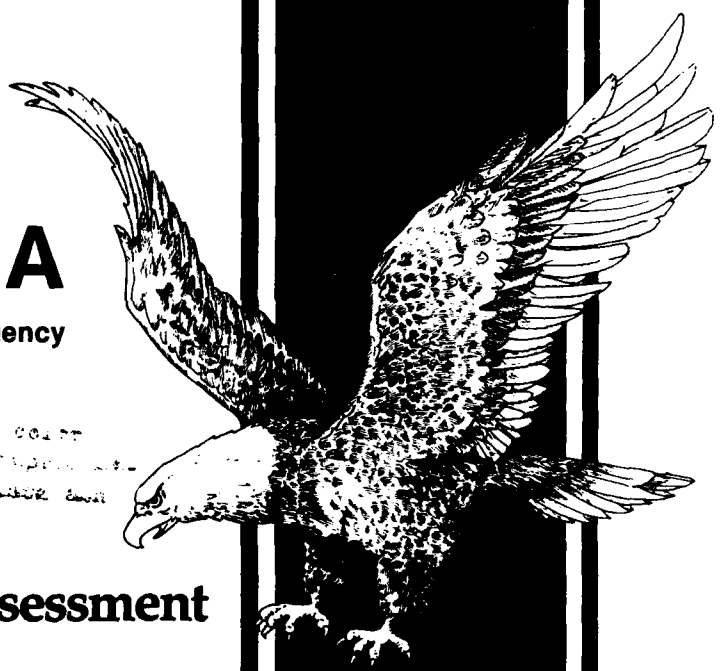
Report No. CETHA-BC-CR-90017



USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

Task Order 2
Enhanced Preliminary Assessment

HAMILTON ARMY AIRFIELD
NOVATO, CALIFORNIA

Contract Number DAAA15-88-D-0007

January 1990

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-90017

USATHAMA Task Order 2

ENHANCED PRELIMINARY ASSESSMENT REPORT

HAMILTON ARMY AIRFIELD
NOVATO, CALIFORNIA

Contract No. DAAA15-88-D-0007

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18. Hamilton Army Airfield.
Environmentally Significant Operations(ESOs).
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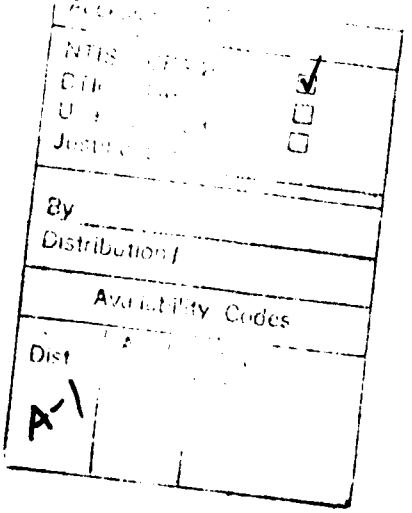
19. ABSTRACT

An enhanced preliminary assessment was conducted at Hamilton Army Airfield (HAA), which is planned for inclusion in the Base Closure Program. The HAA property is approximately 700 acres in size and consists of five noncontiguous parcels of land. HAA is located within the city limits of Novato, California, and just west of San Pablo Bay. The buildings on HAA are used for administration, classrooms, and maintenance related activities.

Based on information obtained during and subsequent to a site visit from 26 September through 29 September 1989, 12 Environmentally Significant Operations (ESOs) were identified: asbestos on and within buildings, underground storage tanks (USTs), aboveground storage tanks (ASTs), transformers, aircraft maintenance/storage areas, Burn Pit, former radiological disposal site, former sewage treatment facility, JP-4 line, Revetment Area, landfill, and bombing range.

Recommended actions for the site investigation of the 12 ESOs include: proceeding with asbestos survey recommendations; inventory and test all transformers; collect soil and groundwater (GW) samples from the POL Area; locate and leak test remaining USTs; collect soil samples from beneath remaining ASTs; collect soil, sediment, and GW samples from maintenance/storage areas/storm sewer; field investigation and leak test of JP-4 line; soil and GW samples in Revetment Areas; GW samples from landfill; ordnance sweep of bombing range areas; and soil samples from sewage treatment sludge drying beds.

No additional action is needed for the former radiological disposal site, as the cylinders were removed and reports indicate no contamination exists.



DISCLAIMER

This Enhanced Preliminary Assessment Report is based primarily on the environmental conditions observed at the Hamilton Army Airfield facility on 26 September through 29 September 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.

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.

WESTON

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EXECUTIVE SUMMARY

BACKGROUND AND PROCEDURES

This Enhanced Preliminary Assessment (PA) report has been prepared 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 report is to present WESTON's findings and conclusions concerning the environmental conditions at Hamilton Army Airfield (HAA) located in Novato, California, and to provide recommendations for further action.

The objectives of the enhanced PA were to:

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

Information contained in this enhanced PA report was obtained through:

- Visual inspection of the facility.
- Review of available information from current property owners (the U.S. Army) and the U.S. Air Force.
- Review of related regulatory agency files at the local, state, and federal levels.
- Interviews with available current and former personnel associated with the facility.

PROPERTY DESCRIPTION

HAA is approximately 700 acres in size and is a portion of the former Hamilton Army Air Corps facility that was originally over 2,000 acres in size. The property is located approximately 22 miles north of San Francisco in Novato, California. San Pablo Bay is just east of the site. The mission of the original Army Air Corps facility was to train fighter and bomber pilots.

Property transactions that have occurred at HAA are as follows:

- 1932 - Property acquired from Marin County.
- 1934 to 1947 - Hamilton Field functioned as a fighter and bomber pilot training facility.

- 1947 to 1974 - After a Defense Department reorganization, the property was transferred to the newly created Air Force and renamed the Hamilton Air Force Base.

- 1975 - Civilian management commenced.

  - Housing portion of property transferred to U.S. Navy.

- 1976 - U.S. Army received permission to use runway and POL Area (Installation Number 6160).

  - State of California received properties north of the runway and east of the east levee.

  - Three noncontiguous parcels of land (Installation Number 6200) transferred to U.S. Army.

- 1984 - Installation Number 6160 transferred to U.S. Army.

The remainder of the property is excessed under the control of the U.S. Army, and is in the process of being sold by the General Services Administration (GSA).

At the present time, the Army-owned property is used for flight operations and maintenance-related activities as well as Army Reserve facilities.

ENVIRONMENTALLY SIGNIFICANT OPERATIONS

ESOs identified on the property include:

- Asbestos materials on and within buildings. Many buildings onsite have areas containing asbestos materials. Asbestos has been found in asbestos-cement Transite siding, floor tiles, ceiling materials, piping, and boiler rooms.

- Polychlorinated biphenyls (PCBs) in transformer oil. Pole and ground mounted. Transformers located within HAA have not been inventoried nor has PCB testing been performed.

- Underground and aboveground storage tanks.

  - Twenty-one removed underground storage tanks.

  - More than four reported underground storage tanks that may remain in the ground or may have been removed

  - One removed aboveground storage tank.

  - More than nine aboveground storage tanks.

  Tanks were mainly used for the storage of aircraft-related fuels, gasoline, diesel, and fuel oil for generators. Previous tank removal efforts recalled and removed much contaminated soil, but several areas of known contamination were not removed.

- Aircraft maintenance/storage areas. Currently light aircraft maintenance and associated storage areas are located within HAA Items stored are petroleums, oils, lubricants (POL), paints, solvents, fuels, and other maintenance-related materials.

- Burn Pit. Previously located on a concrete pad in the Revetment Area. No information was available on materials burned. A previous study conducted by Woodward-Clyde Consultants revealed shallow contamination in the Burn Pit area [R-1].

- Former radiological disposal site. Two metal cylinders reportedly containing low-level radioactive waste were located onsite. The cylinders were recovered and removed from the property as part of a Corps of Engineers (COE) contract in 1988.

- JP-4 line. A 12-in. diameter pipe used for off-loading barges is located on the site. Much of the line is aboveground (approximately 5,700 ft), located in a concrete-lined storm water collection ditch on the north side of the property. The pipeline is underground (approximately 2,900 ft) when it crosses the runway to the POL Area and penetrates the levee at the northeastern corner of the site. The drainage ditch is reportedly deteriorated and cracking [T-1]. The line is not in use. No testing of this line is known to have occurred other than within the POL Area.

- Revetment Area. The Revetment Area consists of concrete parking areas and taxiways that have not been actively used for aircraft since 1974. Oil, fuel, and used oil have reportedly been dumped or spilled on and around these areas [T-1]. Soil testing of these areas, excluding the Burn Pit, have not occurred.

- East Levee Landfill. A capped landfill is located between the east levee and the bay. It is located on both Army-owned property and State-owned property. Reports indicate only construction-related debris was deposited there [T-1; R-1]. Only low levels of contamination were found.

- Bombing range. The only information available regarding the bombing range is a verbal report [T-1] estimating the location of the bombing areas. One was reportedly located near the East Levee Landfill, one north of the Revetment Area, and one at the northwestern end of the runway. These areas expand into non-Army properties. No information was found regarding ordnance sweeps of these areas or the amount and type of ammunition used. However, no written documentation could be found to substantiate the existance of any bombing ranges on HAA.

- Former sewage treatment facility. A sewage treatment facility was located at HAA until 1986 at which time all sanitary wastes were pumped to the Novato Sanitation District. Since then, all buildings have been demolished; only the three sludge drying beds remain.

RECOMMENDATIONS FOR FURTHER ACTION

Table ES-1 outlines recommended actions for the ESOs located on HAA. Figure ES-1 shows proposed sampling locations.

Asbestos

An asbestos survey dated June 1989, conducted by OCCUSAFE, Inc., surveyed buildings on HAA (see Appendix A). OCCUSAFE recommended remediation efforts and an Operations and Maintenance Program [R-3]. In areas where an Operations and Maintenance Program is to be implemented, several measures are required to ensure the integrity of the material and the health of building occupants and maintenance personnel. The measures include:

- In buildings where asbestos-containing materials (ACMs) have been confirmed, notify all full-time and temporary occupants as to the presence of such materials.
- In areas identified as containing ACMs, begin a systematic program to clean up, provide maintenance for, and, where necessary, repair the materials.
- A surveillance program to ensure the integrity of the ACM remediation efforts. These remediation or control measures include removal, encapsulation, enclosure, or establishment of an ACM maintenance program.
- Worker training, including emergency and notification procedures.

It is recommended that the OCCUSAFE recommendations as well as ambient air sampling be implemented where friable asbestos has been removed or encapsulated.

Transformers

Transformers on HAA should be inventoried to verify the condition of the transformer housing and to locate any leaks that may be present. One sample should be taken from each transformer to determine the presence of PCBs. It is also recommended that the transformers be labelled and managed according to Toxic Substances Control Act (TSCA) Regulations.

Underground Storage Tanks (USTs)

Former USTs in the POL Area and their associated piping reportedly have left areas of contamination. Twenty to 40 soil borings (1 to 3 samples per boring) are recommended. Samples should be analyzed for total petroleum hydrocarbons (TPHs). The exact location of these samples will be determined. Groundwater sampling at each existing well is also recommended (1 sample per well). Samples should be analyzed for TPHs.

Table ES-1

ESOs Identified at HAA
and Recommendations for Further Action

ESOs	Concern	Recommended Activity	Number and Type of Samples Recommended	Location	Analysis
Asbestos	Asbestos on and within buildings	Proceed with report R-3 recommendations		To be determined	Asbestos
Transformers	Polychlorinated Biphenyls (PCBs)	Inventory transformers Sample transformer oil	One per transformer	To be determined	PCBs
Underground Storage Tanks (POL Area)	TPH leaks from remaining tanks. TPH soil contamination from former tanks.	Soil boring	20 to 40 soil borings (1 to 3 samples/boring)	To be determined	TPHs
		GW samples	1 per existing well	At existing wells	TPHs
Underground Storage Tanks	TPHs	Locate and leak test	NA	UST 22, 23, 24, 25	NA
Aboveground Storage Tanks	TPHs	Soil borings	2 soil (each 0 to 6 in. and 2 to 3 ft)	AST 5	TPHs
			Composite 2 surface soil samples at each location	AST 6, 7, 10	TPHs
	TPHs	Remove any residual fuel from unused tanks	NA	AST 8, AST 3, misc. drum	Determine contents and dispose if necessary
Aircraft Maintenance/ Storage Areas	Solvents, fuels, and metals potentially contaminating soil and groundwater	Soil borings	2 soil (0 to 6 in. and 2 to 3 ft)	Storage Area 2	TPHs, RCRA metals,* VOCs, BNAs
		Sediment samples	1 sediment sample in inlet chamber	Storage Area 2	TPHs, RCRA metals, VOCs, BNAs
		Sediment samples	2 to 6 sediment samples in storm sewer	In proximity of maint/storage areas	TPHs, RCRA metals, VOCs, BNAs
		GW samples	1 GW sample per new MW	Immediately downgradient from storage area 3	TPHs, RCRA metals, VOCs, BNAs
		Soil borings	4 soil (0 to 6 in. and 2 to 3 ft)	N and E of Building 87	TPHs, RCRA metals, VOCs, BNAs
		Sediment samples	1 sediment sample in inlet chamber	N of Building 87	TPHs, RCRA metals, VOCs, BNAs

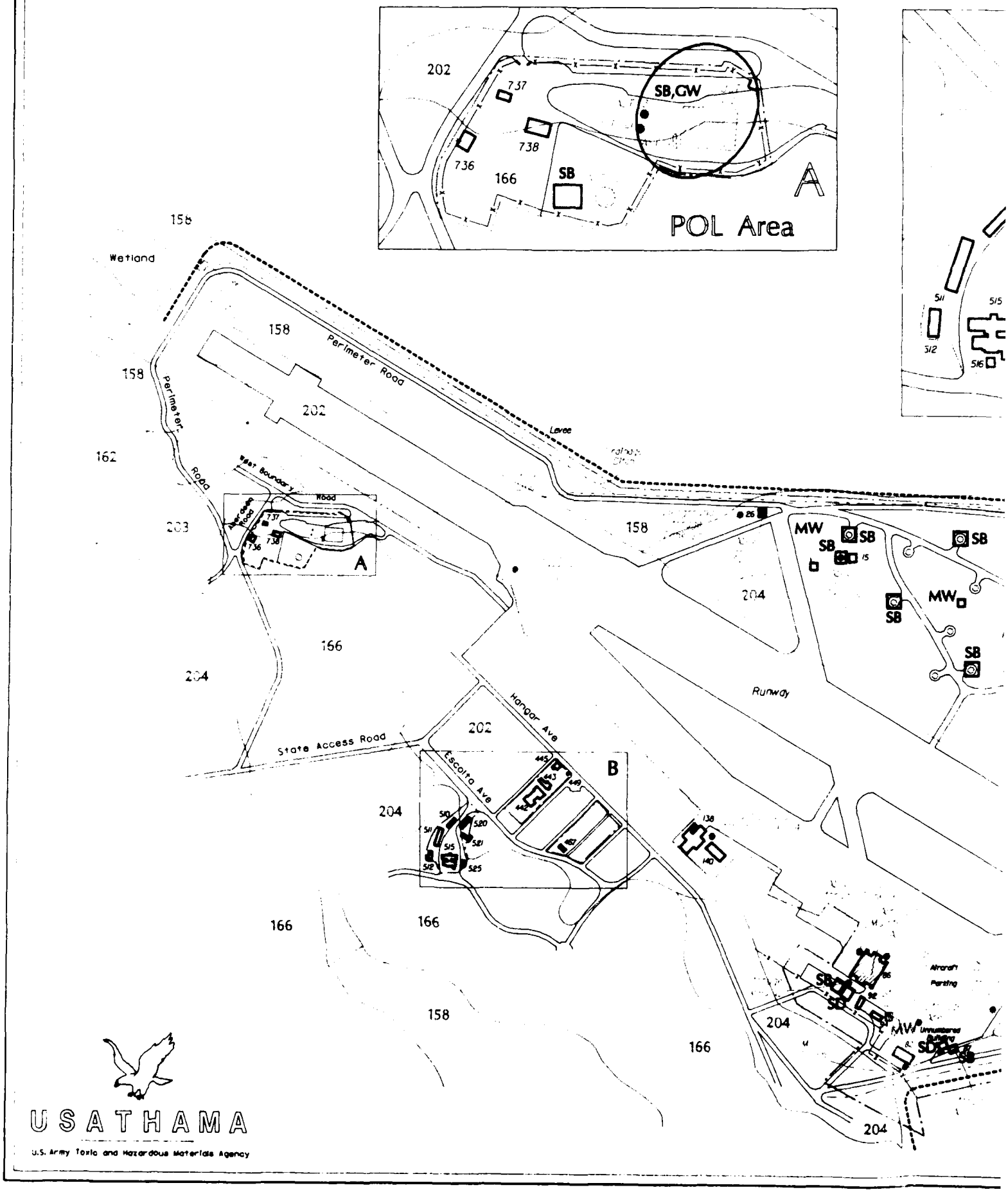
*RCRA metals to be identified: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver.

Table ES-1

ESOs Identified at HAA
and Recommendations for Further Action
(continued)

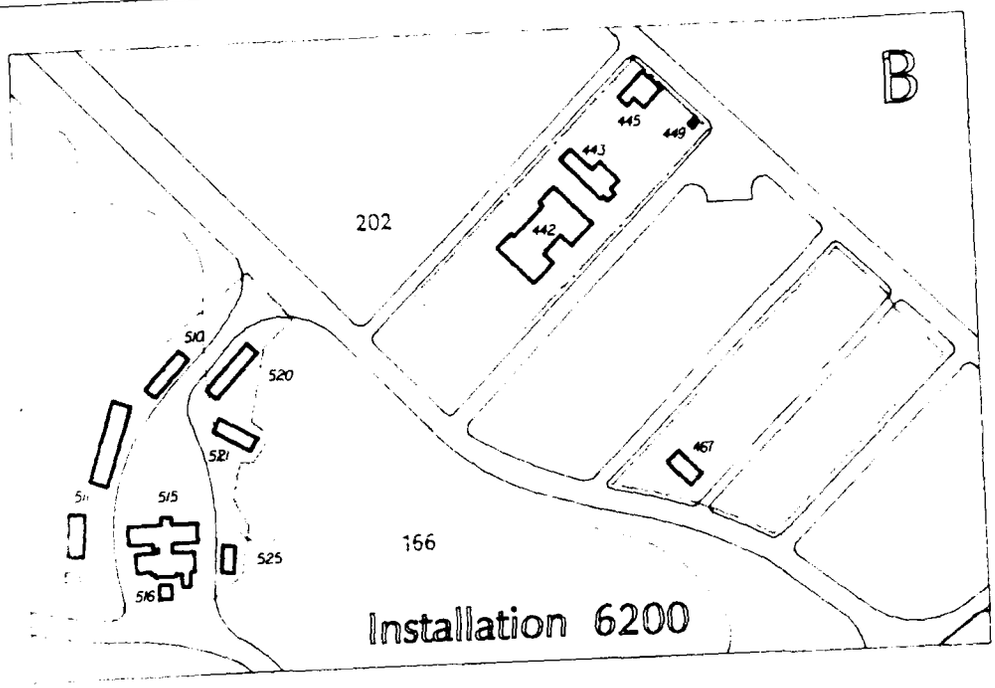
ESOs	Concern	Recommended Activity	Number and Type of Samples Recommended	Location	Analysis
Burn Pit	TPHs, VOCs, metals	Further investigation included in Revetment Area recommendations	NA	NA	NA
Former Radiological Disposal Site	Low-level radioactive waste in two buried cylinders	No further investigation	None		
JP-4 Line	JP-4 jet fuel	Field investigation	NA	Aboveground portion of line.	NA
		Leak test		Underground portion of line.	NA
Revetment Area	Waste oil, fuel spills	Soil borings	10 locations (0 to 6 in. and 2 to 3 ft at each location)	Random	TPHs, RCRA metals
		GW samples	4 new MWs	To be determined	TPHs, RCRA metals, VOCs, BNAs
East Levee Landfill	Organics	Install 2 GW monitor wells	1 GW sample per new MW	1 east and west from landfill	EPA's Hazardous Substance List
Bombing Range	Munition debris, unexploded ordnance	Records investigation	NA	NE,N, and eastern areas of property	NA
Former Sewage Treatment Facility	Non-biodegradable contaminants	Soil borings	2 soil composites from 6 grab samples (0-18 in.); 2 grab soil from each of 3 sludge drying beds	From each sludge drying bed	RCRA EP Toxicity Metals and Herbicides/Pesticides

*RCRA metals to be identified: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver.


202
737
738
736
166
SB,GW
SB
A
POL Area
158
Wetland
158
Perimeter Road
158
Perimeter Road
202
Levee
162
West Boundary Road
737
738
736
A
203
158
MW
SB
SB
SB
MW
SB
SB
204
166
204
Runway
Hangar Ave
202
State Access Road
Escolta Ave
B
204
166
166
158
166
204
204
Aircraft Parking
MW
SB
SB
USATHAMA
U.S. Army Toxic and Hazardous Materials Agency

U. S. Army
Base Closure Preliminary Assessment
Hamilton AAF
Novato, CA – 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

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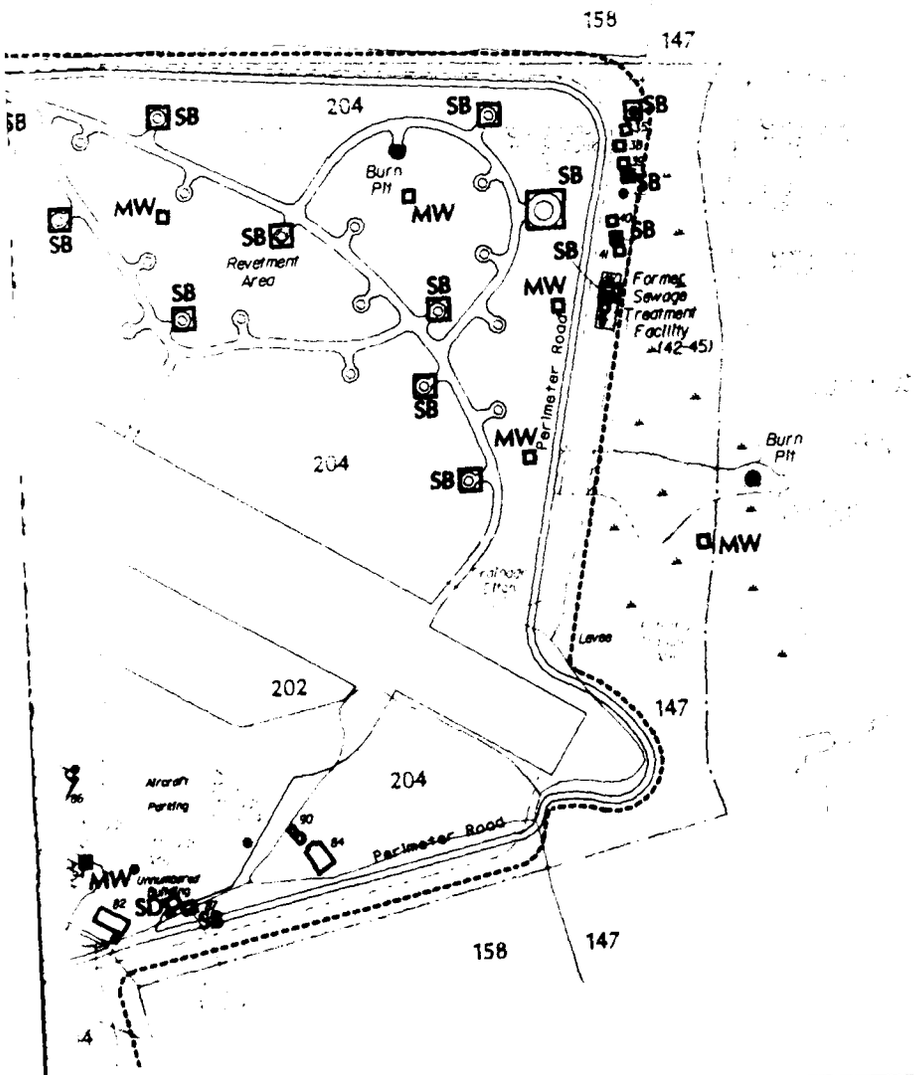
0 meters 400

0 feet 1200



RECOMMENDED SAMPLING METHODS

- **SB** Soil Boring
- **SD** Sediment
- **GW** Groundwater Sampling From Existing Monitoring Well
- **MW** Monitoring Well (Proposed)

SOIL TYPES

- **147** Novato Clay
- **158** Reyes Clay
- **162** Suarin-Bonnydoon Complex
- **166** Saurin-Urban Land-Bonnydoon Complex
- **202** Urban Land-Xerorthents Complex
- **203** Xerorthents Fill
- **204** Xerorthents-Urban Land Complex

The location and contents of the four USTs (22, 23, 24, and 25) possibly remaining on the property should be confirmed either by excavation or geophysical methods. If tanks remain, they should be leak tested. Additional action may be required depending on test results. If leaks are found, tanks should be removed.

Aboveground Storage Tanks (ASTs)

It is recommended that the soil under AST 5 (at Building 35) be sampled. Soil staining seen adjacent to AST 5 (photo 7) was probably due to a fill pipe leak. Two soil samples, each taken at 0 to 6 in. and 2 to 3 ft, are suggested. Samples should be analyzed for TPHs.

Soil samples should also be taken near the other two ASTs at the pump stations (AST 6 and 7) as well as the tank at Building 15 (AST 8). Composite two surface soil samples at each of the three locations. Samples should be analyzed for TPHs.

Aircraft Maintenance/Storage Areas

Oils, fuels, used oil, and other aircraft-related liquids are stored in 55-gal drums outside several areas on unpaved ground. It is recommended that two soil samples be collected from each of the following sites:

- North of Building 87.
- East of Building 87.
- At Storage Area 2.

Soil samples should be collected at 0 to 6 in. and 2 to 3 ft for each sample location. Samples collected at Building 87 should be analyzed for Resource Conservation and Recovery Act (RCRA) metals, volatile organic compounds (VOCs), and base neutral acid extractables (BNAs); samples from Storage Area 2 should be analyzed for TPHs, RCRA metals, VOCs, and BNAs. Because of the close proximity of these two storage areas to storm inlets, sediment samples should be taken in the storm inlet chambers. Samples should be analyzed for TPHs, RCRA metals, VOCs, and BNAs.

Storm sewer inlets are located within and surrounding the maintenance building (Building 86). Trench drains are located within the maintenance hangar (Building 86) next to the bay doors and outside in the aircraft parking areas. Storm inlets are located in unpaved areas near the maintenance hangar. Storm sewers in the proximity of the maintenance hangar may have received spills from within the hangar, the mobile fuel trucks, or other storage areas external to the hangar. Four to six sediment samples are recommended for the storm sewer. Samples should be analyzed for TPHs, RCRA metals, VOCs, and BNAs.

Metal CONEX (container express) sheds containing materials such as POL, paint, gasoline, and cleaning compound are located in Storage Area 3. Because of the number of CONEXs and the lack of historical information, it is suggested that a well be placed immediately downgradient of this area and one groundwater sample collected and analyzed for TPHs, RCRA metals, VOCs, and BNAs.

Burn Pit

Recommendations for the Revetment Area apply to the Burn Pit.

Former Radiological Disposal Site

It is recommended that no further investigation of this area be made based on information that the cylinders have been removed from the property.

JP-4 Line

The visible (aboveground) portion of the JP-4 line (approximately 5,700 ft) should be inspected visually for leaks/stains. The underground portions (approximately 2,900 ft) of the JP-4 pipeline should be leak tested. If results show the pipe not leaking, it should be emptied and capped. If a leak is found, it is recommended that the damaged sections be repaired or permanently removed from service. Based on the results of the leak test, soil and groundwater samples may need to be collected. Further action may be required based on test results.

Revetment Area

It is recommended that soil samples be collected from the soils surrounding the hardstand (paved parking) areas. Ten soil borings should be collected at 0 to 6 in. and 2 to 3 ft at each location. Samples should be analyzed for TPHs and RCRA metals. Further sampling of the remainder of the concrete pads may be necessary, based on test results.

In addition to the soil samples, 4 wells should be placed in the approximate locations shown in Figure 5-1. One sample should be collected from each well and analyzed for TPHs, RCRA metals, VOCs, and BNAs.

East Levee Landfill

It is recommended that two groundwater monitoring wells be installed. One well should be located west of the landfill and one east of the landfill. One groundwater sample from each well should be analyzed for all constituents on EPA's Hazardous Substance List.

Bombing Range

The only information available regarding the bombing range is a verbal report [T-1] estimating the location of the bombing areas. One was reportedly located near the East Levee Landfill, one north of the Revetment Area, and one at the northwestern end of the runway. These areas expand into non-Army properties. No information was found regarding ordnance sweeps of these areas or the amount and type of ammunition used. However, no written documentation could be found to substantiate the existance of any bombing ranges on HAA.

Former Sewage Treatment Facility

It was reported that there were no known sources of process waste entering the sewage treatment facility and that only sanitary waste was treated [T-1, T-8]. However, because the sewage treatment facility may have received waste from maintenance area sinks, it is recommended that the sludge drying beds be sampled. Two composite samples comprised of six grab samples from the three sludge drying beds should be collected at a depth of 0 to 18 in. and should be analyzed for RCRA EP Toxicity metals and pesticides/herbicides.

Section 1
Introduction

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 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 assessment (PA) reports of selected properties destined to be included as part of the Base Closure Program. The purpose of these reports is to present WESTON's findings concerning the environmental conditions at the properties and 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 report discusses the enhanced PA of Hamilton Army Airfield (HAA), located in Novato, California. A site visit was performed from 26 September through 29 September 1989.

1.2 OBJECTIVES

This enhanced PA report is based on information obtained from property records, current and former employees of HAA, and other persons associated with the property. No sampling activities were completed as part of the assessment.

The objectives of this enhanced PA were to:

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

Certain issues have been excluded from consideration as ESOs for the purposes of this report. First, painted surfaces will nct 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 purpose of the enhanced PA was to identify potential environmental liabilities at HAA due to the natural setting, physical construction, and property use. The following steps were taken as a part of the evaluation:

- Onsite physical inspection.
- Review of site historical and background information.
- Interviews with current and former employees.
- Interviews with personnel of regulatory agencies.
- Review of appropriate federal, state, and local files.

1.4 REPORT FORMAT

This enhanced PA report presents an evaluation of the relevant data for the HAA site.

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 persons who were interviewed. Photographs of the items that were investigated for this assessment are provided in Section 7. Supporting documentation is provided in Appendices A through E.

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.

Section 2
Property Characterization

SECTION 2

PROPERTY CHARACTERIZATION

2.1 GENERAL PROPERTY INFORMATION

HAA is located in the city of Novato, Marin County, California, approximately 22 miles north of San Francisco (Figure 2-1). A property information summary is presented in Table 2-1.

2.2 DESCRIPTION OF FACILITIES

2.2.1 PROPERTY DESCRIPTION AND HISTORY

The property for HAA was acquired from Marin County in 1932. The original property was over 2,000 acres in size (Figure 2-2). HAA was opened in 1934 as an Army Air Corps facility to train fighter and bomber pilots and was known as Hamilton Field. Hamilton Field was used extensively during World War II. In 1947, the base was transferred to the U.S. Air Force (USAF) as part of the transfer of aircraft responsibilities from the Army to the USAF and was renamed Hamilton Air Force Base. Hamilton AFB functioned until 1974, when it was listed as excess property. In 1975, base command by military personnel ceased and civilian managers commenced operation. However, shortly thereafter the Department of Defense withdrew the housing area portion of the base from the excess property listing and designated that portion as the responsibility of the U.S. Navy. In 1976, the Army received permission from the USAF to use the runway and other ancillary facilities for aircraft operation. Also in 1976, the State of California determined that lands subject to tidal action belong to the State. Consequently, the State of California claimed a portion of the land outside the levees that encircle the site (referred to as "State" properties in Figure 2-2).

From 1976 to 1983, a number of potential uses of the site were proposed by government agencies and private developers. Some plans called for the resumption of air traffic in a civilian capacity; for example, a regional airport. Other plans called for inundating the area and creating an artificial wetland. In 1983, the State courts accepted a plan that allowed for the division of the site. The first property was given the installation number 6160 and included the airfield, a noncontiguous petroleum, oil, and lubricants (POL) area, and other miscellaneous areas. Installation 6160 was transferred to the Army in 1984. The second property was designated Installation 6200 and consisted of three noncontiguous parcels. The three parcels are used primarily for Army Reserve activities. Installation 6200 was transferred to the Army in 1976. The scope of the Base Closure Program originally included only Installation 6160. Installation 6200 was added to this PA at the request of USATHAMA. The combined properties (Installations 6160 and 6200) total approximately 700 acres.

U.S. Army
Base Closure Preliminary Assessment

Hamilton Army Airfield

Novato, California — November 1989

FIGURE 2-1

PROPERTY LOCATION

Property boundary shown in red. Base map image is from the USGS 7.5 Series quadrangles *Novato, Calif.*, 1954 (PR 1980) and *Petaluma Point, Calif.*, 1959 (PR 1980).

Scale 1:30,000

0 Feet 2000 N

0 Meters 1000

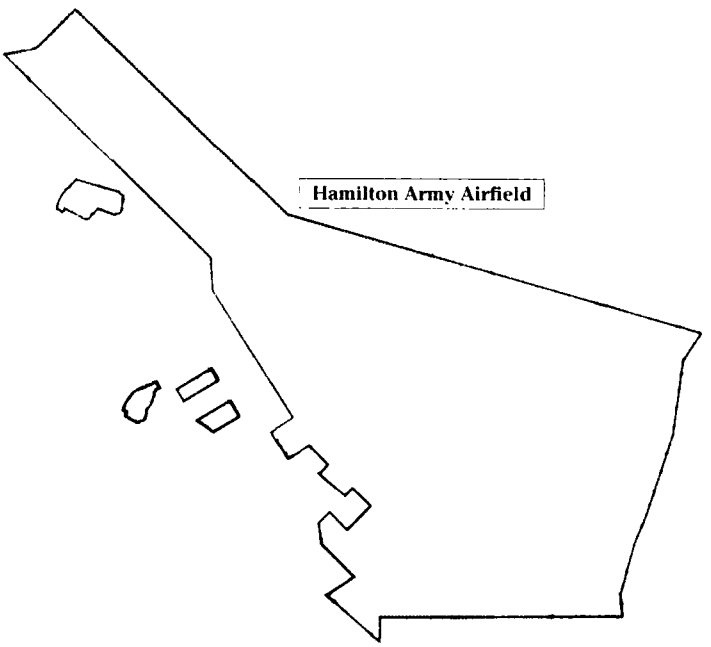


Table 2-1

Property Information Summary

Name: Hamilton Army Airfield (HAA)

Property Numbers: 6160 and 6200

Facility Address: Hamilton Army Airfield
Novato, CA 94949-5093

Civilian Management: Larry Gallagher
Facility Manager

Location: Just inland of San Pablo Bay, in Marin County, on the coast of the State of California.

Installation Coordinates:

Size: Approximately 700 acres.

Mission: HAA is a subinstallation of the Presidio of San Francisco.

