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PHASE II
RCRA FACILITY ASSESSMENT
OF THE
NAVAL AMMUNITION FACILITY
VIEQUES ISLAND, PUERTO RICO
EPA I.D. No. PRD980536189

In ARF

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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 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 Naval Ammunition Facility 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 8 through 10, 1988.

The preliminary review of file material resulted in the identification of 6 SWMUs and 6 AOCs. Following the VSI, a total of 15 solid waste management units and 4 areas of concern were identified (Table 1, Figure 1). Although the facility occupies 8,000 acres, the majority of the property is undeveloped. The primary purpose for the facility is the storage and transfer of munitions for the U. S. Navy Atlantic Fleet. The facility, therefore, maintains and manages numerous magazines for storage of these munitions. Wastes generated at the facility include waste munitions, wastes generated during maintenance of equipment used in transfer and storage of munitions (e.g., vehicles), and sanitary wastes. The final identification of units as SWMUs and AOCs is based upon the preliminary review, observations made during the VSI, and conclusions made concerning the types of wastes managed and the potential for a release 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 and photograph log showing facility conditions at the time of the VSI are included as Attachment A and a copy of the field notes is given in Attachment B.

Table 1. SWMUs and AOCs at the Naval Ammunition Facility, Vieques Island, Puerto Rico.

SOLID WASTE MANAGEMENT UNITS

1	Waste Munitions Container Storage/Transfer Facility (Building 301 Bays A, B, and C)
2	Waste Munitions Container Storage/Transfer Facility (Building 302 Bay D)
3	Former Waste Munitions Container Storage/Transfer Facility (Building 216)
4	Inactive Waste Explosive Open Burn/Detonation Range
5	IRENA/MAF-4 Disposal Site
6	Mangrove Disposal Site
7	Quebrada Disposal Site
8	Spent Battery Accumulation Area
9	Paint Storage Locker
10	Waste Paint and Solvent Disposal Ground
11	Waste Oil and Solvent Accumulation Area
12	Oil/Water Separator and Associated Tank
13	Disposal Site for Drone Casings in Atlantic Ocean
14	Wash Rack
15	Waste Transportation Vehicle

AREAS OF CONCERN

A	Well and Spring Adjacent to IRENA/MAF-4 Disposal Site
B	Sewage Treatment Plant and Disposal Ground
C	Drainage Ditch in the Vicinity of Transportation Shop Area
D	Abandoned Vehicles

Mr. Ben Singh
October 13, 1988
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Please feel free to contact me or Marvin Unger, the Work Assignment Manager (who can be reached at 409/690-9280) if you have any questions.

Sincerely,

Gayle Kline
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Technical Director

Enclosure

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S047E-AM

PHASE II
RCRA FACILITY ASSESSMENT REPORT

of the

NAVAL AMMUNITION FACILITY
VIEQUES ISLAND, PUERTO RICO

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- B. VSI FIELD NOTES

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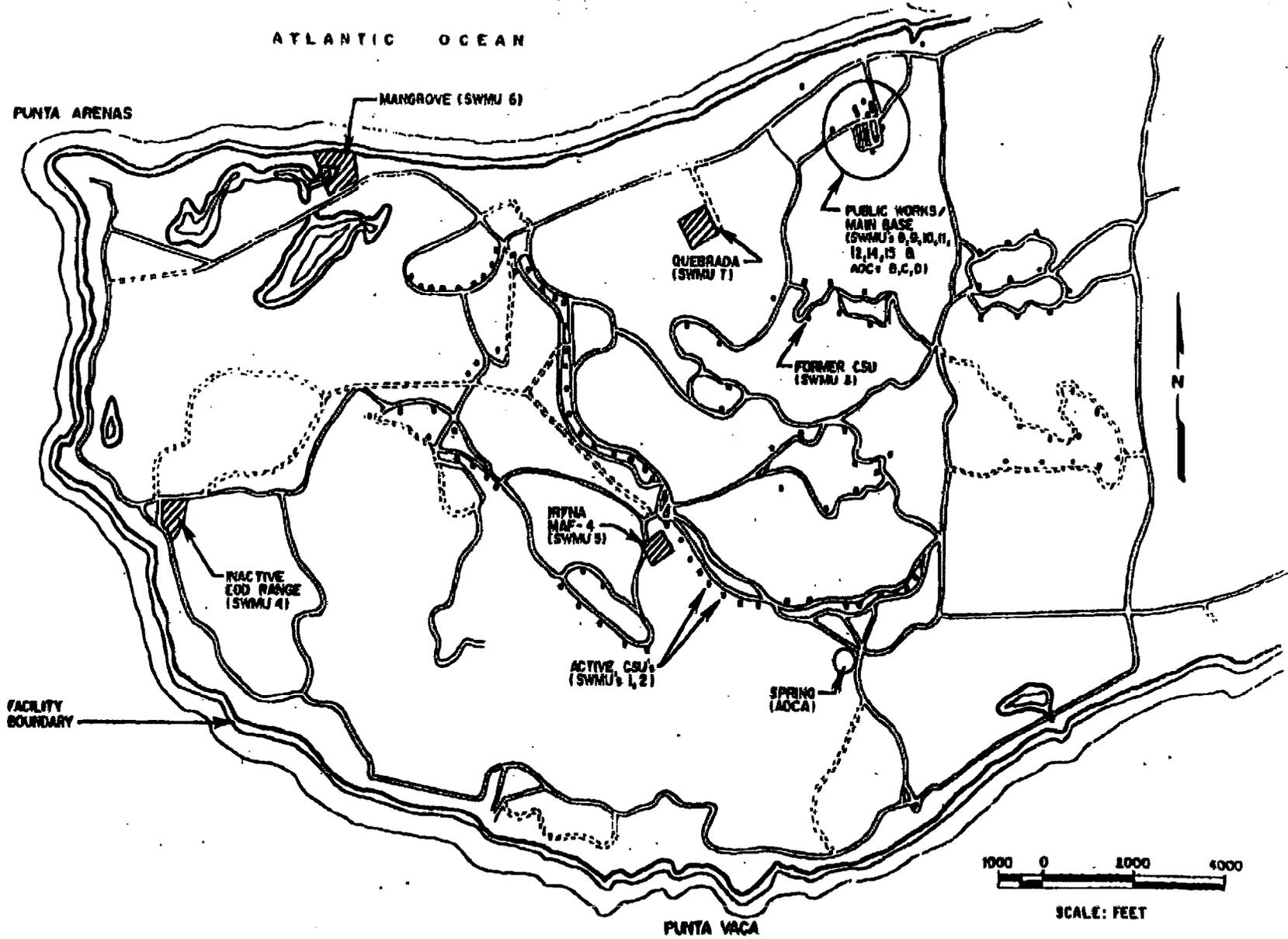


FIGURE I. SWMU s AND AOC s AT THE NAVAL AMMUNITION FACILITY.

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2.0 FACILITY DESCRIPTION

General Facility Description

The subject of this report is the Naval Ammunition Facility (NAF) which is located on the western end of Vieques Island approximately seven miles east of Puerto Rico (Figure 2, Ref. 2). The NAF, Vieques Island maintains magazines for the storage of munitions supplied to the U.S. Naval Atlantic Fleet. In addition to munitions storage, the facility includes a main base area consisting of offices, transportation and carpentry shops. The NAF, which includes 8,000 acres on the western end of Vieques Island, is operated by the U.S. Naval Station Roosevelt Roads (USNSRR) (Ref. 2). On the eastern end of the island, the USNSRR also operates the Eastern Maneuvers Area, Camp Garcia, and the Inner Range (Figure 2, Ref. 2). These areas collectively form a separate facility operated by the Navy under another EPA identification number. Vieques Island is approximately 3 miles wide and 20 miles long with a total land area of approximately 52 square miles.

In 1988, the NAF Vieques continues to operate as the ammunition storage facility for the Atlantic Fleet and other operations at U.S. Naval Station Roosevelt Roads. Munitions are stored by lots and may become classified as waste by the Navy due to age, deterioration, or poor quality. All waste munitions from Roosevelt Roads and from the NAF are stored in magazines at the NAF prior to offsite disposal at the Inner Range waste explosive detonation range on the east end of the island. Wastes managed at the NAF include waste munitions and small quantities of routine maintenance wastes such as waste oils and degreasers, waste paint and solvents, municipal sewage and solid waste refuse. All nonexplosive hazardous waste generated at the NAF is transported to USNSRR for contractor disposal. The primary contractor for offsite disposal of NAF waste is General Electric. Municipal sewage is treated and disposed of on-site, and solid waste refuse is disposed of offsite at a municipal landfill operated by the government of Vieques Island.

History of Ownership

The Navy Assessment and Control of Installation Pollutants (NACIP) Initial Assessment Study (IAS) report (Ref. 2) states that the U.S. Navy first used Vieques as a base for Allied Fleets in conjunction with U.S. Naval Station Roosevelt Roads in the early years of World War II. The Navy acquired land in the eastern and western sectors of the island between 1941 and 1943 (Ref. 2). The initial construction of facilities at NAF, including main base structures, ammunition storage magazines, and Mosquito Pier, were completed by 1943 (Ref. 2). The acquisition of more land and the building of other facilities at NAF was considered in the early 1940s; however, these plans were abandoned due to an anticipated Allied victory (Ref. 2). Following the end of World War II, the NAF was inactive from 1948 until 1962 when the facility was reactivated in response to the Cuban Missile Crisis (Ref. 2).

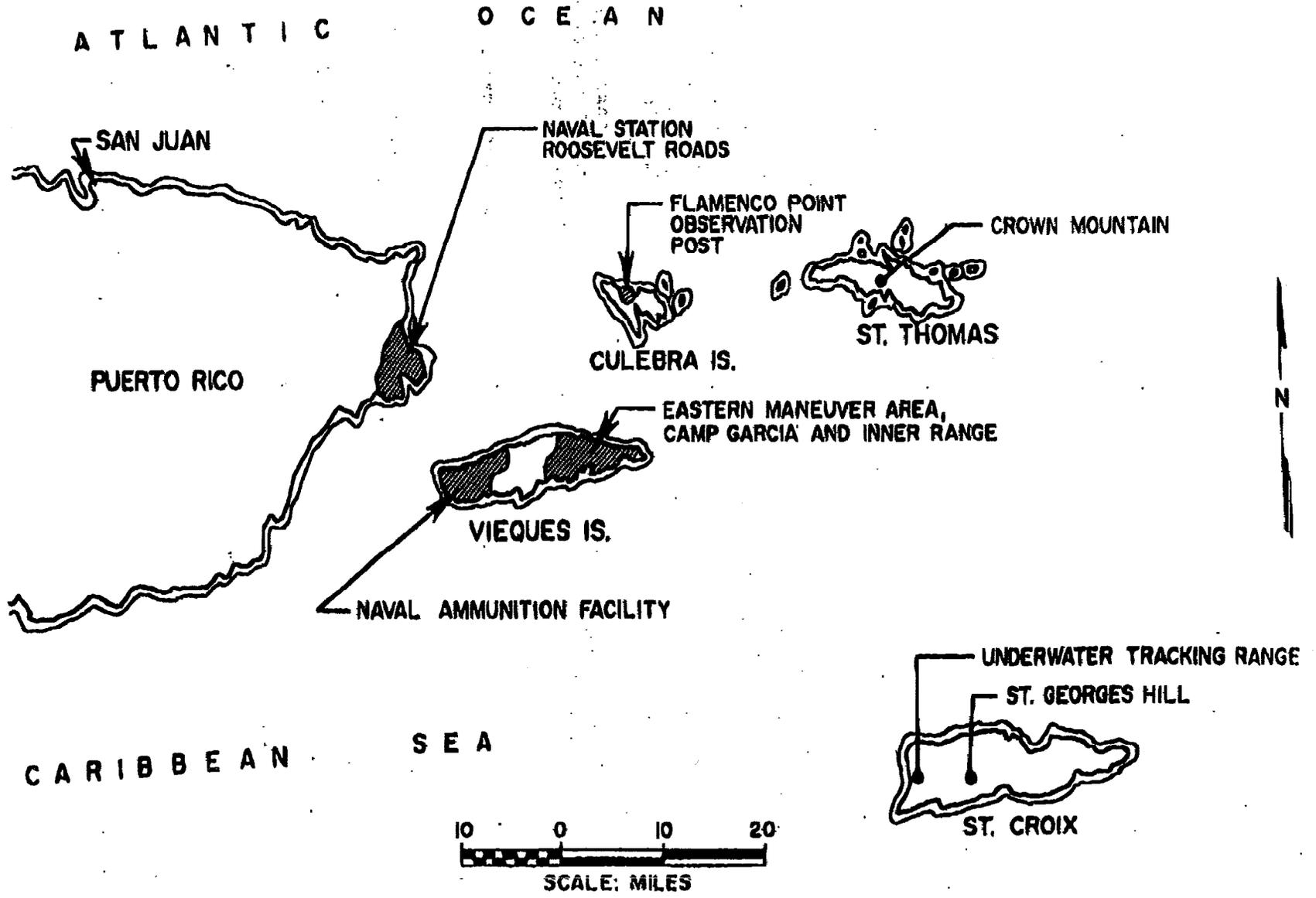


FIGURE 2. LOCATION OF VIEQUES ISLAND AND THE NAVAL AMMUNITION FACILITY (REF. 2).

The history of the island dates to more than 8,000 years ago when South American aborigines inhabited the island (Ref. 2). The first recorded historical reference to Vieques occurs in 1493, when Columbus noted the island on his second trip to the New World (Ref. 2). The island was virtually uninhabited until the late 17th century when the English established a colony (Ref. 2). During subsequent years, settlements were established and attempts made to claim the island by the English, French, and Danes (Ref. 2). The Spanish eventually established a fort near Isabel Segunda and developed the sugarcane industry (Ref. 2). In the late 19th Century, the sugarcane industry was the major economic base of the island. The industry included four large factories and haciendas scattered throughout the island (Ref. 2). Two of the larger haciendas, including portions of a former railroad bed, are located on what is now NAF property (Ref. 2).

Regulatory History

The NAF has been operating an interim status container storage unit at the facility since November 18, 1980 when the facility submitted a Part A permit application for containerized storage of waste munitions. A Part B permit application was submitted March 24, 1987 for use of Building 301 (SWMU #1) as a waste munitions container storage/transfer unit. The permit application further stated that NAF desired to close Building 216 (SWMU #3) as a waste munitions container storage/transfer unit (Ref. 1). During the VSI, it was determined, following discussion with facility representatives, that Building 302 (SWMU #2) was also used as a waste munitions container storage/transfer unit. Additional discussion with facility representatives found that the Part B Permit Application had been withdrawn and that the active container storage/transfer units would be closed and reopened as less than 90-day storage units. A chronological listing, as prepared from information available at the time of the PR and VSI, of activities between NAF and the regulatory agencies is provided as follows:

November 18, 1980	NAF submits Part A Permit Application for containerized storage of waste munitions (Ref. 18).
September 24, 1986	EPA Region II requests the Part B Permit Application from NAF (Ref. 18).
March 24, 1987	NAF submits Part B Permit Application for containerized storage of waste munitions, Building 301 (Ref. 18).
May, 1987	NAF receives Notice of Deficiencies from technical evaluation of Part B Permit Application by EPA Region II (Ref. 10).
August 14, 1987	NAF receives Notice of Deficiencies on Part B Permit Application from EPA Region II following administrative review (Ref. 23).

