

**EPA Superfund  
Record of Decision:**

**NAVAL AMPHIBIOUS BASE LITTLE CREEK  
EPA ID: VA5170022482  
OU 09  
VIRGINIA BEACH, VA  
06/24/2005**

Final

# **Record of Decision SWMU 8: East Annex Sandblasting Yard**

Naval Amphibious Base Little Creek  
Virginia Beach, Virginia



Prepared for

**Department of the Navy  
Naval Facilities Engineering Command  
Mid-Atlantic**

Contract No. N62470-95-D-6007  
CTO-0210

**June 2005**

Prepared by

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# Acronyms and Abbreviations

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ABM	abrasive blast material
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EE/ CA	Engineering Estimate and Cost Analysis
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
FFA	Federal Facilities Agreement
HHRA	Human Health Risk Assessment
HI	Hazard Index
IAS	Initial Assessment Study
IRP	Installation Restoration Program
NAB	Naval Amphibious Base
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	no further action
NTCRA	non-time critical removal action
PRAP	Proposed Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	Remedial Investigation
RME	reasonable maximum exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SWMU	Solid Waste Management Unit
TCL	Target Compound List
VDEQ	Virginia Department of Environmental Quality

# Declaration

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## 1.1 Site Name and Location

SWMU 8: West Annex Sandblasting Yard  
Naval Amphibious Base Little Creek  
Virginia Beach, Virginia  
EPA ID# VA5170022482

## 1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the Selected Remedy at Solid Waste Management Unit (SWMU) 8, West Annex Sandblasting Yard, at Naval Amphibious Base (NAB) Little Creek, Virginia Beach, Virginia. The determination has been made in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information contained in the Administrative Record file for the site.

The United States Department of the Navy (Navy) is the lead agency and provides funding for site cleanups-At NAB Little Creek. The Navy and United States Environmental Protection Agency (EPA) Region III issue this ROD jointly. The lead agency has determined that no action is necessary to protect human health or welfare or the environment. The Virginia Department of Environmental Quality (VDEQ) concurs with the Selected Remedy.

## 1.3 Description of the Selected Remedy

The West Annex Sandblasting Yard (SWMU 8) is among several Installation Restoration Program (IRP) sites under CERCLA investigation at NAB Little Creek. The status of all the IRP sites at NAB Little Creek can be found in the Site Management Plan, which is located in the Administrative Record.

The Selected Remedy for SWMU 8 is no further action (NFA). Removal actions completed at SMWU 8 eliminated potentially unacceptable human health and/or ecological risk associated with soil (2000) and sediment (2004) at the site. Confirmation sampling was conducted for each of the removal actions and the results support the NFA remedial alternative. The Navy and EPA, in partnership with VDEQ agree that no further CERCLA actions are warranted for SWMU 8.



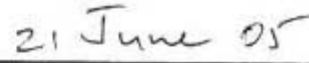
## 1.4 Statutory Determinations

The selected remedy is protective of human health and the environment. The soil and sediment removal actions conducted at SWMU 8 have eliminated potentially unacceptable risks, and the need to conduct further remedial actions. As this remedy will not result in hazardous substances, pollutants, or contaminants remaining on-site above levels that prohibit unlimited use and unrestricted exposure, a 5-year review will not be required.

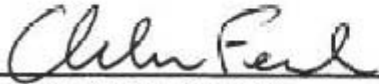
## 1.5 Authorizing Signatures



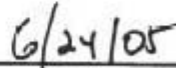
G.E. Cooper, Captain, U.S. Navy  
Commanding Officer  
NAVPHIBASE Little Creek



Date



Abraham Ferdas, Director  
Hazardous Site Cleanup Division  
EPA (Region III)



Date

# Decision Summary

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## 2.1 Site Name, Location, and Description

NAB Little Creek consists of 2,147 acres located in the northwest corner of Virginia Beach, Virginia, adjacent to the Chesapeake Bay (Figure 2-1). The facility is primarily industrial, and the personnel provide logistic facilities and support services for local commands; organizations, home-ported ships, and other United States and allied units to meet amphibious warfare-training requirements of the Armed Forces of the United States. NAB Little Creek is also used for recreational, commercial, and residential purposes. Land development surrounding the base is residential, commercial, and industrial. NAB Little Creek (EPA ID# VA5170022482) was placed on the National Priorities List in May 1999.

SWMU 8, West Annex Sandblasting Yard, is located at the northwestern boundary of NAB Little Creek and consists of three discontinuous parcels at the intersection of Midway Road and Amphibious Drive totaling 21 acres (Figure 2-2). A small drainage ditch parallels the northwestern edge of SWMU 8 and marks the base boundary. The drainage ditch originates east of Shore Drive and is fed by the City of Norfolk stormwater system. The drainage ditch enters the northwestern portion of SWMU 8, enters a catch basin and then flows underground to Outfalls 16 and 17 that discharge to Little Creek.

Historical activities conducted at SWMU 8 include sandblasting to remove paint from boats, which resulted in residual abrasive blast material (ABM) accumulation on the ground surface. An estimated 5,125 yd<sup>3</sup> of ABM were stored at SWMU 8 between 1949 and 1954, and an additional 3,525 yd<sup>3</sup> were stored between 1954 and 1971.

## 2.2 Site History and Enforcement Activities

The SWMU 8 was identified in initial basewide investigations as SWMU 144/8. Investigations at SWMU 8 have been conducted since 1984. NAB Little Creek was placed on the National Priorities List in May 1999. In accordance with SARA as it pertains to CERCLA Federal Facilities Response Actions, SWMU 8 activities are funded by the Defense Environmental Restoration Program (DERP). The Federal Facilities Agreement (FFA) for NAB Little Creek, signed November 2003, provides for CERCLA -directed enforcement activities. No enforcement activities have been recorded to date at SWMU 8. Summaries of previous investigations conducted at SWMU 8 are presented below.

### 2.2.1 Initial Assessment Study (Rogers, Golden, and Halpern, 1984)

An Initial Assessment Study (IAS) was conducted to identify potential areas of concern at NAB Little Creek through a review of waste generation, handling, and disposal practices. The review involved historical records, aerial photographs, field inspections, and interviews with NAB Little Creek personnel.

At SWMU 8, ABM from sandblasting activities accumulated on the site between the 1949 and 1971. Based on results of leachability testing, the ABM was classified as nonhazardous with limited migration potential. The Commonwealth of Virginia had determined that the ABM and residues on the ground surface would not require removal, and that all future disposals be conducted at an approved landfill. Therefore, the IAS recommended that no confirmation studies or remedial actions be undertaken at SWMU 8.

### **2.2.2 RCRA Facility Assessment (A.T. Kearney, Inc., 1989)**

A Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) report was prepared to identify SWMUs and other areas of concern at the NAB Little Creek and evaluate their potential for releases of hazardous wastes or hazardous constituents to the environment. The assessment included a review of available records and site visits. The RFA recommended that soil sampling for analysis of metals be conducted at SWMU 8 to determine the extent of ABM contamination. The RFA also recommended that a cover be placed over all residues to preclude future wind dispersal of the wastes.

