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FINAL NO FURTHER ACTION DECISION DOCUMENT FOR SITES 19 AND 27 NSWC INDIAN  
HEAD MD  
10/1/2012  
CH2M HILL

Final

**No Further Action Decision Document  
for Sites 19 and 27**

**Naval Support Facility Indian Head  
Indian Head, Maryland**

**Contract Task Order JU35**

**October 2012**

Prepared for

**Department of Navy  
Naval Facilities Engineering Command  
Washington**

Under the

**NAVFAC CLEAN 1000  
Contract N62470-08-D-1000**

Prepared by



**CH2MHILL**

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# CONCURRENCE FOR NO FURTHER ACTION

## SIGNATURE PAGE

Sites 19 and 27

Naval Support Facility Indian Head

In 2011, the Department of the Navy (Navy), in partnership with the U.S. Environmental Protection Agency (EPA) Region 3 and Maryland Department of the Environment (MDE), completed removal actions at Sites 19 and 27 at the Naval Support Facility Indian Head in Indian Head, MD. Because the removal action at each site eliminated potential unacceptable risks to human and ecological receptors in soil, no further action (NFA) is recommended for the soils at Sites 19 and 27. Based on an evaluation of the analytical data for surface soil subsurface soil, and groundwater (Site 19 only), including comparison to regional screening levels, site background values, and maximum contaminant levels, the Indian Head Installation Restoration Team (IHIRT) concluded that NFA was warranted for groundwater at Sites 19 and 27. No surface water or sediment exists at either site.

In 2005, a site screening process (SSP) investigation was conducted at Sites 19 and 27. The results of the SSP indicated that contaminant concentrations in soil exceeded the screening criteria, and additional soil sampling was needed. In 2007-2008, three additional rounds of sampling at Site 19 and two additional rounds of sampling at Site 27 were conducted to delineate the lateral and vertical extent of chemicals of potential concern in soil. An Engineering Evaluation/Cost Analysis (EE/CA) was completed, which provided a comparison and evaluation of alternatives for the sites, and documented the reason for selecting soil excavation with offsite disposal as the preferred remedy for both sites. Based on the recommendation in the EE/CA, a non-time-critical removal action was completed in November 2011; approximately 427 tons of soil were removed from Site 19 and approximately 396 tons of soil were removed from Site 27.

In accordance with Section 9.3 subsection D(3) of the Federal Facilities Agreement, it is the consensus of the Navy and EPA, with concurrence from the MDE and other members of the IHIRT, that Sites 19 and 27 require NFA the under Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act. If contamination posing an unacceptable risk to human health or the environment is discovered after execution of this agreement, the IHIRT agrees to reevaluate this site as deemed necessary.

  
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# Acronyms and Abbreviations

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ARAR	applicable or relevant and appropriate requirements
bgs	below ground surface
COPC	constituents of potential concern
E&S	erosion and sediment
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency
ERS	ecological risk screening
HHRS	human health risk screening
IAS	Initial Assessment Study
IHIRT	Indian Head Installation Restoration Team
MDE	Maryland Department of the Environment
mg/kg	milligram(s) per kilogram
Navy	Department of the Navy
NFA	no further action
NG	nitroglycerin
NSF-IH	Naval Support Facility Indian Head
NTCRA	non-time-critical removal action
RAO	removal action objective
RSL	regional screening level
SSP	site screening process
TAL	target analyte list
TCL	target compound list
UDMH	unsymmetrical dimethylhydrazine
UTL	upper tolerance limit

## SECTION 1

# Introduction

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The objective of this report is to document the basis for the no further action (NFA) decision for Sites 19 and 27 at Naval Support Facility Indian Head (NSF-IH) in Indian Head, Maryland. This decision document was prepared by CH2M HILL under the Department of Navy (Navy), Naval Facilities Engineering Command Comprehensive Long-Term Environmental Action Navy 1000 Contract N62470-08-D-1000, Contract Task Order JU35. This report provides the written documentation of the NFA status of Sites 19 and 27 for inclusion in the Administrative Record.

This document provides the background information, nature and extent of contamination, summary of the non-time-critical removal action (NTCRA), and decision summary for NFA at Sites 19 and 27. The NTCRA was selected based on the findings and conclusions of the following:

- Initial Assessment Study (IAS), as documented in the *Initial Assessment Study of Naval Ordnance Station, Indian Head, Maryland* (Fred C. Hart Associates, Inc., 1983)
- Site Screening Process (SSP) investigation, as documented in the *Final Site Screening Process Investigation Report for Sites 19, 26, and 27; Wetland Area Adjacent to Site 45; and Stump Neck SWMUs 14 and 30 at Naval Support Facility Indian Head Maryland, Indian Head, Maryland* (CH2M HILL, 2009)
- Engineering Evaluation/Cost Analysis (EE/CA) as documented in *Engineering Evaluation/Cost Analysis for Sites 19 and 27 at Naval Support Facility Indian Head Maryland, Indian Head, Maryland* (CH2M HILL, 2010)

# Background

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This section presents the background information for Sites 19 and 27 relating to site description and history, and previous investigations and key findings.

## 2.1 Site Description and History

Sites 19 and 27 are located on the Main Installation of NSF-IH, which is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC (Figure 2-1). The Main Installation is bounded by the Potomac River to the northwest, west, and south; Mattawoman Creek to the south and east; and the town of Indian Head to the northeast. Included as part of the Main Installation are Marsh Island and Thoroughfare Island, which are in Mattawoman Creek.

### 2.1.1 Site 19

Site 19, Catch Basins at the Chip Collection Houses, is located to the west of Silo Road and consists of drainage areas leading from the two chip collection houses, Buildings 785 and 1051 (Figure 2-1). The northern drainage area, leading from Building 785, covers approximately 0.25 acre. The southern drainage area, leading from Building 1051, covers approximately 0.18 acre.

