

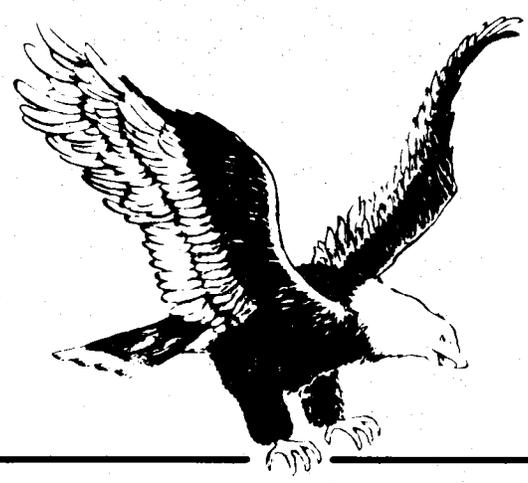
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INSTALLATION ASSESMENT OF FORT STORY, VIRGINIA REPORT NO. 184 FORT STORY
VA
9/1/1980
U.S. ARMY TOXIC AND HAZARDOUS MATERIALS AGENCY

0010

**INSTALLATION ASSESSMENT
OF
FORT STORY, VIRGINIA
REPORT NO. 184**

SEPTEMBER 1980



**US ARMY
TOXIC AND HAZARDOUS MATERIALS AGENCY**

ABERDEEN PROVING GROUND, MARYLAND 21010

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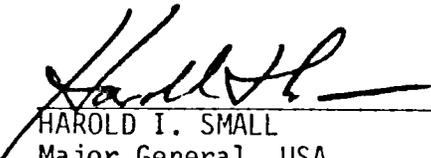
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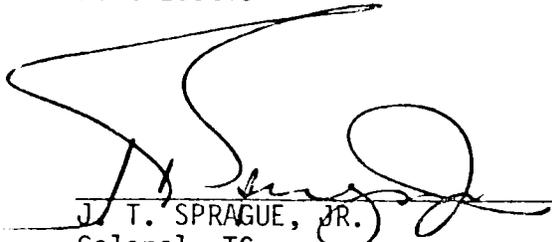
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Installation Assessment
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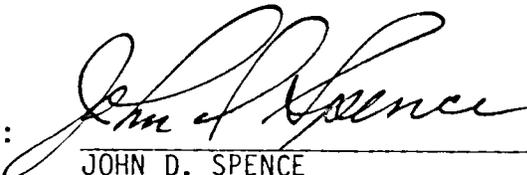
Report No. 184

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ABSTRACT

A records search was conducted at Fort Story (FS), Virginia, to determine the existence of toxic and hazardous materials, and related contamination, emphasizing those posing a potential for migration to offpost areas.

The study found that, although POL wastes from the wash rack area are entering into the storm drainage network, the problem is being adequately addressed by FS under APAP.

A survey by USATHAMA is not recommended.

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I. GENERAL

A. Purpose of the Assessment

To assess the environmental quality of Fort Story (FS), Va, with regard to the use, storage, treatment, and disposal of toxic and hazardous materials and to define any conditions which may adversely affect health and welfare or result in environmental degradation.

B. Authority

DARCOM Regulation 10-30, Mission and Major Functions of the US Army Toxic and Hazardous Materials Agency (USATHAMA), 22 May 1979.

C. Introduction

1. In response to a letter from the Commander, USATHAMA, requesting the identification of potentially contaminated installations, the Commander, US Army Training and Doctrine Command (TRADOC), recommended FS be included in the Installation Restoration Program. FS is a Class II installation under the command of Fort Eustis (FE).

2. Presurvey instructions were forwarded to FE, to outline assessment scope, provide guidelines, and obtain advance information for review by the Records Search Team.

3. FS personnel were briefed on 11 Aug 1980 by a USATHAMA representative on the Installation Restoration Program prior to the onsite records search.

4. Various Government agencies were contacted from 1 July through 8 Aug 1980 for documents pertinent to the records search effort. Agencies contacted included:

- a. Department of Defense Explosives Safety Board (DDESB).
- b. US Army Environmental Hygiene Agency (USAEHA).
- c. US Geological Survey (USGS).
- d. Defense Technical Information Center (DTIC).
- e. US Army Engineer Waterways Experiment Station (WES).
- f. Chemical Systems Laboratory (CSL).
- g. National Archives.
- h. Fort Eustis Museum Historical Files.

5. The onsite phase of the records search was conducted from 11 through 15 Aug 1980. The following personnel were assigned to the team:

- a. Mr. William Collins, Team Leader (CSL).
- b. Mr. Norman Leibel, Ordnance Specialist (CSL).
- c. Mr. Paul Robinson, Environmentalist (CSL).
- d. Mr. Harry Woods, Hydrogeologist (WES).

6. In addition to the review of records, interviews were conducted with FS and FE employees. Ground and aerial tours of the installation were made; photographs taken during the tours are included as Appendix A.

D. Installation History^{1,2}

FS is located on Cape Henry within the corporate city limits of Virginia Beach, Va. It is located 29 kilometers (km) east of Norfolk and 4.8 km north of the resort beaches of Virginia Beach. The installation is bounded on the north by the Chesapeake Bay, on the east by the Atlantic Ocean, and on the south and west by Virginia Seashore State Park (Figure 1).

The original reservation consisting of 133 hectares (ha), shown shaded on Figure 6, was acquired in 1914 by condemnation from private owners. An additional 39 ha were presented as a gift from the Commonwealth of Virginia and 11 ha from the Norfolk and Southern Railroad Company in exchange for a right-of-way. During the period 1938 to 1944, additional tracts were acquired by condemnation from the Commonwealth of Virginia and other agencies, comprising a total of 587 ha.

The name of the Fort was established by War Department General Order 31, dated 24 July 1916, in honor of Major General John Patton Story. After construction of Coast Artillery fortifications, the 2nd and 5th Coast Artillery Companies established the military garrison of FS in February 1917. From 1917 to 1925, the installation continued to be developed as a small harbor defense garrison consisting of four 16-inch howitzers.

As World War II (WWII) approached, FS began an extensive period of development. More than 50 percent of the existing facilities were constructed during 1940-1945.

It was also during this period, December 1941, that the headquarters of the Harbor Defense Command was moved from Fort Monroe to FS, controlling extensive heavy coastal defense positions at Fort Monroe, Fort Wool, Fort Curtis (Smith Point and Fishermans Island on the north side of the mouth of Chesapeake Bay), FS and others in the area.

In 1944, FS transitioned from a heavily fortified coast artillery garrison to a convalescent hospital with 1,800 beds for returning World War II veterans. The hospital accommodated 13,472 patients before it closed in March 1946. FS again transitioned to a new role of training individuals and units in amphibious operations at the end of World War II. In July 1948, the installation was transferred to the Transportation Corps as a subpost of the Transportation Training Command, FE, although the 458th Amphibious Truck Company had been on post since 1946. On 5 Dec 1961, FS was established as a permanent installation and in July 1962 as a Class II installation under FE. The 79th Transportation Battalion (TML) was activated at FS on 25 Nov 1966 and the installation became the "Home of the Amphibians". The 79th Transportation Battalion (TML) was inactivated in August 1979. The 11th Transportation Battalion (TML) became the resident battalion to command FORSCOM units stationed at FS. In July 1979, the Headquarters, Fort Story (Provisional) was established for operation and control of the subinstallation under the command of FE.

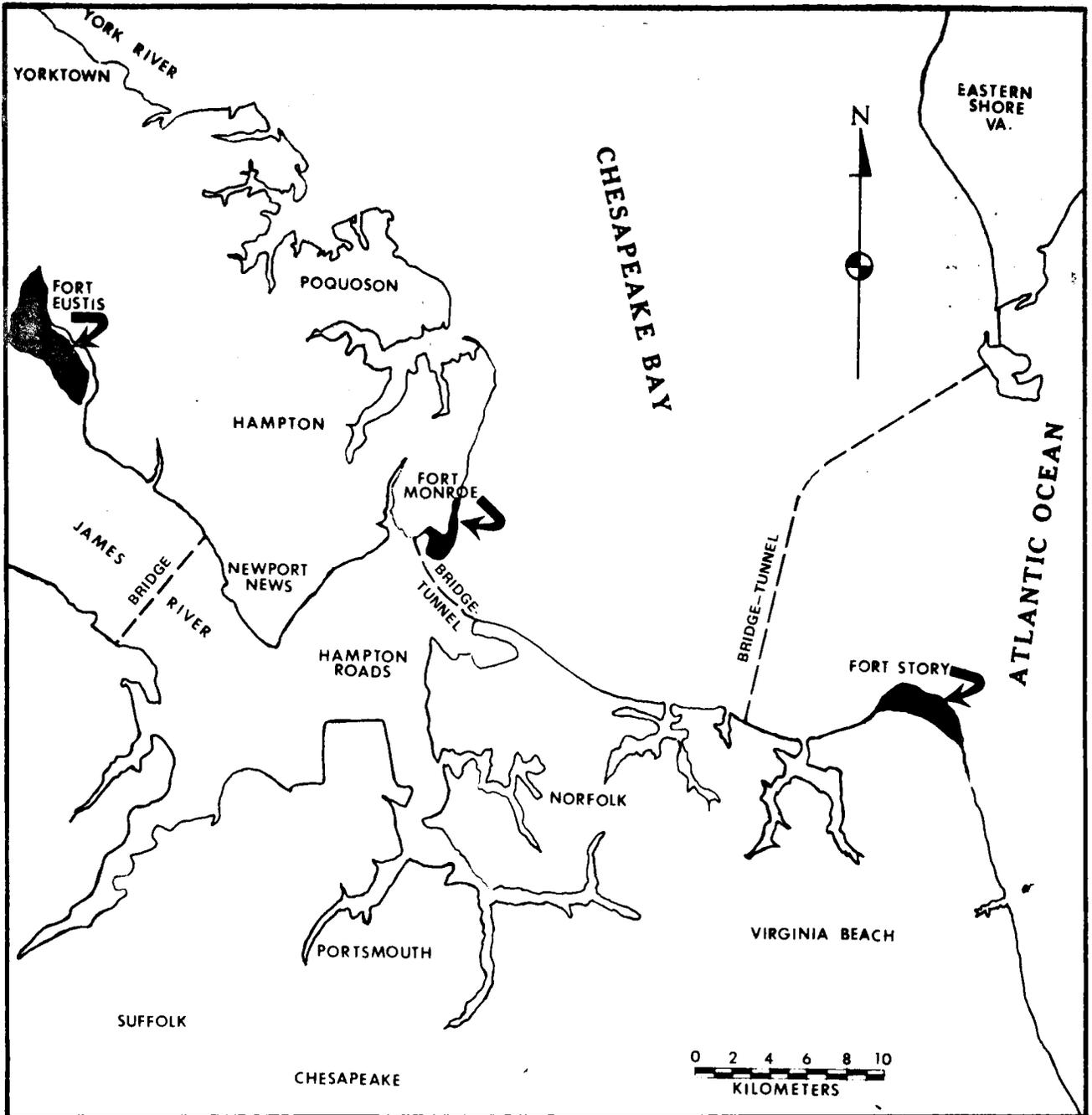


Figure 1. AREA MAP

E. Environmental Setting

1. Meteorological Data^{1,2}

Winters are relatively mild, and the land-sea temperature contrast affects the area's temperatures. The ocean and bay moderate the temperatures in the FS area. Temperature averages, maximum and minimum, are shown in Table I.

The average length of frost-free season is 245 days. The average date of the first killing frost in fall is 21 November, and the last killing frost in spring is 21 March.

Annual precipitation averages 114.6 centimeters (cm). The heaviest precipitation occurs during the summer months, with November being the driest month. Snowfall averages 18.5 cm per year. Table II indicates the 40-year average for precipitation at FS.

The prevailing winds are from the southwest averaging 19.6 km/hr. The area's geographical position is favorable with respect to adverse weather, being south of storms originating in higher latitudes, and north of the usual track of hurricanes and other tropical storms. It is occasionally subjected to the effects of hurricanes.

2. Biota

FS is located on the ocean front and includes sandy beaches, sand dunes, and a cypress swamp. The rear of the dunes has been stabilized with a heavy planting of loblolly pine.

Appendix B lists the flora and fauna of Virginia Beach. The listed species are found not only at this locality but are common to much of the eastern seaboard.

The potential deleterious environmental impact at FS arises primarily from the training activities being concentrated in a relatively small area; however, good land management practices do much to preserve a rather fragile seaside ecosystem.

TABLE I

Temperature (Average - Degree Celsius)

40 Year Average 1939 - 1978 at Norfolk International Airport

	AVG	MAX	MIN		AVG	MAX	MIN
JAN	5.0	9.4	1.1	JUL	26.1	30.6	23.3
FEB	5.5	10.6	1.1	AUG	24.4	29.5	21.1
MAR	9.4	14.4	4.4	SEP	22.8	26.7	18.3
APR	14.4	19.5	8.8	OCT	16.7	21.1	12.8
MAY	19.5	24.4	14.4	NOV	11.1	15.6	6.6
JUN	23.9	28.3	18.9	DEC	6.6	10.6	2.2

Extreme Temperatures Recorded: MAX - 39.4 MIN - 15 ANNUAL - 15.6

TABLE II
Precipitation (in Centimeters)
40 Year Average 1939 - 1978 at Norfolk International Airport

JAN	8.3	MAY	9.3	SEP	9.7
FEB	8.4	JUN	10.3	OCT	8.0
MAR	9.7	JUL	14.6	NOV	6.7
APR	8.1	AUG	13.6	DEC	8.2

Average Annual Precipitation : 114.6 Centimeters

3. Geology

a. Pysiography-Topography-Drainage

FS lies on the eastern limits of the Embayed Section of the Atlantic Coastal Plain Physiographic Province. The Embayed Section is a submaturely dissected and partly submerged coastal plain.

