenic or recreational river.
				3	Not Applicable	Site 19 does not border a wild and scenic or recreational river.
Coastal Zone Management Act						
Coastal zone or area that will affect the coastal zone	Federal activities must be consistent with, to the area that will affect maximum extent practicable, State coastal zone management programs. Federal agencies must supply the State with a consistency determination.	Wetland, flood plain, estuary, beach, dune, barrier island, coral reef, and fish and wildlife and their habitat, within the coastal zone.	*Coastal Zone Management Act* , 16 USC 1451 et. seq.; 15 CFR 930.30; 15 CFR 930.34	2	Relevant and Appropriate	Site 19 and its surrounding vicinity is located within the coastal zone. Activities will be conducted in accordance with approved management program.
				3	Relevant and Appropriate	Site 19 and its surrounding vicinity is located within the coastal zone. Activities will be conducted in accordance with approved management program.

Table A-3
Federal Location-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Wilderness Act						
Wilderness area	Areas must be administered in such manner as will leave it unimpaired as wilderness and to preserve its wilderness. The following are not allowed in a wilderness area: commercial enterprises, permanent roads (except as necessary to administer the area), motor vehicles, motorized equipment, motorboats, aircraft, mechanized transport, and structure or buildings.	Any unit of the National Wildlife Refuge System.	*Wilderness Act,* 16 USC 1131 et. seq.; 50 CFR 35.1 et. seq.	2	Not Applicable	Site 19 is not designated as a National Wildlife Refuge System.
				3	Not Applicable	Site 19 is not designated as a National Wildlife Refuge System.
Resource Conservation and Recovery Act						
Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout. For existing surface impoundments, waste piles, land treatment units, landfills, and miscellaneous units, no adverse effects on human health or the environment will result if washout occurs.	RCRA hazardous waste; treatment, storage, or disposal.	40 CFR 264.18(b)	2	Not Applicable	Site 19 is located within the 100-year floodplain; however, this removal action does not involve the construction of a treatment, storage, or disposal facility.
				3	Not Applicable	Site 19 is located within the 100-year floodplain; however, the soil cover installation does not involve the construction of a treatment, storage, or disposal facility.
Within salt dome formation, underground mine, or cave	Placement of non-containerized or bulk liquid hazardous waste prohibited.	RCRA hazardous waste; placement.	40 CFR 264.18(c)	2	Not Applicable	A salt dome formation, underground mine, or cave are not present at Site 19.
				3	Not Applicable	A salt dome formation, underground mine, or cave are not present at Site 19.

Table A-3
Federal Location-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Fish and Wildlife Coordination Act						
Floodplain	Action to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.	Action that will occur in a floodplain, i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood prone areas.	*Fish and Wildlife Coordination Act* , 16 USC 661 et. seq.; Executive Order 11988; 40 CFR 6, Appendix A; 40 CFR 6.302	2	Applicable	As Site 19 is located in a relatively flat area adjoining surface waters, excavation and regrading activities may require compliance with this order. Erosion control measures will be implemented.
				3	Applicable	As Site 19 is located in a relatively flat area adjoining surface waters, construction of a soil cover may require compliance with this order. Erosion control measures will be implemented.
Area affecting stream or river	Requires that activities avoid, minimize, or compensate for impacts to fish and wildlife and their habitats.	Diversion, channeling or other activity that modifies a stream or river and affects fish or wildlife and their habitat.	*Fish and Wildlife Coordination Act,* 16 USC 661 et. seq.; 40 CFR 6.302	2	Applicable	As Site 19 is located adjacent to the Southern Branch of the Elizabeth River, excavation and regrading activities may require compliance with this order. Erosion control measures will be implemented.
				3	Applicable	As Site 19 is located adjacent to the Southern Branch of the Elizabeth River, construction of a soil cover may require compliance with this order. Erosion control measures will be implemented.

Table A-3
Federal Location-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
National Wildlife Refuge System						
Wildlife refuge	Only actions allowed under the citation may be undertaken in areas that are part of the National Wildlife Refuge System.	Area designated as part of National Wildlife Refuge System.	16 USC 668dd et. seq.; 50 CFR 27	2	Not Applicable	Site 19 is not designated as a wildlife refuge.
				3	Not Applicable	Site 19 is not designated as a wildlife refuge.
Coastal Barrier Resources Act						
Designated coastal barrier	Prohibits any new Federal expenditure within the Coastal Barrier Resource System.	Activity within the Coastal Barrier Resource System.	*Coastal Barrier Resources Act* , 16 USC 3501 et. seq.	2	Not Applicable	Site 19 is not designated as a coastal barrier system.
				3	Not Applicable	Site 19 is not designated as a coastal barrier system.
Rivers and Harbors Appropriation Act						
Navigable waterways of the United States	Meet regulatory requirements to conduct activity in navigable waterways of the United States.	Prohibits the construction of any structures, excavation, fill, or altering of any port, roadstead, haven, harbor, canal, navigable river, or other water of the United States, outside established harbor lines, or where no harbor lines have been established, without meeting established guidelines.	*Rivers and Harbors Appropriation Act* , 33 USC 401-403	2	Not Applicable	This removal action will not be conducted in navigable waters of the United States.
				3	Not Applicable	The soil cover will not be conducted in navigable waters of the United States.