Operations at buildings adjacent to Site 19 used a variety of metallic salts in processing explosives. These operations generated an aqueous wastewater stream that contained explosives and metallic salts, particularly copper and lead. Historically, this wastewater drained from the two buildings through fabric bags, to collect the explosive shavings, and then was discharged into baffled catch basins to further capture smaller explosive shavings. Spills of explosive shavings may have occurred around and downstream from the catch basins when the fabric bags attached to the outfall end of the pipes ruptured or detached.

Wastewater from Building 785 was historically drained through an 8-inch cast iron pipe into an approximately 2-foot by 2-foot wooden catch basin. Discharge from the catch basin would then lead into a downgradient swale. Discharges from Building 785 occurred from 1956, when the building was constructed, until 1999, when the waste stream was diverted to a wastewater treatment building. The wooden structure has been removed; however, the concrete base that supported the wooden catch basin remains in place. The former catch basin (suspected release area) associated with Building 785 lies in a naturally vegetated area and is immediately upstream of a swale. Discharge was headed into this downgradient swale from the catch basin before it was diverted to the wastewater treatment building. Building 785 is still in operation as a chip house, but wastewater is now recycled rather than discharged to the swale.

Building 1051 discharged wastewater through an approximately 50-foot-long cast iron pipe, through the fabric bag, to a concrete outfall, and into an approximately 2-foot by 2-foot metal catch basin. Subsequently, water would migrate approximately 15 feet into a downgradient stream before it was diverted to a wastewater treatment building. Discharges from Building 1051 occurred from 1962, when the building was constructed, until 1999, when the waste stream was diverted to the wastewater treatment building. The area in the vicinity of the suspected release near Building 1051 consists of an intermittent stream/drainage ditch surrounded by a small wooded area to the north and maintained lawn areas to the south. The stream/ditch consists of a small incised channel with a sand substrate. Building 1051 is no longer used as a chip collection house and no longer produces a wastewater stream.

### 2.1.2 Site 27

Site 27 consists of a concrete pad (historically named Building 1584), where the former Thermal Destructor 1 was located, and the immediate surrounding area (Figure 2-1). The site covers approximately 0.27 acre.

The thermal destructor was a propane-fired incinerator that burned wastewater between 1976 and 1979. During operation of the incinerator, the area, with the exception of the actual incinerator, was diked. Small spills may

have occurred in the area of the incinerator when the pump transferring wastewater did not switch off in time. The thermal destructor has been dismantled, and only the concrete pad currently remains at the site.

The footprint of the concrete pad encompasses approximately 225 square feet and is surrounded by a grass-covered area. Building 406 is adjacent to the concrete pad (formerly Building 1584). Building 406, constructed in 1923, was used as a nitre cake (sodium bisulfate) shed until 1947, when it became a storehouse for acid plant filter materials. The building was used as a chemical storehouse from 1957 until 1976, and from 1976 until 1999 it was used for tool and equipment storage. Since 1999, Building 406 has been used as a heating, ventilating, and air-conditioning storage building.

Possible spills of contaminated wastewater may have occurred in the immediate vicinity of the incinerator. Although no pipe ruptures or leaks were noted in available site records, small releases of contaminated wastewater may have occurred at the location where the inflow piping entered the incinerator (Fred C. Hart Associates, 1983).

## 2.2 Previous Investigations and Key Findings

### 2.2.1 Initial Assessment Study

An IAS was conducted in 1983. The objective of the IAS was to identify and assess sites posing a threat to human health or to the environment attributable to contamination from past hazardous materials operations at NSF-IH. Sites 19 and 27 were first identified in this study. No sludge deposits were observed in the catch basins, and no evidence of vegetation stress along the swale or stream was noted at Site 19. There was no indication of any spillage or evidence of stressed vegetation in the area surrounding the incinerator at Site 27.

### 2.2.2 Site Screening Process Investigation

An SSP investigation was conducted at Sites 19 and 27 from October 2005 through December 2008. The objectives of the investigation were to (1) characterize the nature and extent of metals and explosives in surface and subsurface soil, and (2) perform human health and ecological risk screenings to assess whether detected constituents in site soils pose potential risks to human health and ecological receptors.

#### Site 19

A total of four rounds of sampling were conducted during the Site 19 SSP investigation (Figure 2-2). The first round of sampling was conducted in October 2005. Nine surface soil samples (IS19SS01 through IS19SS09) were collected downgradient of the two catch basins along the drainageway leading from the chip collection houses, Buildings 785 and 1051. Five of the nine sampling locations (IS19SS01 through IS19SS05) were in the drainageway downstream from Building 785. The other four locations (IS19SS06 through IS19SS09) were in the drainageway downstream from Building 1051 (Figure 2-2). At each sample location, surface soil samples were collected from 0 to 0.5 foot below ground surface (bgs) and analyzed for target analyte list (TAL) metals, explosives (including nitroglycerin [NG] and nitroguanidine), total organic carbon, and pH.

The detected chemicals were evaluated through the two-step risk-screening process to determine whether the level of chemical concentrations exceeded the acceptable levels: (1) comparison against risk-based criteria, and (2) comparison against background concentrations noted in the background investigation report (Tetra Tech NUS, 2002). A number of explosive compounds and metals were detected in the samples and identified as chemicals of potential concern (COPCs) through the human health risk screening (HHRS) and ecological risk screening (ERS). The Site 19 COPCs identified during the risk screening process are as follows:

- Surface Soil
  - Explosives – NG, nitroguanidine
  - Metals – aluminum, arsenic, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, vanadium, zinc

The COPCs were then compared against other criteria, such as 95 percent upper tolerance limit (UTL) and eastern U.S. soil and Maryland soil background concentrations, as additional considerations for deciding whether they should be retained as risk-driving COPCs. Based on these results, NFA for the Building 1051 catch basin was recommended; however, because of potential human health and ecological risks associated with NG, nitroguanidine, arsenic, cobalt, copper, lead, manganese, mercury, nickel, silver, and zinc, Building 785 was recommended for an additional investigation. Aluminum, chromium, iron, and vanadium were not retained as COPCs.

