

01.02-10/1/88-02023

PHASE II RCRA FACILITY ASSESSMENT OF THE
ATLANTIC FLEET WEAPONS TRAINING FACILITY (LANT)
INCLUDING THE EASTERN MANEUVER AREA
CAMP GARCIA AND INNER RANGE
VIEQUES ISLAND, PUERTO RICO

EPA I.D. NO. PRD0980536221

prepared for

U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

prepared by

A. T. Kearney, Inc.
225 Reinekers Lane
Alexandria, Virginia 22313

and

K. W. Brown and Associates, Inc.
6 Graham Road
College Station, Texas 77840

EPA Contract No. 68-01-7038
Work Assignment No. R02-01-45

October, 1988

PHASE II
RCRA FACILITY ASSESSMENT REPORT

of the

ATLANTIC FLEET WEAPONS TRAINING FACILITY (LANT)
INCLUDING THE EASTERN MANEUVER AREA
CAMP GARCIA AND INNER RANGE
VIEQUES ISLAND, PUERTO RICO

EPA I.D. No. PRD0980536221

TABLE OF CONTENTS

	Page
1.0 INTRODUCTION	1-1
2.0 FACILITY DESCRIPTION	2-1
General Facility Description	2-1
History of Ownership	2-1
Operations/Process Description	2-3
History of Releases	2-5
3.0 ENVIRONMENTAL SETTING	3-1
Location and Surrounding Land Use	3-1
Climate and Meteorology	3-1
Topography and Surface Drainage	3-1
Soils, Geology and Hydrogeology	3-2
4.0 DESCRIPTIONS OF SOLID WASTE MANAGEMENT UNITS AND OTHER AREAS OF CONCERN	4-1
5.0 EXECUTIVE SUMMARY	5-1
6.0 RELEASE PATHWAYS	6-1
7.0 SUMMARY OF CONCLUSIONS AND FURTHER ACTIONS	7-1
8.0 REFERENCES	8-1

ATTACHMENTS

- A. VSI SUMMARY AND PHOTOGRAPH LOG
- B. VSI FIELD NOTES

LIST OF TABLES

	Page
1. SWMUs and AOCs at the Eastern Maneuver Area, Camp Garcia, and Inner Range Vieques Island, PR.	1-2
2. SWMUs and AOCs at the Eastern Maneuver Area, Camp Garcia, and Inner Range Vieques Island, PR.	4-1
3. Summary of Suggested Further Actions.	5-2
4. Summary of SWMUs and AOCs With No Suggested Further Actions . .	7-2

LIST OF FIGURES

1. SWMUs and AOCs at Camp Garcia and the Eastern Maneuver Area Area (Lant)	1-3
2. SWMUs and AOCs at the Inner Range	1-4
3. Locations of Atlantic Fleet Weapons Training Area and Surrounding Installations	2-2

1.0 INTRODUCTION

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

This report summarizes the results from the PR and VSI phases of the RFA at the Atlantic Fleet Weapons Training Facility (LANT), which includes Camp Garcia, the Eastern Maneuver Area, and the Inner Range on Vieques Island, 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 9, 1988.

The PR of file material resulted in the identification of six SWMUs and six AOCs. Following the VSI, a total of 11 SWMUs and 8 AOCs were identified (Table 1, Figures 1 and 2). 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 releases from the units.

This report is organized under eight chapter headings and contains two 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 location, climate, topography, geology, soils, and the 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. Finally, a summary of the VSI, a photograph log showing facility conditions at the time of the VSI, and a copy of the field notes are included as Attachments A and B.

Table 1. SWMUs and AOCs at the Eastern Maneuver Area, Camp Garcia, and Inner Range Vieques Island, PR.

SOLID WASTE MANAGEMENT UNITS

1. Camp Garcia Landfill
2. Fuels Off-Loading Site
3. Waste Explosive Ordnance Detonation Range
4. Spent Battery Accumulation Area (Camp Garcia)
5. Spent Battery Accumulation Area (Inner Range)
6. Waste Oil and Paint Accumulation Area (Seabees, Camp Garcia)
7. Waste Oil Accumulation Area (Marines, Camp Garcia)
8. Waste Oil Accumulation Area (Inner Range)
9. Explosive Ordnance Firing Range (Inner Range)
10. Sewage Treatment Lagoons (Camp Garcia)
11. Non-explosive Ordnance Firing Range

AREAS OF CONCERN

- A. Diesel Fuel Fill Pipe Area
 - B. Solid Waste Collection Units
 - C. Catch Basin for Hydraulic Oil (Building 303)
 - D. Cleaning Basin (Building 303, Camp Garcia)
 - E. Rags, Adsorbent and Grease Storage Area (Building 303)
 - F. Rock Quarry
 - G. Pump Station and Chlorination Building at Sewage Lagoons (Camp Garcia)
 - H. Lubricating Oil Storage Areas
-
-

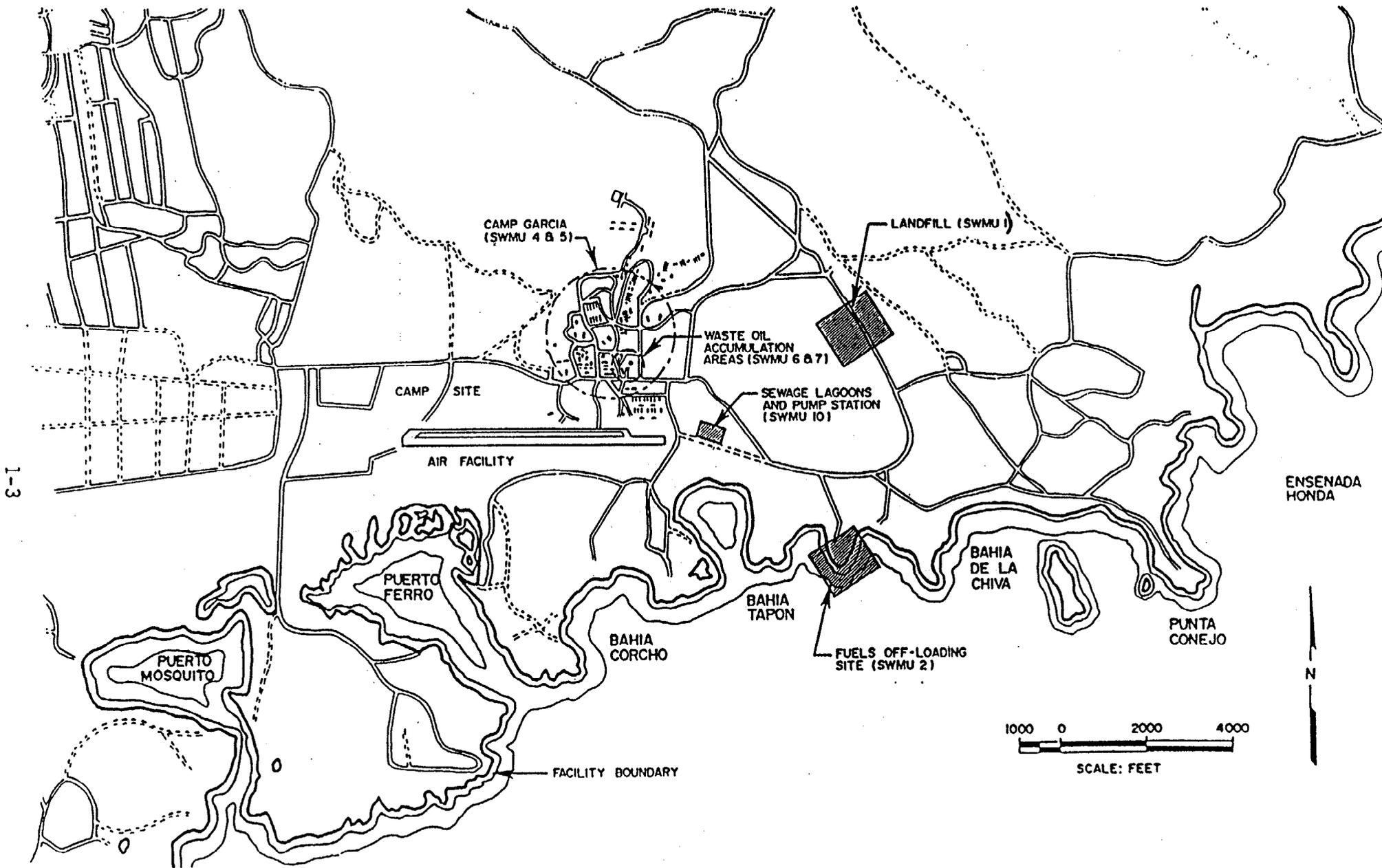


FIGURE I. SWMU s AND AOC s AT CAMP GARCIA AND THE EASTERN MANEUVER AREA (LANT).

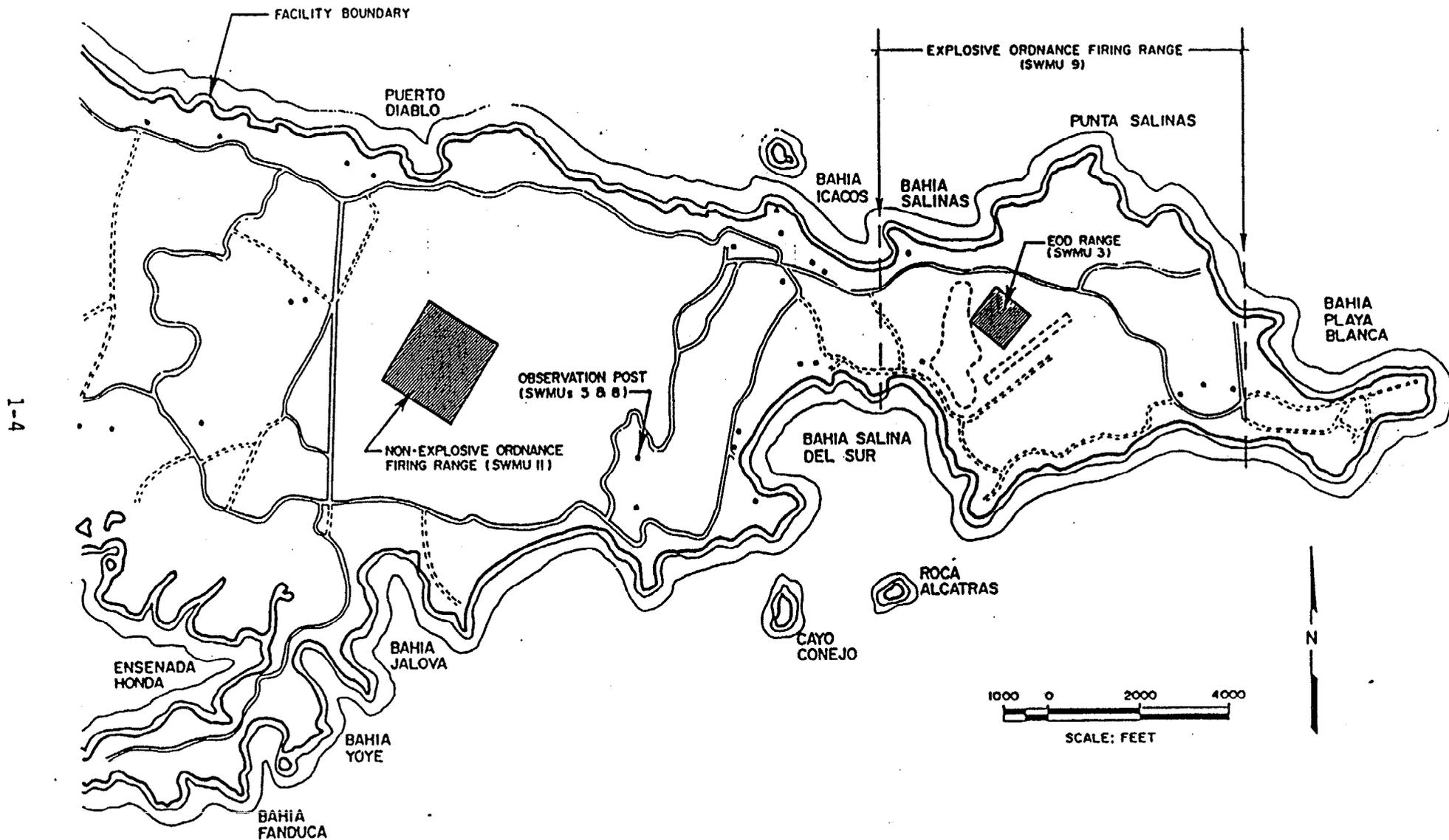


FIGURE 2. SWMU s AND AOC s AT THE INNER RANGE (LANT).

2.0 FACILITY DESCRIPTION

General Facility Description

The subject of this report is the Atlantic Fleet Weapons Training Facility (LANT) located on Vieques Island, Puerto Rico. The Weapons Training Facility is comprised of three primary areas including Camp Garcia, the Eastern Maneuver Area, and the Inner Range. Vieques Island is geographically located approximately seven miles east of the U.S. Naval Roosevelt Roads (USNSRR), Puerto Rico (Figure 3, Ref. 8). Besides the Atlantic Fleet Weapons Training Facility on the eastern end of the island, Naval property on Vieques Island includes the Naval Ammunition Facility (NAF) on the western end of the island (Figure 3, Ref. 8). NAF is also a RCRA facility but operates under a separate identification number and is, therefore, the subject of a separate RCRA Facility Assessment.

Vieques Island has a total land area of approximately 33,000 acres, including 22,600 acres owned by the U.S. Navy (Ref. 8). The remaining property is owned by individuals or the government of Puerto Rico and much of this land is used for cattle grazing or is undeveloped. The Cooperativa de los Ganaderos de Vieques leases 6,300 acres for open grazing of cattle and horses at the LANT facility (Ref. 8).

This facility is presently used for activities associated with Camp Garcia, the Eastern Maneuver Area, and the Inner Range. Camp Garcia is base for a small contingent of Seabees and approximately 15 civilian personnel employed on base, while the Eastern Maneuver Area is used for approximately three months per year for training by the Marines. The Inner Range, consisting of various ordnance firing and disposal ranges, is used year round as needed by the Atlantic Fleet for weapons training exercises.

History of Ownership

Vieques Island was first used by the U.S. Navy as a base for Allied Fleets in the early years of World War II. Land on the island was first acquired by the Navy between the years 1941 and 1943. The acquisition of additional land and the construction of other facilities was considered in the early 1940s; however, these plans were abandoned as an Allied victory seemed more promising. Additional land on the eastern portion of Vieques was acquired in 1947 to accommodate the need to conduct amphibious training exercises and maneuvers. Vieques Island was used for Fleet Marine Force, Atlantic (FMFLANT) maneuvers and training throughout the 1950s. In 1960, the U.S. Navy began holding training exercises on the island and established naval gunfire support (NGFS) and air-to-ground (ATG) targets at the Inner Range area of the LANT facility (Ref. 8).