Operations: Current operations include an airfield with its associated aircraft maintenance area, storage areas, Army Reserve centers, health care facilities, areas related to storm runoff control, and areas owned by the Novato School District and the U.S. Coast Guard.

U. S. Army
Base Closure Preliminary Assessment
Hamilton AAF
Novato, CA – November 1989

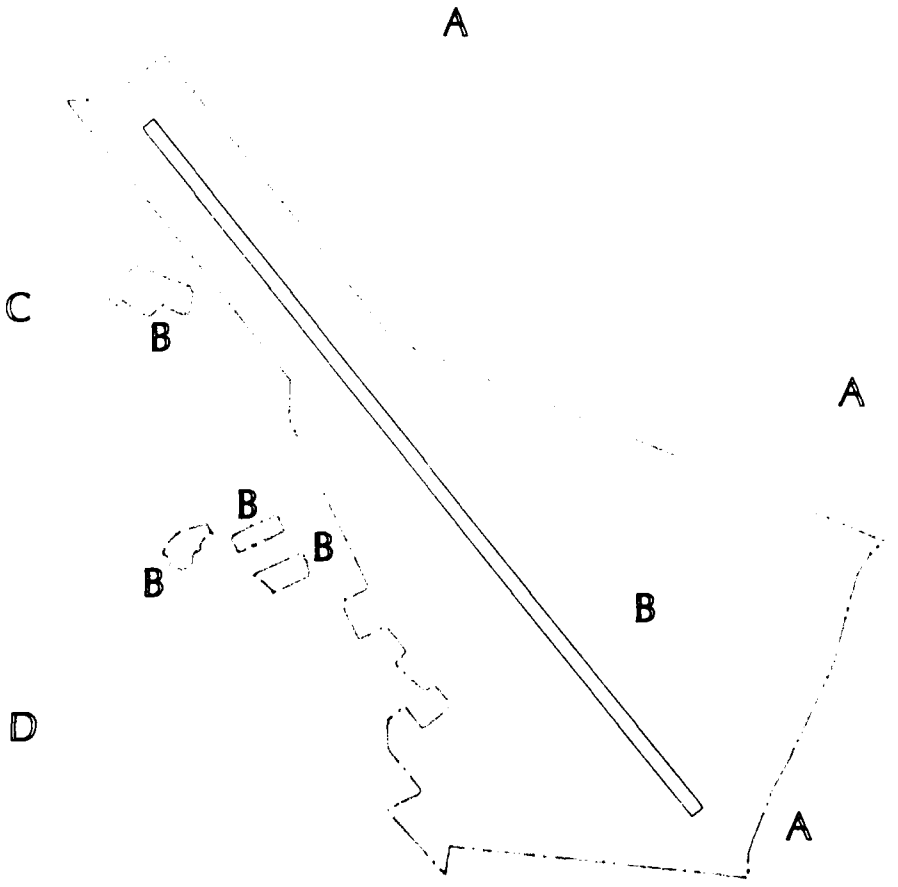
Figure 2–2
Area Land Ownership

A State of California
B Army Property
C GSA Sale Area
D Navy Housing

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

N

meters: 0 – 600
feet: 0 – 2000



USATHAMA
U.S. Army Toxic and Hazardous Materials Agency

The remaining property (not included in this report) consists of approximately 400 acres under the control of the U.S. Army and will be sold by the General Services Administration (GSA). This property includes buffer zones that currently belong to the State and small parcels that belong to the Novato School District, U.S. Navy, and Coast Guard.

In March 1985, the GSA conducted an auction that resulted in a successful bid by a private developer who wanted to develop light industry and residential housing on the site [R-1]. However, a landfill (known as Landfill 26) is located on the site, which presented the potential for hazardous waste. Therefore, the Army Corps of Engineers (COE) decided that the sale should be halted pending further investigation. Landfill 26, along with its buffer zone consisting of approximately 47 acres of land, was subsequently removed from the sale property. A Remedial Investigation/Feasibility Study (RI/FS) has been completed and a recommendation has been made to cap the landfill and install a groundwater monitoring system. Plans are underway to remediate this site. A subsequent interagency agreement between the USAF and the COE split the responsibility for resolving the hazardous waste issue. The USAF is responsible for payment of the investigations at the site, and the COE is responsible for ensuring that any investigations or subsequent field efforts are properly executed [I-3].

In addition, several sites in, around, and on HAA were found to contain hazardous waste. However, with the exception of the POL Area, none is on the property currently owned by the Army.

A rifle range and two abandoned burn pits are located on the State-owned property in areas north of the Revetment Area and at the East Levee Landfill. The bombing range discussed in Subsection 3.11, and the East Levee Landfill, discussed in Subsection 3.10, are on Army property and reportedly extend into non-Army properties.

2.2.2 WASTE MANAGEMENT PRACTICES

Waste management practices associated with HAA include solid waste (refuse) and hazardous waste storage and removal, and sanitary sewage treatment. General refuse placed in dumpsters is removed by the U.S. Navy. Hazardous waste materials are stored in designated areas and removed quarterly for offsite disposal under a contract administered by the Presidio of San Francisco [T-6]. An onsite sewage treatment facility located at the east levee served HAA until 1986. The treatment facility has since been removed from service and demolished, and all sanitary sewage is currently pumped to treatment facilities owned by the Novato Sanitation District.

2.2.3 BUILDING USAGE

On the approximately 700 acres of Army-owned property existing at HAA, there are a number of buildings that have been used for a variety of purposes. Based on visual observations, most of the buildings appear to have been used for offices and related uses. In addition, several of the buildings have been

used as health care facilities, including a hospital with operating rooms. Several buildings are related to aircraft maintenance and storage activities; other buildings are related to the stormwater runoff control system. Information regarding the historical use of each building was not available.

A brief description of the buildings and their current and prior uses is presented below. Buildings noted by an asterisk (*) were entered and visually inspected by WESTON. Refer to Figure 2-3 for the location of each building within HAA.

- Building 26: Ground approach radar building. Reportedly a 1,000-gal underground diesel fuel storage tank is located near this building to feed a generator within the building, but no substantiating evidence was found during the site visit. An estimated 200- to 300-gal aboveground diesel storage tank is located within the building. Reportedly the tank is empty and the building has a concrete floor [T-1].

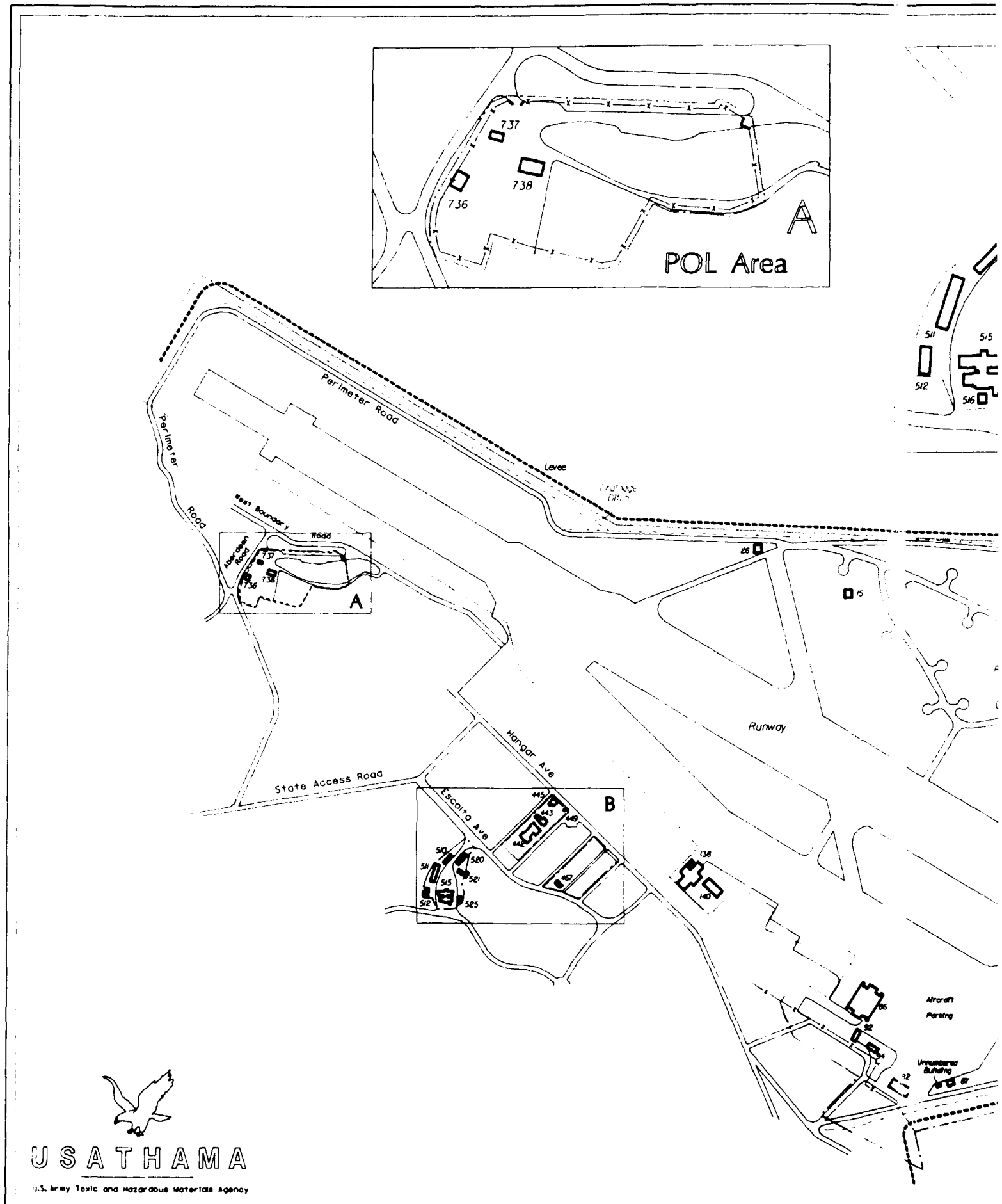
- Buildings 35, 38, 39, 40, 41: Stormwater pump stations and generators for the various stormwater runoff and flood control facilities. Building 39 is an automatic pump station. Buildings 35 and 41 are manually operated pump station buildings. The pump stations reportedly pump runoff directly into the State-owned property to the east [T-1]. Generators are stationed within Buildings 38 and 40 to power the pump stations. Operational maintenance and upkeep of the pumping system is handled by the U.S. Navy. An aboveground diesel storage tank (photo 3) is associated with Building 35. (Refer to Subsection 3.5 for more information on the aboveground storage tanks.) Aboveground storage tanks were observed next to Buildings 39 and 40. Underground storage tanks reportedly were also located in the pump station area, but none were found during the site visit [I-3].

- Buildings 42-45: Former sewage treatment facility for Hamilton until 1986 at which time all sanitary wastes were pumped to the Novato Sanitation District. Since 1987, all buildings have been demolished. Sludge from the drying beds was removed by the Navy Public Works Department. No underground or aboveground tanks are located at the former facility [T-1].

- *Building 82: Currently used by Army units for storage of MEDEVAC supplies. Previously the building was authorized to store war-ready materials [I-3].

- Building 84: Used by the 12th Special Forces of the 4th Army for training. Entry denied.

- *Building 86: Currently used by the 6th Army Flight Unit and the 124th ARCOM MEDEVAC Unit as a storage and light maintenance area for aircraft. Classrooms are located on the third floor.


737
738
736
A
POL Area
Perimeter Road
Levee
Perimeter Road
West Boundary Road
Abandoned Road
737
738
736
A
Runway
Hangar Ave
State Access Road
Escalra Ave
B
543
545
548
547
540
541
520
521
515
512
525
138
140
Aircraft Parking
Unmustered Building
511
515
512
516
USATHAMA
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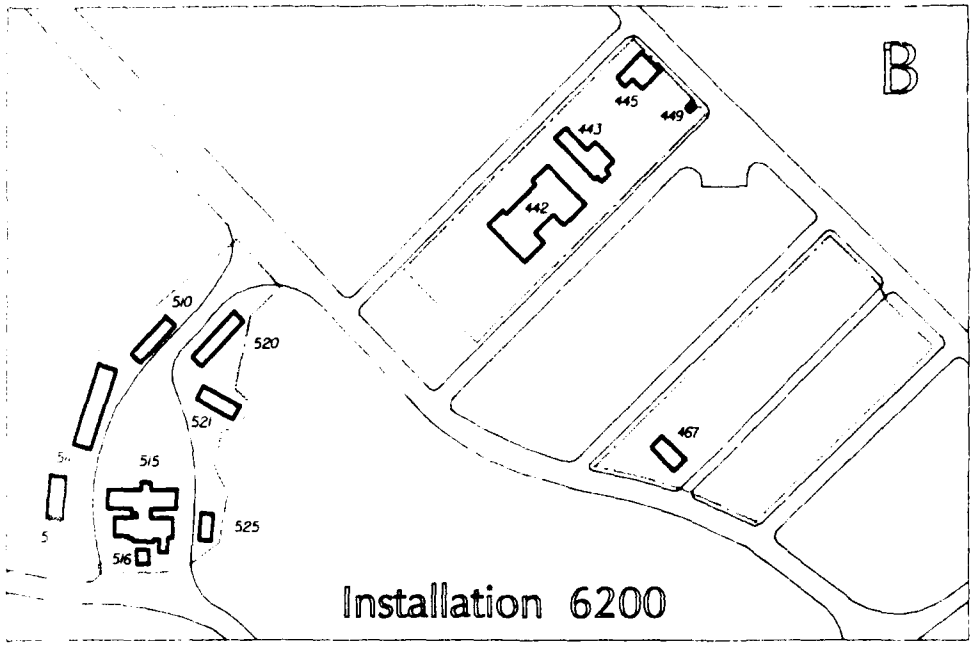

U. S. Army
Base Closure Preliminary Assessment
Hamilton AAF
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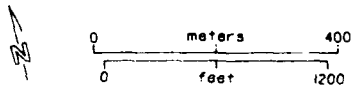
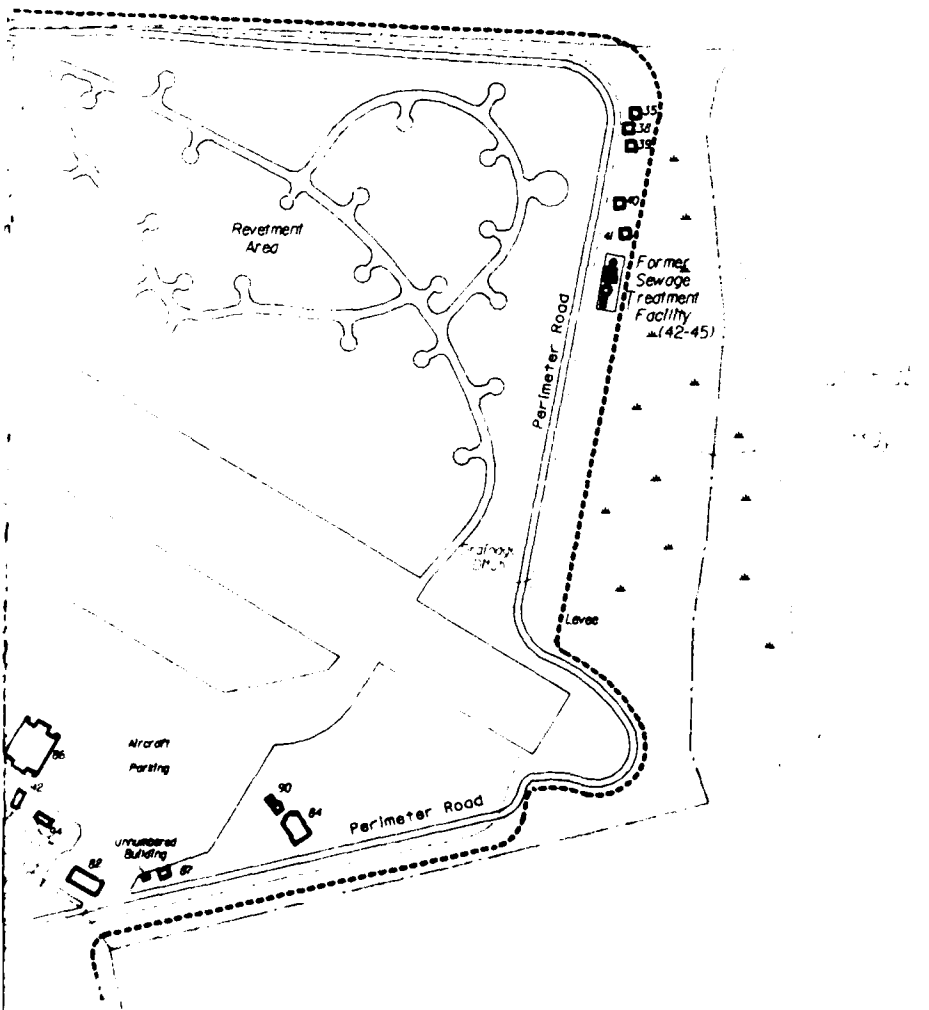
Figure 2–3
Site Plan

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





- Building 87: A 400 sq ft cinderblock building divided by a cinderblock wall into two storage areas. This small building has a concrete floor and no floor drains and no curb at the door. Stored on one side of the building in containers up to 5 gal in size is oil, grease, antifreeze, solvent, and aircraft cleaning compound. Paint and other flammables are stored on the other side of the building in containers up to 5 gal in size. Only packaged (unopened) products are stored within this building. The building was used by the 124th and the 6th Army Flight Detachment. Stored outside of Building 87 are several 55-gal drums and a CONEX. Drums are stored horizontally on metal racks (photos 14-16). The contents of the drums are as follows: two 55-gal drums, PD-680; two 55-gal drums, aircraft cleaning compound; two 55-gal drums, turbine engine cleaner. There are also several empty drums. A metal CONEX located north of Building 87 contains approximately 15 5-gal cans of unleaded gasoline. No curb or other containment is provided [T-9].

- Building 90: Currently used by 6th Army Flight Detachment for the storage of small oxygen cylinders used in aircraft. The building was formerly used for aviation electronic repair.

- Building 92: Crash rescue station in which a fire/rescue truck is located. Visual inspection through windows in this building also revealed several compressed gas cylinders and small drums of "purple K" (potassium bicarbonate) used in firefighting activities.

- Building 94: Formerly used as a training facility. This building was not entered, but the view through the windows was sufficient to determine that this building was vacant.

- *Building 138: Used by the 6th Army CTF (Consolidated Training Facility) for office space.

- Building 140: Being used by the CTF for offices and classroom space. At one time an underground storage tank was associated with this building's generator [T-1]. No record exists stating that it was ever removed.

- *Building 442: Currently used by three Army operations. The first floor is used by the 6251st Hospital Division; the second by the 91st Division; and the third by the 12th Special Forces of the 4th Army. All of the above uses are office or other administrative functions. A military vehicle parking area is located on the west side of the building. It is a fenced area with unpaved ground. A metal CONEX container is within this area and presumably stores petroleum products and paint in small quantities (up to 5-gal cans).

- Building 443: Currently used by the 12th Special Forces of the 4th Army for office/administration and storage.

- Building 445: Used by the Teacher's Registry as a book exchange facility.

- Building 449: 1935 utility vault switch station that currently houses electrical transformers.

- Building 467: Operated by the U.S. Power Squadron (Marin Chapter) under a 5-year permit from the U.S. Army. The building is used as a classroom for training activities.

- Building 510: This building is vacant and has been damaged by a falling tree. It was previously used for administration/general purpose.

- *Building 511: Originally used as a medical lab, and then as a dental clinic. Building 511 is currently used by the U.S. Coast Guard for various administrative functions as well as a clinic, pharmacy, and medical lab. Small quantities of chemicals, such as acetone, peroxide, acetic acid, and denatured alcohol are stored in locked metal lockers.

- Building 512: Houses the 6th Army's Consolidated Training Facility (CTF) headquarters (photo 1). A language lab with associated classrooms is the only current activity.

- *Building 515: This building is used for administrative offices for the 2nd Army's hospital headquarters.

- Building 516: Located directly behind Building 515. This is a small building was previously used for the storage of office-related refuse. Currently empty.

- Building 520: Currently used by the USAF for coordinating and organizing activities for the Civil Air Patrol (CAP) (photo 2).

- Building 521: Used by the USAF for CAP administrative functions.

- Building 525: The 2nd Army's hospital headquarters general storage building. At one point, small amounts of powder/solid decontamination material used to decontaminate persons suffering from radiation exposure were stored in this building. No other information regarding the material is available.

- Building 715: Oil/water separator house formerly located in the POL Area. The building was located above USTs 1 through 20 (see Section 3) and apparently was associated with the tanks. The building was demolished in 1986 as part of the tank removal activity.

- Building 717: Formerly located in the POL Area and used as a fuel pump building. The building was demolished in 1986 as part of the tank removal activity. The exterior of the building was sided with asbestos-cement Transite.

- Buildings 736, 737, and 738: Located in the POL Area. Buildings are currently reported to be empty. Building 736 was used for administration. Buildings 737 and 738 were used for maintenance activities.

- Unnumbered building: Wooden shed reportedly used for storage of tires and parts [I-3].

It was noted that several of the buildings may have materials that contain asbestos on or within the structures. The exterior of Buildings 511, 512 (photo 1), 520 (photo 2), and 521 were sided with what appeared to be asbestos-cement Transite siding. The condition of the siding was generally poor, with chips of fallen materials scattered on the ground. A sample tag indicating the location of asbestos sampling points was noted on the siding of Building 520. Hot water pipes located below and in Buildings 511, 512, 515, 520, 521, and on pipes at pump stations (photos 3 and 4) appeared to be wrapped in asbestos material that was left exposed. Sample tags were seen in Building 515 on exposed piping as well as on the boiler in the basement. It was mentioned by Army personnel that asbestos may also be in the boiler rooms of Buildings 442 and 138 [I-1, I-2]. Nine-inch floor tiles similar to others known to contain asbestos were noted in Buildings 511 and 515, and sample tags were seen in Building 515. Appendix A contains asbestos testing information.

2.3 PERMITTING

The following agencies were contacted regarding the status of permits for HAA:

- U.S. Environmental Protection Agency (EPA) Region IX
- California Department of Health Services (DHS)
- California Regional Water Quality Control Board (RWQCB)
- California Department of Water Resources (DWR)
- Bay Area Air Quality Management District (BAAQMD)
- Marin County Department of Environmental Health (MDEH)
- Marin Municipal Water District (MMWD)

No onsite areas or operations were discovered that required permitting, and no records of spill release or emergency responses were found.

2.4 GENERAL ENVIRONMENTAL INFORMATION

2.4.1 DEMOGRAPHICS AND LAND USE

Existing land use in the HAA vicinity is divided into industrial, small business, and residential. Industrial land use includes Hamilton Industrial Park, Bel Marin Commerce Industrial Park, and Ignacio Industrial Park; all are located north of the base. Small business land use includes a bowling alley and shopping center northwest of the base, a motel west of Highway 101, and assorted small businesses (theatre, offices, and restaurants, etc.) next to the southwestern corner of the site. Residential land use includes Los Robles Mobile Home Park adjacent to the Ignacio Highway 101 interchange, Bel

Marin Keys north of the site runway, Rafael Village on the west side of Highway 101, and single family homes south of the site.

Land adjacent to the site consists mainly of the remainder of what was considered part of the Hamilton Air Force Base. South of the site is the Navy-operated housing (Figure 2-2). Southwest of the site and surrounding the four noncontiguous parcels is the GSA sale property. North of the Revetment Area and east of the east levee is State-owned land. Bel Marin Keys is located north and northwest of the runway; however, the area north of the runway is currently used for farming activities.

The projected regional growth trends for Marin County are listed in Table 2-2. These trends show that Novato and San Rafael will likely continue to be the population centers of the county.

2.4.2 CLIMATE

Hamilton Army Airfield is located approximately 22 miles northeast of San Francisco. San Francisco has cool, pleasant summers and mild winters because of its location relative to the San Francisco Bay, Pacific Ocean, and coastal mountains. There are wide differences in climate within short distances in the San Francisco Bay area. Most noticeable is the difference in the duration of fogs or low cloudiness along the western side of the city.

Figure 2-4 is a wind rose for the San Francisco International Airport. The prevailing direction at the airport is west-northwest. West, west-northwest, and northwest winds occurred 56 percent of the time during 1988. Inland winds from the east seldom occur due to the prevailing westerly flow from the ocean and the blocking effect of coastal mountains to the east. The average wind speed at the airport was 11.4 miles per hour during 1988.

San Francisco has pronounced wet and dry seasons. The annual normal precipitation is 19.7 in. On the average, 80 percent of the precipitation occurs between November and March. January is the wettest month, with normal precipitation of 4.65 in. and July is the driest month, with normal precipitation of 0.03 in. Rainfall is strongly influenced by the topography of the coastal range. Annual rainfall averages from 26 in. at Hamilton Airfield to 49 in. at Kentfield. Snowfall is rare, although 1.5 in. fell in one 24-hour period in 1962, and 1.0 in. fell in one 24-hour period in December 1932.

The San Francisco Airport has a marine-type climate with mild and moderately wet winters and dry, cool summers. The normal annual average temperature is 64.9°F. January is the coldest month, with a normal average temperature of 48.5°F and September is the warmest month, with a normal average temperature of 63.9°F. Daytime temperatures are moderated by the morning low overcast and the afternoon sea breeze. Daily maximum temperatures average around 70°F from May through August. Temperatures rarely rise above 90°F or fall below 32°F.

Table 2-2

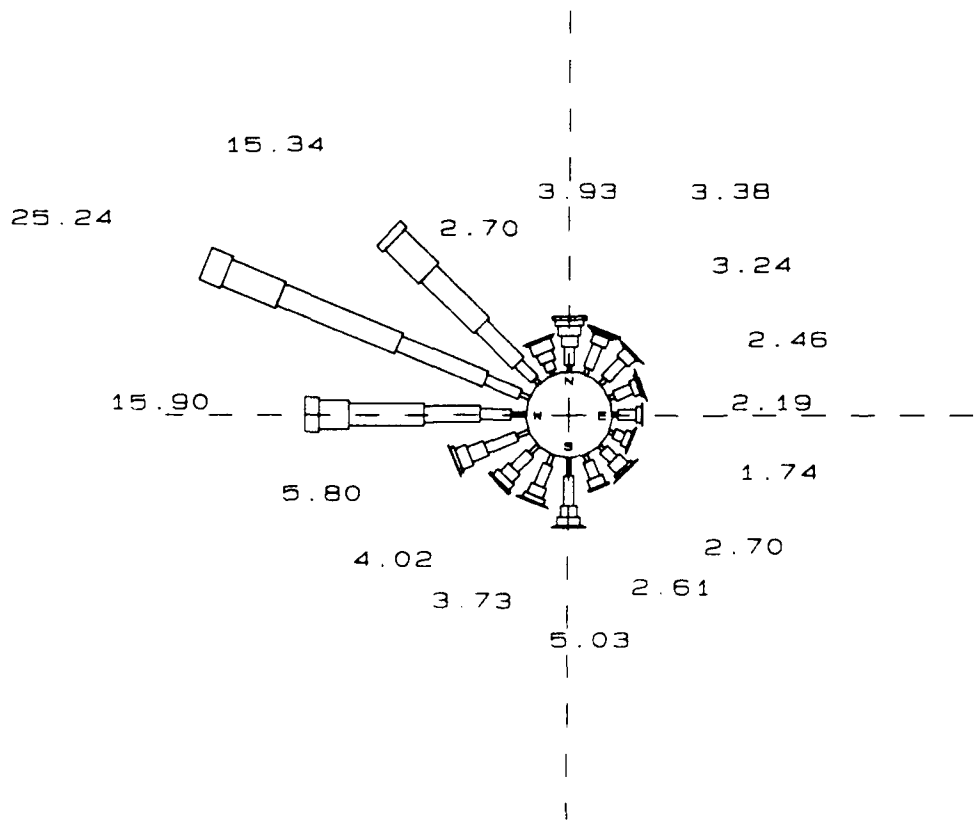
Growth Trends for Marin County, California

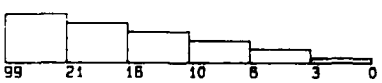
Subregional Area	1980	1985	1990	1995	2000	2005
Belvedere[a]	2,401	2,350	2,350	2,300	2,250	2,250
Corte Madera[a]	8,429	8,400	8,800	9,30	9,400	9,500
Fairfax[b]	8,402	8,200	8,200	8,400	8,600	8,700
Larkspur-Kentfield[b]	20,791	21,100	21,600	22,000	22,300	22,200
Mill Valley[a]	22,688	22,300	22,300	22,300	22,300	22,300
Novato[b]	51,209	53,200	58,400	63,100	67,200	73,100
Ross[b]	2,801	2,750	2,700	2,700	2,750	2,750
San Anselmo[b]	14,420	14,200	13,900	13,900	14,200	14,200
San Rafael[b]	57,177	56,400	59,100	62,300	65,100	69,100
Sausalito-Marin City[a]	9,382	9,500	9,600	9,500	9,600	9,600
Tiburon[b]	13,512	13,600	13,700	14,000	14,600	14,900
Remainder of area	11,356	11,400	11,300	11,900	12,100	12,400
Marin County Total	222,568	223,400	231,950	241,700	250,400	261,000

[a]Urban Service Area
[b]City Sphere of Influence

Source: Association of Bay Area Governments.

SAN FRANCISCO, CALIFORNIA
YEAR: 1988
CALMS INCLUDED





SCALE (KNOTS)

	WIND SPEED (KNOTS)			PERCENT OCCURRENCE		
	0-3	3-6	6-10	10-16	16-21	>21
N	0.45	1.30	0.81	0.71	0.42	0.25
NNE	0.45	1.81	0.74	0.16	0.09	0.13
NE	0.54	1.75	0.76	0.10	0.06	0.02
ENE	0.39	1.34	0.44	0.19	0.07	0.02
E	0.41	1.32	0.38	0.08	0.00	0.00
ESE	0.40	0.74	0.47	0.10	0.03	0.00
SE	0.41	1.04	0.90	0.28	0.05	0.02
SSE	0.53	1.25	0.68	0.14	0.00	0.00

	WIND SPEED (KNOTS)			PERCENT OCCURRENCE		
	0-3	3-6	6-10	10-16	16-21	>21
S	1.32	2.15	0.81	0.61	0.10	0.03
SSW	0.79	1.64	0.76	0.42	0.07	0.05
SW	0.84	1.59	0.81	0.57	0.20	0.00
WSW	0.95	2.36	1.29	0.84	0.28	0.06
W	1.05	2.25	4.02	5.41	2.16	1.01
WNW	0.72	2.70	6.77	9.21	4.19	1.65
NW	0.47	1.63	3.77	5.40	3.44	0.64
NNW	0.27	0.68	0.72	0.85	0.16	0.01

FIGURE 2-4 WIND ROSE

Severe winter storms with gale winds and heavy rains occur only occasionally. Thunderstorms seldom affect the area, but may occur in any month.

2.4.3 SURFACE WATER AND PHYSIOGRAPHY

The Novato area north of HAA contains two distinct creek systems and watersheds. The central Novato area contains the Novato Creek watershed (Figure 2-1), which is a system that drains approximately 44 square miles. HAA is located within this watershed. The watershed basin includes the tidal estuary east of Highway 101 and the upland areas west of the highway. The primary use of this land is for open pastures and growing grain crops. North of the base, Novato Creek flows from west to east into the San Pablo Bay, the major surface water body in the area.

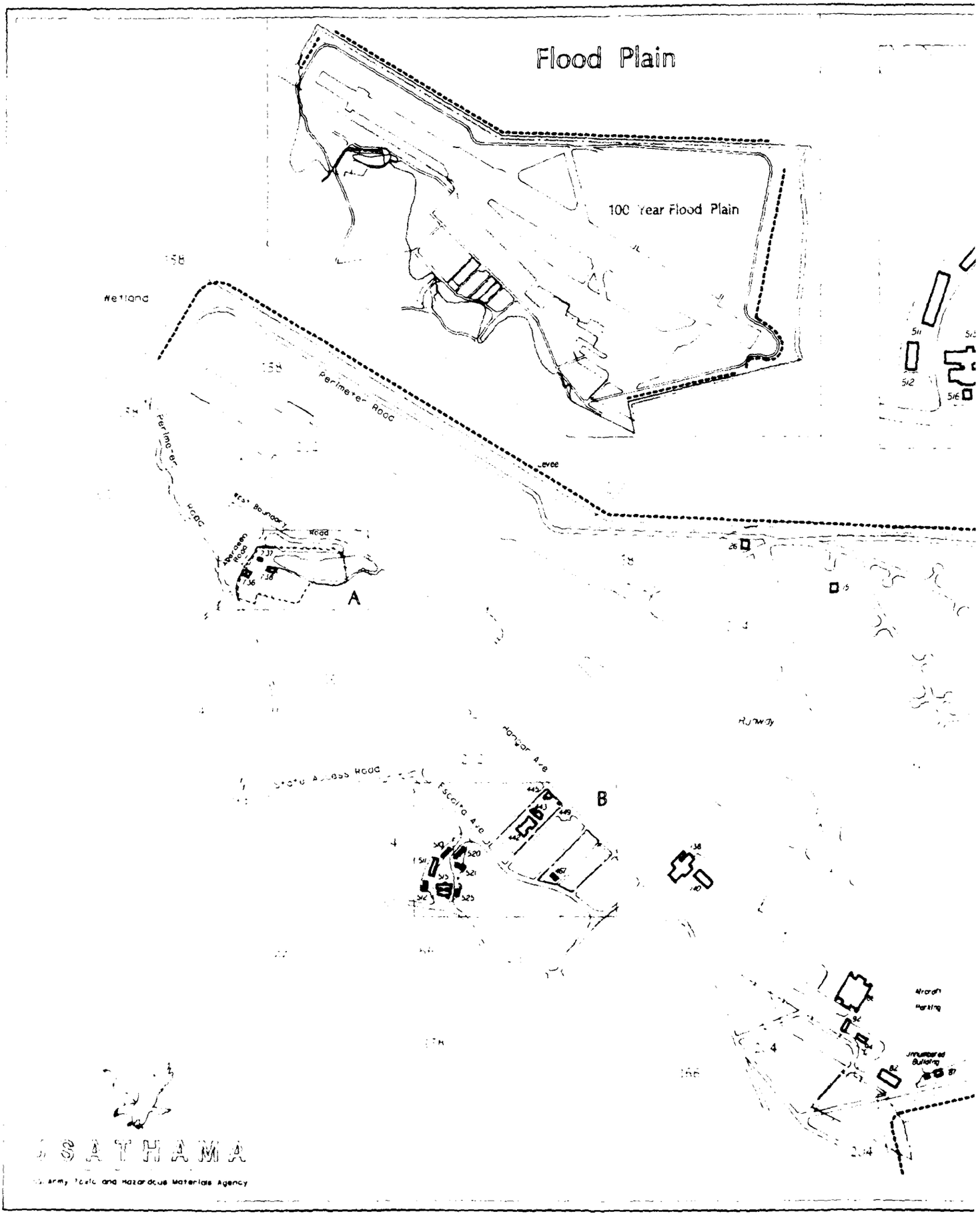
The watershed of the Arroyo San Jose Creek, a tributary of Novato Creek, flows into a ponding area off the northwestern edge of the base along the edge of Ammo Hill (located near the POL Area). Located to the southwest of the base is the Pacheco Creek drainage area. This creek enters the property and is conveyed through a system of buried pipes into the site drainage system.