The second round of sampling was conducted in July 2007. Four direct-push technology borings (IS19DP01 through IS19DP04) were advanced along the drainageway at approximate distances of 25, 100, 200, and 300 feet from the former chip collection box. Four surface soil samples, five subsurface soil samples, and one *in situ* groundwater sample were collected. Samples were analyzed for TAL metals (total and dissolved in groundwater) and explosives, including NG and nitroguanidine. The results of the risk screenings suggested that a soil removal action was necessary at Site 19 based on concentrations of NG, lead, copper, and zinc in the surface soil. NG, however, was not detected in any of the four subsurface soil samples collected from the 2- to 3-foot depth interval, so it was not considered to be a subsurface soil COPC. Lead, however, was found to be a COPC in the subsurface soil, based on the HHRS. Additional soil sampling was recommended to delineate the lateral and longitudinal extents of NG and lead, the primary risk drivers, along the drainage way. Arsenic, chromium, and lead were identified as COPCs in groundwater, which was to be evaluated at a future time.

The third round of sampling was conducted between July and September 2008. A total of 31 direct-push technology borings (IS19DP05 through IS19DP35) were advanced along Transects 1 through 7 from 2 feet and 4 feet on each side of the drainageway to delineate the lateral and longitudinal extents of NG and lead. A total of 32 surface soil samples and 26 subsurface soil samples were collected. Samples were analyzed for TAL metals and explosives, including NG and nitroguanidine. The results indicated that the concentrations of lead and NG in samples collected from south of Silo Road were within acceptable risks levels, so a removal action was not warranted along the drainageway south of Silo Road. In addition, the Indian Head Installation Restoration Team (IHIRT) concluded that delineation was completed to the north of Silo Road, except for the area around Transect 2.

The final round of sampling was conducted in December 2008. Eight surface soil samples (IS19SO36 through IS19SO43) were collected to delineate the extent of NG north and northeast of the stream bank along Transect 2 and to confirm previous sample results along Transect 1. Samples were analyzed for NG. The delineation of lead and NG in the surface soil and subsurface soil was completed for a removal action north of Silo Road.

## Site 27

A total of four rounds of sampling were conducted at Site 27 (Figure 2-3). The first round of sampling was conducted in October 2005. Four soil borings (IS27SB01 through IS27SB04) were advanced. Four subsurface soil samples were collected and analyzed for unsymmetrical dimethylhydrazine (UDMH), hydrazine, TAL metals, target compound list (TCL) semivolatile organic compounds, TCL volatile organic compounds, explosives (including NG and nitroguanidine), total organic carbon, and pH. Neither UDMH nor hydrazine, the suspected contaminants, were detected in any of the samples; however, based on an arsenic exceedance at one location, a second round of sampling was conducted at the site.

The second round of sampling was conducted in June 2006. Five surface soil samples (IS27SS01 through IS27SS05) were collected from 0 to 0.5 feet bgs and analyzed for TAL metals. The detected chemicals were taken through the two-step risk-screening process to determine whether the level of chemical concentrations exceeded the acceptable levels: (1) comparison against risk-based criteria, and (2) comparison against background concentrations noted in the background investigation report (Tetra Tech NUS, 2002). A number of compounds were detected in the samples and identified as COPCs through the HHRS and ERS. The Site 27 COPCs identified during the risk screening process are as follows:

- Surface Soil
  - Metals – aluminum, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium, zinc
- Subsurface Soil
  - Semivolatile organic compounds– benzo(a)pyrene, benzo(b)fluoranthene
  - Metals – arsenic, manganese

The COPCs were then compared against other criteria such as 95 percent UTL and eastern U.S. soil and Maryland soil background concentrations as additional considerations for deciding whether they should be retained as risk-driving COPCs. The comparison identified potential human health and ecological risks associated with metals in surface soil—specifically arsenic, cadmium, chromium, lead, and zinc. Based on these results, the site was recommended for an additional investigation. Subsurface soil was not investigated further because the arsenic concentration exceeded the 95 percent UTL at only one location (IS27SB04).

The third round of sampling was conducted in July 2007. A two-tiered approach was implemented that allowed for 13 surface soil samples to be collected from 20 feet (Tier 1) and 40 feet (Tier 2) from the concrete pad. The Tier 1 samples (IS27SS06 through IS27SS12) were analyzed for TAL metals and the Tier 2 samples (IS27SS13 through IS27SS18) only for arsenic. Based on the HHRs and ERS, it was concluded that arsenic in surface soil may pose a risk to human and ecological receptors. The ERS suggested that chromium may also pose a risk to ecological receptors. Additional characterization was recommended to determine the extent of arsenic and chromium in surface soil around the concrete pad.

The final round of sampling was conducted in August 2008. A total of 31 surface soil samples were collected using a tiered approach; Tier 3 samples (IS27SS19 through IS27SS28) were collected 60 feet away from the concrete pad; Tier 4 samples (IS27SS29 through IS27SS37) were collected 80 feet away; and Tier 5 samples (IS27SS38 through IS27SS49) were collected 100 feet away. Tiers 3 and 4 samples were analyzed for arsenic and chromium. The results from sampling Tiers 1 through 4 were discussed by the IHIRT and it was agreed that sufficient data had been collected to delineate both arsenic and chromium in surface soil at the site. Tier 5 samples were not analyzed.

