PHASE II
RCRA FACILITY ASSESSMENT

OF THE

U.S. NAVAL STATION ROOSEVELT ROADS FACILITY
ROOSEVELT ROADS, PUERTO RICO

EPA ID No. PR2170027203

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 the U.S. 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, and groundwater, and from the generation of subsurface gas. The first phase of the corrective action program, as established by the EPA, is a RCRA Facility Assessment (RFA). The RFA includes a Preliminary Review (PR) of all available relevant documents, a Visual Site Inspection (VSI), and, if warranted, a Sampling Visit (SV).

This report summarizes the results from the PR and VSI phases of the RFA at the U.S. Naval Station Roosevelt Roads Facility at Roosevelt Roads, Puerto Rico. The findings of the assessment are based upon a review of files from EPA Region II in New York and the Environmental Quality Board of Puerto Rico, and a VSI conducted August 15 through 22, 1988.

The preliminary review of file material resulted in the identification of 30 SWMUs and 5 additional AOCs. Following the VSI, a total of 47 SWMUs and 4 additional AOCs were identified (Table 1). The final identification of units as SWMUs and AOCs is based upon the PR, observations made during the VSI, and conclusions made concerning the types of wastes managed and the potential for a release from the units. The locations of these units are illustrated in Figure 1.

Roosevelt Roads covers an area of more than 8000 acres and provides general support for numerous tenant activities. Those SWMUs and AOCs identified in this report are concluded to be representative of waste management activities at the Naval Station Roosevelt Roads. Areas not identified as waste management units (including process areas, product storage facilities, etc.) that were not observed during the VSI are those areas that were situated indoors. The nature of these areas (i.e., fully enclosed) makes it unlikely that there would be releases to environmental pathways; in addition, these areas are not identified with any associated documented releases to the environment.

Prior to the VSI and as a result of review of the PR file material and conversations with both EPA and Roosevelt Roads representations, the VSI team did not expect difficulty with gaining access to any of the Roosevelt Roads areas or units. However, at the time of the VSI and unbeknownst to the VSI team, the VSI team was informed by Mr. Nestor Paradis, Director of the Atlantic Fleet Weapons Training Facility (AFWTF), that the Waste Explosive Storage (SWMU #16) and the Torpedo Shop (AOC A) are both unique military operations. These areas were not observed during the VSI due to associated, unanticipated security restrictions.

This report is organized under eight chapter headings and contains three attachments. Chapter 2.0 describes facility activities and operational areas, history of site ownership, regulatory history, manufacturing operations and processes, wastes managed at the facility, waste management practices and history of releases. Chapter 3.0 discusses the facility's

Table 1. SWMUs and AOCs at the U.S. Naval Station, Roosevelt Roads, PR.

	SWMU Name	Unit Status*
1.	Army Cremator Disposal Site	Inactive, NACIP
2.	Langley Drive Disposal Site	Inactive, NACIP
3.	Station Landfill	Active, NACIP
4.	Drone Fuel Drain Oil/Water Separator	Active
5.	Dumpsters	Active
6.	Former Paint Storage (Building 145)	Inactive, NACIP
7.	Tow Way Road Fuels Farm	Active, NACIP
8.	Tow Way Road Disposal Pits	Active, NACIP
9.	Leaded Sludge Pits	Active, NACIP
10.	Transformer Maintenance Area (Building 90)	Active, NACIP
11.	PCB Storage Compound (Building 38)	Active, NACIP
12.	Fire Training Pit Oil/Water Separator	Active
13.	Old Pest Control Shop (Building 258 and Surrounding Area)	Inactive, NACIP
14.	Fire Training Pit	Active, NACIP
15.	Hospital Incinerator (Building 1928)	Active
16.	Waste Explosive Storage (Building 1666)	Active
17.	DRMO Hazardous Waste Storage Facility (Building 1973)	RCRA, Interim Status
18.	Ignitable Storage Facility (Building 2009)	RCRA, Interim Status
19.	Pesticide Waste Storage (Building 121)	Active, Waiting Closure Plan
20.	Waste Oil Tank Truck (near Building 860)	Active
21.	Donuts	Active
22.	Ships Waste Offload Barges (SWOBs)	Active
23.	Oil Spill Separator Tanks	Active
24.	Oil Spill Oil/Water Separator	Active
25.	Past DRMO Hazardous Waste Storage	Active, Waiting Closure Plan
26.	Abandoned Engine Oil Drums (behind Building 544)	Active
27.	Capehart Area Wastewater Plant	Active, NPDES
28.	Bundy Area Wastewater Plant	Active, NPDES
29.	Industrial Area Wastewater Plant	Active, NPDES
30.	Former Incinerator Site (adjacent to landfill entrance)	Inactive
31.	Waste Oil Collection Area (PWD Storage Yard)	Active
32.	Battery Collection Area (PWD Storage Yard)	Active
33.	AIMD Hazardous Waste Storage Pad	Active
34.	VC-8 Waste Storage Pad	Active
35.	Aircraft Wash Rack Oil/Water Separator (VC-8 yard)	Active
36.	Vehicle Wash Rack Oil/Water Separator	Active
37.	Waste Oil Drum Storage Area (near Hangar 200)	Active
38.	Sewer Drainage System	Active
39.	Spent Battery Storage Building (Building 3158)	Active
40.	Seabee Oil Collection Area	Active

-- Continued --

Table 1. Continued.

SWMU Name	Unit Status*
41. Rinse Rack Near Sea Bee Pesticide Storage (Building 3152)	Active
42. Water Treatment Plant Sludge Lagoons	Active
43. Drone Washdown Area	Active, NACIP
44. Aerial Target Systems Department Drainage Ditch	Active
45. PCB Spill Area (Building 38)	Active, NACIP
46. Pole Storage Yard	Active, NACIP
47. Local Disposal Areas	Active
AOC Name	
A. Torpedo Shop	Active
B. Former PWD Storage Area (Building 25)	Active, NACIP
C. Transformer Storage Area (near Building 2042)	Active
D. Naval Station Outfalls	Active

* Active - Indicates the unit continues to actively manage wastes
Inactive - Indicates the unit no longer actively manages wastes
RCRA - The unit is either permitted under RCRA or operates under RCRA interim status, as noted.
NACIP - The unit or area was a subject in the Initial Assessment Study conducted under the Navy Assessment and Control of Installation Pollutants (NACIP) program.

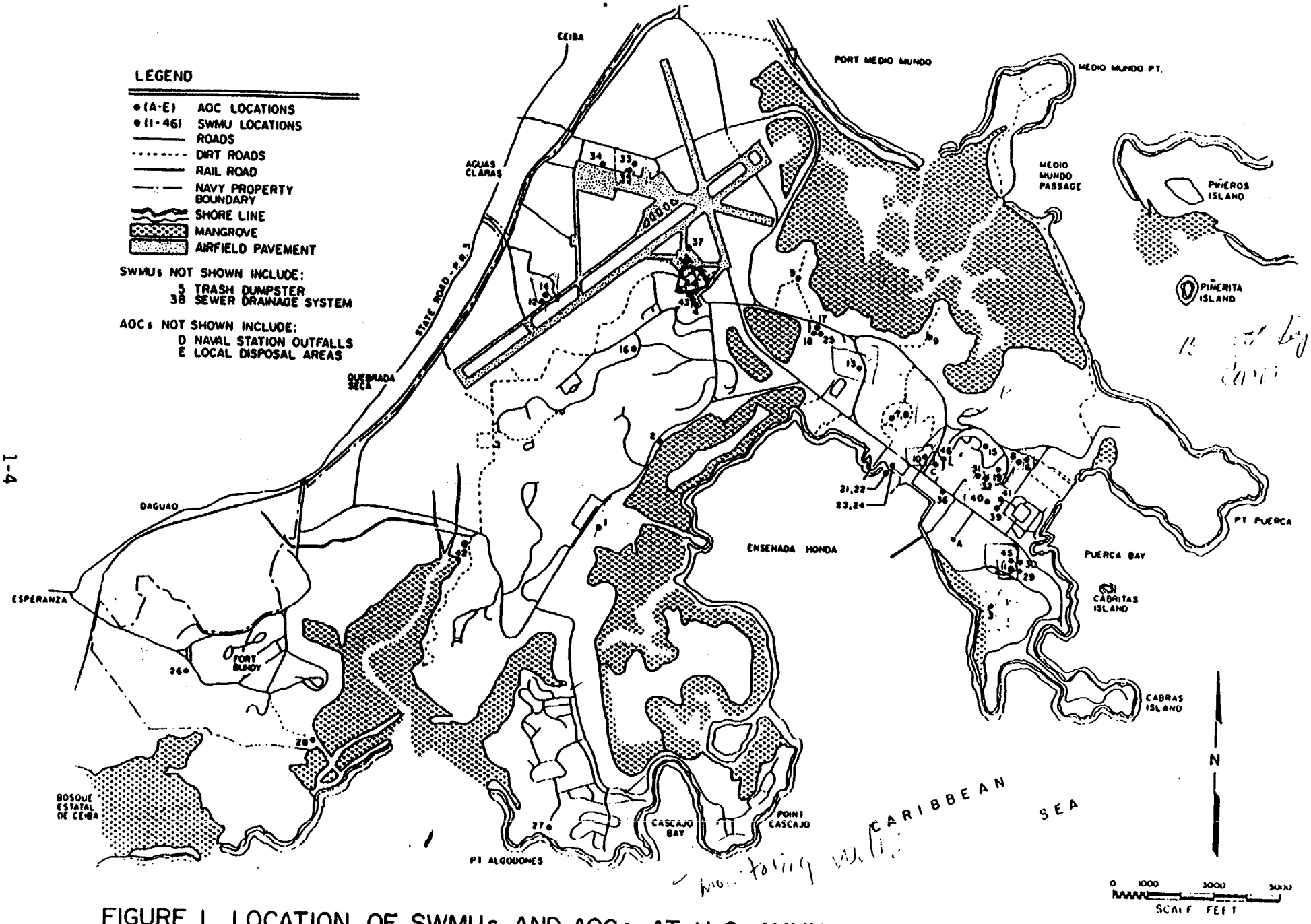

FIGURE 1. LOCATION OF SWMUs AND AOCs AT U.S. NAVAL STATION, ROOSEVELT ROADS (REF. 53).

location, climate, topography, geology, soils and surrounding surface waters. A description of SWMUs and AOCs identified by the assessment are presented in Chapter 4.0. An executive summary of the report is presented in Chapter 5.0 and release pathways are discussed in Chapter 6.0. Conclusions regarding the potential for release and suggested further actions for each area are summarized in Chapter 7.0. References used in preparation of this report are given in Section 8.0. A photographic log, showing facility conditions at the time of the VSI, is included as Attachment A.

Information requested from facility officials arrived on October 21, 1988, too late to be included in this report. It is provided as Attachment B. Furthermore, additional information was requested from the U.S. Coast Guard through the Freedom of Information Act concerning possible release information (e.g., spills) not contained in the documents collected during the PR file search. Information requested from the U.S. Coast Guard arrived on November 3, 1988 and is enclosed as Attachment C. As directed by EPA Region II, the information provided in these documents has not been reviewed, and is not reflected in the text of this RFA report.

2.0 FACILITY DESCRIPTION

General Facility Description

Naval Station (NAVSTA) Roosevelt Roads is located on the eastern tip, or Caribbean side, of Puerto Rico (Figure 2). The capital city of San Juan is approximately 33 miles northwest of Roosevelt Roads, or "Roosey Roads" as the base is commonly referred to by naval personnel. To the southwest is agricultural land and the mangrove forest, Bosque Estatal de Cieba. Adjacent residential villages include Esperanza, Daguao, Quebrada Seca, Aguas Claras, and Cieba (Ref. 48), whose border flanks the road to Gate 1 (Figure 1).

The primary mission of the Roosevelt Roads Naval Complex is to provide full support for Atlantic Fleet weapons training and development activities. NAVSTA Roosevelt Roads provides a refueling station for NATO ships, services aircraft and drones, and provides support for numerous tenant activities. Much of the actual weapons training and ordnance activities take place on the Island of Vieques where the Atlantic Fleet Weapons Training Facility (AFWTF) and Naval Ammunition Facility (NAF) are located. NAF and AFWTF each have their own EPA identification number and are not addressed in this RFA report.

History of Ownership

Plans for a naval base in the Caribbean region were first considered in 1919; however, it was not until 1940, when U.S. involvement in World War II seemed inevitable, that the U.S. Navy established the need for a naval base in this area (Figure 3). Roosevelt Roads was initially targeted to be the base of the Caribbean Defense System with its fully protected anchorage, major air station, and sophisticated industrial complex. The NACIP IAS report (Ref. 48) states that, in the event Great Britain was overwhelmed by the Axis Powers, Roosevelt Roads was to become the new operating port for the British Fleet.

However, by the time Roosevelt Roads was commissioned in 1943, it was clear to Allied leaders that, due to the location of most Allied operations, a base of the intended size would not be necessary in the Caribbean. Perhaps for that reason, Roosevelt Roads was placed in caretaker status the next year. The following year, it was placed in maintenance status and remained so until 1957. That year it was chosen as the primary center for Fleet Guided-Missile Training Operations in the Atlantic because of its location and existing facilities. During the interim, from 1943 to 1957, Roosevelt Roads was an important refueling station and training site for portions of the Atlantic Fleet. One of the first changes made upon the recommissioning of Roosevelt Roads was the acquisition of the U.S. Army's Fort Bundy which now comprises the southern part of the station. Established in 1940, Fort Bundy's purpose was to defend against enemy attack during Naval base construction.

By 1959, Roosevelt Roads had one of the world's largest dry docks, a machine shop to service and repair any ship that might arrive, an 11,000 foot long runway capable of receiving any existing jet aircraft, fuel and ammunition storage facilities, and its own water supply system. In 1963, AFWTF was commissioned as a separate activity, and several years later

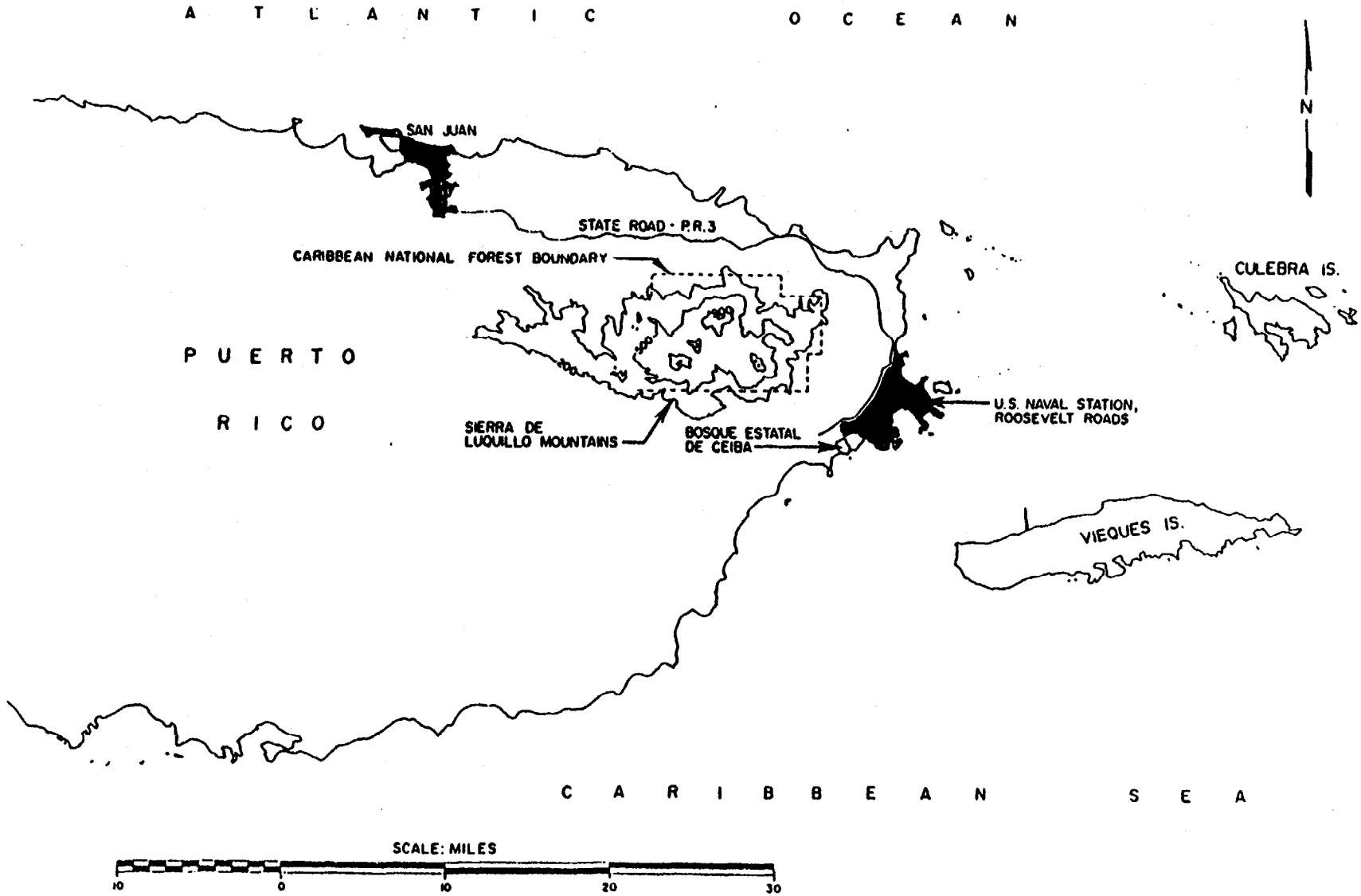

FIGURE 2. VICINITY MAP OF U. S. NAVAL STATION, ROOSEVELT ROADS (REF. 54).

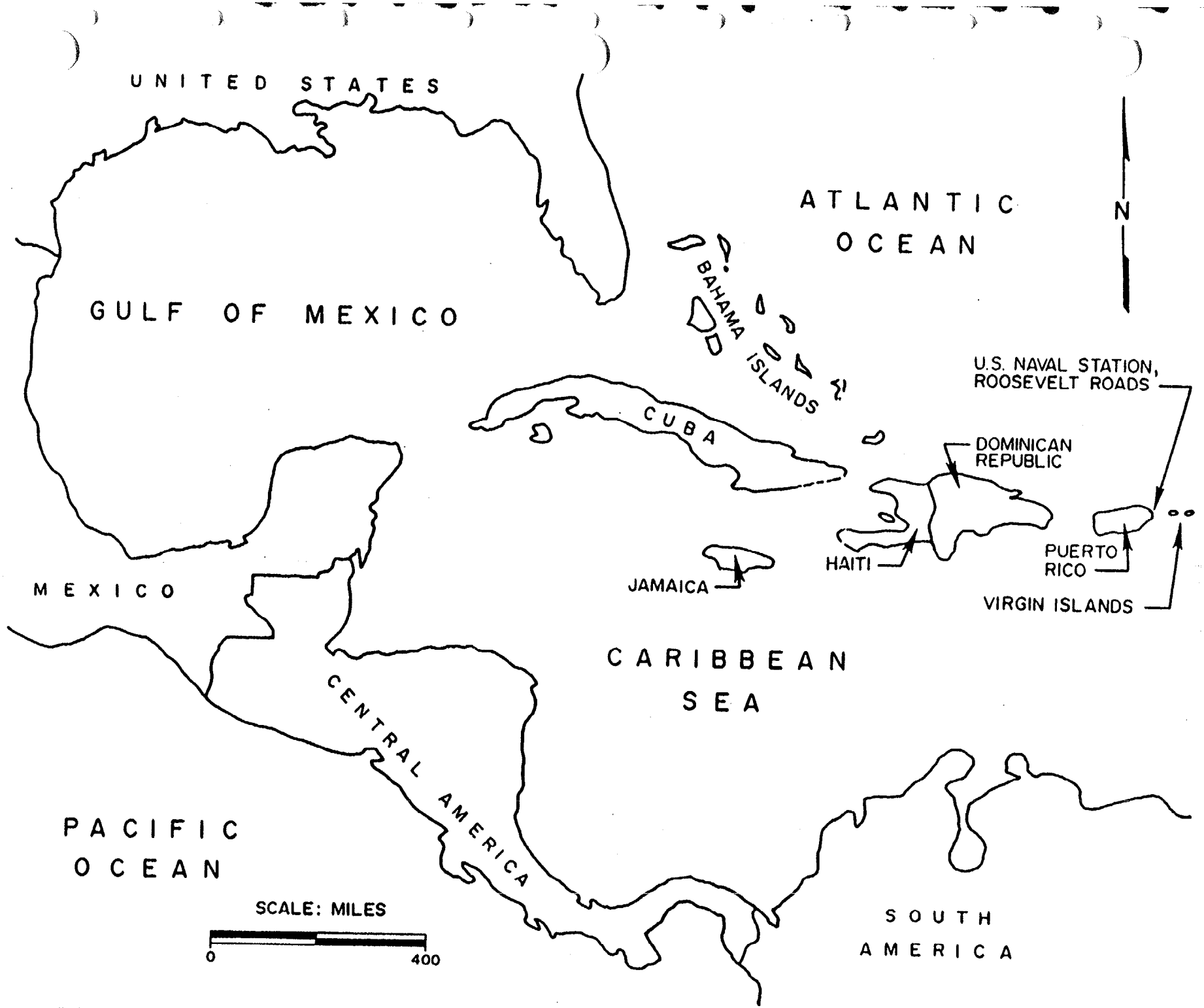

FIGURE 3. PROXIMITY MAP OF U. S. NAVAL STATION, ROOSEVELT ROADS (REF. 55).

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activated its computerized Central Command and Control System (CCCS), allowing the rapid exchange of information between ships and aircraft operating many miles apart. Soon after, a Remote Data and Drone Control System (RDDCS) was added to the CCCS which provided for the control of drones from the Range Operations Center (ROC) on Vieques, instead of the three separate drone control sites located at the Naval Station and on St. Thomas and St. Croix. By the early 1960s, the Roosevelt Roads Complex became known as one of the world's largest and most technologically advanced training complexes in the world, and has provided support for various special and joint exercises held annually in Caribbean waters (Operation Springboard, CARIBEX, etc.) (Ref. 48).

Regulatory History

This section provides an overview of the regulatory history of Naval Station Roosevelt Roads. In November 1980, NAVSTA Roosevelt Roads submitted Part A of its hazardous waste permit application. The Part B permit application was submitted in April 1988. DRMO Hazardous Waste Storage Facility (Building 1973) (SWMU #17) and the Ignitable Storage Facility (Building (2009) (SWMU #18) have been operating under interim status since November 1980. Building 38, PCB Storage Compound (SWMU #11), is the only TSCA regulated unit at this facility, although two other areas have been identified with release of PCBs to the environment. These areas are addressed in Suggested Further Actions, Section 7.

The Defense Reutilization and Marketing Office (DRMO) and Roosevelt Roads, Main Base have the same EPA ID number and are therefore considered in the same report. In the brief summary of noteworthy regulatory events provided below, Class I violations are included since they apply to situations where there is direct potential for release to the environment or where there exists a potential hazard to human health or the environment.

September 29, 1981	Request for Part B permit application by EPA Region II (Ref. 14)
September 29, 1981	RCRA Interim Status Inspection by Puerto Rico Environmental Board; Notice of compliance with all required documents (Ref. 25a)
July 18, 1985	Inspection by EPA Region II; unspecified Class I violation found (Ref. 25b)
September, 1985	Preliminary report of EPA Federal Facility Inspection; Recommendation to send U.S. Naval Station Roosevelt Roads a letter requiring information through Section 114 of Title I of the CAA (as amended) (24a).
November 13, 1985	EPA request for information to determine source compliance status with the Puerto Rico Air Pollution Control Regulations (Ref. 24b)
June 6, 1986	Inspection by EPA Region II; unspecified Class 1 violation found (Ref. 25b)

December 6, 1986	USNSRR submits spill status report and message report to Puerto Rico Environmental Quality Board concerning JP-5 leak from Tank 85 (Ref. 20)
April 29, 1987	Interim Status Compliance Inspection; Notice of Violation/Compliance Demand issued for deficiencies at drum storage area and in waste analysis (Ref. 18)
September 28, 1987	PCB inspection by EPA Region II Toxic Substances Compliance Section; Report provides summary of inspection and request for additional information (Ref. 23)
October 23, 1987	Request for Part B permit application by EPA Region II (Ref. 14)
December 22, 1987	Part B Call-In Inspection by Puerto Rico Environmental Quality Board; unspecified Class 1 violation found (Ref. 25b)
February 29, 1988	Inspection by Puerto Rico Environmental Quality Board; unspecified Class 1 violation found (Ref. 25b)

Other units at the Roosevelt Roads facility are operated under various permit and regulatory conditions. These are listed in Table 2.

Table 2. Naval Station Roosevelt Roads Existing Environmental Permits (Ref. 49).

Permit Type	Permit Number	Permit Description
NPDES	PR0020010	Sewage Treatment Plants (SWMUs #27, #28, and #29)
TSCA		Building 38 (SWMU #1)
RCRA	PR2170027203	NAVSTA Roosevelt Roads - Part A
Air*	PFE-19-0984-0691-I-II-0	BOQ Boiler - Building 729
Air	PFE-19-0883-0601-I-0	Bulk Fuel Storage Tanks
Air	PFE-19-0981-0794-I-C	Contaminated Fuel Storage Tank
Air	PFE-19-0883-0604-II-0	NAVSTA Emergency Generator
Air	PFE-480-0359-I-II-0	Naval Hospital (SWMU #15)
Air	PFE-19-0283-0056-II-0	NAVSTA Boilers
Air	PFE-1080-1001-I-0	NAVSTA Quarry
Air	PFE-19-0585-0383-1-0	Surface Operations Sandblasting
Solid Waste*	PFE-19-0789-0475-I-0	NAVSTA Building Demolition
Solid Waste	CR6-82W & MRP-76-83	Construction Projects
Solid Waste	C-680-675-JCA	NAVSTA Sanitary Landfill (SWMU #3)
Misc.	II-PR-154	EPA Emergency Ocean Dumping

* Air Emission and Solid Waste Permits are issued by the Environmental Quality Board (EQB).

Operations/Process Description

Ongoing operations at Naval Station Roosevelt Roads reflect this facility's purpose; to provide full support for Atlantic Fleet weapons training and development activities. These activities include machining, degreasing and solvent cleaning, battery maintenance, electrical maintenance, calibration, painting and paint stripping, pest control, power generation, air conditioning and refrigeration, medical and dental care, water treatment, specialized installation operations, and some ordnance operations.

Many operations at Roosevelt Roads are run by private contractors. According to a facility representative during the VSI, contractors are responsible for offsite disposal of those wastes generated during the operations they perform. The Torpedo Shop (AOC A) is one of a few exceptions. Although it is run by a contractor, wastes generated by the Torpedo Shop are disposed of through DRMO. Wastes generated by military run operations are disposed of through DRMO. However, DRMO also contracts the transportation and offsite disposal of all hazardous waste stored in the DRMO yard. Where known, distinctions are made between contractor operated and military operated processes in the following section.

A. Industrial (Non-Ordnance) Operations

1. Machining. The Public Works Machine Shop is located in Building 31. Machine Shop operations include all sheet metal work, welding, and tool making. Daily activities involve the repair and maintenance of pumps and other dynamic equipment. Metal pieces, welding material, small grease and oil containers, and small equipment parts are wastes disposed of at the Station Landfill (SWMU #3) (Ref. 48). Located in the Aircraft Intermediate Maintenance Department (AIMD), Building 379 is another small machine shop. During the VSI, a facility representative reported that in recent years there has been very little activity in this shop because aircraft parts are usually ordered from more technologically advanced manufacturers.

2. Degreasing and Solvent Cleaning. Degreasing and solvent cleaning are a necessary part of maintenance and corrosion control. These facility-wide operations are carried out at many locations on base; however, the most extensive operations are located at the Public Works Department (PWD), Aircraft Intermediate Maintenance Department (AIMD), Fleet Composite Squadron Eight (VC-8), and the Torpedo Shop (AOC A) (Ref. 48).

a. Public Works Department. The Transportation Division of the Public Works Department performs maintenance and corrosion control on equipment and machinery. An estimated 2,500 gallons of waste solvent, cleaning solutions, oil, brake fluids, and other oil derivatives were disposed of annually at the Station Landfill (SWMU #3) from 1960 until 1973 (Ref. 48). General Electric Services, a private contractor, runs the Transportation Division. A Transportation Division temporary waste oil accumulation area, noted in this report as Waste Oil Collection Area (SWMU #31), was observed to be a curbed concrete pad in poor condition. Waste oil, solvents, and degreasers are stored in 55-gallon drums on the pad until a private contractor picks up the waste and disposes of it offsite.

b. Aircraft Intermediate Maintenance Department (AIMD). Degreasing and solvent cleaning occurs in all AIMD shops, which are located in Buildings 379 and 826. The degreasing chemical PD-680 (a mineral oil solvent) is used in both the Power Plant Shop (two small baths for dipping engine parts) and the Tire Shop (small tanks for cleaning wheel housings, bearings, and associated hydraulic mechanisms). The Ordnance Shop uses methyl ethyl ketone (MEK), PD-680, Freon, and corrosion inhibiting compounds to clean tow wheels, racks, holders, and release mechanisms (Ref. 48). There was almost no activity in the AIMD shops at the time of the VSI. Building 379 was observed to be a large hangar that had been subdivided into a number of small shops that appeared very clean and well organized. Building 826 appeared to be vehicle storage. A facility representative stated that waste solvents are sent to the Ignitable Storage Facility at DRMO (SWMU #18). The NACIP study (Ref. 48) reported that some wastes are washed into the Sewage Drainage System (SWMU #38) through the floor and hangar drains.

c. Fleet Squadron Eight (VC-8). VC-8's cleaning activities, conducted in Building 1625, are similar to those at AIMD shops, but on a considerably smaller scale. Collectively, less than 10 gallons of dry cleaning solvent, alcohol, aliphatic naptha, technical xylene, and methyl ethyl ketone (MEK) are generated monthly. During the VSI, the VC-8 hangar was observed to be an area where routine aircraft cleaning and maintenance operations were being implemented. Wastes from VC-8 activities are disposed of by a DRMO contractor.

d. Torpedo Shop. The Torpedo Shop (AOC A) assembles MK 30, MK 46, and MK 48 torpedoes for the Atlantic Fleet Weapons Training Facility (AFWTF) and the Weapons Department. Contractors have run the shop since 1964. After a practice run by target or practice torpedoes, the torpedoes are recovered and remaining fuel is removed; finally, the torpedoes are washed with Agentine, a dry cleaning solvent. Wastes generated by this operation include: OTTO Fuel II, clothing contaminated during assembly/maintenance, detergent, Agentine, alcohol (Neosol), sodium sulfide, denatured ethyl alcohol, acetone, oil, and silver cell batteries (MK 30, Torpedo Shop only). OTTO Fuel II consists of propylene-glycol dinitrate (76%), dibutyl sebacate (22.5%), and nitrodiphenylamine (1.5%) (Ref. 48). The VSI team was unable to gain access to the Torpedo Shop because of unanticipated security clearance restrictions.

e. Naval Mobile Construction Battalion (NMCB). The NMCB is located adjacent to the Public Works Department and dry dock area, where its approximately 370 pieces of heavy construction equipment are maintained. During the VSI, Seabee Oil Collection Area (SWMU #40) was observed to be a mobile tank with a capacity of approximately 300 gallons, according to a facility representative. Because the Naval Mobile Construction Battalion is Navy owned and operated, their mobile waste oil tank is emptied by a DRMO contractor who disposes of the waste offsite.

