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Report No. CETHA-BC-CR-89363

# USATHAMA

U.S. Army Toxic and Hazardous Materials Agency



## Task Order 2 Enhanced Preliminary Assessment

KAPALAMA MILITARY RESERVATION  
HONOLULU, HAWAII

Contract Number DAAA15-88-D-0007

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Prepared for

U.S. Army Toxic and Hazardous Materials Agency  
Aberdeen Proving Ground, Maryland 21010-5401

Prepared by

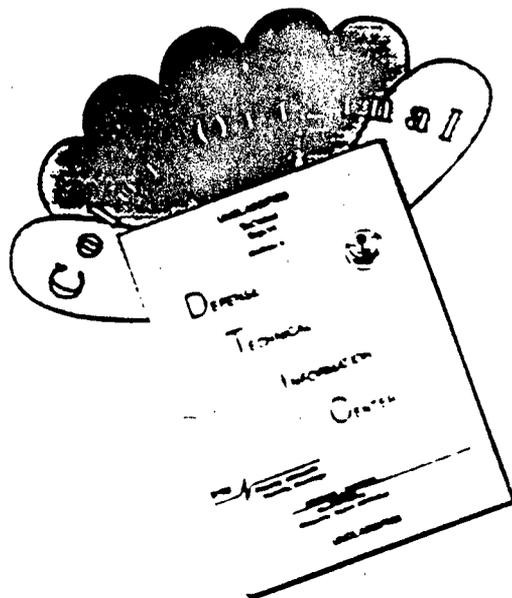


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Report No. CETHA-BC-CR-89363

USATHAMA Task Order 2

ENHANCED PRELIMINARY ASSESSMENT REPORT

Kapalama Military Reservation  
Honolulu, Hawaii

Contract No. DAAA15-88-D-0007

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SECURITY CLASSIFICATION OF THIS PAGE

18. Kapalama Military Reservation. Base Closure Program. Environmentally Significant Operations(ESOs). Logistical Support. Residual Contamination. Receptors. Sampling.
  
19. An Enhanced Preliminary Assessment was conducted at the Kapalama Military Reservation (KMR), which is planned for inclusion in the Base Closure Program. KMR was constructed during World War II, and has served as a logistical support center, receiving and distributing hardware, consumer items, dry goods, and chemicals in the Hawaiian Islands and throughout the Pacific area. Other activities have included maintenance-related painting, canvas repair/waterproofing, forklift maintenance, storage of low level radioactive waste, operation of a mortuary and identification laboratory (for decomposed bodies), and fumigation. (Fumigation is conducted on all materials that are shipped off the island).

Almost the entire KMR property is paved, and infiltration is, therefore, minimal. Stormwater runoff flows to Honolulu Harbor of Keehi Lagoon. The surrounding area is industrial/commercial. Groundwater is tidal and brackish, and is not used for human consumption. The City of Honolulu supplies water for this area.

A previous asbestos survey for the facility has identified material containing asbestos and recommended appropriate actions.

The conclusions and recommendations of this report are that a sampling program be developed to further assess possible contamination. This includes samples of building materials, soils, and groundwater throughout the reservation. Petroleum hydrocarbons have been detected in the past in subsurface soils; the source of these could be either onsite or offsite (underground pipelines are located near the site and a petroleum tank farm is located across the street). Due to the lack of human and environmental receptors, the impact of any existing contamination appears to be minimal.



## DISCLAIMER

This Enhanced Preliminary Assessment Report is based primarily on the environmental conditions observed at the Kapalama Military Reservation, Honolulu, Hawaii, during the period 25 July through 28 July 1989. Past site conditions and management practices were evaluated, based on readily available records and the recollections of people interviewed. Every effort was made, within the scope of the task, to interview all identified site personnel, especially those personnel with a historical perspective of site operations.

No environmental sampling was conducted as part of the assessment. The findings and recommendations for further action are based on WESTON's experience and technical judgment, as well as current regulatory agency requirements. Future regulations, as well as any modifications to current statutes, may affect the compliance status of this site.

During the site visit, access was not gained to the former radioactive material storage building (929A) or the Hawaiian Telephone Company switching building (935). The scope of the site survey was initially restricted to the Phase III portion of KMR. Only selected buildings in Phase II were entered. Subsequent to the site inspection, WESTON was directed by USATHAMA to include all of the Phase II portion of the property in the preliminary assessment.

WESTON does not warrant or guarantee that the property is suitable for any particular purpose or certify any areas of the property as "clean." A more thorough investigation, including intrusive sampling and analysis for specific hazardous materials, is recommended prior to reporting this property as excess.



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## **EXECUTIVE SUMMARY**

### **BACKGROUND AND OBJECTIVES**

This Enhanced Preliminary Assessment (PA) has been performed by Roy F. Weston, Inc. (WESTON) at the request of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) pursuant to Contract DAAA15-88-D-0007, Task Order 2. The purpose of the enhanced PA is to present WESTON's findings concerning the environmental conditions at the Kapalama Military Reservation (KMR) located in Honolulu, Hawaii, and to provide recommendations for possible further action. The objectives of this enhanced PA were to:

- Identify and characterize environmentally significant operations (ESOs) associated with the historical and current use of the KMR property.
- Identify and characterize possible impacts of the ESOs on the surrounding environment.
- Identify additional environmental actions, if any, that should be initiated for the ESOs identified.

Information contained in this enhanced PA was obtained through:

- Visual inspection of the facility.
- Review of available Army documentation.
- Review of related regulatory agency files at the state and federal levels.
- Interviews with current and former employees at KMR.

### **GENERAL PROPERTY DESCRIPTION**

The Kapalama Military Reservation property was acquired by the U.S. Government through condemnation by the Secretary of War in 1941 and 1942. It was subsequently established as a logistics support and warehouse facility. Activities have consisted primarily of the receiving, storage, and distribution of goods and materials for U.S. military facilities in the Hawaiian Islands and throughout the Pacific area. These goods and materials include hardware items (office furniture, hospital beds, appliances, spare parts), consumer items (as sold in PXs), dry goods (tents, clothing), and chemicals (battery acid, cleansers, packing foam, paints, pesticides) in containers no larger than 55-gal capacity. In addition, mortuary and certain maintenance and repair activities (including painting and fumigation) have occurred on the site. It is possible that packaged ammunition has been received for distribution in the past; however, site personnel had no knowledge of any onsite use. One portion of KMR has been sold (Phase I) and another area is in the process of being sold (Phase II). This assessment focused on current active areas in Phase II and Phase III.



ESOs identified on the property include:

- Buildings 913/914 - Mortuary - chemicals used in the embalming process. The chemicals are used in small quantities and are well contained.
- Building 917 - Hazardous Material Storage - warehouse storage of a broad spectrum of chemicals. The chemicals are stored on pallets and racks. The concrete floor is marbled with cracks. A few minor spills were reported in the building.
- Building 923 - Solvent Cleaning Room and Spray Paint Booth - solvents used for cleaning/degreasing parts and vehicle maintenance; paints possibly containing lead and cadmium used in a spray booth; associated solvent storage areas outside.
- Building 924 - Canvas Repair Area & Packaging Area - waterproofing with polymer-type water repellents; packaging with isocyanate foam; "waste oil" drums (apparently empty) on pallet outside building.
- Building 925 - Maintenance & Repair of Forklifts - oils, greases, solvents, and hydraulic fluids used in the repair and maintenance of forklifts in an area adjacent to the building.
- Building 926 - General Storage and Sealed Source Radioactive Storage - sealed low-level radioactive sources such as compasses.
- Building 929 - General Storage and Former Pallet Fumigation Area - fumigation of wooden pallets in a large chamber (no longer used). Samples taken in the room by the Corps of Engineers indicated the presence of pentachlorophenol and 2,4-D.
- Building 929 - Former Sealed Source Radioactive Storage - sealed low-level radioactive sources such as compasses and watches (former storage area).
- Building 930 - General Purpose Storage - super tropical bleach (STB) used for decontamination of personnel and equipment. Several spills were reported.
- Building 931 - General Storage and Fumigation Area - current fumigation of wood and cardboard items; also former chemical storage area.
- Buildings 1027/1028 - The Central Identification Laboratory - darkroom chemicals used in x-ray and film activities for identification of bodies.
- Former Underground Storage Tank Across from Buildings 1027 and 1033 - fuel pump and underground tank removed. Located in locked area not included in primary focus of investigation.



- Underground Storage Tank - Adjacent to Building 935 - Fuel for emergency generator maintained by the Hawaiian Telephone Company.
- Aboveground Storage Tanks
  - approximately 300-gal kerosene tank adjacent to a grassy area.
  - 5,000-gal propane tank adjacent to Building 925.
  - 500-gal propane tank adjacent to Building 921 reported by personnel but not observed during site visit; 150-gal propane tank adjacent to Building 922.
- Asbestos - numerous onsite buildings constructed with Transite siding and other asbestos-containing material. Some siding material is broken along the lower side of buildings.
- Transformers - approximately 40 transformers, two pad mounted, the remainder pole mounted. Fluids have not been tested for polychlorinated biphenyls (PCBs) content. Two apparent minor leaks observed.
- Concrete Pad - possibly used either as a transformer staging area or for a dip tank for termite-proofing pallets.
- Former Railroad Track/Unloading Area - unloading of supplies from rail cars - possible spills in unloading activities.
- Possible Pre-Construction Disposal Site - A portion of KMR may have been used in the 1930s and 1940s as a municipal dump for the City and County of Honolulu.

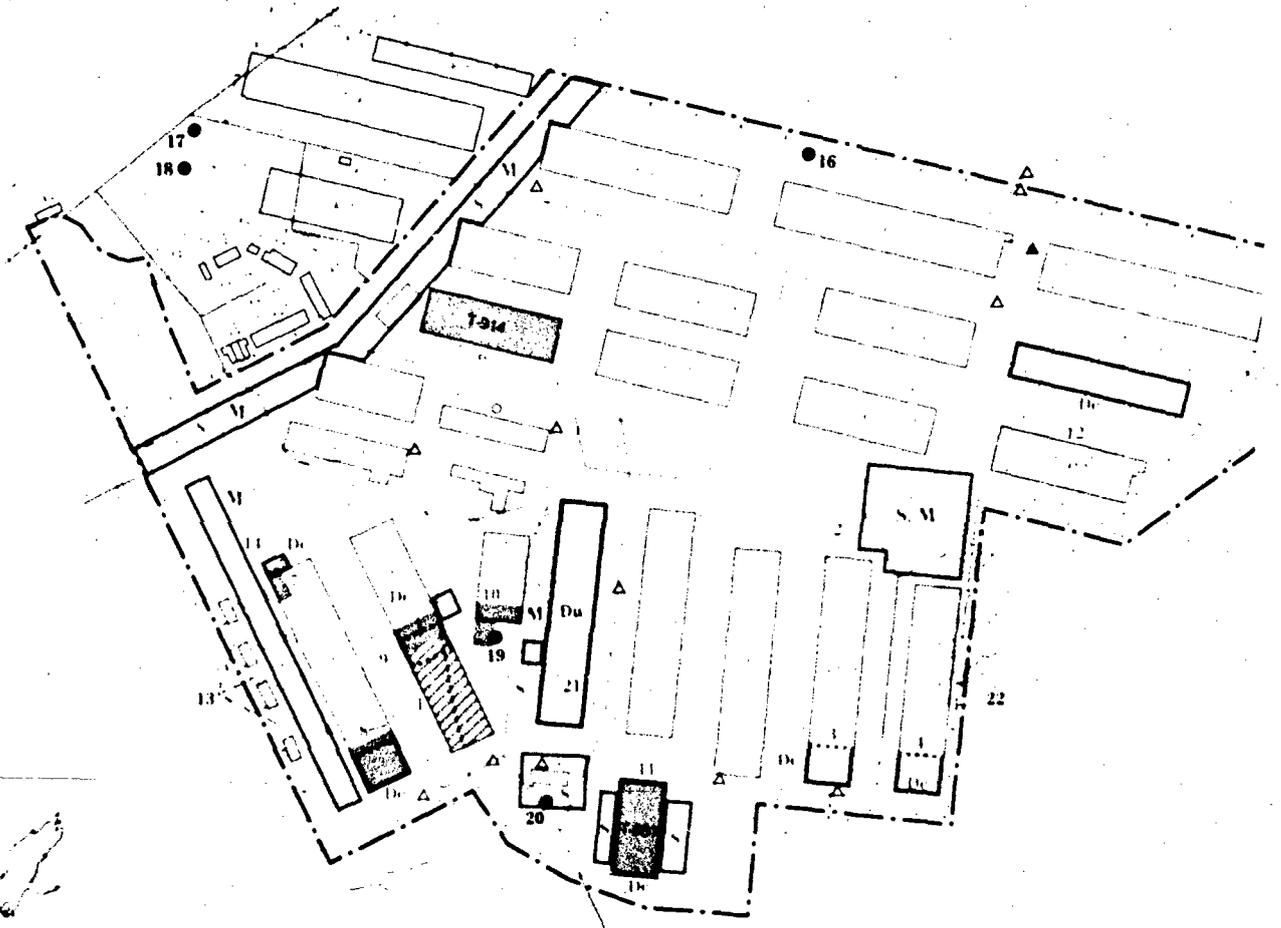
Figure ES-1 shows a site plan of the facility with the buildings and the ESOs marked.

## **HUMAN AND ENVIRONMENTAL RECEPTORS**

KMR is located in the harbor district of the City of Honolulu, directly adjacent to Honolulu Harbor. The property was constructed on materials dredged from the harbor and placed over existing coral rocks and limestone deposits. KMR is almost entirely paved. Surface water runoff and the storm sewer system on KMR discharge directly into the harbor.

Groundwater in the area is hydraulically connected to the harbor. The shallow aquifer is brackish and is not used as a water supply. (The closest known well is approximately one mile north (inland) at the Oahu State Prison.)

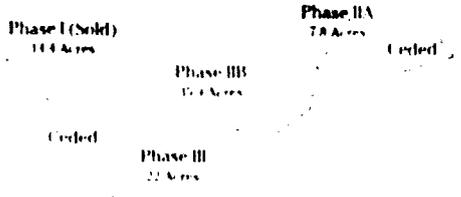
Land adjacent to the facility is used for commercial and industrial purposes. Adjacent properties include: a large fuel storage tank farm for aviation fuels that are piped underground; municipal piers with associated underground fuel oil and diesel lines; and the Phase I former KMR property, which contained three underground diesel and gasoline tanks (one of which was



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**PROPERTY SUBDIVISION**



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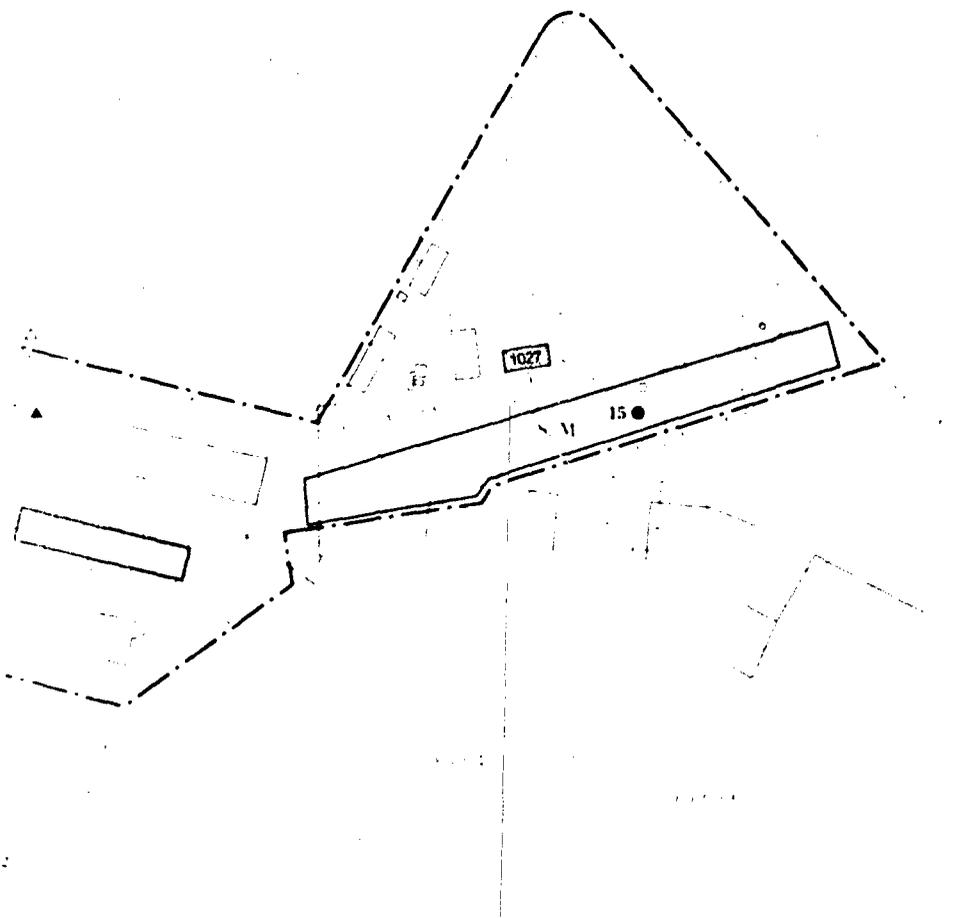
**U.S. Army  
Base Closure Preliminary Assessment  
Kapalama Military Reservation  
Honolulu, Hawaii — November 1989**

**FIGURE ES-1  
PROPERTY INFORMATION  
COMPOSITE**

Compiled in 1989 from various sources provided by  
the U.S. Army Toxic and Hazardous Materials Agency

**Scale 1:4800  
(1"=400')**

0	Feet	400
0	Meters	250



**Former Chemical Use**

- 1. Canvas repair area
- 2. Low level radioactive storage
- 3. Fumigation area
- 4. Bleach storage

**Current Chemical Use**

- 5. Central ID Laboratory
- 6. Mortuary
- 7. Parts cleaner
- 8. Paint spray booth area
- 9. Foam packaging area
- 10. Forklift maintenance area
- 11. Fumigation area

**Current Chemical Storage**

- 12. Chemical storage warehouse
- 13. Solvent waste solvent and petroleum products

**Storage Tanks**

- 15. Former underground storage tank
- 16. Above-ground kerosene storage tank
- 17. Former underground storage tank
- 18. Former underground storage tank
- 19. Above-ground propane storage tank
- 20. Underground storage tank

**Waste Disposal**

- 21, 22. Possible pre-construction disposal sites

**Transformers**

- ▲ High Voltage
- △ Other

**Storm Drain System**

—— Storm Drain and Pipe Diameter

**Recommended Sampling Locations**

Locations are differentiated by the sampling methods indicated below. All locations are approximate. A detailed sampling plan would be developed prior to actual sampling activity.

- |             |                 |
|-------------|-----------------|
| Soil Boring | Destructive     |
| Dust        | Monitoring Well |

**Note:** Oil sample taken at all transformers

**Other Features**

- - - Reservation Boundary
- Building or Other Structure

Property Subdivision

Elevation contour values are in feet



removed prior to sale). Petroleum hydrocarbons have been found under the Phase I property during soil boring activities conducted by the current owner of the Phase I property.

No endangered or threatened species are recorded on KMF. No wetlands were identified within 2 miles of the facility. The variety of aquatic life in the harbor of this industrial/commercial area is expected to be limited and adapted to suboptimal environmental quality.

The groundwater will eventually discharge to the surrounding waters of Honolulu Harbor or Keehi Lagoon; however, the concentrations of a contaminant would be expected to be quite dilute. No ongoing discharges or surface contamination was apparent during the site inspection; therefore, no impact on human and environmental receptors from surface water is expected. The most significant risk on the property appears to be the contaminated building surfaces that may provide a direct contact hazard to personnel.

### **CONCLUSIONS AND RECOMMENDATIONS**

No conditions were observed on the property that appear to represent an immediate substantial threat to human health or the environment. However, the ESOs listed above have the potential to affect human health or the environment. The ESOs, associated concerns, and recommendations are summarized in Table ES-1 and the following subsections.

The choice of analytes and locations of samples in the various buildings is based on the types of chemicals formerly used or stored in the building, the knowledge or likelihood of spills or releases, the persistence of the constituent in the media being sampled, and the ability to collect a sample representative of source contamination. For example, a soil sample collected directly under an area of asphalt paving would be contaminated by semivolatile compounds present in the asphalt. In regard to persistence, volatile organic compounds (VOCs) may be present in groundwater but not in surface soils after a number of years.

### **BUILDINGS**

Wipe, destructive, and dust sampling of building interiors is recommended for most of the primary ESOs discussed in Section 3. The presence of asbestos materials in certain buildings in the Phase II area has been confirmed by previous sampling; therefore, sampling for asbestos is recommended only for Phase III buildings.

### **SUBSURFACE SOILS**

With the discovery of subsurface petroleum hydrocarbons near Buildings 917 and 929 and on neighboring properties, as well as underground piping of aviation fuel and diesel fuel on neighboring properties (see Subsection 2.2), soil borings are recommended throughout the property. Boring samples

Table ES-1

## ESOs Identified at Kapalama Military Reservation and Recommendations for Further Action

ESOs	Location	Concern	Recommended Activity	Number of Samples Recommended	Location	Sample Type	Analysis
ings 913/914 - Mortuary	Phase II	VOCs	No further investigation	4	Evenly distributed, one near entrance	Wipe	Pesticides/Herbicides <sup>a</sup>
ling 917 - Hazardous Material Storage	Phase II	Pesticides RCRA Metals VOCs, TPH	Site investigation	4	In cracked areas, evenly distributed	Destructive	Pesticides/Herbicides RCRA Metals <sup>b</sup>
ing 923 - Solvent Mixing Room and Spray Booth	Western Ceded Area	Chlorinated Hydrocarbons Pb, Cd	Site investigation	1	Building floor	Dust	Pb, Cd
ing 924 - Canvas Air Area & Packaging Area	Phase III/ Western Ceded Area	Pesticides RCRA Metals	Site investigation	1	Paint booth floor	Destructive	Pb, Cd
ing 924 - Former Paint Dip Operation	Phase III/ Western Ceded Area	VOCs	No further investigation	3	Paint booth walls/ ceiling	Destructive	Pb, Cd
ings 923/924 - Drainage	Western Ceded Area	Pesticides RCRA Metals	Site investigation	1	Floor near packaging area	Destructive	Pesticides/Herbicides RCRA Metals
ing 925 - Maintenance & Air of Forklifts	Phase III	Chlorinated Organics, TPH	No further investigation	1	Storm sewer inlet	Sediment	Pesticides/Herbicides RCRA Metals

<sup>a</sup> Hazardous Substance List (HSL) pesticides and herbicides, plus phenoxy acid herbicides.  
<sup>b</sup> Heavy metals defined in 40 CFR 261 pursuant to the Resource Conservation and Recovery Act (RCRA).  
 al petroleum hydrocarbons.  
 atile organic compounds.  
 ardous Substance List Compound...

Not applicable.

Table ES-1

ESOs Identified at Kapalama Military Reservation and Recommendations for Further Action  
(Continued)

ESOs	Location	Concern	Recommended Activity	Number of Samples Recommended	Location	Sample Type	Analysis
Building 926 - General Storage and Sealed Source Radioactive Storage	Phase III	Radioactivity	Site investigation	NA	Building surfaces	Instrumentation sweep	Radioactivity
Building 929 - General Storage and Former Pallet Storage Area	Phase III	Pesticides	Site investigation	6-10	Floor, walls, ceiling	Destructive	Pentachloro-phenol; 2,4-D
Building 929A - Former Sealed Source Radioactive Storage	Phase III	Radioactivity	Site investigation	NA	Building surfaces	Instrumentation sweep	Radioactivity
Building 930 - General Storage	Phase III	Oxidizer	No further investigation				
Building 931 - General Storage and Fumigation Area	Phase III	Pesticides RCRA Metals	Site investigation	4	Walls, ceiling, floor	Destructive	Pentachloro-phenol
Buildings 1027/1028 - The Neutral Identification Laboratory	Phase II	Photographic Chemicals	No further investigation	1	Storm sewer	Sediment	Pentachloro-phenol
Former Underground Storage Tank (Near Buildings 1027 and 1033)	Phase II	TPH	Report review (soil sampling results)	NA		NA	NA
Underground Storage Tank adjacent to Building 935	Phase III	TPH	No further investigation	NA	NA	NA	NA
Underground Storage Tank - Rosene	Phase II	TPH	Site investigation	2	Adjacent to tank	Surface soil (0-6 in)	TPH

hazardous Substance List (HSL) pesticides and herbicides, plus phenoxy acid herbicides. Light metals defined in 40 CFR 261 pursuant to the Resource Conservation and Recovery Act (RCRA). Total petroleum hydrocarbons. Volatile organic compounds. Hazardous Substance List Compounds.

= Not applicable.

Table ES-1

ESOs Identified at Kapalama Military Reservation and Recommendations for Further Action  
(continued)

ESOs	Location	Concern	Recommended Activity	Number of Samples Recommended	Location	Sample Type	Analysis
Overground Storage Tank - Propane, Bldg 925	Phase III	Propane	No further investigation	NA	NA	NA	NA
Overground Storage Tanks - Propane, Bldgs 921, 922	Phase II/ Western Ceded Area	Propane	No further investigation	NA	NA	NA	NA
Asbestos	All Areas	Asbestos	Phase III buildings	As required	Suspect materials	Destructive	Asbestos
Transformers	All Areas	PCBs	Site investigation	40	All transformers	Dielectric fluid	PCBs
Concrete Pad	Western Ceded Area	PCBs Pesticides	Site investigation	2	Top of pad	Destructive	PCBs, Pesticides
Inner Railroad Track/ Loading Area	All Areas	Pesticides, VOCs, RCMA Metals, TPH	Site investigation	6	Adjacent to loading dock	Surface soil under asphalt	Pesticides, RCMA Metals
Petroleum Spill Areas (onsite)	All Areas	TPH	Site investigation	15-20 5-10	Plantwide Plantwide	Soil boring Groundwater	TPH TPH, VOCs <sup>d</sup>
Petroleum Pipelines (offsite)	NA	TPH	Site investigation	(Included in Petroleum Spill Areas)			TPH
Petroleum Storage Tank (offsite)	NA	TPH	Site investigation	(Included in Petroleum Spill Areas)			
Possible Pre-Construction Disposal Site	Phase II/ III	Undefined	Site investigation	2	1 in each disposal area	Soil boring (composite)	HSL <sup>e</sup>
				2	1 in each disposal area	Groundwater	HSL

Hazardous Substance List (HSL) pesticides and herbicides, plus phenoxy acid herbicides.

Eight metals defined in 40 CFR 261 pursuant to the Resource Conservation and Recovery Act (RCRA).

Total petroleum hydrocarbons.

Volatile organic compounds.

Hazardous Substance List Compounds.

A = Not applicable.



should be analyzed for total petroleum hydrocarbons (TPH) and VOCs. Soil samples should be collected at intervals of 2.5 ft from the surface to the top of the groundwater table at each boring. It is expected that groundwater will be reached less than 5 ft below the ground surface. Selected borings may be converted to monitoring wells, based on field operations.

#### **GROUNDWATER**

Groundwater quality has not been characterized throughout the site. The potential exists for contamination due to both site-related activities and to migration from offsite sources. Approximately 5 to 10 monitoring wells should be installed in selected subsurface soil borings. These wells should be strategically placed to characterize the groundwater at areas of concern. These samples should be analyzed for TPHs and VOCs. Additional analyses may be required based on proximity to specific ESOs.

#### **SURFACE SOILS**

Surface soil samples (0 to 6 in.) should be taken along the grass strip behind the aboveground kerosene tank near Building 905 and analyzed for TPH.

#### **SEDIMENTS**

Sediments in the bottom of the two storm drain systems near Buildings 923/924 and 929/930 should be sampled and analyzed for TPH, VOCs, metals, and pesticides. These storm drains would have been likely pathways for any spills in the primary chemicals storage areas.

#### **DRUM LIQUIDS**

Prior to disposal, the contents of the 55-gal drums stored outside Building 924 should be inspected to confirm that they no longer contain waste oil (as marked). Currently, the drums appear to contain rainwater.

#### **CONCRETE PAD**

Chip samples should be taken from three random locations on the concrete pad near Building 923 to check for potential contamination from PCBs or pesticides.

#### **UNDERGROUND STORAGE TANKS**

An underground storage tank (UST) near Buildings 1027 and 1033 has been removed. Reportedly, soil samples were collected during the removal activity, but analytical results are not yet available. The data should be reviewed when available and a decision made as to whether additional sampling is required. The existing UST adjacent to Building 935 was leak tested when installed in 1987, and no further investigation is required at this time.



### **TRANSFORMERS**

All transformers on the property potentially contain PCBs and two of them appear to have leaked in the past. An inventory should be made of all transformers remaining on the property (except Phase I), and each transformer should be sampled for PCBs.

### **POSSIBLE PRE-CONSTRUCTION DISPOSAL SITE**

Soil borings should be conducted and monitoring wells installed at the possible location of the City and County of Honolulu Municipal Dump. Because the material possibly received at this dump is undefined, the soil and groundwater samples should be analyzed for the entire Hazardous Substance List compounds. There will be one soil boring at each of the two possible disposal sites. A composite sample will be collected from each boring. Each composite will be comprised of grab samples collected every 2.5 feet of depth until groundwater is reached. Monitoring wells should be installed in each soil boring.



## SECTION 1

### INTRODUCTION

#### 1.1 BACKGROUND

Roy F. Weston, Inc. (WESTON) has been retained by the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) to conduct waste site characterizations of specific Department of Army properties under the authority of Contract DAAA15-88-D-0007, Task Order 2. This work is being performed within the scope of the U.S. Army Installation Restoration Program (IRP). As part of this contract, WESTON also has been asked to prepare enhanced preliminary assessments of selected properties destined to be included as part of the Base Closure Program. The purpose of the associated preliminary assessment reports is to present WESTON's findings concerning the environmental conditions of the properties and to provide recommendations for further action. These recommendations will serve as a guide to the U.S. Army in prioritizing the activities required to report these properties as excess.

This document discusses the enhanced preliminary assessment (PA) of Kapalama Military Reservation (KMR), Honolulu, Hawaii. A site visit was performed 24 July through 28 July 1989.

The KMR has been subdivided, pursuant to sale of the property, into "phases" (see Section 2). At the time of the site visits, one of the phases had already been sold.

#### 1.2 OBJECTIVES

This enhanced PA report was prepared using existing information obtained from property records and from both current and former employees. No sampling activities were completed as part of this assessment. The objectives of this enhanced PA were to:

- Identify and characterize environmentally significant operations (ESOs) associated with the historical and current use of the KMR property.
- Identify and characterize possible impacts of the ESOs on the surrounding environment.
- Identify additional environmental actions, if any, that should be initiated for the ESOs identified.

Certain issues have been excluded from consideration as ESOs for the purposes of this report. First, painted surfaces will not be identified as ESOs solely because there is a potential for their containing lead. Second, drinking water will not be designated as an ESO solely because there is a potential for lead contamination due to piping solder or piping materials. Third, the presence of radon gas in buildings will not be considered as an ESO. A radon survey of all buildings will be performed utilizing the guidelines set forth in the Army Radon Program.



### **1.3 PROCEDURES**

The information contained in this enhanced PA is based on the following data-gathering activities:

- Visual inspection of the facility.
- Review of available Army documentation.
- Review of U.S. Environmental Protection Agency (EPA) Region IX files.
- Contact with the Hawaii Department of Land and Natural Resources.
- Interviews with current and former employees at KMR.
- Evaluation of aerial photographs.

