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PHASE II RCRA FACILITY ASSESSMENT OF THE ST. JULIENS CREEK ANNEX FACILITY CHESAPEAKE, VIRGINIA

EPA I.D. No. VA5 170000181

ORIGINAL (RED)

prepared for

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1.0 INTRODUCTION

The 1984 Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA) authorize EPA to require corrective action for releases of hazardous waste or hazardous constituents from solid waste management units (SWMUs) and other areas of concern (AOCs) at all operating, closed, or closing RCRA facilities. The intent of this authority is to address previously unregulated releases to air, surface water, soil, groundwater, and from the generation of subsurface gas. The first phase of the corrective action program, as established by EPA, is development of a RCRA Facility Assessment (RFA). The RFA includes a Preliminary Review (PR) of all available relevant documents, a Visual Site Inspection (VSI), and, if appropriate, a Sampling Visit (SV).

This report summarizes the results of the PR and VSI phases of the RFA of the St. Juliens Creek Annex facility in Portsmouth, Virginia. The findings in the report are based on a review of files from EPA Region III in Philadelphia and the Virginia Department of Waste Management office in Richmond, Virginia, and a VSI conducted June 29, 1988 through August 1, 1988. Files reviewed include RCRA, CERCLA, AIR, and WATER files. A total of 34 SWMUs and 12 AOCs were identified as a result of the PR and VSI for this facility. These are listed in Table 1. The location of each SWMU and AOC is presented in Figure 1.

St. Juliens Creek Annex facility is primarily an administrative and light industrial area which has interim status for hazardous waste generated on-site. PCB wastes generated at the nearby Norfolk Naval Shipyard and St. Juliens Creek Annex are stored at the Annex also. The primary wastes managed at the site include both characteristic hazardous wastes (e.g., D001, D002, and D003) and listed hazardous wastes (e.g., F001, F002, F003, and F005). Waste management units include landfills (e.g., dumps) and storage areas.

Table 1.
SWMUs and AOCs at Norfolk Naval Shipyard St. Juliens Annex

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Solid Waste Management Units

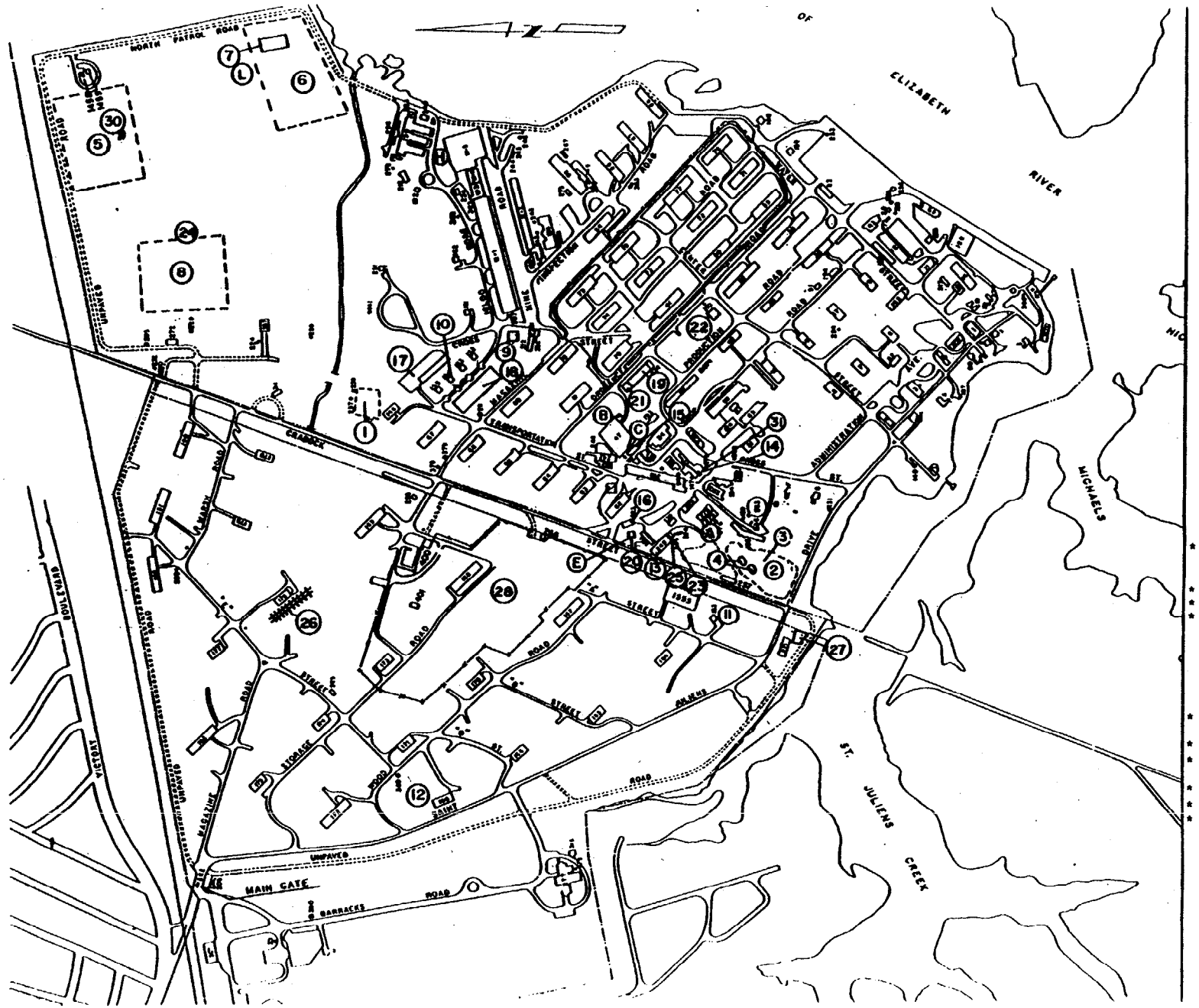
1. Dump A
2. Dump B
3. Dump B Incinerator
4. Blast Grit at Dump B
5. Dump C
6. Dump D.
7. Dumpster Storage at Dump D
8. Burning Grounds
9. Cross and Mine
* 10. Hazardous Waste Container Storage at Bldg. 154Y
* 11. Hazardous Waste Container Storage at Bldg. 163
12. PCB Storage at Bldg. 198
13. Repair and Maintenance Shop at Bldg. 249
14. Hazardous Waste Disposal Area at Bldg. 13 (Railroad Tracks)
15. Hazardous Waste Disposal Area at Bldg. 53
16. Sand Blasting Area at Bldg. 323
17. Old Storage Yard #1
18. Old Storage Yard #2
19. Old Storage Yard #3
20. Waste Generation Area #1 (SIMA Air #1)
21. Hazardous Waste Accumulation Area (SIMA #2)
22. Repair Shop Satellite Storage Area northeast of Bldg. 40
23. Oil Water Separator at Bldg. 249
24. Caged Pit at the Burning Grounds
25. Washrack at Bldg. 249
26. Scrap Metal Storage in Railroad Cars near Bldg. 176
27. Fire Training Area at Bldg. 271
28. Clearing House Storage Area (DRMO)
29. Dumpsters (located throughout the facility)
30. Waste Disposal Pits at Dump C
31. Swale Beneath Bldg. 13
32. Overland Drainage Ditches
33. Sewer Drainage System
34. Operational Waste Accumulation Areas

*RCRA regulated

Table 1. (continued)

Areas of Concern

A. Satellite Storage at Bldg. 279
B. Air Compressor at Bldg. 47
C. Blasting Grit at Bldg. 47
D. Storm Water Outfalls
E. Temporary Pump Storage
F. Underground Storage Tanks
G. Former Process Buildings
H. Residual Ordnance at Bldgs. M-5 and 190
I. Residual Ordnance at Wharf Area
J. Former Ammunition Manufacturing Areas
K. Former Sewage Treatment Plant
L. Old Tanks at Dump D



Solid Waste Management Units

1. Dump A
2. Dump B
3. Dump B Incinerator
4. Blast Grit at Dump B
5. Dump C
6. Dump D
7. Dumpster Storage at Dump D
8. Burning Grounds
9. Cross and Mine
10. Hazardous Waste Container Storage at B
11. Hazardous Waste Container Storage at B
12. PCB Storage at Bldg. 198
13. Repair and Maintenance Shop at Bldg. 2
14. Hazardous Waste Disposal Area at Bldg. (Railroad Tracks)
15. Hazardous Waste Disposal Area at Bldg.
16. Sand Blasting Area at Bldg. 323
17. Old Storage Yard #1
18. Old Storage Yard #2
19. Old Storage Yard #3
20. Waste Generation Area #1 (SIMA Air #1)
21. Hazardous Waste Accumulation Area (SIMA
22. Repair Shop Satellite Storage Area acro from Bldg. 61
23. Oil Water Separator at Bldg. 249
24. Caged Pit at the Burning Grounds
25. Washrack at Bldg. 249
26. Scrap Metal Storage in Railroad Cars ne Bldg. 176
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L. Old Tanks at Dump D

*Not Shown on Map.

Figure 1. SWMUs and AOCs at Norfolk Naval Shipyard St. Juliens Annex.

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2.0 ENVIRONMENTAL SETTING

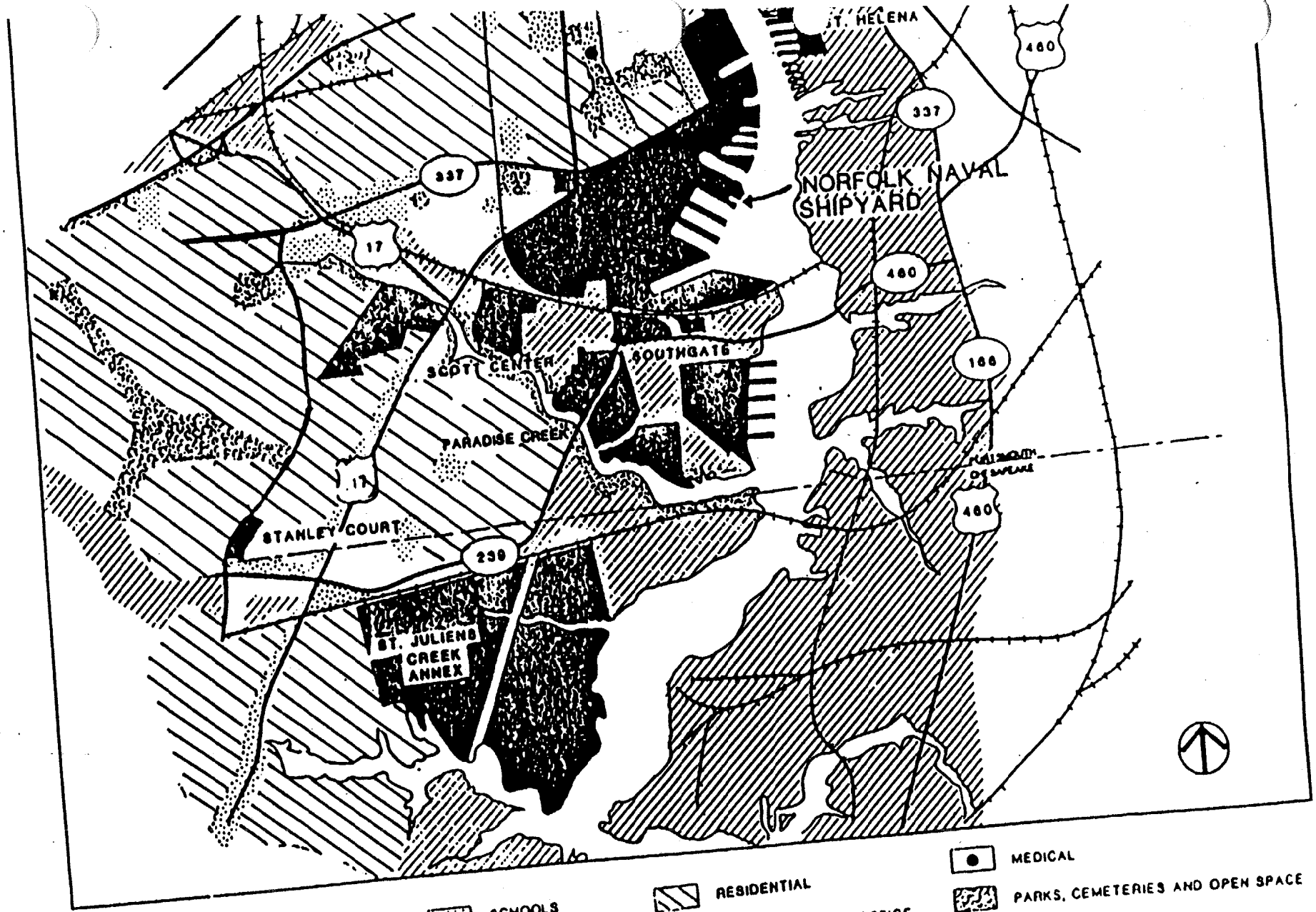
Location and Surrounding Land Use

St. Juliens Creek Annex is located in the southeastern portion of Virginia at the confluence of St. Juliens Creek and the Southern Branch of the Elizabeth River in the City of Chesapeake (Ref. 19). The northern boundary of the Annex is also the city limits for the cities of Portsmouth, VA and Chesapeake, VA (Figure 2).

The eastern boundary of the Annex is represented by the Southern Branch of the Elizabeth River, and the southern boundary is formed by St. Juliens Creek. Most of the area around the St. Juliens Creek Annex facility is developed. The Norfolk Naval Shipyard is located approximately three miles to the north. Residential development borders the facility on the north and the west. A number of educational facilities are located nearby. Recreational and some underdeveloped areas may be found at various locations outside the facility boundaries. There are no agricultural areas in the immediate vicinity of the St. Juliens Creek Annex facility (Ref. 19, 32).

Climate and Meteorology

The Norfolk area, in which the St. Juliens Creek Annex is located, is situated in a humid Mesothermal Forest Climate. Mild winter temperatures are below average around 50x F during the day and 32x F at night. Low daily temperatures are below freezing 60 nights per year. Summers are hot with daily high temperatures in the upper 80s and low temperatures in the upper 60s. Approximately 30 days per year the maximum temperature rises above 90x F. Precipitation, which is very even year round, averages 48 inches of rain and 5 to 10 inches of snow per year. Thunderstorms occur approximately 40 days per year. The region is constantly humid, and averages 72% relative humidity. Annual evaporation rate for water is 40 inches; the theoretical evapotranspiration rate for this area is approximately 33 inches per year. Depth of frost penetration is shallow at 3 inches, and groundwater temperature averages 60x F. Winds, averaging 10 miles/hour, are predominantly from the southwest (Ref. 19).



Adjacent Land Use

Figure 2. Adjacent Land Use. Ref. 32

2-14

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Topography, Surface Drainage, and Soils

St. Juliens Creek Annex is a low-lying wedge of land between the Southern Branch of the Elizabeth River and St. Juliens Creek. A northwest-southeast trending ridge generally bisects the area. The ridge divides the St. Juliens Creek drainage basin from Blows Creek, which extends to the north eastern corner of the Annex. Topographic changes across the Annex are sub tle and nearly imperceptible (Ref. 19). Figure 3 shows the topography of the Annex.

According to the U.S. Navy, both Blows Creek and St. Juliens Creek capture most of the surface runoff from St. Juliens Creek Annex (Ref. 19). Both creeks empty into the Southern Branch of the Elizabeth River. During the VSI, it was observed that most of the operational areas and many of the non-waste material storage areas are served by storm drains which empty either into St. Juliens Creek or into the Southern Branch of the Elizabeth River. Some surface water from off-base enters the upper end of Blows Creek. Figure 4 shows the Annex's surface drainage.

The Southern Branch of the Elizabeth River flows through a highly industrialized area, which includes oil storage facilities, fertilizer plants, and creosol industries. The river, which is part of the intercoastal waterway, is used by many small boats during summer and by larger commercial and naval craft year round (Ref. 19).

According to the U.S. Navy, the State of Virginia has classified the water courses in this area as IIB. This classification results from the water being contaminated by Kepone and by sediments from manufacturing activities of a private firm located several miles from St. Juliens Creek Annex. Taking shellfish from IIB waters is prohibited, but bathing and fishing are permitted. The fecal coliform bacteria count in IIB areas should not exceed the geometric mean of 200 colonies per 100 milliliters. Classification IIB indicates that tidal water should have a dissolved oxygen content of not less than 4.0 milligrams per liter and should have a pH range of 6.0 to 8.5. In past years, the State of Virginia has noted that concentrations of oil and grease, heavy metals, and coliform bacteria in these waters have increased. A state water quality person described the area as "poor water quality" (Ref. 19).

The St. Juliens Creek Annex facility was initially recognized to be located within the boundaries of a 100-year flood plain. In December 1985, the City Council of the City of Portsmouth, Virginia sent to the St. Juliens Creek Annex facility a resolution endorsing the prohibition against siting hazardous waste facilities in a 100-year flood plain (Ref. 14). As a response to this resolution, the U.S. Navy indicated that a central storage facility planned to be located at the St. Juliens Creek Annex, and designed to meet the more strenuous requirements for hazardous waste storage would be reconsidered for a location rather than at the St. Juliens Creek Annex (Ref. 15). However, in a 1984 Environmental Assessment Addendum (Ref. 30), it was indicated that the 100-year flood level for the originally proposed St. Juliens Creek Annex site is 8.5 feet above mean seal level according to the 1983 National Flood Insurance Program. This addendum indicated that because the site plan for the proposed hazardous waste storage area utilized Norfolk Naval Shipyard data rather than National Geodetic Vertical Datum, confusion concerning floodplain status may have resulted. No additional information regarding the 100-year floodplain in conjunction with the St. Juliens Creek Annex location was determined during this RFA.

Geology and Hydrogeology

According to the U.S. Geological Survey, St. Juliens Creek Annex is situated on the Atlantic Coastal Plain. A wedge of easterly dipping and thickening sediments contacts the basement rocks of the fall line (approximately 80 miles to the west) and extends to the Atlantic Ocean (about 20 miles to the east). The basement rocks include downfaulted Triassic strata and Paleozoic igneous and metamorphic rocks similar to the intensely fractured and sheared rocks exposed in the piedmont further west (Ref. 19).

Marine, coastal, and alluvial cretaceous and tertiary strata overlie the basement rocks from the fall zone to beneath the continental shelf. Sediments of Pliocene or early Pleistocene age cover much of the higher portions of the coastal plain, whereas sediments of probable Pleistocene age form a thin blanket covering much of the lower, more seaward portions of the coastal plain in a series of steplike plains or

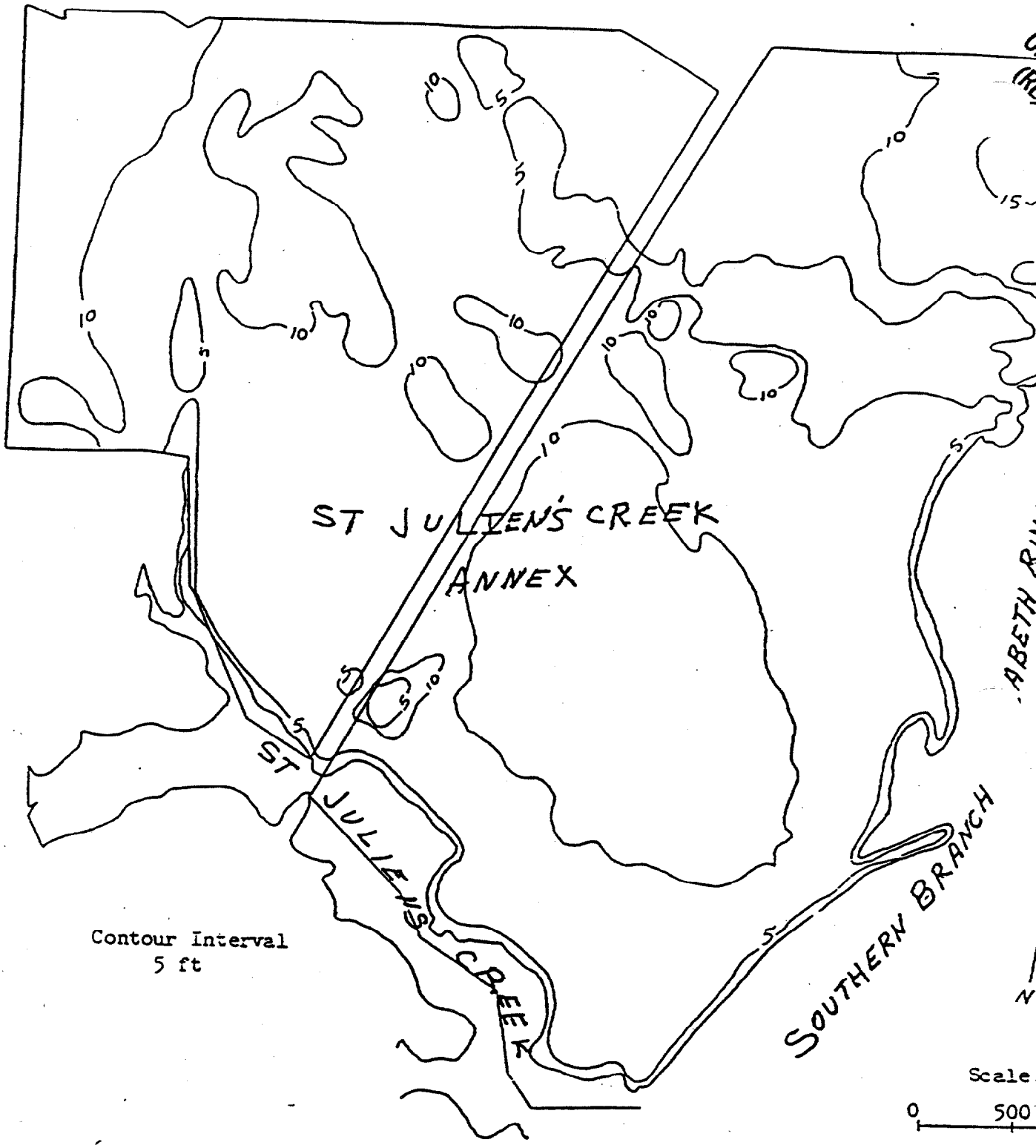

Figure 3. Topography of St. Juliens Creek Annex.
Ref. 19

"terraces" separated by east-facing scarps (Ref. 19). Figure 5 was taken from the Virginia State Geological Map. This generalized account shows that the surface of the Annex's land is Quaternary sands and gravels.

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The rock-stratigraphic units of Cretaceous through Miocene Age in the Coastal Plain of Virginia were studied, and six mapable units are defined (Ref. 19). These units (the Patuxent, "transitional beds", Mattaponi, Nanjemoy, Calvert, and Yorktown Formations) and their characteristics are presented in Figure 6.

The surficial geology of the Annex shows that two facies of the Pleistocene Sand Bridge Formation and some Holocene alluvium sand, and marsh sediments outcrop on the Annex (Ref. 19). These deposits are probably underlain by the Pleistocene Norfolk Formation. All deposits are synonymous with the Columbia Group shown in Figure 6. The eastern portion of the Annex is veneered with the clayey-sand facies of the Sand Bridge Formation. This facies ranges from clayey sand, silt, and clay to well-sorted, fine to medium sand. The facies has been interpreted as tidal channel deposits and has low to high plasticity/sensitivity, good bearing capacity, poor to good permeability, good erosion resistance, fair slope stability, and fair to good aquifer recharge. This recharge capability permits the vertical migration of contaminants from the ground surface to the water table.

The western portion of St. Juliens Creek Annex is veneered with the silty sand facies of the Sand Bridge Formation. This facies is a clean, homogeneous, fine to medium sand, with silt concentrations of 10% to 35%. The average thickness is 12 to 14 feet. The facies has been interpreted to represent river-influenced lagoonal deposits. The silty sand facies has a low to moderate plasticity/sensitivity; poor to good bearing capacity; good permeability, erosion resistance, and slope stability; and fair aquifer recharge. According to the U.S. Navy, the facies offers good paths for both the vertical and horizontal migration of pollutants (Ref. 19). Figure 7 is a geologic cross section south of the St. Juliens Creek Annex facility.

As part of a Naval Assessment and Control of Installation Pollutants (NACIP) program, soil boring logs, ranging from 1946 to 1978, were examined (Ref. 19). Although some of the logs indicated a silty or clayey soil at the surface, most logs exhibited a sandy material at the surface. The soil conditions encountered support

rapid infiltration and percolation of rainfall. These findings substantiate the geological maps and reinforce the possibility for vertical migration of pollutants. Figure 8 shows the locations of these borings.

In addition, the high permeability of the soil and the proximity of much surface water (approximately 50% of the Annex's perimeter is bounded by water) cause a high water table. During dry seasons, the average depth to the water table is 4 feet beneath ground surface; during wet seasons, the average depth is 1 foot (Ref. 19). The data extracted from the boring logs indicate that the water table is at a depth of 5 feet or less. However, in the opinion of the U.S. Navy, the timespread over which these borings were made does not permit reliable estimates of seasonal or long-term fluctuations. In addition, the locations of borings do not allow estimates of the groundwater flow directions (Figure 9). However, the nature of groundwater flow and the topography of the activity indicate that the northwest-southeast trending ridge divides groundwater flow between Blows Creek and St. Juliens creek. A component should also be flowing to the Southern Branch of the Elizabeth River (Ref. 19).

The Miocene, Eocene, and Cretaceous aquifers furnish most of the water for the developed water supplies of the Coastal Plain of Virginia. These aquifers outcrop west of St. Juliens Creek Annex. The Miocene aquifer, which has the closest outcrop, lies approximately 25 to 30 feet below the surface at the Annex. This aquifer is marked by blue and gray sandy diatomaceous shales, shell marls, and minor amounts of sand; in the eastern area of this aquifer, the sands yield moderate water supplies that are subject to salt water encroachment when pumped near marine estuaries. The Eocene aquifers are 500 to 600 feet below the surface of the Annex, and furnish water to some screened wells. The tertiary aquifers are some 600 to 700 feet below the surface of the Annex and represent a good water-bearing formation, although east of Williamsburg, Virginia, the formation may yield brackish waters. Figure 10 shows the characteristics of these aquifers and the groundwater quality.

There were no on-site groundwater wells identified during the PR of the St. Juliens Creek Annex facility. During the VSI, facility representatives stated that they did not know of any type of on-site groundwater wells.

