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PERFORMANCE WORK STATEMENT FOR DRUM AND GAS CYLINDER REMOVAL AT U.S. NAVAL STATION ROOSEVELT ROADS, PUERTO RICO

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1.0 INTRODUCTION

Technical plans and methods for the removal and ultimate disposal of potentially hazardous wastes at the Naval Station (NAVSTA) Roosevelt Roads, Puerto Rico, are presented in this report. The report specifically addresses the recommended practices for handling containerized wastes (i.e., drums and gas cylinders) and is designed to aid the U.S. Navy (Navy) in the preparation of a Performance Work Statement (PWS) to be used to solicit bids for contractor procurement.

The information used in the preparation of this report consists of the results of an Initial Assessment Study performed by Greenleaf & Telesca, Inc./Ecology & Environment, Inc., in January and February 1984 [Naval Energy and Environmental Sport Activity (NEESA) #13-051] and the Confirmation Study site reconnaissance by Environmental Science and Engineering, Inc., (ESE) in November 1985 (Contract #N62470-85B-7972). The pertinent areas for consideration in providing the Naval Facilities Engineering Command (NAVFACENGCOM) and potential contractors with a removal action scope of work were:

1. General site access,
2. Container removal,
3. Container sampling,
4. Preliminary hazard classification,
5. Staging,
6. Overpacking requirements,
7. Detailed analysis for disposal,
8. Decontamination procedures,
9. Offsite disposal of wastes, and
10. Safety/contingency planning.

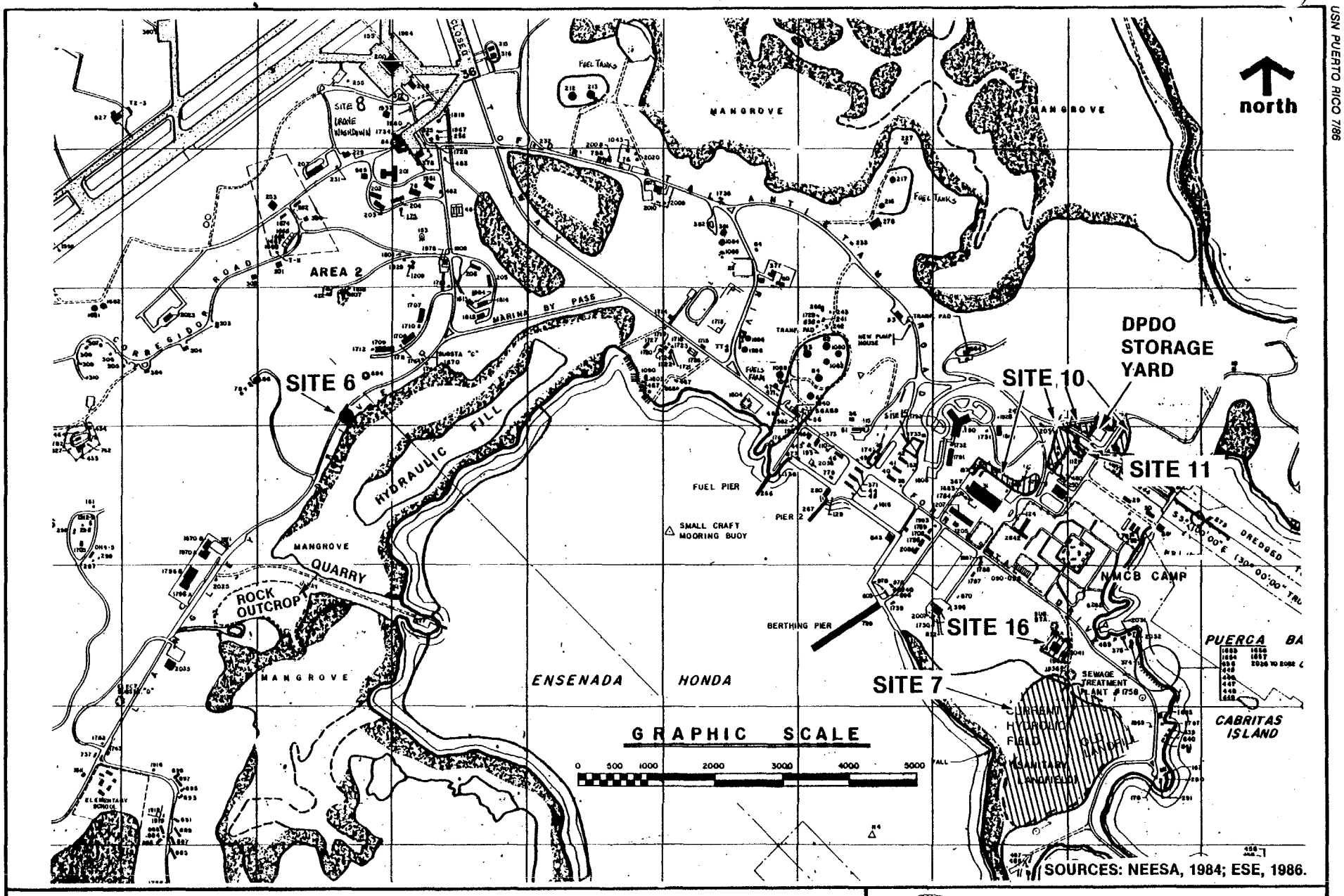
These topics are presented in detail in Sections 3.0 and 4.0 of the report and in Appendix A, the Safety/Contingency Plan.

2.0 BACKGROUND INFORMATION

Under the Department of the Navy Assessment and Control of Installation Pollutants (NACIP) Program, an Initial Assessment Study (IAS) was performed at NAVSTA Roosevelt Roads to identify potential environmental contamination from past hazardous substance use and disposal practices. The IAS identified 13 sites for Confirmation Study at NAVSTA Roosevelt Roads. The following sites were used for the disposal of unknown containerized wastes.

Site Number	Name
6	Langley Drive Disposal Site
7	Station Landfill
10	Building 25 Storage Area
11	Building 145 mitigated
16	Old Power Plant, Building 38 → RI

The locations of the five sites are presented in Figure 2-1. The types of containers disposed onsite are mainly 55-gallon drums, 5-gallon pails, and gas cylinders. There is also a pile of asbestos sheeting (approximately 9 cubic yards) at Site 10. Container conditions range from fair to very poor. Most containers are between 10 and 25 years old and have unknown physical/chemical constituents or characteristics. The exact number of containers is not known because some past disposal areas are overgrown with jungle vegetation which makes search efforts nearly impossible without brush clearing equipment.



SOURCES: NEESA, 1984; ESE, 1986.

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Figure 2-1
NAVAL STATION ROOSEVELT ROADS
SITES WITH CONTAINERIZED WASTES

CONFIRMATION STUDY
U.S. NAVAL COMPLEX
PUERTO RICO

3.0 GENERAL METHODS APPLICABLE TO ALL SITES

This section presents general methods for container accessing, handling, staging, sampling and analysis, storing, transporting, and disposing that are applicable to all five sites having unknown containerized wastes. A summary of all containerized waste found during the IAS and Confirmation Study site reconnaissance is presented in Table 3-1.

3.1 SITE ACCESS

Because many sites are overgrown with dense jungle vegetation and trees, an all-terrain vehicle (ATV) will be required to reach and remove containers from most sites. Small chain saws will also be useful for clearing inaccessible areas of sites.

It will be necessary for the contractor to traverse densely vegetated areas to locate the containers for subsequent removal. The site areas where traversing will be required and the approximate time required for traversing are identified in Section 4.0.

The task of traversing disposal areas will be facilitated by scheduling work during the winter months (December through March), which is the dry season in Puerto Rico. The weather during this period is more conducive to search/removal operations than during the wet season, and, in addition, the vegetative cover will be easier to clear during the dry season.

3.2 CONTAINER HANDLING, REPACKAGING, AND STAGING

Initial handling of containers with unknown contents that are potentially hazardous involves staging of the containers for subsequent sampling and analysis of the container contents to determine:

1. Container segregation requirements for storage prior to transport of the containers to a treatment, recycle, or disposal facility;
2. Transportation requirements; and

Table 3-1. Potentially Hazardous Containerized Waste at Naval Station Roosevelt Roads

Site No.	Site Name	Containers	Condition	Contents
6	Langley Drive Disposal Site	10 to 15 55-gallon drums	Open, corroded	Whitish solid, the consistency of wet plaster, surrounded by approximately 0.5-inch green crust
		Various small containers	Unknown	Pellets of unknown composition
7	Station Landfill	15 to 30 55-gallon drums	Partially crushed	Unknown
10	Building 25 and General Area	20 to 25 55-gallon drums	Fair	Unknown; apparently empty to partially full
		10 to 15 5-gallon pails	Open	Whitish solid, as at Site 6
		Approximately 9 cubic yards asbestos	Grey soggy pile	
		1 transformer	Poor	Unknown [potential for polychlorinated biphenyls (PCBs)]
		Approximately 29 gas cylinders	Fair to poor	Unknown
10	Building 31 Area	15 to 20 55-gallon drums	Poor	Unknown

Table 3-1. Potentially Hazardous Containerized Waste at Naval Station Roosevelt Roads (Continued, Page 2 of 2)

Site No.	Site Name	Containers	Condition	Contents
11	Building 145	Approximately 60 55-gallon drums	Good to poor	21 sampled; analytical results in Appendix D
		Approximately 100 5-gallon drums	Good to poor	8 sampled; analytical results in Appendix D
		Various small containers	Good to poor	Unknown
16	Old Power Plant	Approximately 6 gas cylinders	Fair to poor	Unknown

Source: NEESA, 1984.
ESE, 1986.

3. Appropriate method of treatment, recycle, or disposal of the containerized waste.

In general, all containers found at a site shall be collected at a central staging area at each site for sampling and preliminary hazard classification. However, any container that appears to be made of special alloys (e.g., stainless steel), bulging, or under an internal positive pressure shall be left in place, isolated, and sampled in place. Specific handling and sampling methods for such containers are addressed later in this section.

Personnel involved in handling and packaging of containerized waste shall operate in teams of at least two people. All team members shall be able to establish visual contact with each other at all times. Mechanical equipment should be used as much as possible for handling and transporting containers; manual handling of containers should be minimized. Remote drum handling equipment will be required to include a grappler-equipped backhoe or front-end loader, with an air conditioned, sealed ? cab. Drums shall be transported with ATV front-end loaders or fork lifts with drum grips or modified carrying platforms. Portions of equipment that contact drums or containers shall be constructed of nonferrous metal or lined to preclude spark generation. Handling and transport equipment shall be equipped with full frontal and side splash guards plus explosion ? shields. Each piece of equipment shall be equipped with a Class ABC fire extinguisher.

Liquid contents of drums that are actively leaking, severely deteriorated such that movement can cause rupture, or open and cannot be closed with a replacement bung or lid to prevent spillage in handling shall be pumped into a recovery drum for transport to the staging area at each site. Leaking drums containing sludges or other semi-solid material and deteriorated drums structurally sound enough to be moved shall be overpacked in 85-gallon recovery drums with absorbent and transported to the staging area.

Equipment used in handling drums shall be constructed of nonferrous metal or lined to preclude spark generation, and transfer pumps shall be constructed to explosion-proof specifications.

Once transported to the staging area at each site, the drums shall be sampled as described in Section 3.3.

Extreme care shall be exercised when working with and adjacent to potentially pressurized drums. Any drums suspected of being air reactive, shock-sensitive, or under internal pressure shall be grounded and opened with remote opening equipment. Three types of remote-opening equipment are available: the bung spinner (automatic impact wrench), the remote-controlled drill, and the drum piercer. When any of these pieces of equipment are necessary, the control lines shall be extended to their maximum, and personnel shall operate the controls from behind a protective barrier. Should movement of a pressurized drum be unavoidable, the containers shall be handled only by a grappler unit constructed for explosive containment. The bulging drum shall be moved only as far as necessary to allow seating on firm ground, or it shall be carefully overpacked in place. Techniques for opening containers are summarized in Table 3-2.

Compressed gas cylinders are a special exception to the sampling methods described previously due to the increased risk involved with handling and disposal. Approximately 35 compressed gas cylinders were found at two of the five subject sites during the Confirmation Study site reconnaissance. The majority of the cylinders (approximately 29) are located in the Site 10 area; the remaining cylinders (approximately 6) are located at Site 16.

The cylinders are lying directly on the ground or in small piles. It is estimated that the cylinders have been undisturbed for 5 to 20 years. The majority of the cylinders are badly deteriorated, and the valves

Table 3-2. Techniques for Opening Containers

Types	DOT Designation	Type of Opening	Recommended Opening Technique
Steel drum, open head, unlined and lined	DOT 5 - DOT 6 - DOT 17 - DOT 37 - DOT 42 -	Detachable steel lid with a clamp or lever-locking ring, or a ring with forged lugs and secured by a bolt.	Remove bolt. If possible, relieve pressure on clamp or lever-locking ring remotely (i.e., lanyard). Remove ring with lanyard. Remove lid by hand.
Steel drum, closed head, lined	DOT 5 - DOT 6 - DOT 17 - DOT 37 - DOT 42 -	Plastic bung opening not larger than 2.3 inches.	Preferred method is to remotely open bung. Manually open otherwise.
Steel drum, closed head, unlined (steel, monel, stainless, nickel, and aluminum)	DOT 5 - DOT 6 - DOT 17 - DOT 37 - DOT 42 -	Steel or other metal bung not larger than 2.3 inches.	Remote method.
Burlap bag, double Kraft paper bag, cloth bag, plastic bag	DOT 36 - DOT 44 - DOT 45 -	Various.	Open with sharp implement. Reseal bag or overpack in fiberpack.
Glass carboys and jugs	Usually DOT 1- branded into the wooden outer sheathing; often sheathing is no longer present.	Lapped or ground glass stopper; occasionally a plastic screw cap will be encountered.	Manually.

Table 3-2. Techniques for Opening Containers (Continued, Page 2 of 2)

Types	DOT Designation	Type of Opening	Recommended Opening Technique
Laboratory reagent bottles (amber bottles), small reagent cans	None	Screw top or press lid.	Usually encountered in laboratory packs. Not to be handled or sampled. Replace drum lid carefully.
Polyethylene and other plastic drums or barrels	DOT 2 -	Usually bung opening not more than 2.7 inches in diameter.	Manually.
Gas cylinders	DOT 3 - DOT 4 - DOT 8 - DOT 39 -	Valve, threaded fitting, quick-connect or puncture-type fittings.	Not to be sampled.
Fiberpack or corrugated	DOT 12 - DOT 21 - DOT 23 -	Usually a detachable plastic lid with a clamp or lever-locking ring.	Manually remove locking ring and lid.

DOT = Department of Transportation.

Source: U.S. Environmental Protection Agency (EPA), 1985.

appear inoperative. Some cylinders still show traces of original paint, and markings are discernible on a few of the cylinders. It is possible that some cylinders are empty, but each must be treated as a potentially hazardous waste. Even an "empty" cylinder could contain a small quantity of dangerous gas at atmospheric pressure.

Normally, identification of the gas contained in the cylinder is performed to determine the appropriate methods for handling, transporting, and disposing of the cylinder. The gas can be identified by inspection of the cylinder (type of cylinder, weight, exterior markings on the cylinder, and type of valving) and/or by sampling and analysis. However, because of the age, uncertain origin, and poor condition of the cylinders at NAVSTA Roosevelt Roads, identification of the gases by cylinder inspection only is not recommended because of the possibility that one or more of the cylinders may contain a gas for which it was not originally intended.

Gas cylinders can be sampled by opening the cylinder valve and venting the gas into a collection bag for analysis or by cold-tapping (i.e., setting a new valve in the cylinder). Even where valves appear in good condition externally, there is a possibility of internal damage to the valve. In some cases, deteriorated valves can be opened for sampling, but then fail to close or start to leak around the connection. Sampling such a cylinder in the field can lead to the release of harmful gases into the environment and present an extreme hazard to personnel performing the operation.

All gas cylinders shall be left in place until inspected and evaluated by a gas cylinder disposal expert. After preliminary classification of the cylinders as inert, flammable, toxic, or unknown, the cylinders will be packaged in steel oversleeve jackets using remote container-handling equipment (e.g., grappler attachment to fork lift) and transported to the staging area. All personnel involved in cylinder packaging shall wear

Level B personal safety equipment and be protected by an explosion shield during this operation. All steel jackets shall be secured and properly labeled. The steel oversleeve jackets shall be designed, fabricated, and certified under the American Society for Testing and Materials (ASTM) pressure code as a "flanged cylinder closed at one end and a hemispherical cap." The cap shall have a bleed-off valve and pressure gage to monitor any leakage of the gas cylinder after packaging in a steel jacket.

3.3 SAMPLING AND PRELIMINARY HAZARD CLASSIFICATION

After all drums and containers, with the exception of gas cylinders, at a site have been located and staged, each shall be opened and sampled using appropriate ASTM or EPA representative sampling methods [40 Code of Federal Regulations (CFR) Part 261 App. 1]. However, if it is apparent that the characteristics of the material in some of the smaller containers (e.g., jars of pellet-like material at Site 6 and 5-gallon pails at Site 11) are consistent by type of container, as evidenced by color and texture of the material and markings on the outside of the containers, then only one sample per type of container need be collected for analysis. Level B personal safety protection with Lexan® face shields shall be worn during opening and sampling operations. Further safety requirements are outlined in Appendix A of this report.