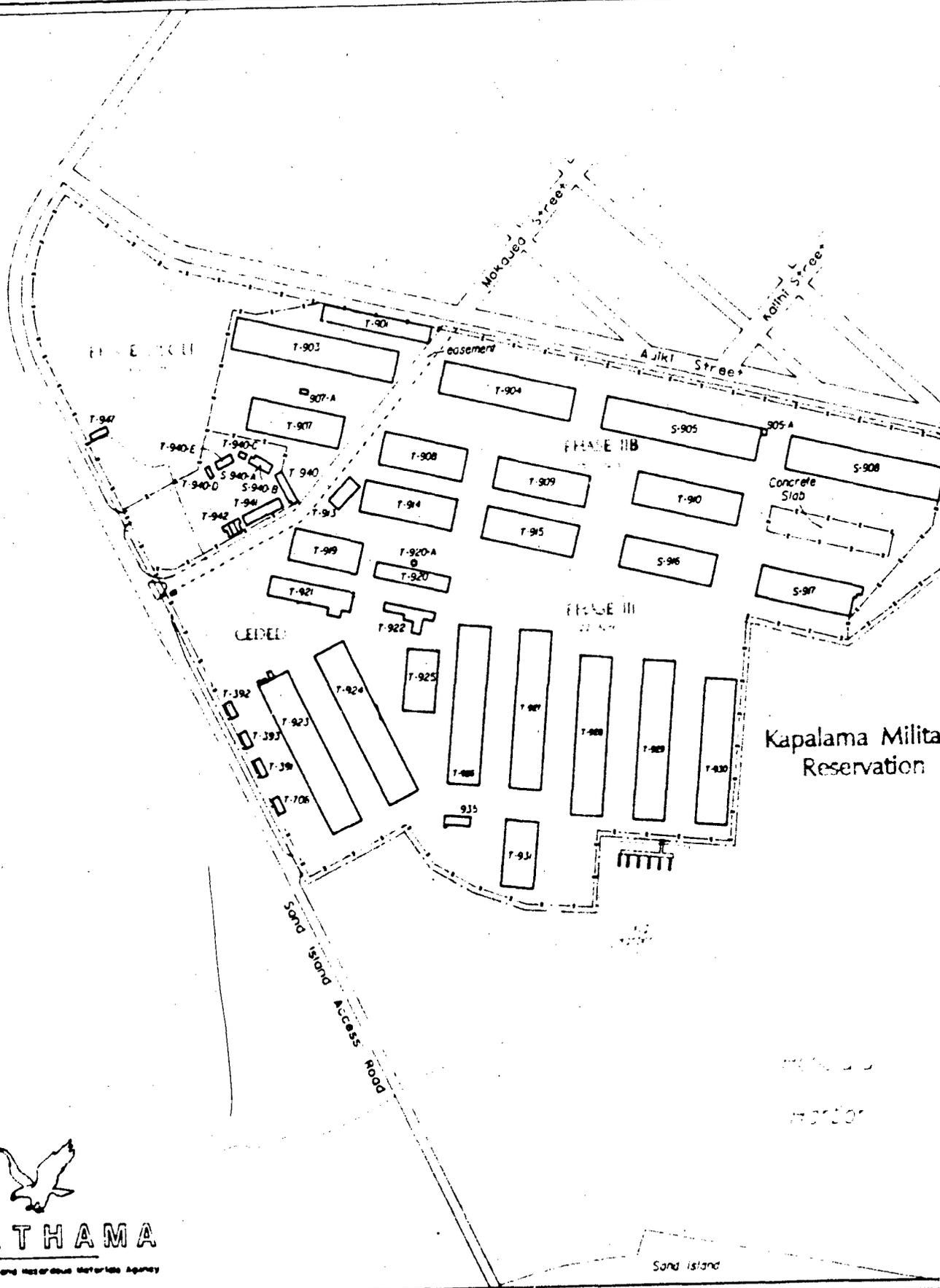
The scope of the site survey was initially restricted to the Phase III portion of the KMR property (Figure 1-1). Two other sections (Phases I and II) were to be treated as adjacent properties that may have environmental impacts on Phase III. In that regard, only selected buildings in Phase II were entered, based on the likelihood of their being possible sources of contamination. Subsequent to the site inspection, WESTON was directed by USATHAMA to include all of the Phase II portion of the property in the PA. Subsection 2.2 of this report specifies all buildings (Phase II and Phase III) that were entered as part of the site investigation.

### **1.4 REPORT FORMAT**

This enhanced PA report presents an evaluation of the relevant data for the Kapalama Military Reservation.

Section 2 describes the property and the surrounding environment and land uses. Section 3 identifies and characterizes all ESOs related to known and suspected releases to the environment. The potential impact of these operations on the local environment and human receptors is discussed in Section 4. Section 5 summarizes the findings and conclusions, discusses the quality and reliability of the supporting information, identifies areas requiring further action, and suggests how such actions may be accomplished. Section 6 lists the pertinent materials reviewed and the agencies that were contacted. Photographs taken during the site visit are provided in Section 7. Supporting documentation is provided in Appendices A and B.

References are presented throughout this report, where appropriate, by means of a letter and number designation in brackets, as follows: I refers to direct interviews; T refers to telephone conversations; and R refers to reports or other written documents. The number following the letter refers to the specific item in the respective lists provided in Section 6.



Kapalama Milita  
Reservation



**USATHAMA**

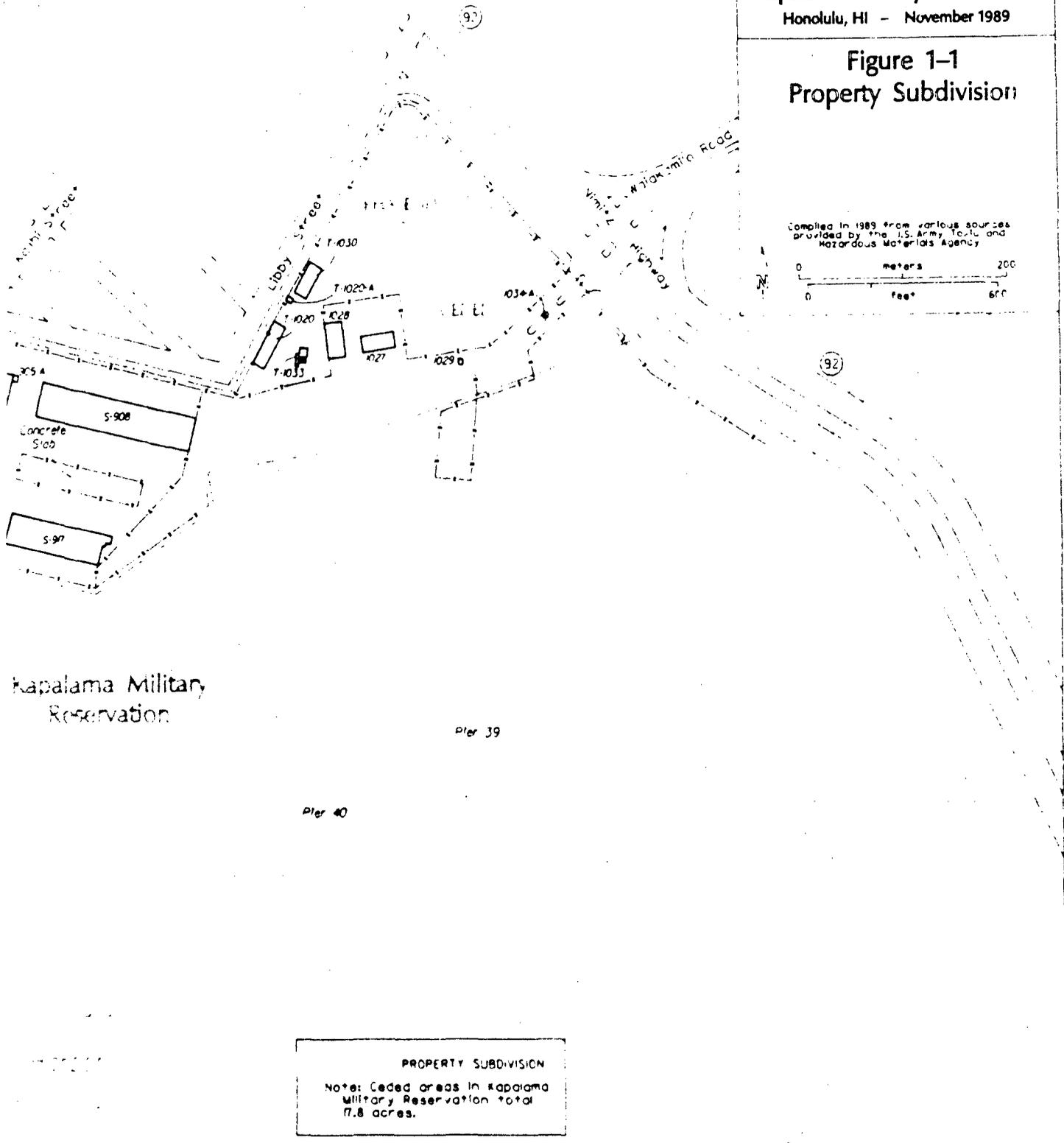
U.S. Army Toxic and Hazardous Materials Agency

Sand Island

U. S. Army  
Base Closure Preliminary Assessment  
**Kapalama Military Reservation**  
Honolulu, HI - November 1989

**Figure 1-1**  
**Property Subdivision**

Compiled in 1989 from various sources  
provided by the U.S. Army Toxic and  
Hazardous Materials Agency



Kapalama Military  
Reservation

PROPERTY SUBDIVISION  
Note: Ceded areas in Kapalama  
Military Reservation total  
7.8 acres.



## SECTION 2

### PROPERTY CHARACTERIZATION

#### 2.1 GENERAL PROPERTY DESCRIPTION AND HISTORY

The KMR property was acquired by the U.S. Government through condemnation by the Secretary of War in 1941. It was subsequently established as a logistics support and warehouse facility. Table 2-1 presents a property information summary. Figure 2-1 presents a site map of the area.

KMR was constructed partly on land that has been filled in with coral-lime dredge materials from the construction of the Keehi Lagoon Seaplane Runway [R-10]. There are approximately 30 buildings of various sizes that were built during the period 1942-1945. Almost all buildings consist of a wood frame, corrugated metal roof, and corrugated metal or Transite siding and are built on a concrete slab at or above grade (photos 1 to 4). It is unknown whether the wood used for construction was treated with pesticides for termite protection; however, this was a common practice. Table 2-2 lists the buildings at KMR. The site is almost entirely paved with asphalt (>99%), except for small grassy areas near the perimeter fence and a small area of ornamental shrubs and trees near the mortuary/chapel (Buildings 913/914) and base canteen (Building 920).

The use of the property prior to construction of KMR is not well documented. According to the Corps of Engineers Pacific Ocean Division (CEPOD), a portable asphalt batching plant was condemned when the Army purchased the property. Also, the City and County of Honolulu reportedly used the property as a site for municipal waste. A portion of the site also may have been used as a junk yard [R-8].

The reservation has been used primarily as a warehouse facility for the last 47 years. Activities have consisted of the receiving, storage, and distribution of goods and materials for U.S. military facilities in the Hawaiian Islands and throughout the Pacific areas. These goods and materials include hardware items (office furniture, hospital beds, appliances, spare parts), consumer items (as sold in PXs), dry goods (tents, clothing), and chemicals (battery acid, cleansers, packing foam, paints, pesticides, etc.). The chemicals do not include any bulk shipments; the largest containers are 55-gal drums. At the time of the site inspection, there were no munitions in the warehouses, and site personnel had no knowledge of any munitions having been stored at KMR. However, the facility was active during WWII, the Korean War, and the Vietnam War; therefore, it is possible that packaged ammunition was received for distribution in the past. There is no record of any onsite use of ammunition. A paint booth was installed at an unspecified date (at least 15 years ago) for maintenance-related activities only. Other site activities include a mortuary, an identification laboratory (for decomposed



Table 2-1

Property Information Summary

---

**Name:** Kapalama Military Reservation (KMR)

**Property No.:** 15265

**FFIS:** HI-214522214

**Facility Address:** Sand Island Access Road  
Honolulu, Hawaii

**Commanding Officer:** None (Subinstallation of Fort Shafter)

**Location:** Just inland of the Kapalama Basin, in the Honolulu Harbor area, on the south coast of the island of Oahu, Hawaii.

**Installation Coordinates:** 19° 54' N; 155° 53' W

**Size:** Approximately 100 acres.

**Mission:** KMR is a subinstallation of Fort Shafter, part of the U.S. Army Support Command. It is a logistics and support facility and a general maintenance installation.

**Operations:** Current operations include warehouse and storage facilities, administration buildings, office machine and furniture repair, an Army mortuary, and the Pacific Area Central Identification Laboratory.

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U.S. Army  
Base Closure Preliminary Assessment  
**Kapalama Military Reservation**  
Honolulu, Hawaii — November 1989

**FIGURE 2-1**  
**PROPERTY LOCATION**

Property boundary shown in red. Base map image is from the USGS 7.5 Series quadrangles Honolulu and Pearl Harbor, Hawaii, 1983

Scale 1:30,000  
0 Feet 3000  
0 Meters 1000

KAPALAMA MILITARY RESERVATION Honolulu

HAWAII

Hawaii

Kapalama Military Reservation

KEEHI LAGOON

Mokuauia Island

Honolulu Harbor

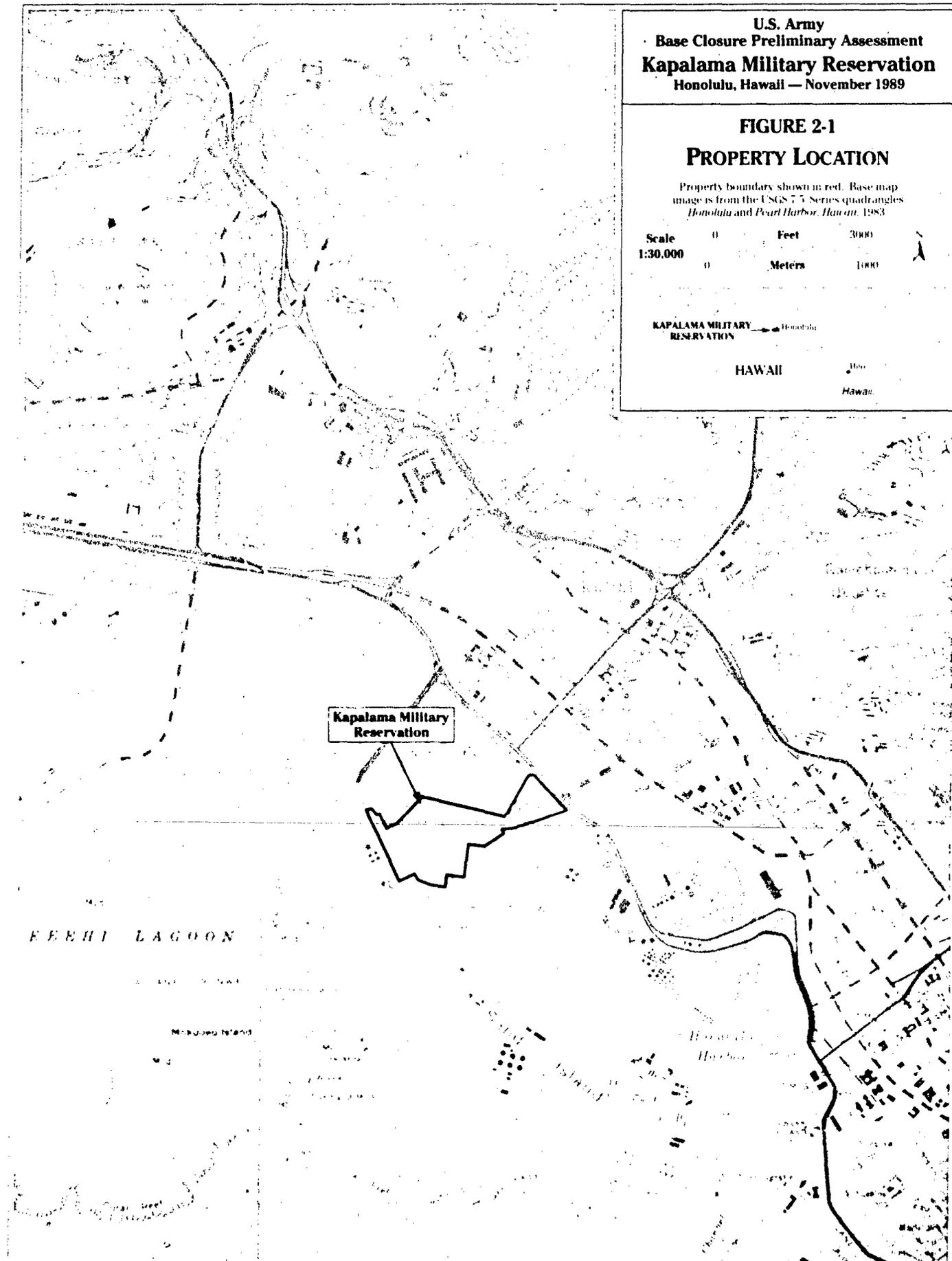




Table 2-2  
Description of Buildings  
Kapalama Military Reservation

Property Subdivision	Building No.	Approx. Size (sq. ft.)	Siding Type	Floor Type	Building Use	Building Entered
Phase II	904	43,000	CT	CA	Warehouse & Administration	No
Phase II	905	50,000	CT	CA	Warehouse & Cold Storage	No
Phase II	906	50,000	CT	CA	Tripler Med. Center Whse.	No
Phase II	908	27,000	CT/CM	CA	Gen'l. Storage (half vacant)	No
Phase II	909	30,000	CT/CM	CA	Tripler & AAFES (PX) Storage	No
Phase II	910	35,000	W	CA	Cold Storage	No
Phase II	913	5,000	W	W	Mortuary/Chapel	Yes
Phase II	914	29,000	CT/W	CA	Mortuary/General Storage	Yes
Phase II	915	30,000	W	CA	Gen'l. Storage, Logistics Dept.	No
Phase II	916	30,000	CT	CA	Gen'l. Storage, Logistics Dept.	No
Phase II	917	30,000	CT	CA	Chemical Warehouse (Haz.Mat.)	Yes
Phase II	919	22,000	CT	CG	Gen. Storage & Package Store	No
Phase II	920	25,000	W	W	Administration Building	No
Phase II	921	17,000	W/CM	CA	Administration Building	No
Phase II	922	7,000	W	W	Environmental Health Office	No

**Siding Type:**  
 CT = Corrugated Transite  
 CM = Corrugated Metal  
 W = Wood  
 C = Concrete Structure  
 B = Brick Structure

**Floor Type:**  
 CA = Concrete, above grade  
 CG = Concrete, on grade  
 W = Wood  
 Unk = Unknown (no access)



Table 2-2  
Description of Buildings  
Kapalama Military Reservation  
(continued)

Property Subdivision	Building No.	Approx. Size (sq. ft)	Siding Type	Floor Type	Building Use	Building Entered
Ceded	923	52,000	W	CA	Paint Booth; Solvent Cleaning	Yes
Phase III <sup>a</sup>	924	52,000	W	CA	Canvas Repair; Packaging Area	Yes
Phase III	925	20,000	CT	CG	Forklift/Vehicle Maintenance	Yes
Phase III	926	53,000	CM	CA	General Storage Warehouse	Yes
Phase III	927	51,000	CM	CA	General Storage Warehouse	Yes
Phase III	928	50,000	CT	CA	General Storage Warehouse	Yes
Phase III	929	50,000	CT	CA	General Storage Warehouse	Yes
Phase III	929-A	200	B	Unk	Radioactive Material Storage	No
Phase III	930	42,000	CT	CA	General Storage Warehouse	Yes
Phase III	931	18,000	CT	CA	Gen'l. Storage; Fumigation Area	Yes
Phase III	935	800	C	Unk	Telephone/Switching Cables	No
Phase II	1020 <sup>b</sup>	5,500	CT/W	CA	General Storage Warehouse	No
Phase II	1027	10,000	C	CG	Central I.D./Forensic Lab	Yes
Phase II	1028	5,000	C	CG	Central I.D./Photo Lab	Yes
Phase II	1030 <sup>b</sup>	4,000	CM	CG	Metal Quonset Hut; Gen. Storage	No

**Siding Type:**  
 CT = Corrugated Transite  
 CM = Corrugated Metal  
 W = Wood  
 C = Concrete Structure  
 B = Brick Structure

**Floor Type:**  
 CA = Concrete, above grade  
 CG = Concrete, on grade  
 W = Wood  
 Unk = Unknown (no access)

<sup>a</sup>Partly within ceded area.  
<sup>b</sup>Building has been demolished.



bodies), a forklift maintenance area, low-level radioactive material storage, pretransport fumigation of materials, and canvas repair and waterproofing. The fumigation process has been carried out in two separate buildings; it was moved to the current location in 1988, and is currently handled by a private contractor.

According to the Historic Section, Division of State Parks, Department of Land and Natural Resources, there are no sites on KMR listed in the national or state register of historic places. However, field work performed on the site reportedly resulted in archeological findings in the Phase IIA section of the property [R-6]. The extent or importance of these findings is unknown and will be monitored during subsequent field activities. Also, portions of Phase II and Phase III were apparently constructed over Loko (Fishpond) Ananoho [R-10]. Additional coordination with the State may be required prior to any excavation activities.

## **2.2 DESCRIPTION OF FACILITIES**

For purposes of property disposal, KMR was divided into four parcels, as shown in Figure 1-1. They are:

- Phase I - 14.4 Acres
- Phase IIA - 7.8 Acres
- Phase IIB - 35.9 Acres
- Phase III - 22.0 Acres

The Phase I lot was sold to Servco Pacific, Inc., in 1987. It is currently used for the storage of new cars and light trucks. Phase II is subdivided into Phases IIA and IIB because the sale of Phase II is expected to be executed in stages. Also shown on Figure 1-1 are two "ceded" areas covering a total of 17.8 acres. These ceded areas are not included in the acreage figures shown above. Although the State is attempting to have this land ceded, this transaction has not yet been completed.

### **2.2.1 CONTENTS OF BUILDINGS - PHASE III AREA**

Most buildings in the Phase III area are devoted to the storage of miscellaneous items such as office equipment and furniture, small mechanical parts, and appliances. These items range in size from small boxes of nuts and bolts to office desks and washing machines (photos 5 to 7). No current or potential ESOs were found in any of these general storage areas.

Some buildings in the Phase III area contain activities that are or may be of an environmentally significant nature. These locations are identified and discussed in Section 3 of this report. They include, for example, the paint spray booth in Building 923 and the termite fumigation area in Building 931.

### **2.2.2 CONTENTS OF BUILDINGS - PHASE II AREA**

Because the original scope of this assessment was limited to the Phase III area of KMR, a less extensive review of buildings in Phase II was performed. General information concerning these buildings was gathered, as well as



specific information on a few selected buildings. These specific buildings, such as the hazardous material storage Building 917, were treated at the time of the assessment as "environmentally significant properties" adjacent to the Phase III area.

Examples of the general storage areas in Phase II include Building 905, which contains general items sold at the Army/Air Force stores (PXs) on the island, and Building 909, which houses surplus equipment (beds, etc.) from Tripler Army Medical Center.

### **2.2.3 GENERATION AND DISPOSAL OF WASTES**

Solid wastes generated at KMR are collected in dumpsters and transported to a municipal landfill [I-2]. Reportedly, there has never been any onsite disposal (landfilling) of this material. These wastes consist mainly of general plant refuse, such as paper, cardboard, and empty containers, but also include dried paint residues from the spray booth and expanded polymer foam from the packaging area.

A few locations at the facility produce nonaqueous liquid wastes. These include a small parts degreasing area, a paint spray booth, and a forklift maintenance area. These wastes consist of used oils and solvents, with an approximate volume of less than 10 gal/week. Interviews with Maintenance Department Personnel [I-6] indicated that the past and current practice has been to accumulate a few drums of these wastes and then transport them by private contractor to the Schofield Barracks/Wheeler AFB waste disposal site on the island.

Small volume sources of chemical wastes exist in the Phase II area. These include the mortuary (e.g., formaldehyde) and the Central Identification Laboratory (darkroom/photographic solutions), but these areas discharge to the city sanitary sewer system. All sanitary wastewater is also discharged to this system. There are no current or former wastewater treatment or disposal facilities on the site.

### **2.3 PERMITTING STATUS**

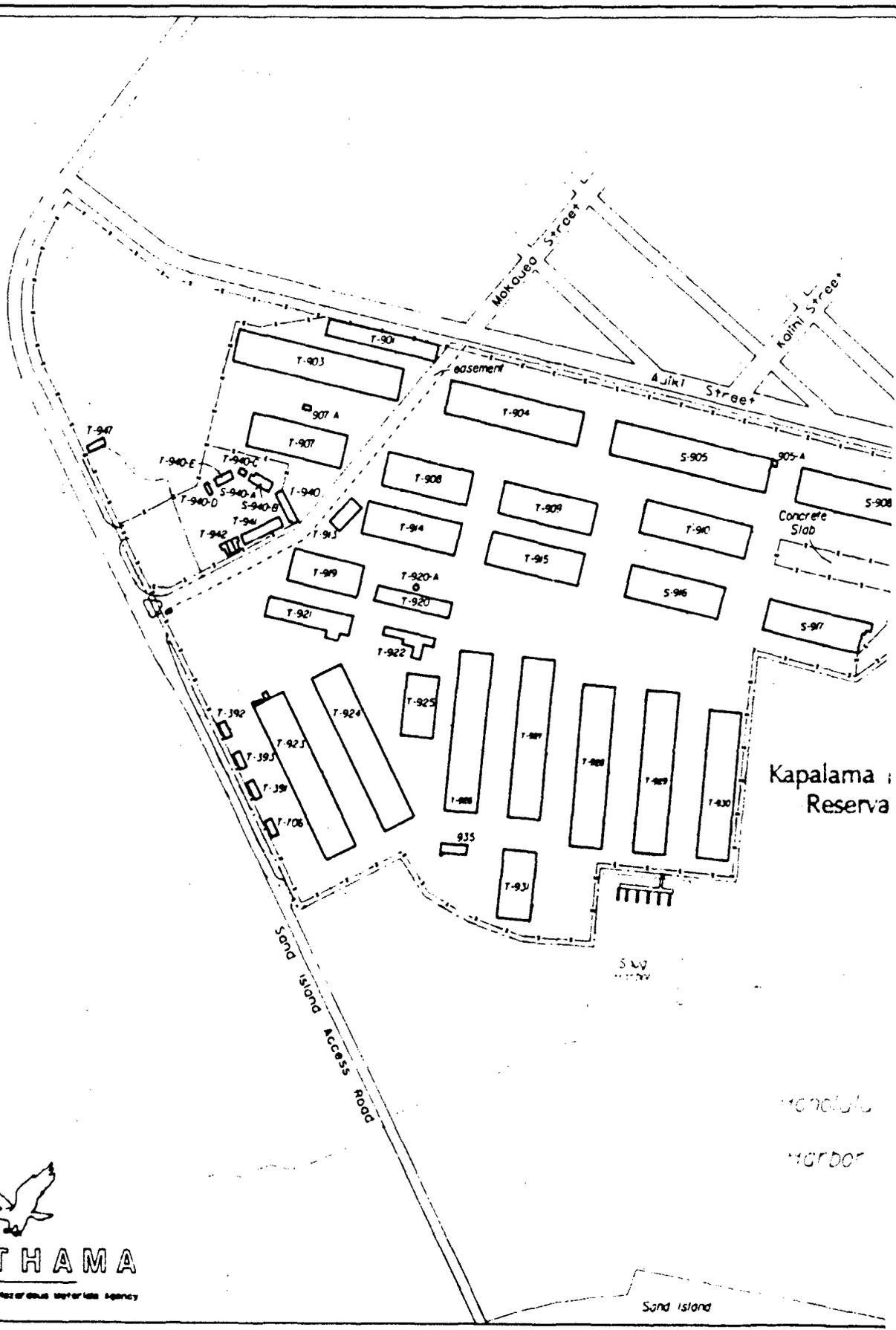
The KMR does not currently operate under any environmental permits. Contacts with the Hawaii Department of Land and Natural Resources and EPA Region IX showed no record of any permits issued. There have been no reported spills for at least the past 10 years.

### **2.4 SURROUNDING ENVIRONMENT AND LAND USE**

The property is on the coastal area of the island of Oahu's southern shoreline. The land surface is flat and the surrounding area varies in elevation from sea level to 5 ft above sea level (Figure 2-2).

#### **2.4.1. DEMOGRAPHICS AND ADJACENT LAND USE**

KMR is located in the harbor district of the City of Honolulu. All surrounding land is used for commercial and industrial purposes. The city designates the area in which KMR is located as a Primary Urban Center, and the land is zoned as industrial/ commercial.



Kapalama  
Reserva

Manalulu  
Harbor

Sand Island



**USATHAMA**

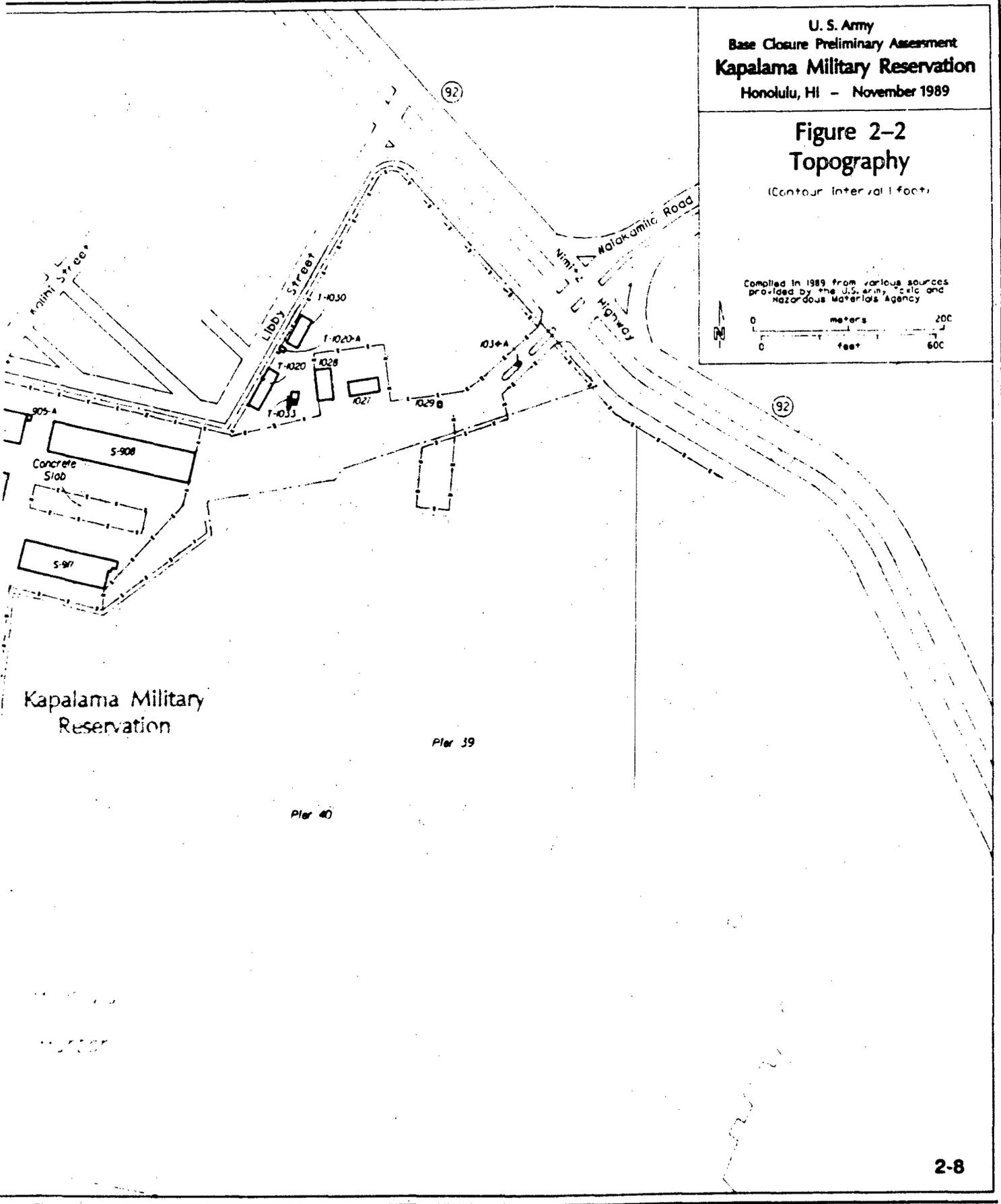
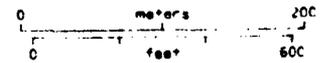
U.S. Army Toxic and Hazardous Materials Agency

U. S. Army  
Base Closure Preliminary Assessment  
Kapalama Military Reservation  
Honolulu, HI - November 1989

Figure 2-2  
Topography

(Contour Interval 1 foot)

Compiled in 1989 from various sources  
provided by the U.S. Army, Toxic and  
Hazardous Materials Agency





The Phase I portion of the property that is now owned by Servco Pacific, Inc., is currently used for the storage of automobiles and trucks.