### **2.2.3 SWMU Installation Restoration (IR) Summary (2000)**

In June 2000, the Navy summarized all available information on the sites under the IRP at NAB Little Creek. The report included information obtained from the Relative Risk Ranking System study, the goal of which was to gather data in order to rank and prioritize the sites based on level of risk.

In 2000, the Navy dug shallow test pits to assess the extent of ABM in the soil. The ABM was present only in the northwestern portion of SWMU 8 and was not found beyond 5 in. below ground surface (bgs), with a clear boundary between the ABM and the underlying clean sand. The Navy elevated SWMU 8 in priority for further site investigation.

### **2.2.4 Delineation of Abrasive Blast Material (2000)**

In March 2000 a field investigation was conducted at SWMU 8 West Annex Sandblasting Area to delineate the extent of ABM in areas where it is visibly present at the ground surface. Findings of the delineation activities indicated that ABM at the site was limited to the upper 6 in. in the soil profile, and in most areas was limited to the upper 4 in. The extent of ABM at SWMU 8 was delineated, and approximately 2,400 yd<sup>3</sup> of ABM and soil material were identified for potential removal at the site.

### **2.2.5 Engineering Evaluation Cost Analysis (2000), ABM Interim Removal Action (2000), and Construction Completion (2001)**

An Engineering Evaluation Cost Analysis (EE/ CA) was prepared for SWMU 8 in 2000 that recommended excavation of the ABM-impacted soils. In November and December 2000, an interim removal action was conducted at SWMU 8 in the vicinity of Water Tower 1553 to excavate approximately 2,000 yd<sup>3</sup> of ABM-laden soil to a depth of approximately 2 ft. Confirmation samples were taken over the approximate 3-acre area and analyzed for metals and polycyclic aromatic hydrocarbons and excavated areas were backfilled with clean borrow material (Figure 2-3). Lead is a target compound of ABM. The removal action cleanup goal was based on the EPA soil lead-screening value of 400 mg/kg, using the Integrated Exposure-Uptake Biokinetic Model. Excavated areas were backfilled following

confirmation sampling. Much of this area has since been paved and fenced, and is currently used to store recreational vehicles. A summary of the removal action is presented in the *Project Close-Out Report, Removal of Abrasive Blast Material, Solid Waste Management Unit 8, Naval Amphibious Base Little Creek, Virginia Beach, Virginia*, prepared by OHM Remediation Services Corporation, February 2001.

### **2.2.6 Site Investigation (2001)**

A Site Investigation was conducted at SWMU 8 in May 2000 that included the collection and analysis of groundwater, soil, and sediment samples. Results of the Site Investigation confirmed that ABM is present only in surface and shallow subsurface soils and in sediment at Outfalls 16 and 17. Results of a human health risk screening evaluation determined that metals and polycyclic aromatic hydrocarbons in soil pose a potential human health risk. No site-related groundwater contamination was identified.

### **2.2.7 Ecological Risk Assessment (2001)**

An ecological risk assessment (ERA) completed for SWMU 8 in January 2001 concluded that potential risks to lower trophic-level receptors in terrestrial areas of the site were low and spatially restricted, and the quality of habitat was limited. There were no unacceptable risks to upper trophic-level terrestrial receptors.

### **2.2.8 Remedial Investigation/Human Health Risk Assessment/Ecological Risk Assessment (2002—2004)**

A Remedial Investigation (RI) was conducted in 2002 with the collection and analysis of groundwater, surface soil, subsurface soil, surface water, and sediment samples. No unacceptable human health or ecological risks for groundwater or surface water were identified. Some constituents exceeded risk screening criteria, therefore additional subsurface soil and sediment sampling was conducted in January 2004. Based on these additional results and risk characterization, no unacceptable human health risks for soil were identified. Potential unacceptable ecological risks associated with metals in outfall sediments were possible. The Navy pursued an interim removal action to address potential sediment risk at Outfalls 16 and 17.

### **2.2.9 Engineering Evaluation Cost Analysis, Interim Removal Action, and Construction Completion (2004)**

An EE/CA was completed in June 2004 to evaluate alternatives for sediment removal at Outfalls 16 and 17. The alternatives evaluated included no action, an engineered protective cover over impacted sediment, and excavation of impacted sediment. The preferred alternative was excavation of sediment at Outfalls 16 and 17.

As required by Section 300.415(n) of the NCP, a public notice of the availability of the Draft EE/CA was issued and the EE/CA was made available to the public for comment from May 11 to June 11, 2004. No comments were received from the public during the comment period. The Navy signed an Action Memorandum on July 1, 2004, to implement the removal action as specified in the EE/CA.

### 2.2.10 Removal Action (2004—2005)

A non-time critical removal action (NTCRA) was completed in September 2004 whereby sediment at Outfalls 16 and 17 was excavated for off-site disposal. Thirty cubic yards (32 tons) of sediment were excavated (Figure 2-4). The limits of excavation were determined based on pre-removal confirmatory sampling. The Navy, EPA, and VDEQ agree the concentrations left in place at the limits of sediment excavation pose no unacceptable ecological risk. Site restoration consisted of a 1-ft layer of clean fill overlain by riprap at Outfalls 16 and 17. The Construction Completion Report (AGVIQ, May 2005) summarizes the confirmation sample results from the NTCRA and demonstrates that the elevated inorganic concentrations previously identified in sediment have been removed from Outfalls 16 and 17. The Construction Completion Report was included as Appendix H in the RI.

Upon completion of the NTCRA for sediment at Outfalls 16 and 17, the combination RI/Human Health Risk Assessment (HHRA)/ERA was finalized for SWMU 8. The Navy and EPA, in partnership VDEQ, agree that no further action is required for soil, sediment, groundwater, or surface water on the basis of the results of the HHRA, ERA, and the completion of the NTCRA.

## 2.3 Community Participation

The Navy and EPA provide information regarding the cleanup of NAB Little Creek to the public through the community relations program which includes a Restoration Advisory Board, public meetings, the Administrative Record file for the site, the information repository, and announcements published in local newspapers.

In accordance with Sections 113 and 117 of CERCLA, the Navy provided a public comment period from February 25 through March 25, 2005, for the Proposed Remedial Action Plan (PRAP) for SWMU 8. A public meeting to present the PRAP was held on March 9, 2005, at the Shelton Park Elementary School. Public notice of the meeting and availability of documents was placed in *The Virginian-Pilot* newspaper on February 24, 2005.