Elevations on FS range from sea level at the water-land interface to about 26 meters (m) above sea level in the sand dunes along Hospital Road. Four landforms (beaches, swamps, sand flats, and sand dunes) occur within FS and are shown in Figure 2. The beaches form a concentric band along the northern and eastern coast line where elevations range from sea level to approximately 1.5 to 2 m above sea level at the base of the fore dunes. A fresh water swamp occurs along the south central boundary and enlarges toward the southeast sector of the installation. Isolated elevations up to 2.5 m occur within this swamp. The sand flats, between the dunes, vary from depressions to large tracts of vegetated to nonvegetated sand. Elevations within these areas are approximately 3 to 5 m above sea level. The sand dunes occur in three discontinuous bands that parallel the beaches. The four dunes and secondary line of dunes are about 6 to 7 m in height while the third series of dunes obtain heights up to 26 m. The scale of Figure 2 precludes mapping the three separate lines of dunes and are mapped as one sand dune unit.

No through-flowing drainageways occur on FS. Four ponds (two in the southwest part and two in the southeast part), totaling 2.8 ha in size, are located on FS. Surface water covers a large portion of the swamp and remains over the surface for several months at a time. Surface drainage in the built-up areas is controlled by storm sewers with four outfalls discharging on the north or water-land interface portion of FS and one outfall discharging to the swamp. Most of the rainfall is absorbed by the sandy soil.

b. Surface

The surficial geology of FS consists of Recent sands and organic matter. The sands have been and are still being moved about by wind action and the organic matter is accumulating due to the lack of drainage.

c. Subsurface

The geology of Cape Henry is typical of the outer Coastal Plain geology that occurs along this reach of the Atlantic Seaboard. Unconsolidated sands, silts, gravels, and some clay of Quaternary to Tertiary age overlie older consolidated deposits which in turn overlie bedrock. The stratigraphic sequence of formations under Cape Henry is presented in Table III. Some input for this table was obtained from a well drilled to a depth of 457 m about 8 km west of FS. Elevations where the formations were encountered in this well and a description of each are as follows:

TABLE III
GEOLOGIC FORMATIONS IN THE COASTAL PLAIN OF VIRGINIA

Age	Series	Name
Quaternary	Pliocene- Holocene -?-?-?	Columbia Group
Tertiary	Miocene	Yorktown Formation
		Calvert Formation
	Eocene	Nanjemoy Formation
	Paleocene	Mattaponi Formation
?-?-? Cretaceous (?) ?-?-?	?-?-? Upper(?)	
Cretaceous	Lower	"transitional beds"
		Patuxent Formation
Precambrian- Triassic		"basement"

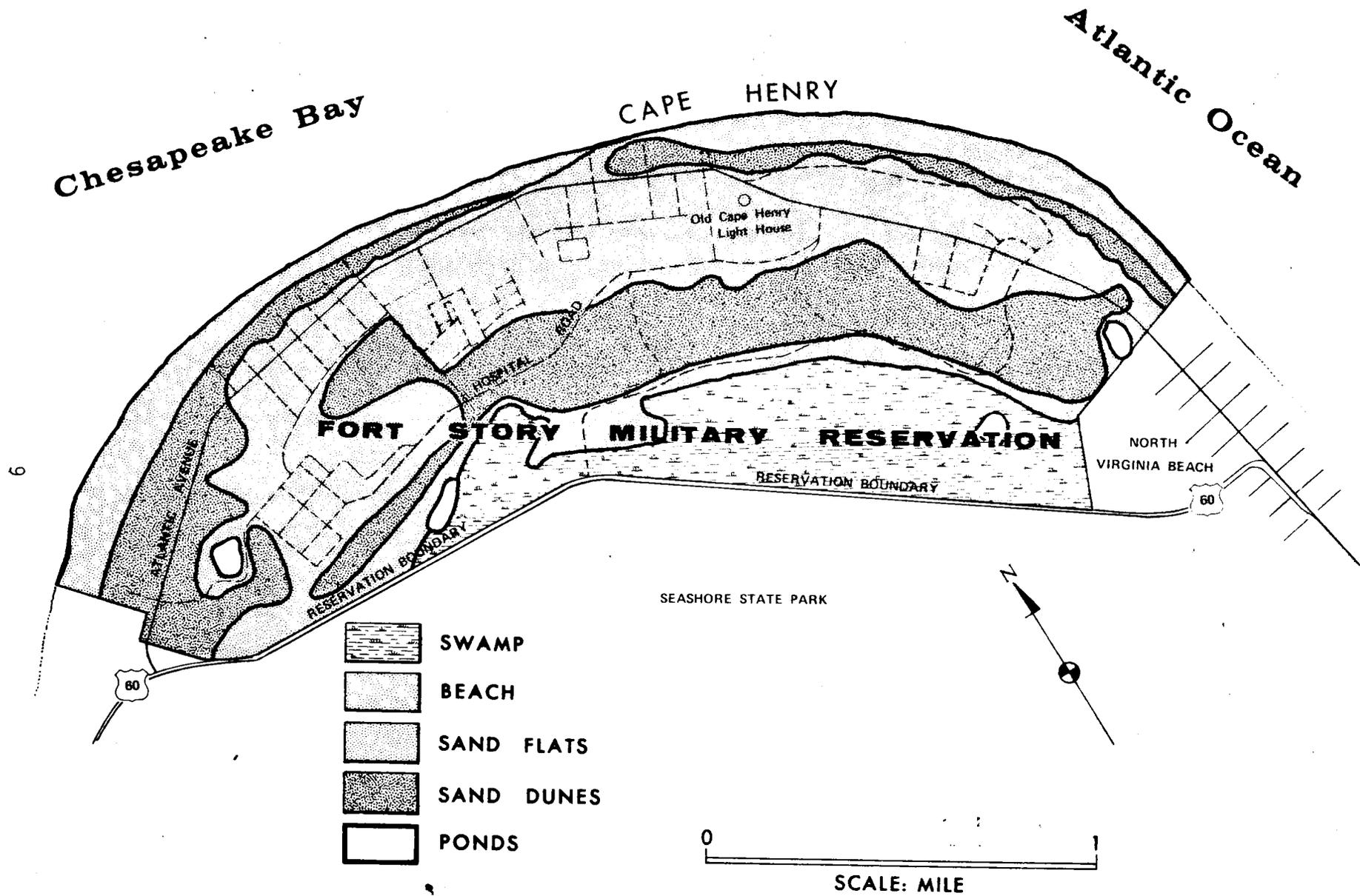


Figure 2. GENERALIZED LANDFORMS

- 0 m - Columbia Group. The deposits of this group are associated with subestuarine and submarine deltas and associated littoral deposits occupying the entire coastal plain of the Middle Atlantic Slope.
- No elevation data - Yorktown Formation (Fm). Gray to bluish-gray silts, sands, shell beds, and clay beds are not uncommon. The top of the Yorktown Fm under FS is estimated to be between 171 to 177 m below sea level and the gradient is to the east as shown in Figure 3.
- 160 m - Calvert Fm. Drab greenish-brown clays and silty clays, commonly consolidated. Plant fragments and shells are locally abundant. Coarse sand is characteristic of the basal material.
- No elevation data - Nanjemoy Fm. Quartz-glaucanite sands, shell beds, and shell limestone fairly common.
- 262 m - Mattaponi Fm. Drab green, gray and brown glauconite-bearing clays, quartz sands with thin beds of shell and dense limestone.
- 341 m - Patuxent Fm. Mainly medium to very coarse-grained sands and fine-grained gravels with tan, light gray and pale green clay interbeds.
- 457 m - Total depth of well was still in the Patuxent Fm. The basement complex has been described as igneous and metamorphic rocks of Precambrian and Paleozoic ages; partly consolidated sediments of Triassic age. From subsurface contours of this general area, the basement rock is between 945 to 976 m below sea level as shown in Figure 4.

Subsurface data from logs at six boring locations were available within FS. The locations are shown on Figure 5 and the logs are presented as Appendix C. These borings were drilled for foundation explorations with depths ranging between 3 to 27 m. The boring log of the deepest hole, location 5, encountered 20.7 m of light gray to tan fine sand with a trace of pea gravel at 9 m. From 20.7 to 27 m dark gray silt and clay were intermixed with the sand. It is assumed that this boring encountered only Recent deposits and did not penetrate the entire Recent strata.

d. Soil

The description of the surface and near surface soil stated in the FS Environmental Impact Statement is as follows:

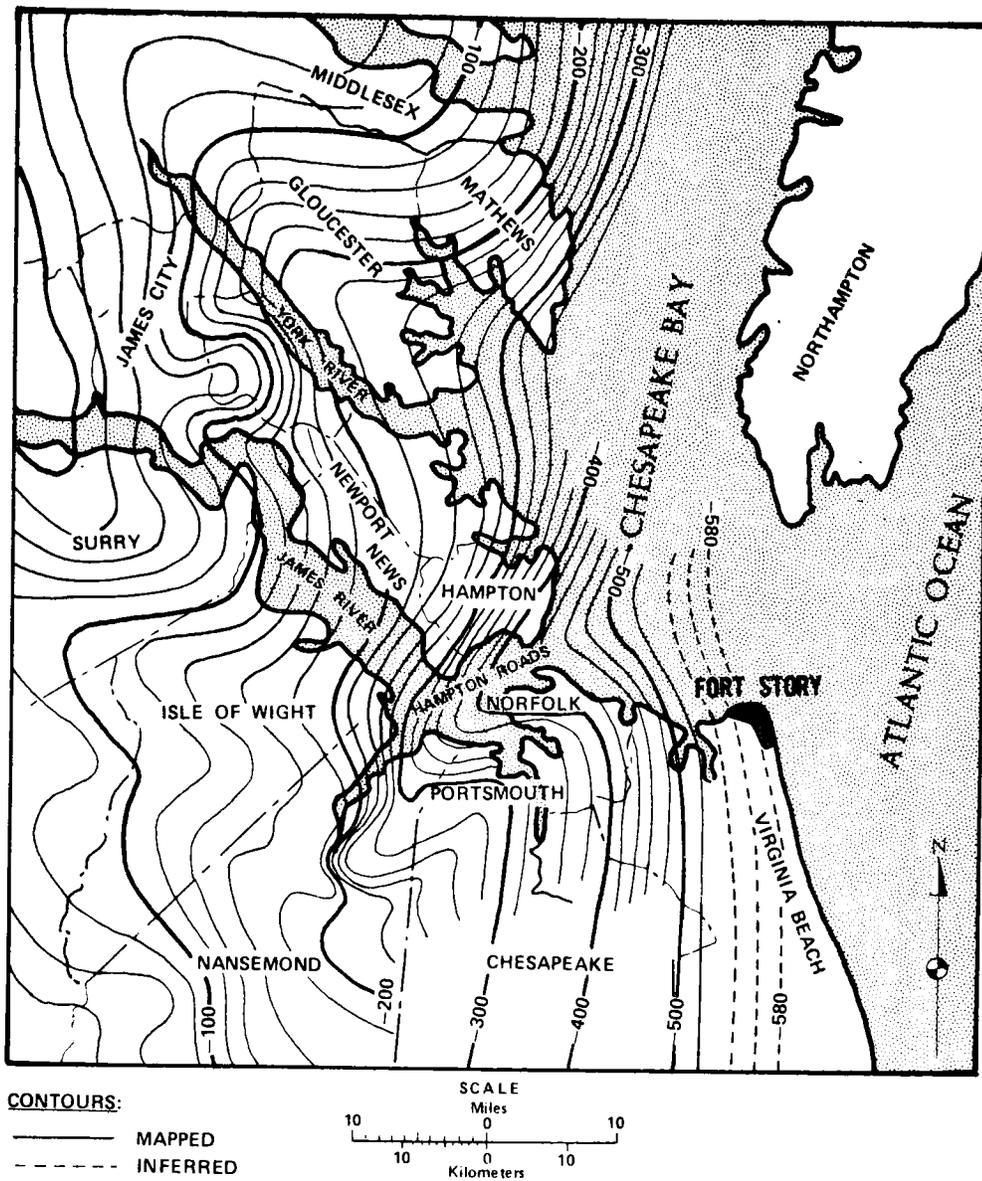


Figure 3. SUBSURFACE CONTOURS ON TOP OF YORKTOWN FORMATION

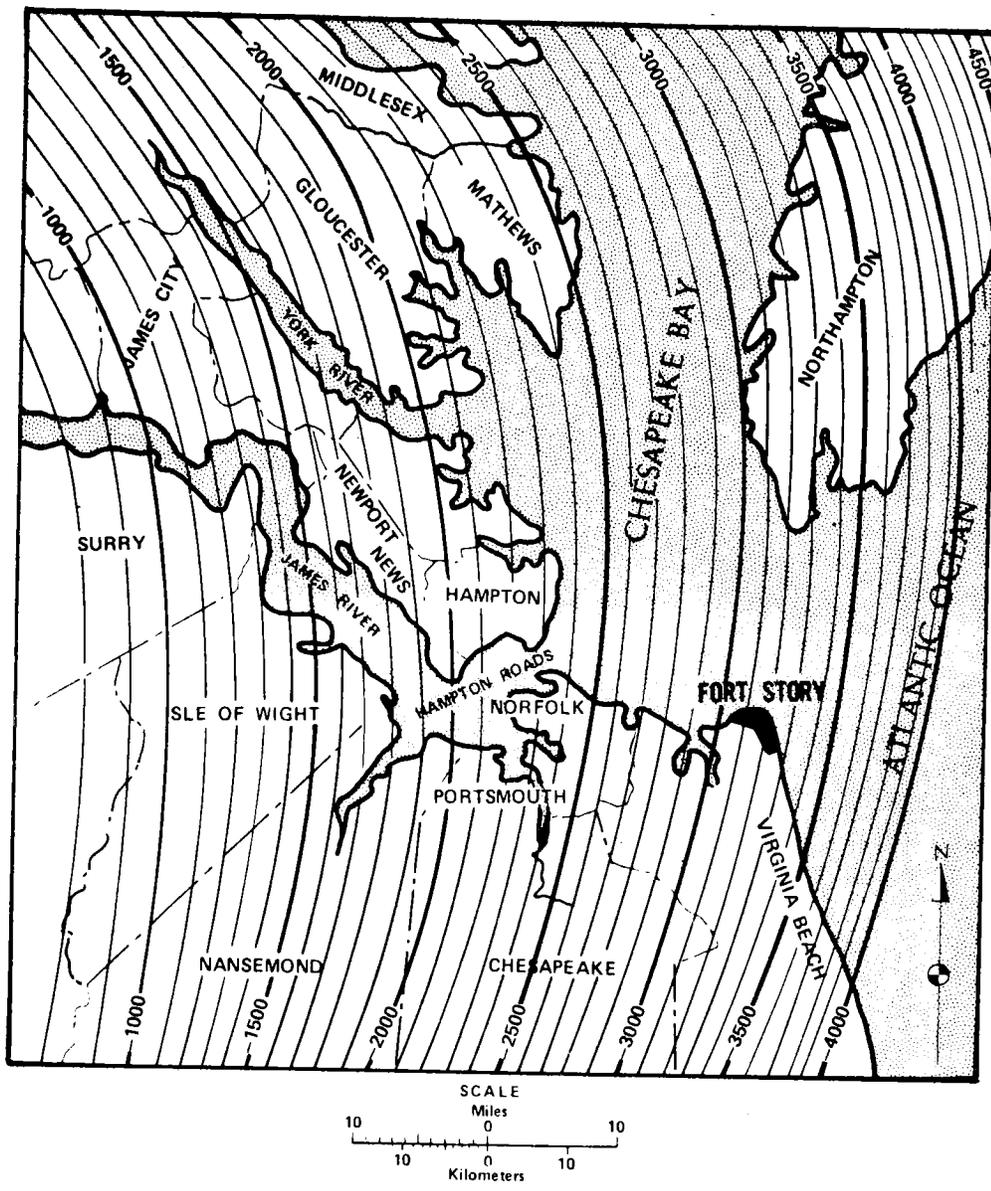


Figure 4. PRESENT "BASEMENT" STRUCTURE COASTAL PLAIN OF VIRGINIA—1973

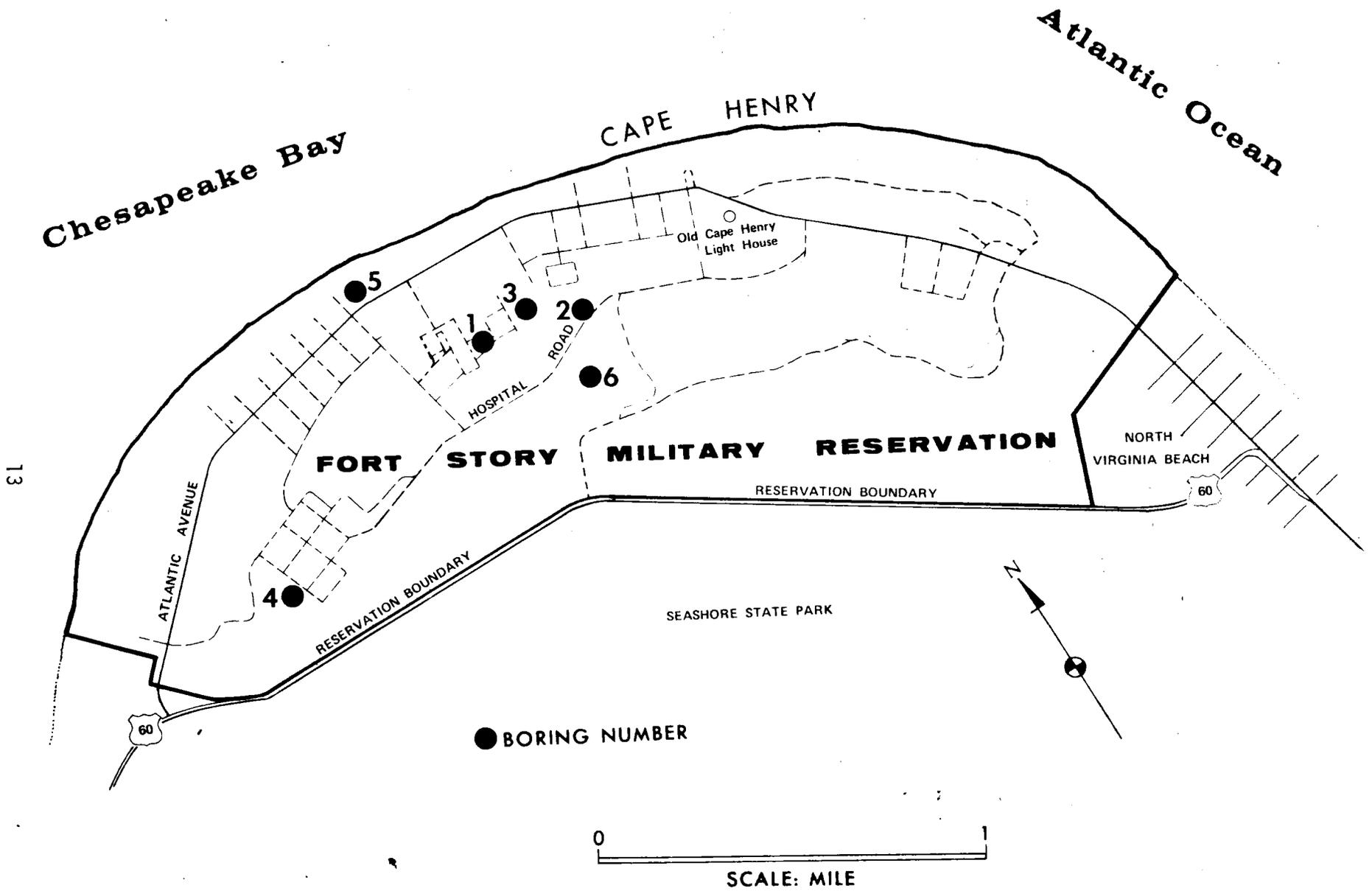


Figure 5. BORING LOG LOCATIONS

"The dune sand-stabilized phase classification is used to describe areas where vegetation has become established on former sand dunes and has essentially stopped the wind movement of sand. On most areas, the encroachment of sand took place many years ago, and, as on some parts of Cape Henry, a feeble Padzol profile has developed. This profile is distinguished by 7.6 to 10 cm of organic matter overlying a white sand that extends to a depth of 5 to 7.6 cm. The subsoil is slightly cemented, coffee-colored, loamy sand that changes at about 15 cm into brown, loose, loamy sand extending to a depth of 38 to 51 cm. The grayish-yellow substratum is loose incoherent sand. In areas that have been stabilized recently, the sand is grayish-yellow throughout."

Swamps consist of several cm of saturated peat, decayed leaf, and fibrous material underlain by a light gray to brown sand.

e. Groundwater

FS receives its potable water from the city of Virginia Beach which in turn purchases water from the city of Norfolk. There are no water wells on FS. The groundwater in the swamp is at the surface and this water is further retained in the swamp by the construction of Highway 60 along the southern installation boundary. There are no outlets from the swamp that pass under Highway 60. Groundwater in the remainder of the installation is usually at or just above sea level. However, as the surface elevation increases the water table trends to follow the topography. Water levels from the six boring locations are presented below:

<u>Location</u>	<u>Elevation ft (m)</u>	<u>Water Depth ft (m)</u>	<u>Total Depth ft (m)</u>	<u>Above or Below Sea Level ft (m)</u>
1	10 (3)	8 (2.4)	40 (12)	2 (0.6)
2	0 (0)	2 (0.6)	68 (20.7)	2 (0.6)
3	13.6 (4.1)	6 (1.8)	10 (3)	7.6 (2.3)
4	15 (4.6)	9 (2.7)	47 (14.3)	6 (1.8)
5	23.2 (7.1)	20 (6)	90 (27.4)	13.2 (4)
6	10 (3)	3 (0.9)	58 (17.7)	7 (2.1)

f. Geological Aspects of Potential Migration

The potential for contaminants reaching the groundwater at FS is extremely high due to the permeable sands above the water table and the close proximity of the water table to the surface. Any movement of contamination in the subsurface would be to the south toward the swamp or in an easterly or northern direction toward the Atlantic Ocean or Chesapeake Bay.

F. Leases

1. Based on available records and interviews there have never been any manufacturing type leasee operations at FS. Outgrants however, have been and are presently active with the city of Virginia Beach, various utility companies and other Government agencies.⁸

2. There were no records which indicated that agricultural or grazing leases had ever been active at FS.

G. Legal Actions

There were no records of legal actions on file or pending as a result of operations at FS.

II. PAST AND CURRENT ACTIVITY REVIEW

A. Installation Operations

1. Industrial Operations (Numbers in parenthesis are keyed to Figure 6.)

Industrial operations at FS were primarily concerned with vehicle maintenance which involved engine overhaul, battery refurbishing, steam cleaning, paint spraying, and similar support activities.

Industrial hygiene surveys conducted by the First US Army Medical Laboratory⁹ and USAEHA,¹⁰ reported that the principal industrial liquid wastes generated resulted from the six wash racks. These wash racks drain into three oil and grease separators prior to discharging to the storm drain network. The wash racks are also used by installation personnel to change crankcase oil. During this operation waste oils can enter the drainage system.

At the time of the records search, wastewaters from the wash racks were by-passing the separators and were being discharged into the storm drainage. The oil contaminated liquids were traced to a discharge culvert which empties into the Chesapeake Bay/Atlantic Ocean near the old Nike tracking site (16). See photographs in Appendix A.

The installation is aware of the problem and a contract has been awarded by the US Army Corps of Engineers to rectify the problem.¹¹ The project consists of the construction of four 23 X 30 m concrete vehicle wash racks, one wash platform, abandonment of existing septic tanks and construction of sewer lines, lift stations, including pumps and emergency generators. The project also includes rehabilitation of the existing sewer system including replacement, cleaning, grouting, testing, restoring pavement cuts, topsoiling, seeding, and other associated work.

Other vehicle maintenance operations do not constitute a waste disposal problem. Most operations are of a limited nature and although some spills have occurred in the past, the installation has an adequate oil spill prevention control and countermeasure plan.¹² All waste oils from the various maintenance shops are collected and disposed of by the US Navy under contract by an approved contractor.

Although records show that a battery shop is operational in Building 1053, interviews with personnel familiar with the operation reported that the facility is used to "charge" batteries only. No rework or rehabilitation of batteries is performed. Unserviceable batteries are taken to Defense Property Disposal Office (DPDO). In 1981, a new battery facility, which will be limited to the charging of batteries, will be set up in the maintenance area. A battery shop with minor repair capability is operational in Building 1083.