This property reportedly contained three underground storage tanks, at least one of which was removed prior to sale of the property by the Army. The tanks contained diesel oil and gasoline; their sizes and dates of installation are unknown. According to a 1987 report, a pressure test indicated one of these tanks was leaking [R-1]. Information recently received from the Department of Logistics at Kapalama indicated that subsurface hydrocarbons were found under the Phase I property [I-2]. Borings have been drilled by Dames & Moore and have revealed hydrocarbons in at least two borings to date [Appendix B]. Dames and Moore also conducted a soil gas survey and reported a "small area" as having measurable quantities of soil gas near the surface zone. A report by Woodward-Clyde Consultants also indicated the presence of subsurface hydrocarbons [R-7; Appendix B].

A large fuel storage tank farm is located just west of KMR, across Sand Island Road. This tank farm reportedly contains aviation fuels that are piped underground directly to Honolulu airport.

Piers 39 and 40 are owned by the State of Hawaii. Fuel oil and diesel fuel lines have been run to both piers, crossing Nimitz Highway to the northeast of KMR. Underground leaks from these pipe lines or from the tank farm could potentially migrate to KMR. The direction of potential leaks from any of these sources is not certain because this is an area of tidal groundwater fluctuation.

The paved area, including Snug Harbor south of Phase III, is owned by the State and used by the University of Hawaii. This site is used as a general storage yard for miscellaneous items such as buoys and mechanical equipment.

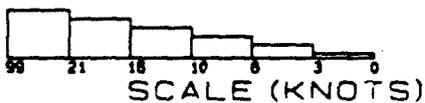
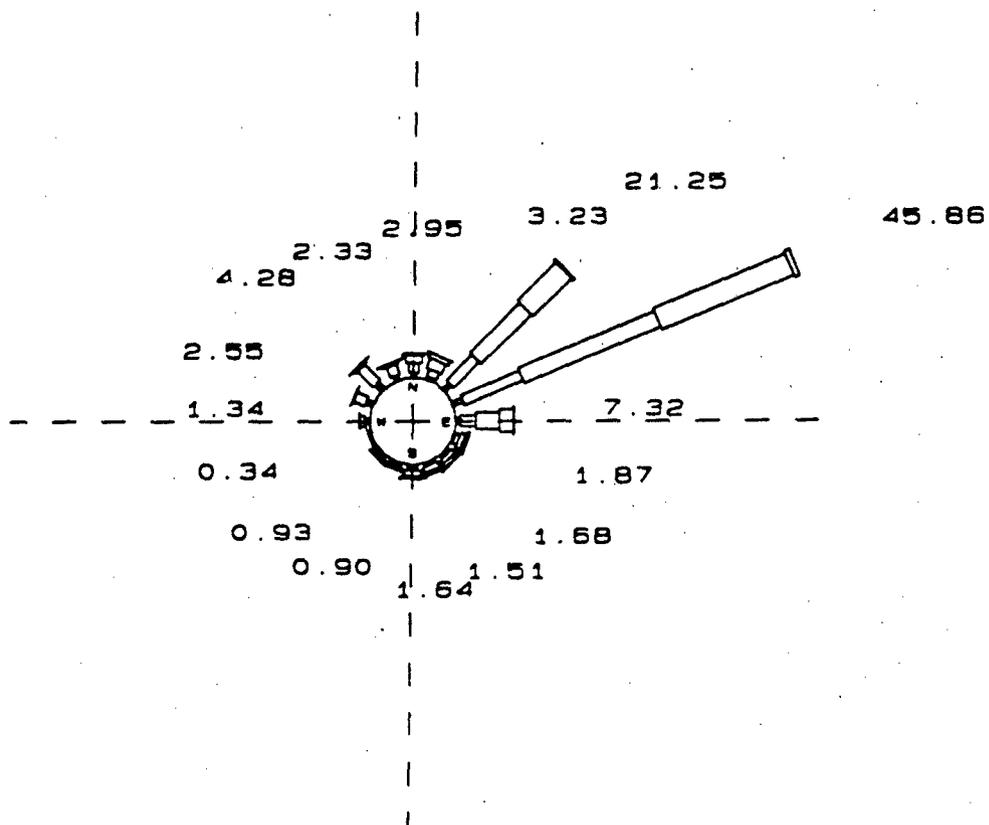
The neighbor southeast of KMR, adjacent to Pier 40, is the Hawaiian Dredging Company. General ship repair activities are performed here. At the northwest corner of KMR, just across the road, is a U.S. Postal Service vehicle maintenance and service facility. All other neighbors to the north consist of private commercial properties and a few truck terminals (photos 8 to 10).

#### **2.4.2 CLIMATE**

In general, the climate of Hawaii is affected by trade winds, variability of rainfall over short distances, and mountain ranges. Honolulu, where KMR is located, has a small seasonal variation in temperature during the year. The warmest months are August (80.7° F) and September (80.4° F), and the coldest months are January (72.3° F) and February (72.3° F). The yearly variation in temperature from summer to winter is approximately 7° F.

Figure 2-3 is a wind rose for Honolulu for the year 1988. The prevailing winds are from the northeast, commonly known as the northeasterly trade winds. The northeasterly trade winds occurred 67 percent of the time during

HONOLULU, HAWAII  
 YEAR: 1988  
 CALMS INCLUDED



	WIND SPEED (KNOTS)						PERCENT OCCURRENCE					
	0-3	3-6	6-10	10-18	18-21	>21	0-3	3-6	6-10	10-18	18-21	>21
N	0.55	1.25	0.92	0.23	0.00	0.00	0.12	0.55	0.66	0.30	0.02	0.00
NNE	0.31	0.97	1.33	0.62	0.01	0.00	0.07	0.36	0.31	0.16	0.00	0.00
NE	1.00	4.98	8.75	6.71	0.22	0.00	0.09	0.38	0.41	0.06	0.00	0.00
ENE	1.27	7.94	18.36	17.60	0.89	0.00	0.08	0.18	0.07	0.01	0.00	0.00
E	0.51	1.90	2.97	1.75	0.09	0.00	0.56	0.64	0.13	0.00	0.00	0.00
ESE	0.24	0.55	0.84	0.44	0.00	0.00	0.90	1.53	0.11	0.01	0.00	0.00
SE	0.13	0.33	0.80	0.56	0.06	0.00	1.14	2.81	0.27	0.05	0.01	0.00
SSE	0.07	0.36	0.69	0.32	0.03	0.02	0.64	1.39	0.29	0.02	0.03	0.00

FIGURE 2-3 WIND ROSE



1988. On an annual basis, the northeasterly trade winds vary from about 90 percent of the time during the summer to about 50 percent of the time during the winter.

Rainfall distribution varies greatly from the coast to the inland mountains. Rainfall in the Honolulu area averages 23 in. per year, but increases to about 35 in. per year one mile inland and to 60 to 70 in. per year 2 miles inland. Parts of the inland mountains average 300 in. of rainfall or more per year. Rainfall varies from month to month and year to year. For example, March rainfall in Honolulu has varied from 0.01 in. (1957) to 20.79 inches (1951).

Severe weather in Honolulu is infrequent. Thunderstorms are mild and seldom occur. Few tropical cyclones have directly struck Hawaii; however, there have been some tropical storms that have come close enough to Hawaii to cause high winds and rain. Tornadoes and waterspouts occur infrequently, but some have moved onshore and caused minor damage.

#### **2.4.3 SURFACE WATER AND HYDROLOGY**

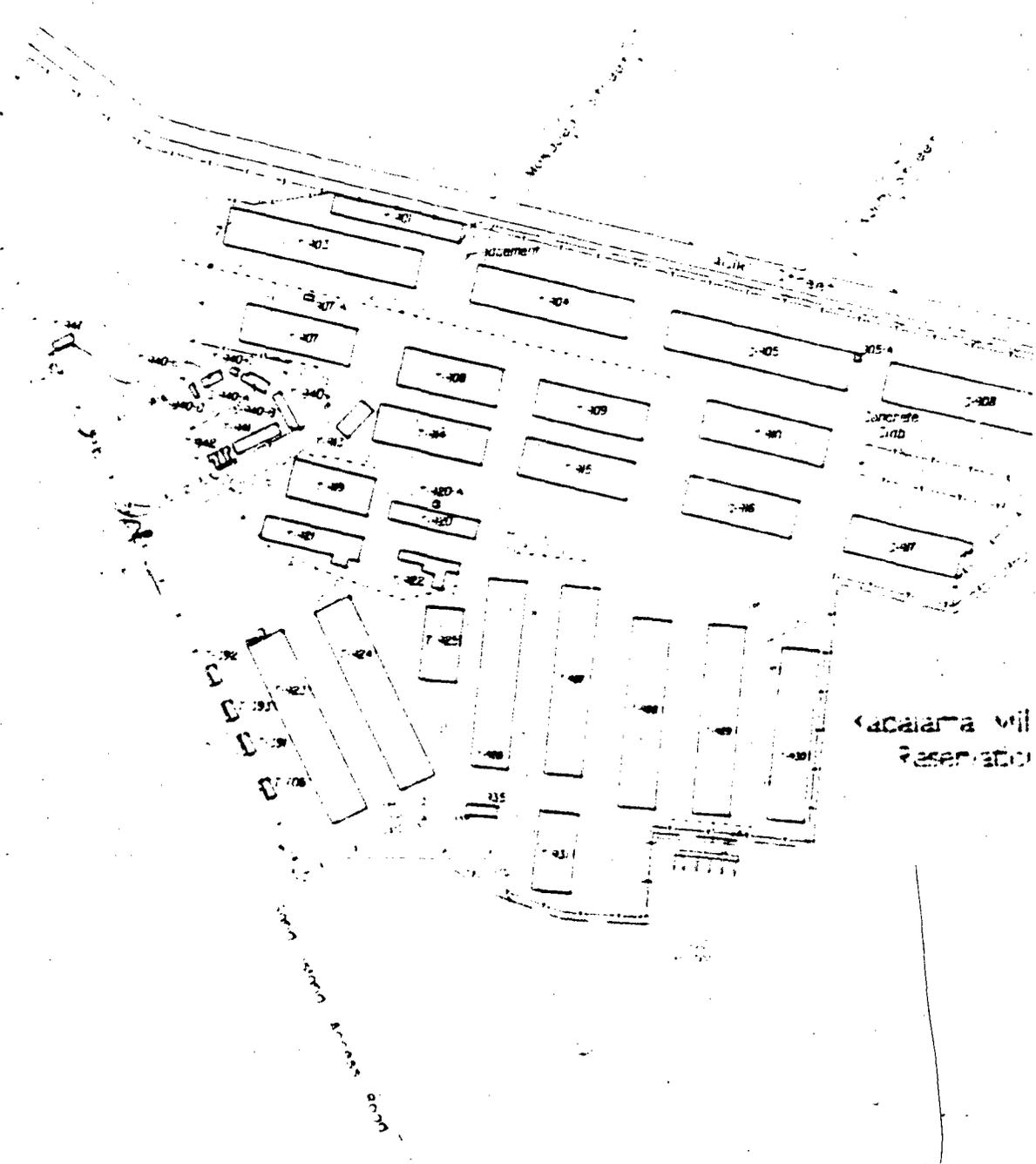
The KMR facility is located adjacent to the Honolulu Harbor. The storm sewer system and any surface runoff discharge directly into the Harbor (Figure 2-4). The primary use of the Honolulu Harbor is for commercial and industrial activities. No surface water bodies are present within the facility boundaries. Although adjacent to the harbor, the site is not subject to flooding; it is located within a flood insurance rate map zone X area, which means it is outside the 500-year flood zone.

#### **2.4.4 SOILS**

The area on which KMR was built consists primarily of dredgings from Kapalama Basin/Honolulu Harbor that were placed over the existing coral rocks and limestone deposits. However, a portion of the original shore line remains [R-8]. The U.S. Soil Conservation Service describes the land as "fill land of a mixed nature, characteristic of fill lands in the Honolulu area, dredged from the Kapalama Basin and Reserve Channel" [I-9]. The limited amount of exposed soil in the area (almost all surrounding areas are paved) is sandy.

Soil maps of the area classify KMR as "Fill Land, Mixed," which consists of areas filled by ocean dredging operations or by dumping of garbage or other material. This land type is described as being used for urban development [R-9].

In the Phase I area, some soil borings have been made. A Woodward-Clyde report references a 1989 report by Geolabs, which states that KMR is underlain predominantly by man-made fill that has been placed over a coral-algal formation [R-7]. The fill is described as consisting of "...clay to sandy gravel mixtures and an intermediate mix of silty sand soils, with consistencies that range from soft or loose to hard or very dense." The depth of this fill material is said to range from 12 to 20 feet.



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Reservato



U S A T H A M A

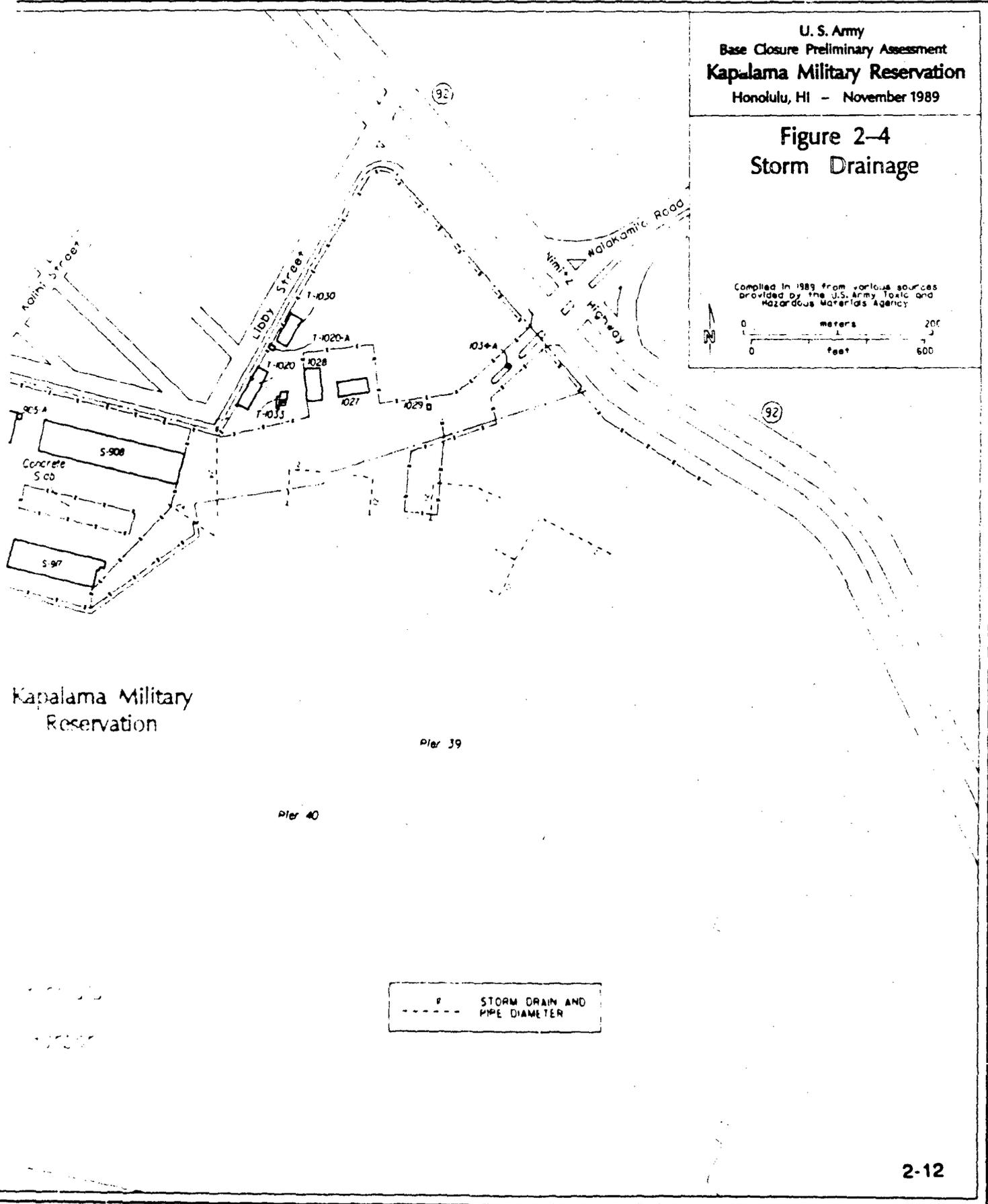
U.S. Army Form 100-100 (REV. 1-55) (GPO: 1955 O-358-888)

Scale 1:1000

U. S. Army  
 Base Closure Preliminary Assessment  
**Kapalama Military Reservation**  
 Honolulu, HI - November 1989

**Figure 2-4**  
**Storm Drainage**

Compiled in 1989 from various sources provided by the U.S. Army Toxic and Hazardous Materials Agency



Kapalama Military  
 Reservation



#### **2.4.5 GROUNDWATER AND HYDROGEOLOGY**

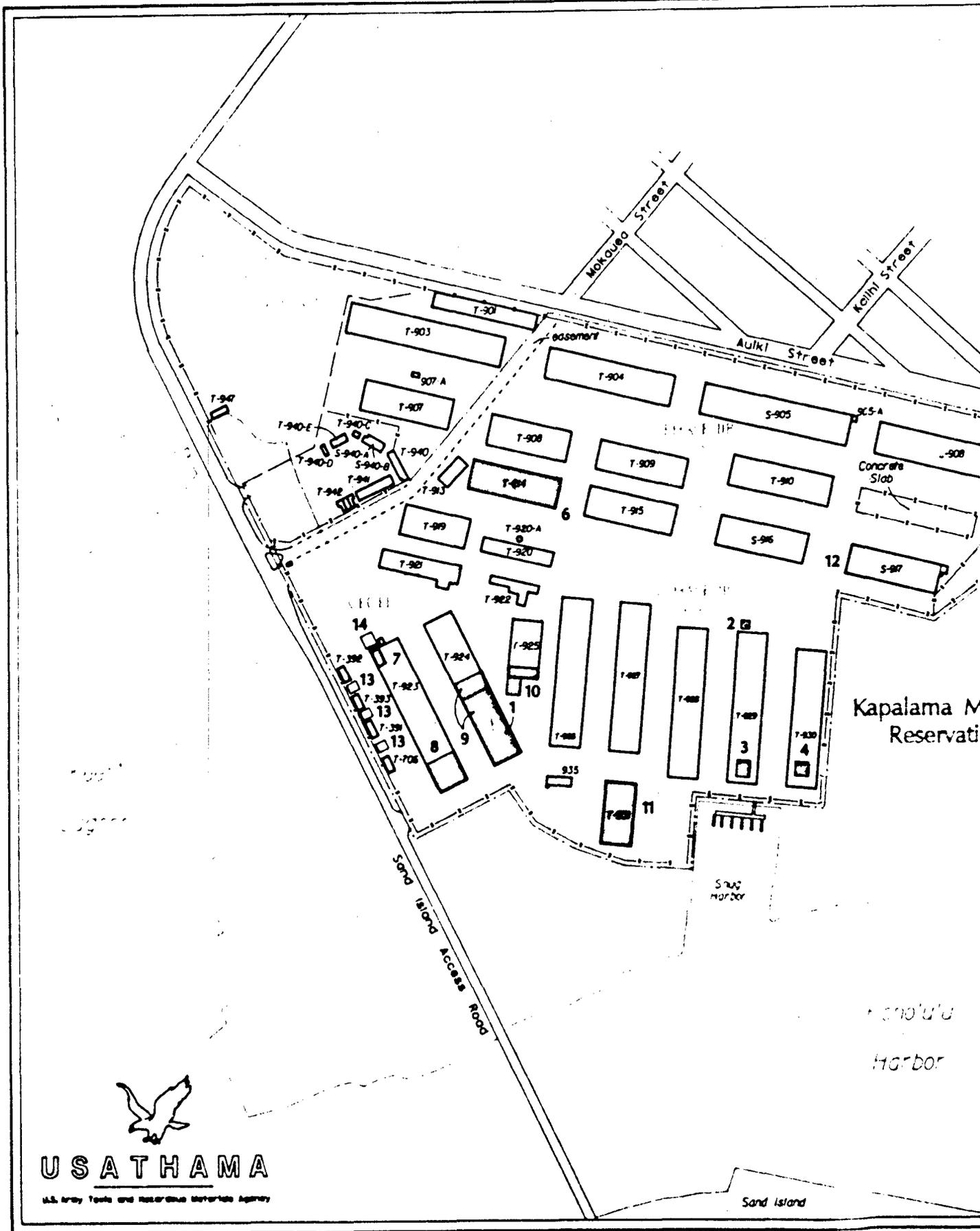
The coral reef and limestone under the facility are highly permeable. The water table is 3 to 5 ft below the surface. The groundwater is hydraulically connected to the harbor, and depth to water varies with the tidal action in the harbor. The water in this shallow aquifer is brackish and is not used as a water supply. The KMR facility is served by the City of Honolulu water and sewer system. There are no wells on the property. The closest known groundwater well is approximately one mile north (inland) at the Oahu State Prison.

#### **2.4.6 FLORA AND FAUNA**

KMR and the surrounding properties consist primarily of paved surfaces for industrial and commercial uses, plus adjacent streets and highways. A limited number of ornamental trees and shrubs exist in this urban area. It is, therefore, a very poor habitat for any wildlife. A few rodents, geckos, finches, and sparrows were observed during this site visit. Stray cats are reported to occasionally inhabit some areas of the facility.

#### **2.4.7 SENSITIVE ENVIRONMENT**

No endangered or threatened species are recorded on KMR nor would any be expected in this environment. (No wetlands were identified within 2 miles of the facility.)

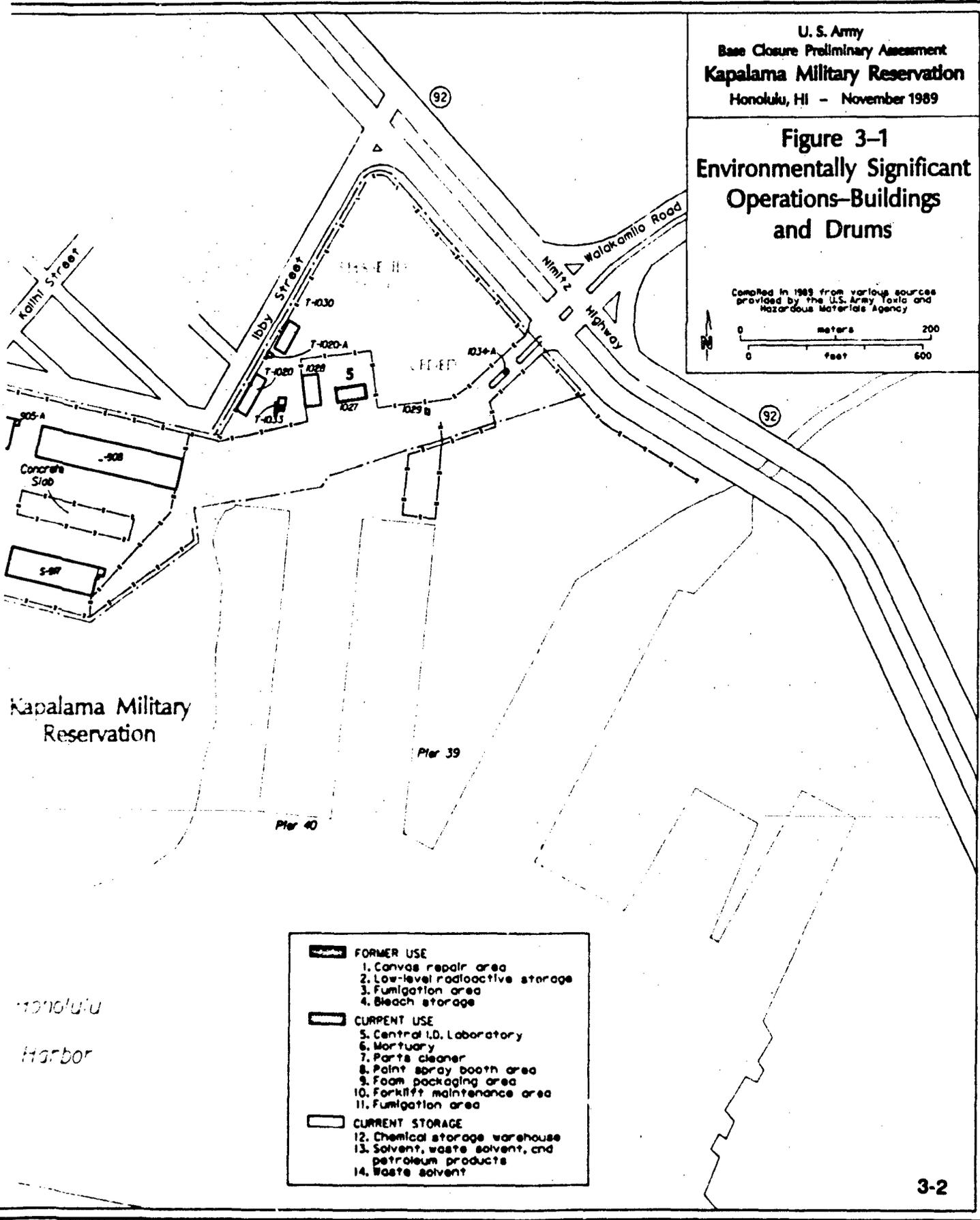
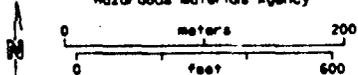


**USATHAMA**

U.S. Army Toxic and Hazardous Materials Agency

**Figure 3-1**  
**Environmentally Significant**  
**Operations-Buildings**  
**and Drums**

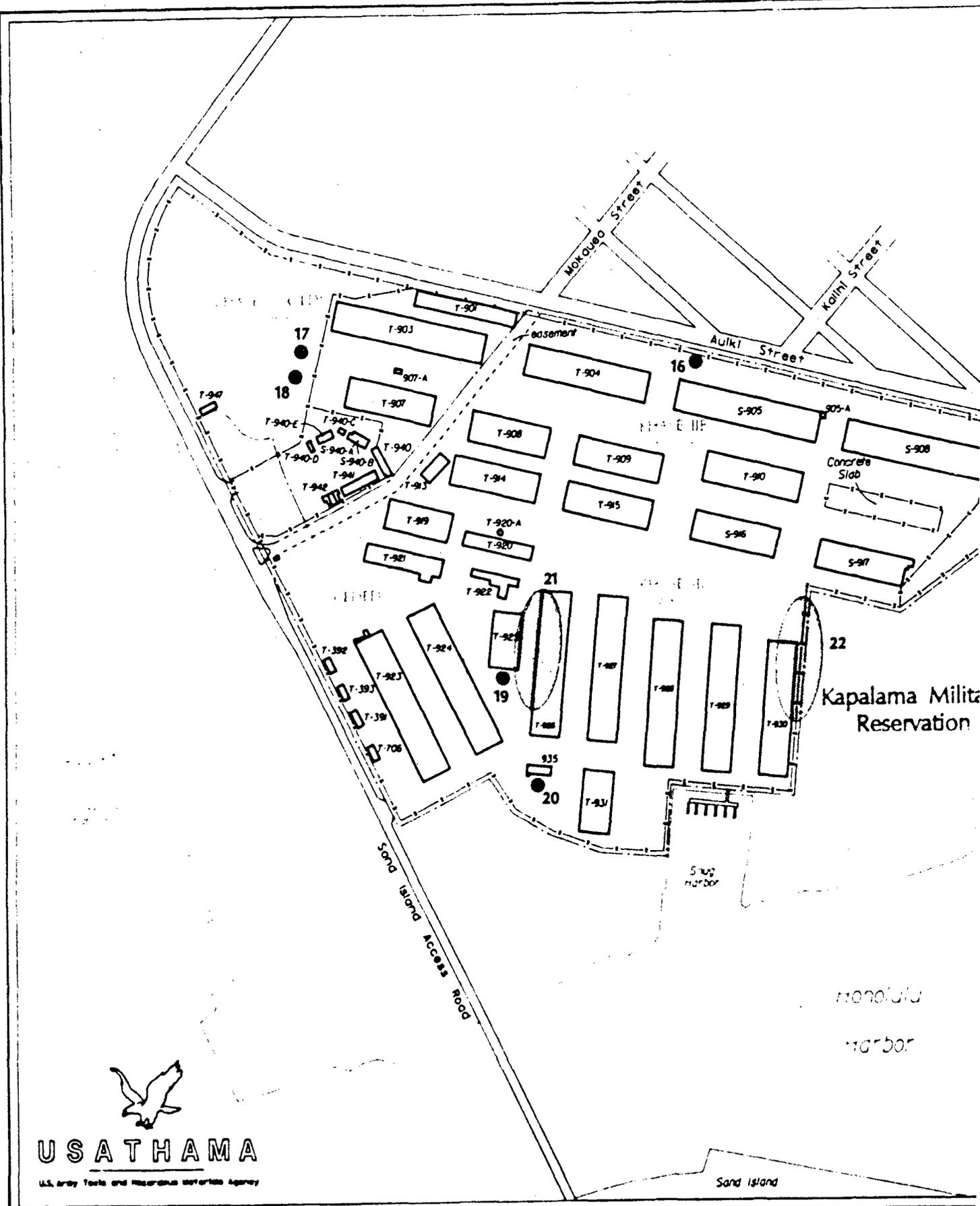
Compiled in 1989 from various sources provided by the U.S. Army Toxic and Hazardous Materials Agency



Kapalama Military Reservation

Honolulu Harbor

	<b>FORMER USE</b>
	1. Canvas repair area
	2. Low-level radioactive storage
	3. Fumigation area
	4. Bleach storage
	<b>CURRENT USE</b>
	5. Central I.D. Laboratory
	6. Mortuary
	7. Parts cleaner
	8. Paint spray booth area
	9. Foam packaging area
	10. Forklift maintenance area
	11. Fumigation area
	<b>CURRENT STORAGE</b>
	12. Chemical storage warehouse
	13. Solvent, waste solvent, and petroleum products
	14. Waste solvent