### 2.2.3 Engineering Evaluation/Cost Analysis

An EE/CA was completed for Sites 19 and 27 in 2010. The objectives of the EE/CA were to identify the objectives of the removal action and to analyze the various alternatives that may be used to satisfy these objectives for cost, effectiveness, and implementability. Soil excavation and offsite disposal were recommended as the preferred remedy for both sites because the removal would decrease chemical concentration in surface and subsurface soil to acceptable levels, thereby reducing risks to human and ecological receptors. In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, the proposed removal actions presented in the EE/CA underwent public review and comment from August 18, 2010 through September 18, 2010.

At Site 19, the EE/CA proposed that surface and subsurface soil be removed along the drainage swale from Building 785 to Silo Road because of human health and ecological risks from NG and lead in the surface soil, and human health risks from NG in the subsurface soil. At Site 27, surface soil was proposed to be removed in the area around the concrete pad (Building 1584) because of human health and ecological risks from arsenic and chromium.

### 2.2.4 Action Memorandum

An action memorandum was finalized in January 2011 to document approval of the proposed NTCRA undertaken at Sites 19 and 27. The action provides the Navy with a permanent solution that is potentially unhindered by future land use restrictions at the sites. It will reduce NG and lead concentrations at Site 19 and arsenic and chromium concentrations at Site 27 to levels that will eliminate human health and ecological risks and eliminate

the potential future concern or pathway for contaminant transport to human and ecological receptors in surrounding and/or downgradient areas.

### **2.2.5 Non-time-critical Removal Action**

See Section 4 for details.



**Legend**  
[Red Outline] IR Site Boundary  
[White Outline] Installation Boundary



0 1,500 3,000  
[Scale Bar] Feet

Figure 2-1  
Facility and Site Location Map  
Decision Document for Sites 19 and 27  
NSF-IH, Indian Head, Maryland



**Legend**

- Surface Soil Sample Location (October 2005)
- DPT Sample Location (July 2007)
- DPT Sample Location (July-September 2008)
- Surface Soil Sample Location (December 2008)
- Surface Water
- Approximate Location of Catch Basin
- IR Site Boundary

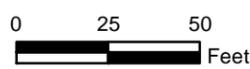


Figure 2-2  
Site 19 Sample Locations  
Decision Document for Sites 19 and 27  
NSF-IH, Indian Head, Maryland



- Legend**
- Subsurface Soil Sample Location (October 2005)
  - ▲ Surface Soil Sample Location (June 2006)
  - Tier 1 (July 2007)
  - Tier 2 (July 2007)
  - Tier 3 (August 2008)
  - Tier 4 (August 2008)
  - Tier 5 (August 2008; not analyzed)



Figure 2-3  
Site 27 Sample Locations  
Decision Document for Sites 19 and 27  
NSF-IH, Indian Head, Maryland

# Nature and Extent of Contamination

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## 3.1 Contaminants of Concern and Impacted Media

The nature and extent of soil contamination at Sites 19 and 27 are based on the data obtained from the SSP investigation. As discussed in Section 2.2.2, the detected chemicals were evaluated through a two-step risk-screening process to determine whether the level of chemical concentrations exceeded the acceptable levels: (1) comparison against risk-based criteria, and (2) comparison against background concentrations noted in the background investigation report. The COPCs were then compared against other criteria such as 95 UTL and eastern U.S. soil and Maryland soil background concentrations as additional considerations for deciding whether they should be retained as risk-driving COPCs. Based on these results, the nature and extent of contamination at Sites 19 and 27 were sufficiently evaluated and delineated. The findings indicated that the surface and subsurface soil at Site 19 had elevated levels of lead and NG. The highest detections of NG and lead were observed at location IS19SS02, with concentrations of 3,200 milligrams per kilogram (mg/kg) and 2,090 mg/kg, respectively (Table 3-1). The findings indicated that the surface soil at Site 27 had elevated levels of arsenic and chromium. The highest detections of arsenic were observed at location IS27SS03, with a concentration of 168 mg/kg, and at location IS27SS01, with a concentration of 344 mg/kg of chromium (Table 3-2).

At the December 2010 partnering meeting, the IHIRT reviewed the Site 19 *in situ* groundwater data collected as part of the SSP investigation. The focus was on arsenic, chromium, and lead because those constituents were identified as COPCs. The results were compared to the 2010 regional screening levels (RSLs), site-wide background data, and maximum contaminant level (Table 3-3). Although total and dissolved arsenic, total chromium, and total lead exceeded the RSLs for tap water, the concentrations were below the maximum contaminant and/or background levels. Based on the analytical results, the IHIRT concluded that NFA for groundwater was warranted at Site 19. Groundwater was not evaluated at Site 27 because surface and subsurface soil sampling results indicated that metals (arsenic and chromium) contamination was confined to the surface soil (0.5 feet in depth).

## 3.2 Remedial Action Objectives

- The removal action objectives (RAOs) for Sites 19 and 27 were to remove and dispose of contaminated soil, ensure that soil left in place does not represent an unacceptable risk to human health and the ecological environment, and ensure that it does not provide a continuing source of contamination to soil beyond Silo Road at Site 19 and around the concrete pad at Site 27.

## 3.3 Cleanup Criteria

The delineation of the soil removal areas at Site 19 and 27 was based on the risk screening and background values discussed in Section 2, and presented in Tables 3-1 and 3-2. The IHIRT performed a comprehensive evaluation of the sampling data to ensure the sites had been sufficiently characterized and removal areas fully delineated. For Site 19, the NG and lead values used to determine the footprint for soil removal were 7.8 mg/kg and 400 mg/kg, respectively; both values were based on the 2007 residential soil risk-based concentrations. In 2009, the risk-based concentrations were revised and replaced with RSLs. The footprint for the Site 19 soil removal was revised to reflect exceedance of the current RSL values of 6.1 mg/kg and 400 mg/kg for NG and lead, respectively;(May 2010 RSLs). For Site 27, arsenic and chromium values used to determine the footprint for soil removal were 14.9 mg/kg and 33.4 mg/kg, respectively; both values are based on the 95 percent UTL background concentrations for arsenic and chromium.