Two sets of samples shall be collected from each drum: one for detailed analysis (as described in Section 3.4) and a second for an in-the-field Preliminary Hazard Classification (PHC) analysis. The PHC analysis is a series of field tests used to determine the compatibility based on general physical/chemical characteristics of the drum contents. The compatibility determination is necessary for final drum segregation and DOT classification in the central staging area for all five disposal sites. The proper segregation of drums at the central staging area is

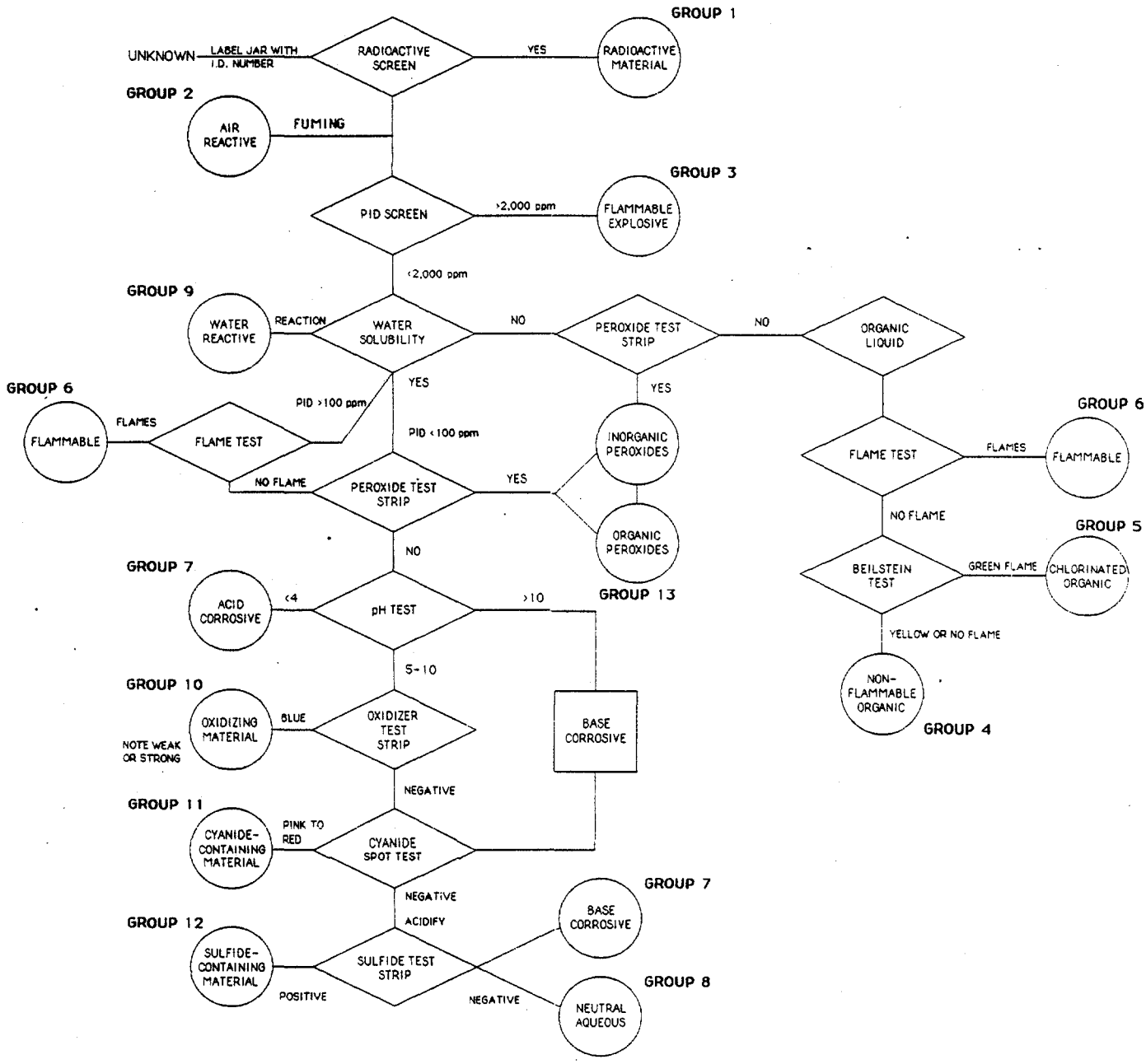
important due to the long lag time between centralized staging and completion of detailed laboratory analysis.

Smaller containers with a capacity of less than 20 gallons will be laboratory packed for transport and disposal, and only one sample shall be collected from each type of container (as described previously) for PHC analysis. Following characterization by PHC analysis, the containers shall be laboratory packed (placed in 85-gallon recovery drums with absorbent material). The aggregate volume of the containers in each laboratory pack shall not exceed 20 gallons.

Incompatible materials shall be segregated on the staging pad to prevent the propagation of reactions or fire caused by leakage. The basic parameters of the PHC analysis for each sample will be:

1. Radiation check,
2. Water and air reactivity,
3. Explosivity (organic vapor test),
4. Water and hexane solubility,
5. Ignitability,
6. Peroxide test,
7. Oxidation test,
8. Cyanide,
9. Sulfide, and
10. Corrosivity (pH).

All tests are qualitative in nature and shall require additional laboratory analysis to determine the required transportation and disposal methods. Test methods for each of the parameters are listed in Appendix B, and Figure 3-1 presents a decision-making flow chart for PHC analysis. The criteria for segregation of potentially incompatible wastes are listed in Appendix C.



SOURCE: ESE, 1986.

Figure 3-1
PRELIMINARY HAZARDOUS CLASSIFICATION

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U.S. NAVAL COMPLEX
PUERTO RICO

All container openings shall be plugged except during sampling operation, and all drums and mechanical equipment shall be grounded prior to sampling. If a drum bung or lid cannot be removed, the drum shall be entered with a hydraulic penetrating device operated remotely. If the lid on a small container (5-gallon pail or smaller) cannot be opened, the top should be punctured using a device of nonsparking material. Puncturing should be performed under a ventilation hood and behind a Plexiglass® explosion-proof shield.

The steps to be followed in sampling small containers are:

1. Remove cover from container.
2. Measure for radioactivity and record results in a field notebook. If greater than 10 millirems per hour of radiation is detected, leave the area immediately and notify the Station Safety Office (809/865-2000, ext. 3010 or 5564).
3. Insert clean spatula or tube into the container to collect a waste sample.
4. Place sample in prelabeled sample container, cap the sample container tightly, and place sample container in a carrier.
5. Replace cover on waste container, and place the container in an overpack drum containing absorbent material.
6. Mark the overpack drum with the same identifying number as the sample.
7. Replace cover on overpack drum.
8. Fill out Chain-of-Custody Record and carefully pack samples. The finished package shall be padlocked or custody-sealed for shipment to the laboratory. The preferred procedure includes the use of a custody seal across filament tape that is wrapped around the package at least twice. The custody seal (paper, plastic, or metal) is then folded over and stuck to itself so that the only access to the samples is by cutting the filament

tape or breaking the seal to unwrap the tape. The seal is signed before the package is shipped.

9. Complete the appropriate traffic report. The samples are always considered to be high-hazard samples.

The steps to be followed in sampling drums with liquids are:

1. Record any markings, special drum conditions, and type of opening in the field notebook and on the sample log sheet. This information will subsequently be recorded on the Chain-of-Custody form.
2. Stencil an identifying number on the drums and record in logbook.
3. Make certain that the drum is set on a firm base, preferably in a fully upright position.
4. Open the drum.
5. Insert glass tubing almost to the bottom of the drum or until a solid layer is encountered. Approximately 1 foot of tubing should extend above the drum.
6. Allow the waste in the drum to reach its equilibrium level in the tube. Then cap the top of the sampling tube with a tapered stopper, ensuring liquid does not come into contact with stopper.
7. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container. Release the stopper and allow the glass thief to drain completely into the sample container.
8. Place the used sampling tube, along with paper towels or rags used to wipe up any spills, into an empty metal barrel for subsequent disposal. If glass tubing has been used, it may be broken and left inside the drum being sampled.
9. Cap the sample container tightly and place prelabeled and tagged sample container in a carrier.
10. Replace the bung or lid or place a plastic drum lid cover over the drum.

11. Measure the sample for radioactivity and record results in a field notebook. If greater than 10 millirems per hour of radiation is detected, leave the area immediately and notify the Station Safety Office (809/865-2000, ext. 3010 or 5564).
12. Fill out Chain-of-Custody Record and carefully pack samples. The finished package shall be padlocked or custody-sealed for shipment to the laboratory. The preferred procedure includes the use of a custody seal across filament tape that is wrapped around the package at least twice. The custody seal (paper, plastic, or metal) is then folded over and stuck to itself so that the only access to the samples is by cutting the filament tape or breaking the seal to unwrap the tape. The seal is signed before the package is shipped.
13. Complete the appropriate traffic report. Drum samples are always considered to be high-hazard samples.

The drum resealing methods will depend on the opening methods used and include the following:

1. Replacing the bung, screw cap, etc.
2. Replacing the lid and retaining ring.
3. Placing the drum in an overpack (85-gallon recovery drum) when it cannot be resealed by any other method.
4. Using a special rubber or plastic plug if a hole is drilled. A drum bonnet should be used to ensure rain water does not seep around the plug.

3.4 ANALYTICAL REQUIREMENTS

Due to the unknown origin and/or constituents of the waste material, analytical characterization is necessary to meet DOT and EPA standards for transportation and disposal of the wastes. The analytical procedure recommended for each waste type based on physical characteristics is presented in Table 3-3.

Table 3-3. Testing Schedule of Wastes by Physical Description

I. Solids

pH in solution
Reactivity
Ignitability
Extraction Procedure (EP) Toxicity
Corrosivity
Total Organic Carbon (TOC)
Total Organic Halogen (TOX))
Cyanide
Pesticide Scan

II. Liquids--Water Soluble/Single Phase

pH Incineration
Reactivity
Ignitability (if positive, perform Incineration Screening Tests)
Total Metals

Corrosivity
Purgeable Organics
Cyanide (if warranted by pH)
Sulfide (if warranted by pH)
TOC
TOX
Pesticide Scan

Incineration Screening Tests

British thermal units
Percent chlorine
Percent sulfur
Ash content
[<140 degrees Fahrenheit (°F)]
Flashpoint

III. Liquids--Water Insoluble; Non-Oil Bearing

pH
Reactivity
Ignitability (if flammable, perform Incineration Screening Test)
Total Metals
Corrosivity (if warranted by pH)
Purgeable Organics
Acid Extractable Compounds
Base-Neutral Extractable Compounds
TOC
TOX
Pesticide Scan

IV. Liquids--Water Insoluble; Oil Bearing

All in III plus PCB

V. Sludges

All in III plus PCB plus percent moisture plus cyanides/sulfides, substitute EP toxicity test for total metals analysis

Source: ESE, 1986.

3.5 STORAGE REQUIREMENTS

Once the PHC has been determined for a container of waste, the container must be labeled and relocated to a central staging area until arrangements are made for transportation to a treatment or disposal facility. After the waste has been confirmed as hazardous, a 90-day maximum storage limit is allowed for the central staging area.

The use, storage, and management of containers holding hazardous waste is regulated under both the Resource Conservation Recovery Act (RCRA) 40 CFR [Section 265.170-177 (Subpart I)] and the Puerto Rico Solid Waste Regulations (Part VIII).

RCRA requires the container to be in good condition and compatible with the hazardous waste stored. The owner/operator must inspect hazardous waste storage areas at least weekly, looking for leaks and deterioration. All containers of hazardous waste must be sealed during storage. Containers holding ignitable or reactive waste (including gas cylinders) must be located 50 feet from the facility's property line. Incompatible waste must be separated by a distance of 20 feet or protective dike, berm, wall, or other physical barrier. The central staging area must be maintained and operated to minimize the possibility of fire, explosion, or any unplanned release of hazardous waste. At a minimum, the central staging area shall be equipped with portable fire extinguishers, and spill response equipment and materials shall be readily available on the station to respond to any spills or leaks which may occur in this area.

Rule 812 of the Puerto Rico Solid Waste Regulation, Requirements for Storage of Hazardous Solid Waste in Containers, requires the following:

1. A continuous base which is impervious to the stored waste constructed to contain any surface runoff or spill (e.g., epoxy coated, concrete bermed or diked structure able to contain 10 percent of total volume stored),
2. Special equipment (e.g., lifts, ramps, and liners) to remove containerized waste,

3. Storage of containers in a covered (roofed) area to reduce exposure to moisture and direct sunlight that could create a hazardous condition, and
4. A security fence to enclose the area and appropriate warning signs in both English and Spanish shall be posted:

DANGER
UNAUTHORIZED PERSONNEL
KEEP OUT

PELIGRO
PERSONAS SIN AUTORIZACION
NO ENTREN

The central staging area shall be situated in an area that is centrally located in relation to the five working sites to minimize transportation distances on the station. An ideal location is the Defense Property Disposal Office (DPDO) storage yard adjacent to Building 145 (see Figure 2-1). If this area is unacceptable for use as a central staging area and no other area on the station is available, the contractor shall construct a temporary storage facility for the drums until transportation for final disposal can be arranged.

The drums shall be staged and segregated according to the results of PHC analysis and using the criteria listed in Appendix C. The separation distance between groups of incompatible materials should be no less than 20 feet with small berms of absorbent material placed between and around separate groups. The staged drums shall be inspected daily for ruptures and leaks. Signs shall be placed in front of each group of drums giving the hazard class (flammable, acid, caustic, reactive, cyanide- or sulfide-bearing, etc.) of each group.

3.6 MANIFESTING AND TRANSPORTATION

When detailed analytical results of all drummed wastes have been received, each container shall be marked with hazardous waste labels containing, at a minimum, the following information:

1. Generator name, mailing address, phone;
2. Generator EPA Identification number;
3. Hazard class (appropriate hazard class mark applied also);
4. Generation date (if known); and
5. DOT description including proper shipping name, hazard class, and identification number.

Manifesting and transportation requirements shall be in accordance with the applicable sections of 40 CFR Parts 263 through 264, and 49 CFR Parts 174 and 177. According to DOT regulations, all hazardous materials must be assigned a hazard class and a proper shipping name based on composition prior to shipment. However, as previously described, the gas cylinders should not be sampled and analyzed because of the associated hazards and, consequently, a DOT classification for the cylinders cannot be determined. Therefore, a DOT exemption must be obtained for the gas cylinders from the Material Transportation Bureau of DOT by submitting an application to the Associate Director for Hazardous Materials Regulation in accordance with 49 CFR, Section 107.103, Subpart B--Exemptions. The application must be submitted through the Naval Sea System Command.

3.7 DISPOSAL OPTIONS

3.7.1 Drums, Pails, and Debris

Due to the unknown contents in the waste containers, disposal options and requirements for waste disposal cannot be specified at this time. Contractors responding to Request for Proposals will be able to present only general options concerning ultimate disposal. Anticipated waste disposal options include recycle/reuse, incineration, waste treatment, landfill, or deep well injection. The majority of commercial hazardous

waste disposal in Puerto Rico is conducted by firms headquartered on the United States mainland; these firms have offices and transfer facilities in Puerto Rico.

The following United States-based disposal companies have offices and facilities in Puerto Rico.

1. Rollins Environmental Services--provides transfer services for PCB and hazardous waste incineration at its Baton Rouge, LA facility.
2. Chemical Waste Management--provides transfer services to the receiving United States ports of Mobile, AL, for landfill disposal at Emelle, AL, and Corpus Christi, TX, for deep well injection.
3. CECOS International--operates a transfer facility located in Ponce, Puerto Rico, and can also ship wastes to its hazardous waste landfill in Livingston, LA, located near Baton Rouge, LA.
4. McKesson Environmental Systems--operates a solvent recovery/distillation facility in Manati, Puerto Rico, and arranges incineration of high-British thermal unit hazardous waste in local cement kilns.

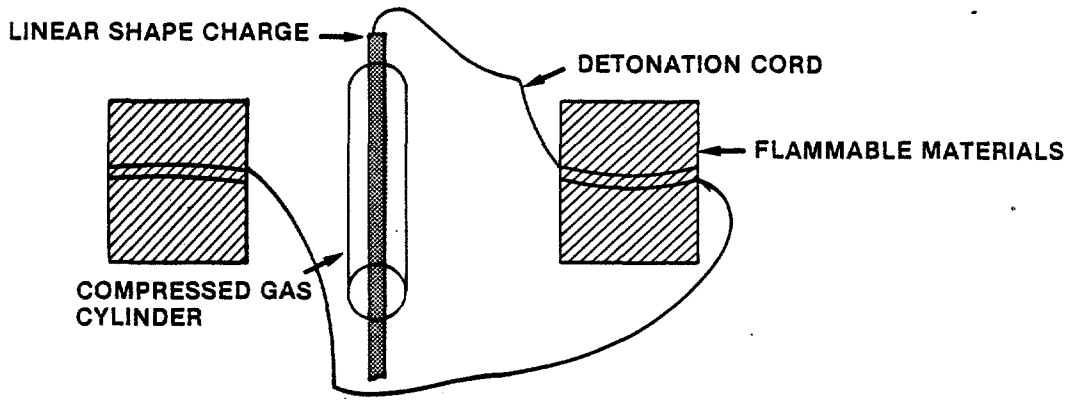
The only locally owned hazardous waste disposal facility in Puerto Rico is Sercicios Carbarcon (Proteco) located near Ponce.