Table A-3
Federal Location-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Marine Research and Sanctuaries Act						
Ocean waters	Prohibits dumping into ocean waters of any material that would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potentialities. Must meet regulatory requirements to conduct dumping into ocean waters.	Applies to actions that result in discharge to ocean waters.	*Marine Research and Sanctuaries Act* , 16 USC 32	2	Not Applicable	This removal action will not involve direct discharge to the ocean.
				3	Not Applicable	The soil cover activities will not involve direct discharge to the ocean.
Migratory Bird Treaty Act						
Migratory bird area	Protects almost all species of native birds in the United States from unregulated taking which can include poisoning at hazardous waste sites.	Presence of migratory birds.	*Migratory Bird Treaty Act* , 16 USC 703	2	Not Applicable	Site 19 is highly developed and provides minimal habitat for ecological receptors. Except for the potential of occasional transient individuals, the presence of migratory birds is not known to occur at Site 19.
				3	Not Applicable	Site 19 is highly developed and provides minimal habitat for ecological receptors. Except for the potential of occasional transient individuals, the presence of migratory birds is not known to occur at Site 19.

Table A-4
Virginia Location-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
General Provisions Relating to Marine Resources Commission **[VA Code Ann. §§ 28.2-1300 to 1320 (1998)]**						
Wetlands	Mitigate or minimize the loss of wetlands and the adverse ecological effects of all permitted activities. To preserve the wetlands as much as possible in their natural state and to consider appropriate requirements for compensation only after it has been proven that the loss of the natural resource is unavoidable and that the project will have the highest public and private benefit. The determination as to whether compensation is warranted and permissible is conducted on a case-by-case basis. Commitments to preserve other existing wetlands shall not ordinarily be an acceptable form of compensation.	If a wetlands zoning ordinance has been adopted by local government, in accordance with the *General Provisions Relating to Marine Resources Commission* , and the response action is not exempt from its provisions, the project must comply with the requirements of the ordinance. In the case of absence of an ordinance, or of an exemption to it, VMRC can exercise jurisdiction over tidal wetlands.	*Wetlands Mitigation Compensation Policy* , 4 VAC 20-390-10 to 50	2	Not Applicable	Wetlands are not located within the areas addressed by this removal action.
				3	Not Applicable	Wetlands are not located within the areas addressed by this soil cover.
Chesapeake Bay Preservation Act **[VA Code Ann. §§ 10.1-2100 to 2116]**						
Chesapeake Bay and its tributaries	Criteria that provide for the protection of water quality of the Chesapeake Bay and its tributaries, that will also accommodate economic development in Tidewater Virginia. Under these requirements, certain locally designated tidal and nontidal wetlands, as well as other sensitive land areas, may be subject to limitations regarding land-disturbing activities, removal of vegetation, use of impervious cover, erosion and sediment control, stormwater management, and other aspects of land use that may have effects on water quality.	Location is within a Chesapeake Bay Preservation Area.	*Chesapeake Bay Preservation Area Designation and Management Regulations* , 9 VAC 10-20-10 to 260	2	Applicable	Site 19 is located within the Chesapeake Bay watershed. Activities conducted at Site 19 will comply with Chesapeake Bay Restoration Act.
				3	Applicable	Site 19 is located within the Chesapeake Bay watershed. Activities conducted at Site 19 will comply with Chesapeake Bay Restoration Act.

Table A-4
Virginia Location-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
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Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Endangered Species **[VA Code Ann. §§ 29.1-563 to 570 (1998)]**						
Presence of any threatened or endangered species of fish or wildlife	Prohibits taking, transporting, processing, selling, or offering for sale within the Commonwealth any threatened or endangered species of fish or wildlife except as authorized by law.	Habitat of endangered species of fish or wildlife.	*Definitions and Miscellaneous in General* , 4 VAC 15-20-130 to 140	2	Not Applicable	Except for the potential of occasional transient individuals, no rare, threatened, or endangered wildlife species are known to occur at Site 19.
				3	Not Applicable	Except for the potential of occasional transient individuals, no rare, threatened, or endangered wildlife species are known to occur at Site 19.
Endangered Plant and Insect Species Act **[VA Code Ann. §§ 3.1-1020 to 1030 (1998)]**						
Presence of any threatened or endangered species of plant or insect	Prohibits taking, transporting, processing, selling, or offering for sale within the Commonwealth any threatened or endangered species of plant or insect except as authorized by law.	Habitat of endangered species of plant or insect.	*Rules and Regulations for the Enforcement of the Endangered Plant and Insect Species Act* , 2 VAC 5-320-10	2	Not Applicable	Except for the potential of occasional transient individuals, no rare, threatened, or endangered wildlife species are known to occur at Site 19.
				3	Not Applicable	Except for the potential of occasional transient individuals, no rare, threatened, or endangered wildlife species are known to occur at Site 19.
Virginia Natural Area Preserve Act **[VA Code Ann. §§ 10.1-209 to 217 (1998)]**						
Natural preserve area	Protects and conserves natural heritage resources (habitats of rare plants and animals; exemplary natural communities; other rare natural features) throughout the state. Offers strong levels of protection by placing privately and publicly held natural areas into a legally established statewide preserve system with statutory protection against most forms of condemnation and conversion to other land uses. This system of protected lands is administered by the Virginia Department of Conservation and Recreation (DCR) and managed by the Division of Natural Heritage (DNH).	Location is a dedicated natural area preserve.	*Virginia Natural Areas Preserve Act* , VA Code Ann. §§ 10.1-209 to 217 (1998)	2	Not Applicable	Site 19 is not designated as a natural preserve area.
				3	Not Applicable	Site 19 is not designated as a natural preserve area.