The PRAP and previous investigation reports for SWMU 8 are available to the public in the information repository for the Administrative Record maintained at:

Virginia Beach Public Library  
4100 Virginia Beach Boulevard  
Virginia Beach, VA 23451  
(757) 431-3001

A complete list of the documents included in the Administrative Record files for NAB Little Creek can be obtained from the IRP web site: <http://public.lantops-ir.org/sites/public/nabl/Site%20Files/AdminRecords.aspx>.

## 2.4 Scope and Role of Response Actions

SWMU 8 is among the IRP sites under CERCLA investigation at NAB Little Creek. The status of all the IRP sites at NAB Little Creek can be found in the Site Management Plan, which is located in the Administrative Record.

## 2.5 Site Characteristics

SWMU 8, West Annex Sandblasting Yard, is located in the northwestern boundary of NAB Little Creek and consists of three discontinuous parcels totaling 21 acres at the intersection of Midway Road and Amphibious Drive. Historical activities conducted at SWMU 8 include sandblasting to remove paint from boats, resulting in residual ABM accumulation on the ground surface. An estimated 5,125 yd<sup>3</sup> of ABM were stored at SWMU 8 between 1949 and 1954, and an additional 3,525 yd<sup>3</sup> were stored between 1954 and 1971.

The majority of SWMU 8 is currently developed, consisting of the paved recreational vehicle storage area, buildings, and paved parking lots. The southwestern portion of the site is undeveloped. Unpaved areas are mainly covered with landscaped grass areas. SWMU 8 is flat and includes a small drainage ditch along its northern edge that originates near Shore Drive and is fed by the City of Norfolk stormwater system. There is also a storm drain near Midway Road that channels stormwater runoff to the north. The drainage ditch and storm drain enter an underground culvert that drains to Outfalls 16 and 17. Outfalls 16 and 17 are located in a developed (piers and a boat ramp) inlet that connects to Little Creek near its junction with Little Creek Channel (Figure 2-2).

Shallow groundwater (Columbia Aquifer) beneath SWMU 8 (3 to 10 ft bgs) generally flows from west to east toward Little Creek Channel with a low hydraulic gradient (0.001 to 0.005 ft.). Underlying the Columbia Aquifer is the Yorktown Confining Unit, a clay unit with interbedded fine sand and silt that generally exceeds 20 ft in thickness. The Yorktown Confining Unit separates the overlying Columbia Aquifer from the sand and silty sand of the underlying Yorktown Aquifer.

The conceptual site models for human health (Figure 2-5) and ecological (Figure 2-6) exposure pathways were developed during the RI. Pathways considered included infiltration and leaching of precipitation through the vadose zone from soil to the groundwater system and surface runoff and erosion of soil to drainage ditch and Outfalls 16 and 17. A quantitative HHRA and ERA were completed for SWMU 8 based on 65 surface soil samples, 61 subsurface soil samples, 14 groundwater samples, nine sediment samples, and one surface water sample. Samples were analyzed for target compound list volatile organic compounds, semivolatile organic compounds, pesticides, and polychlorinated biphenyls; and target analyte list inorganic compounds, tin, acid volatile sulfides, simultaneously extractable metals, and cyanide.

## 2.6 Current and Potential Future Site and Resource Uses

With the exception of a new recreational vehicle storage area and parking lots associated with a number of buildings within the boundaries of SWMU 8, the ground surface at SWMU 8 is unpaved, covered with landscaped grasses and other herbaceous plants, and is generally

level. There are no forested habitats on SWMU 8 except for a narrow fringe along the drainage ditch, and there are no wetlands on SWMU 8.

A secure entrance gate (Gate 1) to NAB Little Creek is located west of SWMU 8. A new Gate 1 entrance is being constructed that will cross the western portion of SWMU 8. Results of the baseline HHRA concluded that site wide concentrations do not pose unacceptable risk for construction workers and industrial workers at SWMU 8. Therefore, the Navy, EPA, and VDEQ agreed that road and utility construction work is permitted within the boundaries of SWMU 8. Current land uses are expected to continue at SWMU 8 and there is currently no other planned future land use. Future residential development of the site is unlikely.

Groundwater from beneath or downgradient of SWMU 8 is not currently used. The shallow groundwater (Columbia Aquifer) is not considered a potable water source at or in the vicinity of NAB Little Creek due to its poor quality and low yield. The City of Norfolk supplies potable water to NAB Little Creek and the surrounding residential area with surface water from Lake Whitehurst and Lake Smith, located southeast of the site. The nearest groundwater supply wells are located on the Little Creek Golf Course, approximately 1/2 mile (2,300 ft) east of SWMU 8. These four supply wells withdraw groundwater from the Yorktown Aquifer for irrigation purposes at the golf course; the wells are not used for drinking-water supply.

Little Creek Channel is located downgradient from SWMU 8. Therefore, any future use of shallow or deep groundwater would be at or upgradient from the site.

## 2.7 Site Risks

A quantitative HHRA and ERA were conducted to evaluate the potential human health and ecological risks associated with the presence of potentially site-related constituents in soil, shallow groundwater, surface water, and sediment at SWMU 8. The risk assessments characterize the current and potential future risks at the site if no additional remediation is implemented.

A detailed discussion of risks identified at SWMU 8 can be found in the RI/HHRA/ERA report (CH2M HILL, 2004). A summary of potential human health risk is provided in Table 2-1. Subsequent to the NTCRA, the Construction Completion Report (AGVIQ/ CH2M HILL Joint Venture I, 2005) documents the remaining sediment concentrations and demonstrates acceptable risk for ecological receptors.

### 2.7.1 Soil

There is no unacceptable human health risk associated with exposure to SWMU 8 soil. The reasonable maximum exposure (RME) noncarcinogenic hazard (1.2) slightly exceeds EPA's target hazard index (HI) of 1.0 for exposure to combined surface and subsurface soil (future child resident). None of the individual constituents in soil contribute hazard quotients above 0.5, and there are no target organs with HIs above 1.0, therefore no unacceptable risk is present.

There are no unacceptable ecological risks associated with soil at SWMU 8 due to low chemical concentrations resulting in minimal ecological screening value exceedances and

limited spatial distribution of ecological screening value exceedances. Furthermore, there were no exceedances of the no observed adverse effects levels based upon growth and reproduction for terrestrial-based food web exposures.

## 2.7.2 Shallow Groundwater

Groundwater beneath the site is not currently used as a potable water supply and not anticipated to be used as a potable water supply in the future. However, the shallow aquifer groundwater data from the site were evaluated as a worst-case risk estimate for potable groundwater use at the site for a future residential exposure scenario.

The RME noncarcinogenic hazard for a child resident (HI of 10) associated with the potable use of shallow groundwater (ingestion of iron and manganese) exceeds EPA's target HI of 1.0. However, based on average or central tendency exposure point concentration, the noncarcinogenic hazard (1) associated with potable use of the upper aquifer does not exceed EPA's target HI of 1. Additionally, iron and manganese concentrations in the shallow aquifer are similar to background levels and do not represent a CERCLA release from SWMU 8. There are no unacceptable RME carcinogenic risks associated with exposure to the upper aquifer groundwater as a potable supply.