October 30, 1987 NAF requests withdrawal of Part B Permit Application for Building 301 and submits closure plan for Building 216 (Ref. 18).

December, 1987 EPA Region II forwards Notice of Deficiencies to Puerto Rico Environmental Quality Board following administrative-technical review of closure plan for Building 216 (Ref. 11).

December 28, 1987 NAF submits closure plan for Building 301 (Ref. 15).

March 16, 1988 EPA Region II receives Notice of Deficiencies for closure plan for Building 301 from Puerto Rico Environmental Quality Board (Ref. 20).

There were no additional permits (e.g., NPDES) identified during the PR and VSI.

Operations/Process Description

The NAF is presently utilized by the U.S. Navy Atlantic Fleet for storage of munitions. The activities at NAF are directed 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. U.S. Naval Station Roosevelt Roads, Puerto Rico is the main support base for Naval activities in Puerto Rico and is responsible for transport and disposal of all nonexplosive wastes generated at the NAF. According to facility personnel, there are no production or process units at the NAF.

The NAF on Vieques occupies approximately 8,000 acres on the western tip of the island (Ref. 2). Operated by the Weapons Department of U.S. Naval Station Roosevelt Roads, its mission is to receive, store, and issue all ordnance authorized by Roosevelt Roads for support of Atlantic Fleet activities. On the northeast coast of NAF, the facility operates a 625-foot ammunition handling pier known as Mosquito Pier. The only active operation at the NAF is the maintenance activities associated with munitions storage magazines and equipment used in munitions storage and transfer (e.g., trucks). In a 12-month period in 1978, NAF received over 4,100 tons of explosives and ammunition (Ref. 2). During this same period, more than 3,500 tons of ammunition and explosives were issued with trans-shipments amounting to about 1,200 tons (Ref. 2).

The NAF receives power requirements from Puerto Rico via underwater transmission lines; therefore, the facility operates no power production units other than emergency generators for supplementing power from Puerto Rico. A small diesel generator is located behind the Commanding Officer's office at NAF.

Wastes Generated Management Practices

As stated, operations at the facility are strictly associated with storage and transfer of munitions. The types of waste materials generated during routine operations at the NAF include waste paints, solvents, oils, sanitary wastes, and a variety of solid waste refuse. On one previous occasion, waste consisting of mixed amine fuel and inhibited red fuming nitric acid from drones was disposed on-site (described in SWMU #5) (Ref. 5). According to facility representatives, the NAF does not presently generate more than 100 kilograms per month of any hazardous materials. Waste management activities at NAF include storage of aged or inoperable munitions. In addition, the NAF generates small quantities of waste oils and degreasers during routine maintenance of vehicles (i.e., cleaning, oil changes, etc.) conducted at the Transportation Shop (Buildings 2015 and 2016). The NAF also operates a Carpentry Shop for woodworking and painting, from which waste paints and solvents are generated. The facility also operates a sewage treatment plant and three septic tanks for domestic sewage. Interviews conducted during the VSI indicate that the facility does not manage any process areas, electroplating operations or photographic labs. In addition, the facility does not include any industrial wastewater collection lines or treatment plants, active landfills, pesticide rinsate tanks, or asbestos storage or disposal areas.

The NAF operates two RCRA regulated waste management units including Buildings 301 and 302 (SWMUs #1 and #2) used for the storage of aged and inoperable munitions. Building 216 (SWMU #3) is an inactive waste munitions container storage/transfer unit. Each of these units includes three bays which have been used to store explosive munitions requiring destruction due to age, obsolescence, surplus or other cause as declared by the Navy. The waste munitions are characterized as hazardous because of their reactive nature and the explosive material is contained within the munition casing. Waste munitions are stored in metal or wooden boxes on pallets which are stored inside the concrete magazines. The sources of waste munitions handled at NAF include the U.S. Naval Station Roosevelt Roads, the Atlantic Fleet Weapons Training Area (on the east end of the island) and the NAF (Table 2). Waste munitions are transported from the magazines at NAF to an explosive ordnance detonation (EOD) range at the Atlantic Fleet Weapons Training Area (LANT). LANT and the EOD range are managed under a separate RCRA permit.

During the VSI, a truck holding 55-gallon drums, salvage drums, and smaller drums of waste labeled "D002" (described as SWMU #15) was observed outside the Transportation Shop. Since the truck had been parked in this location before the present NAF personnel were stationed at this base, they were not aware of its source or disposition. A later interview with civilian personnel from USNSRR indicated that the truck contained waste napalm and had been parked for more than 4 months awaiting disposal.

As discussed previously, the NAF also manages small quantities of waste oils, spent batteries, degreasers, paints and solvents (Table 2). The Transportation Shop generates waste oils, degreasers, spent batteries, and tires. Most of these wastes are collected by a private contractor (General Electric) at the point of generation for offsite disposal. The facility operates a Waste Oil and Solvent Accumulation Area (SWMU #11) adjacent to the Transportation Shop. The Carpentry Shop at NAF generates

Table 2. Summary of Wastes Managed, Sources, and Disposal Practices at NAF, Vieques Island, Puerto Rico.

Waste	Source	Management Unit	Disposal Method
Munitions	USNSRR, LANT, NAF	1,2,3	EOD Range (LANT)
Oil	Transportation Shop, Wash Rack, Oil/Water Separator	11,12,14	Offsite Contractor*
Degreasers	Transportation Shop, Wash Rack, Oil/Water Separator	11,12,14	Offsite Contractor
Solvents	Carpentry Shop	9,10	Drum Inside Paint Locker, Soil Adjacent to Paint Locker
Paint	Carpentry Shop	9,10	Soil Adjacent to Paint Locker
Domestic Sewage	Offices, Barracks, Shops, EM Club	AOC B	Septic Tanks, Wastewater Treatment Plant**
DOO2 (Napalm)	USNSRR	15	Undetermined

* The facility manages one waste accumulation area (SWMU #11) (located near the Transportation Shop). The majority of waste disposal is contracted by General Electric for offsite disposal.

** Effluent from the treatment plant is pumped to a land disposal area (AOC B). Sludge from the septic tanks and the treatment plant is pumped by a private contractor to a vacuum truck for offsite disposal.

small quantities of waste paints and solvents. Observations during the VSI noted that the waste paint and solvents were dumped on an area of soil (described as SWMU #10) adjacent to the Paint Locker (Building 4001).

Domestic sewage generated at the NAF is treated at a Sewage Treatment Plant (AOC B) or at one of the three septic tanks on base. The three septic tanks include a 150-gallon tank at the Carpentry Shop, a 250-gallon tank at the Transportation Shop, and a 1500-gallon tank at the EM Club. The sludge from the tanks is removed by a contractor for offsite disposal. Municipal solid waste including sawdust, base trash, ash from burning of classified papers and fluorescent lighting is disposed of offsite at a municipal landfill operated by the government of Vieques Island.

Included within the boundaries of the NAF are three inactive disposal areas. The Mangrove and Quebrada Disposal Sites (SWMUs #6 and #7) are locations where wastes including paints, solvents, scrap metal, metal parts, and general refuse were dumped on bare ground. The IRFNA/MAF-4 Disposal Site (SWMU #5) is the location of a one-time dumping of approximately 7,000 pounds of an inhibited red fuming nitric acid (IRFNA) and mixed amine fuel (MAF) waste (Ref. 2)

History of Releases

The Navy Assessment and Control of Installation Pollutants (NACIP) Initial Assessment Study (IAS) (Ref. 2) suggested a Confirmation Study for four sites on NAF property (Figure 3). The sites include the Inactive Waste Explosive Open Burn/Detonation Range (SWMU #4), the IRFNA/MAF-4 Disposal Site (SWMU #5), the Mangrove Disposal Site (SWMU #6), and the Quebrada Disposal Site (SWMU #7). A site inspection conducted in 1986 observed rusted 1-gallon paint cans and 55-gallon drums situated on coarse sand at the Mangrove Disposal Site (SWMU #6) (Ref. 6). In addition, some of the waste material was standing in the water of Laguna El Pobre (Ref. 6). Although no additional information was obtained from file information available at the time of the PR and VSI to characterize releases from units at the NAF, a 1986 reference indicates that a Confirmation Study was in progress (Ref. 5). Waste material was observed during the 1988 VSI at both the Mangrove Disposal Site (SWMU #6) and the Quebrada Disposal Site (SWMU #7). At both of these sites, waste materials were placed in a location that would be subject to transport of wastes by surface runoff during the characteristic high intensity, short-duration rainfalls that occur on Vieques Island. Confirmation studies were recommended at all of the land disposal sites (Ref. 2).

Additional discussions of specific releases are provided in the individual unit descriptions (Section 4.0).

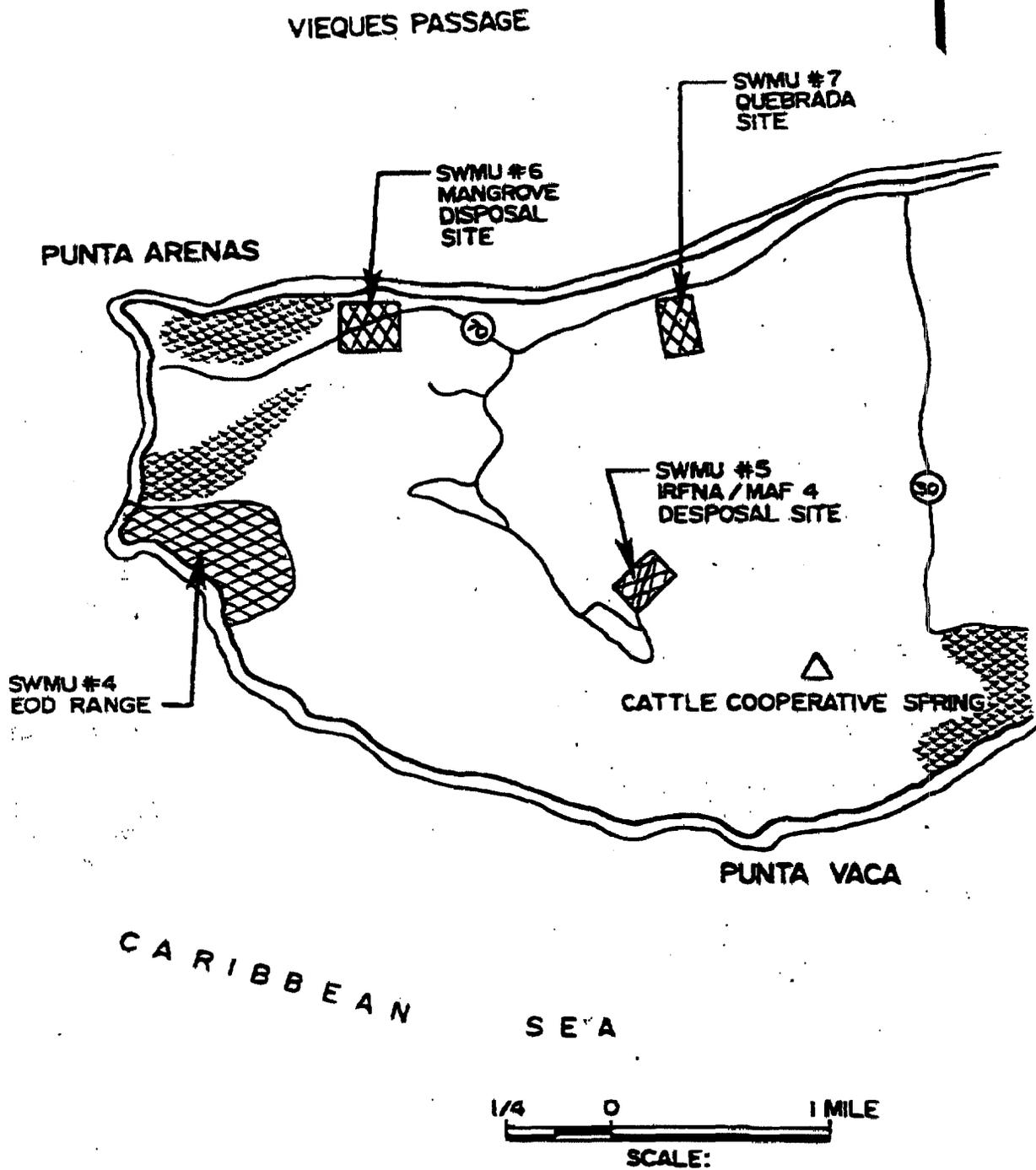


FIGURE 3. SITES RECOMMENDED FOR CONFIRMATION STUDIES IN THE NACIP IAS REPORT (REF. 2).

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 7 miles off the east coast of Puerto Rico between 65°35'W to 65°16'W longitude and 18°05'N to 18°10'N latitude (Ref. 2).

Vieques Island occupies a total land area of approximately 33,000 acres, of which about three-quarters is property of the U.S. Navy. Navy property on Vieques Island includes the Naval Ammunition Facility (NAF) on the western end of the island which occupies 8,000 acres (Ref. 2). The NAF operates two active and one inactive magazine for storage of waste munitions (SWMUs #1, #2, and #3). Waste munitions are transported offsite for disposal at the BOD Range at the Inner Range (LANT). The land adjacent to the NAF is privately owned or is owned by the Commonwealth of Puerto Rico. This land is primarily used for pasture or private homes. The two largest towns on Vieques Island are Isabel Segunda on the north coast and Esperanza on the south coast. The combined population of the two cities is less than 20,000. Much of the land between the two cities has reverted to secondary forest growth (Ref. 2).

Although the facility occupies a total land area of 8,000 acres, much of this area is undeveloped by the facility. Except for secured magazine areas and the main base, most of the land within NAF boundaries is leased to a local cattle cooperative and is used for open grazing. The Navy has hired an agronomist to manage open areas on NAF. Future plans call for removal of brush and planting of pasture grasses to increase the area available for cattle grazing.

Climate and Meteorology

Vieques Island is located in the Caribbean Sea and has a tropical wet and dry climate. Steady year-round trade winds blow directly across the island from an easterly direction which moderate the tropical heat (Ref. 2). The available data on rainfall patterns indicate that approximately 45 inches of rainfall occur annually. Showers are frequent, but they are usually high-intensity, short-duration showers. Vieques Island has considerable periods of sunshine during the year. The mean annual temperature is about 80°. August is the warmest month at 82° and February the coldest at 76° (Ref. 2).

Topography and Surface Drainage

The topography of Vieques consists of a series of low hills and shallow valleys. The hills on the western side of the island are gentler and more rolling (except on high ledges) and have a deeper soil profile than those on the east end. The highest point on the western end of the island is Monte Pirata (301 meters). The average elevation for the island is 75 meters above sea level.