Kapalama Military Reservation

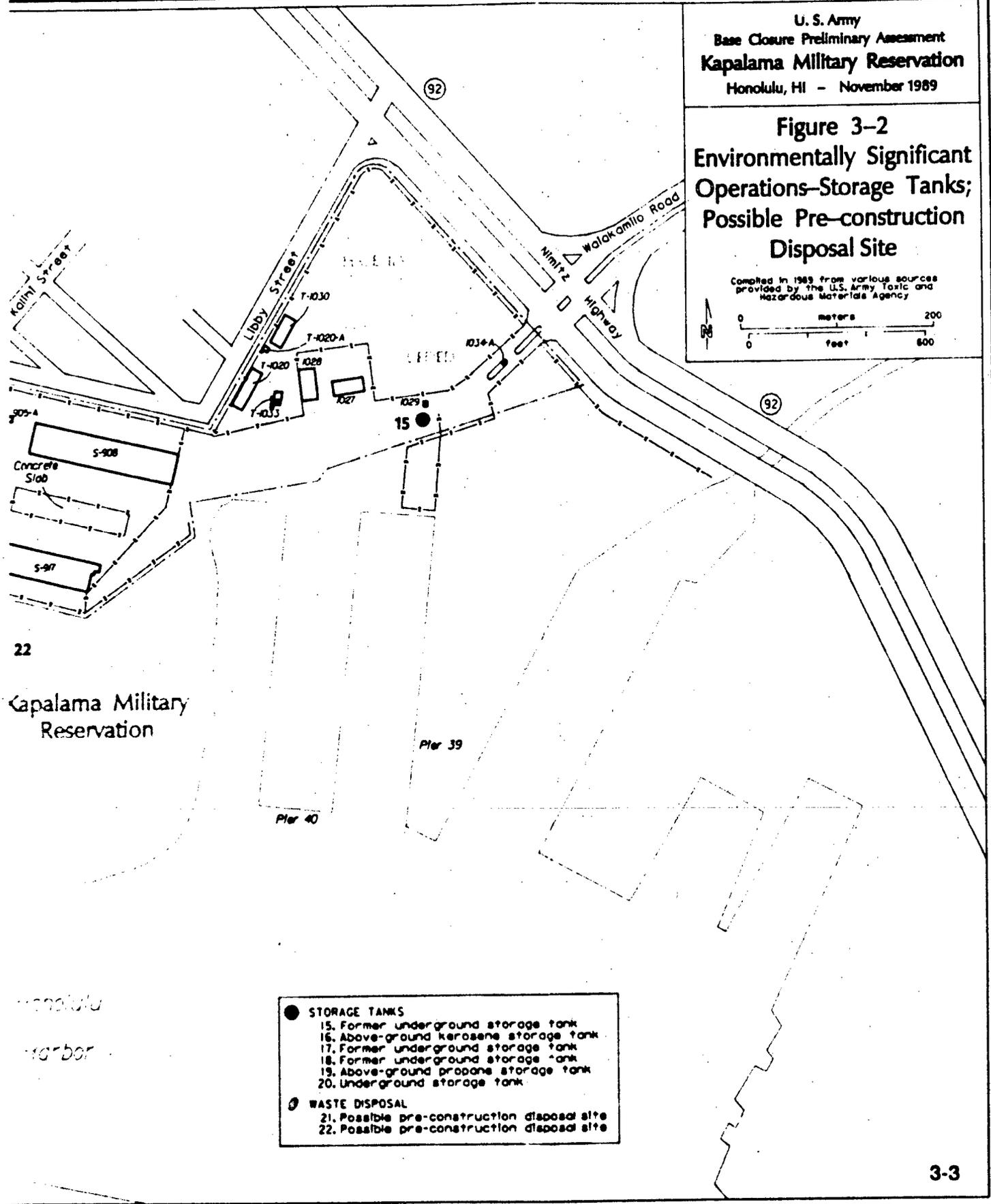
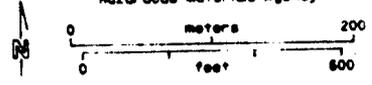


**USATHAMA**

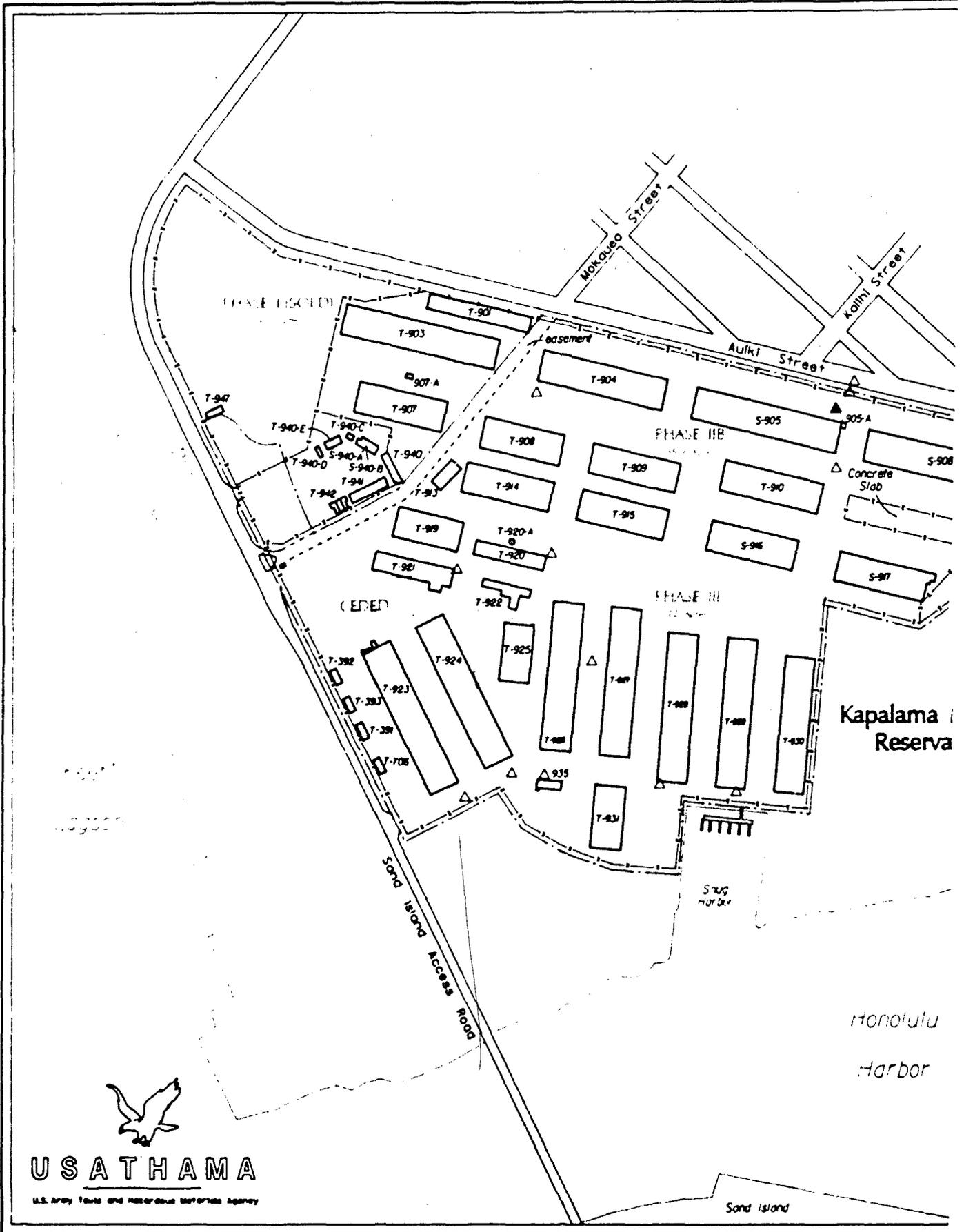
U.S. Army Toxic and Hazardous Materials Agency

**Figure 3-2**  
 Environmentally Significant  
 Operations-Storage Tanks;  
 Possible Pre-construction  
 Disposal Site

Compiled in 1989 from various sources  
 provided by the U.S. Army Toxic and  
 Hazardous Materials Agency



- STORAGE TANKS**
- 15. Former underground storage tank
  - 16. Above-ground kerosene storage tank
  - 17. Former underground storage tank
  - 18. Former underground storage tank
  - 19. Above-ground propane storage tank
  - 20. Underground storage tank
- ⊙ WASTE DISPOSAL**
- 21. Possible pre-construction disposal site
  - 22. Possible pre-construction disposal site



**USATHAMA**

U.S. Army Toxic and Hazardous Materials Agency



# **WESTON**

Examples of some of the materials stored in Building 917 are listed below. A more comprehensive list of materials is provided in the computerized inventory database presented in Appendix A.

- Battery acid (concentrated sulfuric) in 5-gal containers.
- Caustic cleaning compound (sodium hydroxide) of various sizes.
- Aromatic organic solvents such as toluene and xylene in 5 to 55-gal quantities.
- Low flash point solvents such as acetone and methyl ethyl ketone.
- Lindane (organochlorine pesticide).
- Paints, both aqueous and oil based, possibly containing lead and/or cadmium.

Examples of the contents of Building 917 are shown in photos 11 to 17.

The chemicals are stored on wooden pallets and/or metal shelves and racks, and no secondary containment is provided. The warehouse floor is concrete and marbled with cracks, some as large as 1/4 in. Any spills that may have occurred were washed out of the building into the storm drain in the parking area between the buildings. There are no floor drains in the building.

### **3.2.2 KNOWN AND SUSPECTED RELEASES**

At the time of this inspection, the warehouse was clean and there was no evidence of any current or previous spills. A shop steward who had worked at KMR for 20 years stated that there have been "...only a few minor spills over the years, never anything big [I-8]."

Any hazardous chemicals that were spilled could have entered cracks in the floor and remained there after surface cleanup was complete. It is not known how far into the slab these cracks penetrate or if any subsurface contamination has occurred.

The Corps of Engineers issued a 1988 report stating that subsurface samples collected around Building 917 were analyzed for the RCRA hazardous characteristics of ignitability, corrosivity, reactivity, and EP Toxicity [R-4]. All test results indicated the samples were not hazardous. Samples were also tested for total petroleum hydrocarbons (TPH). The report stated that TPHs were detected, but did not identify the number of samples or concentrations. The report further stated that the TPH levels were below those set by the U.S. Environmental Protection Agency. WESTON is unaware of any EPA TPH limitations for soils; therefore, this reference to a regulatory limit is unclear.



### **3.3 BUILDING 923 - SOLVENT CLEANING ROOM AND PAINT SPRAY BOOTH (WESTERN CEDED AREA)**

#### **3.3.1 DESCRIPTION**

Most of Building 923 is used for general storage, including office furniture and file cabinets. There are, however, two areas of concern regarding hazardous materials and the generation of small quantities of wastes.

At the west end of the building, a paint spray booth area (two booths) is used to paint items such as metal office desks and cabinets and small pieces of military hardware such as camouflage-painted vehicle parts. Both aqueous and oil-based paints as well as paint thinners and solvents are used in this area (photo 18).

The spray booths are the typical water-curtain type, with a trough at the bottom to collect the residues. The water is recirculated; there is no wastewater discharge. The current method for disposing of the paint residues is to manually remove the paint waste, allow it to air dry outdoors, and to place it in the trash dumpster. At this time, the water in the trough is hand bailed and dumped into an adjacent sink, which is connected to the sanitary sewer system. Less than 10 percent of the painting performed at this location involves camouflage paint, but some camouflage paints are known to contain lead or cadmium pigments. The exact chemical composition of the paints used is not known.

At the east end of the building is a small room used for solvent cleaning/degreasing of small equipment parts (mainly electronic) and vehicle maintenance. Chlorinated solvents, including trichloroethylene TCE, are used in this room on a limited basis (<10 gal/week). All degreasing operations are performed in a metal sink inside a fume hood, with exhaust directed outside of the building. The sink drain runs directly into a 55-gal drum in a small wooden shed outside the building (photos 19 and 21). The shed has a wooden floor resting on asphalt. There are no floor drains in the building and the floor itself is intact.

Two storage areas that contain hazardous materials and waste liquids are adjacent to Building 923. One area consists of racks containing 55-gal drums filled with fresh solvents such as paint thinners and chlorinated degreasing solvents. The other site is a wire-fenced area in which 55-gal drums of waste solvents from the paint booth and degreasing areas are stored on wooden pallets. Both of these drum storage areas are on the asphalt-paved area near the property perimeter fence along Sand Island Road (photos 22 and 24). Waste solvents and oil are transported by private contractor to Schoefield Barracks for disposal. There are no containment dikes of any type at either storage area. Both storage areas drain to the storm sewer system.



### **3.3.2 KNOWN AND SUSPECTED RELEASES**

There is no evidence of any spills in these storage areas. A spill from one of the outside drum storage areas could have resulted in contamination of the surrounding pavement and ground, and a release could have reached one of the storm drains in the area.

### **3.4 BUILDING 924 - CANVAS REPAIR AREA AND PACKAGING AREA** **(PHASE III - PARTLY WITHIN WESTERN CEDED AREA)**

#### **3.4.1 DESCRIPTION**

Two different operations are carried out in this building, and there is some general warehouse use. The "canvas repair area" operations include the repair of large tents used in military field operations and chemical-resistant suits used by emergency response personnel as well as a small upholstery shop for furniture repair.

One area of this building, approximately 500 sq ft at the east end, is the former "waterproofing area." These operations, which ceased in 1970, consisted of treating various fabric materials with a polymer-type water repellent agent. This area has a sloped floor, which would have channeled any spills directly to the sanitary sewer system (photos 25 and 26).

No chemicals were observed in the building. The interior of the building was clean. Some small rusted tanks (approximate size of 50 to 100 gal) are present in the building; these were reportedly used in a previous dip-type solvent degreasing operation. This operation occurred at least 15 years ago. The floor is cracked around the tanks. The tanks are now occasionally used for washing small parts with household-type cleaners.

The packaging area is a section of the building devoted to packing small to medium-sized containers in crates, using a two-part isocyanate foam. The items are usually chemical products, such as cleansers, solvents, and pesticides from Building 917, packaged in containers ranging in size from one pint to 5 gal. The items to be packaged are placed in the crates, the two components of the foam are mixed in a separate container, and then the blended liquid is poured around the items in the crate and allowed to expand. At the time of the site visit, some of the items packaged in this manner included corrosive alkaline cleaners and methyl ethyl ketone.

The polymeric isocyanate foam components are stored in separate containers and mixed only as needed. Any excess or spilled blended material is disposed of as a solid waste in one of the plant dumpsters once it has expanded and solidified (photos 27 and 28).

There are a few old rusted drums on pallets just outside Building 924. The pallets are located on asphalt, and the only drains in the area are connected to the storm sewer. These are labelled as containing "waste oil" and are now empty, except for 1 to 2 in. of what appears to be rainwater in two of the open drums (photo 29).

### **3.4.2 KNOWN AND SUSPECTED RELEASES**

There is no evidence of past or present spills in this area. The packaging operation could have caused contamination of the floor surface by the material being shipped. A potential spill from the outside drum storage area would likely enter the storm sewer system.

### **3.5 BUILDING 925 - MAINTENANCE AND REPAIR OF FORKLIFTS (PHASE III)**

#### **3.5.1 DESCRIPTION**

This smaller building (20,000 sq ft) is centrally located in the Phase III area and is used for some small parts storage. The activity with potential for environmental impact is the forklift maintenance activity, which is performed adjacent to Building 925.

Numerous propane forklifts are used throughout the KMR warehouse facility. Repair and maintenance of these vehicles, including the changing of fluids, is performed in and around Building 925. A variety of lube oils, greases, and hydraulic fluids are required for these activities. These materials are stored outside on the paved asphalt area southwest of the building. At the time of the site visit, the storage area appeared to be well maintained. Drums are mounted horizontally on metal racks. Drip pans and trays filled with absorbents are used with all drums that are in service. The asphalt shows a few small stains from what appear to have been service-related drips or spills (photos 30 and 31).

This maintenance area generates an average of 2 gal/week of waste oil and solvent. Waste oils and lubricants are stored in drums, and outside in the service yard area. Some drums are of the bung-type, while others are open top with weighted covers on them (photo 32). This area has no design containment (other than drip pans as noted above) and drains to the storm sewer system in the parking lot. Waste oil is delivered by a private contractor to Schoefield Barracks.

#### **3.5.2 KNOWN AND SUSPECTED RELEASES**

There is no evidence of a significant spill in or around Building 925. Small stains were noted, but appear to be the result of only minor quantities that were spilled during transfer operations. Potential spills from the storage area, if more than minor quantities, would drain into the storm sewer system and eventually discharge into the harbor.

### **3.6 BUILDING 926 - GENERAL STORAGE AND SEALED SOURCE RADIOACTIVE STORAGE (PHASE III)**

#### **3.6.1. DESCRIPTION**

This building is used predominantly for the general storage of furniture and small parts. A few boxes containing sealed low-level radioactive sources such as compasses are also kept here. The building, in general, appears to be well maintained.



### **3.6.2 KNOWN AND SUSPECTED RELEASES**

There is no evidence of leaks or spills of any type.

### **3.7 BUILDING 929 - GENERAL STORAGE AND FORMER PALLET FUMIGATION AREA (PHASE III)**

#### **3.7.1 DESCRIPTION**

The building is now used for the general storage of office equipment and small parts. However, a small part of the building was formerly used for the fumigation of wooden pallets. The purpose of this treatment was termite control, and it was used on all wooden and cardboard material transported from the island. The fumigation step was performed in Building 929 up until 1988 [I-11]. It is now handled in Building 931 by a private contractor, as described in Subsection 3.10.

The fumigation process in Building 929 took place in a large chamber (approximately 20 ft x 40 ft) that is still intact. It has wooden walls and a fibrous insulation-type material on the ceiling. A portion of this ceiling material has become partly detached and is hanging in the chamber. A strong organic chemical-type odor is still evident in the chamber, which has remained closed since the fumigation activities ceased (photos 33 to 35). The name of the insecticide used was not available.

#### **3.7.2 KNOWN AND SUSPECTED RELEASES**

Pursuant to the National Environmental Policy Act, an Environmental Assessment prepared by the Army Corps of Engineers in November 1988 indicated that samples taken from the former fumigation room in Building 929 contained 40 mg/kg of PCP (pentachlorophenol) and 0.45 mg/kg of 2,4-D (2,4-dichlorophenoxyacetic acid) [R-4]. The report further stated that the current allowed EPA limit of 10 mg/kg of 2,4-D was not exceeded; however, the PCP-contaminated material must be disposed of as a hazardous waste [R-4]. The 10 mg/kg limit of reference is for the RCRA hazardous characteristics of extraction procedure (EP) toxicity testing. It is unclear whether the results cited refer to direct analysis of the samples or to EP toxicity. In any case, the results indicate the material is not a hazardous waste due to 2,4-D. In regard to PCP, the current RCRA regulations list discarded, unused portions of this substance as a hazardous waste (F027). Contaminated surfaces would not be included under this designation. No containers of discarded, unused PCP (or any other insecticide) were observed in the fumigation room. There is no EPA hazardous waste code for materials contaminated with PCP.

In the same report, TPHs were detected near the west end of Building 929; however, these levels were described as "not above the allowable limits established by the Environmental Protection Agency." The sample media are unclear, but appear to be subsurface soils. Current EPA regulations do not specify TPH limits for soils, and the report's reference to a regulatory limit is unclear.



### **3.8 BUILDING 929-A - FORMER SEALED SOURCE RADIOACTIVE STORAGE (PHASE III)**

#### **3.8.1 DESCRIPTION**

This small one-story brick structure, approximately 200 sq ft in area, is the former "sealed source radioactive storage building." According to KMR personnel, items such as compasses and watches with low levels of radioactivity were stored in Building 929-A until approximately March 1989. The building was locked and inaccessible at the time of the site visit. It is reported to be empty and no longer in use (photo 36).

#### **3.8.2 KNOWN AND SUSPECTED RELEASES**

There have been no reports of any radioactive releases in or around this building. However, there is a potential for radioactive contamination of building surfaces.

### **3.9 BUILDING 930 - GENERAL PURPOSE STORAGE (PHASE III)**

#### **3.9.1 DESCRIPTION**

This building is currently used to store general supplies such as office equipment and miscellaneous small mechanical parts.

Until approximately 10 years ago, large quantities (palletized containers) of super tropical bleach (STB) were stored in this building. STB is a solid (granular) inorganic chlorinated compound used for decontamination purposes for personnel and equipment. There are no floor drains in the building, although the concrete floor is cracked in several places.

There are approximately one dozen used automobile radiators stored on pallets outside of Building 930, near the main door (photo 37). These radiators do not contain any antifreeze, which was reportedly drained into the storm sewers [I-11].

#### **3.9.2 KNOWN AND SUSPECTED RELEASES**

It was reported that several spills occurred during the years that STB was stored there. These were reportedly swept up and any residue was flushed with hoses to the paved area outside the building. The drainage from this paved area empties into the storm sewers.

### **3.10 BUILDING 931 - GENERAL STORAGE AND FUMIGATION AREA (PHASE III)**

#### **3.10.1 DESCRIPTION**

The ESO in Building 931 involves the fumigation of wooden and cardboard materials. This operation has replaced the fumigation process that was formerly performed in Building 929, as discussed in Subsection 3.7. Building 931 has been used for this purpose for approximately one year. Any



items made of wood or cardboard that are transported from the island must first be fumigated for termites and other insects. A commercial insecticide, Vikane (sulfuryl fluorides), produced by Dow Chemical Co. is used.

The fumigation procedure was described as follows. Items, such as pallets, wooden crates, cardboard packages, etc., are placed in the fumigation area at the end of the building and a "tent" is placed over them. The building is closed for 24 hours while the Vikane vapor is applied in the tent and allowed to dissipate [I-11]. Currently, fumigation of wood or cardboard products usually occurs once every two to three weeks. This activity is performed by a private contractor.

The building is set on a concrete pad; the walls are Transite. Exposed wooden areas include sliding doors as well as beams and supports (photos 38 and 39).

Building 931 was also identified during interviews as the primary area for chemical storage prior to 1978 [I-2]. As noted in Subsection 3.2, Building 917 now serves as the chemical warehouse. Currently, Building 931 is used for general storage. Gallon cans of the paint and lithium dry batteries, along with office equipment items, were observed during the site visit. The paint and batteries were wrapped in cardboard packaging and stored on pallets and may only have been staged there prior to fumigation and shipment.

### **3.10.2 KNOWN AND SUSPECTED RELEASES**

The fumigation operation is likely to contaminate the interior surfaces of this building. The tent does not provide an absolute seal during the fumigation process, and, in any case, the Vikane vapors are allowed to dissipate within the building after each application.

## **3.11 BUILDINGS 1027/1028 - THE CENTRAL IDENTIFICATION LABORATORY (PHASE II)**

### **3.11.1 DESCRIPTION**

These two small adjacent buildings contain the Pacific Area Central Identification Laboratory. They are located in the Phase II-A area in the northeast corner of KMR. Unidentified remains of bodies (bones, dental work, clothing) throughout the Pacific/Asia area are brought here for identification. The chemicals typically used and stored in the building are x-ray and photographic film fixatives and developing agents. In addition, small quantities of radioactive sources are contained in the x-ray equipment used in these buildings. These dark room chemicals are stored in metal lockers in quantities ranging from one pint to one gal. There are no floor drains, and all sinks drain directly to the city sanitary sewer system.



### **3.11.2 KNOWN AND SUSPECTED RELEASES**

There is no evidence of any spill or release from the identification operation. All chemical wastes from the x-ray and film activities are flushed down the sinks and into the sanitary sewer system.

## **3.12 FORMER UNDERGROUND STORAGE TANK (PHASE II)**

### **3.12.1 DESCRIPTION**

No underground storage tanks (UST), either in service or abandoned, were reported to be present in the Phase II area [I-2]. No vents, fill caps, or other indications of USTs were observed. It was reported by Unitek Environmental Consultants, Inc., in a 1988 report, that there had been an abandoned fuel pump station (i.e., dispensing pump) in the far northeast corner of the property (Phase II-A) [R-2]. This area was fenced and locked during WESTON's visit and access was not pursued because Phase II was not within the primary scope of our investigation at that time. According to the Corps of Engineers Pacific Ocean Division (CEPOD), this tank, plus an oil/water separator, an oil sump, and a hydraulic lift were removed in October 1989 [R-8]. Reportedly, soil samples were collected during this removal activity. However, a report documenting the results of the soil analyses has not yet been issued.

### **3.12.2 KNOWN AND SUSPECTED RELEASES**

There are no reports of any spills or releases in this area. As noted, the area was not inspected during the site visit.

## **3.13 UNDERGROUND STORAGE TANK (PHASE III)**

### **3.13.1 DESCRIPTION**

The only identified underground storage tank in either the Phase II or Phase III area is adjacent to Building 935. This small building is used by the Hawaiian Telephone Company and contains telephone cables and switching equipment. The tank contains diesel fuel for an emergency electrical generator; its capacity is 550 gal. The tank is constructed of fiberglass, and was leak tested when installed in March 1987 [T-2]. Neither the building nor tank were accessible. The fill line was visible; it protruded through the asphalted paving outside the building. This tank is owned by the U.S. Army and maintained by the Hawaiian Telephone Company.

### **3.13.2 KNOWN AND SUSPECTED RELEASES**

There is no evidence of any spill or release from this tank. There was no visible staining of the asphalt in the vicinity of the fill line.



### **3.14 ABOVEGROUND STORAGE TANK - KEROSENE (PHASE II)**

#### **3.14.1 DESCRIPTION**

An approximately 300-gal capacity tank is used to store kerosene (photo 40). The tank is set on asphalt pavement, adjacent to a grassy area. No form of secondary containment for the kerosene tank is provided. There are no drains nearby.

#### **3.14.2 KNOWN AND SUSPECTED RELEASES**

There is no evidence of any spills around the tank. The asphalt around the tank is not stained. Any spills or overflows from the tank would drain to either the storm sewer or the grassy area.

### **3.15 ABOVEGROUND STORAGE TANK - PROPANE, BUILDING 925 (PHASE III)**

#### **3.15.1 DESCRIPTION**

A 5,000-gal capacity liquid propane tank is located next to Building 925 (photo 41). The primary purpose of this tank is to fuel the forklifts.

#### **3.15.2 KNOWN AND SUSPECTED RELEASES**

There is no evidence of any releases attributed to this tank. In any case, no residual contamination would result from a propane release, which would be gaseous.

### **3.16 ABOVEGROUND STORAGE TANKS - PROPANE, BUILDINGS 921 AND 922 (PHASE II - PARTLY WITHIN WESTERN CEDED AREA)**

#### **3.16.1 DESCRIPTION**

Interviews with KMR personnel [I-2] and review of facility site plans indicated that there were two propane tanks adjacent to Buildings 921 and 922 in the Phase II area, but these were not observed during the site visit, which concentrated on Phase III. The reported capacities of these tanks are 500 gal and 150 gal, respectively.

#### **3.16.2 KNOWN AND SUSPECTED RELEASES**

There are no reports of any releases from either tank. As noted previously, any releases would be gaseous.

### **3.17 ASBESTOS (ALL AREAS)**

#### **3.17.1 DESCRIPTION**

This assessment included all of the buildings in Phase III at KMR, as well as selected buildings in the Phase II area. Many of the buildings at KMR are constructed with Transite siding, a material known to contain asbestos



fibers. The presence of asbestos in various materials was confirmed in a 1988 report by Unitek Environmental Consultants, Inc. [R-3]. The siding is cracked and broken in many locations along the lower sides of the buildings; this appears to be a result of vehicular impacts (photos 42 to 44).

Interior areas of several of the buildings inspected appear to contain asbestos in some ceiling tiles, wallboard, and floor tiles. Some sections of roofing panels and awnings also appear to be made of asbestos-containing materials, but this was not confirmed by close observation.

In a 1988 Army COE report, numerous buildings were identified as containing asbestos materials [R-4]. Table 2 from that report is included in this report as Table 3-1. In their report, the COE recommended that "All buildings with one percent or greater amounts of asbestos containing materials should be removed prior to sale of the property." The one percent figure is apparently based on the Toxic Substances Control Act (TSCA) asbestos abatement regulations, which define friable asbestos material as containing more than one percent asbestos.

### **3.17.2 KNOWN AND SUSPECTED RELEASES**

There is no documentation of asbestos released. The potential exists for exposure to asbestos from damaged materials. If such a problem exists, it is of primary concern inside the buildings as no asbestos would be expected to accumulate outdoors.

## **3.18 TRANSFORMERS (ALL AREAS)**

### **3.18.1 DESCRIPTION**

There are approximately 40 oil-filled transformers on the KMR facility. All 16 transformers in the Phase III area are located on poles. Most of those in the Phase II area are also on poles, except for two that are pad mounted. A ground level inspection of the pole-mounted units was conducted, but name plate information could not be distinguished at that distance. A map (Figure 3-3) shows the location of the transformers. Each location shown on Figure 3-3 may represent from one to three transformers, depending on how many are mounted on a pole.

All transformers in the Phase III area and most in the Phase II area were observed. They appeared to be of various ages; some were rusted, while others appeared to be in good condition (photos 45 and 46).

An Army COE report states that "A name-plate survey ... in 1983 indicated that no transformers containing PCBs were identified at KMR." [R-4]. It should be noted that no transformer fluids were tested for PCBs, and the name plate data are not specific in this regard. Therefore, it should be assumed that all transformers potentially contain PCBs. The only other possible PCB source observed during this visit was the numerous fluorescent light fixtures throughout the buildings. These could contain small amounts of PCBs in their ballast units.



Table 3-1

Buildings Containing Asbestos  
Kapalama Military Reservation

Building	Area Sampled	Results
Phase IIA		
1020 <sup>a</sup>	Corrugated Transite siding	Chrysotile, 5% <sup>b</sup>
1027	Roofing material awning	Chrysotile, 5% <sup>b</sup>
1028	Roofing material awning	Chrysotile, 5%
Phase IIB		
904	Corrugated Transite siding	Chrysotile, 60% <sup>b</sup>
905	Office floor tile	Chrysotile, 1%
905	Roofing material awning	Chrysotile, 5% <sup>b</sup>
906	Corrugated Transite siding	Chrysotile, 60% <sup>b</sup>
906	Office floor tile	Chrysotile, 1%
908	Corrugated Transite siding	Chrysotile, 60% <sup>b</sup>
909	Corrugated Transite siding	Chrysotile, 60% <sup>b</sup>
914	Roofing material awning	Chrysotile, 5% <sup>b</sup>
916	Roofing material awning	Chrysotile, 5% <sup>b</sup>
917	Roofing material awning	Chrysotile, 5% <sup>b</sup>
919	Corrugated Transite siding	Chrysotile, 60% <sup>b</sup>
920	Front office floor tile	Chrysotile, 5%
921	Office floor tile	Chrysotile, 2%
921	Roofing material awning	Chrysotile, 5% <sup>b</sup>
923	Women's restroom, floor tile	Chrysotile, 1%
923 <sup>c</sup>	Clean room, particle wallboard	Chrysotile, 45%
925	Corrugated Transite siding	Chrysotile, 60%

<sup>a</sup>Building has been demolished.

<sup>b</sup>Although the building was not sampled, it contains materials similar to those in buildings that were confirmed to have asbestos.

<sup>c</sup>Within Western Ceded Area.

Reference: [R-4]

# WESTERN

## **3.18.2 KNOWN AND SUSPECTED RELEASES**

None of the transformers in the Phase III area, either the units themselves, the poles, or the ground below, showed any sign of leakage.

Two apparent minor leaks were observed in the Phase II area. A large pad-mounted, high voltage transformer between Buildings 905 and 906 had a small leak near its top; the name plate did not indicate the type of dielectric fluid used (photo 47). Two pole-mounted transformers are located just inside the perimeter fence, near Building 905 (pole 54). One of these appears to have a small leak (photo 48). In both cases, no free liquids were observed on or around the transformers. The term "leak" refers to staining on the outside of the transformer.