3.7.2 Compressed Gas Cylinder Disposal

The overpacked gas cylinders shall be secured horizontally and transported on deck by Navy barge approximately 30 miles to the Naval detonation/bombing range of the Land Fleet Weapons Training Facility on the island of Vieques. The facility will be responsible for deterioration and destruction of gases. A DOT exemption for shipping unknown gases by barge must be obtained prior to shipment from the Material Transportation Bureau, Hazardous Materials Regulation Department. Vieques is recommended for the operation to minimize potential risks to

the environment and military and civilian populations. The Land Fleet Weapons Training Facility has interim status under RCRA for thermal treatment and explosion detonation of hazardous waste. The EPA permit number is PRD980536221. Detonation is the only tested method for the disposal of gas cylinders with unknown contents. Detonation can be combined with the ignition of gasoline or other combustible materials to increase the efficiency of destruction. Detonation has proved highly effective for the destruction of flammable gases. Because of the danger of release of noncombustible toxic gases, the operation shall be carried out remotely and a temporary air emissions permit, or permission, must be granted by the Environmental Quality Board of Puerto Rico. Detonation will be initiated only when sustained winds at ground level are at least 10 knots from the north or west, i.e., away from the Puerto Rico mainland. It is assumed that the waters around the island of Vieques are or can be restricted.

Due to the potential hazards involved in the operation, all detonation activities should be performed by experienced Explosives Ordnance Division (EOD) personnel. Cylinders shall be prepared for detonation as shown in Figure 3-2. A linear shape charge is used to open the cylinder and ignite the contents. The use of a linear shape charge enables a more direct, controlled detonation. The use of flammable materials (e.g., gasoline or acetone) in combination with the charge on the cylinder creates additional heat and turbulence to ensure complete destruction of all combustible gases.



SOURCE: Buttich & Gianti, 1984.

Figure 3-2
CHARGE CONFIGURATION FOR
DETONATION OF GAS CYLINDERS

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4.0 SITE-SPECIFIC REMOVAL PLANS

4.1 SITE 6--LANGLEY DRIVE DISPOSAL SITE

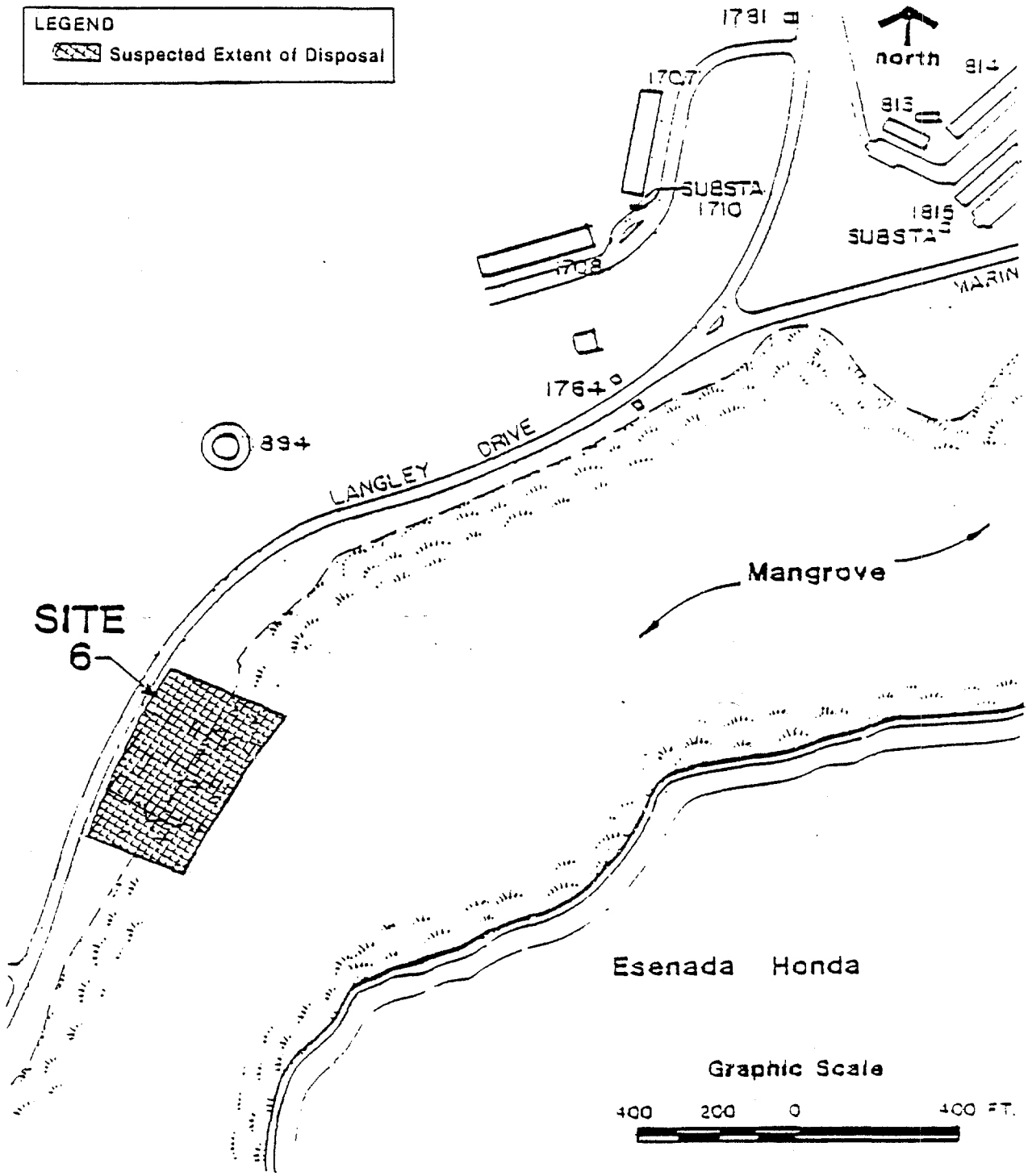
The Langley Drive Disposal Site, Site 6, was used as a station landfill from 1939 to 1959. A diagram of the site is shown in Figure 4-1. Portions of Site 6 lie within the mangrove fringe of Ensenada Honda and are subject to periodic tidal flushing. Ground and surface water flows at the site would be through the mangroves into the bay.

The volume of waste deposited at the site was reported to be approximately 1,700 cubic yards including nonhazardous materials. Most of the material disposed of at Site 6 appears to be nonhazardous construction debris that is partially buried. The construction debris includes large pieces of metal and concrete, flexible metal hoses, steel cable, and hardened tar. There are no records of disposal activity at this site, but aerial photographs from 1951 indicate landfill operations.

The only materials at the site that can be considered potentially hazardous are ten to fifteen 55-gallon drums and a number of containers containing pellets of an unknown nature, as described in the IAS. The drums rest on the surface of the filled land and appear to have been disposed after the landfilling operation. The drums are corroded and the contents are exposed. The drums are nearly full of a whitish, solid substance with the consistency of damp plaster. The substance is surrounded by a greenish crust approximately 0.5 inch thick. Due to the heavy vegetative cover in the area, no containers of pellets were found during the Confirmation Study site reconnaissance.

4.1.1 Site Access

The site can most easily be entered directly from Langley Drive through the jungle. The majority of the containers lie in a central area of the site. A small bulldozer will be necessary to clear a workable path to the drums. It is estimated that 16,000 square feet of jungle will need to be cleared to allow access to the drums. The area can flood during



SOURCES: NEESA, 1984; ESE, 1985.

Figure 4-1
SITE 6—LANGLEY DRIVE DISPOSAL SITE

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periods of high water table elevations (rainy season). Contractor personnel shall thoroughly traverse the Site 6 area to locate other waste containers possibly overlooked during the Confirmation Study. The area to be searched is approximately 150,000 square feet, and traversing this area with a 4- to 6-person crew will require approximately 1 day.

4.1.2 Drum Removal

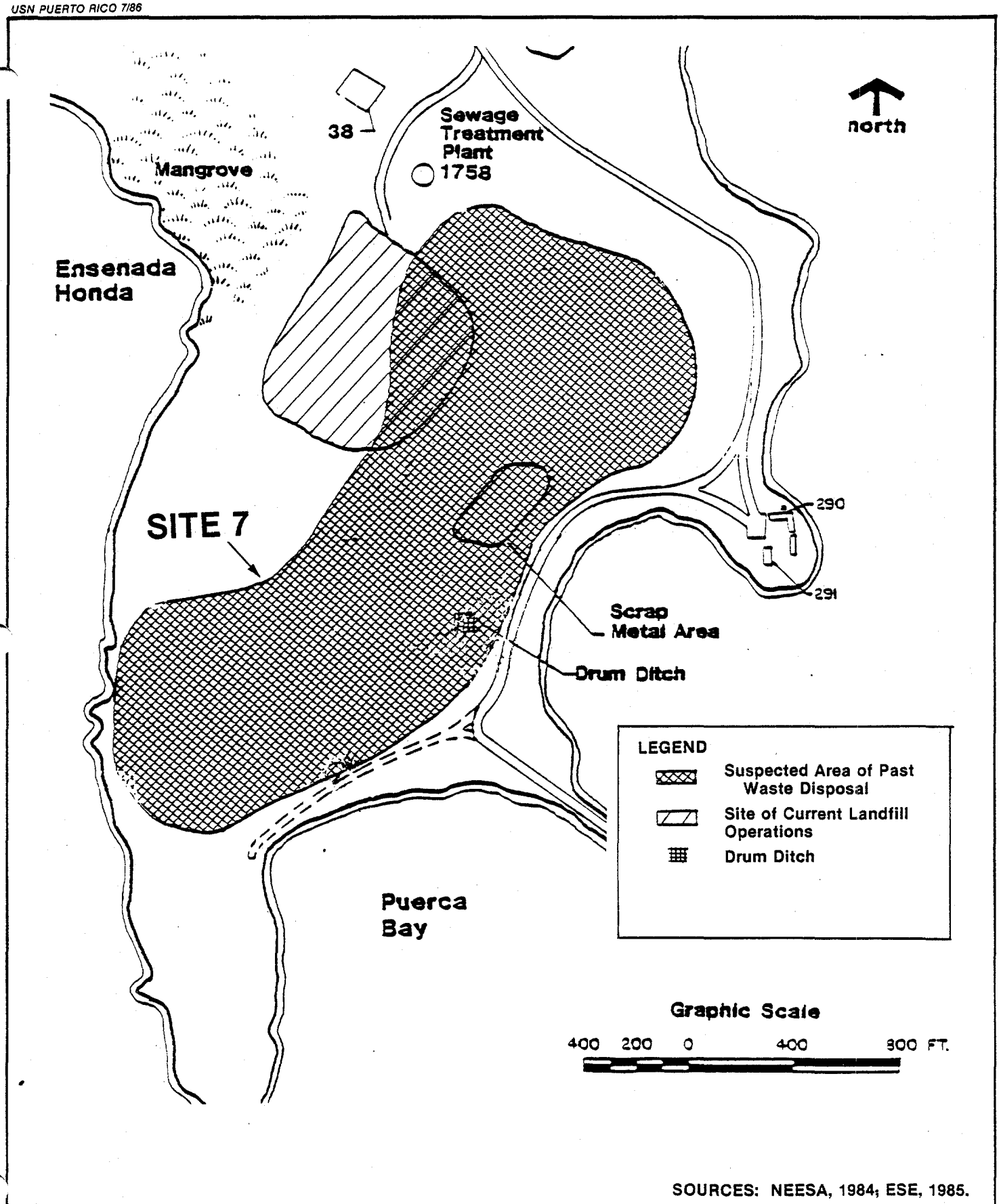
Drums shall be removed by all-terrain forklift or front-end loader to an area near Langley Drive. If found, any containers of pellets shall also be transported to this area either manually or by front-end loader, depending on the number and condition of the containers. The drums and containers shall be sampled for PHC analysis, and upon completion of the PHC analysis they shall be transported to the proposed central staging area (DPDO storage yard).

4.2 SITE 7--STATION LANDFILL

This site has been used for the station landfill since the early 1960s. The site was operated by the Public Works Transportation Division until 1970, when operation was turned over to a private contractor. Hazardous materials were accepted at the site until 1978. The site covers approximately 85 acres and has reportedly received at least 270,000 tons of hazardous and nonhazardous waste.

A records search performed during the IAS revealed that a wide variety of hazardous and potentially hazardous materials were disposed at the landfill. There are several separate disposal areas within the 85-acre facility, and various disposal methods are reported. Only the drum ditch on the southeastern portion of the site (see Figure 4-2), however, is a known localized area within the landfill with buried and partially buried containerized wastes.

During disposal operations at the drum ditch, a trench was dug to the water level for drum burial. Some drums are partially covered with soil and vegetation; most are partially crushed. A number of the partially



SOURCES: NEESA, 1984; ESE, 1985.

Figure 4-2
SITE 7—STATION LANDFILL

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buried drums found during the IAS were leaking an oily substance. A tarry, asphaltic material was noticed on the soil around the site during this study. Approximately 15 to 30 drums are estimated to have been disposed in this area; it is not known if additional drums are completely buried at the site.

4.2.1 Site Access

The site is fully accessible from the service road within the landfill boundaries.

4.2.2 Drum Removal

A backhoe or front-end loader shall be used to excavate partially buried drums after a magnetic detection survey has identified the exact burial location. Care shall be maintained to avoid damaging any drums that may be intact. Intact drums shall be separated, sampled for PHC analysis, and placed in overpacks. All drums in this area should be properly grounded prior to opening for sampling due to the potential ignitability of the contents.

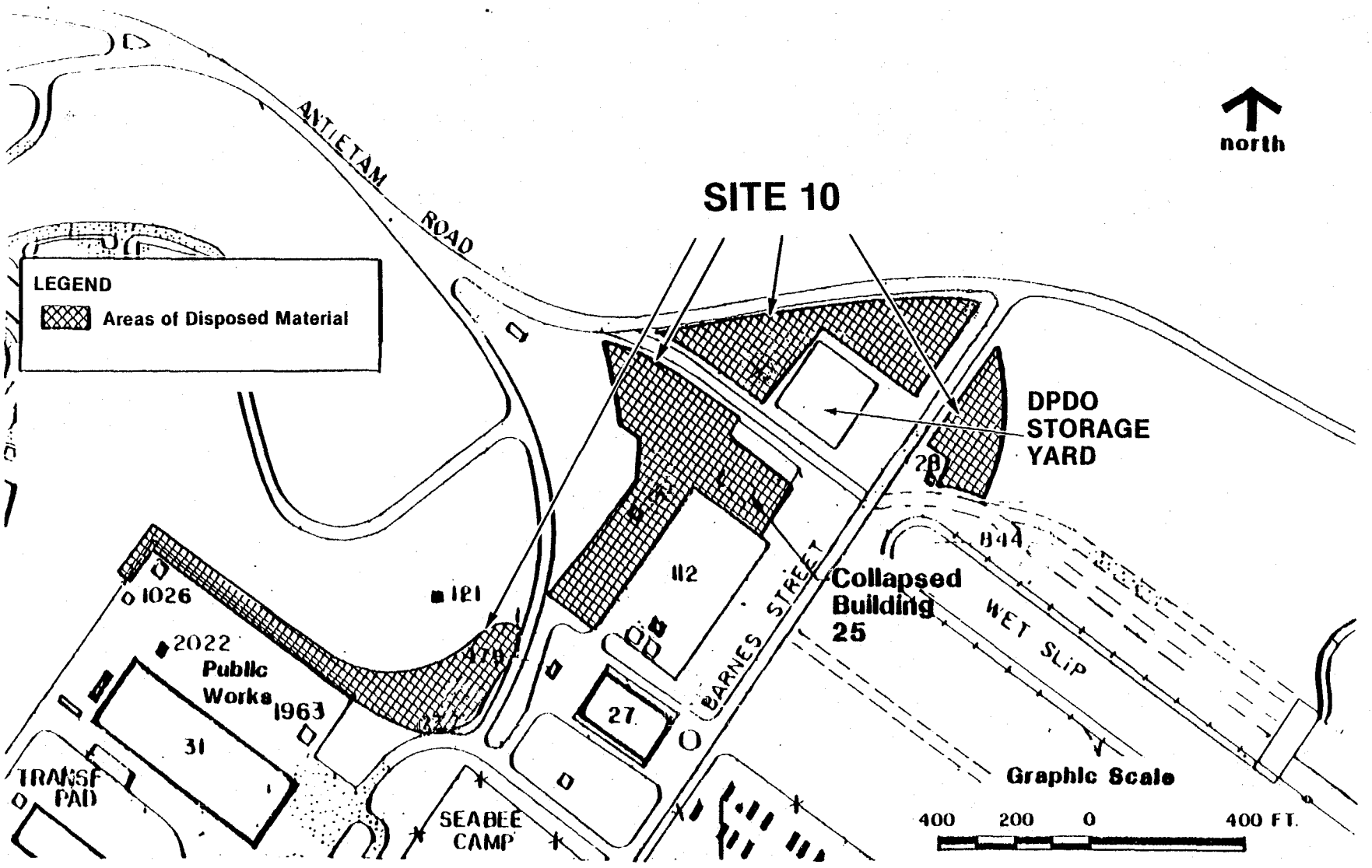
Partially crushed drums that contain potentially hazardous material shall also be sampled, if possible, for PHC analysis prior to overpacking. Any visibly contaminated soil adjacent to a damaged drum shall be placed in the same overpack. Empty containers shall be crushed and left for reburying. Analysis of soil samples collected from the drum ditch during the Confirmation Study indicated the presence of oil and grease in concentrations ranging from 80 to 198 parts per million (ppm), dry weight. However, no contamination by toxic volatile organic compounds on the EPA Priority Pollutant List, methyl ethyl ketone, methyl isobutyl ketone, xylene, or ethylene dibromide was detected. Nevertheless, any drummed waste at the Site 7 drum ditch shall still be considered potentially hazardous.