From the high points of the island, small normally dry waterways flow in both north and south directions to the sea. This division of the

drainage results in by small drainage basins which have no significance for water resource development and only 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, located on the southwest coast of the island between the NAF and the Naval facilities on the eastern end of the island. The total drainage area of that basin is 2.3 square miles. There are four other basins with drainage areas of 1- or 2-square miles. There are several low-lying coastal zones of sedimentary deposits that are generally level and contain lagoons and swamps (Ref. 2).

As of March, 1987, no Federal Insurance Administration floodplain map had been prepared for the island. Similar maps for the island of Puerto Rico, however, identify the 100-year floodplain zones along the narrow internal drainage streams known as quebradas. Units at the facility which are suspected to be within this floodplain include the Mangrove Disposal Site (SWMU #6) and the Quebrada Disposal Site (SWMU #7).

Soils, Geology, and Hydrogeology

The NACIP IAS report (Ref. 2) indicates that the majority of the soils on Vieques are residual, or derived from the gradual breakdown of hard rock. Because of the tropical wet and dry climate type and the relatively impermeable intact volcanic rock, soil development has been severely limited on the eastern portion of the island, resulting in a very shallow soil profile. Soils on the western end of the island in the area of the NAF, however, are somewhat better developed. These have been formed by the weathering of the underlying granite diorite intrusive. The soils of the NAF are primarily coarse-grained and contain primarily arkosic material, with subordinate amounts of clay (Ref. 2).

The larger valleys of Vieques are filled and blanketed by alluvial deposits of the Quaternary age. These deposits, which are stream-laid, consist of clay, silt, sand, and gravel derived from either the parent volcanic rock or the intrusive rock. Although the alluvial deposits vary in thickness, they are generally more than 40 feet thick. In addition to the soils mentioned above, areas along the shoreline are covered with deposits of beach, alluvial and wind-blown sand as well as lagoon and salt marsh muds (Ref. 2).

Vieques Island, including the NAF site, is composed of three major rock types, in terms of age and general lithology. The three main rock types are Upper Cretaceous volcanic rocks, Upper Cretaceous or Lower Tertiary intrusive rocks, and Upper Tertiary and Quaternary age sedimentary rocks. In addition, there are unconsolidated sedimentary deposits on the island which are of Quaternary age and consist of alluvial deposits, beach and dune deposits, and swamp and marsh deposits (Ref. 2).

The oldest rocks exposed on Vieques are presumed to be of Upper Cretaceous age and are mostly andesites, tuffs and conglomerates. It is generally thought that these rocks were deposited in a marine environment, and are similar to rocks of the same age found in Puerto Rico and the Virgin Islands. The thickness of these deposits varies across the island (Ref. 2).

The NACIF IAS report (Ref. 2) states that limestone outcrops of Upper Tertiary age occur at three major areas on the island. Several peninsulas along the south coast constitute the largest concentration, with other deposits located on the extreme eastern end of the island, and at Desembarcadero Mosquito on the north coast. The limestone is soft, yellowish and contains an abundance of fossils. On exposure, the limestone forms a hard crust which resists weathering (Ref. 2).

Groundwater on Vieques Island varies from salty to relatively fresh. The groundwater is quite hard with high levels of chloride and sodium, the result of an accumulation of salts from sea spray and saltwater encroachment, but has low levels of iron and nitrates. There are two main sources of groundwater on the island, with one of these being located in the western portion within the confines of the NAF (Ref. 2). A shallow well and spring are located in the southern portion of NAF property downgradient from the IRFNA/MAF-4 Disposal Site (SWTU #5). A Hazard Ranking System Trip Report (Ref. 6) indicates that humans occasionally drink from the well.

Since 1979, freshwater has been piped from Puerto Rico to the island. At present, there is a limited dependence on groundwater in homes and installations outside the distribution systems (Ref. 2). A Hazard Ranking System Trip Report (Ref. 6) indicates, however, that some residents on the western end of Vieques Island utilize water from wells drilled into the 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 preliminary review are listed in Table 3. Descriptions and known details of the units are given in the following section.

Table 3. SWMUs and AOCs at the Naval Ammunition Facility, Vieques Island, Puerto Rico.

Unit No.	Unit Name	Status*
1	Waste Munitions Container Storage/ Transfer Facility (Building 301)	RCRA Interim Status
2	Waste Munitions Container Storage/ Transfer Facility (Building 302)	RCRA Interim Status
3	Former Waste Munitions Container Storage/Transfer Facility (Building 216)	Inactive, RCRA Interim Status
4	Inactive Waste Explosive Open Burning/Detonation Range	Inactive, NACIP
5	IRENA/MAF-4 Disposal Site	Inactive, NACIP
6	Mangrove Disposal Site	Inactive, NACIP
7	Quebrada Disposal Site	Inactive, NACIP
8	Spent Battery Accumulation Area	Active
9	Paint Locker (Building 4001)	Active
10	Waste Paint and Solvents Disposal Ground	Active
11	Waste Oil and Solvent Accumulation Area	Active
12	Oil/Water Separator and Associated Tank	Active
13	Disposal Site for Drone Casings in Atlantic Ocean	Inactive
14	Wash Rack	Active
15	Waste Transportation Vehicle	Active

-- continued --

Table 2. Continued.

AREAS OF CONCERN		
A	Well and Spring Adjacent to IRFNA/MAF-4 Disposal Site	Active
B	Sewage Treatment Plant and Disposal Ground	Active
C	Drainage Ditch in the Vicinity of Transportation Shop Area	Active
D	Abandoned Vehicles	Inactive

- * RCRA - a unit operating under interim status, awaiting permitting or closure.
- Active - the unit continues to actively manage wastes.
- Inactive - the unit no longer actively manages wastes; however, wastes may still be present.
- NACIP - the unit was included in the NACIP Initial Assessment Study conducted for the Naval Station Roosevelt Roads, Puerto Rico facility.

1. UNIT NAME: Waste Munitions Container Storage/Transfer Facility
(Building 301 Bays A,B,C) (Photos #1, #2, and #3)

Unit Description:

This RCRA interim status unit includes three bays of Building 301 which have been used to store rockets, bombs, mortars, small arms ammunition, etc., which require destruction due to age, deterioration, damage, obsolescence, surplus, or other cause. This hazardous waste container storage/transfer facility is located within the magazine storage area of NAF, Vieques Island. The building is a concrete triple-arch, earth-covered magazine. Three arches (Magazines A, B, and C) are used for the storage/transfer facility. The floor size of each bay is 25 feet by 80 feet. The magazines were designed for the storage of military ammunition and munition components and are spaced in accordance with Quality-distance-standards established by the Department of Defense Explosive Safety Board (Ref. 1).

The aged and inoperative munitions (i.e., the wastes) are stored in separate bays based on the response conditions in case of fire. Bay 301-C is used for the storage of explosive munitions including hand grenades, while Bays 301-A and B are used for the storage of explosive munitions including cluster bombs and blasting caps. All hazardous constituents are contained within munition casings and the munitions are stored in metal or wooden boxes on pallets.

Date of Start-up:

The storage of waste munitions was transferred to Building 301 in 1984. Navy personnel stated that storage activities were transferred to these magazines in order to move waste munition storage farther from the main base facilities (e.g., offices and other buildings) at NAF.

Date of Closure:

Navy personnel stated that they intended to close the waste munition storage/transfer facility and use it as a less than 90-day storage unit. The unit was active at the time of the 1988 VSI.

Wastes Managed:

The wastes managed at this unit include hazardous wastes K054, D002, and D001, as well as ammunition and explosive items which require destruction. The maximum explosive weight limit of the unit is 500,000 pounds.

At the time of the VSI, Bays 301-A and B were used for storage of explosive munitions and Bay 301-C was used for storage of solid chemical munitions. The unit is used for storage of waste munitions from NAF and from USNRR. Waste munitions are taken offsite from the unit to the EOD Range at the Atlantic Fleet Training Area Inner Range on the eastern end of the island.

Release Controls:

The waste munitions are stored on wooden or metal pallets in wooden boxes. Munition storage is spaced according to a grid system on the floor of each bay. The bays have concrete floors, walls, and ceilings. There is a small groove along the edge of each wall to drain runoff from the humidity inside the bay. The groove empties to a drain on the front wall of the magazine.

History of Release:

There were no documented releases from this unit. The inside of Bay B was observed during the VSI and appeared to be well managed. There was no sign of accumulated moisture in the groove along each wall. No other signs of release were observed during the inspection.

2. UNIT NAME: Waste Munitions Container Storage/Transfer Facility
(Building 302 Bay D) (Photos #4 and #5)

Unit Description:

This RCRA interim status unit includes one bay of Building 302 which has been used to store rockets, bombs, mortars, small arms ammunition, etc., which require destruction due to age, deterioration, damage, obsolescence, surplus, or other cause. This hazardous waste container storage/transfer facility is located within the magazine storage area of NAF, Vieques Island. The building is a concrete triple-arch, earth-covered magazine. Navy personnel stated that one arch (Magazine D) is used for the storage/transfer facility. The floor size of the bay is 25 feet by 80 feet. The magazine was designed for the storage of military ammunition and munition components and is spaced in accordance with Quality-distance-standards established by the Department of Defense Explosive Safety Board (Ref. 1).

Bay 302-D is used for the storage of solid chemical explosives including flares and smoke grenades. Navy personnel stated that they planned to close the unit and to use it as a less than 90-day container storage unit for waste munitions.

Date of Start-up:

It is assumed the use of Building 302 was initiated approximately the same time as Building 301. Navy personnel stated that storage of waste munitions was transferred to Building 301 in 1984 in order to move waste munition storage farther from the main base facilities (e.g., offices and other buildings) at NAF.

Date of Closure:

Navy personnel stated that they intended to close the waste munition storage/transfer facility and use it as a less than 90-day storage unit. The unit was active at the time of the 1988 VSI.

Wastes Managed:

The wastes managed at this unit include hazardous wastes K054, D002, and D001, as well as ammunition and explosive items which require destruction. The maximum explosive weight limit of the unit is 500,000 pounds.

At the time of the 1988 VSI, Navy personnel stated that Bay 302-D was used for storage of solid chemical munitions. The unit is

used for storage of waste munitions from NAF and from USNSRR. Waste munitions from the unit are taken offsite to the EOD Range at Inner Range at the Atlantic Fleet Weapons Training Area on the eastern end of the island.

Release Controls:

The waste munitions are stored on wooden or metal pallets in wooden boxes. Munition storage is spaced according to a grid system on the floor of the bay. The bay has concrete floors, walls, and ceiling. There is a small groove along the edge of each wall to drain runoff from the humidity inside the bay. The groove empties to a drain on the front wall of the magazine.

History of Release:

There were no documented releases from this unit. Based on visual inspection, the bay was apparently well managed due primarily to the explosive nature of the wastes. There were no signs of release observed.

3. UNIT NAME: Former Waste Munitions Container Storage/Transfer Facility
(Building 216 Bays A,B,C) (Photos #6 and #7)

Unit Description: This inactive RCRA interim status unit includes three bays of Building 216 which have been used to store rockets, bombs, mortars, small arms ammunition, etc., which require destruction due to age, deterioration, damage, obsolescence, surplus, or other cause. The inactive hazardous waste container storage/transfer facility is located within the magazine storage area of NAF, Vieques Island and is currently planned for closure. The building is a concrete triple-arch, earth-covered magazine. Three arches (Magazines A, B, and C) are used for the storage/transfer facility. The floor size of each bay is 25 feet by 80 feet. The magazines were designed for the storage of military ammunition and munition components and is spaced in accordance with Quality-distance-standards established by the Department of Defense Explosive Safety Board (Ref. 1).

The waste munitions were stored in separate bays based on the response conditions in case of fire. Munitions stored included explosive munitions including hand grenades, cluster bombs and blasting caps.

Date of Start-up: This unit was activated in the early 1940s.

Date of Closure: This unit has been inactive since the start-up of Buildings 301 and 302 as waste munitions storage units. Navy personnel stated that the approximate last date of use was 1984. A closure plan was submitted as part of the Part B Permit Application (Ref. 1).

Wastes Managed: The wastes managed at this unit include hazardous wastes K054, D002, and D001, as well as ammunition and explosive items which require destruction. The maximum explosive weight limit of the unit is 500,000 pounds.

Release Controls: The waste munitions are stored on wooden or metal pallets in wooden boxes. Munition storage is spaced according to a grid system on the floor of each bay. The bays have concrete walls, floor, and ceiling. There is a small groove along the edge of each wall to drain runoff from the humidity

inside the bay. T. groove empties to a drain on the front wall of the magazine.

History of Release:

There were no documented releases from this unit and no signs of release were observed during the VSI.

4. UNIT NAME: Inactive Waste Explosive Open Burning/Detonation Unit
(NACIP Site No. 19) (Photo #8)

Unit Description: The inactive open burning unit was utilized for thermal destruction of waste munitions, fuels or propellants. The material to be burned was placed in the open burn area and a squib or other detonator placed in the waste material. The open burn was then initiated from a safe distance using electrical detonation. The inactive open burn/detonation area has reportedly been swept for live munitions by an EOD team from NAF.

The area is approximately 1/2-mile long and 200 yards wide and is located approximately 1/2-mile from the Caribbean Sea. Civilian personnel who had worked at the base for over 20 years stated that this was the only open burn area ever used at the facility.

Date of Start-up: The NACIP IAS report (Ref. 2) indicates this unit may have been used as early as the 1940s. The reference further states that the unit was known to have operated from 1969 to about 1979.

Date of Closure: As stated, Ref. 2 indicates the unit was used until about 1979. Facility personnel stated that the unit had been inactive since the early 1980s.

Wastes Managed: This unit has been used for the disposal of excess and retrograde ammunition and twice yearly for the disposal of unexploded munitions. In addition, material from the rework of munitions (loose powder and primers) and ordnance items from USNSRR, such flares and cartridge-activated devices, may also have been disposed at the unit.

Release Controls: There are no release controls identified with this unit. The area has been swept for live munitions by an Explosive Ordnance Demolition team. It presently has a thick cover of tall grass.

History of Release:

The unit is the site of disposal of waste fuels and explosives on bare ground. The area is presently overgrown with native grasses; therefore, the exact location of the unit was difficult to determine. There were no obvious signs of past activities (e.g., bare soil, stressed vegetation, etc.) or signs of release observed during the VSI.

5. UNIT NAME: IRF MAF-4 Disposal Site (NACIP site .. 3)
(Photos #9 and #10)

Unit Description:

This inactive unit is the site where, in 1975, approximately 7,000 pounds of fuel from leaking drones were emptied into a low spot in a road near Building 422. The fuel contained inhibited red fuming nitric acid (IRFNA) and mixed amine fuels (MAF-4).