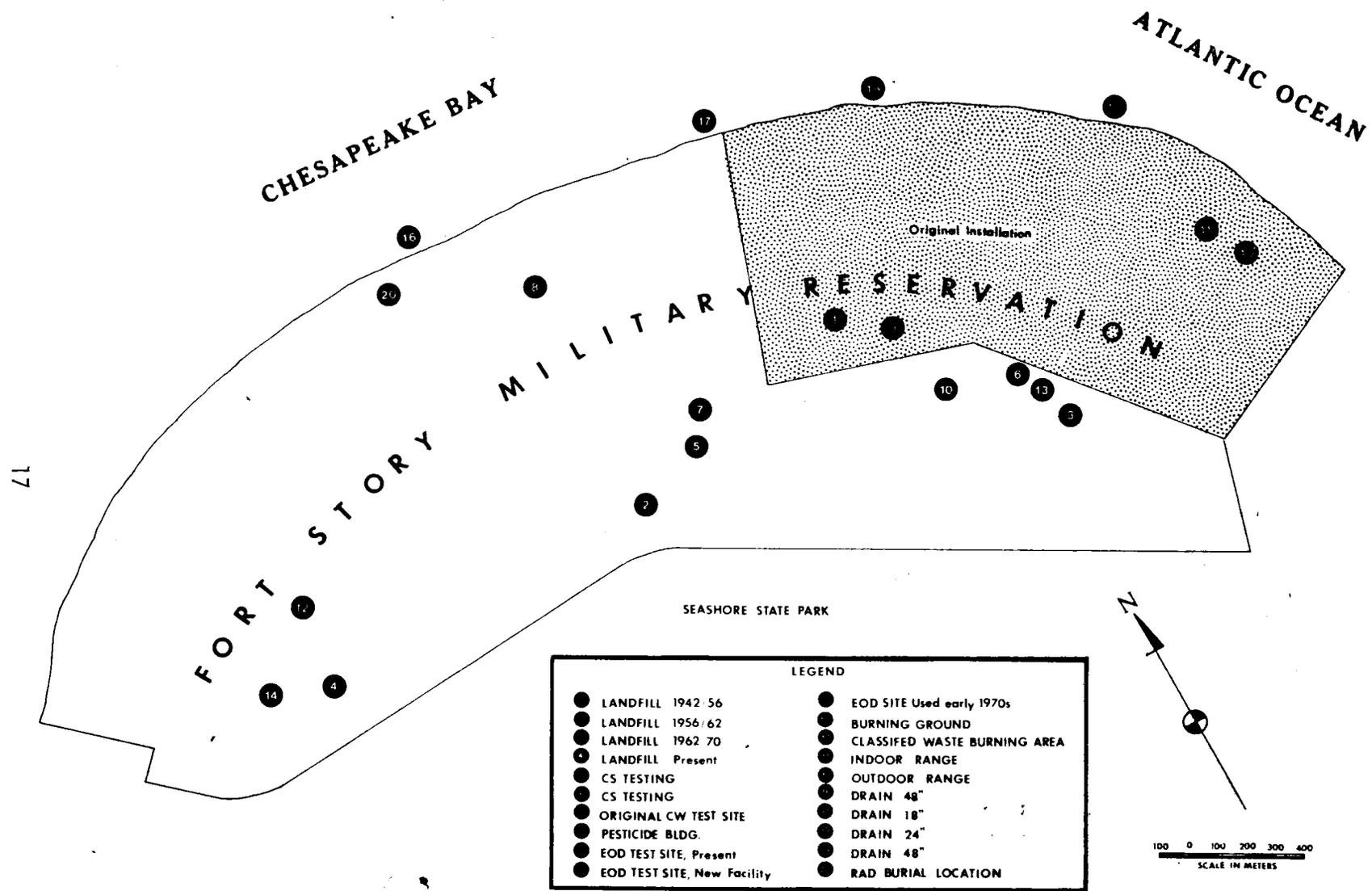


Figure 6. MAP IDENTIFYING LOCATIONS RELEVANT TO SURVEY

2. Lessee Industrial Operations

Based on available records and personnel interviews, there have never been any industrial lessee operations at FS.

3. Laboratory Operations

Industrial laboratory operations at FS were limited to a small photographic laboratory in Bldg 401. Until the early 1970's, the wastes generated were disposed of into the sanitary sewer system. Since then, spent photographic solutions are sent to FE where the silver content is recovered. The laboratory processes black and white film only. The laboratory was operational less than one hour per day. It was closed in the late 1970's.

The multiple craft shop (Bldg. 501) also has a small developing cubicle which is used occasionally to develop film. Spent chemicals are also sent to FE.

4. Material Proof and Surveillance Tests

Based on available records and interviews, operations involving material proof and surveillance tests were never conducted at FS.

5. Training Areas

Due to its beach fronts, FS is used extensively for various amphibious training operations. These training areas are used throughout the year by all branches of the Armed Forces and their reserve components.

Specific training areas include: (see Figure 7)

Red Beach I and II, and Blue Beach, (including the Demonstration Site). These are all located on the Chesapeake Bay and are used for amphibious training, and testing of equipment. The beaches are used year-round but peak periods of use are from April to November.

Green Beach. Green Beach, located on the Atlantic Ocean, is used for amphibious training and testing. The city of Virginia Beach uses 7.8 ha of this beach from June through September on weekends, and holidays for public swimming.

Administrative Area A. This area is used for field training exercises. The area is cleared and includes concrete pads for tents. Water and lights are available.

Tactical Bivouac Areas A, B, C, and D. Wooded areas behind Red Beach I and II and Blue Beach are used for all types of amphibious training.

Cargo Training Areas. Adjacent to Tactical Bivouac Areas C and D, this area is used for training of personnel in cargo handling, stowage and documentation of cargo and handling equipment.

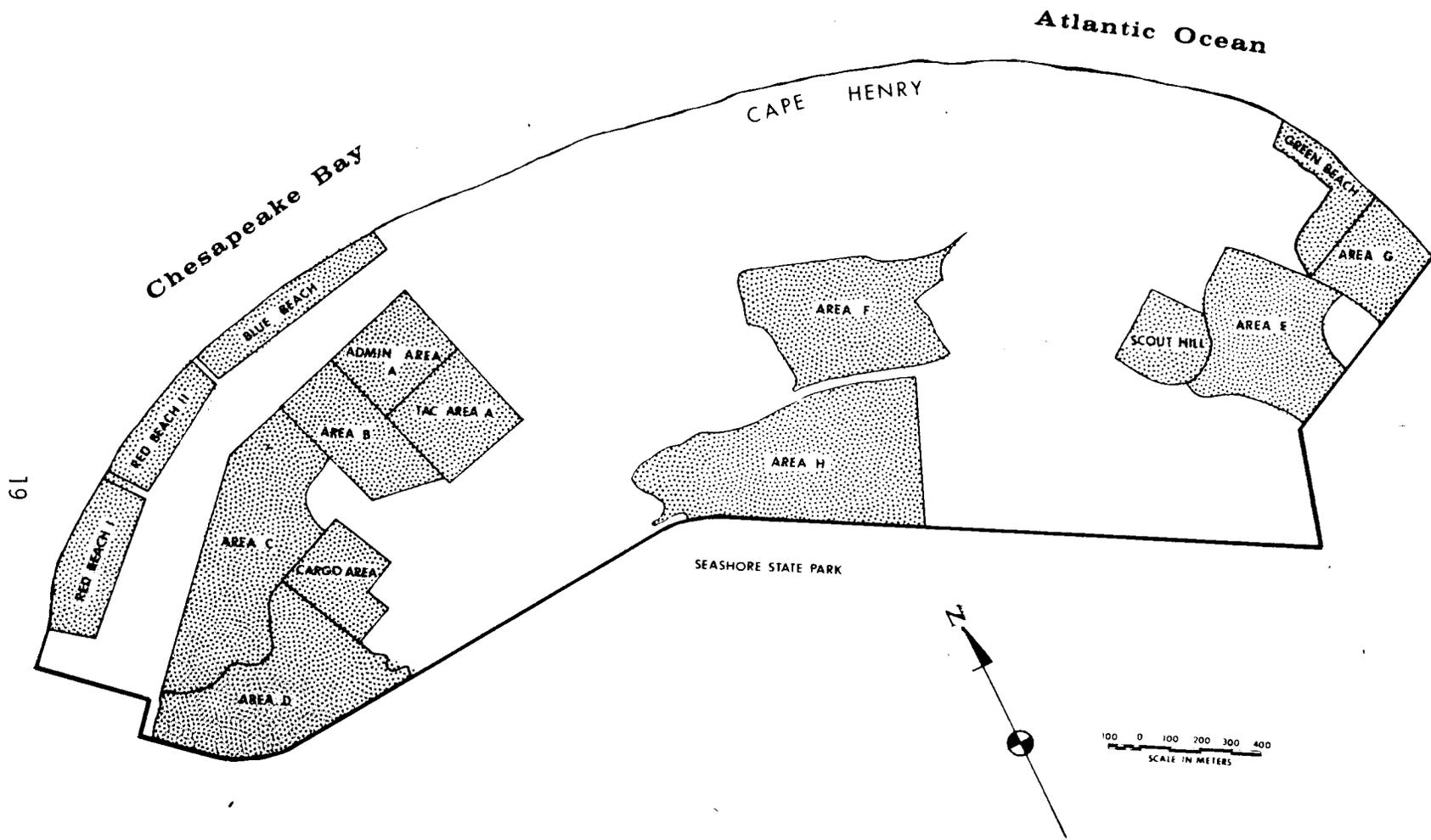


Figure 7. TRAINING AREAS

Tactical Bivouac Area E, F and G. These wooded areas located behind Green Beach on the Atlantic side of the reservation are also used for training.

Driver Training Course (including Area H). Extending throughout the FS reservation, the driver training course includes a swampy area, beaches, sand dunes, unimproved and improved roads. It is used for student proficiency training, research and testing of vehicles, and cargo transfer operations.

Scout Hill. The Boy Scouts make frequent use of this area for camping and meetings.

Two areas used as pistol/rifle ranges were identified; location (15) was an outdoor range and location (14), Building 1202, was an indoor range. Dates as to when these ranges were active could not be confirmed. Based on the ground tour observations, it would appear that the outdoor range has not been active for many years, however, it was reported that the indoor range was used until the 1970's.

Since ranges were limited to small arms firing, UXO's are not a major problem. UXO's are occasionally found on the beach. These rounds, were reported to be from ships which were sunk during WWII. These UXO's are removed by Navy EOD personnel.

6. Toxic/Hazardous Materials - Handling and Storage

a. Industrial Chemicals

Industrial chemicals used at FS were primarily POL products, solvents, and chemicals used to support vehicle maintenance operations.

Two surveys, one conducted by the 1st US Army Medical Laboratory⁹ and the other by the USAEHA¹⁰, reported the following materials as a potential exposure hazard to FS personnel:

- (1) Metal and Flux fumes from welding operations, ozone and oxides of nitrogen.
- (2) Carbon monoxide and other products of internal combustion engines, grease and oils.
- (3) Spray painting fumes.
- (4) Sulphuric acid and its mists during battery charging operations.
- (5) Cleaning solutions including flammable organic solvents.

(6) Ultraviolet, infrared and intense visible radiation during welding operations.

(7) Polyester resin, benzoyl peroxide, butyl benzyl phthalate and their vapors, dusts from sanding painted metals and filled surfaces, and touch-up spray paints in the Tactical Equipment Repair Shop, Building 1083.

(8) Gasoline and other vehicle fuels.

(9) Pesticides (see section II. A. 6. e.).

b. Chemical Agents

Chemical agents including mustard (H) and chlorine (Cl) have been used in the training of military personnel. The toxic chemical agents (H and Cl) were used in limited quantities during World War II to familiarize troops with the agents and use of protective masks.

The riot control chemical agent CS is presently used in troop training and CN was used in the past.

World War II training of personnel with Agents H and Cl was conducted in a building identified at location (7). During the late 1940's, the building was razed.

Training with riot control agents was conducted in buildings identified as locations (5) and (6). These buildings are actually concrete structures built into the side of a hill. Location (5) is the only site presently being utilized (see Photograph 1). Riot control agents to support training exercises, are stored in the magazine area.

c. Biological

Available records did not indicate that biological agents had ever been manufactured, stored, or tested at FS.

d. Radiological Operations

Radiological material at FS includes X-ray diagnostic equipment. Radiation protection surveys conducted by USAEHA^{17,18} and the US Army Medical Laboratory¹⁹ inventoried the equipment at FS. The 1973 USAEHA study concluded that: "The findings indicated that there are potential health hazards resulting from the use of ionizing radiation sources". Interviews with FS personnel indicated that the recommendation by USAEHA was subsequently implemented by FS and that the potential health hazards have been eliminated.

Buried radiation material in the form of electron tubes and other devices containing Cobalt-60 was addressed by USAEHA in a special study conducted in October 1976.¹⁶ A 32 gallon steel drum was located about 15.2 cm

below the surface near the southeastern corner of the Nike site (20). The drum contained 12 metal objects and gamma spectrum analyses indicated all devices contained Cobalt-60 with radioactivity up to 20 nanocuries per device. The report stated that the contents of the drum had been burned either in the drum or burned material has been placed in the drum before burial. The drum and its contents were subsequently shipped to an approved radiological material disposal site.

A radiation survey of the entire area inside the security fence of the Nike site and all permanent structures on the site did not reveal any detectable radiation or radioactive material. The study concluded that "there were no health hazards resulting from the material burned at FS". The study recommended that "all land and permanent structures can be released for unrestricted use as there are no health hazards from radioactive material or other sources of ionizing radiation remaining in the Nike site."

Radiation leases/permits are active for calibration sources and small radioactive items including electronic tubes, gages, and compasses.

e. Pesticide/Herbicide/Fertilizer

The Chiefs of the Land Management and Entomology Sections act as advisors to FS in matters regarding pesticide and herbicide application. The actual work is carried out under contract by the US Navy who is responsible for all maintenance at FS. Pesticides are premixed and transported to FS for application, however, limited quantities are occasionally mixed at FS in Building 755 (8). Overflow from mixing operations is directed to a holding tank which is periodically pumped out under contract by an approved hazardous waste disposal contractor. A list of pesticides used at FS is shown in Appendix D.

B. Disposal Operations

1. Liquid Waste Treatment

a. Sanitary Wastewater Treatment

Most of the domestic waste (which also includes the grindings from approximately 150 garbage disposal units) is discharged to the Hampton Roads Sanitation District Commission treatment facility. There are, however, 24 septic tank disposal systems in use at FS. All tanks, reportedly, are cleaned on an annual basis. The septic tank pumpings are discharged to the main pumping stations. There are also a few locations where pit latrines are still in use.