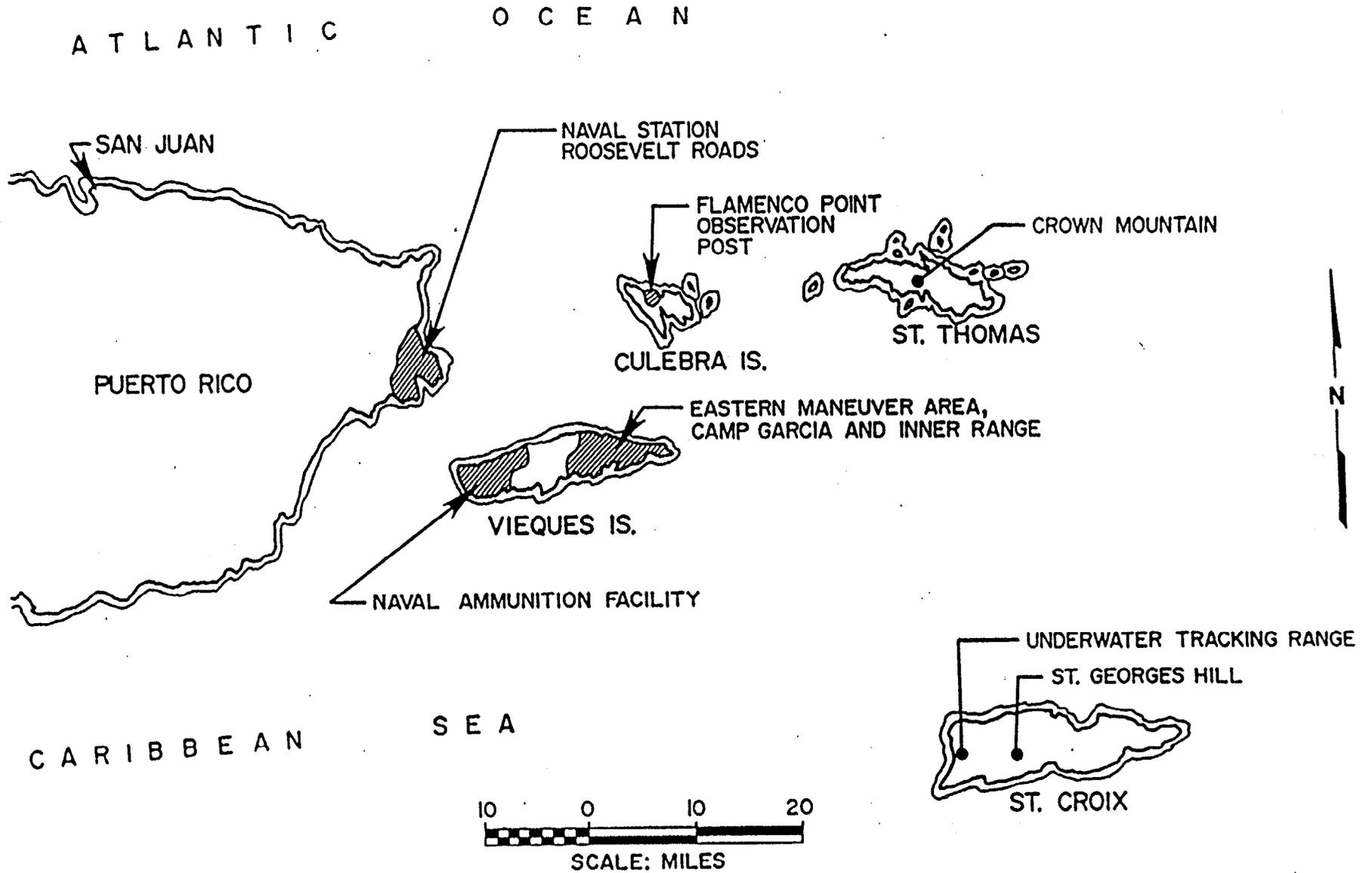


FIGURE 3. LOCATION OF ATLANTIC FLEET WEAPONS TRAINING FACILITY AND SURROUNDING INSTALLATIONS (REF. 8)

The Caribbean Islands, including Vieques, were settled over 6,000 years ago by South American aborigines. The first historical reference to Vieques Island was made by Columbus during his second trip to the New World in 1493. The island was virtually uninhabited until the English established a colony at the end of the 17th century. Various claims to Vieques Island were made throughout the 18th and early 19th centuries by the English, Spanish and Danes. By the middle of the 19th century, the Spanish had established a fort near Isabel Segunda and the sugarcane industry had become the major economic base on Vieques Island (Ref. 8).

Regulatory History

The LANT facility has submitted a Part A permit application for the Waste Explosive Ordnance Detonation Range (SWMU #3) (Ref. 5). This unit is the only RCRA unit at the facility and is regulated under Subpart X regulations as a miscellaneous unit. A letter to the facility from L. Amato, dated February 19, 1988 (Ref. 6), states that the final regulations regarding miscellaneous units were still under evaluation to determine their applicability to the unit at LANT. The letter further states that the required date of submission of the Part B permit application would be suspended until the evaluation was complete. A Part B permit application had not been submitted at the time of the VSI. The facility also operates the Explosive Ordnance Firing Range (SWMU #9) on the eastern end of the island under a NPDES permit allowing firing of ordnance to the water and wetlands. The conditions of the permit require periodic sampling and analyses of the water and wetlands during training exercises.

Operations/Process Description

The LANT facility is operated by the U.S. Naval Station Roosevelt Roads (USNSRR) for naval training exercises and explosive ordnance disposal at SWMU #3. Naval weapons training is conducted at the Inner Range located on the eastern tip of the island (Figure 2), while troop exercises are conducted at the Eastern Maneuver Area (EMA) in the western part of the facility (Figure 1).

The Inner Range is used for ordnance training of Naval equipment and personnel. Within the Inner Range, the Atlantic Fleet's surface ships, aircraft and marine forces practice training all aspects of naval gunfire support (NGFS), air-to-ground (ATG) ordnance delivery, air-to-surface mine delivery, amphibious landings, small arms, artillery, tank fire, and combat engineering (Ref. 8). The Inner Range occupies roughly 3,500 acres on the eastern tip of the island. The mission of the Inner Range is to provide facilities for scheduling and conducting NGFS and ATG ordnance delivery training for 96 Atlantic Fleet ships, 30 North Atlantic Treaty Organization ships, 8 air wings (an air wing consists of approximately 50 to 70 aircraft), and smaller air units from Great Britain and the Puerto Rico National Guard. Weapons systems are also tested and evaluated at the Inner Range to enhance fleet readiness. FMFLANT also uses the Inner Range to train shore fire control parties (spotters). Training entails live firing by the ships described above, with fall of shot observed and adjusted by Marine spotters (Ref. 8).

Naval Gunfire Support (NGFS) training facilities at the Inner Range include the observation post (OP-1) at Cerro Matias and six point targets. The NGFS range officer directs the exercises from Cerro Matias. During training exercises, Inner Range personnel record the accuracy and the elapsed time of naval gunfire so that the performance of each ship may be scored (Ref. 8). The observation post at Cerro Matias was renovated in 1988, which included removal of several old buildings, construction of a new main building and control tower, and installation of new diesel generators.

The Eastern Maneuver Area (EMA) occupies approximately 11,000 acres immediately west of the Inner Range. FMFLANT, the Puerto Rico National Guard, and foreign marine forces use the EMA for combat engineering training of amphibious landing teams. Red, Blue, Yellow and Purple beaches are used for amphibious landings with Red and Blue beaches being the most frequently used. These beaches are located within a restricted area which prevents conflicts with non-participating craft during training (Ref. 8). The EMA typically is used by the Marines for three months per year. During the remaining nine months of the year, these beaches are open to the public and are part of a tree planting program by the local Boy Scouts.

The activities at the Inner Range, EMA, and Camp Garcia function under the consolidated command of Commander Fleet Air Caribbean, Naval Forces Caribbean, and Antilles Defense Command, whose headquarters are at U.S. Naval Station Roosevelt Roads (Ref. 8).

The primary waste management operation at the facility is the Waste Explosive Ordnance Detonation Range (SWMU #3) where waste ordnance and propellants from USNSRR, NAF, and the LANT facility are disposed of by open burning. In addition, ordnance is fired to the land, sea, and wetlands on the eastern part of the island (note description of SWMU #9). Firing of ordnance to the sea and wetlands is regulated under a NPDES permit and periodic sampling and analyses are conducted under the conditions of the permit.

Operations which generate wastes at the facility include the maintenance of vehicles at each of the specific areas (i.e., Camp Garcia, EMA, and the Inner Range). Maintenance of vehicles and equipment by Navy and Marine personnel generates relatively small quantities of waste oil, solvent, lubricants, paints, batteries, and battery acid. All hazardous wastes are stored in drums or on the ground near the point of generation (e.g., SWMUs #4 through #8) prior to offsite transportation to the U.S. Naval Station Roosevelt Roads in Puerto Rico.

In the past, municipal solid waste was disposed of at the Camp Garcia Landfill (SWMU #1). Municipal solid waste is presently collected in various containers (AOC B) and disposed of offsite in the Vieques Island Municipal Landfill. The Vieques Landfill is not included in this RFA because it is not located on Navy property, and because the landfill is owned and operated by the government of Vieques Island. Domestic sewage generated at the facility is treated on-site with discharge of effluent either to the ground or to subsurface drainage lines. The majority of the sewage is treated at the Sewage Treatment Lagoons (described as SWMU #10). In addition, a below grade septic tank is located at the Observation Point. Effluent from the tank is to a drain field near the observation post.

History of Releases

Between approximately 1953 and 1978, an estimated 4,000 gallons of fuel per year were released into the Caribbean Sea and the shoreline of Vieques Island during refueling operations at the Fuels Off-Loading Site (SWMU #2) (Ref. 8). No additional information was available to further document any releases at the facility.

Additional discussion of releases from units observed at the facility are provided in the individual unit descriptions of Section 4.0.

3.0 ENVIRONMENTAL SETTING

Location and Surrounding Land Use

Vieques is a long, narrow island, approximately 52 square miles in area. It is located in the Caribbean Sea approximately seven miles east of U.S. Naval Station Roosevelt Roads in Puerto Rico, between 65°35'W to 65°16'W longitude and 18°05'N to 18°10'N latitude (Ref. 8).

Vieques Island occupies a land area of approximately 33,000 acres, about three-quarters of which is owned by the U.S. Navy (Ref. 8). The Naval facilities are divided into three areas. The land adjacent to the LANT facility is privately owned or owned by the municipality of Vieques or the Commonwealth of Puerto Rico. The land along the northwest boundary of the EMA is used for cattle grazing and private residences. There are two major towns on Vieques Island including Isabel Segunda on the north coast and Esperanza on the south coast. The combined population of these towns is less than 20,000. Most of the property along the southwestern boundary of the facility consists of pasture land, secondary forest growth, mangrove swamp and a public beach (Sun Bay Beach) near Esperanza. Beaches at Camp Garcia are available for public use during the months they are not used for Marines training exercises.

Climate and Meteorology

The climate of Vieques Island is tropical wet and dry. Steady year-round trade winds blow directly across the island from an easterly direction which moderate the tropical heat considerably. The NACIP report (Ref. 8) states that the limited information available on rainfall patterns indicate that approximately 45 inches of rainfall occur annually. Showers occur frequently throughout the year, but are usually of short duration and high intensity. There are considerable periods of sunshine during the year. The mean annual temperature is about 80° F with August being the warmest month at 82° F and February the coldest at 76° F (Ref. 8).

Topography and Surface Drainage

The NACIP IAS report (Ref. 8) states that the topography of Vieques consists of a series of low hills and shallow valleys. The hills on the western side of the island have a deeper soil profile than those on the eastern end. Hills on the eastern end are angular and rugged in appearance and have a large amount of exposed rock surface. The highest point on the eastern end is Cerro Matias (138 meters), the location of the observation post. The average elevation for the island is 75 meters above sea level (Ref. 8).

From the higher elevations of the island, quebradas (i.e., small, normally dry waterways) flow in both north and south directions to the sea. This division of the drainage results in many small drainage basins which function as drainage ditches to carry flood runoff in periods of intense rainfall. The largest drainage area on the island extends in a southeast-northwest direction from the village of Esperanza on the southwest coast of the island. The total drainage area of that basin is 2.3 square miles. There are four other basins with drainage areas of one to two square miles. There are several low-lying coastal zones of sedimentary deposits which are

generally level and contain lagoons and swamps (Ref. 8). The Navy presently has a NPDES discharge permit for its use of the water and wetlands at the eastern end of the island for an explosive ordnance firing range.

Soils, Geology, and Hydrogeology

The soils on Vieques island are mostly residual (i.e., they originate from the gradual breakdown of hard rock). The soil profile on the eastern portion of the island is very shallow as a result of the tropical wet and dry climate and the relatively impermeable volcanic rock. Soils on the eastern of the island can be generally characterized as fine-grained with a high clay content. The larger valleys of Vieques Island are filled and blanketed by alluvial deposits of the Quaternary age. The alluvial deposits are stream-laid and consist of clay, silt, sand and gravel. The deposits were derived from either the parent volcanic rock or the intrusive rock. These deposits, which vary in thickness, are usually more than 40 feet thick. The soils along the shoreline are covered with deposits of beach, alluvial, and wind blown sand, as well as lagoon and salt marsh muds (Ref. 8).

In terms of age and general lithology, there are three major types of rock on Vieques Island. These include the Upper Cretaceous volcanic rocks, the Upper Cretaceous or Lower Tertiary intrusive rocks, and the Upper Tertiary and Quaternary age sedimentary rocks. Unconsolidated sedimentary deposits on the island consist of alluvial deposits, beach and dune deposits, and swamp and marsh deposits. The oldest rocks on Vieques Island are believed to be of Upper Cretaceous age. These rocks appear to have been deposited in a marine environment and are similar to rocks of the same age found in Puerto Rico and the Virgin Islands. There is considerable variation in the thickness of these deposits across the island (Ref. 8).

The deformation and metamorphosis of the Cretaceous volcanic rocks occurred during the Upper Cretaceous or Lower Tertiary period, resulting from emplacement of a quartz diorite complex pluton. The quartz diorite plutonic rocks appear as outcrops over a large portion of the island, including much of the western and central portions. The eastern pluton is generally fine-grained with a microgranitic texture. Mafic intrusives are also distributed throughout the island. Numerous dark, fine-grained dike rock outcrops can be located at various locations across the island. Limestone outcrops of the Upper Tertiary age are found at three principal locations on the island including the extreme eastern end of the island near the observation post on Cerro Matias on the Inner Range. The limestone is soft, yellowish and contains a large number of fossils. The limestone tends to form a hard crust which resists weathering following exposure (Ref. 8).

The groundwater on Vieques Island varies from salty to relatively fresh. Because of the accumulation of salts from sea spray and saltwater encroachment, the groundwater is quite hard with high levels of chloride and sodium. Groundwater on the island has low levels of iron and nitrates. The two main sources of groundwater are located at the Naval Ammunition Facility and on the south coast near Esperanza. Since 1979, freshwater has been piped from Puerto Rico to Vieques Island. At present, there is a limited dependence on groundwater in homes and installations outside the

distribution systems. Very little information could be obtained during the RFA to describe the depth to groundwater on Vieques Island. Discussions with facility personnel indicated that, before 1980, the Navy operated three wells on the western end of the island. A well utilized by the cattle cooperative within NAF property appears to be a relatively shallow well. The depth to water in this well was estimated to be 6 feet (Ref. 4). Reference 4 indicates that NAF personnel occasionally drink from this well. Reference 4 also indicates that residents living near the NAF get their water from wells drilled into a shallow aquifer.

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

The SWMUs and other AOCs which were identified during the PR and VSI are listed in Table 2. Descriptions and known details of the units are given in the following section.

Table 2. SWMUs and AOCs at the Eastern Maneuver Area, Camp Garcia, and Inner Range Vieques Island, PR.

Solid Waste Management Unit	Status *
1. Camp Garcia Landfill	NACIP, Inactive
2. Fuels Off-Loading Site	NACIP, Inactive
3. Waste Explosive Ordnance Detonation Range	RCRA, Active
4. Spent Battery Accumulation Area	Active
5. Spent Battery Accumulation Area	Active
6. Waste Oil and Paint Accumulation Area	Active
7. Waste Oil Accumulation Area	Active
8. Waste Oil Accumulation Area	Active
9. Explosive Ordnance Firing Range	NPDES, Active
10. Sewage Treatment Lagoons	Active
11. Non-explosive Ordnance Firing Range	Active
Areas of Concern	
A. Diesel Fuel Fill Pipe Area	Active
B. Solid Waste Collection Units	Active
C. Catch Basin for Hydraulic Oil (Building 303)	Active
D. Cleaning Basin (Building 303)	Active
E. Rags, Adsorbent and Grease Storage Area (Building 303)	Active
F. Rock Quarry	Active
G. Pump Station and Chlorination Building at Sewage Lagoons (Camp Garcia)	Inactive
H. Lubricating Oil Storage Areas	Active

* Active indicates the unit continues in operation.
 Inactive indicates the unit is no longer in operation, but may still contain wastes.
 RCRA indicates the unit operates under RCRA interim status.
 NPDES indicates the unit operates under a National Pollutant Discharge Elimination System permit.
 NACIP indicates the unit was a subject of the Navy Assessment and Control of Installation Pollutants (NACIP) Department Initial Assessment Study (Ref. 8).

1. UNIT NAME: Camp Garcia Landfill (Eastern Maneuver Area)
(NACIP Site No. 20) (Photos 1, 2, and 3)

(17) NTC 25

Unit Description: This inactive unit is located on high ground approximately 3,000 to 4,000 feet north-northwest of Bahia di la Chiva (Blue Beach) and 1.5 to 2 miles east of Camp Garcia. The unlined landfill serviced a population of approximately 150 individuals. This number was increased during maneuvers and other military exercises. A 5-ton dump truck was used to dispose of waste at the site. At least one trip per day was made to the site, five days per week. It has been estimated that between 1,800 and 3,120 tons of materials have been disposed over the 100 to 200 acre area (Ref. 8).

The unit was closed in 1978 and a cap installed. In the mid-1980s, a gravel road was constructed down the approximate center of the former landfill.