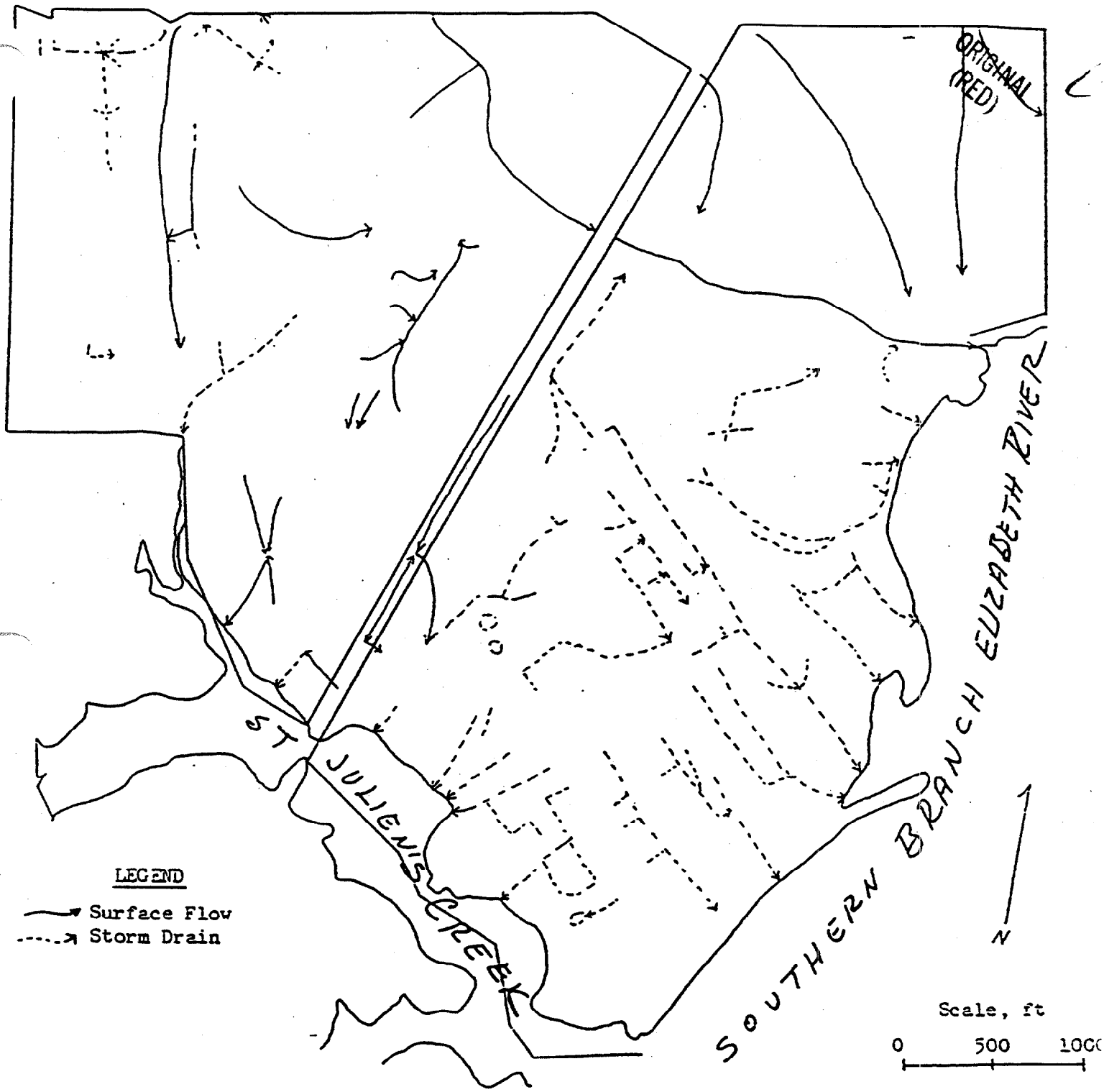
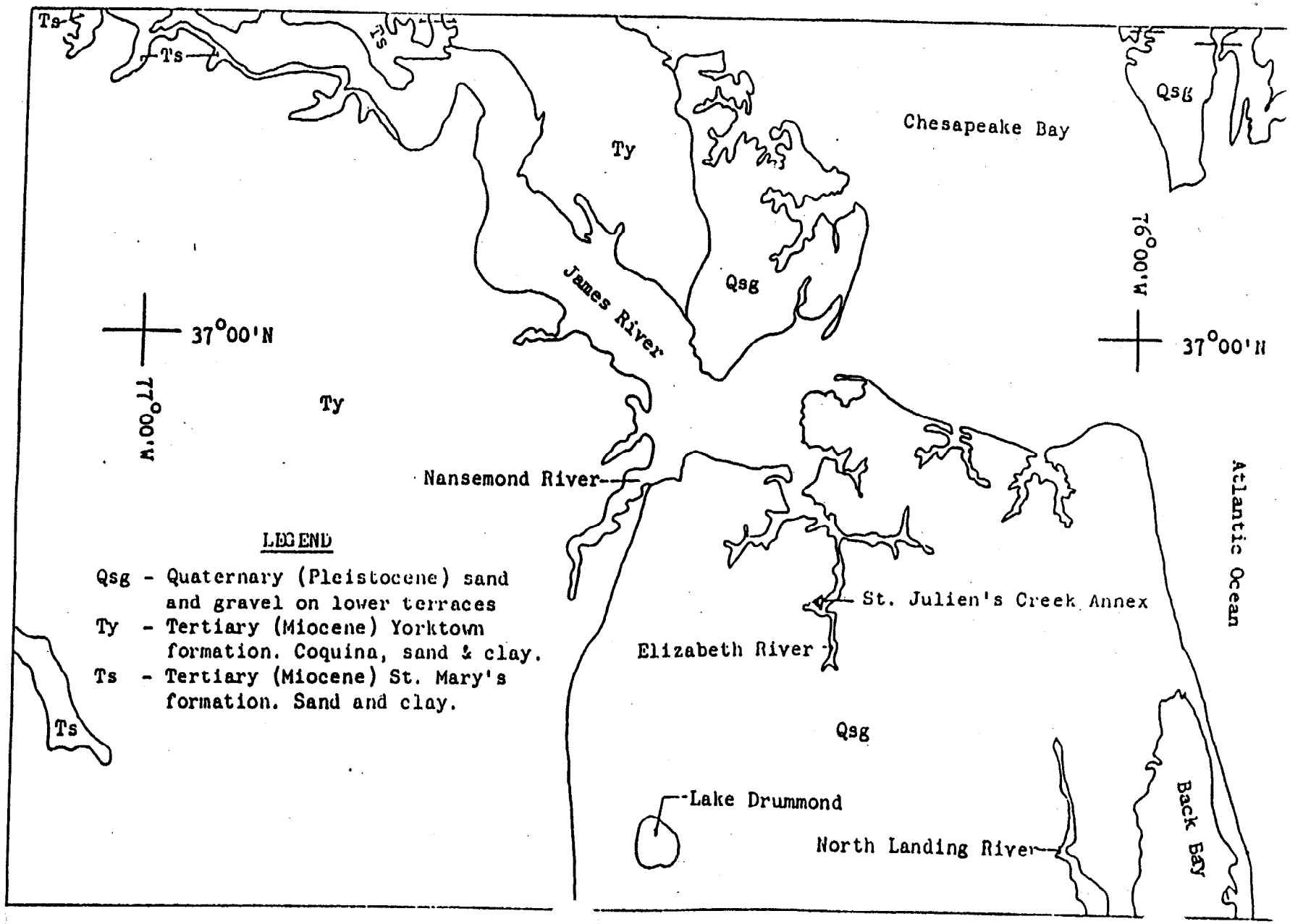


Figure 4. Surface Drainage at St. Juliens Creek Annex.
Ref. 19


Ts
Ts
Ts
Ty
Chesapeake Bay
Qsg
James River
Qsg
37°00'N
77°00'W
Ty
76°00'W
37°00'N
Nansemond River
Atlantic Ocean
LEGEND
Qsg - Quaternary (Pleistocene) sand and gravel on lower terraces
Ty - Tertiary (Miocene) Yorktown formation. Coquina, sand & clay.
Ts - Tertiary (Miocene) St. Mary's formation. Sand and clay.
St. Julien's Creek Annex
Elizabeth River
Ts
Qsg
Lake Drummond
North Landing River
Back Bay
SCALE: FEET
0
5
10

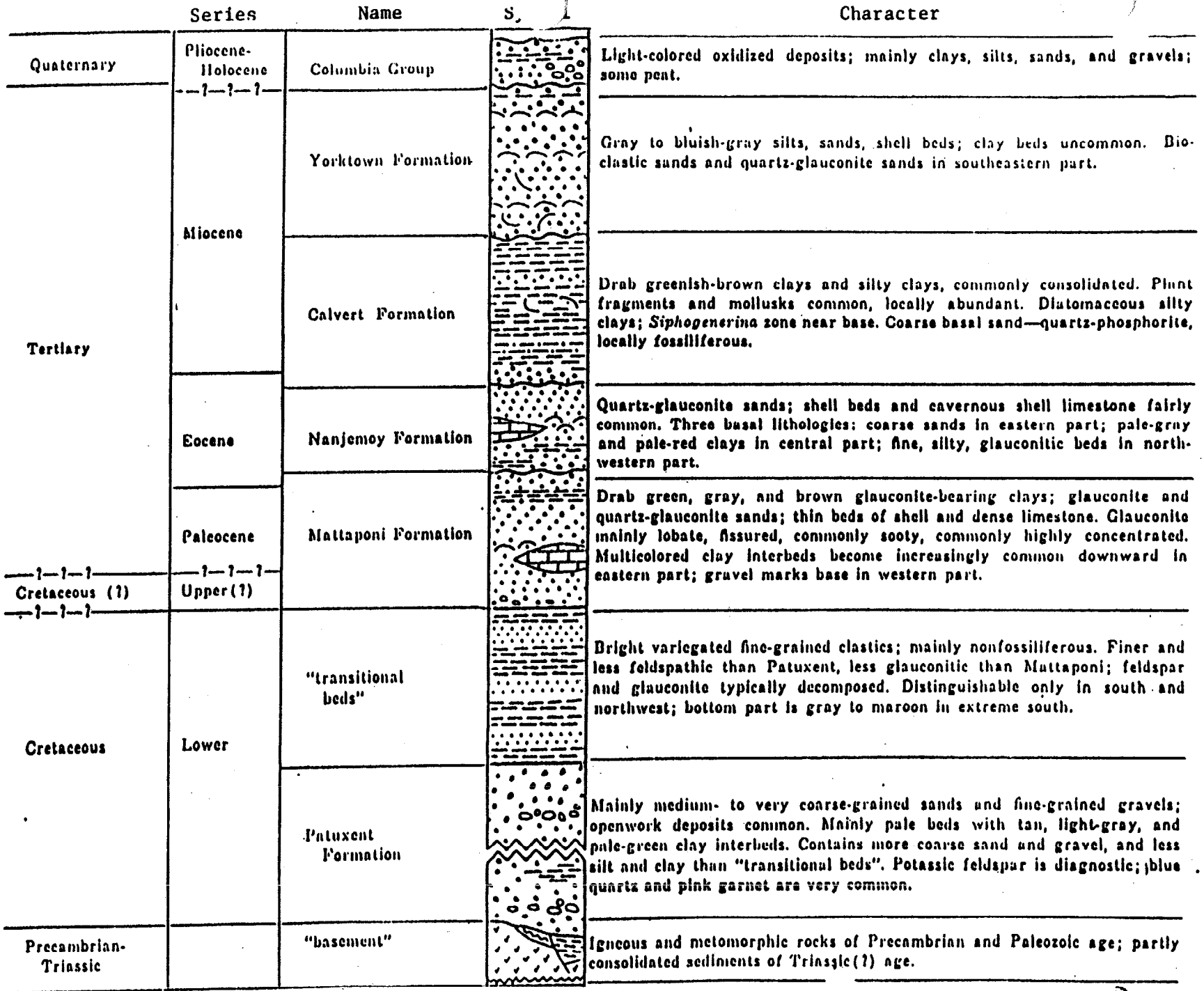
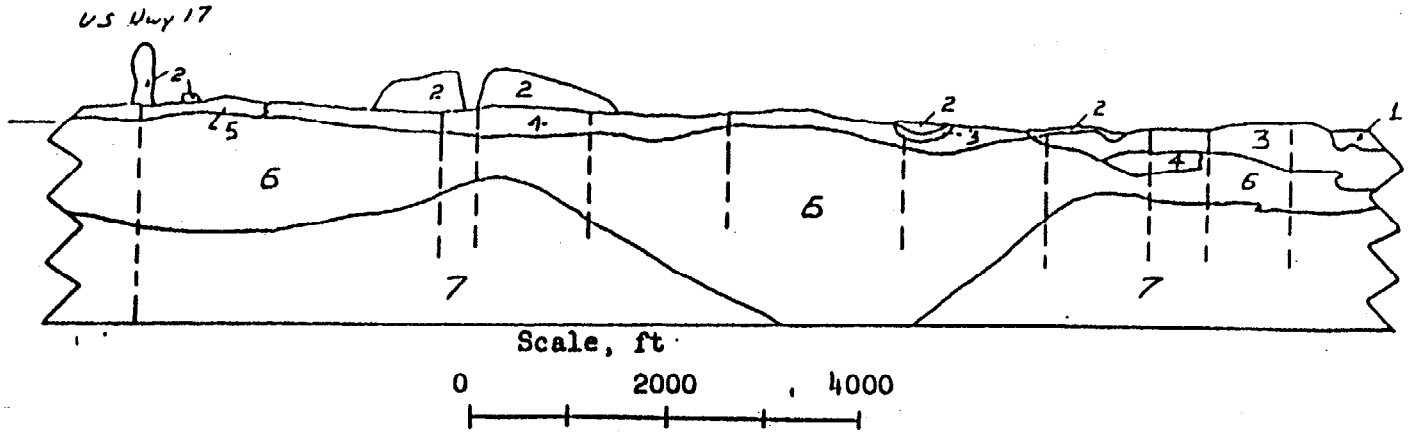


Figure 6. Geologic Formations in the Coastal Plain of Virginia.
Ref. 19



LEGEND

1 Water

2 Fill

3 Quaternary (Holocene) alluvium sand, and marsh sediment. Estuarine-beach, tidal marsh, and fluvial silt, sand, and clay with organic material (peat) abundant in tidal marshes.

Quaternary (Pleistocene) Sand Bridge Formation

Upper Member

4 Tidal channel facies; clayey sand

5 Shoal lagoonal facies; silty sand

Lower Member

Tan to light gray, fine to medium sand with a small amount of pebbles. Included with Upper Member.

6 Quaternary (Pleistocene) Norfolk Formation

Upper Member

Brackish marine silty sand and fluvial-estuarine silty sand.

Lower Member

Clean quartz sand and fine gravel. Included with Upper Member.

7 Tertiary (Pliocene) Yorktown Formation

Nearshore marine fossiliferous, silty, coarse sand and coquina.

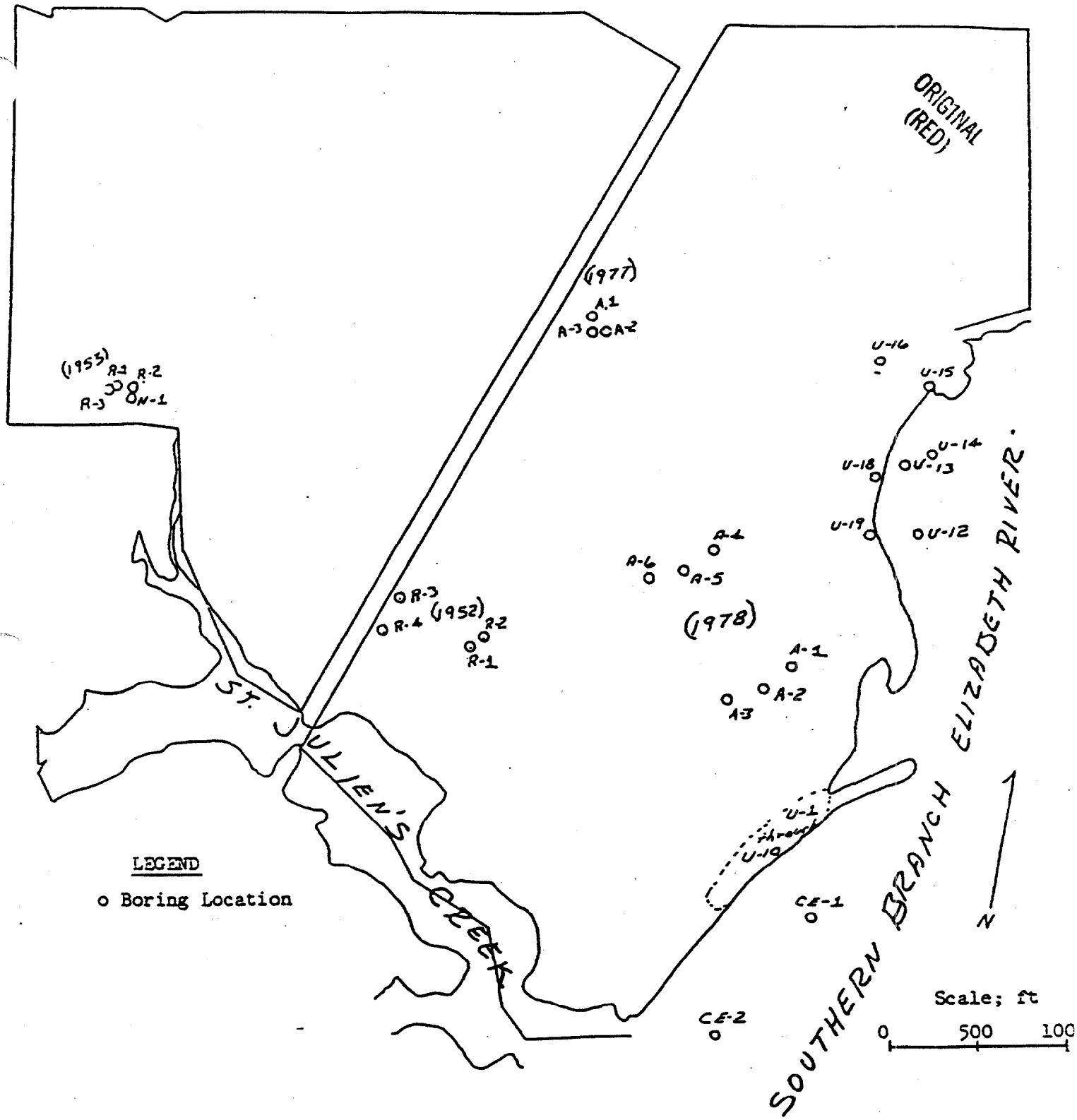


Figure 8. Locations of Borings at St. Juliens Creek Annex.
Ref. 19

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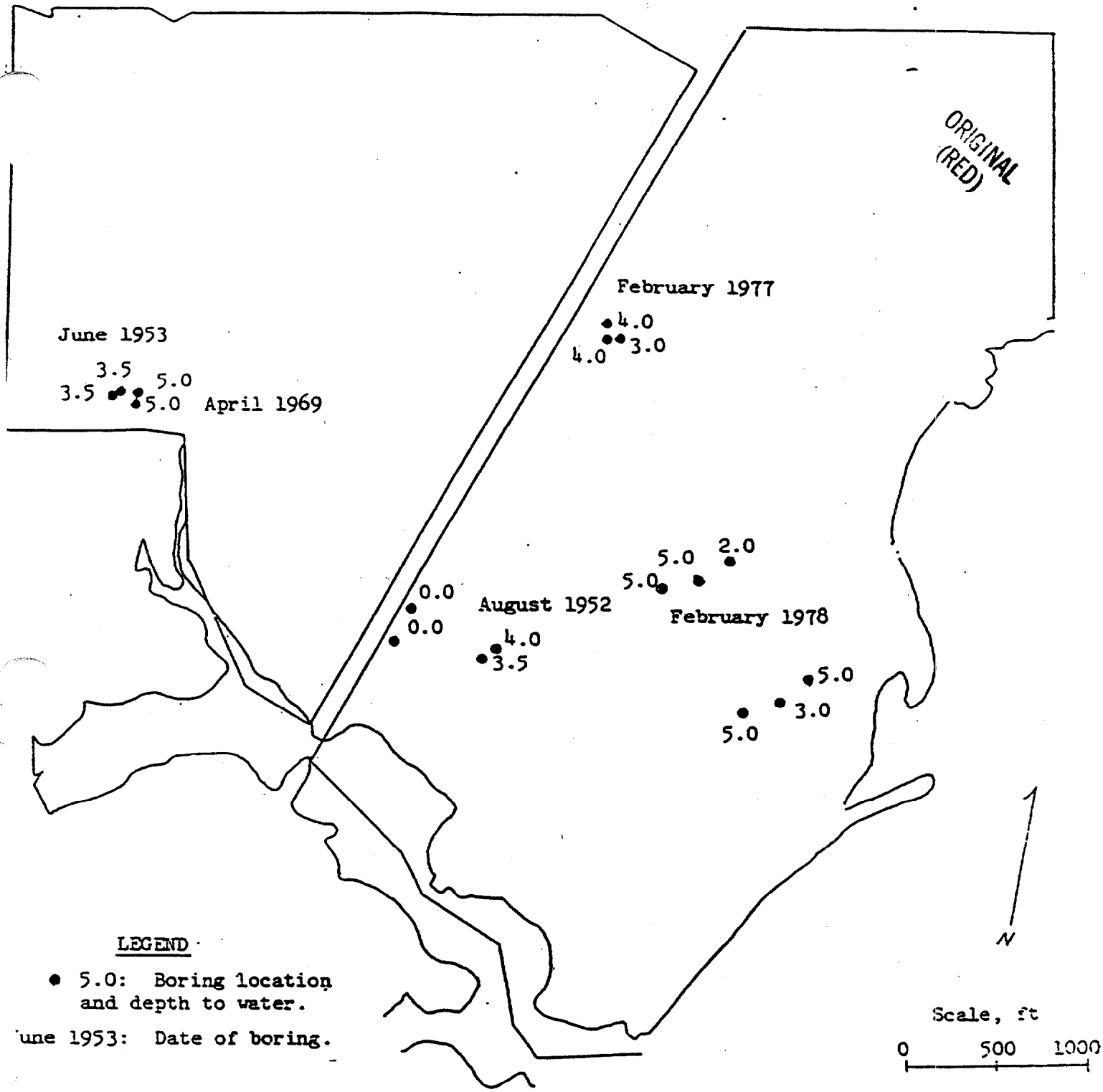

Figure 9. Depth to Groundwater at St. Juliens Creek Annex.
Ref. 19

System	Series	Formation		Approximate thickness (feet)		Physical character	Hydrologic comments
				out-crop	sub-surface		
Quaternary	Recent and Pleistocene			0 - 100	0	Unconsolidated gravels, sand, loam, partly of fluvial and partly of marine origin.	Good aquifers for domestic and small industrial supplies when sources are located some distance from surface saline waters.
Tertiary	Miocene	Chesapeake Group	Yorktown St. Marys Choptank Calvert	125 180 50 200	0 to 600+	Blue and gray sandy diatomaceous shales, shell marls, and minor amounts of sand.	In eastern peninsular area sands yield moderate supplies subject to salt-water encroachment when pumping is heavy near marine estuaries.
	Eocene	Chickahominy (subsurface)		—	0 to 1,000	Blue, gray, and brown pyritic and glauconitic clay.	Aquiclude
		Pamunkey Group	Nanjemoy	125		Gray marls and fine quartz and glauconitic sands.	Quartz and glauconitic sands furnish water to some screened wells.
			Aquia	100			
	Paleocene	Mattaponi (subsurface)		—	0 to 100+	Mottled clay, glauconitic sands and marls with thick quartz basal sand.	A very good water-bearing formation in central part of Coastal Plain. East of Williamsburg the formation yields brackish water.
Cretaceous	Upper Cretaceous	Potomac Group[1]	Patapsco	150	Up to 4,500		
	Lower Cretaceous		Patuxent	250–300		Lenticular sands and clays underlying the entire Coastal Plain of Virginia.	Some of the sands are excellent aquifers and furnish large supplies to wells. Down dip to the east these same deposits contain water too brackish for use.
Pre-Cretaceous[1]		Basement co				Large thick crystalline masses of granites, gneiss, schist and other metamorphic type rocks.	Good aquifers where overlain by permeabl[illegible]cent to the Fall Li[illegible] water quality becomes poor.

[1] Not recognized in outcrop

3.0 FACILITY DESCRIPTION

ORIGINAL (RED)

General Facility Description

St. Juliens Creek Annex, Norfolk Naval Shipyard, is located within the City of Chesapeake in southeast Virginia. Figure 2 (see page 6 of Section 2.0) shows the general area of the St. Juliens Creek Annex in reference to the Norfolk Naval Shipyard. Figure 1 is a base map for the facility. St. Juliens Creek Annex abuts Portsmouth City and the Norfolk and Western Railroad on the north; the Southern Branch of the Elizabeth River on the east; St. Juliens Creek on the south; and a residential section of Chesapeake City on the west. Blows Creek arises toward the northern part of the Annex and flows east to the Southern Branch of the Elizabeth River. A VEPCO power line runs diagonally across the activity in a northeast-southwest direction, splitting the area roughly in half. Structures northwest of the power line are predominantly storage and warehousing; facilities southeast of the power line are light industrial and manufacturing, administrative, quarters, and the search radar test range for the Norfolk Naval Shipyard (Ref. 19).

St. Juliens Creek Annex occupies approximately 490 acres, including 407 acres of hard land, 14 acres of marsh, and 69 acres of water surface. According to the U.S. Navy, structures include 221 buildings, 653 linear feet of wharf, 19 miles of paved roads, 5 miles of railroad tracks, a central heating plant, numerous non-operational industrial facilities, and miscellaneous structures including a housing area (Ref. 19).

The St. Juliens Creek Annex facility was originally an ammunitions facility. Prior to 1977, ordnances were manufactured and stored on the premises. Out-dated ordnances and trash were disposed of in several burn areas within the Annex confines. Though numerous concrete magazines are still present, none are used for the storage of ammunitions. St. Juliens Creek is no longer an ammunitions facility. Activity at the Annex has decreased in conjunction with present national peacetime conditions, and compared to activity during wartime periods, fewer buildings are in use (Ref. 31). Specifically, the primary mission of the St. Juliens Creek Annex

facility is to provide a radar testing range (35 acres), and various other tenant administrative and warehousing structures for the nearby Norfolk Naval Shipyard (Ref. 25) and other local Navy activities.

History of Ownership (Ref. 19)

St. Juliens Creek Annex, Norfolk Naval Shipyard, as a naval activity, dates back to September 1849. At that time, an area known as Fort Norfolk was transferred from the War Department to the Navy Department and was renamed Magazine, Fort Norfolk. The magazine's mission was storage of ordnance and materials.

In 1896, 48 acres of land were purchased adjacent to Magazine, Fort Norfolk, to accommodate five magazines, two personnel quarters, an administration building, two wharfhouses, and two wharves.

By 1898, ordnance material and equipment (including presses and extractors for assembling and breaking down fixed cartridges, and dies and stands for reforming small-caliber cases) were removed from Craney Island and were installed at Magazine, Fort Norfolk. In 1898, Magazine, Fort Norfolk, was redesignated U.S. Arsenal, St. Juliens Creek. The arsenal had a work force of 25 persons.

U.S. Arsenal, St. Juliens Creek, became fully operational in time to provide critical support to the fleet during the waning months of the Spanish-American War. In 1902, the facility's name was changed to U.S. Naval Magazine, St. Juliens Creek. Prior to July 1, 1905, the facility was administered by the Inspector of Ordnance at the Norfolk Navy Yard; from 1905 to 1918, it was a separate department.

In 1908, U.S. Naval Magazine, St. Juliens Creek, occupied 96 acres of land enclosed by a 10-foot high, corrugated iron fence. Rainwater that fell from the roofs was directed into three cisterns. The water was used for drinking and for fire protection. A windmill pumped the water into a 90-foot storage tank near Bldg. 185 to maintain pressure in the distribution system. The permanent work force of the facility prior to World War I (1916) consisted of 3 officers and 65 civilians.

Until 1915, most of the ammunition work was manual labor. Projectiles were pressed into and withdrawn from cases by hand-operated machines geared to a 4-foot diameter wheel. Primers were pressed into cases, and cans were reformed using the same method. Explosive "D" was manually loaded into projectiles. Black shell powder and gun cotton were the main constituents loaded into projectiles, warheads, and mines. In 1915, machines for pressing projectiles into cases and for extracting projectiles were modernized and motor-powered.