The sewage system includes five lift stations and two main pump stations. Chlorine gas is added at the main pump station for odor control and disinfection. No stations have sewage overflow by-passes or metering devices. Three stations have standby power and there is a 4 inch gas engine-driven pump available for use at the pumping stations which do not have standby power. All stations are checked twice daily.

A contract (Contract No. DACA65-80-B-0022) has been awarded to update the present sanitary sewage system during 1981. This includes connecting most of the present septic tank units to the sewage system which

discharges into the Hampton Roads treatment facility. Work is scheduled for completion during the last quarter of 1981.

b. Industrial Wastewater Treatment

The only significant liquid waste generated on the installation is from six vehicle wash racks located in the maintenance area. The wash racks drain to three oil and grease separators prior to discharge into storm drains. The adequacy of the separators was questioned by personnel interviewed by the team. During the team ground tour, the area was inspected and oil residues were observed throughout the wash rack area (see Photographs 2 and 3.

It was reported in 1972⁹, that personnel often use the wash racks to change oil, and in the process, allow waste oils to enter the drainage system.

All other waste POL products from the various maintenance shops are collected and delivered to a Naval unit in Norfolk for disposal. No oil or other POL wastes is disposed of in the sanitary landfill according to the referenced survey⁹.

c. Holding Ponds

There are no industrial waste holding ponds at FS.

d. Stormwater Drainage

Stormwater drains both into the Atlantic Ocean and Chesapeake Bay and into the unnamed Cypress Swamp to the south. No data were found to indicate that drainage into the Cypress Swamp was a problem. The swamp is bounded by a major highway which prevents offpost surface drainage.

The stormwater drainage into the Chesapeake Bay and Atlantic Ocean are monitored by NPDES Permit No. VA0031917. The permit was effective on 14 March 1980 and expires 14 March 1985. Parameters monitored by the permit are flow, pH, and oil/grease. The drains are located at points (16), (17), (18), and (19) on Figure 6.

All of the discharge points meet NPDES permit limitations. The record search team, during its ground tour, examined the 48 inch drain at location (16) and found oil film on the discharge. See Photographs 4 and 5. The team returned to the wash rack area and found military personnel washing their cars. The wash water was entering the rack drains and flowing into the storm drain system. However, this situation is being adequately addressed by FS under APAP.

2. Solid Waste Treatment

a. Sanitary Landfills^{13,14,15}

Four areas have been identified as landfills. These areas are identified on Figure 6 as locations (1), (2), (3), and (4).

Based on available records and interviews, location (1) was used from early 1942 through 1956. Information prior to the 1940's was not available; however, this area was included in the original boundaries of FS and the landfill may have been in existence prior to the 1940's.

Location (2) was used as the sanitary landfill from 1956 through 1962. Details on types of materials buried were not available; however, it was reported that all installation trash was disposed of in this landfill.

The last sanitary landfill location (3) was used from 1962 through 1974. USAEHA has conducted a study which addressed this landfill.¹⁵ In one of the three test wells, concentrations of arsenic, chromium, and lead were found to be in excess of the EPA drinking water standard. The values obtained were within analytical error.

Presently, location (4) is being utilized as a fill area for building debris including concrete, brick, etc.. Other debris were observed in the area during the record search; however, the team was informed that combustible material was removed from fill material prior to leveling.

Since 1974, all installation trash is hauled by the Navy Public Works to the Naval Operating Base, Norfolk, for incineration. Hazardous wastes are removed under contract by an approved hazardous waste disposal contractor.

b. Contaminated Waste

There are presently no known areas at FS which have been used to bury contaminated waste except for landfills which have been discussed in section II. A. 6. d. and II. B. 2. a.

3. Demolition and Burning Ground Areas

There are no demolition grounds as such at FS; however, the US Navy EOD team, a tenant activity at FS, has used locations (9) and (11) for limited training. A new site, location (10), recently approved by DDESB, has been designated as a detonation training range. The maximum detonation is limited to 0.5 pound.

FS has a permit from the State of Virginia to burn building materials, such as wood, near the present landfill area. The area (12) was being used during the survey. Photograph 6 shows material being burned. Classified trash is burned in a 55 gallon drum-like container (Photograph 7) near Building 401 (13).

4. Demilitarization

Based on available records and interviews, there have never been any demilitarization operations at FS.

5. Miscellaneous

Based on available records and interviews, there was no information concerning major spills of hazardous substances at FS. An installation spill contingency plan¹² dated July 1977, has been developed in accordance with provisions of the Federal Water Pollution Control Act which establishes the responsibilities, duties, procedures and resources to be employed to contain and clean up accidental discharges. This plan is currently being updated in accordance with AR 200-1, Environmental Protection and Enhancement.

C. Water Quality

1. Drinking Water

FS receives its potable water from the city of Virginia Beach, which in turn purchases water from the city of Norfolk. The city of Norfolk provides conventional treatment and is a State of Virginia approved supplier.

The potable water of FS is rechlorinated at Building T-213 as it enters the installation adjacent to the east gate. Chlorine residual monitoring, both at the point of chlorine addition and in the distribution system, is performed on a daily basis.

There are two steel water storage tanks at FS. One has a volume of 1,135,500 liters and the other has a volume of 757,000 liters.

The two steel tanks are cathodically protected against corrosion. The distribution system feeds directly from the storage tanks, thus keeping a "fresh" supply of water available and not having "old" water in the system. Pressure in the distribution system is maintained between 35 and 58 pounds per square inch gauge (psig) by an automatic valve system between the main supply line and the storage tanks. The two ground level storage tanks are refilled by main line pressure; however, the elevated tank requires a pump for refilling. Distribution to the installation is through various sizes (5-25 cm) of cast iron, asbestos cement, and galvanized pipes. No problems were reported or noted with the distribution system.

FS is participating in the US Army Drinking Water Surveillance Program (USADWSP) by submitting yearly drinking water samples for physical, chemical, radiological, and pesticide analyses by USAEHA. No problems have been identified by this monitoring program.

The FE MEDDAC Preventive Medicine Activity monitors eight water samples per month for coliform organisms. To date, all bacteriological analyses have been negative.

2. Surface Waters

There are no surface streams on FS; however, a Cypress Swamp exists along the southern boundary (see Figure 8). Storm drainage is discharged into both the ocean and the swamp and is covered by NPDES permits (see Section II. C. 4.). The discharge into the swamp is monitored monthly for flow, total suspended solids, oil and greases, and pH. The surface drainage discharge into the swamp meets NPDES limitations.

Although a complete analysis of the swamp water was not found by the team, an USAEHA report¹⁵ stated that a small manmade pond in the swamp area had concentrations of iron, lead, and zinc which exceeded EPA criteria for freshwater life in the pond. Small traces of DDT and its degradation products were also found in the sediments.

3. Subsurface Water

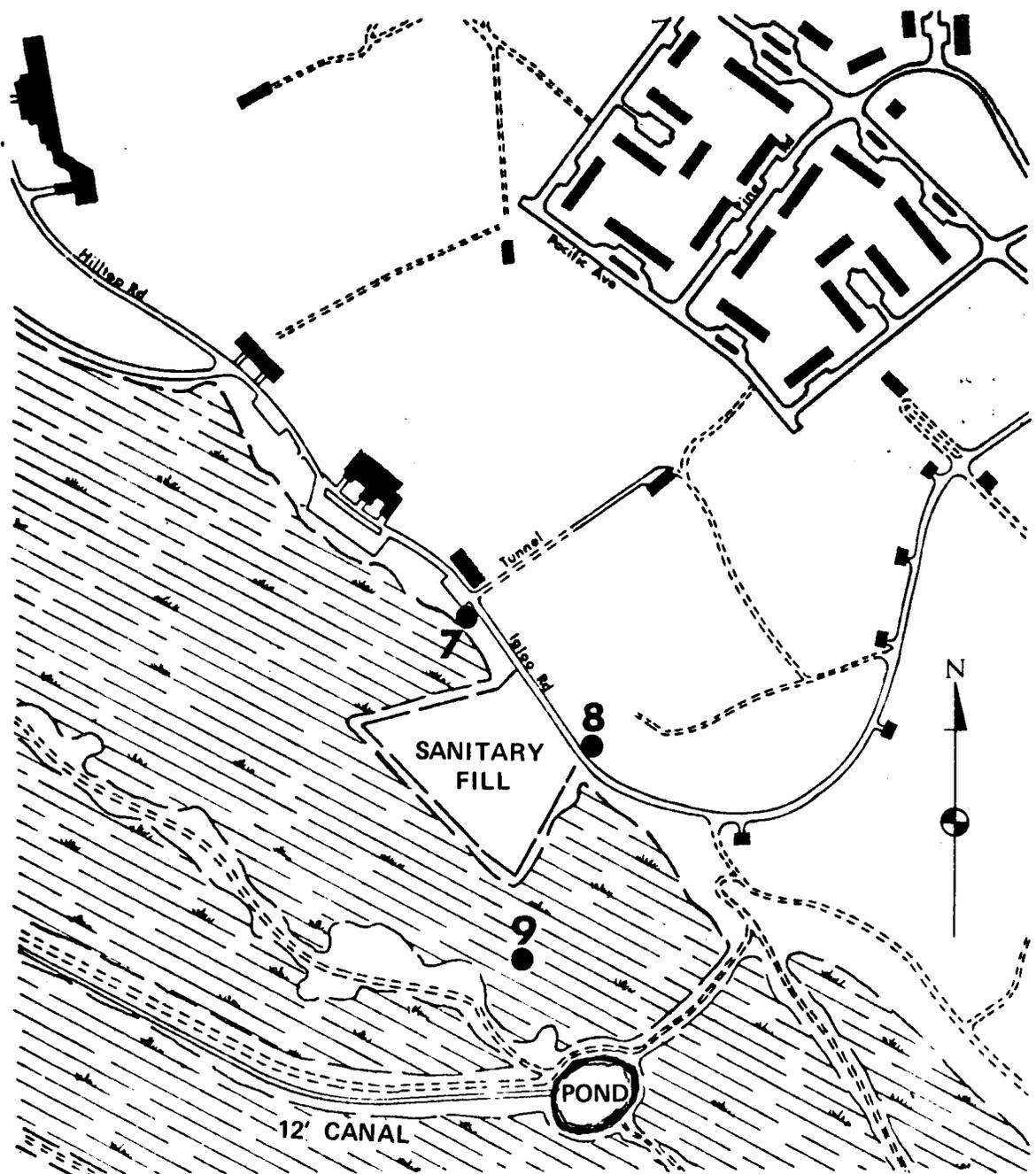
The only data on subsurface waters beneath FS uncovered by the record search team were contained in an USAEHA landfill study conducted in 1977¹⁵. Under this study three wells were drilled (Nos. 7, 8, and 9) around the old landfill adjacent to the Cypress Swamp (see Figure 8). Groundwater was encountered at a depth of about 2.5 m.

Analytical results from the three wells are shown in Table IV.

Well 9 on the south edge of the landfill, yielded samples that were slightly over the drinking water standards for concentrations of arsenic, chromium, and lead. These are very small increments over the standard and do not constitute any significant health or environmental hazard. Both the TOC and the COD are relatively high, which indicates that some organic material is passing through the area.

4. NPDES Permits

Storm drainage into the Atlantic Ocean and Cypress Swamp is covered by NPDES Permit No. VA0031917, effective 14 March 1980. Discharges are monitored monthly for flow, total suspended solids, oil and grease, and pH at five locations including the storm drain discharge near the Nike site. A copy of NPDES Permit No. VA0031917 is included at Appendix E.



LEGEND:



MARSHY AREA



SAMPLE WELL

SCALE: 1" = 400'

Figure 8. LOCATION OF SAMPLE WELLS AT SANITARY LANDFILL, FT. STORY

TABLE IV.
GROUND WATER ANALYSIS

<u>Parameters</u>	<u>Units</u>	<u>Well 7</u>	<u>Well 8</u>	<u>Well 9</u>
Conductivity	umhos/cm	260	632	93
Turbidity	NTU	90	165	185
Total Solids	mg/l	348	648	377
Total Dissolved Solids	mg/l	207	370	103
Hardness	mg/l as CaCO ₃	105	162	44
TOC	mg/l	123	83	235
TPO ₄ /N	mg/l	0.20	0.29	0.24
NH ₃ /N	mg/l	1.2	11.0	0.7
NO ₂ -NO ₃ /N	mg/l	0.17	0.26	0.26
Chloride	mg/l	25.7	48.2	14.4
COD	mg/l	197	167	386
Arsenic	mg/l	0.037	0.048	0.058
Cadmium	mg/l	0.009	0.009	0.009
Chromium	mg/l	0.025	0.026	0.066
Zinc	mg/l	0.046	0.026	0.057
Lead	mg/l	0.036	0.047	0.055
Iron	mg/l	13.8	30.3	15.2

III. INSTALLATION ASSESSMENT

A. Findings

1. Based on available records and interviews, there have never been any industrial, agricultural or grazing leases at FS.
2. Records did not reveal any legal actions as a result of operations at the installation.
3. Industrial manufacturing operations have never existed at FS.
4. A photography laboratory was in existence until the late 1970's although it was a small operation. During the last four years of operation, silver was recovered and sent to PDO at FE. Prior to that time, wastes were disposed of in the sanitary sewer.
5. Many areas on the installation are used for amphibious troop training. The training program is extensive and continues throughout the year.
6. Except for small quantities of CS and CN, there are no other chemical agents at FS. In the past however, H and Cl were used in small quantities for troop familiarization tests.
7. Radiation leases/permits are active for calibration sources and small radioactive items including electronic tubes, gages, and compasses.
8. Most of the pesticides used at FS are premixed on Navy property and transported to FS for application. Occasionally, additional mixing may be required at FS; however, any overflow is directed to a holding tank which is periodically pumped out and removed under contract.
9. Sanitary waste is processed through the city of Norfolk STP. Several septic tanks are still active at FS but are scheduled to be removed from use this year.
10. Stormwater drainage is directed either to the swamp area or the bay/ocean.
11. Four areas have been identified as being used as fill areas. Three were sanitary landfills containing all trash generated on the installation (pesticide containers, hospital waste, insecticides) and were used until 1969. All waste is now hauled off the installation by either the US Navy or under contract. An area in the southwest is presently being used to dispose of non-combustible building rubble.