This site was not included as a HRS "site" because it is not associated with CERCLA Sec. 101 contaminants (Ref. 1).

Date of Start-up: The NACIP IAS report (Ref. 8) indicates that the landfill was in operation from approximately 1954 to 1978.

Date of Closure: This unit has been inactive since 1978 (Ref. 8).

Wastes Managed: The wastes managed at this unit included paper, corrugated containers, cans and food packaging material, rags, scrap metal, and yard waste. All of the municipal solid waste from Camp Garcia and the Inner Range were handled here (Ref. 8).

Release Controls: This unit is presently capped and vegetated with a graded gravel road down the approximate center of the landfill. The unit is unlined.

History of Release: There were no documented releases identified with this unit. There were no signs of erosion or stressed vegetation evident at the time of the VSI. The site presently has a dense cover of pasture grasses.

2. UNIT NAME: Fuels Off-Loading Site (NACIP Site No. 4)
(Photos 4, 5, 6, 7 and 8)

DK Site 4

Unit Description: This unit is the former site of four aboveground fuel storage tanks located off the south coast of Vieques at Camp Garcia, east of Blue Beach. The two 20,000-gallon and two 30,000-gallon aboveground tanks were constructed for storage of fuel for naval equipment. The tanks were filled from a barge approximately every three months by pumping the fuel through an 8-inch submarine line to the tanks on shore. According to the NACIP IAS study (Ref. 8), seawater was flushed from the hose at each refueling period, resulting in the discharge of approximately 1,000 gallons of fuel to the land and sea. This activity occurred for approximately 25 years; therefore, about 100,000 gallons of fuel were discharged over this time period.

This site was not included as a HRS "site" because it is not associated with CERCLA Sec. 101 contaminants (Ref. 1).

Date of Start-up: The NACIP IAS report (Ref. 8) reports that the tanks began operation in 1953.

Date of Closure: The NACIP IAS report (Ref. 8) states that the tanks were removed between 1978 and 1979.

Wastes Managed: This unit was used for storage of diesel fuel, unleaded gasoline, AVGAS, and JP-5 fuel. Wastes in the vicinity of the unit consisted of spilled fuels during unloading periods. Facility representatives stated that sludge from the tanks was removed by a private contractor for disposal on the main island of Puerto Rico. The ultimate disposition of the sludge is unknown.

Release Controls: These were aboveground metal tanks; otherwise, no release controls were identified with this unit.

History of Release: As discussed earlier, during refueling periods at Bahía de la Chiva (Blue Beach), it was necessary to flush the seawater from hoses. This resulted in the discharge of approximately 1,000 gallons of fuel to the land and sea per refueling period. The tanks were filled a maximum of four times per year for approximately 25 years (Ref. 8). During the VSI, there were no visible signs of past releases to soil or adjacent surface water at

the location of the unit. The site of the former tanks is presently overgrown with grass and small shrubs. The only signs of activity at the location were a small piece of metal pipe and some cinder blocks.

3. UNIT NAME: Waste Explosive Ordnance Detonation Range (Photo 9) OD/AB

Unit Description: This unit is an active RCRA regulated waste ordnance open burn/detonation range within the Inner Range section of the facility. The unit currently operates as a RCRA interim status unit and is regulated under Subpart X regulations (Ref. 6). A Part B permit application had not been submitted at the time of the VSI. The area is located approximately 150 yards south of the north shore of Vieques Island and approximately 100 yards north of the simulated airfield used by the firing range. For explosive ordnance disposal, bulldozers are used to dig a trench across the area. The waste ordnance is placed in the trench and detonated from a safe distance using an electrical detonator. The trench is then covered with soil. The EOD range is presently used for disposal of all waste ordnance from U.S. Naval Station Roosevelt Roads and the Naval Ammunition Facility.

Date of Start-up: The date of start-up of this unit is believed to be approximately 1979, the same time as the deactivation of the range at the Naval Ammunition Facility (note NACIP Site No. 19, Ref. 8).

Date of Closure: This unit is presently active.

Wastes Managed: The wastes managed at this unit include aged and inoperative ammunition and explosive items which require destruction (i.e., K054, D001, D002). All explosive waste from U.S. Naval Station Roosevelt Roads and the Naval Ammunition Facility are disposed of here.

Release Controls: There are no release controls identified with this unit. The area is swept (i.e., explosively) twice per year for live ordnance by an Explosive Ordnance Demolition team.

History of Release: There were no documented releases identified from this unit. The adjacent surface waters of the Caribbean Sea are sampled as part of a NPDES permit, and the range was sampled during the NACIP Confirmation Study. This monitoring data was not readily available during the VSI and will, therefore, be requested as a suggested further action for this unit. The VSI team was not allowed direct access to this area during the VSI due to the potential

existence of live munitions. As viewed from a nearby observation post, the soil at the unit appeared bare and portions of the surrounding ordnance firing range were marked with impact craters.

4. UNIT NAME: Spent Battery Accumulation Area (Building 303, Camp Garcia)
(Photo 11)

Unit Description: This unit is an area in Building 303 at Camp Garcia where Navy Seabees store spent batteries and battery acid for disposal. No batteries or battery acid were being stored at the time of the VSI. The spent batteries and acid are transported offsite to U.S. Naval Station Roosevelt Roads on Puerto Rico and are eventually disposed of by a contractor. The acid from spent batteries is stored in a plastic container prior to offsite shipment.

Date of Start-up: The maintenance shop was built in the late 1960s and it is anticipated that the batteries have been stored in the building since that time.

Date of Closure: This unit is presently active.

Wastes Managed: This unit is used to manage spent batteries or battery acid.

Release Controls: The unit is located inside a metal building on a concrete floor.

History of Release: There are no documented releases identified with this unit. At the time of the VSI, there were no batteries stored at the site. Facility personnel indicated the location where batteries were stored. The location appeared to be clean with no visible stains on the floor.

5. UNIT NAME: Spent Battery Accumulation Area (Inner Range) (Photo 10)

Unit Description: This unit is an area at the Inner Range where spent batteries and battery acid are stored prior to disposal. At the time of the VSI, the batteries were stored on a gravel driveway adjacent to the observation post. Facility personnel stated that the battery acid would eventually be emptied into a plastic container. Periodically, both the spent acid and batteries are transported offsite to U.S. Naval Station Roosevelt Roads in Puerto Rico for disposal by a contractor.

Date of Start-up: The date of start-up of the unit was uncertain.

Date of Closure: This unit is presently active.

Wastes Managed: This unit is used to manage spent batteries and battery acid.

Release Controls: There are no release controls identified with this unit. The batteries were stored outdoors on a gravel driveway.

History of Release: There are no documented releases identified with this unit. At the time of the VSI, nine batteries were observed on a gravel driveway. No staining of soil or other signs of release were observed on the driveway or in the vicinity of the batteries.

6. UNIT NAME: Waste Oil and Paint Accumulation Area (Seabees, Camp Garcia)
(Photo 13)

Unit Description: The Seabees utilize this area for temporary storage of waste oil in 55-gallon drums and paint in small containers. This area includes a welded metal pipe stand for storage of two drums of lubricating oil and an adjacent grassy area where 55-gallon drums of waste oil and tires are stored. Waste materials are transported to U.S. Naval Station Roosevelt Roads on Puerto Rico for offsite disposal by a private contractor.

Date of Start-up: According to facility representatives, this unit has been in use for approximately 10 years.

Date of Closure: This is an active unit.

Wastes Managed: This area is used to manage waste lubricating oils and several tires. Two drums of waste oil were located at the unit at the time of the VSI.

Release Controls: The waste oil and lubricants are stored in 55-gallon drums; otherwise, no release controls were identified with this unit.

History of Release: There were no documented releases identified at this unit. The waste oil and tires are stored on and above bare ground and spills of oil to the soil were observed during the VSI.

7. UNIT NAME: Waste Oil Accumulation Area (Marines, Camp Garcia)
(Photo 14)

Unit Description: This is a temporary waste oil storage area located near the maintenance shop (Building 303) at Camp Garcia. The Marines use the area once per year during their three month training exercise at the Eastern Maneuver Area. The waste oil accumulation area included an open-top 55-gallon metal drum, a 25-gallon metal trash can and two metal drums split in half (and laying on their sides) for the storage of waste oil from the maintenance of Marine vehicles. The soil in this area was severely stained with waste oil. A Marine sergeant stated that they would add sand and dig up the contaminated soil prior to their departure. The sergeant further stated that the waste oil was to be placed in drums and transported to U.S. Naval Station Roosevelt Roads on Puerto Rico for disposal.

Date of Start-up: The area is used for three months each year in conjunction with Marine maneuvers at the Eastern Maneuver Area. The date the area was first used in this manner is unknown.

Date of Closure: The Marines stated that the waste oil is removed at the end of maneuvers each year.

Wastes Managed: These units are used for the accumulation of waste oils from the maintenance of vehicles during maneuvers at the Eastern Maneuver Area.

Release Controls: A Marine sergeant stated that, at the end of maneuvers, the drums and the contaminated soil would be excavated and loaded into new 55-gallon drums and transported to U.S. Naval Station Roosevelt Roads in Puerto Rico. There are no release controls identified with this unit.

History of Release: During the VSI, the drums were observed to be full and the soil adjacent to the storage area was severely stained.

8. UNIT NAME: Waste Oil Accumulation Area (Inner Range) (Photo 15)

Unit Description: This unit is a drum storage area for waste lubricants and oil operated by the Navy. The unit is located outside of the generator building at the observation post on Cerro Matias. The drums of waste oil are stored on bare soil prior to transport to U.S. Naval Station Roosevelt Roads in Puerto Rico for contractor disposal. During the VSI, a small spill of lubricating oil was observed beneath one of the product barrels.

Date of Start-up: This unit has been in use for approximately 10 years.

Date of Closure: This is an active unit.

Wastes Managed: This area is used to manage lubricating oils and waste oils.

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

History of Release: During the VSI, three drums of waste oil were being stored on bare soil. Stains were observed on the soil adjacent to the drums.

9. UNIT NAME: Explosive Ordnance Firing Range (Photos 9, 16 and 17)

Unit Description: This area is located on the easternmost end of Vieques Island and is employed by the Navy as a live ordnance firing range for the Atlantic Fleet Weapons Training Facility (Ref. 2). Ships and aircraft are scored for accuracy with live ordnance using several targets on the range. The Navy has a NPDES permit allowing release or firing of ordnance into the waters adjacent to the area and the wetlands within the training area (Ref. 1). Facility personnel stated that after a round is fired into the wetland, a facility employee obtains a water sample from a boat within 45 minutes. The sample is shipped on dry ice within 24 hours to the mainland for chemical analysis.

Date of start-up: This unit has been in use since the start-up of the Inner Range in the early 1960s.

Date of closure: This is an active unit.

Wastes Managed: This area receives explosive ordnance from training exercises conducted by the Atlantic Fleet at the eastern end of Vieques Island. The ordnance may contain residual propellants and explosive materials.

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

History of Release: The unit is used for training with live ordnance from aircraft and ships at sea. The land area, water, and wetlands are used as impact zones for the ordnance. During training exercises, surface water is sampled twice monthly. The results of the monitoring data were not available at the time of the VSI. This will, therefore, be requested as a suggested further action for this unit. At the time of the VSI, the area was being swept by an Explosive Ordnance Demolition team and could only be viewed from a distance. From the observation post, it could not be determined if any signs of release were visible.

10. UNIT NAME: Sewage Treatment Lagoons (Camp Garcia)
(Photos 18, 19, and 20)

Unit Description: Camp Garcia utilizes a two-stage lagoon system for treatment of domestic sewage. The system utilizes a series of four unlined lagoons, including two receiving and two polishing lagoons. The effluent from the final lagoons is discharged to land. The amount of domestic sewage generated at Camp Garcia is limited due to the small population utilizing the facilities. A small contingent of Navy Seabees uses the facilities in the barracks full-time, and approximately 15 civilians use the sanitary facilities daily.

Date of Start-up: These lagoons have been in use since the adjacent pump station was installed in the early 1950s.

Date of Closure: This is an active unit.

Wastes Managed: The lagoons are used for treatment of domestic sewage from approximately 45 people at the Seabee barracks and facility offices. It is unlikely, but also uncertain, that hazardous constituents are present in the waste. The facility does not add chemical treatments to the sewage.

Release Controls: There were no release controls identified with the unlined lagoons. The final effluent from the lagoons is discharged to the ground. There is no known sampling conducted near this unit.

History of Release: The lagoons discharge effluent to the soil through a pipeline system. There were no signs of uncontrolled or unintentional release in the vicinity of the unit.

11. UNIT NAME: Non-explosive Ordnance Firing Range (Inner Range)
(Photo 21)

Unit Description: This area is located west of the observation post at Cerro Matias and east of Camp Garcia. The area is used for air target practice with non-explosive ordnance.

Date of Start-up: The firing range has been active since the 1960s.

Date of Closure: This is an active unit.

Wastes Managed: This unit contains shells of non-explosive ordnance. It is unknown if hazardous constituents are present. However, based upon the types of ordnance used (e.g., smoke producing ordnance) and the presence of residual propellants, hazardous constituents may be present.

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

History of Release: There are no documented releases identified with this unit. This area was inaccessible at the time of the VSI.

- A. AREA OF CONCERN NAME: Diesel Fuel Fill Pipe Area
(Observation Post - 1) (Photo 22)

Area of Concern

Description: This is an area of bare soil approximately 6 feet x 6 feet adjacent to a pipe used to fill diesel fuel into the underground storage tank at the observation post at Cerro Matias. According to facility representatives, this equipment has been in use for approximately 10 years. No release controls were observed to be associated with the area. During the VSI, the soil surrounding the fuel fill pipe appeared to be severely stained from past filling operations. Since the underground tank is located approximately 25 feet southwest and downgradient from the fill pipe, it is unlikely that the stains are from tank seepage.

B. AREA OF CONCERN NAME: Solid Waste Collection Units (Photos 27 and 28).

Area of Concern

Description: These units include wooden boxes, wooden trailers, and metal cans and dumpsters which are used to manage general refuse. During the VSI, a small wooden trailer was observed at the observation post at Cerro Matias. Facility personnel stated that the trailer and other containers are loaded with refuse until full and then transported offsite to the Vieques Island landfill for disposal.

C. AREA OF CONCERN NAME: Catch Basin for Hydraulic Oil (Camp Garcia)

Area of Concern

Description: This area is a metal gutter, approximately 5 feet long and 6 inches wide, located beneath several containers of hydraulic oil on a rack. The gutter is designed to catch drips that occur when hydraulic oil is removed from the drums. The unit is located inside of Building 303 and is over a concrete floor. No sign of release was observed during the VSI.

D. AREA OF CONCERN NAME: Cleaning Basin (Building 303, Camp Garcia)
(Photo 32)

Area of Concern

Description: This unit is a square metal container, approximately 24 inches long, 18 inches wide, and 12 inches deep, used to hold solvent for the cleaning and degreasing of parts. The unit is located inside of Building 303 at Camp Garcia. Waste solvent from the unit is stored in drums at the waste oil accumulation area (SWMU #7) prior to transport to U.S. Naval Station Roosevelt Roads on Puerto Rico.

E. AREA OF CONCERN NAME: Rags, adsorbent, and grease storage area in Building 303 (Photo 11)

Area of Concern

Description: This area is located inside Building 303 and is a small area of the shop where several barrels of grease, rags, and adsorbent for spills are stored. Facility personnel stated that this was also the approximate area where spent batteries would be stored (SWMU #4). There were no visual signs of a release or spill to the floor observed during the VSI.

F. AREA OF CONCERN NAME: Rock Quarry (Camp Garcia) (Photo 31)

Area of Concern

Description: This area is located southwest of the former Camp Garcia landfill. The area is used by the Navy as a source of gravel for road building. During the VSI, several used tires and accumulated paper waste were observed to have been deposited at the quarry.

G. AREA OF CONCERN NAME: Pump Station and Chlorination Building at Sewage Lagoons (Camp Garcia) (Photo 33)

Area of Concern

Description: This unit was used for the pumping and chlorination of domestic sewage at Camp Garcia during the 1950s and 1960s. The unit is partially below grade and is constructed of concrete. The use of the unit was completely stopped in 1978 when the activity of the base decreased. During the VSI, stains were observed at the top of the concrete unit, which indicated there may have been periodic events when the unit had overflowed; however, the grass adjacent to the unit did not appear to be severely stressed.