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Virginia Location-Specific ARARs
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St. Juliens Creek Annex, Chesapeake, Virginia

Location	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Groundwater Management Act of 1992 **[VA Code Ann. §§ 62.1-254 to 62.1-279]**						
Groundwater management area	Regulates groundwater withdrawals in Ground Water Management Areas. Any person or entity wishing to withdraw 300,000 gallons per month or more in a declared management area must obtain a permit.	Location is in a Groundwater Management Area. Currently (June 2005), there are two Ground Water Management Areas in the state. The Eastern Virginia Ground Water Management Area comprises an area east of Interstate 95 and south of the Mattaponi and York Rivers. The Eastern Shore Ground Water Management Area includes Accomack and Northampton counties.	*Groundwater Management Act of 1992,* VA Code Ann. §§ 62.1-254 to 62.1-270	2	Not Applicable	Site 19 is not located in a groundwater management area.
				3	Not Applicable	Site 19 is not located in a groundwater management area.
Land Use Authority **[VA Code Ann. § 15.2-2223 and § 15.2-2283)]**						
Sole source aquifer	Requires each State to adopt an approved wellhead protection program that specifies public water supply systems, delineates wellhead protection areas, identifies sources of contamination within protection areas, develops management approaches, develops contingency plans for alternate water sources in the event of contamination, considers protection options when siting new wells, and ensures public participation in plan development. Prevents federal funding from being committed to any project that may contaminate a sole source aquifer, meaning any USEPA-designated aquifer that is the only principal drinking water supply for a given area which, if contaminated, would present a significant human health hazard.	Generally, CERCLA activities do not in and of themselves increase pre-existing contamination of sole source aquifers. Although it is unlikely that CERCLA activities would be subject to funding restrictions, a review of potential problems associated with sole source aquifers should be conducted.	*Land Use Authority,* VA Code Ann. § 15.2-2223 and § 15.2-2283	2	Applicable	Although the underlying Columbia and Yorktown Aquifers are sole source aquifers, this removal action at Site 19 is not anticipated to impact the groundwater. No site-related contaminants have been detected in groundwater.
				3	Applicable	Although the underlying Columbia and Yorktown Aquifers are sole source aquifers, the soil cover installation at Site 19 is not anticipated to impact the groundwater. No site-related contaminants have been detected in groundwater.

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Federal Action-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Clean Water Act						
Direct discharges	Controls the direct discharge of pollutants to surface waters through the NPDES program. NPDES standards include technology-based pollutant controls, or effluent standards, governing surface water discharges.	Direct discharges to surface waters.	*Clean Water Act*, §402	2	Not Applicable	This removal action will not result in any direct discharges to surface water.
				3	Not Applicable	The soil cover installation will not result in any direct discharges to surface water.
Indirect discharges	Discharge must comply with local POTW pretreatment program, including POTW-specific pollutants, spill prevention program requirements, and reporting and monitoring requirements.	Indirect discharges of wastewater to a POTW through performance and technology-based pretreatment standards.	*Clean Water Act,* §307(b)	2	Not Applicable	This removal action will not result in discharge to a POTW.
				3	Not Applicable	The soil cover installation will not result in discharge to a POTW.
Discharge of dredge-and-fill	No discharge of dredged or fill material will be allowed unless appropriate and practicable steps are taken that minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Discharges of dredged or fill material to surface waters, including wetlands.	*Clean Water Act,* §404; 40 CFR 230; 33 CFR 320 to 330	2	Not Applicable	No dredged or fill material will be discharged to surface waters other than stormwater runoff.
				3	Not Applicable	No dredged or fill material will be discharged to surface waters other than stormwater runoff.

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Federal Action-Specific ARARs
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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Clean Air Act						
Air emissions	Ensure compliance with the Clean Air Act which regulates the various types of air emissions: mobile sources, hazardous air pollutants, acid deposition and electrical utility emissions, stationary sources, and stratospheric ozone. Requirements are based on the air quality designation of the site's location (i.e., attainment, non-attainment, unclassified, or transport) (see Federal Location-Specific ARARs) for each NAAQS, the classification of each area, the required control measures, and baseline emission estimates. Must meet specific NSPS standards for incineration, use of statutory gas turbines, and storage of petroleum liquids.	Air pollutant emissions during the response action, or during the operation and maintenance of the response action.	40 CFR 50.4 to 50.12 40 CFR 60.112 to 60.52	2	Applicable	No discharges to air are anticipated other than fugitive dust.
				3	Applicable	No discharges to air are anticipated other than fugitive dust.
Safe Drinking Water Act						
Underground injection	Regulates the subsurface emplacement of liquids through the Underground Injection Control program, which governs the design and operation of five classes of injection wells in order to prevent contamination of underground sources of drinking water. The Underground Injection Control program regulates well construction, well operation, and monitoring.	Underground injection of wastes and treated groundwater.	40 CFR 144 to 148 40 CFR 268.2	2	Not Applicable	Underground injection does not pertain to this removal action.
				3	Not Applicable	Underground injection does not pertain to the soil cover installation.

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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Toxic Substances Control Act						
Use/presence of chemicals	Chemical control measures including information gathering, chemical testing, labeling, inspection, use, storage, and disposal requirements.	Use/presence of asbestos, CFCs used as aerosol propellants, hexavalent chromium, and PCBs.	*Toxic Substances Control Act*, §6; 40 CFR 700 to 766	2	Not Applicable	Asbestos, CFCs, hexavalent chromium, and PCBs are not known to have been used at Site 19.
				3	Not Applicable	Asbestos, CFCs, hexavalent chromium, and PCBs are not known to have been used at Site 19.
PCB management	Governs many aspects of PCB management, including cleanup of spills, storage, and disposal. USEPA has also proposed PCB spill response regulations which utilize self-implementing, performance-based, and risk-based cleanup standards to address various types of PCB releases.	Presence of PCBs. PCB contamination below 50 ppm is not regulated by TSCA, except under special circumstances.	*Toxic Substances Control Act, §6;* 40 CFR 761	2	Not Applicable	PCBs were sampled for but were not detected in validated data. Soils will be characterized prior to disposal.
				3	Not Applicable	PCBs were sampled for but were not detected during site investigation activities. No soil will be removed as a result of the soil cover installation.