Upon completion of the PHC analysis, the drums shall be transported to the proposed central staging area at the DPDO storage yard.

4.3 SITE 10--BUILDING 25 STORAGE AREA

At Site 10, Building 25 was used for temporary storage of waste materials to be turned over to DPDO for ultimate disposal, and the entire area near Building 25 (see Figure 4-3) was used for open storage of drummed material since as early as 1957. Building 25 was used from the late 1940s or early 1950s until it collapsed during 1979. Currently, a variety of materials are stacked or randomly disposed of around the building. Potentially hazardous materials at the site include 20 to 25 empty to partially filled 55-gallon drums, 10 to 15 corroded 5-gallon pails, transformers, and 29 gas cylinders. The contents of the 5-gallon pails are exposed to the environment and consist of a white solid and a greenish crust similar to that found in the drums at Site 6. During the Confirmation Study, these wastes, except for the 55-gallon drums, were found in the area directly adjacent to Building 25. The drums were found scattered throughout the area northwest of Building 25 and the DPDO Storage Yard, which is heavily vegetated. There are remnants of several dirt roads and trails through the vegetation. The IAS team reported additional materials within the collapsed Building 25, but did not specify types or quantities. An inspection of Building 25 during the Confirmation Study indicated the presence of one full 55-gallon drum with no markings identifying the drum contents.

Additional drum storage is located immediately north of the Building 31 transportation lot (see Figure 4-3). The IAS team reported 50 drums in the area. The IAS report states that an attempt was made to remove some of these drums and that a spill occurred during that operation. Approximately 15 to 20 drums were present in this area at the time of the Confirmation Study.



SOURCES: NEESA, 1984; ESE, 1985.

Figure 4-3
SITE 10—BUILDING 25 STORAGE AREA

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4.3.1 Site Access

Access roads (trails) through the area surrounding Building 25 were fairly clear during the Confirmation Study site reconnaissance, but many areas of disposal were located well off of the trails. Most of the heavily wooded areas will have to be traversed on foot to ensure all potentially hazardous materials are located for subsequent removal. This will take approximately 4 to 5 days to complete with a 4- to 6-person crew.

If containers of potentially hazardous materials are found in dense vegetation, a path will have to be cleared by a small bulldozer to allow access to the containers by an all-terrain forklift or front-end loader.

Access to Building 25 itself is impeded by a small amount of vegetation which has grown around and over parts of the collapsed building. This vegetation will have to be cleared by a small bulldozer to gain access to the building by a front-end loader.

4.3.2 Container Removal

Due to the collapsed condition of Building 25, equipment will be needed to remove building materials and segregate potentially hazardous materials from nonhazardous materials. The use of front-end loading equipment and bulldozers to remove building components while "spotters" check the debris for any potentially hazardous materials is recommended. Spotters should be located near the bulldozing operations and also at off-loading for trucks going to the station landfill. Any containers found shall be moved using a front-end loader to a secure staging area within the station landfill for sampling for PHC analysis. Upon completion of the PHC analysis, the containers shall be transported to the proposed central staging area at the DPDO storage yard.

Many of the drums located in the area surrounding Building 25 are easily accessible from the roads in the area. The condition of the drums shall

be checked to determine if overpacking is necessary to prevent spills when transporting to the initial staging area. For drums located in heavily overgrown areas, a path can be cleared with small chain saws or a bulldozer and removed with all-terrain forklift or front-end loader.

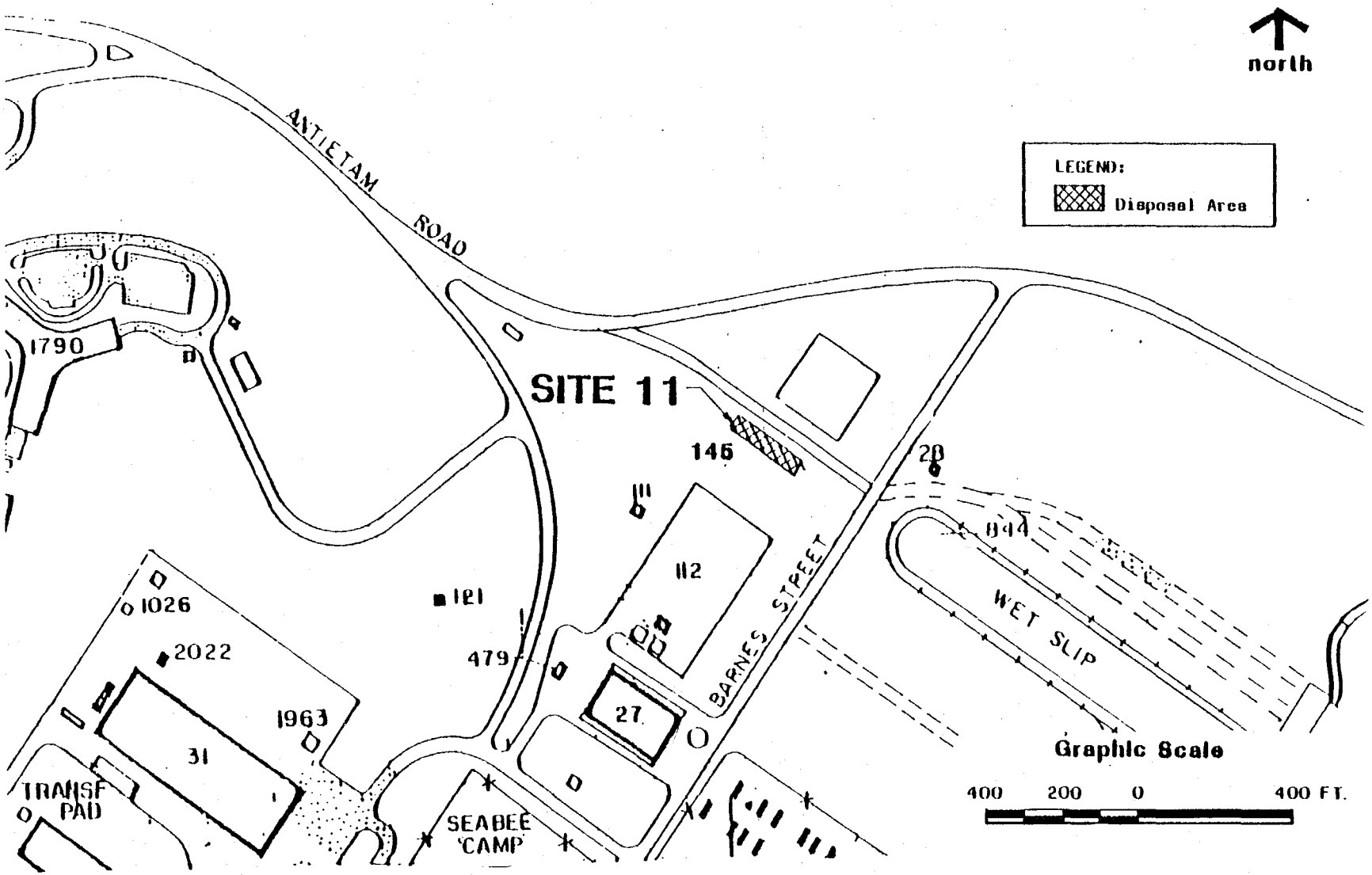
There are approximately 29 gas cyclinders in the Site 10 area. After inspection, evaluation, and classification of the gas cylinders, appropriate steps shall be taken utilizing remote container handling equipment to pack the gas cylinders in steel oversleeve jackets for secure storage and safe handling. Each steel oversleeve jacket shall have a bleed-off and pressure gage to monitor any gas leaks during storage. The cylinders shall be segregated by compatibility classification determined from the visual inspection of a cylinder disposal expert. The overpacked cylinders shall be carefully relocated to the central staging area with a separate isolated storage area for gas cylinders. The cylinders shall then be secured and transported horizontally to the island of Vieques for detonation.

Asbestos material shall be placed into plastic-lined, DOT-approved drums. The material will be wetted with a water/surfactant mist before and during removal operations to reduce fiber emissions. Shoveling the wetted material into the drums by hand is recommended.

Any transformers found in the area shall be transported to the hazardous waste storage facility in Building 38 for storage and subsequent testing for PCB along with other potentially PCB-containing items stored at this facility.

4.4 SITE 11--BUILDING 145

The original purpose of Building 145 (Site 11, see Figure 4-4) is unknown. It is a concrete bunker approximately 180 feet long, 7 feet high, and 8 feet wide. Three entrances through the roof are covered with deteriorated wooden structures; one entrance is at ground level. The



SOURCES: NEESA, 1984; ESE, 1986.

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Figure 4-4
SITE 11—BUILDING 145

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building first appears on a 1959 map of the area, and, based on markings on some of the drums stored there, it is likely that it was used for storage during that time. There is a large pool of water, presumably rain water, at a low point in the bunker. Several trees have grown roots through the openings in the roof to the water.

Some nonhazardous materials, including old office furniture and scrap metal, are stored or disposed in Building 145. Among the potentially hazardous wastes stored at the site are approximately sixty 55-gallon drums, one-hundred 5-gallon pails, and a number of small containers. Markings on some drums are partially readable. Samples were taken from 21 drums, 8 pails, and 3 spills during the IAS; analytical results are presented in Appendix D. Paints, black boot polish, and adhesives were identified in some of the containers during the IAS. The conditions of the containers range from good to poor. Some containers are intact and sealed and probably contain the original materials; others are missing tops or have rusted through.

Discarded materials are staged in three distinct sections of the bunker. In the rear of the bunker are 20 to 25 drums. These drums are randomly placed, but do not appear to have been dropped through the openings in the roof. The drums are rusted, and most appear empty or partially full. Located approximately halfway through the bunker are approximately one-hundred 5-gallon pails. These pails are piled randomly and are blocking access to the rear of the bunker. The pails are filled. Near the entrance are a number of drums, several pails, and some smaller containers. These containers are neatly stacked, some on metal pallets, and most appear full. Some spills were noticed in this area.

Air characterization performed during the IAS indicated the presence of volatile organics within the building, although Confirmation Study results showed no such indication. Leaks that release volatile organics can lead to an explosive or flammable atmosphere within the bunker.

4.4.1 Site Access

Access to Building 145 can be obtained through a clearing adjacent to the DPDO storage yard. The front opening to the bunker is located at the southeastern end of the structure. Some brush clearing and dirt removal will be necessary to provide equipment access for removal of materials inside. Front entrance dimensions are approximately 7-feet high by 8-feet wide. The bunker is approximately 180 feet long and has a sloping floor, with the lowest point in the center of the building. Approximately 1 foot of water had collected in the center portion of the building at the time of the Confirmation Study site reconnaissance.

Because preliminary sampling results for some drums in Building 145 show extremely low flash points (see Appendix D), any mishandling of the low-flash-point wastes that results in spills of material inside the enclosed building area can result in the rapid evolution of explosive and/or toxic atmosphere. The roof vents on the building would most likely not dissipate the vapors quickly enough to prevent possible respiratory injury or explosions. Any ignition sources (i.e., machinery, forklifts, nonintrinsically safe lighting, and pumps) shall be prohibited in drum removal operations. Additional ventilation should be included by placement of large industrial fans at the entrances to the bunker. Only sparkless tools should be used during this operation.

4.4.2 Container Removal

A strong, intrinsically safe lighting system shall be installed through each of the three roof vents and at the entrance. Standing water shall be pumped out of the floor area and into 55-gallon drums. Characteristic testing of the water shall precede this operation (see Table 3-3 for analytical requirements). Pumps shall be located outside the building. Any remaining dirt or sludge residue shall be sprinkled with adsorbent and shoveled into drums. This will prevent slipping accidents during drum removal.

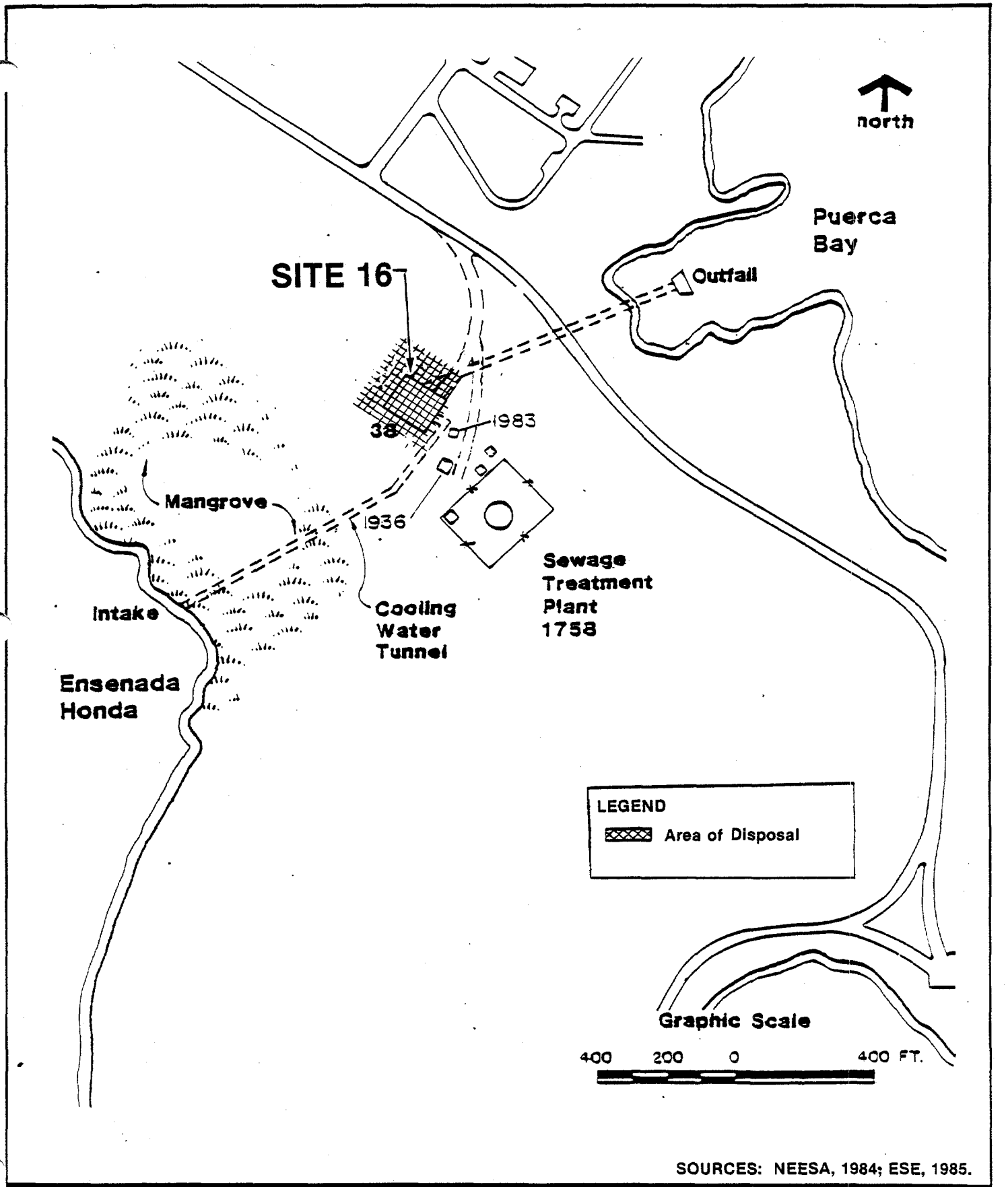
Drums shall be removed with a hydraulic dolly. Due to the slope of the floor, two people will be needed to remove the drums. One extra person shall be present inside the building to continuously monitor air quality with an HNU meter, cyanide meter, explosimeter, and hydrogen sulfide monitor. The contents of drums in poor condition will be pumped into new drums if the liquid is pumpable. The receiving drum and pump will be located outside the building, and all personnel must leave the building while pumping is in progress. If material in the drum is not pumpable and cannot be moved, the drum shall be overpacked inside the building. All 5-gallon pails will be overpacked in 55-gallon drums with absorbent. Three 5-gallon pails with compatible contents, based on previous PHC analyses, shall be overpacked together in one 55-gallon drum.

A temporary staging area will be established at a cleared and level area directly adjacent to the bunker to allow for sampling, PHC analysis, and labeling of drums. Following PHC analysis, the drums shall be transported to the central staging area.

4.5 SITE 16--OLD POWER PLANT (BUILDING 38)

A steam-turbine power plant was operated in Building 38 during the 1940s. The plant burned Bunker C fuel, which was stored in two 50,000-gallon reinforced concrete underground tanks northwest of the building. At least one release of Bunker C fuel was noted during the 1970s, and a contractor was hired to clean up the spill and drain the tanks. From 1956 to 1964, Building 38 was used for the maintenance of transformers. During maintenance, the used transformer oil, probably containing PCBs, was drained to the ground at the southeast corner of the building.

During the Confirmation Study site reconnaissance, however, approximately six unmarked gas cylinders were located west and southwest of Building 38. These cylinders were lying at random on the ground behind the building underneath a dense growth of vines and other vegetation, and ranged in condition from fair to poor. See Figure 4-5 for building



SOURCES: NEESA, 1984; ESE, 1985.

Figure 4-5
SITE 16—OLD POWER PLANT (BUILDING 38)

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location. In addition, the area surrounding the building (including the southeast side of the building, which is fenced) is cleared and easily accessible.