H. AREA OF CONCERN NAME: Lubricating Oil Storage Areas (Photos 13 and 14)

Area of Concern

Description: Lubricating oil is stored in several areas at the facility. Two representative areas were observed during the VSI including the Seabees maintenance area (see SWMU #6) and the Marine maintenance area (see SWMU #7), both at Camp Garcia. Each of these areas were approximately 6 feet x 6 feet and were located on bare soil. The areas appeared to be used for storage of 1 to 10 55-gallon drums. Stains were observed on the soil in the vicinity of the stored product drums during the inspection of the area.

5.0 EXECUTIVE SUMMARY

A RCRA Facility Assessment was conducted at the Atlantic Fleet Weapons Training Facility (LANT) including Camp Garcia, the Eastern Maneuver Area and the Inner Range 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. Primary sources of existing information included the Region II office of the Environmental Protection Agency in New York and the Environmental Quality Board of Puerto Rico.

The Atlantic Fleet Weapons Training Facility includes approximately 14,500 acres on the eastern end of Vieques Island (Ref. 8). The facility includes Camp Garcia, the Eastern Maneuver Area, and the Inner Range. The facility is geographically located approximately seven miles east of Puerto Rico. Vieques Island is a long, narrow island, approximately 52 square miles in total area.

The U.S. Navy began using Vieques in conjunction with Naval Station Roosevelt Roads in the early years of World War II as a base for Allied fleets (Ref. 8). Land was acquired in the eastern and western sectors of the island between 1941 and 1943. The LANT facility is operated by the U.S. Naval Station Roosevelt Roads (USNSRR) for naval training exercises and explosive ordnance disposal. Naval weapons training is conducted at the Inner Range located on the eastern tip of the island (Figure 2), while troop exercises are conducted at the Eastern Maneuver Area (EMA) in the western portion of the facility, southeast of Camp Garcia (Figure 1). Although the facility occupies a total of approximately 14,500 acres, most of that area is used for training exercises. The facility employs no industrial or process operations and generation of wastes is limited to maintenance of vehicles and equipment and the disposal of explosive wastes. Wastes generated during maintenance activities include oils, lubricants, solvents, paints, batteries, and battery acid which are all disposed off-site. The explosive wastes are generated by the LANT facility as well as the Naval Ammunition Facility and U.S. Naval Station Roosevelt Roads and are disposed on-site by open burning in a RCRA interim status unit (SWMU #3).

The RFA resulted in the identification of 11 SWMUs and 8 AOCs. The units which presently handle wastes include the Waste Explosive Ordnance Detonation Range (SWMU #3), the Explosive Ordnance Firing Range (SWMU #9), and the Non-explosive Ordnance Firing Range (SWMU #11). Other wastes are temporarily accumulated in the Spent Battery Accumulation Areas (SWMUs #4 and #5) and the Waste Oil Accumulation Areas (SWMUs #6, #7, and #8). Domestic sewage is treated in the Sewage Treatment Lagoons (SWMU #10). Former waste management units include the Camp Garcia Landfill (SWMU #1) and the Fuels Off-Loading Site (SWMU #2).

The primary units of concern include the closed Camp Garcia Landfill (SWMU #1), the Fuels Off-Loading Site (SWMU #2), and the Detonation Ranges (SWMUs #3, #9, and #11) which all represent a potential for release to soil, groundwater and surface water. Further actions were suggested at 9

of the 11 SWMUs and at 2 AOCs. Further actions included soil sampling, surface water and sediment sampling, verification of unit integrity, and requests for additional information. Table 3 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 3. Summary of Suggested Further Actions.

Unit Number	Unit Name	Comments
1	Camp Garcia Landfill	Additional information, soil sampling
2	Fuels Off-Loading Site	No further action
3	Waste Explosive Ordnance Detonation Range	Soil, sediment sampling
4	Spent Battery Accumulation Area	No further action
5	Spent Battery Accumulation Area	Secondary containment
6	Waste Oil and Paint Accumulation Area	Secondary containment
7	Waste Oil Accumulation Area	Secondary containment
8	Waste Oil Accumulation Area	Secondary containment
9	Explosive Ordnance Firing Range	Review of information
10	Sewage Treatment Lagoons	Determine presence of hazardous constituents
11	Non-explosive Ordnance Firing Range	Determine presence of hazardous constituents
A	Diesel Fuel Fill Pipe Area	Secondary containment
B	Solid Waste Collection Units	No further action
C	Catch Basin for Hydraulic Oil	No further action
D	Clean-o-matic (Building 303)	No further action
E	Rags, adsorbent, and grease storage area (Building 303)	No further action
F	Rock Quarry	No further action
G	Pump station and chlorination building at sewage lagoons (Camp Garcia)	No further action
H	Lubricating Oil Storage Areas	Secondary Containment

6.0 RELEASE PATHWAYS

Groundwater

The main source of potable groundwater on Vieques is the Valle de Resolucion, located on the western portion of Vieques. Groundwater on the eastern portion of the island, however, is very hard and brackish, and little use is made of the resource (Ref. 8). Depth to groundwater at a well on the western end of the island is 6 feet (Ref. 4). Groundwater movement occurs where alluvial deposits of clay, silt, sand, and gravel measure up to 40 feet thick (Ref. 8). The groundwater moves in a northwesterly and southeasterly direction within these sediments from the subsurface water divide, which runs in a southwest to northeast direction across the Valle de Resolucion. Given the expected shallow depth to groundwater and the existence of unlined units and release of wastes to soil at the facility, the potential for release to groundwater is considered high. Unlined units at the facility include the closed landfill (SWMU #1), and the unlined sewage lagoons (SWMU #10). In addition, the presence of waste oils, paints, solvents, and diesel oil in and on soil at various locations throughout the facility results in a potential for release to groundwater.

Soil

The majority of the soils on Vieques Island are residual (i.e., they originate from the gradual breakdown of hard rock). Soil development on the eastern end of the Island has been severely limited, resulting in a very shallow profile over relatively impermeable volcanic rock. Generally the soils on the eastern end of the Island are fine-grained with a high clay content. The presence of unlined units and practices which place wastes directly on bare soil result in a high potential for release to the soil. Unlined units include the Camp Garcia Landfill (SWMU #1) and the Sewage Treatment Lagoons (SWMU #10). In addition, several areas were observed where wastes were routinely released to soil, including the Waste Oil Accumulation Areas (SWMUs #6, #7, and #8) and the Sewage Treatment Lagoons (SWMU #10). The facility also uses the island for ordnance practice resulting in residual explosive and propellant materials on the soil. The areas include the Explosive Ordnance Firing Range (SWMU #9) and the Non-explosive Ordnance Firing Range (SWMU #11). The facility employs an open burning site (SWMU #3) where explosives are burned on bare soil.

Air

The facility conducts open burning of ordnance on-site, representing a high potential for release to air during these excursions. Additionally, paint solvents, waste oils, and fuels may represent a moderate potential for release to air; however, most of these materials are stored in drums with lids or tanks.

Subsurface gas

The potential for generation of subsurface gas at the facility is considered relatively low due to the types of wastes managed. The primary unit considered to present a potential for generation of subsurface gas is the closed, unlined landfill (i.e., Camp Garcia Landfill, SWMU #1), which was used for disposal of municipal waste.

7.0 SUMMARY OF CONCLUSIONS AND SUGGESTED FURTHER ACTIONS

The following section is a summary of conclusions and suggestions for further action at units at the Atlantic Fleet Weapons Training Facility, Vieques Island, Puerto Rico, which includes Camp Garcia, the Eastern Maneuver Area, and the Inner Range. These units are considered to represent a potential for release to soil/groundwater, surface water, air, and/or subsurface gas. The PR and VSI phases of the RFA identified 11 solid waste management units (SWMUs) and 8 areas of concern (AOCs). Of these units, it was determined that 9 SWMUs and 2 AOCs have a potential for release to one or more environmental pathways. The conclusions and further actions for these units are discussed in detail.

The remaining SWMUs and AOCs were determined to have low/no potential for release to all environmental pathways. These units are presented in Table 4, with a summary of the basis for this determination. No pathway-by-pathway descriptions have been developed for these units; however, detailed descriptions of the units can be found in Section 4.0.

A preliminary assessment of the potential for release from each unit was made based upon information collected during the PR and 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.

Table 4. Summary of SWMUs and AOCs With No Suggested Further Actions.

Unit No.	Unit Name	Comments
2	Fuels Off-Loading Site	Old fuel spill to ocean and shore, no visible signs of impact
4	Spent Battery Accumulation Area (Camp Garcia)	Indoors on concrete
B	Solid Waste Collection Units	No known hazardous constituents
C	Catch Basin for Hydraulic Oil	Waste contained, unit indoors
D	Clean-o-matic	Waste contained, unit indoors
E	Rags, adsorbent, and grease storage area (Building 303)	Waste contained, unit indoors
F	Rock Quarry	No known hazardous constituents
G	Pump station and chlorination building at sewage lagoons (Camp Garcia)	Inactive unit, limited use, no apparent impact

1. UNIT NAME: Camp Garcia Landfill

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from the unlined unit. However, it is unclear if hazardous constituents have been disposed of in the landfill.

Surface water: There is a moderate potential for release to surface water, if hazardous constituents are present, given the close proximity of the unlined unit to surface water.

Air: There is a low potential for release to air since the unit is covered.

Subsurface gas: There is a moderate to high potential for generation of subsurface gas since the unit is unlined and was used for disposal of municipal solid wastes.

Suggested Further Action: Although Ref. 8 states that no hazardous constituents were disposed of here, it is suggested that the Navy provide additional information to characterize the types of waste managed at the landfill. This information ~~should~~ include estimated volume of biodegradable waste, solvents, paints, and automotive fluids. This information should be used to determine the need for soil sampling and the potential for the presence of subsurface gas. If this information indicates that sampling is warranted, the investigation should include collection of a minimum of three soil borings at a depth that is at least equivalent to the depth of the unit and analysis for heavy metals and the semi-volatile fraction of Appendix VIII.

3. UNIT NAME: Waste Explosive Ordnance Detonation Range

Conclusions: Soil/Groundwater: There is a high potential for release to soil from this unit, given the fact that explosive wastes are burned on bare soil.

Surface water: There is a moderate to high potential for release to surface water, given that the unit is located immediately adjacent to surface water, wastes are burned on bare soil, and there were no release controls identified with the unit.

Air: The unit is designed to release to air during burn events.

Subsurface gas: There is a low potential for the generation of subsurface gas, since most of the waste is consumed during the burn.

Suggested Further Action: The practice of thermal treatment, or open burning, of explosive waste is currently being scrutinized by the EPA, and the facility is now required to submit a permit application under Subpart X regulations. It is proposed that actions at these units ultimately be determined based upon the requirements of EPA regarding permitting and operation of the burn area.

In order to investigate releases to both soil and sediment, collection of soil and sediment samples is suggested with analyses to include an appropriate set of indicator parameters based upon knowledge of the explosives and propellants managed. Results of the soil and sediment sampling should be analyzed in conjunction with the analysis of surface water which is currently being performed.

5. UNIT NAME: Spent Battery Accumulation Area (Inner Range)

CONCLUSIONS: Soil/Groundwater: There is a high potential for release to soil since the batteries are stored on a gravel driveway with no release controls. The actual potential for release is based upon the integrity of each battery casing containing the acid.

Surface water: There is no surface water in the near vicinity of the unit; therefore, there is a low potential for release to surface water.

Air: There is a low potential for release to air since the unit stores used batteries.

Subsurface gas: There is a low potential for the generation of subsurface gas since the batteries are stored on the soil surface and volatile constituents should be lost to the atmosphere is a release occurs.

SUGGESTED FURTHER ACTION: No staining or other signs of release were observed at the unit during the VSI; therefore, sampling and analysis are not suggested at this time. It is suggested, however, that an area with secondary containment be established for storage of the batteries and acid.

6. UNIT NAME: Waste Oil and Paint Accumulation Area (Seabees, Camp Garcia)

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from this unit based on observed release of oily wastes to soil and the presence of waste oils, lubricants, and paints.

Surface water: There is a moderate potential for release to surface water via runoff from the unit. The unit is located in close proximity to runoff ditches which drain to the Caribbean Sea.

Air: There is a low potential for release to air from the unit since the unit stores materials which are nonvolatile or only slightly volatile, and most storage is in drums with lids.

Subsurface gas: There is a low potential for the generation of subsurface gas given that the unit does not manage highly volatile materials and that releases to soil are small and on the soil surface.

Suggested Further Action: Given the amount of material released to the soil surface and the types of materials stored at the unit, no sampling and analyses are suggested at this time. A general cleanup of the area, however, would help reduce the potential for release. It is suggested that an area with release controls for storage of the waste materials be established and that procedures be developed to minimize spillage of product.

7. UNIT NAME: Waste Oil Accumulation Area (Marines, Camp Garcia)

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from this unit. Spilled waste oil was observed spilled on bare soil, and several containers of waste oil were seen to be full and overflowing.

Surface water: There is a moderate potential for release to surface water via surface runoff. The unit is located in close proximity to runoff ditches which drain to the Caribbean Sea.

Air: The unit does not manage highly volatile compounds; thus, there is considered to be a low potential for a release to air.

Subsurface gas: There is a low potential for the generation of subsurface gas given that the unit does not manage highly volatile materials and that releases to soil are to the soil surface.

Suggested Further Action: Given the amount of material released to the soil surface and the types of materials stored at the unit, no sampling and analyses are suggested at this time. A general cleanup of the area, however, would help reduce the potential for more significant release. It is suggested that an area with release controls for storage of the waste materials be established and procedures be developed to minimize spillage of product.

8. UNIT NAME: Waste Oil Accumulation Area (Inner Range)

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from this unit based upon observed stains on the soil. The unit is a storage area for waste oil and lubricants. The materials are stored on bare soil.

Surface water: There is a moderate potential for release to surface water via surface runoff. The unit is located in close proximity to runoff ditches which drain into the Caribbean Sea.

Air: The unit does not manage highly volatile materials; thus, there is considered to be a low potential for a release to air.

Subsurface gas: There is a low potential for the generation of subsurface gas given that the unit does not manage highly volatile materials and releases are to surface soil.

Suggested Further Action:

Given the amount of material released to the soil surface and the types of materials stored at the unit, no sampling and analyses are suggested at this time. A general cleanup of the area, however, would help reduce the potential for more significant release. It is suggested an area with release controls for storage of the waste materials be established and that procedures be developed to minimize spillage of product.

9. UNIT NAME: Explosive Ordnance Firing Range

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from this unit. The unit is a firing range for explosive ordnance. Explosive ordnance is released routinely into the water and wetland of the Caribbean Sea. The facility does conduct monitoring as part of their NPDES permit.

Surface water: There is a high potential for release to surface water since explosive ordnance is fired into the Caribbean Sea on a routine basis.

Air: There is a high potential for release to air during training exercises when exploding ordnance is active.

Subsurface gas: The potential for the generation of subsurface gas is low given that most of the explosive ordnance is destroyed upon impact.

Suggested Further Action: Further action suggested at this time includes continued monitoring under the conditions of the NPDES permit. Sampling of soil and sediments is suggested to supplement the surface water sampling program. In addition, it is suggested that the results of these monitoring activities be reviewed to determine if additional action, including environmental sampling, is warranted at the unit.

10. UNIT NAME: Sewage Treatment Lagoons

Conclusions: Soil/Groundwater: The unit is unlined, therefore, if hazardous constituents are present, the potential for release is high.

Surface water: The potential for release to surface water is considered moderate if hazardous constituents are present in the waste, since the units discharge effluent to the soil in the approximate vicinity of ditches which flow to surface water.

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

Subsurface gas: The potential for the generation of subsurface gas is considered high if hazardous constituents are present since the unit is unlined.

Suggested Further Action: Further review of facility practices or sampling and analysis of the waste should be conducted to determine if hazardous constituents may be present in the waste. Additional sampling and analyses of soil, etc. may be suggested based upon review of this information.

11. UNIT NAME: Non-explosive Ordnance Firing Range

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from this unit if hazardous constituents are present in the ordnance, since the ordnance is placed directly on the soil surface.

Surface water: There is a moderate potential for release to surface water via surface runoff if hazardous constituents are present in the ordnance.

Air: There is a high potential for periodic release to air during training exercises of hazardous constituents are present in the ordnance.

Subsurface gas: The potential for the generation of subsurface gas is low given that residual materials would be left at the surface and that most volatiles would be lost to the air during or shortly after impact.

Suggested Further Action: The chemical characteristics of the ordnance fired into this range should be investigated to determine if hazardous constituents are present. Based upon this determination, soil sampling may be suggested to further investigate the potential for release to soil, groundwater, etc.