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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Federal Insecticide, Fungicide, and Rodenticide Act						
Disposal of pesticides, pesticide containers, and pesticide residue	Must follow proper disposal methods.	Pesticides requiring disposal.	40 CFR 165.7 to 165.9	2	Not Applicable	This removal action does not involve the disposal of pesticides or pesticide containers. Soils will be characterized prior to disposal.
				3	Not Applicable	This soil cover installation does not involve the disposal of pesticides.
Labeling pesticides	Labeled per specifications to show ingredients, warnings and precautionary statements, toxicity, and directions for use (including storage and disposal methods).	Labeling requirements may apply when pesticides are considered products, and not RCRA hazardous wastes.	40 CFR 162.10	2	Not Applicable	This removal action does not involve the disposal of pesticides.
				3	Not Applicable	This soil cover installation does not involve the disposal of pesticides.
Handling pesticides	Individuals handling certain pesticides must be State or Federally approved applicators.		40 CFR 171.4	2	Not Applicable	This removal action does not involve the disposal of pesticides.
				3	Not Applicable	This soil cover installation does not involve the disposal of pesticides.

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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Resource Conservation and Recovery Act Subtitle C						
Treatment, storage, and/or disposal of hazardous waste	Design and operating specifications for hazardous waste treatment, storage, and disposal units.	Potential CERCLA remedial alternatives include but are not limited to: capping, closure with no post-closure care, closure with waste-in-place, closure of land treatment units, consolidation between units, container storage, construction of new landfill, construction of new surface impoundment, dike stabilization, incineration, land treatment, surface water control, tank storage, treatment, waste pile.	40 CFR 264	2	Relevant and Appropriate	Based on the analytical results from the site investigation, it is not anticipated that this removal action will require disposal of hazardous wastes. Soils will be characterized prior to disposal.
				3	Not Applicable	This soil cover installation does not involve the handling, storage, treatment, disposal, or transportation of hazardous waste.
Generation of hazardous waste	Land disposal restrictions and standards for hazardous wastes placed on land. Treatment standards vary depending on the type of hazardous waste being treated and are concentration- and technology-based designed to reduce the mobility and toxicity of hazardous constituents present in hazardous wastes.	Placement of restricted hazardous wastes moved or treated outside the area of contamination.	40 CFR 268	2	Relevant and Appropriate	Based on the analytical results from the site investigation, it is not anticipated that this removal action will require disposal of hazardous wastes. Soils will be characterized prior to disposal.
				3	Not Applicable	This soil cover installation does not involve the generation of hazardous waste.
Closure and post-closure of hazardous waste management unit	There are two types of potentially applicable RCRA closure schemes: clean closure and landfill closure. Clean closure involves removing or decontaminating all waste residues, contaminated equipment, and contaminated soils so that no additional care or monitoring is required, either at RCRA or CERCLA sites. Landfill closure involves leaving hazardous wastes and contaminated equipment in place, and there are requirements for the use of a final cap or cover for the unit and continued groundwater monitoring in the post-closure period.	Removal or decontamination of all waste residues, contaminated equipment, and contaminated soils so that no additional care or monitoring is required or leaving hazardous wastes and contaminated equipment in place.	40 CFR 264 Subpart G	2	Not Applicable	Based on previous investigations and historic records, Site 19 does not require closure as a hazardous waste management unit.
				3	Not Applicable	Based on previous investigations and historic records, Site 19 does not require closure as a hazardous waste management unit.

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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
(cont.) Resource Conservation and Recovery Act Subtitle C						
Groundwater monitoring of hazardous waste land disposal units	RCRA groundwater monitoring standards, which involve the use of monitoring wells to detect the presence of contaminants in underlying aquifers, are applicable when a Superfund response involves the creation of a new land disposal unit or the remediation of an existing land disposal unit.	Groundwater monitoring of hazardous waste land disposal units.	40 CFR 264 Subpart F	2	Not Applicable	Based on previous investigations and historic records, Site 19 is not a land disposal unit.
				3	Not Applicable	Based on previous investigations and historic records, Site 19 is not a land disposal unit.
Off-site disposal of hazardous wastes	Administrative standards for hazardous wastes sent off-site for further management. Administrative RCRA standards include the obligation to obtain permits and keep various records at all hazardous waste treatment, storage, and disposal facilities; and the requirement to include a hazardous waste manifest when sending hazardous wastes off-site.	Off-site disposal of hazardous wastes.	40 CFR 240 to 282	2	Relevant and Appropriate	Based on the analytical results from the site investigation, it is not anticipated that this removal action will require disposal of hazardous wastes. Soils will be characterized prior to disposal.
				3	Not Applicable	This soil cover installation does not involve disposal of hazardous waste.