The NACIP IAS Report (Ref. 2) states that the quebrada where the disposal took place is in the probable surface recharge area for one of the few naturally occurring springs on the island that runs year-round. The site lies less than 2 miles from the well and spring which are used by the local cattle cooperative. Facility personnel stated that a series of three sets of soil and water samples were collected from the well and disposal areas, with the final in January, 1988. These results were requested during the VSI but were not readily available at the facility. They will, therefore, be requested as part of the suggested further action for this unit.

Date of Start-up:

This unit was used for the one-time disposal of fuel from target drones in 1975 (Ref. 2).

Date of Closure:

This is an inactive site used on one event in 1975.

Wastes Managed:

This unit was used for the disposal of a maximum total of 1,775 pounds of mixed amine fuel and 5,275 pounds of inhibited red fuming nitric acid. Although it is likely that much of the material was volatilized or has biodegraded, there is a possibility of persistent nitrogen-containing chemicals being present in the soil.

Release Controls:

The disposal was on bare soil and there were no release controls identified with this unit.

History of Release:

The open disposal of approximately 7,000 pounds of mixed amine and nitric acid fuel took place at this location in 1975.

An area of stressed vegetation approximately 200 yards from Building 422 was observed during the VSI. Facility personnel stated that, although they were uncertain as to the exact location of the disposal site, the

stressed area in t quebrada was near the approximate location of the fuel disposal ~~area~~ ~~approximately~~ the same species composition as surrounding vegetation and appeared to have been stressed by environmental conditions occurring more recently than 1975.

stressed area in t quebrada was near the approximate location of the fuel disposal area. However, the stressed vegetation was approximately the same species composition as surrounding vegetation and appeared to have been stressed by environmental conditions occurring more recently than 1975.

6. UNIT NAME: Mangr Disposal Site (NACIP Site No.
(Photos #11 through #18).

Unit Description:

This inactive site was used by the facility for disposal of various types of trash. Located in the northwestern portion of Vieques Island along North Shore Drive, the site stretches for approximately 300 feet and extends into an 18-acre seaside mangrove swamp for about 100 feet. The unit is located adjacent to Laguna Arenas between Laguna Kiani Bridge and Vieques Passage. The material disposed at this unit was piled, burned, and shoved into a mangrove swamp (Ref. 2). Facility personnel indicated that this area was included as part of the NACIP sampling activities. The NACIP IAS report (Ref. 2) referenced two studies, (TAMS/E&E, 1979 and Lewis, et al., 1981) which recommended that the material be removed from the site to eliminate it as a source of contamination.

Date of Start-up:

This unit was initially used in the early 1960s (Ref. 2).

Date of Closure:

The date the unit became inactive is uncertain; however, records indicate that the unit was used until about 1978 (Ref. 2). There were no apparent signs of recent waste disposal at this unit during the 1988 VSI.

Wastes Managed:

This unit was used for the disposal of all types of trash, cans of lubricants and oil, solvents, paints and rubble. It has been estimated that approximately 800 cubic yards of material was disposed, including approximately 6,400 pounds of potentially hazardous material (Ref. 2). Much of the waste is scrap metal and solid waste.

Release Controls:

There are no release controls identified with this unit.

History of Release:

This unit consists of numerous piles of trash and scrap metal dumped into the swamp which extends to a lagoon which flows to the Atlantic Ocean.

An extensive area of small piles of waste, much of it in standing water, was observed during the 1988 VSI. Much of the waste was scrap metal and broken glass; however, at least one 1-gallon can of paint was observed.

7. UNIT NAME: Quebrada Disposal Site (NACIP Site 1)
(Photos #19 through #23)

Unit Description:

This is an inactive land disposal unit located in the northcentral portion of the Naval Ammunition Facility. The unit is located south of North Shore Drive, adjacent to a quebrada (an intermittent drainage area) which discharges to the Vieques Passage, and ultimately to the Atlantic Ocean. The quebrada varies from 20 to 30 feet wide and 10 to 20 feet deep (Ref. 2). The disposal site covers an area approximately 500 feet long by 4 feet wide and 20 feet deep. The material was apparently tumbled down the side of the quebrada and is now partially buried. In 1984 it was reported that steel posts had been driven into the sides of the quebrada as shoring where the material had been deposited and that some of the solvent containers had become detached from the main pile and were lying in the silt and sand at the bottom of the quebrada (Ref. 2). During the VSI, a monitoring well was located downgradient of the disposal site while inspecting the area. The monitoring well had been installed approximately 200 yards south of North Shore Drive. Results of monitoring of the well were requested during the VSI but were not readily available at the facility. The results will, therefore, be requested as a suggested further action for this unit.

The area is presently reached by following an overgrown trail (formerly a dirt road) that is covered with tall grass and numerous thorny leguminous trees. The trail begins at the monitoring well and continues up a hill for approximately 1-mile south from North Shore Drive. Since the posts described in the 1984 report (Ref. 2) were not visible during the 1988 VSI, it is assumed that much of the material in the pile has been covered with eroded soil from the hill and the area above. In addition, very little of the discarded material is still visible and the material which is visible is partially covered with soil and dense vegetation.

Date of Start-up:

The NACIP IAS report (Ref. 2) states that no records of this disposal site could be located in Navy files and that none of the

facility personnel were aware the site existed. The report estimates that the site had been in use by civilian and base personnel since the 1960s (Ref. 2).

Date of Closure:

Records indicate the site had apparently been used for many years since the waste pile had steadily moved uphill a total length of approximately 500 feet (Ref. 2). No signs of recent waste disposal were observed during the VSI and most of the waste which was present had been covered with eroded soil.

Wastes Managed:

The wastes managed at this unit include approximately 1,500 cubic yards of trash, including ordnance carriers, cans of oil and lubricants, solvents, paint, rubble, buried and exposed 55-gallon metal drums, cars, and all types of general trash. It has been estimated that between 3,000 and 13,000 pounds of hazardous material have been disposed at this site (Ref. 2).

Release Controls:

There are no release controls identified with this unit. As stated, a monitoring well has been installed approximately 200 yards south of North Shore Drive, downgradient of the disposal site.

History of Release:

The unit consists of a large amount of waste materials piled into an unlined quebrada. Some of the disposed material in the quebrada has been transported further toward Vieques Passage by surface water which occasionally floods the quebrada. There were no signs of stressed vegetation or stained soil observed during the VSI.

8. UNIT NAME: Spent Battery Accumulation Area (Pl 5 #24)

Unit Description: Spent batteries are accumulated inside the Transportation Shop (Building 2015) at NAF for offsite transport and contractor disposal at Roosevelt Roads. During the VSI, four spent batteries were observed stored on top of a bench inside Building 2015. This bench has traditionally been used by the Transportation Shop for accumulation of spent batteries.

Date of Start-up: The Transportation Shop was built in the early 1970s.

Date of Closure: This unit is presently active.

Wastes Managed: This area is used for accumulation of spent batteries and battery acid. The spent batteries are shipped offsite to U.S. Naval Station Roosevelt Roads for disposal by private contractor.

Release Controls: The area is located inside of a metal building which is constructed with concrete floors.

History of Release: There are no documented releases identified with this unit and there were no signs of release observed during the VSI.

9. UNIT NAME: Paint . ker (Building 4001) (Photos #1 through #32)

Unit Description: This is a small building adjacent to the maintenance shop which is used for the storage of paints, solvents, and thinner. Some of the waste solvents are apparently stored in a drum inside the building for use as a thinner. The building is approximately 8 feet by 12 feet with a concrete floor and metal roof.

Date of Start-up: This unit was constructed in the early 1980s.

Date of Closure: This is an active unit.

Wastes Managed: One drum of waste solvent was stored inside the building for use as a paint thinner. In addition, this area is used for the storage of product paints and solvents.

Release Controls: The unit is a building constructed with a concrete floor and metal roof.

History of Release: There are no documented releases identified with this unit. Some staining was observed on the floor and paint cans inside the building during the VSI.

10. UNIT NAME: te Paint and Solvents Disposal Pond (adjacent to Building 4001) (Photos #28 and #32)

Unit Description:

Facility personnel initially stated that they did not accumulate any waste solvents or paints for disposal. Upon further examination, it was determined that excess paints or solvents from small jobs were disposed on the soil outside the Paint Locker, Building 4001. During the VSI, the active use of the area adjacent to the Paint Locker as a paint and solvent disposal ground was observed (note Photo 28). An area of soil approximately 3-foot square adjacent to the Paint Locker was observed to be stained and vegetation in the area was stressed (Photo 32).

Date of Start-up:

This area has been in use since the mid-1970s.

Date of Closure:

This is an active unit.

Wastes Managed:

This area is used for the open dumping of waste paints and solvents. Approximately 1 pint of waste paint and thinner is generated from brush cleaning operations. It is estimated that approximately 2 gallons of waste paint and solvent are disposed monthly.

Release Controls:

There are no release controls identified with this unit.

History of Release:

An area of stained soil and stressed vegetation approximately 3-foot square was observed adjacent to the Paint Locker. A civilian maintenance personnel was observed disposing waste paint on the soil during the VSI.

11. UNIT NAME: Was Oil and Solvent Accumulation A: (Photos #33 and #34)

Unit Description:

This unit is located approximately 50 yards east of the Transportation Shop (Building 2015). The area consists of a concrete pad with a 6-inch curb used for storage of metal cans or drums of waste oil and degreasing solvents. The waste oil is generated in maintenance operations and from the oil/water separator (SWMU #12) beneath the oil change rack. Facility personnel stated that small quantities of degreasing solvents were occasionally used to clean parts and waste generated during this operation is stored at this unit.

Date of Start-up:

This unit has been in use since approximately 1975.

Date of Closure:

This is an active unit.

Wastes Managed:

This unit is used for accumulation of waste oil and degreasing solvents from the Transportation Shop. At the time of the VSI, there were approximately six, 55-gallon drums of waste oil stored on the pad.

Release Controls:

The unit is a concrete pad with a 6-inch curb. A drain valve for isolation and discharge of rainwater is located at one end of the pad.

History of Release:

There are no documented releases identified with this unit. During the VSI, rainwater was observed to have collected in the containment area and was being detained by the drain valve which is constructed into the containment curb. There were no signs of release (e.g., sheen on contained water, stains, stressed vegetation around unit), observed during the VSI.

12. UNIT NAME: /Water Separator and Associated Tank
(Photos #35 and #36)

Unit Description: This unit includes an oil/water separator and tank associated with an oil change rack used to facilitate the removal of waste crankcase oil during vehicle maintenance. The oil is collected in a funnel which leads to an oil/water separator and underground storage tank. The tank is periodically emptied using a vacuum truck by a contractor for offsite disposal. Facility personnel stated that solvent degreasers could be included in the waste oil. The underground storage tank is a 600-gallon capacity fiberglass tank.

Date of Start-up: This unit has been in use since the early 1970s.

Date of Closure: This is an active unit.

Wastes Managed: The unit is used for the collection and storage of waste oil from vehicle maintenance. Facility personnel stated that all major vehicle maintenance was conducted at Roosevelt Roads, and that only routine maintenance occurred at NAF. The NAF also services vehicles from Camp Garcia at the eastern end of Vieques.

Release Controls: The oil change rack is surrounded by a concrete pad and curb. The oil/water separator and storage tank are at grade and below grade, respectively. There were no additional release controls identified with the unit.

History of Release: There are no documented releases identified with this unit. In addition, there were no obvious signs of release observed in the vicinity of the unit during the VSI.

13. UNIT NAME: Disposal Site for Drone Casings in Atlantic Ocean

Unit Description:

The metal casings for 25 target drones were disposed in the Atlantic Ocean by the Navy in 1975. According to the NACIP IAS report (Ref. 2), the casings were dropped off a deep water ledge where other ordnance items had been disposed in the past. During the VSI, facility representatives were uncertain of the actual location of the disposal site.

Date of Start-up:

The drone casings were disposed in 1975.

Date of Closure:

The casings were disposed in 1975.

Wastes Managed:

The wastes managed were empty metal casings for 25 target drones. Prior to their disposal, the fuel was emptied into a quebrada on Vieques Island (SWMU #5). It is unknown if hazardous constituents remained in the casings at the time of disposal.

Release Controls:

There are no release controls identified with this unit.

History of Release:

This is a disposal site for 25 target drone metal casings off a deep water ledge in the Atlantic Ocean. The actual location of the site was unknown by the facility representatives except that it was located in the Atlantic Ocean. It was, therefore, not inspected during the VSI.

14. UNIT NAME: sh Rack (Photo #39)

Unit Description: This unit is located near the Transportation Shop (Building 2016). The area is a concrete driveway with 4-inch curbs on each side and ramps on each end, measuring approximately 20 feet long by 10 feet wide. The area is primarily used for cleaning Navy vehicles. Facility personnel stated that degreasing solvents are occasionally used in this area to facilitate cleaning.

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

Date of Start-up: This is an active unit.

Wastes Managed: This area is used to clean vehicles. Mostly oil and dirt are washed from the vehicle, although facility personnel stated that degreasing solvents may be used in the area.

Release Controls: The unit includes a concrete pad with curbing on each side. A swale at the end of the unit facilitates the discharge of runoff water to a ditch which eventually discharges to the Atlantic.

History of Release: There are no documented releases identified with this unit other than the designed release to an unlined ditch. All washwater and any oil, grease or degreasing solvent would be washed into the unlined ditch.

15. UNIT NAME: Waste Transportation Vehicle (Photos # #41, and #42)

Unit Description: During the VSI, a Navy truck containing numerous drums and salvage drums of a waste was observed in the vicinity of the Transportation Shop. The waste was described on the label as "caustic waste" and D002 (EPA code for corrosive waste) waste. Facility and Navy personnel at NAF did not know the source of this waste or its intended disposition. A later discussion with personnel from U.S. Naval Station (USNSRR) Roosevelt Roads indicated that the truck was used for storage of waste napalm from Roosevelt Roads. The truck had been in the area for 6 months at the time of the VSI and was awaiting a decision on the final disposal procedure.

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

Date of Closure: This is an active unit.

Wastes Managed: This unit is a truck containing numerous drums of a waste labeled as caustic and D002. Following the VSI, it was determined that the drums contained napalm from USNSRR.

Release Controls: The waste was stored in drums on the truck; otherwise, there were no release controls identified with this unit.

History of Release: The truck contained 55-gallon metal drums, and overpack drums suggesting that the material inside may have, at one time, leaked from a drum or other source.

A. AREA OF CONCERN NAME: Well and Spring Adjacent to IRFNA/MAF-4
Disposal Site (Photos #43 and #44)

AOC Description: This unit is the sole source for water for livestock during dry periods of the year. Records indicate that in 1975 waste fuel (IRFNA/MAF-4) was disposed of into a quebrada upstream of the well. The quebrada is the probable recharge area for the well and spring (Ref. 2). In addition, surface drainage from the disposal site may also reach the area. During the VSI, no sign of past release or stressed vegetation was observed. Facility personnel stated that the soil and water from the area had been recently sampled. The results of this sampling event were unavailable at the time of the VSI and will, therefore, be requested as a suggested further action for this area.