The internal drainage of the base is accomplished by a system of storm sewers and channels that direct runoff to stormwater pumping stations that discharge into San Pablo Bay. The hangar and building complex are drained by storm sewers that lead into an open channel that parallels a levee through the southern and eastern property lines. The runway and areas to the north are drained by an earthen channel that parallels a levee along the northeastern property line. The 100-year floodplain (see inset in Figure 2-5) covers most, if not all, of the site as these areas are low lying and adjacent to a bay.

2.4.4 SOILS AND GEOLOGY

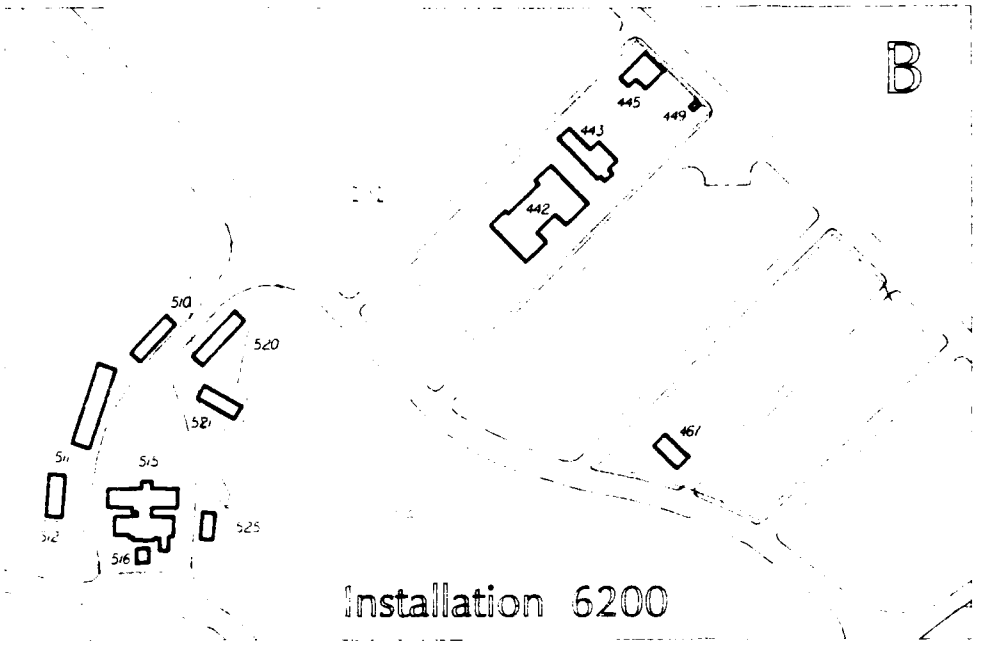
The San Francisco Bay occupies a depression situated between uplifted regions that lie to the east and west. The Franciscan Formation comprises the primary bedrock unit beneath the bay and the surrounding areas. This formation, which is of Jurassic Age, consists primarily of graywacke (sandstone), but also contains shale, siltstone, chert, greenstone, and serpentine. Prior to the deposition of the various bay sediments, the Franciscan Formation underwent considerable faulting, deformation, and erosion. Consequently, the erosional unconformity between the Franciscan Formation and the overlying sediments shows considerable relief [R-10].

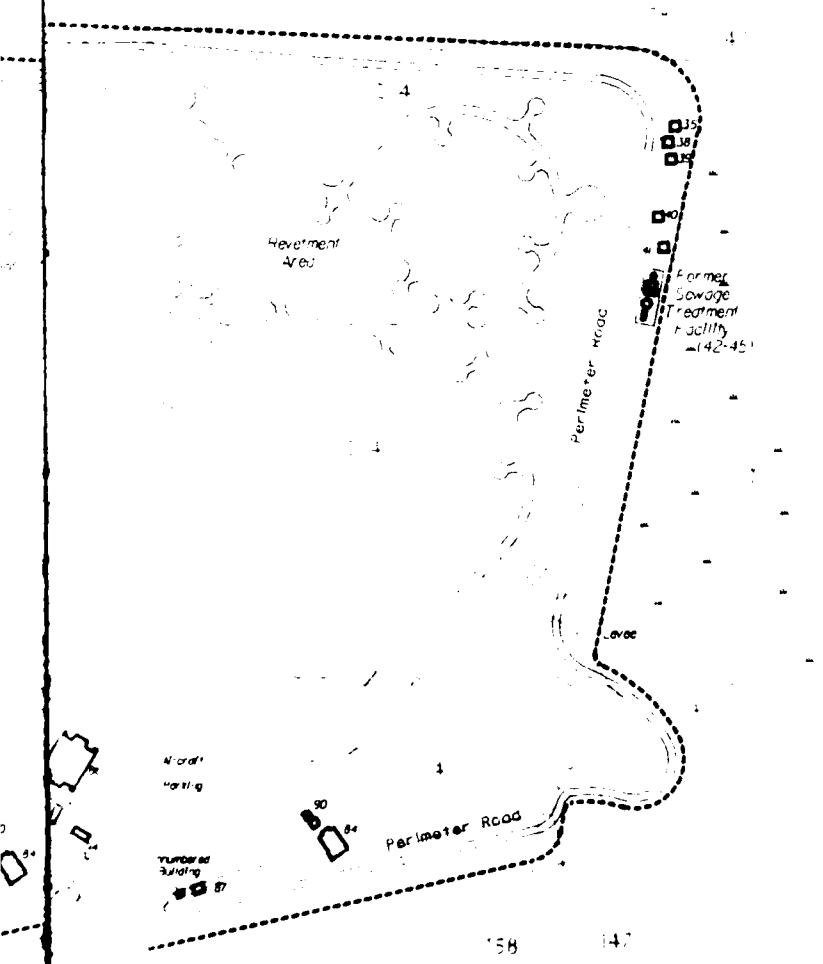
Overlying bedrock are the San Francisco Bay sediments, a series of five sedimentary formations, the youngest of which is the San Francisco Bay Mud. Descriptions of these five formations are given in Table 2-3. The bay sediments are of late Quaternary Age and consist of materials washed out of the surrounding hills and from sediments brought down the Sacramento River and other smaller rivers that enter the bay. The diversity of the source rock


Flood Plain
100 Year Flood Plain
Wetland
Perimeter Road
A
B
Aircraft Parking
Uninstalled Building
SATHAMA
Army Toxic and Hazardous Materials Agency

U. S. Army
Base Closure Preliminary Assessment
Hamilton AAF
Novato, CA – November 1989

Figure 2–5
Area Soils And Flood Plain





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

0 meters 400
0 feet 1000

SOIL TYPES
147 Novato Clay
158 Reyes Clay
162 Suarin-Bonnydoon Complex
166 Saurin-Urban Land-Bonnydoon Complex
202 Urban Land-Xerorthents Complex
203 Xerorthents Fill
204 Xerorthents-Urban Land Complex

Table 2-3

Sediments in San Francisco Bay

Bay Mud	
Formation A	
Member A-1	Soft mud up to 65 ft thick composed of silty clay and occasional interbedded thin sand layers.
A-2	Fine to medium grained silty sand up to 40 ft thick.
A-3	Silty clay, firmer and less sandy than zone A-1, up to 45 ft thick.
Merritt Sand	
Wind blown sand up to 60 ft thick.	
Posey Formation	
A mixture of sand and sandy clay up to 50 ft thick.	
San Antonio Formation	
A sequency of moderately firm clays, sands, and gravels between 15 and 120 ft thick.	
Alameda Formation	
This formation varies from very firm clay through sandy clay to sand and gravel. It varies up to 200 ft in thickness.	
Bedrock	

Source: [R-10]

from which bay sediments are derived accounts for the wide variety of minerals found in them. The Bay Mud extends from the ground surface to a depth of about 58 ft. The top part of the deposit has been oxidized, weathered, and desiccated and has a light to medium gray color. The stiff, desiccated zone extends to a depth of about 10 ft. Below this upper zone the Bay Mud is a soft dark gray silty clay with various silt and fine sand lenses. It contains numerous small shell fragments and small amounts of organic material [R-10].

A wide variety of soil types can be found at HAA, as shown in Figure 2-5, which is taken from maps and preliminary information provided by the U.S.D.A. Soil Conservation Service (SCS).

Soils found at HAA consist primarily of the following types:

- Novato Clay: A clay material with 0 to 2 percent slopes. Novato clay is poorly drained and is light grey in color.
- Reyes Clay: A clay material with 0 to 2 percent slopes. Reyes clay is poorly drained and light brownish-grey in color.
- Saurin-Bonnydoon Complex: A yellowish-brown clayey loam to brown gravelly loam has 15 to 30 percent slopes. This material is moderate to well drained.
- Saurin-Urban Land Bonnydoon Complex: A yellowish-brown clayey loam to brown gravelly loam has 30 to 350 percent slopes. This material is moderate to well drained.
- Urban Land-Xerorthents Complex: This material exhibits a variable cut and fill composed of soil, rock, cement, asphalt, bay mud, and other solid materials with 0 to 9 percent slopes. Variable drainage occurs with this soil type.
- Xerorthents Fill: This soil exhibits variable fill composed of soil, rock, concrete, and other materials. Xerorthents fill has variable slopes as well as variable drainage.
- Xerorthenths-Urban Land Complex: This soil has variable cut and fill composed of soil, rock, cement, asphalt, bay mud, and other solid materials. This material has 0 to 9 percent slopes and variable drainage.

The seismic hazard at HAA is significant due to the presence of major earthquake fault zones within the region. The San Andreas Fault is 15 miles to the west, and the Hayward Fault is 4 miles to the east. These faults run through the Bay Area in a north-south direction and are capable of producing earthquakes up to or greater than 8 on the Richter Scale. The Burdell Mountain Fault Zone is potentially active and has been traced from Burdell Mountain (approximately 2 miles northwest of the site) to the northeastern corner of HAA. The traces of this fault can be examined on the enclosed earthquake risk map prepared by the California Division of Mines and

Geology. These traces are based on topographical evidence of geologically recent displacements on the faults within the Burdell Mountain Fault Zone. The Division of Mines and Geology has recommended that large public structures, such as schools and hospitals, not be located within this zone.

Figure 2-6 locates earthquake risk areas in the proximity of HAA.

2.4.5 GROUNDWATER AND HYDROLOGY

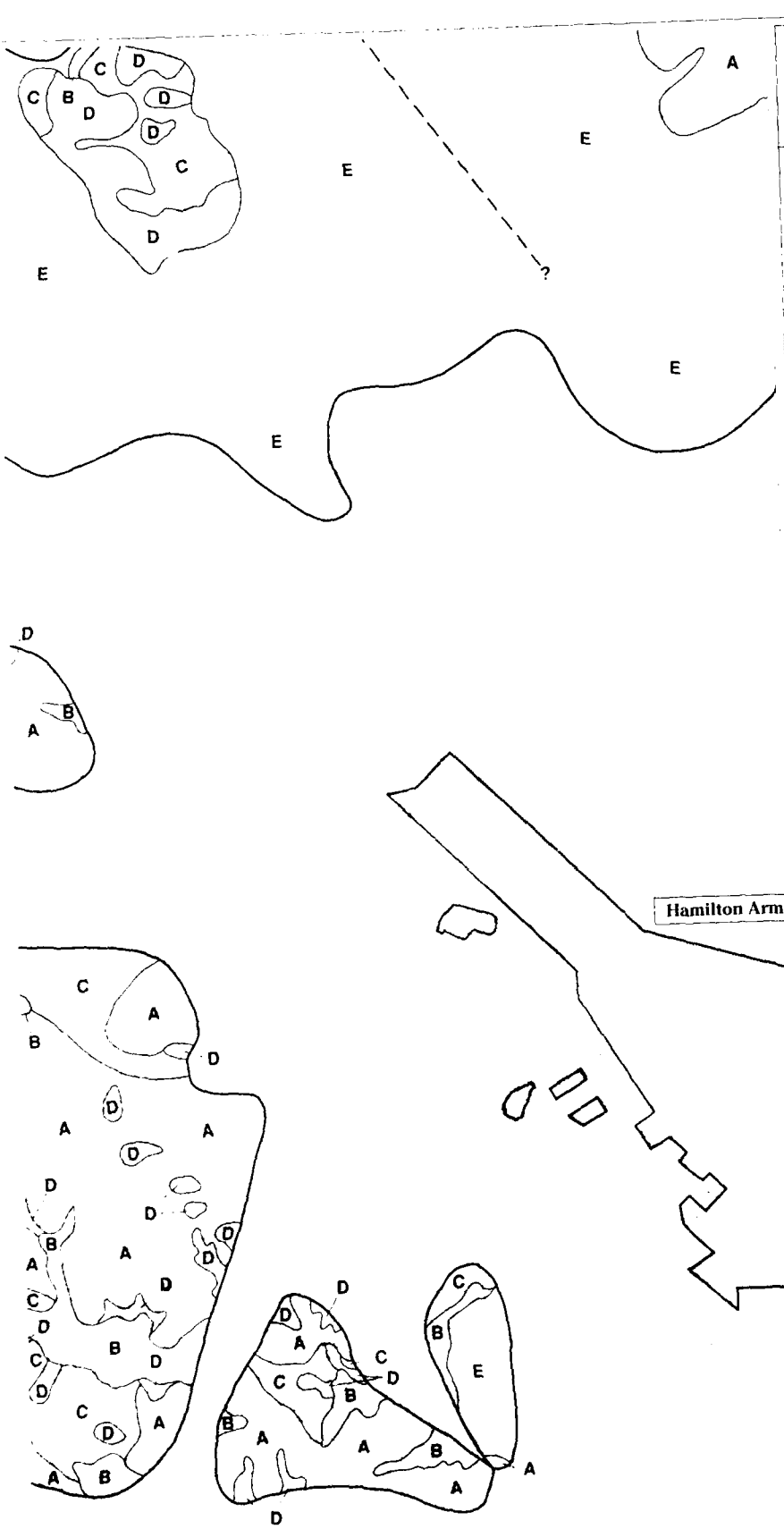
Groundwater in the vicinity of HAA is not utilizied because of the underlying geology and proximity to San Pablo Bay. Groundwater exists at a depth of less than 1 ft and is brackish. The Bay Mud deposits are predominantly clayey materials that are not favorable for a productive aquifer. The groundwater that could be extracted from a nearby saltwater bay is too saline for practical uses. Therefore, residential/municipal wells are not present in the vicinity of the site. Tidal influence on groundwater flows is expected in low lying areas.

2.4.6 SENSITIVE ENVIRONMENTS

Many areas on HAA, particularly those areas on either side of the levee, are marshy with poor drainage. Historically, HAA has had 1,200 acres of marshland compared to the existing 87 acres of marshland [R-9].

A number of endangered plants and animals are known to occur or could potentially occur at or near the HAA property. Several others are suspected to also exist there because they have been observed in similar habitats in the vicinity of the base. The only known listed endangered species occurring in the vicinity of HAA, according to the Fish and Wildlife Service, is the salt marsh harvest mouse (Reithrodontomys raviventris). Several candidate species occur in the area as well. Candidate species have no protection under the Endangered Species Act, but are included as it is possible that one or more could be proposed and listed before the subject property is completed [R-12]. Candidate species include:

Birds - California black rail and San Pablo song sparrow
Invertabrates - San Francisco fork-tailed damselfly
Plants - North coast bird's-beak



U.S. Army
Base Closure Preliminary Assessment
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FIGURE 2-6
EARTHQUAKE RISK AREAS

- **A** Probable low damage area—bedrock
- **B** Probable low to moderate damage area—alluvial and colluvial valleys
- **C** Probable low to moderate damage area—sheared and disrupted bedrock zones
- **D** Potentially high damage area—landslide deposits, steep slopes
- **E** Probable high damage area—bay mud, secondary effects damage is likely
- Fault trace
- Study area boundary

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

Explanation of Figure 2-6 [R-11]

This map is a simplification of the very complex effects that would result from a nearby great earthquake in such a varied geologic and topographic setting. Although the physical characteristics of the geological materials underlying a site have a major influence in determining the frequency of vibrations, other factors, such as local topographic conditions and the orientation of the site with respect to the source, can have a major influence on the amplitude of vibrations--thus intensity of shaking. One and two story frame structures that comply with California codes are likely to survive the effects of shaking alone in any of these zones. It is secondary effects of the shaking, such as landsliding and differential settlement of the ground, that are likely to be the principal causes of severe earthquake damage to such structures.

A - Probable low damage areas underlain by firm, relatively unweathered bedrock (compact metamorphic rock, well cemented sedimentary rock, and volcanic rock) that crops out at the surface or is covered by only thin layers of soil or colluvium. Subject to relatively high frequency vibrations. Some very steep slopes in this zone are potentially subject to earthquake-induced rock debris avalanches or rock falls.

B - Probable low to moderate damage areas, valleys underlain by relatively shallow compacted alluvium and colluvium on flat or gently sloping surfaces. Subject to relatively low frequency vibrations. In places may be threatened by landsliding derived from upslope area.

C - Probable low to moderate damage underlain by sheared and disrupted zones in bedrock. Subject to lower frequency vibrations than in A, and possible to landsliding on steep slopes as a result of failure of the relatively weak bedrock material.

D - Potentially high damage areas underlain by deep upslope landslide deposits and by thick deposits of colluvium or deeply weathered bedrock on steep slopes. Subject to more intense shaking than A and C, and possible to downslope movement, particularly if saturated.

E - Probable high damage areas, underlain by bay mud ranging in thickness from a few ft to more than 100 ft. Subject to relatively low frequency vibrations whose amplitudes depend to a large extent on the thickness of unconsolidated, water saturated deposits overlying the bedrock. Damage to structures from shaking alone will be related to the natural periods of vibration of the structures, but in this setting is likely to be less for one- and two-story buildings than for multi-story structures that have not been specifically designed for the site (Seed, 1969, p. 96). Major damage in this setting is likely to result from secondary effects of the earthquake vibrations, especially from rapid differential settlement and disruption of the fill caused by accelerated compaction or lateral flow of the mud beneath the fill. Buried utility pipes in this setting are subject to disruption both from the low frequency vibrations and from differential displacements of the ground.

Section 3
Environmentally Significant Operations

SECTION 3

ENVIRONMENTALLY SIGNIFICANT OPERATIONS

The objective of this section is to document the ESOs identified at HAA. The locations of the identified ESOs are shown in Figure 3-1.

3.1 ASBESTOS

3.1.1 DESCRIPTION

Significant amounts of asbestos appear to be present throughout the onsite building structures, both externally in asbestos-cement Transite siding and internally in the floor tiles, thermal insulation, and ceiling surfaces. In 1989, the Army undertook an asbestos survey program to determine asbestos-containing materials (ACMs) on the property. Results from the survey performed by OCCUSAFE, Inc., are provided in a report issued on June 1989, which is included in Appendix A of this report. Evidence of previous asbestos surveys, including sample tags, was noted within several building areas at the time of the assessment. Asbestos samples were collected from all buildings included within the scope of this report (except for five small buildings that, because of their age or construction, were excluded). Asbestos is not located on the ESO site plan because asbestos was found in virtually every building according to the OCCUSAFE survey.

3.1.2 KNOWN AND SUSPECTED RELEASES

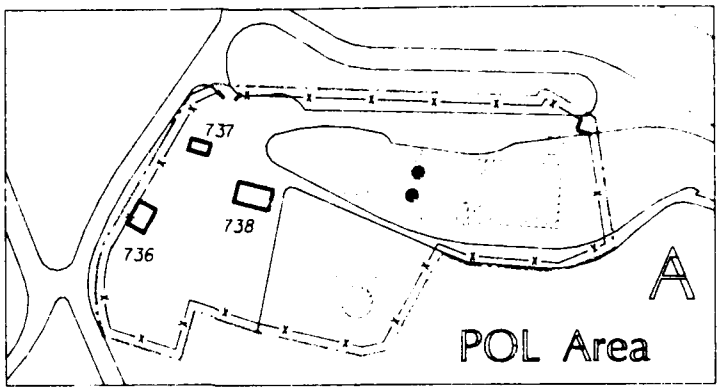
Because of the age of the onsite structures, it is likely that construction of these facilities included the use of ACMs. Also, due to deterioration of the buildings themselves, there is greater potential that ACMs have become damaged and may release fibers. At the time of the assessment, many of the buildings were noted as having Transite siding, which is a known ACM. ACMs, such as thermal insulation or damaged ceiling or floor tiles, were also observed.

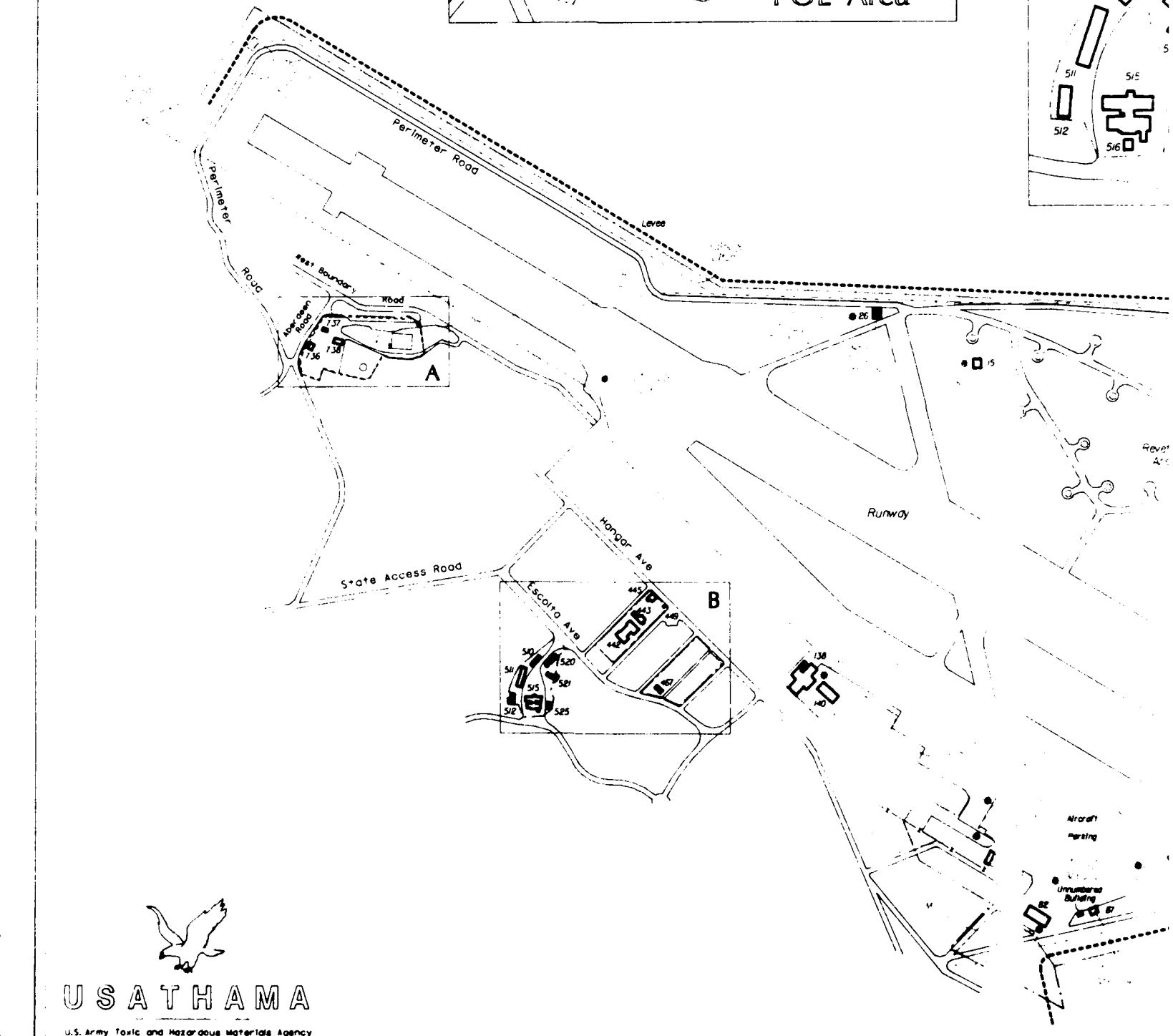
Building materials sampled included flooring materials, ceiling tile, pipe insulation, roofing material, exterior siding, wallboard, and duct insulation [R-2]. The report concluded that many areas within the property are in need of immediate action due to the poor conditions identified.

3.2 TRANSFORMERS

3.2.1 DESCRIPTION

Polychlorinated biphenyls (PCBs) have been found in concentrations of up to 300 ppm in some of the transformer equipment located on non-Army owned properties on HAA. Of the many transformers visually inspected during the site visit, none contained testing labels. No transformers were found leaking and no rusted transformer housings were noted. Several transformers have been removed from service, and at the time of the site visit were located on



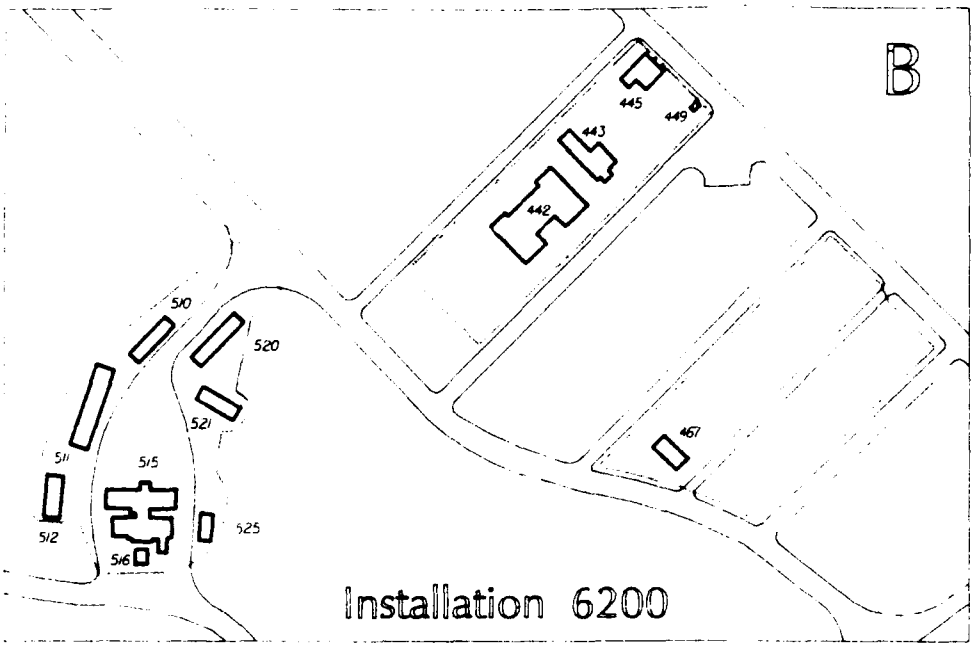


USATHAMA

U.S. Army Toxic and Hazardous Materials Agency

U. S. Army
Base Closure Preliminary Assessment
Hamilton AAF
Novato, CA – November 1989

Figure 3–1
Environmentally Significant Operations

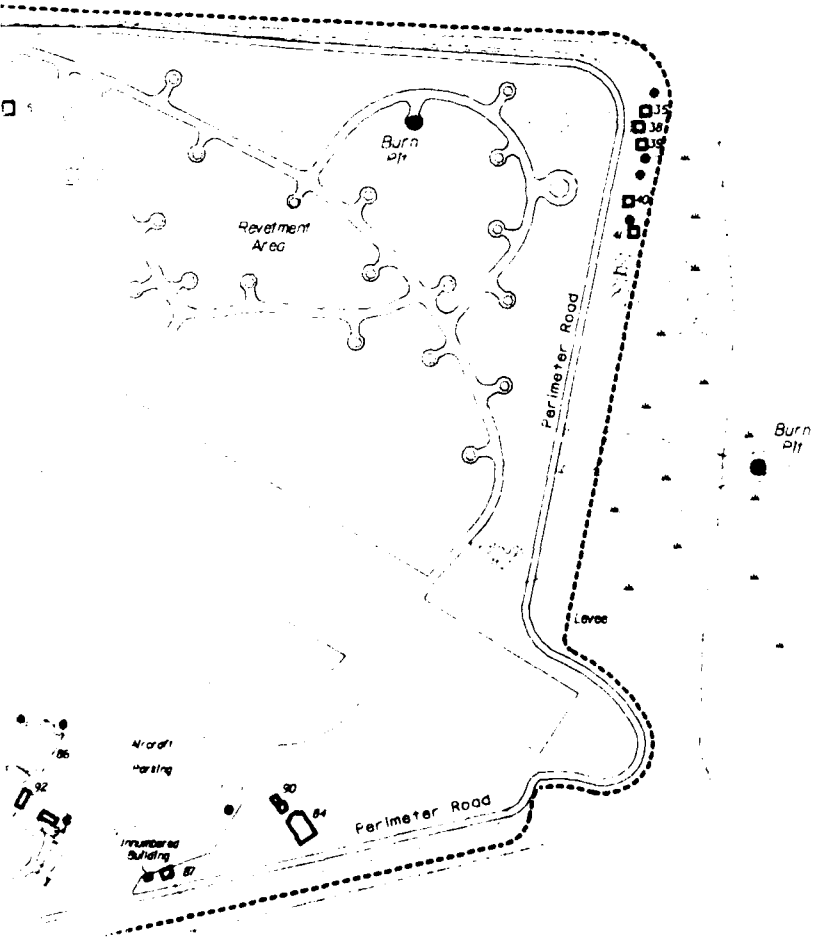


Compiled in 1989 from various sources provided by the U.S. Army Toxic and Hazardous Materials Agency

N

0 meters 400

0 feet 1200



the ground near where they had been used. Reports from HAA personnel indicate that no PCB transformers exist on HAA; however, no documentation or transformer inventory could be found by environmental personnel at The Presidio or Sacramento COE to verify this information [T-1, T-6, T-7]. The exact locations of all transformers within HAA are unknown, and, therefore, are not shown in Figure 3-1.

Woodward-Clyde Consultants tested many transformers on HAA, but only 13 of these were within the closure property [R-1; Appendix B]. Transformers were first screened using a McGraw-Edison PCB Field Test Kit. The purpose of the screening was to identify transformers that contained PCBs at concentrations greater than 50 ppm, which is the Toxic Substances Control Act (TSCA) limit for PCB contamination (i.e., transformers with concentrations less than 50 ppm are not subject to TSCA regulation). If the test kit indicated a concentration greater than 25 ppm, a sample of the transformer oil was sent to a laboratory for confirmatory analysis. The 25 ppm threshold was chosen because the test kits are only screening tools and do not give exact results. However, they are more likely to show false positive than false negative results. Therefore, the procedure for confirmatory testing of all test kit results greater than 25 ppm is a conservative means of identifying transformers with concentrations greater than 50 ppm.

Only one of the transformers obtained a concentration of PCBs greater than 25 ppm. This was a pole-mounted transformer between Buildings 443 and 445. Analysis of the dielectric fluid showed a PCB concentration of 32 ppm. No other information on transformers is available within the closure properties.

3.2.2 KNOWN AND SUSPECTED RELEASES

Several older transformers appeared in poor condition with the connecting tape unravelling. However, no leaks or rusted transformer housings were noted during the site visit.

3.3 UNDERGROUND STORAGE TANKS (USTs)

3.3.1 DESCRIPTION

There are several areas where USTs are known or have been reported to be located on HAA. In 1986, the COE contracted for the removal of nearly 65 aboveground and underground storage tanks. Critical sections of that report are included in Appendix C [R-2]. Most of these tanks were removed from the GSA sale property; however, 21 of the USTs were located in the POL Area.

Following is a listing of USTs known or reportedly located within the subject property along with available information on each tank. The locations of these USTs are shown in Figure 3-1.

UST 1 through 20 - When installed, the tanks were arranged in two rows of 10 tanks each. Each tank was supported by concrete footings built on the original grade. The tanks were then covered with approximately 20 ft of soil. The date of installation and tank contents are unknown. Each

tank had a capacity of 25,000 gal and contained JP-4 (jet fuel). A water control pit and water separator house (Building 717) were constructed on the ground directly above this UST area [R-2]. Details of the use of Building 717 and the water control pit and their association with the tanks are unknown.

In 1986, the COE contracted for the removal of these tanks and subsequent investigative excavations as part of an effort to clean up the POL Area. The water control pit, Building 717, and all 20 USTs and associated piping were removed at that time. Eleven monitoring wells were placed downgradient of this excavated and sampled area. Based on test results of samples taken from a nearby monitoring well, an Av-gas (aviation fuel) water separator was dismantled. As a result of investigative trenching operations, areas of contamination were found as follows [R-2]:

- Below the removed tanks.
- Along the west boundary fence.
- Adjacent to the drainage ditch.
- Around the meter pad at the truck fill stand.
- Just outside of the west boundary fence near the drainage ditch.
- At the sump that collected water from the water control pit (excavation was expanded to areas outside the boundary fence).
- Adjacent to Building 715.
- Under the upper road truck fill area.

A detailed description of visual observations of soil staining and levels of contamination found in the above areas is provided in Subsection 3.3.2.

UST 21 - This 750-gal tank, also located in the POL Area, was removed as part of the COE contract in 1986. Age and material of tank are unknown. Contents thought to be JP-4.

UST 22 - Apparently there was a tank located in the vicinity of the runway, but Army personnel were unable to determine its exact location with a metal detector because of the reinforcing rods in the pavement. Attempts were made to locate the tank by removing the pavement, but no tank could be found.

UST 23 - Several USTs were reportedly located among Buildings 35 through 41 (pump station area, Figure 3-1), but no visible evidence of the tanks was found during the site visit. These tanks may have been removed. There was no information regarding tank size, content, or exact location, but tanks were probably associated with the two generators (Buildings 38 and 40) that powered the pump stations. Those tanks would have contained fuel oil.

UST 24 - Reports indicate that a tank containing fuel oil for a generator was located at Building 140, but no documentation verifies that it was ever removed [T-1]. No information is available on its exact location, age, or capacity.

UST 25 - Reports indicate that an estimated 1,000-gal UST that previously contained diesel fuel is located near Building 26 [T-1]. The contents from the UST were manually pumped into a small aboveground storage tank (AST 8) located within the building. Tanks were used to fuel a generator within the building. The exact location of UST 25 is unknown.

3.3.2 KNOWN AND SUSPECTED RELEASES

There have been many areas of contamination associated with USTs at HAA. Documented and suspected releases from USTs and/or associated piping are described below. The following information is paraphrased from a report issued by International Technologies Corp. [R-2]. Information and findings from the report could not be verified by WESTON's onsite inspections.