Chromium (119 µg/L) and arsenic (17 µg/L) slightly exceed their maximum contaminant levels (100 and 10 µg/L, respectively). However, these metals are not believed to reflect a CERCLA release from SWMU 8 for the following reasons:

- These metals are not elevated in the soil
- Concentrations of typical ABM-related metals such as lead, copper, and zinc are not elevated in soil or groundwater; these metals would be expected to also be elevated if chromium and arsenic were related to the ABM activities
- There is no identifiable plume in which these metals exceed maximum contaminant levels

Additionally, the source of contamination (ABM-impacted soil) was removed during the interim removal actions conducted at the site.

## 2.7.3 Surface Water

There are no unacceptable human health or ecological risks associated with surface water at SWMU 8. Potential human health risks associated with exposure to SWMU 8 surface water are below EPA's target risk range for all scenarios. Potential ecological risks associated with surface water are considered acceptable based on EPA Region III ecological screening values and documented freshwater chronic values developed by Oak Ridge National Laboratory as recommended by the EPA guidance.

## 2.7.4 Sediment

There are no unacceptable human health risks associated with exposure to sediment at SWMU 8 as risks are below EPA's target risk range for all scenarios.

Seven metals (barium, beryllium, copper, lead, silver, tin, and zinc) were identified in sediment collected adjacent to Outfalls 16 and 17 as potential constituents of concern based



on comparison to EPA Region III ecological screening values. Based on available data, the low potential ecological risk associated with these metals was confined to the “pool” area located just north of the outfalls where deposition of sediments is occurring. In January 2004, additional sediment samples were collected at Outfalls 16 and 17 to support a NTCRA. The area of elevated metals in sediment was delineated, excavated, and backfilled with clean material. A Construction Completion Report documenting the NTCRA is available in the administrative record file for NAB Little Creek.

## **2.8 No Further Action Necessary**

As demonstrated by the risk assessments, SWMU 8 poses no unacceptable risk to human health or the environment from exposure to soil, groundwater, surface water, or sediment. The Navy and EPA, in consultation with VDEQ, agree that no further action is required for SWMU 8. Consequently, with the exception of no action, no remedial action alternatives were considered and the development of remedial action objectives are not necessary. There are no principal threat wastes at the site and a NFA determination for SWMU 8 meets the statutory requirements of CERCLA for protection of human health and the environment. No response action will be performed at SWMU 8 and no restrictions on land use or exposure are necessary.

## **2.9 Documentation of Significant Changes**

The PRAP for SWMU 8 identified NFA as the preferred alternative. No members of the public attended the public meeting for the SWMU 8 PRAP and no comments were received during the public comment period. Therefore, no significant changes were made to the preferred remedial action alternative identified in the PRAP.

**Table 2-1**  
 Summary of RME Cancer Risks and Hazardous Indices  
 SWMU 8  
 NAB Little Creek, Virginia Beach, Virginia

Receptor	Media	Exposure Route	Cancer Risk	Hazard Index	Chemicals with HI>1		
Current/Future Maintenance Worker	Surface Soil	Ingestion	1.8E-07	0.011	None		
		Dermal Contact	8.1E-08	0.007			
		Total	2.8E-07	0.02			
	Surface Water	Ingestion	1.6E-07	0.005			
		Dermal Contact	1.3E-08	0.0004			
		Total	1.8E-07	0.005			
	Sediment	Ingestion	2.4E-08	0.0002			
		Dermal Contact	1.7E-08	2.4E-13			
		Total	4.1E-08	0.0002			
	All Media	Total	4.8E-07	0.02			
	Current/Future Trespasser/Visitor Adult	Surface Soil	Ingestion	3.8E-07		0.02	None
			Dermal Contact	2.9E-07		0.03	
Total			6.7E-07	0.05			
Surface Water		Ingestion	5.3E-07	0.02			
		Dermal Contact	5.7E-08	0.001			
		Total	5.9E-07	0.02			
Sediment		Ingestion	1.2E-07	0.0008			
		Dermal Contact	6.6E-08	0.001			
		Total	2.1E-07	0.001			
All Media		Total	1.5E-06	0.07			
Current/Future Trespasser/Visitor Adolescent		Surface Soil	Ingestion	2.0E-07	0.03	None	
			Dermal Contact	1.2E-07	0.03		
	Total		3.2E-07	0.06			
	Surface Water	Ingestion	2.7E-07	0.02			
		Dermal Contact	3.1E-09	0.002			
		Total	3.1E-07	0.02			
	Sediment	Ingestion	6.2E-08	0.001			
		Dermal Contact	4.4E-08	0.0002			
		Total	1.1E-07	0.002			
	All Media	Total	7.3E-07	0.1			
	Future Resident Adult	Groundwater	Ingestion	NA	4.0		Iron (1.6), Manganese (2.2)
			Dermal Contact	NA	0.3		
Inhalation			NA	0.02	None		
Total			NA	4.4			
Soil*		Ingestion	NA	0.1			
		Total	NA	0.2			
All Media	Total	NA	4.5				
Future Resident Child	Groundwater	Ingestion	NA	9.3	Iron (3.8), Manganese (5.2)		
		Dermal Contact	NA	1.0			
		Total	NA	10			
	Soil*	Ingestion	NA	1.0	None		
		Dermal Contact	NA	0.1			
		Total	NA	1.2			
All Media	Total	NA	11				
Future Resident Child/Adult	Groundwater	Ingestion	2.3E-06	NA	None		
		Dermal Contact	3.5E-06	NA			
		Total	5.8E-06	NA			
	Soil*	Ingestion	1.7E-05	NA			
		Dermal Contact	8.5E-06	NA			
		Total	2.5E-05	NA			
All Media	Total	3.1E-05	NA				
Future Industrial Worker	Groundwater	Ingestion	5.4E-07	1.4	None		
		Dermal Contact	NA	NA			
		Total	5.4E-07	1.4			
	Soil*	Ingestion	3.7E-08	0.08			
		Dermal Contact	6.1E-09	0.10			
		Total	6.8E-08	0.2			
All Media	Total	1.0E-06	1.8				
Future Construction Worker	Groundwater	Ingestion	NA	NA	None		
		Dermal Contact	1.0E-07	0.6			
		Inhalation	4.1E-09	0.000			
		Total	1.0E-07	0.6			
	Soil*	Ingestion	3.6E-07	0.2			
		Dermal Contact	9.1E-08	0.0			
		Total	4.5E-07	0.2			
		All Media	Total	5.5E-07		0.8	

NA – Not Applicable, pathway incomplete.