TABLE 3-1  
 Site 19 Sampling Results for Soil COPCs  
*Decision Document for Sites 19 and 27*  
*NSF-IH, Indian Head, Maryland*

COPC (mg/kg)	Maximum Concentration (mg/kg)	Location of Maximum Concentration	Frequency of Detection	Frequency of Exceedance	Background <sup>a</sup> (mg/kg)	RSL Residential Soil (mg/kg)	Eastern U.S. Soils <sup>b</sup> (mg/kg)	Maryland Soils <sup>c</sup> (mg/kg)	Clean Up Level (mg/kg)
Nitroglycerin	3,200	IS19SS02	32/46 (SS); 0/26 (SB)	25/46 (SS); 0/26 (SB)	NA	6.1	NA	NA	6.1
Lead	2,090	IS19SS02	24/24 (SS); 26/26 (SB)	5/24 (SS); 1/26 (SB)	62.5	400	<10 - 300	10 - 50	400

Notes:

COPC - chemical of potential concern

mg/kg - milligram(s) per kilogram

RSL - regional screening level

<sup>a</sup> Background values based on the 95% upper tolerance limit; can be found in *Background Soil Investigation Report for Indian Head and Stump Neck Annex Naval Surface Warfare Center, Indian Head, Maryland* (Tetra Tech, 2002).

<sup>b</sup> Shacklette, Hansford.T. and Josephine.G. Boerngen. U.S. Geological Survey Professional Paper 1270. *Element Concentrations in Soils and Other Surficial Material of the Conterminous United States*

<sup>c</sup> United States, U.S. Geological Survey Professional Paper 1270, 1984

TABLE 3-2  
 Site 27 Sampling Results for Soil COPCs  
*Decision Document for Sites 19 and 27*  
*NSF-IH, Indian Head, Maryland*

COPC (mg/kg)	Maximum Concentration (mg/kg)	Location of Maximum Concentration	Frequency of Detection	Frequency of Exceedance	Background <sup>a</sup> (mg/kg)	Eastern U.S. Soils <sup>b</sup> (mg/kg)	Maryland Soils <sup>c</sup> (mg/kg)	Clean Up Level (mg/kg)
Arsenic	168 L	IS27SS03	37/37 (SS); 4/4 (SB)	25/37 (SS); 1/4 (SB)	14.9	<0.1 - 73	1.1 - 7.1	14.9
Chromium	344 L	IS27SS01	31/31 (SS); 4/4 (SB)	16/31 (SS); 0/4 (SB)	33.4	1 - 1,000	15 - 100	33.4

Notes:

COPC - chemical of potential concern

mg/kg - milligram(s) per kilogram

L - Reported value may be biased low

<sup>a</sup> Background values are based on the 95% UTL; can be found in the *Background Soil Investigation Report for Indian Head and Stump Neck Annex Naval Surface Warfare Center, Indian Head, Maryland* (Tetra Tech, 2002)

<sup>b</sup> Shacklette, Hansford.T. and Josephine.G. Boerngen. U.S. Geological Survey Professional Paper 1270. Element Concentrations in Soils and Other Surficial Material of the Conterminous United State:

<sup>c</sup> United States, U.S. Geological Survey Professional Paper 1270, 1984

TABLE 3-3  
 Site 19 Sampling Results for Groundwater  
*Decision Document for Sites 19 and 27*  
*NSF-IH, Indian Head, Maryland*

COPC (µg/L)	Maximum Concentration	Frequency of Detection	Background <sup>a</sup>			RSL Tap Water (µg/L)	MCL (µg/L)	
			95% UTL Unfiltered (µg/L)	95% UTL Filtered (µg/L)	95% UTL Non- Turbid Unfiltered (µg/L)			
Arsenic	Total	11.2	1/1	19.1	NA	NA	0.045	10
	Dissolved	5 J	1/1					
Chromium	Total	13.3	1/1	2,272	NA	20.9	0.043	100
	Dissolved	ND	0/1					
Lead	Total	148	1/1	273	1.4	NA	15	15
	Dissolved	ND	0/1					

Notes:

J - Result may be estimated

COPC - chemical of potential concern

UTL - upper tolerance limit

µg/L - micrograms per liter

RSL - regional screening limit

MCL - maximum contaminant level

ND - not detected

NA - Not available

<sup>a</sup> Background Soil Investigation Report for Indian Head and Stump Neck Annex Naval Surface Warfare Center, Indian Head, Maryland (Tetra Tech, 2002)

# Non-time-critical Removal Action

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## 4.1 Effectiveness, Implementability, and Cost

### 4.1.1 Effectiveness

The overall effectiveness of the remedy is high. The level of effectiveness was assessed based on the number of “effectiveness criteria” that would be satisfied by the alternative. The “effectiveness criteria,” from the federal guidance document (EPA, 1993) are as follows:

1. Protection of public health
2. Protection of workers during implementation
3. Protection of environment
4. Compliance with applicable or relevant and appropriate requirements (ARARs)
5. Level of treatment and containment expected
6. Residual effect concerns

Each criterion is addressed below with respect to the NTCRA.

**Protection of Public Health:** The NTCRA was considered to protect human and ecological receptors. As discussed in Section 2, NG and lead posed unacceptable human health and ecological risks at Site 19; and arsenic and chromium posed potential unacceptable human health and ecological risks at Site 27.