UST 1 through 20

Described in this section are details of the removal of the 20 tanks as well as the subsequent excavation investigations resulting from the tank removal. Prior to excavation, Building 717, the water control pit, and their associated valves and equipment were demolished and removed. The excavation started by removing the first 4 ft of soil, exposing the tops of the tanks and the water control pit. No soil staining was observed at this time. The water control pit foundation was removed, revealing liquid thought to be JP-4. The liquid was removed and disposed offsite. When pipes running from the control pit to Building 717 were uncovered, extensive soil staining became apparent. Sample results collected from this area ranged from 340 to 12,000 ppm for volatile fuel hydrocarbons (VFHs). Further excavation around and beneath the tanks revealed extensive soil staining. Soil samples collected below the tanks gave results ranging from 12 ppm to 12,000 ppm for VFHs. Excavation continued until the level of the original grade was reached. As tanks were removed, liquid thought to contain JP-4 was observed between the concrete footings on the original grade. Investigative trenching beneath the original grade revealed stained soils with concentrations of fuel hydrocarbons greater than 1,000 ppm. Groundwater taken from trenches in the removed tank area was analyzed and results ranged from none detected to 100 ppm and 150 ppm in the center of the area. The entire tank area was eventually backfilled.

An Av-gas water separator and a 6-in. AV-gas pipeline were located east of the tank removal area. One of the monitoring wells, placed as a result of the tank removal area, was located adjacent to the separator. Water samples from the well contained 600 ppm VFHs and 1,100 ppm semi- and non-VFHs. The separator was dismantled and the pipeline flushed and capped.

Areas of contamination located along the west boundary fence and adjacent to the drainage ditch were found as a result of investigative trenching related to the tank removal area. Soil contained fuel hydrocarbons at levels greater than 1,000 ppm; however, contamination in these areas appeared to be due to pipe leaks or spills and not directly related to any leaks from the removed tanks. This area was backfilled.

A meter pad associated with the lower truck fill stand was located northeast of the removed tank area. Groundwater taken from investigative trenches just southeast of the meter pad contained 20 ppm VFHs with 2,100 ppb benzene, 2,100 ppb toluene, and 520 ppb xylene (BTX). Soil samples taken around the meter pad had hydrocarbon levels of 1,600 to 11,000 ppm VFHs. Water samples collected from a monitoring well adjacent to the meter pad contained 250 ppm VFHs and, according to the report, high levels of benzene, toluene, and xylene. Upon further excavation of this area, extensive soil staining was encountered. Soils excavated from this area were removed for offsite disposal. Soil contamination in this area was thought to be caused by a JP-4 pipe leak several years earlier. Following excavation, soil samples were analyzed. Of 35 samples collected, 2 had levels greater than 1,000 ppm total petroleum hydrocarbons (TPHs); both samples were collected beneath the neighboring concrete fill stand pavement. These areas of contamination were not addressed by COE and the area was backfilled with clean material.

East of the removed tank area and just inside the north boundary fence is a concrete sump used to collect water from the water control pit. An overflow pipe connected the sump to the drainage ditch through a 10-in. buried culvert. The sump contained approximately 7,000 gal of liquid, which, when analyzed, showed no detected VFHs at a detection limit of 0.5 ppm (benzene less than 5 ppb, toluene less than 5 ppb, xylene less than 5 ppb). The liquid was removed for offsite disposal. The sump was then removed, revealing soil that was wet and stained and had a strong hydrocarbon odor. After removing soil to a depth of 7 ft below the sump, strong hydrocarbon odors and staining were still evident.

Excavation was expanded to areas outside the boundary fence to the north and west. During excavation, a 70-ft section of drainage culvert containing numerous penetrations was replaced. East of the replaced culvert a dark black clay lens with strong hydrocarbon odor was found to be contaminated with greater than 1,000 ppm of semi- and non-VFHs (calculated as diesel). Inside the fenced area, soil samples showed VFH contamination greater than 1,000 ppm. These areas of contamination were left in place under the direction of the COE, and the area was backfilled with clean material.

Building 715 was located east of the removed tanks and just inside the south boundary fence. Soil samples collected in investigative trenches adjacent to the building exhibited levels of fuel hydrocarbons greater than 1,000 ppm. Contamination was thought to come from two JP-4 and an Av-gas pipeline, which ran along the east side of the building. These pipelines and the soil around them were removed to a distance of 100 ft outside the south boundary fence. Samples collected around the pipeline in front of Building 715 revealed fuel hydrocarbon levels greater than 1,000 ppm. Stained soil was observed

under Building 715. The COE again postponed cleanup of the area and the excavation was backfilled using clean material. Before Building 715 was demolished, the asbestos siding was removed.

Located just west of the removed tank area is a 6-in. fill pipe associated with the upper truck fill stand. Soil below the capped pipe reportedly emitted strong hydrocarbon odors. All stained soil was removed around the fuel line. Soil samples collected against the rock interface directly beneath the capped pipe showed greater than 1,000 ppm of semi- and non-VFHs. The source of contamination appeared to be under the concrete pavement running to the truck fill stand. The COE requested further investigation of this area be postponed. The area was backfilled with clean material.

UST 21

No soil staining was observed upon excavation of this tank. Soil samples were collected from beneath the removed tank. Results indicate that no VFHs were present at a detection limit of 10 ppm. Another sample collected from the area was analyzed for organic lead, none was detected at a detection limit of 0.3 ppm. The excavation was backfilled with clean material.

UST 22 through 24

The exact location of underground storage tanks 22, 23, and 24 was not verified and the tanks have not been leak tested. It is possible that spills or leaks may be associated with these tanks.

3.4 ABOVEGROUND STORAGE TANKS (ASTs)

3.4.1 DESCRIPTION

ASTs are located in several areas within HAA (Figure 3-1). The following is a list of known existing and removed tanks, including available information on each tank. In many cases, little historical data exist. Information in this section has been paraphrased from a report issued by International Technologies [R-2]; however, the information and results could not be verified during WESTON's onsite inspection.

AST 1 - An aboveground storage tank is located within the POL Area. This tank is used to store JP-4 and is estimated to be 25,000 gal in size. No information is available on the age of the tank. This tank can be seen in photo 5 (silver tank in the center of the photo).

AST 2 - Also within the POL Area was an 840,000-gal bulk storage JP-4 tank that was removed in 1986 as a part of the COE tank removal contract. The steel tank was surrounded by an earthen berm, which was covered with a thin layer of asphalt. Located on an elevated section of the POL Area, the tank was supplied fuel by pipes and a pump station in a lower area. Northwest of the tank, the ground sloped to a concrete

drain box. Both the tank and drain box were removed. Areas of contamination found during excavation activities are discussed in Subsection 3.4.2.

AST 3 - Several 55-gal drums, a 600-gal tank, and a 2,500-gal tank (photo 6) are located in the POL Area and are reported empty. Approximately 10 55-gal drums (full drums from Storage Area 2) are stored in a concrete-lined truck ramp, which has no drains. Drums are removed annually by an outside contractor under a contract administered by the Presidio of San Francisco [T-9].

AST 4 - Also used for aircraft refueling at Building 86 is a 600-gal capacity jet fuel pod located at the southeast end of the aircraft parking area. The tank is located on a concrete paved area with a sandbag berm.

AST 5 - An estimated 1,000- to 2,000-gal tank is associated with the pump station operations located on the northeast side of Building 35 (Photos 3 and 7). The tank contains diesel fuel, but no other information is available.

AST 6 - Another storage tank associated with pump station operations is located in the proximity of Building 39. Contents of the tank are unknown.

AST 7 - This tank is located at the pump station. Photo 4 shows its proximity to Building 48. This tank appears to be less than 1,000 gal and may contain fuel oil for the generator in Building 40.

AST 8 - An estimated 200- to 300-gal tank located within Building 26 is reported empty [T-1]. The tank previously contained diesel fuel to power the generator.

AST 9 - Associated with the aircraft maintenance area (Building 86) are three mobile fuel trucks, such as the one in photo 9. Each truck carries JP-4 to refuel aircraft in the aircraft parking areas around Building 86. The three trucks have a fuel capacity as follows:

One 1,000-gal tank
One 1,200-gal tank
One 2,400-gal tank

AST 10 - An estimated 300-gal tank is located just outside of Building 15 (photo 8). Contents of the tank are unknown.

Miscellaneous Drum - A 55-gal drum labeled PD-680 was located behind Building 82 during the site visit. The contents of the drum were not verified. Moreover, there was no activity in or around the building that would suggest the need for solvent. Personnel at the building were unaware of its existence and claimed no knowledge of its use.

3.4.2 KNOWN AND SUSPECTED RELEASES

A large bulk storage tank (AST 2) and its associated drain box were located in the POL Area. Leaks from AST 2 were known to have occurred, although inspection of the tank and foundation did not substantiate such information [T-2; R-2]. No evidence of soil discoloration was found when the tank and foundation were removed. Following tank removal, 10 trenches were dug to bedrock north and west of where the tank had been located (these were the only areas where depth to bedrock was greater than 1 ft).

Samples from four of the trenches contained fuel hydrocarbons at levels greater than 1,000 ppm. Two of the samples were taken downslope of where a 3-in. diameter drain valve had been located on the west side of the tank. Based on sampling information, it was felt that a leak or spill of JP-4 had occurred from that drain valve. It appeared that the leak had been contained within the bermed area. Another of the sample areas was adjacent to the concrete drain box. All soil was removed to bedrock north and west of the removed drain box. Of the 27 soil samples collected in the vicinity of the drain box and tank, five indicated the presence of combined fuel hydrocarbons at levels exceeding 1,000 ppm. One of these samples collected near the drain box consisted of clay-filled material in cracks in the fractured rock. This contaminated material was not recovered because removal would have required excavation of a considerable amount of bedrock. The other four samples were in soils that could be excavated, but at the direction of the COE the soil was left in place. All removed soils were then backfilled with clean material.

Close examination of many of the ASTs was impossible during the site visit due to the inaccessibility of the locations, especially in the POL Area, which was completely fenced and locked. Some staining, however, was noted in the pump station areas. AST 5 at Building 35 (photo 7) appears to have leaked from one of the connecting pipes directly into the ground. Photo 10 shows machinery within Building 35 (photo was shot through a window) that is associated with the tank outside. Stains are visible on the concrete floor within Building 35.

3.5 AIRCRAFT MAINTENANCE AREA/STORAGE AREAS

3.5.1 DESCRIPTION

Several areas onsite (Building 86, in particular) have been used for the maintenance and storage of maintenance fluids, repair, and washing of both fixed-wing and helicopter aircraft. Oil staining was noted on many of the concrete parking areas located east of the runway. The potential exists for aircraft-related oil, fuel, or cleaning solvents to have spilled or flowed onto the unpaved grassy areas. The following sections are related to aircraft maintenance and storage activities within and outside of the hangar.

Activities Within Building 86

Army Reserve activities within the hangar include light maintenance of aircraft. Photo 11 shows the inside of the hangar. The hangar has a concrete floor with trench floor drains located at the bay doors. These drains discharge into the storm sewer.

A flammable materials locker located within the maintenance area contains POL, paint, and spray cans in 1 gal or smaller containers. There is a well in the bottom of the locker to contain potential spills. A list of chemicals used in and around the hangar is provided in Appendix D.

Parts cleaning is a daily activity and is accomplished by the use of at least one small recirculating solvent unit. PD-680 solvent is used in parts cleaners. Waste solvent is taken to Storage Area 2 by Army personnel. An estimated 35-gal tank is contained within each unit. Small numbers of NICAD batteries are stored in the hangar (usually only three at a time), but no extra containers of acid are present.

Storage Areas Outside of Hangar

Storage Area 1

On the northeast side of Building 86 is a drum storage area. Drums are placed horizontally on metal storage and dispensing racks, located in a concrete paved area. Drip pans are located under the drums to contain drips but not the contents of the entire drums. The contents/quantity of each drum noted during the site visit are as follows:

- Three 55-gal drums of engine cleaning compound.
- Three 55-gal drums cleaning compound.
- One 55-gal drum PD-680 solvent.

Storage Area 2

This waste materials storage area is located southwest of Building 86. Approximately 12 55-gal drums (photo 12) and several smaller containers (photo 13) of waste oil, waste fuel, and other maintenance related fluids are stored in a gravel area with a sandbag berm. When 55-gal drums become full, they are moved to the POL Area (AST 3). All 55-gal drums in the POL Area, as well as any waste materials in Storage Area 2, are removed for disposal offsite quarterly under a contract administered by the Presidio of San Francisco [T-6]. Note in photo 12 the close proximity of storm drains to this area.

Storage Area 3

Southwest of Building 94 are five metal CONEX containers used for the storage of maintenance-related fluids. Storage sheds are located on broken asphalt pavement. No curbing or other containment is provided. The contents of each shed are as follows:

- POL and spray cans; largest container is 5 gal; total materials estimated to be 100 to 150 gal.

- Diesel and mogas fuel in 5-gal cans; 10 cans total.
- Paint, isopropyl alcohol; largest container 5 gal; estimated total materials is 200 to 300 gal.
- Paint, spray cans, ethyl glycol, denatured alcohol, naptha, toluene, methyl ethyl ketone, corrosion resistant compound; estimated total materials at 150 to 200 gal.
- One 55-gal drum cleaning compound.

Storage Area 4

Building 87, a small unnumbered building, and a CONEX are located just off the southeastern end of the aircraft parking area. Building 87 is surrounded by 55-gal drums on a gravel surface (photo 14). Contents of the 55-gal drums are as follows: two 55-gal drums of PD-680; two 55-gal drums of aircraft cleaning compound; two 55-gal drums of turbine engine cleaner. There are several empty drums. Drip pans under drums (photos 15 and 16) would contain drips but not major spills. Stains were visible on the ground surface. Building 87 has a concrete floor and no floor drain; however, no curb at the door exists. The building is divided into two rooms by a cinderblock wall. Flammables, mainly paint, are stored on one side of the building in containers up to 5 gal in size. Stored on the other side of the building are oil, grease, antifreeze, solvent, and aircraft cleaning compound in containers no larger than 5 gal in size. Only packaged (unopened) products are stored within this building. A metal CONEX is located just north of Building 87 and contains approximately 15 5-gal cans of unleaded gasoline. No curb or other containment is provided [T-9]. The small, unnumbered, red wooden shed (photo 14) reportedly contains tires and parts.

Storage Area 5

Oxygen cylinders (1 dozen) are stored in a covered area (photo 18) along the south side of the aircraft parking area. The cylinders are used to supply oxygen to flight crews during flight operations.

Aircraft Washing

Also associated with the maintenance activity is the washing of aircraft. Until July 1989, aircraft were reportedly washed in and around Building 87 in the aircraft parking areas (photo 17 shows storm drains in parking areas) [I-4]. Aircraft are now flown to Alameda NAS for washing.

3.5.2 KNOWN AND SUSPECTED RELEASES

Releases are suspected based on the visual evidence provided by stains on the concrete floor in Building 86 and also in the gravel at Storage Areas 2 and 4. The extent and type of contamination present in these areas is unknown.

3.6 BURN PIT

3.6.1 DESCRIPTION

The Burn Pit is located in the northeastern portion of the site within the Revetment Area.

Firefighting training occurred at Revetment Area No. 10 from 1975 until at least 1987. No direct information is available on what materials were burned at the site. However, based on soil contaminants, as described below, the materials may have included used oils. Results of soil sampling are described in Subsection 3.6.2

3.6.2 KNOWN AND SUSPECTED RELEASES

Soil samples from the Burn Pit collected during the previous investigation were analyzed for TPHs, polynuclear aromatic hydrocarbons (PAHs), volatile organics, and metals. Positive results for TPHs, volatile organics, and metals analyses were shown for the Burn Pit. Results indicate shallow soil contamination adjacent to and beneath the existing concrete pad [R-1].

3.7 FORMER RADIOLOGICAL DISPOSAL SITE

3.7.1 DESCRIPTION

Two corrugated-metal cylinders, with diameters of approximately 2 ft and lengths of about 12 ft and 20 ft, respectively, were previously located below the northern earthen level beyond the runway overrun [R-1; Appendix E]. According to historical records, these cylinders were used for low-level radioactive waste disposal of materials such as electron tubes (bearing small amounts of radioisotopes) and radium-containing luminous dials. The cylinders were recovered and removed from the property as part of a COE contract in 1988.

3.7.2 KNOWN AND SUSPECTED RELEASES

No known releases have occurred as a result of the disposal or subsequent removal activity.

3.8 JP-4 LINE

3.8.1 DESCRIPTION

A 12-in. diameter JP-4 fuel line extends east-southeast from the POL Area along the drainage ditch towards San Pablo Bay. It was used prior to 1975 to transfer JP-4 from a barge off-loading area to the POL Area. Approximately 2,900 ft of the line is underground and roughly 5,700 ft is aboveground. No soil, groundwater, or leak testing is believed to have been performed (other than as described in Subsections 3.3 and 3.4). In addition, no information is available as to when the JP-4 line was installed.

3.8.2 KNOWN AND SUSPECTED RELEASES

Based on conversations with onsite personnel, it is suspected that some spillage and leakage occurred from the tanks and piping associated with the JP-4 line within the POL Area; however, the exact time, location, and volume spilled have not been documented [I-3].

3.9 REVETMENT AREA

3.9.1 DESCRIPTION

Located north of the southwest end of the runway are more than 20 concrete hardstand (parking areas) and taxi areas used to park aircraft in a dispersed, protected fashion such that more aircraft would survive bombing attacks. This is known as a "Revetment Area." The Air Force ceased use of the airfield in 1974. Since then, the Revetment Area has been used for a variety of purposes, including an annual air show, Army drill sessions, and auto and cycle training for several police departments. A few movie scenes also have been shot here.

In the past, the maintenance and service of aircraft occurred in the Revetment Areas. Mobile fuel trucks were used to fuel aircraft and mechanical work and oil changing and reoiling was common.

One of these concrete areas was larger than the others. It was used as a jet test cell and was surrounded with a blast shield. A large bolt located in the center of the pad was used to anchor engines during testings.

In conjunction with the 1986 tank removal activity, the aircraft parking pads and taxiways were used to aerate soil materials contaminated with petroleum hydrocarbons. During tank excavation, soil materials were tested to determine TPHs levels. Soils found containing 100 ppm of TPHs were taken to the Revetment Area where they were aerated to reduce the TPHs levels. The taxiways that were used for this function were lined and bermed with visqueen to contain the contaminated soil materials. Approximately 12 in. of soil was placed on the lined taxiways and physically manipulated until the volatile fraction of the soil contamination had dissipated and reduced to the target level of 100 ppm TPHs. When the TPHs level was reduced to less than 100 ppm, the material was used as backfill for tank removal areas.

3.9.2 KNOWN AND SUSPECTED RELEASES

Because the aircraft Revetment Area was used for maintenance, fueling, and changing oil, normal service-related spills could have been expected. In addition, a prior Air Force maintenance mechanic reported that used oil was dumped in this area. Aircraft were positioned such that the engine was not over the paved area, and used oil from the aircraft was drained onto the ground [T-1]. This practice occurred when time constraints did not allow proper procedures to be followed.

3.10 EAST LEVEE LANDFILL

3.10.1 DESCRIPTION

Located on the eastern side of the site is a landfill that is bordered by the east levee and San Pablo Bay. Part of this landfill is on the State-owned property, and in the intertidal zone. Beginning in approximately 1961, it was used mainly for disposal of construction debris and later was capped with clay and concrete. Because the site is mostly inundated (about 90 percent underwater) during periods of high tide, the landfill material is continually saturated [R-1].

A comprehensive exploratory trenching program was conducted in previous studies (R-1) to characterize the contents of this landfill. Thirty-six soil samples were taken from the landfill and tested by a laboratory. The test results showed a limited number of positive TPHs, volatile organics, and semivolatiles, and a variety of metals. The TPH analyses indicated minor concentrations of heavy-end petroleum hydrocarbons (motor oil and C21-C36). Detected level of metals are well below California State standards and federal contamination limits.

A Woodward-Clyde report concluded, based on laboratory data and the exploratory trenching study, that the landfill poses a very limited source of contamination to the surrounding environment [R-1]. The consultants recommended no remediation or clean-up actions.

3.10.2 KNOWN AND SUSPECTED RELEASES

An exploratory trenching program was conducted in 1986. Low concentrations of TPHs were found. Trace levels of one volatile organic and two semivolatile organics imply very limited existing contamination [R-1]. The specific contaminants are unknown.

3.11 BOMBING RANGE

3.11.1 DESCRIPTION

HAA was authorized by Congress in 1932 as a training bombing range. A hearsay report indicates three estimated locations of bombing areas are as follows:

- Near the East Levee Landfill.
- North of the aircraft parking areas.
- In Bel Marin Keys (north of runway overrun).

It is also thought that these areas extend into other properties. However, the use of any areas on or around HAA for bombing range activities could not be documented. A practice bomb was found in Landfill 26, but no munition debris, explosives contamination or unexploded ordnance was found on HAA.

3.11.2 KNOWN AND SUSPECTED RELEASES

Since the areas were bombing ranges, the potential exists for metals and explosives contamination, as well as possible unexploded ordnance; however, no documentation exists to show that live rounds were or were not used.

3.12 FORMER SEWAGE TREATMENT FACILITY

3.12.1 DESCRIPTION

A former sewage treatment facility (STP) was located on the east side of HAA between Perimeter Road and the east levee. The facility provided primary and secondary treatment in aboveground concrete tanks. Effluent from the facility discharged into the Novato Sanitation District sanitary lines. Chemicals (probably coagulants) were used in the treatment process, but no list is available [T-8]. Only sanitary waste is believed to have been treated. The facility operated until 1986, at which time all sanitary wastes were pumped to the Novato Sanitation District. Since then, all buildings have been demolished. No ASTs or USTs remain at the facility [T-1]. The three unlined sewage treatment sludge drying beds still remain; however, they are partially covered with soil from demolition activity [T-8].

3.12.2 KNOWN AND SUSPECTED RELEASES

The Woodward-Clyde report dated January 1987 states that surface composite and soil boring samples were collected from the sludge drying beds and were analyzed for metals. The analytical results were compared to the California Total Threshold Limit Concentration (TTLC) for Biologically Accumulative and Environmentally Persistent Compounds. None of the analytical results exceeded these criteria and no remediation was recommended.

Section 4
Human and Environmental Receptors

SECTION 4

HUMAN AND ENVIRONMENTAL RECEPTORS

The pathways by which human and environmental receptors may be exposed to site-related contaminants are discussed in this section.

4.1 GROUNDWATER

Given the high water table at the site, it is likely that releases of some contaminants to surface soils in many areas will reach groundwater (through percolation) unless contaminated materials are removed. Solvents (from aircraft maintenance activities), and petroleum hydrocarbons (from aircraft maintenance and fuel storage areas) would also be somewhat mobile in groundwater.

Due to the proximity of the site to San Pablo Bay, shallow groundwater beneath HAA exhibits relatively high salinity and is not used for drinking or irrigation. Therefore, the potential for human ingestion of contaminated groundwater is low. Groundwater flow information was not available, but it appears that it discharges to the San Pablo Bay. Contaminated groundwater may also discharge to surface water, potentially impacting wildlife in the area.

4.2 SURFACE WATER

There are no surface water bodies (streams, ponds, etc.) onsite; however, HAA contains many wet areas. Stormwater runoff is collected and diverted to stormwater pumping stations where it is ultimately pumped into San Pablo Bay. Stormwater collection systems may have received contaminants from several onsite areas (POL Area, Revetment Area, aircraft maintenance or parking areas, and outdoor storage areas). This contamination would consist of spilled fuels, oils, lubricants, or solvents. PCBs from electrical transformers are an unlikely source of contamination in surface water because PCBs adsorb strongly to soil particles and are relatively immobile. The potential exists for surface water contamination of PCBs in areas where they may have leaked and found a pathway through stormwater runoff and/or erosion of soil.

As stated in Subsection 2.4.6, areas within HAA are indicative of wetlands. Contaminants could have a significant effect on wetland wildlife should they spread into wetland areas. Because contamination could ultimately reach the bay, possible wildlife predators and humans eating aquatic life (shellfish, etc.) could be impacted. Endangered species in the wetland or bay area may also be impacted.

4.3 SOIL

Much of the property is unpaved, especially the areas north and east of the runway. In the POL Area, any contaminated surface soils may present a direct contact hazard to site visitors and wildlife. Fuels, oils, and other aircraft-related materials, if present in surface soils, would be a hazard if excavation work were done in the POL Area. Contaminants that are persistant in soil, such as PCBs and semivolatile fractions of petroleum hydrocarbons (from spills from aircraft maintenance activities or storage tanks). would present the greatest exposure hazard among the identified site contaminants. However, no evidence of PCB leakage from electrical equipment exists. Surface soils around the Burn Pit, potentially contaminated with liquids used during the firefighting activities, also may present a direct contact hazard. Known soil contamination is present in the POL Area, mainly from JP-4 storage tanks and associated facilities.

4.4 AIR

No permanent sources of air contamination are known to be present onsite. No human or environmental receptors would expect to be impacted by air contamination at the site. Primary receptors to potential asbestos exposure would be inhalation by humans occupying any building containing ACMs. This would include office workers, maintenance personnel, and any remediation or demolition workers. It should be noted, however, that any building with ACMs would require the removal of asbestos prior to any demolition activities.

4.5 OTHER HAZARDS

A potential safety hazard associated with the bombing range areas is unexploded ordnance and munition debris.

Section 5
Conclusions and Recommendations

SECTION 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The preliminary assessment for HAA identified the following onsite ESOs:

- Asbestos
- Transformers
- Underground Storage Tanks
- Aboveground Storage Tanks
- Aircraft Maintenance Area/Storage Areas
- Burn Pit
- Former Radiological Disposal Site
- JP-4 Line
- Revetment Area
- East Levee Landfill
- Bombing Range
- Former Sewage Treatment Facility

5.1.1 ASBESTOS

An evaluation of the site for asbestos-containing materials (ACMs) was performed by OCCUSAFE, Inc. and has been included in Appendix A. The results identified the need for action based on the condition of the material and the potential for contact. In regard to the Army property, the report identified:

- 29 sites in 9 buildings where immediate actions (algorithms greater than 40) are needed due to the presence, condition, and friability of ACMs.

  135 sq ft of surface area
  3,240 linear ft of pipe insulation

- 149 sites in 22 buildings have been identified where an Operations and Maintenance Program (algorithms 1 through 39) should be implemented. This option requires the inspection and maintenance of identified materials until funds are available for removal.

  199,848 sq ft of surface area
  4,694 linear ft of pipe insulation

- 235 sites in 28 buildings were identified as not requiring action because the tested materials did not contain ACMs.

5.1.2 TRANSFORMERS

The exact number of electrical transformers located on HAA is unknown. Some of these units, especially north and east of the runway, have been found to be in a deteriorating condition; however, no leaks or rusted housings were

seen during the site visit. Several transformers have been removed from service, but are currently located on the ground close to the prior connection. The transformers seen were not labelled. It is reported that no PCB transformers (as TSCA defined) exist on the property, although no test data could be found to verify their PCB levels [T-1].

5.1.3 UNDERGROUND STORAGE TANKS (USTs)

All known USTs have been removed from HAA except the following unverified tanks:

- UST 22 located near the runway.
- UST 23 located in the pump station area.
- UST 24 associated with Building 140.
- UST 25 associated with Building 26.

Twenty-one tanks and their associated piping, etc. were removed as part of the 1986 tank removal activity. Areas of contamination were found during the tank removal activity. Much of the contaminated soil was removed but removal of several areas of contamination was postponed.

5.1.4 ABOVEGROUND STORAGE TANKS (ASTs)

There are several ASTs on HAA. The utilization, contents, and age, of the tanks was not verified. The large AST 2 in the POL Area has been removed; however, contamination is known to have occurred at AST 2 and its associated drain box. A prior report states that not all contamination in this area has been removed [R-2].

5.1.5 AIRCRAFT MAINTENANCE/STORAGE AREAS

Aircraft maintenance and the storage of aircraft-related materials/fluids are current activities at HAA. Spills or leaks in and/or around the hangar (Building 86) could go to the storm sewer via trench drains or storm drains. They could also go directly to the ground since waste oil and fuel are stored on unpaved areas (outside of Building 87 and at Storage Areas 2 and 3). Storm inlets are located in the proximity of Building 87 and Storage Area 2.

5.1.6 BURN PIT

Until 1987, one of the concrete pads at the Revetment Area was used as a burn pit for fire fighting training. Information on the exact materials burned was not available. Results of a previous report [R-1] indicate shallow contamination around and under the concrete pad. The contaminants included diesel fuel, kerosene, jet fuel, C11-C20 hydrocarbons, and several volatile organics. Concentrations of metals detected in the Burn Pit area were all well below California's TTLC.

5.1.7 FORMER RADIOLOGICAL DISPOSAL SITE

Two metal cylinders reportedly containing low-level radioactive wastes were buried on the northwestern end of the property [R-1]. The cylinders were recovered and removed as part of a COE contract in 1988.

5.1.8 JP-4 LINE

A 12-in. diameter pipe used for off-loading barges is located on the site. Much of the line is aboveground (approximately 5,700 ft), located in a concrete-lined storm water collection ditch on the north side of the property. The pipeline is underground (approximately 2,900 ft) when it crosses the runway to the POL Area and penetrates the levee at the northeastern corner of the site. The drainage ditch is reportedly deteriorated and cracking [T-1]. The line is not in use. No testing of this line is known to have occurred other than within the POL Area.

5.1.9 REVETMENT AREA

The Revetment Area consists of concrete parking areas and taxiways that have not been actively used for aircraft since 1974. Oil, fuel, and used oil have reportedly been dumped or spilled on and around these areas [T-1]. Soil testing of these areas, excluding the Burn Pit, have not occurred.

5.1.10 EAST LEVEE LANDFILL

A capped landfill is located between the east levee and the bay. It is located on both Army-owned property and State-owned property. Reports indicate only construction-related debris was deposited there [T-1; R-1]. Only low levels of contamination were found.

5.1.11 BOMBING RANGE

The only information available regarding the bombing range is a verbal report [T-1] estimating the location of the bombing areas. One was reportedly located near the East Levee Landfill, one north of the Revetment Area, and one at the northwestern end of the runway. These areas expand into non-Army properties. No information was found regarding ordnance sweeps of these areas or the amount and type of ammunition used. However, no written documentation could be found to substantiate the existance of any bombing ranges on HAA.

5.1.12 FORMER SEWAGE TREATMENT FACILITY

It was reported that there were no known sources of process waste entering the sewage treatment facility and that only sanitary waste was treated [T-1, T-8]. However, because the sewage treatment facility may have received waste from maintenance area sinks, it is recommended that the sludge drying beds be sampled. Two composite samples comprised of six grab samples from the three sludge drying beds should be collected at a depth of 0 to 18 in. and should be analyzed for RCRA EP Toxicity metals and pesticides/herbicides.

5.2 RECOMMENDATIONS FOR FURTHER ACTION

Table 5-1 outlines recommended actions for the ESOs located on HAA. Figure 5-1 shows proposed sampling locations. Recommendations are discussed in the following subsections.

5.2.1 ASBESTOS

In areas where isolation and removal or decontamination are recommended by OCCUSAFE, Inc. and in areas where no asbestos was found, the actions are clear. In areas where an Operations and Maintenance Program is to be implemented, several measures are required to ensure the integrity of the material and the health of building occupants and maintenance personnel. The measures include:

- Notification of building occupants, including temporary workers, concerning the presence of asbestos.
- Initial cleaning of the identified areas.
- Maintenance and, where necessary, repair of ACMs.
- A surveillance program of ACMs to ensure integrity of control measures.
- Worker training, including emergency and notification procedures.

It is recommended that the OCCUSAFE, Inc. recommendations as well as ambient air sampling be implemented where friable asbestos has been removed or encapsulated.

5.2.2 TRANSFORMERS

Transformers on HAA should be inventoried to verify transformer housing condition and to locate any leaks that may be present. One sample should be taken from each transformer to determine the presence of PCBs. It is also recommended that the transformers be tested, labelled, etc., according to TSCA regulations.

5.2.3 UNDERGROUND STORAGE TANKS (USTs)

Former UST areas in the POL Area and their associated pipes that have been reported to leave areas of contamination should be leak tested. Twenty to 40 soil borings (1-3 samples/boring) are recommended. Samples should be analyzed for TPHs. The exact location of these samples is to be determined. Groundwater sampling at each existing well is recommended (1 sample per well). Samples should be analyzed for TPHs.

The location and contents of the other four USTs (22, 23, 24 and 25) possibly remaining on the facility should be confirmed either by excavation or geophysical methods. If tanks remain, they should be leak tested. Additional action may be required depending on test results. If leaks are found, tanks should be removed.

Table 5-1

ESOs Identified at HAA
and Recommendations for Further Action

ESOs	Concern	Recommended Activity	Number and Type of Samples Recommended	Location	Analysis
Asbestos	Asbestos on and within buildings	Proceed with report R-3 recommendations		To be determined	Asbestos
Transformers	Polychlorinated Biphenyls (PCBs)	Inventory transformers Sample transformer oil	One per transformer	To be determined	PCBs
Underground Storage Tanks (POL Area)	TPH leaks from remaining tanks. TPH soil contamination from former tanks.	Soil boring	20 to 40 soil borings (1 to 3 samples/boring)	To be determined	TPHs
		GW samples	1 per existing well	At existing wells	TPHs
Underground Storage Tanks	TPHs	Locate and leak test	NA	UST 22, 23, 24, 25	NA
Aboveground Storage Tanks	TPHs	Soil borings	2 soil (each 0 to 6 in. and 2 to 3 ft) Composite 2 surface soil samples at each location	AST 5 AST 6, 7, 10	TPHs TPHs
	TPHs	Remove any residual fuel from unused tanks	NA	AST 8, AST 3, misc. drum	Determine contents and dispose if necessary
Aircraft Maintenance/ Storage Areas	Solvents, fuels, and metals potentially contaminating soil and groundwater	Soil borings	2 soil (0 to 6 in. and 2 to 3 ft)	Storage Area 2	TPHs, RCRA metals,* VOCs, BNAs
		Sediment samples	1 sediment sample in inlet chamber	Storage Area 2	TPHs, RCRA metals, VOCs, BNAs
		Sediment samples	2 to 6 sediment samples in storm sewer	In proximity of maint/storage areas	TPHs, RCRA metals, VOCs, BNAs
		GW samples	1 GW sample per new MW	Immediately downgradient from storage area 3	TPHs, RCRA metals, VOCs, BNAs
		Soil borings	4 soil (0 to 6 in. and 2 to 3 ft)	N and E of Building 87	TPHs, RCRA metals, VOCs, BNAs
		Sediment samples	1 sediment sample in inlet chamber	N of Building 87	TPHs, RCRA metals, VOCs, BNAs

*RCRA metals to be identified: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver.