## **3.19 CONCRETE PAD (WESTERN CEDED AREA)**

### **3.19.1 DESCRIPTION**

A small concrete pad, approximately 10 ft x 20 ft, is located near the east end of Building 923 in the asphalt-paved parking lot (photo 49). Interviews with KMR personnel revealed two conflicting possible former uses that may have had potential environmental impacts.

One report indicated that the pad was used as a staging area for both new and used transformers as they were transferred on and off of the facility [I-6]. The other version was that a dip tank for termite-proofing pallets was formerly located on the pad. All parties reported that the pad has been unused for the last 5 to 6 years. No spill containment is provided around the pad.

### **3.19.2 KNOWN AND SUSPECTED RELEASES**

There is no evidence of any past or present spills at this site. Any spills could potentially have been washed to the storm sewer system.

## **3.20 FORMER RAILROAD TRACK/UNLOADING AREA (ALL AREAS)**

### **3.20.1 DESCRIPTION**

Railroad tracks formerly ran from offsite locations, including the adjacent piers, onto KRM and between the various warehouse buildings. Supplies were then unloaded directly into the warehouses from the rail cars. These tracks were removed about 20 years ago (1968-70), and the track bed area was covered with asphalt. Building 931 was the only chemical warehouse identified as being present before 1970.

### **3.20.2 KNOWN AND SUSPECTED RELEASES**

There is no record of any spills from unloading or railroad operations. Given that the tracks were removed 20 years ago, no such records would be expected, except for catastrophic events. However, spills due to unloading operations are not uncommon, and it is prudent to assume that some chemical releases could have occurred.



### **3.21 POSSIBLE PRE-CONSTRUCTION DISPOSAL SITE (PHASES II & III)**

#### **3.21.1 DESCRIPTION**

In the 1930s and early 1940s, the City and County of Honolulu may have operated a municipal dump on land that now comprises Phases II and III of KMR. A reference to this activity has been supplied by the Corps of Engineers Pacific Ocean Division (CEPOD) [R-8], which in turn references a 1946 real estate appraisal prepared for the U.S. Department of Justice [R-10]. A topographical map supplied by CEPOD shows two areas (as shown on Figure 3-2) that are designated as "C&C Dump." No other information is known as to the extent or type of materials that may have been placed in this dump.

#### **3.21.2 KNOWN AND SUSPECTED RELEASES**

There are no known releases from the possible dump areas. However, the site is unlined and the water table is close to the surface; therefore, any waste present in the site would likely have migrated to the groundwater. The identity of any possible contaminants is unknown because the sources and nature of the wastes that may have been received are not documented.



## SECTION 4

### HUMAN AND ENVIRONMENTAL RECEPTORS

In this section, the pathways by which human and environmental receptors may be exposed to site-related chemicals are discussed.

#### 4.1 GROUNDWATER

Because almost all of the KMR property is paved, infiltration and percolation to the groundwater is minimal. Furthermore, the groundwater in this tidal area is brackish. The City of Honolulu supplies water to this area for human use. If any contaminants were to penetrate the asphalt or concrete floors of the buildings through cracks, they would reach the groundwater 3 to 5 ft below. The groundwater would eventually discharge to the Honolulu Harbor; however, the concentrations would be expected to be quite dilute. The variety of aquatic life in the harbor of this industrial/commercial area is expected to be limited and adapted to suboptimal environmental quality. Therefore, the effects on human and environmental receptors exposed to groundwater will be negligible or non-existent.

#### 4.2 SURFACE WATER

There are no surface water bodies (streams, ponds, etc.) onsite. Storm water runoff is collected by storm water sewers and is discharged to Honolulu Harbor. Any past spill would eventually have been washed to the harbor or to the storm sewer. No ongoing discharges or surface contamination was apparent during the site inspection; therefore, no impact on human and environmental receptors from surface water is expected.

#### 4.3 SOIL

Most of the KMR site is paved with asphalt. What soil exists is primarily on a strip of land along the perimeter fence and a small strip of land in front of the mortuary. The soil is not known to be contaminated. If an aboveground kerosene tank near Building 905 leaked, soil near the tank may have been contaminated. Depending on the contaminant levels, this soil could pose an inhalation or direct contact exposure risk to personnel working in the area.

#### 4.4 AIR

No permanent sources of air contaminants are known to be present onsite; therefore, no human or environmental receptors would be impacted by air contaminants at the site. However, the potential exists for exposure to asbestos from the ceiling tiles or siding in some of the buildings if they are removed or damaged.



## **4.5 OTHER HAZARDS**

### **4.5.1 FIRE AND EXPLOSIONS**

Transformers represent a certain, but small risk of fire and explosion. However, this risk does not appear to be any greater at KMR than at other industrial sites. No other fire and explosion hazards will exist at the site once chemicals stored at the site are removed prior to property transfer and the propane storage tanks are emptied.

### **4.5.2 DIRECT CONTACT**

Building surfaces, if contaminated, may provide a direct contact hazard to site personnel. The walls and floors of buildings that housed hazardous materials may have absorbed contaminants that could be contacted by personnel at a later time. Such buildings include Buildings 917, 923, 924, 929, 929-A, 930, 931, and the concrete pad near Building 923.



## SECTION 5

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 SUMMARY OF FINDINGS

The Kapalama Military Reservation is a large urban warehouse facility in the Honolulu, Hawaii, harbor area. The 30 buildings on the property are approximately 45 years old and are constructed of various materials such as wood siding, Transite (asbestos) siding, and corrugated metal. Most buildings are built on a concrete pad and contain warehouse items such as furniture, documents, foodstuffs, and spare equipment parts. At the time of this site visit, all areas that were checked were maintained in a clean and orderly manner. This includes active work areas such as the forklift maintenance area and the foam packaging department.

This facility is located in a commercial/industrial area. Drinking water in the area is supplied by the City of Honolulu. Groundwater is brackish and tidal in nature. All surface runoff discharges to the Honolulu Harbor. The facility is largely paved and well maintained. There are few operations that would adversely impact local human and environmental receptors. These operations are summarized in the following subsections.

##### 5.1.1 BUILDINGS

Some of the buildings pose a potential hazard because they contain materials of asbestos construction. In addition, certain indoor operations could have resulted in contamination of building surfaces. Buildings 929 and 931 each house a pesticide fumigation area. The operation in Building 931 is still active, while the one in Building 929 was discontinued in 1988. Both operations could have resulted in contamination of floors, ceilings, and walls.

Ongoing operations in other buildings may have in the past potentially posed contamination hazards to various surfaces. These include the chemical warehouse in Building 917, the parts cleaning and painting operations in Building 923, the Building 924 packaging area, and the two radioactive storage areas in Buildings 926 and 929-A.

##### 5.1.2 SUBSURFACE SOILS AND GROUNDWATER

Contamination of subsurface soil by petroleum hydrocarbons was detected in and around Buildings 917 and 929. Petroleum hydrocarbons were also detected offsite on the former Phase I property. The presence of underground fuel pipelines on adjacent property was also confirmed. These activities indicate the potential for significant subsurface contamination of the property. The depth to groundwater is only a few feet; therefore, any significant soil contamination will impact the groundwater. However, due to the proximity of the site to Honolulu Harbor and Keehi Lagoon, effects of groundwater contamination on human health and the environment are minimum. This is an industrial/commercial area, and groundwater is not used as a drinking water source.



### **5.1.3 SURFACE SOILS AND SEDIMENTS**

With the exception of the aboveground kerosene tank near Building 905, almost the entire site is asphalt paved, and any past spills would likely have entered Honolulu Harbor, either as direct runoff or through the storm sewer system. Due to the impervious nature of the asphalt, it is unlikely that surface soils would be contaminated by a spill unless the pavement was cracked where the spill occurred. Any past spills that entered the storm sewers could have resulted in contamination of sediments in the sewers.

### **5.1.4 DRUM LIQUIDS**

Drum liquids of unidentified contents are located outside Building 924. These are labeled as waste oil, but may contain only rainwater.

### **5.1.5 CONCRETE PAD**

A concrete pad near Building 923 was reportedly used either to stage transformers or to support a dip tank as part of a termite-proofing operation.

### **5.1.6 UNDERGROUND STORAGE TANKS**

An underground storage tank in the Phase II-A area was removed in October 1989. Results of soil analyses to determine whether contamination exists are not yet available. An underground storage tank of unknown capacity does exist adjacent to Building 935; it has not been leak tested.

### **5.1.7 TRANSFORMERS**

All transformers on the site potentially contain PCBs, although this has not been confirmed. Two transformers appeared to have leaked in the past, as evidenced by stains on the casings.

### **5.1.8 POSSIBLE PRE-CONSTRUCTION DISPOSAL SITE**

The City and County of Honolulu may have operated a municipal dump on the site before KMR was constructed.

## **5.2 RECOMMENDATIONS FOR FURTHER ACTION**

No conditions were observed on the property that appear to represent an immediate substantial threat to human health or the environment. However, the ESOs discussed in Section 3 have the potential to affect human health or the environment. These recommendations are summarized in Table 5-1 and shown in Figure 5-1. Accordingly, the recommended sampling of the property is presented in the following subsections.

### **5.2.1 BUILDINGS**

Wipe, destructive, and dust sampling of building interiors is recommended for most of the primary ESOs discussed in Section 3. Specific sampling recommendations are set forth in Table 5-1. The presence of asbestos

Table 5-1

## ESOs Identified at Kapalama Military Reservation and Recommendations for Further Action

ESOs	Location	Concern	Recommended Activity	Number of Samples Recommended	Location	Sample Type	Analysis
Buildings 913/914 - Mortuary	Phase II	VOCs	No further investigation				
Building 917 - Hazardous Material Storage	Phase II	Pesticides RCRA Metals VOCs, TPH	Site investigation	4	Evenly distributed, one near entrance	Wipe	Pesticides/ Herbicides <sup>a</sup>
				4	In cracked areas, evenly distributed	Destructive	Pesticides/ Herbicides RCRA Metals <sup>b</sup>
				4	Under cracked areas	Surface soil under floor	Pesticides/ Herbicides RCRA Metals, TPH <sup>c</sup>
Building 923 - Solvent Wiping Room and Spray Booth	Western Ceded Area	Chlorinated Hydrocarbons Pb, Cd	Site investigation	1	Building floor	Dust	Pb, Cd
				1	Paint booth floor	Destructive	Pb, Cd
				3	Paint booth walls/ceiling	Destructive	Pb, Cd
Building 924 - Canvas Repair Area & Packaging Area	Phase III/ Western Ceded Area	Pesticides RCRA Metals	Site investigation	1	Floor near packaging area	Destructive	Pesticides/ Herbicides RCRA Metals
Building 924 - Former Solvent Dip Operation	Phase III/ Western Ceded Area	VOCs	No further investigation				
Buildings 923/924 - Road Drainage	Western Ceded Area	Pesticides RCRA Metals	Site investigation	1	Storm sewer inlet	Sediment	Pesticides/ Herbicides RCRA Metals
Building 925 - Maintenance & Repair of Forklifts	Phase III	Chlorinated Organics, TPH	No further investigation				

Hazardous Substance List (HSL) pesticides and herbicides, plus phenoxy acid herbicides, light metals defined in 40 CFR 261 pursuant to the Resource Conservation and Recovery Act (RCRA).

Total petroleum hydrocarbons.

Volatile organic compounds.

Hazardous Substance List Compounds.

— = Not applicable.

Table 5-1

ESOs Identified at Kapalama Military Reservation and Recommendations for Further Action  
(continued)

ESOs	Location	Concern	Recommended Activity	Number of Samples Recommended	Location	Sample Type	Analysis
Building 926 - General Storage and Sealed Source Radioactive Storage	Phase III	Radioactivity	Site investigation	NA	Building surfaces	Instrumentation sweep	Radioactivity
Building 929 - General Storage and Former Pallet Staging Area	Phase III	Pesticides	Site investigation	6-10	Floor, walls, ceiling	Destructive	Pentachloro-phenol; 2,4-D
Building 929A - Former Sealed Source Radioactive Storage	Phase III	Radioactivity	Site investigation	NA	Building surfaces	Instrumentation sweep	Radioactivity
Building 930 - General Storage	Phase III	Oxidizer	No further investigation				
Building 931 - General Storage and Fumigation Area	Phase III	Pesticides RCRA Metals	Site investigation	4	Walls, ceiling, floor	Destructive	Pentachloro-phenol
Buildings 1027/1028 - The Central Identification Laboratory	Phase II	Photographic Chemicals	No further investigation				
Former Underground Storage Tank (Near Buildings 1027 & 1033)	Phase II	TPH	Report review (soil sampling results)	NA		NA	NA
Former Underground Storage Tank (Adjacent to Building 935)	Phase III	TPH	No further investigation	NA		NA	NA
Former Underground Storage Tank - Rosene	Phase II	TPH	Site investigation	2	Adjacent to tank	Surface soil (0-6 in)	TPH

azardous Substance List (HSL) pesticides and herbicides, plus phenoxy acid herbicides.  
 ight metals defined in 40 CFR 261 pursuant to the Resource Conservation and Recovery Act (RCRA).  
 otal petroleum hydrocarbons.  
 olatile organic compounds.  
 azardous Substance List Compounds.

NA = Not applicable.

173M2-4

Table 5-1

ESOs Identified at Kapalama Military Reservation and Recommendations for Further Action  
(continued)

ESOs	Location	Concern	Recommended Activity	Number of Samples Recommended	Location	Sample Type	Analysis
ground Storage Tank - ne. Bldg 925	Phase III	Propane	No further investigation	NA	NA	NA	NA
ground Storage Tanks - ne. Bldgs 921, 922	Phase II/ Western Ceded Area	Propane	No further investigation	NA	NA	NA	NA
Asbestos	All Areas	Asbestos	Phase III buildings	As required	Suspect materials	Destructive	Asbestos
Transformers	All Areas	PCBs	Site investigation	40	All transformers	Dielectric fluid	PCBs
Waste Pad	Western Ceded Area	PCBs Pesticides	Site investigation	2	Top of pad	Destructive	PCBs, Pesticides
RR Railroad Track/ Loading Area	All Areas	Pesticides, VOCs, RCRA Metals, TPH	Site investigation	6	Adjacent to loading dock	Surface soil under asphalt	Pesticides, RCRA Metals
Petroleum Spill Areas (site)	All Areas	TPH	Site investigation	15-20	Plantwide	Soil boring	TPH
Petroleum Pipelines (site)	NA	TPH	Site investigation	5-10	Plantwide	Groundwater	TPH, VOCs <sup>d</sup>
Petroleum Storage Tank (site)	NA	TPH	Site investigation	(Included in Petroleum Spill Areas)	(Included in Petroleum Spill Areas)		TPH
Pre-Construction Site	Phase II/ III	Undefined	Site investigation	2	1 in each disposal area	Soil boring (composite)	HSL <sup>e</sup>
				2	1 in each disposal area	Groundwater	HSL

Hardness Substance List (HSL) pesticides and herbicides, plus phenoxy acid herbicides.  
<sup>d</sup> metals defined in 40 CFR 261 pursuant to the Resource Conservation and Recovery Act (RCRA).  
<sup>e</sup> petroleum hydrocarbons.  
<sup>f</sup> inorganic compounds.  
<sup>g</sup> Hardness Substance List Compounds.

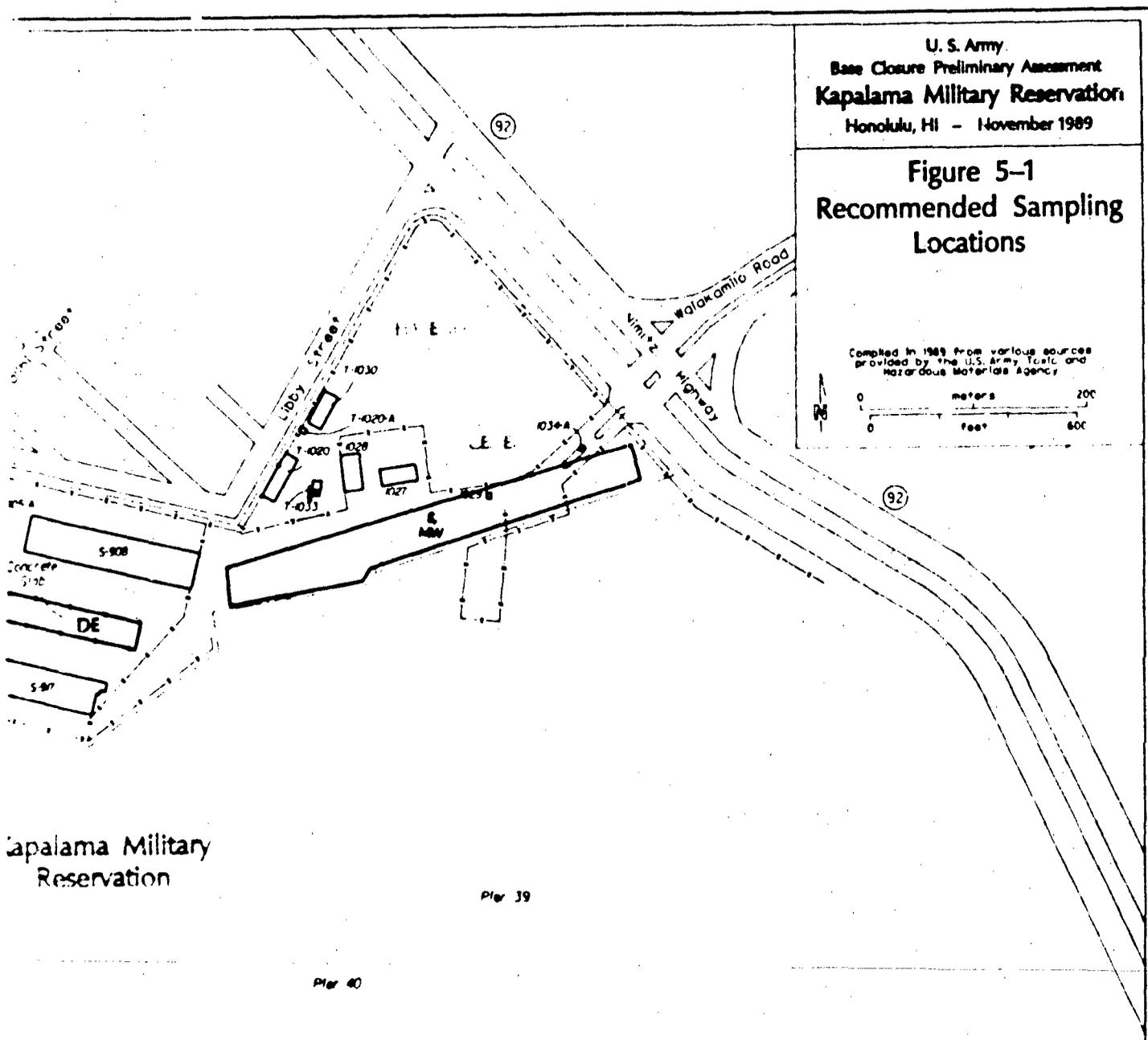
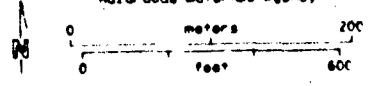
Not applicable.



U. S. Army  
 Base Closure Preliminary Assessment  
**Kapalama Military Reservation**  
 Honolulu, HI - November 1989

**Figure 5-1**  
 Recommended Sampling  
 Locations

Compiled in 1989 from various sources  
 provided by the U.S. Army Toxic and  
 Hazardous Materials Agency



RECOMMENDED SAMPLING METHODS

- S** Soil Boring
- W** Wipe
- DU** Dust
- DE** Destructive
- MW** Monitoring Well

NOTE: Oil Sample taken at all transformers (see Fig. 3-3).



materials in certain buildings in the Phase II area has been confirmed by sampling; therefore, sampling for asbestos is recommended only for Phase III buildings.

### **5.2.2 SUBSURFACE SOILS**

With the discovery of subsurface petroleum hydrocarbons near Buildings 917 and 929 and on neighboring properties, as well as underground piping of aviation fuel and diesel fuel on neighboring properties (see Subsection 2.2), soil borings are recommended throughout the property. Boring samples should be analyzed for TPH and VOCs. Soil samples should be collected at intervals of 2.5 feet from the surface to the top of the groundwater table at each boring. It is expected that groundwater will be reached less than 5 ft below the ground surface. Selected borings may be converted to monitoring wells, based on field operations.

### **5.2.3 GROUNDWATER**

Groundwater quality has not been characterized throughout the site. The potential exists for contamination due to both site-related activities and to migration from offsite sources. Approximately 5 to 10 monitoring wells should be installed in selected subsurface soil borings. These wells should be strategically placed to characterize the groundwater at areas of concern. These sample should be analyzed for TPH and VOCs. Additional analyses may be required based on proximity to specific ESOs.

### **5.2.4 SURFACE SOILS**

Surface soil samples (0 to 6 in) should be taken along the grass strip behind the aboveground kerosene tank near Building 905 and analyzed for total petroleum hydrocarbons.

### **5.2.5 SEDIMENTS**

Sediments in the bottom of the two storm drain systems near Buildings 923/924 and 929/930 should be sampled and analyzed for TPH, VOCs, metals, and pesticides. These storm drains would have been likely pathways for any spills in the primary chemicals storage areas.

### **5.2.6 DRUM LIQUIDS**

The contents of the 55-gal drums stored outside Building 924 should be inspected to confirm that they no longer contain waste oil (as marked) prior to disposal. Currently, the drums appear to contain rainwater.

### **5.2.7 CONCRETE PAD**

Chip samples should be taken from three random locations on the concrete pad near Building 923 to check for potential contamination from PCBs or pesticides.



### **5.2.8 UNDERGROUND STORAGE TANKS**

An underground storage tank (UST) in Phase II-A, near Buildings 1027 and 1033, has been removed. Reportedly, soil samples were collected during the removal activity but a report documenting the results has not yet been issued. The report should be reviewed when issued; if the soil is not contaminated, no further action is required. If contamination is present, remedial measures may be necessary.

An underground storage tank next to Building 935 was leak tested when installed in 1987, and no further investigation is required at this time.

A potential underground storage tank was reported, but unconfirmed, in area II-A. The presence of this tank needs to be confirmed. If the tank exists, both it and the tank near Building 935 should be leak tested.

### **5.2.9 TRANSFORMERS**

All transformers on the property potentially contain PCBs and two of them appear to have leaked in the past. An inventory should be made of all transformers remaining on all phases (except Phase I), and each transformer should be sampled for PCBs.

### **5.2.10 POSSIBLE PRE-CONSTRUCTION DISPOSAL SITE**

The nature of the material that may have been placed in the municipal dump operated by the City and County of Honolulu is undefined. Although designated as a municipal dump, the possibility exists that industrial wastes were received. Soil borings and monitoring wells are recommended with analyses for the constituents included on the Hazardous Substance List (HSL). There will be one soil boring at each of the two possible disposal sites. A composite sample will be collected from each boring. Each composite will be comprised of grab samples collected every 2.5 feet of depth until groundwater is reached. Monitoring wells should be installed in each soil boring.



## SECTION 6

### REFERENCES

#### 6.1 DIRECT INTERVIEWS

- I-1 Management Analyst (WESTCOM BRACO), Deputy Chief of Staff for Resource Management
- I-2 Chief of Storage Branch, D.O.L. (Kapalama)
- I-3 Central Identification Lab, Bldg. #1027 (Kapalama)
- I-4 Planning Division Chief (Wheeler AFB)
- I-5 Chief Real Estate, C.O.E. (Federal Building, Honolulu)
- I-6 Maintenance Shop Foreman, Bldg. #923 (Kapalama)
- I-7 Mortuary Building Supervisor (Kapalama)
- I-8 Supervisor/Shop Steward, Bldg. #917 (Kapalama)
- I-9 Geologist, Hawaii Dept. of Land and Natural Resources (Honolulu)
- I-10 Mortuary Attendant, Bldg. #913/914 (Kapalama)
- I-11 Supervisor, Storage Branch, D.O.L. (Kapalama)
- I-12 Environmental Specialist, Master Planning Division (Wheeler AFB)

#### 6.2 TELEPHONE INTERVIEWS

- T-1 Branch Chief, Hawaii Dept. of Land and Natural Resources (Honolulu)
- T-2 Supervisor for Military Services Office, Hawaiian Telephone Company (Honolulu)

#### 6.3 REPORTS AND OTHER DOCUMENT SOURCES

- R-1 Precision Leak Test Report, Unitek Environmental Services, Inc., pp. 23-28, April 1987.
- R-2 Environmental Assessment, Preliminary Site Survey, Unitek Environmental Consultants, Inc., 27 June 1988.
- R-3 Environmental Assessment, Hazard Verification and Action Plan, Unitek Environmental Consultants, Inc., 30 September 1988.

## WESTON

- R-4 Environmental Assessment for Sale and Replacement, Phase II, Kapalama Military Reservation, Corps of Engineers, U.S. Army Engineer District, Honolulu, 1 November 1988.
- R-5 Progress Letter to Servco Pacific, Inc., Dames and Moore, 5 July 1989.\*
- R-6 Memorandum for Commander, Honolulu Engineer District, from Chief, Environmental Master Plans and Programs Unit, 3 October 1989.
- R-7 Report, Subsurface Investigation of Kapalama, Phase I, Woodward-Clyde Consultants, 1989.\*
- R-8 CEPOD Comments on USATHAMA - Task Order 2 Draft Preliminary Assessment, Kapalama Military Reservation (November 1989), Corps of Engineers Pacific Ocean Division, Prepared by Roy F. Weston, Inc., December 1989.
- R-9 Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, USDA Soil Conservation Service and University of Hawaii, Agricultural Experiment Station, 1972.
- R-10 Appraisal Report - Appraisal of Lands at Kalihi-Kai, Honolulu, T.H., 82,534 Acres, More or Less, John F. Child Jr. (Appraiser) for U.S. Department of Justice, 1946.

\*Included in Appendix B.



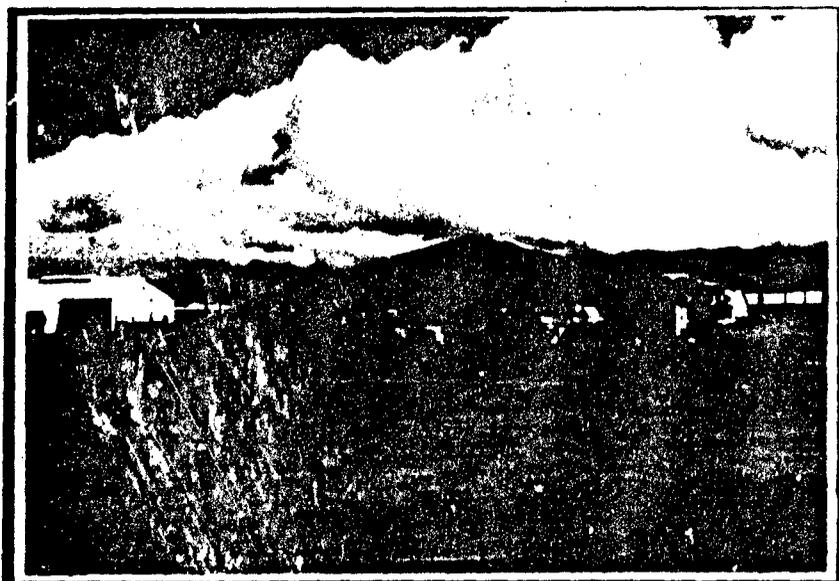
**SECTION 7**

**PHOTOGRAPHS**

Photographs of ESOs taken during WESTON's site visit are included in this section.

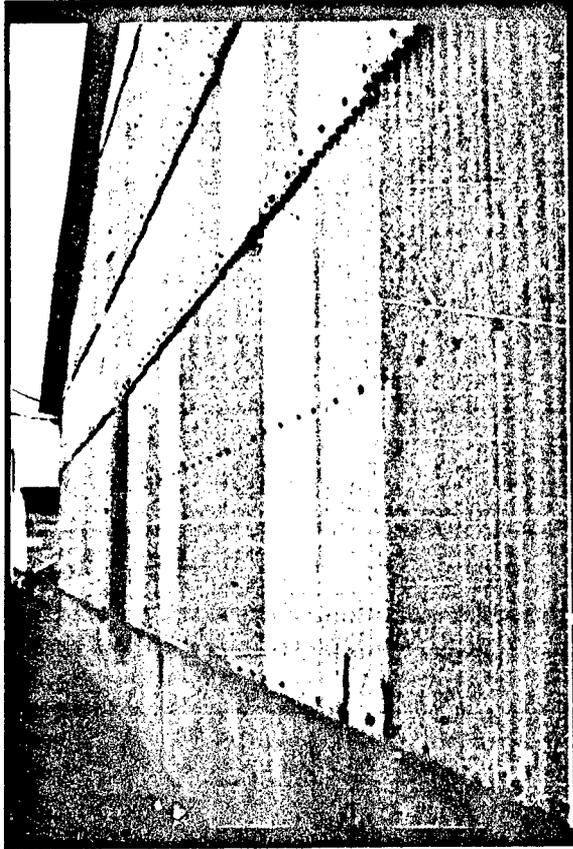


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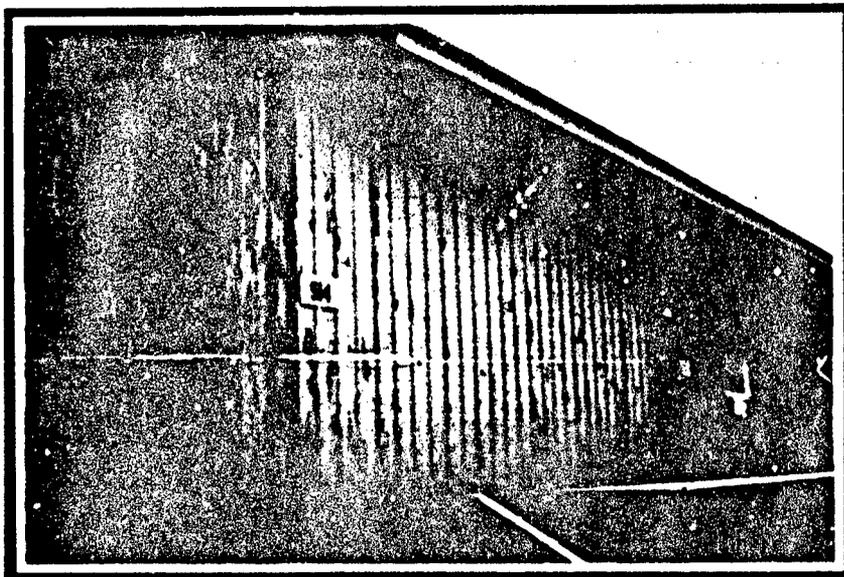


2.

**GENERAL CONDITIONS OUTSIDE OF BUILDINGS**



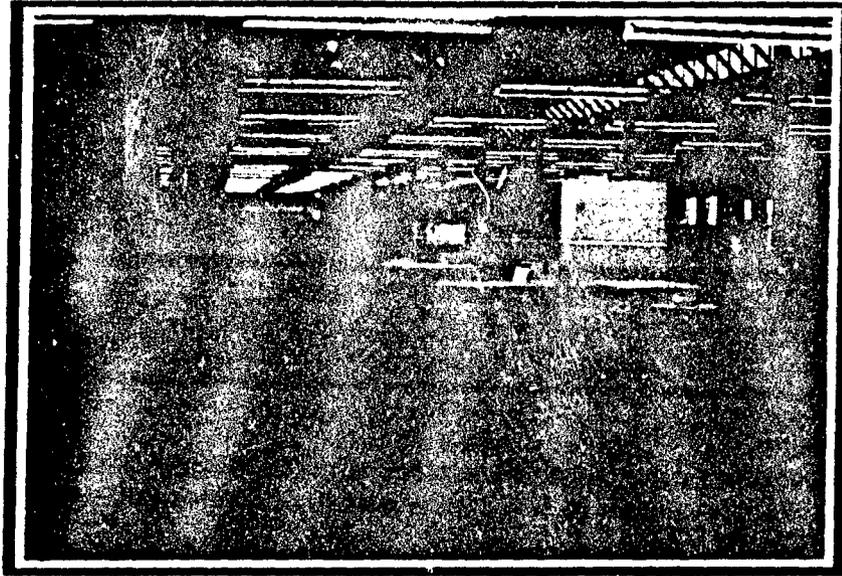
3.