On January 30, 1986, ESE performed another reconnaissance of Site 16. It was observed that the area directly adjacent to Building 38 to the northwest, west, southwest, south, and southeast had been scraped to remove soil and debris which had been previously deposited in this area. In the process of this scraping, at least two or three of the gas cylinders were moved to the area south of the building and were probably buried in a pile of soil and debris which was formed in this area during the scraping operation. In addition, one cylinder was observed lying on the ground directly adjacent to the soil/debris pile, and two cylinders were observed to be lying in the original locations noted during the first site reconnaissance (near the west corner of the building).

The analytical results for soil samples collected near the southeast side of the building during the Confirmation Study indicate PCB contamination with PCB concentrations ranging from 3.39 to 92.9 micrograms per gram (μg/g), dry weight. Consequently, the soil present in the soil/debris pile formed during the scraping operation is potentially contaminated with PCB.

4.5.1 Site Access

A negotiable access road exists around the Building 38 perimeter.

4.5.2 Container Removal

All gas cylinders will be left in place and visually inspected by a gas cylinder disposal expert. All buried cylinders will be carefully excavated with a protective explosion shield, and all cylinders shall be overpacked and disposed as discussed previously in Section 3.7.2.

5.0 DECONTAMINATION

During cleanup and removal operations, personnel and equipment can become contaminated by:

1. Contacting vapors, gases, mists, or particulates in the air;
2. Being splashed by materials during sampling or opening containers;
3. Walking through puddles of liquids or on contaminated soil; or
4. Using contaminated equipment.

Protective clothing and remote handling equipment assist in minimizing the potential for contamination. Each site must be controlled by establishing work zones and limiting the number of personnel and amount of equipment involved in cleanup operations. A preferred method of preventing and reducing migration of contamination is to delineate zones on the site where prescribed operations occur.

Three contiguous zones are recommended:

Zone 1--Exclusion or "Hot" Zone (EZ),
Zone 2--Contamination Reduction Zone (CRZ), and
Zone 3--Support Zone.

The EZ is the contaminated zone requiring prescribed levels of protection. An entry and checkpoint must be established at the periphery to regulate flow of personnel and equipment and to conduct proper decontamination procedures specified in the Safety Plan (see Appendix A).

The Support Zone, the outermost part of the site, is considered a noncontaminated area. Support equipment, command post, and observers are located in this zone.

The CRZ is between the EZ and the Support Zone and provides a transition between contaminated and clean zones. The CRZ serves as a buffer to reduce the probability of contaminating the Support Zone.

Decontamination will proceed in the CRZ. A corridor of 75 feet by 15 feet will be adequate for decontamination. A separate work area with three zones will be established for each site, and decontamination operations will be conducted for all personnel and equipment leaving the EZ. Within the CRZ, distinct areas are set aside for decontamination including a heavy equipment area, personnel decontamination, portable field equipment, tools, etc.

The following decontamination operation is recommended for NAVSTA Roosevelt Roads.

1. High temperature/high pressure wash,
2. Trisodium phosphate (TSP)/water scrub, and
3. High temperature/high pressure wash.

All affected areas of equipment (e.g., backhoe or front-loader buckets, forklifts, tires, etc.) shall be thoroughly cleaned before equipment is allowed offsite. All washwater shall be collected and tested (see Table 3-3). If contaminated, washwater shall be drummed and disposed at a RCRA-approved treatment/disposal facility. If washwater is nonhazardous, it can be disposed onsite by allowing it to percolate into the soil. All spent materials and equipment used for decontamination must be disposed properly. Clothing, tools, buckets, brushes, and all other equipment that is contaminated must be secured in drums, labeled, and disposed of as a hazardous waste.

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APPENDIX A

SAFETY/CONTINGENCY PLAN

APPENDIX A
SAFETY/CONTINGENCY PLAN

A.1 PROJECT DESCRIPTION

Attached are technical plans and methods for the removal and ultimate disposal of containerized wastes that are potentially hazardous wastes resulting from past disposal operations, spills, or leaks at the Naval Station (NAVSTA) Roosevelt Roads, Puerto Rico.

This Safety/Contingency Plan primarily addresses the recommended practices for safely handling containerized wastes (e.g., drums and gas cylinders) and is designed to aid the U.S. Navy in the reduction of hazards inherent to the handling of such wastes.

A.2 RESPONSIBILITY AND ORGANIZATION

The purpose of the Safety/Contingency Plan is to protect all personnel and the surrounding environment during investigative activities at NAVSTA Roosevelt Roads, and to satisfy Occupational Safety and Health Administration (OSHA) requirements. The plan includes procedures and preventive measures that will protect human health and the environment from the hazards of metal, acid, and toxic organic compound exposure and from fire, explosion, and mechanical hazards which may exist during field preparation, screening analyses, and ultimate removal and disposal.

The safety and health policies of the U.S. Navy require that a safety plan be implemented at NAVSTA Roosevelt Roads, to protect all individuals and the environment. It is the responsibility of each member of the container removal team, including all subcontractor personnel, to conform to and comply with all aspects of this safety program. All personnel must regard and conduct themselves as members of the "safety team" and adhere to the prescribed site Safety/Contingency

Plan. The Site Safety Officer onsite is responsible for enforcing strict adherence to the plan.

The "buddy system" is a key element of this plan and requires that all activities at the site be conducted using a minimum of 2-person teams.

Overall responsibility for safety during the container removal activities rests with the Project Manager. The Project Manager's responsibilities include:

1. Presenting an effective site safety plan for the project that satisfies OSHA requirements,
2. Categorizing and identifying the project staff as to the levels of potential exposure to dangerous levels of hazardous materials,
3. Assuring that adequate and appropriate safety training and equipment are available for project personnel,
4. Arranging for medical examinations for specified project personnel, and
5. Designating a Site Safety Officer.

The responsibilities of the Site Safety Officer include:

1. Implementing all safety procedures and operations onsite;
2. Updating equipment or procedures based on new information gathered during the container removal process;
3. Upgrading or downgrading (with approval of the Project Manager) the levels of personnel protection based on site observations;
4. Determining and posting locations and routes to medical facilities (see Attachment A for Emergency Medical Facilities), including poison control centers, and arranging emergency transportation to medical facilities (as required);
5. Notifying (as required) local public emergency officers (i.e., police and fire departments) of the nature of the team's operations, and making emergency telephone numbers available to all team members;

6. Observing work party members for symptoms of exposure or stress; and
7. Arranging for the availability of emergency medical care and first aid onsite, as necessary.

The Site Safety Officer has the ultimate responsibility to stop any operation that threatens the health and safety of the team or surrounding populace or causes significant adverse impact to the environment.

In the absence of the Site Safety Officer during the container removal operation, the Field Team Leader will serve as the Site Safety Officer.

It is the responsibility of all other onsite personnel:

1. To comply with all aspects of the project Safety Plan, including strict adherence to the "buddy system;"
2. To obey the orders of the Site Safety Officer; and
3. To notify the Site Safety Officer of hazardous or potentially hazardous incidents or working situations.

A.3 GENERAL SAFETY RULES

In addition to the specific requirements of the project Safety Plan, common sense should prevail at all times. The following general safety rules will be in effect at the site.

1. Each container, drum, or cylinder must be treated as though it were toxic and hazardous;
2. Unauthorized personnel are not permitted at the work sites or within 50 feet of waste removal equipment, and Base Security will be asked to remove violators upon failure to heed a verbal request to vacate the site;
3. To reduce contact between the hands and mouth, all smoking, eating, and drinking will be strictly prohibited in the work area;

4. Persons with beards or other facial hair that interferes with respirator fit are not permitted within the site boundaries when conditions require respiratory protection. A respirator program shall be in place in accordance with 29 CFR 1910.134 for all activities requiring respirators.
5. Persons with long hair and/or loose fitting clothing which could become entangled in drilling equipment are not permitted in the work area;
6. All personnel should avoid unnecessary contact with contaminated soil and water;
7. All personnel should avoid any contact between their hands and mouths until they are thoroughly decontaminated;
8. Horseplay is prohibited;
9. Use of alcohol, narcotics, or controlled substances while working is prohibited;
10. Firearms, ammunition, fireworks, and explosives are prohibited;
11. Approved and appropriate safety equipment, as specified in the project Safety/Contingency Plan, such as eye protection, hardhats with face shields, foot protection, gloves and respirators, must be worn in areas where required by the Safety Plan. In addition, eye protection must be worn when handling acidic, caustic, or other hazardous liquids, such as analytical preservatives;
12. All removal vehicles (backhoes, ATV's, front-end loaders, etc.) will be equipped with Class ABC fire extinguishers, sealed, and air conditioned;
13. All surfaces on removal vehicles which may cause sparking when in contact with waste drums or cylinders will be constructed of a nonferrous metal or coated with Teflon®;
14. All vehicles will be fitted with splash guards and explosion shields;
15. All vehicles and containers will be electrically grounded to further preclude static discharge;

16. Remotely operated devices will be used whenever possible and will be operated from the maximum distance allowed by the control device;
17. Local meteorological data (real time) will be required to determine areas of potential impact and to formulate emergency exit plans; and
18. Prior to encountering hazardous materials, all site personnel will be trained in accordance with 29 CFR 1919.1200 (Hazard Communication).

The Site Safety Officer will have the authority to modify the site safety rules when necessitated by onsite conditions.

A.4 SITE CHARACTERIZATION AND SITE SAFETY PLAN

A characterization of each site of potential contamination was performed, based on a thorough evaluation of the IAS of NAVSTA Roosevelt Roads (NEESA 13-051, September 1984) and an assessment of the potential hazards at each site. Based on the site characterization, a Site Safety Plan was prepared to describe various procedures and precautions that will be followed to assure preservation of health and safety during all site activities.

A.4.1 SITE CHARACTERIZATION

The IAS (NEESA 13-051, September 1984) identified 13 sites at NAVSTA Roosevelt Roads that may pose a potential threat to human health or the environment due to contamination resulting from past hazardous materials operations. A thorough review of the information presented in the IAS and gathered during the Confirmation Study site reconnaissance regarding type and estimated quantities of hazardous materials disposed of at each site was conducted to identify the potential hazards that exist in performing the container removal operations. Information contained in the IAS report indicates that many different compounds have been spilled, leaked, or disposed of at the various sites of potential contamination. Possible polychlorinated biphenyl (PCB) contamination

has been identified at several sites, which could pose a skin absorption problem or an inhalation problem when present in dust particles. Possible pesticide and herbicide contamination has also been identified at several sites. These compounds affect the nervous system, and many are absorbed through intact skin. Both solutions and dusts containing these compounds are potentially hazardous. Solvents such as trichloroethylene, methyl ethyl ketone, and methyl isobutyl ketone have been reported as possible water contaminants and may be present in drums in a relatively pure state. Skin contact should be avoided, but inhalation is the greatest hazard.

The following Site Safety/Contingency Plan presents procedures and precautions that will be followed to ensure the protection of human health and the environment during the container and waste removal operation.

A.4.2 SITE SAFETY/CONTINGENCY PLAN

The Site Safety/Contingency Plan outlines procedures to be used during the removal of hazardous waste to minimize the risk of injury or illness resulting from onsite activities. The specific health and safety concerns in this plan deal with chemical and physical hazard exposure during the various phases of the removal process. The intent is to carry out these duties to the degree that injuries, occupational illnesses, and unwarranted property losses are prevented, while at the same time ensure compliance with applicable laws and regulations. Emphasis will be placed on individual awareness, personal protective equipment, and emergency response.

Site Safety Plan

The Site Safety Plan is comprised of the following major sections:

* Personal Protective Clothing and Equipment
* Medical Monitoring
* Site Entry Procedures
* Decontamination Procedures

* Investigation-Derived Material Disposal

Personal Protective Clothing and Equipment--Personnel must wear protective equipment when removal activities involve known or suspected atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with skin-affecting substances may occur. Respirators can protect lungs, gastrointestinal tract, and eyes against air toxicants. Chemical-resistant clothing can protect the skin from contact with skin-destructive and absorbable chemicals. Good personal hygiene limits or prevents ingestion of material. Portable eyewash stations can be used in the event of splashes of contaminated materials into the eyes of field team members.

Equipment to protect the body against contact with known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded:

- Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.

- Level B: Should be selected when the highest level of respiratory protection, but a lesser level of skin protection, is needed. Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by onsite studies and appropriate personnel protection utilized.

- Level C: Should be selected when the types of airborne substances are known, the concentrations measured, and the criteria for using air-purifying respirators are met.

- Level D: Should not be worn on any site with respiratory or skin hazards. Is primarily a work uniform providing minimal protection.

The level of protection selected should be based primarily on:

- Types and measured concentrations of chemical substances in the ambient atmosphere and their toxicity.

- Potential or measured exposure to substances in air, splashes of liquids, or other direct contact with material due to work being performed.

In situations where the types of chemicals, their concentrations, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be better characterized. Additional guidance for selecting level of protection utilizing air monitoring equipment is presented later in this section. Air monitoring is necessary in all levels of protection to allow immediate upgrade of protection or temporary retreat from the site.

The specifications of protective clothing and equipment associated with each level of protection identified above are listed below:

Level A Protection

Personal Protective Equipment:

- Pressure-demand, self-contained breathing apparatus, approved by the Mine Safety and Health Administration (MSHA) and National Institute of Occupational Safety and Health (NIOSH)
- Fully encapsulating chemical-resistant suit
- Coveralls*
- Long cotton underwear*
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots, chemical-resistant, steel toe and shank (depending on suit construction, worn over or under suit boot)
- Hardhat* (under suit)
- Disposable protective suit, gloves, and boots* (worn over fully encapsulating suit)
- 2-way radio communications

*Optional

Criteria for Selection: Meeting any of these criteria warrants use of Level A protection:

- The chemical substances have been identified and require the highest level of protection for skin, eyes, and the respiratory system based on:

  - Measured (or potential for) high concentrations of atmospheric vapors, gases, or particulates, or

  - Site operations and work functions involving high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates

- Extremely hazardous substances (for example: dioxin, cyanide compounds, concentrated pesticides, Department of Transportation (DOT) Poison "A" materials, suspected carcinogens, and infectious substances) are known or suspected to be present, and skin contact is possible.

- The potential exists for contact with substances that destroy skin.

- Operations must be conducted in confined, poorly ventilated areas until the absence of hazards requiring Level A protection is demonstrated.

- Total atmospheric readings on the Century OVA System, HNU Photoionizer, or similar instruments indicate 500 to 1,000 parts per million (ppm) of unidentified substances.

Level B Protection

Personal Protective Equipment:

- Pressure-demand, self-contained breathing apparatus (MSHA/NIOSH-approved)

- Chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; hooded, one- or two-piece chemical-splash suit; disposable chemical-resistant coveralls)

- Coveralls*

- Gloves (outer), chemical-resistant

- Gloves (inner), chemical-resistant

- Boots (outer), chemical-resistant, steel toe and shank

- Boots (outer), chemical-resistant (disposable*)

- Hardhat (face shield*)

- 2-way radio communications

*Optional

Criteria for Selection: Meeting any one of these criteria warrants use of Level B protection:

- The types and atmospheric concentrations of toxic substances have been identified and require the highest level of respiratory protection, but a lower level of skin and eye protection. These would be atmospheres:

  - With concentrations Immediately Dangerous to Life and Health (IDLH), or

  - Exceeding limits of protection afforded by a full-face, air-purifying mask, or

  - Containing substances for which air-purifying canisters do not exist or have low removal efficiency, or

  - Containing substances requiring air-supplied equipment, but substances and/or concentrations do not represent a serious skin hazard.

- The atmosphere contains less than 19.5 percent oxygen.

- Site operations make it highly unlikely that the small, unprotected area of the head or neck will be contacted by splashes of extremely hazardous substances.

- Total atmospheric concentrations of unidentified vapors or gases range from 5 ppm to 500 ppm on instruments such as the Century OVA or HNU Photoionizer, and vapors are not suspected of containing high levels of chemicals toxic to skin.

Level C Protection

Personal Protective Equipment:

- Full-face, air-purifying, canister-equipped respirator (MSHA/NIOSH-approved)

- Chemical-resistant clothing (coveralls; hooded, two-piece chemical splash suit; chemical-resistant hood and apron; disposable chemical-resistant coveralls)

- Coveralls*

- Gloves (outer), chemical-resistant

- Gloves (inner), chemical-resistant*

- Boots (outer), chemical-resistant, steel toe and shank*

- Boots (outer), chemical-resistant (disposable*)

- Hardhat (face shield*)

- 2-way radio communications

*Optional

Criteria for Selection: Meeting all of these criteria permits use of Level C protection:

- Measured air concentrations of identified substances will be reached by the respirator at or below the substance's exposure limit, and the concentration is within the service limit stated on the canister.

- Atmospheric contaminant concentrations do not exceed IDLH levels.

- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect the small area of skin left unprotected by chemical-resistant clothing.

- Job functions have been determined not to require self-contained breathing apparatus.

- Total vapor readings register between background and 5 ppm above background on instruments such as the HNU Photoionizer and Century OVA.

- Air will be monitored periodically.

Level D Protection

Personal Protection Equipment:

- Coveralls

- Gloves*

- Boots/shoes, leather or chemical-resistant, steel toe and shank

- Boots (outer), chemical-resistant (disposable*)

- Safety glasses or chemical splash goggles*

- Hardhat (face shield*)

- Escape mask*

*Optional, but should remain onsite for quick access in an emergency.

Criteria for Selection: Meeting any of these criteria allows use of Level D protection:

- No hazardous air pollutants have been measured.

- Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

Guidance on Selection Criteria: Level D protection is primarily a work uniform. It can be worn in areas where: (1) only boots can be contaminated, or (2) there are no inhalable toxic substances.