File Path: v:\110\gis\secret\figs\swmu\_7\_8.apr

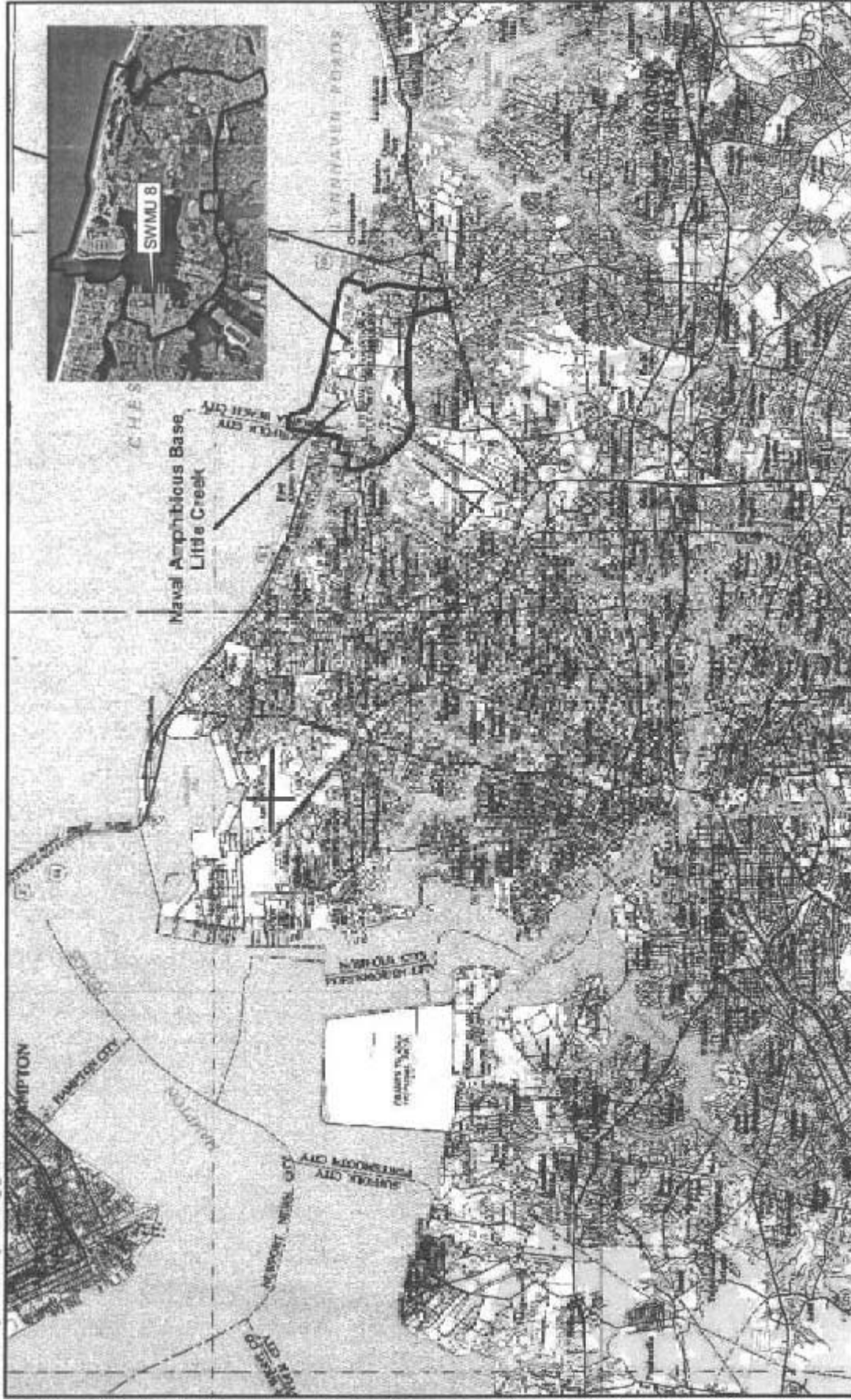
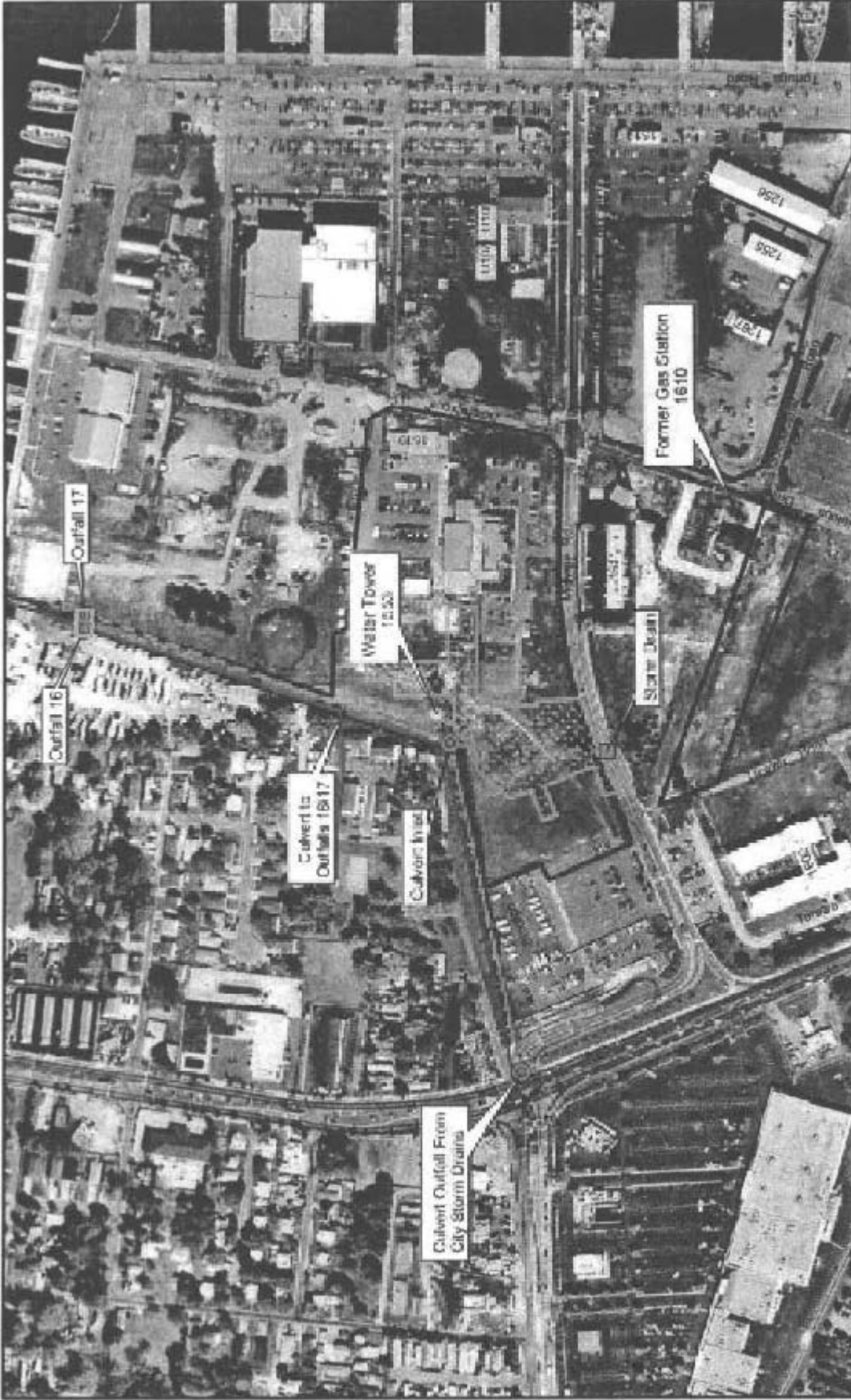