On January 1, 1917, the facility's name was changed to Naval Ammunition Depot (NAD), St. Juliens Creek. The depot operated under the auspices of the Commandant Fifth Naval District.

In 1917, 18 buildings and a wharf were constructed, and equipment was installed for loading MARK VI mines. Portable outside lights shining through the windows provided illumination for night work. The only source of heat during winter was a coal stove in the mess hall.

Between World War I and World War II, the depot assumed a peacetime mission of supplying ammunition to the fleet. The civilian work force decreased from 1,800 to approximately 400 persons.

In 1941, depot personnel numbered 774. The beginning of World War II caused a rapid increase in personnel. During the peak operation period (1942 to 1944), depot personnel were 59 naval officers, 131 enlisted Marines, and 4,018 civilians. In addition, the present-day recreation area contained barracks for 15 Naval officers and 1,253 Navy enlisted, bringing the on-board personnel count to 5,340. During World War II, additional magazines, filling houses, and other facilities, including the all-concrete wharf No. 1 were constructed.

During World War II, the depot maintained and/or operated 175 buildings. The personnel count increased to 6 officers and 600 civilian workers in the core area of the depot. The mine plant, located in the "M" buildings complex, employed 3 officers and 1,200 enlisted personnel who loaded mines 24 hours a day. During World War II, 119 additional acres of land were purchased, giving the depot a total of 215 acres. Fencing was erected to secure the new area.

NAD St. Juliens Creek's mission during World War II included loading, assembling, issuing, and receiving naval gun ammunition. All calibers from 20 mm to 16-inch (with the exception of 40 mm) were loaded and assembled. Shipments to the fleet alone averaged 12,500 tons per month. The depot also served as the principal experimental and test loading facility for new ammunition types for the Bureau of Ordnance. Manufacturers' samples of projectiles for flight, plate, and ballistics tests were loaded and fused. In an attempt to reduce fatal incidents, the Safety Department was established in 1942.

The depot again supplied ammunition to the fleet when the Korean conflict erupted. Gun ammunition (predominantly 3- and 5-inch) were loaded and assembled. Supplies of larger caliber gun ammunition, left over from World War II, were renovated. On-board personnel numbered 1,500. During the post-Korean conflict period, the depot resumed its mission of peacetime service to the fleet. The work force was once again reduced.

In 1964, the depot was the prime source of gun ammunition for Navy and Marine Corps operations in southeast Asia. Peak production operations employed approximately 900 civilians.

In October 1969, after 50 years as an independent activity, NAD St. Juliens Creek was disestablished under Department of Defense "Project 703" and was consolidated as an annex to the Naval Weapons Station, Yorktown, Virginia.

October 1, 1977, the Annex was transferred to the Norfolk Naval Shipyard.

In 1984, the Defense Logistics Agency (DLA) proposed locating a hazardous waste storage facility at the St. Juliens Creek Annex (Ref. 7). This proposed facility was to include five warehouses approximately 50 years old where the wastes were to be stored (Ref. 8). The DLA decided to prepare a full environmental impact statement regarding the proposed waste storage unit (Ref. 10). However, the City Council of the City of Portsmouth, Virginia expressed concern regarding the nature of the proposed storage unit (i.e., hazardous wastes being transported adjacent to residential areas) and the location of the unit within the boundaries of the

100-year flood plain (Ref. 14). As a result of this concern, the DLA withdrew its permit application for the establishment of this proposed hazardous waste storage unit; and, informed EPA that hazardous wastes generated by the Norfolk Naval Shipyard would be managed/stored on-site at the Shipyard (Ref. 16).

Currently, St. Juliens Creek Annex provides administrative offices, light industrial shops and storage facilities for tenant naval commands. Various production areas generate small amounts of hazardous waste which are stored in greater than 90 day hazardous waste storage areas at the Annex, namely Bldgs. 154Y (SWMU #10) and 163Y (SWMU #11) (Ref. 28).

Regulatory History

Since the St. Juliens Creek Annex facility is non-contiguous to the Norfolk Naval Shipyard, a separate Hazardous Waste Permit Application was prepared for U.S. EPA Region III. In 1981, the Annex submitted their Part A Permit Application (Ref. 25); including, conditions of interim status (Ref. 26). In 1987, the St. Juliens Creek Annex facility submitted to the Virginia Department of Waste Management a closure plan, completed inspection schedules and the contingency plan (Refs. 27 and 28). Currently, the two Hazardous Waste Storage Units at Bldgs. 154Y (SWMU #10) and 163Y (SWMU #11) are the Annex's RCRA regulated units.

In December 1982, the DLA facility initiated efforts for a permitted hazardous waste facility for the storage of such materials as paint, paint thinner, battery water, concrete floor cleaner and other cleaning solutions, degreasing compounds, packaged asbestos, metal finishing and plating solutions, drain cleaners, and bleach. However, the City of Chesapeake expressed strong concerns over this type of storage based on the potential for impact to nearby surface waters, specifically the Elizabeth River (Ref. 29). In February 1983, DLA indicated that it was no longer intending to pursue this particular hazardous waste storage unit (Ref. 16).

There have been several assessment studies of the St. Juliens Creek Annex facility. In 1981, the U.S. Navy conducted an Initial Assessment Study (IAS) as part of the Naval Assessment and Control of Installation Pollutants (NACIP) program. As a

result of this study, low level concentrations of ordnance materials were determined to exist throughout the area east and south of the VEPCO power lines. However, according to the U.S. Navy, the sites identified were determined not to pose a threat to human health and the environment; therefore, it was recommended that no confirmation study be conducted (Ref. 19).

(REV)

In 1983, the NUS Corporation, Superfund Division conducted a low priority Preliminary Assessment of six sites of the St. Juliens Creek Annex facility. These sites include the following: Cross and Mine (SWMU #9), Bldg. 249 (SWMU #13), Dump A (SWMU #1), Dump B (SWMU #2), Dump B Incinerator (SWMU #3), Dump C (SWMU #5), and Dump D (SWMU #6). Each site was monitored for volatile organics and radiation. No readings above background were found for any of the sites. According to NUS, no signs of serious contamination were seen at any of the sites, although, according to the NUS report, various locations on the St. Juliens Annex were identified to be contaminated with low level residues of pesticide and herbicide materials. It was proposed that no confirmation study be performed (Ref. 31). No information is currently available describing the U.S. Navy's plans for addressing the contamination.

Past inspections of the St. Juliens Creek Annex facility have resulted in the identification of various inadequate waste management practices. These inadequacies have included improper management of containers (e.g., poor condition, open lids) (Ref. 20), containers of hazardous waste being stored in areas not listed as having interim status (Ref. 21), and drums containing waste that were badly corroded, bulging or leaking (Ref. 24). According to the facility, recent (i.e., 1988) State/EPA inspections have been positive for St. Juliens Creek Annex and did not find deficiencies previously noted. The Annex is in full compliance with RCRA (Ref. 37).

In addition, the St. Juliens Creek Annex facility has had various episodes involving the potential release of hazardous waste and/or hazardous constituents. The following incidences of releases were identified from the information reviewed. For the most part, the releases occurred prior to the implementation of formal

,uiations. Many of these releases were documented during the preliminary /iew; dates were not available for all of the releases. In addition, during the VSI, veral minor releases were noted and have been included in this list of releases.

1. Ordnance wastewater and rinsewaters were discharged to Blows Creek and the Elizabeth River. Releases occurred prior to the 1950s (Ref. 19).

2. Rinsate from powder cans "most probably drained" into St. Juliens Creek (Ref. 19).

3. Washwater from mine loading was discharged into the Elizabeth River or Blows Creek (Ref. 19).

4. Steamout condensate was released to the Elizabeth River and Blows Creek (Ref. 19).

5. Degreasing operations resulted in releases to a storm drain which terminated at St. Juliens Creek. Constituents include lye, sulfuric acid, and chromic acid.

6. Degreasing from the 1940s through the 1970s included alodine, caustic detergent, MEK, and acetone. Liquids were usually dumped at the railroad tracks at Bldg. 13 (Ref. 19).

7. Machine shop cutting oil was poured down the storm drain (Ref. 19).

8. Roads and fence lines were treated with hydraulic fluid and some solvents to kill weeds and control dust (Ref. 19).

9. Effluent from the washrack drained into a storm drain which emptied into St. Juliens Creek. Discharge occurred prior to 1976 (Ref. 19).

10. Release of 500 gallons of oil occurred from an aboveground storage tank near Bldg. 283 during 1975 and 1976 (Ref. 19).

11. Release of oil to the soil from pump equipment which is stored behind Bldg. 104 (AOC E) (Ref. 33).

12. Release of oil from an air compressor used in operations is at Bldg. 47 (AOC B) (Ref. 33).

13. Blasting grit is poured on the soil at Bldg. 47 (AOC C) (Ref. 33).

Operations/Process Description

The operations and processes at the St. Juliens Creek Annex facility has included general ordnance operations involving wartime transfer of ammunitions to various other U.S. Naval facilities throughout the United States and abroad. In addition, the Annex has been involved in specific ordnance operations and processes including those involving black powder operations, smokeless powder operations, projectile loading operations, mine loading, tracer mixing, demilitarization, degreasing, wharf operations, testing operations, and decontamination operations.

The St. Juliens Creek Annex facility 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, washrack operations, potable water, salt water fire protection systems, and fire training. Many of these operations have been discontinued such as locomotive maintenance, printing, and pest control.

Materials storage at the St. Juliens Creek Annex facility has included oil storage, ordnance materials storage, non-ordnance chemical storage, and disaster preparedness chemicals (NBC) storage. Various points within the facility are used to store minor amounts of waste (SWMU #34) before being sent to accumulation points (SWMUs #10, #11, #20, #21, and #22).

The facts presented in this section are the best reconstruction of the operations performed at St. Juliens Creek Annex, and are primarily based on the information described in the Initial Assessment Study (IAS) performed during the Navy

Assessment and Control of Installation Pollutants (NACIP) program in 1981 (Ref. 19). Information and records covering the time prior to World War II are sketchy or non-existent, and, unless cited, no other current references providing as comprehensive a description of St. Juliens operations and activities exist.

A. Operations, Ordnance

This section describes the types of ordnance operations which had occurred at the St. Juliens Creek Annex. According to the facility, all ordnance operations terminated prior to October 1977 (Ref. 37).

1. General. High explosives, smokeless powders, and pyrotechnics were used in ordnance operations at St. Juliens Creek Annex to manufacture and process finished ammunition for the fleet. During World War II, at the peak of production, shipments of ammunition and explosives to the fleet averaged 13,500 tons per month. Operations tapered off during the 1970s. Ordnance operations were terminated or transferred to other unidentified U.S. Naval facilities in October 1977. Ordnance-handling buildings, equipment, magazines, and the Burning Grounds (SWMU #8) were then decontaminated. Many of the buildings used in the past for the production or handling of wastes associated with ordnance operations have been torn down or converted to "non-waste" generating activities (AOCs G and H).

Typical wastes generated during ordnance handling operations may include the following hazardous constituents:

Waste Constituents	Hazardous Waste Identification Number
Nitroglycerin	D003, P081
Nitrocellulose	D003
Nitroguanidine	D003
2,4-dinitrotoluene	U105, D003
2,6-dinitrotoluene	U106, D003
Explosive D (Ammonium picrate)	P009, D003
Tetryl	D003
2,4,6-Trinitrotoluene (TNT)	D003
Cyclonite (RDX)	D003

Reports indicate that the powder was used in two buildings, Bldgs. 18 and 184. In Bldg. 18, built in 1905, the black powder was poured into the cartridges and primers. In Bldg. 184, built in 1942, the black powder was quilted (sewn) into the end of a powder bag. The remainder of the powder bag was filled with the propellant, smokeless powder (discussed later); the black powder ignited the bag when the bag was loaded into the gun. The empty powder kegs were reportedly returned to the powder manufacturer for reuse. Loose powder from the filling operations was usually swept up and sent to the Burning Grounds (SWMU #8) for disposal. Black powder operations are no longer practiced at the St. Juliens Creek Annex facility.

2. Black Powder Operations. Black powder ignites other explosives or smokeless powders. Black powder was used at St. Juliens Creek Annex to produce torpedo impulse cartridges and other similar small cartridges and primers. Black powder was usually shipped to other U.S. Naval facilities, both in the continental United States and also abroad, in 25-pound kegs and was stored in magazines until it was used.

3. Smokeless Powder Operations. Three types of smokeless powder propellants were loaded into ammunition at St. Juliens Creek Annex: single base (nitrocellulose (NC)), double base (NC and nitroglycerin (NG)), and triple base (NC, NG, and nitroquamidine (NQ)). The smokeless powder was shipped to the Annex in cans which were stored in unidentified magazines until used.

Personnel in various buildings loaded smokeless powder into cartridges. These buildings included Bldgs. 185, 46, 39, 41, 32, 32A, and 33. In Bldg. 185, silk bags were filled with smokeless powder for use as propellant charge in large-caliber bag guns during World War II. This operation ceased during the next 20 years. The line in Bldg. 185 was reopened in 1968 to produce more bag charges and was operated until the 1970s. Recorded information does not indicate whether bag charges were produced at the Annex prior to World War II. As determined during the VSI, smokeless powder operations are no longer practiced at the St. Juliens Creek Annex facility.

Various sizes of small and medium caliber cartridges were loaded in Bldgs. 39, 41, and 46. These buildings were constructed around 1913 and were used until the present time. Bldgs. 32, 32A, and 33 (located between Bldgs. 17, 39, and 38), which were used for loading smokeless powder into cartridges, were torn down immediately after World War II (AOC J). Reports indicate that, in the mid-1930s, smokeless powder (probably single base) was loaded into tank cars adjacent to Bldg. 44. The amount of spillage from this operation is unknown. Dust from smokeless powder operations was usually swept up and sent to the Burning Grounds (SWMU #8) for disposal. Powder cans were washed in Bldgs. 13 and 47, and then returned to the manufacturer. The rinsate from both buildings probably went into the swale (SWMU #31) that runs under Bldg. 13 and drains into St. Juliens Creek (AOC D).

4. Projectile Loading Operations. Three types of explosives were loaded into projectiles at St. Juliens Creek Annex: Explosive D, Composition A-3 (RDX and wax), and tetryl. Explosive D was used at the Annex from 1908 to present time. The use of tetryl started sometime between World War I and World War II. The use of Composition A-3 started during World War II. These explosives were not produced at the Annex. They were usually received in lined boxes from the manufacturer. The explosives were pressed into the projectiles. The empty boxes were sent to the Burning Grounds (SWMU #8) for disposal. Explosive D handling and loading operations produced more dust than that produced by other operations at the Annex because of the fine powdery nature of the explosive. Dust was either swept up and sent to the Burning Grounds (SWMU #8) for disposal, or was washed into the nearest floor drain; and subsequently, discharged through a storm sewer outfall (AOC D). As determined during the VSI, projectile loading operations are no longer practiced at the St. Juliens Creek Annex facility.

5. Mine Loading. From 1912 to 1917, Mark VI mines were loaded with TNT in Bldgs. M-3, M-4, and M-5 for the North Sea minefield. Presumably, these operations ceased in 1917; since, as determined during the VSI, mine loading operations are no longer practiced at the St. Juliens Creek Annex facility. The TNT, shipped to St. Juliens Creek Annex in lined boxes, was melted and then poured into mine cases where it solidified. Existing records do not indicate how wastes from this operation, including empty TNT boxes and sweepings, were disposed. Most

probably, the wastes were burned, primarily for safety reasons. Wash-down water was probably discharged into both the Southern Branch of the Elizabeth River and Blows Creek (AOC D).

6. Tracer Mixtures. Tracers are slow-burning pyrotechnics composi tions that produce a colored flame. Less than one gram of tracer, usually a strontium nitrate composition (a salt), was placed in the base of the projectile. After ignition, the tracer burns, emitting light to show the path of the projectile. Other salts used in tracer mixtures are believed to have included sodium, barium, and copper salts.

Tracer mixtures were reportedly used throughout St. Juliens Creek Annex's history in Bldgs. 188 and 29 (AOC J). Bldg. 29, torn down after World War II, was located adjacent to the east end of Bldg. M-2. Although, these areas were not inspected during the VSI, facility personnel indicated that tracer mixing operations are no longer practiced at the St. Juliens Creek Annex facility.

7. Demilitarization.

a. Fuze Drillout. From the 1940s until the 1970s, fuze drillout operations were conducted in Bldgs. 244, 245, and 246. The fuzes, containing tetryl, were drilled out; the shavings were caught and then sent along with the dust sweepings to the Burning Grounds (SWMU #8) for disposal. Some dust may have washed into the floor drains and discharged into receiving waters from an unidentified storm water outfall (AOC D). As determined during the VSI, fuze drillout operations are no longer practiced at the St. Juliens Creek Annex facility.

b. Ammunition Breakdown. Ammunition breakdown was performed throughout St. Juliens Creek Annex's history. During ammunition breakdown, the projectile is pulled loose and the primer is unscrewed from the cartridge. The spacer and the wad are picked from the cartridge and are either kept for reuse or disposed of as garbage. The smokeless powder is emptied out of the cartridge and either packaged and sent back to the manufacturer for reprocessing or sent to the Burning Grounds (SWMU #8) for disposal. These operations were performed in Bldgs. 39, 46, and 185. Also, cartridges were filled with smokeless powder in these buildings. Primers were

renovated in Bldgs. 18 and 184 (AOC J). The black powder was removed from the primer and was either reused or sent to the Burning Grounds (SWMU #8) for disposal. Projectiles that were removed from the cartridges were either demilitarized or reused. As in other black powder and smokeless powder operations, dust and spillage either was swept up and sent to the Burning Grounds (SWMU #8) for disposal or was washed into the floor drains and discharged into receiving waters from an unidentified storm water outfall (AOC D). As determined during the VSI, ammunition breakdown operations are not presently practiced at the St. Juliens Creek Annex facility.

c. Steamout. Steamout operations were performed in three buildings: M-5, M-5 annex, and 222 (AOC J). The steamout process used steam to clean explosive residues, such as TNT and Explosive D, out of projectiles. The condensed steam, containing explosives, was captured and then discharged into a series of two cooling and settling tanks. There, the explosive cooled, recrystallized, and settled to the bottom of the tank. The explosive was then removed from the tank. TNT either was packaged and sent to the manufacturer for reprocessing or, like explosive D, was sent to the Burning Grounds (SWMU #8) for disposal. The overflow from the final settling tank usually contained from 0.01 to 10 ppm of explosive, but according to the Navy, could have contained as much as 100 ppm.

Reports indicate that during the 1960s a steamout operation for TNT was performed in Bldg. M-5 for approximately six months. The overflow from this operation went either into the sanitary sewer system or more probably into the Southern Branch of the Elizabeth River (AOC D). As determined during the VSI, steamout operations for TNT are not presently practiced at the St. Juliens Creek Annex facility.

An explosive D steamout operation was conducted in Bldg. M-5 from the mid-1950s to approximately 1970. Overflow from this operation, which initially discharged via a storm water outfall (AOC D) into the Southern Branch of the Elizabeth River, may have been routed to the sanitary sewer system during the 1960s. As determined during the VSI, steamout operations for explosive D are not presently practiced at the St. Juliens Creek Annex facility.

During World War II, an Explosive D steamout operation was conducted in Bldg. 222, the Victory Building. Overflow from the operation discharged into Blows Creek (AOC D) about 1,200 feet west of the creek mouth. As determined during the VSI, steamout operations for explosive D at Bldg. 222 are not presently practiced at the St. Juliens Creek Annex facility.

A probability exists that steamout operations were also performed periodically at the Annex prior to World War II. Where these operations were conducted is not documented, but the most likely location is in the M-buildings complex area.

8. Degreasing. Cartridge cases were cleaned and degreased, in preparation for explosive loading. This was a practice that was employed during wartime periods. As determined during the VSI, degreasing operations in preparation for explosive loading are no longer practiced at the St. Juliens Creek Annex facility.

Prior to World War II, cartridge cases were degreased with carbon tetrachloride in Bldg. 47. The waste solvent was most likely taken to the Burning Grounds (SWMU #8) for disposal, but this action was not confirmed. Black-powder shell-case cleaning was also performed throughout the activity's history. The cleaning operation consisted of a series of washing tubs or vats in this order: (1) lye, (2) water rinse, (3) 10% sulfuric acid, (4) rinse, (5) optional chromic acid wash, and (6) final rinse. The waste from this operation was dumped into the storm drain system, which empties, via a swampy area, into St. Juliens Creek (AOC D). About 14 tubs, each containing 400 to 500 gallons of liquid, were used in this operation.

The operation performed in the tank overhaul plant, Bldg. 13, was similar to the operation performed in Bldg. 47, but on a smaller scale. From prior to 1940 to the 1970s, approximately 15 pounds of alodine, a caustic detergent, were used each day in the hardware cleaning tanks. In addition, about two gallons/day of methyl ethyl ketone (MEK) and acetone were used in the building. The waste was usually dumped along the adjacent railroad tracks (SWMU #14).

From the 1940s to the 1970s, trichloroethylene was used in Bldgs. 190 and 227 to degrease ordnance hardware. The spent solvent was disposed of at the Burning Grounds (SWMU #8).

9. Wharf Operations. The waterfront areas of the base include about 6,000 feet of shoreline on the Elizabeth River and 4,200 feet of shoreline on St. Juliens Creek (AOC I). The status of the pier area (now present only as rubble from the M-5 area) during early production is unknown. Explosive Ordnance Disposal Team divers searched the area and reported some metal and deep silt. The area of the new pier, along the river in the southeast corner of the property, was also searched. Many metallic objects and deep silt were reported. A reasonable assumption is that various ordnance items were dropped during loading operations. Similar items were exhumed from a similar pier at the Jackson Park Annex near Bremerton, Washington. The number of objects remaining is unknown, although according to facility representatives, none have been found to date (Ref. 37).

According to U.S. Army Corps of Engineers personnel, if the pier area is ever dredged, the process would be extremely slow and expensive, because ordnance items may be present in the silt. During the VSI, facility personnel stated that the location of the pier area was not known. Inspection of the St. Juliens Creek Annex perimeter resulted in the identification of various nondescript construction rubble; however, did not determine specific evidence of pier operation materials.

10. Testing Operations. Destructive testing of ordnance items was performed throughout St. Juliens Creek Annex's history. Manufacturers' samples and ordnance loaded at the activity were tested near Bldgs. 23 and 282, and at the 40-foot drop tower, Bldg. 354. Fuzes and other ignition devices were tested in the drop tower. The Explosive Ordnance Disposal Team, stationed at the Annex until 1969, performed occasional tests and used explosives during training exercises at the Burning Grounds (SWMU #8). Inspection of this area during the VSI identified the radar tower near Dump B (SWMU #2) as the probable site for this operation; however, according to facility personnel, destructive testing of ordnance items is no longer practiced at the St. Juliens Creek Annex facility.

11. Decontamination Operations. Ordnance operations at the Annex were terminated in the 1970s. An effort was then made to decontaminate all ordnance-handling buildings, equipment magazines, and Burning Grounds. Prior to the decontamination effort, the Naval Ammunition Production Engineering Center (NAPEC) visually inspected in, under, and around the facilities, and collected samples for chemical analyses. The results of the inspections and the analyses were used to develop appropriate step-by-step decontamination procedures for each building.

In mid-1977, the following procedures were implemented. Buildings were flushed with chemical solutions and water. Equipment was removed, filled with oil and straw, and was either ignited at the Burning Grounds (SWMU #8) or flashed in 550x ovens. The Burning Grounds was then covered with oil and straw, and was burned. Then, the top six inches of soil were disced. The soil was again covered with oil and straw, and was burned. Decontamination solutions and rinse waters were directed to the sanitary sewer system. Magazines were swept, water-washed, and reswept. At the conclusion of this process, NAPEC visually reinspected each building, all equipment, and the Burning Grounds; collected samples for chemical analyses; and certified the facilities were decontaminated. However, the level of decontamination was not specified. Regardless of how thoroughly the decontamination operation was conducted, the NACIP inspection team believed that residues of ordnance materials will remain. Effects of long-term human exposure to these levels have not been determined. As deter mined during the VSI, decontamination procedures where buildings were flushed with chemical solutions are no longer practiced at the Annex. In addition, inspection of the Burning Grounds did not identify any areas where there was evidence of recent oil/straw discing; rather, the Burning Grounds area was covered over with grass and tall reeds.

In July 1978, representatives of the Ordnance Environmental Support Office (OESO) and NAPEC reinspected Bldgs. 89 and 240 for Explosive D contamination. Results of the inspection indicate that levels of Explosive D (less than 10 ppm) still remain in portions of these buildings, and that further decontamination is required before these buildings can be used for non-ordnance operations. The condition of these buildings during the VSI was not determined.

During the on-site survey, when the NACIP team visually inspected Bldgs. 240 and M-5 Annex, Explosive D was observed seeping from the lower portions of walls in several areas of the buildings. The condition of these specific buildings during the VSI was not determined; however, a general inspection of the facility grounds area did not determine any evidence of seepage from any of the enclosed buildings.

B. Operations, Non-Ordnance

1. Metal Plating. Records searches and personnel interviews conducted during the NACIP study indicate that metal plating was not conducted at the Annex. Metal plating, as needed, was accomplished at the nearby Norfolk Naval Shipyard.

2. Degreasing. Degreasing of metal parts were performed at the Annex using solvents. The common method of disposal was to dump small amounts (less than 2 gallons) of waste solvents on the railroad tracks next to buildings (SWMU #14). It was determined during the VSI that degreasing of metal parts is still currently practiced inside various buildings throughout the St. Juliens Creek Annex facility. Although all of the buildings where these degreasing operations are performed were not identified, Bldg. 249 (SWMU #13), an automotive vehicle repair and maintenance shop, was observed to utilize solvent baths for routine degreasing operations. The types of solvents used in these degreasing operations were not identified. During the VSI, the only degreasing operation observed to be performed outside of a facility building was at the Washrack (SWMU #25). At this unit, a chemical cleaner, Penetone, was reported as the degreasing agent. According to the facility, waste disposal is now managed by the Norfolk Naval Shipyard Environmental Programs Division personnel following Virginia and Federal EPA regulations (Ref. 37).

3. Paint Shops. Ordnance containers, after they were cleaned, were painted in a spray paint booth located in the overhaul building, Bldg. 13. During normal daily operations, 15 to 20 gallons of paint were used. Waste paint sludge that accumulated in the water curtain was removed and was placed in 55-gallon barrels for disposal. The paint sludge may also have been dumped at the Burning Grounds area (SWMU #8). According to the facility, this represents a past practice (Ref. 37).

4. Machine Shop. A salvagable cutting oil is used in the machine shop, Bldg. 68, for machining metal. Approximately 5 gallons are used every 6 months. The NACIP study indicated that waste oil was poured down the storm drain (SWMU #33) and discharged from a storm drain outfall (AOC D) into nearby receiving waters. During the VSI, it was observed that uncontained waste oil (although not necessarily from the Machine Shop) may still reach the storm drain system. According to the facility, this represents a past practice (Ref. 37).

Machine shop personnel were responsible for maintaining the hydraulic pump and the equipment in Bldgs. 190, 228, 191, 43, 185, 39, 47, and 201. The hydraulic fluid is reported to have been changed every 6 months. Two to three 55-gallon drums of waste were reported to be generated. Past disposal practices were reported by the NACIP study to have included pouring the waste hydraulic oil along the fence line for weed control and on the roads for dust control. Subsequently, alternative disposal practices involved delivering the waste to Craney Island for disposal. The Machine shop was not specifically investigated during the VSI, therefore, the present disposition of this operational area is not available.