**Protection of Workers during Implementation:** Workers were protected during implementation of this alternative using personal protection equipment and construction controls, as necessary, and in accordance with the project-specific health and safety plan. The environment was protected through the removal of the potential source of contamination from the site.

**Protection of the Environment:** Excavation and disposal of the contaminated surface and subsurface soil at Sites 19 and 27 achieved the RAOs, which are protective of human and ecological receptors.

**Compliance with ARARs:** The remedy complies with the location-specific, action-specific, and chemical-specific ARARs that apply to the implementation of the alternative. The removal action did not endanger groundwater or surface water, and complied with regulations regarding environmentally sensitive locations, excavations, air emissions, storage, transportation, and other ARARs.

**Level of Treatment and Containment Expected and Residual Effect Concerns:** Soil excavation with offsite disposal removed and contained the contaminated surface and subsurface soil in a facility specifically designed to manage the medium. The potential risks to human and environmental receptors were significantly reduced because the potential for exposures has been prevented. The potential for future contamination of the clean fill to a level greater than the action levels in the area of excavation has been eliminated.

### 4.1.2 Implementability

The level of implementability was assessed based on the number of “implementability criteria” satisfied by the alternative. The “implementability criteria,” from the federal guidance document (EPA, 1993), are as follows:

1. Construction and operational considerations
2. Demonstrated performance/useful life
3. Adaptable to environment conditions
4. Contributes to remedial performance
5. Can be completed in an acceptable timeframe

6. Availability of equipment, personnel and services, outside laboratory testing capacity, and offsite treatment and disposal capacity
7. Permits required
8. Easements or rights-of-way required
9. Impact on adjoining property
10. Ability to impose institutional controls

Evaluation of implementability essentially comes down to the evaluation of technical and administrative feasibility. The technical feasibility consists of criteria 1 through 6. For both Sites 19 and 27, implementation of excavation projects was straightforward and easily achieved based on criteria 1 through 6. Administrative feasibility involves criteria 7 through 10. These criteria are irrelevant to Sites 19 and 27 because no permits were required, no rights-of-way were required, and no adjoining property was present. Institutional controls (criterion 10) have been easily imposed as necessary because the two sites are on a Navy facility.

### 4.1.3 Cost

The total cost for the Sites 19 and 27 removal actions was \$447,171.

## 4.2 Description of Removal

### 4.2.1 Site 19

A summary of the removal action activities is provided in the construction completion report (Shaw, 2012). The following tasks were completed in March 2011:

- Pre-mobilization
  - Obtained base work permits
  - Conducted utility clearance and mark out
- Mobilization and site preparation
  - Set up general support area, including construction of the temporary soil staging cell
  - Marked out removal area
  - Installed erosion and sediment (E&S) controls, including construction entrances, earth dike/swale combinations, silt fence, and stone outlet structure
  - Conducted vegetation clearing as necessary to provide adequate access for personnel and equipment
- Contaminated soil removal
  - Divided the excavation area into three subareas based on the different depths of excavation: upper-excavation subarea (0 to 0.5 foot bgs), mid-excavation subarea (0.5 to 2 feet bgs), and lower-excavation subarea (2 to 4 feet bgs) (Figure 4-1).
  - Executed the excavation to the predetermined horizontal and vertical limits for each subarea; conducted random spot measurements to verify the correct depth was achieved.
  - Relocated excavated soil to the temporary soil staging cell and stabilized with dehydrated lime. Soil and lime mixing operations were conducted inside the cell.
  - The limits of the Site 19 removal area, which consisted of contaminated soil that presented potentially unacceptable human health and ecological risks, were clearly defined by the extensive delineation achieved through the SSP investigation. Therefore, the Navy, EPA, and MDE decided that confirmation sampling following the excavation was not required.