Figure 2-1  
Site Location Map  
SWMU 8 Record of Decision  
NAB Little Creek  
Virginia Beach, Virginia  
**CH2MHILL**

LEGEND  
□ Activity Boundary

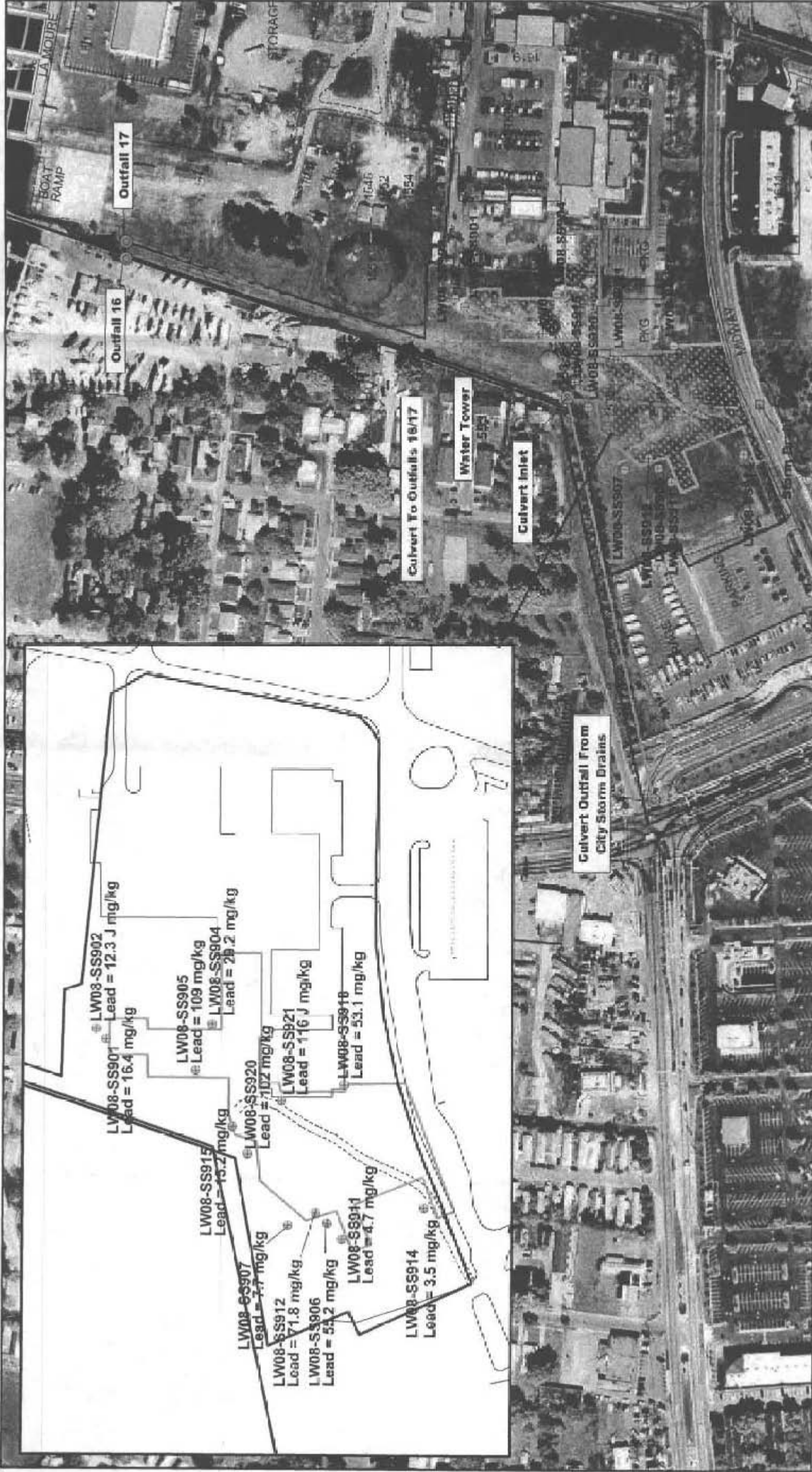


**LEGEND**

- Activity Boundary
- SWMU 8 Boundary
- Area of Excavation (ABM Removal Action, Dec. 2000)
- Area of Excavation (Sediment Removal Action, Sept. 2004)
- Drainage Ditch
- Subsurface Storm Water Pipe

N  
 0 200 400 600 Feet

**Figure 2-2**  
 SWMU 8 Boundary and Vicinity  
 SWMU 8 Record of Decision  
 NAB Little Creek  
 Virginia Beach, Virginia  
**CH2MHILL**