3. Painting. According to facility representatives, all large scale painting is done by contractors. At the time of the VSI, private contractors were painting the interior and exterior of AIMD Building 379. Painting by AIMD and VC-8 is generally restricted to aircraft components. Spray cans are used until empty. Unused paint is sent to the Ignitable Storage Facility (SWMU #18) located at DRMO (Ref. 48). The Carpentry Shop, Public Works Department, does small, isolated painting jobs. According to the NACIP report (Ref. 48), wastes (e.g. scrap wood pieces, and empty paint cans) are sent to the Station Landfill (SWMU #3) (Ref. 48).

4. Paint Stripping. Paint stripping is carried out by the Public Works Department, AIMD, and VC-8 in an attempt to prolong the life expectancy of equipment and aircraft (Ref. 48).

a. Public Works Department. Whether done by hand or using machinery, paint stripping at the Public Works Department involves scraping paint from pumps, motors, vehicle parts, and other mechanical equipment. This results in small amounts of paint scrapings getting mixed in with the rest of the trash (Ref. 48). A facility representative stated that the Public Works Department also has a sandblaster.

b. Aircraft Intermediate Maintenance Department (AIMD). Paint stripping here usually involves only vehicle components. The paint stripping process is done by scraping manually or by dissolving with removing compounds and then rinsing the component with water. According to the NACIP report, rinse water carrying paint skins and removing compound is flushed to the Sewer Drainage System (SWMU #38) (Ref. 48). After stripping and before repainting, corrosion prevention and metal conversion coatings are applied. Like paints, they are completely used up during application and overage materials are sent to the Ignitable Storage Facility (SWMU #18) at DRMO (Ref. 48).

c. Fleet Composite Squadron Eight. Paint stripping activities here are very minor, limited to touch-ups or corrosion/metal conditioning. All waste paint stripping and coating compounds are sent to the Ignitable Storage Facility (SWMU #18) located at DRMO. Wastes generated here include epoxy paint remover and phosphoric acid metal conversion solution (Ref. 48).

5. Printing. Main printing operations are housed in Building 583. Before the early 1970s, the use of oil-based ink made it necessary to wipe down the presses every night with Blankrola solvent, which contains perchloroethylene and petroleum naptha. The current practice of using rubber-based ink reduces the need for cleaning to usually once a week. All materials used at this facility are consumed in the process, with the exception of cleaning rags, which are sent to the Station Landfill (SWMU #3), and the approximately 8 gallons of lubricating oil used annually (Ref. 48). According to facility representatives, this is either sent to DRMO or picked up directly by a private contractor.

6. Photograph Developing. The purpose of the photograph developing center, according to the NACIP study, is to provide official photography and coordination of photographic activities for the Naval establishment in the Caribbean area. The Center developed 2,575 rolls of 36-shot film and slides in 1983. All film has been recycled for silver recovery through DRMO since about 1978. Prior to this, all wastes were disposed of in the Station Landfill (SWMU #3) (Ref. 48).

7. Calibration. The purpose of calibration shops is to simulate field use by fine tuning electronic components against signal generators and frequency standards, or by testing the accuracy of various pressure and vacuum gauges. These shops are located at the Aircraft Intermediate Maintenance Department (AIMD), Fleet Composite Squadron Eight (VC-8), and Naval Electronics Engineering Office (Ref. 48).

a. Aircraft Intermediate Maintenance Department (AIMD). The NACIP study states that no wastes are generated in the calibration of avionic components. The testing of gauges and hydraulic components involves instruments containing small amounts of oil which are changed periodically and recycled. Occasionally a component of the test unit will fail and hydraulic fluid will flow into the floor drain (less than 100 gallons total over the years) to be released into the Sewer Drainage System (SWMU #38) (Ref. 48).

b. Fleet Composite Squadron Eight (VC-8). VC-8 shops are located in Building 1625, performing very much like the AIMD shops, but on a smaller scale. According to the NACIP, negligible amounts of waste oil are generated (Ref. 48). The little waste that is generated goes to the Oil Spill Oil/Water Separator (SWMU #24) which is pumped out by a DRMO contractor, according to facility representatives.

c. Naval Electronics Engineering Office. Moved from San Juan to Building 377 in 1975, the Naval Electronics Engineering Office calibrates equipment for the entire Caribbean fleet, the local U.S. Coast Guard and U.S. Army units. Equipment is calibrated against signal generators and frequency standards which do not generate any appreciable amount of waste. Interviewees have stated that calibration sources are low-level isotopes, possibly of cesium and plutonium (Ref. 48). The NACIP report states that the Department of Energy maintains this operation (Ref. 48).

8. Electrical and Electronic Equipment Repair. The Public Works Department; AIMD; VC-8; and Air Operations Department, Ground Electronics Division all have electrical and electronics shops whose activities include repair and maintenance of electrical motors, generators, switching units, etc., as well as navigational, communications, and avionics equipment, etc. (Ref. 48).

a. Public Works Department. The Public Works Department Electric Shop maintains and repairs intercommunication cables, electrical motors and appliances, and repairs, installs, and replaces electrical systems of up to 600 volts according to the NACIP

report. Wastes include cables, wires, conduits, receptacles, ballasts, bulbs, and small amounts of grease and oil containers which are disposed of at the Station Landfill (SWMU #3). Waste production averages 10 tons annually (Ref. 48). The Power Distribution Shop maintains and repairs the electrical distribution system which includes 13 main transformers in eight substations located at the Airfield, Industrial Area, Bundy Area and the Capehart Housing Area (Ref. 48). From 1956 through 1964, transformer maintenance was performed at the PCB Spill Area (SWMU #45). From 1964 to the present, all transformer maintenance was performed at the Transformer Maintenance Area (SWMU #10). To facilitate inner core repair, transformer oil was commonly drained on the ground until the dangerous properties of PCBs were recognized in 1978 (Ref. 48). Since that time, drained transformer fluid has been contained in 55-gallon drums inside the PCB Storage Compound (SMWU #11) and is disposed of by a DRMO contractor.

b. Aircraft Intermediate Maintenance Department (AIMD). Located in Building 379, the AIMD Electronics/Avionics Shop provides avionics maintenance and repair services. Its services range from minor calibration and gauge cleaning and repair to the complete overhaul of avionic components. According to the NACIP study, luminescent dials are sent stateside for servicing. Most materials used are consumed in the process, although small amounts of solder and lead are discarded daily. All waste fluids are recycled through a private contractor (Ref. 48).

c. Fleet Composite Squadron Eight (VC-8). The VC-8 Electronic/ Avionics Shop, located in Building 1625, performs a service similar to AIMD, but on a smaller scale, because its sole responsibility is squadron aircraft (Ref. 48).

d. Air Operations Department, Ground Electronic Division. According to the NACIP report, Ground Electronics Shops are housed in Buildings 377 and 426 where they perform maintenance on airfield electronics and ground communications for base operations and security. Wastes generated are similar to that of AIMD and VC-8s (minor amounts of solder, lead, and spent cleaning fluids). Additionally, small electronic transformers (no PCBs), low voltage batteries, and power tubes containing beryllium insulators (total of 12 per month) are disposed of in the Station Landfill (SWMU #3). At one time, mercury switches and vacuum tubes possibly containing radium were also disposed of in the Station Landfill (SWMU #3) (Ref. 48).

9. Pest Control. Under the direction of the Public Works Department, the Pest Control Shop is responsible for insect and rodent control in station buildings and on station property, as well as weed control along streets, sidewalks, and buildings. Replacing the Old Pest Control Shop (SWMU #13) in 1983, this facility has separate storage areas for pesticides, equipment, and pesticide mixing, in addition to a concrete-bermed equipment wash pad which drains to the Sewer Drainage System (SWMU #38) (Ref. 48). According to facility representatives, pesticide containers are triple rinsed and the rinsate is saved for later use. Empty

containers do not go into the dumpster. They are taken to the Station Landfill (SWMU #3) by Pest Control Shop Employees. The NMCB pesticide storage building, which is immediately adjacent to the Rinse Rack near Sea Bee Pesticide Storage (SWMU #41), appeared clean and well maintained at the time of the VSI. Sea Bee personnel reported that pesticides had not been applied for several months, since no one in their battalion had a pesticide applicators license.

10. Steam Supply. The Utility Shop operates and maintains the 16 boilers scattered throughout the base according to the NACIP report. Used for making steam and hot water, most of the boilers are fueled by No. 2 diesel fuel which is stored in underground tanks adjacent to the boilers. No acid cleaning is required to clean the soft boiler sludge and soot because of the soft characteristics of the water supply. Between 1962 and 1972, loose asbestos chipping from pipe insulation was removed and disposed of at the Station Landfill (SWMU #3) as a part of regular maintenance (Ref. 48). According to a facility representative during the VSI, this is an ongoing practice.

11. Power Supply. Puerto Rico Water Resources Authority supplies the base with electric power, but 42 fixed standby and 18 portable generators, ranging from 3.5 kilowatts (kw) to 850 kw, are available in case of emergency. All units operate on diesel fuel. Between 1960 and 1972, an estimated 1,000 gallons of waste oil and 1 ton of other waste (wires, meters, gauges, windings, etc.) from generator maintenance were disposed of at the Station Landfill (SWMU #3) yearly. It is suspected that the non-electric temperature gauges contained a small amount of mercury (Ref. 48). The current practice is to sell the waste oil to a private contractor who recycles it, according to facility representatives.

12. Air Conditioning and Refrigeration. Located in Building 1788, the Refrigeration and Air Conditioning Shop does repair and preventative maintenance for air conditioning units, in addition to household, commercial, and industrial refrigeration equipment. Waste sent to the Station Landfill (SWMU #3) averages 2.5 tons annually and consists of small parts, air conditioners, and empty 5-gallon cans of cleaning solution (Ref. 48) in addition to empty freon containers.

13. Battery Maintenance. The Public Works Department, AIMD, Weapons Department, and NMCB have battery shops whose primary purpose is the disassembly, reassembly, drainage, rinsing, recharging, and cleaning of batteries (Ref. 48).

a. Public Works Department. The Transportation Division of the Public Works Department is responsible for maintenance and replacement of batteries in all Naval Station vehicles. Approximately 2,300 batteries were disposed of at the Station Landfill (SWMU #3) from 1960 to 1973. Since then, all discarded batteries (approximately 20 per month) are drained of acid and sent to the DRMO Hazardous Waste Storage Facility (SWMU #17). The drained acid is neutralized in special acid-resistant containers (Ref. 48). In the Public Works Department yard the VSI team discovered a Battery Collection Area (SWMU #32). Several dozen old batteries, most of them undrained, were stacked outside in the bed of a truck and on a pallet.

b. Aircraft Intermediate Maintenance Department (AIMD). Two battery shops are operated by AIMD in Building 379. One handles small nickel-cadmium (NICAD) rechargeable batteries, but only to the extent of cleaning and charging. Batteries that will not hold a charge are returned to the manufacturer. The second shop cleans, drains, rinses, and recharges lead/acid batteries. Wastes, including concentrated sulfuric acid, acid-contaminated rinse waters and potassium hydroxide electrolyte, are discharged to the sewer system (SWMU #38) after the acids are neutralized with baking soda (Ref. 48).

c. Weapons Department. Located in Building 378, the mission of the Weapons Department is to provide logistical support to the tenant activities and those units assigned to Roosevelt Roads for training. According to the NACIP report, silver cell batteries from torpedoes are returned to Kingsport, Washington for reworking or disposal (Ref. 48).

d. Naval Mobile Construction Battalion. According to the NACIP report, approximately 30 to 40 batteries are sent to the DRMO Hazardous Waste Storage Facility (SWMU #17) every six months from the Naval Mobile Construction Battalion. During the VSI, the Spent Battery Storage Building (SWMU #39) was observed. On a covered concrete pad, next to the building, spent batteries are drained by pouring the contents into an oversized funnel and collecting the battery acid below. The spent battery acid is stored inside the Spent Battery Storage Building (SWMU #39). At the time of the VSI, battery shells were stacked next to the building. The batteries and battery acid go to the DRMO Hazardous Waste Storage Facility (SWMU #17) for disposal.

14. Fire Fighting Training. The Fire Division of the Air Operations Department provides fire protection and crash rescue response at Roosevelt Roads. The structural fire station, built in the early 1960s, is Building 798 on Forrestal Drive. Building 827, located on the north side of Runway 6 between the 3,000 and 4,000-foot runway markers, is the aircraft crash rescue station, and has been used since the early 1960s for fire fighting training (Ref. 48). Waste oil is burned at the Fire Training Pit (SWMU #14) in the course of fire fighting training.

15. Medical and Dental Care. Medical and dental health care facilities are located in Buildings 1790 and 593 (Ref. 48). Wastes from these two facilities are disposed of in several ways.

a. U.S. Naval Hospital. Located in Building 1790, the U.S. Navy Hospital provides general clinical and hospitalization services for active duty Navy and Marine Corps personnel and their eligible dependents. Acute and long-term cases are sent off-base to better equipped hospitals. Solid wastes produced at the hospital are sealed in plastic bags and sent to the Station Landfill (SWMU #3). Pathological and biohazardous wastes are burned at the permitted Hospital Incinerator (SWMU #15). Laboratory wastes go to the DRMO

Hazardous Waste Storage Facility (SWMU #17), with the exception of small amounts, which are washed into the Sewer Drainage System (SWMU #38). X-ray solutions are processed for silver recovery and then flushed into the Sewer Drainage System (SWMU #38) (Ref. 48).

b. Dental Facilities. According to the NACIP report, dental facilities are located at both the Naval Hospital and at the U.S. Regional Dental Center. Both facilities produce similar wastes in comparable quantities. Developing solution is poured down the drain to the Sewer Drainage System (SWMU #38), while spent fixing solution and scrap amalgam are sent to the DRMO Hazardous Waste Storage Facility (SWMU #17) for metals recovery (Ref. 48).

16. Water Treatment. The Naval base water treatment plant (Building 88) has been in operation for over 30 years according to the NACIP report (Ref. 48). It has the capacity to treat 4 million gallons a day using pre-chlorination, coagulation, sedimentation, filtration, and final chlorination. The amount and type of waste, mainly water from filter backwash and sludge from the sedimentation tanks, has been fairly consistent over the lifespan of this plant. Adjacent to the plant are two specially constructed lagoons (SWMU #42) which receive daily backwash from the filters, as well as sludge from the treatment system sedimentation basins. By plant design, decanted backwash is returned to the front of the plant which enables the recovery of wash water. Sludge (river mud containing aluminum sulfide and lime) is discharged into the adjacent lagoons (SWMU #42) at a rate of 150 tons per year of dry sludge (Ref. 48). The Water Treatment Plant operator stated during the VSI that the source water is piped in from the mountains to the west. Although owned by the Navy, the Water Treatment Plant is operated by a contractor.

17. Wastewater Treatment. Domestic sewage and some stormwater flow is processed through one of three wastewater treatment plants on base. The Capehart Area Wastewater Plant (SWMU #27), Bundy Area Wastewater Plant (SWMU #28), and Industrial Area Wastewater Plant (SWMU #29) comprise this NPDES permitted wastewater treatment system. The Bundy Area and Industrial Area Wastewater Plants (SWMUs #28 and #29) use a trickling filter system with final chlorination before effluent discharge to surface water. Both units are designed to maximize gravitational pull of wastewater through the system. It is likely that the Capehart Area Wastewater Plant (SWMU #27) is similar in design. Influent reaches the wastewater treatment system through the Sewer Drainage System (SWMU #38) and is discharged through Naval Station Outfalls (AOC D) as treated effluent. All three wastewater treatment plants are in violation of Puerto Rico Environmental Quality Board regulations (Ref. 50). Because Reference 50 is undated and reports no specific violations, it is not possible to determine how long these units have been in violation and the reasons for violation. However, the VSI team was informed by a plant operator that all three had been in violation for an extended period of time.

18. Specialized Installation Operations. Several specialized operations are conducted by various organizations at the facility including veterinary services, garage and gas station facilities, Water Security Patrol, Army Reserves, and the Navy Courier Service Detachment. A description of the services and any wastes generated follows.

a. Veterinary Services. According to the NACIP study, the Veterinary Services Section offers small and large animal veterinary services in addition to conducting meat and food inspections at the Navy Exchange and the commissary. Approximately 25 small animals are buried at the Station Landfill (SWMU #3) per month (Ref. 48).

b. Navy Exchange Garage and Gas Station Facilities. The Navy Exchange operates two service areas: a garage and gas station facility in the Bundy Area, and a gas station near the base fire department, north of the Industrial Area. Each facility has three underground fuel tanks of approximately 10,000 gallon capacity. At the Bundy facility a private contractor removes waste oil, spent batteries, and tires. The remaining tires, empty quart oil cans, and waste cardboard are disposed of at the Station Landfill (SWMU #3). Machinery or resellable parts are stored in the DRMO yard until resale (Ref. 48). Specific information regarding the Industrial Area gas station was not available in the PR file material; nor did facility representatives provide additional specific information during the VSI.

c. Water Security Patrol (WASP). Established in 1983, the Water Security Patrol is under the command of Surface Operations and is responsible for waterfront security. Fueling is done at the fuel pier loading facility. Waste generated from routine maintenance of boats and outboard motors is considered minimal, consisting of small amounts of oil, solvents, soaps, etc., all of which is disposed at the Station Landfill (SWMU #3) (Ref. 48).

d. U.S. Army Reserves - 390 Terminal Transfer Company. The mission of the 390 Terminal Transfer Company is to train reserves on weekends in material handling and transport, and for qualification for various motor vehicle class licenses. Although training in cargo handling is conducted, no cargo is actually handled. However, about one 55-gallon drum of waste oil from vehicle maintenance is picked up by a DRMO contractor every three months (Ref. 48).

e. U.S. Army Reserves - 699 Engineering Company. The mission of the 699 Reserves Engineering Company is to provide port construction training. Four landing craft-type units, as well as land vehicles, are available to the reserves. Maintenance of the watercraft is handled by Surface Operations. Land vehicle maintenance generates about five gallons of waste oil per month, which is picked up by a DRMO contractor (Ref. 48).

f. U.S. Navy Courier Service Detachment. The mission of the detachment is to provide transportation and handling of special classified documents in a manner similar to a private service such as Federal Express. Wastes generated from this service are considered by the Navy to be minimal, consisting of general office waste and shredded paper which is picked up and disposed of by a private contractor (Ref. 48).

B. Ordnance Operations

1. Torpedo Shop. All ordnance for disposal from the Torpedo Shop (AOC A) is taken offsite by the Explosive Ordnance Disposal (EOD) detachment to the Vieques Naval Ammunition Facility (NAF) for proper disposal. Ordnance items include propellants, igniters, carbon dioxide bottles with squibs, explosive bolts, rocket motors, ignition separator assemblies (ISAs), and piston motors. Formerly, ISAs were burned off in the office ashtrays. Before 1968, explosives from this activity were disposed of in the Station Landfill (SWMU #3) or in the ocean. None of the torpedoes prepared by this activity are armed with warheads (Ref. 48). The Torpedo Shop is considered a "unique military operation" by the Navy. At the time of the VSI, the VSI team was informed of unanticipated security clearance regulations associated with this operation and, therefore, was not able to proceed with the visual inspection of the Torpedo Shop.

2. Weapons Department, Naval Station Roosevelt Roads. The Weapons Department, located in Building 378, is responsible for receipt, storage, maintenance, transport, and disposal of ordnance as well as providing logistical and administrative support regarding ordnance activities. Ordnance disposal is through Explosives Ordnance Disposal (EOD) which takes place on Vieques Island (Ref. 48).

3. Radiological Operations. According to the NACIP report, the Naval Electronics Engineering Center uses low-level isotopes to calibrate fleet electronic instruments twice a year. The Department of Energy monitors these activities. Electron-generator type X-ray machines, which produce no radiological waste, are used by the Naval Hospital and the Naval Regional Dental Center. The hospital laboratory uses small amounts of low-level radioisotopes, such as iodine (Ref. 48). Facility representatives could not determine if wastes were being generated by these facilities.

Wastes Handled and Waste Management Practices

Waste management operations at the Roosevelt Roads facility include activities involving the Defense Reutilization and Marketing Office (DRMO), operation of storage lots and scrap yards, and management of PCBs, pesticides, petroleum, oil, lubricants (POL), and various other hazardous wastes. A discussion of the wastes generated and waste management practices follows. Table 3 provides a composite of wastes generated and specific disposal practices.

1. Waste Management. Waste management practices at Roosevelt Roads are discussed in the following section. The primary waste management units or practices include the Defense Reutilization and Marketing Office and the numerous temporary accumulation areas at the facility.

a. Defense Reutilization and Marketing Office (DRMO). The DRMO at Roosevelt Roads transports, stores, and disposes of both materials and wastes from all base operations from the Naval Ammunition Facility (NAF) and Atlantic Fleet Weapons Training Facility (AFWTF) on Vieques, from other Department of Defense facilities on Puerto Rico and from Puerto Rico National Guard units. Materials stored in the open include office furniture, clothing, vehicles, salvage drums, and hazardous material. Materials are stored in

Table 3. Waste Management Practices at U.S. Naval Station Roosevelt Roads, PR.

Process	Disposition	Wastes Generated
Painting	• Station Landfill (SWMU #3)	Scrap wood pieces, empty paint cans
	• Ignitable Storage Facility (SWMU #18)	Waste paint
Paint Stripping*	• Station Landfill (SWMU #3)	Paint scrapings
	• Ignitable Storage Facility (SWMU #18)	Paint stripping compounds, corrosion prevention compounds, metal conversion compounds
Degreasing and Solvent Cleaning*	• Offsite disposal by private contractor	Waste oil, solvents, degreaser
	• Ignitable Storage Facility (SWMU #18)	Corrosion inhibiting compounds, PD-680 (mineral oil solvent), methyl ethyl ketone (MEK)
	• Offsite disposal by DRMO contractor	Dry cleaning solvent, alcohol, aliphatic naptha, technical xylene, methyl ethyl ketone (MEK), OTTO Fuel II, Agentine, alcohol (Neosol), sodium sulfide, acetone, denatured ethyl alcohol, silver cell batteries, waste oil, contaminated clothing, detergent
Machining	• Station Landfill (SWMU #3)	Metal pieces, welding material, small grease and oil containers
Printing	• Station Landfill (SWMU #3)	Cleaning rags (soiled with rubber-based ink)
	• Offsite disposal by private contractor	Minor amounts of lubricating oil
Photograph Developing*	• Offsite recycling by DRMO contractor	Film (recycled for silver recovery)
Electrical & Electronic Equipment Repair	• Offsite disposal by DRMO contractor	Transformer oil (PCB)
	• Station Landfill (SWMU #3)	Cables, wires, conduits, receptacles, ballasts, bulbs, grease and oil containers, minor amounts of solder and lead, small electronic transformers (no PCBs), low voltage batteries, power tubes containing beryllium insulators (approximately 12 per month)
	• Recycled through a private contractor	Spent cleaning fluids
Calibration	• Deposited in Oil Spill/Oil Water Separator (SWMU #24) which is pumped out by a DRMO contractor	Small amounts of oil and hydraulic fluid
	• Washed into Sewer Drainage System (SWMU #38) and eventually discharged from Naval Station Outfalls (AOC D)	Small amounts of oil and hydraulic fluid
Power Generation	• Station Landfill (SWMU #3)	Wires, meters, gauges, windings, etc.
	• Recycled through a private contractor	Waste oil
Navy Exchange Garage & Gas Station Facilities	• Offsite disposal by private contractor	Waste oil, spent batteries, tires
	• Station Landfill (SWMU #3)	Empty quart oil cans, tires, waste cardboard

-- continued --

Table 3. Continued.

Process	Disposition	Wastes Generated
Battery Maintenance	• Hazardous Waste Storage Facility (SWMU #17)	Battery acid, drained batteries
	• Returned to manufacturer for reworking or disposal	Rechargeable and silver cell batteries
	• Released to Sewer Drainage System (SWMU #38) and eventually discharged from Naval Station Outfalls (AOC D)	Acid contaminated rinse waters (neutralized with baking soda), potassium hydroxide electrolyte
Medical & Dental Care	• Hazardous Waste Storage Facility (SWMU #17)	Laboratory wastes
	• Station Landfill (SWMU #3)	Solid wastes sealed in plastic bags
	• Hospital Incinerator (SWMU #15)	Biological and pathological wastes
	• Released to Sewer Drainage System (SWMU #38) and eventually discharged from Naval Station Outfalls (AOC D)	Small amounts of laboratory waste
Pest Control*	• Station Landfill (SWMU #3) (after triple rinse)	Empty pesticide containers
Steam Supply	• Station Landfill (SWMU #3)	Asbestos from pipe insulation
Veterinary Services	• Station Landfill (SWMU #3)	Approximately 25 small animal corpses monthly
	• Buried on stable property	Approximately two horses per year
Air Conditioning & Refrigeration	• Station Landfill (SWMU #3)	Small parts, air conditioners, empty containers of cleaning solution and freon
Fire Fighting Training*	• Burned at Fire Training Pit (SWMU #14) then washed into Fire Training Pit Oil/Water Separator (SWMU #12)	Waste oil
Water Treatment	• Water Treatment Plant Sludge Lagoons (SWMU #42)	River mud containing aluminum sulfide and lime
Wastewater Treatment	• Processed through Naval Station Wastewater Plants (SWMUs #27, #28, #29) and eventually discharged from Naval Station Outfalls (AOC D)	Domestic sewage
Ordnance Activities	• Explosive Ordnance Disposal (EOD) on Vieques Island	Propellants, igniters, CO_2 bottles with squibs, explosive bolts, rocket motors, ignition separator assemblies (ISAs), piston motors
Water Security Patrol (WASP)	• Station Landfill (SWMU #3)	Small amounts of oil, solvents, soaps
U.S. Army Reserves	• Offsite disposal by DRMO contractor	Approximately 280 gal. waste oil/year
U.S. Navy Courier	• Offsite disposal by private contractor	General office waste and shredded paper

* Some wastes may be released to the Sewer Drainage System (SWMU #38) and eventually discharged from Naval Station Outfalls (AOC D).

designated areas, and numbered and moved according to a manifest system (Ref. 48). Disposal depends upon the nature of the material and entails auctioning, sending materials to other government agencies, or removal by a contractor. Housing two RCRA-permitted units (SWMUs #17 and #18), the DRMO yard is located on Forrestal Drive, south of the intersection of Forrestal Drive and Tow Way Road. The DRMO Hazardous Waste Storage Facility (SWMU #17) is contained inside Building 1973 and is used to store all nonflammable hazardous waste. The Ignitable Storage facility, Building 2009 (SWMU #18), is a small metal building inside the fenced DRMO yard, which stores all flammable hazardous waste. Immediately adjacent to Building 2009 is an open area, Past DRMO Hazardous Waste Storage (SWMU #25), that is presently used to store hazardous materials. Approximately 1,000 gallons of acid, bases, paints, thinners, and sealing compounds, as well as 10 to 15 55-gallon drums of waste oils, are received at DRMO monthly (Ref. 48). According to facility representatives, DRMO contracts the services of transportation and offsite disposal for all hazardous wastes.

b. Storage Lots and Scrap Yards. Storage lots and scrap yards are primarily associated with the Public Works Department, Supply Department, DRMO, Naval Mobile Construction Battalion (NMCB) and the dry dock area. The Transportation Division of the Public Works Department maintains a storage yard adjacent to the Public Works Department Building (Building 31) where the Waste Oil Collection Area (SWMU #31) and Battery Collection Area (SWMU #32) were observed at the time of the VSI. Items stored at the Public Works Transportation Division and Supply Department storage yards are generally vehicles and construction equipment. The Pole Storage Yard (SWMU #46) located behind Building 2042 is a Public Works storage yard that was noted during the VSI to be a telephone pole and insulator storage area. Adjacent to the Pole Storage Yard is the Transformer Storage Area (AOC C) in the former location of Navy Exchange Warehouses 40, 41, and 42. The Former Paint Storage Building (SWMU #6), now empty, and Former PWD Storage Area (AOC B), a collapsed building, are located in an unfenced yard in the vicinity of the dry dock. Naval Mobile Construction Battalion (NMCB) yards store fuels, oils, construction equipment and chemicals (Ref. 48), and some waste, as in the case of the Spent Battery Storage Building (SWMU #39) and the Seabee Oil Collection Area (SWMU #40).

2. Wastes Generated. The primary wastes generated at the facility include hazardous wastes, PCBs, petroleum products (e.g., lubricants, oils) and pesticides. The generation of these wastes is discussed as follows.

a. PCBs. The process of testing and, if necessary, replacing all transformers on base started in 1981 and should be completed during 1988-1989 (Ref. 23). For this reason there is a PCB Storage Compound (SWMU #11) where PCB-contaminated and possible PCB-contaminated items are stored indoors on a curbed concrete pad in an area surrounded by a cyclone fence. Past release to the ground outside this unit has been documented (Ref. 48) and is noted in this report as PCB Spill Area (SWMU #45). Another

possible PCB storage area is the Transformer Storage Area (AOC C). Release of transformer oil to the ground was observed at this unit during the VSI. Approximately 150 feet north of the Transformer Storage Area (AOC C) is the Pole Storage Yard (SWMU #46), which was used to store transformers and drums containing PCB-contaminated materials, according to the NACIP report (Ref. 48). No transformers or drums were observed during the VSI. Substation 2, noted in this report as Transformer Maintenance Area (SWMU #10), was observed to have release to the soil. According to the NACIP study, PCB-contaminated items have been disposed of at the Station Landfill (SWMU #3).

b. Pesticides. Past and present pesticide waste storage areas include the Old Pest Control Shop (SWMU #13) and Pesticide Waste Storage (SWMU #19). According to facility representatives, closure plans are forthcoming for Pesticide Waste Storage (SWMU #19) which is used to store outdated pesticides. The New Pest Control Shop was not observed during the VSI but, according to the NACIP study, it houses insecticides, herbicides, and rat poisons and has separate areas for pesticide storage and mixing. According to facility representatives, pesticide containers are triple-rinsed before being taken to the Station Landfill by shop employees. The rinsate is treated as a material and is added to the next batch when that particular pesticide is needed. The Old Pest Control Shop (SWMU #13) no longer stores pesticides and, according to the president of the Navy Scuba Diving Club, was "decontaminated" before being used as their headquarters.

c. Petroleum, Oil, Lubricants (POL). Because petroleum, oil, and lubricants are essential to equipment function, maintenance and repair, POL storage, transportation, and disposal goes on throughout the entire base. In addition, Roosevelt Roads serves as an important refueling station for all NATO ships and, therefore, must maintain a large store of fuel. Numerous releases to soil and surface water associated with fuel storage are cited in this report (for example, SWMUs #7, #8, and #9). The maintenance and repair of aircraft generates considerable waste, observed during the VSI as the Waste Oil Drum Storage Area (SWMU #37), VC-8 Waste Storage Pad (SWMU #34), and Aerial Target Systems Department Drainage Ditch (SWMU #44). Oil/water separators are a common means of reclaiming waste POLs for recycling or disposal. The Fire Training Pit Oil/Water Separator (SWMU #12), Aircraft Wash Rack Oil/Water Separator (SWMU #35), and Drone Fuel Drain Oil/Water Separator (SWMU #4) were observed during the VSI. When there is a spill in the harbor, SWMUs #21 through #24, known collectively as the Oil Spill Removal System, contain and remove the waste oil. In the days before oil/water separators were used as a matter of course, waste POLs were disposed of at random. The Army Cremator Disposal Site (SWMU #1), Langley Drive Disposal Site (SWMU #2), Station Landfill (SWMU #3), and Abandoned Engine Oil Drums (SWMU #26) were all used for POL disposal. Waste POLs are burned at the Fire Training Pit (SWMU #14). As a matter of course, waste POLs do not pass through DRMO, but are transported offsite for reclamation or disposal by either private or DRMO contractors.

d. Hazardous Wastes. Hazardous wastes were observed to be stored at the AIMD Hazardous Waste Storage Pad (SWMU #33), DRMO Hazardous Waste Storage Facility (SWMU #17), and Ignitable Storage Facility (SWMU #18). According to the NACIP study, other areas, including the Army Cremator Disposal Site (SWMU #1), Langley Drive Disposal Site (SWMU #2), and Station Landfill (SWMU #3), are suspected of having been used for hazardous waste disposal. Roosevelt Roads has two RCRA permitted hazardous waste units, the DRMO Hazardous Waste Storage Facility, and the Ignitable Storage Facility (SWMUs #17 and #18, respectively). Table 4 lists hazardous wastes stored in SWMUs #17 and #18 at the DRMO facility.