A. AREA OF CONCERN NAME: Diesel Fuel Fill Pipe (Inner Range)

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from this unit. Frequent spillage from the fill pipe has occurred during refueling operations and soil in a 3-foot radius area around the pipe is stained.

Surface water: There is a moderate potential for release to surface water via surface runoff. The unit is located in close proximity to runoff ditches which drain to the Caribbean Sea.

Air: There is a high potential for minor releases to air during filling of the tank. However, since this activity occurs outdoors, volatile emission should be quickly dispersed.

Subsurface gas: There is a low potential for the generation of subsurface gas. Since spills have apparently occurred only to surface soil, the majority of volatile constituents should have been lost at that time.

Suggested Further Action: Given the limited amount of fuel spilled to the soil, sampling and analysis of soil is not suggested at this time. A general cleanup of the area, however, would help reduce the potential of a release. It is further suggested that secondary containment be provided in the fill pipe area to collect spillage and that practices be amended to reduce the potential for release to soil. Furthermore, integrity testing of the tank and fill pipe are suggested to investigate the potential for subsurface leaks, given the age of the components.

H. AREA OF CONCERN NAME: Lubricating Oil Storage Areas

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from this unit given that oily stains were observed on soil in the storage areas.

Surface water: There is a moderate potential for release to surface water via surface runoff. The unit is located in close proximity to runoff ditches which drain to the Caribbean Sea; however, apparently only a small amount of material has been released.

Air: There is low potential for release to air since the area stores relatively non-volatile materials and the amounts of spilled materials are small.

Subsurface gas: There is a low potential for the generation of subsurface gas given that spills have apparently occurred only to surface soil in the area, and the materials spilled are relatively nonvolatile.

Suggested Further Action: Given the limited amount of materials spilled to the soil, sampling and analysis of soil is not suggested at this time. A general clean-up of the area, however, would help reduce the potential of a release. It is suggested that secondary containment be provided for storage of the products and that handling practices be amended to reduce the potential for release to soil.

8.0 REFERENCES

1. Documentation for Hazard Ranking System at USN SSR (Site 13), Vieques Island, Puerto Rico. By: William Beimbom (NUS Corporation). August 27, 1986.
2. Correspondence From: William Beimbom (NUS Corporation) To: File for Naval Station Roosevelt Roads. Subject: Permit Review. June 4, 1986.
3. Documentation for Hazard Ranking System at USN SSR (Main Base Site A), Ceiba, Puerto Rico. By: William Beimbom (NUS Corporation). September 12, 1986.
4. Correspondence From: William Beimbom (NUS Corporation) To: File. Subject: Trip Report for Site Visit Trip to Roosevelt Roads and Vieques Islands Sites. March 26, 1986.
5. Correspondence from: Conrad Simon (Director Air and Waste Management Division - EPA) To: Felix Mestey (Director, Environmental Engineering Division, LANT Fleet Weapons Training Facility - Inner Range). Subject: RCRA Part B Permit Application Submission Request LANT Fleet Weapons Training Facility - Inner Range Vieques Island, Puerto Rico. February 22, 1987.
6. Correspondence From: Lori Amato (Chief Caribbean Facilities Section) To: Paul Rakowski (Environmental Engineer, LANT Fleet Training Facility - Inner Range). Subject: Subpart X Regulations LANT Fleet Weapons Training Facility - Inner Range, Vieques Island. February 19, 1988.
7. Summary Appraisals of the Nation's Ground-Water Resources - Caribbean Region. Geological Survey Professional Paper 813 - U.
8. Navy Assessment and Control of Installation Pollutants Department (NACIP). 1984. Initial Assessment Study Naval Station Roosevelt Roads, Puerto Rico. Contract No. N62474-82-C-C357.

ATTACHMENT A

VISUAL SITE INSPECTION SUMMARY

August 8, 1988; 9:30 a.m. The VSI team arrived at the Public Works Office and met with Mr. Felix Mestey and Mr. Jose Negron until 12:00 to discuss information needs for LANT. It was determined that the Navy ferry was inoperable and we would have to obtain private transportation to Vieques Island.

August 9, 1988; 8:30 a.m. The VSI team arrived at the Transportation Department (NAF) to locate Winston Martinez, the Agronomist responsible for land use planning at LANT and NAF. We discussed information needs with Mr. Martinez, Mr. Cresencio Gonzalez (Manager of Carpentry Shop) and Lt. Laney (Officer in Charge, NAF).

August 10, 1988; 8:00 a.m. The VSI team arrived at the Camp Garcia Offices (LANT) to meet with Mr. George Armijo (Foreman, LANT), and discussed information needs. Vehicle maintenance procedures were discussed and it was found that only minor maintenance is conducted at this facility. Most maintenance activities are performed at U.S. Naval Station Roosevelt Roads (USNSRR). It was also determined that the final disposition of municipal trash is the Vieques Island municipal landfill, owned and operated by the local government. The landfill is located east of Isabell Segunda. All power at Camp Garcia and Inner Range is purchased from Puerto Rico. The VSI team was informed that the road to the observation post may not be passible using a standard vehicle. Winston Martinez arrives with truck to transport the VSI team to observation post.

The VSI team arrived at the observation post at approximately 9:30 and met with Mr. Walt Webb (Manager of OP-1) to discuss information needs. It was determined that battery acid is emptied into plastic containers and shipped to USNSRR. Waste oil is placed in barrels and shipped to USNSRR. The septic tank and leach fields were inspected. Sludge from the septic tank is removed by private contractor. Four underground storage tanks are located at OP-1, three at the Boat House Fueling Facility, and one at the main building. The VSI team reviewed the map with locations of ordnance firing ranges and the ordnance disposal range and reviewed procedures for ordnance disposal. Sampling procedures were discussed for live ammunition, which is dropped into the Caribbean Sea. The EOD disposal range, non-explosive ordnance, and explosive ordnance firing ranges were inspected from OP-1. At the time of the VSI, a Navy EOD team was sweeping water and wetland, and an escort for the VSI team could not be obtained to allow the team to inspect ordnance disposal unit. The diesel fuel fill pipe and underground diesel storage tank, located approximately 25 feet downgradient from fill pipe, were inspected. Finally, the spent battery storage area, old generators, and waste oil storage areas were inspected, following which, the VSI team left OP-1 with Winston Martinez.

The VSI team then drove to the approximate location of a former fueling area at Eastern Maneuver Area. The area was very overgrown and the VSI team could not locate signs of the tanks or any sludge from tanks. One small piece of metal pipe and a broken cinder block were located in the approximate location of the former tanks. No signs of stressed vegetation or stained soil were observed.

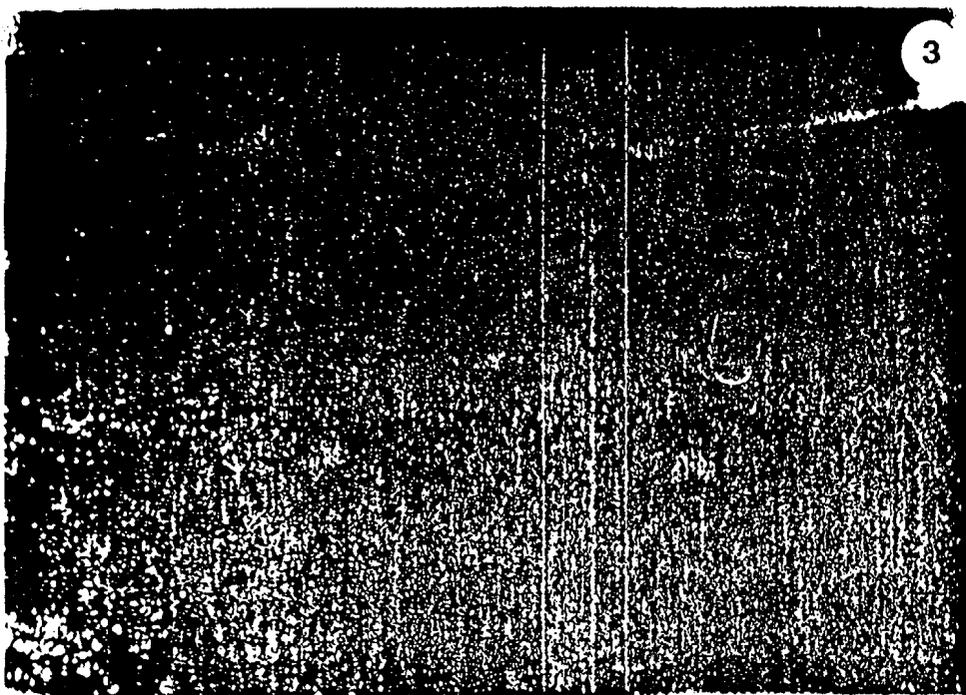
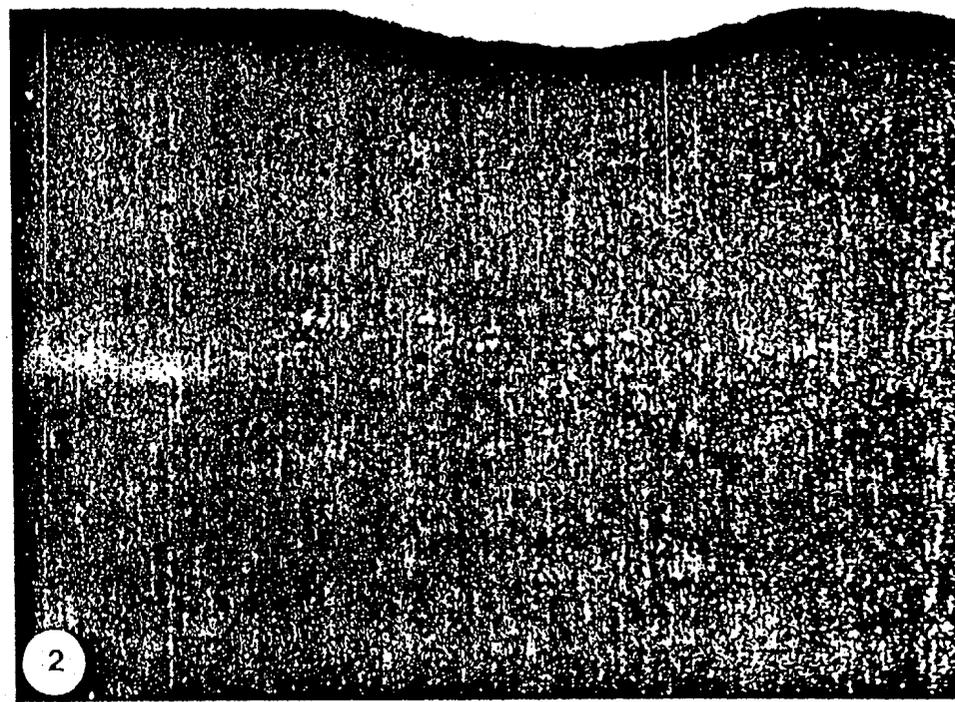
The VSI team then drove to Camp Garcia and inspected the Seabee Vehicle Maintenance Shop, waste oil storage area, battery storage area, clean-o-matic parts cleaner, hydraulic oil storage area, and Marine oil storage area at or near Building 303. The inside of Building 243 was also inspected.

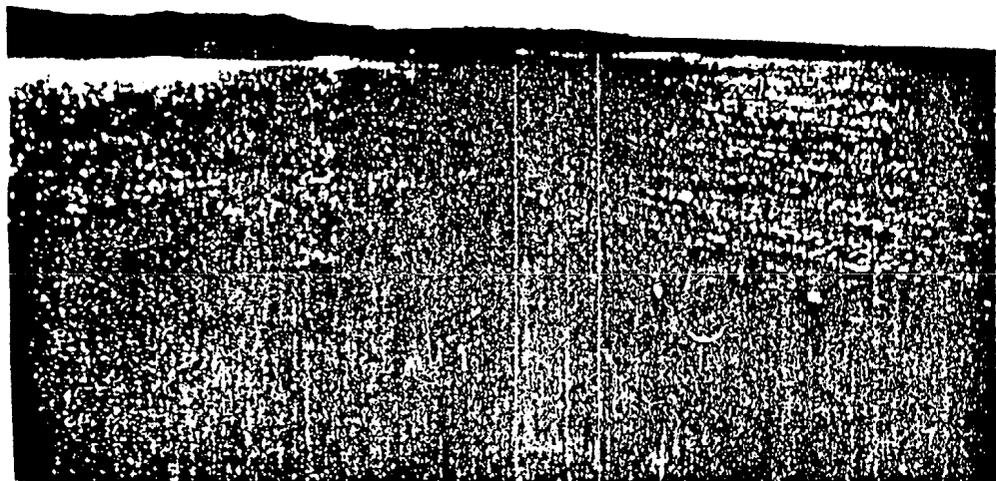
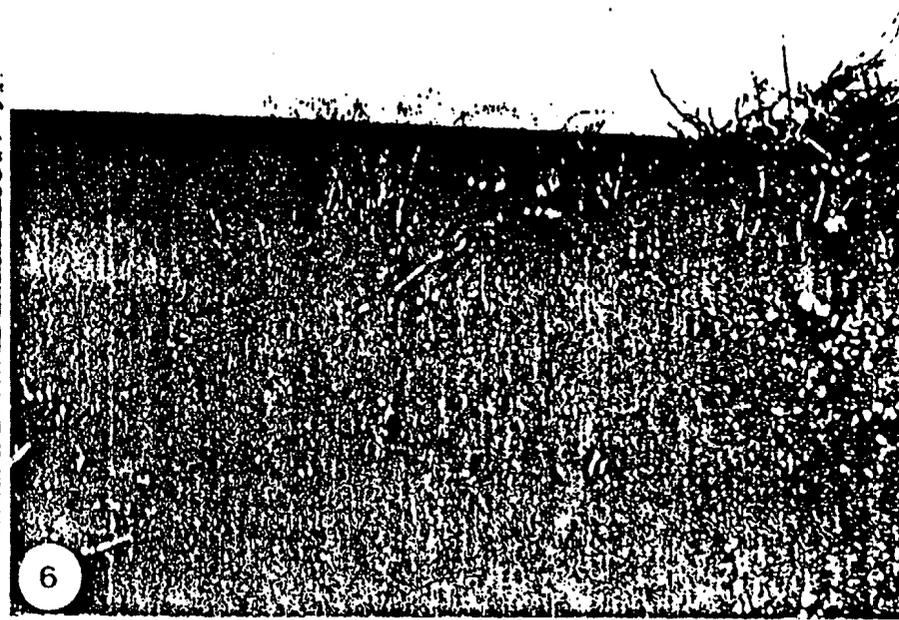
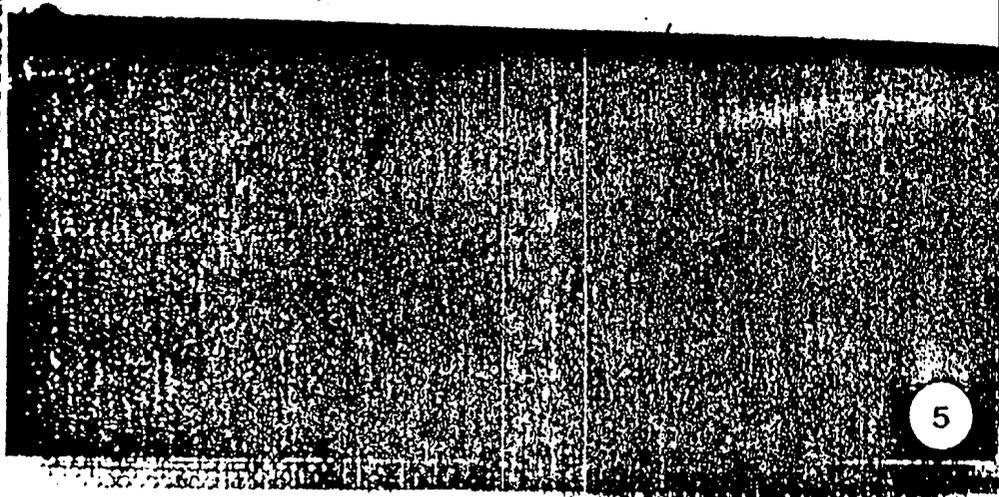
The VSI team then drove to the site of the former Camp Garcia Landfill. The area is capped, revegetated, and shows no sign of stress or erosion. On the return trip, the quarry was inspected where several old tires and paper trash were observed in the general area. The next area inspected was the marine truck wash area on the beach. The area is used solely to wash dirt from Marine vehicles. No photographs were taken as the Marines were moving trucks to NAF for transport to USNSRR. The sewage lagoon area was inspected following the truck wash area. This area included two polishing ponds, two influent lagoons, and one metal pipe (approximately 12 inches in diameter) leaving the lagoon and leading towards the Caribbean Sea. The old chlorination basin and pump station adjacent to the sewage lagoons were then inspected. The final unit inspected was the aboveground fuel storage tanks, following which, the team returned to NAF to meet with Winston Martinez and Cresencio Gonzalez to discuss additional information needs.