B. AREA OF CONCERN NAME: Sewage Treatment Plant and Disposal Ground
(Photos #37 and #38)

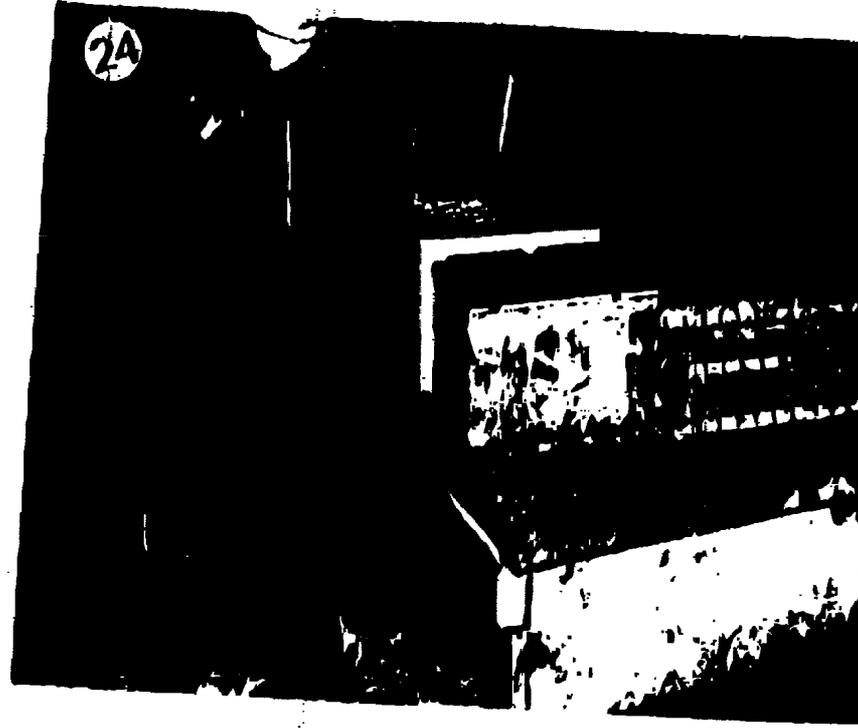
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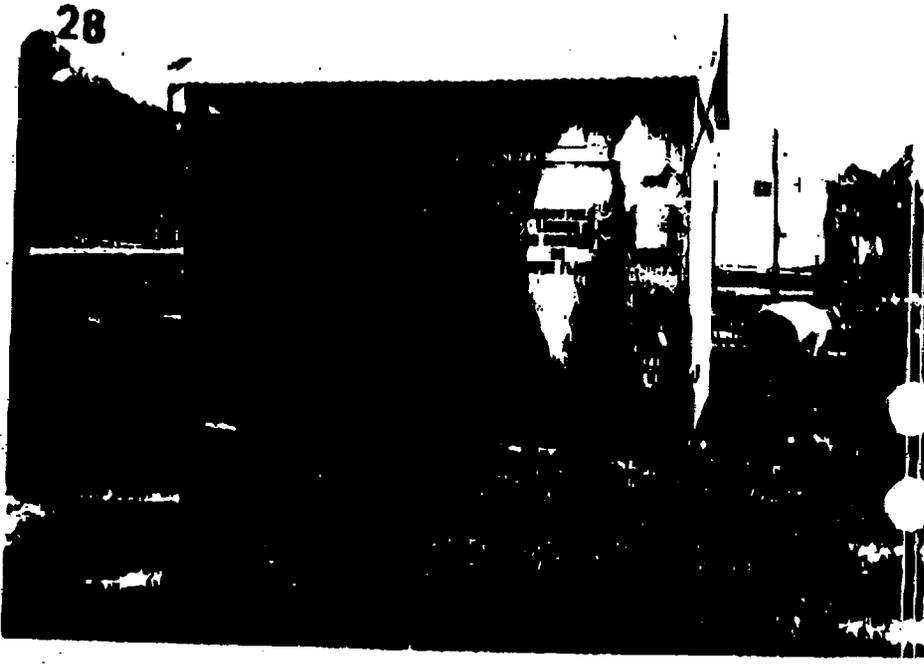
This area is a package sewage treatment plant located in the main base area of NAF, approximately 200 yards west of the maintenance shop. The sewage treatment plant is an open-topped, partially belowgrade concrete basin into which raw sewage is pumped for treatment by aeration. There is apparently no chemical treatment or additive in the package plant. Effluent from the treatment plant is pumped to a disposal ground located approximately 100 yards from the treatment plant. The plant and disposal ground have been in use since 1983. It is uncertain if hazardous constituents are introduced into the waste at any point in the system. No signs of release were observed in the area during the VSI.

C. AREA OF CONCERN NAME: Drainage Ditch in the Vicinity of the
Transportation Shop (Photo #49)

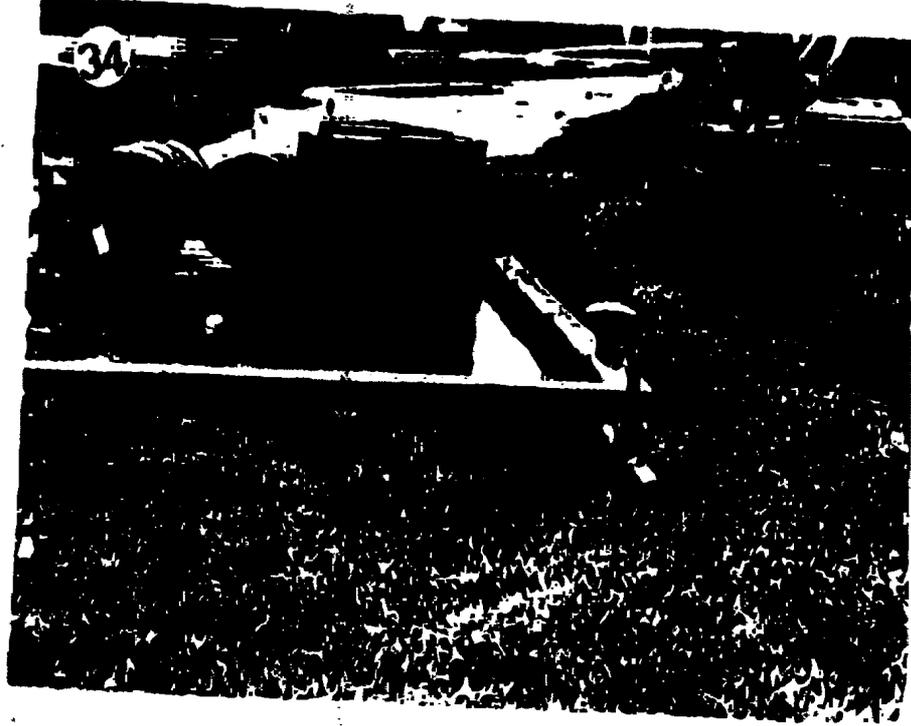
AOC Description: The facility Part B states the drainage ditches are located throughout the facility (Ref. 7). One of the ditches was observed during the VSI in the vicinity of the Transportation Shop. The ditch routinely handles stormwater runoff during precipitation events. It is unknown if hazardous constituents are routinely discharged to the ditch which ultimately drains to the Atlantic Ocean. An oily sheen, characteristic of runoff from a parking lot, was observed in the runoff water standing in the ditch during the VSI.