Table A-6
Virginia Action-Specific ARARs
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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
State Water Control Law **[VA Code Ann. §§ 62.1-44.2 to 62.1-44.34:28 (2003)]**						
Dredging, filling, and/or discharging pollutants into, or adjacent to, surface waters (including wetlands)	Permitting requirements in addition to complying with USACE requirements (Nationwide Permits) and *Virginia Wetlands Mitigation Policy* . Administered by local wetlands boards and/or VMRC.	Activities requiring a permit include dredging, filling, or discharging any pollutant into or adjacent to surface waters, or otherwise altering the physical, chemical or biological properties of surface waters, excavating in wetlands, or conducting the following activities in a wetland: 1. New activities to cause draining that significantly alters or degrades existing wetland acreage or functions. 2. Filling or dumping. 3. Permanent flooding or impounding. 4. New activities that cause significant alteration or degradation of existing wetland acreage or functions. This would include any project that requires a *Clean Water Act* Section 404 permit or a R*ivers and Harbors Act* Section 10 permit, or a water withdrawal that also requires a Section 404 permit or a Federal Energy Regulatory Commission license or license re-issuance, as well as the same projects that do not require a Federal permit.	*Virginia Water Protection Permit Program Regulation* , 9 VAC 25-210-10 to 260	2	Not Applicable	No dredged or fill material will be discharged to surface waters other than stormwater runoff.
				3	Not Applicable	No dredged or fill material will be discharged to surface waters other than stormwater runoff.
Discharge of stormwater from construction activities to a surface water or through a municipal or non-municipal separate storm sewer system to surface waters	This general permit regulation governs stormwater discharges from construction activities.	Discharges are defined as storm water discharges associated with industrial activity, and storm water discharges associated with small construction activity. Storm water discharges associated with other types of industrial activity shall not have coverage under this general permit. This general permit covers only discharges through a point source to a surface water or through a municipal or non-municipal separate storm sewer system to surface waters. Storm water discharges associated with industrial activity that originate from the site after construction activities have been completed and the site has undergone final stabilization are not authorized by this permit.	*VPDES General Permit Regulation for Discharges of Storm Water from Construction Activities* , 9 VAC 25-180-10 to 70	2	Applicable	As a result of the potential for stormwater runoff during excavation and backfill, erosion control measures will be implemented.
				3	Applicable	As a result of the potential for stormwater runoff during soil cover installation, erosion control measures will be implemented.

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Virginia Action-Specific ARARs
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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
(cont.) *State Water Control Law* [VA Code Ann. §§ 62.1-44.2 to 62.1-44.34:28 (2003)]						
Operation, construction, or modification of sewage or sewage treatment works	Governs the design, construction and operation of sewerage systems and treatment works serving more than one residence or a non-residential sewage source.	Control of sewage or sewage treatment works.	*Sewage Collection and Treatment Regulation* , 9 VAC 25-790-10 to 1000	2	Not Applicable	This removal action at Site 19 does not pertain to sewage or sewage treatment works.
				3	Not Applicable	The soil cover installation at Site 19 does not pertain to sewage or sewage treatment works.
Discharge of groundwater, decontamination water, or other materials to surface waters	Establishes consistent procedures and requirements for the issuance of permits for discharges of pollutants through point sources to surface waters of the Commonwealth in order to effectuate the proper and comprehensive protection of such waters.	Discharge of groundwater, decontamination water, or other materials to surface waters.	*Virginia Pollutant Discharge Elimination System (VPDES) Permit Regulation* , 9 VAC 25-31-10 to 940	2	Not Applicable	This removal action does not involve discharge of groundwater, decontamination water, or other materials to surface waters.
				3	Not Applicable	This soil cover installation does not involve discharge of groundwater, decontamination water, or other materials to surface waters.
Discharge of wastes and/or wastewater to state waters	Regulates the treatment, storage, and land application of industrial waste (sludge and wastewater), sewage sludge, municipal wastewater, and animal waste. A permit may be issued for pollutant management activities. Specific limitations on proposed response activities can be established following receipt of a detailed description of the activities.	Handling of waste and wastewater in a manner that does not involve discharging to a sewage treatment work, or to state waters pursuant to a valid VPDES permit.	*Virginia Pollution Abatement (VPA) Permit Regulation* , 9 VAC 25-32-10 to 300;	2	Not Applicable	This removal action does not involve discharge of waste to state waters.
				3	Not Applicable	This soil cover installation does not involve discharge of waste to state waters.

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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
(cont.) *State Water Control Law* [VA Code Ann. §§ 62.1-44.2 to 62.1-44.34:28 (2003)]						
Construction and maintenance development activities	Establishes general permit number WP4 to govern impacts related to the construction and maintenance of development activities, and activities directly associated with mining.	Activities requiring a permit include dredging, filling, or discharging any pollutant into or adjacent to surface waters, or otherwise altering the physical, chemical or biological properties of surface waters, excavating in wetlands, or conducting the following activities in a wetland: 1. New activities to cause draining that significantly alters or degrades existing wetland acreage or functions. 2. Filling or dumping. 3. Permanent flooding or impounding. 4. New activities that cause significant alteration or degradation of existing wetland acreage or functions. This would include any project that requires a *Clean Water Act* Section 404 permit or a *Rivers and Harbors Act* Section 10 permit, or a water withdrawal that also requires a Section 404 permit or a Federal Energy Regulatory Commission license or license re-issuance, as well as the same projects that do not require a Federal permit.	*Virginia Water Protection General Permit for Impacts from Development Activities Regulation* , 9 VAC 25-690-10 to 100	2	Not Applicable	This removal action will not result in any discharges to surface waters other than stormwater runoff
				3	Not Applicable	The soil cover installation will not result in any discharges to surface waters other than stormwater runoff
Surface Water Management Areas [VA Code Ann. §§ 62.1-242 to 62.1-253]						
Establishment of surface water management area and /or surface water withdrawal during periods of low stream flow	Procedures and requirements to be followed in connection with establishment of surface water management areas, the issuance of surface water withdrawal permits and the issuance of surface water withdrawal certificates for the protection of beneficial uses during periods of low stream flow.	Establishment of surface water management areas and /or surface water withdrawal during periods of low stream flow.	*Surface Water Management Area Regulation* , 9 VAC 25-220-10 to 330	2	Not Applicable	No surface water management area will be established and no surface water withdraw will be conducted as part of this removal action.
				3	Not Applicable	No surface water management area will be established and no surface water withdraw will be conducted as part of the soil cover installation.