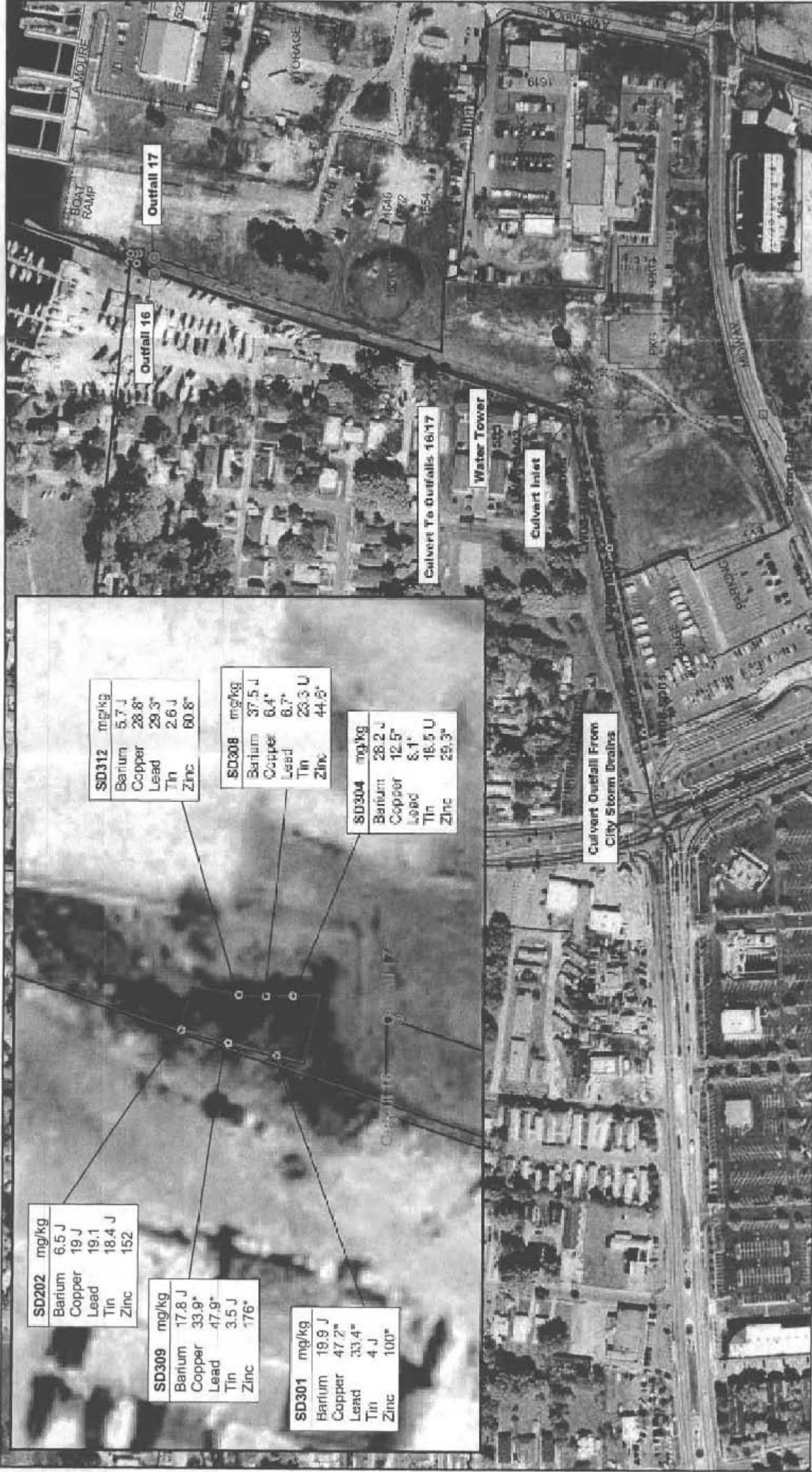


**LEGEND**

- ⊕ Confirmation Surface Soil Locations
- Activity Boundary
- SWMUs
- ▭ Area of Excavation
- ~ Drainage Ditch
- Subsurface Storm Water Pipe



Figure 2-3  
 Area of 2000 Soil Excavation  
 NAB Little Creek  
 Virginia Beach, Virginia



SD202	mg/kg
Barium	6.5 J
Copper	19 J
Lead	19.1
Tin	18.4 J
Zinc	152

SD309	mg/kg
Barium	17.8 J
Copper	33.9*
Lead	47.9*
Tin	3.5 J
Zinc	176*

SD301	mg/kg
Barium	19.9 J
Copper	47.2**
Lead	33.4*
Tin	4 J
Zinc	100*

SD312	mg/kg
Barium	5.7 J
Copper	28.8*
Lead	29.3*
Tin	2.6 J
Zinc	60.8*

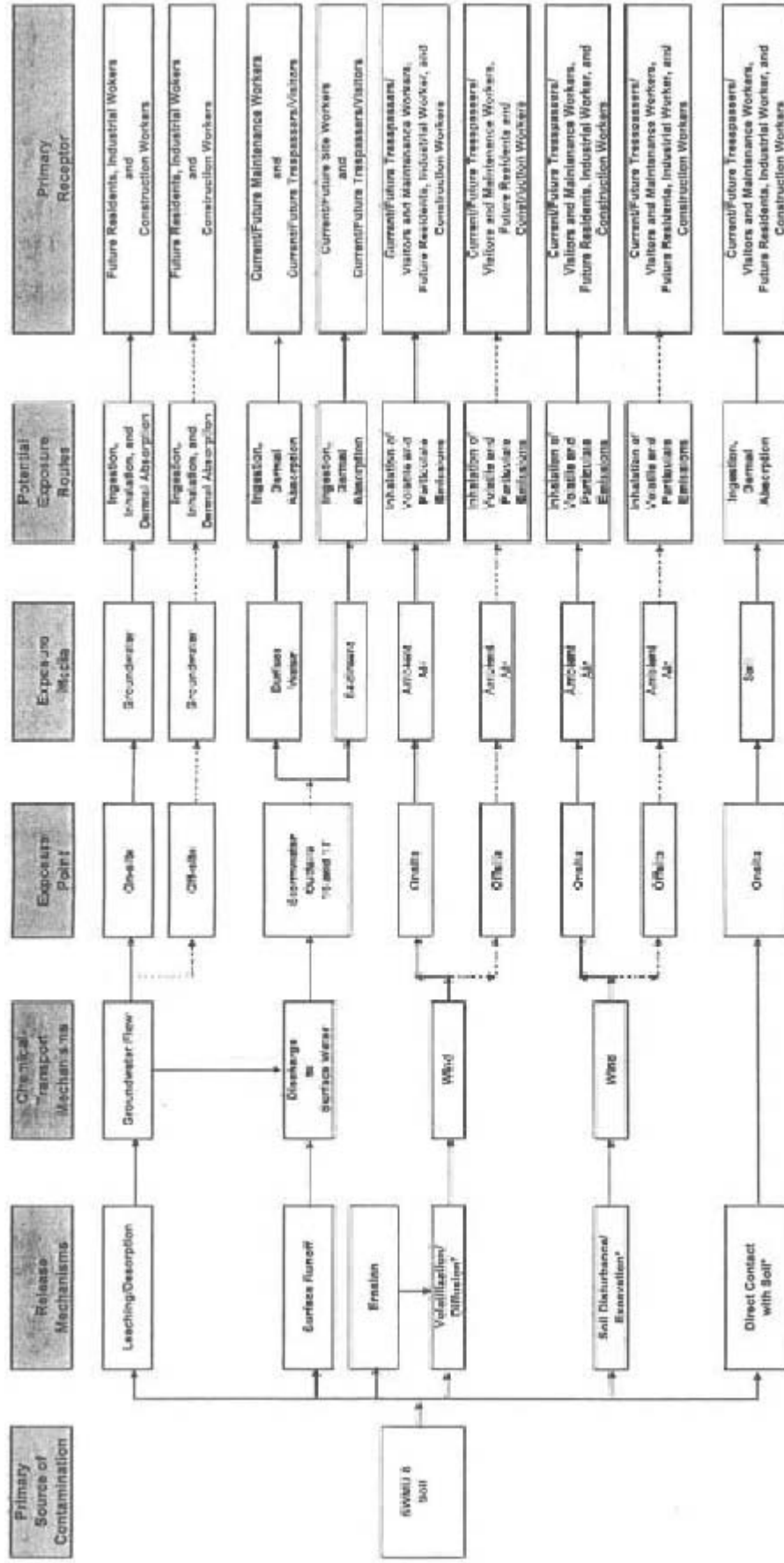
SD308	mg/kg
Barium	37.5 J
Copper	6.4*
Lead	6.7*
Tin	23.3 U
Zinc	44.8*