5. Vehicle and Locomotive Maintenance Shops. St. Juliens Creek Annex were reported to have had vehicle maintenance operations in Bldgs. 101, 109, 107, 201, and 239. Locomotive maintenance operations were reported to be located in Bldgs. 187, 247, and 248. In previous years, some waste oils and waste solvents were said to have been used for dust control around the station. Currently, waste oils and waste solvents are usually drummed for disposal off-station. The NACIP study reported that the area around the locomotive shed, Bldg. 187, was saturated with oil. Building 187 was not specifically investigated during the VSI, therefore, the present disposition of this operational area is not available. Currently, Bldg. 249 (SWMU #13) was observed to be utilized as an automotive vehicle repair and maintenance shop. At this operational area, it was observed that uncontained waste oil may reach the storm drain system. According to the facility, this represents a past practice (Ref. 37).

6. Pest Control Shop. The pesticide shop, formerly located at Bldg. 249 (SWMU #13), housed the Annex's supply of pesticides. This supply was said to

:lude Abate, rodent baits, Bromacil, Carbaryl, Chlordane, Dalapon, Diazinon, quat, Gardona, Malathion, Naled, Tandex, and other combinations of chemicals. ıe chemicals were said to have been mixed at the pesticide shop and are applied :cording to label directions. Currently, Bldg. 249 (SWMU #13) was observed to be tilized as an automotive vehicle repair and maintenance shop. It was not .etermined during the VSI if a pest control shop still exists on the St. Juliens Creek Annex facility grounds.

From the early 1950s to the mid-1960s, only one mobile 150 to 250 gallon spray tank was available at the Annex. Both herbicides and insecti cides were sprayed ·rom the same spray tank. The tank was cleaned when tank usage changed from nerbicides to insecticides and vice-versa. One hundred to three hundred gallons of rinsewater were used in each cleaning operation. The waste rinsewater was discharged to an open area by Cross Street (SWMU #9) near Bldgs. M1 and 212. The spray tank was generally used each day. An additional spray tank was purchased in ıe mid-1960s. Daily cleaning of the tanks was not considered necessary. Rinsewater discharges ceased. The rinsate disposal area is devoid of vegetation, though the area has not been used for rinsate disposal since the mid-1960s. Soil samples were not taken at this area.

Other possible areas of contamination from pesticide and herbicide operations include the Burning Grounds area where pesticides were buried "a long time ago", and the wash pad (SWMU #25) near Bldgs. 249 and 266 where spray tanks were washed. According to the facility, this represents a past practice (Ref. 37).

7. Battery Shop. The battery shop was located in Bldg. 102 until the building was torn down in 1954. Lead-acid battery maintenance operations were moved to Bldg. 279. According to station battery-maintenance personnel, waste-acid electrolyte, which was collected in containers, was hauled off-station for disposal. It was not determined during the VSI if a battery shop still exists on the St. Juliens Creek Annex facility grounds.

8. Print Shop. A printing shop was located in Bldg. 69, until the late 1970s. Chemical usage or disposal practices were never reported. It was not determined

during the VSI if a print shop still exists on the St. Juliens Creek Annex facility grounds. According to the facility, this represents a past practice (Ref. 37).

9. Electrical Shop, Bldg. 53 (SWMU #15). The Annex purchases electrical power from VEPCO. The only power generated on-station was reported in the NACIP study to be generated by emergency generators located in Bldgs. 90, 283, 233, and 234. Currently, emergency generators in Bldgs. 90, 233, and 234 are out of service (Ref. 37). The majority of transformers were reported in the 75 to 300 KVA range. At the time of the NACIP study, only one transformer on-station was known to contain polychlorinated biphenyls (PCB); all others were said to have contained oil dielectric. According to the facility, Bldg. 53 is no longer utilized as an electrical shop on the St. Juliens Creek Annex facility grounds (Ref. 37).

The PCB transformer identified during the NACIP study, was located in the heating plant, Bldg. 283, once developed a leak. A New Jersey firm was contracted to pump out the dielectric, flush the transformer, and refill it with a Silicone dielectric in 1979. This transformer was believed to have been contaminated with PCB. It was suggested that it be tested to determine PCB concentration; and if the concentration of PCB was approximately 500 ppm or greater, the transformer should be labeled as a PCB transformer. According to the facility, the transformer at Bldg. 283 has been tested and is less than 50 ppm PCB. Therefore, the facility no longer labels this transformer as a PCB transformer (Ref. 37).

The station electricians used approximately five gallons/month of trichloroethylene for cleaning and degreasing. Most of this solvent was believed to have evaporated. The remainder was said to have been poured beside the building or on the railroad track bed.

The electricians replaced an average of approximately ten fluorescent ballasts per month. The old ballasts, which normally contain PCB, were disposed of in a dumpster (SWMU #29), along with the station's solid waste. Approximately two boxes (40 total) of fluorescent light tubes, which contain traces of mercury, were also said to have been thrown into the dumpsters each month. Occasionally, two or three lead-acid batteries were reported to have been placed in an unidentified facility dump (SWMUs #1, #2, #5, or #6).

10. Boiler Plant. The main boiler plant, Bldg. 283, was reported in the NACIP study to have had two boilers. Internal chemical treatment was accomplished by feeding phosphate and sulfite, and by softening the water with sodium zeolite softeners. The backwash is described to have entered the sanitary sewer along with the boiler blowdown. About 50,000 gallons of make-up water was used daily because the station had no condensate return. Other boilers were reported to have been located in Bldgs. 271, 277, and 285. According to the facility, the boiler in Bldg. 285 no longer exists (Ref. 37). A boiler was operated in Bldg. 272 until about 1977. At that time, the boiler was taken out of service and the asbestos walls of the building were removed by Norfolk Naval Shipyard personnel. The asbestos from the ripout was sent to an unknown location. The best guess is that it was sent to an off-base location.

The boilers were acid cleaned, at a frequency reported at about every 5 to 6 years, with approximately 15 barrels of Formula 990, a chemical manufactured by Penetone (trade name) of New Jersey. The waste from the cleanout was said to be directed to the sanitary sewer. It was not determined during the VSI where boiler operations are conducted at the St. Juliens Creek Annex facility.

11. Washrack (SWMU #25). Vehicles and equipment are washed and steam cleaned in the Washrack, Bldg. 266. The washrack's concrete pad is bermed. A deck-drain directs wastewater flows to the sanitary sewer. Prior to 1976, the effluent from the washrack discharged into a storm drain that emptied into a swampy area, which drained into St. Juliens Creek. Penetone, a chemical cleaner, is used for equipment cleaning.

12. Potable Water. St. Juliens Creek Annex does not have waterwells. Potable water is supplied by the City of Portsmouth, Virginia. Preventive medicine units conduct regular checks on the water quality. It was reported in the NACIP study that a one million gallon reservoir, Bldg. 263, was used to store and supply water for the Annex; it was not determined during this RFA if this building is still used as a potable water reservoir. Currently, the Environmental Programs Division monitors water quality (Ref. 37).

13. Salt Water Fire Protection System. The Annex was reported in the NACIP study to have had a salt water system for fire protection. Pumps, said to be located in Bldg. 113, withdrew water from the Southern Branch of the Elizabeth River at the southeast corner of the Annex and pumped the water into the 150,000 gallon elevated salt water tank, structure 286, which maintained pressure throughout the system. The salt water system and the potable water system were described to be not cross-connected. The facility indicates that the salt water system has been abandoned for several years including the storage tank and the pump station; currently, fire protection entails the use of fresh water (Ref. 37).

14. Radiological Materials. Radiological materials have not been reported as being at St. Juliens Creek Annex.

15. Fire Training. A small fire training area (SWMU #27) is maintained at the Annex to illustrate the use of water and CO_2 extinguishers. This area is located near the fire station (Bldg. 271). Wooden pallets or a diesel fuel pit are ignited for the training exercises.

C. Materials Storage

1. Oil Storage. The boiler plant, reported in the NACIP study to have been located at Bldg. 283, burned heavy fuel oil. The fuel oil was said to have been stored in two 2,500-gallon tanks and two 1,500-gallon tanks. The raised tanks were located adjacent to Bldg. 283. In 1975 or 1976, up to 500 gallons of oil is reported to have leaked from one of the tanks. The oil spill was said to have been cleaned up. Further incidents were not noted.

2. Ordnance Materials. Incoming ordnance materials were stored in their shipping boxes in various magazines, by classification. Loaded goods were also stored in magazines, by classification. Unpadded, loose ordnance materials were not allowed to be stored on base. The activity has not reported any significant spills or other incidents that could cause contamination.

3. Non-Ordnance Chemical Storage

a. Kepone. It was reported in the NACIP study that in March 1976, EPA Region III and the Naval Weapons Station, Yorktown, negotiated a consent agreement to temporarily store 96 drums (55 gallons each) of technical Kepone in Bldg. 198 (SWMU #12) at St. Juliens Creek Annex. The Kepone contaminated Bldg. 198. This Kepone, originally removed by EPA from Life Sciences Products, Incorporated, of Hopewell, Virginia, had been initially stored in a privately owned warehouse. When insurance problems precipitated removal of the Kepone from the private warehouse, the EPA negotiated the agreement with the Navy.

The Kepone was delivered, under the direction of an EPA Region III representative to the Annex, March 12, 1976. Three Navy civilian employees off-loaded the material. These employees wore protective clothing and/or apparatus during the one hour operation. A permanent log was improvised to record the names and identification numbers of personnel who made physical contact with Kepone storage containers and storage pallets.

Building 198 is an aboveground, poured-concrete structure with a raised concrete platform and a metal-ribbed, peaked roof. The building does not have utilities. It is ventilated by three squirrel ventilators and by several windows and doors. The Kepone was stored in metal drums lined with plastic bags. Apparently, pallets used for handling the drums, rather than the drums themselves, caused the contamination of Bldg. 198. A new consent agreement was negotiated with EPA in 1977, when cognizance of St. Juliens Creek Annex was transferred from the Naval Weapons Station, Yorktown, to the Norfolk Naval Shipyard.

During October and November 1978, Allied Chemical employees removed the Kepone and the pallets from Bldg. 198. The contaminated materials were shipped, via a container ship, to salt mines in West Germany. Allied Chemical personnel decontaminated Bldg. 198, which was still leased to EPA.

On October 5, 1978, an extensive swipe survey was performed, before decontamination efforts commenced to determine levels of Kepone contamination. On November 1, 1980, a second swipe survey was performed to check levels of Kepone contamination after decontamination. Allied Chemical related the results of the swipe survey to EPA in a November 27, 1978 letter. Allied Chemical stated that all swipes taken after decontamination efforts were less than the 10 microgram/sq. ft. guidelines established for other decontamination efforts. Allied Chemical recommended that Bldg. 198 be released for use as a warehouse facility.

In March 1979, the Norfolk Naval Shipyard needed the space in Bldg. 198 to store electronic systems. The shipyard requested EPA to issue a "Free From Kepone Contamination Certificate" for Bldg. 198. A letter from the Deputy Assistant Administrator for Pesticide Programs for EPA outlined restrictions that should be imposed on the utilization of Bldg. 198. EPA did not mention a contaminant-free certificate.

In July 1980, the Norfolk Naval Shipyard indicated to EPA that restrictive use of the facilities was not acceptable. The shipyard once again requested EPA to issue a contaminant-free certification. As of this date, EPA has not responded.

During the Initial Assessment Study, team members made an on-site inspection of the decontaminated Bldg. 198. The building is kept secure. Stringent control is maintained on access to the interior of the building. Team members noticed a white residue in several areas on the floor of the building. However, after examination of the Allied Chemical swipe survey results, team members were in agreement that the white residue was the result of solutions used during decontamination, and that the residue did not pose a threat. The team could not visually determine if Kepone residuals remained.

During the VSI, it was determined that this building is currently being used, and is permitted to store PCB materials and waste. State agency representatives indicated that there is no present indication of residual contamination inside this building.

b. Waste Storage. In recent years, the shipyard stored hazardous materials in magazine, Bldgs. 154Y and 163Y (SWMUs #10 and #11). Stored materials include waste liquids, both characteristic and listed. Incidents have not occurred. Visual evidence of spills was not present during the VSI. Improvements such as a curbed, sealed floor and proper waste segregation, have been made to ensure future spill containment.

The Navy had intended to use Bldgs. 178 through 182 for hazardous waste storage. However, during the VSI facility representatives indicated that these plans were never realized, therefore, the buildings have never stored wastes.

Additional areas designated for waste storage included SIMA generation points and accumulation areas (SWMUs #20, 21, and 22). These areas receive liquid and solid wastes from vehicle maintenance operations and various types of solvents.

4. Disaster Preparedness Chemicals (NBC Agents). Two hundred eighty-one chemical indicator kits were stored in Bldg. 163. The kits are used to detect various chemical warfare agents, including arsenicals and G and H series chemical agents. Refill kits contain anticholinesterase agents (V and G agents). In September 1977, as part of the SETCON ONE operation to remove all such kits from naval activities, the kits were airlifted to Marine Corps Air Station, Quantico, VA. Reports do not indicate that any incidents resulted from the storage or the removal of the kits.

Wastes Handled and Waste Management Practices

Waste management practices at the St. Juliens Creek Annex facility were developed to address the waste types generated by various on-site operational and process activities. The hazardous waste types generated at the St. Juliens Creek Annex facility are listed in Table 2. Although many of these waste management practices have been described in the previous subsections; however, there are other additional general waste management practices that either have been, or are still presently, employed at the facility. The additional general waste management practices

Table 2
Hazardous Wastes Managed at the St. Juliens Creek Annex Facility*

Waste Type	Estimated Quantity (lbs)	Waste Description
D001	1,000	Ignitable
D002	1,000	Corrosive
D003	1,000	Reactive
F001	1,000	Halogenated Degreasing Solvent
F002	1,000	Halogenated Solvent
F003	1,000	Non-Halogenated Solvent
F005	1,000	Non-Halogenated Solvent

* Ref. 25

include wastewater collection and treatment, landfilling operations or garbage/refuse operations, scrap metal and obsolete equipment management, ordnance disposal operations, and other miscellaneous storage and operations. Currently, the facility no longer performs land filling or garbage/refuse operation, ordnance disposal operations and wastewater treatment (Ref. 37).

1. Wastewater Collection and Treatment. Prior to the late 1950s, many of the process wastewaters, in addition to sewage collected at the Annex, was discharged through storm water outfalls (AOC D) into surrounding watercourses.

In the late 1950s, the sewage collection system was connected, via a force main, to the City of Portsmouth's system, and the sewage discharges, were discontinued. In addition, the small sewage treatment plant at Bldg. 318 (AOC K), utilized from 1942 to 1947, was discontinued; during the VSI, it was observed that physical evidence of this sewage treatment plant no longer exists. Many of the industrial discharges to surrounding watercourses reportedly continued into the 1970s, mostly through floor drains.

Presently, the St. Juliens Creek Annex sanitary sewer system is directed to a POTW and accommodates all sewage from St. Juliens. The oil water separator (SWMU #23), which collects rinsate from the washrack (SWMU #25), is tied to the sanitary sewer (SWMU #33). Separate from the sanitary sewer is a stormwater drain system (SWMU #32) which connects the facility via numerous outfalls (AOC D) to local surface waterways.

2. Landfilling Operations or Garbage/Refuse Operations. Information on garbage disposal methods, prior to 1921, was not recorded. According to the U.S. Navy, garbage would not have buried at the Annex during this period, because that practice was uncommon and cover material was not available at the Annex. Garbage and trash were probably burned at a designated area on base. Another possibility considered by the Navy is that garbage was sold to farmers as feed for hogs, and trash was burned. Currently, there are no active landfilling operations at the Annex (Ref. 37).

From 1921 until the present time, records and other information indicate four garbage/trash dumps.

Dump A (SWMU #1), initiated in approximately 1921, was operated for less than three years. Garbage and/or trash was most likely burned there. The ash was probably used as fill. During the VSI, visual examination of the location did not reveal any indication of environmental contamination.

From about 1921 until the mid-1940s, Dump B (SWMU #2) was the primary garbage and trash disposal site. Trash and garbage were open-burned there, and the ash was used to fill this former low, swampy area. Records indicate that, from 1942 to 1947, an incinerator (SWMU #3) operated at this location. During that time, a barracks existed on the far northwestern portion of the base, and the base generated its greatest amount of garbage. Physical examination of the area revealed broken glass, cinder, ash, deteriorated metal and other rubbish-typical residues of garbage-burning operations. Presently, blast grit waste has been observed in this area (SWMU #4).

Starting about 1940, and continuing until about 1970, refuse was burned at Dump C (SWMU #5). A 1953 study indicates that this former low-lying area and the mud flats were being reclaimed with non-combustible rubbish and ashes. Refuse was burned and then extinguished daily, using water from a fire hose. Most of the refuse consisted of dry, easily burned materials. Occasionally small quantities of wet refuse were included. Salvageable materials were removed daily from the site. Every two weeks, a bulldozer compacted and leveled the site. In 1952 and 1953, approximately 35,000 cubic yards per year of refuse were disposed of at this site. From 1963 to 1966, approximately 11,500 cubic yards per year of trash and semi-wet garbage were burned at this site on a weekly basis. During the VSI, visual examination of the location did not reveal any indication of environmental contamination.

Two pits (SWMU #30) were also reported as available at this site for the disposal of waste oils and oil sludges that were not accepted by Naval Supply

Center, Craney Island. Periodically, the oil was burned in the pits. No evidence of these pits were observed during the VSI. The facility indicates that this represents a past practice (Ref. 37).

About 1970, the activity ceased burning garbage and trash and started a sanitary landfill operation at Dump D (SWMU #6) in the marshes of Blows Creek. The operation was continued until 1976. Initially, a trench was dug parallel to Blows Creek. The trench was located approximately 500 feet north of the creek. This 1,000-feet long trench stretched from near the eastern boundary of the activity westward. As this trench was filled, a parallel trench was dug. The soil was used to cover the first trench. Primarily, trash and some wet garbage were disposed at this location. It was also noted in the NUS study (Ref. 31) that several old tanks (AOC L) were present at Dump D; however, there was no evidence of these tanks observed during the VSI.

From 1976 to May 1986, trash and garbage were hauled to the Salvage Fuel boiler at the Norfolk Naval Shipyard for disposal. The Salvage Fuel boiler is currently inactive (Ref. 37). Inert material is disposed of at Dump D. It was noted during the VSI that dumpsters (SWMU #7) were being stored in the area of Dump D; although, visual examination of the location did not reveal any indication of environmental contamination. Currently, trash and garbage disposal is by contract (Ref. 37).

Currently, approximately 50 dumpsters (SWMU #29) are maintained by a local contractor to collect refuse and other solid wastes for off-site disposal. One of the dumpsters is associated with Bldg. 323 (SWMU #16) and is used to accept waste sand blast grit from blasting operations conducted at Bldg. 26.

3. Scrap Metal/Obsolete Equipment. St. Juliens currently maintains three storage yards to handle obsolete equipment and scrap metal (SWMUs #17 through #19). Additionally, the DMRO facility (SWMU #28) is designated as the clearing house for scrap metal and various types of excessed items. It was also noted that railroad cars were being used to transport scrap metal (SWMU #26).

4. Ordnance Disposal Operations. Starting in the 1930s, waste ordnance materials were disposed of by open burning at the Burning Grounds (SWMU #8). Reports indicate that, prior to the 1930s, ordnance materials were disposed of with garbage at Dump B (SWMU #2).

Three main pads were located at the Burning Grounds for the disposal of ordnance materials, including black powder, smokeless powder, Explosive D, composition A-3, and materials containing or contaminated by these compounds. The amount of ordnance disposed of varied over the years; 427 short tons of ordnance items were disposed of at the Burning Grounds in 1974. Reports state that, in the 1970s, the Burning Grounds spontaneously caught fire several times prior to the decontamination effort mentioned earlier. A pit with a cage over it (SWMU #24) was located just west of Bldg. 23. Small items, such as igniters and fuzes, were burned in the pit. According to the Navy, the pit was filled in during recent years. No evidence of this pit was observed during the VSI.

Visual examination of the Burning Grounds revealed ordnance residue, such as old cartridge ends and spacers, as well as non-ordnance residue, such as broken glass. The presence of broken glass indicates that non-ordnance items were burned along with the ordnance materials.

According to the Navy, the surface of the Burning Grounds was decontaminated in mid-1977.

5. Miscellaneous Storage and Operational Areas. Miscellaneous areas are currently operated by St. Juliens Creek Annex for the purpose of handling products or wastes which have the potential for releases to the environment. These areas include: a satellite storage area at Bldg. 279 (AOC A), which contains liquid cleaners; an air compressor at Bldg. 47 (AOC B), which has leaked oil; blasting grit poured on the soil along Bldg. 47 (AOC C); an area used to temporarily store pump equipment (AOC E) where oil leaks were noted; and underground tanks (AOC F) which have been or are currently used to store fuels.

4.0 DESCRIPTIONS OF SOLID WASTE MANAGEMENT UNITS AND OTHER AREAS OF CONCERN

Following the VSI of St. Juliens Creek Annex, a total of 34 SWMUs and 12 AOCs were identified. These are listed in Table 1.

SWMUs and AOCs at Norfolk Naval Shipyard St. Juliens Annex.

Solid Waste Management Units

1. Dump A
2. Dump B
3. Dump B Incinerator
4. Blast Grit at Dump B
5. Dump C
6. Dump D
7. Dumpster Storage at Dump D
8. Burning Grounds
9. Cross and Mine
* 10. Hazardous Waste Container Storage at Bldg. 154Y
* 11. Hazardous Waste Container Storage at Bldg. 163Y
12. PCB Storage at Bldg. 198
13. Repair and Maintenance Shop at Bldg. 249
14. Hazardous Waste Disposal Area at Bldg. 13 (Railroad Tracks)
15. Hazardous Waste Disposal Area at Bldg. 53
16. Sand Blasting Area at Bldg. 323
17. Old Storage Yard #1
18. Old Storage Yard #2
19. Old Storage Yard #3
20. Waste Generation Area #1 (SIMA Air #1)

*RCRA regulated

21. Hazardous Waste Accumulation Area (SIMA #2)
22. Repair Shop Satellite Storage Area northeast of Bldg. 40
23. Oil Water Separator at Bldg. 249
24. Caged Pit at the Burning Grounds
25. Washrack at Bldg. 249
26. Scrap Metal Storage in Railroad Cars near Bldg. 176
27. Fire Training Area at Bldg. 271
28. Clearing House Storage Area (DRMO)
29. Dumpsters (located throughout the facility)
30. Waste Disposal Pits at Dump C
31. Swale Beneath Bldg. 13
32. Overland Drainage Ditches
33. Sewer Drainage System
34. Operational Waste Accumulation Areas

Areas of Concern

A. Satellite Storage at Bldg. 279
B. Air Compressor at Bldg. 47
C. Blasting Grit at Bldg. 47
D. Storm Water Outfalls
E. Temporary Pump Storage
F. Underground Storage Tanks
G. Former Process Buildings
H. Residual Ordnance at Bldgs. M-5 and 190
I. Residual Ordnance at Wharf Area
J. Former Ammunition Manufacturing Areas
K. Former Sewage Treatment Plant
L. Old Tanks at Dump D

1. UNIT NAME: Dump A

Unit Description: The site encompasses one acre along a southern section of Blows Creek, east of the Vepco Right-of-Way and west of a set of railroad tracks.

Dump A was used from 1921 to 1924 primarily for the disposal of trash and garbage (Ref. 19). Additionally, some pesticides, acids, and bases were dumped at the site. It was reported that the waste was burned at the site and the ashes used to fill in a marsh area that is part of Dump A that extends along Blows Creek. The burn area and disposal area for the ash were supposedly on the same site. It was reported that a team of specialists examined the site in July 1980, as part of the NACIP study, and found no sign of environmental contamination (Ref. 31).

This unit was included as part of a 1983 Preliminary Assessment conducted by NUS. Air samples were monitored for volatile organics and radiation; no readings above background were encountered. There was no information available regarding whether any further actions would be implemented at this site.

During the VSI, inspection of the marshy area revealed construction rubble and old lumber. A faint sheen was noted on standing water in the marsh area (Ref. 33).

Date of Start-up: The date of start-up was 1921 (Ref. 31).

Date of Closure: The use of this unit was discontinued in 1924 (Ref. 31). However, the unit has not been formally closed.

Waste Managed: The wastes managed at this unit include: organics, inorganics, pesticides, acids, bases, and mixed municipal waste. Most of this material was burned. The volume was estimated by the U.S. Navy at 30,000 cubic feet prior to being burned (Ref. 31).

Release Control: There are no release controls identified with this unlined unit.

History of Release: Ash from burning waste was placed in a marsh along Blows Creek (Ref. 31).

2. UNIT NAME: Dump B

Unit Description: From 1921 to 1947, Dump B was used for the disposal of an estimated 950,000 cubic feet of trash, garbage, acids, and waste ordinance (Ref. 19). Almost half of this was disposed of after 1942. The refuse was burned on-site and the ash used to fill in an adjacent swampy area. In 1942, the Dump B incinerator went into operation and took the place of open burning. The site was closed sometime after 1947 and, as observed during the VSI, has since grown into a swampy area covered with brush, trees, and grass. Blast grit from ship overhaul and repair operations was also dumped at this location, although the exact year is unknown (Ref. 31). Remnants of this grit were observed in this area during the VSI.

This unit was included as part of a 1983 Preliminary Assessment conducted by NUS. Air samples were monitored for volatile organics and radiation; no readings above background were encountered. There was no information available regarding whether any further actions would be implemented at this site.

In addition, it was noted during the VSI that this area is being used as a storage area for heavy equipment and machinery, including a shed for ceramic tile and several trailers containing tools, tires and machinery. As a result, the soil in this area was noted to have oil stains associated with leakage from the materials being stored.

Date of Start-up: The date of start-up was 1921 (Ref. 31).

Date of Closure: The use of this unit was discontinued sometime after 1947 (Ref. 31). However, this unit has not been formally closed.

Waste Managed: The waste managed at this unit included mixed municipal waste and ordinance waste estimated at 950,000 cubic feet prior to being burned.

Release Control: There are no release controls identified with this unlined unit.

History of Release: During the NACIP study, remnants of ash were observed on the ground (Ref. 31). In addition, ash/grit were also observed on the ground during the VSI, as were stains associated with leaking heavy equipment and machinery (Ref. 33).

3. UNIT NAME: Dump B Incinerator

ORIGINAL (RED)

Unit Description: Dump B covers 1.5 acres adjacent to the east side of the Vepco Right-of-Way just north of St. Juliens Creek. The Dump B Incinerator no longer exists, but originally covered an area of 1,600 square feet. Its former location is not known, except that it was in the area of Dump B (SWMU #2).

The Dump B Incinerator was used from 1942 to 1947 to burn trash, garbage, and some solvents (Ref. 19). During this period activity at the Annex was the highest in its history because of World War II. It was estimated in the NUS report that 400,000 cubic feet of waste was incinerated and disposed of in Dump B. The incinerator has since been torn down (Ref. 31). This condition was confirmed during the VSI.

This unit was included as part of a 1983 Preliminary Assessment conducted by NUS. Air samples were monitored for volatile organics and radiation; no readings above background were encountered. There was no information available regarding whether any further actions would be implemented at this site.

Date of Start-up: The date of start-up was 1942 (Ref. 31).