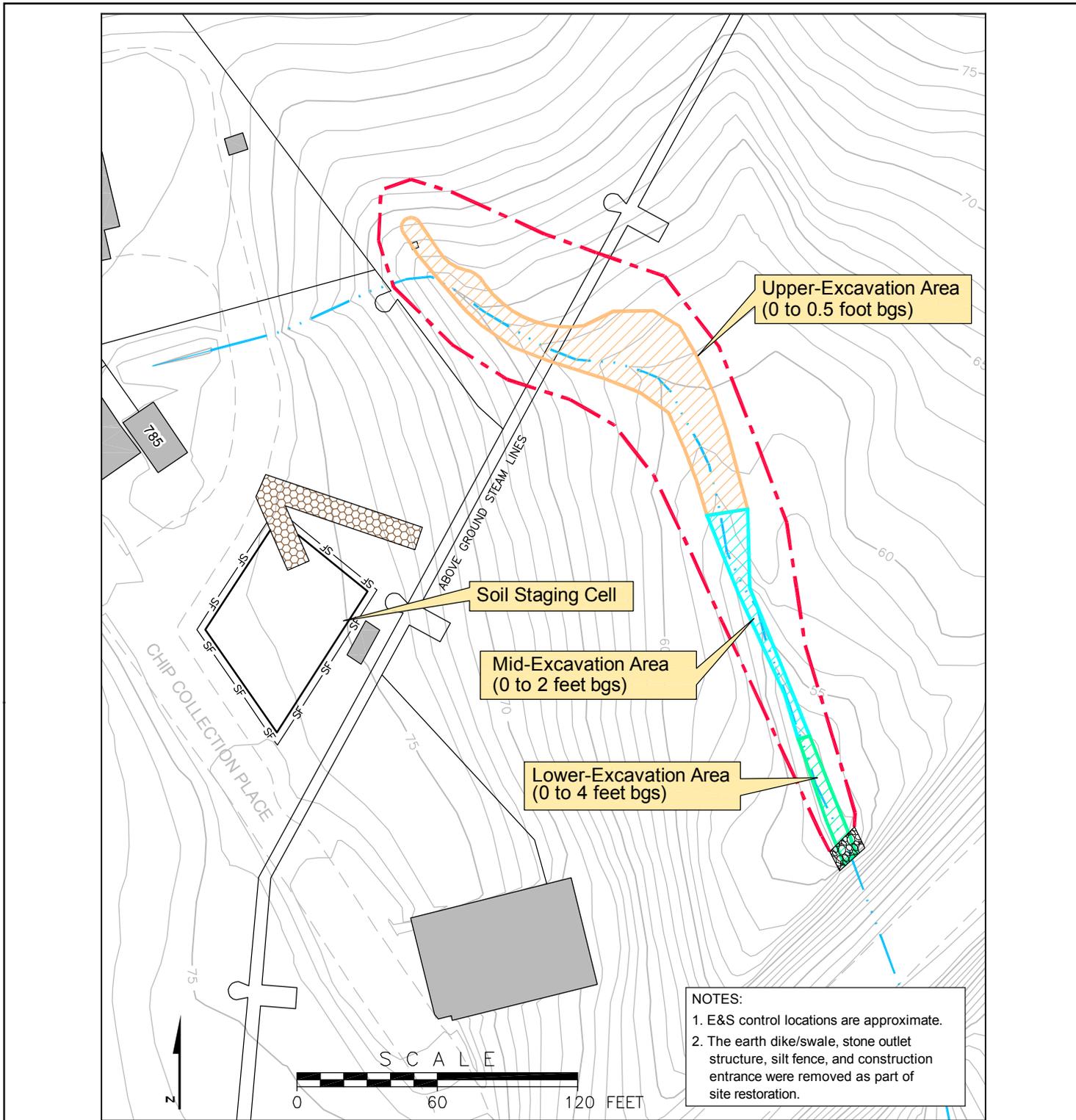
- Waste disposal
  - Characterized waste for full toxicity characteristic leaching procedure; polychlorinated biphenyls; reactivity, corrosivity, ignitability; and total petroleum hydrocarbons. The sample results indicated that the concentrations in soil were below hazardous regulatory limits and landfill disposal facility acceptance limits.
  - Removed a total of 426.58 tons of non-hazardous soil and debris from Site 19.
- Site restoration
  - Backfilled the removal area with common fill to a level of 6 inches below the finished grade. Six inches of topsoil was placed over the common fill to complete backfilling.
  - Collected elevation readings using a laser level to confirm the proper slope was achieved.
  - Seeded and stabilized with erosion control matting the disturbed swale area. Straw mulch was applied to complete restoration.
  - Conducted removal of the E&S controls during restoration to reduce disturbance after vegetation at the site was established. Shaw returned to the site in October 2011 and completed final restoration.
  - Because the NTCRA removed the clearly delineated areas of unacceptable human health and ecological risks in the soil, and the excavated area was restored with clean fill material and re-vegetated, no unacceptable risk for soil remained at the site following the removal action.

#### 4.2.2 Site 27

As stated in Shaw's construction completion report, the following tasks were completed in October 2011:

- Pre-mobilization
  - Obtained Base work permits
  - Conducted utility clearance and mark out
- Mobilization and site preparation
  - Set up general support area, including constructing the temporary soil staging cell
  - Marked out removal area
  - Installed E&S controls, including construction entrance, earth dike, silt fence, and stone outlet structure
- Contaminated soil removal
  - Executed the excavation to a depth of 6 inches from north to south; conducted random spot measurements to verify the correct depth was achieved (Figure 4-2).
  - The limits of the Site 27 removal area, which consisted of contaminated soil that presented potentially unacceptable human health and ecological risks, were clearly defined by the extensive delineation achieved through the SSP investigation. Therefore, the Navy, EPA, and MDE decided that confirmation sampling following the excavation was not required.
- Waste disposal
  - Characterized waste for full toxicity characteristic leaching procedure; polychlorinated biphenyls; reactivity, corrosivity, ignitability; and total petroleum hydrocarbons. The sample results indicated that the concentrations in soil were below hazardous regulatory limits and landfill disposal facility acceptance limits.
  - Removed a total of 395.59 tons of non-hazardous soil and debris from Site 27.

- Site restoration
  - Backfilled the removal area with 6 inches of topsoil, followed by seeding and mulching with straw. The E&S controls will not be removed until vegetation is established.
  - Because the NTCRA removed the clearly delineated areas of unacceptable human health and ecological risks in the soil, and the excavated area was restored with clean fill material and re-vegetated, no unacceptable risk for soil remained at the site following the removal action.