History of Releases

There have been various release events at the Roosevelt Roads facility. Specifically, in their NACIP study report (Ref. 48), the U.S. Navy documented releases of fuel, PCBs, pesticides, and other as yet unidentified materials. These instances are described below.

Three unlined landfills (SWMUs #1, #2, and #3) have been in operation for overlapping periods of time beginning in the 1940s up until the present. Corroded 55-gallon drums of unidentified substances, pesticides, asbestos, solvents, and contaminated OTTO Fuel II have been disposed of at these units (Ref. 48).

Numerous releases have been identified with the Tow Way Road Fuels Farm (SWMU #7), including 420,000 gallons of Bunker C fuel released to soil and surface water in the 1950s, approximately 65,000 gallons of diesel fuel released to soil in 1978, approximately 91,000 gallons of JP-5 (aviation kerosene) released to soil and surface water in November 1986, and an estimated 420,000 gallons of diesel fuel released to the soil over a 15 to 20 year period.

In the early 1970s between 4,000 and 7,000 gallons of Bunker C fuel sludge was buried in unlined pits, which are identified in this report as Tow Way Road Disposal Pits (SWMU #8). Approximately 30,000 to 40,000 gallons of leaded sludge were buried in unlined Leaded Sludge Pits (SWMU #9).

Over a period of years (not extending beyond 1978) a maximum of 3,000 gallons of PCB-contaminated transformer oil was poured on the ground at the Transformer Maintenance Area (SWMU #10) and an estimated 1,600 gallons was poured out at PCB Spill Area (SWMU #45).

Table 4

HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (Ref. 59)

WASTE DESCRIPTION	WASTE NUMBER	WASTE CODE
Beryllium Dust	P015	H
Lithium/Sulfur Dioxide Batteries	D003	R
Nickel/Cadmium Batteries	D003/D006	R, T
Mercury Batteries	D009	T
Mercury Batteries in Acetic Acid	D002/D009	C, T
ATON Batteries	D002	C
Alkaline Batteries	D002	C
Lead/Acid Batteries	D002/D008	C, T
Lead/Acid Batteries (Drained)	D008	T
Battery Electrolyte[1]	D002/D008	C, T
Acetic Acid	D002	C
Chromic Acid (Alodine)	D002/D007	C, T
Hydrochloric Acid	D002	C
Sulfuric Acid	D002	C
Ammonium Hydroxide	D002	C
Cleaning Compound[2]	D002	C
Mercury	U151/D009	T
Blasting Booth Dust[3]	D007/D008	T
Gasoline (Unleaded)	D001	I
Petroleum Fuels (Leaded)	D001/D008	I
Jet Fuel (JP-4 or JP-5)	D001	I

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Table 4

HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (cont.) (Ref. 59)

Kerosene (contaminated)	D001	I
Adhesives[4]	D001	I
Calibration Fluid	D001	I
Cleaning Compound (Mineral Spirits)	D001	I
Isopropyl Alcohol	D001	I
Sealing Compound	D001/F003	I
Icing Inhibitor	D001	I
Inspection Penetrant	D001/F003	I
Decontaminating Agent, STB	D003	R
Denatured Alcohol	D001	I
Duplicating Fluid	D001	I
Waste Paints[5]	D001	I
Painting Wastes[6]	D001/D002 D007/D008 F002/F003 F005	I, C, T
Chlordane	U036	T
Malathion (with carrier solvent)	D001	I
Photographic Developer	D002/D011	C, T
Photographic Fixer	D002/D011	C, T
Photographic Toners	D001	I
Photographic Hardener	D011	T
Photographic Stabilizer	D011	T

Table 4

HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (cont.) (Ref. 59)

Photographic Starter	D011	T
Photographic Replinisher	D002/D011	C, T
Photo Auto Reversal Chemical	D011	T
Hypo-Solution : $(NH_4)_2S_2O_3$	D011	T
Hypo-Solution : $Na_2S_2O_3 - 5H_2O$	D011	T
Corrosion Inhibitor	D001	I
Naphtha	D001	I
Acetone	F003/U002	I
Ethyl Ether	F003/U117	I
Isobutanol	F005/U140	I, T
Methanol	F003/U154	I
Methylene Chloride	F001/F002 U080	T
Methyl Ethyl Ketone (MEK)	F005/U159	I, T
Tetrachloroethylene	F001/F002 U210	T
Toluene	F005/U220	T
1,1,1 Trichloroethane	F001/F002 U226	T
Trichloroethylene	F001/F002 U228	T
Trichlorofluoromethane	F002/U121	T

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Table 4
HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (cont.) (Ref. 59)

Trichlorotrifluoroethane	F002	T
Xylene	F003/U239	I
Chlorinated Flourocarbons	F001	T
1,1,2-Trichloroethane	F002/U227	T
MEK and Paint	F005/D007 D008	I, T
Paint Removers	D002/F002	C, T
Dye Penetrant	D001/F001 F002	I, T
Carbon Remover	F002	T
Dry Cleaning Solvent (PD-680-I)	D001	I
Stoddard Solvent	D001	I
Inspection Penetrant	D001/F002	I, T
Petroleum Lubricant	D001	I
Aerosol Cans (Partially Full)	D001/F001 F002/F003 F005	I, T
Miscellaneous Waste Ignitables	D001	I
Miscellaneous Waste Acids	D002	C
Miscellaneous Waste Caustics	D002	C
Miscellaneous Waste Reactives	D003	R
Misc. Halogenated Solvents[7]	F001/F002	T
Misc. Halogenated Solvents[8]	F001/F002	T

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Table 4

HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (cont.) (Ref. 59)

Misc. Non-Halogenated Solvents	F003/F005	I, T
Miscellaneous POL's[9]	D001/F001 F002/F003 F005	I, T
Magnesium Batteries	D003	R
Grease Contaminated with Oils	D001/D007 D008	I, T
Freon Contaminated Hydraulic Fluid	F002	T

NOTES:

1. Battery electrolyte refers to the sulfuric acid/water mixture drained from lead acid batteries.
2. Cleaning compound refers aircraft surface cleaning compound whose NSN# is 6850-00-935-0995, and is commonly known as TURCO.
3. Blasting booth dust is the spent sandblasting media which includes glass beads contaminated with heavy metals.
4. Adhesives refers to variety of adhesive materials that contain low flash point solvents.
5. Waste paints include acrylics, enamels, epoxy paints, lacquers, oil based paints, polyurethane paints, varnish, primers, deck coating, and shellac.
6. Painting wastes refers to waste paints or painting related materials that are contaminated with one or more of the following materials: oils, thinners, dirt, halogenated solvents, non-halogenated solvents, corrosive strippers and heavy metals.
7. Mixed waste containing, before use, a total of 10% or more of the F-listed halogenated solvents.
8. Mixed waste containing, before use, less than a total of 10% of the F-listed halogenated solvents.
9. POL's (Petroleum, Oils, and Lubricants) potentially contaminated with one or more ignitable wastes or F-listed solvents .

3.0 ENVIRONMENTAL SETTING

Location and Surrounding Land Use

The Naval Station Roosevelt Roads (NAVSTA) is located on the extreme eastern coast of Puerto Rico near the municipality of Ceiba, approximately 33 miles southeast of the capital City of San Juan. The nearest major town is Fajardo, which is 10 miles north of the station.

NAVSTA occupies 8,055 acres and is bordered on all sides but the west by the Caribbean Sea. Immediately to the west of the station and adjacent to its western boundary is the town of Ceiba (Figure 1). The land to the southwest is used for agricultural purposes and includes Bosque Estatal de Ceiba, which is a mangrove forest. Along the station's western border, from south to north, are several settlements including Esperanza, Daguao, Quebrada Seca, Aguas Claras and Ceiba. The town of Ceiba is the largest (27.5 square miles) with a population of 15,000 people. Land use in these adjacent areas is primarily residential, with some commercial uses interspersed. There are no industrial uses adjacent to the station (Ref. 48).

Climate and Meteorology

The climate of the Roosevelt Roads area is characterized as warm and humid, with frequent showers occurring throughout the year. Consistent easterly trade winds blow throughout the year and moderate the temperature. The mean annual temperature ranges from 88° F in August to 64° F in January. Rain usually occurs at least nine days in every month, with an average of 60 inches per year. A dryer winter season occurs from December through April. The hurricane season is from mid-June through mid-September, with maximum winds exceeding 95 knots during severe hurricanes. An average of two tropical storms per year occurs in the area, one of which usually reaches hurricane intensity (Ref. 48)

Surface Water

Originating in the Sierra de Luquillo mountains to the west, surface waters generally flow eastward across Roosevelt Roads in a network of rivers and streams that eventually reach the Caribbean Sea. Surface waters generally have high turbidity and naturally-occurring organics due to the periodic heavy rains which can easily erode soils from steep slopes, exposed areas, and disturbed stream beds. The Daguao River and Quebrada Seca Stream collect surface waters from the hills immediately north of the station, and in periods of heavy rain, on-station flooding occurs. Increased development in the town of Ceiba, especially in areas adjacent to the station's northern border, has significantly increased the surface runoff reaching the station, causing ponding and erosion in the northern parts of the Naval Station. The Daguao-Quebrada Seca watershed covers an area measuring approximately 7.6 square miles (4,864 acres) (Ref. 48).

Topography and Surface Drainage

The regional area of the Naval Station consists of an interrupted narrow coastal plain with small valleys extending from the Sierra de Luquillo Range, which has been deeply eroded by streams into valleys several hundreds of feet deep. Slopes of 30° to 45° are not uncommon. The Station elevation ranges from sea level to 295 feet. There is a series of three hilly areas on the station (Figure 4), two of which separate the southern airfield area from the Port/Industrial, Housing, and Personnel Support areas. The third set of hills is in the Bundy area. These ridge lines not only separate sections of the station, but also dictate the degree of allowable development. Relief near the coast is low and lagoons and swamps are common (Ref. 48).

Soils, Geology, and Hydrogeology

The soil associations found at the Naval Station are predominantly of two types typical of humid areas, namely the Swamps-Marshes (SM) Association and the Mabi-Rio-Arriba-Cayagua (MRAC) Association. These two associations cover one half of the station's surface area and are equally distributed. The remaining area is covered primarily by the Descalabrado-Guayama (DG) and Caguabo-Mucara-Naranjito (CMN) associations (Ref. 48).

The SM Association consists of deep, sandy or clayey soils, that are very poorly drained. They contain organic matter from decaying mangrove trees. This association is found in level or nearly level areas that are slightly above sea level but are wet. When the tide is high, they are covered or affected by saltwater or brackish water. These soils are underlain by coral, shells, and marl at varying depths. The high concentration of salts inhibits the growth of vegetation, with the exception of mangrove trees, and in small scattered patches, other salt-tolerant plants (Ref. 48).

The MRAC Association consists generally of deep, somewhat poorly drained and moderately well drained, nearly level to moderately steep soils found on foot and side slopes, terraces, and alluvial fans. These soils are basically clayey, and are located predominantly in the areas surrounding Ofstie Field (Ref. 48).

The DG Association generally consists of shallow, well drained, strongly sloping to very steep soils on volcanic uplands. Soils of this association are found primarily in the hilly areas located directly inland and adjacent to the soils of the SM Association (Ref. 48).

The CMN Association consists generally of shallow and moderately deep, well drained, sloping to very steep soils on volcanic uplands. This association is represented at the Naval Station by the Sabana series, which are found on the side slopes and hilly terrain west of Langley Drive in the Fort Bundy area. Steep slopes, susceptibility to erosion, and depth to bedrock are the main limitations of these soils; thus, their use is limited to pasture and woodland (Ref. 48).

The remaining soils on the station consist mainly of deep and moderately deep, well drained soils on nearly level to low rolling hills. In some areas, the soils are strongly sloping and poorly drained (Ref. 48).

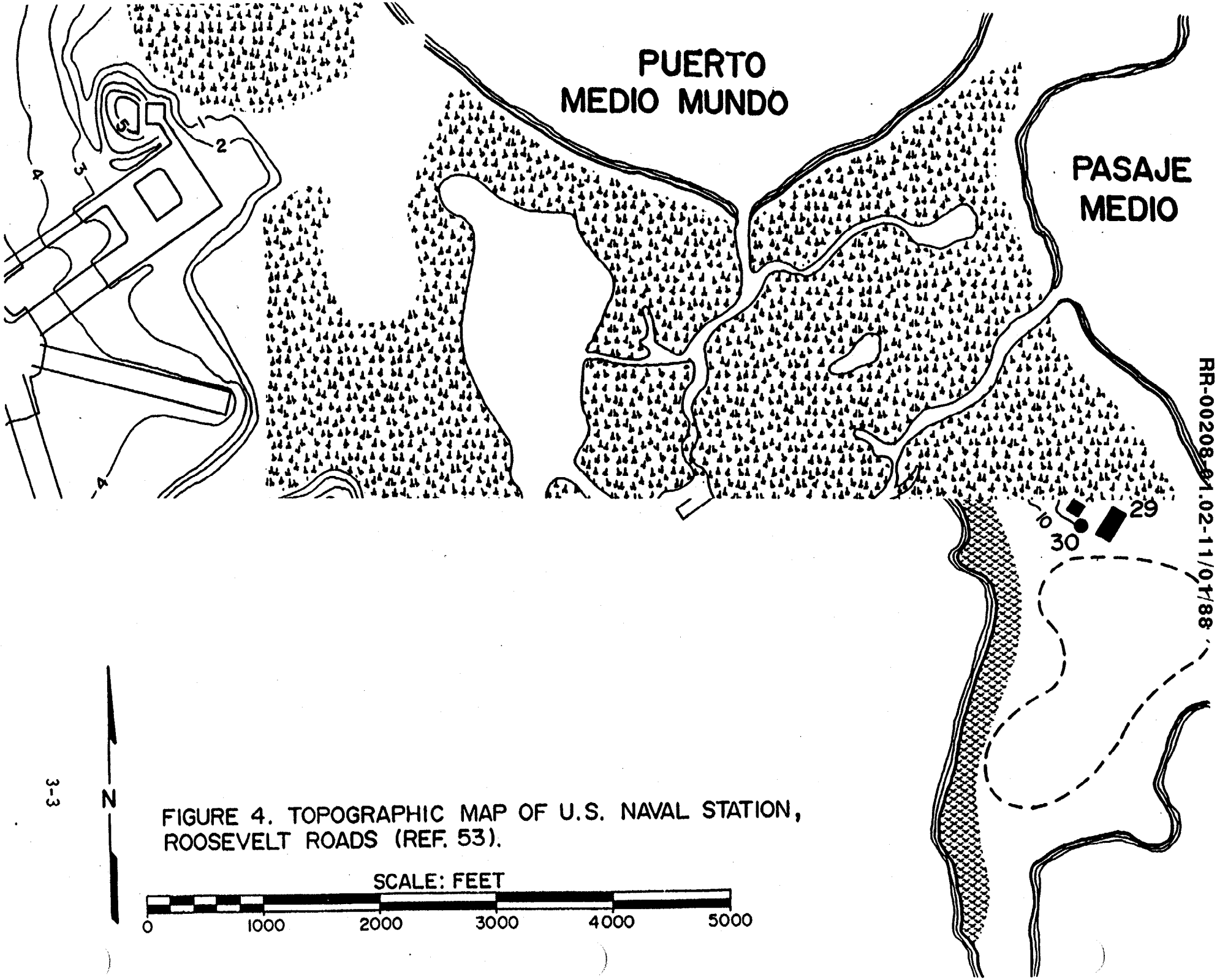

FIGURE 4. TOPOGRAPHIC MAP OF U.S. NAVAL STATION, ROOSEVELT ROADS (REF. 53).

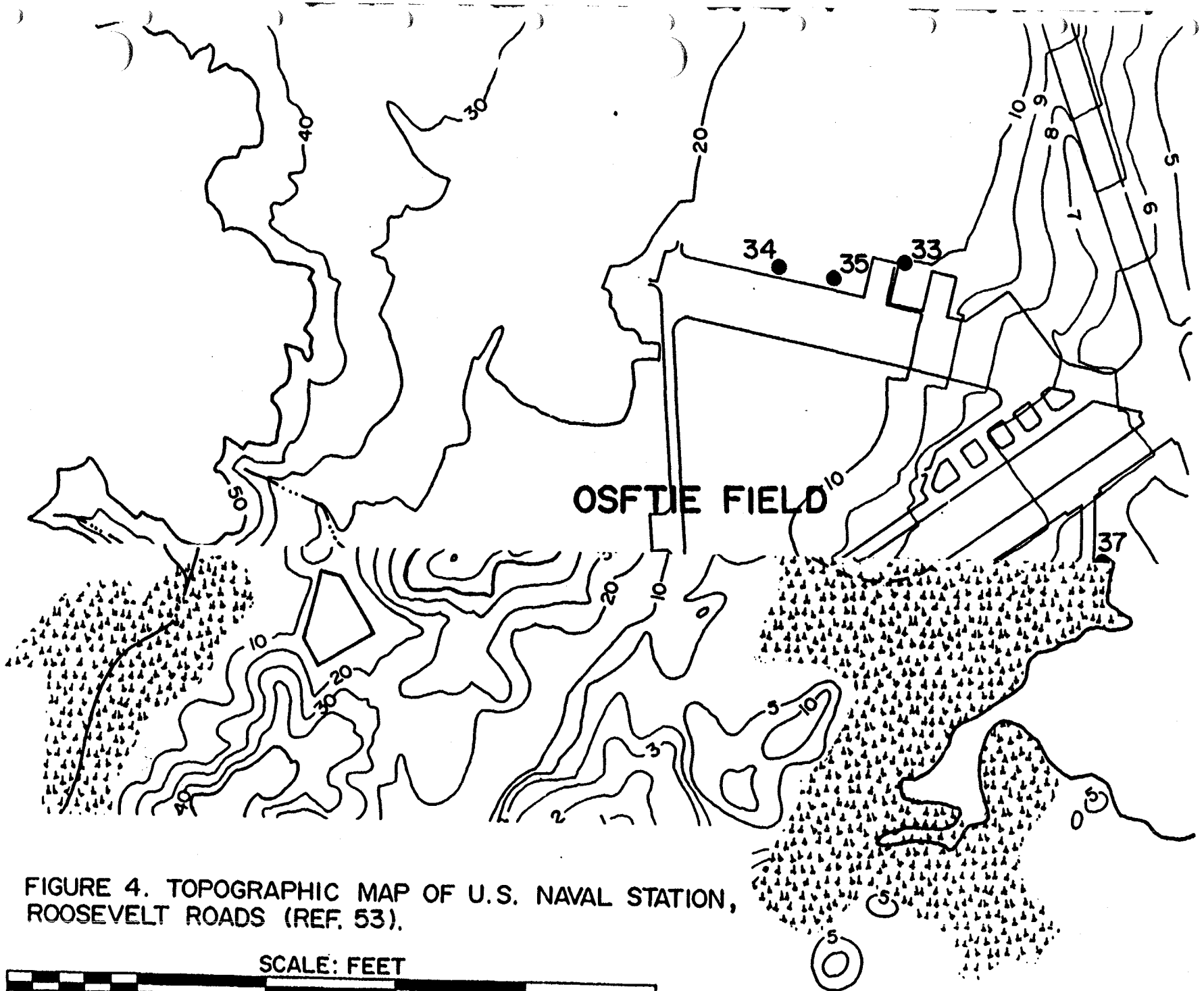

FIGURE 4. TOPOGRAPHIC MAP OF U.S. NAVAL STATION, ROOSEVELT ROADS (REF. 53).

The underlying geology of the station area is predominantly volcanic composed of lava and tuff, as well as sedimentary rocks derived from discontinuous beds of limestone. The volcanic rocks and interbedded limestones have been complexly faulted, folded, metamorphosed, and intruded by dioritic rocks. This complex geological restructuring occurred sometime after the deposition of the limestone, when Puerto Rico was separated from the other major Antillean Islands by block faulting and was arched, uplifted, and tilted to the northeast (Ref. 48).

In addition to the predominant volcanic and sedimentary rock, the northwestern and western sectors of the base are underlain by unconsolidated alluvial and old alluvial deposits from the Quaternary period (Ref. 48).

The primary geologic formations on and near NAVSTA Roosevelt Roads are various beach deposits, alluvium, quartz diorite and granodiorite, quartz keratophyre, the Daguao formation, and Figuera lava. The station is traversed by the Pena Pobre fault zone (Ref. 48).

Little information exists concerning the hydrogeology of NAVSTA Roosevelt Roads. Some wells were developed upgradient of the station in Ceiba, but were abandoned due to high levels of salinity. The principal aquifer of concern underlying Roosevelt Roads is alluvium consisting of lenticular beds of clay, sand, gravel, and rock fragments. These deposits are generally less than 100 feet thick and overlie the Daguao Formation, a massive, interbedded unit composed of volcanic breccia, lava, and subordinate volcanic sandstone and crystal tuff. According to the NACIP study, the water table is very near the surface (i.e., less than 10 feet) and, in places, at depths of two feet or less (Ref. 48). Groundwater present in the alluvial aquifer was formerly used to irrigate sugar cane fields, but is currently not utilized (Ref. 31a).

In June 1975, six observation wells were constructed at the Station Landfill (SWMU #3). The wells ranged in depth from 7.4 to 14.3 feet below ground surface. Depth to water in the wells, measured on two occasions (June 17, 1975 and July 1, 1975), ranged from 0.65 to 12.5 feet below ground surface. Water quality analysis was also provided, and indicated the groundwater to be relatively salty with chloride concentrations as high as 20,000 mg/l and total dissolved solids concentrations as high as 31,700 mg/l (Ref. 37).

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

The SWMUs and other AOCs identified during the PR are listed below. Descriptions and known details of the units are given in the following section.

Descriptions of Solid Waste Management Units and Other Areas of Concern

Solid Waste Management Units

1. Army Cremator Disposal Site
2. Langley Drive Disposal Site
3. Station Landfill
4. Drone Fuel Drain Oil/Water Separator
5. Dumpsters
6. Former Paint Storage (Building 145)
7. Tow Way Road Fuels Farm
8. Tow Way Road Disposal Pits
9. Leaded Sludge Pits
10. Transformer Maintenance Area (Building 90)
11. PCB Storage Compound (Building 38)
12. Fire Training Pit Oil/Water Separator
13. Old Pest Control Shop (Building 258 and Surrounding Area)
14. Fire Training Pit
15. Hospital Incinerator (Building 1928)
16. Waste Explosive Storage (Building 1666)
17. DRMO Hazardous Waste Storage Facility (Building 1973)
18. Ignitable Storage Facility (Building 2009)
19. Pesticide Waste Storage (Building 121)
20. Waste Oil Tank Truck (near Building 860)
21. Donuts
22. Ships Waste Offload Barges
23. Oil Spill Separator Tanks
24. Oil Spill Oil/Water Separator
25. Past DRMO Hazardous Waste Storage
26. Abandoned Engine Oil Drums (behind Building 544)
27. Capehart Area Wastewater Plant
28. Bundy Area Wastewater Plant
29. Industrial Area Wastewater Plant
30. Former Incinerator Site (adjacent to landfill entrance)
31. Waste Oil Collection Area (PWD Storage Yard)
32. Battery Collection Area (PWD Storage Yard)
33. AIMD Hazardous Waste Storage Pad
34. VC-8 Waste Storage Pad
35. Aircraft Wash Rack Oil/Water Separator (VC-8 yard)
36. Vehicle Wash Rack Oil/Water Separator (near Berthing Pier)

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Solid Waste Management Units

37. Waste Oil Drum Storage Area (near Hangar 200)
38. Sewer Drainage System
39. Spent Battery Storage Building (Building 3158)
40. Seabee Oil Collection Area
41. Rinse Rack near Seabee Pesticide Storage
42. Water Treatment Plant Sludge Lagoons
43. Drone Washdown Area
44. Aerial Target Systems Drainage Ditch
45. PCB Spill Area
46. Pole Storage Yard
47. Local Disposal Areas

Areas of Concern

A. Torpedo Shop
B. Former PWD Storage Area (Building 25)
C. Transformer Storage Area (near Building 2042)
D. Naval Station Outfalls

1. UNIT NAME: Army Cremator Disposal Site (Photos 1 and 2)

Unit Description: This unit is located south of the intersection of the access road to the Ammo Pier and Langley Drive. According to the NACIP study (Ref. 48), for approximately 20 years this site was the primary Station Landfill (SWMU #3) for the main base. Fort Bundy also utilized this area during that period. Waste material was disposed of by piling, burning, and then compacting. Also according to Ref. 48, the eventual migration of contaminants to Ensenada Honda is probable, since some of the material lies directly in the mangrove swamp which is subject to periodic flooding by high tides. The Ensenada Honda mangrove area provides a habitat for several endangered species (Ref. 48). In 1984, the NACIP IAS team spotted several large mounds of drums during an overflight. The drums were located near the mangroves and were rusted, but some appeared to be intact. An on-ground visual inspection was attempted, but the vegetation was too dense and the drums could not be located (Ref. 48). Facility officials estimate the size of this unit to be 40 acres (Ref. 52).

The VSI team observed an oily, silver-toned substance floating at the water's edge. Dead mangroves were observed several feet out from the water's edge and extending up and down the shoreline (Ref. 57). This was due to a spill of JP-5 (aviation kerosene) in November 1986 (Ref. 20), according to a facility representative. An area measuring approximately 50 feet in diameter completely devoid of vegetation was found within the boundaries of this unit (Photo 2).

Date of Start-up: This unit was first used as a disposal area in the early 1940s (Ref. 48).

Date of Closure: This unit was abandoned in the early 1960s (Ref. 48).

Wastes Managed: According to the NACIP study, waste material was disposed of by piling, burning, and then compacting. An estimated 100,000 tons of waste including scrap metal, inert ordnance, batteries, tires, appliances, cars, cables, dry cleaning solvent cans,

paint cans, gas cylinders, construction debris, dead animals, and residential waste was disposed of at this site (Ref. 48).

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

History of Release: By management design (trash burning), there were daily releases to the atmosphere (Ref. 48). Wastes were disposed of directly in the swamp (Ref. 48), constituting release to surface water and probably release to groundwater. The mangroves which border the Army Cremator Disposal Site are regularly flooded by tidal action (Ref. 31a). The VSI team observed an oily, silver-toned substance floating at the water's edge in addition to observing an area at the edge of the swamp that was completely devoid of vegetation (Ref. 57).

2. UNIT NAME: Langley Drive Disposal Site (Photo 3)

Unit Description: This unit is located along Langley Drive, approximately 2,000 feet north of the Navy Exchange Complex and 300 feet east of the drive towards Ensenada Honda. According to the NACIP report, there are no records of historic disposal practices at this site (Ref. 48). However, the Navy documents this unit as having been used for the disposal of both hazardous and nonhazardous wastes (Ref. 52). The NACIP team was led to the site by a Public Works employee who knew of the site (Ref. 48), and found materials including large, nondescript metal and concrete objects, various sized sample containers (one containing pellets), old fuel lines, flexible metal hoses, steel cables, hardened tar, rubble, and 10 to 15 full 55-gallon drums, which were corroded. As described in the NACIP report, the larger debris appeared "to have been disposed of in a manner consistent with filling in the mangrove swamps to create new land. The drums, on the other hand, rest on the surface of the made land for the most part, and seem to have been disposed of at a later date" (Ref. 48). Some of the drums were also described to have been rusted through, exposing a discolored green crust about 1/2 inch thick, encasing a whitish compound with the consistency of semi-dry plaster (Ref. 48). As estimated by the Navy, this unit covers 4 acres (Ref. 52).

The VSI team observed in this area a dump site covering an area of approximately 40 feet x 150 feet. Within the perimeter were lengths of thick cable, broken concrete blocks, ringed metal hoses, and six severely corroded drums. At least one of the drums was filled with a white, damp chalky substance (Ref. 57).

Date of Start-up: The Navy documents 1939 as the date of start-up (Ref. 52). According to the NACIP report, no records of this unit existed until 1984 when the NACIP IAS team was led to this unit by a Public Works employee (Ref. 48).

Date of Closure: This unit has been inactive since 1959 (Ref. 52).

Wastes Managed: According to the NACIP report, materials found on the site include large metal and concrete objects, various sized sample containers (one containing pellets), old fuel lines, flexible metal hoses, steel cables, hardened tar, rubble, and 10 to 15 full 55-gallon drums (Ref. 48). The VSI team also found lengths of thick cable, broken concrete blocks, ringed metal hoses, and six severely corroded drums on the site. At least one of the drums was filled with a soft, whitish, damp chalky substance (Ref. 57).

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

History of Release: The NACIP team noted 10 to 15 full 55-gallon drums in 1984 (Ref. 48). The VSI team found six severely corroded drums. The white chalky substance within the drums was observed to be exposed to wind and rain, indicating ongoing releases to the surrounding environment (Ref. 57).

In addition, this unit is regularly flooded by tidal action (Ref. 31a) and surface runoff (Ref. 26).

3. UNIT NAME: Station Landfill (Photos 4 and 5)

Unit Description: This unit is located south of the Industrial Area Wastewater Plant (Bldg. 1758) on the peninsula that separates Ensenada Honda from Puerca Bay. The NACIP study (Ref. 48) reports that the Station Landfill (SWMU #3) has been the active base landfill since the Army Cremator Site was abandoned in the early 1960s. The landfill covers 85 acres and is separated into several different disposal "areas", a number of which are undetectable from the ground. According to the Navy, previous disposal methods involved excavating a trench to the water table, filling the trench with waste, spreading and compacting with a bulldozer, then covering the waste with soil (Ref. 48). It is estimated that from 40 to 60 tons of waste per day were disposed of in the past. According to the NACIP study, the water table is very near the surface (i.e., less than 10 feet) and, in places, at depths of two feet or less (Ref. 48). This unit is surrounded by surface water (Ref. 53). It is not within the 50 year floodplain (Ref. 33).