PHOTOGRAPH LOG

- Photo 1. Camp Garcia Landfill looking west from road.
- Photo 2. Camp Garcia Landfill looking northwest from road.
- Photo 3. Camp Garcia Landfill looking east from road.
- Photo 4. Fuels Off-Loading Area.
- Photo 5. Fuels Off-Loading Area looking southwest
- Photo 6. Fuels Off-Loading Area looking southeast.
- Photo 7. Fuels Off-Loading Area looking northwest.
- Photo 8. Fuels Off-Loading Area looking east towards Marine wash area.
- Photo 9. Explosive Ordnance Detonation Range (EOD range approximately 50 yards to the left of bare soil at center of photograph).
- Photo 10. Spent battery accumulation area (Inner Range).
- Photo 11. Rags, grease, and general storage areas inside of Maintenance Building (Camp Garcia).
- Photo 12. No photo.
- Photo 13. Lubrication Oil and Waste Oil Accumulation Area (Seabees, Camp Garcia).
- Photo 14. Lubrication Oil and Waste Oil Accumulation Area (Marines, Camp Garcia).
- Photo 15. Lubrication Oil and Waste Oil Accumulation Area (Inner Range).
- Photo 16. Water and wetland at the Inner Range and boathouse refueling.
- Photo 17. Water and wetland at the Inner Range (photo taken with telephoto lens).
- Photo 18. Sewage treatment lagoons (Camp Garcia).
- Photo 19. Sewage treatment lagoons (Camp Garcia).
- Photo 20. Sewage treatment lagoons (Camp Garcia).
- Photo 21. Approximate location of non-explosive ordnance firing range (right side of photograph) and Blue Beach (left side of photograph) with fuels off-loading site in background.
- Photo 22. Diesel fuel fill pipe at Inner Range.

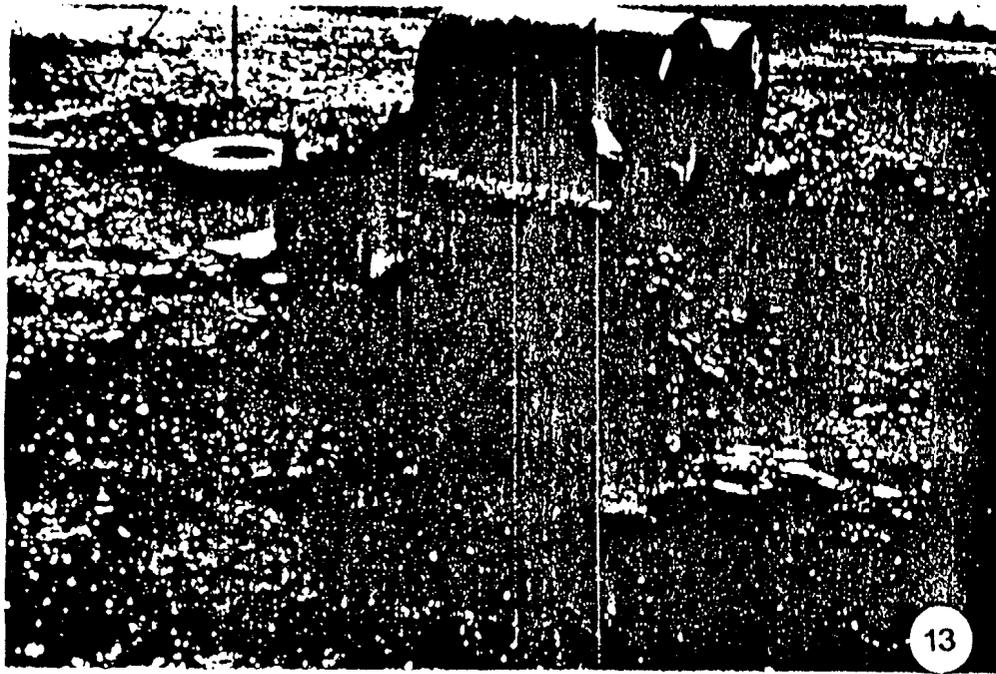
- Photo 23. Area of the Inactive septic tank at Inner Range.
- Photo 24. Active septic tank at Inner Range.
- Photo 25. Field lines for septic tank at Inner Range.
- Photo 26. Field lines for septic tanks at Inner Range.
- Photo 27. Solid waste dumpster at Camp Garcia.
- Photo 28. Solid waste dumpster at Inner Range.
- Photo 29. Underground diesel storage tank at Inner Range.
- Photo 30. Far view of Marine washdown area.
- Photo 31. Quarry at Camp Garcia.
- Photo 32. Clean-o-matic inside of Building 303.
- Photo 33. Pump station and chlorination room.
- Photo 34. Inactive generators at Inner Range.
- Photo 35. Active generators at Inner Range.
- Photo 36. View from OP-1 Inner Range looking southwest.
- Photo 37. Sawdust Waste at Wood Shop (Camp Garcia).
- Photo 38. Aboveground Fuel Storage Area (Camp Garcia).



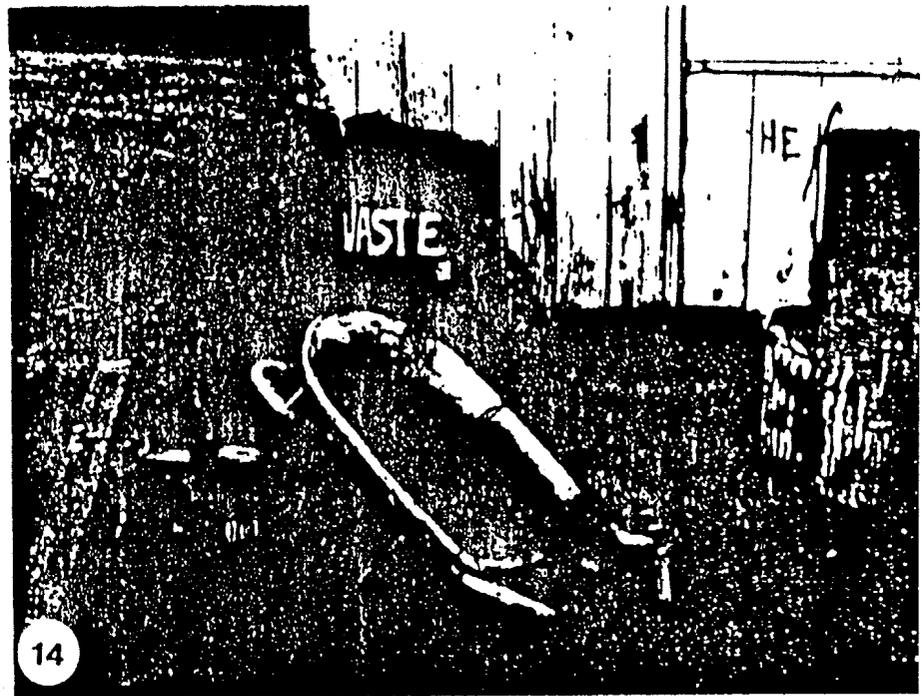




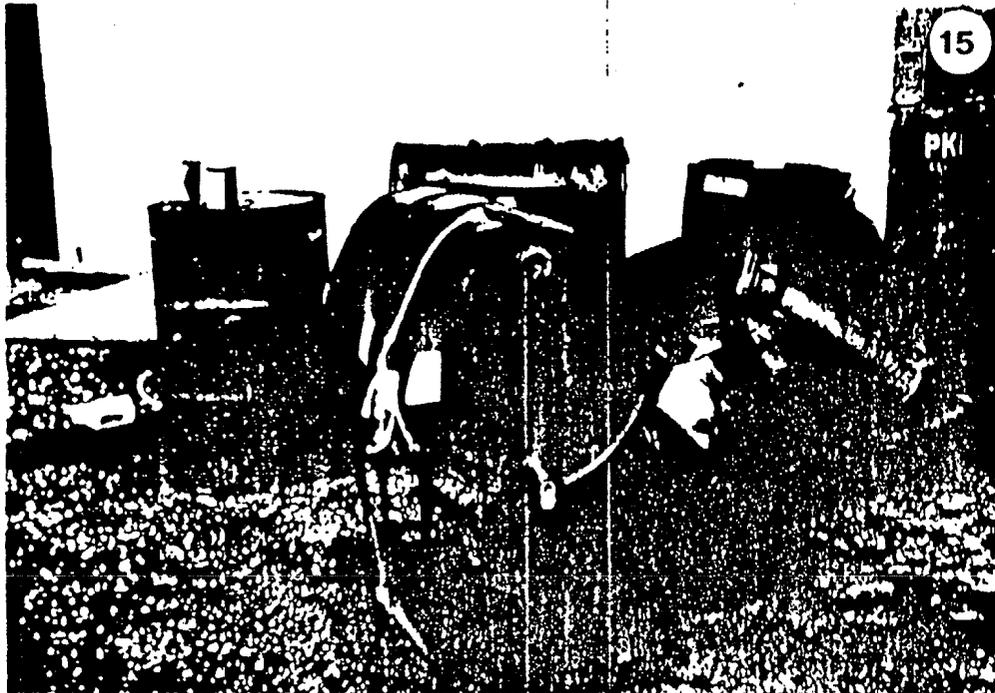
12



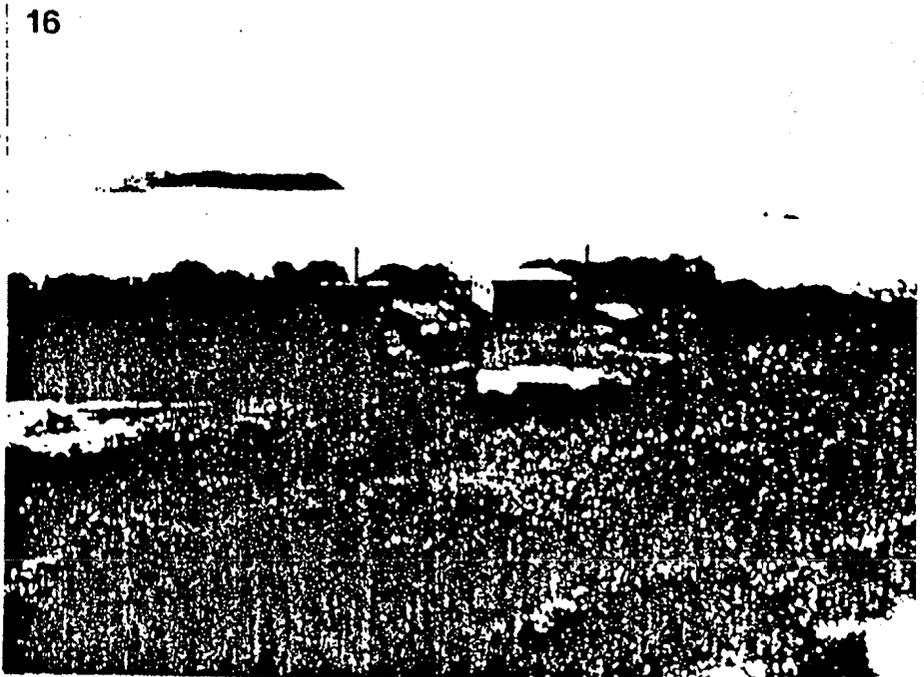
13



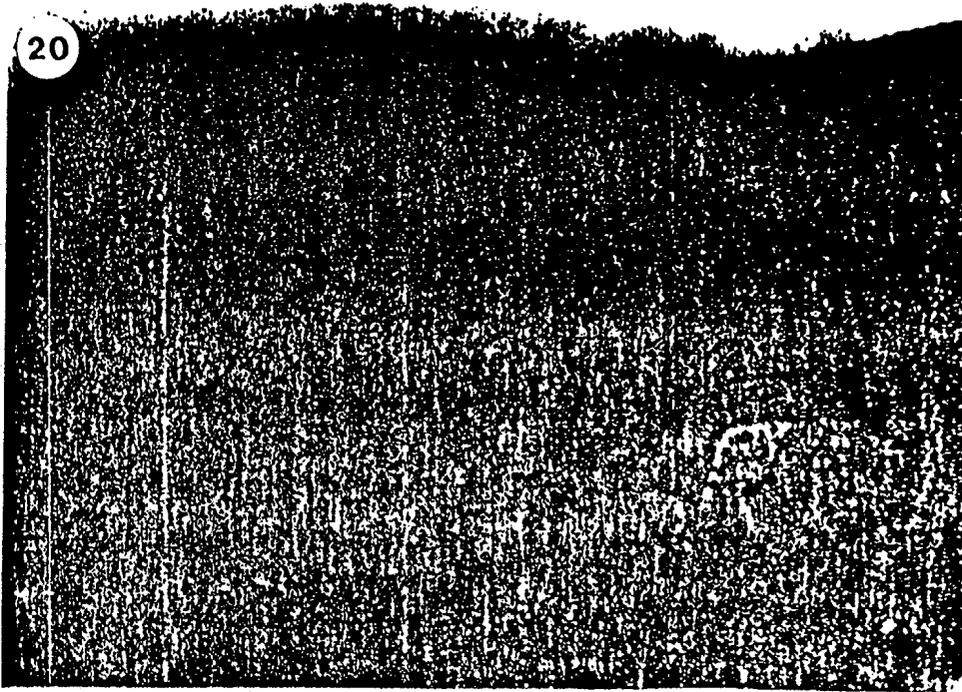
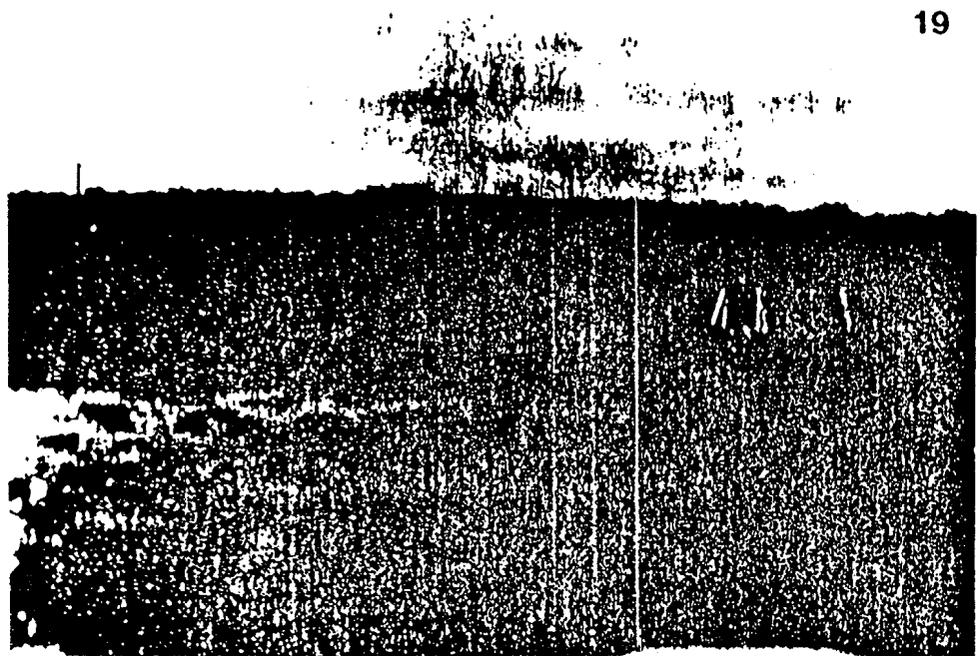
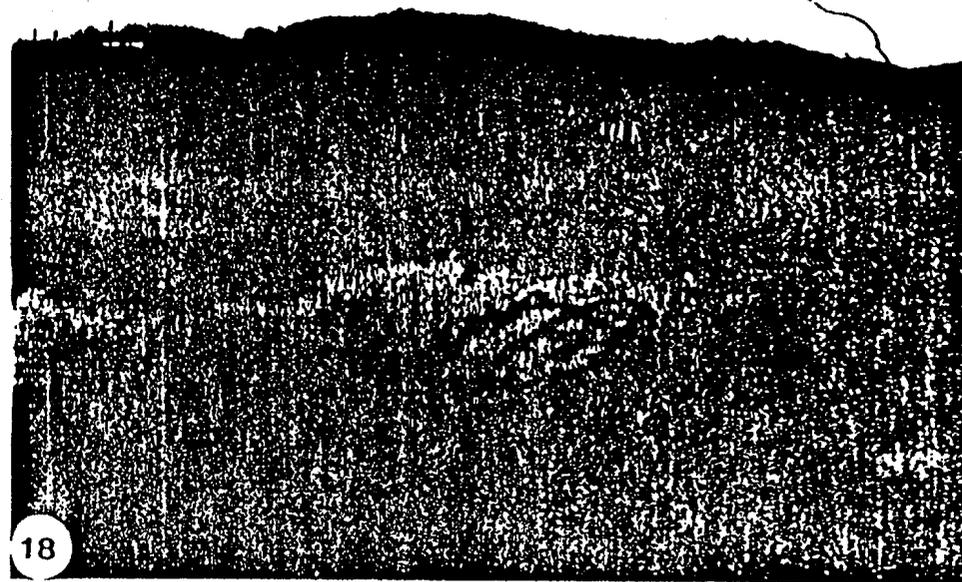
14