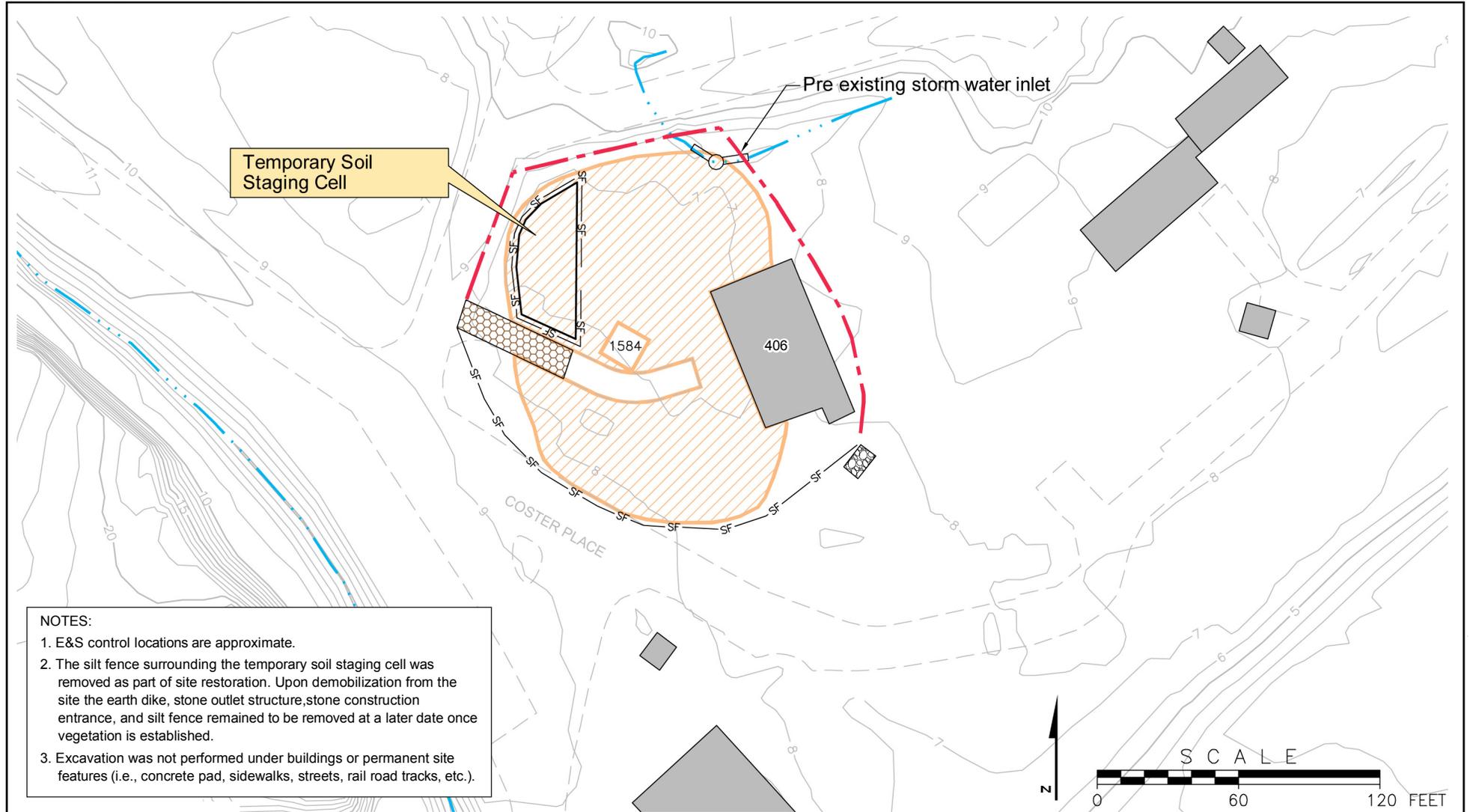


SOURCE: Original figure provided by Shaw

**Legend**

- Area of Surface Excavation 0 to 0.5 ft bgs
- Area of Subsurface Excavation 0 to 2 ft bgs
- Area of Subsurface Excavation 0 to 4 ft bgs
- Stone Construction Entrance
- Stone Inlet Protection
- Earth Dike/Swale
- Silt Fence
- Surface Water
- Topographic Contour (1-Foot Interval)
- Topographic Contour (5-Foot Interval)

Figure 4-1  
Site 19 Soil Removal Area  
Decision Document for Sites 19 and 27  
NSF-IH, Indian Head, Maryland



**NOTES:**

1. E&S control locations are approximate.
2. The silt fence surrounding the temporary soil staging cell was removed as part of site restoration. Upon demobilization from the site the earth dike, stone outlet structure, stone construction entrance, and silt fence remained to be removed at a later date once vegetation is established.
3. Excavation was not performed under buildings or permanent site features (i.e., concrete pad, sidewalks, streets, rail road tracks, etc.).

- Legend**
-  Excavation Area
  -  Stone Construction Entrance
  -  Stone Outlet Structure
  -  Earth Dike
  -  Silt Fence
  -  Surface Water
  -  Topographic Contour (1-Foot Interval)
  -  Topographic Contour (5-Foot Interval)

SOURCE: Original figure provided by Shaw

Figure 4-2  
 Site 27 Soil Removal Area  
 Decision Document for Sites 19 and 27  
 NSF-IH, Indian Head, Maryland

# Decision Summary

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## 5.1 Rationale for NFA

NFA is recommended at Sites 19 and 27. At Site 19, the removal action reduced concentrations of NG and lead in surface soil to acceptable levels of human health and ecological risks, and reduced NG concentrations in subsurface soil to acceptable levels of human health risks. At Site 27, the removal action reduced concentrations of arsenic and chromium in surface soil to acceptable levels of human health and ecological risks. The removal action has achieved the RAOs identified in the EE/CA.

## SECTION 6

# References

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CH2M HILL. 2009. *Final Site Screening Process Investigation Report for Sites 19, 26, and 27; Wetland Area Adjacent to Site 45; and Stump Neck SWMUs 14 and 30 at Naval Support Facility Indian Head Maryland, Indian Head, Maryland.*

CH2M HILL. 2010. *Engineering Evaluation/Cost Analysis for Sites 19 and 27 at Naval Support Facility, Indian Head, Indian Head, Maryland.*

EPA. 1993. *Memorandum: Final Revised Draft Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA.* EPA/540-R-93-057. OSWER Publication 9360.0-32, PB93-963402.

Fred C. Hart Associates, Inc. 1983. *Initial Assessment Study of Naval Ordnance Station, Indian, Head, Maryland.*

Shaw. 2012. *Construction Completion Report, Removal Actions at Sites 19 & 27 at Naval Support Facility Indian Head, Indian Head, Maryland*

Tetra Tech NUS, Inc. 2002. *Background Soil Investigation Report for Indian Head and Stump Neck Annex Naval Surface Warfare Center, Indian Head, Maryland.*