Date of Closure: The date of closure is uncertain; the use of this unit was discontinued (i.e., "torn down") in 1947 (Ref. 31).

Waste Managed: The wastes managed at this unit included organics, inorganics, solvents, and mixed municipal wastes estimated at 400,000 cubic feet prior to being incinerated.

Release Controls: This unit no longer exists. There were no release controls identified with this unit.

History of Release: This unit is designed for release or air emissions. No other types of releases were identified in the file information. During the VSI, no evidence of release was noted in the area of this former unit.

4. UNIT NAME: Blast Grit at Dump B

Unit Description:	This unit is located to the north of Dump B (SWMU #2) and consists of piles of blast grit on the ground.
Date of Start-up:	The exact date of start-up is unknown.
Date of Closure:	Waste piles of grit are present; however, facility personnel indicated that this area is not now used to store or dispose of blast grit.
Waste Managed:	Waste consists of blast grit which consists of a commercial product, Black Beauty, and walnut hulls. The blast grit is used to strip paint from metal surfaces.
Release Controls:	No release controls were noted for this unlined unit.
History of Release:	During the VSI, blast grit was observed on the soil within the unit.

5. UNIT NAME: Dump C

Unit Description: The site covers 10 acres along the northern edge of the Annex and is accessible by way of a patrol road.

Dump C was originally a mudflat area where refuse was dumped and allowed to burn. The ash was used to fill in the mudflat. The operation began in 1940 and continued until 1970 (Ref. 19). Refuse brought to the site included solvents, acids, bases, and mixed municipal waste. The area was graded level and is covered with grass (Ref. 31).

This unit was included as part of a 1983 Preliminary Assessment conducted by NUS. Air samples were monitored for volatile organics and radiation; no readings above background were encountered. There was no information available regarding whether any further actions would be implemented at this site.

During the VSI, assorted construction rubble and asphalt remnants were observed at this unit.

Date of Start-up: The date of start-up was 1940 (Ref. 31).

Date of Closure: The use of this unit was discontinued in 1970 (Ref. 31). However, this unit has not been formally closed.

Waste Managed: The wastes managed at this unit include organics, inorganics, solvents, acids, bases, and mixed municipal waste (Ref. 31), in addition to TCE, waste oil and oil sludges (Ref. 19) estimated at approximately 750,000 cubic feet prior to being burned.

Release Control: There are no release controls identified with this unlined unit.

History of Release: According to the NACIP study, waste was dumped in a mudflat area and allowed to burn (Ref. 31).

6. UNIT NAME: Dump D

Unit Description: The site is located approximately 300 feet south of Dump C (SWMU #5) and is accessible by way of a patrol road. The entrance to the site is on the side opposite Blows Creek, although tall grass and reeds line the perimeter of where the unit is suspected to be situated. Dump D covers an area of approximately five acres (Ref. 31).

Dump D was in use from 1970 to 1981. Waste disposed of at the dump included trash, garbage, and construction materials (Ref. 19). Some solvents, pesticides, acids, bases, PCBs and out-dated civil defense stores were also disposed of in the dump (Ref. 31).

Though some of the waste was piled on the surface, the site was primarily a landfill operation involving trenches. The first trench was dug 500 feet north of and parallel to the Blows Creek and was 1,000 feet in length. When the trench became full of waste, it was covered with soil obtained from excavating a parallel trench. It is not known how many trenches were eventually dug.

During a prior investigation for this site, it was reported that drums were stored on the surface of Dump D and that others were buried. It is not known what was in the drums, how many drums were buried or what was done with the stored drums when the dump was closed. Among the wastes buried at the site were PCBs. Ron White of the Public Works Department N.N.S. said that information on the site is very limited. He stated that PCBs buried in the dump probably came from the ballast containers for fluorescent light fixtures. The quantity of PCBs disposed of in the dump is not known (Ref. 31).

This unit was included as part of a 1983 Preliminary Assessment conducted by NUS. Air samples were monitored for volatile organics and radiation; no readings above background were encountered. There was no information available regarding whether any further actions would be implemented at this site.

During the VSI, 4 dumpsters with the words "Asbestos Only", and 2 dumpsters with the words "Burnable Wastes, No Metals" were observed within the Dump D area (see SWMU #7, Dumpster Storage Area). In addition, the general Dump D area contained partially buried construction rubble, an old cement mixer, and an empty, half-buried, rusted dumpster. This unit represents the site of several "old tanks" (see AOC L), the purpose of which remain unknown; these tanks were no longer present during the time of the VSI (Refs. 33 and 34).

Date of Start-up: The date of start-up was 1970 (Ref. 31).

Date of Closure: The use of this unit was discontinued in 1981 (Ref. 31). However, this unit has not been formally closed.

Waste Managed: The wastes managed primarily include trash, wet garbage, construction material, and out-dated civil defense stores (Ref. 31). Also included were solvents, acids, bases, and some PCBs were estimated at 1,500,000 cubic feet.

Release Control: Trenches were covered with soil that was excavated from subsequent trenches (Ref. 31). Otherwise there are no release controls associated with this unlined unit.

History of Releases: There were no known releases identified from this unit (Ref. 37). Construction rubble and various scrap metal were observed partially buried in the area comprising Dump D (Refs. 31, 33, and 34).

7. UNIT NAME: Dumpster Storage at Dump D

Unit Description:	This area, consists of six steel, closed-top compaction trash dumpsters located on bare soil at the eastern end of the area occupied by Dump D (SWMU #6). Each dumpster measured approxi mately 10' x 10' x 30' (Refs. 33 and 34).
Date of Start-up:	The start-up date for this unit is not known. It is though to post-date the 1983 report prepared by NUS (Ref. 31).
Date of Closure:	This unit is physically present and used for the storage of waste material, although facility representatives indicated that this area was not actively utilized as a dedicated dumpster storage area.
Waste Managed:	Four of the dumpsters were designated for "Asbestos Only" and two were for "Burnable Waste, No Metal." All of the dumpsters were empty except one, which was approximately 25% full of plastic bags containing waste asbestos.
Release Controls:	No release controls were identified for this unit.
History of Release:	There are no known releases from this unit (Ref. 37), and none were evident at the time of the VSI.

8. UNIT NAME: Burning Grounds

Unit Description: This unit includes an open field with areas overgrown with high reeds. Several abandoned automotive vehicles were situated in the open field compris ing this unit (Refs. 33 and 34).

Date of Start-up: The exact start-up date for this unit is unknown by facility personnel. Opera tions are believed to have started in the 1930s (Ref. 19).

Date of Closure: The exact closure date for this unit is unknown. Operations are believed to have ended in the 1970s (Ref. 19). In mid-1977 the surface of the area was "decontaminated" by burning with "oil and straw", disced and burned a second time. This unit presently appears to be inactive.

Waste Managed: Waste managed at this unit was reported to have included the following ordnance materials: black powder, smokeless powder, explosive D, Composition A-3, tetryl, TNT, and fuzes. Additional wastes included carbon tetra-chloride, trichloroethylene, paint sludge, pesti cides, and various types of refuse (Ref. 19).

Release Controls: There are no release controls identified with this unlined unit.

History of Releases: This unit was designed to release to air and operational practices are thought to have involved inplace disposal of residual waste materials. During the VSI, a faint odor of a hydrocarbon-type compound was detected upon close inspection of unit soil (Ref. 33).

9. UNIT NAME: Cross and Mine

ORIGIN (RED)

Unit Description: The site is located in the vicinity of Cross Street and Mine Road. The area is next to Bldg. 212 and across the street from Bldg. M1. It covers an approximate area of 20,000 square feet.

This site was utilized as a means of disposing of water used to rinse out mobile spray tanks. The spray tanks contained either herbicides or insecticides. Rinse water from cleaning the tanks was disposed of by discharging it to the ground surface and allowing it to filter into the soil. It is thought that this practice occurred from the early 1950s to mid-1960s and resulted in the disposal of an estimated 675,000 gallons of rinse water. At the time the Notifications of Hazardous Waste Site form was submitted for this site, the area was reported as "devoid of vegetation." Currently, the site is covered with grass and is indistinguishable from the surrounding area (Ref. 31).

This unit was included as part of a 1983 Preliminary Assessment conducted by NUS. Air samples were monitored for volatile organics and radiation; no readings above background were encountered. There was no information available regarding whether any further actions would be implemented at this site.

During the VSI, this area was marked by an unvegetated area and some old, discarded lumber and asphalt remnants.

Date of Start-up: The date of start-up of this unit was in the early 1950s (Ref. 31).

Date of Closure: The date of closure was the mid-1960s (Ref. 31).

Waste Managed: The wastes managed at this unit include an estimated 675,000 gallons of rinse water containing pesticides and herbicides (Ref. 31).

Release Controls: There are no release controls identified with this unlined unit (Ref. 34).

History of Release: There was direct discharge of rinsewater with pesticides and insecticides to the soil. A subarea of this unit was reported to be devoid of vegetation during the NACIP investigation (Ref. 31). At the time of the VSI, the subarea was observed to be devoid of vegetation (Ref. 33).

10. UNIT NAME: Hazardous Waste Container Storage at Bldg. 154Y

ORIGINAL (RED)

Unit Description: Building 154Y is a greater than 90 day storage bunker, presently operated under interim status (Ref. 25). This unit consists of a concrete bunker, covered with soil on all sides, except the side of the entrance. At present, a drainage ditch extends across the front of the bunker.

The inside area of this unit is comprised of designated areas for flammable and Other Regulated Materials (ORM) waste types. Thirty six drums, all situated atop wooden pallets, were observed inside the unit (Ref. 33 and 34).

Date of Start-up: The start-up date for this unit is August 1981 (Ref. 25).

Date of Closure: This unit is presently active (Refs. 33 and 34).

Waste Managed: The wastes managed at this unit include both characteristic (e.g., D001, D002, and D003) and listed hazardous waste (e.g., F001, F002, F003, and F005).

Release Control: According to Norfolk Naval Shipyard personnel, the floor is treated with a waterproof epoxy coating. An air vent extends through the roof of the bunker.

History of Release: It was noted during a June 1986 RCRA Compliance Evaluation Inspection, that the majority of the drums were either badly corroded or bulging; the contents of some of the drums had leaked on or spilled onto the ground (Ref. 24). In addition, inspection reports indicate the drums inside the unit were in unsatisfactory condition during April and May 1987 (Ref. 27). During the VSI, there were no conditions suggesting a release of hazardous waste either inside or outside of the unit.

11. UNIT NAME: Hazardous Waste Container Storage at Bldg. 163Y

ORIGIN

Unit Description: Building 163, presently operated under interim status (Ref. 24), is used to store listed hazardous waste and large quantities of unknown waste for a period of time greater than 90 days (Ref. 28). This unit consists of a concrete bunker, covered with soil on all sides, except the side of the entrance. The front of the bunker previously had a railroad spur extending to the entrance of the unit; this railroad spur no longer exists. At present, a drainage ditch extends across the front of the bunker.

The inside area of this unit is comprised of designated areas for alkali, acid, flammable, and ORM (Other Regulated Materials) waste types. Twelve drums, all situated atop wooden pallets, were observed inside the unit (Refs. 33 and 34).

Date of Start-up: The start-up date for this unit is August 1981 (Ref. 25).

Date of Closure: This unit is presently active (Refs. 33 and 34).

Waste Managed: The wastes managed at this unit include both characteristic (e.g., D001, D002, and D003) and listed hazardous waste (F001, F002, F003, and F005) and large quantities of unknown waste (Ref. 24); also, PCBs, mercuric nitrate and trichloroethylene (Ref. 19).

Release Control: There is an undefined sloped floor which drains into troughs (Ref. 24). According to Norfolk Naval Shipyard personnel, the floor is treated with a waterproof epoxy coating. An air vent extends through the roof of the bunker.

History of Releases: There are no known releases identified from this unit (Ref. 37). The troughs appear to open to the outside of the bunker (Ref. 24).

During the VSI, what appeared to be absorbent, with an odor representative of organic liquid (e.g., solvent), was noted outside the entrance of this unit (Ref. 33). However, no staining was observed of the soil surrounding this unit.

12. UNIT NAME: PCB Storage at Bldg. 198

Unit Description:	This unit is a warehouse which used to store Kepone for the EPA (Ref. 19), and now stores PCB transformers and PCB oil (Ref. 37). This unit is an active, fully enclosed, locked building being used as a PCB storage area, including four 55-gallon barrels and three trans formers, all situated atop wooden pallets (Refs. 33 and 34).
Date of Start-up:	The start-up date for this unit was March 12, 1976 (Ref. 19).
Date of Closure:	The use of this unit for the storage of Kepone was discontinued in October and November 1978 (Ref. 19). However, this building is actively used for PCB storage.
Waste Managed:	The waste stored at this unit have included excessed Kepone (Ref. 19), and PCB transformers and oil (Ref. 24).
Release Controls:	This unit is a fully enclosed, locked building, inside of which wastes reside atop an epoxy treated, concrete floor.
History of Release:	There was no evidence of releases from this unit noted during the VSI.

13. UNIT NAME: Repair and Maintenance Shop at Bldg. 249

ORIGINAL (RED)

Unit Description: This unit is located on the east side of the Vepco Right-of-Way, approximately three miles south of Victory Boulevard. The building is oriented perpendicular to the road, and consists of a two-story wooden structure with garage doors along the north side of the building (Refs. 33 and 34). There is a washrack (SWMU #33) at the east end of the building.

During the NACIP study, this unit was described as used for the storage of a variety of unused equipment, although it was, for the most part, empty. During this NACIP investigation, one mobile spray tank, one open 55-gallon drum labeled "Malathion", one open 55-gallon drum labeled "Exxon XD 3-30", one 55-gallon drum labeled "Ortho VOKK 70", and one bag of diazinon were being stored in the building (Ref. 31).

This unit was included as part of a 1983 Preliminary Assessment conducted by NUS. Air samples were monitored for volatile organics and radiation; no readings above background were encountered. There was no information available regarding whether any further actions would be implemented at this site.

This unit is currently used as a repair and maintenance shop for automotive vehicles used at the St. Juliens Creek facility (Ref. 33). Building 249 contains heavy equipment, vehicles needing repair, tools, and operational areas (e.g., solvent baths) normally found in areas used for automotive repair and maintenance. There were no waste management operations at Bldg. 249 at the time of the VSI.

Date of Start-up: The date of start-up of this unit was in the mid-1960s (Ref. 31).

13. UNIT NAME: Repair and Maintenance Shop at Bldg. 249 (continued)

Date of Closure:	The use of this unit as a waste storage area was discontinued in 1976 (Ref. 31). It could not be determined what, if any, modifications were made to Bldg. 249 in the modification from a waste management unit to a motor vehicle maintenance area.
Waste Managed:	The wastes managed at this unit include rinse water containing pesticides and penetone (cleaning agent). The quantity of discharge rinse water is unknown.
Release Control:	All operations reportedly occur within the confines of the building. Additionally, runoff from the area is directed to a storm water sewer (AOC D).
History of Release:	No releases were in the available file information and no evidence of release was noted during the VSI.

14. UNIT NAME: Hazardous Waste Disposal Area at Bldg. 13 (Railroad Tracks)

Unit Description: There is no description of this unit other than being identified as a railroad tracks located on-site in an unidentified proximity to Bldg. 13. Waste solvents generated in hardware cleaning operations were disposed of at this site (Ref. 19).

Currently, this area is an inactive portion of railroad track with no features discernibly different from a typical section of track. The facility indicates that the railroad track area is currently filled with asphalt, concrete, and gravel (Ref. 37). Building 13 was observed to be a well-maintained (e.g., no stains) machine shop (Refs. 33 and 34).

Date of Start-up: The start-up date for this unit is believed to be prior to 1940 (Ref. 19).

Date of Closure: The use of this unit was discontinued in the 1970s (Ref. 19). However, the unit has not been formally closed.

Waste Managed: The wastes managed at this unit included Alodine (a caustic detergent), methyl ethyl ketone, and acetone (Ref. 19).

Release Control: There are no release controls identified with this unit.

History of Releases: Liquid wastes were poured on the railroad tracks near Bldg. 13 (Ref. 19). No evidence of release (e.g., stains, stressed vegetation, odors) was observed during the VSI (Refs. 33 and 34).

15. UNIT NAME: Hazardous Waste Disposal Area at Bldg. 53

Unit Description:	This area was reportedly used for the disposal of waste solvents onto the ground adjacent to Bldg. 53 (Ref. 19). During the VSI, facility personnel could provide no information on the volume of water disposed, the area over which wastes were disposed, or the period of use. The VSI team attempted to locate the area, but were unable to define any boundaries for this unit. The general area around Bldg. 53 was vegetated and no evidence of staining or stressed vegetation were noted. Currently, Bldg. 53 has been converted into a facility recreation room.
Date of Start-up:	The start-up date for this unit is unknown.
Date of Closure:	The date of closure for the unit is unknown. However, the facility indi cated that the recreation facility had existed at least five years at the time of this reporting (Ref. 37).
Waste Managed:	The wastes managed at this unit were said to include TCE and possibly PCB (Ref. 19).
Release Control:	There are no release controls identified with this unit.
History of Release:	Waste solvents were poured directly onto the bare ground (Ref. 19). As stated above, no evidence of release was observed during the VSI (Refs. 33 and 34).

16. UNIT NAME: Sand Blasting Area at Bldg. 323

Unit Description:	Building 323 is used as a dedicated area to sand blast paint from metal items. The building is a bare floored, metal shed, which is covered, divided into two stalls, and open at two ends (Refs. 33 and 34).
Date of Start-up:	The date of start-up for this unit could not be identified.
Date of Closure:	This unit is currently active (Refs. 33 and 34).
Waste Managed:	Wastes at the site consist of the waste blast grit (Black Beauty and walnut hulls) and any particulates removed from the items being blasted (e.g., paint, metal) (Ref. 33).
Release Controls:	No release controls are associated with this unit, although there is a roof and several walls to promote some localization of the particulate waste as it is generated. It was stated that additional barriers will be installed in the future to prevent particulate waste grit from escaping the building.
History of Release:	Sand blast waste grit was noted on the ground surrounding Bldg. 323 (Ref. 33).

17. UNIT NAME: Old Storage Yard #1

Unit Description:	This unit consists of a fenced outdoor grassy area used primarily to store a variety of materials (e.g., anchors, chain, equipment, etc.). Additionally, closed 5-gallon containers of hydraulic fluid, lube oil, and lead paint (product) were present (Ref. 33). Waste hydraulic fluids and lube oils may contain semi-volatile hazardous constituents.
Date of Start-up:	The start-up date for this unit is unknown.
Date of Closure:	This unit is presently active.
Waste Managed:	This unit stores obsolete equipment, scrap metal, 5-gallon buckets of hydraulic fluid, lube oil, and lead paint on wooden pallets (Ref. 33). Waste hydraulic fluids and lube oils may contain semi-volatile constituents.
Release Control:	No release controls were noted for this unit.
History of Release:	It was noted that oil had leaked, or had been drained, from the crank-case of one of the pieces of equipment stored at the site onto the underlying soil (Ref. 33). In addition, open drums of sand blast grit, also being stored at this unit, were observed to have spilled portions of their contents onto the soil (Ref. 33).

18. UNIT NAME: Old Storage Yard #2

Unit Description:	This unit is located south of Bldg. 154Y (SWMU #10) and consists of an asphalt pad which measured approximately 100' x 400'. The area is used to store scrap metal and various types of metal equipment. Additionally, two old metal tanks were present (volume > 1,000 gallons). Facility personnel did not know the source of the tanks, although it appeared that they could have been boilers out of a ship (Refs. 33 and 34).
Date of Start-up:	The start-up date for this unit could not be determined.
Date of Closure:	This unit is presently active.
Waste Managed:	Wastes consisted of scrap metal and various types of obsolete metal equipment.
Release Control:	The unit is underlain by an asphalt pad. No other release control structures were noted (Refs. 33 and 34).
History of Release:	There are no known releases from this unit (Ref. 37), and no releases were evident at the time of the VSI (Refs. 33 and 34).

19. UNIT NAME: Storage Yard #3

Unit Description: This unit is at a location contiguous with SIMA #2 (SWMU #27), and consists of a fenced concrete pad which appeared to be the foundation of a building previously located at this site. This unit is located outdoors and measures approximately 40' x 500'. In the center of the pad is a small metal building (approximately 20' x 40'). The area is used to store scrap metal, obsolete equipment, and piping (Refs. 33 and 34).

Date of Start-up: The start-up date for this unit could not be identified.

Date of Closure: This unit is presently active.

Waste Managed: Types of wasted stored at this unit include scrap metal, obsolete equipment, and various types of piping.

Release Controls: The pad is partially surrounded by a concrete berm. The berm is less than six inches in height and is not continuous around the perimeter of the pad (Refs. 33 and 34).

History of Release: There are no known releases from this unit (Ref. 37). During the VSI, insulation material, the specific type of which could not be identified at the time, was observed flaking off of an old pipe being stored at this unit onto the underlying concrete (Refs. 33 and 34).

20. UNIT NAME: Waste Generation Area #1 (SIMA Air #1)

ORIGINAL (RED)

Unit Description:	This unit, regulated by the State of Virginia, is a fenced concrete pad used to store waste liquids (e.g., battery acid, lacquer thinner, and lube oils) prior to being sent to the waste accumulation area (SWMU #21). Closed, 55-gallon barrels are used to contain the wastes; when the barrel is filled, it is removed to the waste accumulation area (SWMU #21) within 72 hours. The pad measures approximately 20' x 20' and is surrounded by a 6-foot high chain-link fence. Entrance into the area is controlled by a locked gate (Refs. 33 and 34).
Date of Start-up:	The date of start-up could not be determined.
Date of Closure:	This unit is presently active.
Waste Managed:	Wastes stored at the site include waste lacquer thinner, waste lube oil, old batteries, antifreeze, and battery acid (Refs. 33 and 34).
Release Controls:	The concrete pad is surrounded by sand bags which form a pseudo-berm (Refs. 33 and 34).
History of Release:	During the VSI, oily stains were noted on concrete pad and to a lesser degree, on the soil in areas surrounding the pad (Refs. 33 and 34).

21. UNIT NAME: Hazardous Waste Accumulation Area (SIMA #2)

Unit Description:	This area, regulated by the State of Virginia, located east of Bldg. 47 and consists of a concrete pad (approxi mately 20' x 40') which receives wastes from SIMA #1 (SWMU #25). Waste material is stored at this unit before being transported to a RCRA interim status storage facility (Bldgs. 154Y or 163Y; SWMUs #10 and #11, respectively). The area is enclosed by a 8-foot high chain-link fence, and access is controlled by a locked gate (Refs. 33 and 34).
Date of Start-up:	The date of start-up for this unit could not be determined.
Date of Closure:	This unit is presently active.
Waste Managed:	Wastes stored at this unit were observed to include old batteries, waste lacquer thinner, lube and oils. At the time of the VSI there were approximately 13 batteries and two 55-gallon drums of waste lube oil (Refs. 33 and 34).
Release Controls:	The concrete pad is surrounded by a concrete berm (e.g., less than six inches) and sand bags (Refs. 33 and 34).
History of Release:	There are no known releases from this unit (Ref. 37), and no releases were evident at the time of the VSI (Refs. 33 and 34).

22. UNIT NAME: Repair Shop Satellite Storage Area Northeast of Bldg. 40

Unit Description: This unit, regulated by the State of Virginia, is a repair shop satellite area located northeast of Bldg. 40. It is an outdoor concrete pad which measures approximately 15' x 35', and which was used in the past for the storage of hazardous wastes (Refs. 33 and 34).

Date of Start-up: According to facility representatives, this unit was used for waste storage as early as 1985.

Date of Closure: At the time of the VSI, the unit was physically present but inactive. Facility representatives stated that the unit was used for waste storage for a period of approximately two years (approximately 1985 through 1987).

Waste Managed: Facility representatives stated in the past, this unit stored barrels of hazardous waste for a period less than 90 days. At the time of the VSI no barrels were present, nor were any other types of waste (Refs. 33 and 34).

Release Controls: The concrete pad is surrounded by sand bags on two sides and a concrete curb on the other two sides (Refs. 33 and 34).

History of Release: During the VSI oily stains were noted on the concrete pad, but no releases were evident on the surrounding soil (Refs. 33 and 34).

23. UNIT NAME: Oil Water Separator at Bldg. 249

Unit Description:	This unit is located adjacent to the washrack (SWMU #25) at Bldg. 249 (SWMU #13), and consists of a subgrade, concrete, open-top tank with a metal grating as a cover. This purpose of this unit is to collect rinsate and washdown material from the associated wash pad. According to St. Juliens Creek personnel, sludge is pumped on a periodic basis from the bottom of this unit into a vacuum truck, and transported off-site for final disposal. Excess water is directed to a POTW conduit via a level control outlet (Ref. 33).
Date of Start-up:	The start-up date for this unit is unknown.
Date of Closure:	This unit is presently active.
Waste Managed:	This unit manages oily water and solvent rinsate from the adjacent washrack (SWMU #25).
Release Control:	This is a subgrade, concrete, open-top tank with a metal grating as a cover. According to St. Juliens Creek personnel, sludge is pumped on a periodic basis from the bottom of this unit into a vacuum truck, and transported off-site for final disposal. Excess water is directed to a POTW conduit via a level control outlet (Refs. 33 and 34).
History of Release:	There are no known releases identified from this unit (Ref. 37). During the VSI, no evidence of release was noted.

24. UNIT NAME: Caged Pit at the Burning Grounds

ORIGINAL (RED)

Unit Description: This unit was located within the area of the facility Burning Grounds (SWMU #8) (Ref. 19), and was used as a pit to burn small items. Additionally, the pit has a cage over it.

During the VSI, it was determined that the unit no longer exists. In addition, facility representatives were not able to provide any operational information regarding this unit (Ref. 33).

Date of Start-up: The start-up date for this unit is unknown.

Date of Closure: The closure date for this unit is unknown. This unit no longer exists.

Waste Managed: Waste items burned were said to include igniters and fuzes.

Release Control: There are no release controls identified with this unit.

History of Release: Operational practices involved releases to air and wastes being managed directly on the soil surface. No specific evidence of release from this unit was identified during the VSI (Refs. 33 and 34).

25. UNIT NAME: Washrack at Bldg. 266

Unit Description:	This unit is located at the east end of Bldg. 266 and is a single concrete wash pad which is divided into two separate stalls (Refs. 33 and 34). The unit is located outdoors and is not covered. One stall is used to remove grease and the other is used to rinse non-greasy items. Each stall measures approximate ly 15' x 40' and is surrounded by 6" to 8" concrete berms. Prior to 1976, the discharge ran out the southern end of the wash pad and into a storm drain. In 1976, the discharge stream was directed to a sanitary sewer (Ref. 31). Present ly, discharge from this unit is directed to the oil/water separator (SWMU #23).
Date of Start-up:	From the mid-1960s to 1976, the wash pad was used for cleaning pesticides and herbicides out of mobile spray tanks. However, one stall was rebuilt in 1981 (approximately) and the other was constructed in 1986.
Date of Closure:	This unit is presently active.
Waste Managed:	The wastes managed at this unit include solvent wastewater from rinsing various types of equipment. A chemical cleaner, Penetone, reportedly has been used for cleaning (Ref. 31). The chemical make-up of Penetone was not determined.
Release Controls:	The unit is a concrete pad and is surrounded by concrete berms (6" to 18" in height). Each stall is sloped to direct rinsewater to drains which are connected to an oily water separator (SWMU #30).
History of Release:	Prior to 1976, effluent from this unit drained directly into St. Juliens Creek. During the VSI, oily sludge was observed on the soil beyond the secondary containment of the pad.