4.

GENERAL CONDITIONS OUTSIDE OF BUILDINGS (CONTINUED)

**WESTON**  
MANUFACTURING

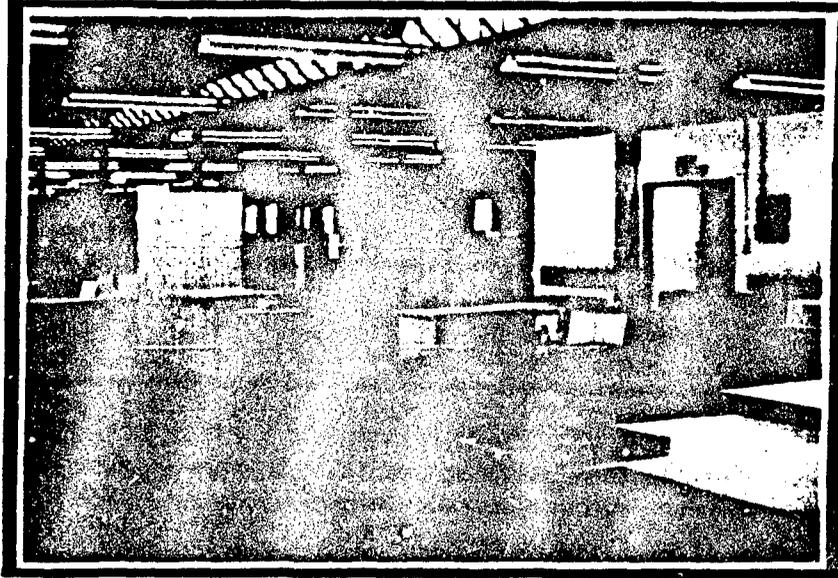


5.



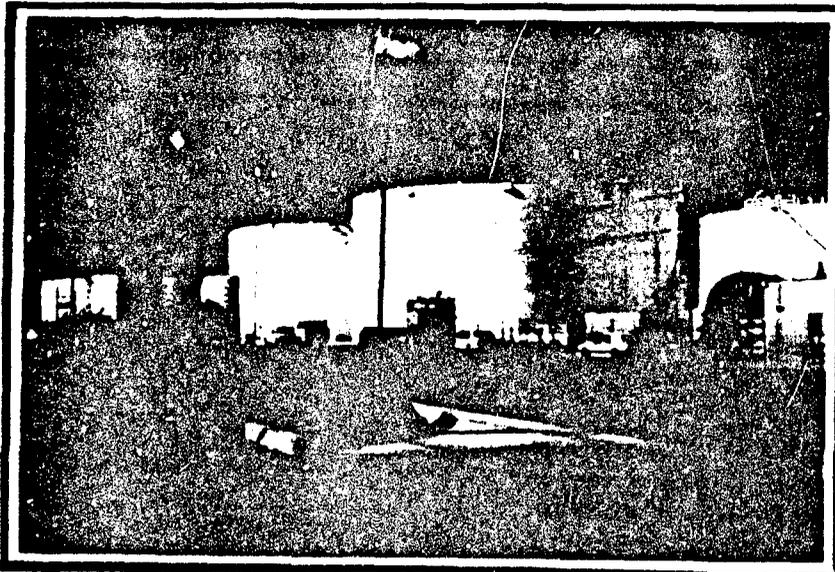
6.

**GENERAL CONDITIONS INSIDE WAREHOUSE**



7.

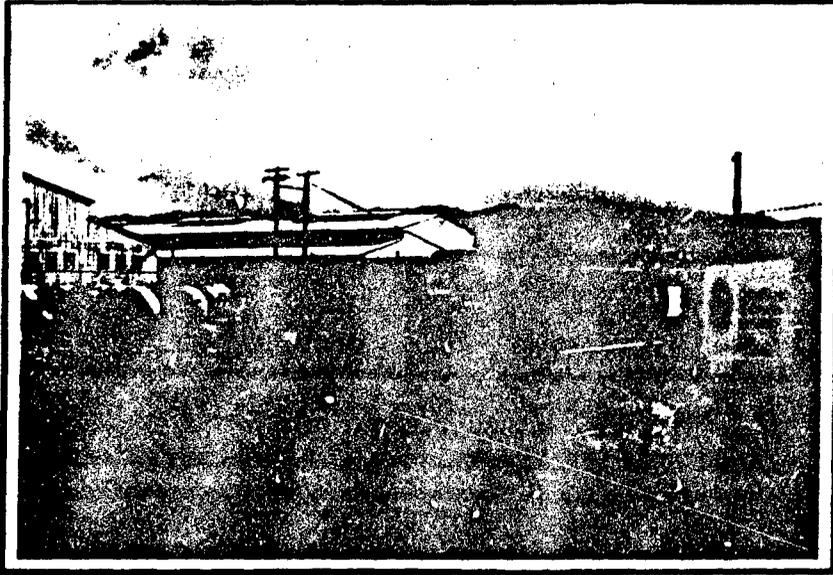
**GENERAL CONDITIONS INSIDE WAREHOUSE (CONTINUED)**



**8. Chevron Tank Farm**

**NEIGHBORS**

**WESTON**

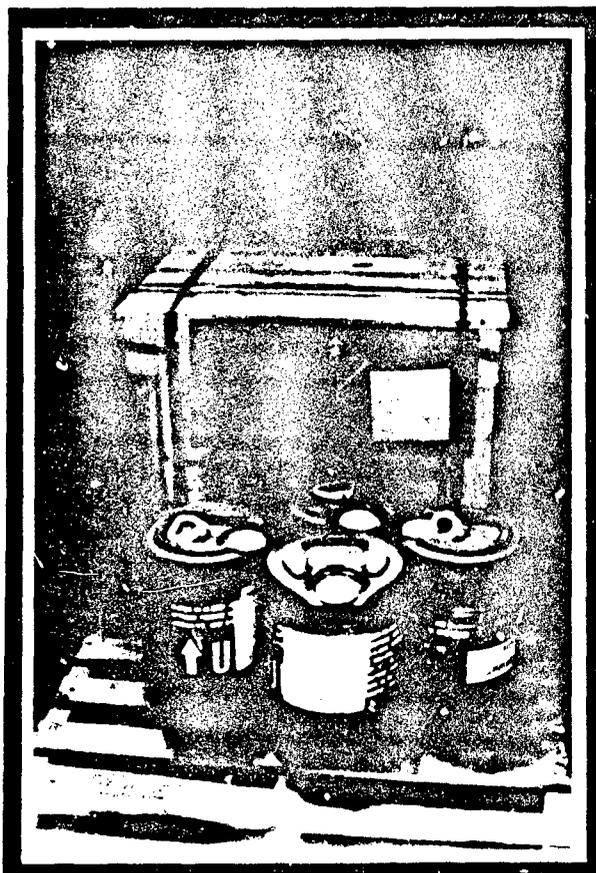


**9. N.O.A.A. Storage Yard**



**10. Car/Truck Storage Area**

**NEIGHBORS (CONTINUED)**

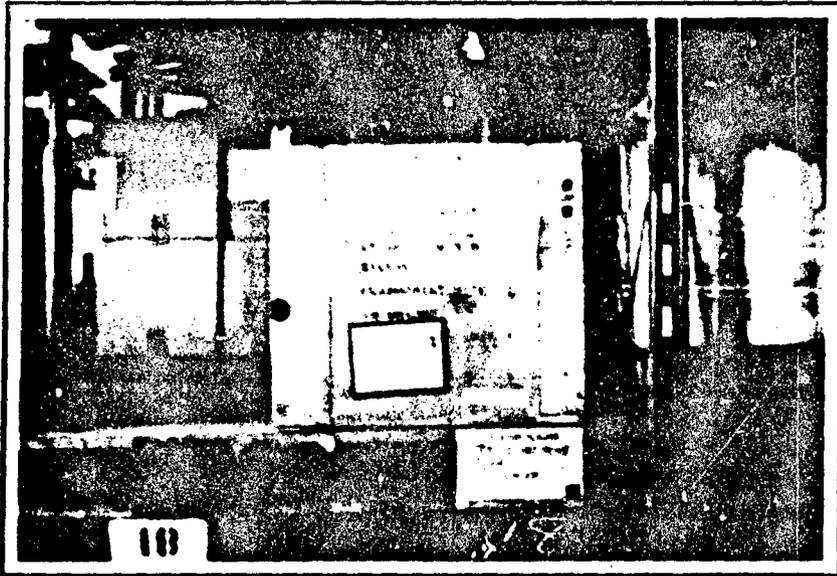


11. Battery Acid

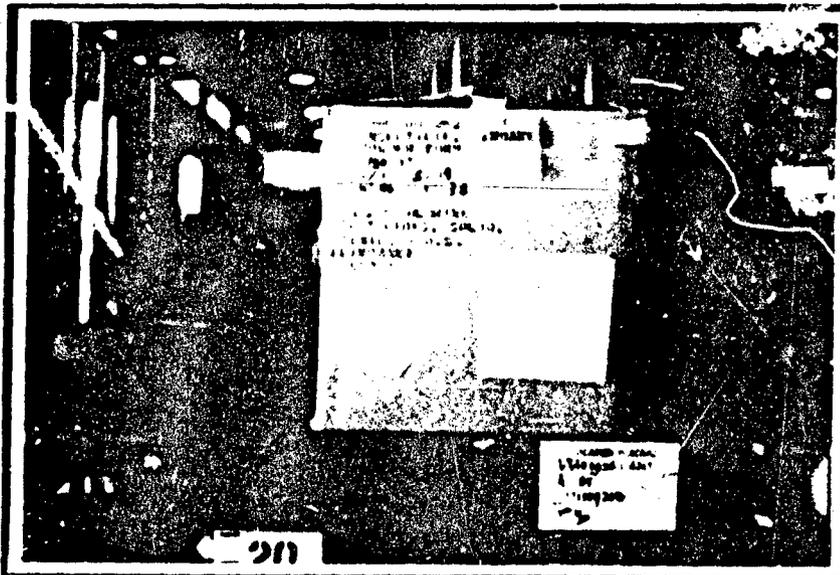


12. Caustic Cleaner

**CONTENTS OF BUILDING 917**

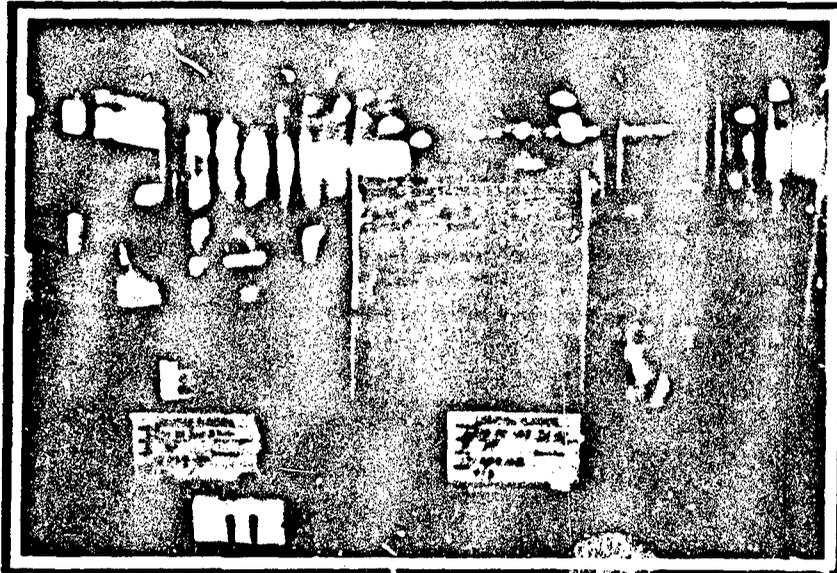


**13. Aromatic Solvents**



**14. Pesticides**

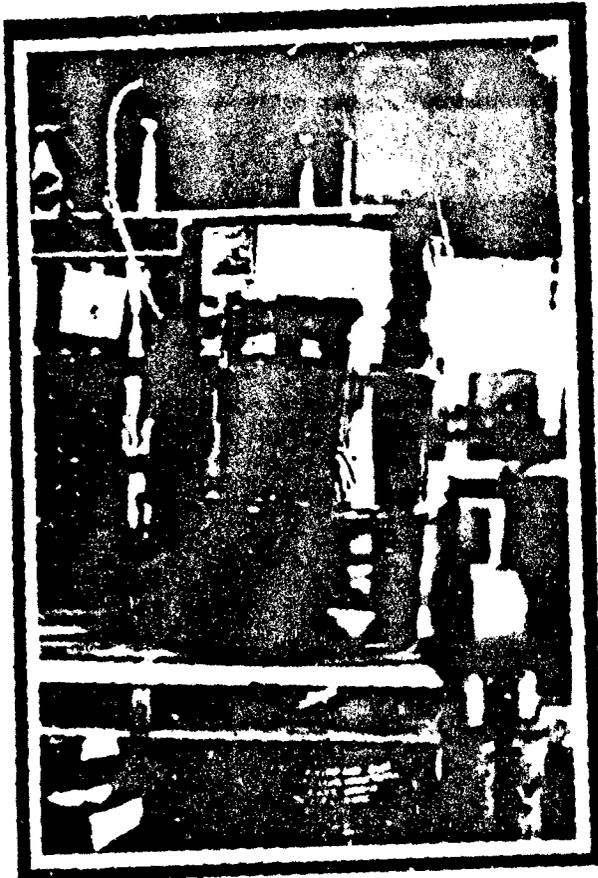
**CONTENTS OF BUILDING 917 (CONTINUED)**



15. Solvents

CONTENTS OF BUILDING 917 (CONTINUED)

**WESTEN**



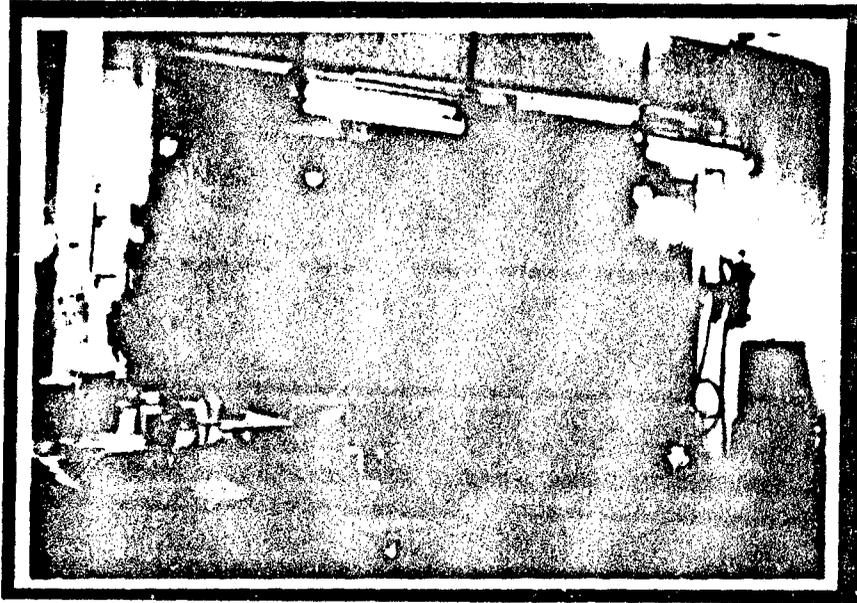
16. Chlorinated Solvents



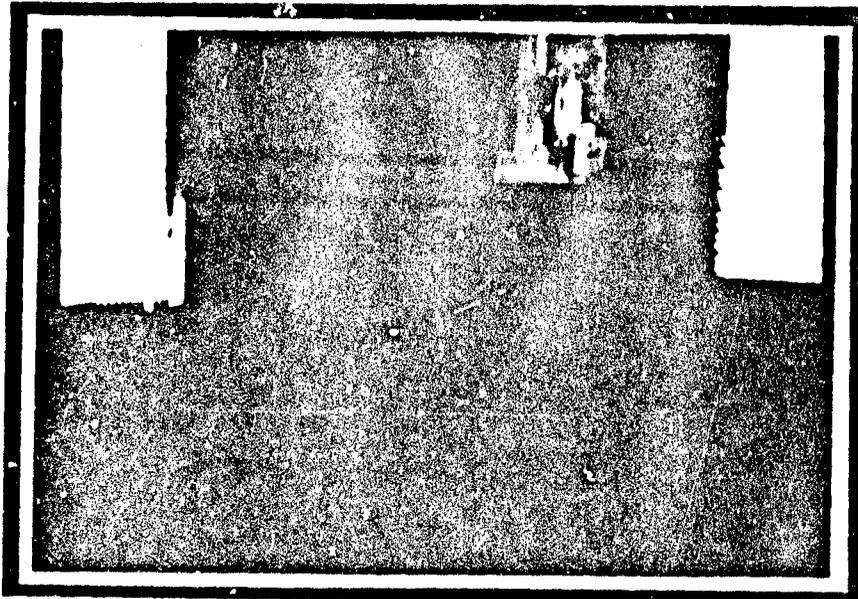
17. Flammable Liquids

**CONTENTS OF BUILDING 917 (CONTINUED)**

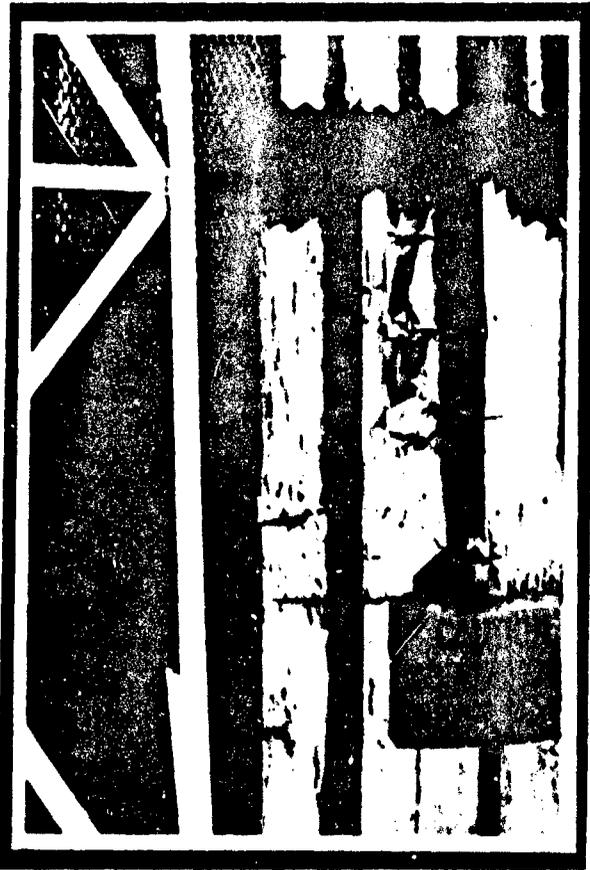
**WESTON**  
SINCE 1948



**18. PAINT SPRAY BOOTH**



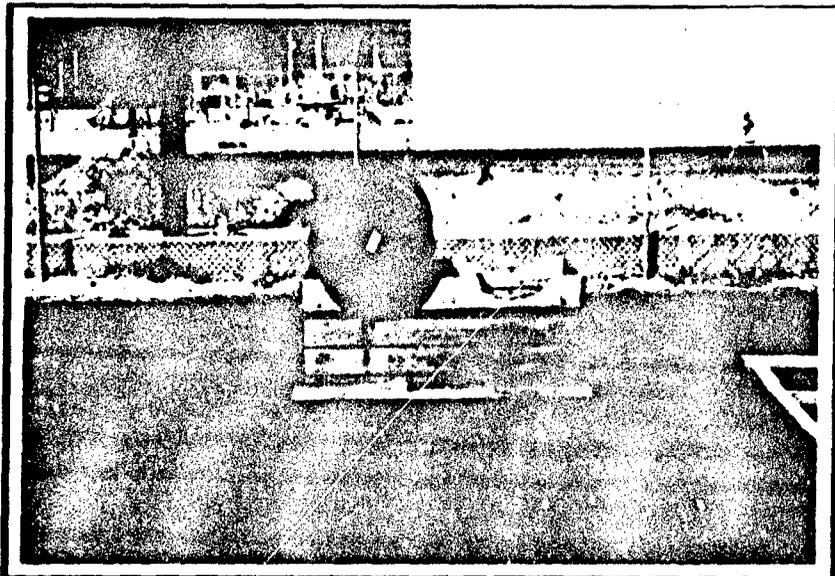
**19. SOLVENT DEGREASING HOOD**



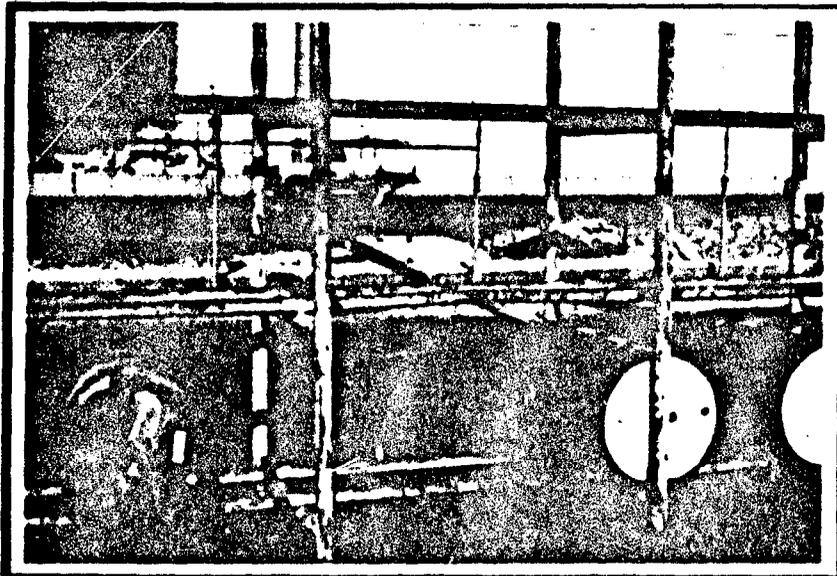
**20. DRAIN LEADING TO DRUM IN SHED**



**21. VIEW OF EXHAUST VENT AND SHED**



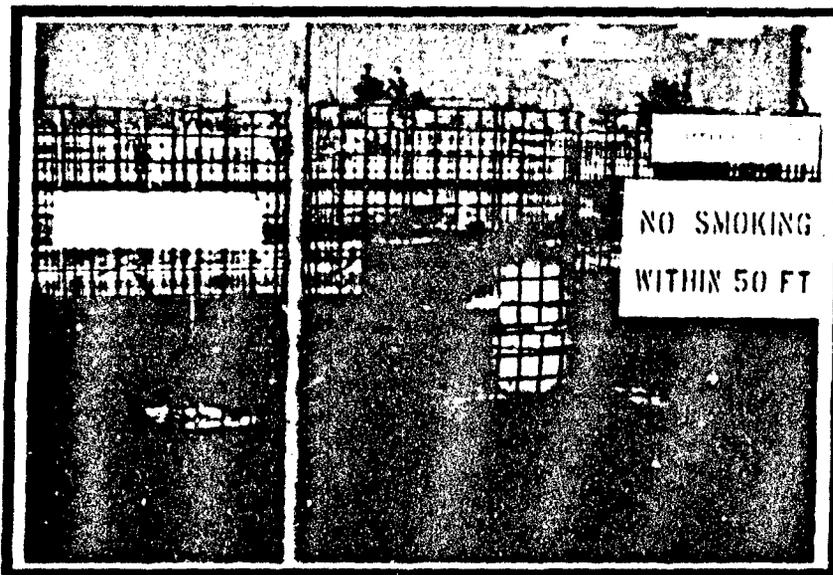
22.



23.

**DRUM STORAGE AREAS NEAR SAND ISLAND ROAD**

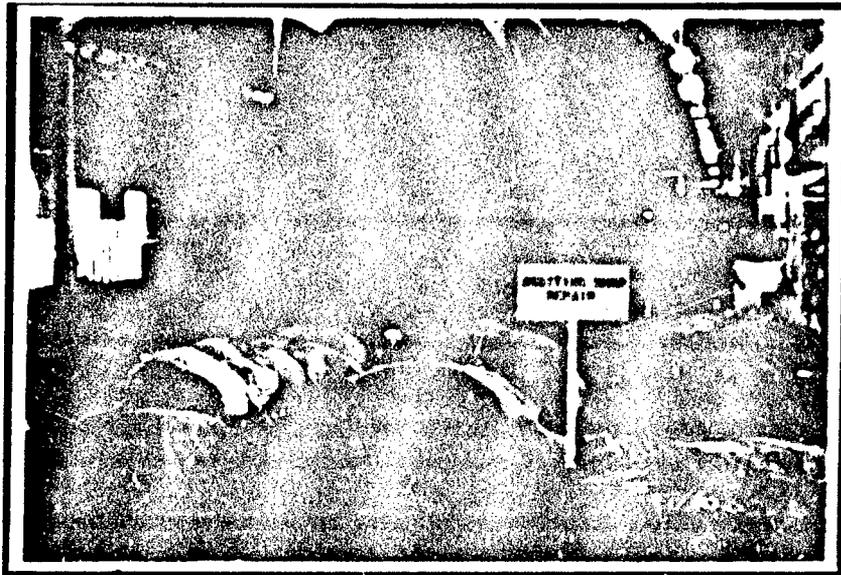
**WESTON**  
CORPORATION



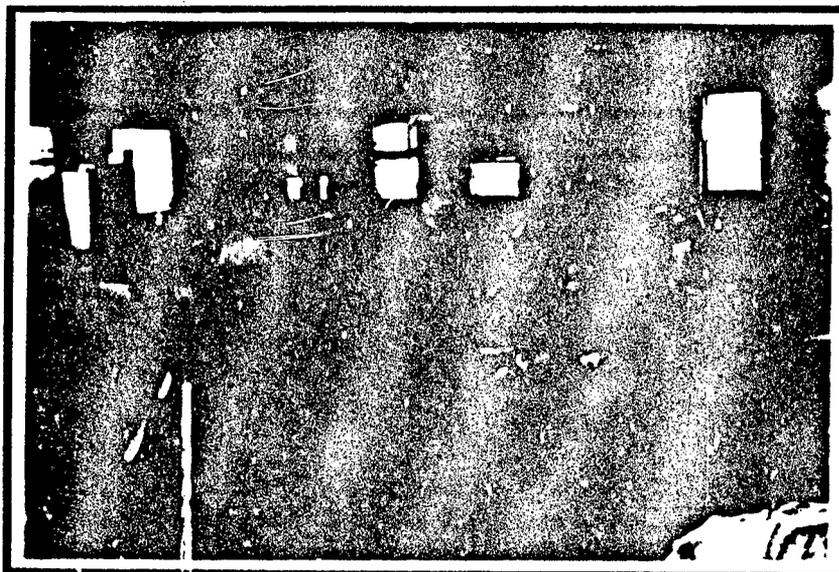
24.

**DRUM STORAGE AREAS NEAR SAND ISLAND ROAD**

**WESTON**  
INDUSTRIAL LIGHT



25.



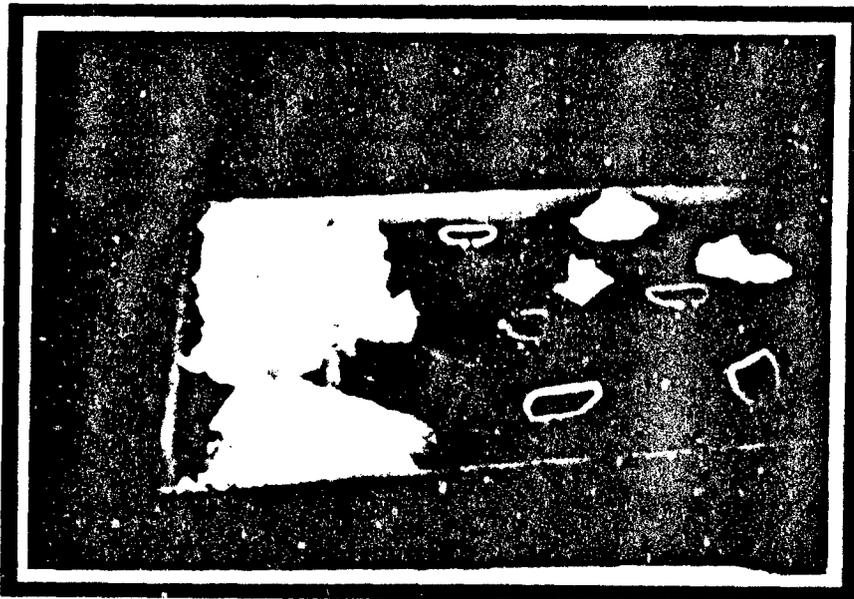
26.

**CANVAS REPAIR AREA, BUILDING 924**

**WESTON**  
CORPORATION



27.



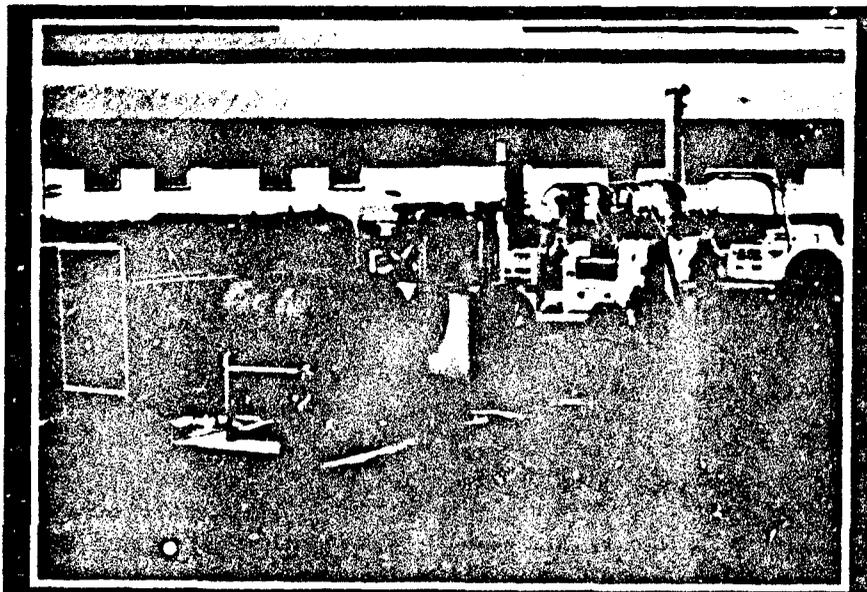
28.