Three basic risks are involved in moving and opening closed containers:

1. Exposure of personnel to toxic materials,
2. Fire, and
3. Explosion.

The first risk can be reasonably eliminated through the use of proper skin and respiratory protection equipment. The use of Level B protection [i.e., coated Tyvek® suit, Solvex® gloves, Lexicon® full face shield, and a self contained breathing apparatus (SCBA)] acceptably reduces the risk of a worker being injured by toxic vapors, mists, or splashes. In the same way, standard fire prevention procedures can be used to reduce the fire hazard through the use of detector instruments (i.e., HNU meter, explosimeter, and oxygen meter) and proper equipment. Proper equipment should include the use of nonsparking tools and intrinsically safe radios, pumps, and ATV vehicles, as well as the staging of firefighting equipment (i.e., ABC, CO_2, and foam fire extinguishers).

The explosive risk, however, is not easily handled, and thus is the primary consideration in any container-opening operation. Remote sampling and container handling equipment shall be used whenever possible. Explosion shields shall be attached in the front and side of all container handling equipment. Personnel explosion barriers/shield also should be used. Any bulging, fuming, or suspected shock-sensitive drum shall be left in place and, if possible, isolated until further

inspection and secure overpacking by remote handling equipment is accomplished.

Based on information presented in the IAS and gathered during the Confirmation Study Site Reconnaissance, personnel involved in the operations during the sampling and staging will wear Level B protection at the sites which will include:

- o Saranex® coveralls,
- o Steel-toed Neoprene boots,
- o Disposable boot covers (Neoprene),
- o Solvex® gloves,
- o Impervious inner PVC gloves,
- o Hardhats,
- o Lexicon faceshields, and
- o SCBA respirators (full-face).

NOTE: Upon safety equipment monitoring results and the Site Safety Officer's approval, the safety level can be reduced to Level C with full-face organic vapor/pesticide cartridges.

As mentioned earlier, air monitoring will be conducted during all phases of the removal process to assess the need for upgrading personnel protection. The criteria described above for each level for protection will be used in decision making regarding the appropriate level of personal protection. The Site Safety Officer will be responsible for air monitoring and assessment of the need for upgrading the level of personal protection. Air monitoring will be performed at each location using an HNU, with a 10.2-electron volt (eV) lamp or the Foxboro OVA.

In addition to the protective clothing and equipment specified previously for conditions normally anticipated during the removal process, an emergency egress pack (minimum 5-minute duration) will be available for each field team member in the event of a major release of toxic gas, vapor, or dust emission. The emergency egress pack will allow field personnel to quickly vacate the area affected by the sudden release.

Medical Monitoring--Medical monitoring of all field personnel involved in this process is required to identify potential adverse effects that may result from exposure to toxic substances. The medical monitoring program consists of a baseline medical examination and periodically scheduled surveillance examinations. The surveillance examinations are at the discretion of the Site Safety Officer, but will always be given if obvious exposure has occurred.

The baseline physical examination shall provide a history of previous exposure and general health status and will serve as a baseline for comparative purposes.

The baseline examination includes the following:

1. Self-administered health history questionnaire as an aid in diagnosis.
2. General physical examination to assess the individual's overall health and current heart and neurological conditions. Specific tests include:
   - Chest X-ray
   - Electrocardiogram
   - Stress test
3. Laboratory hematologic analysis to determine liver and blood functions. These clinical tests include a complete blood count with differential, VDRL, thyroid hormone, albumin, alkaline phosphatase, bilirubin-total and iron-serum, lactic acid dehydrogenase, phosphorus, potassium, protein-total, sodium, SGOT, SGPT, triglycerides, urea nitrogen (BUN) and uric acid, hemoglobin, methemoglobin, heavy metals, and pesticide residues.
4. Urinalysis for urine characterization.
5. Pulmonary functions to be measured for determining lung condition. These specific tests include: forced vital capacity, forced volume, max-mid exploratory flow, maximum voluntary ventilation, functional residual volume, residual volume, and total lung capacity.

6. Hearing abilities will be determined through audiometric testing.

Periodic examinations will be performed annually for all personnel participating in the medical monitoring program. Periodic monitoring provides a continuous record of health status and also assists in the early identification of advanced health effects. Periodic surveillance examinations shall include those items which are considered good indicators of acute toxicity. Specifically, these involve the clinical tests listed above for kidney, liver, and blood functions.

Copies of medical records will be kept in personnel files at the office of the person's employer.

Site Entry Procedures--Field personnel should enter sites where sampling and handling operations are underway from an upwind direction, if possible. This practice will avoid obvious contamination and lessen the risk of exposure.

Decontamination Procedures--A portable steam cleaning unit will be used to decontaminate ATV's, backhoes, front-end loaders, and other equipment to be used in the removal process. Waste rinse water will be disposed of at the site of potential contamination. Likewise, wash and rinse water generated by the cleaning of contaminated boots, gloves, other protective clothing, and sampling equipment will be disposed of onsite. Stations must be easily mobile and simple (wash-and-rinse basins, heavy-duty trash bags for disposable clothing).

Protective Clothing Disposal--Contaminated disposable clothing must be labeled and stored onsite in heavy plastic bags in drums. Disposition of this contaminated material will be determined by the Site Safety Officer.

Contingency Plan

The Contingency Plan is comprised of two major sections: (1) Emergency Communications, and (2) Medical Support. These sections provide critical information required for emergency response related to the following:

- Fire or explosion requiring fire department response
- Serious injury requiring immediate attention
- Any other serious incident requiring rescue, police, fire, or security support from NAVSTA Roosevelt Roads
- A public hazard evaluation distance should be determined, in any direction from the site based on the worst-case atmospheric condition for release of toxic vapors

Emergency Communications--In the event of emergency, the appropriate NAVSTA Roosevelt Roads response resources must be contacted. Pertinent emergency response activities and telephone numbers are listed below:

Ambulance	865-2000, ext. 4144 (4144 on base)
Poison Control	753-4849
Hospital	865-2000, ext. 4133 (4133 on base)
Police	865-2000, ext. 4123 (4123 on base)
Fire Department	865-2000, ext. 4333 (4333 on base)
Explosives Unit	865-2000, ext. 4333 (4333 on base)
Water Supply	865-2000, ext. 2000 (3104 on base)

Safety Manager (M. Santiago) 809/865-2000 ext. 3010 or 5564

In addition, the following emergency contacts are available to lend information and support:

1. Felix Mestey (Environmental Coordinator, NAVSTA Roosevelt Roads), 809/865-2000, ext. 2507, and
2. Lt. Saul Alvarez (Industrial Hygienist, NAVSTA Roosevelt Roads).

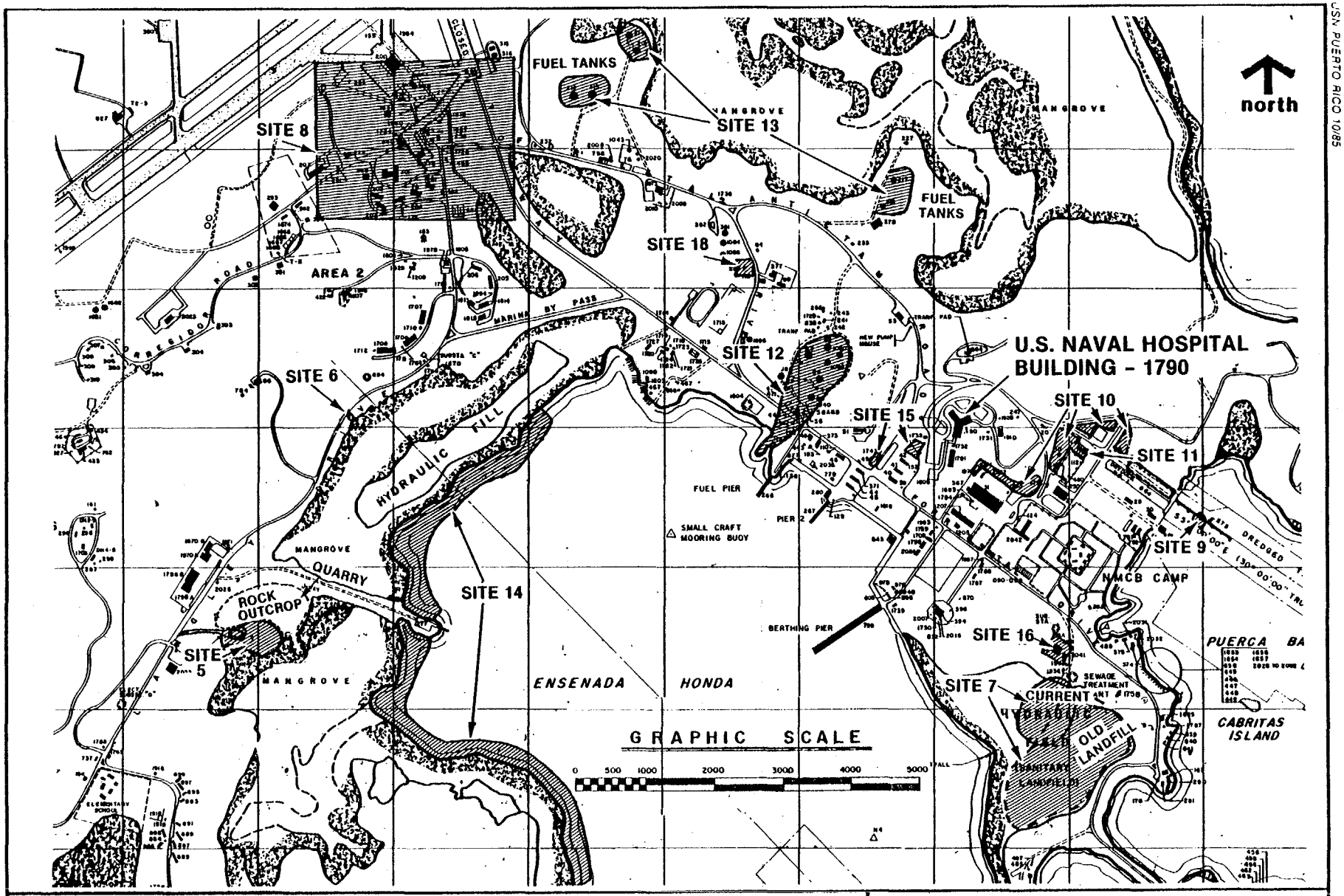
Supplemental NAVSTA Roosevelt Roads contacts are provided in Attachment B.

All field team members should acquaint themselves with the location of the nearest telephone to each site prior to initiation of work. This will help minimize response time in the event of an emergency. In addition, if working at remote areas, a hand-held radio will be used for emergency communications.

In the event of a medical emergency, the U.S. Naval Hospital at NAVSTA Roosevelt Roads will provide medical attention required for stabilizing the injured person prior to transferring to an offpost medical facility. The U.S. Naval Hospital at NAVSTA Roosevelt Roads is located in Building 1790 (see Figure A-1). For major medical services, the Veterans' Administration Hospital in Rio Piedras is located approximately 12 miles east of NAVSTA Roosevelt Roads.

ATTACHMENT A

Map showing location of U.S. Naval Hospital at NAVSTA Roosevelt Roads.



USN PUERTO RICO 10/85

Figure A-1
SITE MAP SHOWING LOCATION OF EMERGENCY MEDICAL FACILITY (U.S. NAVAL HOSPITAL), NAVSTA ROOSEVELT ROADS

CONFIRMATION STUDY
U.S. NAVAL COMPLEX
PUERTO RICO

ATTACHMENT B

ADDITIONAL NAVSTA ROOSEVELT ROADS CONTACTS

Contact	Telephone No.
Executive Officer	809/865-2000, ext. 6550
Commanding Officer	809/865-2000, ext. 4141
Command Master Chief	809/865-2000, ext. 5378
Chief Ward Officer	809/865-2000, ext. 4310
Quarter Deck-Officer of the Day (all hours)	809/865-2000, exts. 4311 4108, 4352
Environmental Coordinator	809/865-2000, ext. 2507
Public Works Department	809/865-2000, ext. 3104, 3105

APPENDIX B

PRELIMINARY HAZARD CLASSIFICATION (PHC) PROTOCOL FOR UNKNOWN HAZARDOUS WASTES

Appendix B

Preliminary Hazard Classification (PHC) Protocol For Unknown Hazardous Wastes

The following presents a methodology to determine the gross physical/chemical characteristics of an unknown sample (fingerprinting) in order to determine segregation criteria during preliminary transportation and staging. The preliminary classification allows wastes to be staged so as to substantially reduce the risk of fire, explosion, toxic gas evolution, or other undesireable reactions due to incompatible wastes stored in close proximity to one another.

Note: Some or all of these tests can produce small amounts of toxic gas and/or other hazards and should be performed only by personnel experienced with hazardous materials and the appropriate safety precautions. A portable fume hood and proper ventilation are required. Do not perform these tests in close proximity to the drums or containers from which the samples were taken or in areas where toxic/flammable atmospheres exist.

FINGERPRINT/COMPATIBILITY
FIELD TESTING PROCEDURES

Compiled by:

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Joseph J. Vondrick

April 1986

ESE No. 86-206-0100-2150

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1.0 INTRODUCTION

Fingerprint analysis is a quick method to determine the hazard class of individual unknown samples (i.e., drums, laboratory chemicals, tanks, etc.). The objective of fingerprinting is to provide economical and practical methods for in-field sampling classification and compositing unknown wastes. This method classifies wastes to meet U.S. Department of Transportation (DOT) labeling and manifesting requirements. Once individual unknowns are classified and grouped according to compatability (see Table 1-1), bulking or composite sampling can occur for an indepth laboratory analysis (see Figure 1-1). Exhibit 1-1 is an example of a typical fingerprint data sheet. The equipment needed for fingerprint analysis is presented in Table 1-2. Table 1-3 is a summary of the DOT hazard classifications corresponding with the fingerprinting compatability groups.

Table 1-1. Fingerprint Analyses

Group Number	Compatability Groups
1	Radioactivity
2	Air Reactivity/Physical Static
3	Flammable Explosivity
4	Non-Flammable Organic
5	Chlorinated Organic
6	Flammability
7	Corrosivity
8	Water Solubility
9	Water Reactivity
10	Oxidizer
11	Cyanides
12	Sulfides
13	Peroxides

Source: ESE, 1986.

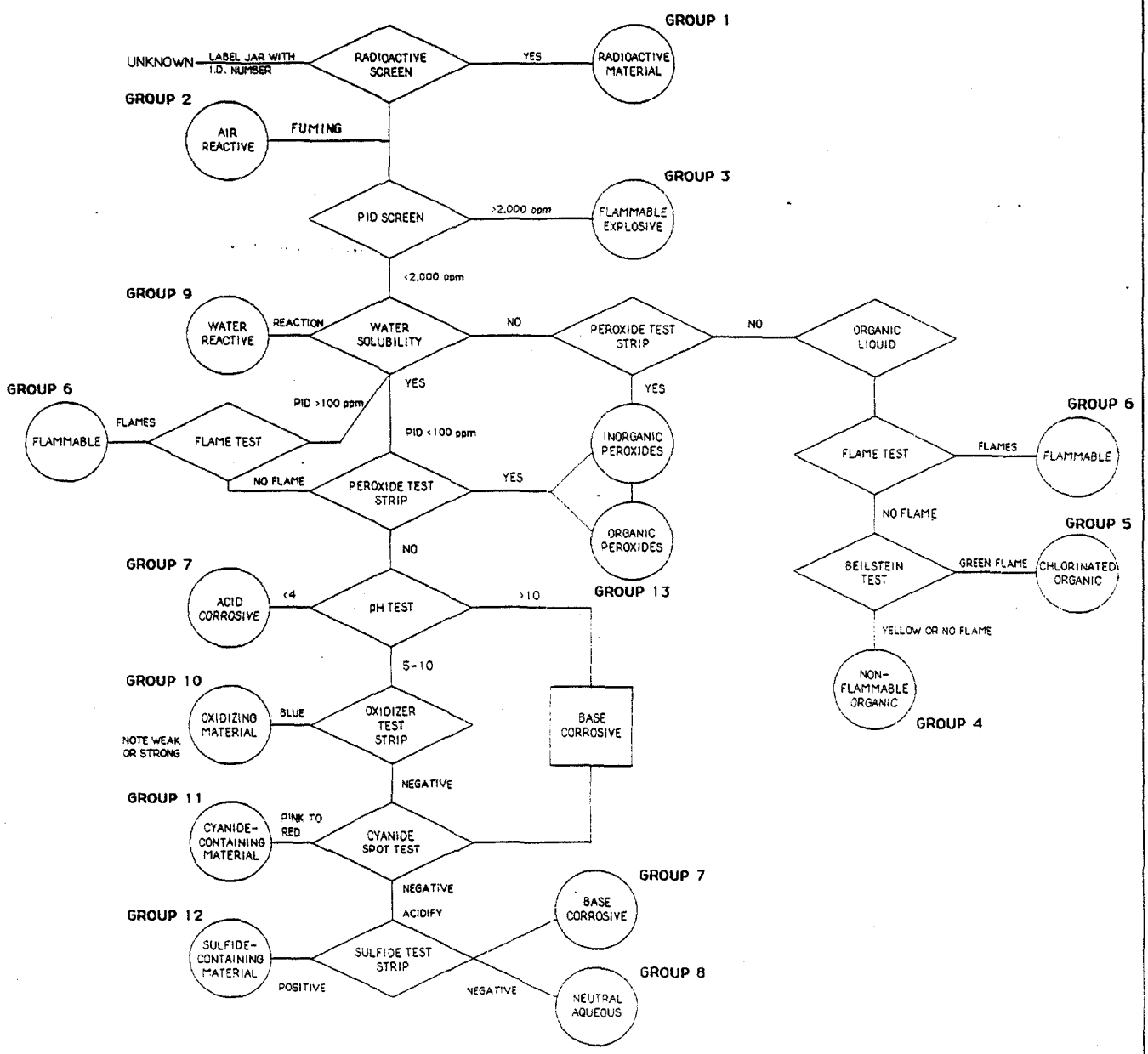

Figure 1-1
COMPATIBILITY SCHEME

SOURCE: ESE, 1986.