In June 1975, six observation wells were bored to the aquifer at various points within and around the perimeter of this unit (Ref. 37).

In an attempt to locate the "drum ditch" referred to in the NACIP study, the VSI team entered the Station Landfill from the east side, several hundred yards north of the Tea House/Cabras Island intersection. One half-buried, cracked fiberglass drum with a polyester lining was observed. No other drums were located. Approximately 30 yards north of the drum, a crushed, corroding Volkswagon Beetle was observed (Ref. 57).

Date of Start-up: This unit has been active since the early 1960s (Ref. 48).

Date of Closure: Hazardous waste disposal was stopped in 1978. This unit is presently active.

Wastes Managed: Waste materials disposed of at this site include residential wastes, scrap metal, cables, paint waste, solvents, PCBs, contaminated OTTO Fuel II, Agentine, Askarel, pesticides, lubricating oil,

unlabeled 55-gallon drums, dead animals, inert ordnance, digested sewage sludge, construction debris, asbestos, and possibly Super Tropical Bleach (STB), a decontaminating agent (Ref. 48). One fiberglass drum with a polyethylene liner and a decaying Volkswagon Beetle were observed at this unit during the VSI (Ref. 57).

Release Controls: The only known release control at this site is a soil cover.

History of Release: Disposal practices at this unlined unit historically involved disposing of waste in trenches at or near the water table constituting a direct release to soil/ groundwater (Ref. 48).

William Biemborn, of NUS Corporation, reported in September 1986 that U.S. Geological Survey tests had detected levels of lead and zinc above background levels in the groundwater at this unit (Ref. 31a).

4. UNIT NAME: Drone Fuel Drain Oil/Water Separator (Photo 6)

Unit Description: Drones that are not destroyed during launching presentations are rescued from the sea and brought back to Building 860, Aerial Target Systems Department. Since 1970, all waste drone fuel has been drained directly into a below ground oil/water separator (Ref. 48). Observed during the VSI to be built of concrete covered with steel grating at ground level, the oil/water separator measured approximately 10 feet x 10 feet x 10 feet deep. After separation, the waste petroleum goes to a private contractor and the wastewater to the sanitary sewer system (Ref. 57).

Date of Start-up: During the VSI, it was determined that the drone fuel drain oil/water separator has been in operation since 1970 (Ref. 57).

Date of Closure: This unit is presently active.

Wastes Managed: This unit manages JP-4 and JP-5 jet fuel (Ref. 57).

Release Controls: In 1983, a valve was installed on the pipe between the oil/water separator and the storm sewer to prevent the overflow that had been reaching the storm sewer during heavy rainfall (Ref. 48). The overflow valve was not observed during the VSI.

History of Release: Between 1970 and 1983 during periods of heavy rainfall, the oil/water separator would overflow into the adjacent storm sewer system (Ref. 48). No sign of release was observed at the time of the VSI.

5. UNIT NAME: Dumpsters (No Photo)

Unit Description: This unit consists of numerous metal dumpsters located at various points throughout the facility, which are used to receive various types of refuse and waste products. Listed in Table 3 are the building number, size, type of dumpster, and collection frequency associated with each dumpster (Ref. 51).

Date of Start-up: Start-up dates for these dumpsters could not be determined. Each is emptied on a regular schedule (Ref. 51).

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), and non-salvageable wastes (e.g., sand).

Release Controls: Other than the fact that these units are constructed of metal, there are no release controls identified with this unit.

History of Release: No releases were noted for any of the dumpsters observed.

Table 5. Type II Dumpsters (Ref. 51).

Bldg. No.	Description	Collection Frequency (per week)	Total Capacity (cubic yds.)
1211	Golf Club Snack Bar	5	6
643	Softball Field	2	2
615	Animal Shelter	2	4
724	OPCON Center	5	6
598	COMNAVFORCARIB	2	6
594	Dental Clinic	2	6
729	COMO	5	12
1687	Gymnasium	2	2
510	Auto Repair	2	2
1686	Laundry	2	8
529	Navy Exchange Whse	5	28
530	Toyland	2	12
536	Commissary Whse. (Gate 4)	2	6
532	Commissary Store Whse.	2	2
520	Bundy Gas Station	2	6
745	Navy Exchange Auto Shop	2	4
519	Patio Shop	1	12
525	Navy Vending Service	1	4
629	Theater	1	2
500	Administration Bldg.	2	6
639	Chapel	1	2
572	Navy Exchange Laundromat	2	4
580	Special Services	2	4
584	Printing Whse.	2	4
583	Printing Office	2	6
504	Security Dept.	2	4
731	Bundy UEPH	5	6
732	Bundy UEPH	2	6
733	Bundy UEPH	2	8
734	Bundy UEPH	2	8
630	Package Store	2	4
781	Stables	1	4
801	Flying Club	1	2
827	Crash Crew Bldg.	2	4
880	Missile Maint. Shop	1	2
378	Weapons Dept.	2	6
1625	VC-8 Hangar	5	16
379	AIMD Hangar	5	16
790	Photographic Bldg.	2	4
426	Ops Snack Bar	5	8
1203	Pass Office (Gate 1)	1	2
88	Filtration Plant	2	2
663	AFWIF University	1	2
386	AFWIF ROC	5	6
1817	COMOPS Center	5	14

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Table 5. Continued.

Bldg. No.	Description	Collection Frequency (per week)	Total Capacity (cubic yds.)
296	AFCN	1	4
1511	NEX Rental Car	5	4
737	Telephone Exchange	3	2
1796	Navy Exchange	5	32
1970	Commissary Store	5	32
	Family Service Center	2	6
1707	UEPH Bldg. "A"	5	6
1708	UEPH Bldg. "B"	5	6
1709	UEPH Bldg. "C"	5	6
1808	Enlisted Dining Fac.	5	18
206	Disco Club	5	8
1813	UEPH Bldg. "1"	2	8
1814	UEPH Bldg. "2"	2	8
1815	UEPH Bldg. "3"	2	8
1209	Marine Barracks	2	12
1807	Correctional Center	1	4
422	LOX/LIN Plant	1	4
201	Auto Hobby Shop	1	4
982	Weapons Field Office	1	4
256	AFWIF Supply Center	1	4
1981	AFWIF Electronic-Warfare Shop	2	4
825	Drone Storage	2	4
860	Drone Shop	5	4
876	Development Dept. (AFWIF)	5	4
200	Hangar Area	2	8
798	Structural Fire Station	2	2
1973	DPDO	1	4
1738	Navy Exchange Gas Station-Time Square	2	2
113	Sanitation & Pest Control	2	2
377	Ground Electronics-Maintenance Shop	2	4
60	Warehouse	2	4
IT-4	EOD	1	2
467	Wood Hobby Shop	2	4
	Marina Compound	1	12
53	Cold Storage	2	2
1684	Seabreeze Club	5	10
1790	Hospital	5	12
1810	Medical Warehouse	2	6
1791	Corpsman Barracks	5	6
27	GSK Warehouse	2	4
787	UDT (Dry Dock)	2	8
788	Fleet Analysis Center-Corona (Telemetry Site)	1	4
31	Public Works Dept.	2	54

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Table 5. Continued.

Bldg. No.	Description	Collection Frequency (per week)	Total Capacity (cubic yds.)
1207	Supply Warehouse	5	6
42	NEX Warehouse	2	6
192	Fuel Lab	2	2
48	POL Ops	2	4
486	Tea House (Pavilion)	2	4
	Officer's Beach	2	2
124	Gas Station Ind. Area	1	2
899	UOPH, Algodones	2	4
897	UOPH, Algodones	2	4
895	UOPH, Algodones	2	4
895	UOPH, Algodones	2	4
888	UOPH, ALgodones	2	4
891	UOPH, Algodones	2	4
889	UOPH, Algodones	2	4
886	Child Care Center	2	4
	Elementary School	2	8
1567	Mini Mart	5	24
1741	Teen Club	2	2
	High School	2	14
	Community Beach	2	12
2042	ACSS Warehouse	1	6
51	Army Reserves	1	4
	Army Reserve Compound	1	4
31	Public Works	1	30
887	BOQ Apartment	2	4
1756	Housing PW Shop	2	4

6. UNIT NAME: Former Paint Storage (Building 145) (Photo 7)

Unit Description: It was determined during the VSI that this is an inactive, nonregulated unit. Building 145 was observed to be a partially subterranean concrete bunker with three openings on the roof. Two of these openings were covered by wooden boxlike structures. The third opening was uncovered. At the time of the VSI, Building 145 was empty. According to facility representatives, all waste materials were removed by a private contractor in July 1988. Several old paint covered gloves and pieces of clothing, broken pallets, and several empty paint cans were observed outside this unit. Inside this unit were several articles of protective clothing floating in water that had collected on the floor.

Date of Start-up: This unit was used as storage for at least 25 years, according to the NACIP report (Ref. 48).

Date of Closure: This unit has been inactive since July 1988 (Ref. 57).

Wastes Managed: The NACIP team (Ref. 48) observed containers of paint and shoe polish, adhesives, old office furniture, 25 or more 55-gallon drums, and 100 or more 5-gallon pails. Reportedly, the condition of the containers ranged from being intact and neatly stacked to randomly placed, leaking, and obviously reused for waste material. An ambient air characterization conducted by the NACIP team indicated that the contents of many of the containers were highly volatile (Ref. 48).

Release Controls: The walls, roof, and floor of this unit are concrete (Ref. 57).

History of Release: Release to the air was documented by the NACIP team (Ref. 48). Otherwise, there are no documented releases to the environment identified with this unit and no evidence of release was observed during the VSI.

7. UNIT NAME: Tow Way Road Fuels Farm (Photos 8 and 9)

Unit Description: This unit is a fuel storage compound located on Tow Way Road on a hill overlooking Ensenada Honda. All tanks at the unit are buried under grassy slopes. No aboveground tanks were observed during the VSI (Ref. 57). Large volume releases have been documented from this unit over a period of 30 years (Refs. 20, 26, and 48)

Date of Start-up: The date of start-up for this unit could not be determined during the VSI. Documented releases date back to the late 1950s (Ref. 48).

Date of Closure: This unit is presently active.

Wastes Managed: Wastes managed at this unit include diesel and Bunker C fuel.

Release Controls: During the VSI, it was noted that at the bottom of the hill there were two earthen retaining walls, both with gates (Ref. 57). Since the time of the JP-5 spill from Tank 85, a permanent boom has been placed on the Tow Way Road Fuels Farm stormwater outfall (Ref. 20), which is one of the Naval Station Outfalls (SWMU #47).

History of Releases: The NACIP study (Ref. 48) reported the following history regarding this unit. Over a 15 to 20 year period, an estimated 420,000 gallons of diesel fuel leaked from underground storage tanks 56A and 56B. These tanks were removed in 1984. The NACIP team observed diesel fuel on top of the groundwater that had seeped into the holes where the tanks had been removed. In the late 1950s, a fuel line to Tank 82 burst, spilling an estimated 420,000 gallons of Bunker C fuel that ran downhill into Ensenada Honda. In 1978, an estimated 65,000 gallons of diesel fuel leaked from Tank 1080 (Ref. 48).

In November 1986, approximately 91,000 gallons of JP-5 (unleaded aviation kerosene) leaked from Tank 85. Facility representatives estimated that 70,000 gallons entered Ensenada Honda. Less than two weeks after the spill, a Judge Advocate General (JAG) investigation was underway

(Ref. 20). The dead mangroves observed at the Army Cremator Disposal Site (SWMU #1) were the result of the JP-5 spill from Tank 85, according to facility representatives.

Observed by the VSI team were small areas of dried sludge directly downhill from Tank 82, fuel vapors rising up from the manhole over Tank 84, and fluid dripping steadily from a pipe that extended laterally outward from Tank 83. Stressed vegetation was evident directly below the dripping pipe. Facility representatives reported a recent minor spill from Tank 83 (Ref. 57).

8. UNIT NAME: Tow Way Road Disposal Pits (No Photo)

Unit Description: In 1972 or 1973, Tanks 83 (2,100,000-gallon capacity) and 1080 (1,340,000-gallon capacity) were cleaned out and an estimated 3,900 to 7,500 cubic yards of Bunker C fuel sludge was deposited in two pits. The disposal pits, located within 100 feet of the tanks, were left open until the sludge solidified (a process estimated to take six to seven years), and then covered with several feet of soil (Ref. 48).

The tanks were located on a hill between Ensenada Honda and mangroves to the north were covered by grassy slopes (Ref. 57). No visible signs of buried sludge were observed during the VSI.

Date of Start-up: Disposal pits were dug and filled with Bunker C fuel sludge in 1972 or 1973.

Date of Closure: The pits contain sludge from Tanks 83 and 1080 collected during a one-time cleaning operation in 1972 or 1973 (Ref. 48). The pits no longer actively collect waste.

Wastes Managed: The waste managed by this unit is Bunker C fuel sludge.

Release Controls: Both disposal pits have a soil and vegetation cover. As far as can be determined, these pits are unlined.

History of Release: By nature of design, there is ongoing release to soil/groundwater.

9. UNIT NAME: Leaded Sludge Pits (No Photo)

Unit Description: Tanks 212 to 215 are located along Manila Bay Road, north of Forrestal Drive. Tanks 216 and 217 are on a hilltop about 4,000 feet southeast of Tanks 212 to 215, north of Forrestal Drive. These tanks were installed in 1940 and, according to the U.S. Navy, were cleaned approximately every five years until 1978. The location of Tanks 210 and 211 could not be determined during this RFA. According to the NACIP report (Ref. 48), both tanks were abandoned in 1950 and had been cleaned once in a manner consistent with the other tanks. Leaded sludge removed from the tanks was disposed of in a series of pits (8 feet x 8 feet x 8 feet) within 300 feet of the tank being cleaned (Ref. 48). After the sludge settled in the pits, it was covered with 3 to 4 feet of soil. The pits are located on hillsides at elevations 15 to 45 feet above an adjacent mangrove swamp. The slope from the tanks to the swamp varies from 10% to 40%. It is estimated that a total of 34,000 to 53,000 gallons of highly leaded sludge were buried at this site (Ref. 48). The VSI team was unable to locate the buried pits.

Date of Start-up: The date of start-up for this unit was 1940 (Ref. 48).

Date of Closure: The last date this disposal practice was utilized was 1978.

Wastes Managed: The waste managed at this unit is leaded aviation gasoline sludge (Ref. 48).

Release Controls: The only release controls identified with this unit are the 3 to 4 feet thick soil covers on the disposal pits.

History of Release: By nature of design, there is ongoing release to soil/groundwater.

10. UNIT NAME: Transformer Maintenance Area (Building 90) (Photo 10)

Unit Description: The Transformer Maintenance Area (Substation 2) is located adjacent to Building 90. According to the NACIP report, a maximum of 3,000 gallons of transformer oil, probably containing PCBs, were poured out on the ground in the vicinity of this site from 1964 to 1979, creating a potential threat to the health of the workers who currently work at the site (Ref. 48). Surface drainage is both to the southwest and east, eventually joining in a drainage ditch that flows southwest into Ensenada Honda (Ref. 26).

Date of Start-up: The date of start-up for this site is 1964 (Ref. 48).

Date of Closure: Transformer maintenance is still performed here, although transformer oil has not been poured out on the ground since 1979 (Ref. 48).

Wastes Managed: The wastes managed at this unit were PCB-contaminated transformer oils (Refs. 31a and 48).

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

History of Release: Between 1964 and 1979, a maximum of 3,000 gallons of transformer oil were poured on the ground in the vicinity of Building 90 (Ref. 48).

During the VSI, oil stains were observed on the soil adjacent to the building. Also noted was a trash can (approximately 20 gallon capacity), which was filled with oil and leaking onto the ground (Ref. 57).

11. UNIT NAME: PCB Storage Compound (Building 38) (Photo 11)

Unit Description: The PCB Storage Compound (Building 38) is TSCA regulated, according to facility representatives. Inside this unit is a cyclone fence which surrounds a curbed concrete pad (the pad and fence are both inside Building 38). PCB-contaminated items (e.g., old transformers and full 55-gallon drums) are temporarily stored on the concrete pad inside the cyclone fence. These items are ultimately disposed of by a DRMO contractor (Ref. 23).

Date of Start-up: The date of start-up for this unit was not determined during the VSI.

Date of Closure: This unit is presently active.

Wastes Managed: PCB-contaminated items are stored inside this unit (Refs. 23, 48, and 57).

Release Controls: Items identified as PCB-contaminated are stored inside Building 38 on a concrete pad that has an 8-inch curb and is surrounded by a cyclone fence. Observed outside the cyclone fence (still inside the building) were drums believed to contain PCB-contaminated soil (Ref. 57). These drums were moved inside the cyclone fence shortly after the VSI team visited this unit, according to facility representatives.

History of Release: No release history has been identified with this unit. At the time of the VSI, oil contaminated sorbent was observed inside the fence on the concrete pad. Several drums were observed just outside the fence (inside the building). The facility representative present at the time stated that the oil spill was from a non-PCB transformer (<50 ppm PCBs) and that laboratory results were pending regarding the contents of the drums (Ref. 57).

12. UNIT NAME: Fire Training Pit Oil/Water Separator (Photo 12)

Unit Description: The Fire Training Pit Oil/Water Separator is an in-ground concrete tank measuring approximately 7 feet x 30 feet x 10 feet deep. The ground level opening is covered by heavy grating. This unit collects and separates the oil/water waste generated from the fire training pit.

Date of Start-up: The date of start-up for this unit is 1983.

Date of Closure: This unit is presently active.

Wastes Managed: Waste oils are burned at this unit during training exercises (Refs. 48 and 57).

Release Controls: This unit is constructed from concrete. Overflow from the separator is controlled by a manually operated valve (Ref. 57). Wastewater from this unit flows through the Sewer Drainage System (SWMU #38) to be processed by one of the Naval Station Wastewater Treatment Plants (one of SWMUs #27, #28, or #29). Periodically, oils from this unit are pumped back into the Fire Training Pit (SWMU #14) (Ref. 26).

History of Release: During the VSI, an area of dead grass was observed directly adjacent to the separator. Oil stains on the curbing and guardrail uprights were observed suggesting further release to soil (Ref. 57).

13. UNIT NAME: Old Pest Control Shop (Bldg. 258 and Surrounding Area) (Photo 13)

Unit Description: This unit includes Building 258, the area immediately surrounding the building and the drainage ditch behind the building. The Old Pest Control Shop was located in Building 258 from the late 1950s through 1983. According to the NACIP study (Ref. 48), incidental spillage of pesticides occurred in and around the building during that time. Pesticides were stored inside the building, as well as on the parking apron and, according to the NACIP team, pesticide odors were still very strong in the vicinity approximately one year later (Ref. 48). In 1976, a 55-gallon drum of malathion, which was stored outside the building, ruptured and spilled on the ground. The contents eventually washed into the drainage ditch in back of the building. This ditch, according to the U.S. Navy, also received excess pesticide and rinse waters from equipment cleaning. Surface drainage is westward into this drainage ditch which discharges into Ensenada Honda (Ref. 26). The NACIP team reported that the drainage ditch did not show any signs of stressed vegetation, although the area surrounding the building was devoid of vegetation. Past environmental engineering surveys cite numerous aquatic kills in Ensenada Honda due to pesticides entering the drainage ditch (Ref. 48). Building 258 now houses the Navy scuba diving club (Ref. 57).

At the time of the VSI, a faint but discernible pesticide odor was present behind the building and inside what is now the diving club pump room. No signs of stressed vegetation were observed. The president of the diving club, Mr. Seufert, reported that club members had decontaminated the inside of the building before occupying it. According to Mr. Seufert, decontamination involved washing the inside walls and floor with bleach before sealing with a vinyl coating. The meeting room was then tiled, but the pump room was not (Ref. 57).

Date of Start-up: The date of start-up for this unit is the late 1950s.

Date of Closure: This unit has been inactive since 1983 (Ref. 48). Mr. Seufert stated that Building 358 might be torn down soon because of concern over the pesticide hazard (Ref. 57).

Wastes Managed: Wastes managed at this unit included DDT, Paris Green, maldane, malathion, chlordane (Ref. 48), para-dichlorobenzene, and pentachlorophenol (Ref. 31a). There is no information available, either from records or interviewees, regarding the amounts or concentrations of the pesticides used (Ref. 48).

Release Controls: No release controls were identified outside the building or in the ditch. Building 258 was observed to be a Quonset hut with concrete walls and floor.

History of Release: According to the NACIP report, former Pest Control Shop employees remember incidental spillage occurring in and around Building 258 (Ref. 48). In 1976, a 55-gallon drum of malathion ruptured outside the building, spilling the contents onto the ground (Ref. 48). During the VSI, there was no evidence observed indicating a release; however, a faint odor representative of pesticides was noted inside the pump room and outside by the southwest side of the building (Ref. 57).

14. UNIT NAME: Fire Training Pit (Photo 14)

Unit Description: The Fire Training Pit measures approximately 75 feet in diameter and is surrounded by concrete curbing that is approximately 10 feet wide and slopes in toward the pit. According to a facility representative this unit is concrete-lined and was built in 1983 (Ref. 57). Observed adjacent to this unit was an oil/water separator noted in this report as Fire Training Pit Oil/Water Separator (SWMU #12). Observed within the concrete curbing of the pit was a metal structure (what appeared to be the tank from a railroad tankcar and large pieces of scrap metal) underlain by a layer of rocks which rest on the concrete lining. The metal structure, rocks, and concrete curbing were completely black. Immediately adjacent to the pit was an area of darkly stained soil measuring approximately 40 feet x 100 feet. Vegetation was observed to be growing in the stained area adjacent to the pit.

Date of Start-up: This unit has been operational since 1983 (Ref. 48).

Date of Closure: This unit is presently active (Ref. 57).

Wastes Managed: Wastes managed at this unit include waste oil (Ref. 57). The facility representative present at the time of the VSI reported that waste oil and fuel burned here came from various sources, depending upon the fire training schedule. Therefore, he could not be more specific about particular wastes managed here.

Release Controls: This unit has a concrete liner, concrete curbing, and associated oil/water separator (SWMU #12).

History of Release: A large area of darkly stained soil observed adjacent to this unit (Ref. 57) indicates release to soil. By management design (i.e., burning), there is release to air.

15. UNIT NAME: Hospital Incinerator (Building 1928) (Photo 15)

Unit Description: As described in the NACIP report, this unit is a "package" incinerator with burners located in the main chamber at the base of the stack. The unit operates under the auspices of Commonwealth of Puerto Rico air pollution regulations. According to the U.S. Navy, it is used exclusively to burn pathological waste generated by the hospital (Ref. 48).

This unit's capacity was estimated at 1/2 cubic yard by the VSI team. At the time of the VSI, the Hospital Incinerator was observed to be constructed of metal and lined inside with fire bricks. This unit rests on a concrete pad (no curbing) and is protected by a roof and two walls made of corrugated metal (Ref. 57).

Date of Start-up: The facility representative present during the inspection of this unit did not know the date of start-up.

Date of Closure: This unit is presently active.

Wastes Managed: Wastes managed by this unit include biological and pathological wastes generated by the hospital (Ref. 48).

Release Controls: This unit rests on a concrete pad without curbing. The unit is protected by a corrugated metal roof and walls on two sides (Ref. 57).

History of Release: There are no documented releases identified with this unit in the file material. No evidence of release at this unit was observed during the VSI.

16. UNIT NAME: Waste Explosive Storage (Bldg. 1666) (No Photo)

Unit Description: This unit was included on the original Part A RCRA Application for NAVSTA Roosevelt Roads submitted in November 1980. However, this unit is merely cited, and not included in the revised RCRA Part A Application; no listing of wastes that had been stored at this unit is provided (Ref. 49). According to the U.S. Navy, this building is not being permitted because it is used as a temporary accumulation point only, and wastes are stored there for less than 90 days (Ref. 49).

According to AFWTF Director, Mr. Nestor Paradis, this unit is a "unique military operation" and requires special security clearance for entry. The VSI team was therefore denied access, and no VSI was conducted at this unit.

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

Date of Closure: This unit is presently active, according to facility representatives.

Wastes Managed: The types of wastes managed at this unit could not be determined during this RFA.

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

History of Release: There are no documented releases identified with this unit in the PR file material. Since the VSI team was not allowed to observe this unit, evidence of present release could not be determined.

17. UNIT NAME: DRMO Hazardous Waste Storage Facility (Bldg. 1973) (Photo 16)

Unit Description: This unit is a hazardous waste container storage facility and has been operated under RCRA interim status since 1980 (Ref. 49). Building 1973 is located in the Defense Reutilization and Marketing (DRMO) Office Yard. This unit has a storage capacity of 17,400 gallons (Ref. 49) and is divided into 4 storage bays containing caustics, acids, general toxics, and oxidizers (Ref. 49). According to the U.S. Navy, only nonflammable hazardous wastes are stored at this unit (Ref. 49). Prior to the use of this unit for hazardous waste storage, hazardous wastes were stored at Past DRMO Hazardous Waste Storage (SWMU #25).

During the VSI, it was observed that this unit was clean, orderly, and secured, with the exception of caustics, such as sodium hydroxide and potassium hydroxide, being stored in the "acid" storage bay. There was no evidence of release to secondary containment (Ref. 57).

Date of Start-up: This unit has been operating under RCRA interim status since 1980 (Ref. 49).

Date of Closure: This unit is presently active.

Wastes Managed: This unit stores nonflammable hazardous waste. The following page contains a list of hazardous wastes generated at Naval Station Roosevelt Roads (Ref. 49).

Release Controls: Dedicated storage bays separated by solid concrete block walls and dedicated containment trenches were release controls observed during the VSI. A facility representative stated that inspections are conducted approximately once a month, on average. He further stated that the concrete slab of each storage bay is coated with epoxy (Ref. 57).

History of Release: There are no documented releases identified with this unit in the PR file material. There was no evidence of release observed during the VSI.

HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (Ref. 59)

WASTE DESCRIPTION	WASTE NUMBER	WASTE CODE
Beryllium Dust	P015	H
Lithium/Sulfur Dioxide Batteries	D003	R
Nickel/Cadmium Batteries	D003/D006	R, T
Mercury Batteries	D009	T
Mercury Batteries in Acetic Acid	D002/D009	C, T
ATON Batteries	D002	C
Alkaline Batteries	D002	C
Lead/Acid Batteries	D002/D008	C, T
Lead/Acid Batteries (Drained)	D008	T
Battery Electrolyte[1]	D002/D008	C, T
Acetic Acid	D002	C
Chromic Acid (Alodine)	D002/D007	C, T
Hydrochloric Acid	D002	C
Sulfuric Acid	D002	C
Ammonium Hydroxide	D002	C
Cleaning Compound[2]	D002	C
Mercury	U151/D009	T
Blasting Booth Dust[3]	D007/D008	T
Gasoline (Unleaded)	D001	I
Petroleum Fuels (Leaded)	D001/D008	I
Jet Fuel (JP-4 or JP-5)	D001	I

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HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (cont.) (Ref. 59)

Kerosene (contaminated)	D001	I
Adhesives[4]	D001	I
Calibration Fluid	D001	I
Cleaning Compound (Mineral Spirits)	D001	I
Isopropyl Alcohol	D001	I
Sealing Compound	D001/F003	I
Icing Inhibitor	D001	I
Inspection Penetrant	D001/F003	I
Decontaminating Agent, STB	D003	R
Denatured Alcohol	D001	I
Duplicating Fluid	D001	I
Waste Paints[5]	D001	I
Painting Wastes[6]	D001/D002 D007/D008 F002/F003 F005	I, C, T
Chlordane	U036	T
Malathion (with carrier solvent)	D001	I
Photographic Developer	D002/D011	C, T
Photographic Fixer	D002/D011	C, T
Photographic Toners	D001	I
Photographic Hardener	D011	T
Photographic Stabilizer	D011	T

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HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (cont.) (Ref. 59)

Photographic Starter	D011	T
Photographic Replinisher	D002/D011	C, T
Photo Auto Reversal Chemical	D011	T
Hypo-Solution : $(NH_4)_2S_2O_3$	D011	T
Hypo-Solution : $Na_2S_2O_3 - 5H_2O$	D011	T
Corrosion Inhibitor	D001	I
Naphtha	D001	I
Acetone	F003/U002	I
Ethyl Ether	F003/U117	I
Isobutanol	F005/U140	I, T
Methanol	F003/U154	I
Methylene Chloride	F001/F002 U080	T
Methyl Ethyl Ketone (MEK)	F005/U159	I, T
Tetrachloroethylene	F001/F002 U210	T
Toluene	F005/U220	T
1,1,1 Trichloroethane	F001/F002 U226	T
Trichloroethylene	F001/F002 U228	T
Trichlorofluoromethane	F002/U121	T

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HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (cont.) (Ref. 59)

Trichlorotrifluoroethane	F002	T
Xylene	F003/U239	I
Chlorinated Flourocarbons	F001	T
1,1,2-Trichloroethane	F002/U227	T
MEK and Paint	F005/D007 D008	I, T
Paint Removers	D002/F002	C, T
Dye Penetrant	D001/F001 F002	I, T
Carbon Remover	F002	T
Dry Cleaning Solvent (PD-680-I)	D001	I
Stoddard Solvent	D001	I
Inspection Penetrant	D001/F002	I, T
Petroleum Lubricant	D001	I
Aerosol Cans (Partially Full)	D001/F001 F002/F003 F005	I, T
Miscellaneous Waste Ignitables	D001	I
Miscellaneous Waste Acids	D002	C
Miscellaneous Waste Caustics	D002	C
Miscellaneous Waste Reactives	D003	R
Misc. Halogenated Solvents[7]	F001/F002	T
Misc. Halogenated Solvents[8]	F001/F002	T

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HAZARDOUS WASTES
at
NAVAL STATION ROOSEVELT ROADS (cont.) (Ref. 59)

Misc. Non-Halogenated Solvents	F003/F005	I, T
Miscellaneous POL's[9]	D001/F001 F002/F003 F005	I, T
Magnesium Batteries	D003	R
Grease Contaminated with Oils	D001/D007 D008	I, T
Freon Contaminated Hydraulic Fluid	F002	T

NOTES:

1. Battery electrolyte refers to the sulfuric acid/water mixture drained from lead acid batteries.
2. Cleaning compound refers aircraft surface cleaning compound whose NSN# is 6850-00-935-0995, and is commonly known as TURCO.
3. Blasting booth dust is the spent sandblasting media which includes glass beads contaminated with heavy metals.
4. Adhesives refers to variety of adhesive materials that contain low flash point solvents.
5. Waste paints include acrylics, enamels, epoxy paints, lacquers, oil based paints, polyurethane paints, varnish, primers, deck coating, and shellac.
6. Painting wastes refers to waste paints or painting related materials that are contaminated with one or more of the following materials: oils, thinners, dirt, halogenated solvents, non-halogenated solvents, corrosive strippers and heavy metals.
7. Mixed waste containing, before use, a total of 10% or more of the F-listed halogenated solvents.
8. Mixed waste containing, before use, less than a total of 10% of the F-listed halogenated solvents.
9. POL's (Petroleum, Oils, and Lubricants) potentially contaminated with one or more ignitable wastes or F-listed solvents .