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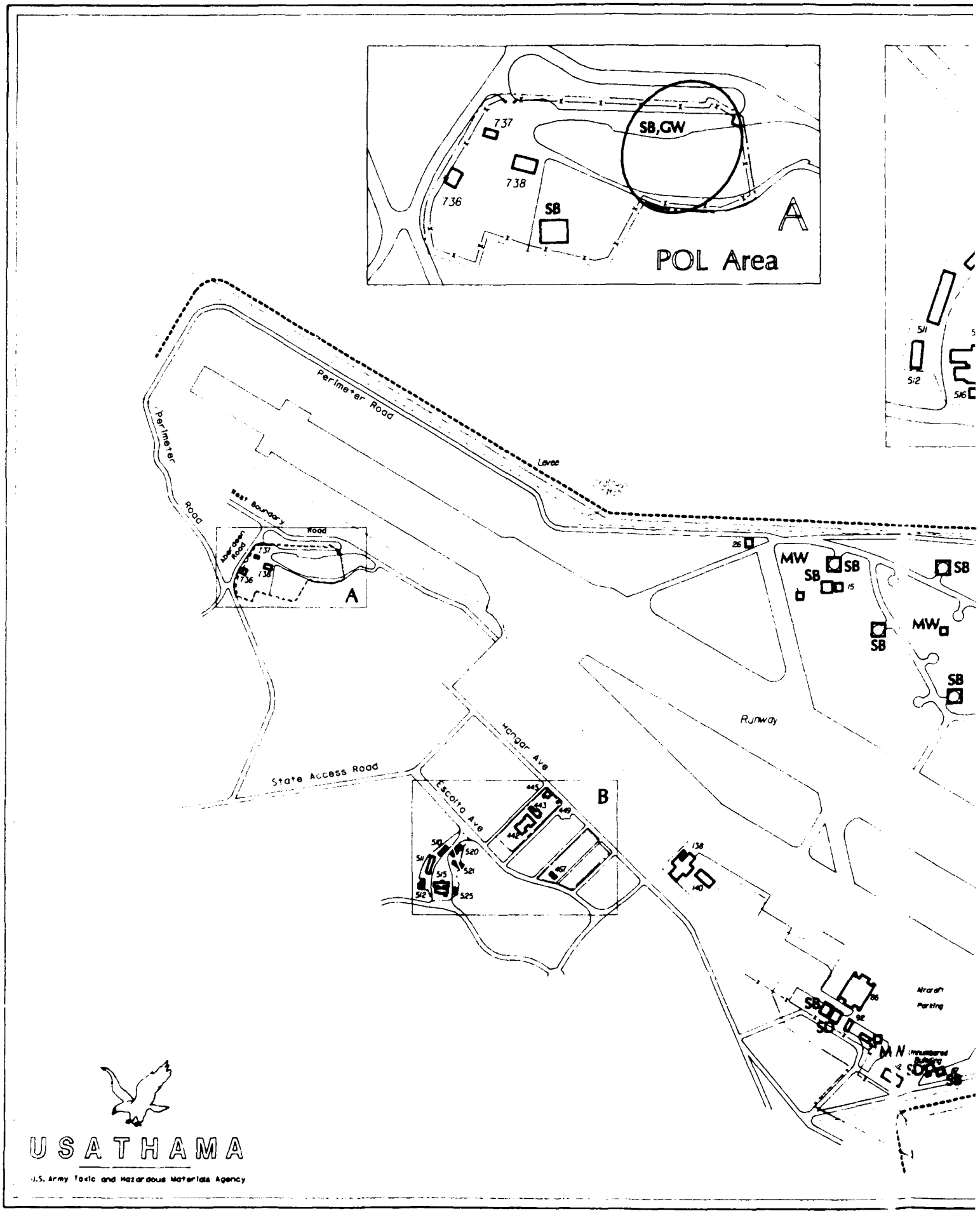
Table 5-1

ESOs Identified at HAA
and Recommendations for Further Action
(continued)

ESOs	Concern	Recommended Activity	Number and Type of Samples Recommended	Location	Analysis
Burn Pit	TPHs, VOCs, metals	Further investigation included in Revetment Area recommendations	NA	NA	NA
Former Radiological Disposal Site	Low-level radioactive waste in two buried cylinders	No further investigation	None		
JP-4 Line	JP-4 jet fuel	Field investigation	NA	Aboveground portion of line.	NA
		Leak test		Underground portion of line.	NA
Revetment Area	Waste oil, fuel spills	Soil borings	10 locations (0 to 6 in. and 2 to 3 ft at each location)	Random	TPHs, RCRA metals
		GW samples	4 new MWs	To be determined	TPHs, RCRA metals, VOCs, BNAs
East Levee Landfill	Organics	Install 2 GW monitor wells	1 GW sample per new MW	1 east and west from landfill	EPA's Hazardous Substance List
Bombing Range	Munition debris, unexploded ordnance	Records investigation	NA	NE,N, and eastern areas of property	NA
Former Sewage Treatment Facility	Non-biodegradable contaminants	Soil borings	2 soil composites from 6 grab samples (0-18 in.); 2 grab soil from each of 3 sludge drying beds	From each sludge drying bed	RCRA EP Toxicity Metals and Herbicides/Pesticides

*RCRA metals to be identified: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver.

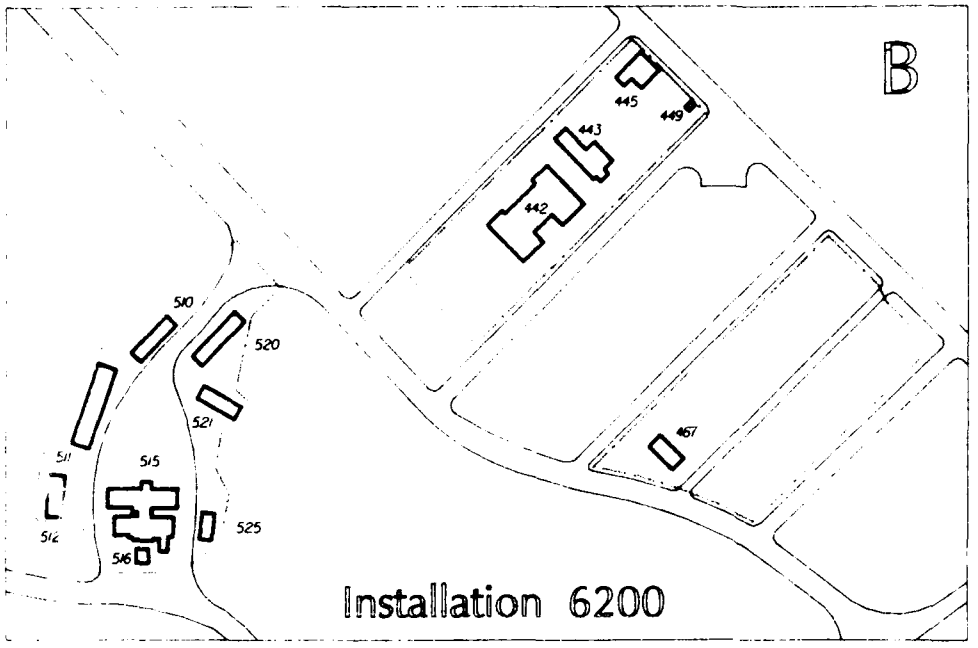

737
738
736
SB,GW
SB
A
POL Area
Perimeter Road
Levee
Perimeter Road
West Boundary Road
Aberdeen Road
737
738
736
A
MW
SB
MW
Runway
Hangar Ave
State Access Road
Escorte Ave
B
511
512
515
520
521
525
138
140
Aircraft Parking
USATHAMA
U.S. Army Toxic and Hazardous Materials Agency

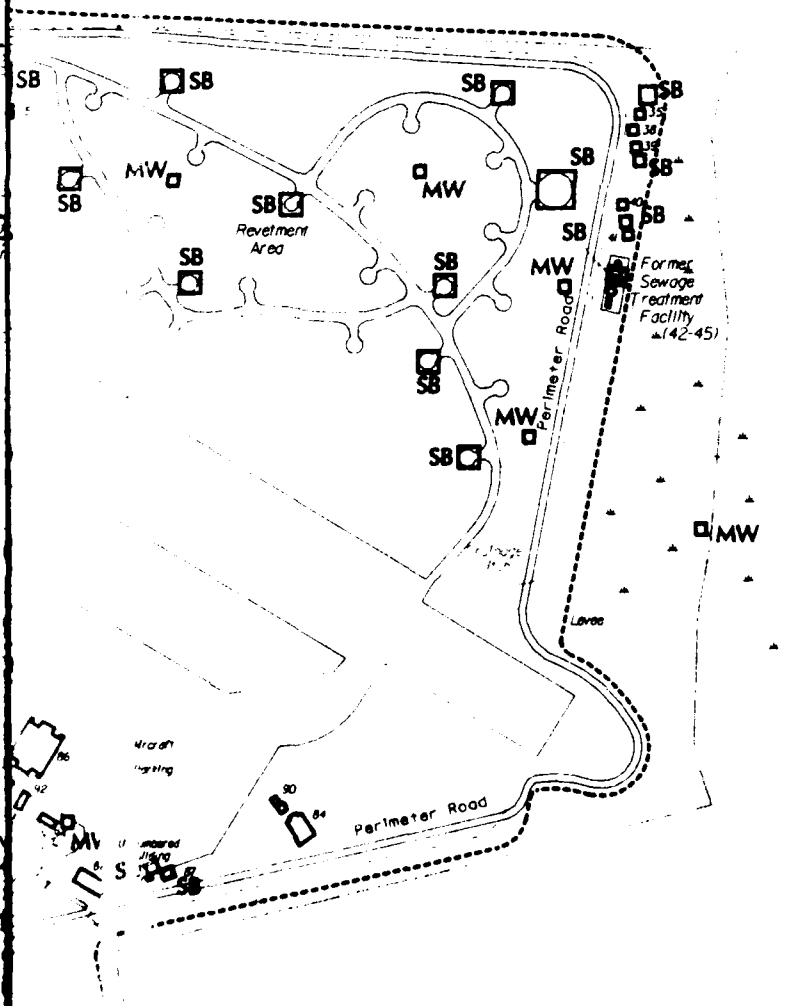
U. S. Army
Base Closure Preliminary Assessment
Hamilton AAF
Novato, CA – November 1989

Figure 5–1
Recommended Sampling Locations

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

0 meters 400
0 feet 1200





RECOMMENDED SAMPLING METHODS

SB Soil Boring
SD Sediment
GW Groundwater Sampling From Existing Monitoring Well
MW Monitoring Well (Proposed)

5.2.4 ABOVEGROUND STORAGE TANKS (ASTs)

It is recommended that the aboveground storage tank area at the pump station Building 35 (AST 5) be sampled. Soil staining was seen adjacent to the tank, probably due to a fill pipe leak. Two soil samples, each taken at 0 to 6 in. and 2 to 3 ft are suggested. Samples should be analyzed for TPHs.

The two other aboveground storage tanks at the pump stations (AST 6 and 7) as well as the tank at Building 26 (AST 8) should also be sampled. It is recommended that a composite of two surface soil samples be taken at each of the three locations. Samples should be analyzed for TPHs. It should also be verified that no contents remain in AST 8 and AST 3 and the contents of the miscellaneous drum at Building 82 be verified.

5.2.5 AIRCRAFT MAINTENANCE AREA/STORAGE AREAS

Oils, fuels, used oil and other aircraft-related liquids are stored in 55-gal drums outside several areas on unpaved ground. It is recommended that two soil samples be collected from each of the following sites:

- North of Building 87.
- East of Building 87.
- At Storage Area 2.

Soil samples should be collected at 0 to 6 in. and 2 to 3 ft for each sample location. Samples collected at Building 87 should be analyzed for TPHs, RCRA metals, VOCs, and BNAs; samples from Storage Area 2 should be analyzed for TPHs, RCRA metals, VOCs, and BNAs. Because of the close proximity of these two storage areas to storm inlets, sediment samples should be taken in the storm inlet chambers near each area. Samples should be analyzed for TPHs, RCRA metals, VOCs, and BNAs.

Storm sewer inlets are located within and surrounding the maintenance building. Trench drains are located within the maintenance hangar (Building 86) next to the bay doors and outside on the aircraft parking areas. Storm inlets are located in unpaved areas near the maintenance hangar. Storm sewers in the proximity of the maintenance hangar may have received spills from within the hangar or from mobile fuel trucks, or other storage areas external to the hangar. Four to six sediment samples are recommended for the storm sewer in this area. Samples should be analyzed for TPHs, RCRA metals, VOCs, and BNAs.

Metal CONEX sheds containing materials such as POL, paint, gasoline, and cleaning compound are located in Storage Area 3. Because of the number of CONEXs and the lack of historical information, it is suggested that a well be placed immediately downgradient of this area and one groundwater sample collected and analyzed for TPHs, RCRA metals, VOCs, and BNAs.

5.2.6 BURN PIT

Further recommendations for the Burn Pit are included in those made for the Revetment Area.

5.2.7 FORMER RADIOLOGICAL DISPOSAL SITE

It is recommended that no further investigation of this area be made based on information that the cylinders have been removed from the property [T-1, T-7, T-12].

5.2.8 JP-4 LINE

The visible (aboveground) portion of the JP-4 line (approximately 5,700 ft) should be inspected visually for leaks/stains. The underground portions (approximately 2,900 ft) of the JP-4 pipeline should be leak tested. If results show the pipe is not leaking, it should be emptied and capped. If a leak is found, it is recommended that the damaged sections be repaired or permanently removed from service. Based on the results of the leak test, soil and groundwater samples may need to be collected. Further action may be required based on test results.

5.2.9 REVETMENT AREA

It is recommended that soil samples be collected from the soils surrounding the hardstand (paved parking) areas. Ten soil borings should be collected at 0 to 6 in. and 2 to 3 ft at each location. Samples should be analyzed for TPHs and RCRA metals. Further sampling of the remainder of the concrete pads may be necessary, based on test results.

In addition to the soil samples, 4 wells should be placed in locations shown in Figure 5-1. One sample should be collected from each well and analyzed for TPHs, RCRA metals, VOCs, and BNAs.

5.2.10 EAST LEVEE LANDFILL

It is recommended that two groundwater monitoring wells be installed. One well should be located west of the landfill and one east of the landfill. One groundwater sample from each well should be analyzed for all constituents on the hazardous substance list.

5.2.11 BOMBING RANGE

Because the use of any areas on or around HAA for bombing range activities could not be documented, further investigation is recommended to verify the existance of any bombing ranges. Should any such documentation (either written or first-hand verbal reports) be discovered, an ordnance sweep of suspect areas is required.

5.2.12 FORMER SEWAGE TREATMENT FACILITY

It was reported that there were no known sources of process waste entering the sewage treatment facility and that only sanitary waste was treated [T-1, T-8]. However, because the sewage treatment facility may have received waste from maintenance area sinks, it is recommended that the sludge drying beds be sampled. Two composite samples comprised of six grab samples from the three sludge drying beds should be collected at a depth of 0 to 18 in. and analyzed for RCRA EP Toxicity metals and pesticides/herbicides.

Section 6
References

SECTION 6

REFERENCES

6.1 DIRECT INTERVIEWS

I-1 Operations Officer for 6th U.S. Army Regional Training Site (Intelligence), U.S. Army Personnel, Hamilton Army Airfield
28 September 1989

I-2 U.S. Army Personnel, Hamilton Army Airfield
28 September 1989

I-3 Facility Manager, Hamilton Army Airfield
26, 27, 28 September 1989

I-4 U.S. Army Personnel, Hamilton Army Airfield
28 September 1989

I-5 U.S. Army Personnel, Hamilton Army Airfield
28 September 1989

I-6 U.S. Army Personnel, Hamilton Army Airfield
28 September 1989

I-7 Environmental Coordinator, Presidio of San Francisco
1 December 1989

6.2 TELEPHONE INTERVIEWS

T-1 Facility Manager, Hamilton Army Airfield
17 November, 20 November 1989; 4 December 1989; 9, 11 January 1990, 23 January 1990

T-2 Operations Officer for 6th U.S. Army Regional Training Site (Intelligence), U.S. Army, Hamilton Army Airfield
16 November 1989

T-3 California Department of Water Resources
20 October 1989

T-4 Marin Municipal Water District
23 October 1989

T-5 California Department of Water Resources
23 October 1989

T-6 Environmental Coordinator, Presidio of San Francisco
1 December 1989; 11, 12 January 1990, 23 January 1990

T-7 Sacramento COE
1 December 1989, 23 January 1990

T-8 Navy Public Works
11 January 1990

T-9 Airfield POL Supervisor
10, 17 January 1990

T-10 Environmental Protection Agency Region IX
10 January 1990

T-11 Bay Area Air Quality Management District
12 January 1990

T-12 Sacramento Corps of Engineers
9 January 1990

6.3 REPORTS AND OTHER DOCUMENTS

R-1 Woodward-Clyde Consultants. Final Report, "Confirmation Study for Hazardous Waste, Novato, CA, 14 January 1987."

R-2 International Technologies Corporation. "Final Report, Hamilton AFB - Storage Tank Removal Project," February 1987.

R-3 OCCUSAFE, Inc. "Asbestos Survey for Hamilton Army Airfield," 25 June 1989.

R-4 List of chemicals used in association with maintenance activities of Building 86.

R-5 1988 Local Climatological Data, Annual Summary with Comparative Data, National Oceanic and Atmospheric Administration.

R-6 California Department of Health Services. Information from the Abandoned Site Program Information System (CERCLA) Information System, Hazardous Waste and Substances Site List (Cortese List), Bond Expenditure Plan (State Superfund), and RCRA List.

R-7 California Regional Water Quality Control Board. Information on the North Bay Site Management System.

R-8 Marin County Department of Environmental Health. Information on HAA and regional data.

R-9 "Environmental Impact Statement on Disposition and Use of Federal Property at Hamilton Air Force Base, Novato, California." General Services Administration, February, 1980.

R-10 Bonaparte, R. and Mitchell, J. "The Properties of San Francisco Bay Mud at Hamilton Air Force Base, California," April 1979.

R-11 Rice, Salem J. "Earthquake Risk in Part of the Novato Area, Marin County, California [MAP].

R-12 Letter sent from Fish and Wildlife Service to Lewis A. Whitney dated 1 January 1990.

Section 7
Photographs

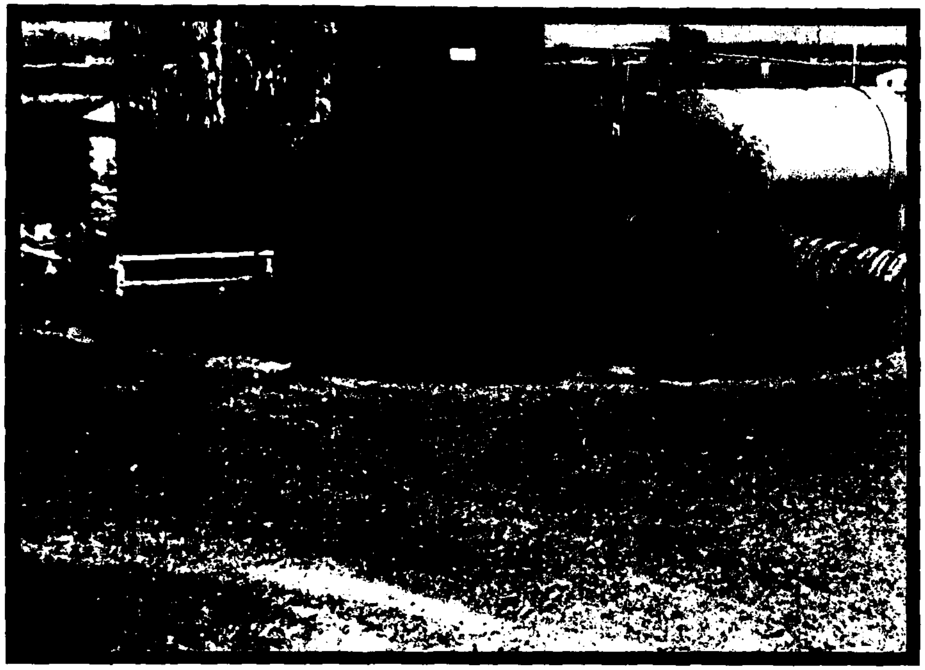
SECTION 7

PHOTOGRAPHS

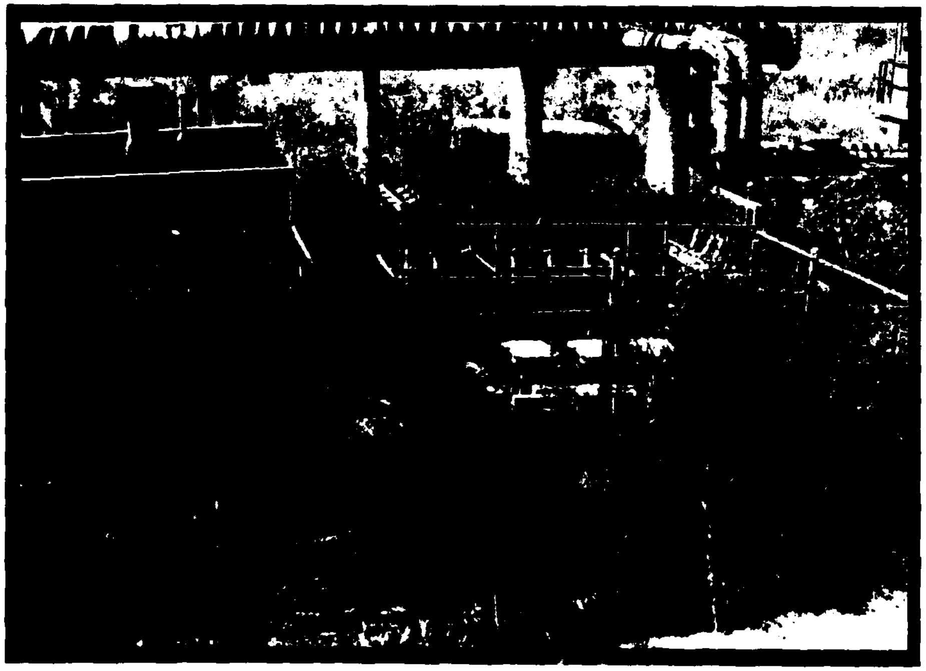
Photographs of the items and areas that were investigated for the Hamilton Enhanced Preliminary Assessment are provided on the following pages.

1. TRANSITE SIDING ON BUILDING 512

2. TRANSITE SIDING ON BUILDING 520



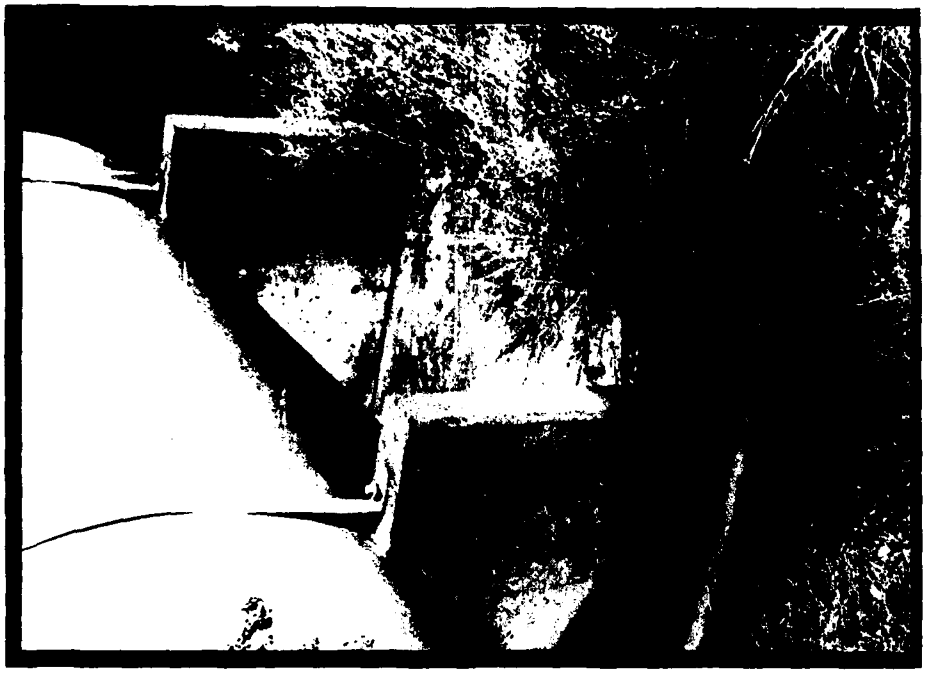
3. ABOVEGROUND STORAGE TANK AT BUILDING 35



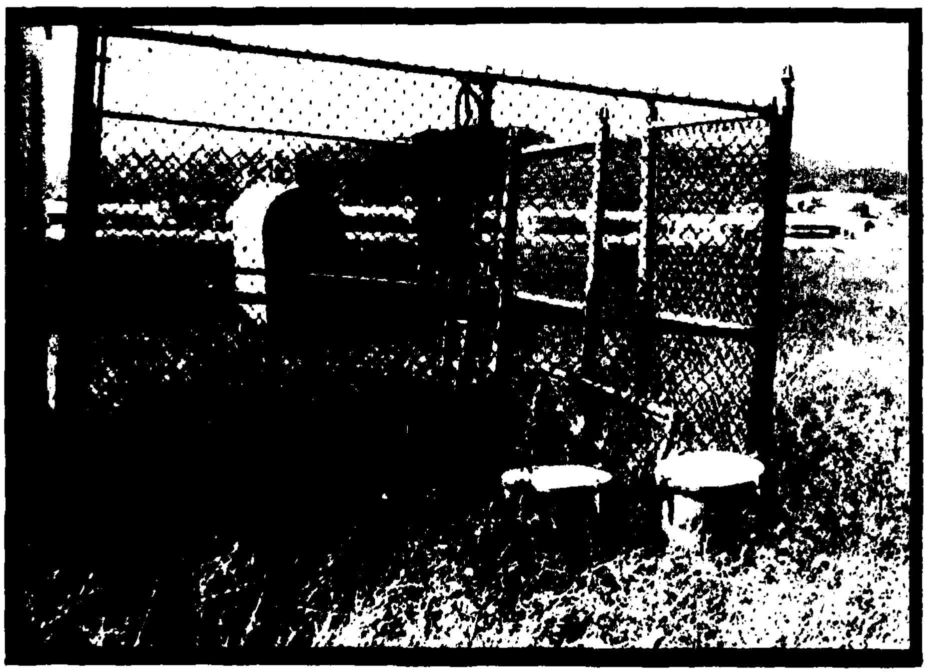
4. ABOVEGROUND STORAGE TANK AND POTENTIAL ASBESTOS ON PIPE IN VICINITY OF BUILDING 40

5. ABOVEGROUND STORAGE TANK
IN POL AREA

6. ABOVEGROUND STORAGE TANKS
IN POL AREA



7. SOIL STAINING FROM AST
AT BUILDING 35

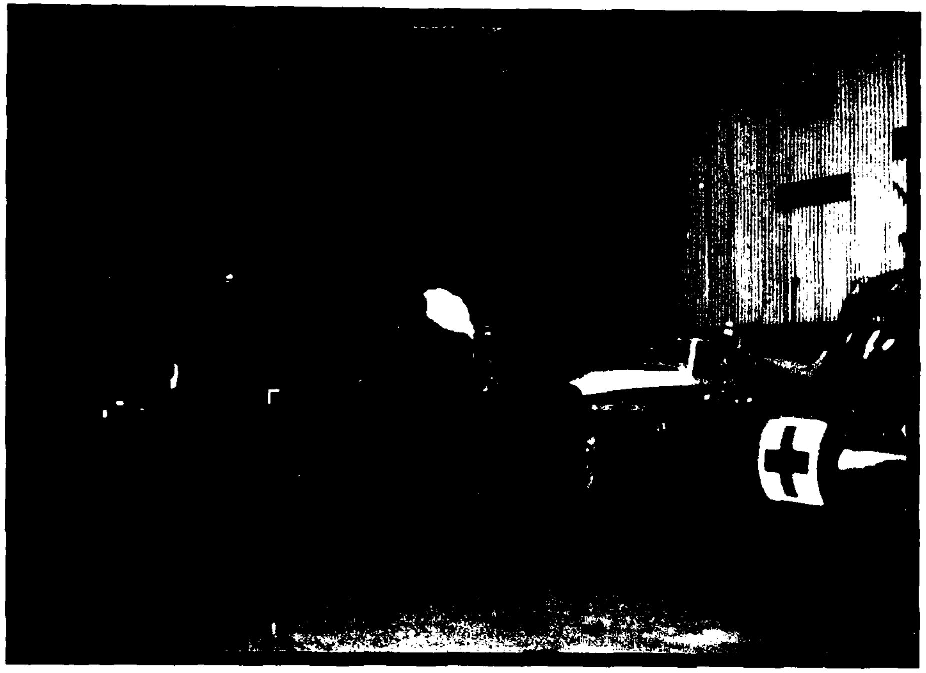


8. ABOVEGROUND STORAGE TANK
AT BUILDING 15

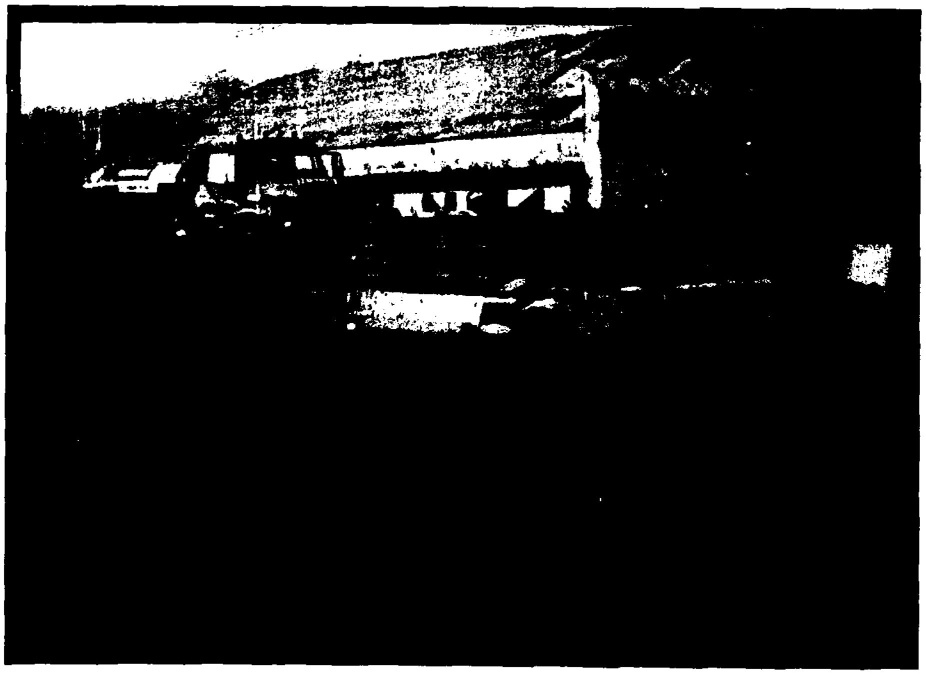
9. MOBILE FUEL TRUCK AND STORAGE AREA 2 AT BUILDING 86

10. FLOOR STAINING IN BUILDING 35

WESTON



11. AIRCRAFT MAINTENANCE
WITHIN BUILDING 86



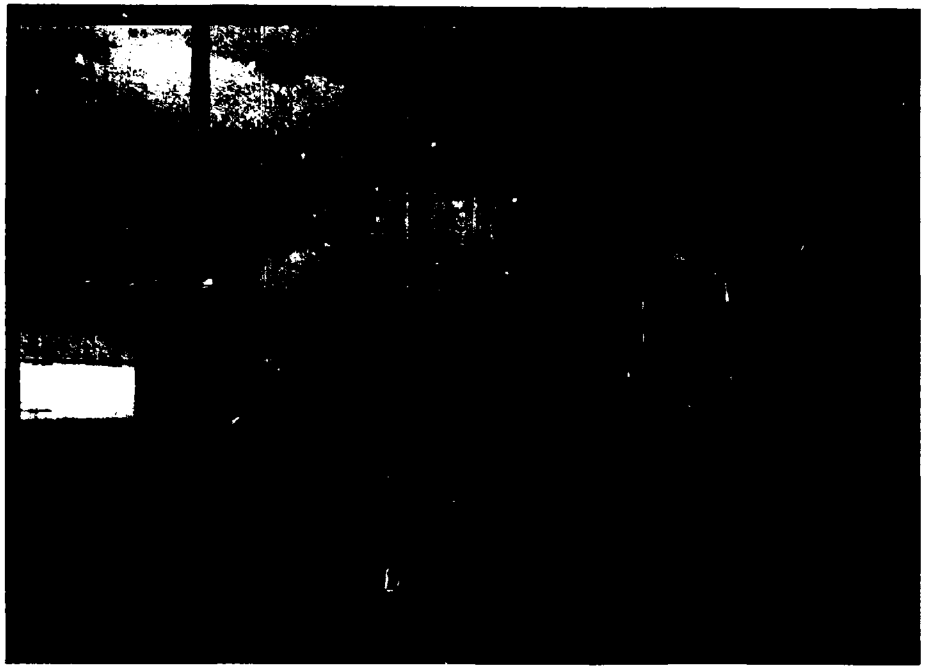
12. WASTE POL/FUEL AT STORAGE AREA 2
SOUTHWEST OF BUILDING 86
NOTE STORM DRAIN IN FOREGROUND

13. STORAGE AREA 2

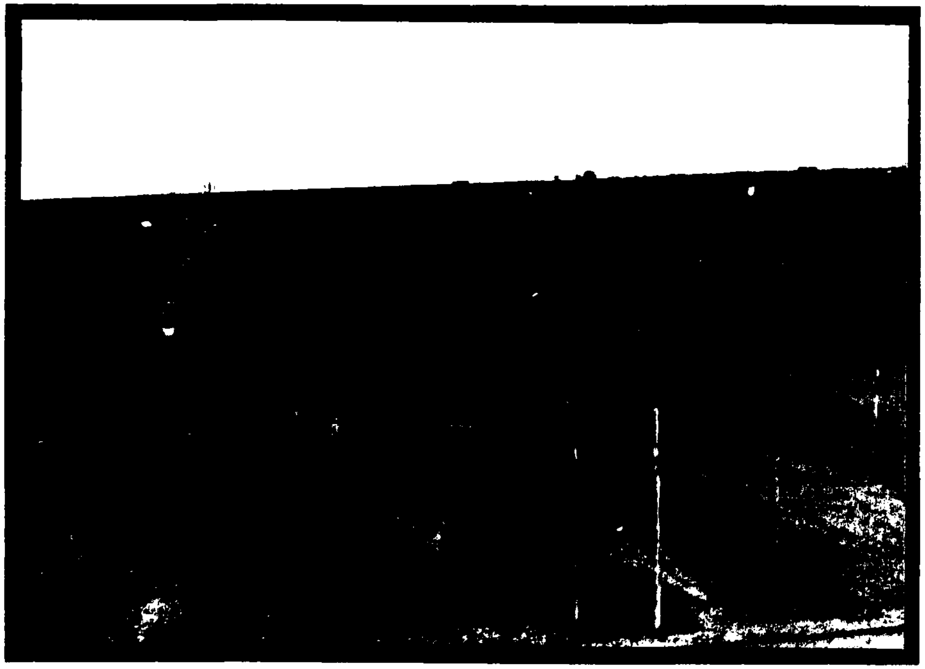
14. BUILDING 87 AND
UNNUMBERED BUILDING
NOTE STORM DRAIN IN FOREGROUND

15. DRUMS ADJACENT TO BUILDING 87

16. DRUMS ADJACENT TO BUILDING 87



17. OXYGEN STORAGE ADJACENT TO AIRCRAFT PARKING



18. STORM DRAINS ON AIRCRAFT PARKING AREA

Appendices

APPENDIX A

ASBESTOS SURVEY FOR HAMILTON ARMY AIRFIELD

OCCUSAFE, INC.