12. The Navy EOD has used two areas of FS for both training and disposal areas. A new area has recently been approved by DDESB as a test and training facility. Demilitarization has never been conducted on the installation.

13. There are two burning areas: One is used to burn building and construction waste and the other for classified waste. An open burning permit with the State of Virginia is active.

14. Drinking water, which is supplied by the city of Norfolk through the city of Virginia Beach meets all EPA criteria.

B. Conclusions

1. The combination of available geological evidence and information on contaminant sources does not indicate the migration of significant quantities of contaminated material by surface or subsurface means.

2. Leachate from one of the sanitary landfills has been analyzed and concentrations of arsenic, lead, and chromium were found to slightly exceed drinking water standards in one of three wells. However, it has been concluded¹ that the concentrations of arsenic, lead, and chromium did not constitute a significant health or environmental hazard to surrounding communities.

3. The washrack area of FS is contributing POL wastes to the storm drainage network; however, this situation is being adequately addressed by FS under APAP.

C. Recommendation

That no survey be performed by USATHAMA at this time.

¹US Army Environmental Hygiene Agency, Landfill Study, No. 26-0031-78, 31 Oct-11 Nov 1977.

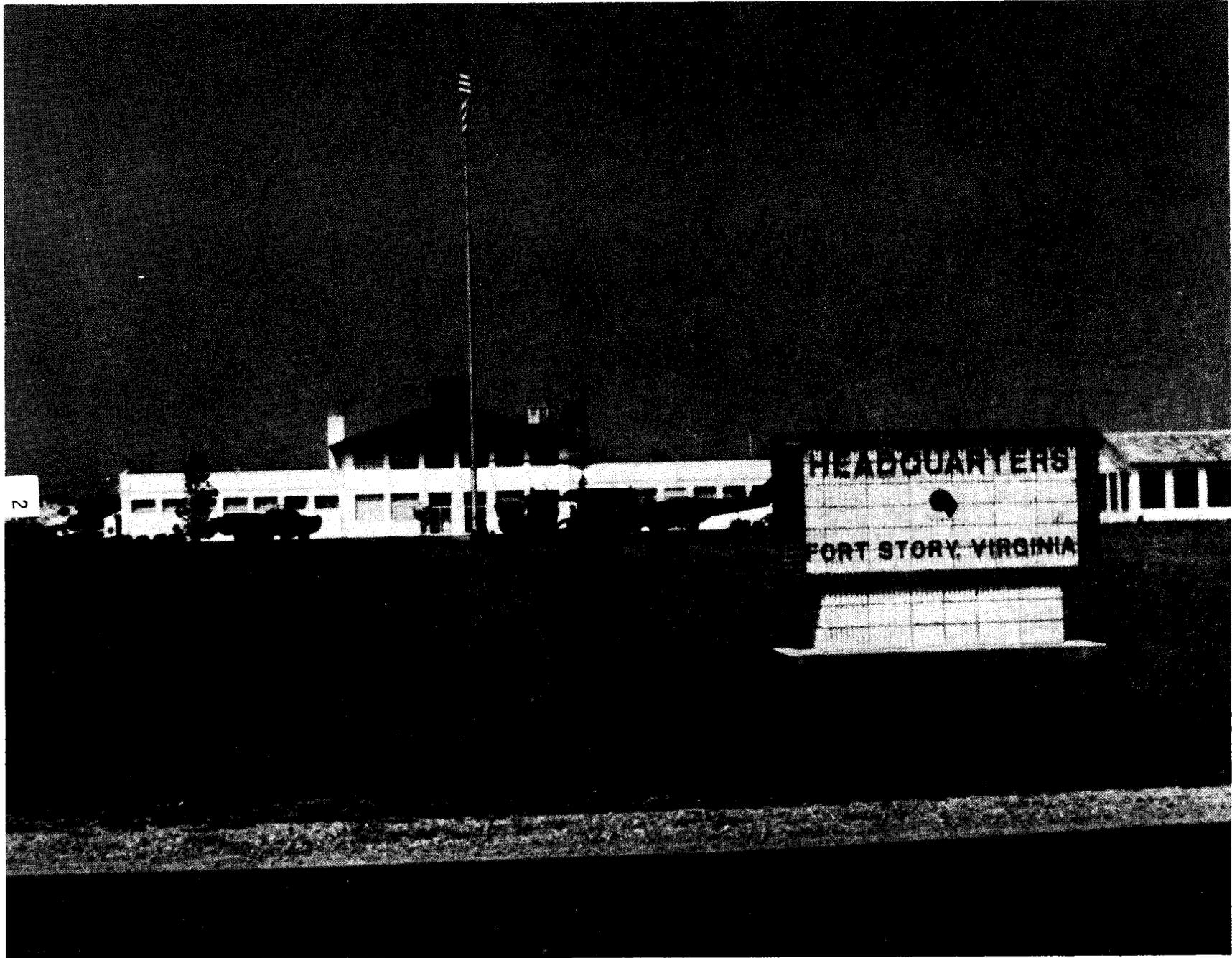
REFERENCES

1. Environmental Impact Statement of Ongoing Mission, Fort Story, 1 Apr 80.
2. Fort Story Record Book (undated historical document).
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5. "Geological Studies Coastal Plain of Virginia", Division of Mineral Resources, Bulletin 83, Parts 1, 2, 3, Charlottesville, VA, 1973.
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12. Oil Spill Prevention Control and Countermeasure Plan, Fort Story, Virginia, Dec 1974.
13. US Army Environmental Hygiene Agency, Solid Waste Survey No. 26-004-73, dated 30 Oct - 2 Nov 1977.
14. US Army Environmental Hygiene Agency, Solid Waste Management Consultation, Report No. 25-M03-75, dated 18 July 1974.
15. US Army Environmental Hygiene Agency, Landfill Study, No. 26-0031-78, Fort Eustis, VA, dated 31 Oct - 11 Nov 1977.
16. US Army Environmental Hygiene Agency, Report No. 43-0650-77, Radiation Protection Special Study, dated 6 - 8 Oct 1976.
17. US Army Environmental Hygiene Agency, Radiation Protection Survey No. 43-010-70, August 1969.

18. US Army Environmental Hygiene Agency, Radiation Protection Survey No. 43-005 74, July 1973.

19. US Army Medical Laboratory, Ft. Meade, Protection Radiation Survey of Fort Eustis and Fort Story, 20 October 1971.

APPENDIX A
PHOTOGRPAHS OF FORT STORY



2



3

BEACH TRAINING AREA



4

CS
CHAMBER
11 TH
TRANS
BN (TML)

BUNKER USED FOR CS TRAINING



5

VEHICLE WASH RACKS

9

DRAINPIPE DISCHARGE TO OCEAN (121.9 cm)

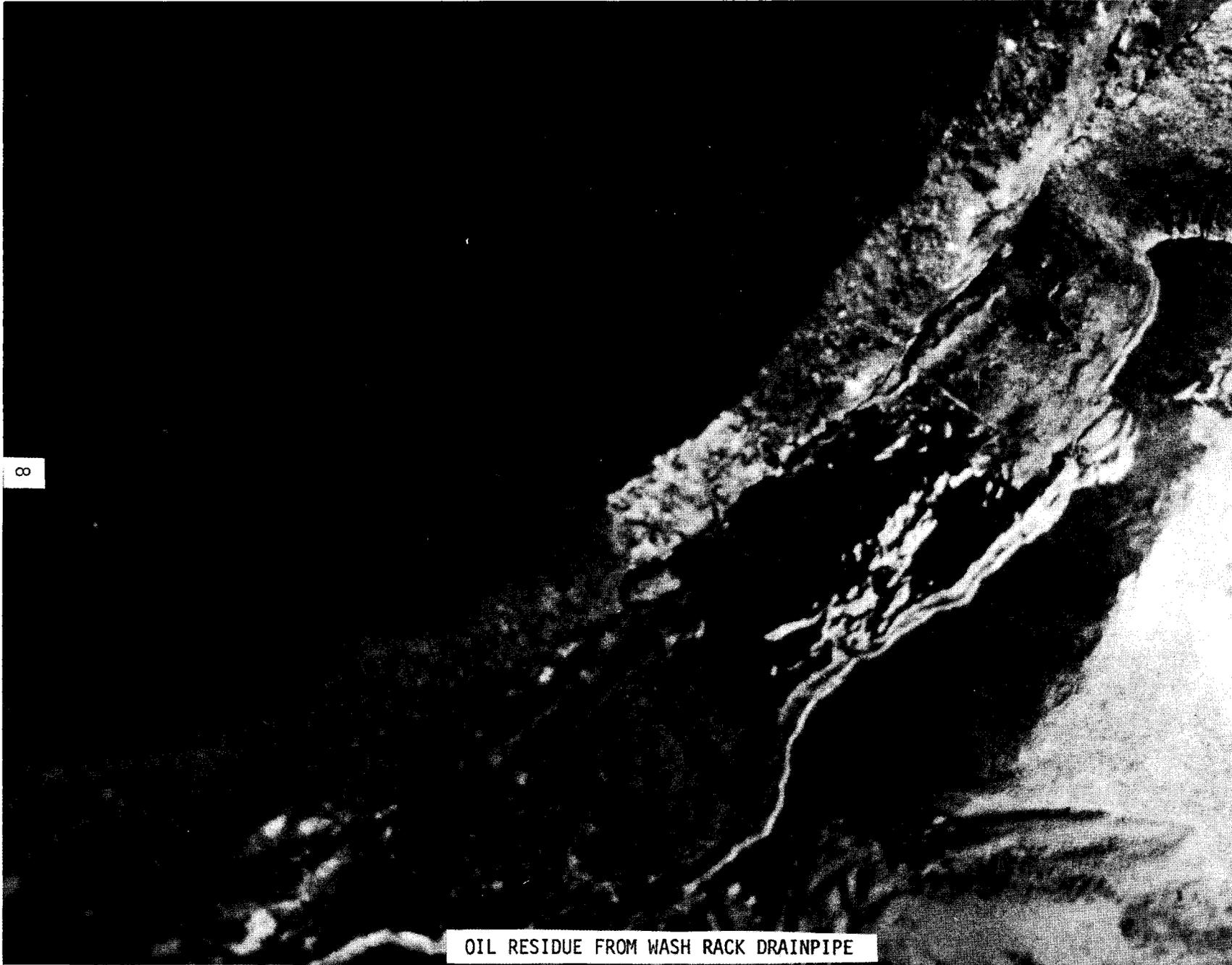




7

WASH RACK DRAINPIPE TO OCEAN (121.9 cm)