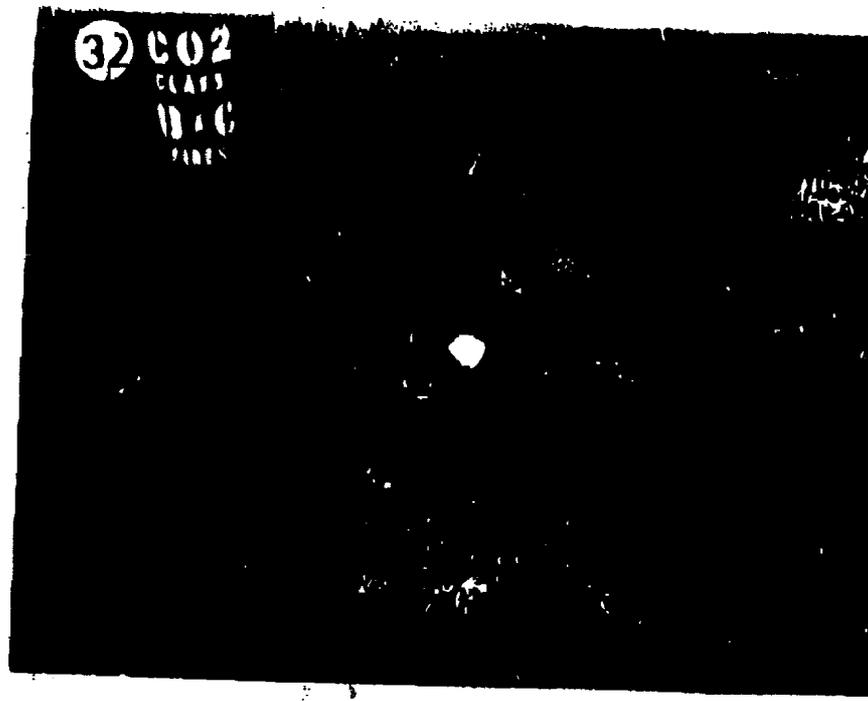


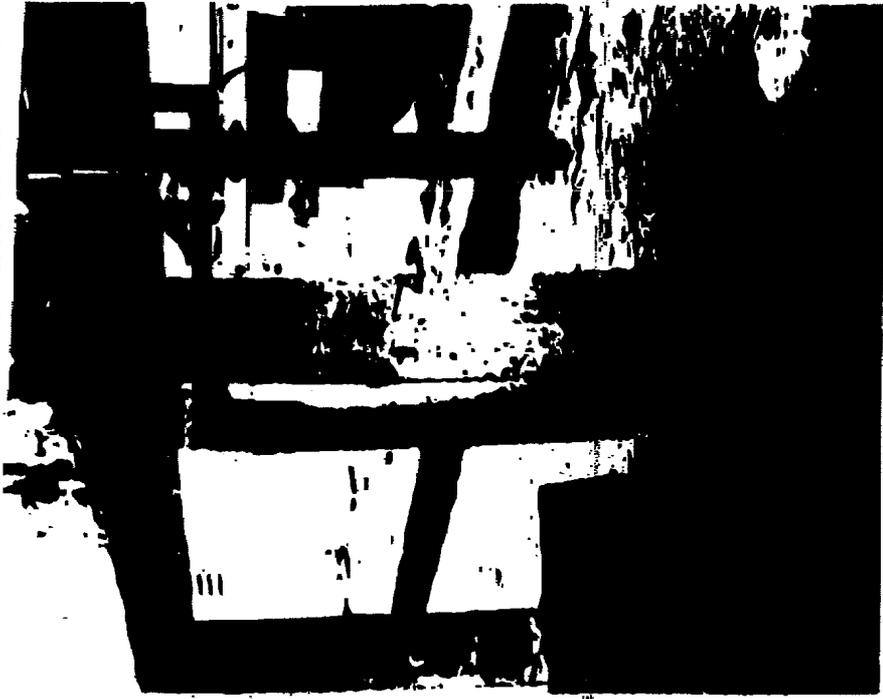


33

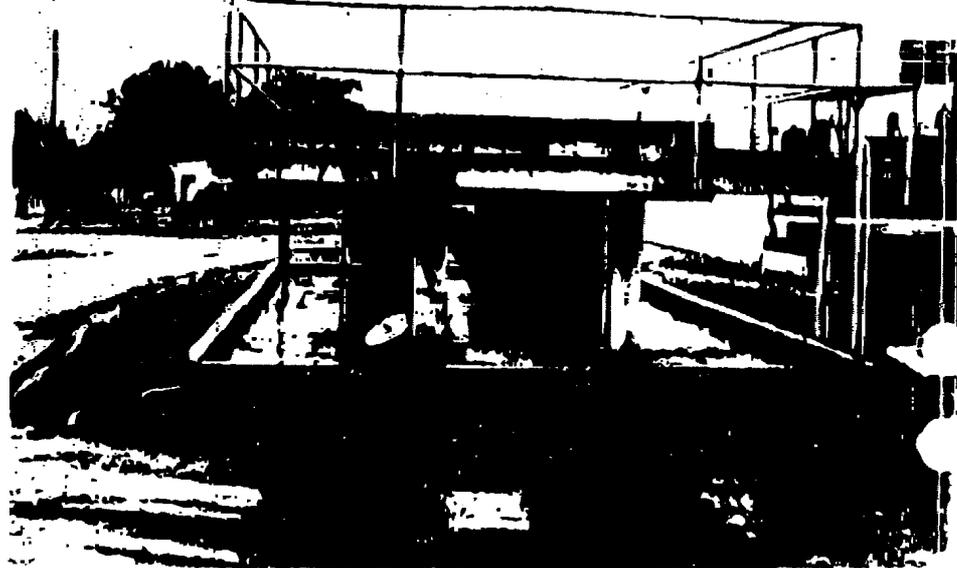


34

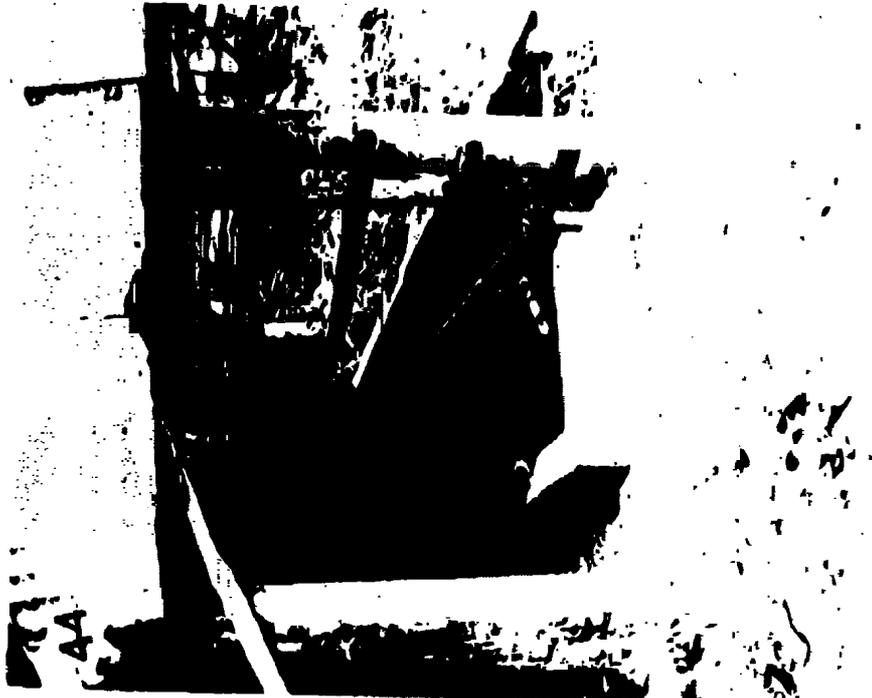
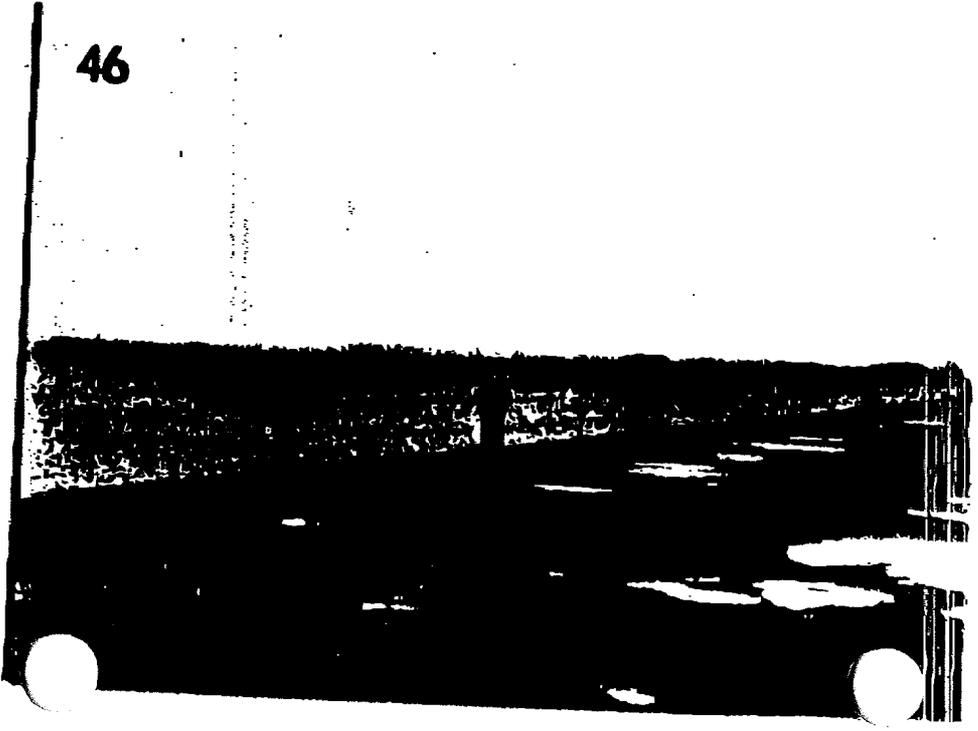
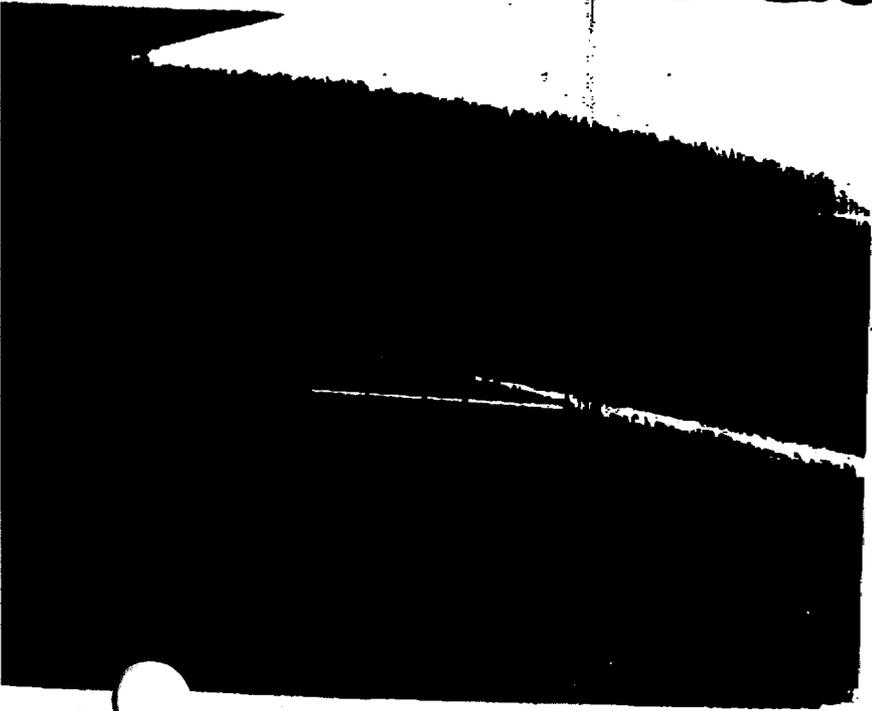




38



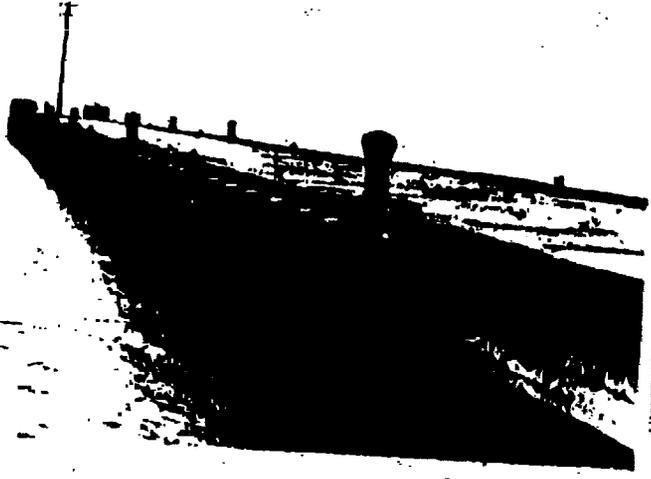
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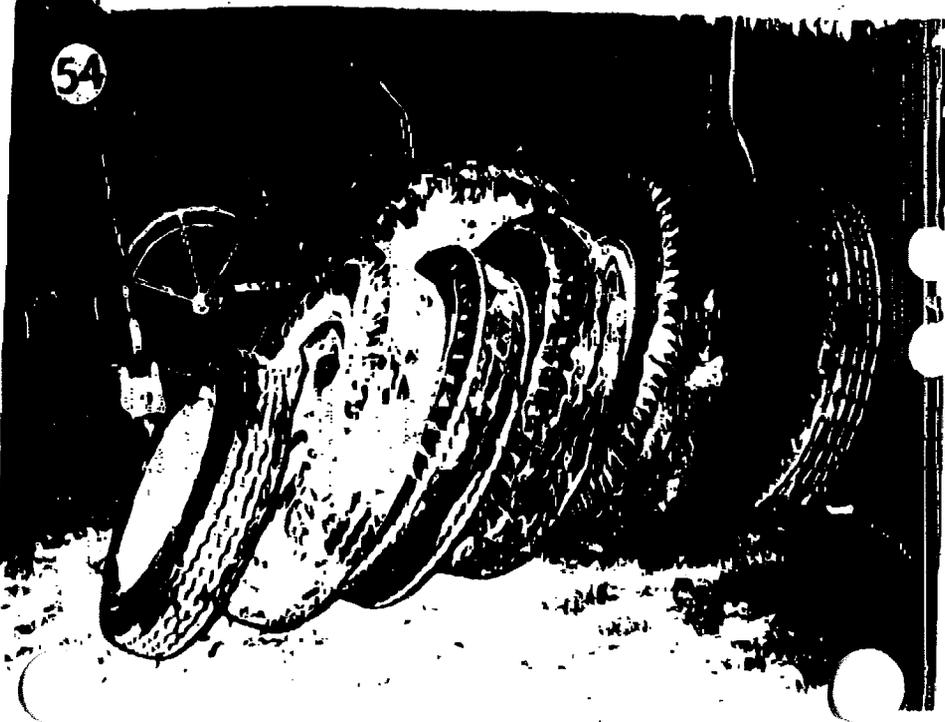
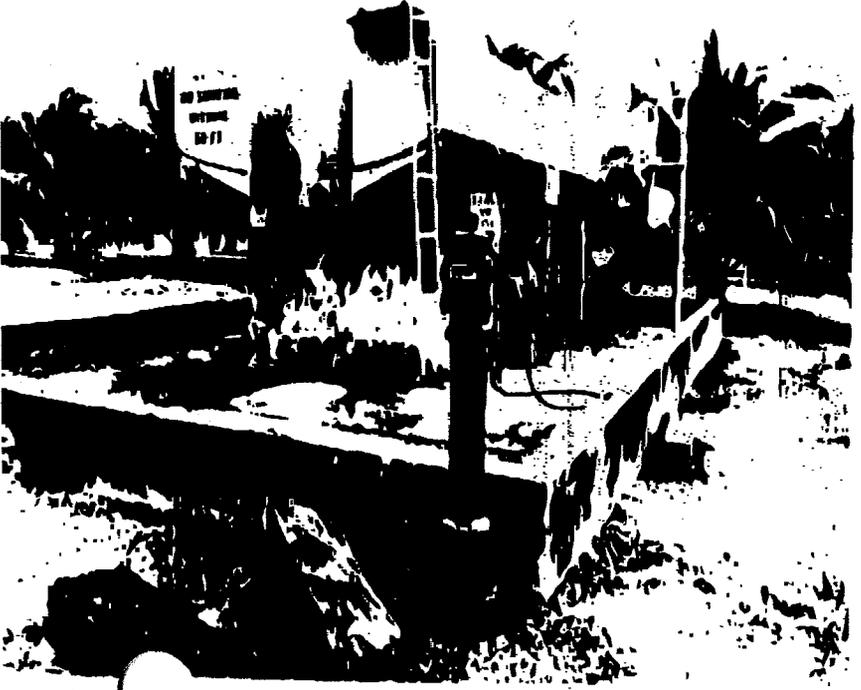


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ATTACHMENT B

VSI Field Notes

5.0 EXECUTIVE SUMMARY

A RCRA Facility Assessment was conducted at the Naval Ammunition Facility on Vieques Island, Puerto Rico to identify solid waste management units (SWMUs) and other areas of concern (AOCs) and to 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, New York and the Environmental Quality Board in San Juan, Puerto Rico.

The facility is located on the western portion of Vieques Island, Puerto Rico. The facility is bounded on the south by the Caribbean Sea, and on the north by the Atlantic Ocean. The primary operations presently active at the NAF include a main base for logistics and maintenance support, and numerous magazines for storage of munitions in support of the Atlantic Fleet. The Naval Ammunition Facility was established in the early 1940s to support the Atlantic Fleet and NATO operations during World War II. Although the facility occupies 8,000 acres, much of this area is undeveloped. The primary duty of the facility is the storage and transfer of munitions for the Atlantic Fleet. The main operation at the facility is the management and maintenance of magazines for storage of the munitions. Wastes generated at the facility are waste munitions and wastes generated during maintenance of equipment used at the facility (e.g., vehicles).

The RFA resulted in the identification of 15 SWMUs and 4 AOCs. Primary waste handling units at the facility include the Waste Munitions Container Storage Transfer Units (SWMUs #1 and #2), the Oil/Water Separator and Associated Tank (SWMU #12), the Waste Oil and Solvent Accumulation Area (SWMU #11), and the Waste Paint and Solvent Disposal Ground (SWMU #10). In addition, some units exist for temporary storage of wastes including the Spent Battery Accumulation Area (SWMU #8) and the Paint Storage Locker (SWMU #9). All waste streams at the facility are transported for offsite disposal. Finally, a truck, designated as SWMU #15, was observed during the VSI to be storing waste napalm (D002 waste). The vehicle had reportedly been in place for approximately 4 months.

The primary units of concern include the three inactive disposal sites the Quebrada Disposal Site (SWMU #7), the Mangrove Disposal Site (SWMU #6), and the IRFNA/MAF-4 Disposal Site (SWMU #5), which all represent potential release to soil, groundwater, and/or surface water. The Waste Paint and Solvents Disposal Ground (SWMU #10) represents a concern for release to soil. Furthermore, the unlined ditch (AOC C) in the vicinity of the Transportation Shop and any similar unlined ditches represent a potential for release to soil and surface water. The Inactive Open Burn Area (SWMU #4) is considered a likely potential for release to soil and surface water, given that explosive wastes were burned on bare soil adjacent to surface water, and the unit apparently was not equipped with secondary containment structures.

Further actions were suggested at 9 of the 15 SWMUs and 4 of the 4 AOCs. Suggested further actions included soil sampling, surface water and sediment sampling, verification of unit integrity, and requests for additional information. Table 4 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 4. Summary of Suggested Further Actions.

Unit Number	Unit Name	Comments
1	Waste Munitions Container Storage	No Further Action
2	Waste Munitions Container Storage	No Further Action
3	Former Waste Munitions Storage	No Further Action
4	Inactive Explosive Open Burn/ Detonation Range	Verification Investigation
5	IRFNA/MAF-4 Disposal Site	Verification Investigation
6	Mangrove Disposal Site	Verification Investigation
7	Quebrada Disposal Site	Verification Investigation
8	Spent Battery Accumulation Area	No Further Action
9	Paint Locker	No Further Action
10	Paint/Solvents Disposal Ground	Soil Sampling
11	Waste Oil Accumulation Area	No Further Action
12	Oil/Water Separator and Tank	Integrity Testing
13	Disposal Site for Drone Casings in Atlantic Ocean	Additional Information
14	Wash Rack	Soil Sampling
15	Waste Transportation Vehicle	Inspect Drums, Determine Future Disposition
A	Well and Spring	Review Information
B	Sewage Treatment Plant and Disposal Ground	Determine Presence of Hazardous Constituents
C	Drainage Ditch	Soil Sampling
D	Abandoned Vehicles	Soil Sampling

6.0 RELEASE PATHWAYS

Groundwater

The precise depth to groundwater at the facility is not known because the facility operates only storage units and, therefore, has no extensive information on groundwater (e.g., well construction or monitoring data). Given that the land is an island which is relatively small in size, it is anticipated that the groundwater is relatively near surface. According to the NACIP IAS Study (Ref. 2), the quality of groundwater in the area of NAF is relatively good with low chloride levels. The report further states that there is little dependence on groundwater for water supply since fresh water is supplied to the island from Puerto Rico. A Hazard Ranking System Trip Report (Ref. 6), however, suggests that the shallow groundwater is used for limited human consumption. Given the shallow depth to groundwater and the existence of several disposal sites where waste was placed in intimate contact with the soil, the potential for release to groundwater is considered high. Other factors contributing to a concern for release to groundwater include the practice of open dumping of waste paints and solvents to the soil and the potential for a release of waste oil or solvents to unlined ditches.

Soil

Typical surface soils on the western end of the island in the vicinity of the facility are coarse-grained with subordinate amounts of clay. The soils are moderately sloping and well drained. The presence of unlined units and units where wastes are placed directly on top of the soil surface results in the potential for release to soil being considered high.

Air

The overall potential for release to air is considered low. Past releases to air may have occurred at the waste explosive detonation range and at units where volatile wastes were disposed. The potential for release of volatiles, however, is considered low since these types of wastes are typically drummed or placed in closed containers, except for small quantities of waste paint and solvents which are open dumped near the paint locker.