**FOAM PACKAGING AREA, BUILDING 924**

**WESTON**  
ENGINEERING CONSULTANTS

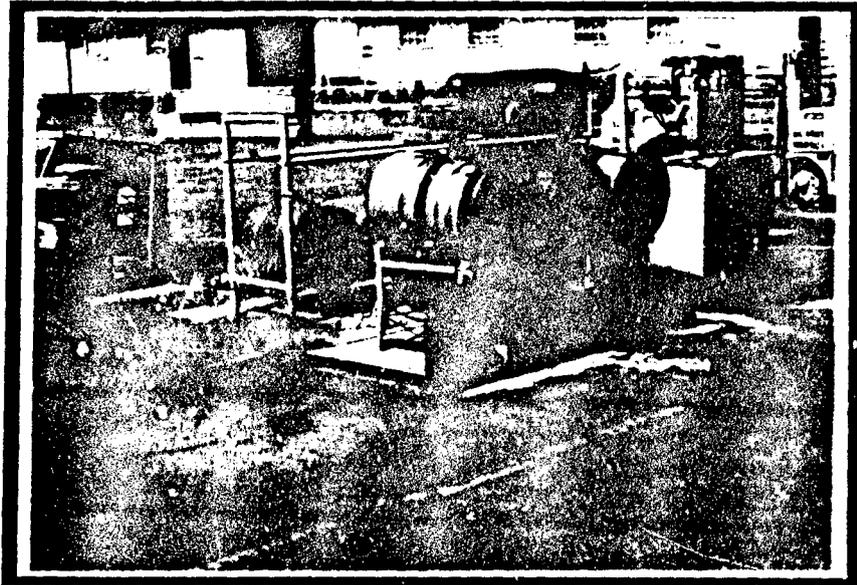


**29. RUSTED DRUMS OUTSIDE BUILDING 924**



**30. FORK LIFT MAINTENANCE AREA, BUILDING 925**

**WESTON**



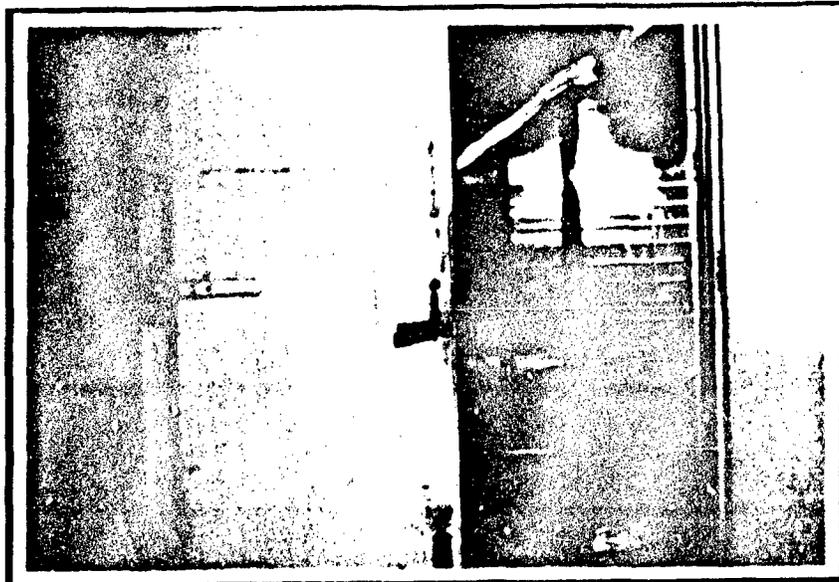
31.



32.

**FORK LIFT MAINTENANCE AREA, BUILDING 925**

**WESTON**  
PHOTOGRAPHY



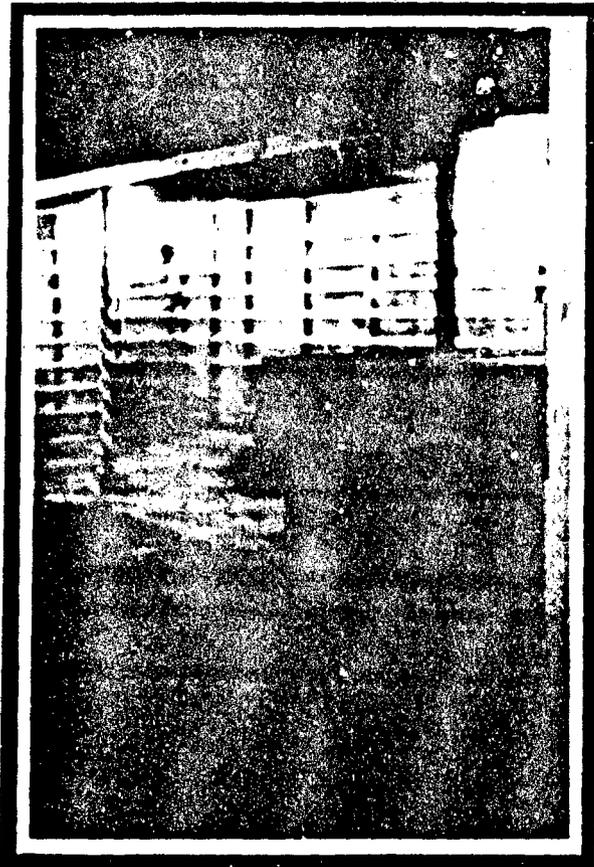
33.



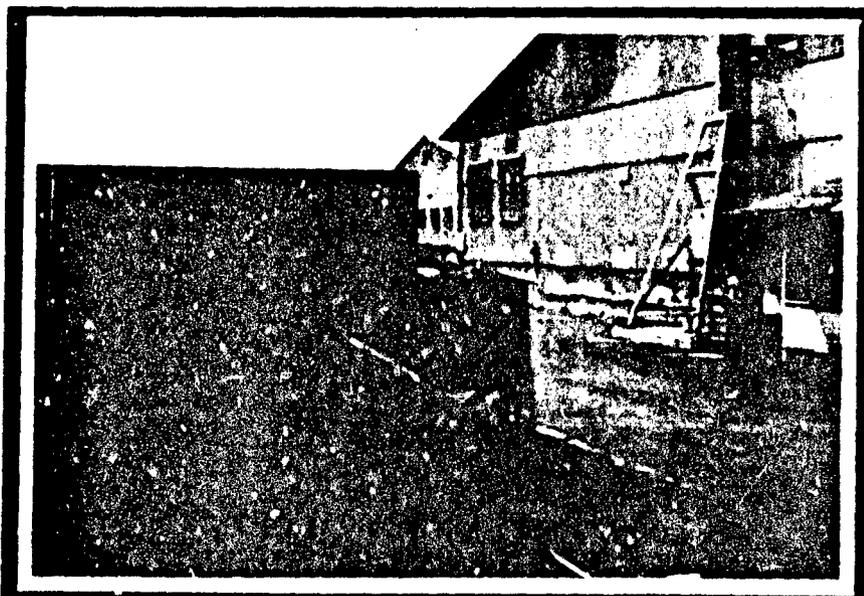
34.

FORMER FUMIGATION CHAMBER BUILDING 929

**WESTON**  
CORPORATION

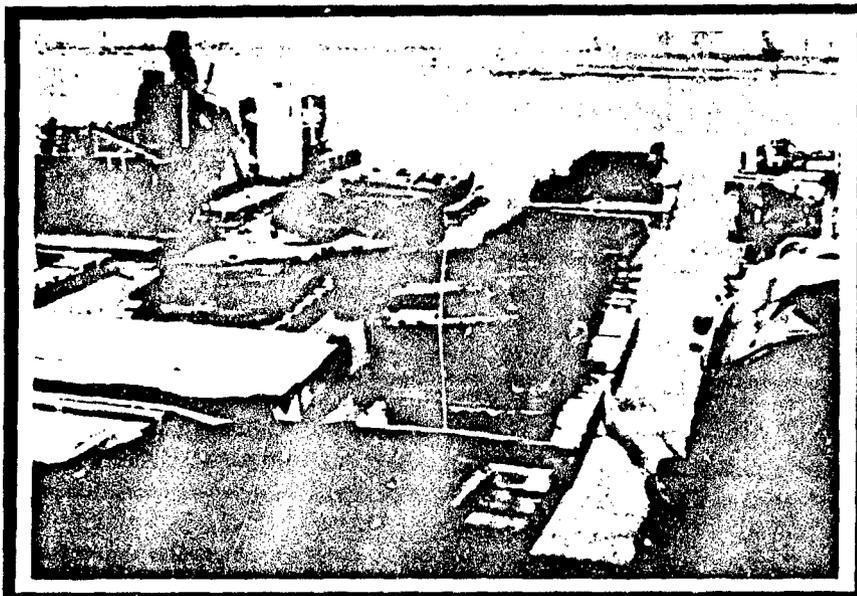


**35. FORMER FUMIGATION CHAMBER, BUILDING 929**

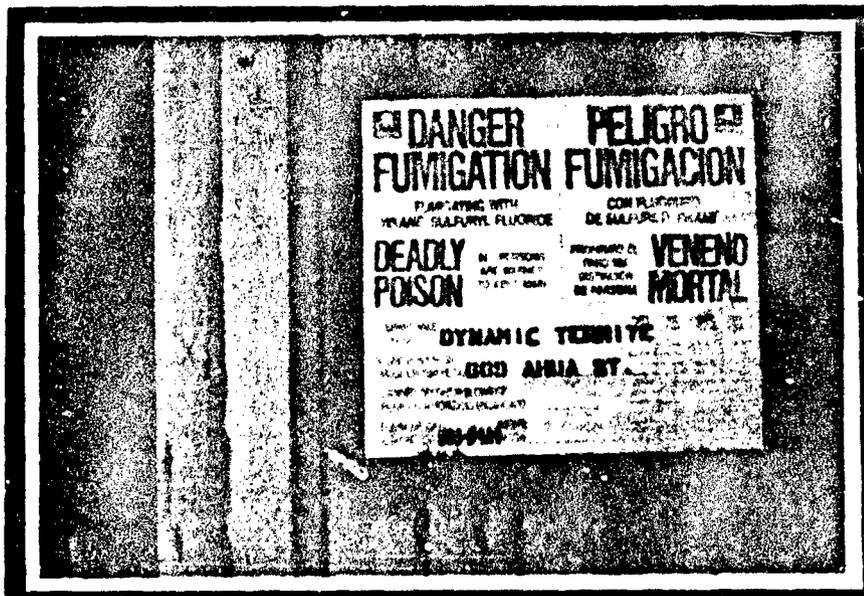


**36. FORMER RADIOACTIVE MATERIAL STORAGE AREA, BUILDING 929-A**

**WESTON**  
MANUFACTURING COMPANY

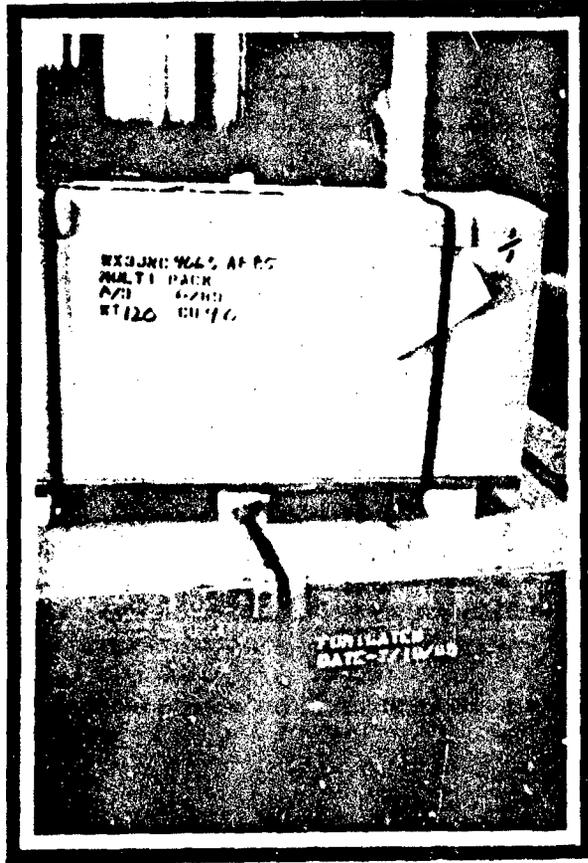


37. USED RADIATORS FROM VEHICLES



38. CURRENT FUMIGATION AREA, BUILDING 931

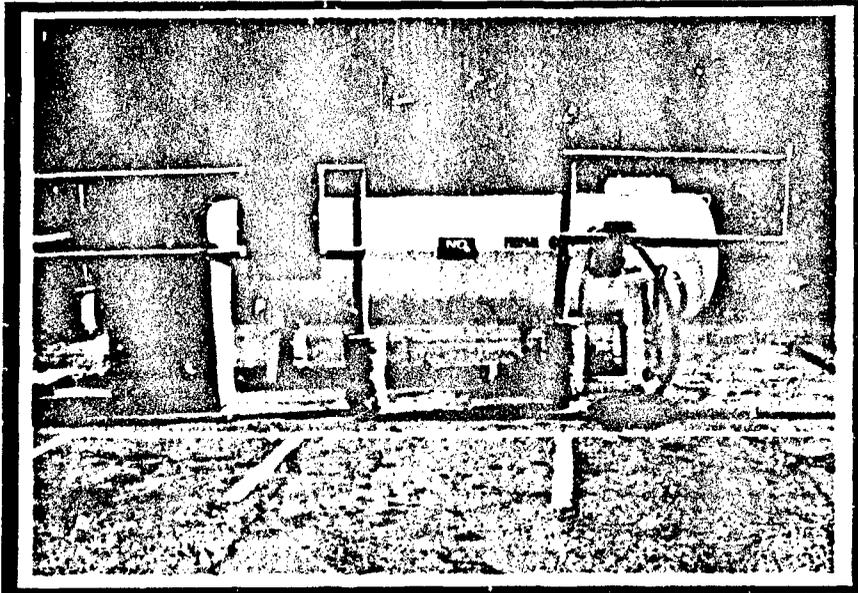
**WESTON**  
SINCE 1945



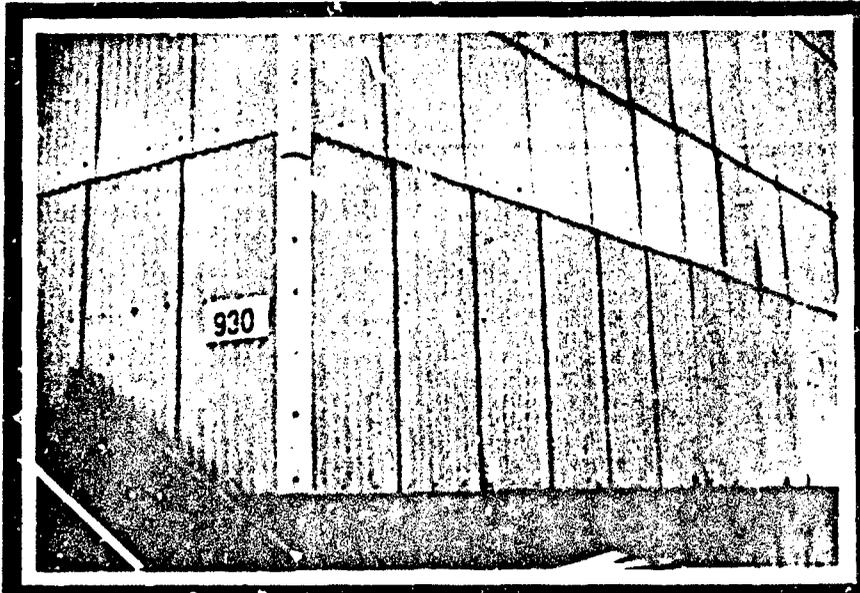
**39. CURRENT FUMIGATION AREA, BUILDING 931**



**40. KEROSENE STORAGE TANK**



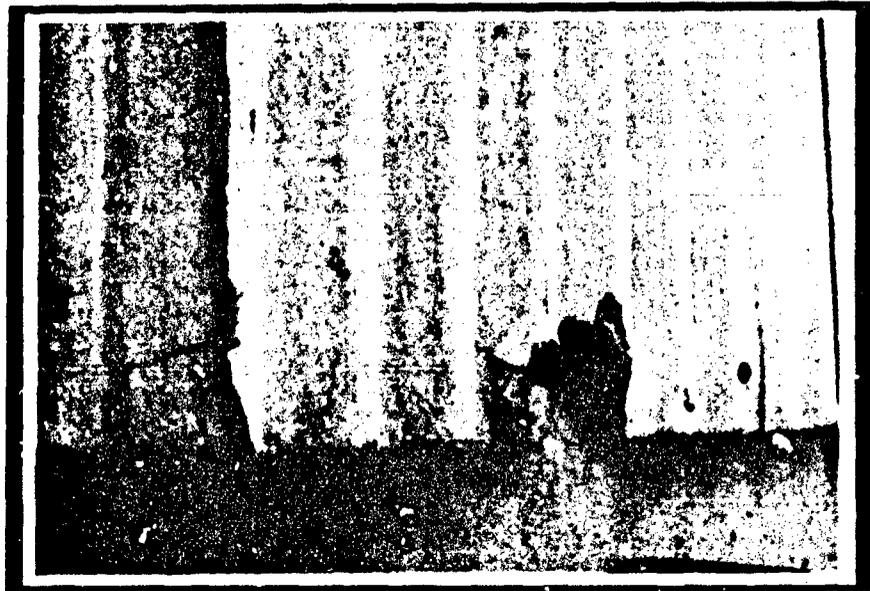
**41. PROPANE STORAGE TANK NEAR BUILDING 925**



**42. GENERAL CONDITION OF TRANSITE SIDING**

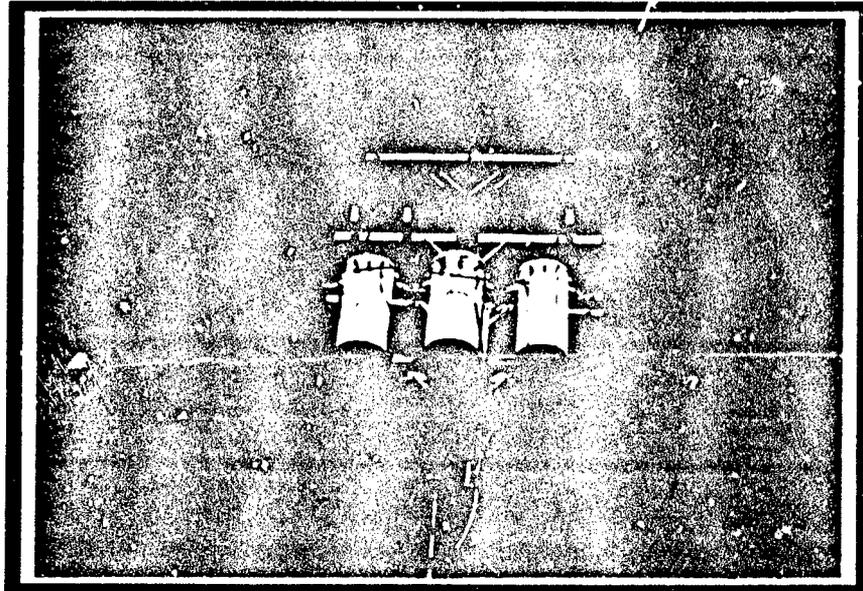


43.



44.

**GENERAL CONDITION OF TRANSITE SIDING**



45.

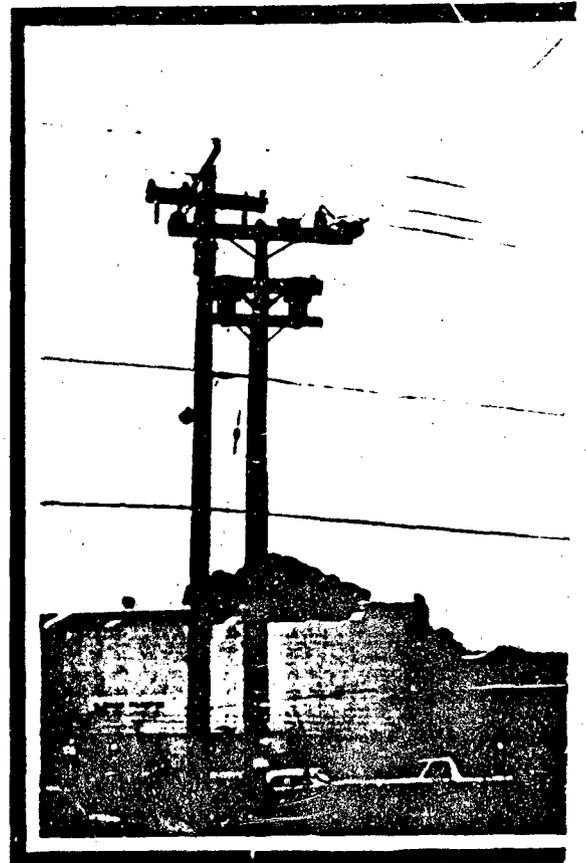


46.

**TRANSFORMERS**

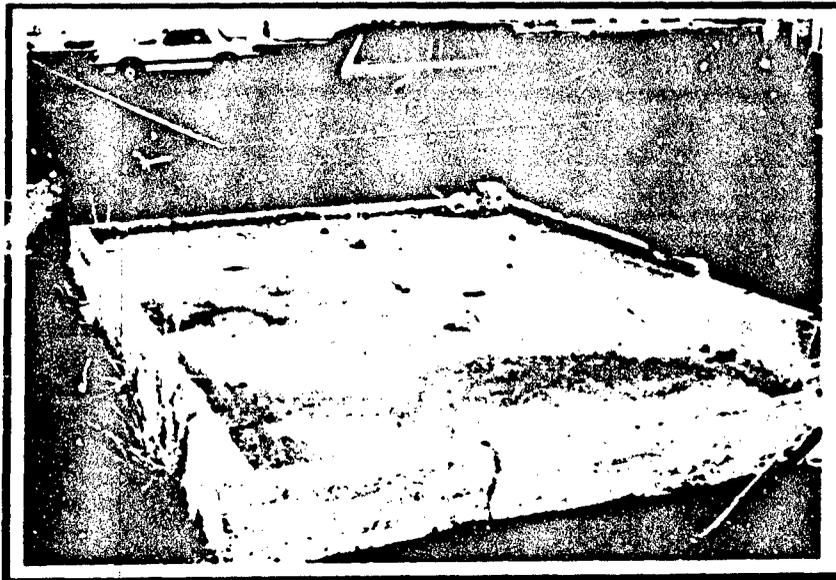


47.



48.

**TRANSFORMERS**



**49. CONCRETE PAD NEAR BUILDING 923**

**WESTON**

**APPENDIX A**

**BUILDING 917 - INVENTORY AS OF 9 AUGUST 1989  
(As Received)**

**1073M2-4**

08/09/89

07.31.06

N2N	LOC	NDUN	UI	CCD	SCIC
1615012444970	17A02220A	TRANSMISSION ROTOR	EA	A	8
2540010331831	2609919G1	PARTS KIT MIRROR NO	EA	A	7
4931010485834	JNM07335J	ALIGNMENT DEVICE LO	EA	H	8
5335006189659	2605115B1	KNIFE	EA	A	8
5835009339049	17102918K	CLEANING AGENT HEAD	EA	A	7
5835009413037	17102909B	EYEPiece ASSEMBLY LO	EA	A	8
5835009413037	17102909B	EYEPiece ASSEMBLY LO	EA	A	8
5855010677772	2605115B2	WINDOW OPTICAL INCT	EA	A	9
5855011076433		COLLIMATOR ROPE ICH	EA	A	8
5930006159376	2608619J2	SWITCH TOGGLE	EA	A	8
5930006551514		SWITCH	EA	A	8
59600000824139	2605115C4	ELECTRON TUBE	EA	A	8
5960001345754	2605115C4	ELECTRON TUBE	EA	A	8
5960006686706	2605115D1	ELECT TUBE	EA	A	8
605000731342	2608525H1	LOUDSPEAKER LT 45A D	EA	A	7
6050007673705	2608223E1	LOUDSPEAKER LT 45A D	EA	A	7
6135002397973	2607301E3	BATTERY, NONRECHARG	EA	A	7
6135004308120	17100709A	BATTERY, NONRECHARG	EA	H	7
6135004308120	17106206A	BATTERY, NONRECHARG	EA	A	7
6135004308120	261180101	BATTERY, NONRECHARG	EA	H	7
6135004308120	17100713A	BATTERY, DRY	EA	H	7
6135004308120	2611804D1	BATTERY, NONRECHARG	EA	H	7
6135004308120	261180112	BATTERY, NONRECHARG	EA	A	7
6135004308120	17100704A	BATTERY, DRY	EA	H	7
6135004308120	17100709A	BATTERY, DRY	EA	H	7
6135004308120	17106206A	BATTERY, NONRECHARG	EA	A	7
6135004308120	17106206A	BATTERY, NONRECHARG	EA	A	7
6135004308120	2607814D3	BATTERY, NONRECHARG	EA	A	7
6135004308120	2607814D3	BATTERY, NONRECHARG	EA	A	7
6135004308120	2611804D2	BATTERY, NONRECHARG	EA	H	7
6135004308120	2611804D2	BATTERY, NONRECHARG	EA	A	7
6135004308120	2611804D2	BATTERY, NONRECHARG	EA	A	7
6135004308120	261180104	BATTERY, NONRECHARG	EA	A	7
6135004308120	261180104	BATTERY, NONRECHARG	EA	A	7
6135004308120	261180104	BATTERY, NONRECHARG	EA	A	7
6135004308120	2611804D1	BATTERY, NONRECHARG	EA	H	7
6135004308120	2611804D1	BATTERY, NONRECHARG	EA	A	7
6135004308120	2611804D1	BATTERY, NONRECHARG	EA	A	7
6135004308120	17100713A	BATTERY, NONRECHARG	EA	H	7
6135004308120	17100713A	BATTERY, NONRECHARG	EA	H	7
6135004308120	17100713A	BATTERY, NONRECHARG	EA	A	7
6135004308120	17100713A	BATTERY, NONRECHARG	EA	H	7
6135004308120	17100713A	BATTERY, NONRECHARG	EA	H	7
6135004308120	17100713A	BATTERY, NONRECHARG	EA	A	7
6135004308120	17100713A	BATTERY, NONRECHARG	EA	H	7
6135004308120	17100706A	BATTERY, PRIMARY, LIT	EA	A	7
6135004308120	17100706A	BATTERY, PRIMARY, LIT	EA	H	7
6135004308120	17100706A	BATTERY, PRIMARY, LIT	EA	H	7
6135004308120	17100107A	BATTERY, PRIMARY, LIT	EA	A	7
6135004308120	17100706A	BATTERY, PRIMARY, LIT	EA	H	7

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NSN	LDC	NOON	UI	CCD
6135010363495	17100708A	BATTERY, PRIMARY, LIT	EA	H
6135010363495	17100708A	BATTERY, PRIMARY, LIT	EA	H
6135010363495	17100708A	BATTERY, PRIMARY, LIT	EA	H
6135010363495	17100107A	BATTERY, PRIMARY, LIT	EA	A
6135010631978	17103210A	BATTERY, NONRECHARG	PG	A
6135010882708	17102617B	BATTERY, DRY	EA	A
6135010882708	17102617B	BATTERY, DRY	EA	A
6135010882708	17100715A	BATTERY, DRY	EA	H
6135010882708	17100715A	BATTERY, DRY	EA	H
6135010882708	17102617B	BATTERY, DRY	EA	A
6135010882708	17100715A	BATTERY, DRY	EA	H
6135010882708	17100706A	BATTERY (1) NONRECH	EA	H
6140001226110	17106207A	BATTERY, STORAGE	EA	A
6140001343415	17106409B	BATTERY, STORAGE	EA	A
6140001343415	17106207C	BATTERY, STORAGE	EA	A
6140008816087		BATTERY, STORAGE	PG	
6140010321326	30101726A	BATTERY, STORAGE	EA	H
6140010321326	17106209A	BATTERY, STORAGE	EA	A
6140010321326	17106209A	BATTERY, STORAGE	EA	A
6140010321326	30101726A	BATTERY, STORAGE	EA	H
6140010461116	17103112A	BATTERY, STORAGE	EA	F
6140010461116	17101120A	BATTERY, STORAGE	EA	H
6140010461116		BATTERY, STORAGE	EA	
6140010461116		BATTERY, STORAGE	EA	
6140010461116	17103112A	BATTERY, STORAGE	EA	F
6140010461116		BATTERY, STORAGE	EA	
6140010461116	17103112A	BATTERY, STORAGE	EA	F
6140010461116	17101120A	BATTERY, STORAGE	EA	H
6140010461116	17101120A	BATTERY, STORAGE	EA	H
6140010461116	2606225B2	BATTERY, STORAGE	EA	F
6140010461116	2606225B2	BATTERY, STORAGE	EA	F
6140010461116	2606225B2	BATTERY, STORAGE	EA	F
6140010461116	2606225B2	BATTERY, STORAGE	EA	F
6140010461116	2606225B2	BATTERY, STORAGE	EA	F
6140010612818	17101120A	BATTERY, STORAGE	EA	H
6140010612818	17106208A	BATTERY, STORAGE	EA	A
6140010612818	2601634B1	BATTERY, STORAGE	EA	A
6140010612818	17101120A	BATTERY, STORAGE	EA	H
6140010612818	2601634B1	BATTERY, STORAGE	EA	H
6140010612818	2601619B3	BATTERY, STORAGE	EA	H
6140010715070	2607634H3	BATTERY, STORAGE	EA	H
6140010715070	17102218A	BATTERY, STORAGE	EA	F
6140010715070		BATTERY, STORAGE	EA	
6140010723103	17106211B	BATTERY, STORAGE	EA	A
6140010723103	2606620B2	BATTERY, STORAGE	EA	F
6140010723103	2606620B2	BATTERY, STORAGE	EA	F



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NSN	LOC	NOUN	UI	CCD
6685005575316	2605107D1	THERMOMETER, SELF&INDICATING, BIMETAL	EA	H
6685005575316	2605107D1	THERMOMETER, SELF&INDICATING, BIMETAL	EA	H
6685005575316	2605109F2	THERMOMETER, SELF&INDICATING, BIMETAL	EA	F
6685005575316	2605116C2	THERMOMETER, SELF&INDICATING, BIMETAL	EA	A
6685005575316	2605116C2	THERMOMETER, SELF&INDICATING, BIMETAL	EA	A
6685005575316	2605109F2	THERMOMETER, SELF&INDICATING, BIMETAL	EA	F
6685005575316	2605107D1	THERMOMETER, SELF&INDICATING, BIMETAL	EA	H
6685005575316	2605116C2	THERMOMETER, SELF&INDICATING, BIMETAL	EA	A
6810001237047	17102912B	N-AMYL ACETATE REAGENT 1 PT PER BT	PT	A
6810001237047	17102911B	N-AMYL ACETATE REAGENT 1 PT PER BT	PT	A
6810001844798	17701809A	ACETONE TECH 5 GL CN	CN	A
6810001844800	17102914B	TRICHLOROETHYLENE TECH 55 GAL DR	DR	A
6810001844800	17102905A	TRICHLOROETHYLENE TECH 55 GAL DR	DR	A
6810002010906	17102620B	ALCOHOL, DENATURED	PT	A
6810002010907	17102610A	ALCOHOL, DENATURED GR III 5 GL CN	CN	A
6810002232739	17100118B	ACETONE TECH LIO FORM 1 PT CN	PT	A
6810002380115	17103303C	CALCIUM HYPOCHLORIT	BT	A
6810002588119	17100510C	NAPHTHA ALIPHATIC TT-N-25 1 GL CN	GL	A
6810002380119	17100510C	NAPHTHA ALIPHATIC TT-N-25 1 GL CN	GL	A
6810002414709	17102609H	BUTYL ALCOHOL ACC LIO FORM 1 GL BT	GL	A
6810002497534	17103410A	SULFURIC ACID ELECTROLYTE 1 GAL BT	GL	A
6810002550471	17103807C	CALCIUM HYPOCHLORIT	BT	A
6810002550472	17103808C	CALCIUM HYPOCHLORIT	DR	A
6810002646610		SODIUM NICHROMATE TECH 1 LB CN	LB	A
6810002646715	17102912B	MOLYBDENUM DICHLORIDE 1 LB CN	LB	A
6810002646715	17102612B	MOLYBDENUM DICHLORIDE 1 LB CN	LB	A
681000276010	17100111A	METHANOL TECHNICAL 5 GL DR	CN	A
6810002812762	17100171A	METHYL ETHYL KEYTONE 5 GL CN	CN	A
6810002812785	17100104A	METHYL ETHYL KEYTONE 1 GL CN	GL	A
6810002894106	17102207H	XYLENE, TECHNICAL	DR	A
6810002900574	17103200C	SODIUM DICARBONATE 100 LB DR	DR	A
6810002912676	17100510A	METHANOL TECH CCL 0 0 252 1 GL CN	GL	A
6810002975546	17106214B	PURE WATER	PT	A
6810003064936	17106410A	DISTILLED-DEIONIZED	PT	A
6810003437415	17101018A	ALCOHOL, DENATURED GR III 1 GL CN	GL	A
6810003570431	17100510B	TOLUENE TECHNICAL 1 GL CN	GL	A
6810003570617	28101035A	LIMESTONE FULVERINT	DR	A
6810003570600	17100117C	METHANOL TECHNICAL 1 GL CN	GL	A
6810003773600	17100117H	METHANOL TECHNICAL 1 GL CN	GL	A
6810003840337	17100604B	1,1,1-TRICHLOROETHANE 1 GAL CN	GL	A
6810003876867	17106211B	DISTILLED-DEIONIZED	PT	A
6810003876956	17100510B	METHANOL ACC 1 GAL CN	GL	A
6810003876993	17100118B	ISOPROPYL ALCOHOL TECH 2 02 CN	GN	A
6810003876997	17101005B	CARBIDE, TECHNICAL 1 LB DR	LB	A
6810003947372	17100510A	SULFURIC ACID REAGENT 5 GL DR	DR	A
6810003954064	17100910A	DIETHYLAMINE 1 PT BT	PT	A
6810004153792	17100108B	ISOBUTYL ACETATE, REA	BT	A
6830001690800	17800111A	OXYGEN, TECHNICAL	CF	A
6830001690800	17800111A	OXYGEN, TECHNICAL	CF	A