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Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Erosion and Sediment Control Law **[VA Code Ann. §§ 10.1-560 to 571 (2003)]**						
Erosion and deposits of soil/sediment caused by land disturbing activities	Regulations for the effective control of soil erosion, sediment deposition and nonagricultural runoff which must be met in any control program to prevent the unreasonable degradation of properties, stream channels, waters and other natural resources.	If a local soil and erosion control program has been adopted in accordance with the *Erosion and Sediment Control Law* , and the *Erosion and Sediment Control Regulations* , and the response action is not exempt under the local program, the project must comply with the program. In the case of absence of a local program, or of an exemption to it, the standards and regulations should be followed.	*Erosion and Sediment Control Regulations* , 4 VAC 50-30-10 to 110	2	Applicable	As excavation and regrading activities will be conducted, erosion and sediment control measures will be implemented.
				3	Applicable	As a soil cover will be installed, erosion and sediment control measures will be implemented.
Air Pollution Control Board **[VA Code Ann. §§ 10.1-1300 to 1326 (1998)]**						
Air emissions from disturbance of soil, treatment of soil or water, or other pollutant management activities	Standards for visible emissions, fugitive dust/emissions, hazardous air pollutants, and toxic pollutants from new and modified sources.	Source of visible emissions, fugitive dust/emissions, and/or a stationary source that emits or may emit any toxic pollutant.	*Standards of Performance for Visible Emissions and Fugitive Dust/Emissions [Rule 5-1]* , 9 VAC 5-50-60 to 120; U*SEPA National Emission Standards for Hazardous Air Pollutants [Rule 6-1]* , 9 VAC 5-60-60 to 80; *Emission Standards for Toxic Pollutants from New and Modified Sources [Rule 6-5]* , 9 VAC 5-50-60-300 to 370	2	Applicable	No discharges to air are anticipated other than fugitive dust during excavation and backfill.
				3	Applicable	No discharges to air are anticipated other than fugitive dust during soil cover installation.
Stormwater Management Act **[VA Code Ann. §§ 10.1-603.1 to 603.15 (2001)]**						
Stormwater runoff caused by development of land that contributes to water pollution, erosion, and localized flooding	Procedures and requirements to be followed in connection with establishment of surface water management areas, the issuance of surface water withdrawal permits and the issuance of surface water withdrawal certificates to provide for the protection of beneficial uses during periods of low stream flow.	Every locality that establishes a local stormwater management program; and every state project. If a local stormwater management program has been adopted in accordance with the *Stormwater Management Act* , and the *Stormwater Management Regulations* , and the response action is not exempt under the local program, the project must comply with the program. In the case of absence of a local program, or of an exemption to it, the standards and regulations should be followed.	*Stormwater Management Regulations* , 4 VAC 3-20-10 to 251	2	Relevant and Appropriate	As a result of the potential for stormwater runoff during excavation and backfill, a stormwater management program may be required.
				3	Relevant and Appropriate	As a result of the potential for stormwater runoff during soil cover installation, a stormwater management program may be required.

Table A-6
Virginia Action-Specific ARARs
Site 19 Engineering Evaluation/Cost Estimate
St. Juliens Creek Annex, Chesapeake, Virginia

Action	Requirement	Prerequisite	Citation	Alternative	ARAR Determination	Comment
Virginia Waste Management Act **[VA Code Ann. §§ 10.1-1400 to 1457 (2004)]**						
Handling, storage, treatment, disposal, and/or transportation of hazardous waste	Provides for the control of all hazardous wastes that are generated within, or transported to, the Commonwealth for the purposes of storage, treatment, or disposal or for the purposes of resource conservation or recovery. Any disposal facility must be properly permitted and in compliance with all operational and monitoring requirements of the permit and regulations.	Management of wastes that meet the definition of hazardous waste.	*Hazardous Waste Regulations* , 9 VAC 20-60-12 to 1505; *Regulations Governing the Transportation of Hazardous Materials* , 9 VAC 20-110-10 to 130	2	Relevant and Appropriate	Based on the analytical results from the site investigation, it is not anticipated that this removal action will require disposal of hazardous wastes. Soils will be characterized prior to disposal.
				3	Not Applicable	This soil cover installation does not involve the handling, storage, treatment, disposal, or transportation of hazardous waste.
Handling, storage, treatment, disposal, and/or transportation of solid waste	Establishes standards and procedures pertaining to the management of solid wastes, and siting, design, construction, operation, maintenance, closure, and post-closure care of solid waste management facilities in this Commonwealth in order to protect the public health, public safety, the environment, and natural resources. Provides the means for identification of open dumping of solid waste and provides the means for prevention or elimination of open dumping of solid waste to protect the public health and safety and enhance the environment. Sets forth the requirements for undertaking corrective actions at solid waste management facilities. Any disposal facility must be properly permitted and in compliance with all operational and monitoring requirements of the permit and regulations.	Management of wastes that meet the definition of solid waste.	*Solid Waste Management Regulations* , 9 VAC 20-80-10 to 790	2	Applicable	Based on the analytical results from the site investigation, it is anticipated that this removal action will require disposal of solid wastes. Soils will be characterized prior to disposal. Based on previous investigations and historic records, Site 19 does not require closure as a waste management facility.
				3	Not Applicable	This soil cover installation does not involve the handling, storage, treatment, disposal, or transportation of solid waste.