(As Received)

OCCUSAFE, INC.
1040 S Milwaukee Ave.
Wheeling, Illinois 60090-6306 • (312) 459-4800 • 1-800-323-7597

ASBESTOS SURVEY
FOR
HAMILTON ARMY AIR FIELD

Prepared Under Direction Of:
Army Corps of Engineers
Sacramento District
Project No. 381A

June 25, 1989
Job No. 8297/0360R

Copy 6 of 6

Prepared by:

Terrance G. Alexander, CIH
Senior Consultant

Reviewed by:

John T. Davis, CIH
Senior Consultant

Approved:

Gary N. Crawford, CIH
Group Vice President

OCCUSAFE INC. 1040 S MILWAUKEE AVENUE, WHEELING, ILLINOIS 60090-6306 (312) 459-4800 1 800 323-7597

June 25, 1989

Ms. Linda Finley-Miller
Project Manager
CESPK-ED-M-ISS
Sacramento District Corps Engineers
650 Capitol Mall
Sacramento, California 95814-4794

RE: Asbestos Survey Report For Hamilton Army Air Field

Dear Ms. Finley-Miller:

Your Asbestos Survey Report is complete and ready for your review.

This Asbestos Survey Report provides you with details on the variety and quantity of asbestos-containing materials in thirty buildings at Hamilton Army Air Field. The report also contains cost estimates for abatement of the materials. The report has been divided into Reserve Center and Other Buildings per requirement of the contract.

As a result of this work, you have an information source which will help you make intelligent, cost effective decisions for managing ACM in the buildings involved.

Thank you for your continuing business. We look forward to future opportunities to work with you.

Sincerely,

Terrance G. Alexander, CIH
Senior Consultant

TGA/efc

Enclosure: Asbestos Survey Report

8297/0322R/OS

TABLE OF CONTENTS

EXECUTIVE SUMMARY

A building survey and bulk material sampling for asbestos-containing materials (ACM) was performed at Hamilton Army Airfield, California on October 17 - 21, 1988, February 6, 1989 and May 12, 1989, by OCCUSAFE, INC. A total of thirty buildings were included in the survey.

Building materials sampled included flooring materials, ceiling tile, pipe insulation, roofing material, exterior siding, wallboard, and duct insulation. A total of 323 samples were collected, and approximately 43% tested positive for asbestos. There was good agreement in analysis results between the main and quality control laboratories.

Recommendations for managing ACM include establishing an Operations and Maintenance Program and a prioritized abatement program based on a Sacramento COE approved algorithm. Air monitoring is recommended during maintenance operations and in buildings containing friable ACM.

The cost to abate ACM in buildings inspected at this installation was estimated at $3,001,070.

CONCLUSIONS

The following are conclusions based upon survey and analytical results.

Floor tile located in several buildings contained asbestos. These materials were normally non-friable, and repair can be accomplished during routine operations and maintenance activities or removal during remodeling efforts.

Transite materials such as exterior siding, wallboard, and flue pipe located in several buildings contained asbestos. These materials are considered non-friable, and removal could be done during remodeling efforts.

Pipe and pipe fitting insulation, duct insulation, and boiler insulation located in several buildings contained asbestos. These materials were friable and removal would require use of glove bag systems and/or isolation zones.

RECOMMENDATIONS

Recommendations presented are based on guidelines for control of ACM found in applicable EPA and OSHA regulations.

1. Prepare and implement an Operations and Maintenance Program for maintaining ACM in buildings on USARC Hamilton.

2. Prepare and implement a training program for maintenance personnel to teach proper handling of ACM.

3. Prepare a prioritized list of abatement projects based on the Sacramento COE approved algorithm.

PURPOSE AND SCOPE

PURPOSE

The purpose of this survey was to identify asbestos-containing materials (ACM) in buildings at Hamilton Army Airfield, to record and prioritize the ACM found according to an algorithm system, to recommend a general approach to ACM management, and to estimate the cost for ACM abatement.

SCOPE

1. Project Data:
   a. Installation: Presidio of San Francisco Subinstallations
   b. Study Title: Asbestos Abatement Survey at the Presidio of San Francisco Subinstallations
   c. Authorization: AFZM-DEH-E ltr received 7 Feb 86 and AFZM-DEH-E ltr dtd 8 May 86
   d. Congressional Cost Limitation: N/A

2. Project Description/Status:

   The A-E shall conduct an Asbestos Abatement Survey for the Presidio of San Francisco Subinstallations which are listed as follows:

   Ft. Baker]
   Ft. Barry] (209)
   Ft. Cronkhite]
   Hamilton Army Airfield (23)
   Camp Parks (230)
   Hamilton Army Reserve Center (13)
   Parks Reserve Forces Training Area R.C. (12)
   Las Vegas Reserve Center (5)
   Sunny Vale Reserve Center (1)
   Reno Reserve Center (3)
   Oakland Reserve Center (10)
   Mountain View Reserve Center (4)
   Sacramento Reserve Center (2)
   Modesto Reserve Center (1)
   San Pablo Reserve Center (2)
   Concord Reserve Center (4)
   Santa Rosa Reserve Center (4)

Vallejo Reserve Center (2)
Stockton Reserve Center (4)
Rio Vista Reserve Center (20)
Chico Reserve Center (3)
San Bruno Reserve Center (1)
San Jose Reserve Center (4)
Ukiah Reserve Center (1)

*Building lists for each subinstallation are attached. The survey shall be conducted as outlined in #3 below.

3. Work and Services:

a. General: The A-E shall perform all professional Architectural/Engineering services required for and related to the preparation, coordination and completion of all work described herein. The A-E shall consecutively number all pages of documents submitted to the Sacramento District.

b. The A-E shall conduct the Asbestos Survey as outlined below. The A-E shall be familiar with the current California and Nevada requirements on asbestos abatement and survey work. The A-E shall be a certified asbestos firm (if California and Nevada law or regulations requires).

(1) The A-E shall survey all parts of each building which includes, but is not limited to, all interior and exterior walls in all rooms, basements, attics, boiler room, furnace rooms, closets, crawl spaces under buildings, flooring, roofing, insulation (where applicable), plaster, areas above ceilings air plenums (supply and return) and ceilings. The A-E shall not cut holes to determine possible location of hidden asbestos. It was agreed that he may assume that if a vent or pipe is wrapped in asbestos material going into a wall, that some asbestos is located behind the wall. He will not cut into or damage the facility to determine asbestos location.

(2) The A-E shall use an accredited laboratory to test the asbestos samples. The laboratory shall be American Industrial Hygiene Association (AIHA) accredited. The A-E shall bulk sample lagging, sprayed-on ceiling, ceiling panels, panel walls, decorative spray, cladding around boilers, and a representative sampling of pipe elbows and other locations where asbestos materials are suspect. The A-E cannot assume that a visual inspection/identification of asbestos will be adequate. Bulk samples shall be taken in many areas of each building and the sample points shall be restored so that a worse condition is not present afterwards. All bulk samples shall be tested by polarized light microscopy with dispersion staining. For samples that produce questionable results, x-ray diffraction testing shall be conducted. At least five (5) percent of all samples shall be tested by a second facility to ensure quality testing. There are approximately 558 buildings to be surveyed, for a total of approximately 3,100 total bulk samples to be taken (including the 5% quality control testing).

(3) Each building will be rated by algorithm factors. These factors shall help to determine the urgency of what needs to be done immediately. The Presidio of San Francisco shall review this rating system prior to the beginning of the field survey.

(4) The A-E may visually inspect the vinyl asbestos tile (VAT) and plaster in each building and only spot sampling will be required for similar buildings.

(5) As the A-E is conducting his survey, he will notify the Corps of Engineers and the Presidio of San Francisco-DEH as soon as possible of all friable conditions that pose an eminent health hazard. This notification may be done first by a telephone call with a written letter following within seven calendar days (the notification shall include recommendations for correction).

(6) The A-E shall begin the asbestos survey with Camp Parks Reserve Forces Training Area.

c. The A-E shall provide a report with the following information:

(1) On floor plans (single line drawings) for each building (on sheets of 8-1/2x11 or 11x14 inch size), annotate all areas, and fixtures in those areas, found to have asbestos. Materials reasonably suspected of containing asbestos, but for which asbestos is not a certainty, shall be analyzed by an accredited laboratory for the purpose of confirming existence and concentration of asbestos in such materials. The A-E shall indicate on these floor plans (and in separate tables keyed to these floor plans), the following information:

(a) Where asbestos was found (i.e., pipe insulation, boiler insulation, asbestos panels, and siding used as wall covering or ceiling, etc.).

(b) Locations tested where no asbestos was confirmed.

(c) A code "A" cost estimate of the amount of asbestos found (i.e., 2 inch pipe insulated with 1 inch thick insulation, length of pipe is approximately 1,500 feet, etc.). A cost estimate shall be developed for each building and shall include removal, correction and replacement.

(d) Condition of material (i.e., material present of sound condition with no indication of deterioration; materials present mostly of sound condition; however, there are isolated areas where some deterioration was detected; material is starting to deteriorate; material is in poor condition and is considered friable and can become airborne, etc.).

(e) Location of materials in relation to habitable space (i.e., material is in crawl space where only person or persons subject to be in contact with material could be mechanics working in system; material is above ceiling and space is not used as air plenum; material is above ceiling, but space is not used as air plenum; material is behind wall; material is in habitable space (below ceiling), but high enough that contact with person or persons using space is unlikely; material is in habitable space, within 6 feet of floor and can be hit (and damaged by occupants of space, etc.).

(f) For each condition encountered, the A-E will provide a short remark addressing the following items and or recommendations:

-1- Professional recommendations of actions to be taken (i.e., all insulation shall be removed immediately; immediate removal not necessary, but encapsulation of total (or partial) area is recommended; immediate removal not necessary, but shall be scheduled within (specific number) years; removal of insulation not necessary because it is in an inaccessible space, however, location shall be identified and area marked to avoid possible disturbance during future construction and/or alterations to building, etc.).

-2- For each building identified as having friable asbestos conditions, the A-E shall make recommendations for correction, develop a brief operations plan to accomplish recommended abatement, and a code "A" cost estimate to do this work.

(2) Additional requirement: In addition to the requirements indicated above, the A-E shall complete the following actions:

(a) For each type of material not clearly identifiable as asbestos or asbestos-containing material, the A-E shall take bulk samples of this material and have them further tested by x-ray defraction.

(b) Depending on the degree of deterioration found, the A-E will recommend areas where air samples should be taken to insure space is free of contamination. Areas that are an eminent health hazard shall be recommended immediately. Air samples shall be tested using a transmission electron microscope (TEM).

d. Concept Survey Submittal: (30 calendar days after issue of NTP). The A-E shall submit a rough draft of the standard field survey forms and algorithm methods he plans to use. The A-E shall submit, for approval, recommended software to be used for the data base and work processing. He shall also submit a Quality Assurance (QA) Control outline to present how he assures that the proper QA will be conducted. A list of laboratories to be used for sample testing shall be submitted for approval. All labs shall be in compliance with EPA. The submittal shall be reviewed by the DEH-PSF. Submit five (5) copies to the Project Manager.

e. Preliminary Survey Submittals: (30 calendar days after the completed Government review on concept submittal). The A-E shall submit the final draft of the standard field survey forms and the final QA Control procedure/plan that have incorporated DEH-PSF comments. These final drafts must be approved by DEH-PSF prior to the field survey beginning. Submit five (5) copies to the Project Manager.

f. Final Report

(1) Final Survey Report Submittal (450 calendar days after receiving approved field survey forms and QA Control procedure). The A-E shall submit a monthly report (first report submitted 60 calendar days after field work begins; then every 30 days thereafter). The monthly reports shall include a listing of all survey reports submitted that month and a progress account of past and future work. Each final written report shall be submitted to the Project Manager with three (3) copies of all laboratory analysis results and six (6) complete copies of the written report. All originals (which include field survey forms, laboratory test results, written report, and any photographs) shall be submitted to the Project Manager at the completion of the project. The written reports shall be broken down into the following groups (within 30 calendar days after the submittal of each report, a review meeting, at the Presidio of San Francisco, shall be held):

(a) Camp Parks RFTA, with a future breakdown into Family Housing, Reserve Center, active and inactive buildings.

(b) Each remote reserve center.

(c) Forts Baker, Barry and Cronkhite, with further breakdown into Family Housing, Reserve Centers, and other categories of buildings.

(2) The A-E shall dispose of all contaminated air mask filters, removal suits, gloves and all generated waste for the project as follows:

(a) Asbestos contaminated material shall be handled, packaged, transported and disposed of in accordance with the below referenced Federal and State laws and regulations.

-1- PL 93-633 Hazardous Materials Transportation Act, 1974. 49 CFR 171-178 (Department of Transportation) "Transport of Hazardous Waste and Hazardous Substances."

-2- California Department of Health Services (DOHS). Hazardous Waste Control Law, 1977. 22.4.30 California Administrative Code; "Minimum Standards for Management of Hazardous and Extremely Hazardous Wastes."

(b) A California Hazardous Waste Manifest (CHWM) shall accompany all shipments of hazardous waste. The manifest shall originate with the A-E, be signed by the generator (PSF), signed by the transporter and permitted disposal site, and returned to the generator who then forwards a copy of the completed manifest to the DOHS. The A-E is responsible for obtaining all permits necessary to transport and dispose of asbestos contaminated materials.

(c) The A-E shall include the PSF EPA issued identification number: CA 7210020791, on the CHWM as the generator.

(d) The hazardous waste transporter shall be permitted by the California DOHS to haul hazardous materials on public highways.

(e) Temporary storage of double plastic bags containing asbestos contaminated protective clothing shall not exceed 90 calendar days as required by California DOHS.

(f) The hazardous waste disposal site shall be a facility permitted by both the California DOHS and the local regional water quality management district to accept hazardous material of the type being disposed.

(g) If any asbestos waste is generated in the Nevada subinstallations, all waste shall be disposed of in accordance with Nevada law and regulations.

g. Data Base (450 calendar days after receiving approved field survey forms and QA control procedures). Three (3) copies of the floppy disks containing the data base of the written reports and survey data (for use with an IBM PC 5-1/4" floppy disk drive)) shall be submitted to the Project Manager.

h. Option #1: X-Ray Defraction. For each type of material not clearly identifiable as asbestos or asbestos containing material using PLM with dispersion staining, the A-E shall take bulk samples of this material and have them further tested by x-ray defraction.

i. Option #2: TEM Air Sampling. Depending on the degree of deterioration found, the A-E will recommend areas where air samples shall be taken to insure space is free of contamination. Areas that are an eminent health hazard shall be recommended immediately. All air samples shall be analyzed by transmission electron microscopy.

4. Project Criteria:

a. Functional Requirements for this project are established by SPKED-M Conference Minutes dated 17 Sep 86, Subject, PN 381, Asbestos Abatement Survey, Presidio of San Francisco Subinstallations and Reserve Centers.

b. Study criteria shall be in accordance with the following:

(1) Construction Criteria Manual DOD 4270.1M

(2) A-E Guide, Volume I, General Instructions, dated January, 1985

(3) SPK Cost Estimate Guide, dated 1 May 1985

(4) PL 93-633, Hazardous Materials Transportation Act, 1974

(5) 49 CFR 171-178 (DOT) Transportation of Hazardous Wastes and Hazardous Substances

(6) DOHS Hazardous Waste Control Law, 1977

(7) 22.4.30 California Administrative Code: Minimum Standards for Management of Hazardous Wastes and Hazardous Substances

c. Technical Criteria are established by:

(1) Publications listed in A-E Guide, Vol 1, General Instructions, Chapter 6, dated January, 1985

(2) Utility Maps of the Installation

(3) EPA Guide 560/5-85-024, June, 1985, Guidance for Controlling Asbestos Containing Materials in Buildings.

(4) Material furnished: In addition to the items cited above, the Sacramento District will furnish the A-E the following items upon written request:

(a) Technical Manuals
(b) Estimating Forms

The necessary forms for requesting Technical Manuals can be found in the A-E Guide, Vol 3, Specifications, Chapter 1, General Instructions. In addition to the regular address for the Corps of Engineers, please add the following to the outside of all correspondence to the Project Manager "SPKED-M-ISS (Finley-Miller)."

5. The period of service does not include government review time, but does include transmittal time from A-E to the Sacramento District Representative. Close coordination will be maintained with the District Project Manager to insure quick resolution of study problems and a satisfactory end product. The A-E is cautioned to take no guidance during the course of the study from any source other than the Sacramento District Representative.

TABLE I

ASBESTOS SURVEY LIST
HAMILTON ARMY AIRFIELD

BUILDING NUMBER	CAT-DESCRIPTION	AREA - S.F.
15		365.0
22	ROD-GUN CLUB	1,477.0
24	RES FORCE OP/TN	4,020.0
25	BE STOR CV FAC	992.0
26	DADAE BLDG	1,536.0
27	RG SPT BLDG	1,042.0
30	RECEIVER BLDG	4,029.0
32	PWR PL BLDG OTH	460.0
35	STORM PUMP BLDG	492.0
39	STORM PUMP BLDG	489.0
41	STORM PUMP BLDG	2,454.0
42	TECH LAB	550.0
43	SEW/W TR PL BLDG	733.0
44	TECH TAB	151.0
45	WASTE TREATMENT BLDG	1,012.0
48	POWER PLANT BLDG OTH	300.0
82	WHSE SUP AND EQUIPMENT	14,960.0
83	OXY STORAGE FACILITY	121.0
84	AV MAINT SHOP	12,132.0
86	MAINT HANGAR COMB	68,811.0
87	HAZARD STOR BSE	464.0
90	AV MST SHOP	2,986.0
92	SHP A/M ORGL	4,000.0
94	SHP A/M ORGL	4,020.0
138	READY BLDG	15,393.0
140	PRECISION MEASUREMENT LAB	9,100.0
442	ARMY RESERVE CENTER	46,808.0
443	ADMIN GEN PURPOSE	4,202.0
445	ADMIN GEN PURP	2,771.0
449	SWITCH STATION	255.0
467		4,802.0
510	ADMIN GEN PURPOSE	2,171.0
511	DENTAL CLINIC	5,240.0
512	DET DAY ROOM	4,802.0
515	ARMY RESERVE CENTER	26,139.0

TABLE I

(Continued)

ASBESTOS SURVEY LIST

HAMILTON ARMY AIRFIELD

BUILDING NUMBER	CAT-DESCRIPTION	AREA - S.F.
520	ADMIN GENERAL PURPOSE	3,635.0
521	ADMIN GENERAL PURPOSE	2,137.0
525	GENERAL STOREHOUSE	1,387.0
736		1,496.0
737		800.0
738		2,596.0

NOTE: Buildings 22, 24, 25, 27, 30, 32, 42, 43, 44, 45, and 48 were deleted from survey. Buildings 15, 467, 736, 737, and 738 were added to survey. Ref. AFZM-DEH-ES letter dated 25 Oct 88.

FINDINGS AND DISCUSSION

The following discussion covers the ACM inventory, ACM management, abatement costs, and laboratory quality control.

ACM INVENTORY

ACM inventory results are given in the Appendix organized numerically by building number. A summary of ACM is also provided in the Appendix.

Materials provided in the ACM inventory are as follows:

- A summary table for the building sorted by area within the building.
- A summary table for the building sorted by algorithm number within the building.
- Building Survey Data Sheets. This form lists material sampled, its location, asbestos content, material condition, and other parameters necessary for assessment ranking.
- Unit Cost Estimate Sheets for the building. This form provides cost estimates for material removal.
- One or more building diagrams are provided which indicate location of suspect ACM surveyed and samples collected.
- Copies of analytical data for samples collected in the building. Entries on the data sheet not pertaining to the building have been lined out.

ACM ASSESSMENT

Physical assessment of ACM is a method to determine relative risk to individuals in an area and develop an algorithm used to prioritize abatement actions. Physical condition of ACM is determined through visual observations and sampling. This data is related to potential future conditions, based upon current and past condition, potential contact frequency, vibration sources, and other physical damage or fiber transport mechanisms. These factors are inserted into a formula and an algorithm for abatement priority is generated.

Algorithm numbers range from 0 for suspect materials which prove to be non-asbestos to a possible 144 which would occur under worst conditions. The algorithm formula uses codes for variables as shown in Table II. The formula is as follows:

[(Condition of material + contact potential) X friability] X % asbestos code = Algorithm Number

TABLE II

COMPUTER CODE KEY

Friability		Condition		% Asbestos	
4.	High	1.	Good (No Apparent Damage)	4.	GT 40
3.	Moderate			3.	15-40
2.	Low	2.	Fair (Limited Damage)	2.	1-15
1.	Non-Friable	4.	Poor (General Damage)	1.	LT 1
				0.	Non-Asbestos

Contact Potential

5. Accessible - Occupied With Airstream or Vibration Present
4. Accessible - Occupied
3. Unaccessible - Source of Asbestos Likely to Contaminate Accessible Area
2. Accessible - To Maintenance only and/or Unoccupied
1. Unaccessible - Source of Asbestos Unlikely to Contaminate Accessible Area

ACM condition is dependent on material friability and physical condition. Material friability was determined by touching suspect material and observing hand pressure required to cause the material to crumble. The following definitions were used for this study:

High - Material which was very soft and crumbled at the touch or with light hand pressure

Moderate - Material which crumbled with medium hand pressure applied

Low - Material that crumbled somewhat by exerting substantial hand pressure

Non-friable - Material that could not be crumbled, lightly abraded or powdered by exertion of hand pressure

Material physical condition was determined by visual observation. The following definitions were used for this study:

Good - No apparent damage to material

Fair - Vast majority of material was in good condition with small damaged areas

Poor - General damage which involved substantial deterioration in places, or minor general damage involving more than 20% of the visible surface

Material potential future condition was related to current and past condition by determining contact potential and occupancy. Contact potential assesses direct contact or fiber transport mechanisms. The following definitions were used for this study:

Accessible - Occupied with airstream or vibration present: An area with suspect material and personnel present, and a potential transport mechanism for airborne fibers such as an airstream or a vibration source that could generate fibers.

Accessible - Occupied: An area with suspect material and personnel present.

Unaccessible - Source of asbestos likely to contaminate accessible area: An area with suspect material present and no normal accessibility to personnel; however, asbestos fibers could contaminate accessible areas due to ventilation or natural air movement.

Accessible - To maintenance and/or unoccupied: An area with suspect material present, but accessible to maintenance only or normally unoccupied.

Unaccessible: An area with suspect material present but not accessible to personnel and no chance of contaminant spread to accessible areas.

Area occupancy was used to determine potential number of personnel at risk. In an area where occupancy may fluctuate, maximum occupancy likely to occur was used.

ACTION CODES

The Action Code provides a recommendation for action to be taken as a result of data gathered at each inspection point. The algorithm number calculated for each inspection point provides a relative index of hazard assessment.

There are three primary categories of action which may result. These are:

1. Isolate the area and remove/decontaminate as soon as possible due to the poor conditions identified.

2. Utilize an Operations and Maintenance (O&M) Program to inspect and keep in repair identified material until such time as funding is available for removal, or the building is to be demolished. Use the algorithm number as a guide to prioritizing and allocating resources.

3. No action is necessary, because the material has proved to fall in a class of "non-asbestos substances."

The suggested algorithm relation to "action" is as follows:

- Algorithm values of 40 or greater should require the immediate action described in Item 1 above.

- Algorithm values in a range of 1-39 correspond to the Item 2 action code above.

- A zero value would correspond to Item 3 above.

The computerized data base for this project has been programmed to automatically read the algorithm results and print a corresponding action code in a designated column of the Building Survey Report printout. The algorithms and action codes are reflected in the summary tables for each building section.

ACM MANAGEMENT

Control Measures

Four control measures have been considered acceptable by the Environmental Protection Agency. These are:

1. Establishment of an Operations and Maintenance Program
2. Removal
3. Encapsulation
4. Enclosure

Control measure selection is usually based upon material condition, building occupancy, asbestos friability, and other factors. Assistance in making these choices was provided through the algorithm calculation and OCCUSAFE preliminary cost estimates.

An Operations and Maintenance Program usually has lowest initial costs, but the asbestos source still remains. An Operations and Maintenance Program allows for asbestos removal over a period of time, spreading out the expenditure. Cost of training and maintaining asbestos monitoring and surveillance may be significant.

Removal is generally considered the least expensive control option when remedial action is justified. Two major advantages to removal are:

1. It eliminates the asbestos-containing material from the building, and
2. It eliminates the need for a continued O&M Program.

Encapsulation or enclosure may reduce asbestos fiber release from the material, however, asbestos still remains and may have to be removed at a later date. The initial cost may not always be lower. Inappropriately applied encapsulating agents may cause asbestos material to delaminate from the substrate, resulting in fiber release and possibly higher long-term cost.

Encapsulated fireproofing and insulating material may lose its fire resistance ability and Underwriters Laboratory fire rating. Additional insulation must be added to protect encapsulated fireproofing. Long-term life cycle costs may be greater than removal when periodic re-application of encapsulating or enclosing material is instituted.

Acoustical materials treated with encapsulants frequently lose sound absorbing effectiveness.

Insurance must be considered for encapsulation projects. Some abatement companies are not insured for performing encapsulation or enclosure projects. Insurance companies are reluctant to write policies for encapsulation projects because no guarantee can be made on encapsulating material or enclosing structure effectiveness. Fiber release may result from damage done by other trades working in the area. Damage following encapsulation or enclosure may be interpreted as an unnecessary and uncontrollable risk for an insurance carrier.

Operations and Maintenance Programs associated with an enclosure or encapsulation method of controlling ACM may also have its faults. Asbestos exposure risk could increase if the O&M Program is poorly enforced. Army personnel may not be properly trained to repair encapsulated material.

Enclosing methods and encapsulation techniques can be as labor intensive as removal, and require similar site preparation and worker protection. No major benefit is obtained in using encapsulation or enclosure methods to maintain asbestos. Preliminary budgetary cost estimates for asbestos abatement and asbestos enclosing or encapsulation methods are, for the most part, equal.

Floor Tile - Special Considerations

Some floor tile samples were positive for asbestos. Asbestos analysis in floor materials is very difficult due to small fiber size and vinyl resin adherence to fibers. It is possible that asbestos may exist within tile without being detected by laboratory analysis. Many older buildings may have had tile installed and replaced at many different times and places. The adhesives may vary from tile to tile. Similar appearing tile may have different compositions. In view of this, it would be prudent to consider all floor materials to contain greater than 1% asbestos. Floor materials should not be subjected to grinding, sanding, or other mechanical processes that could produce dust. These materials are considered an enclosed form of asbestos and, if maintained in good condition, removal could be deferred until renovation or demolition is scheduled.

Operations and Maintenance Program

An Operations and Maintenance Program for asbestos in buildings is considered an essential control measure by the Environmental Protection Agency. Such a program should address asbestos currently in place and any asbestos remaining following control measures. An Operations and Maintenance Program includes the following elements:

- Workers and building occupant notification concerning presence of asbestos
- Initial cleaning and maintenance of asbestos-containing materials
- Asbestos repair in the building
- Inspection of asbestos left in place following control measures and inspection of enclosures and encapsulated areas
- Emergency procedures
- Worker training

Worker Training

The following training recommendations meet the requirements generated by EPA for school systems. While there are no specific requirements for non-school related operations and maintenance programs, these are considered good practice. A worker training program includes the following elements:

1. Maintenance and custodial staff, who may work in buildings containing asbestos, should receive at least two hours of awareness training, including:
   - Information regarding asbestos and its various uses and forms
   - Information on health affects of asbestos exposure
   - Location of asbestos identified in the buildings
   - Recognition of damage or deterioration of asbestos material

2. Maintenance and custodial staff, who perform duties that may disturb asbestos-containing material, should receive the training in paragraph 1 above and an additional 14 hours of training. The additional training should include:

- Descriptions of the proper methods for handling asbestos
- Information on the proper use and selection of respiratory protection
- Appropriate regulations governing the handling and disposal of asbestos materials
- Hands-on training in the use of proper respiratory protection, personal protection measures, and good work practices

3. EPA-approved asbestos training courses are available for this purpose, but are not mandatory.

ABATEMENT COSTS

Cost estimates for asbestos abatement in buildings surveyed are provided with the ACM inventory for each building section. Costs are summarized in Tables III and IV below. The tables have been divided into Reserve Center and Other Buildings, respectively.

TABLE III

SUMMARY OF REMOVAL COSTS FOR ACM
RESERVE CENTER

Building	Removal Cost
82	3,959
84	81,905
94	0
140	307,047
442	308,614
443	171,890
445	257,805
449	37,013
467	96,334
510	160,129
512	235,540
515	124,654
525	3,752
736	18,092
738	5,675
	$1,812,409

TABLE IV

SUMMARY OF REMOVAL COSTS FOR ACM
OTHER BUILDINGS

Building	Removal Cost
15	$ 315
26	8,096
35	844
39	1,202
41	14,091
83	0
86	776,589
87	0
90	0
92	0
138	73,658
511	173,492
520	83,914
521	56,460
737	0
	$1,188,661

A budgetary cost estimate represents a general estimate, based on limited conceptual project information. The estimate consists of unit prices for major items and quantities of work. The level of detail for this type of estimate is useful for preliminary phase of cost determination.

Budgetary cost estimates are structured from information within limits and conditions of the project. They reflect prudent abatement standards and are intended to conform to all current regulations governing the work.

Budgetary cost estimates for asbestos abatement include seven (7) specific activities. These include:

1. Cost for preparation of containment area.

2. Cost for equipment required for removal action.

3. Cost for pre-abatement preparation of work area.

4. Cost for removal of asbestos-containing materials.

5. Cost for internal contractor OSHA compliance monitoring activities during asbestos abatement work.

6. Cost for disposal of all asbestos-containing materials and associated, contaminated equipment.

7. Cost for cleanup/decontamination of the work area following abatement activities.

This subtotal has been adjusted for the contractor's overhead and profit on material costs. All budget costs represent the U.S. national averages with an additional adjustment to reflect current California costs. A 17.5% contingency multiplier has been added to the abatement cost to cover Army Corps of Engineer's contingency and administrative costs.

Cost estimates are made using the R.S. MEANS Construction Cost Data Manual, manufacturer's data, contractor's data, and OCCUSAFE's experience with private and government abatement work.

Budgetary cost estimates represent cost figures for the current year. If costs are to be projected into following years, a cost inflation factor must be added to the estimate for each additional year. The inflation factor fluctuates and must be verified yearly.

OCCUSAFE's experience indicates removal approximately equals cost of other remedial measures, i.e., enclosure, encapsulation, etc. Although short term costs may be somewhat less, an Operations and Maintenance Program and eventual removal can result in higher long term costs.

Estimates provided reflect abatement costs for a major project where the contractor has already mobilized to the site. A minimum $2,500 should be added to a contract to cover mobilization and general conditions. Several abatement contractors contacted concerning minimum job size stated $15,000 was the minimum contract they would bid on.

QUALITY CONTROL

All original survey forms were prepared by a Certified Industrial Hygienist and cross-checked for compatibility, duplication, and redundancy. The forms were peer reviewed by an independent Certified Industrial Hygienist. Revisions were made based on agreement between the originator and the reviewer. Final clearance was given after a company officer reviewed and agreed with the format and content. Standard packages of forms were prepared in advance of site surveys.

Materials used as supplies in bulk sampling and repair were selected to be free from asbestos contaminant. Only new supplies were used as sample containers including vials, tray liners and sealable bags. Sampling tools and respirators were washable.

Duplicate bulk samples were taken randomly for five percent of sample locations to meet QA requirements. A prepared list of random QC samples was generated using a random number generator, and issued with the sample sticker package.

Random survey audits were performed at survey sites by the project manager. A complete walk-through was performed using documents prepared during the original survey. All observations, specific sample locations and findings were checked. Additional observations were recorded as necessary. Approximately five percent of the survey sites were audited in this manner.

Based on findings of the completed survey, algorithm factors were assigned to each building and building area. Using the algorithm protocol, a relative priority for action was assigned. A five percent random check was performed on the algorithm computations.

The standard Code A cost estimate was prepared using guidelines in context with the description of asbestos material found and its volume. Each building was treated as an individual entity. The cost estimates were peer reviewed by an individual other than the one who prepared the estimate.

All written work was checked for technical content and accuracy, completeness, conciseness, and presentation. A peer reviewer critiqued the team leader's work, adding supplemental comments and suggestions for improvement. Addition of the peer reviewer's experience to the cycle generated additional insight into the survey and findings. This approach strengthened overall observations and recommendations within the report.

Samples submitted to analytical laboratories were maintained under a continual chain of custody and secure conditions when not being analyzed. At the option of the Corps of Engineers, these samples may be returned to the Corps of Engineers at any time up to and after completion of the project for retention under their security requirements.

LABORATORY QUALITY CONTROL

Random duplicate samples were collected for approximately 5% of the total samples during the project. A results comparison table is provided for specific samples related to the reported facility. Due to randomness of the quality control sample assignment, some facilities may not have had quality control samples collected. This does not affect the overall quality control of the project.

Results of the quality control comparison for Hamilton Army Airfield are provided in Table V.

TABLE V

QUALITY CONTROL SAMPLES

Sample Number	Asbestos I.D. QC Lab	Asbestos I.D. Primary Lab
54503	75-90% Chrysotile	65% Chrysotile
54510	None Detected	None Detected
54597	15-30% Chrysotile	30% Chrysotile
54692	None Detected	None Detected
54722	None Detected	None Detected
54814	None Detected	None Detected
54865	5-15% Chrysotile	30% Chrysotile
54868	15-30% Chrysotile	10% Chrysotile

A total 153 QC samples were collected during the overall project surveys. Complete agreement or only minor disagreement regarding type and amount of asbestos present occurred in 83% of the duplicate samples. The minor disagreements did not change the ACM ranking. Asbestos detected and a difference in amount detected was sufficient to place the material into a different ACM ranking for 8%.

Based on past experience, the QC results indicate good agreement between laboratories.

METHODOLOGY

A systematic approach was used to survey buildings at Hamilton Army Airfield for asbestos-containing material. Buildings were divided into building zones, based on architectural divisions such as floors. This method of subdivision was used to organize the field survey. Since abatement work normally requires isolating building areas to prevent contaminant spread, building zones provided logical isolation points.

Each building system was inspected in each building zone to assure complete potential ACM coverage. Building systems inspected included:

- Floor, wall, ceiling systems
- Hot and cold water plumbing
- Chilled water systems
- Steam systems, including low pressure, medium pressure, high pressure, and condensate return systems
- Miscellaneous materials such as tank insulation, duct vibration isolators, structural fireproofing, equipment items in areas, roof materials, etc.

The survey team worked through each building zone, inspecting building systems and collecting samples where appropriate. Data was recorded on Building Survey Data Sheets included with each building data section of this report. As the survey proceeded from one building zone to the next, materials found to be similar to those previously sampled were noted on data sheets but not resampled. The notation used was sample number plus a suffix number, such as 69217-1. Surface material square footages and pipe insulation material linear feet were determined.

Analytical data is provided in the Appendix with each building section. Analytical data was transferred to Building Survey Data Sheets, which were used to calculate an algorithm and action code.

The scoring system calculated an algorithm based upon material friability, material condition, contact potential, percent asbestos, and facility mission criticality. A summary of asbestos samples is provided in Table V, by algorithm rating.