8



OIL RESIDUE FROM WASH RACK DRAINPIPE



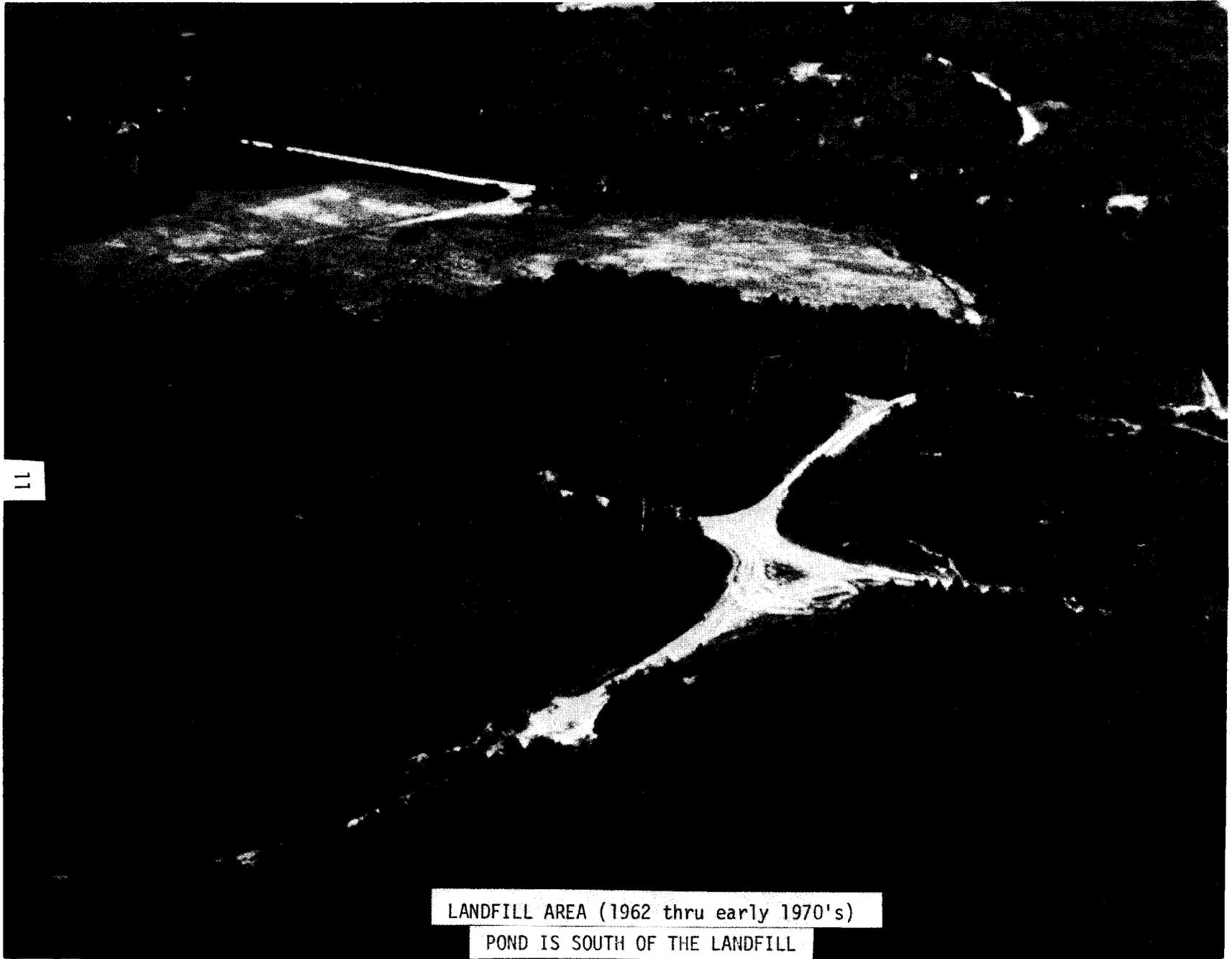
6

ORIGINAL LANDFILL (CIRCA EARLY 1940's)

10



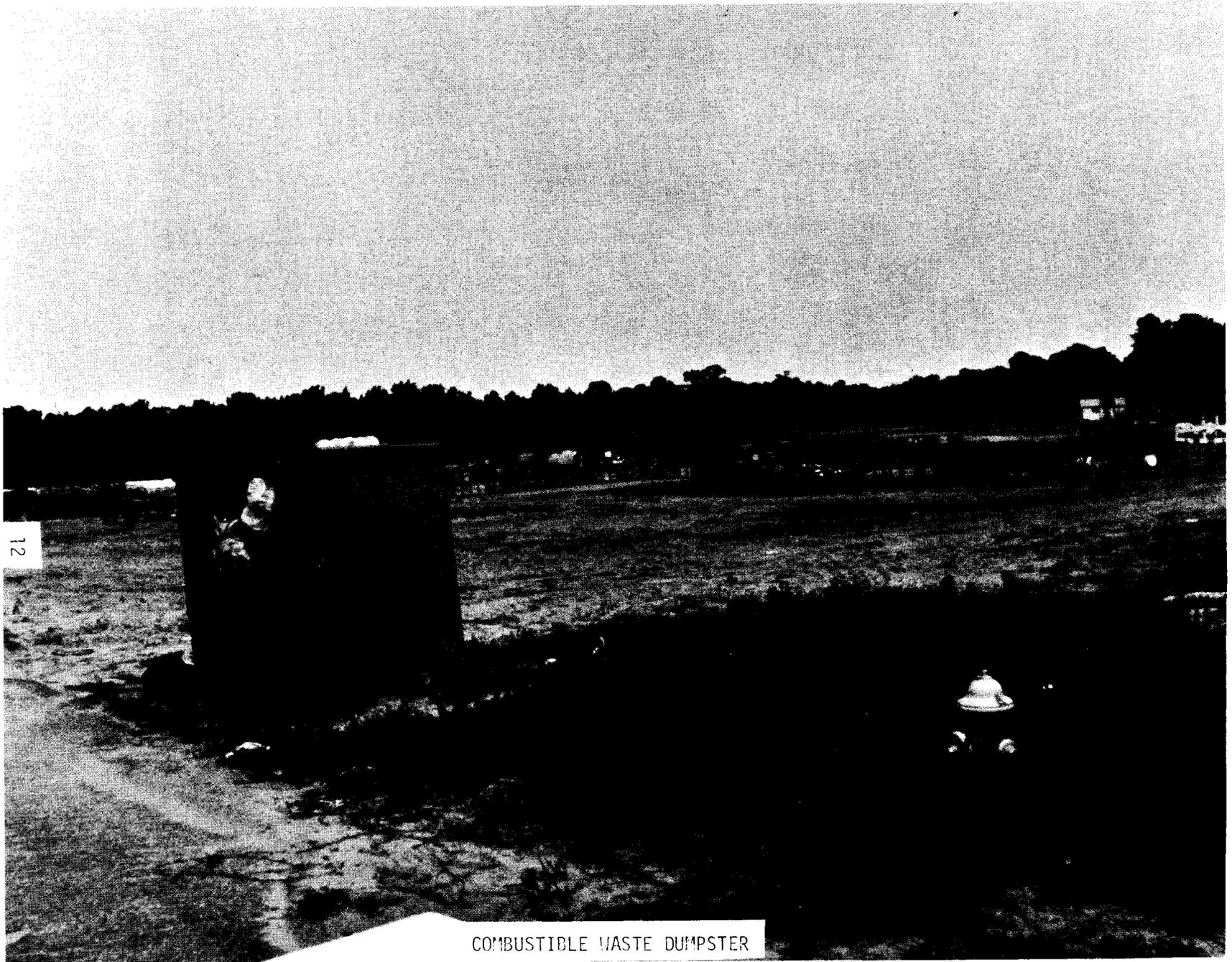
LANDFILL AREA (1956/1962)



11

LANDFILL AREA (1962 thru early 1970's)

POND IS SOUTH OF THE LANDFILL



12

COMBUSTIBLE WASTE DUMPSTER



13

LANDFILL IN CARGO TRAINING AREA

14



TRASH PILE AT CARGO TRAINING AREA



15

TRASH FIRE AT CARGO TRAINING AREA

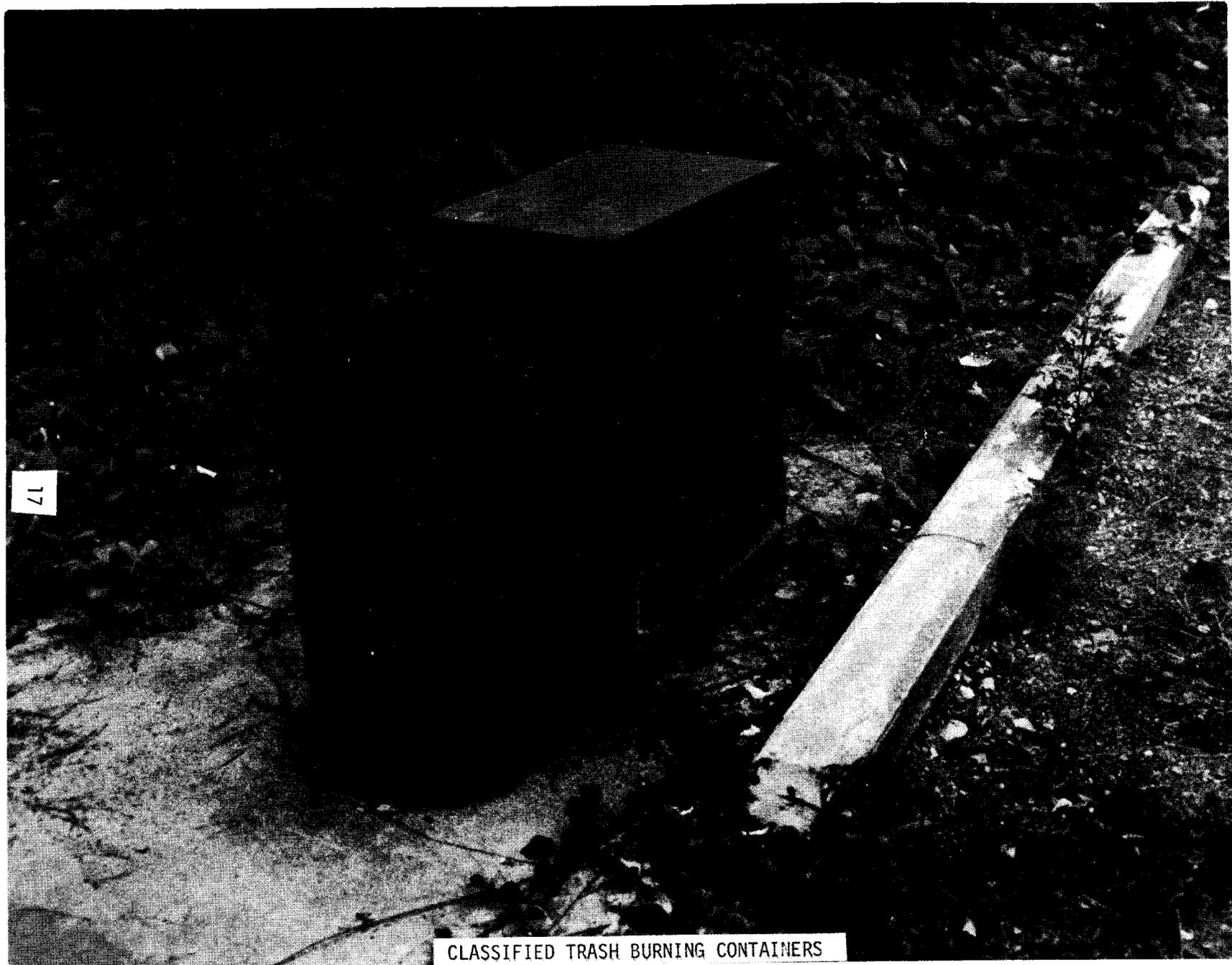


16

NEW AREA FOR NAVY EXPLOSIVE ORDNANCE
DISPOSAL TRAINING

17

CLASSIFIED TRASH BURNING CONTAINERS



APPENDIX B

FLORA AND FAUNA OF FORT STORY AREA

FLORA AND FAUNA OF VIRGINIA BEACH

American beachgrass	<u>Ammophila breviligulata</u>
Sea oat	<u>Uniola paniculata</u>
Ghost crab	<u>Ocypode albicans</u>
Mole crab	<u>Emerita talpoida</u>
Blue crab	<u>Callinectes sapidus</u>
Hermit crab	<u>Pargurus sp.</u>
Cancer crab	<u>Cancer sp.</u>
Lady crab	<u>Ovalipes ocellatus</u>
Razor clam	<u>Ensis directus</u>
Coquina	<u>Donax variabilis</u>
Sand worm	<u>Diopatra cuprea</u>
Sand worm	<u>Nereis grayi</u>
Common squid	<u>Loligo pealei</u>
Smooth dogfish	<u>Mustelus canis</u>
Spiny dogfish	<u>Squalus acanthias</u>
Dusky shark	<u>Carcharhinus obscurus</u>
Sandbar shark	<u>Carcharhinus milberti</u>
Sand tiger shark	<u>Odontaspis taurus</u>
Atlantic angel shark	<u>Squatinina dumerili</u>
Winter skate	<u>Raja ocellata</u>
Clearnose ray	<u>Raja eglanteria</u>
Smooth butterfly ray	<u>Gymnura micrura</u>
Cownose ray	<u>Rhinoptera bonasus</u>
American eel	<u>Anguilla rostrata</u>
Atlantic menhaden	<u>Brevoortia tyrannus</u>
Bay anchovy	<u>Anchoa mitchilli</u>
Oyster toadfish	<u>Opsanus tau</u>
Goosefish	<u>Lophius americanus</u>
Spotted hake	<u>Urophycis regius</u>
Halfbeak	<u>Hyporhamphus unifasciatus</u>
Atlantic needlefish	<u>Strongylura marina</u>
Mummichog	<u>Fundulus heteroclitus</u>
Striped killifish	<u>Fundulus majalis</u>
Atlantic silverside	<u>Menidia menidia</u>
White perch	<u>Morone americana</u>
Striped bass	<u>Morone saxatilis</u>
Black sea bass	<u>Centropristis striata</u>
Bluefish	<u>Pomatomus saltatrix</u>
Pigfish	<u>Orthopristis chrysoptera</u>
Pinfish	<u>Lagodon rhomboides</u>
Sheepshead	<u>Archosargus probatocephalus</u>
Spot	<u>Leiostomus xanthurus</u>
Inshore lizardfish	<u>Synodus foetens</u>
Silver perch	<u>Bairdiella chrysura</u>
Red drum	<u>Sciaenops ocellata</u>
Atlantic croaker	<u>Micropogon undulatus</u>
Southern kingfish	<u>Meticirrhus americanus</u>

Northern kingfish
Spotted sea trout
Weakfish
Northern stargazer
Northern puffer
King mackerel
Spanish mackerel
Little tunny
Butterfish
Northern searobin
Atlantic moonfish
Lookdown
Florida pompano
Silver hake
Summer flounder
Winter flounder
Windowpane
Hogchoker
Blackcheek tonguefish