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

Exhibit 1-1. Typical Fingerprint Data Sheet

Sample #_____ Estimated Wt._____g.

HNU Reading_____ Container Size_____vol.

Description_____

Category Number	Test	Results		
1	Radioactive	+	-	
2	Air Reactive	+	-	
3	Explosive Organics	+	-	
4	Combustible	+	-	
5	Organic Chlorinated	+	-	
6	Flammable	+	-	
7	pH	<4	5-10	>10
8	Density (insoluble liquids)	<1	>1	
	Solubility (H_2)	+	-	
9	Reactive (H_2O)	+	-	
10	Oxidant			
11	Cyanide	+	-	
12	Sulfide	+	-	
13	Peroxide	+	-	

Classification_____

Disposal Drum_____

ESE Initials_____

Table 1-2. Equipment List

Laboratory Equipment

Fume Hoods

Spatulas

Disposable Pipettes, Syringes

Lead Acetate Paper

Potassium Iodide Starch Paper

Peroxide Indicator Test Strips

Capped Culture Tubes and Racks

Pipette Pumps

Clamps (Remote Bottle Opener)

pH Wide Range Test Strips

Propane Torch and Fuel

Copper Wire

Flashpoint Test Unit (Seta Flash)

Spot Testers

Sample Labels

Reagents

HCL (conc.)

Hexane

Acetone

Distilled/Deionized H_2O

Chloramine-T Solution

Pyridine/Burbituric Acid Solution

Monitors

Tridetector

- Oxygen
- Explosimeter
- H_2S

HNU Meter

HCN Monitox Monitor

Geiger Counter

Table 1-2. Equipment List (Continued, Page 2 of 2)

<u>Accessories</u>
Garbage Bags
Paper Towels
Gatorade/Cooler
Duct Tape
Visqueen
Absorbent
<u>Tools</u>
Explosion Shield
Brass Bung Wrench
Insulated Channel Locks
Utility Knife
Vice Grips
<u>Safety Equipment</u>
Viton, Solvex, PVC Gloves
Escape Air Pack
Grounding Cables
Splash Aprons (Butyl)
Neoprene Safety Boots
SCBA
Fire Extinguishers
Portable Eyewash
Pump Sprayer
Hooded Tyvek
APRs
Fullface Respirator
Chemical Cartridges

Source: ESE, 1986.

Table 3-1. Fingerprinting DOT Classifications

Compatability Group	EPA Hazard Type	EPA #	DOT Class	UN/NA #
Group 1	Radioactive Material			
Group 2	Reactive	Air/H2O D003	Reactive	2510
Group 3	Flammable explosive	D001/ D003	Class A explosive	
Group 4	Nonflammable Organic	Poison or Haz. Waste Solid/Liquid NOS	Poison Liquid NOS Solid NOS	2810 2811
Group 5	Chlorinated Organic	Poison	Poison. Liquid NOS Solid. NOS	2810 2811
Group 6	Flammable	D001	Flammable Liquids Solid NOS	1993 1325
Group 7	Corrosive	D002	Corrosive Liquid NOS Solid NOS	1760 1759
Group 8	Water Soluble (Nonorganic)	NA	NA	NA
Group 9	Water Reactive	D003	Flammable Solid	2513
Group 10	Oxidizer	D003	Oxidizer	1479
Group 11	Poison B-Cyanides	Poison B	Poison B Liquid	3510
Group 12	Sulfides-Reaction	D003	Reactive	
Group 13	Peroxides-Reactive Liquid & Solid (Flammable)	D003	Organic Peroxide Flammable	3101 3107 [illegible]

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Table 1-3. Fingerprinting DOT Classifications
(Continued, Page 2 of 2)

DOT Combination Classification:

Poison:	Classification	Haz. Class	UN/NA #
	Poisonous Liquid, NOS	Poison	1995
	Solid, NOS	Poison	2811
	B, NOS	Poison B	2811 (ie Cyanide)
	Solid, Corrosive, NOS	Poison/Corrosive	2928
	Liquid, Flammable NOS	Poison A	1583
Corrosive: (D002)			
	Corrosive Liquid, NOS	Corrosive	1760
	Liquid Poisonous NOS	Corrosive	2922
	Solid	Corrosive	1759
Cyanide Solution, NOS		Poison B, Corrosive	1935
Flammable: (D001)			
	Liquid, NOS	Flammable	1993
	Liquid, Corrosive NOS	Corrosive/Flammable	2924
	Poison NOS	Flammable	1992
	Solid, Corrosive NOS	Flammable	2925 (Acidic or Basic)
	Solid NOS	Flammable	2926

Reactive (D003)

*Air	*Sulfide Gas
*H2O	*Organic
*Corrosive Acidic or Basic	*Peroxide
*Oxidizer	*LA + Gas

Note: Reactives cannot be shipped according to DOT Regulations

Source: ESE, 1986.

2.0 FINGERPRINTING ANALYSIS PROCEDURES

The procedures involved in fingerprint analysis compatability grouping are discussed in this section.

2.1 RADIOACTIVITY SCAN

All samples and containers are checked for radioactivity by a portable Geiger counter that measures alpha, beta, and gamma radiation in the field.

A positive indication will result in immediate isolation of material and appropriate action for shielding and containment.

2.2 AIR REACTIVITY

Each of the unknowns are carefully opened and observed for emission of fumes or gases, care must be taken with container tops that are caked, especially when exposing the potentially reactive material below the surface.

If, after air exposure, the material emitted fumes or gases, it is classified air reactive. The contents of containers which release pressure when opened and exposed to the atmosphere are also considered air reactive. It is automatically assumed that any sealed ampule or flask is air reactive. Any containers releasing visible fumes upon immediate opening are considered reactive corrosives. A pH paper strip will be used to identify fumes as acidic or basic.

2.3 EXPLOSION POTENTIAL

After being opened for sampling, all containers are measured for vapor concentration by an HNU meter [photoionization detector (PID)] or an organic vapor analyzer (OVA). A PID reading indicates vaporization. Explosive potential is considered if a PID reading exceeds 2,000 parts per million (ppm).

In conjunction with an HNU meter, an Explosimeter is used to determine the upper or lower explosion limits of the unknown material.

2.4 ORGANIC MATERIAL

Solids and liquids are easily defined; sludges are difficult to classify. If the material can be pumped or flows, the material is a liquid. Further clarification should be provided on viscosity, phase layering, density, emulsification, etc.

A solid or liquid that is insoluble in distilled water is considered organic (i.e., non-aqueous). This sample is tested for flammability, explosiveness, and chlorinated content, then placed in the appropriate category (see Figure 1-1). As a confirmatory test for organic material, hexane solubility is observed.

2.5 CHLORINATED ORGANICS (BIELSTEIN TEST)

A portion of the sample is coated on a copper wire and burned in a flame. If the material burns with a green flame, it is considered a chlorinated organic material.

2.6 FLAME TEST FOR IGNITABILITY

For liquids, a stainless-steal loop or glass transfer pipet holding a drip of the unknown liquid is passed over the propane torch in the flame test. For solids, 20 to 50 milligrams (mg) of a solid unknown is transferred to a stainless-steel spatula and heated in open flame (propane torch).

If the sample ignites violently at some point in the heating process, it is considered to be explosive. If the sample burns slowly but evolves large quantities of fumes, it may also be explosive. If the material burns with a flame, it is considered flammable organic. Exceptions to these guidelines are inorganics, such as phosphorous or sulfur. If the material does not burn but turns black, it is suspected of being organic (Group 4). If on continual heating, the charred section burns off, the material is considered combustible (Group 4).

Additional testing may be performed to determine flashpoint or if flashpoint is less than or greater than 140 degrees Farenheit (°F), a criterion for meeting the U.S. Environmental Protection Agency (EPA) definition of ignitability.

2.7 pH TEST

The residue from the water reactivity test should be used for pH measurement. Wide range pH paper is used to estimate pH.

A pH of 4 or less indicates the material is acidic, and a pH of 11.0 or greater is basic. Both categories should be classified as corrosive (D002). For fuming acids and gases, pH is taken by placing pH strips in the vicinity of the corrosive fumes.

2.8 WATER SOLUBILITY

Approximately 1 milliliter (mL) of water is added to the sample in a culture tube and any extreme reaction (i.e., exothermic, gas generation and precipitation or color change) is noted. Suspected reactive metals and fuming concentrated acids are prescreened. If sample material floats or is immiscible with water, it is noted. Hexane solubility tests could also be performed to indicate organic material classification.

2.9 WATER REACTIVITY

The unknown [1 to 2 grams (g)] is added to a culture tube containing approximately 1 mL of distilled water. The sample is observed for temperature change and evolution of gas or fumes. The solubility of the material will also be noted. (Water reactivity and solubility are the same test.)

Materials which evolve gases or fumes or ignite are considered water reactive. Dilution of strong acids and bases tends to be exothermic (emit heat) while dilution of compounds such as thiosulfates tends to be endothermic (absorb heat). The solubility of the materials is noted as being very soluble, slightly soluble, or insoluble. While solubility is

not indicative of water reactivity, it helps to characterize the unknowns. Clear organics, such as chloroform or carbon tetrachloride, are tested as inorganics in the flame test. Immiscibility with water indicates the presence of organics.

2.10 OXIDIZING MATERIAL

The aqueous-liquid and water-soluble portion of the solid is tested for potential oxidizers. A potassium iodide/starch indicator test strip is exposed to the sample. If the paper turns dark blue, the substance is a strong oxidizer; if the paper turns light blue, the substance is a weak oxidizer; and if there is no change in the paper, the substance is non-oxidizing.

2.11 CYANIDES

The non-acidic aqueous liquids and solids are tested for cyanide contamination. This is a spot test to be conducted on a white porcelain spot plate.

Procedure: To 3 drops of sample, add 1 drop of chloramine-T solution.
Add 1 drop of pyridine/barbituric acid solution.
Observe color.

Results: Pink to Red --> greater than 1 ppm CN^-
Yellow --> less than 1 ppm CN^-

Reagents:

- Chloramine-T Solution: 1.0 gram of powder dissolved in 100 mL of deionized water (prepare weekly).
- Pyridine/Barbituric Acid Solution:
  - 15 grams barbituric acid placed in a 500 mL flask, add just enough water to wet.
  - 75 mL pyridine.

- 15 mL concentrated HCl added slowly, mixed, and cooled to room temperature.
- Dilute to 250 mL with deionized water (stable for 6 months).

2.12 SULFIDES

The aqueous liquid or water soluble portion of the solid is tested for potential sulfide-containing material. The 1 mL of sample is acidified with a few drops of concentrated HCl. Then a strip of lead acetate is added to the culture tube. If the paper turns black from the fumes, the sample contains sulfide. If the paper appears unchanged, no sulfide is indicated.

2.13 PEROXIDES

All samples are tested for peroxide-containing materials. To the water solubility culture tube, a peroxide test strip is added. If the indicator portion turns blue, then the sample may potentially contain peroxides and should be handled carefully. This group may be broken up into organic or inorganic peroxides (depending on the water solubility result).

APPENDIX C

SEGREGATION CRITERIA FOR INCOMPATIBLE WASTES

statistically significant change in the concentration or value of the indicator parameter.

Formulae for calculation of the t-statistic and tables for t-test of significance can be found in most introductory statistics texts.

APPENDIX V—EXAMPLES OF POTENTIALLY INCOMPATIBLE WASTE

Many hazardous wastes, when mixed with other waste or materials at a hazardous waste facility, can produce effects which are harmful to human health and the environment, such as (1) heat or pressure, (2) fire or explosion, (3) violent reaction, (4) toxic dusts, mists, fumes, or gases, or (5) flammable fumes or gases.

Below are examples of potentially incompatible wastes, waste components, and materials, along with the harmful consequences which result from mixing materials in one group with materials in another group. The list is intended as a guide to owners or operators of treatment, storage, and disposal facilities, and to enforcement and permit granting officials, to indicate the need for special precautions when managing these potentially incompatible waste materials or components.

This list is not intended to be exhaustive. An owner or operator must, as the regulations require, adequately analyze his wastes so that he can avoid creating uncontrolled substances or reactions of the type listed below, whether they are listed below or not.

It is possible for potentially incompatible wastes to be mixed in a way that precludes a reaction (e.g., adding acid to water rather than water to acid) or that neutralizes them (e.g., a strong acid mixed with a strong base), or that controls substances produced (e.g., by generating flammable gases in a closed tank equipped so that ignition cannot occur, and burning the gases in an incinerator).

In the lists below, the mixing of a Group A material with a Group B material may have the potential consequence as noted.

Group 1-A	Group 1-B
Acetylene sludge	Acid sludge
Akaline caustic liquids	Acid and water
Alkaline cleaner	Battery acid
Alkaline corrosive liquids	Chemical cleaners
Alkaline corrosive battery fluid	Electrolyte, acid
Caustic wastewater	Etching acid liquid or solvent
Lime sludge and other corrosive alkalies	
Lime wastewater	Pickling liquor and other corrosive acids
Lime and water	Spent acid
Spent caustic	Spent mixed acid

Potential consequences: Heat generation; violent reaction.

Group 1-A	Group 1-B
	Spent sulfuric acid

Potential consequences: Fire or explosion; generation of flammable hydrogen gas.

Group 2-A	Group 2-B
Aluminum	Any waste in Group 1-A or 1-B
Beryllium	
Calcium	
Lithium	
Magnesium	
Potassium	
Sodium	
Zinc powder	
Other reactive metals and metal hydrides	

Potential consequences: Fire, explosion, or heat generation; generation of flammable or toxic gases.

Group 3-A	Group 3-B
Alcohols	Any concentrated waste in Groups 1-A or 1-B
Water	Calcium
	Lithium
	Metal hydrides
	Potassium
	SO_2Cl_2, $SOCl_2$, PCl_3, CH_3SiCl_3
	Other water-reactive waste

Potential consequences: Fire, explosion, or violent reaction.

Group 4-A	Group 4-B
Alcohols	Concentrated Group 1-A or 1-B wastes
Aldehydes	Group 2-A wastes
Halogenated hydrocarbons	
Nitrated hydrocarbons	
Unsaturated hydrocarbons	
Other reactive organic compounds and solvents	

Potential consequences: Fire, explosion, or violent reaction.

Group 5-A	Group 5-B
Spent cyanide and sulfide solutions	Group 1-B wastes

Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas.

Group 6-A	Group 6-B
Chlorates	Acetic acid and other organic acids
Chlorine	Concentrated mineral acides
Chlorites	Group 2-A wastes
Chromic acid	Group 4-A wastes
Hyphochlorites	Other flammable and combustible wastes
Nitrates	
Nitric acid, fuming	
Perchlorates	
Permanganates	
Peroxides	
Other strong oxidizers	

Potential consequences: Fire, explosion, or violent reaction.

Source: "Law, Regulations, and Guidelines for Handling of Hazardous Waste." California Department of Health, February 1975.

PART 266—STANDARDS FOR THE MANAGEMENT OF SPECIFIC HAZARDOUS WASTES AND SPECIFIC TYPES OF HAZARDOUS WASTE MANAGEMENT FACILITIES

Subparts A-B—[Reserved]

Subpart C—Recyclable Materials Used in a Manner Constituting Disposal

Sec.

266.20 Applicability.
266.21 Standards applicable to generators and transporters of materials used in a manner that constitute disposal.
266.22 Standards applicable to storers of materials that are to be used in a manner that constitutes disposal who are not the ultimate users.
266.23 Standards applicable to users of materials that are used in a manner that constitutes disposal.

Subpart D—Hazardous Waste Burned for Energy Recovery

266.30 Applicability.
266.31 Prohibitions. [Reserved]
266.32 Standards applicable to generators of hazardous waste fuel.
266.33 Standards applicable to transporters of hazardous waste fuel.
266.34 Standards applicable to marketers of hazardous waste fuel.
266.35 Standards applicable to burners of hazardous waste fuel.
266.36 Conditional exemption for spent materials and by-products exhibiting a characteristic of hazardous waste.

Sec.

Subpart E—[Reserved]

Subpart F—Recyclable Materials Utilized for Precious Metal Recovery

266.70 Applicability and requirements.

Subpart G—Spent Lead-acid Batteries Being Reclaimed

266.30 Applicability and requirements.

AUTHORITY: Sec. 1006, 2002(a), and 3004 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6905, 6912(a), and 6924).

SOURCE: 50 FR 666, Jan. 4, 1985, unless otherwise noted.

EFFECTIVE DATE NOTE: At 50 FR 666, Jan. 4, 1985, Part 266 was added, effective July 5, 1985. For clarification of the effective date for Subpart F, § 266.70, see 50 FR 14216, Apr. 11, 1985.

Subparts A-B—[Reserved]

Subpart C—Recyclable Materials Used in a Manner Constituting Disposal

§ 266.20 Applicability.