18. UNIT NAME: Ignitable Storage Facility (Building 2009) (Photo 17)

Unit Description: This unit is a hazardous waste container storage facility that has been under RCRA interim status since November 1980 (Ref. 49). Building 2009 is located in the Defense Reutilization and Marketing Office (DRMO) yard. This unit has a storage capacity of 2,600 gallons and has been designed and designated for the storage of ignitable hazardous wastes in containers (Ref. 49). Building 2009 is a metal structure measuring approximately 20 feet x 20 feet underlain by a concrete slab with 4-inch curbing. The walls and roof are constructed of corrugated metal. The slab appeared stained, but no evidence of recent spillage was observed (Ref. 57).

Date of Start-up: According to the Part B Permit Application (Ref. 49), this unit has been operating under interim status since November 1980.

Date of Closure: This unit is presently active.

Wastes Managed: This unit is a storage facility for ignitable hazardous wastes stored in drums (Ref. 49). A facility representative stated that, at the present time, paint waste made up the majority of waste stored in this unit. He mentioned that aviation fuel waste was also stored here in drums (Ref. 57).

Release Controls: This unit is inspected approximately once a month, according to a facility representative. Four-inch curbing around the concrete slab of this metal building was observed during the VSI (Ref. 57).

History of Release: There are no documented releases identified with this unit in PR file material. There was no evidence of release observed during the VSI.

19. UNIT NAME: Pesticide Waste Storage (Building 121) (Photo 18)

Unit Description: This unit is a hazardous waste storage facility which is used for the storage of outdated pesticides (Ref. 48). This unit was included in the original Part A RCRA Permit Application; however, it was not included in the revised application because of plans to close this unit (Ref. 49). At the time of the VSI, this unit was still being used for pesticide waste storage (Ref. 57).

The VSI team observed this unit to be a building surrounded by an unlocked cyclone fence; however, the building itself was secured, denying the VSI team entry. Tall grasses, vines, and woody vegetation grew thick immediately around the outside of the building and outside the cyclone fence. The smell of pesticides was evident (Ref. 57). According to facility representatives, their office is still awaiting the completion of the closure plan for this unit.

Date of Start-up: This unit has been active since at least 1980 (Ref. 49).

Date of Closure: This unit is currently active. Facility representatives stated that a closure plan is being prepared for this unit (Ref. 57).

Wastes Managed: Wastes managed at this unit include various pesticide waste (Ref. 48).

Release Controls: As observed during the VSI, the walls, floor, and underlying pad are concrete (Ref. 57).

History of Release: There was no evidence of release from this unit encountered in the PR file material. The VSI team noted release (odors) to the atmosphere. The cyclone fence surrounding this unit was unlocked, but the building itself was locked. Observations of the inside of this unit were, therefore, not possible.

20. UNIT NAME: Waste Oil Tank Truck (Photo 19)

Unit Description: Located at the northern edge of the Aerial Target Systems Department yard (in front of building 860), this unit is a truck that temporarily stores waste oil, solvents, and fuel. According to a facility representative, wastes are stored in the 1,500 gallon steel tank of this unit. Periodically, a contractor pumps out the accumulated waste. If this unit fills up before the contractor arrives, facility representatives will tow this unit approximately 75 feet into the middle of the yard and let the tank drain into the Drone Fuel Drain Oil/Water Separator (SWMU #4) (Ref. 57).

Date of Start-up: According to on-site personnel, the start-up date was approximately 1982 (Ref. 57).

Date of Closure: This unit is presently active.

Wastes Managed: This unit temporarily stores waste fuel, oil, and solvents from drone maintenance and repair (Ref. 57).

Release Controls: This unit is a steel tank.

History of Release: No evidence of release was observed during the VSI (Ref. 57).

21. UNIT NAME: Donuts (#1 - #4) (No Photo)

Unit Description: These four units are part of the Oil Spill Removal System (Ref. 48), which also is comprised of the Ships Waste Offload Barges (SWMU #22), Oil Spill Separator Tanks (SWMU #23), and Oil Spill Separator (SWMU #24). A donut is basically a motorized storage tank having a circular, bloated shape (hence the name donut). As described by facility representatives during the VSI, a fuel or oil spill in the harbor is first contained with containment booms and oil skimmers. Donuts are then motored to the spill area where they pump the waste into their respective 10,000 gallon storage tanks. Back in the dock, the donuts are emptied into one of the Ships Waste Offload Barges (SWOBs) (SWMU #22), the next step in the Oil Spill Removal System (Ref. 57).

Date of Start-up: The date of start-up for these units could not be determined.

Date of Closure: These units are presently active (Ref. 57).

Wastes Managed: These units transport oil from spills, as well as bilge and ballast wastewater (Ref. 57).

Release Controls: These units are closed containers.

History of Release: The units are designed and operated to recover material which has been released to surface water.

22. UNIT NAME: Ships Waste Offload Barges (SWOB) #1 and #2 (No Photo)

Unit Description: These two units are part of the Oil Spill Removal System which is also comprised of Donuts (SWMU #21), Oil Spill Separator Tanks (SWMU #23), and the Oil Spill Oil/Water Separator (SWMU #24). Naval personnel reported the following about the Ships Waste Offload Barges (SWOBs). The capacity of these floating barges is 40,000 gallons each. In addition to collecting material from large spills and bilge and ballast wastewater from ships, these units act as a collection point for waste from the donuts (SWMU #21) during spill events, and oily waste from the general vehicle maintenance shops (at those times when DRMO is late in removing accumulated waste). Three onshore Oil Spill Separator Tanks (SWMU #24) receive the SWOB waste (Ref. 57).

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

Date of Closure: These units are presently active (Ref. 57).

Wastes Managed: These units store and transport waste oil and fuel, and bilge and ballast wastewater (Ref. 57).

Release Controls: Aside from being completely contained, these units have bumpers that help prevent structural damage.

History of Release: No past releases are identified with these units and no mention was made of release by facility representatives during the VSI. These units are designed and operated to recover material which has been released to surface water.

23. UNIT NAME: Oil Spill Separator Tanks #1 - #3 (Photo 20)

Unit Description: Located approximately 100 feet inshore from the Fuel Pier are three Oil Spill Separator Tanks which process waste pumped in from the Ships Waste Offload Barges (SWMU #22). The Oil Spill Separator Tanks are large steel boxes, each with a pipe extending out laterally from the bottom. After the water settles to the bottom of the tank a valve on the pipe is opened and the contents allowed to spill out until all the water has been removed. The separated oil is then transferred to the Oil Spill Oil/Water Separator (SWMU #24). This added process of separation is necessary because the majority of liquid pumped up by Donuts (SWMU #21) and SWOBs (SWMU #22) consists of sea water. Each Oil Spill Separator Tank is constructed of steel and has 2,000 gallon capacity, according to facility representatives (Ref. 57).

Date of Start-up: The date of start-up for these units could not be determined.

Date of Closure: These units are presently active.

Wastes Managed: The Oil Spill Separator Tanks manage wastes received from the SWOBs (i.e., waste fuel and oil and bilge and ballast wastewater) (Ref. 57).

Release Controls: These units were observed to be underlain by a concrete pad with approximately 8-inch curbing (Ref. 57).

History of Release: It was noted during the VSI that the concrete pad, curbing, and areas of surrounding asphalt were stained black.

24. UNIT NAME: Oil Spill Oil/Water Separator (No Photo)

Unit Description: The Oil Spill Oil/Water Separator is a below ground structure built of concrete with steel grating covering the top at ground level. It has a capacity of 1,500 gallons, as reported by facility representatives. This unit receives discharge from Oil Spill Separator Tanks (SWMU #23). After separation, the waste oil is removed by DRMO (Ref. 57). The final disposal of wastewater was not determined during this RFA.

Date of Start-up: The date of start-up for this unit was not determined during this PR or VSI.

Date of Closure: This unit is presently active (Ref. 57).

Wastes Managed: This unit is the final step, before disposal by DRMO, in the Oil Spill Removal Process. Wastes managed include separated oil from the Oil Spill Separator Tanks (SWMU #23) (Ref. 57).

Release Controls: Other than the fact that this unit is constructed of concrete, there were no release controls identified during this RFA. The existence of an overflow control device could not be determined.

History of Release: There are no previous releases identified from this unit and no sign of release was observed at the time of the VSI.

25. UNIT NAME: Past DRMO Hazardous Waste Storage (Photo 21)

Unit Description: This unit is an area measuring approximately 40 feet x 100 feet that is located immediately adjacent to the Ignitable Storage Facility (SWMU #18) (Ref. 57). A facility representative stated that this unit was active prior to the use of the Ignitable Storage Facility (SWMU #18) and DRMO Hazardous Waste Storage Facility (SWMU #17) for hazardous waste storage. Closure plans are being written for this unit, according to facility representatives. Evidence of past release was observed during the VSI. Several oily stains, the largest measuring approximately 20 feet in diameter (Ref. 57), are evident in Photo 21. This site is currently being used to store hazardous materials according to a facility representative.

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

Date of Closure: This unit no longer actively collects and stores waste, so could be considered inactive.

Wastes Managed: This unit managed hazardous waste, the exact nature of which could not be determined during this RFA.

Release Controls: No release controls are identified with this unit.

History of Release: Several areas of stained gravel were observed during the VSI (Ref. 57).

26. UNIT NAME: Abandoned Engine Oil Drums (Photo 22)

Unit Description: Located behind Building 544 and surrounded by thick brush are approximately 25 30-gallon drums, some with polyethylene liners. Some of the drums contain engine lubricating oil and one of the labels had the numbers 9150-231-6654 stamped on it. A tar-like substance was observed leaking onto the ground (Ref. 57).

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

Date of Closure: This unit was active at the time of the VSI.

Wastes Managed: Since most of the drums were unlabeled, it was not possible to identify all the waste types located at this unit. Several of the drums contain engine lubricating oil.

Release Controls: No release controls were observed for this unit.

History of Release: Many of the drums were observed during the VSI to be severely corroded, and a tar-like substance was observed on the bare ground around the drums (Ref. 57).

27. UNIT NAME: Capehart Area Wastewater Plant (Bldg. 1691) (Photo 23)

Unit Description: The NACIP study (Ref. 48) reports the following concerning this domestic sewage treatment plant. This unit serves the Capehart housing area and has a total capacity of 0.46 million gallons per day. This treatment plant is divided into two parallel units and both are similar extended aeration plants. Digested sludge is dewatered in two drying beds and hauled periodically to the Station Landfill (SWMU #3). Chlorinated effluent is discharged to the adjacent coastal waters through a submarine outfall. Sludge generation is estimated at 70 tons per year (10% moisture) (Ref. 48). This unit and the other two Naval Station Wastewater Treatment Plants (SWMUs #28 and #29) were issued a NPDES Permit in March 1986 (Ref. 30).

The VSI team was unable to gain access to this unit because the gate was locked and there was no operator on-site. Information regarding the processes of this unit has been requested from facility representatives, but had not been received before completion of this report.

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

Date of Closure: According to facility officials, this unit is presently active.

Wastes Managed: As reported by the NACIP study, this unit receives sanitary waste from the Capehart housing area (Ref. 48).

Release Controls: Because this unit was not observed during the VSI, no release controls were identified for this unit.

History of Release: Data obtained from chemical characterization of effluent discharged by this unit revealed that this unit is in violation of the Puerto Rico Environmental Quality Board Water Quality Standards Regulations, according to Ref. 50. Specific violations were not cited in "Scope of Work; Study for Elimination of NPDES Violations at the U.S. Naval Station, Roosevelt Roads" (Ref. 50).

28. UNIT NAME: Bundy Area Wastewater Plant (Bldg. 1757) (Photo 24)

Unit Description: The operator of this unit stated that the Bundy Area Wastewater Plant has a capacity of 200,000 gallons per day. Flow varies greatly because this unit services a military training area nearby which is used sporadically. Influent flows through a system involving a communitor, primary clarifiers, a contact basin, trickling filters, secondary clarifiers, a chlorine contact basin, and final discharge through one of the Naval Station Outfalls (AOC D). Four drying beds with sand filters are used to dry digested sludge which is disposed of in the Station Landfill (SWMU #3). According to the NACIP report, approximately 6.5 tons of sludge (90% solids) are produced yearly from this unit (Ref. 48). Detailed information (including flow charts) was requested from facility officials at the time of the VSI (Ref. 57). A NPDES Permit for this unit and the two other Naval Station Wastewater Treatment Plants (SWMUs #27 and #29) was issued in March 1986 (Ref. 30).

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

Date of Closure: This unit is presently active.

Wastes Managed: This unit's operator stated that incoming domestic sewage is from the Bundy substation which varies greatly because it services a military training area nearby (Ref. 57).

Release Controls: Release controls for this unit consist of manual and automatic level controls (Ref. 57).

History of Release: Data obtained from chemical characterization of effluent discharged by this unit revealed that this unit is in violation of the Puerto Rico Environmental Quality Board Water Quality Standards Regulations, according to Ref. 50. Specific violations were not cited in "Scope of Work; Study for Elimination of NPDES Violations at the U.S. Naval Station, Roosevelt Roads" (Ref. 50).

29. UNIT NAME: Industrial Area Wastewater Plant (Bldg. 1758) (Photo 25)

Unit Description: The Industrial Area Wastewater Plant has a capacity of .937 million gallons per day and processes 0.7 million gallons per day on average. This unit and the two other Naval Station Wastewater Treatment Plants (SWMUs #27 and #28) were issued a NPDES Permit in March 1986 (Ref. 30). According to a facility representative, this unit uses a trickling filter system with anaerobic digestion to serve the southeastern section of the base, including the Public Works Complex (Ref. 57). Influent was observed during the VSI to be stored in a plastic-lined aeration lagoon prior to processing. Chlorinated effluent is discharged to the adjacent coastal waters through a 14-inch submarine outfall (Ref. 48). Sixty tons of dry sludge per year is disposed of in the adjacent Station Landfill (SWMU #3) (Ref. 48). Additional detailed information has been requested from facility representatives.

Date of Start-up: This unit has been in operation since 1970 (Ref. 57).

Date of Closure: This unit is presently active.

Wastes Managed: Wastes managed include sewage from the Public Works Department and the southeast section of the base (Ref. 48) including wastewater from the Aircraft Wash Rack Oil/ Water Separator (SWMU #35) (Ref. 57).

Release Controls: The aeration lagoon has a plastic liner in addition to manual and automatic level controls.

History of Release: Data obtained from chemical characterization of effluent discharged by this unit revealed that this unit is in violation of the Puerto Rico Environmental Quality Board Water Quality Standards Regulations, according to Ref. 50. Specific violations were not cited in "Scope of Work; Study for Elimination of NPDES Violations at the U.S. Naval Station, Roosevelt Roads" (Ref. 50).

30. UNIT NAME: Former Incinerator Site (near Station Landfill entrance) (Photo 26)

Unit Description: Installed in 1973 and dismantled in 1983, this unit was used to burn classified material, contaminated diesel oil, JP-5 fuel (usually mixed with some lube oil), solvents, and sludge residue. During its period of operation, the NACIP study (Ref. 48) estimated that 600 gallons of oil were processed here per week.

A facility representative reported that, in 1984, the present unit was installed in the same location as the dismantled incinerator and has never been activated. The new unit is surrounded by a cyclone fence that was unlocked at the time of the VSI. Dense vegetation made approach difficult. There was no indication through visual observation that the new unit had ever been active.

Date of Start-up: The date of start-up for this unit is 1973.

Date of Closure: This unit was dismantled in 1983.

Wastes Managed: Classified material, contaminated diesel oil, JP-5 fuel (usually mixed with some lube oil), solvents, and sludge residue were burned at this unit, according to the NACIP study (Ref. 48).

Release Controls: The NACIP report makes no mention of release controls and the VSI team was unable to observe this unit since it was dismantled in 1983.

History of Release: This unit was designed to release to air.

31. UNIT NAME: Waste Oil Collection Area (PWD Storage Yard) (Photo 27)

Unit Description: The Transportation Shop services Public Works Department vehicles inside Building 31 and in the yard just north of the building. Approximately 30 yards from the Transportation Shop warehouse is a concrete pad used for the temporary storage of 55-gallon waste oil drums, although none were present at the time of the VSI. A 6-inch concrete curb surrounds the pad which measures approximately 13 feet x 20 feet. A steel drainage pipe with a broken valve is set into the curbing, and at the time of the VSI, was in the open position (Ref. 57). The yard surrounding this unit is asphalt.

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

Date of Closure: This unit is presently active.

Wastes Managed: Wastes managed at this unit include waste lubricating oil (Ref. 57).

Release Controls: This unit is a concrete pad with 6-inch concrete curbing around it (Ref. 57).

History of Release: No leakage was evident at the time of the VSI; however, with the drain pipe valve broken in the open position any spills on the concrete pad would flow directly onto the Public Works Department yard.

32. UNIT NAME: Battery Collection Area (PWD Storage Yard) (Photo 28)

Unit Description: This area is approximately 100 yards northeast from the Transportation Shop warehouse. Several dozen batteries in various stages of decay were observed in the bed of a truck and on a nearby pallet on the ground. None of the batteries were corroded to the point of leakage, although most appeared to contain electrolyte (Ref. 57).

Date of Start-up: During the VSI, it could not be determined how long batteries have been stored here.

Date of Closure: This area was observed to be active.

Wastes Managed: This unit is used for the temporary storage of old vehicle batteries.

Release Controls: No release controls were observed during the VSI.

History of Release: No evidence of release was observed during the VSI (i.e., no stains were observed) (Ref. 57).

33. UNIT NAME: AIMD Hazardous Waste Storage Pad (Photo 29)

Unit Description: The unit is located outside, against the northern wall of Building 379. It was described by facility representatives as a temporary hazardous waste storage area. The wastes stored at this unit are generated by Aircraft Intermediate Maintenance Department (AIMD) maintenance and according to the NACIP report (Ref. 48) include wastes generated from cleaning, painting, paint stripping, minor calibration, complete overhaul of avionic components, and battery cleaning and recharging operations.

Date of Start-up: The date of start-up for this unit was not determined during this RFA.

Date of Closure: This unit is active.

Wastes Managed: Observed during the VSI were beryllium waste, hydraulic fluid and solvents generated from aircraft maintenance (Ref. 57).

Release Controls: The temporary hazardous waste storage area was located on a curbed concrete pad with a manual overflow control valve (Ref. 57).

History of Release: There are no documented releases identified from this unit in the PR file material. During the VSI, minor amounts of unidentified damp white powder were observed in the grass several feet outside the storage pad (Ref. 57).

34. UNIT NAME: VC-8 Waste Storage Pad (Photo 30)

Unit Description: This unit is located outside, behind a trailer at the northeastern edge of the Fleet Composite Squadron Eight (VC-8) airfield. It was observed to be a concrete pad with one foot curbing. One-half of the pad is used for bousers and one-half for drum storage. Measuring 8 feet x 13 feet, the bouser pad supports a tank with approximately a 500 gallon capacity. Immediately adjacent is the 5 feet x 10 feet drum storage pad. Stored at this unit are waste aviation fuel and waste paint resulting from aircraft maintenance. The drums were grounded at the time of the VSI. During heavy rainfall, the manual overflow control valve is sometimes opened to prevent overflow. The discharge runs into an adjacent ditch (Ref. 57).

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

Date of Closure: This unit is presently active.

Wastes Managed: This unit is used for the temporary storage of waste aviation fuel and waste paint (Ref. 57).

Release Controls: This concrete pad was observed to have 1-foot concrete curbing and a manual overflow control valve. In addition, the drums and storage tank are grounded (Ref. 57).

History of Release: No sign of release was observed during the VSI.

35. UNIT NAME: Aircraft Wash Rack Oil/Water Separator (VC-8 Yard) (Photo 31)

Unit Description: This unit is located approximately 50 feet from Building 396, and is designed to collect and separate oil and washwater from aircraft washdown. This belowgrade, concrete unit measures approximately 5 feet x 15 feet x 5 feet deep. According to a facility representative, after separation the water goes to the Industrial Area Wastewater Plant (SWMU #29) and the sludge goes to the Station Landfill (SWMU #3) (Ref. 57).

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

Date of Closure: This unit is presently active.

Wastes Managed: Oily washwater from aircraft washdown is managed at this unit (Ref. 57).

Release Controls: A manual overflow control valve was observed during the VSI.

History of Release: No evidence of release was observed during the VSI.

36. UNIT NAME: Vehicle Wash Rack Oil/Water Separator (Photo 32)

Unit Description: This unit is not surrounded by any immediate buildings, but is in the general vicinity of the Berthing Pier. As required by USDA regulations, the Department of Defense washes vehicles at the vehicle wash rack. The purpose of this activity is to remove soil borne contaminants (insects, microbes, etc.). In the process, some oily waste is washed into the Vehicle Wash Rack Oil/Water Separator. This is an underground concrete unit measuring approximately 8 feet x 18 feet x an undetermined depth. Steel grating covered two thirds of the surface opening at the time of the VSI. According to a facility representative, this separator has been operational for approximately five years (Ref. 57).

Date of Start-up: This unit has been active since approximately 1983 up until the present.

Date of Closure: This unit is presently active.

Wastes Managed: Wastes managed at this unit include oily washwater.

Release Controls: Other than the fact that this unit is constructed from concrete, there are no release controls associated with this unit.

History of Release: No evidence of release was observed during the VSI (Ref. 57).

37. UNIT NAME: Waste Oil Drum Storage Area (near Hangar 200) (Photo 33)

Unit Description: This unit consists of 19 55-gallon drums resting on wooden pallets, situated on a raised concrete pad behind Hangar 200. The drums were observed to contain waste gasoline and lubricating oil from AIMD operations (Ref. 57).

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

Date of Closure: This unit is presently active.

Wastes Managed: Waste gasoline and lubricating oil are stored here.

Release Controls: The drums were resting on a covered, concrete pad without curbing at the time of the VSI.

History of Release: During the VSI, minor oil stains were observed on the concrete pad and a minor area on the nearby grass was observed to have stressed vegetation (Ref. 57).

38. UNIT NAME: Sewer Drainage System (No Photo)

Unit Description: This unit is an underground sewer drainage system that includes both the sanitary and storm sewer systems. During this RFA, it could not be determined if this unit is comprised of two separate, dedicated sewage systems, or one single unit. In addition, the particular piping material used for construction (e.g., PVC, metal piping) could not be determined. Past and present waste management practices involve various wastes washing into this facility's drainage system. The NACIP report documented release to the Sewer Drainage System of excess pesticides from the Old Pest Control Shop (SWMU #13) and overflow from the Drone Fuel Drain Oil/Water Separator (SWMU #4) (Ref. 48). During the VSI, evidence of overflow that may enter the Sewer Drainage System was observed at the Fire Training Pit Oil/Water Separator (SWMU #12) (Ref. 57).

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

Date of Closure: This unit is presently active.

Wastes Managed: Wastes managed include excess pesticides and oil/water separator overflow.

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

History of Release: Release to this unit has been documented in the NACIP report (Ref. 48) and the possibility of release to this unit was observed during the VSI. However, due to the location of this unit (i.e., underground) a visual determination could not be made regarding the likelihood of release to the surrounding environment.

39. UNIT NAME: Spent Battery Storage (Building 3158) (Photo 34)

Unit Description: This unit consists of a storage building and covered battery drainage area. This building stores waste batteries and battery acid that are wastes generated by Naval Mobile Construction Battalion (NMCB or "Seabees") operations. The metal battery drain tank (shaped rather like a funnel) is underlain by a curbed concrete pad. Battery contents are poured into the drain tank and the battery acid is caught below in a container. The curbing around the pad is cracked and stained, indicating that there have potentially been past releases to the soil (Ref. 57).

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

Date of Closure: This unit is presently active.

Wastes Managed: This unit manages waste batteries and waste battery acid (Ref. 57).

Release Controls: The battery drain tank is underlain by a curbed (and cracked) concrete pad.

History of Release: The curbing around the pad was observed during the VSI to be cracked and stained (Ref. 57), suggesting the likelihood of a release to soil.

40. UNIT NAME: Seabee Oil Collection Area (Photo 35)

Unit Description: This unit is located in the Alpha Company Maintenance Yard and consists of a mobile storage tank (capacity approximately 300 gallons) stored on a gravel yard. The tank is used to collect used lubricating oil before DRMO disposes of it (Ref. 57). Adjacent to the mobile storage tank is a curbed concrete pad that contained several drums and pails at the time of the VSI.

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

Date of Closure: This unit is presently active.

Wastes Managed: This unit temporarily stores used lubricating oil.

Release Controls: There are no release controls associated with the mobile storage tank. The adjacent drums and pails were contained on a curbed concrete pad.

History of Release: During the VSI, stained gravel was observed under the mobile storage tank (Ref. 57).

41. UNIT NAME: Rinse Rack near Seabee Pesticide Storage (Photo 36)

Unit Description: This unit was observed to be an uncurbed concrete slab measuring approximately 12 feet x 20 feet that is located directly adjacent to the Seabee Pesticide Storage Building (Building 3152) (Ref. 57). The drain within this slab is made up of four strips (6 inches wide). Each strip runs parallel to and is located within the perimeter of the slab. The overall effect is of an inner rectangular "frame." The drain is covered by steel grating. The VSI team was informed by naval personnel that this unit is most commonly used to rinse out the spray trailer which usually contains a mosquito pesticide (Ref. 57).

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

Date of Closure: This unit is presently active.

Wastes Managed: This unit processes rinsate from the mosquito control trailer. It was not determined during the VSI whether expired pesticides are washed down the drain of this unit or sent to DRMO (Ref. 57).

Release Controls: No release controls were observed during the VSI.

History of Release: No sign of release was observed during the VSI.

42. UNIT NAME: Water Treatment Plant Sludge Lagoons (Photos 37 and 38)

Unit Description: Raw water is supplied by mountain rainwater from the Rio Blanco River (Ref. 33) west of the Naval Station. Water treatment at Naval Station Roosevelt Roads involves aeration, prechlorination, coagulation, sedimentation, filtration, fluoride adjustment, and disinfection (Ref. 33). Located several hundred feet west of the Roosevelt Roads Water Treatment Plant are two open sludge lagoons measuring approximately 160 feet x 90 feet x 20 feet deep (Ref. 57). According to a facility representative, the lagoons are natural, unlined ponds. Sludge from the Water Treatment Plant sedimentation tanks is released periodically into one of the sludge lagoons. Thick vegetation was observed growing along the edges of both lagoons. The plant operator reported that the sludge in these lagoons consists of river mud with aluminum sulfide and lime added during the water filtration and sediment settling processes. In order to prevent a system backup during heavy rainfall the lagoon gates are opened. This happens about once a year, according to the plant operator. Discharge flows into a surface water canal that eventually reaches the mangroves. The operator also stated that the sludge in these lagoons had been removed and deposited offsite once in the seven years of his tenure there (Ref. 57).

Date of Start-up: According to the plant operator, the sludge lagoons have been in operation for at least seven years.

Date of Closure: This unit is presently active.

Wastes Managed: This unit manages river mud containing aluminum sulfide and lime (Ref. 57).

Release Controls: Overflow is addressed through the use of manual and automatic level controls.

History of Release: Approximately once a year the lagoon gates are opened and the sludge discharged into a surface water canal. The sludge from both lagoons was removed and deposited offsite once in a seven year period.

43. UNIT NAME: Drone Washdown Area (Photo 39)

Unit Description: Directly in front of the garage doors of Building 860, Aerial Target Systems Department, is a concrete lined drainage ditch covered by steel grating which measures approximately 350 feet x 2 feet x 3 feet deep (Ref. 57). As stated by a facility representative, drones are recovered from the sea after military exercises and brought to Building 860. Here the saltwater and marker dye is rinsed off over the steel grating. This unit drains into the drainage ditch north of Building 860. According to the NACIP study (Ref. 48), from about 1960 until the mid-1970s, between 2,500 and 5,000 gallons of contaminated JP-4 and JP-5 drone fuel was drained in the approximate area where this unit is now, eventually discharging into the ditch north of Building 860, Fuel and Chemical Storage Compound Drainage Ditch (SWMU #44). The current practice is to drain unused drone fuel directly into the Drone Fuel Drain Oil/Water Separator (SWMU #4) (Ref. 57).

Date of Start-up: Facility representatives stated that this unit has been in operation for at least 10 years (Ref. 57).

Date of Closure: This unit is presently active.

Wastes Managed: This unit manages washwater containing sea salt and marker dye.

Release Controls: This unit is concrete-lined.

History of Release: By construction design, this unit releases to the drainage ditch north of Building 860. According to the NACIP report, between 2,500 and 5,000 gallons of contaminated JP-4 and JP-5 was drained into this unit over a 15 year period. The practice was stopped in the mid-1970s (Ref. 48).

44. UNIT NAME: Aerial Target Systems Drainage Ditch (Photo 40)

Unit Description: This unit is a concrete lined ditch that parallels the north edge of the Aerial Target Systems Department yard. According to the NACIP report, between 2,500 and 5,000 gallons of JP-4 and JP-5 fuel was discharged into this unit (Ref. 48) from the area cited in this report as the Drone Washdown Area (SWMU #4). In addition, a fuel and chemical storage pad for the Aerial Target Systems Department (Building 860) is located adjacent to this unit. The fuel and chemical storage pad stores products used in the maintenance and repair of drones, such as JP-4, JP-5, rust preventive, and solvents (Ref. 57). Extending out from the storage pad and over the Aerial Target Systems Drainage Ditch is a drain pipe with a valve. A small patch of dead vegetation was observed directly below the drain pipe.

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

Date of Closure: This unit is presently active.

Wastes Managed: Wastes managed here include JP-4, JP-5, rust preventative, and solvents.

Release Controls: This unit is lined with concrete. Vegetation was observed growing up through seams in the concrete.

History of Release: A small patch of dead vegetation was observed directly below a drainage pipe that extends out over this unit. Between 2,500 and 5,000 gallons of JP-4 and JP-5 fuel was discharged into this unit over a 15 year period. Washwater from the Drone Washdown Area (SWMU #4) containing sea salt and marker dye is discharged to this unit as a matter of routine. This ditch flows southward (Ref. 26), eventually discharging into Ensenada Honda (Ref. 48).

45. UNIT NAME: PCB Spill Area (Photo 41)

Unit Description: According to the NACIP study (Ref. 48), outside of Building 38 near the northeast corner, transformer maintenance was performed from 1956 until 1964. An estimated 1,600 gallons of transformer oil, probably containing PCBs, were poured out on the ground during that time (Ref. 48). The exact location of the spill area was difficult to ascertain at the time of the VSI. Oil stains were observed on a concrete pad near the northeast corner of Building 38 (Ref. 57). No evidence of release to soil was observed.

Date of Start-up: Transformer oil was first poured onto the ground in 1956, according to the NACIP report (Ref. 48).

Date of Closure: The date of closure for this unit is 1964 (Ref. 48).

Wastes Managed: Wastes managed at this unit include transformer oil possibly contaminated with PCBs (Ref. 48).