26. UNIT NAME: Scrap Metal Storage in Railroad Cars Near Bldg. 176

Unit Description:	This unit consists of four, open-topped railroad storage cars containing scrap metal. The cars were located on an active railroad spur near Bldg. 176 (Refs. 33 and 34).
Date of Start-up:	The start-up date for this unit could not be determined.
Date of Closure:	This unit is presently active.
Waste Managed:	The types of wastes noted during the VSI consisted of stainless steel scrap metal destined for DRMO (SWMU #28). There was no evidence that suggests this unit manages hazardous waste or constituents.
Release Control:	No release controls were identified for this unit.
History of Release:	There are no documented releases from this unit and no releases were evident during the VSI.

27. UNIT NAME: Fire Training Area at Bldg. 271

Unit Description:	The fire training area is located at Bldg. 271. This unit consists of two adjacent celled areas which are used to train personnel to fight fires. One of the celled areas consists of a burning site where wooden pallets are soaked with diesel, ignited, and extinguished with water. The other burning site is a buried stainless steel pit (4' x 4' x 3' deep) filled with diesel fuel which is ignited and extinguished using CO_2 (Refs. 33 and 34).
Date of Start-up:	The start-up date for this unit could not be determined.
Date of Closure:	This unit is presently active.
Waste Managed:	Wastes managed at this site include wooden pallets and diesel fuel.
Release Control:	Other than the stainless steel pit used to hold the diesel fuel, no control structures were noted (Refs. 33 and 34).
History of Release:	This unit is designed to release to air. During the VSI, blackened and stained soil was observed. Additionally, ashes from the burning of the pallets were observed to be piled along the fence-line behind the fire training area, and the soil of the storage area containing the diesel fuel used to start the fire was observed to be stained (Refs. 33 and 34).

28. UNIT NAME: Clearing House Storage Area (DRMO)

Unit Description: This unit is a clearing house for any items which are excessed by the government. The area occupied by DRMO is approximately 10 acres in size, of which approximately 6 acres are bare soil and the remaining 4 acres are currently overlain by concrete or asphalt. The DRMO area is divided into subareas for handling various individual types of waste items, from old navy boats to piles of scrap metal. The bare soil areas are primarily used for the storage and handling of scrap metal (e.g., stored in piles 20 to 30 feet high) and obsolete equipment, while the concrete and asphalt areas are reserved for items to be auctioned (e.g., machinery, equipment) or salvaged (e.g., bolts, stainless steel). Also, on-site at the DRMO area is a warehouse which is used to store obsolete or excessive items such as computers, copiers, and other types of electrical equipment (Refs. 33 and 34).

Date of Start-up: The start-up date for this unit could not be determined.

Date of Closure: This unit is presently active.

Waste Managed: Wastes handled at this unit included scrap metal, old uniforms, old boats and vehicles, obsolete equipment, and excess hardware items. Some of the old vehicles dripped oil and other auto motive fluids.

Release Control: The warehouse is completely enclosed and is located on a concrete floor. Additionally, no liquid wastes were noted in the warehouse. No release control structures were noted for the outdoor areas at this unit. A storm water drain was observed in the center of the DRMO area (Ref. 33).

History of Release: Waste metals are stored on the soil surface. Localized oily stains were observed during the VSI at several points on the bare soil areas where heavy equipment and machinery were being stored. In addition, the drainage ditch behind the warehouse contained an old tire and various debris; standing water in this ditch had an organic sheen (Refs. 33 and 34).

29. UNIT NAME: Dumpsters (Located Throughout the Facility)

Unit Description: This unit consists of numerous metal dumpsters (50) located at various points throughout the facility, which are used to receive various types of refuse and waste products (Refs. 33 and 34). Listed below are the number, size, type of dumpster, and waste handled by each dumpster:

#	Size	Type & Waste
18 –	3 yd^3	closed top for burnable waste
4 –	3 yd^3	open top for salvageable material
1 –	6 yd^3	closed top for asbestos
1 –	10 yd^3	open top for sand
2 –	20 yd^3	open top for burnable waste
4 –	20 yd^3	open top for salvageable material
3 –	20 yd^3	open top for non–burnable, non–salvageable material
1 –	30 yd^3	closed top for asbestos
10 –	40 yd^3	open top for burnable waste
5 –	8 yd^3	closed top for burnable waste
1 –	8 yd^3	closed top for non–burnable, non–salvageable material

29. UNIT NAME: Dumpsters (Located Throughout the Facility) (continued)

Date of Start-up:	Start-up dates for these dumpsters could not be determined. Each is emptied on a regular schedule by a contractor for off-site disposal.
Date of Closure:	These dumpsters are presently active.
Waste Managed:	Wastes handled in these dumpsters include burnable wastes (e.g., refuse), non-burnable wastes (e.g., metal), salvageable wastes (e.g., metal), non-burnable, non-salvageable wastes (e.g., sand), and asbestos wastes.
Release Control:	Other than the closed tops identified for specific dumpsters, no release control structures are associated with these units.
History of Release:	No releases were noted during the VSI other than the dumpster associated with Bldg. 323 (SWMU #17) which is used to contain waste blasting grit. At this dumpster, waste grit was observed on the soil surface (Ref. 33).

30. UNIT NAME: Waste Disposal Pits at Dump C

Unit Description:	This unit consists of two pits at the Dump C site (SWMU #5). These pits were reported to have been used for disposal of oils and oily sludges, as well as for periodic burning of oil (Ref. 19). Facility representatives were not aware of this unit, nor was there any specific evidence of these pits during inspection of the Dump C area.
Date of Start-up:	The start-up date for this unit is believed to be around 1940 (Ref. 19).
Date of Closure:	The date of closure for this unit is uncertain; the use of Dump C was discontinued at about 1970 (Ref. 19).
Waste Managed:	The wastes managed at this unit include waste oils and oil sludges.
Release Control:	There are no release controls identified with this unlined unit.
History of Release:	This unit would have released to air during the burning of oily wastes. No evidence of release was noted during the VSI (Refs. 33 and 34).

31. UNIT NAME: Swale Beneath Bldg. 13

Unit Description:	This unit is a swale that runs under Bldg. 13 (SWMU #14) and drains into St. Juliens Creek. Rinsate generated from the washing of smokeless powder cans that were washed in Bldgs. 13 and 47 were emptied into this swale (Ref. 19). During the VSI, neither the swale area nor any evidence of contamination (e.g., staining or stressed vegetation) could be found. Facility representatives indicated that they did not know of a swale in this area.
Date of Start-up:	The start-up date for this unit is unknown, but operations of this type are believed to have been employed during the 1930s (Ref. 19).
Date of Closure:	The date of closure is uncertain; this type of smokeless powder cleaning operation is believed to have been discontinued after World War II (Ref. 19).
Waste Managed:	The wastes managed at this unit include rinsate generated from the washing of smokeless powder cans.
Release Control:	There are no release controls identified with this unit.
History of Release:	There are no release events identified with this unit. No evidence of release was observed during the VSI (Refs. 33 and 34).

32. UNIT NAME: Overland Drainage Ditches

Unit Description: At the facility, a series of overland drainage ditches were used for transport of process wastewaters and runoff from process areas. During the VSI, representative ditches were observed (Ref. 33). Specifically, drainage ditches were observed in the vicinity of Dump D (SWMU #6). Since it was common practice to discharge wastes directly to receiving waters (i.e., before the facility had pipelines) (Ref. 19), these overland drainage ditches are expected to have transported waste effluents before an unregulated discharge to receiving waters.

Date of Start-up: The start-up date for this unit is unknown, but operations of this type are believed to have been employed since the early 1900s.

Date of Closure: Facility representatives indicated that process wastes are collected and managed at waste generation points and are no longer transported via these ditches. There was no evidence of waste transport in these ditches observed during the VSI.

Waste Managed: This unit managed wastewater and runoff from various past facility operations.

Release Control: There are no release controls identified with this unlined unit.

History of Release: There are no release events identified with this unit, nor was there evidence of a release (e.g., staining) observed during the VSI (Ref. 33).

33. UNIT NAME: Sewer Drainage System

Unit Description: This unit consists of the underground sewer drainage system used for both sanitary sewage and storm water runoff. Past waste management practices involve unspecified waste washed into floor drains, and ultimately, entering either the sanitary or storm water sewer system lines. Waste materials include those generated from fuze drillout operations, ammunition breakdown operations, steamout operations, degreasing operations, and boiler plant operations. During the VSI, it was observed that the oil water separator (SWMU #23), which collects rinsate from the washrack (SWMU #25), is tied to the sanitary sewer. In addition, it was observed during the VSI that unspecified spilled liquids in operational areas throughout the St. Juliens Creek Annex facility (e.g., Bldg. 249 (SWMU #13)) may enter the drain system.

Date of Start-up: The start-up date for this unit is unknown, but operations of this type are believed to have been employed since the early 1900s.

Date of Closure: The sewer drainage system is currently active.

Waste Managed: The wastes managed at this unit are sanitary wastewater and minimal wastewaters (e.g., surface drainage) from process operations.

Release Control: There are no release controls identified with this unit. However, facility representatives indicated that the sanitary sewer system lines are directed to a local POTW.

History of Release: There are no release events identified with this unit; however, the condition of this underground unit could not be visually determined (Ref. 33).

34. UNIT NAME: Operational Waste Accumulation Areas

Unit Description:	Throughout the St. Juliens facility, there are various dedicated waste accumulation areas (e.g., hundreds). Based on observation of representative units, and following a discussion with facility personnel, a typical operational waste accumulation area is a "two-day" storage area, and was observed as an indoor, dedicated (i.e., identified as a painted floor area) portion of a building and contained a single 55-gallon drum and a 5-gallon can. Both the drum and the can were closed (Refs. 33 and 34).
Date of Start-up:	The start-up date for each unit is unknown, but each individual operational waste accumulation area is expected to be related to the specific operation being employed at the facility.
Date of Closure:	Operational waste accumulation areas are currently active.
Waste Managed:	The wastes managed at each waste accumulation area unit are specific to the operation being employed, and are expected to include various waste oils and solvents.
Release Controls:	These units are located within enclosed buildings with concrete floors (Refs. 33 and 34).
History of Release:	There are no release events identified with this unit, and no evidence of release was noted during the VSI.

A. AREA OF CONCERN NAME: Satellite Storage at Bldg. 279

Description: This area of concern is a small concrete storage pad located just outside of Bldg. 279, which is used to store two 55-gallon drums of PD-680, a commercial product used as a degreaser. A two gallon bucket was observed hanging under the tap of one of the barrels, apparently designed to catch barrel drippings. At the time of the VSI, the two gallon bucket was full to the point of overflowing, and there were stains on the concrete and nearby soil. Aside from the concrete pad, there were no release control structures associated with this area (Refs. 33 and 34).

B. AREA OF CONCERN NAME: Air Compressor at Bldg. 47

Description: This area of concern is a large aircompressor located atop an unused portion of railroad spur, outside of Bldg. 47. There are oily stains located on the soil directly below the compressor, which suggests that lubri cating oil may either be routinely leaking, or else being drained from the compressor resulting in a release to the soil (Refs. 33 and 34).

C. AREA OF CONCERN NAME: Blasting Grit at Bldg. 47

Description: This area of concern consists of small amounts (e.g., less than five gallons) of black blasting grit which had been poured on the soil along the south end of Bldg. 47. The source of the blasting grit could not be determined; however, there were two sand blasting booths in Bldg. 47. Personnel at Bldg. 47 stated that black blasting grit is never used in their sand blasters (Refs. 33 and 34).

D. AREA OF CONCERN NAME: Storm Water Outfalls

Description: A total of 35 outfall structures were identified at the facility. All of the outfalls are associated with the storm water drainage system; none are connected to the sanitary sewers. No evidence of a release of waste was noted at the outfalls during the VSI (Ref. 33). These outfalls are listed as an area of concern based on past releases from waste management areas through outfalls structures (Ref. 19).

E. AREA OF CONCERN NAME: Temporary Pump Storage

Description: This area of concern is located at Bldg. 104, and is used to temporarily store generators, pumps, and heavy equipment. At the time of the VSI, it was noted that lubricating oil had leaked from one of the pumps onto the bare ground. Once it was noted, the leaking pump was removed and placed on the concrete foundation of Bldg. 104 (Ref. 33).

F. AREA OF CONCERN NAME: Underground Storage Tanks

Description: During the VSI, it was determined that a total of eight underground product storage tanks (USTs) were listed on the facility's UST notification forms. Some of the tanks were determined to be out of service but still inplace; others are currently being used for storage of refined fuels (diesel and gasoline). The age of the tanks varied from 10 to 30 years and the capacity of the tanks ranged from 250 to 8,000 gallons. The tanks are constructed from steel, concrete, and fiberglass, and are located at Bldgs. 113, 201 (two tanks), 263, 266, 271, and 283 (three tanks) (Ref. 35).

Due to the underground location of most of these tanks, an inspection could not be performed (Ref. 35).

G. AREA OF CONCERN NAME: Former Process Buildings

Description: The former process buildings at the St. Juliens Creek Annex facility represent structures where various processes and operations were performed, some of which were suspected to have generated hazard ous constituents, however, these structures no longer exist. In addition, it was determined during the VSI that there were various buildings which may have been used for process operations in the past, and still physically exist; however, process oper ations are no longer implemented at these buildings (Ref. 33). A compre hensive list of either existing or non-existing former process buildings was not available during this investigation. It should be known that the information collected during this investigation did not identify whether these buildings were cleaned or decontaminated prior to being torn down, or describe any modification(s) in waste management once these buildings were torn down.

H. AREA OF CONCERN NAME: Residual Ordnance at Bldgs. M-5 and 190

Description: This area of concern is an area between two buildings and is presently the site of various undefined construction rubble. It is believed that various ordnance items that were disposed of in this area during past ordnance management operations may still be present in the soils of this area (Ref. 19). Facility representa tives stated during the VSI that they had no knowledge of residual contamina tion in this area; a visual inspection of this area was not performed due to time constraints.

I. AREA OF CONCERN NAME: Residual Ordnance at Wharf Area

Description: This area of concern is a former pier area, and is presently the site of various undefined construction rubble. According to the NACIP study (Ref. 19), Explosive Ordnance Disposal Team divers searched the area and reported some metal and deep silt. The area of the new pier, along the river in the southeast corner of the property, was also searched. Many metallic objects and deep silt were reported. According to the Navy, it is a reasonable assumption that various ordnance items were dropped during loading operations, and may still be present in the silt.

J. AREA OF CONCERN NAME: Former Ammunition Manufacturing Areas

Description: This area of concern represents former areas used and in the manufacture of ammunition. According to the NACIP study (Ref. 19), different sizes and types of ammunition were loaded with black powder, smokeless powders, Explos ive D, TNT, Composition A-3, and tetryl in these areas since 1898. Buildings in which loose ordnance is believed to have been handled include: Bldgs. 12, 13, 14, 18, 29 (which has been torn down, and was formerly adjacent to the east end of M-2), 32, 32A, 33 (these three buildings were located between Bldgs. 17, 38, and 39), 39, 41, 43, 46, 47, 89, 180, 184, 185, 188, 190, 193, 222 (Victory Build ing, located between the Burning Grounds (SWMU #8) and Blows Creek), 240 through 246, 256, 267, M-3, M-4, M-5, and M-5 Annex. These buildings are believed to have been located (e.g., it is not presently known if they still exist) south and east of the Virginia Electric and Power Company (VEPCO) power lines that bisect the facility. There is no indication of whether these areas were cleaned or decontaminated prior to being decommissioned as ammunition manufactur ing areas. A visual inspection of these specific areas was not performed due to time constraints. However, Table 3 lists a summary of St. Juliens Creek Annex buildings where explosives were used.

K. AREA OF CONCERN NAME: Former Sewage Treatment Plant

Description: No information is available on the description and operation of this unit other than being identified as a "small sewage treatment plant located on-site in an undefined proximity to Bldg. 318 (Ref. 19). Facility representatives were not able to provide any operational information regarding this unit. Inspection of the area where this unit was thought to have been located did not reveal any evidence of prior existence (Ref. 33). The start-up date for this unit is 1942 (Ref. 19). The date of closure is uncertain; the use of this unit was discontinued in 1947 (Ref. 19). Presently there is no physical evidence demonstrating the existence of sewage treatment plant. The wastes managed at this unit were said to include treated wastewater from the on-site barracks (Ref. 19). There are no release controls identified with this unit. According to the U.S. Navy, there is a documented discharge of unspecified waste to an unnamed receptor (Ref. 19).

L. AREA OF CONCERN NAME: Old Tanks at Dump D

Description: There is no description of this unit other than a map illustrating on-site location in an undefined proximity to Dumps C and D (SWMUs #5 and #6). However, no such unit(s) were observed to be located in the area illustrated on the map, nor did St. Juliens personnel know of these tanks during the VSI. The start-up date for this unit is unknown. This unit is no longer in existence. It is unknown which waste types were managed at this unit. There are no documented releases identified from this unit, either during the PR or the VSI.

Bldgs. 12, 14:	Explosive D (1900s to late 1930s) These buildings originally had wooden or dirt floors. The concrete slab flooring was probably installed about 1940. Whether contamination is still present under these buildings is unknown.
Bldg. 43:	Explosive D (1908 to 1970s), Compound A-3 (1940s to 1970s). This building originally had wooden or dirt floors. The concrete slab was probably installed about 1940.
Bldg. 89:	Explosive D (1920s to 1970s), Tetryl (1930s to 1970s). This building was heavily used for loading explosives into ammunition.
Bldg. 188:	Composition A-3 (1940s to 1970s), Tetryl (1940s to 1970s) Ammunition loading.
Bldg. 190:	Explosive D (1940s to 1970s), Composition A-3 (1940s to 1970s). This building was heavily used for loading explosives into ammunition.
Bldg. 193:	Explosive D (1900s to late 1930s) This building was torn down and was replaced with a new building in 1942. Whether any contamination is present under the building is unknown.
Bldg. 240:	Explosive D (1945 to 1970s) Explosive-sifting building.
Bldgs. 241, 242, 243:	Composition A-3 (1940s to 1970s), Tetryl (1940s to 1970s) Vacuum systems for bldg. 188.
Bldg. 256:	Explosive D (1940s to 1970s), Composition A-3 (1940s to 1970s) Vacuum systems for bldg. 190.
Bldg 267:	Explosive D (1940s to 1970s), Tetryl (1940s to 1970s) Vacuum system for bldg. 89.

Table 3. Summary of Buildings Where Explosives Were Used (Ref. 19).

5.0 EXECUTIVE SUMMARY

A RCRA Facility Assessment (RFA) of the St. Juliens Creek–Portsmouth facil ity was conducted to identify sources and/or areas of contaminant releases and to evaluate the potential for releases of contaminants to the environ ment from solid waste management units (SWMUs) identified at this facility. This RFA consisted of a Preliminary Review (PR) of pertinent EPA Region III and Virginia Department of Environmental Resources files, and a Visual Site Inspection (VSI) of the facility performed from June 29, 1988 to July 1, 1988. The objective of the RFA is to use the corrective action authorities provided by the 1984 Hazardous and Solid Waste Amendments to RCRA to address otherwise unregulated releases of hazardous constituents to local area surface waters, soils, groundwater, air, through subsurface gas gener action, and also to identify other areas of concern (AOCs) at the facility.

St. Juliens Creek is an annex of the Norfolk Naval Shipyard, located within the City of Chesapeake in southeast Virginia. This facility occupies approximately 490 acres, including 407 acres of hard land, 14 acres of marsh, and 69 acres of surface water. The St. Juliens Creek abuts Portsmouth City and the Norfolk and Western Railroad on the north, the southern branch of the Elizabeth River to the east, St. Juliens Creek on the south, and a residential section of Chesapeake City to the west.

The St. Juliens Creek facility, in existence since 1848, has been associated with Ordnance Operations including those involving black powder, smokeless powder, projectile loading, mine loading, tracer mixtures, demilitarization, degreasing, testing, and decontamination for the U.S. Navy. In addition, non–ordnance operations included metal plating, non–ordnance degreasing, painting, machining, vehicle and locomotive maintenance, battery shop operations, printing, and fire protection. Oil, ordnance materials, and non–ordnance materials (e.g., including kepone) have been stored at the St. Juliens Creek facility. Presently, St. Juliens Creek manages wastes that are generated in sandblasting, rinsing and degreasing operations (e.g., D001, D002, and D003). Hazardous wastes are stored at RCRA interim status storage units.

A total of 34 SWMUs and 12 areas of concern were identified through the file review and a VSI of the facility. For this report, SWMUs were identified in the following categories: landfills/dumps, storage areas, and operational area units.

Based on a review of files submitted by the facility and observations during the VSI, the potential for release and suggested further actions for SWMUs and AOCs has been developed. The SWMUs representing the greatest concern are those, which in the past, have involved waste management operations, including areas where landfilling and designated area burns were practiced routinely. These units include Dump A (SWMU #1), Dump B (SWMU #2), Dump C (SWMU #5), Dump D (SWMU #6), and the Burning Grounds (SWMU #8). Additionally, units which are associated or have been associated with these units (i.e., Dump B Incinerator (SWMU #3), Blast Grit at Dump B (SWMU #4), Old Tanks at Dump D (AOC L), Caged Pit at the Burning Grounds (SWMU #24), and the Waste Disposal Pits at Dump C (SWMU #30)) should be included in the assessment of these units. Although there was no salient visible evidence to confirm a release of hazardous waste or hazardous waste constituents from these units, historical data indicates that these sites are likely to contain significant amounts of hazardous constituents and/or wastes having hazardous characteristics in unmapped subsoils of these units. The unlined nature of these landfills in conjunction with sensitive hydrogeologic profile (e.g., water table less than ten feet from the surface) further exacerbates the potential for release. Other SWMUs and AOCs with a moderate to high potential for release are both those for which the soils were observed to have staining, and also, those without adequate controls to prevent releases to surface waters (e.g., stormwater discharge).

Suggested further actions for these units include the following:

A) Conducting a hydrogeologic investigation to determine the nature, extent, direction, and rate of migration of releases to groundwater;

B) Soil sampling to determine if hazardous constituents have been released;

C) A waste assessment to determine the presence of hazardous constituents and/or characteristics;

D) Integrity testing to determine the condition of below-grade units; and

E) Measures to prevent releases to surface waters for units which are releasing hazardous constituents in runoff generated within the unit area, and directed to adjacent storm water sewers.

Both integrity testing and verification investigations are suggested for SWMUs and AOCs at the St. Juliens Creek Annex facility. These units and their respective suggested testing and investigations conditions are listed in Table 4 and include units such as the Oil Water Separator (SWMU #23), Underground Tanks (AOC F; address under UST), and the Sewer Drainage System (SWMU #33). The objectives and scope of these integrity testing and verification investigations are described in detail in Section 7.1 of this report.

The specific details involving integrity testing and verification investigations are provided in Attachment B. Table 6 lists the SWMUs for which a detailed subsurface investigation appears warranted based on a high potential for release, or a documented release, of hazardous waste or hazardous waste constituents. A summary of conclusions and suggested further actions for the 34 SWMUs and 12 AOCs are found in Chapter 7.0 of this report. The objectives and scope of the RCRA Facility Investigation (RFI) for these units are described in detail in Section 7.2 of this report.

Table 4
SWMUs and AOCs Recommended for Further Action
Other Than a RCRA Facility Investigation (RFI). *

SWMU No.	Solid Waste Management Units	Suggested Further Action	Sampling or Control Strategy
4	Blast Grit at Dump B	A waste assessment to determine the presence of hazardous constituents and/or characteristics	Analyze soil/blasting grit; control particulate dispersion
9	Cross and Mine	Soil sampling to determine if hazardous constituents have been released	Soil samples at 0-1 and 1-2 feet within grid at 20 foot radius of stressed vegetation
13	Repair and Maintenance Shop	Measures to prevent releases to surface waters for units which are releasing hazardous constituents in runoff generated within the unit area, and directed to adjacent storm sewers	Control runoff from operations at Bldg.249 area to storm sewer
14	Hazardous Waste Disposal Area at Bldg. 13 (Railroad Tracks)	Soil sampling to determine if hazardous constituents have been released	Soil samples (0-1 and 1-2 feet) at suspect areas
15	Hazardous Waste Disposal Area at Bldg. 53	Soil sampling to determine if hazardous constituents have been released	Soil samples (0-1 and 1-2 feet) at suspect areas
16	Sand Blasting Area at Bldg. 323	A waste assessment to determine if hazardous constituents have been released	Analyze blasting grit; control particulate dispersion
17	Old Storage Yard #1	Soil sampling to determine if hazardous constituents have been released	Soil samples (0-1 foot) at stained areas along perimeter

* All units for which an extensive subsurface investigation is suggested are listed in Table 6.

Table 4 (Continued)

SWMU No.	Solid Waste Management Units	Suggested Further Action	Sampling or Control Strategy
19	Old Storage Yard #3	Measures to prevent releases to surface waters for units which are releasing hazardous constituents in runoff generated within the unit area, and directed to adjacent storm sewers	Control particulate dispersion
20	Waste Generation Area #1 (SIMA Air #1)	Soil sampling to determine if hazardous constituents have been released	Soil samples (0-1 foot) at stained areas along perimeter
23	Oil Water Separator at Bldg. 249	Integrity testing to determine the condition of below-grade units	Test integrity of unit
25	Washrack at Bldg. 249	Soil sampling to determine if hazardous constituents have been released	Soil/sludge samples (0-1 fo beyond lower level area of p
27	Fire Training Area at Bldg. 271	Soil sampling to determine if hazardous constituents have been released	Soil samples (0-1 foot) at both ignition area and fenceline
32	Overland Drainage Ditches	Soil sampling to determine if hazardous constituents have been released	Identify drainage system network; sediment and/or water samples in suspect areas
33	Clearing House Storage Area (DRMO)	Soil sampling to determine if hazardous constituents have been released	Soil samples (0-1 foot) at visibly affected (e.g., stained and unlined areas
41	Sewer Drainage System	Integrity testing to determine the condition of below-grade units	Integrity testing of unit

Table 4 (Continued)

SWMU No.	Solid Waste Management Units	Suggested Further Action	Sampling or Control Strategy
B	Air Compressor at Bldg. 47	Measures to prevent releases to surface waters for units which are releasing hazardous constituents in runoff generated within the unit area, and directed to adjacent storm water sewers	Refer to SPCC Plan
C	Blasting Grit at Bldg. 47	A waste assessment to determine the presence of hazardous constituents and/or characteristics	Analyze blasting grit; ensure proper waste disposal practices
D	Storm Water Outfalls	Soil sampling to determine if hazardous constituents have been released	Sediment (0-1 foot) and water samples at all outfall areas
E	Temporary Pump Storage	Measures to prevent releases to surface waters for units which are releasing hazardous constituents in runoff generated within the unit area, and directed to adjacent storm water sewers	Refer to SPCC Plan
G	Former Process Buildings	A waste assessment to determine the presence of hazardous constituents and/or characteristics	Identify and assess operations for potential of hazardous contamination
H	Residual Ordnance at Bldgs. M-5 and 190	Soil sampling to determine if hazardous constituents have been released	Soil samples along grid between the two buildings
I	Residual Ordnance at Wharf	Soil sampling to determine if hazardous constituents have been released	Benthic sediment samples at Area wharf area

Table 4 (Continued)

SWMU No.	Solid Waste Management Units	Suggested Further Action	Sampling or Control Strategy
J	Former Ammunition Manufacturing Areas	A waste assessment to determine if hazardous constituents have been released	Identify and assess operations for potential of hazardous contamination

6.0 RELEASE PATHWAYS

Groundwater

Depth to groundwater at St. Juliens Creek Annex is less than ten feet and, given the proximity of the facility to the Atlantic Ocean, the potential exists for the flow direction and depth to water measurements to vary in response to tidal changes. The predominance of coarse-grained materials at the site increase the migration to groundwater. Also, the high rainfall and shallow water table should increase the potential migration to groundwater. Therefore, the potential for release to groundwater from unlined and underground units is considered high. This condition warrants attention considering past waste management practices (e.g., disposal of wastes in unlined pits). The release potential from indoor or lined units is considered low.