(a) The regulations of this subpart apply to recyclable materials that are applied to or placed on the land:

(1) Without mixing with any other substance(s); or

(2) After mixing with any other substance(s), unless the recyclable material undergoes a chemical reaction so as to become inseparable from the other substance(s) by physical means; or

(3) After combination with any other substance(s) if the resulting combined material is not produced for the general public's use. These materials will be referred to throughout this subpart as "materials used in a manner that constitutes disposal."

(b) Products produced for the general public's use that are used in a manner that constitutes disposal and that contain recyclable materials are not presently subject to regulation if the recyclable materials have undergone a chemical reaction in the course of producing the product so as to become inseparable by physical means. Commercial fertilizers that are pro-

APPENDIX D

ANALYTICAL RESULTS FROM BUILDING 145 SAMPLES

Naval Facilities Engineering Command
06 July 1984
Page 2 (Report No. 274)

CAS No.	Description	Ignitability (°F)	Corrosivity (mils/yr)	Reactivity (mg/l)
37511	LP #1 Solid	>200		Neg.
37512	LP #2 Liquid/Solid	130		Neg.
37513	LP #3 Solid	>200		Neg.
37514	LP #4 (No Sample)			
37515	LP #5 Liquid	>200	11	Pos. Sulfide
37516	LP #6 Solid	>200	Neg.	Neg.
37517	LP #7 Liquid	190	Neg.	Neg.
37518	LP #8 Liquid	70	13	Neg.
37519	LP #9 Liquid	70	1	Neg.
37520	LP #10 Liquid	>200	Neg.	Neg.
37521	LP #11 Liquid/Sludge	70	1	Neg.
37522	LP #12 Solid Dried Glue	100	Neg.	Neg.
37523	LP #13 Liquid/Solid	70	10	Neg.
37524	LP #14 Liquid/Sludge	70	2	Neg.
37525	LP #15 Liquid/Glue	70	4	Neg.
37526	LP #16 (No Sample)			
37527	LP #17 Liquid	70	4	Neg.
37528	LP #18 (No Sample)			
37529	LP #19 Liquid	70	1	Neg.
37530	LP #20 Liquid	70	1	Neg.
37531	LP #21 Liquid	70	2	Neg.
37532	LP #22 Liquid	70	<1	Neg.
37533	LP #23 Liquid	70	1	Neg.
37534	LP #24 Liquid	70	1	Neg.

Naval Facilities Engineering Command
06 July 1984
Page 3 (Report No. 274)

CAS No.	Description	Ignitability (°F)	Corrosivity (mils/yr)	Reactivity (mg/l)
37535	LP #25 Liquid	70	1	Neg.
37536	LP #26 Liquid	70	1	Neg.
37537	LP #27 Liquid	70	1	Pos. Sulfide
37538	LP #28 Liquid	70	1	Neg.
37539	LP #29 (No Sample)			
37540	LP #30 (No Sample)			
37541	LP #31 Liquid	>200	10	Neg.
37542	LP #32 Liquid	70	< 1	Neg.

NOTE: Neg. = Negative

Pos. = Positive

DEPARTMENT OF THE NAVY 6500 COPIER

LD #1

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 1-Sample#1 Date 1/24/84

Project No. GT230 Time 1028

Type of Contents: ✓ Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color Blue Grey Size of Grain —

pH — ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon ✓ 5-gallon

Other ___

Amount of Contents: ___ Full ___ Three-fourths ✓ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other HATCHET AND SCREW driver

Markings: NONE DISCERNABLE

Additional Comments: CONTENTS ARE IN one lump THAT IS equidistant from the sides and top.

LAYERS

Layer Description	Designation	State
N/A		

~~Drum~~ Number of Similar CANS.

CANS Number 16 5 of 2 row; 1 layer, 2 of 2 (green) 1 layer

374103

LD #2

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 2; Sample 2 Date 1/24/84

Project No. GT230 Time +7 min (Always from #1)

Type of Contents: ___ Solid ✓ Liquid ✓ Sludge ___ Lab Pack

___ Explosive Other tarry

Color rusty orange/black Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon X 5-gallon

Other 3 containers

Amount of Contents: X Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: none; container previously opened

Additional Comments: Before sample taken HNU reading <1 ppm, after taking sample HNU reading up to 50 ppm. At breathing level <1 ppm.

LAYERS

Layer Description	Designation	State
rusty surface		
tarry body		

374103

LO #3

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 3; Sample #3 Date 1/24/84

Project No. GT230 Time ~3 min (From #2)

Type of Contents: X Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color WHITEISH / grey. Size of Grain uniform powdery

pH ___ ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon X 5-gallon

Other totally disintigrated, contents on ground

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other grab

Markings: None

Additional Comments: Can Remnants removed, sample taken.

LAYERS

Layer Description	Designation	State

374103

LD# 4 No Sample

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 4; Sample 4 Date 1/24/84

Project No. GT230 Time +/1 min From #3

Type of Contents: X Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ships tackle

Color Metallic Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other open top

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth 7 pieces

Sample Method: ___ Thief ___ Trowel Other ___

Markings: NONE

Additional Comments: ___

LAYERS

Layer Description	Designation	State

No sample; 7 metal shapes of ship tackle.

374103

LD#5

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 5; Sample # 5 Date 1/24/84

Project No. GT230 Time + 3 minutes from 4

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color Too Dark Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other open top

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth X Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other dip

Markings: None decipherable - rusted.

Additional Comments: none

LAYERS

Layer Description	Designation	State
NONE		

374103

LD #6

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. Sample #6 Date 6/24/84

Project No. GT230 Time +1 min Fam#5

Type of Contents: X Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other

Color red/orange (bright!) Size of Grain N/A

pH ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other unknown

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other spill 2' diameter 3" thick

grab

Markings: none

Additional Comments: ~~Ta~~ Looks like the drum ruptured; NO CONTAINER AROUND.

LAYERS

Layer Description	Designation	State

374103

LD # 7

ecology and environment, inc.

Drum # 6 from

CONTAINER INSPECTION LOG

Container No. 3; Sample #7 Date 1/24/84

Project No. GT230 Time 1 min From #6

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color Black - oily appearance Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other ~~Steel~~ closed top, top bung opened

Amount of Contents: ✓ Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ✓ Thief ___ Trowel Other ___

Markings: None/scrawled.

Additional Comments: HNU reading of 20 ppm at drum face when opened

LAYERS

Layer Description	Designation	State
None		

374103

LD #8

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. ~~7 8 sample 8~~ drum Date 1/24/84

Project No. container 7 sample #8 Time 11:40

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other glue (?)

Color rust brown, silver white Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other ring top drum

Amount of Contents: ___ Full X Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other GRAB

Markings: Nondescernible

Additional Comments: HNU readings upto 250 ppm

LAYERS

Layer Description	Designation	State

374103

LD #9

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CONTAINER INSPECTION LOG

Container No. 8-Sample #9 Date 1/24/84

Project No. GT230 Time +23 From Sample #8.

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color Black paint Size of Grain —

pH — ___ Paper ___ Meter

Container Size: ✓ 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other Closed top

Amount of Contents: X Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other ___

Markings: "WATE— —

DA— "

Additional Comments: looks like paint; very runny.

LAYERS

Layer Description	Designation	State
NONE		

374103

LD #10

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. #9 Sample #10 Date 1/24/84

Project No. _____ Time +5 min

Type of Contents: ___ Solid ✓ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other Black Tar - roadtar

Color Black Size of Grain _____

pH _____ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other _____

Amount of Contents: X Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other _____

Markings: See photo.

Additional Comments: Lid broken due to consistency of sample

LAYERS

Layer Description	Designation	State

374103

LD #11

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CONTAINER INSPECTION LOG

Container No. #10 Sample #11 Date 1/24/84

Project No. GT230 Time +5 min from Sample #10.

Type of Contents: ___ Solid X Liquid X Sludge ___ Lab Pack

___ Explosive Other ___

Color rusty color, black yellow Size of Grain multiphase

pH ___ ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon X 5-gallon

Other previously opened

Amount of Contents: X Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: yellow paint outside

Additional Comments: HNU peaks of 50 ppm at drum face

1 of 10 - 5 gallon drums

LAYERS

Layer Description	Designation	State
None		

374103

LD #11A No Sample

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. #11 - NO SAMPLE Date 1/24/84

Project No. GT230 Time #3

Type of Contents: ___ Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other NONE

Color ___ Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon ✓ 5-gallon

Other ___

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other ___

Markings: C-610 / Corrosion Preventative, ACFT MIL C 6529C AMC / Type 3 / FSN 6850-299 7230 / Pennzoil MAY 1969 / DSA 600-69 E-1829

Additional Comments: ___

LAYERS

Layer Description	Designation	State
Empty		

374103

LD#12

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CONTAINER INSPECTION LOG

Container No. ~~12~~ Sample 12 Date 1/24/84

Project No. GT230 Time +5 min from sample #11

Type of Contents: ___ Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other dried glue

Color brownish Size of Grain -

pH - ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon X 5-gallon

Other previously opened

Amount of Contents: X Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other Grab

Markings:

Additional Comments: HNU up to 30ppm at drum face

LAYERS

Layer Description	Designation	State

374103

LD# 13

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CONTAINER INSPECTION LOG

Container No. 13 Sample #13 Date 1/24/84

Project No. GT230 Time 1:20

Type of Contents: X Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other solid bottom, liquid top "glue"

Color brownish Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other open top

Amount of Contents: X Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: From SO NNSY to Supply Officer Portsmouth VA Roosevelt Roads 4/8/57

Additional Comments: HNU reading of 200ppm at drum face

LAYERS

Layer Description	Designation	State

374103

LD#14

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CONTAINER INSPECTION LOG

Container No. #14 / BOTTLE#14 Date 1/24/84

Project No. GT230 Time #1 [illegible]

Type of Contents: ___ Solid X Liquid X Sludge ___ Lab Pack

___ Explosive Other Multi phase - 2 layers

Color black Size of Grain —

pH ___ ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon ✓ 5-gallon

Other Never opened

Amount of Contents: X Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ✓ Thief ___ Trowel Other ___

Markings: "PAINT Semi gloss, rapid drying / Type 1 Air Dry Lacq OLIVE DRAB March 1959"

Additional Comments: HNU reading to 150 ppm at drum face

LAYERS

Layer Description	Designation	State

374103

LD#15

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 15 Sample 15 Date 1/24/84

Project No. GT230 Time ~5 min

Type of Contents: ___ Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other glue

Color ~~brown~~ NJA/gray Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other open top

Amount of Contents: X Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other ___

Markings: "Supply Officer to Supply Officer
NNYSO - Portsmouth, VA Roosl Rds"
4/8/87

Additional Comments: HNU readings 200-300 ppm when drum opened at drum face

LAYERS

Layer Description	Designation	State

374103

LD #16 No Sample

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 16 Sample 16 Date 1/24/84

Project No. ~~A~~ NO Sample Time

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other

Color clear Size of Grain

pH ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth X Less than one-fourth 1/8th

Sample Method: ___ Thief ___ Trowel Other

Markings: Dupont - GRX Methanol

Additional Comments: No reading; sample 1 Amount of tube so that no sample could be collected.

LAYERS

Layer Description	Designation	State

374103

LD # 17

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 17 sample 17 Date 1/24/84

Project No. GT230 Time 1+5 min

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain —

pH — ___ Paper ___ Meter

Container Size: ✓ 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other ___

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth X Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: "195-
Cheatham Annex - San Juan Station
NWAH Station Roosevelt Roads

Additional Comments: no readings on HNU-

LAYERS

Layer Description	Designation	State

374103

LD #18 No Sample

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 18 no sample Date 1/24/84

Project No. GT 230 Time #1 minute #17

Type of Contents: X Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color bluish/grey paint Size of Grain ___

pH dried up ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon X 5-gallon

Other top missing

Amount of Contents: ___ Full ___ Three-fourths X One-half

___ One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: ___

Additional Comments: Solid; no sample possible

LAYERS

Layer Description	Designation	State

374103

LD# 19

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 19 Sample 19 Date 1/24/84

Project No. GT230 Time +5min

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other Closed top, side bung, 1 top bung (2 1/2") (1/2")

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth X Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: "Officer Naval Station San Juan, Roosevelt Rds, Puerto Chatham Annex 1st of 1957"

Additional Comments: no readings

LAYERS

Layer Description	Designation	State

374103

LD#20

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 20 sample 20 Date 1/24/87

Project No. GT230 Time 2:50

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color Clear Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other closed top; top + sidebung

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth X Less than one-fourth 1/8 th

Sample Method: X Thief ___ Trowel Other ___

Markings: "Chatham Annex - San Juan etc. Same as 19 sample"

Additional Comments: ___

LAYERS

Layer Description	Designation	State

374103

LD #21

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 21 sample 21 Date 1/24/84

Project No. GT230 Time +5min

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain —

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other closed top, top bung 2 1/2", side bung 1/4"

Amount of Contents: ___ Full ___ Three-fourths ___ One-half 1/3 Full

___ One-fourth ___ Less than one-fourth

Sample Method: ✓ Thief ___ Trowel Other ___

Markings: same markings at #20

NO PKGS 22, inv 255719-6

Additional Comments: No readings on HNU

LAYERS

Layer Description	Designation	State

374103

LD # 22

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 22 sample 22 Date 1/24/84

Project No. GT230 Time 45 min previous sample

Type of Contents: ___ Solid ✓ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other shoe polish? - tarry

Color black Size of Grain —

pH ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon X 5-gallon

Other not previously opened

Amount of Contents: X Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: "Sherwin Williams Boot topping"

Additional Comments: HNU readings up to 10 ppm

LAYERS

Layer Description	Designation	State

374103

LD # 23

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 23 Sample 23 Date 1/24/84

Project No. GT230 Time 45 min

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain —

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other close top, top bung 2 1/2", side bung 1/4"

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth X Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: Chatham Annex markings as per Samples #20

Additional Comments: no readings

LAYERS

Layer Description	Designation	State

374103

LD # 24

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 24 sample 24 Date 1/24/84

Project No. GT230 Time +5 min

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other closed top, top bung, side bung

Amount of Contents: ___ Full ___ Three-fourths X One-half

___ One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: ~~[illegible]~~ no markings; drum similar to Chemtron drums - sample #20

Additional Comments: readings up to 100 ppm on HNU

LAYERS

Layer Description	Designation	State

374103

LD # 25

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 25 sample 25 Date 11/24/84

Project No. GT230 Time +5 min sample #24

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain —

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other closed top, top bung, side bung
2½ 1/4

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

X One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: No markings; same drum as #20 "Chemtron Annex"

Additional Comments: No reading on HNU

LAYERS

Layer Description	Designation	State

374103

LD # 26

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 26 sample 26 Date 1/24/84

Project No. GT230 Time 48 min From #25 -

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other closed top, side top bung 2 1/2 1/4

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth X Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: no markings; from same as #20 "Chemtron Annex"

Additional Comments: no reading

LAYERS

Layer Description	Designation	State

374103

LD #27

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 27 sample 27 Date 7/24/84

Project No. GT230 Time +5 min from #27

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other 2 bungs in top, closed top

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

X One-fourth ___ Less than one-fourth

Sample Method: ✓ Thief ___ Trowel Other ___

Markings: no markings

Additional Comments: no readings, negative deflection on HW4

LAYERS

Layer Description	Designation	State

374103

LD # 28

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. LD sample 28 Date 1/24/84

Project No. GT230 Time +5 min

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain —

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other closed top, bung on top

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth 1/3 full

Sample Method: X Thief ___ Trowel Other ___

Markings: ~~No markings~~ "Cheatham Annex markings" as per sample 20

Additional Comments: neg. deflection on HNU

LAYERS

Layer Description	Designation	State

374103

LD# 29 NO Sample

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 29 sample 29 Date 1/24/84

Project No. Empty (GT230) Time 45 min From #29

Type of Contents: ___ Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color ___ Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other Closed top

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other ___

Markings: no markings, NO Sample

Additional Comments: EMPTY

LAYERS

Layer Description	Designation	State

374103

LD #30 No Sample

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 30sample30 Date 1/24/84

Project No. empty (GT230) Time +3min

Type of Contents: ___ Solid ___ Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color ___ Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other Closed -

Amount of Contents: ___ Full ___ Three-fourths ___ One-half

___ One-fourth ___ Less than one-fourth

Sample Method: ___ Thief ___ Trowel Other ___

Markings: NO Sample

Additional Comments: Empty

LAYERS

Layer Description	Designation	State

374103

LD # 31

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. 31 sample 31 Date 11/24/84

Project No. GT230 Time + 1 min ~~sample #30~~

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color ~~Black~~ clear Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: ___ 55-gallon ___ 42-gallon ___ 30-gallon X 5-gallon

Other ___

Amount of Contents: ~~X~~ Full ___ Three-fourths ___ One-half 1/3 full

___ One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: NONE, drum top + size same as Chemical Annex

Additional Comments: ___

LAYERS

Layer Description	Designation	State

374103

LD# 32

ecology and environment, inc.

CONTAINER INSPECTION LOG

Container No. B2 sample 32 Date 1/24/84

Project No. GT230 Time 45 min From Sample #27

Type of Contents: ___ Solid X Liquid ___ Sludge ___ Lab Pack

___ Explosive Other ___

Color clear Size of Grain ___

pH ___ ___ Paper ___ Meter

Container Size: X 55-gallon ___ 42-gallon ___ 30-gallon ___ 5-gallon

Other closed top, bung on top

Amount of Contents: ___ Full ___ Three-fourths ___ One-half 1/8th full

___ One-fourth ___ Less than one-fourth

Sample Method: X Thief ___ Trowel Other ___

Markings: No markings; looks like Chemran Anvéx

Additional Comments: ___

LAYERS

Layer Description	Designation	State

374103