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NSN	LOC	QUAN	UT	CCD	SCIC
6830002450199	17104020A	CARBON DIOXIDE,TECH	LR	A	7
6830002450199	17104019A	CARBON DIOXIDE,TECH	LR	A	7
6830002646755		ACETYLENE,TECHNICAL	CF		7
6830002646755		ACETYLENE,TECHNICAL	CF		7
6830002646755	18000101A	ACETYLENE,TECHNICAL	CF	A	7
6830002646755	18000101A	ACETYLENE,TECHNICAL	CF	A	7
6830005774623		NITROGEN,TECHNICAL	CF		7
6830005774623		NITROGEN,TECHNICAL	CF		7
6830005774623	17000102A	NITROGEN,TECHNICAL	CF	A	7
6830006600027		HELIUM,TECHNICAL	CF		7
6830006600027		HELIUM,TECHNICAL	CF		7
6830006600027	17000101A	HELIUM,TECHNICAL	CF	A	7
6830006600027	17000101A	HELIUM,TECHNICAL	CF	A	7
6830007357876	17102210A	BORONCHLORIDE TRIFLUORIDE	BT	A	7
6840002424217	17102220B	INSECTICIDE LINDANE 3 OZ BT	BT	A	7
6840002424217	17102220B	INSECTICIDE LINDANE 3 OZ BT	BT	A	7
6840002666018	2605115DA	INSECTICIDE DAPHTHA	LR	A	7
6840005843127	17102214B	DISINFECTANT DETERG	GL	A	7
6840005843127	17102214B	DISINFECTANT DETERG	GL	A	7
6840006077904	17102214B	DISINFECTANT DETERG	BT	A	7
6840006077904	17102214B	DISINFECTANT DETERG	BT	A	7
6840006077904	17102214B	RODENTICIDAL BAIT ANTICOAGUL 5LB CN	CN	A	7
6840006077904	17102214B	DISINFECTANT FOOD SVC 3LBS OZ 10	BT	A	7
6840006077904	17102214B	INSECTICIDE DIALINON 10000 1 GL CN	GL	A	7
6840006077904	17102214B	REFILL 10000012E	BT	A	7
6840006077904	17102214B	INSECTICIDE DURETHAN	BT	A	7
6840006077904	17102214B	WATER INDICATING FA	TU	A	7
6840006077904	17102214B	WATER INDICATING FA	TU	A	7
6840006077904	17102214B	CLEANING AND LUBRIC	CF	A	7
6840006077904	17102214B	CLEANING COMPOUND 14 OZ CN	CF	A	7
6840006077904	17102214B	DRY CLEANING SOLVENT	BT	A	7
6840006077904	17102214B	ANTI-FROGGING THT 500	BT	A	7
6840006077904	17102214B	CLEANING COMPOUND A	CF	A	7
6840006077904	17102214B	DEVELOPER IMPREGN	BT	A	7
6840006077904	17102214B	OILICOMP COMPOUND 2 OZ TU	TU	A	7
6840006077904	17102214B	ANTI-FREEZE	BT	A	7
6840006077904	17102214B	ANTI-FREEZE FORM DII-A-4001 1 GL	CN	A	7
6840006077904	17102214B	ANTI-FREEZE FORM DII-A-4015 1 GL	CN	A	7
6840006077904	17102214B	ANTI-FREEZE	BT	A	7
6840006077904	17102214B	CLEANING COMP RIFLE 100E 2 OZ CN	BT	A	7
6840006077904	17102214B	CLEANING COMP RIFLE 100E 2 OZ CN	BT	A	7
6840006077904	17102214B	CLEANING COMP RIFLE 100E 1 GL CN	GL	A	7
6840006077904	17102214B	CLEANING COMP RIFLE 100E 1 GL CN	BT	A	7
6840006077904	17102214B	TOUCH-IMPREGNANT GEL	BT	A	7
6840006077904	17102214B	CLEANING COMPOUND 10E	BT	A	7
6840006077904	17102214B	DESICCANT ACTIV 450 1/2000 16 5GL CN	CN	A	7
6840006077904	17102214B	DRY CLEANING SOLVENT TYPE 1 BULK-GI	GL	A	7
6840006077904	17102214B	DRY CLEANING SOLVENT TYPE 1 BULK-GI	GL	A	7

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NSN	LOC	NOUN	UT	CCD	S
8850002705528	2805113A1	GASOLINE INDICATING PASTE 2 1/2 TU	JR	A	7
8850002705526	17102610B	GASOLINE INDICATING PASTE 2 1/2 TU	JR	A	7
8850002706225	17103606B	CHLORINATION KIT FED O-C-28 TYPE 1 BX	KY	A	7
8850002745421	17101703A	DRY CLEANING SOLVENT TYPE II 5 GLON	CN	A	7
8850002811785	17100509A	DRY CLEANING SOLVENT	GL	A	7
8850002858011	17102203A	DRY CLEANING SOLVENT TYPE II 55GLDR	DR	A	7
8850002858012	17102205A	DRY CLEANING SOLVENT TYPE I 55GLDR	DR	A	7
8850002978653	17106416A	DECON AGENT STR	DF	A	7
8850003685233	17102914A	INHIBITOR CORROSION CRYSTAL 1LDR	LF	A	7
8850003685233	17102914A	INHIBITOR CORROSION CRYSTAL 1LDR	LF	A	7
8850003929751	17102804B	CLEANING COMP OPTICAL LENS 2 OZ RT	RT	A	7
8850004372076	2607526A1	DEVELOPER INDIRECT	FG	A	7
8850004372076	2605115E2	DEVELOPER INDIRECT	FG	A	7
8850004571521	17102613A	TONER DIRECT ELECTR	DF	A	7
8850005133233	17102613A	CLEANING COMPOUND	C	A	7
8850005215765	17100120A	CLEANING COMPOUND SOLVENT 1 GL CN	GL	H	7
8850005215765	17100130A	CLEANING COMPOUND SOLVENT 1 GL CN	GL	H	7
8850005215765	17100110A	CLEANING COMPOUND SOLVENT 1 GL CN	GL	H	7
8850005215765	17100170A	CLEANING COMPOUND SOLVENT 1 GL CN	GL	H	7
8850006645600	17102620A	DRY CLEAN SOLVENT	DF	H	7
8850006747473	17102613B	CLEANING COMPOUND	DF	A	7
8850007349607	17102613B	INHIBITOR CORROSION FWDK Em 1 OZ LP	LF	A	7
8850007575201	17101810A	INHIBITOR JOINTS LNF	LF	A	7
8850008222740	17101516B	INSPECTION FLOWTHRU FIL	FF	A	7
8850008523914	17102511B	INHIBITOR CORRO 2 OZ JR	DR	A	7
8850008523914	17100109A	SILICONE COMPOUND	TU	A	7
8850008523914	17100120F	CLEANING COMPOUND WTR 16 OZ CN	CT	A	7
8850008523914	17101205A	CARBON PENS 1 GL CN	CN	A	7
8850008737081	17102916A	PENETRATING FLUID	UN	A	7
8850008737081	17102605B	SILICONE COMPOUND	TU	A	7
8850008830202		CLEANING COMPOUND SOLVENT 55 GL DR	DR	A	7
8850008830202	17102615A	CLEANING COMP SOLV 5 GL CN	DF	A	7
8850010114277	17102612A	TONER DIRECT ELECTR	DF	A	7
8850011631134	2605115E3	DEVELOPER INDIRECT	DF	A	7
8850011631134	17102611B	FUSING FLUID	DF	A	7
8850012100100	17102910A	DR 104 CARTRIDGE	DF	A	7
8850002753805	17100101C	PRINTER COATING	PT	H	7
8850002753805	17102909B	PHOSPHATE COMPOUND	LF	A	7
8850002841276	17100510E	CORROSION PREVENTIV	CN	A	7
8850001312716	17100101E	COATING COMPOUND 16L	PT	H	7
8850006187101	17100104C	SEALING COMPOUND	PT	H	7
8850006471101	17105203A	COATING COMPOUND 16L	GL	A	7
8850006709553	17100104C	SEALING COMPOUND	PT	H	7
8850007131746	17100104C	SEALING COMPOUND	PT	H	7
8850007575347	17100101C	SEALING COMPOUND	PT	H	7
8850007575347	17100104C	SEALING COMPOUND	PT	H	7
8850008893535	2601328C1	TAPE ANTICIZING	DA	A	7
8840001450019	17100101C	ADHESIVE	PT	H	7
9110002639625	17100703A	FUEL COMPRESSED TRICOR BATH HTNG BR	UR	A	7





**WESTON.**

**APPENDIX B**  
**DAMES & MOORE REPORT**  
**WOODWARD-CLYDE CONSULTANTS REPORT**  
**(As Received)**

**1073M2-4**

**WESTON**

**DAMES & MOORE REPORT**

**1073M2-4**

**B-1**

# DAMES & MOORE

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July 5, 1989  
19038-001-11

Servco Pacific Inc.  
900 Fort Street Mall, Suite 600  
Honolulu, Hawaii 96813

Fax: 533-1369

Attention: Mr. Glenn H. Takeuchi  
Senior Division Manager  
Property Development

Subject: Progress Letter  
Engineering Services and Consultation  
Subsurface Hydrocarbon at  
Proposed Servco Commercial Center - Phase I  
Sand Island, Oahu, Hawaii

Following our discussion today, this letter provides our progress to date on the subject project.

Soil Gas Survey - The results of our soil gas survey are presented on the attached Plot Plan. The plot plan indicates that only a small area has measureable quantities of soil gas in the near surface zones. This finding, however, was not consistent with previous findings (hydrocarbon in borings), so we drilled borings in areas outside the indicated plume.

Borings - To date we have completed three of the five borings originally proposed. We have encountered hydrocarbon in two of the borings, which are outside the area indicated by the soil gas survey. Soil gas measurements taken during drilling did not indicate hydrocarbon until a clayey silt layer, approximately at the water table, was penetrated by the drilling. In Boring 1, the hydrocarbon was not detected in significant amounts until a clayey silt layer at approximately 6 feet in depth was penetrated. In Boring 3, hydrocarbon was detected when a clay layer from 8 to 10 feet was penetrated. Hydrocarbon in significant quantities was not detected in Boring 2, which appears to lie outside the hydrocarbon plume.

It appears that the hydrocarbon is more extensive than indicated by the soil gas survey, but hydrocarbon vapors are being prevented from moving up by the clay layer. Field boring logs for the three borings drilled to date are attached. We anticipate completing two more borings by the end of this week.

Recommendation - Based on the results, we anticipate that borings will need to be the primary means of investigation, as the soil gas survey does not extend deep enough to penetrate the apparently confining clayey silt layer. We therefore recommend that additional borings (beyond the five currently authorized) be drilled.

 **DAMES & MOORE**

Servco Pacific Inc.  
July 5, 1989  
Page 2

**Budget** - A review of our budget indicates that we are within the original estimates of our proposal of May 2, 1989. For the soil gas survey, approximately \$4,000 in charges were generated. For the drilling, we anticipate that we will be within the budget.

For the additional borings recommended, we anticipate that drilling, sampling, and logging costs would be approximately \$1,000 per boring and chemical testing would be approximately \$500 to \$1,000 per boring.

An additional six borings would cost approximately \$6,000 plus \$3,000 to \$6,000 for chemical testing.

**Planned Construction** - We understand that a sewer line may soon be constructed to an approximate invert elevation of +2 in the area just mauka of the existing plume. We recommend that available information, particularly the soil gas survey results, be supplied to the contractor. Because of the confining clay layer, it may be possible to proceed with excavation work for the sewer without encountering hydrocarbons, if the excavation does not penetrate the clay layer. The contractor, however, should be aware of the presence of hydrocarbons so that proper safety precautions can be taken, such as periodic checks for vapors.

- o o o -

It has been a pleasure to prepare this progress letter for you. Please let us know as soon as possible if the additional borings are authorized, so that we can proceed without demobilizing. We believe that we require some assistance in moving automobiles temporarily out of areas to be investigated.

I will be out of town from 7/7/89 through 7/14/89. In the meantime, Ken Fan or Glen Lau will be available to coordinate the field investigation with you.

Respectfully submitted,

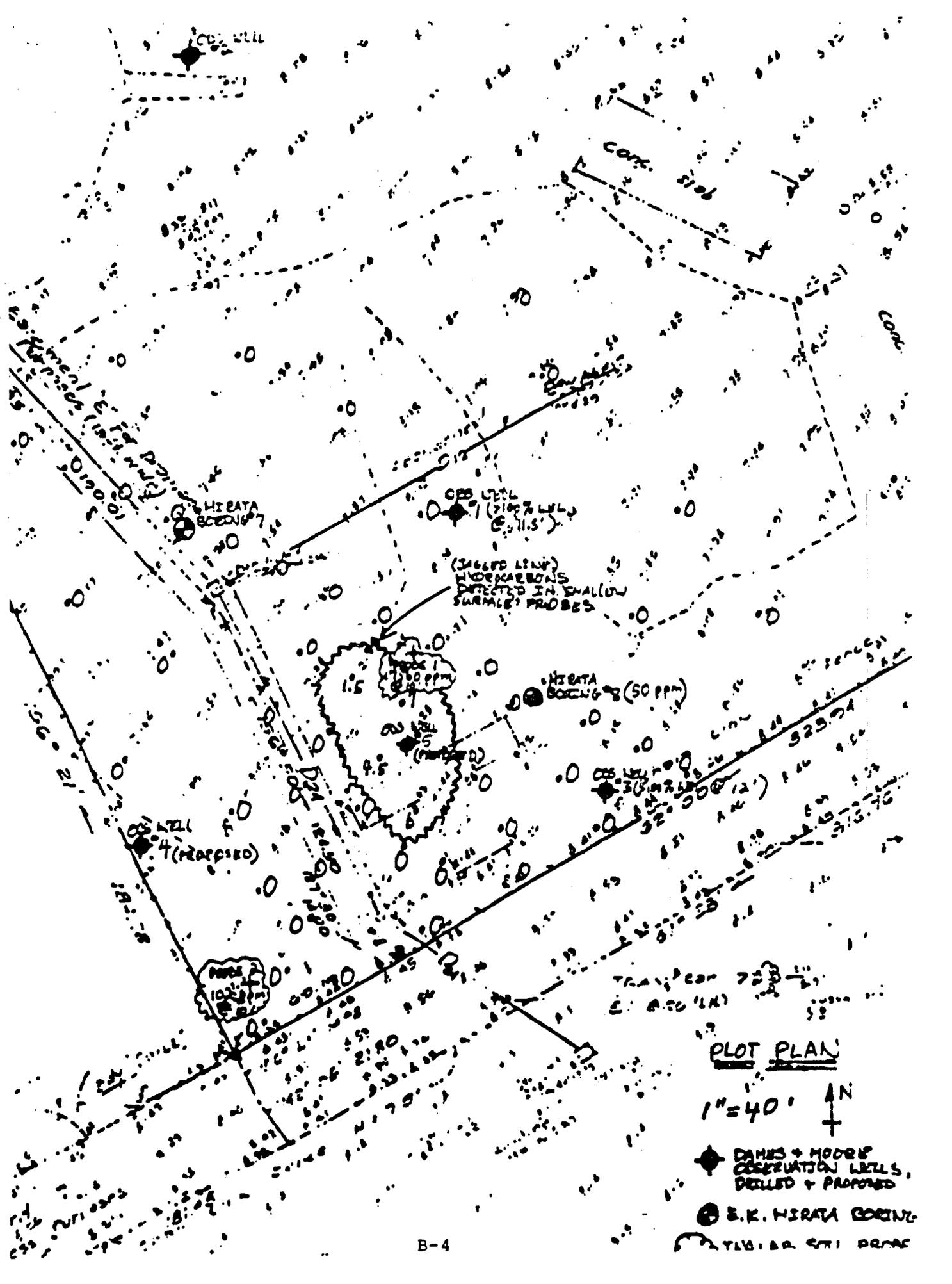
DAMES & MOORE  
A Professional Limited Partnership

*Kenneth Fan*

for  
Masanobu R. Fujioka, P.E.  
Consultant

MRF(45478/2008:19038-001-11)  
(two copies submitted)

Attachments: Plot Plan  
Field Logs



**PLOT PLAN**

1" = 40' AN  
 ↑

- ◆ DAMES + MOORE OBSERVATION WELLS, DRILLED & PROPOSED
- E.K. HIRATA BOREHOLE
- TUBULAR SET POINTS

**WESTEN.**

**WOODWARD-CLYDE CONSULTANTS REPORT**

**1073M2-4**

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**REPORT**  
**SUBSURFACE INVESTIGATION OF KAPALAMA, PHASE I**  
**KAPALAMA MILITARY RESERVATION**  
**HONOLULU, HAWAII**

**I GENERAL**

This report presents the results of Woodward-Clyde Consultants (WCC) Phase I subsurface investigation of the United States Army Engineer Division's (Army Corps) Kapalama Military Reservation in Honolulu, Hawaii. The work was authorized under Delivery Order No. 0007 to Architect-Engineer Contract No. DACA83-88-D-0127. The site location is shown on Figure 1.

**II OBJECT AND SCOPE**

The object of the work was to assess the quality of groundwater at the Kapalama Military Reservation - Phase I Property. The Phase I Property is one of five parcels of land at the Kapalama Military Reservation being sold (or that have been sold) by the Army. To complete this work, WCC evaluated existing reports, prepared a work plan, obtained well permits, advanced four soil borings and installed monitoring wells in these borings, developed and sampled the wells, evaluated the results of chemical analyses, measured ground water level elevations and free product thickness; prepared subsurface cross sections, water level and contaminant distribution maps; and prepared this report summarizing the results of our findings.

**III SITE DESCRIPTION**

The Kapalama Military Reservation is situated along Sand Island Access Road, in Honolulu, Hawaii at the location shown on Figure 1. The site is presently used by Servco Corporation as a vehicle storage parking lot. The

site is generally flat and partially covered with asphalt. Buildings and an underground storage tank, once present at the site, have been removed. A site plan map is shown on Figure 2.

#### IV REPORT REVIEW

To assist in the evaluation of the subsurface conditions at the Kapalama Military Reservation, WCC evaluated the following records and reports:

1. Unitec (1987) Underground Storage Tank Removal Reports,
2. Geolabs (1987) Preliminary Geological and Geotechnical Engineering Reconnaissance Report of the Honolulu Waterfront Master Plan Technical Report Series,
3. Jason Lembeck and Associates (1989) Petroleum Facilities Report for the Honolulu Waterfront Master Plan Technical Report Series,
4. Dames and Moore (1989a and b) reports concerning groundwater quality on the Kapalama Phase I Military Reservation,
5. Goodsill, Anderson, Quinns and Stifel's August 15, 1989 letter to the U.S. Army Engineer Division, and
6. Interviews with U.S. Army Engineer Division personnel familiar with either the removal or use of the underground storage tank.

A brief discussion of each of these is described below:

In 1987, Unitec removed an underground storage tank at the Kapalama Military Reservation Phase I property at the location shown on Figure 2. At the time of removal, Unitec's records show that the underground storage tank contained both gasoline and water. Thus, it is reasonable to conclude that holes existed in the underground storage tank, and that product may

have migrated from the tank into the native soils and groundwater. Unitec did not test the groundwater at the time of tank removal for hydrocarbons. Thus no conclusions can be drawn concerning the concentration or amount of gasoline dispersed.

Geolabs (1989) prepared a report describing the general geologic and geotechnical conditions of the Honolulu waterfront which included the Kapalama Military Reservation area. They report that the Kapalama Military Reservation is underlain predominantly by man made fill (designated Rf1) overlying more competent coral-algal formation. The fill consists of clay to sandy gravel mixtures and an intermediate mix of silty sand soils, with consistencies that range from soft or loose to hard or very dense.

Jason Lembeck and Associates (1989) describe the current petroleum distribution system within Honolulu Harbor. Their report shows that several oil pipelines, which belong to the Hawaiian Independent Refinery (HIRI), Chevron, and the Hawaiian Fuel Facilities Corporation (HFFC), cross the Kapalama Military Reservation Phase 1 property (Figure 3). The petroleum pipeline distribution system is presented in more detail by Helber et al. and R.M. Towill Corporation on sheet 2 of their Honolulu Waterfront project report. Their map shows that the pipelines that cross or are located immediately adjacent to the Kapalama Phase I property includes two Chevron 8-inch pipelines which transport black and white oil, respectively; three Chevron 4-inch pipelines which transport jet-A fuel, one HFFC 10-inch pipeline, and one 10-inch HIRI pipeline. The HIRI and HFFC pipelines reportedly transport numerous petroleum products to other refiners and the Honolulu airport.

Dames and Moore (1989a and b) prepared two reports concerning groundwater quality at the Kapalama Phase I property. Their July 5, 1989 report describes the results of a soil gas survey and observations of subsurface conditions from soil borings. Although they do not describe their soil gas procedures, Dames and Moore indicated that hydrocarbon product is present in the shallow subsurface.

Dames and Moore's August 17, 1989 progress letter reports the results of a more extensive subsurface investigation. In addition to detecting hydrocarbon vapors in shallow soils, Dames and Moore presented the results of their ground water monitoring. These results show a free floating hydrocarbon product plume centered around the location of the former underground storage tank.

Dames and Moore's findings are summarized in Goodsill, Anderson, Quinns and Stifel's August 15, 1989 letter to the U.S. Army Engineer Division. It is concluded in this letter that, based upon the location of floating gasoline product, the source of contamination is onsite rather than offsite. Thus the source of the leak is the underground storage tank. This conclusion is drawn, however, without mention of an investigation of external sources of subsurface petroleum product--such as that transported by one of the many underground pipelines that traverse or are located adjacent to the property.

Personal interviews with U.S. Army Corps of Engineers personnel in September of 1989 revealed that both diesel fuel and gasoline products were stored in the underground tank. At the time of tank removal, personnel at the site did not, however, observe gasoline or diesel fuel product in either the soils or groundwater.

#### V FIELD ACTIVITIES

To assess the quality of subsurface groundwater adjacent to the location of the former underground storage tank at the Kapalama Military Reservation Phase I Property, WCC completed a subsurface field investigation. The activities required to complete this task are described below. WCC's findings are presented in subsequent report sections.

### A. Drilling

On August 30 and 31, 1989, WCC subcontracted PR Drilling to advance four soil borings and install monitoring wells (MW-1, 2, 3 and 4) in the borings at the subject site. The borehole locations were selected by WCC after a field consultation with the Engineers Division representative. The location of the boreholes are shown on Figure 2. The borings were advanced to depths of approximately 12 to 20 feet with a Mobile B-80 truck mounted drill rig equipped with hollow stem augers. While drilling, soils were obtained using a split spoon sampler placed through the hollow stem of the auger. The augers and sampler were steam cleaned between sampling locations. The soils were logged by a WCC geologist according to the Uniform Soils Classification System. Logs of the materials encountered are provided in Appendix A.

### B. Monitoring Well Construction

Groundwater Monitoring wells were constructed in each of the borings after their completion. The wells were designed to monitor the top of the shallow groundwater. The wells were constructed with 2-inch schedule 40 ASTM grade PVC casing placed inside the hollow stem of the auger. The casing consists of an upper blank section and a lower screened (.020 inch slots) section positioned across the top of the shallow ground water. Grade A12 silica sand filter pack was placed in the annular space of the well bore to approximately 1 foot above the top of the well screen section. A 1/2 to 1 foot thick bentonite pellet seal was placed above the filter pack, followed by a cement slurry to surface grade. Well No. MW-4 was completed with a locking Cristy cap, the remaining wells were completed with removeable steel caps.

### C. Well Development and Groundwater Sampling

After their construction, the wells were developed using the bailer method. Approximately 18 to 25 gallons of water were removed from each well during this process. Well development was terminated when the well water appeared clear a short time after bailing. A clean acrylic bailer was then used to identify wells which contained free floating product. This included wells installed both by Dames and Moore and WCC. Once identified, these wells were not sampled because of their obvious contamination. The depth to free product and top of groundwater were then determined in all the wells using an electronic sounder. WCC then purged all the wells to be sampled of approximately 4 to 5 well volumes using a clean teflon™ bailer. A sample was then obtained from each of these wells using the same bailer. The teflon bailer was cleaned between well locations using a laboratory grade acetone rinse, followed by an alconox soap rinse and finally a distilled water rinse. The samples were placed in laboratory prepared finger vials for benzene, toluene, ethylbenzene, and total xylenes (BTEX) analyses; and 1 liter glass containers for total petroleum hydrocarbon (TPH) as gasoline and diesel fuel analyses. The sample containers were immediately placed in refrigerated storage for transport to Brewer Analytical Laboratories in Papaikou, Hawaii. The samples were delivered following EPA chain of custody procedures. A copy of WCC's chain of custody is included in Appendix B.

### D. Laboratory Analyses

On September 5 and 13, 1989, the groundwater samples were analyzed for TPH, both as gasoline and diesel fuel; and BTEX using California LUFT Manual Procedures. The results of these analyses are discussed below. The analytical laboratories report is included in Appendix B of this report.

### E. Well Survey

On September 7, 1989 R. M. Towill Corporation surveyed in the elevations of the wells installed both by WCC and Dames and Moore. Their survey elevations are summarized in Table 1. The elevation datum was mean sea level (MSL). Their reference benchmark is 10.255 feet MSL.

## VI RESULTS

### A. Subsurface Conditions

As shown on the logs of borings in Appendix A and in cross section A-A' Figure 5, (see Figure 4 for the cross section location) the subsurface materials encountered consist of interbedded sand, underlain by clays, silty clays, and clayey and sandy gravels to depths that vary from 12 to 20 feet. These units comprise Geolabs (1989) Rf1 unit described as fill. They are all, in turn, underlain by coral.

### B. Groundwater

Shallow groundwater beneath the site occurs at a depth of about 6 feet. Groundwater level and free product thickness measurements obtained on September 5, 1989 are summarized in Table 1. The data is plotted as a water level elevation map on Figure 6. As shown, the groundwater gradient is generally flat, with a slight depression located near wells B-8 and OB-3 and local groundwater highs around wells MW-2 and MW-3.

### C. Free Product Thickness

The location and thickness of floating hydrocarbons beneath the site is shown on Figure 7. As shown, the thickest accumulation of free product surrounds wells OB-3 and OB-5. Up to 1.55 feet of free floating hydro-

carbons were detected in well OB-3, 0.59 feet in well OB-5, 0.29 feet in well OB-1, 0.12 feet in well MW-3, and 0.12 feet in well OB-13. Free product was not observed in any other wells at the site.

#### D. Groundwater Analyses

Groundwater samples were obtained from monitoring wells that did not contain free floating product. These samples were submitted to Brewer Analytical Laboratories for TPH as gasoline, diesel fuel and BTEX analyses. The results of these analyses are summarized in Table 2. As shown, TPH as gasoline was detected in monitoring wells MW-1, 2, 4, OB-4, and OB-12 at concentrations of 40, 2.9, 46, 1.7 and 7.9 mg/l, respectively. Diesel fuel was also detected in groundwater from these same wells. The reported concentrations were 24, 2.9, 10, 1.3 and 5.7 mg/l, respectively. The analytical laboratory also reported that benzene, toluene, ethylbenzene and total xylenes were present either singularly or in combination in wells MW-1, MW-2, MW-4, OB-4 and OB-12. The water sample obtained from well MW-1 showed the highest concentration of benzene (0.36 mg/l), toluene (0.097 mg/l), ethylbenzene (2.6 mg/l) and total xylenes (0.35 mg/l) relative to all other samples from the site.

#### E. Distribution of Groundwater Contaminants

The distribution of TPH as gasoline, diesel fuel, and BTEX constituents in groundwater is shown on Figures 8, 9 and 10, respectively. As shown, these constituents are present in groundwater around the edges of the free floating product plume. The distribution of these contaminants to the northeast appears limited to the west side of wells OB-11 and OB-9, but is unknown in all other directions. The vertical extent of contamination is also unknown.

## VII DISCUSSION

Both the analytical laboratory's report and our own field observations indicate that both dissolved and floating phase hydrocarbons are present in the shallow groundwater at the Kapalama Military Reservation Phase I property in Honolulu, Hawaii. The laboratory's report shows that both gasoline and diesel fuel products are present in water samples obtained from the site. These products were also reportedly stored in the underground storage tank removed by Unitec in 1987. The free product thickness map shows that floating hydrocarbon product is also thickest adjacent to the former underground storage tank location. TPH as gasoline, diesel fuel, and BTEX constituents are distributed adjacent to this free product plume, with the highest concentrations of diesel fuel and BTEX found in well MW-1, the well closest to the former underground tank location. Concentrations of these constituents generally decrease radially away from well MW-1, with the exception of TPH as gasoline, which is also found in high concentration in well MW-4. These spatial relations suggest that the underground storage tank formerly located at the Kapalama Military reservation leaked both gasoline and diesel fuel into the shallow groundwater. The distribution of TPH, diesel and BTEX beyond the limits of this investigation, however, does not preclude the possibility of additional or other sources of both dissolved and floating phase contaminants.

## VIII CONCLUSIONS

Based upon the results of our records and report review, the analytical laboratories report, and our own field observations, the underground storage tank formerly located at the Kapalama Military Reservation Phase I property probably leaked hydrocarbon product into the shallow groundwater. Other sources of dissolved phase hydrocarbons may be one of the several pipelines adjacent to or that cross the Kapalama Military Reservation Phase I property, or underground storage tanks reported on the Phase II property. Product transfer and hydrostatic test records of these tanks and/or pipelines should be reviewed to assess their contribution of hydrocarbon products to the shallow soil and groundwater.

**END  
FILMED**

**DATE:**

**4-93**

**DTIC**