Each sample location in the facility was marked with an OCCUSAFE sample number. The marking was covered with clear tape to protect against weathering.

Friable surface material was divided into homogeneous sampling areas. A homogeneous area contained material uniform in texture and color, and apparently identical in every other respect. Separate sampling areas were established if there was any suspicion the material might be from a different type. Each friable homogeneous area was sampled.

Thermal system insulation sampling required determining homogeneous areas, various building systems, and material types. Sample quantities were determined by the following requirements.

- Minimum one sample from each homogeneous length of thermal insulation.

- Minimum one sample from each homogeneous area of patched insulation.

- Mechanical system fitting, where cement or plaster was used for insulation, required a number of samples sufficient to determine if it was ACM.

- No samples were required from any homogeneous area where the inspector determined thermal insulation was fiber glass, foam glass, rubber, or other non-ACM.

Miscellaneous materials including floor tile, ceiling tile, duct vibration isolators, etc. were sampled in a number sufficient to determine if it was ACM.

Building material samples were collected using appropriate tools such as scrapers, knives, borers, etc. Samples were sealed in plastic vials for shipment.

Sample analysis was performed using polarized light microscopy. Analysis was performed by an American Industrial Hygiene Association (AIHA) accredited laboratory. Replicates of 5% of the samples were collected for quality control and were shipped to a second AIHA-accredited laboratory for analysis.

Sample locations were repaired to prevent airborne fiber generation in areas where friable material was collected. Repair was accomplished using various combinations of encapsulant, spackle fill, and duct tape. In addition, samples were collected near previously damaged areas where possible. Sample location repair work included the previously damaged area.

Survey personnel used appropriate personal protective equipment, including gloves, goggles, disposable protective suits, and respirators with filters NIOSH-approved for use with asbestos-containing dusts. Sampling was limited to areas where non-survey personnel were absent.

Building drawings were annotated with sample site locations. Drawing plan scale limitations did not allow for marking locations where all asbestos material was found. Location descriptions are provided on the Building Survey Data Sheets in the Remarks Section.

TABLE VI

ACM SUMMARY BY ALGORITHM

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Lengtn FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
** LOCATION CODE = 40																	
72	1	442	5	10	4	4	1	35.00	0.00	0.000	0.250	3	4	2	1	2	52900-
64	1	442	5	18	3	4	7	0.00	200.00	2.000	1.000	4	2	2	1	2	52894-
64	1	442	5	18	3	4	7	0.00	540.00	2.000	1.000	4	2	2	1	2	52894-1
60	1	736	1	17	3	4	7	0.00	30.00	1.000	1.000	3	3	2	1	2	55074-
56	1	467	1	10	11	4	1	7.00	0.00	0.000	0.062	2	3	4	4	4	55092-
48	1	442	5	17	3	3	7	0.00	130.00	1.500	1.000	4	2	2	1	2	52889-
48	1	442	5	5	3	4	7	0.00	540.00	1.500	1.000	3	2	2	1	2	52894-2
48	1	510	5	18	3	4	7	0.00	15.00	2.000	1.000	3	2	2	1	2	52945-
48	1	510	6	18	3	4	7	0.00	22.00	2.000	1.000	3	2	2	1	1	52945-
48	1	510	6	18	3	4	7	0.00	10.00	2.000	1.000	2	4	2	1	1	52945-1
48	1	510	5	18	3	4	7	0.00	10.00	5.000	1.000	3	2	2	1	2	52945-2
48	1	510	6	23	2	4	7	0.00	1.00	2.000	1.000	3	2	2	1	1	52946-
48	1	510	5	23	2	4	7	0.00	2.00	2.000	1.000	3	2	2	1	2	52946-1
48	1	510	5	23	2	4	7	0.00	9.00	5.000	1.000	3	2	2	1	2	52946-2
48	1	515	8	18	4	4	1	0.00	20.00	1.000	1.000	3	2	2	1	1	54503-
48	1	515	5	33	2	4	7	0.00	20.00	2.000	1.000	2	2	4	3	1	54508-
48	1	515	5	23	2	4	7	0.00	75.00	1.000	1.000	2	2	4	3	1	54595-1
48	1	515	5	5	3	4	7	0.00	500.00	1.000	1.000	2	2	4	3	1	54596-1
45	1	515	5	20	2	3	1	0.00	12.00	2.000	1.000	3	1	4	3	1	54599-
45	1	736	1	23	2	3	7	0.00	10.00	1.000	1.000	3	3	2	1	2	55075-
40	1	515	5	23	2	4	7	0.00	24.00	3.000	1.000	2	1	4	3	1	54595-
40	1	515	5	18	3	4	7	0.00	500.00	3.000	1.000	2	1	4	3	1	54596-
36	2	442	1	18	3	2	1	0.00	35.00	2.000	1.000	3	2	4	3	1	52887-
36	2	442	5	5	4	3	1	0.00	200.00	2.000	1.000	3	2	2	1	2	52893-
36	2	442	5	22	3	3	7	0.00	16.00	2.000	1.000	3	2	2	1	2	54651-
36	2	442	5	21	3	3	7	0.00	16.00	2.000	1.000	3	2	2	1	2	54651-1
36	2	442	5	23	3	3	7	0.00	16.00	2.000	1.000	3	2	2	1	2	54651-2
36	2	442	5	24	3	3	7	0.00	16.00	2.000	1.000	3	2	2	1	2	54651-3
36	2	512	1	28	5	4	2	55.00	0.00	0.000	2.000	3	2	1	1	1	54687-
36	2	512	1	10	11	4	1	10.00	0.00	0.000	0 062	3	2	1	1	1	54688-
36	2	515	5	33	2	3	7	0.00	175.00	2.000	1.000	2	2	4	3	1	54504-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
36	2	515	5	5	2	3	7	0.00	175.00	2.000	1.000	2	2	4	3	1	54504-1
36	2	515	5	24	3	3	7	0.00	15.00	2.000	1.000	2	2	4	3	1	54505-
36	2	515	5	6	3	3	7	0.00	15.00	2.000	1.000	2	2	4	3	1	54505-1
36	2	515	5	33	4	3	1	0.00	150.00	2.000	1.000	3	2	2	1	1	54506-
36	2	515	5	23	2	3	2	0.00	41.00	6.000	1.000	2	2	4	3	1	54593-1
36	2	515	5	18	3	3	7	0.00	500.00	1.000	1.000	2	2	4	3	1	54594-1
36	2	515	5	6	2	3	1	0.00	75.00	1.000	1.000	2	2	4	3	1	54597-1
32	2	84	1	10	11	4	1	5.00	0.00	0.000	0.062	2	2	2	1	2	54711-
32	2	443	1	10	11	4	1	45.00	0.00	0.000	0.375	2	2	2	1	0	54881
32	2	445	1	10	11	4	1	16.00	0.00	0.000	0.062	2	2	2	1	2	54879-
32	2	510	5	2	2	4	7	25.00	0.00	0.000	1.000	2	2	2	1	0	52948
32	2	738	1	18	3	4	7	0.00	80.00	2.000	1.000	2	2	2	1	2	55079-
32	2	738	1	17	3	4	1	0.00	60.00	1.000	1.000	2	2	2	1	2	55081-
32	2	738	1	23	2	4	1	0.00	15.00	1.000	1.000	2	2	2	1	2	55082-
30	2	515	5	31	8	3	1	160.00	0.00	0.000	1.500	2	1	4	3	1	54582-
30	2	515	5	18	3	3	7	0.00	500.00	3.000	1.000	2	1	4	3	1	54594-
30	2	515	5	23	2	3	1	0.00	24.00	3.000	1.000	2	1	4	3	1	54597-
27	2	442	5	2	3	3	1	220.00	0.00	0.000	2.000	3	1	2	1	2	52896-
24	2	442	5	33	4	2	1	0.00	200.00	1.500	1.000	3	2	2	1	2	52890-
24	2	442	5	16	3	2	1	0.00	200.00	2.000	1.000	3	2	2	1	2	52892-
24	2	443	1	10	11	3	1	10.00	0.00	0.000	0.062	2	2	2	1	2	54813-
24	2	445	1	10	11	3	1	36.00	0.00	0.000	0.250	2	2	2	1	2	54877-
24	2	467	1	30	5	4	1	25.00	0.00	0.000	0.250	1	2	4	4	4	55091-
24	2	512	11	26	5	2	1	4500.00	0.00	0.000	0.125	2	2	4	3	1	54681-
24	2	512	1	13	5	4	1	63.00	0.00	0.000	0.500	2	2	1	1	1	54753-
20	2	515	1	18	3	2	1	0.00	10.00	1.000	1.000	2	1	4	3	1	54575-
18	2	443	11	26	5	3	1	3320.00	0.00	0.000	0.125	1	2	4	1	3	54653-
18	2	515	5	18	3	3	7	0.00	100.00	3.000	1.500	2	1	2	1	1	54592-
18	2	515	5	23	2	3	2	0.00	12.00	3.000	1.500	2	1	2	1	1	54593-
16	2	84	1	4	2	2	1	0.00	15.00	16.000	1.000	2	2	2	1	2	54705-
16	2	84	1	22	2	2	1	0.00	35.00	4.000	0.500	2	2	2	1	2	54706-
16	2	84	1	28	2	2	1	0.00	4.00	8.000	1.000	2	2	2	1	2	54710-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
16	2	510	5	10	11	4	1	10.00	0.00	0.000	0.062	1	2	2	1	2	52947-
16	2	515	5	16	3	2	1	0.00	5.00	1.000	1.000	2	2	2	1	1	54589-
15	2	515	1	14	11	3	1	2285.00	0.00	0.000	0.125	1	1	4	3	1	54570-1
15	2	515	5	15	3	1	2	0.00	80.00	2.000	1.000	3	1	4	3	1	54598-
15	2	525	11	26	5	3	1	1450.00	0.00	0.000	0.125	1	1	4	1	1	54557-
12	2	84	1	14	11	2	1	1000.00	0.00	0.000	0.125	1	2	4	3	3	54715-
12	2	84	1	14	11	2	1	1000.00	0.00	0.000	0.125	1	2	4	3	3	54721-
12	2	140	1	33	11	2	1	7800.00	0.00	0.000	2.000	2	2	1	3	3	54691-
12	2	140	1	28	11	2	1	500.00	0.00	0.000	1.250	2	2	1	1	3	54694-
12	2	442	3	14	11	2	1	7355.00	0.00	0.000	0.125	1	2	4	3	1	52882-
12	2	442	2	14	11	2	1	7355.00	0.00	0.000	0.125	1	2	4	3	1	52882-1
12	2	442	1	14	11	2	1	4550.00	0.00	0.000	0.125	1	2	4	3	1	52882-2
12	2	442	2	14	11	2	1	8.00	0.00	0.000	0.125	1	2	4	3	1	52885-
12	2	442	1	14	11	2	1	6.00	0.00	0.000	0.125	1	2	4	3	1	52885-1
12	2	442	5	14	11	2	1	1500.00	0.00	0.000	0.125	1	2	4	1	2	52898-
12	2	443	1	14	11	2	1	480.00	0.00	0.000	0.125	1	2	4	1	2	54657-
12	2	445	10	25	5	3	1	6.00	0.00	0.000	0.375	1	2	2	1	1	54871-
12	2	467	11	11	5	3	1	5400.00	0.00	0.000	0.250	1	2	2	1	1	55086-
12	2	510	11	26	5	3	1	50.00	0.00	0.000	0.125	1	2	2	1	2	52937-
12	2	510	11	26	5	3	1	2600.00	0.00	0.000	0.125	1	2	2	1	2	52938-
12	2	510	5	26	5	3	1	500.00	0.00	0.000	0.125	1	2	2	1	2	52938-1
12	2	515	5	14	11	2	1	150.00	0.00	0.000	0.125	1	2	4	3	1	54564-
12	2	515	5	14	11	2	1	900.00	0.00	0.000	0.125	1	2	4	3	1	54568-
10	2	512	2	14	11	2	1	2400.00	0.00	0.000	0.125	1	1	4	3	2	54682-
10	2	512	1	14	11	2	1	1850.00	0.00	0.000	0.125	1	1	4	3	2	54682-1
10	2	515	5	33	2	2	1	185.00	0.00	0.000	0.125	1	1	4	3	1	54566-
10	2	515	2	33	2	2	1	185.00	0.00	0.000	0.125	1	1	4	3	1	54566-2
10	2	515	2	14	11	2	1	432.00	0.00	0.000	0.125	1	1	4	3	1	54568-1
10	2	515	5	14	11	2	1	360.00	0.00	0.000	0.125	1	1	4	3	1	54570-
10	2	525	11	26	5	2	1	10.00	0.00	0.000	0.125	1	1	4	1	1	54552-
10	2	736	1	14	5	2	1	750.00	0.00	0.000	0.125	1	3	2	1	2	55071-
10	2	736	1	14	5	2	1	750.00	0.00	0.000	0.125	1	3	2	1	2	55072-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
9	2	510	5	12	5	3	1	6.00	0.00	0.000	0.250	1	1	2	1	2	52950-
9	2	510	5	4	2	3	7	0.00	30.00	12.000	0.500	1	1	2	1	2	54551-
8	2	84	11	26	5	2	1	150.00	0.00	0.000	0.125	1	2	2	1	1	54703-
8	2	445	11	26	5	2	1	5200.00	0.00	0.000	0.125	1	2	2	1	1	54874-
8	2	445	1	14	11	2	1	3750.00	0.00	0.000	0.125	1	2	2	1	2	54878-
8	2	449	11	11	8	2	1	900.00	0.00	0.000	0.750	1	2	2	1	1	54810-
8	2	510	1	14	11	2	1	2200.00	0.00	0.000	0.125	1	2	2	1	2	52941-
6	2	82	1	14	11	1	1	350.00	0.00	0.000	1.250	1	2	4	3	3	54701-
6	2	84	1	14	11	1	1	1000.00	0.00	0.000	0.125	1	2	4	3	3	54714-
6	2	84	1	14	11	1	1	2000.00	0.00	0.000	0.125	1	2	4	3	3	54716-
6	2	84	1	14	11	1	1	2000.00	0.00	0.000	0.125	1	2	4	3	3	54717-
6	2	442	2	14	11	1	1	10.00	0.00	0.000	0.125	1	2	4	3	1	52886-
6	2	443	1	14	11	1	1	1728.00	0.00	0.000	0.125	1	2	4	1	2	54656-
6	2	443	1	14	11	1	1	54.00	0.00	0.000	0.125	1	2	4	1	2	54658-
6	2	443	1	14	11	1	1	792.00	0.00	0.000	0.125	1	2	4	1	2	54660-
6	2	467	1	14	5	1	1	4000.00	0.00	0.000	0.125	1	2	4	4	4	55087-
5	2	515	1	33	2	1	5	0.00	0.00	0.125	1.000	1	1	4	3	1	54566-11
4	2	445	1	33	3	1	1	15.00	0.00	0.000	0.125	1	2	2	1	2	54875-
0	0	82	1	30	5	0	0	4000.00	0.00	0.000	0.500	2	2	4	3	3	54899-
0	0	82	1	33	1	0	0	14800.00	0.00	0.000	2.000	2	2	4	3	3	54900-
0	0	84	10	25	5	0	0	13000.00	0.00	0.000	0.125	1	2	2	1	1	54702-
0	0	84	11	11	5	0	0	150.00	0.00	0.000	0.062	1	2	2	1	1	54704-
0	0	84	1	18	3	0	0	0.00	1000.00	4.000	0.500	2	2	2	1	2	54707-
0	0	84	1	20	2	0	0	0.00	35.00	4.000	0.500	2	2	2	1	2	54708-
0	0	84	1	15	3	0	0	0.00	1000.00	4.000	0.500	2	2	2	1	2	54709-
0	0	84	1	18	3	0	0	0.00	15.00	0.500	0.500	2	2	2	1	2	54712-
0	0	84	1	3	3	0	0	10000.00	0.00	0.000	0.375	2	2	4	3	3	54713-
0	0	84	1	3	3	0	0	3000.00	0.00	0.000	0.375	2	2	4	3	3	54713-1
0	0	84	1	10	1	0	0	1500.00	0.00	0.000	0.500	2	2	2	1	2	54718-
0	0	84	1	14	11	0	0	3000.00	0.00	0.000	0.125	1	2	4	3	3	54719-
0	0	84	1	14	11	0	0	1000.00	0.00	0.000	0.125	1	2	4	3	3	54720-
0	0	84	1	10	11	0	0	100.00	0.00	0.000	0.062	2	2	2	1	2	54722-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
0	0	94	1	30	5	0	0	8500.00	0.00	0.000	0.375	2	2	4	3	2	52848-
0	0	94	1	14	11	0	0	2000.00	0.00	0.000	0.125	1	2	4	3	2	52849-
0	0	94	1	3	3	0	0	117.00	0.00	0.000	0.250	2	2	4	3	2	52850-
0	0	94	1	2	1	0	0	1.00	0.00	0.000	0.250	2	2	4	3	2	54818-
0	0	94	1	3	3	0	0	350.00	0.00	0.000	0.250	2	2	4	3	2	54819-
0	0	140	1	14	11	0	0	60.00	0.00	0.000	0.125	1	1	4	3	3	54689-
0	0	140	1	3	3	0	0	69000.00	0.00	0.000	1.000	2	2	4	3	3	54690-
0	0	140	1	33	2	0	0	220.00	0.00	0.000	0.125	1	1	4	3	2	54692-
0	0	140	1	30	5	0	0	8200.00	0.00	0.000	0.500	2	2	4	3	3	54693-
0	0	140	1	10	10	0	0	10.00	0.00	0.000	0.063	3	2	1	1	0	54695
0	0	140	1	2	11	0	0	0.25	0.00	0.000	0.250	3	2	1	1	3	54696-
0	0	140	1	29	10	0	0	3.00	0.00	0.000	0.125	3	2	1	1	3	54697-
0	0	140	1	18	4	0	0	0.00	135.00	1.000	1.000	3	2	1	1	3	54698-
0	0	442	3	3	3	0	0	7255.00	0.00	0.000	1.000	3	2	4	3	1	52879-
0	0	442	2	3	3	0	0	7255.00	0.00	0.000	1.000	3	2	4	3	1	52879-1
0	0	442	1	3	3	0	0	7255.00	0.00	0.000	1.000	3	2	4	3	1	52879-2
0	0	442	3	32	8	0	0	10760.00	0.00	0.000	0.500	2	2	4	3	1	52880-
0	0	442	2	32	8	0	0	10760.00	0.00	0.000	0.500	2	2	4	3	1	52880-1
0	0	442	1	32	8	0	0	10760.00	0.00	0.000	0.500	2	2	4	3	1	52880-2
0	0	442	5	32	8	0	0	10000.00	0.00	0.000	0.500	2	2	4	1	2	52880-3
0	0	442	3	30	5	0	0	12080.00	0.00	0.000	0.500	2	2	4	3	1	52881-
0	0	442	2	30	5	0	0	12080.00	0.00	0.000	0.500	2	2	4	3	1	52881-1
0	0	442	1	30	5	0	0	12080.00	0.00	0.000	0.500	2	2	4	3	1	52881-2
0	0	442	5	30	5	0	0	8000.00	0.00	0.000	0.500	2	2	4	1	2	52881-3
0	0	442	3	33	2	0	0	190.00	0.00	0.000	0.125	1	2	4	3	1	52883-
0	0	442	2	33	2	0	0	190.00	0.00	0.000	0.125	1	2	4	3	1	52883-1
0	0	442	1	33	2	0	0	190.00	0.00	0.000	0.125	1	2	4	3	1	52883-2
0	0	442	5	33	2	0	0	60.00	0.00	0.000	0.125	1	2	4	1	2	52883-3
0	0	442	3	14	11	0	0	6.00	0.00	0.000	0.125	1	2	4	3	1	52884-
0	0	442	1	14	11	0	0	1815.00	0.00	0.000	0.125	1	2	4	3	1	52884-1
0	0	442	5	14	11	0	0	500.00	0.00	0.000	0.125	1	2	4	1	2	52884-2
0	0	442	11	27	8	0	0	15200.00	0.00	0.000	0.500	1	1	4	3	1	52888-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
0	0	442	5	17	4	0	0	0.00	200.00	2.000	1.000	3	2	2	1	2	52891-
0	0	442	5	28	1	0	0	120.00	0.00	0.000	1.000	2	2	2	1	2	52895-
0	0	442	5	29	10	0	0	3.00	0.00	0.000	0.050	2	4	2	1	2	52897-
0	0	442	5	3	3	0	0	1100.00	0.00	0.000	1.000	3	2	4	1	2	52899-
0	0	443	10	25	5	0	0	5220.00	0.00	0.000	0.125	1	2	4	1	1	54652-
0	0	443	1	33	2	0	0	98.00	0.00	0.000	0.125	1	2	4	1	2	54654-
0	0	443	1	30	5	0	0	8500.00	0.00	0.000	0.500	2	2	4	1	2	54655-
0	0	443	11	33	5	0	0	3320.00	0.00	0.000	0.062	3	1	1	1	2	54659-
0	0	443	1	30	5	0	0	700.00	0.00	0.000	0.500	2	2	2	1	2	54814-
0	0	445	10	25	5	0	0	4125.00	0.00	0.000	0.125	1	2	2	1	1	54872-
0	0	445	11	31	5	0	0	5200.00	0.00	0.000	0.062	1	2	2	1	1	54873-
0	0	445	1	14	11	0	0	110.00	0.00	0.000	0.125	1	2	2	1	2	54876-
0	0	445	1	30	5	0	0	9650.00	0.00	0.000	0.375	2	2	2	1	2	54880-
0	0	445	1	3	3	0	0	285.00	0.00	0.000	0.375	2	2	2	1	2	54881-
0	0	445	1	14	5	0	0	3750.00	0.00	0.000	0.125	1	2	2	1	2	54882-
0	0	449	1	33	8	0	0	6.00	0.00	0.000	2.000	2	2	2	1	2	54822-
0	0	467	1	14	5	0	0	500.00	0.00	0.000	0.125	1	2	4	4	4	55088-
0	0	467	1	14	5	0	0	8000.00	0.00	0.000	0.125	1	2	4	4	4	55089-
0	0	467	1	30	5	0	0	3000.00	0.00	0.000	0.250	1	1	4	4	4	55090-
0	0	467	2	30	5	0	0	3000.00	0.00	0.000	0.250	1	1	4	4	4	55090-1
0	0	467	10	25	5	0	0	640.00	0.00	0.000	0.125	1	1	2	1	1	55093-
0	0	467	10	25	5	0	0	6400.00	0.00	0.000	0.125	2	2	2	1	1	55094-
0	0	510	10	26	5	0	0	3000.00	0.00	0.000	0.125	1	2	2	1	2	52936-
0	0	510	1	30	5	0	0	7000.00	0.00	0.000	0.500	2	2	2	1	2	52939-
0	0	510	5	30	5	0	0	50.00	0.00	0.000	0.500	2	2	2	1	2	52939-1
0	0	510	1	3	3	0	0	2200.00	0.00	0.000	0.750	3	2	2	1	2	52940-
0	0	510	1	33	2	0	0	100.00	0.00	0.000	0.125	1	1	2	1	2	52942-
0	0	510	1	31	5	0	0	3100.00	0.00	0.000	0.062	1	2	2	1	2	52943-
0	0	510	6	2	1	0	0	72.00	0.00	0.000	0.500	2	2	2	1	1	52944-
0	0	510	5	30	5	0	0	500.00	0.00	0.000	0.500	2	1	2	1	2	52949-
0	0	512	0	0	0	0	0	0.00	0.00	0.000	0.000	0	0	0	0	0	
0	0	512	10	25	5	0	0	2880.00	0.00	0.000	0.125	2	2	1	3	1	54680-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
0	0	512	2	14	11	0	0	2400.00	0.00	0.000	0.062	2	2	1	3	2	54683-
0	0	512	1	14	11	0	0	1950.00	0.00	0.000	0.062	2	2	1	3	2	54683-1
0	0	512	2	3	3	0	0	600.00	0.00	0.000	0.500	2	2	4	3	2	54684-
0	0	512	2	30	5	0	0	4420.00	0.00	0.000	0.500	2	2	4	3	2	54685-
0	0	512	1	30	5	0	0	4600.00	0.00	0.000	0.500	2	2	4	3	2	54685-1
0	0	512	1	14	5	0	0	56.00	0.00	0.000	0.125	1	1	4	3	2	54686-
0	0	512	10	25	5	0	0	2880.00	0.00	0.000	0.125	2	2	1	3	1	54699-
0	0	512	11	33	5	0	0	4500.00	0.00	0.000	0.062	2	2	1	3	1	54700-
0	0	512	1	14	11	0	0	84.00	0.00	0.000	0.125	1	1	4	3	2	54751-
0	0	512	1	30	5	0	0	660.00	0.00	0.000	0.500	2	2	1	1	1	54752-
0	0	515	5	17	2	0	0	0.00	150.00	2.000	1.000	2	2	4	3	1	54507-
0	0	515	5	14	11	0	0	80.00	0.00	0.000	0.125	1	1	4	3	1	54562-
0	0	515	5	33	2	0	0	29.00	0.00	0.000	0.125	1	1	4	3	1	54563-
0	0	515	1	33	2	0	0	310.00	0.00	0.000	0.125	1	1	4	3	1	54563-1
0	0	515	2	33	2	0	0	310.00	0.00	0.000	0.125	1	1	4	3	1	54563-2
0	0	515	5	3	3	0	0	510.00	0.00	0.000	0.500	2	2	4	3	1	54565-
0	0	515	5	14	11	0	0	1680.00	0.00	0.000	0.125	1	2	4	3	1	54567-
0	0	515	1	14	11	0	0	2000.00	0.00	0.000	0.125	1	1	4	3	1	54567-1
0	0	515	2	14	11	0	0	4000.00	0.00	0.000	0.125	1	1	4	3	1	54567-2
0	0	515	5	33	2	0	0	310.00	0.00	0.000	0.125	1	1	4	3	1	54569-
0	0	515	5	3	3	0	0	160.00	0.00	0.000	0.250	2	1	4	3	1	54571-
0	0	515	5	30	8	0	0	8200.00	0.00	0.000	0.375	1	2	4	3	1	54572-
0	0	515	1	30	8	0	0	10100.00	0.00	0.000	0.375	1	2	4	3	1	54572-1
0	0	515	2	30	8	0	0	10100.00	0.00	0.000	0.375	1	2	4	3	1	54572-2
0	0	515	5	33	8	0	0	1250.00	0.00	0.000	0.375	1	2	4	3	1	54573-
0	0	515	1	33	8	0	0	1250.00	0.00	0.000	0.375	1	2	4	3	1	54573-1
0	0	515	2	33	8	0	0	1250.00	0.00	0.000	0.375	1	2	4	3	1	54573-2
0	0	515	5	30	5	0	0	85.00	0.00	0.000	0.500	2	2	4	3	1	54574-
0	0	515	2	18	3	0	0	0.00	1.00	1.000	1.000	3	2	4	3	1	54575-1
0	0	515	1	3	3	0	0	2112.00	0.00	0.000	0.375	2	1	4	3	1	54576-
0	0	515	5	3	2	0	0	72.00	0.00	0.000	0.375	2	1	4	3	1	54576-1
0	0	515	11	11	8	0	0	13000.00	0.00	0.000	0.750	1	2	4	1	1	54577-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
0	0	515	10	25	5	0	0	6000.00	0.00	0.000	0.125	1	2	4	1	1	54578-
0	0	515	10	25	5	0	0	4000.00	0.00	0.000	0.125	1	2	4	1	1	54579-
0	0	515	1	14	11	0	0	60.00	0.00	0.000	0.125	1	1	4	3	1	54580-
0	0	515	1	33	2	0	0	50.00	0.00	0.000	0.125	1	1	4	3	1	54581-
0	0	515	1	14	11	0	0	198.00	0.00	0.000	0.250	1	1	4	3	1	54583-
0	0	515	2	14	5	0	0	944.00	0.00	0.000	0.125	1	1	4	3	1	54584-
0	0	515	2	14	11	0	0	300.00	0.00	0.000	0.125	1	1	4	3	1	54585-
0	0	515	2	14	11	0	0	150.00	0.00	0.000	0.125	1	1	4	3	1	54586-
0	0	515	8	18	2	0	0	0.00	100.00	2.000	1.000	2	4	4	3	1	54587-
0	0	515	5	33	10	0	0	150.00	0.00	0.000	1.250	3	2	4	3	1	54588-
0	0	515	5	16	3	0	0	0.00	320.00	1.000	1.000	2	4	2	1	1	54590-
0	0	515	8	16	3	0	0	0.00	30.00	1.000	1.000	2	2	2	1	1	54590-1
0	0	515	5	21	2	0	0	0.00	24.00	1.000	1.500	2	2	2	1	1	54591-
0	0	515	8	21	2	0	0	0.00	10.00	1.000	1.500	2	2	2	1	1	54591-1
0	0	525	1	14	11	0	0	1350.00	0.00	0.000	0.125	1	2	2	1	2	54553-
0	0	525	1	30	5	0	0	3114.00	0.00	0.000	0.500	2	2	2	1	2	54554-
0	0	525	11	31	5	0	0	1450.00	0.00	0.000	0.062	1	2	4	1	1	54555-
0	0	525	1	3	3	0	0	132.00	0.00	0.000	0.250	2	2	2	1	2	54556-
0	0	525	1	33	2	0	0	60.00	0.00	0.000	0.125	1	1	2	1	2	54558-
0	0	525	1	14	5	0	0	1350.00	0.00	0.000	0.250	2	2	2	1	2	54559-
0	0	525	10	25	5	0	0	3012.00	0.00	0.000	0.125	1	2	2	1	1	54560-
0	0	525	10	25	5	0	0	3012.00	0.00	0.000	0.125	2	2	2	1	1	54561-
0	0	736	10	25	5	0	0	1500.00	0.00	0.000	0.125	1	3	1	1	2	55069-
0	0	736	1	30	5	0	0	2000.00	0.00	0.000	0.250	2	2	2	1	2	55070-
0	0	736	1	10	0	0	0	15.00	0.00	0.000	0.500	2	2	2	1	2	55073-
0	0	736	1	3	5	0	0	400.00	0.00	0.000	0.250	2	3	2	1	2	55076-
0	0	738	10	25	5	0	0	6500.00	0.00	0.000	0.125	1	2	2	1	2	55069-1
0	0	738	1	14	5	0	0	100.00	0.00	0.000	0.125	1	2	2	1	2	55077-
0	0	738	1	14	5	0	0	100.00	0.00	0.000	0.125	1	2	2	1	2	55078-
0	0	738	1	24	2	0	1	0.00	20.00	2.000	1.000	2	2	2	1	2	55080-
0	0	738	1	16	3	0	0	0.00	2.50	0.500	0.500	2	2	2	1	2	55083-
0	0	738	1	21	2	0	1	0.00	8.00	0.000	0.500	2	2	2	1	2	55084-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
0	0	738	1	28	1	0	0	30.00	0.00	0.000	1.000	2	2	2	1	2	55085-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
** LOCATION CODE = 41																	
54	1	520	5	2	2	3	7	50.00	0.00	0.000	0.500	3	4	2	1	1	54529-
54	1	521	5	2	2	3	7	30.00	0.00	0.000	1.500	3	4	2	1	1	54546-
48	1	520	5	32	2	4	7	3.00	0.00	0.000	0.250	3	2	2	1	1	54535-
48	1	521	1	18	2	4	7	0.00	25.00	1.000	1.000	2	2	4	4	2	54540-
48	1	521	5	10	11	4	1	10.00	0.00	0.000	0.062	3	2	2	1	1	54545-
40	1	138	1	18	3	4	7	0.00	330.00	2.000	1.000	2	1	4	3	4	54677-
40	1	511	6	18	3	4	7	0.00	215.00	1.500	0.500	2	3	2	1	1	54867-
36	2	520	6	18	4	3	1	0.00	56.00	1.000	1.500	3	2	2	1	1	54526-
38	2	521	1	24	3	3	7	0.00	3.00	1.000	1.000	2	2	4	4	2	54541-
32	2	41	1	10	4	4	1	0.00	130.00	10.000	0.375	2	2	2	1	2	54805-
32	2	86	1	10	11	4	1	25.00	0.00	0.000	0.062	2	2	2	1	2	54891-
32	2	86	2	10	11	4	1	25.00	0.00	0.000	0.062	2	2	2	1	2	54891-1
32	2	86	3	10	11	4	1	12.00	0.00	0.000	0.062	2	2	2	1	2	54891-2
32	2	520	6	18	3	4	7	0.00	170.00	0.100	1.500	2	2	2	1	1	54522-
32	2	520	5	18	3	4	7	0.00	15.00	1.000	1.500	2	2	2	1	1	54522-1
32	2	520	6	22	2	4	7	0.00	20.00	1.000	1.500	2	2	2	1	1	54523-
32	2	520	6	18	3	4	2	0.00	370.00	1.000	1.000	2	2	2	1	1	54524-
32	2	520	5	18	3	4	2	0.00	60.00	1.000	1.000	2	2	2	1	1	54524-1
32	2	520	6	22	2	4	7	0.00	40.00	1.000	1.000	2	2	2	1	1	54525-
32	2	520	5	23	2	4	7	0.00	5.00	1.000	1.000	2	2	2	1	1	54525-1
32	2	520	5	18	3	4	7	0.00	50.00	6.000	1.000	2	2	2	1	1	54532-
32	2	520	5	23	2	4	7	0.00	14.00	6.000	1.000	2	2	2	1	1	54533-
32	2	521	5	24	2	4	7	0.00	7.00	5.000	1.000	2	2	2	1	1	54548-
32	2	521	6	24	2	4	7	0.00	20.00	2.000	1.000	2	2	2	1	1	54550-
32	2	521	6	24	2	4	7	0.00	40.00	1.000	1.000	2	2	2	1	1	54550-1
30	2	138	1	24	2	3	7	0.00	80.00	2.000	1.000	2	1	4	3	4	54678-
30	2	511	5	28	3	3	7	10.00	0.00	0.000	1.500	2	3	2	1	2	54860-
30	2	511	5	28	3	3	7	75.00	0.00	0.000	1.500	2	3	2	1	2	54862-
24	2	41	1	10	11	3	1	25.00	0.00	0.000	0.062	2	2	2	1	2	54804
24	2	86	1	22	3	2	1	0.00	38.00	2.000	0.500	2	2	4	3	3	54890-
24	2	86	2	22	3	2	1	0.00	45.00	2.000	0.500	2	2	4	3	3	54890-1