Soil

Since many of the outside units are unlined or are not equipped with release control structures, the potential for release for these types of units to the soil is considered high. The release potential to soil from indoor units is considered low.

Surface Water

Historically, St. Juliens Creek Annex has implemented past waste management practices which resulted in unregulated discharge into nearby surface waters. Currently, all of St. Juliens Creek Annex is drained by a storm water drain system and the outfalls for this system discharge directly into one of the major waterways surrounding the facility. Many of the outside units are not equipped with release control structures, hence, the runoff potential, and therefore, the release potential for the outside units to surface water is considered high. The potential for release of surface water from indoor units in considered low.

Air

The overall potential for release to air from the active and inactive units is considered low. No incinerators are currently located at the site and the "burning", which was reported in the past, has been discontinued.

Subsurface Gas

The overall potential for the generation of subsurface gas at the facility is considered low. However, the potential for the formation of subsurface gas at the inactive dumps/landfills is considered high.

7.0 SUMMARY OF CONCLUSIONS AND SUGGESTED FURTHER ACTIONS

This section presents the conclusions and suggested further actions for the SWMUs identified during the PR and VSI of the St. Juliens Creek Annex facility.

For each unit, the potential for release to soil and groundwater, surface water, air, and from the generation of subsurface gas is assessed. For the purposes of this report, a high potential for release was assigned in cases where there was documented contamination, visual evidence of release, or where the design/operation of the unit was determined to allow releases to one or more environmental media. A moderate release potential was assigned in cases where there may be a release during certain operational periods or depending on the volume of material handled at a given time. A low potential for release was assigned in cases where units are located inside buildings, are in good condition, have appropriate release controls, or do not manage hazardous wastes or wastes containing hazardous constituents. The units listed in Table 5 are the units for which no further action is suggested based on their low potential for release to environmental media. Table 6 lists the SWMUs for which a detailed subsurface investigation, such as an RFI, is suggested based on a high potential for release, or a documented release, of hazardous waste or hazardous waste constituents. The general scope of the suggested investigation is discussed in detail in this section.

The conclusions and specific suggested further actions for each SWMU and AOC identified during this RFA are listed in Table 7.

In 1983, the NUS Corporation, Superfund Division conducted a low priority Preliminary Assessment of six sites of the St. Juliens Creek Annex facility. These sites include the following: Cross and Mine (SWMU #9), Bldg. 249 (SWMU #13), Dump A (SWMU #1), Dump B (SWMU #2), Dump B Incinerator (SWMU #3), Dump C (SWMU #5), and Dump D (SWMU #6). Each site was monitored for volatile organics and radiation. No readings above background were found for any of the sites.

According to NUS, no signs of serious contamination were seen at any of the sites, although, according to the NUS report, various locations on the St. Juliens Annex were identified to be contaminated with low level residues of pesticide and herbicide materials. It was proposed that no confirmation study be performed (Ref. 31). No information is currently available describing the U.S. Navy's plans for addressing the contamination.

Table 5. SWMUs and AOCs Requiring No Further Action.

	No.	Description
Solid Waste Management Unit		
	7	Dumpster Storage at Dump D
*	10	Interim Status Hazardous Waste Container Storage at Bldg. 154Y
*	11	Interim Status Hazardous Waste Container Storage at Bldg. 163
**	12	PCB Storage at Bldg. 198
	18	Old Storage Yard #2
***	21	Hazardous Waste Accumulation Area (SIMA #2)
***	22	Repair Shop Satellite Storage Area northeast of Bldg. 40
	26	Scrap Metal Storage in Railroad Cars near Bldg. 176
	29	Dumpsters (located throughout the facility)
	31	Swale Beneath Bldg. 13
	34	Operational Waste Accumulation Areas
Areas of Concern		
*	A	Satellite Storage at Building 279
*****	F	Underground Storage Tanks
	K	Former Sewage Treatment Plant

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* Regulated under RCRA
** Regulated under TSCA
*** Regulated under the State of Virginia
**** Regulated under OSHA
***** Regulated under Federal UST Program

7.1 INTEGRITY TESTING AND VERIFICATION INVESTIGATIONS

Both integrity testing and verification investigations are suggested for SWMUs and AOCs at the St. Juliens Creek Annex facility. These units and their respective suggested testing and investigations are listed in Table 4. Specific conditions involving these tests and investigations are described below.

Integrity Testing

It is suggested that the Oil Water Separator (SWMU #23) and the Sewer Drainage System (SWMU #33) located at the St. Juliens Creek Annex facility be integrity tested to verify that there is no potential for releases of hazardous waste or hazardous constituents to the soil, groundwater, surface water, or subsurface gas. The method of integrity testing should involve a visual inspection and a pressure test or other method adequate to assess the unit's integrity. If integrity testing reveals pathways for release, verification investigation should be completed in order to establish the presence and migration of any hazardous waste or hazardous constituents to soils and/or groundwater. If release has occurred, appropriate subsequent investigations or monitoring programs should be undertaken to delineate the extent of contaminant migration.

Verification Investigations

A Verification Investigation for 21 SWMUs and AOCs is suggested in order to establish the location, presence, and migration of any hazardous wastes or hazardous constituents to soils and/or groundwater. The verification objectives include:

1. establishing the presence of hazardous waste or constituents in the soils surrounding the units;

2. establishing the migration of hazardous waste or constituents from the units; and

3. establishing criteria to be used to determine if subsequent investigations are required.

To accomplish these objectives, a limited soil investigation of a minimum of one or two soil borings is suggested at the location of the units. All units recommended for verification investigations should include, at a minimum, the metals, volatiles, and semi-volatiles organics, within Appendix VIII, or an appropriate subset (e.g., priority pollutants) as analytical parameters in samples collected during the course of the investigation.

7.2 TASKS OF THE RCRA FACILITY INVESTIGATION

The objectives of the RCRA Facility Investigation (RFI) at the St. Juliens Creek Annex facility include: (1) providing an accurate description of site conditions (hydrogeological); (2) characterization of existing contamination at the site; and (3) identification of potential receptors. A facility-wide RFI is suggested for the St. Juliens Creek Annex facility due to the difficulty in identifying individual SWMUs responsible for releases due to the commonalty of waste constituents, overlap of unit locations, and the extent and volume of wastes placed onto and throughout the facility. The investigation, centering on the units listed in Table 6, should involve characterization of the subsurface conditions at the Annex and define the nature and extent of the releases from SWMUs through soils sampling at the individual units.

The individual tasks addressed in this document involve the hydrogeological assessment of the site and subsequent groundwater and soil sampling under the RFI. These tasks include the following:

Task 1

Task 1 involves establishing detailed geologic and hydrogeologic data for the entire facility and, to the extent possible, areas surrounding and underlying the units. This would involve a hydrogeologic assessment and subsequent groundwater monitoring program at both the north and south areas of the facility. The goals of the groundwater monitoring program will be to:

Table 6
SWMUs Recommended for a RCRA Facility Investigation (RFI).

No.		Description
Solid Waste Management Units		
	1	Dump A
	2	Dump B
*	3	Dump B Incinerator
*	4	Blast Grit at Dump B
	5	Dump C
	6	Dump D
	8	Burning Grounds
***	24	Caged Pit at the Burning Grounds
****	30	Waste Disposal Pits at Dump C
*****	32	Overland Drainage Ditches
Areas of Concern		
**	L	Old Tanks at Dump D

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* Investigation at this unit should be within RFI framework developed for Dump B (SWMU #2).

** Investigation at this unit should be within RFI framework developed for Dump D (SWMU #6).

*** Investigation at this unit should be within RFI framework developed for the Burning Grounds (SWMU #8).

**** Investigation at this unit should be within RFI framework developed for Dump C (SWMU #5).

***** Investigation should include sampling along entire length of unit.

1. provide a description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the entire facility and, where possible, individual study areas;

2. define the horizontal and vertical directions of contaminant movement;

3. describe the velocity of contaminant movement;

4. delineate the horizontal and vertical concentrations profiles of metals and organics (e.g., volatiles and semi-volatiles) in the plume(s);

5. provide an evaluation of factors influencing plume movement; and

6. produce an extrapolation of future contaminant movement.

The hydrogeologic assessment phase of this task should involve: (1) the definition of the geology beneath the site area; and (2) identification of groundwater flow paths and rates. The investigatory techniques used should, at a minimum, include: (1) a survey of existing geologic infor mation; (2) soil borings; (3) material testing; (4) installation of piezo meters; (5) water level measurements at various location; and (6) slug or pump tests. Based on the results of the hydrogeologic assessment done under Task 1, a groundwater monitoring program should be undertaken utilizing existing wells and through placement of additional wells upgradient and downgradient from investigation areas. Based on observation made on the VSI, a possible approach would involve a network of wells designed to monitor groundwater entering and leaving the north and south areas of the facility, including:

1. Dump A (SWMU #1);
2. Dump B (SWMU #2);
3. Dump C (SWMU #5);
4. Dump D(SWMU#6); and
5. The Burning Grounds(SWMU#8).

Based on groundwater flow, the commonalty of contaminant constituents (metals, volatile and semi-volatile organics), and the probable wide-spread contamination, monitoring about distinct units or areas may not yield data which can be used to identify releases from individual units.

Well Location

Downgradient wells should be no further than 100 feet from specific invest igation areas. The upgradient wells must be capable of yielding samples that are representative of background water quality in the uppermost aquifer and are not affected by any SWMU. The number and location of the wells should be sufficient to characterize the spatial variability of back ground water. Downgradient wells should be capable of detecting any statistically significant amounts of hazardous waste or hazardous consti tuents that migrate from investigation areas into the groundwater.

Task 2

The second task of the RFI involves characterization of the nature, extent, and rate of migration of release to soils, surface and groundwater from the units through sampling (soil/sediment and groundwater) at and about units requiring additional further action for metal, and volatile and semi-volatile organic hazardous constituents listed in Appendix VII, or an appropriate analytical subset (e.g., Priority Pollutants). Any data gathered during previous investigations or inspections and other relevant data should be reviewed prior to development of the sampling plan including:

1. available monitoring data and qualitative information on locations and levels of contamination at this facility;

2. all potential migration pathways, including information on geology, pedology, hydrogeology, physiography, hydrology, water quality, meteorology, and air quality; and

3. the potential impact(s) on human health and the environment, demography, groundwater and surface water use, and land use.

Sampling should be conducted to establish the migration of hazardous waste or hazardous constituents from the units included in the RFI. Sampling should be conducted based on a grid system developed for the entire area of each individual unit included in the RFI. The sampling grids should be collected to supply a statistically sufficient number of sampling sites. Borings should be to a minimum depth at the point groundwater is encountered, with samples taken at 2-foot intervals (additional samples should be taken if visual evidence of contamination is noted on the boring). Additionally, soil samples should be taken at locations of visible staining or stressed vegetation. Note: the types of wastes suspected at these units warrant a detailed safety plan in conjunction with RFI activities.

A summary of conclusions and suggested further actions for each SWMU and AOC follows as Table 7.

Table 7: Summary of Conclusions and Further Suggested Actions

1. UNIT NAME: Dump A
2. UNIT NAME: Dump B
5. UNIT NAME: Dump C
6. UNIT NAME: Dump D
30. UNIT NAME: Waste Disposal Pits at Dump C

Conclusions:

Soils/Groundwater: There is a high potential for release to soils/ground water based on the unlined nature of this unit and proximity of groundwater to the soil surface (i.e., less than ten feet).

Surface Water: There is a moderate to high potential for release to surface water via groundwater discharge, and through runoff due to the proximity of this unit to surface water. Ash has been placed in a marshy area comprising Dump A; an oily sheen was also observed at this area.

Air: During the period of operations, there was a high potential for releases to air from open burning of wastes. The potential for ongoing releases to air is low since the unit is no longer active.

Subsurface Gas: There is a moderate to high potential for the release of subsurface gas to soil-pore voids based on the volatile nature of the wastes (e.g., organic solvents) reported to be buried in this unlined unit.

Suggested Further Action: A subsurface investigation of soil and groundwater should be conducted to determine the nature and extent of contamination. The groundwater investi gation should involve a hydrogeologic assessment to determine the nature, extent, direction, and rate of migration of releases to the groundwater from these landfills. Detailed information about the geology beneath the site, horizontal and vertical extent of the uppermost aquifer, and groundwater flow paths and rates should be provided. The details of this assessment are more fully described under Tasks of the RCRA Facility Investigation (p. 7-3).

3. UNIT NAME: Dump B Incinerator

Conclusions:

Soils/Groundwater:	There is a low potential for a release of hazardous waste or constituents to soils/ground water, based on the likely design and operation of the unit and because the unit appears to have managed predom inantly general trash and garbage.
Surface Water:	There is a low potential for a release of hazardous waste or constituents to surface water based on the likely design and operation of the unit and type of waste managed.
Air	The unit was designed to release to air. Because the unit no longer exists, there is no potential for ongoing release to air.
Subsurface Gas:	There is no potential for subsurface gas generation based on the aboveground design of the unit.
Suggested Further Action:	No further action is suggested for this unit at this time.

4. UNIT NAME: Blast Grit at Dump B

Conclusions:

Soils/Groundwater: There is a high potential for release to soils because wastes are placed directly on soils. The potential for release to groundwater is low due to the sparingly soluble nature of this waste material.

Surface Water: There is a moderate to high potential for release to surface water via runoff due to the proximity to the marsh and the lack of runoff controls. Surface water at this area may also be affected by groundwater dis charge and the proximity of this unit to surface water.

Air Since the waste at this unit is not covered, there is a moderate potential for release via wind-borne particulates.

Subsurface Gas: There is low potential for the release of subsurface gas to soil-pore voids based on the nonvolatile nature of the blast grit wastes.

Suggested Further Action: It is suggested that any measures to address possible past releases at this unit be considered within the framework of actions suggested for Dump B (SWMU #2) since this unit is recognized to be located within the Dump B area. The details of this assessment are more fully described in Attachment B.

Additionally, in order to assess the surface soil conditions at this unit, it is suggested that soil samples are collected from affected areas to determine if there are any hazardous constituents associated with this material. A minimum of two surface soil samples should be collected beneath the pile and two along the perimeter of the pile runoff paints. Samples should be analyzed for toxic metals.

7. UNIT NAME: Dumpster Storage at Dump D

Conclusions:

Soils/Groundwater:	There is a low potential for release to soils/ground water as long as the sparingly soluble asbestos being stored at this unit is contained in the sealed plastic bags within the confines of the locked dumpster.
Surface Water:	There is a low potential for a release of hazardous waste or constituents to surface water as long as the asbestos being stored at this unit is contained in the sealed plastic bags within the confines of the locked dumpster.
Air	There is a low potential for a release to the air as long as the asbestos being stored at this unit is contained in the sealed plastic bags within the confines of the locked dumpster.
Subsurface Gas:	There is no potential for a release of hazardous waste or constituents to subsurface gas based on the inorganic nature of asbestos fibers.
Suggested Further Action:	No further action is suggested for this unit at this time other than continued storage of waste in sealed bags and providing for the ultimate disposal of wastes stored in these dumpsters.

8. UNIT NAME: Burning Grounds
24. UNIT NAME: Caged Pit at the Burning Grounds

Conclusions:

Soils/Groundwater:	There is a high potential for release to soil at this unit. Waste were burned directly on the soils and it is unclear how effective the "decontamination" efforts were, which focused on desensitizing residual explosives. The potential for release to groundwater is high due to the prox imity of groundwater to the soil surface (i.e., less than ten feet).
Surface Water:	There is a moderate to high potential for release to surface water via groundwater discharge, and via runoff due to the proximity of this unit to surface water.
Air	The unit was designed to release to air during its active life. Because the unit has been inactive since 1977, there is a low potential for ongoing releases to air.
Subsurface Gas:	There is a moderate potential for the release of subsurface gas to soil-pore voids based on the volatile nature of the wastes (e.g., organic solvents) reported to be buried in this unlined unit, and the past waste management practices (e.g., aboveground burning).
Suggested Further Action:	A subsurface investigation of soil and groundwater should be conducted to determine the nature and extent of contamination. The groundwater investigation should involve a hydrogeologic assessment to determine the nature, extent, direction, and rate of migration of releases to the groundwater from these landfills. Detailed information about the geology beneath the site, horizontal and vertical extent of the uppermost aquifer, and groundwater flow paths and rates should be provided. The details of this assessment are more fully described on page 7-6.

9. UNIT NAME: Cross and Mine

Conclusions:

Soils/Groundwater: There may be a moderate to high potential for release to soils/groundwater if waste residuals are still present in this unlined unit's soil.

Surface Water: If waste residuals remain in the soil, then there is a moderate potential for release to surface water via groundwater discharge, and the proximity of this unit to surface water.

Air There is a low potential for release to air since waste residuals are no longer present at the soil surface.

Subsurface Gas: There is a low to moderate to high potential for the release of subsurface gas to soil-pore voids in the event that volatile constituents are in the waste residuals which may be present in the subsoil.

Suggested Further Action: It is suggested that soil sampling be conducted to determine if hazardous constituents have been released. Soil samples should be taken at this unit in the area devoid of vegetation and any other areas where there is visual evidence of release at the time of sam pling. The analytical parameters should include metals and semi-volatiles fractions of Appendix VIII.

10. UNIT NAME: Hazardous Waste Container Storage at Bldg. 154Y

Conclusions:

Soils/Groundwater:	There is a low potential for a release of hazardous waste or constituents to soils/ground water based on the construction of this fully enclosed, concrete-floored, locked bunker.
Surface Water:	There is a low potential for a release of hazardous waste or constituents to surface water based on the construction of this fully enclosed, concrete-floored, locked bunker.
Air	There is a low potential for a release of hazardous waste or constitu ents to air based on the construction of this fully enclosed, concrete-floored, locked bunker.
Subsurface Gas:	There is a low potential for a release of hazardous waste or constituents to subsurface gas based on the construction of this fully enclosed, concrete-floored, locked bunker.
Suggested Further Action:	No further action is suggested for this unit at this time, other than continued compliance under RCRA permit conditions for waste storage units.

11. UNIT NAME: Hazardous Waste Container Storage at Bldg. 163

Conclusions:

Soils/Groundwater: There is a low potential for a release of hazardous waste or constituents to soils/ground-water based on the construction of this fully enclosed, concrete-floored, locked bunker. A low to moderate potential exists for the release of hazardous waste or constituents from the absorbent noted outside this unit to the soil outside the bunker.

Surface Water: There is a low potential for a release of hazardous waste or constituents to surface water based on the construction of this fully enclosed, concrete-floored, locked bunker. A low to moderate potential exists for the release of hazardous waste or constituents from the absorbent noted outside this unit via runoff generated outside the bunker.

Air There is a low potential for a release of hazardous waste or constituents to air based on the construction of this fully enclosed, concrete-floored, locked bunker. A low to moderate potential exists for the release of hazardous waste or constituents from the absorbent noted outside the unit to air outside the bunker.

Subsurface Gas: There is a low potential for a release of hazardous waste or constituents to subsurface gas based on the construction of this fully enclosed, concrete-floored, locked bunker. A low potential exists for the release of hazardous waste or constituents from the absorbent noted outside the unit to subsurface gas since the absorbent resides atop the soil surface outside the bunker.

Suggested Further Action: No further action is suggested for this unit at this time, other than continued compliance under RCRA permit conditions for waste storage units. Consideration is warranted for the ultimate disposal of the uncontained waste absorbent outside the unit.

12. UNIT NAME: PCB Storage at Bldg. 198

Conclusions:

Soils/Groundwater:	There is a low potential for a release of hazardous waste or constituents to soils/ground water based on the construction of this fully enclosed, concrete-floored, locked building.
Surface Water:	There is a low potential for a release of hazardous waste or constituents to surface water based on the construction of this fully enclosed, concrete-floored, locked building.
Air	There is a low potential for a release of hazardous waste or constituents to air based on the construction of this fully enclosed, concrete-floored, locked building.
Subsurface Gas:	There is a low potential for a release of hazardous waste or constituents to subsurface gas based on the construction of this fully enclosed, concrete-floored, locked building.
Suggested Further Action:	No further action is suggested for this unit at this time, other than to first determine if the facility has a TSCA permit, and if so, require continued compliance under TSCA permit conditions for PCB storage units.

13. UNIT NAME: Repair and Maintenance Shop at Bldg. 249

Conclusions:

Soils/Groundwater:	There is a low potential for a release of hazardous waste or constituents to soils/ground water based on the construction of this enclosed, concrete-floored, building.
Surface Water:	There is a low potential for a release of hazardous waste or constituents to surface water based on the construction of this enclosed, concrete-floored, building; however, spills and releases from this building entering the storm sewer system indicate a moderate potential for release to the surface water at the storm sewer outfall.
Air	There is a low potential for a release of hazardous waste or consti tuents to air based on the construction of this enclosed building; however, there is a moderate to high release to the indoor environment in the vicinity of selected operational areas (e.g., solvent baths).
Subsurface Gas:	There is a low potential for a release of hazardous waste or constituents to subsurface gas based on the construction of this enclosed, concrete-floored building.
Suggested Further Action:	It is suggested that management practices be considered to control waste runoff to the adjacent storm sewer(s). Otherwise, no further action is suggest ed for this unit at this time.

Table 7 (Continued)

14. UNIT NAME: Hazardous Waste Disposal Area at Bldg. 13 (Railroad Tracks)
15. UNIT NAME: Hazardous Waste Disposal Area at Bldg. 53

Conclusions:

Soils/Groundwater:	There is a high potential for release to soil/ground water at this unit since wastes were disposed of on bare soil.
Surface Water:	There is a low potential for a release to surface water since these areas are not near a body of surface water.
Air	There is a low potential for release to air since waste residuals are no longer present at the soil surface.
Subsurface Gas:	There is a low potential for the release of subsurface gas to soil–pore voids based on the waste management practices (e.g., surface disposal) at the unit.
Suggested Further Action:	It is suggested that soil samples be collected from suspect areas to determine if hazardous constituents have been released. Analytical parameters should include semi–volatile organic compounds. See Verification Investigations (p. 7–2) for additional details.

16. UNIT NAME: Sand Blasting Area at Bldg. 323

Conclusions:

Soils/Groundwater: There is a high potential for release to soils based on storage of waste directly on soils in this unlined unit; however, the poten tial for the release of hazardous waste or constituents to groundwater is low due to the sparingly soluble nature of this material.

Surface Water: There is a moderate to high potential for release to surface water (approximately 150 yards downslope) via runoff.

Air There is a high potential for release of uncontained, wind-borne particulate sand blast grit waste to air.

Subsurface Gas: There is a low potential for the release of subsurface gas to soil-pore voids based on the nonvolatile nature of the sand blast grit waste.

Suggested Further Action: It is suggested that the sand blast grit be assessed in order to determine if there are any hazardous constituents associated with this material. The need for further actions (e.g., soil sampling) should be based on the results of this assessment. In addition, measures might be considered to more effectively contain the sand blast grit generated during routine operations.

17. UNIT NAME: Old Storage Yard #1

Conclusions:

Soils/Groundwater:	There is a high potential for release to soils and groundwater based on observed staining and uncontained waste materials managed at this unlined unit.
Surface Water:	There is a moderate potential for release to surface water (e.g., several hundred yards away) via runoff. This potential is based on inti mate contact between the low volume waste and the surface soil in this unlined unit.
Air	There is a moderate potential for release to air based on selected areas with uncontained waste.
Subsurface Gas:	There is a moderate potential for the release of subsurface gas to soil–pore voids in selected unit areas where potentially volatile constituents of uncontained wastes may have infiltrated the subsoil.
Suggested Further Action:	It is suggested that point source areas of hazardous waste or constituent release be appropriately addressed (e.g., move leaking equipment to a confined area) in order to prevent continuing releases. In addition, it is suggested that surface soil areas of this unit be sampled in order to determine if there has been a release of hazardous constituents. Soil samples should be collected in areas of observed staining and analyzed for semi–volatiles and metals.

18. UNIT NAME: Old Storage Yard #2
19. UNIT NAME: Old Storage Yard #3

Conclusions:	
Soils/Groundwater:	There is a low potential for release to soils/ground water based on the inert nature of the waste (e.g., scrap metal) and the under lying asphalt pad.
Surface Water:	There is a low potential for release to surface water based on the inert nature of the scrap metal, the absence of liquid waste materials, and the underlying asphalt pad.
Air	There is a low potential for release to air based on the nonvolatile, nonparticulate nature of the scrap metal.
Subsurface Gas:	There is a low potential for the release of subsurface gas to soil-pore voids based on the inert nature of the scrap metal and the aboveground design of the unit.
Suggested Further Action:	No further action is suggested for this unit at this time.

20. UNIT NAME: Waste Generation Area #1 (SIMA #1)

Conclusions:	
Soils/Groundwater:	There is a high potential for release to soils/ground water based on oily stains observed on soils beyond the concrete pad.
Surface Water:	There is a low potential for release to surface water via the low volume of contaminated runoff generated from waste materials present on the undiked pad and the surrounding soil (e.g., located several hundred yards away).
Air	There is a low potential for release to air; low volumes of waste leaked from drums that were observed to be closed.
Subsurface Gas:	There is a low potential for the release of subsurface gas to soil–pore voids based on the low volume of the wastes, which were observed to have leaked at this concrete padded area.
Suggested Further Action:	In order to determine if a release of hazardous constituents has occurred, surface soil samples should be collected in the stained areas and analyzed for semi–volatiles and metals. Actions are suggested to control the source of staining (e.g., upgrade berms or modify waste transfer practice). Continue compliance with the State of Virginia regulatory requirements.

21. UNIT NAME: Hazardous Waste Accumulation Area (SIMA #2)

Conclusions:	
Soils/Groundwater:	There is a low potential for a release from this unit to soils/groundwater based on the unit's secondary containment design features (e.g., concrete pad and berms).
Surface Water:	There is a low potential for a release from this unit to surface water based on the unit's secondary containment design features (e.g., concrete pad and berms).
Air:	There is a low potential for release to air since the wastes stored at this unit are stored in closed containers.
Subsurface Gas:	There is a low potential for a release of subsurface gas from this unit to soil–pore voids based on the unit's secondary contain ment design features (e.g., concrete pad and berms).
Suggested Further Action:	No further action is suggested for this unit at this time.

22. UNIT NAME: Repair Shop Satellite Storage Area across from Bldg. 61

Conclusions:

Soils/Groundwater:	There is a low potential for a release from this unit to soils/groundwater based on the unit's secondary containment design features (e.g., concrete pad and berms), and the absence of waste materials being managed.
Surface Water:	There is a low potential for a release from this unit to surface water based on the unit's secondary containment design features (e.g., concrete pad and berms), and the absence of waste materials being managed.
Air	There is a low potential for release to air in the absence of wastes being actively managed at this unit.
Subsurface Gas:	There is a low potential for a release of subsurface gas from this unit to soil-pore voids based on the unit's secondary contain ment design features (e.g., concrete pad and berms), and the absence of waste materials being managed.
Suggested Further Action:	No further action is suggested for this unit at this time.