Release Controls: No release controls in the spill area were identified in the PR material or observed during the VSI.

History of Release: Between 1965 and 1964, approximately 1,600 gallons of transformer oil were poured out on the ground (Ref. 48).

46. UNIT NAME: Pole Storage Yard (Photo 42)

Unit Description: This unit was cited in the NACIP report as a Public Works Department hazardous waste storage area that had been used to store transformers and 55-gallon drums of PCB-contaminated material (Ref. 48). The reference further stated that the area showed evidence of oil spillage. A facility representative confirmed that this unit had formerly been used to store transformers. Within this unit was a covered concrete pad, observed to be used for the storage of products including insulators, telephone poles, small cardboard boxes of electrical equipment, and several full 5-gallon pails, one marked as electrical lubricant (Ref. 57). This unit was surrounded by a cyclone fence. Telephone poles were piled near the entrance. No evidence of release was observed.

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

Date of Closure: This unit is presently active as a product storage area. Waste is not presently stored here.

Wastes Managed: According to the NACIP report, this unit formerly managed transformer oil, possibly containing PCBs (Ref. 48).

Release Controls: Release controls included a covered concrete pad without curbing. No release controls were associated with the rest of the yard.

History of Release: The NACIP reported cited periodic spillage of transformer oil and noted evidence of oil spillage in the area (Ref. 48). No evidence of release was observed during the VSI.

47. UNIT NAME: Local Disposal Areas

Unit Description: Throughout this facility are an unspecified number of satellite disposal points, existing both as dedicated areas associated with specific process points, and also as general refuse accumulation areas. Facility representatives did not know the specific locations of all disposal points and refuse accumulation areas, nor the specific composition of materials disposed of at these units.

Date of Start-up: Due to the unspecified number of units and general lack of documentation regarding these units, a date of start-up could not be determined.

Date of Closure: These units are considered to be presently active.

Wastes Managed: Specific wastes managed at these units could not be determined during this RFA, but are thought to include process-specific waste materials and general refuse.

Release Controls: There are no release controls identified with these units.

History of Release: Lack of documentation regarding these units (e.g., waste types, secondary containment) prohibits an accurate assessment of release history.

AREAS OF CONCERN

A. AREA OF CONCERN: Torpedo Shop (No Photo)

Area of Concern Description: The Torpedo Shop assembles MK 30, MK 46, and MK 48 torpedoes for the Atlantic Fleet Weapons Training Facility (AFWTF) and the Weapons Department (Ref. 48). Following a "run" by one of the target or practice torpedoes, the torpedo is recovered, the fuel removed, and the torpedo washed with Agentine, a dry cleaning solvent. The waste produced by this process includes OTTO Fuel II, clothing contaminated in the assembly and maintenance of the torpedoes, detergent, Agentine, alcohol (Neosol), sodium sulfide, denatured ethyl alcohol, acetone, oil, and silver cell batteries. According to the U.S. Navy, approximately 120 55-gallon drums of solvent and fuel waste are generated yearly by this unit (Ref. 48). Contaminated OTTO Fuel II and other waste is stored temporarily before being shipped to Cape Canaveral, Florida (Ref. 48). According to the NACIP study, disposal of inoperable explosives generated by this unit is carried out by Explosive Ordnance Detachment (EOD) personnel at the Eastern Maneuver Area (EMA) on Vieques Island (Ref. 48). According to AFWTF Director, Mr. Nestor Paradis, this unit is a "unique military operation" and requires special security clearance for entry. The VSI team was therefore denied access, and no VSI was conducted at this unit.

B. AREA OF CONCERN NAME: Former PWD Storage Area (No Photo)

Area of Concern Description: This AOC is in the location of Building 25 (NACIP Site 10). At one time used by the Public Works-Supply Department to store DRMO-bound materials (Ref. 48), Building 25 was observed during the VSI to have collapsed. The materials stacked on its unmortared brick floor were overgrown with vegetation. It appeared that the majority of material stored there consisted of old clothing, empty wooden boxes, and small empty shells. No sign of release was noted during the VSI; however, it is possible that some amount of material was completely covered by vines and could not be observed during the VSI (Ref. 57). The topography of this area slopes gently (2%) southeast toward Puerca Bay (Ref. 26), which lies at a distance of approximately 1,500 feet.

C. AREA OF CONCERN NAME: Transformer Storage Area (Photo 43)

Area of Concern Description: This AOC is comprised of two raised concrete pads that, at the time of the VSI, were used for storage of transformers (Ref. 57). During the VSI, 40 transformers were observed to be stored on the storage pad to the south, which measured approximately 20 feet x 50 feet. This pad was covered by ripped canvas stretched over a wooden frame. The north pad was uncovered and contained at least 25 transformers and 20 to 40 batteries. The products stored at this unit were in good condition. Standing oil inside the north pad and release to the soil through a crack in the concrete were observed. Transformers of various sizes were scattered around both the south pad and the north concrete pad (Ref. 57).

D. AREA OF CONCERN NAME: Naval Station Outfalls (No Photo)

Area of Concern Description: There are a number of outfalls at the Roosevelt Roads facility. These outfalls may be associated with the Sewer Drainage System (SWMU #38), the various on-site WWTPs, and/or other drainage areas or ditches which exist within the facility boundaries. These outfalls include both regulated (e.g. NPDES) and nonregulated outfalls. The facility representatives knew neither the specific location of all outfalls nor the specific chemical composition of the effluent being discharged at each of these outfalls. These areas are a concern since there have been repeated past violations of releases from regulated discharge units (e.g., NPDES) (Ref. 50).

5.0 EXECUTIVE SUMMARY

A RCRA Facility Assessment was conducted at the Naval Station (NAVSTA) Roosevelt Roads Rico to identify solid waste management units (SWMUs) and other areas of concern (AOCs) and assess the potential for release of hazardous wastes and hazardous constituents from these units to the environment. The description of SWMUs and AOCs and the assessment of potential for release was based upon a Preliminary Review (PR) of existing information and a Visual Site Inspection (VSI) of the facility. The primary source of existing information was the Region II office of the Environmental Protection Agency in New York City, New York.

Roosevelt Roads covers an area greater than 8,000 acres and provides general support for numerous tenant activities. Those SWMUs and AOCs identified in this report were concluded to be representative of waste management activities at the Naval Station Roosevelt Roads. Areas (including process areas, storage facilities, etc.) not observed during the VSI were situated indoors (i.e., fully enclosed) which prevents any possible releases to environmental pathways, and/or had no documented release to the environment associated with them.

The RFA resulted in the identification of 47 SWMUs and 4 other AOCs. The primary units of concern include three unlined landfills (SWMUs #1, #2, and #3,) fuel storage and disposal areas (SWMUs #7, #8, and #9), the Old Pesticide Shop (SWMU #13), and the Naval Station Outfalls (AOC E) and Local Disposal Areas (AOC F). All of these represent potential releases to soil, groundwater, and surface water, and require extensive sampling to determine the existence of release of hazardous constituents to the environment.

Additional units which are of concern include the NAVSTA Roosevelt Roads Wastewater Treatment Plants (SWMUs #27, #28, and #29), several oil/water separators (SWMUs #4, #24, #35, #36), Donuts (SWMU #21), Ships Waste Offload Barges (SWMU #22), and the Sewer Drainage System (SWMU #38). The structural integrity of these units needs to be verified to insure that release of hazardous constituents to the environment is not occurring.

In summary, further actions were suggested at 35 of the 47 SWMUs and 4 AOCs. Suggested further actions include soil sampling, groundwater investigations, surface water and sediment sampling, verification of unit integrity, requests for additional information, suggestions of better facility management, and referral to another agency. Table 5 summarizes the SWMUs and AOCs and suggestions for further action, if any, at each unit. This table and discussions in Section 7.0 provide additional descriptions of further actions which have been recommended and the basis for these recommendations.

Table 6. Summary of Suggested Further Actions.

	Unit Name	Further Action
1.	Army Cremator Disposal Site	Sampling
2.	Langley Drive Disposal Site	Sampling
3.	Station Landfill	Sampling
4.	Drone Fuel Drain Oil/Water Separator	Integrity Testing
5.	Dumpsters	No Further Action
6.	Former Paint Storage (Building 145)	Additional Information
7.	Tow Way Road Fuels Farm	Sampling, Integrity Testing
8.	Tow Way Road Disposal Pits	Sampling
9.	Leaded Sludge Pits	Sampling
10.	Transformer Maintenance Area	Refer to TSCA
11.	PCB Storage Compound (Building 38)	Additional Information
12.	Fire Training Pit Oil/Water Separator	Sampling, Repairs
13.	Old Pest Control Shop	Sampling
14.	Fire Training Pit	Sampling
15.	Hospital Incinerator (Building 1928)	No Further Action
16.	Waste Explosive Storage (Building 1666)	Additional Information
17.	DRMO Hazardous Waste Storage Facility	No Further Action
18.	Ignitable Storage Facility (Bldg. 2009)	No Further Action
19.	Pesticide Waste Storage (Building 121)	Review Regulatory Status
20.	Waste Oil Tank Truck (near Building 860)	No Further Action
21.	Donuts	Integrity Testing
22.	Ships Waste Offload Barges (SWOBs)	Integrity Testing
23.	Oil Spill Separator Tanks	Sampling, Repairs
24.	Oil Spill Oil/Water Separator	Integrity Testing
25.	DRMO Past Hazardous Waste Storage	Sampling
26.	Abandoned Engine Oil Drums (behind Bldg. 544)	Sampling
27.	Capehart Area Wastewater Plant	Integrity Testing, Sampling
28.	Bundy Area Wastewater Plant	Integrity Testing, Sampling
29.	Industrial Area Wastewater Plant	Integrity Testing, Sampling
30.	Former Incinerator Site (adjacent to landfill entrance)	No Further Action
31.	Waste Oil Collection Area (PWD Storage Yard)	Repairs
32.	Battery Collection Area (PWD Storage Yard)	Relocate
33.	AIMD Hazardous Waste Storage Pad	Sampling, Improve Management
34.	VC-8 Waste Storage Pad	Build Cover
35.	Aircraft Wash Rack and Oil/Water Separator	Integrity Testing
36.	Vehicle Wash Rack (near Berthing Pier)	Integrity Testing
37.	Waste Oil Drum Storage Area (near Hangar 200)	Sampling
38.	Sewer Drainage System	Integrity Testing, Additional Information
39.	Spent Battery Storage Building (Bldg. 3158)	Sampling
40.	Sea Bee Oil Collection Area	Sampling

-- Continued --

Table 6. Continued.

Unit Name	Further Action
41. Rinse Rack near Sea Bee Pesticide Storage (Building 3152)	Additional Information
42. Water Treatment Plant Sludge Lagoons	No Further Action
43. Drone Washdown Area	No Further Action.
44. Aerial Target Systems Drainage Ditch	Sampling
45. PCB Spill Area	Sampling, Refer to TSCA
46. Pole Storage Yard	Sampling
47. Local Disposal Areas	Survey, Sampling
A. Torpedo Shop	Additional Information
B. Former PWD Storage Area (Building 25)	Inventory
C. Transformer Storage Area (near Bldg. 2042)	Sampling
D. Naval Station Outfalls	Survey, Sampling

6.0 RELEASE PATHWAYS

Groundwater

Groundwater at Roosevelt Roads flows generally southeast, except in the areas of high ground on the peninsulas which constitute the Industrial Area, where SWMUs #3, #7, #8, #9, #15, #19, and #45 are located. In these areas, due to the steep slopes, relatively shallow well-drained soils, and proximity to bedrock at the surface, subsurface contaminant migration will be in the direction dictated by local topography (Ref. 48). This will generally be north and northwest into the mangrove swamps and south and southeast into Ensenada Honda. The only known possible sources of usable groundwater are lenticular beds of clay, sand, gravel and rock fragments which occur at less than 30 meters depth. However, the facility is located on alluvial deposits of sand, silt clay and gravel, floodplain and terrace deposits which contain shallow groundwater (Ref. 48). Furthermore, the facility is surrounded on three sides by ocean. Given the shallow depth to groundwater and the existence of several unlined units at the facility (e.g., SWMUs #1, #2, #3, #8 and #9), potential for release to groundwater is considered high.

Soil

Typical surface soils at the facility range from sandy to clayey soils which are moderately well to poorly drained (Ref. 48). The presence of many unlined units (e.g., SWMUs #1, #2, and #3) and units where wastes are placed directly on top of the soil surface (e.g., SWMUs #10, #13, #43, #45, and #46, and AOCs C and F) results in the potential for release to soil being considered high.

Air

The overall potential for release to air is considered low due to the nature of SWMUs and AOCs at U.S. Naval Station Roosevelt Roads. Most waste is either not exposed to the atmosphere or the waste being managed is not volatile. Four units were observed to have a high potential for release during the VSI. These units are SWMUs #7, #14, #15, and #19. All four were observed to have release to air during the VSI (Ref. 57). By the nature of the design (i.e., burning), SWMU #14 and #15 cause additional release to air.

Surface Water

The potential for release to surface water is considered high. Surface waters that flow across Roosevelt Roads originate in the Sierra de Luquillo mountains to the west and hilly terrain to the north (Ref. 48). Station flooding is normal during periods of heavy rainfall. This situation has been aggravated by development in the northern town of Cieba. Surface runoff would occur throughout the series of on-site drainage ditches (e.g., SWMU #44), which empty either into the Rio Daquao watershed or into the mangroves that fringe Ensenada Honda, Puerca Bay or Port Medio Mundo (Ref. 48). The high elevation of certain units (e.g., SWMUs #7 and #8) in conjunction with documented release to soil constitutes a high potential

for release to surface water. In addition, the presence of shallow groundwater and unlined units immediately adjacent to surface water (SWMUs #1, #2, and #3) suggests the potential for migration to surface water via groundwater. Furthermore, the various mangrove swamps are subject to tidal influence daily. High tides or increased flow from the streams and drainage ditches that terminate in the swamps would increase the migration of contaminants.

Subsurface Gas

The overall potential for generation of subsurface gas is considered low since most of the wastes are managed aboveground. However, a moderate to high potential for generation of subsurface gas exists at the unlined units where general refuse and volatiles were disposed; for example, the unlined solid waste landfills (SWMUs #1 and #3) and SWMUs #7, #8, and #9, which have documented long-term release of fuel and sludge to the soil (Ref. 57). No immediate threat to human health exists in these cases because no units with a high potential for subsurface gas generation are located near populated areas. However, a hazard to human health and safety may exist in the event of subsurface excavation.

7.0 SUMMARY OF CONCLUSIONS AND SUGGESTED FURTHER ACTIONS

The following section is a summary of conclusions and suggestions for further actions for solid waste management units (SWMUs) at U.S. Naval Station Roosevelt Roads, Roosevelt Roads, Puerto Rico. Each SWMU and area of concern (AOC) is evaluated to determine if it represents a potential for release to soil/groundwater, surface water, air, and/or subsurface gas. The PR and VSI phases of the RFA identified 47 SWMUs and 4 additional AOCs. Of these, it was determined that 36 SWMUs and 4 AOCs have a potential for release to one or more environmental pathways or a determination could not be made (as in the case of SWMU #16 and AOC A). The conclusions and further actions for these units are discussed in detail.

The remaining 11 SWMUs were determined to have low/no potential for release to all environmental pathways.

A preliminary assessment of the potential for release from each unit was made based upon information collected during the Preliminary Review (PR) and Visual Site Inspection (VSI). For each unit where suggestions for further action have been made, the potential for release to environmental media (soil/groundwater, surface water, air, and subsurface gas) is assessed. For example, the potential for release was described as high at the units which exhibited visual evidence of contamination, where there was documented release, or where design or operation was considered to potentially allow a release. A moderate potential for release was used to describe units where there may be release during certain operational periods or depending on volume or procedure for handling the waste. A low potential for release was used to describe units located inside buildings, units in good condition, or those which managed very small quantities of waste.

In some cases, it is suggested that further action at a unit be based upon collection of additional information or requirements of the EPA or other entity. These instances are described in the individual SWMU or AOC evaluation provided in this section. In addition, suggestions at several of the units include verification of unit integrity.

1. UNIT NAME: Army Cremator Disposal Site

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is high, since this unit is an unlined landfill. According to the Navy, this unit has been used for the disposal of hazardous wastes (Ref. 52).

Surface Water: Areas of this unit are located directly in the mangrove swamp (Ref. 48) which is subject to flooding by periodic high tides; therefore, the potential for release to surface water is high.

Air: Most of this unit is now covered with dense vegetation; however, in the absence of information regarding the rusty drums noted in the NACIP report (Ref. 48) and the (possibly volatile) oily sheen observed during the VSI, it must be assumed that the potential for release to air is low to moderate.

Subsurface Gas: There is a moderate potential for the release of methane from this unlined landfill. In addition, there is a moderate potential for the release of volatile organics because this unit is unlined and was used for the disposal of trash likely to contain volatile wastes, including gas cylinders, paint cans, and dry cleaning solvent cans.

Suggested Further Action: It is suggested that aerial photographs of this unit (if they exist) be obtained and studied in order to determine the location of the drums observed by the NACIP IAS team (Ref. 48), and that an appropriate geophysical method (e.g., magnotometer, ground penetrating radar) be employed to locate any buried materials that may be present. Soil samples should be taken from each area where drums are found. The area observed by the VSI team to be devoid of vegetation should have soil samples taken from within the barren area itself. In addition, surface water and soil sediment samples should be taken along the edge of the mangroves. Samples should be analyzed to determine the existence of a release of hazardous constituents to the environment.

2. UNIT NAME: Langley Drive Disposal Site

Conclusions: Soil/Groundwater: This unit is an unlined landfill located at the edge of the mangrove swamp. According to the NACIP study, certain areas of the swamp appeared to have been filled in with waste to create new land (Ref. 48). In addition, corroded drums (the contents of which were exposed to the environment) were observed during the VSI. The potential for release to soil/groundwater is, therefore, high.

Surface Water: The potential for release to surface water is high because this is an unlined unit where waste was used to fill in the swamp (Ref. 48) and where the contents of corroded drums were observed to be exposed to the environment at the time of the VSI.

Air: The potential for release to air is indeterminate until the constituents of the drums have been determined.

Subsurface Gas: The potential for subsurface gas generation can not be determined due to the lack of historical information available regarding specific types of wastes (e.g. those that would be likely to generate subsurface gas) disposed of here.

Suggested Further Action: The Navy documents this unit as having been used for the disposal of hazardous and nonhazardous waste (Ref. 52). It is suggested that the contents of the drums be analyzed to determine the existence of hazardous constituents and then disposed of properly. It is further suggested that an appropriate geophysical method (e.g., magnotometer, ground penetrating radar) be employed to locate any buried wastes that may be present at this unit. Further action should be based upon the results of laboratory analysis and recently gathered geophysical data.

3. UNIT NAME: Station Landfill

Conclusions: Soil/Groundwater: This unit is an unlined landfill. Disposal practices commonly entailed digging to the water table (Ref. 48). This constitutes release to groundwater. Ref. 31a states that the U.S. Geological Survey detected elevated levels of lead and zinc in groundwater at this unit.

Surface Water: This unlined unit is surrounded by surface water, and has a water table very near the surface. The potential for release to surface water is high because of the surrounding surface water and the possibility of subsurface migration.

Air: This unit has a soil cover. Thus, the potential for release to air is low.

Subsurface Gas: There is a moderate potential for the generation of subsurface gas, because volatiles were disposed of at this unit.

Suggested Further Action: This unit has documented release to soil/groundwater and probable release to surface water. It is suggested that an appropriate geophysical method (e.g., magnotometer, ground penetrating radar) be employed to determine the location of wastes buried within the perimeter of this extensive unit. It is further suggested that extensive soil, groundwater, and surface water sampling be employed to determine the existence of a release of hazardous constituents to the environment and to further determine the likelihood of subsurface migration. Further action will be based upon the results of these analyses.

4. UNIT NAME: Drone Fuel Drain Oil/Water Separator

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is dependent upon the integrity of the unit.

Surface Water: Past release to the Sewer Drainage System (SWMU #38) has been documented. This issue is addressed in the Suggested Further Actions for SWMU #38.

Air: The potential for release to air is high because of the type of waste managed at this unit (i.e., jet fuel).

Subsurface Gas: The potential for generation of subsurface gas is dependent upon the integrity of this unit.

Suggested Further Action: It is suggested that the integrity of this unit be tested using a standard method (e.g., visual inspection, pressure testing). Should the unit integrity be found unsatisfactory, soil sampling should be conducted adjacent to this unit. (This may require drilling through concrete). The depth of samples taken should either correspond to the depth of the unit, or progress until there is evidence supporting the existence of a release (e.g., staining). Analyses should include a set of indicator parameters based upon the chemical and physical characteristics of the wastes present at this unit. The documented release to Sewer Drainage System (SWMU #38) is addressed elsewhere in this report.

5. UNIT NAME: Dumpsters

Conclusions: Soil/Groundwater: There is a low potential for release to soil/groundwater because these units are constructed of metal.

Surface Water: These units are metal containers. The potential for release to surface water is low.

Air: Since these units have covers that may occasionally be left open, the potential for release to air could be considered low to moderate.

Subsurface Gas: Since the potential for release to soil/groundwater is low the potential for generating subsurface gas is also low.

Suggested Further Action: Other than continuing to empty these units on schedule in order to avoid a release to the environment through spillage, there is no further action suggested at this time.

6. UNIT NAME: Former Paint Storage (Building 145)

Conclusions: Soil/Groundwater: Because this unit is self-contained, and wastes are no longer being stored at this unit, the potential for releases to the soil or groundwater is low.

Surface Water: Because this unit is self-contained, and wastes are no longer being stored at this unit, the potential for releases to surface water is low.

Air: Although the NACIP study cited release to air, the contents of this building had been removed shortly before the VSI. The potential for release to air is low.

Subsurface Gas: Although this unit contained highly volatile chemicals in the past, no releases to surface water or soil/groundwater have been documented. Also, because this unit is self-contained, the potential for generating subsurface gas is low.

Suggested Further Action: It is suggested that the regulatory status of this unit be determined and that, if not already in progress, formal closure plans be implemented for this unit. Otherwise, no further action is suggested at this time.

7. UNIT NAME: Tow Way Road Fuels Farm

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is high because all of these tanks are underground and several underground leaks have been documented.

Surface Water: Although this unit has earthen retaining walls to contain spills, large volumes of fuel have leaked from Tanks 56A, 56B, and 85, constituting release to surface water.

Air: Release to air was noted during the VSI. The potential for release from spilled fuels is high.

Subsurface Gas: A large volume of volatile organics have been released into the soil from spills and leaking underground storage tanks. This creates a high potential for the generation of subsurface gas. There is no immediate threat to human health because of this unit's location (removed from populated areas of the Naval Station). However, a hazard to human health and safety is probable in the event of subsurface excavation.

Suggested Further Action: It is suggested that all tanks within the boundaries of this unit be subjected to integrity testing (e.g., pressure testing) to determine if there is a need for tank replacement. Soil and groundwater samples should be collected to determine the extent of release. The depth of soil samples taken should either correspond to the depth of the unit or should progress until there is evidence supporting the existence of a release (e.g., staining). Analysis should include a set of indicator parameters based upon the chemical and physical characteristics of the wastes present at this unit. Further action should be based upon these results.

8. UNIT NAME: Tow Way Road Disposal Pits
9. UNIT NAME: Leaded Sludge Pits

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is high because sludge waste was buried in unlined pits.

Surface Water: The Leaded Sludge Pits (SWMU #9) are located on hillsides at elevations 15 to 45 feet above the adjacent Machos mangrove swamp with slopes from 10% to 40% toward the swamp (Ref. 48). The approximate area of the Tow Way Road Disposal Pits (SWMU #8) was observed to be hilly (Ref. 57). The potential for release to surface water via surface runoff is high.

Air: No release to air was noted during the VSI. The sludge pits are covered with soil, thus, the potential for release to air is low.

Subsurface Gas: There is potential for the generation of subsurface gas due to the semivolatile nature of the waste at this unit.

Suggested Further Action: It is suggested that an appropriate geophysical method (e.g., ground penetrating radar) be employed to locate the pits and that soil and groundwater samples be collected adjacent to each pit. Samples should also be collected at elevations below the pits and all samples analyzed to determine the existence of a release of hazardous constituents and the likelihood of subsurface migration. Further action should be based on these results.

10. UNIT NAME: Transformer Maintenance Area

Conclusions: Soil/Groundwater: An estimated maximum of 3,000 gallons of transformer oil, probably containing PCBs, was poured directly on the soil surrounding this unit. The potential for release to soil/groundwater is high.

Surface Water: Although PCBs are preferentially adsorbed onto soils, their high concentrations in the soil around this unit create a high potential for impacting surface waters via surface runoff erosion.

Air: Transformer oil is not volatile; therefore, there is low potential for release to air.

Subsurface Gas: Transformer oil is not volatile; therefore, there is low potential for subsurface gas generation.

Suggested Further Action: It is suggested that the regulatory status of this unit be determined and that if this unit is not already regulated (e.g., undergoing closure plans or TSCA regulated) the unit should be referred to the appropriate TSCA personnel.

11. UNIT NAME: PCB Storage Compound

Conclusions: Soil/Groundwater: Since this unit is located inside a building and appears to be well contained, the potential for release to soil/groundwater is low.

Surface Water: The potential for release to surface water is low because this is an indoor unit and appears to be well contained.

Air: Because PCBs are not volatile, the potential for release to air is low.

Subsurface Gas: Because PCBs are not volatile and because this unit is located indoors, the potential for subsurface gas generation is low.

Suggested Further Action: It is suggested that the results of the analysis of the spilled materials be obtained to confirm that they are non-PCB. If the spilled materials are, in fact, non-PCB, no further action beyond continuing to comply with TSCA regulations is suggested at this time.

12. UNIT NAME: Fire Training Pit Oil/Water Separator

Conclusions: Soil/Groundwater: Evidence of direct release to soil/groundwater was observed during the VSI (stained curbing, guardrail uprights, and dead vegetation adjacent to this unit).

Surface Water: Although there is the possibility of subsurface migration, this unit is not in close proximity to surface water. Therefore, the potential for release to surface water could be considered moderate.

Air: The potential for release to air is high due to the volatile nature of wastes managed here.

Subsurface Gas: The potential for subsurface gas generation is dependent upon the integrity of this unit.

Suggested Further Actions: It is suggested that an automatic overflow control valve be installed on this unit and that the final disposition of wastewater be determined. It is further suggested that soil and groundwater samples be collected in conjunction with sampling for the Fire Training Pit (SWMU #14) in order to determine the existence of release of hazardous constituents to the environment. Further action will be based upon results of analysis.

13. UNIT NAME: Old Pest Control Shop (Building 258 and surrounding area)

Conclusions: Soil/Groundwater: Continual release to the soil in the vicinity of this unit has been documented for a period of nearly 30 years.

Surface Water: Because the drainage ditch behind this unit received excess pesticides and pesticide rinse water, and since this drainage ditch flows into Ensenada Honda, the potential for release to surface water is high.

Air: During the VSI, faint pesticide odors were noted. This constitutes a moderate potential for release to air.

Subsurface Gas: Due to the volatile nature of pesticides and the extent of release to the soil at this unit, there is a moderate potential for the generation of subsurface gas.

Suggested Further Action: It is suggested that extensive soil and groundwater sampling be performed at this unit to determine the existence and nature of release of hazardous constituents to the environment. Areas sampled should include outside near the south side of Building 258 and in and around the ditch that is approximately 40 feet from the building. Analyses should include a set of indicator parameters based upon the physical and chemical characteristics of pesticides stored here in the past. As an interim measure, it is suggested that recreational use of the building be discontinued immediately until sampling results confirm that building's safety. Further action will be based upon these results.

14. UNIT NAME: Fire Training Pit

Conclusions: Soil/Groundwater: Evidence of release to soil/groundwater was observed during the VSI. The potential for release to soil/groundwater is high.

Surface Water: Although this unit is not directly adjacent to surface water, the potential for release to surface water can be considered high due to the action of rainwater (and the resulting surface migration) on the curbing and stained area, both of which displayed evidence of release to soil.

Air: Due to the volatile nature of wastes managed at this unit, the potential for release to air is considered high.

Subsurface Gas: The potential for subsurface gas generation is considered high due to the volatile nature of wastes managed at this unit. There is no immediate threat to human health because of this unit's location (removed from populated areas of the Naval Station). However, a hazard to human health and safety is probable in the event of subsurface excavation.

Suggested Further Actions: It is suggested that soil and groundwater samples be collected in order to determine the existence of release. The samples should be taken at a depth corresponding to either the depth of the unit, or progress until there is evidence supporting the existence of a release (e.g., staining), whichever is deeper. Analysis should include a set of indicator parameters based upon the chemical and physical characteristics of wastes managed at this unit. Further action will be based upon the results of analyses.

15. UNIT NAME: Hospital Incinerator (Building 1928)

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is low due to the self-contained design of this unit and the volume and nature of waste management (i.e., burning small quantities of waste).

Surface Water: There is a low potential for release to surface water due to management design (self-contained chamber) and the manner of disposal (i.e., burning).

Air: This unit is permitted by the Environmental Quality Board to release to air.

Subsurface Gas: There is a low potential for the generation of subsurface gas since no wastes are in contact with soil.

Suggested Further Action: Other than continuing to comply with Environmental Quality Board regulations, no further action is suggested at this time.

16. UNIT NAME: Waste Explosive Storage

Conclusions: No determinations can be made concerning the potential for release to soil/groundwater, surface water, air, and subsurface gas due to the fact that the VSI team was denied access to this unit.

Suggested Further Action: The VSI team was denied access to this unit. No further action can be suggested until information required to make release determinations is obtained.

17. UNIT NAME: DRMO Hazardous Waste Storage Facility

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is low, since the wastes are stored indoors on concrete.

Surface Water: The wastes are stored indoors on concrete, resulting in a low potential for release to surface water.

Air: The potential for release to air is generally considered low; however, it was noted during the VSI that caustics were stored in a bay designated for acids. In the event of spillage and mixing of incompatible wastes, a release to air could occur.

Subsurface Gas: The waste is stored in drums on concrete; thus, the potential for generation of subsurface gas is low.

Suggested Further Action: Caustics were observed to be stored in the acid storage bay during the VSI. Other than continued compliance with RCRA requirements, including proper storage of incompatible wastes, no further action is suggested at this time.

18. UNIT NAME: Ignitable Storage Facility (Building 2009)

Conclusions: Soil/Groundwater: Since this unit is underlain by a curbed concrete pad and is inside a building, the potential for release to soil/groundwater is considered low.

Surface Water: The potential for release to surface water is low because this is an indoor unit underlain by a concrete pad with curbing.

Air: Because this is an indoor unit, the potential for release to air is considered low.

Subsurface Gas: The wastes managed at this unit have no contact with soil. The potential for subsurface gas generation is low.

Suggested Further Actions: Other than continued compliance with RCRA regulations, no further action is suggested at this time.

19. UNIT NAME: Pesticide Waste Storage

Conclusions: Soil/Groundwater: Release to the soil/groundwater is unknown because visual inspection of the interior of this unit was not possible.