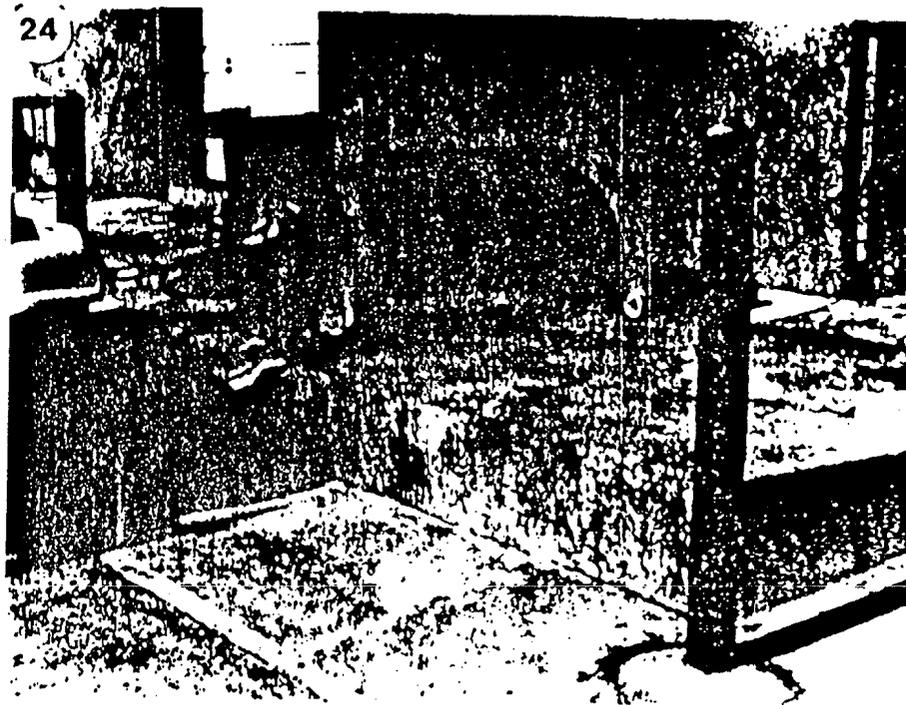
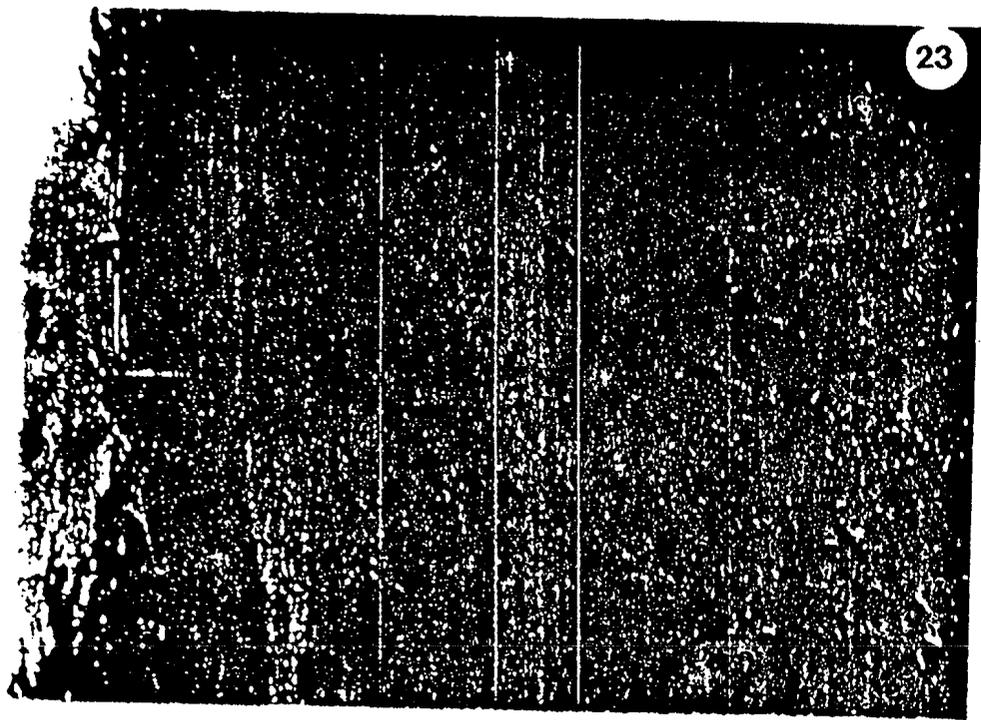
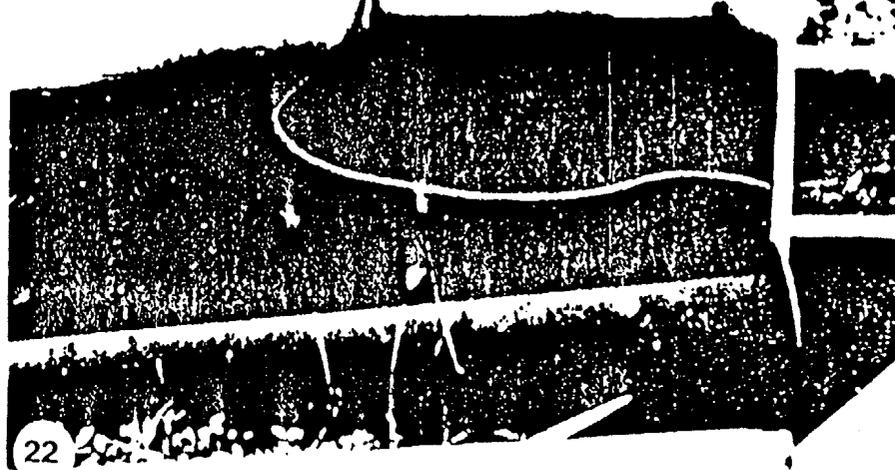
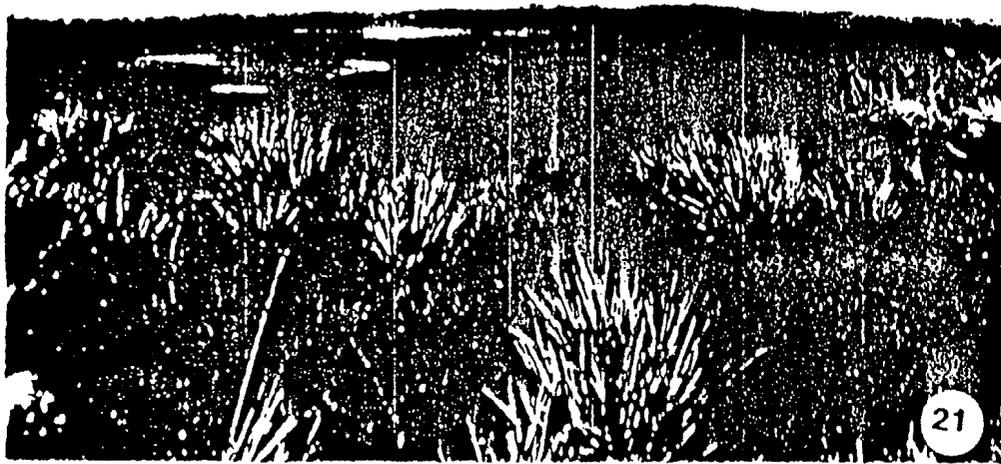


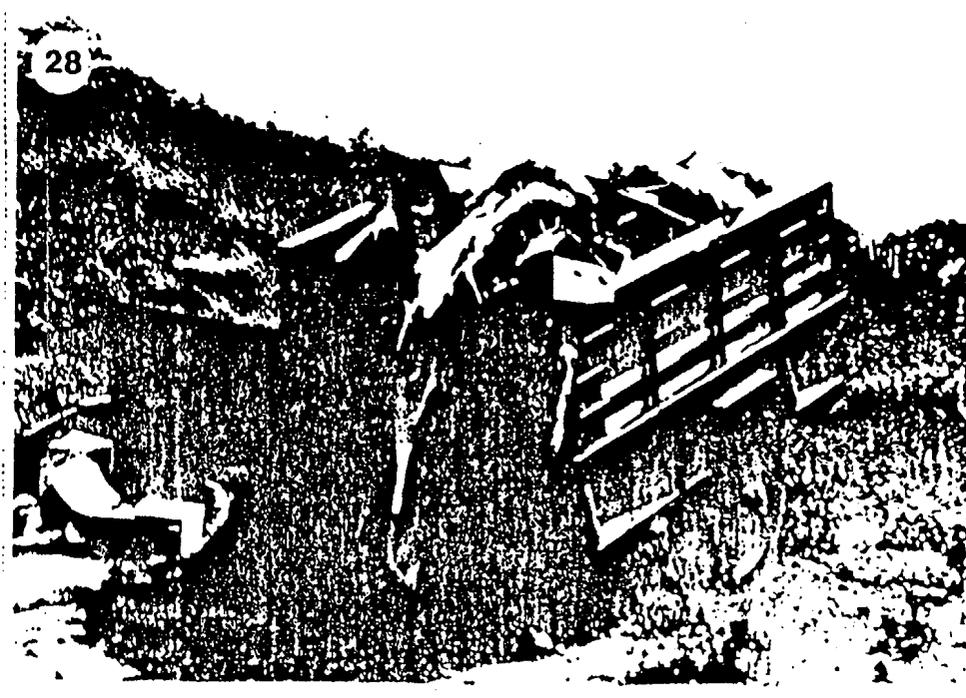
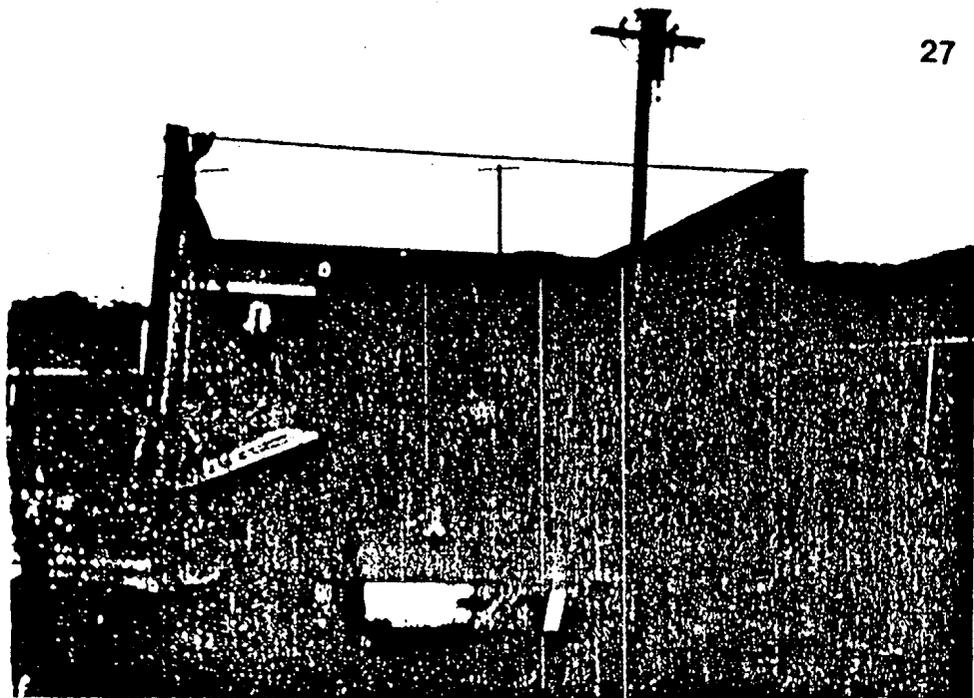
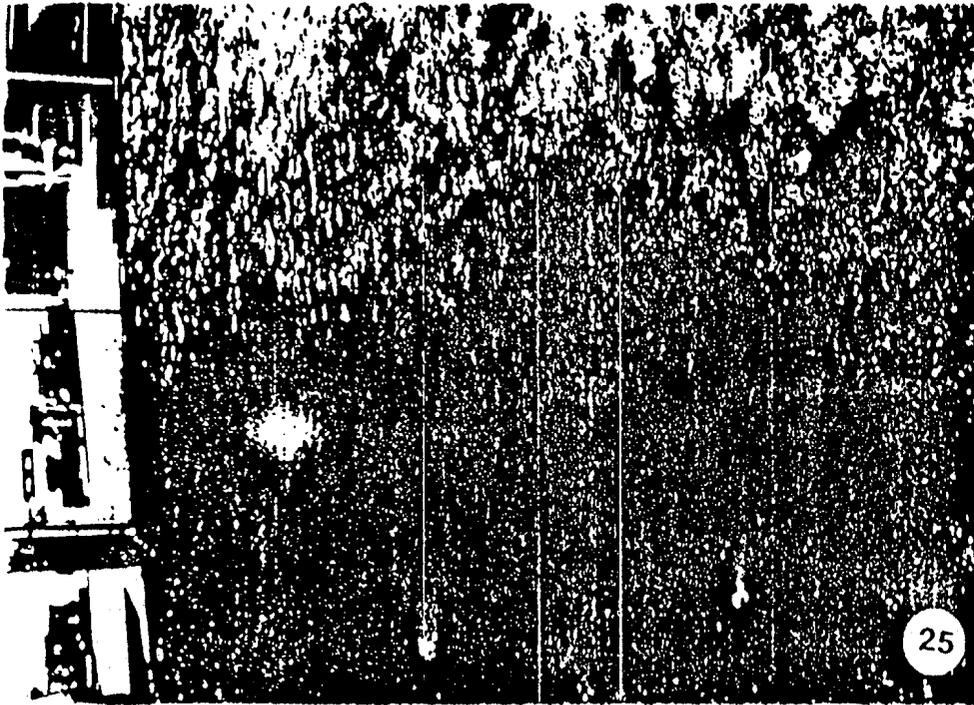
15