Surface Water

The potential for release to surface water is considered high. The Naval Ammunition Facility has historically operated several disposal units where waste was discharged directly to soil. At the Mangrove Disposal Site (SWMU #6), waste has been dumped directly on the soil and in standing surface water which flows to the Atlantic Ocean. Other inactive disposal units exist where waste was dumped in drainage paths, resulting in the potential for past release to surface water during rainfall events being considered high. In addition, the presence of shallow groundwater and unlined units immediately adjacent to surface water suggests the potential for migration to surface water via groundwater.

Subsurface Gas

The overall potential for generation of subsurface gas is considered low since most of the wastes are managed aboveground. The primary source for generation of subsurface gas is considered to be the unlined units where general refuse and volatiles were disposed; for example, the Quebrada Disposal Site (SWMU #7).

7.0 SUMMARY OF CONCLUSIONS AND SUGGESTED FURTHER ACTIONS

The following section is a summary of conclusions and suggestions for further actions at units at Naval Ammunition Facility, Vieques Island, Puerto Rico, which 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 15 solid waste management units and 4 areas of concern. Of these, it was determined that 9 SWMUs and 4 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 6 SWMUs were determined to have low/no potential for release to all environmental pathways. These units are presented in Table 5, 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.

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 regulatory agency. These instances are described in the detailed summaries provided in this section. In addition, suggestions at several of the units include a verification investigation in the area adjacent to the unit. Further discussion of this suggestion is provided in the following:

Verification Investigations

A verification investigation is recommended for 4 solid waste management units at the facility in order to establish the potential location, presence and migration pathways of any hazardous waste or hazardous constituent to soils, groundwater, and/or surface water. The subjects of the investigations include the Inactive Waste Explosive Open Burn/Detonation Range (SWMU #4), the IRFNA/MAF-4 Disposal Site (SWMU #5), the Mangrove Disposal Site (SWMU #6), and the Quebrada Disposal Site (SWMU #7). The objectives of the investigations should include:

Table 5. Summary of Units With No Suggested Further Actions.

Unit Number	Unit Name	Comments
1	Waste Munitions Container Storage (Building 301)	Wastes stored indoors on concrete floor
2	Waste Munitions Container Storage (Building 302)	Wastes stored indoors on concrete floor
3	Former Munitions Container Storage (Building 216)	Closing under RCRA
8	Spent Battery Accumulation Area	Batteries stored indoors on concrete
9	Paint Storage Locker	Waste stored in drum inside building
11	Waste Oil and Solvent Storage	Waste stored in drums on concrete

1. Establishing the presence of hazardous waste or constituents in the soils surrounding the units.
2. Establishing the migration pathways of hazardous waste or constituents from the units.
3. Establishing criteria to be used to determine if further investigation is required.

To accomplish these objectives, a limited soil investigation of a minimum of three soil borings is recommended at each of the units. In addition, collection of samples from both surface water and surface water sediments is recommended at the Mangrove Disposal Site (SWMU #6). All analyses of samples collected from the area of the units requiring subsurface investigations should include, at a minimum, the metals, volatiles, organics, and semivolatile organics within Appendix VIII, or an appropriate subset based upon the knowledge of the wastes managed at the units. Based upon the findings of the initial verification investigation, a determination should be made on the requirement for further investigation which may include additional soil or surface water sampling or investigation of groundwater conditions at the units.

4. UNIT NAME: In: lve Waste Explosive Open/Burn E nation Range

Conclusions: Soils/Groundwater: There is a high potential for release to soil since the unit was used for open burning of explosives on bare soil. The exact depth to groundwater in the area is uncertain; however, it is anticipated that the majority of the waste is destroyed during the burn, thus reducing the potential for downward migration of waste to groundwater.

Surface water: There is a moderate potential for release to surface water via runoff. Explosives were burned on bare soil where runoff eventually drained to the Atlantic Ocean.

Air: There is a low potential for release to air since the unit is no longer active. In the past, the unit was designed to release to air during burn operations.

Subsurface gas: If volatile constituents present in the residual material in the soil, there is a moderate potential for generation of subsurface gas. The burning activities, however, occurred at the soil surface and it is anticipated that the majority of volatile constituents were lost during the burn.

Suggested Further Action:

A verification investigation is suggested for this unit. The investigation should include soil boring in the area where burn activities were conducted. The sampling should include a minimum of four samples to a depth of 3 feet and analysis of the semivolatile and heavy metals portions of Appendix VIII, a subset of these parameters, or any additional parameters based upon knowledge of the wastes. Further discussion of the recommended verification investigation is provided in the initial portion of this section (Section 7.0).

5. UNIT NAME: IRFNA/M 4 Disposal Site

Conclusions: Soil/Groundwater: There is a high potential for past release to soil. A release of inhibited red fuming nitric acid and mixed amine fuel occurred at this site in 1975. Soil was contaminated with approximately 7000 pounds of fuel from drones.

Surface water: The release of fuel to the surface soil occurred near a quebrada (e.g., a drainage path or ravine) indicating that there is a moderate potential for past release to surface water via surface drainage. The area is located 2 to 3 miles from surface water, which may have resulted in dilution of any wastes in the runoff prior to their discharge into the ocean.

Air: Release to air during the disposal event may have occurred at that time if volatiles were present in the waste. The current potential for release to air is low since the event occurred in 1975.

Subsurface gas: Since wastes were disposed directly on soil, there is a moderate potential for generation of subsurface gas if volatiles were present in the waste fuel. Disposal, however, apparently occurred at the soil surface and it is anticipated that the majority of volatile constituents would have been lost to the atmosphere.

Suggested Further Action:

According to facility representatives, sampling and analysis have been conducted in the vicinity of the fuel disposal site and at the well and spring downgradient (AOC A). This information was not readily available at the facility during the VSI. Therefore, it is requested that the information be provided by the facility representatives and determinations made from these data as to the need and location of future sampling. If a review of existing data suggests the presence of contaminants or if the information is concluded to be insufficient or unsatisfactory, it is suggested that a verification investigation be conducted to further evaluate the potential for release to the environment. The investigation should include soil sampling with a minimum of three samples collected to a depth of 3 feet. A stressed area was observed near the

spill site during a VSI and sampling in this area should be included. Analysis of the samples should include pH, heavy metals, the semivolatile fraction of Appendix VIII, and any additional parameters based upon knowledge of the wastes. Further discussion of the recommended verification investigation is provided in the initial portion of this section (Section 7.0).

6. UNIT NAME: Mangrove Disposal Site

Conclusions:

Soil/Groundwater: There is a high potential for release to soil since wastes were disposed on bare ground.

Surface water: There is a high potential for release to surface water since portions of the disposed materials were placed in the mangrove swamp adjacent to the site.

Air: The potential for past release to air is high since the materials were not covered. The unit, however, has not been used since the late 1970s; therefore, it is anticipated that the majority of the volatiles will have been released to air.

Subsurface gas: There is a moderate potential for generation of subsurface gas given that the unit is unlined and was used for disposal of volatile wastes, including waste varnish and chemical wastes.

Suggested Further Action:

Facility representatives stated that soil and surface water sampling and analysis was being conducted as part of the NACIP confirmation study. The results, however, were not readily available at the facility during the VSI and were not obtained. It is suggested that these data be obtained from the facility representatives and that these results be reviewed to determine if the data indicate that a release has occurred. It is further suggested that a verification investigation be conducted to evaluate the potential for release to the environment. The investigation should include soil, surface water, and sediment sampling. Further details of the recommended verification investigation are provided in the initial portion of this section (Section 7.0).

7. UNIT NAME: Quebrada Disposal Site

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from this unit since a wide variety of wastes were disposed in the unlined quebrada. Very little information has been provided to describe the types of materials disposed of at this site, or the procedures for disposal and covering.

Surface water: There is a moderate potential for release to surface water via runoff given the fact that wastes have been dumped on the soil in a drainage ravine. The unit is located approximately one-half mile from surface water.

Air: Since the unit has apparently not been used in recent years, the potential for continuing release to air is low. The majority of volatile constituents in the wastes which were disposed were probably lost to the air at the time of disposal.

Subsurface gas: The potential for generation of subsurface gas is considered moderate. The wastes, which included base refuse, solvents, paints, and other unidentified materials, were disposed on bare soil and eventually covered; therefore, conditions for generation of subsurface gas may have been present.

Suggested Further Action: This site was recommended for a Confirmation Study in the NACIP IAS report (Ref. 2); however, no data or information were available at the time of the VSI. It is suggested that, if these data are available, they be obtained from facility representatives and reviewed to investigate the potential for hazardous constituents remaining at the unit. Furthermore, it is suggested that monitoring data, which were not available during the VSI, from the well downgradient of the unit be reviewed to determine if the data indicate a release has occurred. If it is then determined that further sampling is warranted, a verification investigation is suggested. Sampling areas should include the soil of the quebrada, sediment downstream from the disposal site, surface water if available, and the monitoring well downgradient from the disposal site. It is suggested that

soil borings be collected in the quebrada area to a depth of at least equivalent to the bottom of the unit, if known. In addition, downgradient sediment samples, surface water samples, and monitoring well samples are suggested. Samples should be analyzed for heavy metals, volatiles and semivolatiles fraction of Appendix VIII. Alternative parameters may be suggested based upon knowledge of the wastes disposed in the unit. Further discussion of the verification investigation is provided in the initial portion of this section (Section 7.0).

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10. UNIT NAME: Wa , Paint and Solvents Disposal G. and
(adjacent to Building 4001)

Conclusions: Soil/Groundwater: There is a high potential for release to soil/groundwater from this unit due to the observed use of this unit for disposal of waste paint, thinners, lacquers, etc. on bare soil.

Surface water: There is a low potential for release to surface water since small quantities of paint and solvents are placed directly on the ground and the site is located approximately 1 mile from surface water.

Air: There is a high potential for a release to air since this unit is used for the open dumping of volatile organic solvents, paints and thinners.

Subsurface gas: There is a moderate potential for the generation of subsurface gas. Wastes were disposed directly on soil and volatile constituents were most likely to release to air at the time of disposal.

Suggested Further Action:

Soil sampling should be conducted in the area adjacent to the Paint Locker (Building 4001) where disposal has occurred. Sampling should include at least two surface soil samples and one soil core to a depth of 18 inches. Samples should be analyzed for heavy metals and the semivolatiles fraction of Appendix VIII or other appropriate parameters (e.g., paint thinners). Furthermore the practice of disposing of excess paints, solvents, thinners, etc. on the soil should be discontinued.

12. UNIT NAME: Oil/ ex Separator and Associated Tar.

Conclusions:

Soil/Groundwater: The potential for release from this unit is dependent upon the integrity of the separator and tank.

Surface water: There is a low potential for release to surface water since the unit is below ground.

Air: There is a low potential for release to air based upon the low volatility of the contaminants and the fact that the unit is below ground.

Subsurface gas: There is a low potential for the generation of subsurface gas due to the low volatility of the constituents.

Suggested Further Action:

The integrity of these units should be verified using a standard method to assess the potential for release. Further actions will be dependent upon the results of integrity testing.

13. UNIT NAME: Disposal Site for Drone Casings in Atlantic OceanConclusions:

Soil/Groundwater: The casings were disposed in the Atlantic Ocean; thus, there is a low potential for release to soil.

Surface water: The casings were disposed in the ocean; therefore, the potential for release to surface water and sediments is considered high if spent propellant remained in the casing at the time of disposal.

Air: The casings were disposed in the ocean resulting in a low potential for release to air.

Subsurface gas: The casings were disposed in the Atlantic Ocean resulting in a low potential for generation of subsurface gas.

Suggested Further Action:

The location of the drone casings should be determined to investigate the impact of the casings, if any, on surface water and sediment from the metal casing or any residual propellant in the casing. The NACIP IAS study (Ref. 2), however, states that the casings were disposed at sea off a deep water ledge. If this is the case, further investigation may be prohibitive.

14. UNIT NAME: Wa Rack

Conclusions:

Soil/Groundwater: There is a high potential for release to soil/groundwater, given that degreasers periodically are used in this area. Drainage from the unit is discharged to an unlined ditch.

Surface water: There is a moderate to high potential for release to surface water via runoff from the wash rack to adjacent ditches which discharge to surface water.

Air: There is a moderate to high potential for release to air from the small amounts of cleaning agents used at the unit.

Subsurface gas: If volatile constituents are discharged to the unlined ditch, the potential for generation of subsurface gas is moderate. Given the small amount of cleaners apparently used at the unit, it is anticipated that the majority of the volatile constituents are discharged to the air.

Suggested Further Action:

Sampling is suggested in the unlined ditch which discharges water from the unit. Sampling should include surface soil samples near the discharge point from the wash rack with analysis for the semivolatile fraction of Appendix VIII or an appropriate subset (e.g., degreasing solvents).

15. UNIT NAME: te Transportation Vehicle

Conclusions:

Soil/Groundwater: The potential for release to soil/groundwater is considered to be low at the present time since the waste is contained in drums on the truck. The truck, however, included salvage drums; therefore, the condition of the remaining drums should be inspected to note any present or future deterioration which may result in a high potential for release to soil.

Surface water: The potential for release to surface water is low at the present time since the waste is stored in drums on the truck.

Air: The waste is stored in covered drums; thus, the potential for release to air is low.

Subsurface gas: The potential for generation of subsurface gas is low since the waste is stored in drums on the truck.

Suggested Further Action:

The condition of all drums should be inspected to determine if a potential for release from the drums exists. In addition, the purpose of this unit and the intended disposition of the waste should be determined.

A. AREA OF CONCERN

NAME: Well and Spring Downgrad at from IRFNA/MAF-4 Disposal Site

CONCLUSIONS:

Soil/Groundwater: There is a moderate potential for release to soil/groundwater from SWMU #5 which could potentially affect this area. This area is less than two miles downgradient of the site where inhibited red fuming nitric acid and mixed amine fuel was disposed in 1975.

Surface water: There is no potential for release to surface water from this area.

Air: There is no potential for release to air from this area.

Subsurface gas: There is no potential for generation of subsurface gas from this area.

SUGGESTED FURTHER ACTION:

The concern at this area is the potential impact on the spring and well from the IRFNA/MAF-4 Disposal Site (SWMU #5). This area was reportedly sampled as part of recent NACIP confirmation study. The data were not available at the time of the VSI; however, these data should be reviewed to determine if additional sampling is merited at this location.

B. AREA OF CONC. NAME: Sewage Treatment Plant and Disposal GroundConclusions:

Soil/Groundwater: The sewage treatment plant is partially below grade and constructed of concrete. The potential for release to soil/groundwater is dependent upon the integrity of the tank and the presence of hazardous constituents in the waste. The potential for release at the disposal ground is also dependent upon the presence of hazardous constituents in the waste since the area is designed for release to soil.

Surface water: The area is not located in the immediate vicinity of surface water; therefore, the potential for release to surface is considered low.

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

Subsurface gas: The potential for generation of subsurface gas is dependent upon the presence of hazardous constituents in the runoff.

Suggested Further Action:

It is suggested that it be determined if hazardous constituents are present in the waste, either by further inspection of the process or sampling/analysis of the waste. Additional actions should be based on the results of this determination.