Herring gull
Ring-billed gull
Bonaparte's gull
Laughing gull
Great black-backed gull
Sanderling

Menticirrhus saxatilis
Cynoscion nebulosus
Cynoscion regalis
Astroscopus guttatus
Sphoeroides maculatus
Scomberomorus cavalla
Scomberomorus maculatus
Euthynnus alletteratus
Peprilus triacanthus
Prionotus carolinus
Vomer setapinnis
Selene vomer
Trachinotus carlinus
Merluccius bilinearis
Paralichthys dentatus
Pseudopleuronectes americanus
Scophthalmum aquosus
Trinectes maculatus
Symphurus plagiusa

Larus argentatus
Larus delawarensis
Larus philadelphia
Larus atricilla
Larus marinus
Crocethis alba

FLORA AND FAUNA OF THE SAND STOCKPILE AREA ON FORT STORY

American beachgrass	<u>Amphiphila breviligulata</u>
Spike grass	<u>Distichlis spicata</u>
Salt meadowgrass	<u>Spartina patens</u>
Seaside wild rye	<u>Elymus virginicus</u>
White willow	<u>Salix alba</u>
Sea rocket	<u>Cabite edentula</u>
Seaside goldenrod	<u>Heterotheca pinifolia</u>
Sandspur	<u>Cenchrus tribuloides</u>
Common trumpet creeper	<u>Compsis radicans</u>
Riverbank grape	<u>Vitis riparia,</u>
Red bay	<u>Persea borborina</u>
Spanish bayonet	<u>Yucca alofolia</u>
Live oak	<u>Quercus virginiana</u>
Ghost crab	<u>Ocypode albicans</u>
Mole crab	<u>Emerita Talpoida</u>
Sand worm	<u>Nereis grayi</u>
Herring gull	<u>Larus argentatus</u>
Ring-billed gull	<u>Larus delawarensis</u>
Bonaparte's gull	<u>Larus philadelphia</u>
Laughing gull	<u>Larus atricilla</u>
Great black-backed gull	<u>Larus marinus</u>
Sanderling	<u>Crocethia alba</u>
Cottontail rabbit	<u>Sylvilagus floridanus</u>
Raccoon	<u>Procyon lotor</u>

APPENDIX C

BORING LOGS

Copy of boring logs can be obtained from:

US Army Engineer Waterways Experiment Station
Corps of Engineers
PO Box 631
Vicksburg, MS 39180

APPENDIX D
PESTICIDES USED AT FORT STORY

PESTICIDES USED ON FORT STORY

Pyrethrins (Aeosol)

Rodent Baits

57% Malathion EC (2% Diluted)

0.5% Propoxur (Label 1.1%)

2.0% Propoxur Bait

0.5% Diazinon

3.0% Pyrethrins

Drione Powder Regis. Trademark FMC Corp., Cansury, MI

0.025% Warfarin (Parafin Bait)

3.0% Malathion (Sugar Solution)

6.0% Malthion (Cold Fogger)

Dalapon

Bromacil

APPENDIX E
NPDES PERMIT VA0031917

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, 33 U.S.C. 1251 et seq. (the "Act"),

U. S. Army Transportation Center and Fort Eustis
Fort Eustis, VA 23604

is authorized to discharge from a facility located at

Fort Story Virginia 23459

to receiving waters named

Atlantic Ocean and unnamed Salt Water Marsh

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III herein.

This permit shall become effective on March 14, 1980

This permit and the authorization to discharge shall expire at midnight, March 14, 1985.

Signed this 13 date of February, 1980



R. Sarah Compton
Director, Enforcement Division
U.S. Environmental Protection Agency
Region III

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning effective date and lasting through expiration of permit the permittee is authorized to discharge from outfall(s) serial number(s) 001 through 005

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day(lbs/day)		Other Units (Specify)		Measurement Frequency	Sample Type
	Monthly Avg	Daily Max	Monthly Avg	Daily Max.		
Flow-m ³ /Day (MGD)	N/A	N/A	N/A	N/A	1/month	Estimate
Total Suspended Solids	N/A	N/A	N/A	60mg/l	1/month	*
Oil & Grease	N/A	N/A	N/A	15mg/l	1/month	Grab

*Minimum of 5 grab samples composed to form one 8hr. composite

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per month by grab sample

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): 001 through 005

Permit No.

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

Final Design Complete December 1979

Construction Award 90 days after allocation of funds

Construction Complete: 365 days after construction award

Note: As part of the regular monthly reporting requirement Ft. Eustis will submit a status report as to the funding for this project.

2. No later than 14 calendar days following each date identified in the above schedule of compliance, the permittee shall submit the required written report of progress or, in the case of specific steps required by identified dates, a written notice of compliance or noncompliance, as appropriate. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled step.

C. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting

Monitoring results obtained during the previous months shall be summarized for each month and reported on Discharge Monitoring Report forms (EPA No. 3320-1) postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on April 14, 1980. Duplicate signed copies of these and all other reports required herein, shall be submitted to the Regional Administrator and the State at the following addresses:

State Water Control Board
P. O. Box 11143
Richmond, VA 23230

State Water Control Board
Tidewater
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3. Definitions

- a. The "monthly average" discharge means the total mass (and concentration if appropriate) of all daily discharges sampled and/or measured during a calendar month divided by the number of daily discharges sampled and/or measured during such month.
- b. The "daily maximum" discharge means the total mass of a pollutant discharged during the calendar day. Where the pollutant is limited in terms other than mass, the daily maximum shall mean the average concentration or other measurement specified during the calendar day or other specified sampling day.

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- c. "Bypass" means the intentional diversion of wastes from any portion of a treatment facility.
- d. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee.
- e. Composite Sample - A combination of individual samples obtained at regular intervals over a time period. Either the volume of each individual sample is proportional to discharge flow rates or the sampling interval (for constant volume samples) is proportional to the flow rates over the time period used to produce the composite.
- f. Grab Sample - An individual sample collected in less than 15 minutes.
- g. "i-s" (immersion stabilization) - a calibrated device is immersed in the effluent stream until the reading is stabilized.
- h. The "monthly average" temperature means the arithmetic mean of temperature measurements made on an hourly basis, or the mean value plot of the record of a continuous automated temperature recording instrument, either during a calendar month, or during the operating month if flows are of shorter duration.
- i. The "daily maximum" temperature means the highest arithmetic mean of the temperature observed for any two (2) consecutive hours during a 24-hour day, or during the operating day if flows are of shorter duration.

- j. "Measured Flow" - Any method of liquid volume measurement the accuracy of which has been previously demonstrated in engineering practice, or for which a relationship to absolute volume has been obtained.
- k. "At outfall XXX" - A sampling location in outfall line XXX downstream from the last addition point or as otherwise specified.
- l. Estimate - To be based on a technical evaluation of the sources contributing to the discharge including, but not limited to pump capabilities, water meters and batch discharge volumes
- m. Non-contact cooling water means the water that is contained in a leak-free system, i.e. no contact with any gas, liquid, or solid other than the container for transport; the water shall have no net poundage addition of any pollutant over intake water levels.
- n. The term "cyanide A" shall mean those cyanides amenable to chlorination as described in "1972 Annual Book of ASTM Standards," 1972. Standard D2036-72, Method B, page 553.

4. Test Procedures

Test procedures for the analysis of pollutants shall conform to the applicable test procedures identified in 40 C.F.R. Part 136 unless otherwise specified in this permit

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. The date, exact place and time of sampling or measurements;
- b. The person(s) who performed the sampling or measurements;
- c. The dates analyses were performed;
- d. The person(s) who performed each analysis;
- e. The analytical techniques or methods used; and
- f. The results of such analyses.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report form (EPA No. 3320-1). Such increased frequency shall also be indicated.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recording from continuous monitoring instrumentation shall be retained for three (3) years. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the Regional Administrator or State water pollution control agency.

A. MANAGEMENT REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, production increases, or process modifications which will result in new or substantially increased discharges of pollutants must be reported by submission of a new NPDES application at least 180 days prior to commencement of the changed discharge. Any other activity which would constitute cause for modification or revocation and reissuance of this permit, as described in Part II, Section B, paragraph 5 of this permit, shall be reported to the Regional Administrator.

2. Noncompliance Notification

a. If, for any reason, the permittee does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit, the permittee shall provide the Regional Administrator and the State with the following information, in writing, within five (5) days of becoming aware of such condition:

- i. A description of the discharge and cause of noncompliance;
- ii. The period of noncompliance, including exact dates and times and/or the anticipated time when the discharge will return to compliance; and
- iii. Steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

- b. In the case of any discharge subject to any toxic pollutant effluent standard under Section 307(a) of the Act, the Regional Administrator shall be notified within 24 hours of the time the permittee becomes aware of the noncomplying discharge. Notification shall include information as described in paragraph 2(a) above. If such notification is made orally, a written submission must follow within five (5) days of the time the permittee becomes aware of the noncomplying discharge.

3. Facilities Operation

The permittee shall at all times maintain in good working order and operate as efficiently as possible all collection and treatment facilities and systems (and related appurtenances) installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to navigable waters resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypassing

Any bypass of treatment facilities necessary to maintain compliance with the terms and conditions of this permit is prohibited unless:

- a. The bypass is unavoidable to prevent a loss of life, personal injury or substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources; and

- b. There are no feasible alternatives; and
 - c. The Regional Administrator is notified within 24 hours (if orally notified, then followed by a written submission within five (5) days) of the permittee's becoming aware of the bypass. Where the need for a bypass is known (or should have been known) in advance, this notification shall be submitted to the Regional Administrator for approval at least ten (10) days before the date of bypass; and
 - d. The bypass is allowed under conditions determined by the Regional Administrator to be necessary to minimize adverse effect.
6. Conditions Necessary for Demonstration of an Upset.

An upset shall constitute an affirmative defense to an action brought for noncompliance with technology-based effluent limitations only if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence, that:

- a. An upset occurred and that the permittee can identify the specific cause(s) of the upset; and
- b. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures; and
- c. The permittee submitted a notification of non-compliance as required by paragraph 2, above; and
- d. The permittee complied with any remedial measures required to minimize adverse impact.

7. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of collection or treatment of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

8. Power Failures

In order to maintain compliance with the effluent limitations and all other terms and conditions of this permit, the permittee shall either:

- a. In accordance with the Schedule of Compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater collection and treatment facilities;

or, if such alternative power source is not in existence, and no date for its implementation appears in Part I,

- b. Halt, reduce or otherwise control production and all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater collection and treatment facilities.

B. RESPONSIBILITY

1. Right of Entry

The permittee shall allow the head of the State water pollution control agency, the Regional Administrator, and their authorized representatives, jointly and severally, upon the presentation of credentials and such other documents as may be required by law:

- a. To enter upon the permittee's premises where a point source is located or where any records are required to be kept under the terms and conditions of this permit; and

- b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; to inspect any collection, treatment, pollution management, or discharge facilities required under this permit; and to sample any discharge of pollutants.

2. Transfer of Ownership or Control

In the event of any change in ownership or control of facilities from which the authorized discharge emanates, the permit may be transferred to another person if the permittee:

- a. Notifies the Regional Administrator, in writing, of the proposed transfer;
- b. A written agreement, indicating the specific date of proposed transfer of permit coverage and acknowledging responsibilities of current and new permittees for compliance with and liability for the terms and conditions of this permit, is submitted to the Regional Administrator; and
- c. The Regional Administrator within thirty (30) days does not notify the current permittee and the new permittee of intent to modify, revoke and reissue, or terminate the permit and require that a new application be submitted.

3. Reapplication for a Permit

At least 180 days before the expiration date of this permit, unless permission for a later date has been granted by the Regional Administrator, the permittee shall submit a new application for a permit or notify the Regional Administrator of the intent to cease discharging by the expiration date. In the event that a timely and sufficient reapplication has been submitted

and the Regional Administrator is unable, through no fault of the permittee, to issue a new permit before the expiration date of this permit, the terms and conditions of this permit are automatically continued and remain fully effective and enforceable.

4. Availability of Reports

Except for data determined to be confidential under Section 308 of the Act, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act.

5. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, terminated, or revoked and reissued in whole or in part during its term for cause including, but not limited to, the following:

- a. Violation of any terms or conditions of this permit;
- b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or
- c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or
- d. Information that the permitted discharge poses a threat to human health or welfare.

6. Toxic Pollutants

Notwithstanding Part II, B-5 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revoked and reissued or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified. Any effluent standard established in this case for a pollutant which is injurious to human health is effective and enforceable by the time set forth in the promulgated standard, even absent permit modification.

7. Civil and Criminal Liability

Except as provided in permit conditions on "bypassing" (Part II A-5), "upset" (Part II A-6) and "power failures" (Part II A-8), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

8. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

9. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

10. Property Rights

The issuance of this permit neither conveys any property rights in either real or personal property, or any exclusive privileges, nor authorizes any injury to private property or any invasion of personal rights, or any infringement of Federal, State or local laws or regulations.

11. Construction Authorizations

This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any navigable waters.

12. Severability

The provisions of this permit are severable. If any provision of this permit is held invalid, the remainder of this permit shall not be affected. If the application of any provision of this permit to any circumstance is held invalid, its application to other circumstances shall not be affected.

PART III

OTHER REQUIREMENTS