Surface Water: Release to the surface water is unknown as visual inspection was not possible. The strong odor outside this unit suggests release to the floor inside. However, the potential for release to the surface water is unknown. The door to this structure was locked, making an inspection of the integrity of the concrete floor impossible and the area surrounding this unit was overgrown with vegetation, making an inspection of the concrete pad difficult.

Air: As the VSI team approached this building, the smell of pesticides was strong and became overpowering inside the cyclone fence. The potential for release to air is very high at this unit.

Subsurface Gas: The potential for releases as subsurface gas is dependent upon releases into the soil and the volatility of the pesticide. At present, these factors are unknown.

Suggested Further Action: It is suggested that the current regulatory status of this unit be reviewed and the unit inspected to ensure compliance with interim status requirements. Further action will be based upon this information.

20. UNIT NAME: Waste Oil Tank Truck

Conclusions:

Soil/Groundwater: This unit is usually parked on the grass at the edge of the yard around Building 860. The potential for release to soil/groundwater is moderate, if a release were to occur.

Surface Water: The potential for release to surface water is low based on distance to nearest surface water.

Air: This unit is enclosed; therefore, the potential for release to air is low.

Subsurface Gas: Because the unit is above-ground the potential for subsurface gas generation is low.

Suggested Further Action: It is suggested that this unit be moved from the grass to the concrete yard of Building 860 and kept there as a routine matter. In the event of a spill, the waste oil can be washed into the Drone Fuel Drain Oil/Water Separator (SWMU #4). Otherwise, no further action is suggested at this time.

21. UNIT NAME: Donuts (#1 - #4)
22. UNIT NAME: Ships Waste Offload Barges (#1 and #2)

Conclusions: Soil/Groundwater: These units are located in the ocean. The potential for release to soil/groundwater is considered low.

Surface Water: The potential for release to surface water is dependent upon the integrity of these units.

Air: Due to the fact that these units are contained, the potential for release to air is low.

Subsurface Gas: Since release from these units would not reach soil/groundwater, the potential for the generation of subsurface gas must be considered low.

Suggested Further Action: It is suggested that these units be tested for integrity (e.g., visual inspection, pressure testing) and repaired or replaced accordingly. Otherwise, no further action is suggested at this time.

23. UNIT NAME: Oil Spill Separator Tanks

Conclusions: Soil/Groundwater: Base on the extent of the stains observed during the VSI, release of waste oil from secondary containment to the asphalt appeared to be fairly common. The potential for release to soil/groundwater is high.

Surface Water: Since this unit is approximately 100 feet inshore from the dock, the potential for release to surface water is moderate to high.

Air: Due to the volatile characteristics of the waste managed, the potential for release to air is moderate to high.

Subsurface Gas: The potential for subsurface gas generation is moderate to high due to the volatile nature of wastes managed by this unit.

Suggested Further Action: It is suggested that soil samples be taken from the area showing evidence of a visible drainage path in order to determine the existence of release. It is also suggested that the concrete pad and curbing be replaced with one sufficient to contain the entire contents of the tanks in the event of a rupture or leak. Further action will be based upon the results of analysis.

24. UNIT NAME: Oil Spill Oil/Water Separator

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is dependent upon the integrity of this unit.

Surface Water: Due to this unit's location (i.e., approximately 100 feet from the dock), the potential for release to surface could be considered moderate to high, depending upon whether or not this unit has overflow controls and whether or not they work.

Air: The potential for release to air is moderate to high because this unit is open at ground level and the nature of wastes managed here.

Subsurface Gas: The potential for subsurface gas generation is dependent upon the potential for release to soil.

Suggested Further Actions: It is suggested that this unit be subjected to integrity testing to determine the likelihood of release to the environment. It is also suggested that the existence and integrity of an overflow control device be verified. Further action will be based upon these findings.

25. UNIT NAME: Past DRMO Hazardous Waste Storage

Conclusions: Soil/Groundwater: Visual evidence suggesting past release to soil/groundwater (i.e., stained gravel) was observed at the time of the VSI.

Surface Water: Since there is evidence suggesting release to soil/groundwater and the distance the surface water is approximately 500 to 1,000 feet (Figure 1), there is a moderate potential for release to surface water.

Air: Since this unit has had no recent releases and the spill areas observed visually are relatively minor, the potential for release to air could be considered low.

Subsurface Gas: The potential for subsurface gas generation can not be determined until the nature of release (i.e., whether volatiles are present) is determined.

Suggested Further Actions: Soil sampling in areas of staining should be conducted to determine if there has been release of hazardous constituents to the environment. Sampling should be done in conjunction with closure activities for this unit.

26. UNIT NAME: Abandoned Engine Oil Drums

Conclusions: Soil/Groundwater: Release to soil was observed during the VSI.

Surface Water: The potential for release to surface water is moderate. This unit is not directly adjacent to any body of water, but contaminants could reach surface water through subsurface migration.

Air: There is a moderate potential for release to air for this unit. The contents of the drums were exposed to the environment, but no odor was present. The leaking contents had a tar-like appearance, and at least one of the drums was labeled as engine oil, which is not volatile.

Subsurface Gas: Since volatile constituents were not confirmed at this site, the observed releases to soil warrant a moderate release potential to subsurface gas.

Suggested Further Action: It is suggested that the contents of the drums be determined. The drums should be disposed of in a manner that is appropriate regarding the physical and chemical characteristics of their contents. Soil sampling in the areas where release has occurred may be necessary to determine the potential harm to human health and the environment. Further action will be based on these determinations.

27. UNIT NAME: Capehart Area Wastewater Plant
28. UNIT NAME: Bundy Area Wastewater Plant
29. UNIT NAME: Industrial Area Wastewater Plant

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is dependent upon the structural integrity of these units.

Surface Water: These units are designed to release to surface water; however, the existence of hazardous constituents in the effluent is likely for SWMUs #28 and #29 because they are located near industrial operations.

Air: The potential for release to air is low for SWMUs #28 and #29 because virtually all the raw sewage was contained. It is likely that SWMU #27 is of similar construction.

Subsurface Gas: The potential for generation of subsurface gas is dependent upon the structural integrity of these units.

Suggested Further Actions: It is suggested that each of these units be tested for structural integrity of its component parts. There has been no determination made regarding the Sewer Drainage System (SWMU #38) and the nature of constituents that flow through it. It is therefore suggested that soil or surface water samples be collected near the outfall of each of these units to determine the potential for the release of hazardous constituents. Further action will be based upon the results of integrity testing, sample analyses, and whether each of these units will be able to come into compliance with NPDES regulations.

30. UNIT NAME: Former Incinerator Site

Conclusions: Soil/Groundwater and Surface Water: Based on the design of the unit and on information regarding the operation of the unit during the active life of the unit, there is a low potential for release to soil/groundwater and to surface water.

Air: This unit was designed to release to the atmosphere when active. However, because the unit is inactive and has been dismantled, there is a low potential for on-going releases to air.

Subsurface Gas: There is a low potential for subsurface gas generation based on the above-ground design of the unit.

Suggested Further Action: No further action is suggested at this time.

31. UNIT NAME: Waste Oil Collection Area (PWD Storage Yard)

Conclusions: Soil/Groundwater: Since the wastes are contained in closed 55-gallon drums and enclosed in a secondary containment structure, there is a low potential for release to soil/groundwater.

Surface Water: The potential for release to surface water is low because a relatively small volume of waste is involved, the unit is surrounded by an asphalt lot, and the wastes are contained in closed 55-gallon drums within a secondary containment structure.

Air: Since the wastes are contained in closed 55-gallon drums, the potential for release to air is low.

Subsurface Gas: Since the wastes are contained in closed 55-gallon drums, the potential for the generation of subsurface gas is low.

Suggested Further Action: Other than repairing the drain valve, there is no further action suggested at this time.

32. UNIT NAME: Battery Collection Area (PWD Storage Yard)

Conclusions: Soil/Groundwater: Since no leaking batteries were observed and this unit is located on asphalt, the potential for release to soil/groundwater is low.

Surface Water: Since no stains or leaking batteries were observed and this unit is located on asphalt, there is little potential for release to surface water.

Air: The potential for release to air is negligible since the batteries are sealed.

Subsurface Gas: The potential for the generation of subsurface gas is low, since the batteries are not leaking and the unit is located on asphalt.

Suggested Further Action: It is suggested that the facility remove and properly dispose of or recycle the batteries. In addition, it is suggested that the facility provide a designated battery storage area, designed to ensure that releases to environmental pathways do not occur.

33. UNIT NAME: AIMD Hazardous Waste Storage Pad

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is low since the wastes are stored in drums on concrete with secondary containment curbs. An unidentified white powder was observed on the soil adjacent to the unit during the VSI.

Surface Water: The wastes are stored in drums on concrete; thus, the potential for release to surface water is low.

Air: The wastes are stored in drums; therefore, the potential for release to air is low. Particulate release, however, may occur from unmanaged areas such as the area of white powder observed during the VSI.

Subsurface Gas: The wastes are stored in drums on concrete; therefore, the potential for generation of subsurface gas is considered low.

Suggested Further Action: It is suggested that the white powder observed during the VSI be sampled, characterized, and removed, and that future management practices prevent release from this unit.

34. UNIT NAME: VC-8 Waste Storage Pad

Conclusions: Soil/Groundwater: There is a moderate potential for release to soil/groundwater, because this unit has a manual overflow control valve, which must be opened during heavy rainfall.

Surface Water: There is a moderate potential for release to surface water due to surface runoff.

Air: There is a moderate potential for release to air due to the volatile nature of these wastes.

Subsurface Gas: There is a moderate potential for subsurface gas generation due to the fact that wastes come in contact with the soil during heavy rainfall and due to the type of wastes managed at this unit.

Suggested Further Action: It is suggest that Naval personnel build a cover for this unit to keep rainwater from flooding the concrete pad underlying this unit. Otherwise, no further action is suggested at this time.

35. UNIT NAME: Aircraft Wash Rack Oil/Water Separator
36. UNIT NAME: Vehicle Wash Rack Oil/Water Separator

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is dependent upon the structural integrity of these units.

Surface Water: No evidence of overflow was observed during the VSI. The potential for release to surface water is low.

Air: The potential for release to air is moderate due to the nature of wastes managed at these units.

Subsurface Gas: The potential for subsurface gas generation is dependent upon the release to soil/groundwater. If there has been release to soil/groundwater, the potential for generation of subsurface gas is moderate.

Suggested Further Action: It is suggested that these units be subjected to integrity testing to determine the likelihood of release to soil/groundwater, surface water, and the generation of subsurface gas. Further actions will be based upon the integrity of these units.

38. UNIT NAME: Sewer Drainage System

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is dependent upon the structural integrity of the sewer system, which could not be determined during this RFA.

Surface Water: The potential for release to surface water is dependent upon the structural integrity of this unit, which could not be determined during this RFA.

Air: There is a low potential for release to air due to the underground design of this system.

Subsurface Gas: The potential for generating subsurface gas is dependent upon the structural integrity of this unit, which could not be determined during this RFA.

Suggested Further Action: The Sewer Drainage System consists of the sanitary and storm sewer systems. It is suggested that the relative interdependence and integrity of these systems be determined. Based upon the results of integrity testing, soil sampling may be warranted to determine if hazardous constituents have been released to the environment. 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 semivolatiles), based upon the hazardous constituents in the facility wastewaters.

39. UNIT NAME: Spent Battery Storage Building (Building 3158)

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is considered high, since visible cracks and stains were observed in the concrete containment pad.

Surface Water: The potential for release to surface water considered moderate due to the possibility of subsurface migration.

Air: The wastes are spent batteries and battery acid; therefore, the potential for release to air is considered low.

Subsurface Gas: The potential for generation of subsurface gas is considered low because battery acid is not volatile.

Suggested Further Action: Soil samples should be collected adjacent to and through the pad to determine the nature and extent of release. The sampling effort should include collection of soil samples, with analysis for pH, to a depth of approximately two feet or until visible contamination is observed. In addition, it is further suggested that cracks in the concrete pad be repaired to prevent future release to soil.

40. UNIT NAME: Seabee Oil Collection Area

Conclusions: Soil/Groundwater: Stained gravel was observed directly below the mobile storage tank, indicating a direct release to soil.

Surface Water: Surface water is approximately a 1/4 mile from this unit. The potential for release to surface water is moderate.

Air: The potential for release to air could generally be considered low since the tank is a contained unit.

Subsurface Gas: Due to the nonvolatile nature of lubricating oil, the potential for subsurface gas generation is considered low.

Suggested Further Action: It is suggested that soil samples be collected beneath the mobile storage tank. Analysis should include a set of indicator parameters based upon the chemical and physical characteristics of the wastes managed by this unit. It is further suggested that a covered concrete pad with curbing be built for the mobile tank. Further actions will be based upon the results of analysis.

41. UNIT NAME: Rinse Rack near Seabee Pesticide Storage

Conclusions: Soil/Groundwater: This unit is made of concrete (at surface level at least) and appears to be in very good condition. The potential for release to soil/groundwater is therefore considered low.

Surface Water: Since the point of ultimate discharge has not been determined for this unit, the potential for release to surface water can not be assessed.

Air: At the time of the VSI, no pesticides had been applied for several months. However, during the time of pesticide application, the potential for release to air is moderate to high.

Subsurface Gas: The potential for subsurface gas generation is considered low since the potential release to soil/groundwater appears to be considered low.

Suggested Further Action: This unit was not in use at the time of the VSI. The point of ultimate discharge of wastes from this unit should be determined and evaluated in conjunction with further information regarding the disposal of excess pesticides (i.e., whether they are sent to DRMO or drained at this unit). Further action will be based upon these determinations.

43. UNIT NAME: Drone Washdown Area

Conclusions: Soil/Groundwater: This unit is designed to release to soil/groundwater. Past release of hazardous constituents to soil/groundwater has been documented.

Surface Water: Surface water generally flows northeast in the northern part of the Naval Station. There has been documented release to soil/groundwater. The potential for release to surface water and subsurface migration is high.

Air: Although jet fuel is highly volatile, release of jet fuel to soil/groundwater has not been documented for over 10 years. The potential for release of hazardous constituents to air could be considered low.

Subsurface Gas: The potential for subsurface gas generation in this immediate location is low because this unit is concrete lined. Wastes discharged from this unit have an affect upon the Aerial Target Systems Drainage Ditch (SWMU #44) and are addressed in the Suggested Further Actions for SWMU #44.

Suggested Further Actions: Due to the fact that release of hazardous constituents from this unit has not been documented for at least 10 years and because the ditch that received discharge of hazardous constituents is addressed as SWMU #44, no further action action is suggested at this time.

44. UNIT NAME: Aerial Target Systems Drainage Ditch

Conclusions: Soil/Groundwater: Visual evidence of release to soil/groundwater was observed during the VSI.

Surface Water: This unit has received discharge of hazardous constituents from the Drone Washdown Area (SWMU #43) in the past (Ref. 48), in addition to probable release from the adjacent fuel and chemical storage pad. Surface water in the northern part of the Naval Station flows northeast into the mangroves; therefore, the potential for release to surface water is moderate to high due to surface drainage.

Air: Due to the volatile nature of wastes managed by this unit, there is a high potential for release to air.

Subsurface Gas: Due to the nature of wastes managed by this unit (e.g., contaminated JP-4 and JP-5 from SWMU #43, rust preventive and solvents from the adjacent fuel and chemical storage pad), the potential for subsurface gas generation is high. There is no immediate threat to human health because this unit is not located in a highly populated section of the base. However, in the event of soil excavation, a hazard to human health and safety may exist.

Suggested Further Actions: It is suggested that soil samples be collected from both the area immediately around the dead vegetation, and at least 10 to 15 feet further north in the drainage ditch. Indicator parameters should include a set of parameters appropriate for the types of waste managed by this unit in order to determine the existence of release to the environment. Further action will be based upon these results.

45. UNIT NAME: PCB Spill Area

Conclusions: Soil/Groundwater: There has been documented release to soil/groundwater.

Surface Water: The potential for release to surface water is high due to erosion and subsurface migration along the Old Power Plant cooling water outlet.

Air: Due to the fact that transformer oil is generally not volatile, and maintenance was reportedly discontinued over 20 years ago, the potential for release to air could be considered low.

Subsurface Gas: Since transformer oil is not volatile, the potential for generating subsurface gas is low.

Suggested Further Action: It is suggested that soil samples be collected from stained areas within the area constituting the PCB Spill Area and that surface water samples be taken at the old cooling water outlet on the Enlisted Beach. Parameters for analysis will include an indicator parameter appropriate for the wastes managed (i.e., transformer oil matrix). It is also suggested that the PCB issue be addressed by referring this unit to TSCA. Further action will be based upon the results of analysis.

46. UNIT NAME: Pole Storage Yard

Conclusions: Soil/Groundwater: There has been documented release to soil/groundwater.

Surface Water: The potential for release to surface water is moderate to high due to the close proximity to surface water and the action of erosion.

Air: Since transformer oil is not volatile, the potential for release to air is low.

Subsurface Gas: The potential for subsurface gas generation is low because transformer oil is not volatile.

Suggested Further Actions: It is suggested that a determination be made regarding the previous location of transformers and 55-gallon drums stored within the Pole Storage Yard. Once these areas are located, it is suggested that soil samples be collected and analysis be performed using indicator parameters capable of characterizing the nature and existence of release to the environment. Further action will be based upon these results.

47. UNIT NAME: Local Disposal Areas

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is dependent upon the exact location of disposal areas and composition of disposed materials.

Surface Water: The potential for release to surface water is dependent upon the exact location of disposal areas and composition of disposed materials.

Air: The potential for release to air is dependent upon the exact location of disposal areas and composition of disposed materials.

Subsurface Gas: The potential for generating subsurface gas is dependent upon the exact location of disposal areas and composition of disposed materials.

Suggested Further Action: It is suggested that the facility implement a survey to determine the location of all satellite disposal areas and general refuse accumulation areas. If it is suspected that hazardous constituents are being released at any of these areas, then appropriate sampling (e.g., soil, sediment, groundwater, surface water) is suggested at local areas to determine if there has been a release of hazardous constituents to the environment.

AREAS OF CONCERN

A. AREA OF CONCERN NAME: Torpedo Shop (Building 394)

Conclusions: Soil/Groundwater: Activities at this unit are conducted inside the building; however, the potential for release to soil/ groundwater is uncertain, since visual inspection of the unit was not allowed.

Surface Water: Activities are apparently conducted inside a building resulting in a low potential for release to surface water.

Air: Volatile emissions may occur from the waste products, such as waste fuel and solvents, generated at this unit.

Subsurface Gas: The potential for generation of subsurface gas is uncertain, since visual inspection of the unit was not allowed.

Suggested Further Action: Further action should be suggested after additional information is obtained to determine the manner in which wastes are generated, stored and disposed.

B. AREA OF CONCERN NAME: Former PWD Storage Area

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is dependent upon the existence of hazardous constituents in the waste.

Surface Water: The potential for release is dependent upon the existence of hazardous constituents in the waste.

Air: The potential for release to air is dependent upon the existence of hazardous constituents in the waste.

Subsurface Gas: The potential for release is dependent upon the existence of hazardous constituents in the waste.

Suggested Further Action: It is suggested that this unit be cleared of vegetative cover and an inventory be made regarding general type, amount and location of wastes currently stored here. Public Works Department records should be reviewed to determine type, amount and, if possible, location of wastes stored here in the past. Further action will be based upon this information.

C. AREA OF CONCERN NAME: Transformer Storage Area

Conclusions: Soil/Groundwater: During the VSI, release to soil/groundwater was observed.

Surface Water: This unit is near surface water. The potential for release to surface water is high due to surface drainage.

Air: Since transformer oil is not volatile, the potential for release to air is low.

Subsurface Gas: Transformer oil is not volatile, so although there has been release to soil, the potential for generating subsurface gas is low.

Suggested Further Action: It is suggested that soil samples be collected from each pad. Analysis should include an indicator parameter appropriate for the wastes managed (i.e., transformer oil matrix). Further action should be based upon these results.

D. AREA OF CONCERN NAME: Naval Station Outfalls

Conclusions: Soil/Groundwater: Dilution is usually so great at the point of discharge to surface water, that release to soil/groundwater could be considered low.

Surface Water: Naval Station Outfalls discharge directly to surface water; therefore, the potential for release to surface water is high.

Air: Dilution is usually so great that the potential for release to air could be considered low.

Subsurface Gas: Due to the low potential for release to soil/groundwater, the potential for generating subsurface gas is low.

Suggested Further Actions: It is suggested that the facility implement a survey to determine the location of all outfalls at the Roosevelt Roads facility and the nature of the effluent being discharged at each of the outfalls. If it is suspected that hazardous constituents are being released at any outfall, then sampling (e.g. effluent and sediment) is suggested at the outfall discharge point to determine if there has been a release of hazardous constituents to the environment.

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ATTACHMENT A

PHOTOGRAPH LOG

LIST OF PHOTOGRAPHS FROM VISUAL SITE INSPECTION CONDUCTED AUGUST 15 TO AUGUST 22, 1988 NAVAL STATION ROOSEVELT ROADS, CIEBA, PUERTO RICO

The VSI team failed to photograph several SWMUs and AOCs. These areas were not specifically considered individual SWMUs and AOCs until after the VSI.

Photo 1. View of dead vegetation in mangrove swamp in the general vicinity of the Army Cremator Disposal Site (SWMU #1).

Photo 2. Area devoid of vegetation within the mangrove swamp in the general vicinity of the Army Cremator Disposal Site (SWMU #1).

Photo 3. Abandoned and corroded drums at the Langley Drive Disposal Site (SWMU #2).

Photo 4. View of inactive portion of the Station Landfill (SWMU #3). Area in picture is capped with temporary cover and volunteer vegetation.

Photo 5. View of fiberglass drum and liner at the Station Landfill (SWMU #3).

Photo 6. View of Drone Fuel Drain Oil/Water Separator (SWMU #4) located adjacent to Building 860.

Photo 7. Inside view of Former Paint Storage (SWMU #6) (Building 145). The floor is covered with standing water.

Photo 8. Northeast view of oily sludge near Tank 83 of the Tow Way Road Fuels Farm (SWMU #7).

Photo 9. Northwest view of Tank 83 of the Tow Way Road Fuel Farm (SWMU #7). Dead vegetation is evidence of recent spill of JP-5 fuel.

Photo 10. Transformer Maintenance Area (SWMU #10) behind Building 90. Note oil stains on concrete pad and lack of curbing around the pad.

Photo 11. PCB Storage Compound (SWMU #11) located inside Building 38.

Photo 12. View facing west of Fire Training Pit Oil/Water Separator (SWMU #12) linked to the fire training pit. The oil stains on the curbing and guardrail uprights are evidence of a recent wastewater overflow from this unit.

Photo 13. View of the Old Pest Control Shop (SWMU #13, Building 258). The building, facing northwest in this photograph, has been remodeled and is now used to house the Las Croabas Dive Club.

Photo 14. View of Fire Training Pit (SWMU #14). Note the oil stained ground surrounding the pit in the center of the photo.

Photo 15. North view of the Hospital Incinerator (SWMU #15).

Photo 16. View of one of four bays used to store hazardous wastes in the DRMO Hazardous Waste Storage Facility (SWMU #17, Building 1973).

Photo 17. View of Ignitable Storage Facility (SWMU #18, Building 2009).

Photo 18. West view of Pesticide Waste Storage (SWMU #19, Building 121).

Photo 19. Waste Oil Tank Truck (SWMU #20), located near Building 860.

Photo 20. Three Oil-Spill Separator Tanks which are part of the Oil Spill Removal System (SWMU #23).

Photo 21. View of Past DRMO Hazardous Waste Storage (SWMU #25). Note the stained gravel adjacent to the blue drums.

Photo 22. Northwest view of Abandoned Engine Oil Drums (SWMU #26) located behind Building 544.

Photo 23. View of sludge drying beds which are part of the Capehart Area Wastewater Treatment Plant (SWMU #27).

Photo 24. East-facing view of primary clarifiers and anaerobic sludge digestion tank at the Bundy Area Wastewater Treatment Plant (SWMU #28).

Photo 25. Gravity-operated trickling filter beds at the Industrial Area Wastewater Treatment Plant (SWMU #29).

Photo 26. East view of the Former Incinerator Site (SWMU #30) located near the entrance to the Station Landfill.

Photo 27. View of empty Waste Oil Collection Area (SWMU #31) located in the Public Works Department storage yard (Building 31). Note the deteriorated curbing around this unit.

Photo 28. Battery Collection Area (SWMU #32) located in the Public Works Department Storage Yard (Building 31).

Photo 29. AIMD Hazardous Waste Storage Pad (SWMU #33) for the Aircraft Intermediate Maintenance Department.

Photo 30. VC-8 Waste Storage Pad (SWMU #34) adjacent to VC-8 hangar.

Photo 31. View of Aircraft Wash Rack Oil-Water Separator (SWMU #35) located near the VC-8 hangar.

Photo 32. View of Vehicle Wash Rack Oil/Water Separator (SWMU #36) located near the berthing pier. The below ground oil-water separator is located to the right of the wash rack.

Photo 33. Waste Oil Drum Storage Area (SWMU #37) adjacent to Hangar 200.

Photo 34. East view of Building 3158, the Spent Battery Storage Building (SWMU #39) located within the Seabee compound.

Photo 35. View facing north of Seabee Oil Collection Area (SWMU #40) within the Seabee Compound. Mobile storage tank is on the right. Drum storage pad is on the left.

Photo 36. View of Building 3152 and the Rinse Rack near Seabee Pesticide Storage (SWMU #41).

Photo 37. View facing north of Water Treatment Plant Sludge Lagoon (SWMU #42).

Photo 38. View facing southwest of Water Treatment Plant Sludge Lagoon (SWMU #42).

Photo 39. Steel-grated drain used as a Drone Washdown Area (SWMU #43). Location is adjacent to Building 860.

Photo 40. View of Aerial Target Systems Drainage Ditch (SWMU #44).

Photo 41. View of general vicinity of PCB Spill Area (SWMU #45).

Photo 42. Telephone poles at Pole Storage Yard (SWMU #46).

Photo 43. View of Transformer Storage Area (AOC C) located near Building 2042.


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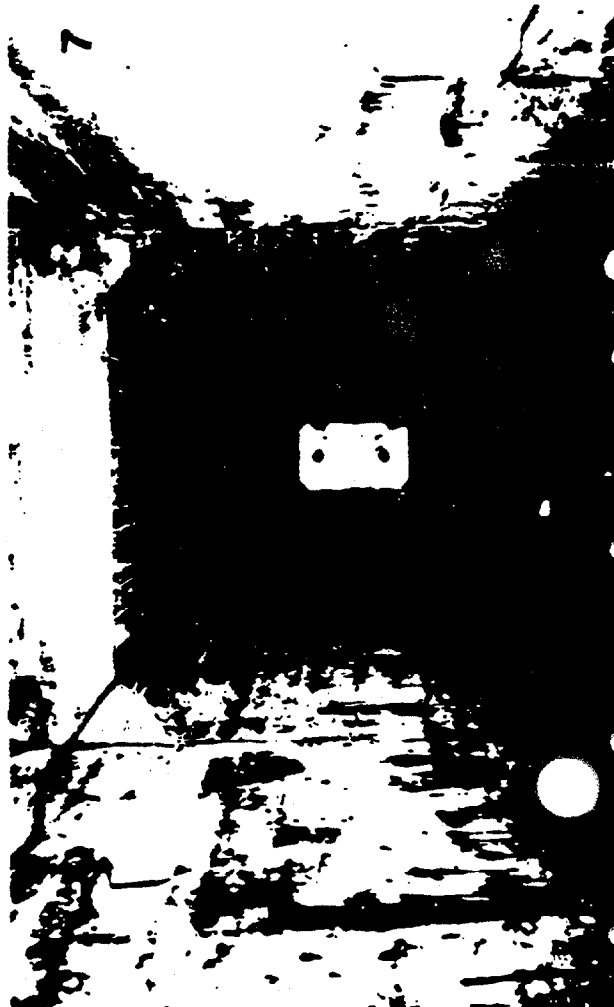
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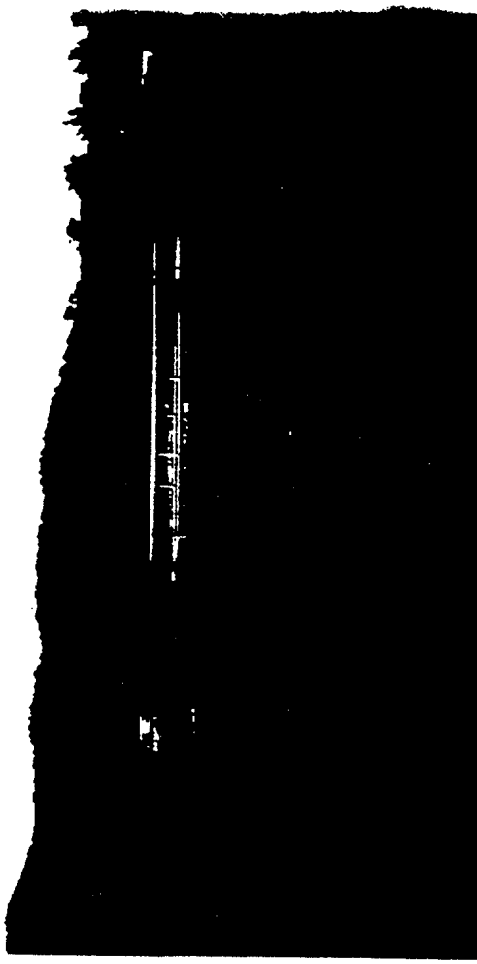

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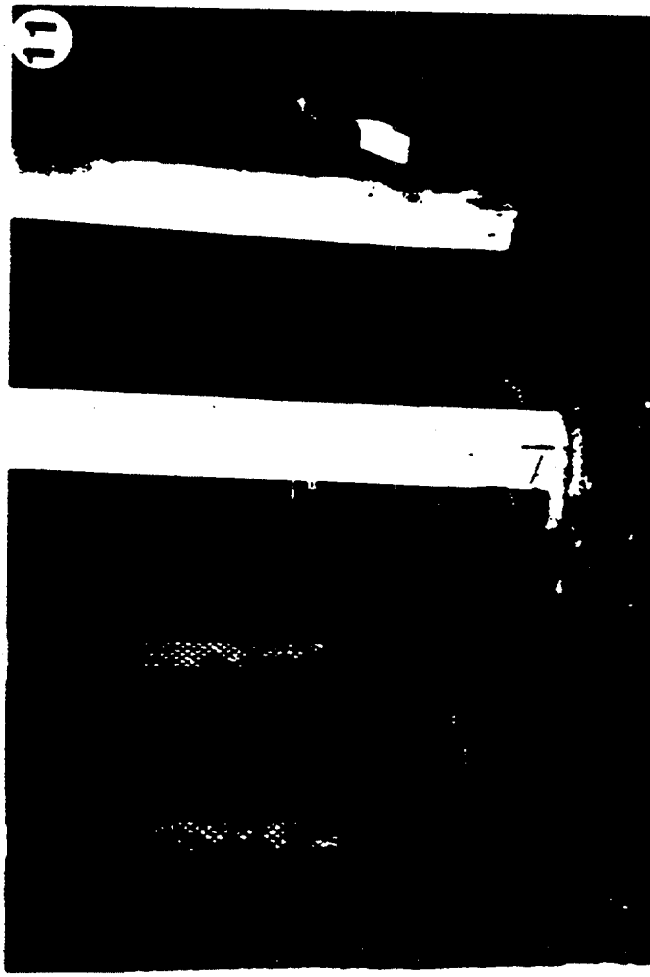