Appendix B
Cost Estimates

Alternative 2: Excavation and Backfill with Import Soil

Site: Site 19
Location: St. Juliens Creek Annex, Chesapeake, Virginia
Phase: EE/CA
Date: 18-Aug-05

Description: Excavation of PAH, metallic slag, and inorganic contaminated soil areas. Backfill and restoration of excavation areas.

CALCULATIONS

Elevated Subsurface PAHs Area

Impacted Area (4 ft excavation)

Impacted (sq ft)	1084
Thickness of PAH contaminated soil (ft)	4
Assumed soil weight (tons/cu yd)	1.6
Volume of soil to be excavated (tons)	257

Material Associated with Sloped Excavation

Assumed slope for excavation (H:V)	1:1
Assumed perimeter (ft)	140
Assumed soil weight (tons/cu yd)	1.6
Volume of soil to be excavated (tons)	66
Total Soil from Elevated Subsurface PAHs Area (tons)	**323**

Metallic Slag Area

Impacted Area (1.5 ft excavation)

Impacted (sq ft)	2866
Thickness of metallic slag & inorganic contaminated soil (ft)	1.5
Assumed metallic slag weight (tons/cu yd)	1.8
Volume of material to be excavated (tons)	287
Total Slag & Inorganic Contaminated Soil (tons)	**287**

Fill Material

Excavation volume (cu yd)	361
Total fill volume (cu yd)	452

ASSUMPTIONS

1) Clearing and Grubbing
No Clearing Will Be Necessary

2) Excavation of PAH Contaminated Soil Area
* Depth of contaminated soils = 4 feet
* Excavated materials disposed at offsite landfill as non-hazardous waste
* Excavation slope is 1:1
* Landfill located within 50 miles of site

3) Excavation of Metal Slag and Inorganic Contaminated Soil
* Thickness of slag area removal = 1.5 feet
* Excavated materials disposed at offsite landfill as non-hazardous waste
* Landfill located within 50 miles of site

4) Removal of Excavated Soil
* 8 trucks/day at 20 tons of soil /truck x 2 trips/day x 2 days = 640 tons

5) Excavation Dewatering
* ***No Dewatering Will Be Necessary***

6) UXO Support
* 2 UXO technicians will be present during excavation of the PAH-impacted soil and the metallic slag impacted soil
* Work will take place in September through March
lodging, meals, and incidental = $110 per day per person

7) Fill Material
* Backfill material will come from an offsite borrow source
* Complete backfill of material removed, restoring original grade
* Complete backfill of material will be completed in 2 days
(1 day for general fill and 1 day for topsoil)
* General fill will be used below the top 6 inches
* Top soil will be used for the top 6 inches
* Additional 25% for compaction

8) Confirmation Sampling
No Confirmation Samples Will be Necessary

9) Disposal Characterization
* 1 composite disposal sample from each area
* Actual frequency of disposal characterization samples will be based on facility
* $1000/sample for TCLP

CAPITAL COSTS

Description	Qty	Unit	Unit Cost	Total Cost	Notes
Remove Slag, PAH and Inorganic Contaminated Soil					
Excavate and load material	610	TON	$5.00	$3,050	Engineer's Estimate
SUBTOTAL				$3,050	
Excavation Support					
UXO Technician II/III for UXO scanning (2 UXO technicians)	3	DAYS	$1,442.00	$4,326	Engineer's Estimate
UXO Mobilization (2 UXO technicians)	2	DAYS	$3,120.00	$6,240	Engineer's Estimate
UXO Demobilization (2 UXO technicians)	2	DAYS	$3,120.00	$6,240	Engineer's Estimate
Per Diem (2 UXO technicians)	3	DAYS	$220.00	$660	Engineer's Estimate
SUBTOTAL				$17,466	
Disposal Characterization					
TCLP Analysis	2	UNIT	$1,000.00	$2,000	Engineer's Estimate
SUBTOTAL				$2,000	
Transportation and Disposal (Nonhazardous Waste)					
Transportation and disposal (local)	610	TON	$45.00	$27,446	Engineer's Estimate
SUBTOTAL				$27,446	
Clean Fill (Haul, Dump, Spread, Compact)					
Equipment (mob/demob), labor, and materials	452	CU YD	$14.00	$6,323	Engineer's Estimate
SUBTOTAL				$6,323	
Site Restoration					
Seeding	1	EACH	$500.00	$500	Engineer's Estimate
SUBTOTAL				$500	
SUBTOTAL				$56,785	
Contingency	20%			$11,357	Engineer's estimate
SUBTOTAL				$68,142	
Project Management	10%			$6,814	Source: A Guide to Developing and Documenting Cost
Work Plan and Closeout Report	30%			$20,442	Estimates During the Feasibility Study - USEPA/USACE,
Construction Management	8%			$5,451	July 2000
TOTAL CAPITAL COST				**$100,849**	

PRESENT VALUE ANALYSIS

Cost Type	Year	Total Cost	Total Cost Per Year	Discount Factor (3.1%)	Present Value
Capital	0	$100,849	$100,849	1.000	$100,849
TOTAL PRESENT VALUE OF ALTERNATIVE					**$101,000**

*Discount factor established per "Revisions to OMB Circular A-94 on Guidelines and Discount Rates for Benefit-Cost Analysis", OSWER Directive No. 9355.3-20, June 25, 1993.

The costs estimates are provided to an accuracy of +50 percent and -30 percent.

cu yd = cubic yard
cu ft = cubic feet
ft = foot,feet
LF = linear foot
mob/demob = mobilization/demobilization
PAH = polycyclic aromatic hydrocarbon
sq ft = square feet
UXO = unexploded ordnance

Alternative 3: Soil Cover

Site: Site 19
Location: St. Juliens Creek Annex, Chesapeake, Virginia
Phase: EE/CA
Date: 3-Aug-05

Description: Construction of soil cover over the Elevated Subsurface PAHs Area and the Metallic Slag Area.