23. UNIT NAME: Oil Water Separator at Bldg. 249

Conclusions:

Soils/Groundwater: The potential for a release from this unit to soils/ground water is dependent on the integrity of this subgrade unit which could not be assessed during the VSI.

Surface Water: The potential for a release from this unit to surface water is low based on the level control outlet of this unit which directs excess water to a POTW conduit.

Air There is a moderate to low potential for release to air due to the tarp covering observed during the VSI over the top of the unit.

Subsurface Gas: The potential for a release of subsurface gas from this unit to soil-pore voids is dependent on the integrity of this subgrade unit which could not be assessed during the VSI.

Suggested Further Action: It is suggested that the facility conduct integrity testing of this subgrade unit. If the integrity is determined to be impaired, soil sampling may be warranted to assess if hazardous constituents (e.g., hydrocarbons) have been released. Further details on integrity testing is provided in the section describing Integrity Testing (see p. 7-2).

25. UNIT NAME: Washrack at Bldg. 249

Conclusions:

Soils/Groundwater: Based on observations during the VSI (e.g., oily sludge piled on the soil adjacent to the con crete berm), there is a moderate to high release potential to soil and ground water from this unit.

Surface Water: There is a low potential for a release of hazardous waste or constituents to surface water based on the unit's secondary containment design features (e.g., concrete pad and berms), and its location (e.g., 150 yards from nearby surface waters.

Air There is a low to moderate potential for release to air based on the use of solvents in cleaning opera tions.

Subsurface Gas: There is a low potential for a release of subsurface gas to soil-pore voids based on the design of the unit features (e.g., concrete pad and berms).

Suggested Further Action: It is suggested that surface soil sampling be conducted to determine if hazardous constituents have been released. Soil samples samples should be taken at this unit in the area where waste sludge resides on the soil beyond the unit's berms and any other areas where there is visual evidence of release at the time of sampling. Analytical parameters should include metals and the volatile and semi-volatile fractions of Appendix VIII. In addition, it is suggested management practices be considered to prevent future releases of waste materials beyond unit boundaries.

26. UNIT NAME: Scrap Metal Storage in Railroad Cars Near Bldg. 176

Conclusions:

Soils/Groundwater:	There is a low potential for release to soils/ground water based on the physical nature (i.e., bulk solid) of the contained scrap metal.
Surface Water:	There is a low potential for release to surface water based on the nonparticulate nature of the contained scrap metal.
Air	There is a low potential for release to air based on the nonvolatile, nonparticulate nature of the scrap metal.
Subsurface Gas:	There is a low potential for the release of subsurface gas to soil-pore voids based on the nonvolatile nature of the scrap metal.
Suggested Further Action:	No further action is suggested for this unit at this time.

27. UNIT NAME: Fire Training Area at Bldg. 271

Conclusions:

Soils/Groundwater: There is a high potential for a release of hazardous waste or constituents to soil/ground water based on the operational proce dures implemented atop the bare ground of this unit (e.g., volatile liquids used to promote ignition). The high potential for release to groundwater is based on the shallow groundwater (e.g., less than ten feet from the surface) in the area.

Surface Water: Based on the proximity of this unit to surface water, and given that the burning takes place on soils without any release controls there is a high potential for release to surface water via groundwater discharge.

Air There is a high potential for release to air based on the volatile nature of the wastes being generated and burning activities.

Subsurface Gas: There is a high potential for a release of subsurface gas to soil-pore voids based on the operational procedures implemented atop the bare ground of this unit (e.g., volatile liquids used to promote ignition).

Suggested Further Action: It is suggested that soil sampling be conducted to determine if hazardous constituents have been released. Soil samples samples should be taken at this unit in the area where the volatile liquids used for ignition were released to the soil, and any other areas where there is visual evidence of release at the time of sampling. The analytical parameters should include analytical fractions of Appendix VIII hazardous constituents (e.g., metals, volatiles, semi-volatiles).

In addition, it is suggested that management practices be considered (e.g., construction of a bermed, concrete pad) that would prevent continuing releases of waste materials to the subsoil below the unit.

28. UNIT NAME: Clearing House Storage Area (DRMO)

Conclusions:

Soils/Groundwater: There is a moderate to high potential for release to soils based on direct contact with soils of the leaked and/or uncontained waste materials managed at unlined areas of this unit.

Surface Water: There is a moderate potential for release to surface water via runoff. This potential is based on intimate contact between waste and the soil surface in this unlined unit. In addition, waste-affected runoff has a high potential of entering the storm sewer system, ultimately being released to receiving waters via an outfall.

Air There is a moderate potential for release of point source, leaking, volatile constituents.

Subsurface Gas: There is a low to moderate potential for the release of subsurface gas to soil-pore voids in selected unit areas where volatile constituents may have infiltrated the subsoil.

Suggested Further Action: It is suggested that point source areas of hazardous waste or constituent release be appropriately addressed in order to prevent continuing releases. In addition, it is suggested that affected (e.g., drainage ditch, stained and unlined areas) soil areas of this unit be sampled in order to determine if there has been a release of hazardous constituents. The analytical parameters should include analytical fractions of Appendix VIII hazardous constituents (e.g., metals, volatiles, semi-volatiles).

29. UNIT NAME: Dumpsters (Located Throughout the Facility)

Conclusions:

Soils/Groundwater:	There is a low potential for release to soils/ground water as long as the wastes in these units are contained within the confines of the dumpsters.
Surface Water:	There is a low potential for release to surface water as long as the wastes in these units are contained within the confines of the dumpsters.
Air	There is a low potential for release to air as long as the units are kept fully closed/covered; in any event, the wastes contained in the dumpsters are not expected to exhibit a significant degree of volatility (e.g., no solvents). However, in the case of the open-topped dumpsters used to contain sand blast grit, there is a moderate potential for wind-borne particulate releases.
Subsurface Gas:	There is a low potential for release to subsurface gas as long as the wastes in these units are contained within the confines of the dumpsters. In any event, the wastes contained in the dumpsters are not expected to exhibit a significant degree of volatility (e.g., no solvents).
Suggested Further Action:	No further action is suggested for these units at this time.

31. UNIT NAME: Swale Beneath Bldg. 13

Conclusions:

Soils/Groundwater:	If this unit was used for waste disposal, there is a high potential for continuing release at this unit since the swale was unlined.
Surface Water:	There is a low potential for a continuing release to surface water based on distance to surface water.
Air	There is a low potential for ongoing release to air since volatiles would have dissipated.
Subsurface Gas:	There is a low potential for the release of subsurface gas to soil-pore voids based on the time period elapsed since this waste management practice was employed (e.g., approximately 15 years); and the proximity to underlying groundwater (10 to 15 feet).
Suggested Further Action:	Provide documentation to confirm: (1) whether this swale was/was not used for solvent disposal; and (2) the exact location of the swale. Alternatively, conduct soil sampling in the area of reported disposal as described in Reference 19 (near Bldgs. 13 and 47). A random grid should be used and samples analyzed for metals.

32. UNIT NAME: Overland Drainage Ditches

Conclusions:	
Soils/Groundwater:	The potential for ongoing release of hazardous waste or constituents is high, based on the unlined nature of this unit in conjunc tion with its proximity to underlying groundwater (e.g., less than ten feet.
Surface Water:	The potential for release of hazardous waste or consti tuents is high due to its proximity (e.g., in some cases less than 20 feet) to surface waters.
Air	The potential for a past release of hazardous waste or constituents to air was high due to the waste types (e.g., solvents) suspected of being managed in these open ditches. Because the unit is no longer used, the potential for ongoing release to air is low.
Subsurface Gas:	The potential for release of hazardous waste or consti tuents is low, based on the diluted nature (e.g., mixed with water) of the transported waste in conjunction with the open design of the ditches.
Suggested Further Action:	Identify the exact boundaries of the drainage ditch system that extends throughout the facility grounds. Subsequently, sample all points where there is either visible evidence of release (e.g., staining) or suspicion that past releases may have occurred (e.g., proximity to process areas). These samples should be analyzed for metals and semi-volatile fractions in Appendix VIII. It is suggested that any measures to address releases at this unit be considered within the framework of actions suggested for adjacent dump areas, namely Dump C (SWMU #5), and Dump D (SWMU #6) since portions of this unit is recognized to have been located adjacent to these areas.

33. UNIT NAME: Sewer Drainage System

Conclusions:

Soils/Groundwater: The potential for a release of hazardous waste or consti tuents to soils/groundwater is dependent on the integrity of the sewer system, which could not be determined during the VSI.

Surface Water: The potential for a release of hazardous waste or constituents to soils/groundwater is dependent on the integrity of the sewer system, which could not be determined during the VSI.

Air There is a low potential for a release of hazardous waste or consti tuents to air due to the underground design of the system.

Subsurface Gas: The potential for a release of hazardous waste or consti tuents from this unit to soil-pore voids is dependent on the integrity of the sewer system, which could not be deter mined during the VSI.

Suggested Further Action: It is suggested that the integrity of the subsurface system be determined. Based on the results, soil sampling may be warranted to determine if hazardous constituents have been released. Soil samples should be collected from those points along the sewer system where there is leaking or cracking. Analytical parameters should include fractions of Appendix VIII hazardous constituents (e.g., metals, volatiles, and semi-volatiles).

34. UNIT NAME: Operational Waste Accumulation Areas

Conclusions:	
Soils/Groundwater:	There is a low potential for a release of hazardous waste or constituents to soils/ground water based on these units being located inside fully enclosed, concrete-floored, buildings.
Surface Water:	There is a low potential for a release of hazardous waste or constituents to surface water based on these units being located inside fully enclosed, concrete-floored, buildings.
Air	There is a low potential for a release of hazardous waste or constituents to air based on these units being located inside fully enclosed, concrete-floored buildings. However, based on waste management practices (e.g., if containers are not covered), there may be a moderate to high potential for release to air inside of the buildings.
Subsurface Gas:	There is a low potential for a release of hazardous waste or constituents to subsurface gas based on these units being located inside fully enclosed, concrete-floored, buildings.
Suggested Further Action:	No further action is suggested for these units at this time.

A. AREA OF CONCERN: Satellite Storage at Bldg. 279

Conclusions:

Soils/Groundwater:	There is a moderate potential for release to soils/ground water based on oily stains observed on the concrete and nearby soil and consid eration of the small amount of material being released.
Surface Water:	There is a low to potential for release to surface water via contaminated runoff generated from the small amount of oily materials present on the stained concrete and nearby soil.
Air	There is a low potential for release to air based on the modestly volatile nature of the small amount of oily material observed to have leaked at this area.
Subsurface Gas:	There is a low potential for the release of subsurface gas to soil-pore voids based on the modestly volatile nature of the small amount of material observed to have leaked at this area.
Suggested Further Action:	It is suggested that releases of product material in amounts that were observed (e.g., drippings from a 2-gallon bucket) be referred to the SPCC section of the facility RCRA Part B Permit Application. In addition, alternative management practices (e.g., secondary containment) are suggested to ensure that continuing releases at this area of concern do not occur in the future.

B. AREA OF CONCERN: Air Compressor at Bldg. 47

Conclusions:

Soils/Groundwater:	There is a moderate to high potential for release to soils/groundwater based on the oily stains observed on the bare soil.
Surface Water:	There is a low to moderate potential for release to surface water via contaminated runoff generated from oily materials present on the underlying soil.
Air	There is a low to moderate potential for release to air based on the modestly volatile nature of the oily material observed to have leaked at this area.
Subsurface Gas:	There is a low to moderate potential for the release of subsurface gas to soil-pore voids based on the modestly volatile nature of the wastes observed to have leaked at this area.
Suggested Further Action:	It is suggested that releases in the small amounts that were observed (e.g., drippings) be referred to the SPCC plan of the facility RCRA Part B Permit Application. In addition, alternative management practices (e.g., secondary containment) are suggested to ensure that continuing releases at this area of concern do not occur in the future.

C. AREA OF CONCERN: Blasting Grit at Bldg. 47

Conclusions:	
Soils/Groundwater:	There is a moderate to high potential for release to soils/groundwater based on the blast grit observed on the bare soil.
Surface Water:	There is a low to moderate potential for release to surface water via contaminated runoff generated from the particulate blast grit waste present on the soil surface.
Air	There is a moderate to high potential for release of wind-borne, particulate sand blast grit to air.
Subsurface Gas:	There is a low potential for the release of subsurface gas to soil-pore voids based on the nonvolatile nature of the blast grit waste observed on the soil surface.
Suggested Further Action:	It is suggested that alternative management practices (e.g., secondary containment) are suggested to ensure that continuing releases at this area of concern do not occur in the future.

D. AREA OF CONCERN: Storm Water Outfalls

Conclusions:	
Soils/Groundwater:	There is a moderate to high potential for release of hazardous constituents to sediments based on the quality of runoff generated in the various operational and waste management areas throughout the facility. The potential for the release of hazardous constituents to groundwater depends on site hydrogeology as influ enced by the receiving waters at the outfalls.
Surface Water:	There is a high potential for release of hazardous constituents to surface water via contaminated runoff generated in the various operational and waste management areas throughout the facility. Runoff from these areas entering storm water sewers are released, by design, to surface receiving waters at the individual outfalls.
Air	There is a low to moderate potential for release to air based on the possibly volatile nature of the runoff generated in the various opera tional and waste management areas throughout the facility.
Subsurface Gas:	There is a low to moderate potential for the release of subsurface gas to soil–pore voids given that volatile wastes or constituents may have been discharged through these outfalls.
Suggested Further Action:	Sampling is suggested at the various outfall to determine whether there has been a release of hazardous constituents. The analytical parameters should include a comprehensive suite of hazardous constituents (e.g., metals, volatiles, semi–volatiles). If so, addi tional actions may be warranted at this unit (e.g., characterization of the release). In addition, alternative management practices (e.g., control of runoff quality entering storm sewer system) are suggested to ensure that continuing releases at these areas of concern do not occur in the future.

E. AREA OF CONCERN: Temporary Pump Storage

Conclusions:	
Soils/Groundwater:	There is no potential for a continuing release of hazardous constituents to soil/ground water since the source of the release (i.e., leaking pumps) were observed to be removed from this area at the time of the VSI. However, there was a past high potential for release to soils/ground water based on the oily stains observed on the bare soil.
Surface Water:	There is a low potential for release to surface water via contaminated runoff generated from the small amount of oily material present on the soil surface.
Air	There is a low potential for release to air based on the volatile nature of the small amount of oily material present on the soil surface.
Subsurface Gas:	There is a low to moderate potential for the release of subsurface gas to soil-pore voids based on the nature of the wastes observed to have leaked at this area.
Suggested Further Action:	It is suggested that releases in the small amounts that were observed (e.g., drippings) be referred to the SPCC plan of the facility RCRA Part B Permit Application. In addition, alternative management practices (e.g., secondary containment) are suggested to ensure that continuing releases at this area of concern do not occur in the future characterization of the release).

F. AREA OF CONCERN: Underground Storage Tanks

Conclusions:	
Soils/Groundwater:	There is a high potential for release of hazardous constituents from these tanks if the integrity is impaired. The high potential is based on their intimate contact with the soil, the shallow depth to groundwater (< 10 feet), and the age of many of the tanks (> 20 years).
Surface Water:	The release potential to surface water is low based on under ground location of the unit.
Air	The release potential to the air is considered to be low due to the underground design of these tanks.
Subsurface Gas:	The generation of subsurface gas is considered dependent on the integrity of the tanks.
Suggested Further Action:	It is suggested that the integrity of these tanks be verified. The ultimate fate of these tanks be should be addressed through the UST program. It is also suggested that the Oil Water Separator (SWMU #23), which is listed as an underground tank, and the aboveground tank at the Fire Training Area (SWMU #27) be removed from the notification list for underground tanks.

G. UNIT NAME: Former Process Buildings
L. UNIT NAME: Old Tanks at Dump D

Conclusions:

Soils/Groundwater:

Subsurface Gas: There is an unknown potential for the release of hazardous waste or constituents to any of these media since it is not known if these buildings either exist or are still used in process operations. The potential for a past release of hazardous waste or constituents from this unit also remains unknown.

Suggested Further Action: It is suggested that the facility first initiate a program to identify all former process buildings and areas and determine if residual contamination still exists. Subsequently, this program should identify the type and amount of waste generated with a specific focus on operational and waste management practices. If a potential is identified for the release of hazardous waste or hazardous constituents from any former process area or building, verification or characterization sampling should be implemented in a timely and appropriate manner.

H. UNIT NAME: Residual Ordnance at Bldgs. M-5 and 190

Conclusions:

Soils/Groundwater:

Subsurface Gas: There is an unknown potential for the release of hazardous waste or constituents to any of these media since it is not known if residual ordnance still exists. The potential for a past release of hazardous waste or constituents from area of concern also remains unknown.

Suggested Further Action: It is suggested that the facility first implement a program to determine if residual ordnance still exists. If possible, this program should initially collect soil grab samples in a grid area between the two buildings to determine possible residual contamination. Subase quently, this program should identify the type, amount and extent of ordnance present. This program must address safety considerations as well as a com prehensive analytical suite designed to ensure that all ordnance materials are identified, if present. If residual ordnance is identified, remedial clean-up operations should be implemented in a safe, timely and appropriate manner.

I. UNIT NAME: Residual Ordnance at Wharf Area

Conclusions:

Soils/Groundwater:

Subsurface Gas: There is an unknown potential for the release of hazardous waste or constituents to any of these media since it is not known if residual ordnance still exists. The potential for a past release of hazardous waste or constituents from area of concern also remains unknown.

Suggested Further Action: It is suggested that the facility first implement a program to determine if residual ordnance still exists. If possible, this program should initially collect grab samples of benthic sedi ments in a manner to determine possible residual contamination. Subsequently, this program should identify the type, amount, and extent of ordnance present. This program must address safety consid erations as well as a comprehensive analytical suite designed to ensure that all ordnance materials are identified, if present. If residual ordnance is identified, remedial cleanup operations should be implemented in a safe, timely and appropriate manner.

J. UNIT NAME: Former Ammunition Manufacturing Areas

Conclusions:

Soils/Groundwater:

Subsurface Gas: There is an unknown potential for the release of hazardous waste or constituents to any of these media since it is not known if these areas exist. The potential for a past release of hazardous waste or consti tuents from this unit also remains unknown.

Suggested Further Action: It is suggested that the facility first initiate a program to identify all former ammunition areas (see Table 3). Subsequently, this program should identify the type and amount of waste generated with a specific focus on oper ational and waste management practices. If a potential is identified for the release of hazardous waste or hazardous constituents from any former ammunition manufacturing areas, verification or characterization sampling should be implemented in a safe, timely and appropriate manner.

K. UNIT NAME: Former Sewage Treatment Plant

Conclusions:

Soils/Groundwater:	There is no potential for a release of hazardous waste or constituents to soils/ground water since this unit does not exist. The potential for a past release of hazardous waste or constituents from this unit remains unknown since it could not be determined if this unit ever existed.
Surface Water:	There is no potential for a release of hazardous waste or constituents to soils/groundwater since this unit does not exist. The potential for a past release of hazardous waste or constituents from this unit remains unknown since it could not be determined if this unit ever existed.
Air	There is no potential for a release of hazardous waste or constituents to soils/groundwater since this unit does not exist. The potential for a past release of hazardous waste or constituents from this unit remains unknown since it could not be determined if this unit ever existed.
Subsurface Gas:	There is no potential for a release of hazardous waste or constituents to soils/groundwater since this unit does not exist. The potential for a past release of hazardous waste or constituents from this unit remains unknown since it could not be determined if this unit ever existed.
Suggested Further Action:	No further action is suggested for this unit since there is no reason to suspect that it handled hazardous waste or hazardous constituents.

8.0 REFERENCES

Letters and Memos

1a. Letter from S. D. Bulkin, U.S. EPA Region III to S. H. Hanes, Dept. of the Navy. Dated: March 9, 1981. Acknowledgment of application for a hazardous waste permit.

1b. Letter from S. H. Hanes, Dept. of the Navy, to Ms. Bulkin, U.S. EPA Region III. Dated: March 25, 1981. Topic: Part A application forms have not been received.

2. Letter from S. D. Bulkin, U.S. EPA Region III to Capt. D. P. Donohue, Norfolk Naval Shipyard. Dated: September 10, 1981. Topic: Processing Part A Permit; temporary interim status granted.

3a. Letter from P. R. Anderson, RCRA Permits Section to J. R. Bailey, Dept. of the Navy. Dated: March 3, 1981. Topic: Replacing and upgrading the hazardous waste storage operations at the Annex.

3b. Letter from S. M. Prindiville, Commonwealth of Virginia - Council on the Environment to D. L. West, Virginia Wildlife Federation. Dated: June 21, 1983. Topic: Discussion of jurisdiction of waste units at site.

4. Letter from Gen. T. B. Arwood, DLA to W. Gluevich, Bureau of Hazardous Waste Management. Dated: July 9, 1984. Topic: Submittal of Part B to the State in September 1984.

5. Letter and comments from K. J. Buttleman, Commonwealth of Virginia - Council on the Environment to Brig. Gen. T. B. Arwood. Dated: September 12, 1984. Topic: Review of the Navy's environmental Assessment concerning the Hazardous waste storage facility. Comments and attachments included.

6. Memo with attachment: from C. H. Ellis, Commonwealth of Virginia - Council on the Environment to various agencies. Dated: January 23, 1985. Topic: Navy's response to agency comments for the hazardous waste facility.

7. Letter from Mayor J. W. Holley, City of Portsmouth to J. B. Kenley Virginia, Dept. of Health. Dated: December 21, 1984. Topic: Agreement to public meeting concerning the hazardous waste storage facility.

8. News articles and transcript of speech. Dated: January 17, 1985. Topic: Storage Facility.

9. Letter from (J. O. Daye) Commanding Officer, Naval Sea Support Center to Commonwealth of Virginia Dept. of Health. Dated: February 5, 1985. Topic: Clarification concerning EPA identification number designation.

10. Letter from A. L. Collins Southeastern Virginia Planning District Commission to C. H. Ellis Commonwealth of Virginia – Council on the Environment. Dated: October 4, 1985. Topic: Transmittal of a copy of the SVPDC Staff Statement of the storage unit.

11a–f. Letter from Commonwealth of Virginia – Council on the Environment: various branches of the state agency. Dated: October 3, 1985 through November 21, 1985. Topics: Items to be included in the site assessment of the storage unit.

11g. Unidentified attachments signed by C. H. Ellis.

12. Memo from St. Juliens Citizens Committees to Judges of surrounding cities. Dated: December 10, 1985. Topic: Environmental impact statement for site.

13. Letter from Rear Adm. J. K. Parker to H. E. Gregori Commonwealth of Virginia – Council on the Environment. Dated: December 11, 1985. Topic: Comments on the proposed storage facility.

14. Letter from C. B. Jeffreys, City of Portsmouth to H. E. Gregori Commonwealth of Virginia – Council on the Environment. Dated: December 13, 1985. Topic: City council resolution against siting hazardous waste facilities in a 100–year flood plain.

15. Memo from W. Gulevich Bureau of Hazardous Waste Management to A. Albert, Special Assistant to the Governor. Dated: February 5, 1986. Topic: Briefing on the status of the storage facility.

16. Letter from J. B. Reitman, DLA to W. Gulevich Bureau of Hazardous Waste Management. Dated: February 1986. Topic: Transmittal of newsletter from DLA subcontractor concerning implementation of impact study.

17. Letter from W. Gulevich Commonwealth of Virginia – Dept. of Health to U.S. Navy St. Juliens Creek Annex. Dated: February 27, 1986. Topic: Notification of amended waste codes for spent solvents: D001 to F001 through F005.

18a. Letter from K. A. Akers Commonwealth of Virginia Dept. of Waste Management. Dated: April 1, 1986. Topic: Notification of State primacy on permitting facilities.

18b. Letter from W. Gulevich Commonwealth of Virginia – Dept. of Health to U.S. Navy St. Juliens Creek Annex. Dated: May 12, 1986. Notification which void previous exclusions for reused, beneficial reuse, recycled, or reclaimed waste. Required new Part A (revised) by June 2, 1986.

18c. Letter from W. J. Sarnacky, Virginia Bureau of Hazardous Waste Management to J. Moore, Norfolk Naval Shipyard. Dated: July 17, 1986. Topic: Followup letter from an inspection which found the facility to be out of compliance based on storage violations.

Assessment Report

19. Navy Assessment and control of Installation Pollutants: Initial Assessment Study of St. Juliens Creek Annex, Norfolk Naval Shipyard, Portsmouth, VA. April, 1981.

Inspection Files

20. Bureau of Hazardous Waste Management inspection forms and comments. Inspection Date: October 2, 1984.

21. Bureau of Hazardous Waste Management inspection forms and comments. Inspection Date: April 1, 1986.

22. Dept. of Waste Management inspection forms and comments. Inspection Date: March 30, 1987.

23. Bureau of Hazardous Waste Management letter to J. Moore, Norfolk Naval Shipyard addressing June 11-12, 1986 RCRA inspections. Exceeding storage capacity, leaking drums, exceeding storage life, and storing drums in inappropriate locations.

24. RCRA Compliance Evaluation Inspection Report. July 1, 1986. Poor conditions of drums, improper storage, unknown wastes.

Permits and Documents

25. Part A Permit.

26. Conditions of Operation During Interim Status. September 10, 1981.

27. Closure Plan for St. Juliens Creek Annex. July 1987.

28. Contingency Plan for St. Juliens Creek Annex. Undated.

Environmental Assessment Report

29. Environmental Assessment Hazardous Waste Storage Facility St. Juliens Creek Annex, Norfolk Naval Shipyard, Chesapeake, VA. May 1983.

30. Addendum to Environmental Assessment Hazardous Waste Storage Facility St. Juliens Creek Annex, Norfolk Naval Shipyard, Chesapeake, VA. January 1984.

31. Project for Performance of Remedial Response Activities at Uncontrolled Hazardous Substance Facilities-Zone 1. A Final Report of Norfolk Naval Shipyard St. Juliens Creek Annex. August 1983. Topic: A preliminary assessment of the site performed by NUS.

32. Part B RCRA Permit Application for the Norfolk Naval Shipyard (in a separate binder).

33. VSI Field Book. 1988. Field notebook maintained by K. W. Brown & Associates, Inc. during the Visual Site Inspection of the St. Juliens Creek Annex.

34. VSI Forms. 1988. Forms used to collect notes by K. W. Brown & Associates, Inc. during the Visual Site Inspection of the St. Juliens Creek Annex.

35. UST Notification Forms. 1988 (Received). Underground Storage Tank Notification Forms filed by the Norfolk Naval Shipyard for the St. Juliens Creek Annex.

36. Letter from Steven R. Wasserug, EPA Region III to Commander F. L. Edebrock, Norfolk Naval Shipyard. Dated: April 10, 1981. Topic: Transmittal of laboratory results concerning cleanup efforts associated with Kepone storage.

37. Letter from James K. Strickland, Director, Environmental Programs Division, St. Juliens Creek Annex to Mr. John J. Jumphries, III, Chief, General State Section, U.W. EPA Region III, Dated: February 8, 1989. Topic: Comments for consideration and incorporation into the Final RFA Report.

Personal Communication

38. Conference call between Diane Schott (EPA Region IV), Sherman Latchaw (EPA Region IV), and Jim Levin (A.T. Kearney), on December 6, 1988. Topic: Incorporation of comments into Final RFA Report.