C. AREA OF CONCERN E: Drainage Ditch in the Vicinity of the
Transportation Shop Area

Conclusions: Soil/Groundwater: The potential for release to soil/groundwater is dependent upon the existence of hazardous constituents in the runoff. An oily sheen was noted on runoff water in the ditch near the shop during the VSI.

Surface water: The potential for release to surface water is dependent upon the presence of hazardous constituents in the runoff. The ditch ultimately discharges to surface water.

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

Subsurface gas: The potential for generation of subsurface gas is dependent upon the presence of hazardous constituents in the runoff.

Suggested Further Action:

This ditch, and numerous similar ditches at the facility, manage stormwater runoff generated on-site at the NAF. Further information should be collected regarding standard practice for discharges from the shop to the ditch. Furthermore, soil sampling along the open ditch(es) and sediment sampling at the outfall is suggested to determine if hazardous constituents are present. The sampling should include collection of a minimum of two surface soil samples along the open ditch and one sediment sample at the outfall. Analysis should include oil and grease, heavy metals, and any other indicators based upon knowledge of the discharged materials.

D. AREA OF CONCE. NAME: Abandoned Vehicles

Conclusions: Soil/Groundwater: Inspection of the area found that the abandoned vehicles included a fuel truck. If fuel remained in the vehicle when it was abandoned, the potential for release to soil is considered moderate based upon the deteriorated condition of the vehicle.

Surface water: The abandoned vehicles were not located in the vicinity of surface water; thus, the potential for release to surface water is considered low.

Air: Volatile emissions may escape from the vehicle if fuel remained upon abandonment. The vehicle, however, was apparently abandoned several years ago; thus, the majority of volatile constituents probably have been lost to the air.

Subsurface gas: The potential for generation of subsurface gas is considered low. If fuel was spilled from the vehicle, it would have occurred on the surface near the truck several years ago.

Suggested Further Action:

It is suggested that the condition of the vehicles and their contents, if any, be investigated to determine the potential for release. If a release of any material, e.g., fuel, has occurred, surface soil sampling may be warranted to determine the extent of release.

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ATTACHMENT A

VSI Summary and Photograph Log

VISUAL SITE INSPECTION SUMMARY

The VSI team consisting of K. C. Donnelly and William Hornby of K. W. Brown & Associates, Inc. (KWB&A) met at the Naval Ammunition Facility at 9:00 a.m. on August 9, 1988. Facility representatives at the meeting included Lt. Laney, the Officer in Charge at NAF, Mr. Winston Martinez, the NAF agronomist in charge of land resource management at the facility, and Mr. Cresencia Gonzalez, the NAF Public Works Supervisor. The initial portion of the meeting consisted of questions by the VSI team and answers from the facility representatives concerning known and potential solid waste management units (SWMUs) and areas of concern (AOCs).

Information collected from the meeting includes:

1. RCA (GE) is the contractor for collection and offsite disposal of most wastes.
2. Building 216 ceased operation and Building 301 began operation in 1984.
3. Ordnance detonation occurs every 90 days offsite at the LANT facility.
4. Waste munitions include solid chemicals (signal flares, smoke flares), hand grenades, cluster bombs, blasting caps, etc.
5. Land use on the facility is primarily cattle grazing.
6. Waste oil is disposed offsite, somewhere near San Juan. The waste oil is collected every 6 to 8 months.
7. The oil change rack has an underground storage tank for collection of the waste oil.

Following the meeting at the facility, SWMUs and AOCs were inspected in the following order:

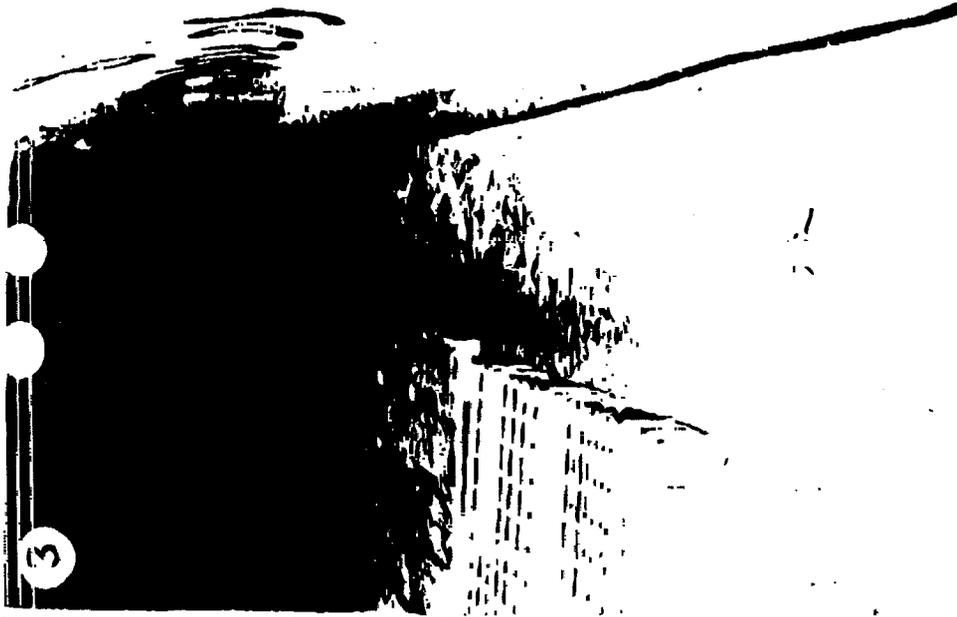
1. Transportation Shop
2. Oil Change Rack
3. Wash Rack
4. Maintenance Shop
5. Carpentry Shop
6. Paint Locker
7. Sewage Treatment Plant
8. Mangrove Disposal Site
9. Inactive Ordnance Disposal Site
10. Building 216
11. Building 302
12. Building 301
13. Abandoned Vehicle
14. IRFNA/MAF-4 Disposal Site
15. Well and Spring Downgradient of IRFNA/MAF-4 Site
16. Mosquito Pier
17. Quebrada Disposal Site

SET OF PHOTOGRAPHS FROM THE
VISUAL SITE INSPECTION CONDUCTED
AUGUST 9 AND 10, 1988
AT THE NAVAL AMMUNITION FACILITY
VIEQUES ISLAND, PUERTO RICO

- Photo 1. Active waste munitions container storage/transfer facility (Building 301)
- Photo 2. Inside view of building 301.
- Photo 3. Close-up view of drainage groove along wall of building 301.
- Photo 4. Active waste munitions container storage/transfer facility (Building 302).
- Photo 5. Drainage holes at front of building 302.
- Photo 6. Inactive waste munitions container storage/transfer facility (Building 216).
- Photo 7. Area above Building 216.
- Photo 8. View of inactive explosive ordnance disposal range looking south.
- Photo 9. IRFNA/MAF-4 disposal site.
- Photo 10. IRFNA/MAF-4 disposal site.
- Photo 11. Mangrove Disposal Site.
- Photo 12. View of Mangrove Disposal Site looking northeast from North Shore Road.
- Photo 13. View from approximately 100 yards north of North Shore Road looking south toward scrap metal pile at Mangrove Disposal Site.
- Photo 14. Close-up of waste pile at Mangrove Disposal Site.
- Photo 15. View looking south toward North Shore Drive from Mangrove Disposal site.
- Photo 16. View looking northwest toward Laguna Arenas from Mangrove Disposal Site.
- Photo 17. View looking north toward Atlantic Ocean from bridge adjacent to Mangrove Disposal Site.
- Photo 18. View looking south from bridge adjacent to Mangrove Disposal Site.
- Photo 19. Close-up view of waste pile at Quebrada Disposal Site.
- Photo 20. Close-up view of waste pile at Quebrada Disposal Site.

- Photo 21. Close-up view of waste pile at Quebrada Disposal Site.
- Photo 22. View looking south toward Quebrada Disposal Site from approximate location of monitoring well.
- Photo 23. View of monitoring well downgradient from Quebrada Disposal Site.
- Photo 24. View of battery accumulation area inside Transportation Shop (Building 2016).
- Photo 25. View of ditches along the side of the Transportation Shop (Note: oily sheen observed on surface runoff at time of the VSI).
- Photo 26. Abandoned vehicle.
- Photo 27. Abandoned vehicle.
- Photo 28. View of Paint Locker from approximate location of carpentry shop. (Note: Waste Paint and Solvent Disposal Ground operations visible to right of Paint Locker).
- Photo 29. Inside view of Paint locker.
- Photo 30. Inside view of Paint locker.
- Photo 31. Inside view of Paint locker.
- Photo 32. Close-up view of Waste Paint and Solvent Disposal ground adjacent to Paint Locker.
- Photo 33. Far view of Waste Oil and Solvent Accumulation Area from Transportation Shop.
- Photo 34. Close-up view of Waste Oil and Solvent Accumulation Area.
- Photo 35. Funnel leading to Oil/Water Separator beneath maintenance rack adjacent to Transportation Shop (Building 2015).
- Photo 36. View of oil change rack and funnel leading to underground waste oil storage tank.
- Photo 37. Sewage treatment plant.
- Photo 38. Far view of sewage treatment plant looking west.
- Photo 39. Wash rack near Transportation Shop.
- Photo 40. Storage area on truck and barrels of D002 waste near Transportation Shop at NAF.
- Photo 41. Close-up of barrels in truck.
- Photo 42. Close-up of barrels in truck.

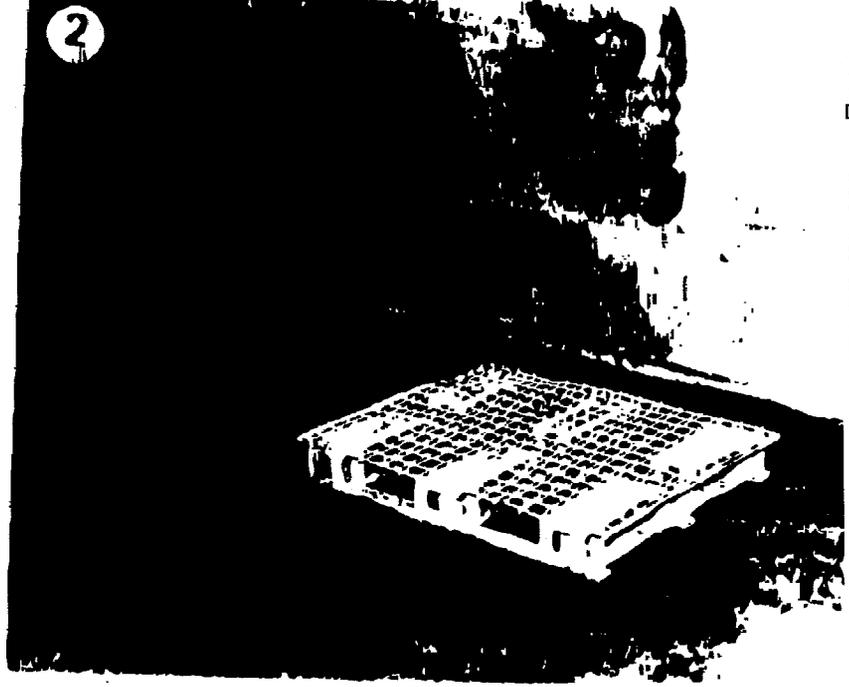
- Photo 43. Well approximately 2 miles downstream from surface runoff adjacent to IRFNA/MAF-4 Disposal Site.
- Photo 44. Water trough approximately 2 miles downgradient from IRFNA/MAF-4 Disposal Site.
- Photo 45. Aerial view of Mosquito Pier.
- Photo 46. View looking northwest toward Roosevelt Roads from Mosquito Pier.
- Photo 47. View of Mosquito Pier looking northwest.
- Photo 48. View of NAF looking southwest from Mosquito Pier.
- Photo 49. Sawdust and Metal Storage Area.
- Photo 50. Former Vieques Power Plant viewed from North Shore Drive looking north.
- Photo 51. View of backup diesel generator outside base headquarters at NAF.
- Photo 52. Solid waste container at main base NAF.
- Photo 53. Fuel storage tanks at NAF.
- Photo 54. Used tire storage.
- Photo 55. Close-up view of drum for burning classified papers.
- Photo 56. Far view of drum for burning classified papers.



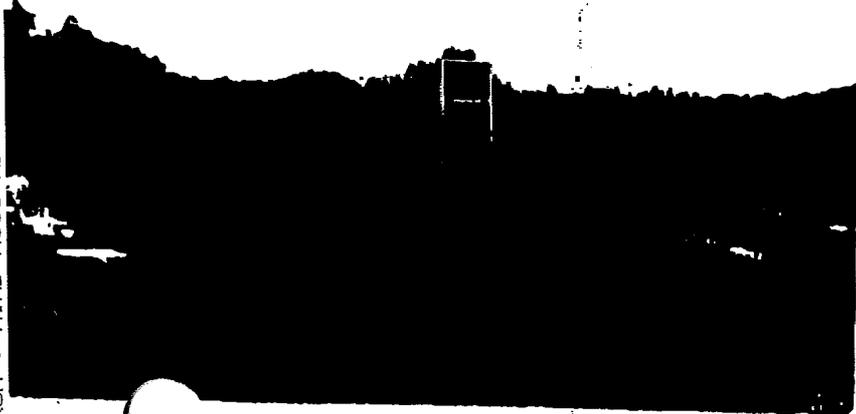
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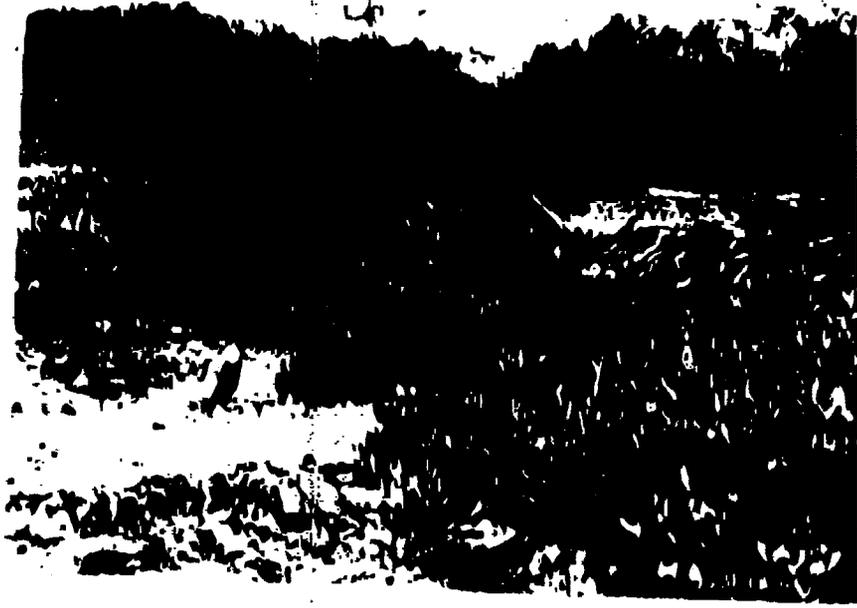


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