CALCULATIONS

Elevated Subsurface PAHs Area

Materials for Soil Cover

Impacted (sq ft)	1084
Cap thickness (ft of new material)	1.5
Volume for compaction (cu yd)	15
Volume for sloping (cu yd)	9
Volume of topsoil (cu yd)	28
Volume of general fill (cu yd)	56
Total Cap Material Required (cu yd)	**84**

Metallic Slag Area

Materials for Soil Cover

Impacted (sq ft)	2866
Cap thickness (ft of new material)	2
Volume for Compaction (cu yd)	53
Volume for Sloping (cu yd)	32
Volume of topsoil (cu yd)	74
Volume of general fill (cu yd)	223
Total Cap Material Required (cu yd)	**297**

ASSUMPTIONS

1) Clearing and Grubbing

No Clearing Will Be Necessary

2) Fill Material

* Fill material will come from an offsite borrow source
* The soil cover will have a minimum 2% slope
* Final slopes of the cover will not exceed 3 horizontal:1 vertical
* Material will arrive to the site in 2 days (1 day for general fill and 1 day for topsoil)
* General fill will be used below the top 6 inches
* Top soil will be used for the top 6 inches
* 25% extra fill volume for compaction
* 15% extra fill volume to achieve slope

3) Installation of Monitoring Wells

* 3 monitoring wells will be installed for each area

4) Groundwater Sampling

* 2 field technicians at $55/hr
* 2 hours per well, 4 hours mobilization/demobilization
* Cost for TAL metals in groundwater is $137/sample
* Cost for PAHs in groundwater = $118/sample
* 9 groundwater samples (per area) including QA/QC samples
* QA/AC samples include 1 duplicate, 1 equipment blank, 1 field blank, 1 trip blank and 1 matrix spike/matrix spike duplicate

5) Cap Maintenance

* Cap vegetation will be mowed on a monthly basis from May through September. No moving October through April.
* Annual cost for potential monitoring well repairs
* Annual cost for potential cap repairs
* Annual cost for site inspections

6) Perimeter Fence

* 280 LF of fence for Metallic Slag Area
* 180 LF of fence for Elevated Subsurface PAHs Area
* Assume 1 gate per area
* Assume 1 sign per area

Alternative 3: Soil Cover

Site: Site 19
Location: St. Juliens Creek Annex, Chesapeake, Virginia
Phase: EE/CA
Date: 3-Aug-05

Description: Construction of soil cover over the Elevated Subsurface PAHs Area and the Metallic Slag Area.

CAPITAL COSTS

Description	Qty	Unit	Unit Cost	Total Cost	Notes
Soil Cover (Haul, Dump, Spread, Compact)					
Equipment (mob/demob), labor, and materials	382	CU YD	$14.00	$5,341	Engineer's Estimate
SUBTOTAL				$5,341	
Monitoring Wells					
Installation per well (including mob/demob)	6	EACH	$2,500.00	$15,000	Engineer's Estimate
SUBTOTAL				$15,000	
Fence Installation					
Fence	460	LF	$51.10	$23,506	RS Means 02820-150-6600
Gate	2	OPENENING	$1,730.00	$3,460	RS Means 02820-130-5080
Sign	2	EACH	$37.70	$75	RS Means 10400-200-0140
SUBTOTAL				$27,041	
Site Restoration					
Seeding	1	EACH	$500.00	$500	Engineer's Estimate
SUBTOTAL				$500	
SUBTOTAL				$47,883	
Contingency	20%			$9,577	Engineer's estimate
SUBTOTAL				$57,459	
Project Management	10%			$5,746	Source: A Guide to Developing and Documenting Cost
Work Plan and Closeout Reprot	30%			$17,238	Estimates During the Feasibility Study - USEPA/USACE,
Construction Management	8%			$4,597	July 2000
TOTAL CAPITAL COST				**$85,040**	

OPERATION AND MAINTENANCE COSTS (1 to 30 years)

Long Term Groundwater Monitoring					
Groundwater sampling (labor, equipment, materials)	4	EVENT	$1,990.00	$7,960	Engineer's Estimate, 6 monitoring wells, quarterly
Laboratory analysis (TAL TCL), including QA/QC	4	EVENT	$2,300.00	$9,200	Engineer's Estimate
Annual report	1	UNIT	$2,500.00	$2,500	
SUBTOTAL				$19,660	
Cap Monitoring					
Mowing cap vegetation	5	Month	$500.00	$2,500	Engineer's Estimate
Repair to cap and monitoring wells	1	UNIT	$2,000.00	$2,000	Engineer's Estimate
Annual cap inspection and report	1	UNIT	$2,000.00	$2,000	Engineer's Estimate
				$6,500	
SUBTOTAL				$26,160	
Contingency	20%			$5,232	Engineer's estimate
SUBTOTAL				$31,392	

PRESENT VALUE ANALYSIS

i = 0.031
t = 30

Cost Type	Year	Total Cost	Total Cost Per Year	Discount Factor (3.1%)	Present Value
Capital	0	$85,040	$85,040	1.000	$85,040
O&M	1-30	$941,760	$31,392	19.35	$607,419
					$692,459
TOTAL PRESENT VALUE OF ALTERNATIVE					**$692,000**

*Discount factor established per "Revisions to OMB Circular A-94 on Guidelines and Discount Rates for Benefit-Cost Analysis", OSWER Directive No. 9355.3-20, June 25, 1993.

The costs estimates are provided to an accuracy of +50 percent and -30 percent.

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