SD304	mg/kg
Barium	28.2 J
Copper	12.5*
Lead	8.1*
Tin	18.5 U
Zinc	29.3*

- LEGEND**
- ⊙ Sediment sample locations
  - ▭ Activity Boundary
  - ▭ SWMUs
  - ▭ Area of 2004 Sediment Excavation
  - ~ Drainage Ditch
  - ~ Subsurface Storm Water Pipe



Figure 2-4  
 Area of 2004 Sediment Excavation  
 NAB Little Creek  
 Virginia Beach, Virginia



\* Surface soil for current/future maintenance worker and trespasser/visitor; subsurface soil for future industrial worker, trespasser/visitor, resident, and construction worker.  
 \*\* Little Creek Cove only.

**Figure 2-5**  
 Conceptual Site Model for Potential Human Exposures at SWMU 8  
 NAB Little Creek, Virginia Beach, Virginia

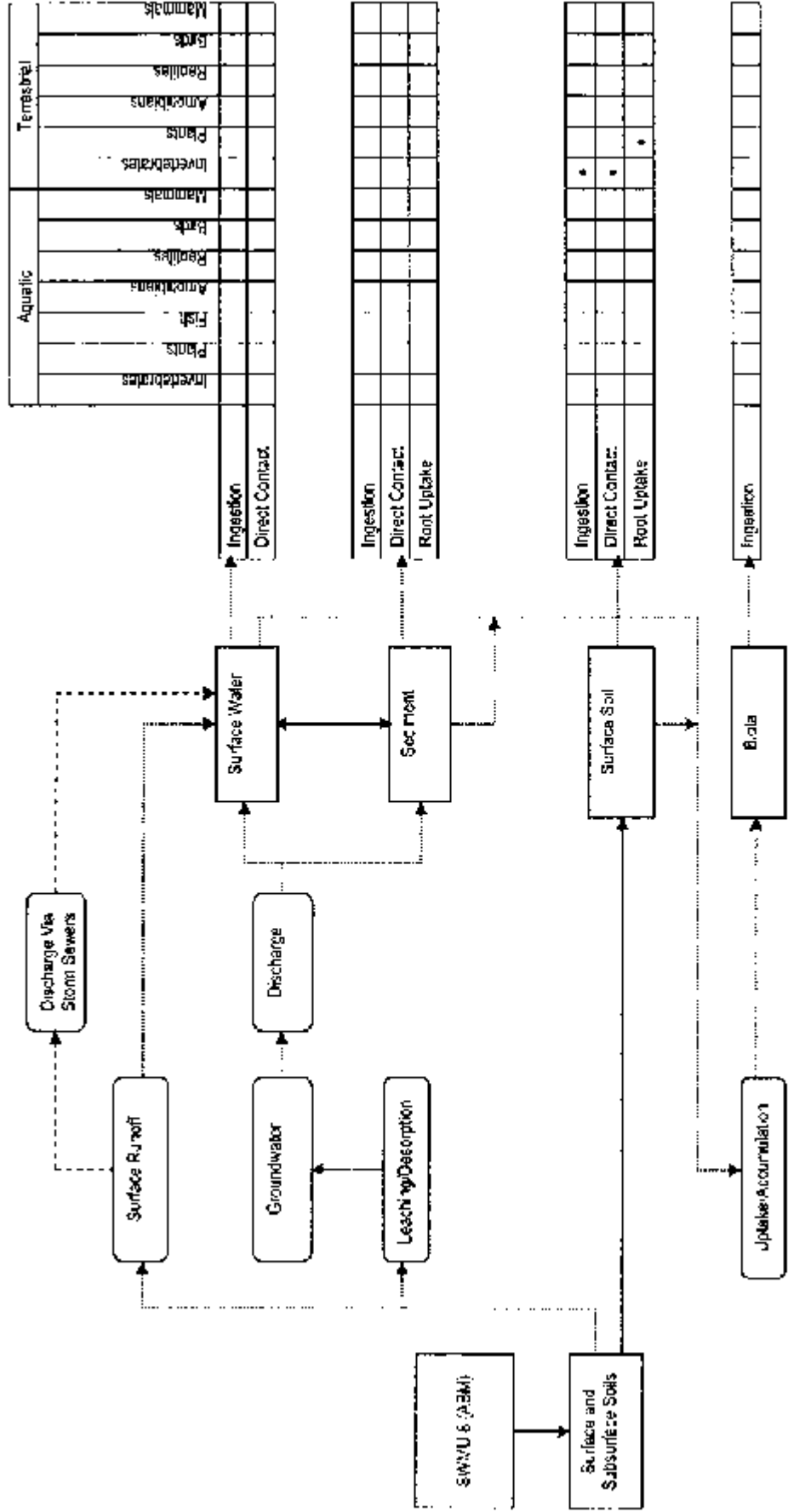
Source

Transport Pathways

Exposure Media

Exposure Route

Receptors



..... Minor complete pathway  
 ————— Complete pathway  
 - - - - - Incomplete pathway



SECTION 3

# Responsiveness Summary

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The participants in the Public Meeting, held on March 9, 2005, included representatives of the Navy and the Commonwealth of Virginia. No members of the public attended the public meeting for the SWMU 8 PRAP, and no comments were received during the public comment period.

# References

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## COMMONWEALTH of VIRGINIA

W. Tayloe Murphy, Jr.  
Secretary of Natural Resources

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Director

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June 17, 2005

Mr. Abraham Ferdas, Division Director  
Hazardous Site Cleanup Division (3HS00)  
U.S. Environmental Protection Agency, Region III  
1650 Arch Street  
Philadelphia, PA 19103-2029

Re: Final Record of Decision for SWMU 8  
West Annex Sandblasting Yard  
Naval Amphibious Base Little Creek, Virginia Beach, Virginia

Dear Mr. Ferdas:

The Virginia Department of Environmental Quality (VDEQ) staff has reviewed the above referenced Record of Decision (ROD) for SWMU 8. We concur with the selected remedial alternative as outlined in the ROD received by this office on May 19, 2005 and signed by the Navy (Captain G.E. Cooper) on May 18, 2005.

Should you have any questions concerning this letter, please feel free to contact Mr. Paul Herman at (804) 698-4464.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert J. Weld".

Robert J. Weld, Director  
Office of Remediation Programs

cc: Dawn Hayes, LANTDIV  
Mary Cooke, EPA Region III  
Karen Sismour, VDEQ  
Durwood Willis, VDEQ  
Milt Johnston, VDEQ  
Paul Herman, VDEQ