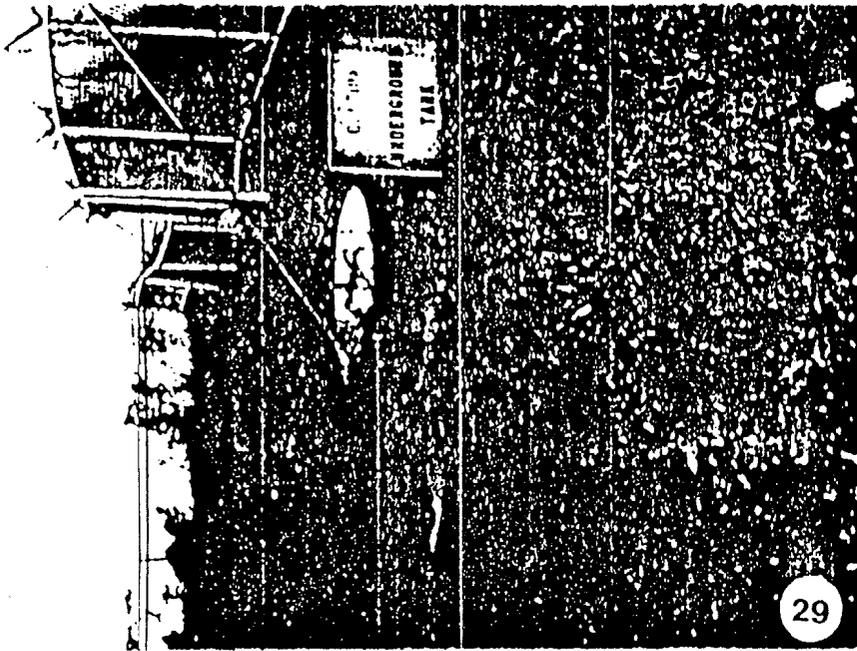


16









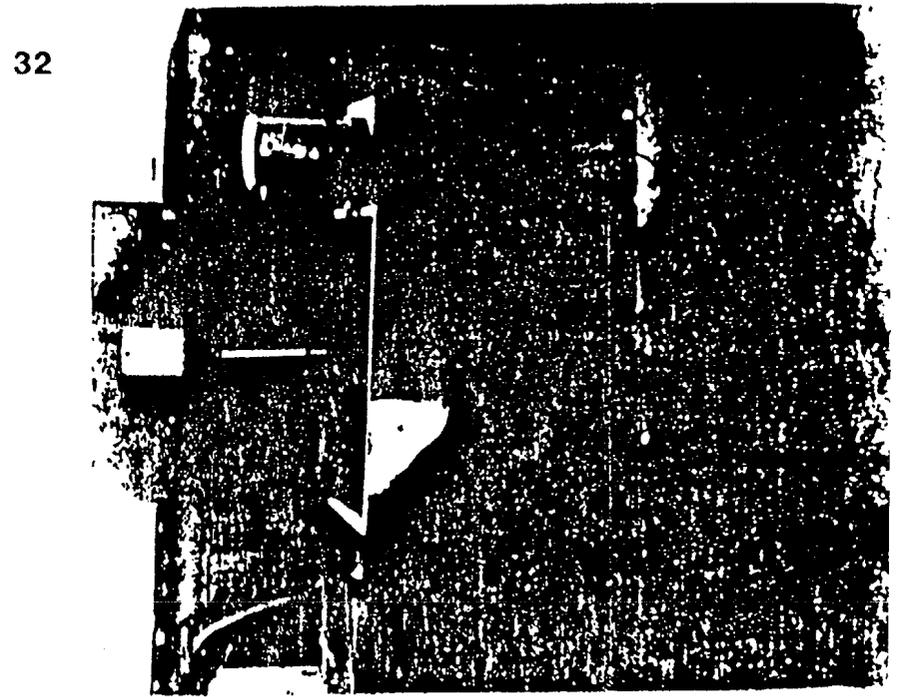
29



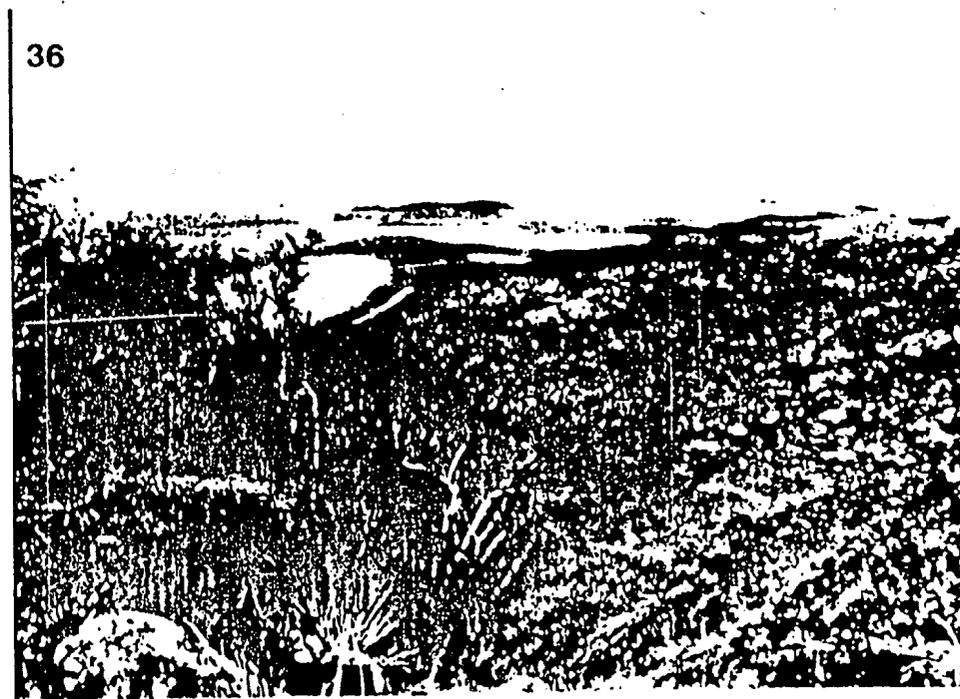
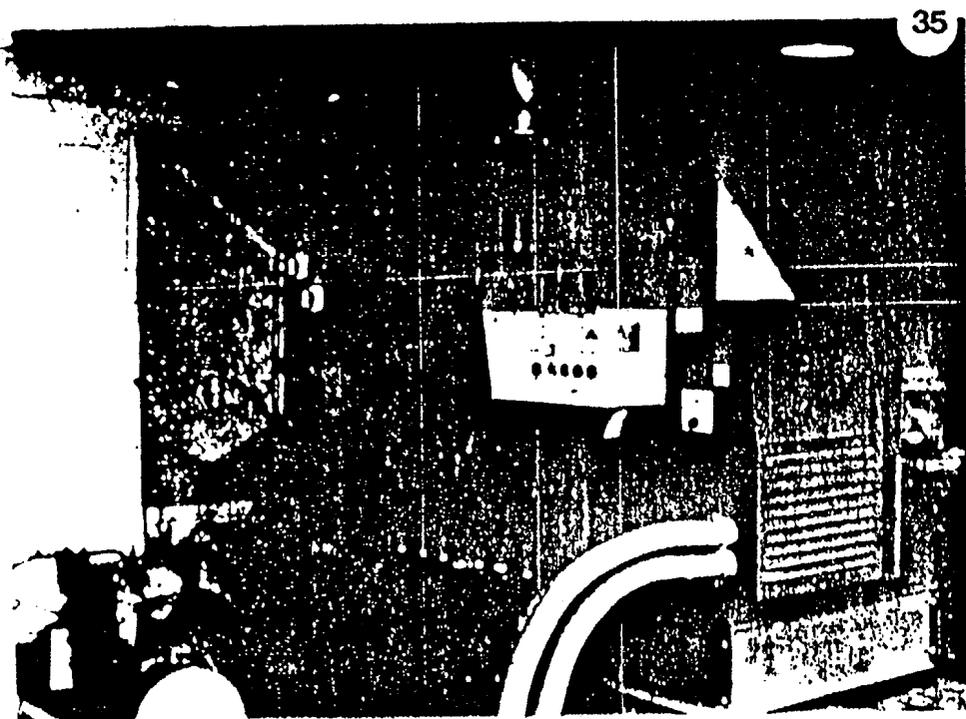
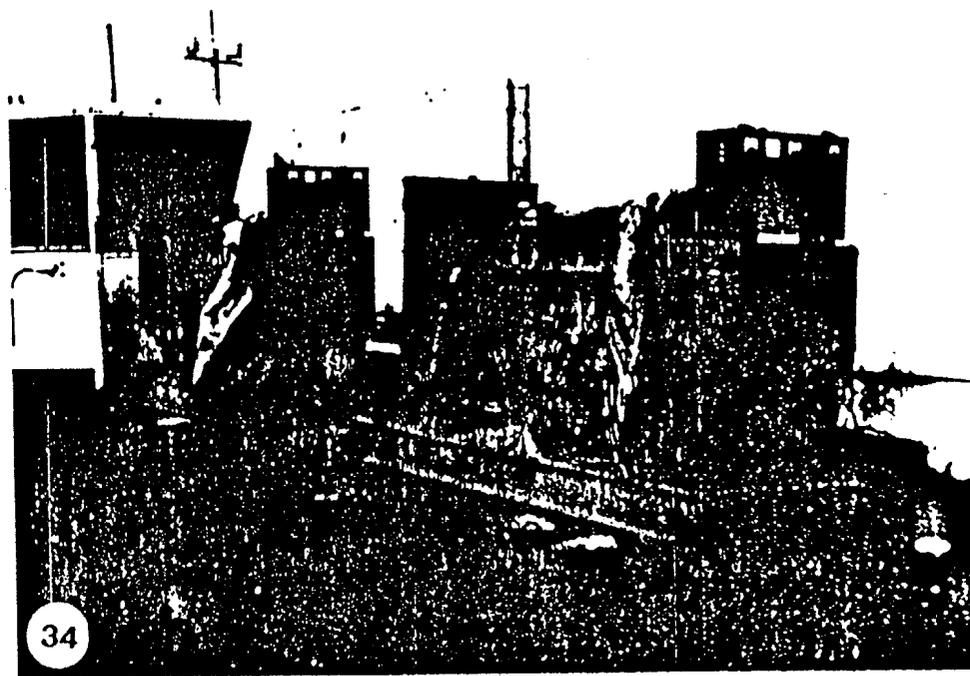
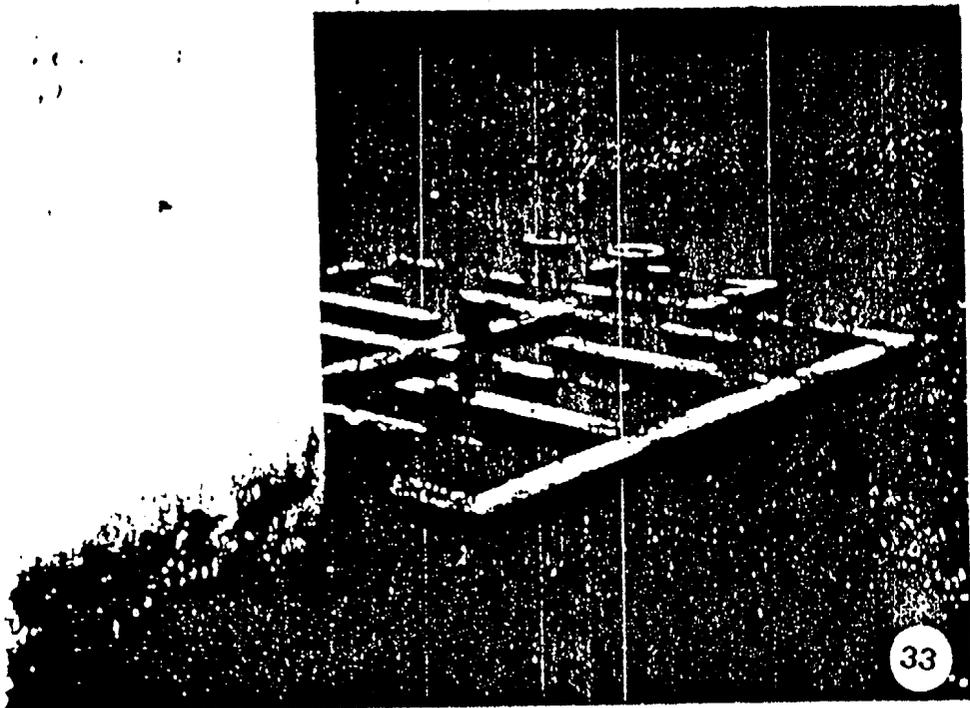
30

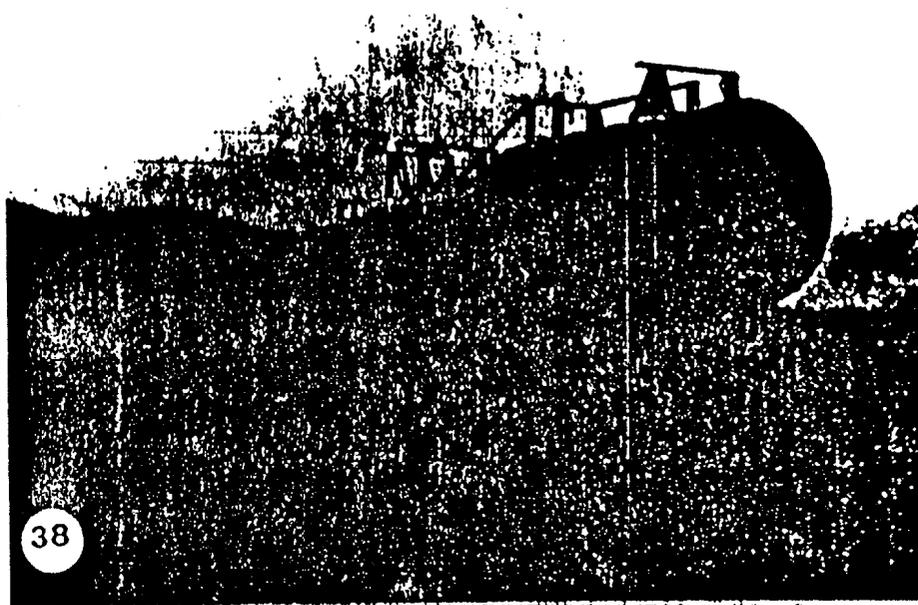
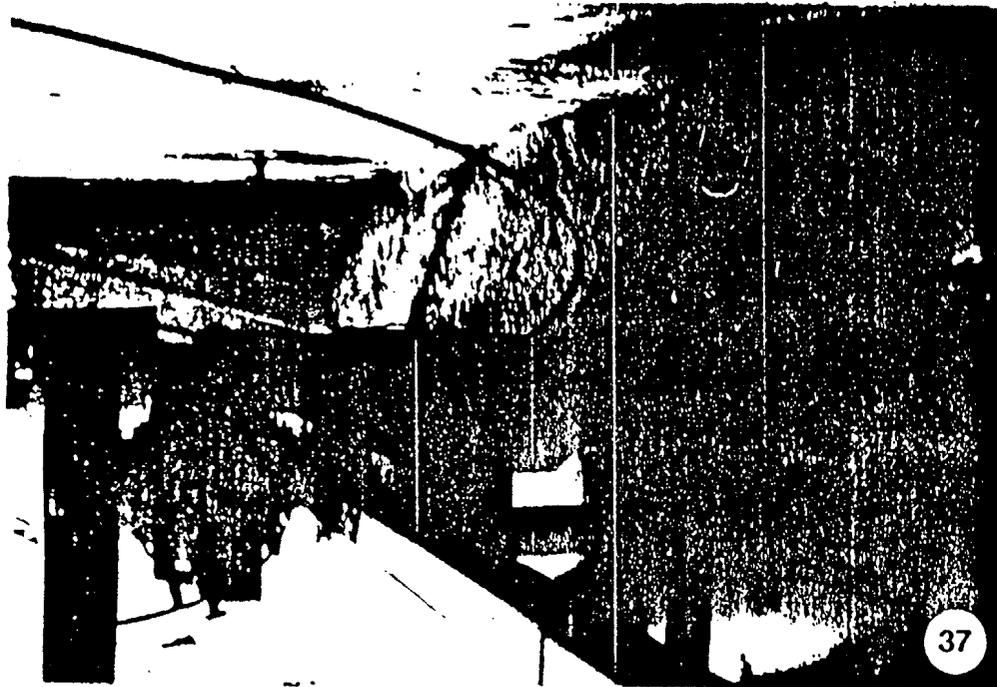


31



32





ATTACHMENT B

8/10/88

Meeting with George V. Armitage
@ FLANT Fleet/Comd Station

All fuels are contracted in

OP II / T. Patton 72-385

Power Lines from PK

Maintenance Shop -
Train goes to Landfill (Murray)

Nashville Maintenance

See Gen. Note @ Shop

Walt Welch - J. Manager of O/R

Train Range CRV

Ballroom West simplified etc
for Radio (Ballroom)

Ballroom Shipped to K... ..

11/11/11 11/11/11 11/11/11 11/11/11

Kanada and K... ..
Road

Septic tank and

... .. Diesel tank

... ..
... ..

5000 gal

3 - 4000 gal

1

... ..

... ..

... ..

... ..

#9 (D) ...
...
...

#10 ...
...

#11 ...
...
...

Roll #4

Dried
#1 ...
...
...

#2 ...
...

#3 ...

#4 ...
...

#5 ...
...

#7 ...
...

Next ...

1. The Series of 1/4

2. The Series of 1/2

3. The Series of 3/4
Looking SE

4. The Series of 1/2

5. The Series of 1/2

6. The Series of 1/2

7. The Series of 1/2

8. The Series of 1/2

9. The Series of 1/2

8/11

10. The Series of 1/2

11. The Series of 1/2
Looking SE

12. The Series of 1/2

13. The Series of 1/2

14. The Series of 1/2

15. The Series of 1/2

16. The Series of 1/2

17. The Series of 1/2

8/10/88

#3 Sitka spruce
Mammals
off Shop 302
Mammals

wood hole
#5

#1 Sitka spruce (2 trunks)
Shop 302

#2 White Bay Family Ranch
Mammals & birds
back of Ranch

#3 Sitka spruce 245
Sitka spruce 245

8/10/88 Camp 9 trees

#4 Sitka spruce

#5 Sitka spruce

#6 Sitka spruce

#7 Sitka spruce
Mammals
No photos

Wood hole

#8 Sitka spruce

#9 Sitka spruce

#10 Sitka spruce