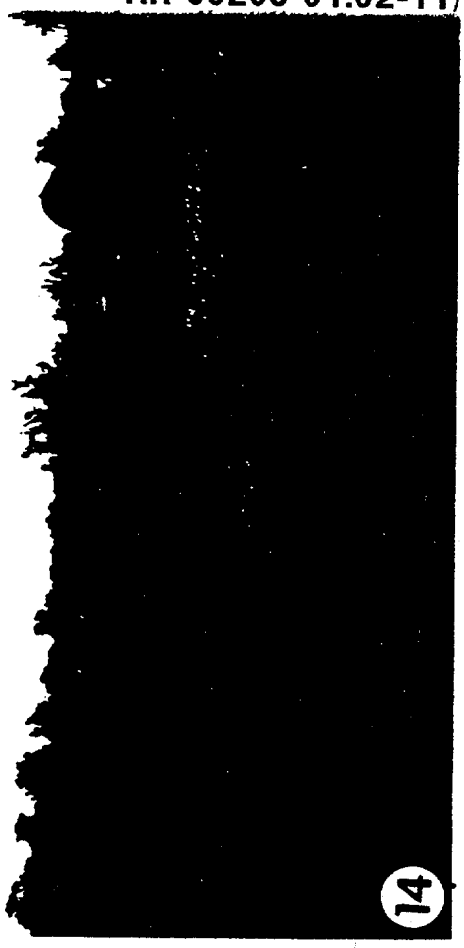

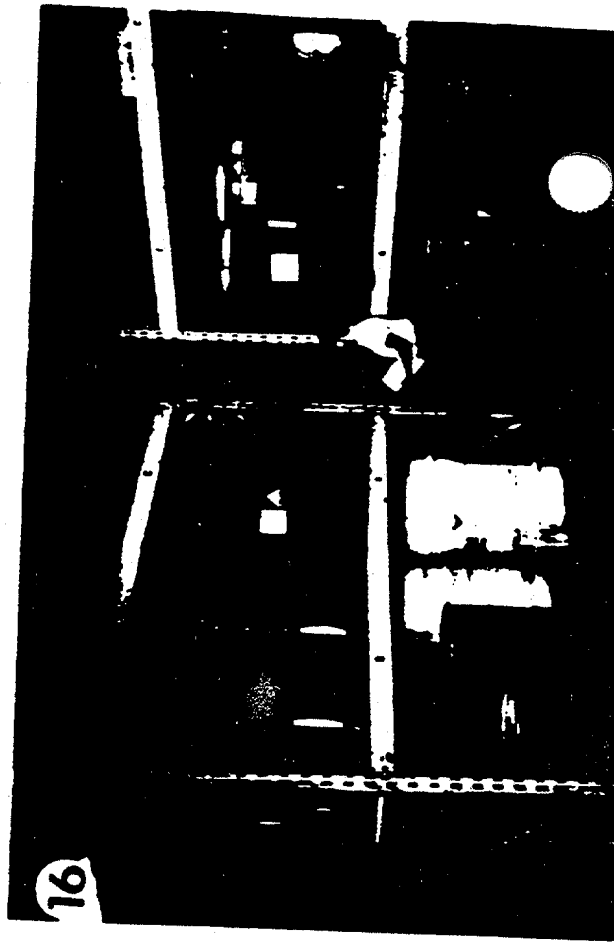

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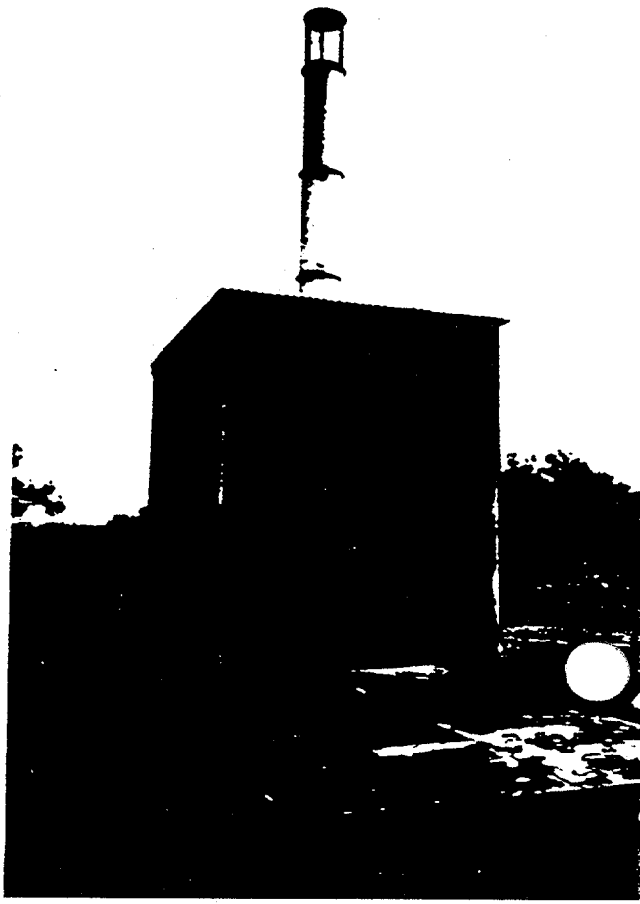

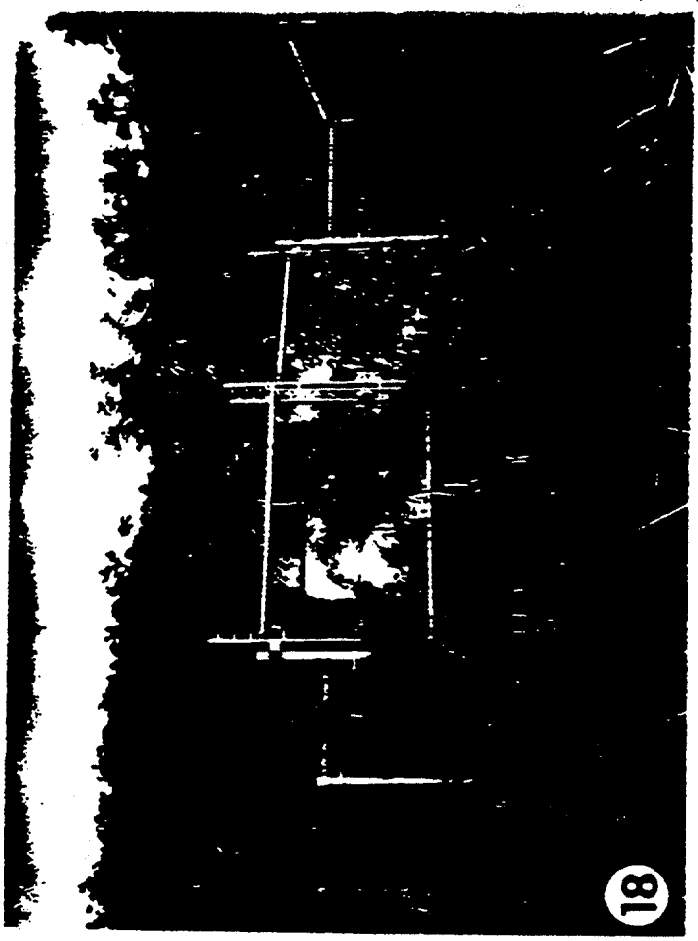
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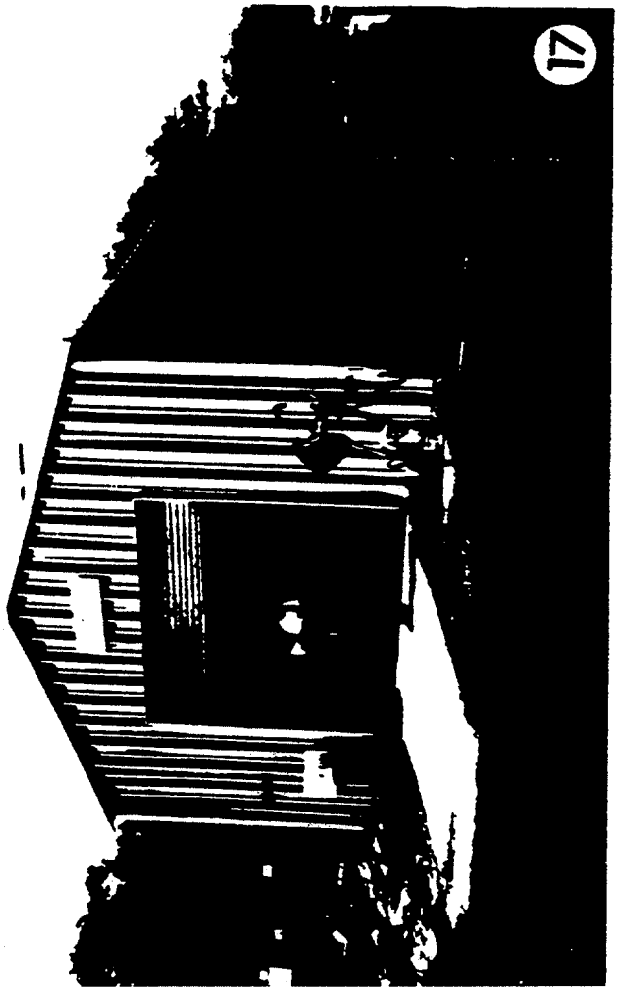
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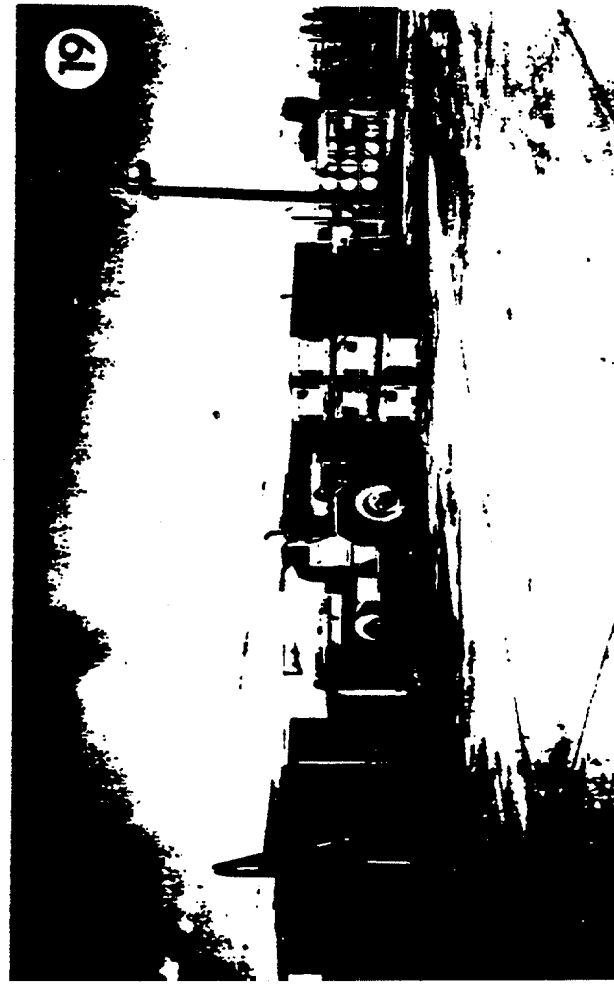
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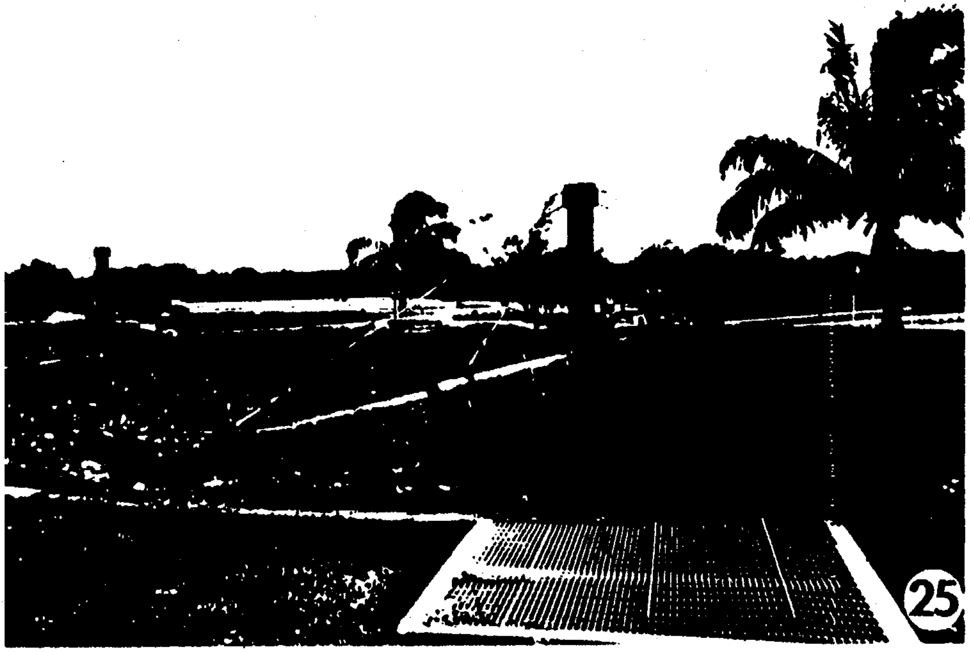

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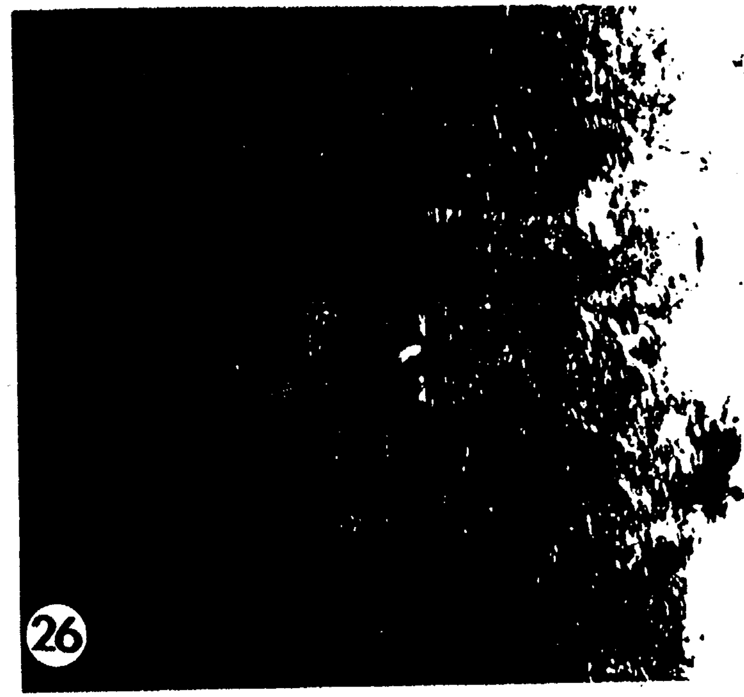

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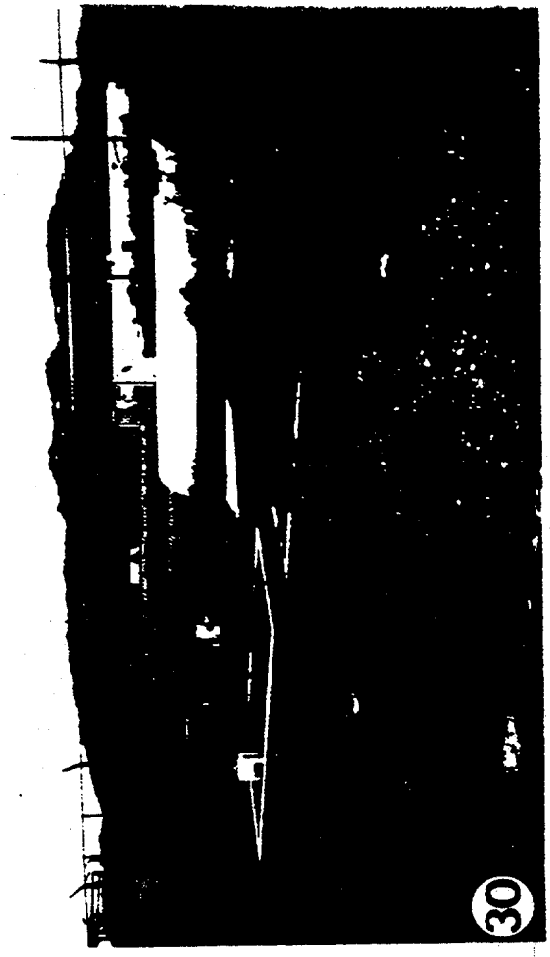

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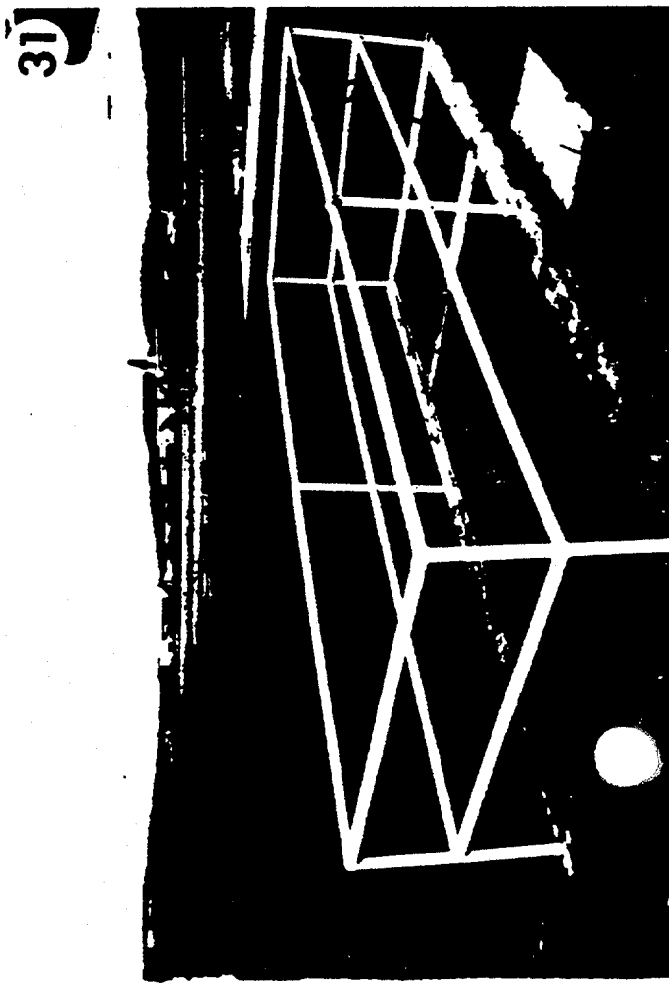

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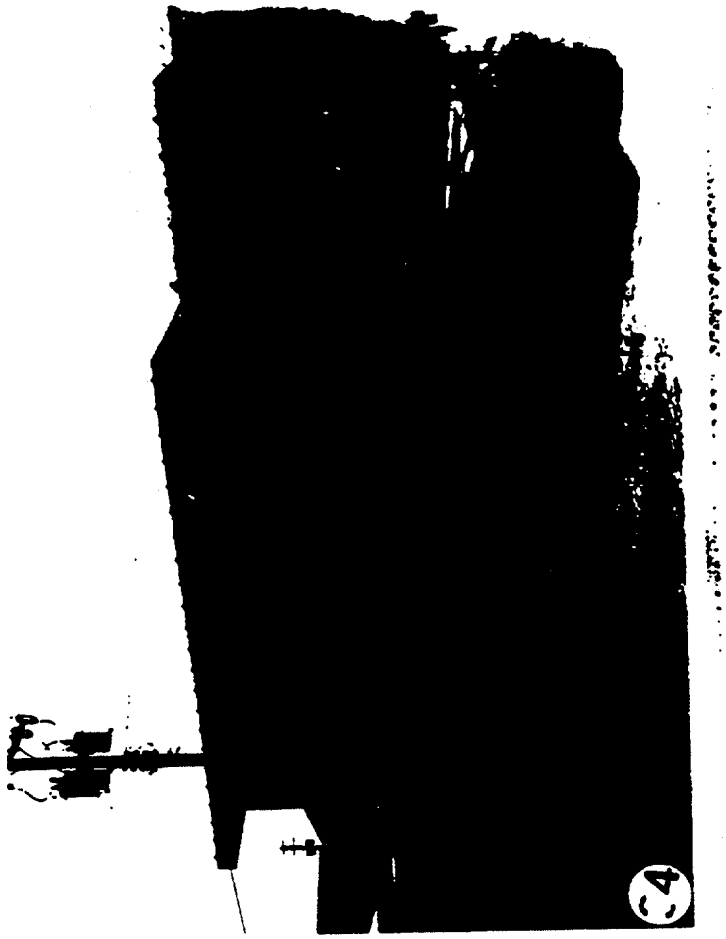
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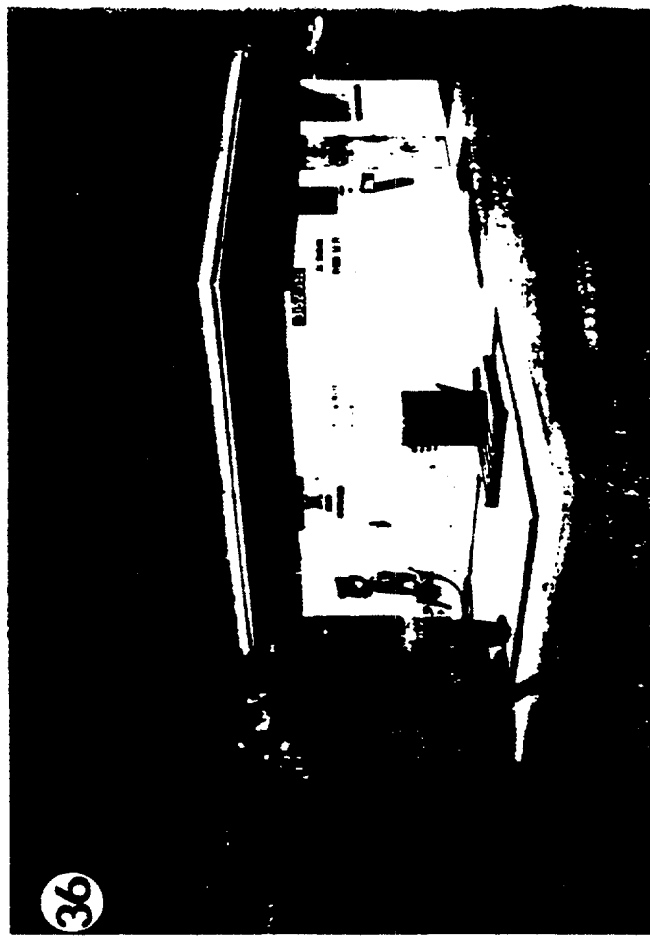
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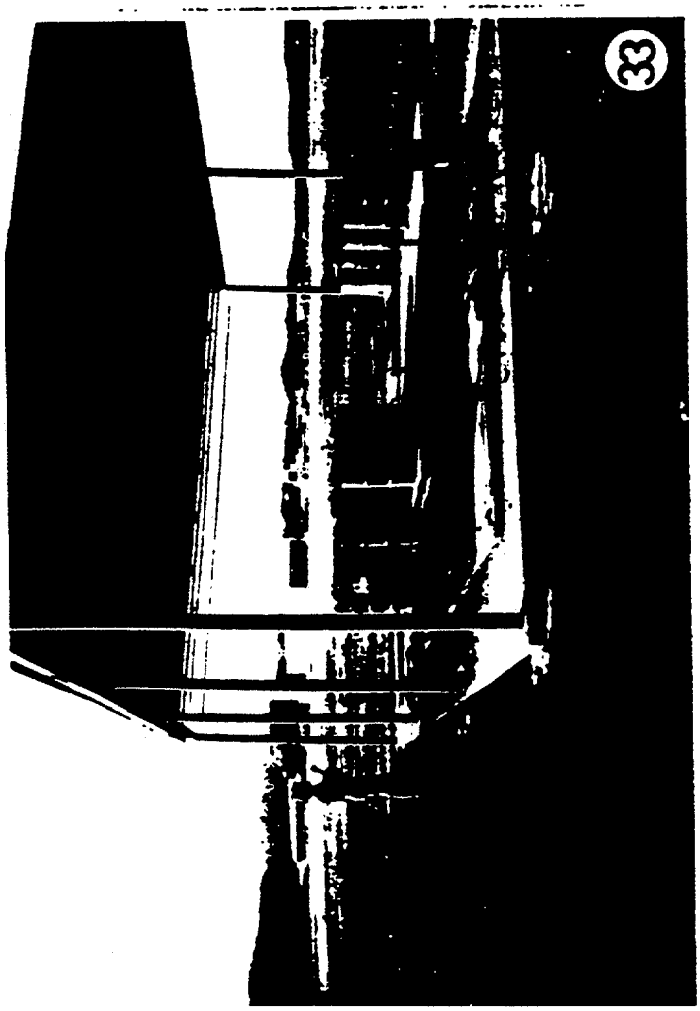
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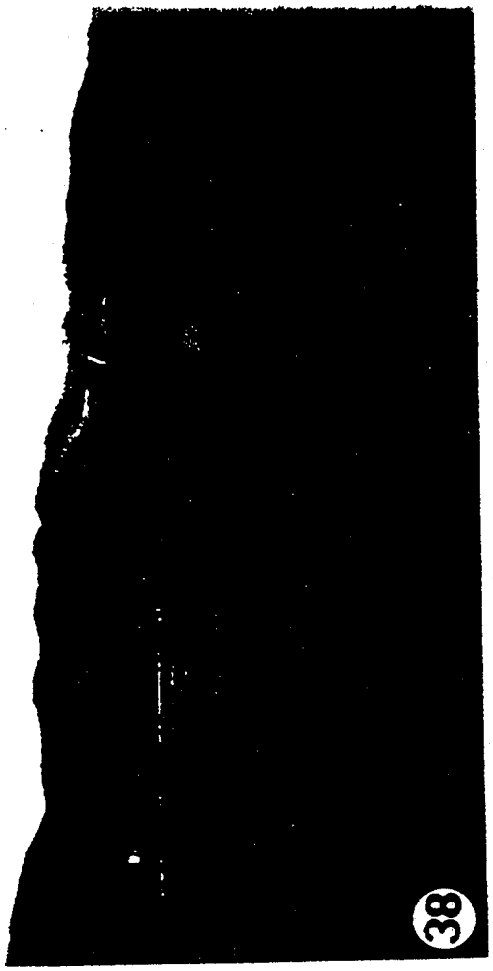
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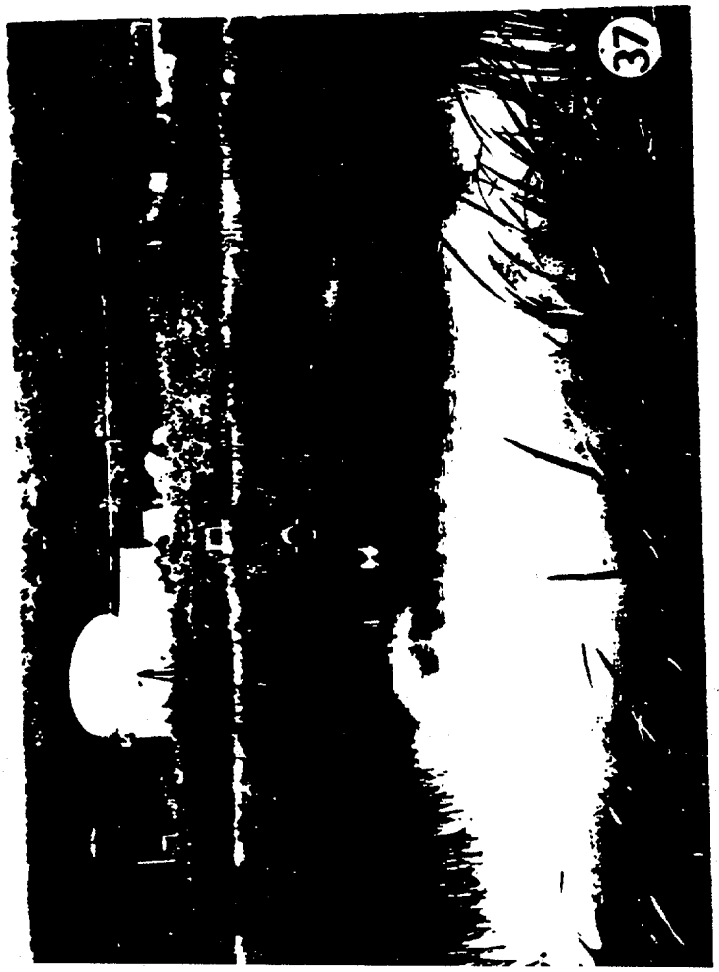
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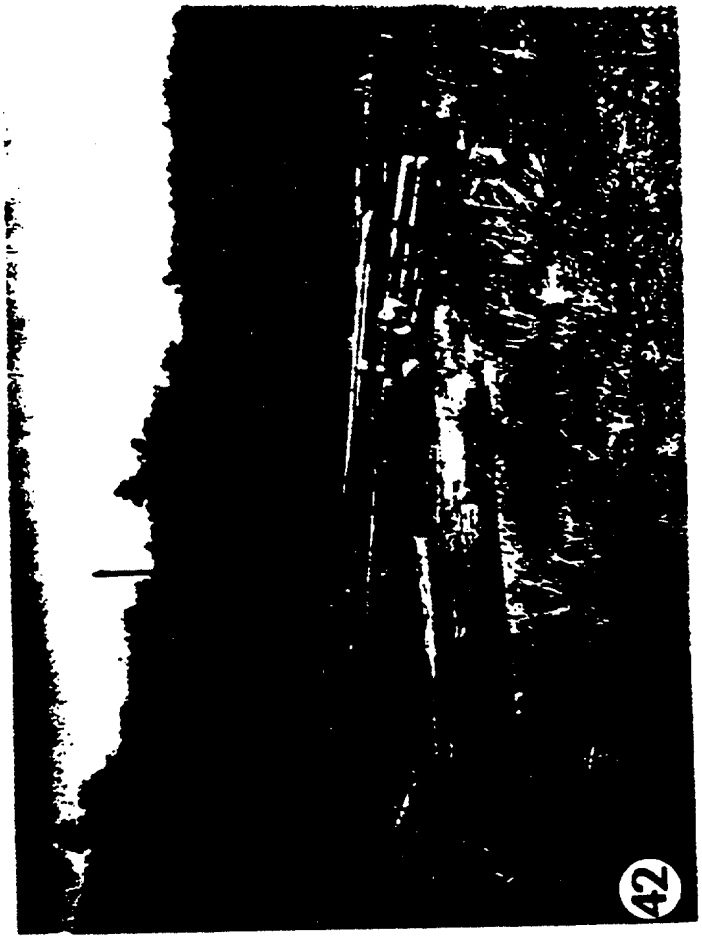
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