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
24	2	86	3	22	3	2	1	0.00	25.00	2.000	0.500	2	2	4	3	3	54890-2
24	2	138	1	28	5	4	7	75.00	0.00	0.000	1.000	2	2	1	1	2	54679-
24	2	511	6	22	3	3	1	0.00	2.00	1.000	1.000	2	2	2	1	1	54865-
24	2	520	5	30	11	3	1	10.00	0.00	0.000	0.250	2	2	2	1	1	54528-
24	2	521	11	26	5	4	7	1200.00	0.00	0.000	0.125	1	2	4	1	1	54536-1
24	2	521	5	18	3	3	2	0.00	10.00	5.000	1.000	2	2	2	1	1	54547-
24	2	521	5	18	3	3	2	0.00	30.00	2.000	1.000	2	2	2	1	1	54547-1
24	2	521	6	18	3	3	2	0.00	225.00	2.000	1.000	2	2	2	1	1	54549-
24	2	521	6	18	3	3	2	0.00	350.00	1.000	1.000	2	2	2	1	1	54549-1
20	2	511	6	20	3	2	1	0.00	2.00	1.000	0.500	2	3	2	1	1	54868-
18	2	138	6	24	2	3	7	0.00	40.00	2.000	1.000	2	2	1	1	2	54678-1
18	2	511	11	26	5	3	1	3500.00	0.00	0.000	0.125	1	2	4	4	1	54851-
18	2	521	11	26	5	3	1	2751.00	0.00	0.000	0.125	1	2	4	1	1	54536-
16	2	138	1	30	5	4	7	23720.00	0.00	0.000	0.500	1	0	4	3	4	54671-1
16	2	511	5	4	2	4	7	0.00	32.00	16.000	0.375	1	2	2	1	2	54863-
16	2	520	5	30	5	4	7	1116.00	0.00	0.000	0.250	1	2	2	1	1	54527-
16	2	520	5	4	3	4	7	50.00	0.00	0.000	0.250	1	2	2	1	1	54534-
15	2	15	10	10	3	3	1	25.00	0.00	0.000	0.250	1	3	2	1	1	55097-
12	2	26	1	14	5	2	1	1050.00	0.00	0.000	0.125	1	2	2	1	2	53249-
12	2	86	2	14	11	2	1	17000.00	0.00	0.000	0.125	1	2	4	3	3	54893-
12	2	86	3	14	11	2	1	17000.00	0.00	0.000	0.125	1	2	4	3	3	54893-1
12	2	86	2	14	11	2	1	17000.00	0.00	0.000	0.125	1	2	4	3	3	54895-
12	2	86	3	14	11	2	1	17000.00	0.00	0.000	0.125	1	2	4	3	3	54895-1
12	2	511	5	25	5	3	1	1000.00	0.00	0.000	0.125	1	2	2	1	2	54861-
12	2	520	11	26	5	2	1	3142.00	0.00	0.000	0.125	1	2	4	1	1	54509-
12	2	520	11	26	5	2	1	1200.00	0.00	0.000	0.125	1	2	4	1	1	54509-1
12	2	520	1	14	11	2	1	2600.00	0.00	0.000	0.125	1	2	4	4	2	54515-
12	2	520	1	14	11	2	1	70.00	0.00	0.000	0.125	1	2	4	4	2	54516-
12	2	520	1	14	11	2	1	400.00	0.00	0.000	0.125	1	2	4	4	2	54519-
12	2	521	1	14	11	2	1	1600.00	0.00	0.000	0.125	1	2	4	4	2	54538-
10	2	138	2	14	11	2	1	320.00	0.00	0.000	0.125	1	1	4	3	4	54665-
8	2	39	11	33	3	2	1	0.00	100.00	36.000	0.125	1	2	2	1	1	54723-1

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
8	2	41	11	33	3	2	1	0.00	300.00	36.000	0.125	1	2	2	1	1	54723-2
8	2	41	11	11	5	2	1	3200.00	0.00	0.000	0.125	1	2	2	1	1	54808-
8	2	521	1	14	11	1	1	100.00	0.00	0.000	0.125	1	2	4	4	2	54539-
0	0	15	10	25	5	0	0	400.00	0.00	0.000	0.125	1	3	2	1	1	55095-
0	0	15	10	10	3	0	0	10.00	0.00	0.000	1.000	2	3	2	1	1	55096-
0	0	15	1	30	5	0	0	1000.00	0.00	0.000	0.250	2	2	2	1	1	55098-
0	0	26	1	29	10	0	0	10.00	0.00	0.000	0.125	2	1	2	1	2	53250-
0	0	35	11	33	3	0	0	0.00	70.00	36.000	0.125	1	2	2	1	1	54723-
0	0	35	10	25	5	0	0	450.00	0.00	0.000	0.125	1	2	2	1	1	54724-
0	0	35	10	26	5	0	0	50.00	0.00	0.000	0.125	1	2	2	1	1	54725-
0	0	39	0	0	0	0	0	0.00	0.00	0.000	0.000	0	0	0	0	0	
0	0	39	11	33	3	0	0	0.00	240.00	18.000	0.125	1	2	2	1	1	54726-
0	0	39	10	25	5	0	0	400.00	0.00	0.000	0.125	1	2	2	1	1	54727-
0	0	39	10	25	5	0	0	100.00	0.00	0.000	0.125	1	2	2	1	1	54728-
0	0	41	0	0	0	0	0	0.00	0.00	0.000	0.000	0	0	0	0	0	
0	0	41	5	30	5	0	0	32.00	0.00	0.000	0.500	2	2	2	1	2	54803-
0	0	41	1	30	5	0	0	350.00	0.00	0.000	0.500	2	2	2	1	2	54803-1
0	0	41	1	3	3	0	0	350.00	0.00	0.000	0.500	2	2	2	1	2	54806-
0	0	41	11	11	5	0	0	3200.00	0.00	0.000	0.062	2	2	2	1	1	54807-
0	0	41	10	26	5	0	0	70.00	0.00	0.000	0.125	1	2	2	1	1	54809-
0	0	83	0	0	0	0	0	0.00	0.00	0.000	0.000	0	0	0	0	0	
0	0	86	10	25	5	0	0	75000.00	0.00	0.000	0.125	1	2	2	1	1	54885-
0	0	86	10	26	5	0	0	3000.00	0.00	0.000	0.125	1	2	2	1	1	54886-
0	0	86	10	29	10	0	0	76.00	0.00	0.000	0.125	2	2	2	1	2	54887-
0	0	86	1	18	3	0	0	0.00	3700.00	2.000	0.500	2	2	4	3	3	54888-
0	0	86	2	18	3	0	0	0.00	3700.00	2.000	0.500	2	2	4	3	3	54888-1
0	0	86	3	18	3	0	0	0.00	2700.00	2.000	0.500	2	2	4	3	3	54888-2
0	0	86	1	18	3	0	0	0.00	0.00	2.000	0.500	2	2	2	1	2	54889-
0	0	86	3	3	3	0	0	500.00	0.00	0.000	0.375	2	2	4	3	3	54892-
0	0	86	2	33	2	0	0	2000.00	0.00	0.000	0.125	1	1	4	3	3	54894-
0	0	86	3	33	2	0	0	2000.00	0.00	0.000	0.125	1	1	4	3	3	54894-1
0	0	86	8	10	3	0	0	200.00	0.00	0.000	2.000	2	2	2	1	2	54896-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
0	0	86	2	30	5	0	0	25000.00	0.00	0.000	0.375	2	2	4	3	3	54897-
0	0	86	3	30	5	0	0	25000.00	0.00	0.000	0.375	2	2	4	3	3	54897-1
0	0	86	1	30	5	0	0	4500.00	0.00	0.000	0.375	2	2	4	3	3	54897-2
0	0	86	2	3	3	0	0	1500.00	0.00	0.000	0.375	2	2	4	3	3	54898-
0	0	87	1	30	5	0	0	500.00	0.00	0.000	0.500	2	2	2	1	2	54801-
0	0	87	10	25	5	0	0	500.00	0.00	0.000	0.500	1	2	2	1	1	54802-
0	0	90	1	3	3	0	0	288.00	0.00	0.000	2.000	2	2	2	1	1	54820-
0	0	90	10	33	11	0	0	288.00	0.00	0.000	1.000	3	2	2	1	1	54821-
0	0	92	1	33	1	0	0	14000.00	0.00	0.000	2.000	2	2	4	3	3	54883-
0	0	92	1	30	5	0	0	3000.00	0.00	0.000	0.500	2	2	4	3	3	54884-
0	0	138	2	14	5	0	0	800.00	0.00	0.000	0.125	1	1	4	3	4	54661-
0	0	138	1	14	5	0	0	700.00	0.00	0.000	0.125	1	1	4	3	4	54661-1
0	0	138	2	14	5	0	0	1800.00	0.00	0.000	0.125	1	1	4	3	4	54662-
0	0	138	1	14	5	0	0	2380.00	0.00	0.000	0.125	1	1	4	3	4	54662-1
0	0	138	1	14	5	0	0	1600.00	0.00	0.000	0.125	1	1	4	3	4	54662-2
0	0	138	2	14	5	0	0	360.00	0.00	0.000	0.125	1	1	4	3	4	54663-
0	0	138	2	14	5	0	0	2960.00	0.00	0.000	0.062	1	1	4	3	4	54664-
0	0	138	1	14	5	0	0	3080.00	0.00	0.000	0.000	1	1	4	3	4	54664-1
0	0	138	2	14	11	0	0	380.00	0.00	0.000	0.125	1	1	4	3	4	54666-
0	0	138	1	14	11	0	0	1370.00	0.00	0.000	0.125	1	1	4	3	4	54666-1
0	0	138	2	14	11	0	0	72.00	0.00	0.000	0.125	1	1	4	3	4	54667-
0	0	138	1	14	11	0	0	1850.00	0.00	0.000	0.125	1	2	4	3	4	54667-1
0	0	138	2	14	5	0	0	752.00	0.00	0.000	0.060	1	1	4	3	4	54668-
0	0	138	2	33	3	0	0	57.00	0.00	0.000	0.125	1	1	4	3	4	54669-
0	0	138	11	27	8	0	0	15600.00	0.00	0.000	0.250	1	1	4	3	4	54670-
0	0	138	2	30	5	0	0	17700.00	0.00	0.000	0.500	2	2	4	3	4	54671-
0	0	138	2	32	8	0	0	1065.00	0.00	0.000	0.750	2	4	4	3	4	54672-
0	0	138	1	32	8	0	0	1065.00	0.00	0.000	0.750	2	4	4	3	4	54672-1
0	0	138	1	14	11	0	0	1200.00	0.00	0.000	0.125	1	1	4	3	4	54673-
0	0	138	1	3	3	0	0	2735.00	0.00	0.000	0.500	2	1	4	3	4	54674-
0	0	138	1	3	3	0	0	1000.00	0.00	0.000	0.500	2	1	4	3	4	54675-
0	0	138	1	3	3	0	0	650.00	0.00	0.000	0.500	2	1	4	3	4	54676-

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
0	0	138	6	18	3	0	0	0.00	600.00	2.000	1.000	2	2	1	1	2	54677-1
0	0	511	1	31	5	0	0	3500.00	0.00	0.000	0.125	1	2	1	1	1	54852-
0	0	511	10	26	5	0	0	3200.00	0.00	0.000	0.125	1	2	2	1	1	54853-
0	0	511	1	14	11	0	0	110.00	0.00	0.000	0.125	1	2	4	4	4	54854-
0	0	511	1	14	11	0	0	3090.00	0.00	0.000	0.125	1	2	4	4	4	54855-
0	0	511	1	33	3	0	0	400.00	0.00	0.000	0.125	1	2	4	4	4	54856-
0	0	511	1	3	3	0	0	1440.00	0.00	0.000	0.375	2	2	4	4	4	54857-
0	0	511	1	3	3	0	0	1120.00	0.00	0.000	0.375	2	2	4	4	4	54858-
0	0	511	1	3	3	0	0	320.00	0.00	0.000	0.375	2	2	4	4	4	54858-1
0	0	511	1	3	3	0	0	400.00	0.00	0.000	0.375	2	2	4	4	4	54859-
0	0	511	6	15	3	0	0	0.00	500.00	1.000	0.500	2	3	2	1	1	54864-
0	0	511	6	18	3	0	0	0.00	500.00	1.500	0.500	2	3	2	1	1	54866-
0	0	511	6	22	3	0	0	0.00	16.00	1.500	0.500	2	3	2	1	1	54869-
0	0	511	6	22	3	0	0	0.00	28.00	1.500	0.500	2	3	2	1	1	54870-
0	0	520	11	11	5	0	0	3142.00	0.00	0.000	0.125	1	2	4	1	1	54510-
0	0	520	11	11	5	0	0	1200.00	0.00	0.000	0.125	1	2	2	1	1	54510-1
0	0	520	11	11	5	0	0	3142.00	0.00	0.000	0.125	1	2	4	1	1	54511-
0	0	520	11	11	5	0	0	1200.00	0.00	0.000	0.125	1	2	2	1	1	54511-1
0	0	520	10	26	5	0	0	3078.00	0.00	0.000	0.125	1	2	2	1	1	54512-
0	0	520	10	26	5	0	0	3078.00	0.00	0.000	0.125	1	2	2	1	1	54513-
0	0	520	10	25	5	0	0	81.00	0.00	0.000	0.125	1	2	2	1	1	54514-
0	0	520	1	14	11	0	0	70.00	0.00	0.000	0.125	1	2	4	4	2	54517-
0	0	520	1	33	2	0	0	170.00	0.00	0.000	0.125	1	1	4	4	2	54518-
0	0	520	1	3	3	0	0	872.00	0.00	0.000	0.250	2	2	4	4	2	54520-
0	0	520	1	3	3	0	0	50.00	0.00	0.000	0.250	2	1	4	4	2	54520-1
0	0	520	1	30	5	0	0	3614.00	0.00	0.000	0.375	2	2	4	4	2	54521-
0	0	520	5	18	2	0	0	0.00	25.00	2.000	1.500	2	2	2	1	1	54530-
0	0	520	5	30	5	0	0	45.00	0.00	0.000	0.375	2	2	2	1	1	54531-
0	0	521	0	0	0	0	0	0.00	0.00	0.000	0.000	0	0	0	0	0	
0	0	521	1	33	2	0	0	132.00	0.00	0.000	0.125	1	2	4	4	2	51518-1
0	0	521	10	26	5	0	0	2500.00	0.00	0.000	0.125	1	2	2	1	1	54512-1
0	0	521	1	30	5	0	0	2800.00	0.00	0.000	0.375	2	2	4	4	2	54521-1

TABLE VI
HAMILTON ARMY AIR FIELD
US ARMY COE - SACRAMENTO
FACILITY SURVEY REPORT BY ALGORITHM

Alg Num	Act Code	Bldg Num	Bldg Area Code	Funct Code	Form Code	Asb Pct Code	Asb Type Code	Area SF	Length FT	Pipe Dia. Inch	ACM Thick Inch	Friab Code	Cond Code	Contct Potntl Code	Occup Code	Scty Code	Sample Number
0	0	521	11	11	5	0	0	2751.00	0.00	0.000	0.062	1	2	4	1	1	54537-
0	0	521	11	11	5	0	0	1200.00	0.00	0.000	0.062	2	2	2	1	1	54537-1
0	0	521	1	3	3	0	0	486.00	0.00	0.000	0.250	2	2	4	4	2	54542-
0	0	521	1	3	3	0	0	420.00	0.00	0.000	0.250	2	2	4	4	2	54543-
0	0	521	5	30	5	0	0	250.00	0.00	0.000	0.375	2	2	2	1	1	54544-
0	0	737	0	0	0	0	0	0.00	0.00	0.000	0.000	0	0	0	0	0	
0	0	737	0	0	0	0	0	0.00	0.00	0.000	0.000	0	0	0	0	0	

APPLICATION AND LIMITATIONS

An effort has been made to provide as complete and comprehensive an evaluation as professionally practical. However, inherent constraints of time, observation, and scope of work must be recognized. Observations, findings, results, and conclusions are limited accordingly and to those apparent at the time. They are not to be construed to be all inclusive nor covering every possible aspect. It should not be construed that actions taken as a result of this work will achieve complete compliance with every regulatory standard nor prevent every possible accident or loss. Neither should it be considered that any recommendations noted are the only possible actions to be taken. Management should assess and analyze each thought in relation to its more intimate knowledge of its resources, objectives, and activities. Decisions should then be made and acted on accordingly.

WESTON

APPENDIX B

FINAL REPORT

CONFIRMATION STUDY FOR HAZARDOUS WASTE

WOODWARD-CLYDE CONSULTANTS

(Excerpts)

Woodward-Clyde Consultants

Transformers

FINAL REPORT

CONFIRMATION STUDY FOR HAZARDOUS WASTE

HAMILTON AIR FORCE BASE

NOVATO, CALIFORNIA

JANUARY 14, 1987

Table 1. TRANSFORMER LOCATIONS, NUMBERING DESIGNATION, AND INSPECTION PLATE DATA (SEE PLATE 1 FOR LOCATIONS)

LOCATION NUMBER	TRANSFORMER NUMBER	MAKE	SERIAL NUMBER	MODEL NUMBER	KVA
G-1	1	Hill	145069	D02	50
G-1	2	Hill	145070	D02	50
G-1	3	Hill	145068	D02	50
G-2	4	Westinghouse	60S C158	12V2031	15
G-2	5	Westinghouse	60S C157	12V2031	15
G-2	6	Westinghouse	60S C156	12V2031	15
G-3	7	Hill	146771	D02	75
G-3	8	Hill	146772	D02	75
G-3	9	Hill	146770	D02	75
G-4	10	Westinghouse	8334793	1583545	10
G-4	11	Westinghouse	8334795	1583545	10
G-4	12	Westinghouse	8334794	1583545	10
G-4	13	Federal Pacific	126089	D065	25
G-5	14	General Electric	9284805	4160Y	25
G-5	15	General Electric	9267626	4160Y	25
G-5	16	General Electric	9900299	4160Y	25
G-5	17	General Electric	9278642	4160Y	25
G-6	18	General Electric	J824895	11/F	15 KW
G-6	19	General Electric	9952482	MC-1	37.5 KW
G-6	20	General Electric	9952925	MC-1	37.5 KW
G-6	21	General Electric	9952870	MC-1	37.5 KW
G-7	22	Hill	14194	D02	75
G-7	23	Hill	141943	D02	100
G-7	24	Hill	141944	D02	100
G-7	25	Hill	141942	D02	100
G-7	26	Westinghouse	3262497	1028822D	50
G-7	27	Line Material	296935	C3T9P	50
G-7	28	Westinghouse	3262504	1028822D	50
G-8	29	Westinghouse	2975510	958612	75
G-8	30	Westinghouse	2972991	958612	75
G-8	31	Westinghouse	2964011	958612	75
G-8	32	Westinghouse	3173410	1191217	37.5
G-9	33	Hill	141735	D02	37.5
G-9	34	Hill	141591	D02	25
G-9	35	Hill	141590	D02	25
G-9	36	Hill	141589	D02	25

Table 1. TRANSFORMER LOCATIONS, NUMBERING DESIGNATION, AND INSPECTION PLATE DATA (SEE PLATE 1 FOR LOCATIONS) (continued)

LOCATION NUMBER	TRANSFORMER NUMBER	MAKE	SERIAL NUMBER	MODEL NUMBER	KVA
G-9	33	Hill	141735	DO2	37.5
G-9	34	Hill	141591	DO2	25
G-9	35	Hill	141590	DO2	25
G-9	36	Hill	141589	DO2	25
G-10	37	Sierra	12785-1	300TPL22GF	300
G-11	38	General Electric	L667809K74	None	75
G-11	39	General Electric	None	None	100
G-11	40	General Electric	9753580	None	100
G-11	41	General Electric	9753630	None	100
G-12	42	Hill	145071	DO2	333
G-12	43	Hill	145072	DO2	333
G-12	44	Hill	145073	DO2	333
G-13	45	Westinghouse	74A12494	A2412A25AAG	25
G-13	46	Westinghouse	74AJ2489	A2412A25AAG	25
G-13	47	Westinghouse	74AL2493	A2412A25AAG	25
G-13	48	Hiper Core	1265690	LL	50
G-14	49	Precision	150102N	None	37.5
G-14	50	Precision	150103N	None	37.5
G-14	51	Precision	150104N	None	
G-15	52	Westinghouse	3173606	1191217	37.5
G-15	53	Wagner	K9F1325	Hex	50
G-15	54	Westinghouse	6008214	1583536A	37.5
G-15	55	Westinghouse	2968349	958612	75
G-15	56	Gardner	62713	D	50
P-1	57	General Electric	9814759	None	37.5
P-1	58	General Electric	9785134	None	37.5
P-1	59	General Electric	9772207	None	37.5
G-16	60	Westinghouse	5458972	7UC3-001	25
G-16	61	Westinghouse	5458999	7UC3-001	25
G-16	62	Westinghouse	5459000	7UC3-001	25
G-17	63	General Electric	9653655	None	75
G-17	64	General Electric	9645162	None	75
G-17	65	General Electric	9653654	None	75

Table 1. TRANSFORMER LOCATIONS, NUMBERING DESIGNATION, AND INSPECTION PLATE DATA (SEE PLATE 1 FOR LOCATIONS) (continued)

LOCATION NUMBER	TRANSFORMER NUMBER	MAKE	SERIAL NUMBER	MODEL NUMBER	KVA
G-18	66	Westinghouse	62SF2133	12V3489	50
G-18	67	Westinghouse	62SF2135	12V3489	50
G-18	68	Westinghouse	62SF2134	12V3489	50
G-19	69	Delta Star	W157670	D02C	37.5
G-19	70	Delta Star	W157671	D02C	37.5
G-19	71	Delta Star	W157672	D02C	37.5
G-19	72	Sierra	10511-2	100SAL22LE	100
G-19	73	Sierra	10511-1	100SAL22LE	100
G-19	74	Sierra	10511-3	100SAL22LE	100
G-20	75	Line Material	419527	03T8P	37.5
G-20	76	Line Material	419452	03T8P	37.5
G-20	77	Line Material	419593	03T8P	37.5
G-20	78	General Electric	69001555	KP	50
G-21	79	Delta Star	185109	None	15
G-21	80	Delta Star	185107	None	15
G-21	81	Delta Star	185108	None	15
G-22	82	Hill	148155	D02	10
G-22	83	Hill	148157	D02	25
G-22	84	Hill	148156	D02	10
G-23	85	Westinghouse	6924254	7UC4-001	25
G-23	86	Westinghouse	6924264	7UC4-001	25
G-23	87	Westinghouse	6912563	7UC4-001	25
P-2	88	General Electric	9892375	R02	10
P-2	89	General Electric	J824835	C202G139	15
P-2	90	General Electric	9915085	H5	25
P-2	91	General Electric	9915078	H5	25
P-2	92	General Electric	9915076	H5	25
P-3	93	General Electric	D866313/58K	None	50
P-3	94	General Electric	D755480/57K	None	50
P-3	95	General Electric	D755479/57K	None	50
P-4	96	Westinghouse	6931115	5U4C-001	10
P-4	97	Westinghouse	6910192	5U4C-001	10
P-4	98	Westinghouse	6912391	5U4C-001	10

Table 1. TRANSFORMER LOCATIONS, NUMBERING DESIGNATION, AND INSPECTION PLATE DATA (SEE PLATE 1 FOR LOCATIONS) (continued)

LOCATION NUMBER	TRANSFORMER NUMBER	MAKE	SERIAL NUMBER	MODEL NUMBER	KVA
P-5	99	General Electric	None	W2F	10
P-5	100	Wagner	208324	8112	15
P-5	101	General Electric	6963638	W2F	10
P-6	102	General Electric	6898378	K	25
P-7	103	General Electric	None	K	15
P-8	104	General Electric	None	K	25
P-9	105	Delta Star	W-193421	None	25
P-9	106	Delta Star	W-193420	None	25
P-9	107	Delta Star	W-193422	None	25
P-10	108	General Electric	6897659	None	15
P-10	109	General Electric	6897107	None	15
P-10	110	General Electric	6897717	None	15
P-11	111	General Electric	6902034	H	25
P-12	112	Hill	None	None	25
P-13	113	None	None	None	37.5
P-14	114	General Electric	J743282K70A	HS	25
P-15	115	Westinghouse	2000908	M 1250	15
P-16	116	H.K. Porter	225383	None	25
P-16	117	H.K. Porter	224384	None	25
P-16	118	H.K. Porter	225385	None	25
P-17	119	General Electric	9673082	HS	25
P-18	120	General Electric	G731371-67K	HSB	10
P-19	121	General Electric	F954269-64K	None	10
P-19	122	General Electric	F954268-64K	None	10
P-19	123	General Electric	F954270-64K	None	10
P-20	124	Wagner	373708	None	25
P-20	125	Wagner	373709	None	25
P-20	126	Wagner	373707	None	25

Table 1. TRANSFORMER LOCATIONS, NUMBERING DESIGNATION, AND INSPECTION PLATE DATA (SEE PLATE 1 FOR LOCATIONS) (continued)

LOCATION NUMBER	TRANSFORMER NUMBER	MAKE	SERIAL NUMBER	MODEL NUMBER	KVA
P-21	127	Kuhlmal	942224	None	25
P-24	128	Precision	150237K	None	37.5
P-24	129	Precision	150238K	None	37.5
P-24	130	Precision	150239K	None	37.5
P-24	131	Delta Star	204188	OS	50
P-24	132	Delta Star	204187	OS	50
P-24	133	Delta Star	204186	OS	50
P-22	134	H.K. Porter	173013	None	25
P-22	135	H.K. Porter	173012	None	25
P-22	136	H.K. Porter	173011	None	25
P-23	137	General Electric	FA48190-641	None	10
P-23	138	General Electric	6701971	None	37.5
P-23	139	General Electric	FA48184-649	None	10
P-24	140	Westinghouse	5939179	S	37.5
P-25	141	Delta Star	152717	D021	25
P-26	142	Line Material	AV112106	HPS	37.5
P-27	143	Westinghouse	2677271	M8328	15
P-28	144	Westinghouse	6330928	None	15
P-28	145	Westinghouse	6330947	None	15
P-28	146	Westinghouse	6330933	None	15
P-29	147	Gardner	70851	C	25
P-29	148	Gardner	70849	C	25
P-29	149	Gardner	70850	C	25
P-30	150	Hill	141736	D02	37.5
G-25	151	Central	3035/5	AOD	25
G-25	152	Central	3147/2/71	AOD	25
G-25	153	Central	3035/11	AOD	25
G-25	154	General Electric	L676977474	None	37.5
G-25	155	General Electric	L676978K74	None	37.5
G-25	156	General Electric	L678978474	None	37.5

Table 1. TRANSFORMER LOCATIONS, NUMBERING DESIGNATION, AND INSPECTION PLATE DATA (SEE PLATE 1 FOR LOCATIONS) (concluded)

LOCATION NUMBER	TRANSFORMER NUMBER	MAKE	SERIAL NUMBER	MODEL NUMBER	KVA
P-31	157	Westinghouse	6166023	None	25
P-31	158	Westinghouse	6166024	None	25
P-31	159	Westinghouse	6166019	None	25
G-26	160	Hill	146443	SW1	37.5
G-26	161	Hill	146442	SW1	37.5
G-26	162	Hill	146441	SW1	37.5
G-26	163	Line Material	1005772	LA	75
P-32	164	General Electric	J756382K70	None	100
P-32	165	General Electric	J756383K70	None	100
P-32	166	General Electric	J736665K70	None	100
UG-1	167	None	None	None	25
UG-2	168	None	None	None	15
UG-3	169	None	None	None	37.5

Table 11. RESULTS OF PCB ANALYSIS FOR TRANSFORMER OIL (ppm)

Transformer Identification No.	Field Test Kit	Laboratory Results
1	0	NT
2	0	NT
3	0	NT
4	7	NT
5	0	NT
6	0	NT
7	0	NT
8	0	NT
9	0	NT
10	0	NT
11	8	NT
12	0	NT
13	0	NT
14	0	NT
15	0	NT
16	0	NT
17	6	NT
18	0	NT
19	36	25
20	0	NT
21	0	NT
22	0	NT
23	0	NT
24	0	NT
25	0	NT
26	7	NT
27	24	NT
28	36	45
29	9	NT
30	0	NT
31	234	300
32	0	NT
33	0	NT
34	0	NT
35	0	NT
36	0	NT
37	0	NT
38	7	NT
39	0	NT

Table 11. RESULTS OF PCB ANALYSIS FOR TRANSFORMER OIL (ppm) (continued)

Transformer Identification No.	Field Test Kit	Laboratory Results
40	12	NT
41	0	NT
42	0	NT
43	0	NT
44	0	NT
45	13	NT
46	10	NT
47	6	NT
48	6	NT
49	14	NT
50	18	NT
51	13	NT
52	0	NT
53	0	NT
54	0	NT
55	10	NT
56	0	NT
57	0	NT
58	155	32
59	9	NT
60	0	NT
61	0	Nt
62	0	NT
63	11	NT
64	8	NT
65	8	NT
66	4	NT
67	1	NT
68	0	NT
69	1	NT
70	1	NT
71	0	NT
72	8	NT
73	10	NT
74	10	NT
75	3	NT
76	10	NT
77	9	NT
78	489	180
79	1	NT
80	0	NT
81	0	NT

Table 11. RESULTS OF PCB ANALYSIS FOR TRANSFORMER OIL (ppm) (continued)

Transformer Identification No.	Field Test Kit	Laboratory Results
82	0	NT
83	0	NT
84	0	NT
85	0	NT
86	0	NT
87	0	NT
88	0	NT
89	0	NT
90	0	NT
91	1	NT
92	0	NT
93	7	NT
94	0	NT
95	0	NT
96	0	NT
97	0	NT
98	0	NT
99	103	ND
100	25	ND
101	132	ND
102	254	100
103	679	140
104	254	160
105	3	NT
106	2	NT
107	6	NT
108	215	100
109	168	68
110	168	9.5
111	324	130
112	Transformer could not be opened - No sample	
113	Transformer empty - No sample	
114	0	NT
115	0	NT
116	0	NT
117	23	NT
118	1	NT
119	8	NT
120	1	NT
121*	20	NT
122*	5	NT
123*	25	NT

Table 11. RESULTS OF PCB ANALYSIS FOR TRANSFORMER OIL (ppm) (continued)

Transformer Identification No.	Field Test Kit	Laboratory Results
124	10	NT
125	11	NT
126	5	NT
127	4	NT
128	16	NT
129	20	NT
130	20	NT
131	0	NT
132	0	NT
133	0	NT
134	2	NT
135	0	NT
136	0	NT
137	22	NT
138	215	80
139	21	NT
140	18	NT
141*	0	NT
142	0	NT
143	7	NT
144	10	NT
145	0	NT
146	0	NT
147	0	NT
148	0	NT
149	0	NT
150	2	NT
151	13	NT
152	5	NT
153	10	NT
154	5	NT
155	3	NT
156	2	NT
157	0	NT
158	0	NT
159	0	NT
160	0	NT
161	0	ND
162	0	NT
163	3	NT
164	0	NT
165	0	NT

Table 11. RESULTS OF PCB ANALYSIS FOR TRANSFORMER OIL (ppm) (concluded)

Transformer Identification No.	Field Test Kit	Laboratory Results
166	0	NT
167	Underground Vault - Transformer Underwater - No Sample	
168	Underground Vault - Transformer Underwater - No Sample	
169	Underground Vault - Transformer Underwater - No Sample	
170	679	230

Lower Detection Limit = 3 ppm

Note: 170 is a Duplicate of 103
ND = Not Detected
NT = Not Tested

APPENDIX C

FINAL REPORT

HAMILTON AFB - STORAGE TANK REMOVAL PROJECT

ITC
MARTINEZ, CALIFORNIA

(Excerpts)

FINAL REPORT
HAMILTON AFB - STORAGE TANK REMOVAL PROJECT

CONTRACT DACA 45-86-C-0140

PREPARED FOR:

ATLAS HYDRAULIC CORPORATION
HAYWARD, CALIFORNIA

BY:

INTERNATIONAL TECHNOLOGY CORPORATION
ENGINEERING SERVICES DIVISION
MARTINEZ, CALIFORNIA

FEBRUARY 1987

1.0 INTRODUCTION

1.1 BACKGROUND

Hamilton Air Force Base is located in Marin County approximately 25 miles north of San Francisco and 5 miles southeast of Novato, California. It is bounded on the west by Highway 101 and on the east by San Pablo Bay. The facility occupies 2,137 acres; approximately 400 of these acres are in the process of being sold by the General Services Administration (GSA) to a private developer who proposes to develop light industry and residential housing on the property. The remaining 1,757 acres are currently under the control of the U.S. Navy, which has assumed control of the housing area and the operation of the facility's utilities.

In 1974 the Air Force declared Hamilton AFB in excess and decommissioned the facility. The GSA then assumed custodial responsibility for the facility. In 1984 the Army took over the operation of the airfield and custodial responsibility of the facility from GSA. It also changed the name of the facility to Hamilton Army Airfield (Hamilton).

In 1985 preliminary confirmation studies conducted at Hamilton under the direction of U.S. Army Corps of Engineers (COE) identified over 50 underground storage tanks on the facility, ranging in size from 750 to 25,000 gallons. The majority of these tanks were located on the sale property. The tanks had been taken out of service several years earlier, but potentially contained hazardous or toxic substances. On May 12, 1986, the COE contracted Atlas Hydraulic Corporation (Atlas) and their key subcontractor, International Technology Corporation (IT), to remove and dispose of over 50 underground storage tanks, including two grease traps and one above ground 840,000 gallon tank. The contract also included the removal of several concrete equipment vaults and related equipment, the disposal of tank contents, sampling and analysis of soil and water beneath and around the tanks, and the disposal of contaminated soil and liquids.

TABLE 1-1

REMOVED STORAGE TANK CONTENT DATA

Plan Loc.	Tank No.	Tank Vol.(gal.)	Liquid[a] Level (in.)	Liquid[a] Vol.(gal.)	Hydrocarbon Level (in.)	Hydrocarbon Vol.(gal.)	Orig. Use[b]
1	A01	1,000	6.0	70	0.5	10	Diesel
1	B01	1,000	19.5	250	1.5	20	Diesel
2	C01	840,000	12.5	24,400	0	0	JP-4
3	D01	25,000	1.75	70	0.75	40	JP-4
3	D02	25,000	10.5	1,000	10.5	1,000	JP-4
3	D03	25,000	1.75	100	1.75	100	JP-4
3	D04	25,000	6.0	450	5.5	440	JP-4
3	D05	25,000	4.25	250	4.0	240	JP-4
3	D06	25,000	2.0	100	2.0	100	JP-4
3	D07	25,000	2.5	100	2.5	100	JP-4
3	D08	25,000	2.5	100	2.5	100	JP-4
3	D09	25,000	2.5	100	2.5	100	JP-4
3	D10	25,000	11.0	1,100	11.0	1,100	JP-4
3	D11	25,000	2.5	100	2.5	100	JP-4
3	D12	25,000	1.0	50	1.0	50	JP-4
3	D13	25,000	3.75	200	3.75	200	JP-4
3	D14	25,000	4.5	300	2.0	200	JP-4
3	D15	25,000	3.0	150	1.5	100	JP-4
3	D16	25,000	2.0	100	1.5	90	JP-4
3	D17	25,000	10.0	950	7.0	800	JP-4
3	D18	25,000	87.0	19,100	87.0	19,100	JP-4
3	D19	25,000	2.5	100	2.5	100	JP-4
3	D20	25,000	6.0	450	C	0	JP-4
3	D21	750	2.0	10	2.0	10	Unknown
4	E01	25,000	0	0	0	0	Av-Gas
4	E02	25,000	16.0	1,900	5.0	800	Av-Gas
4	E03	25,000	8.5	750	0	0	Av-Gas

TABLE 1-1 (CONTINUED)

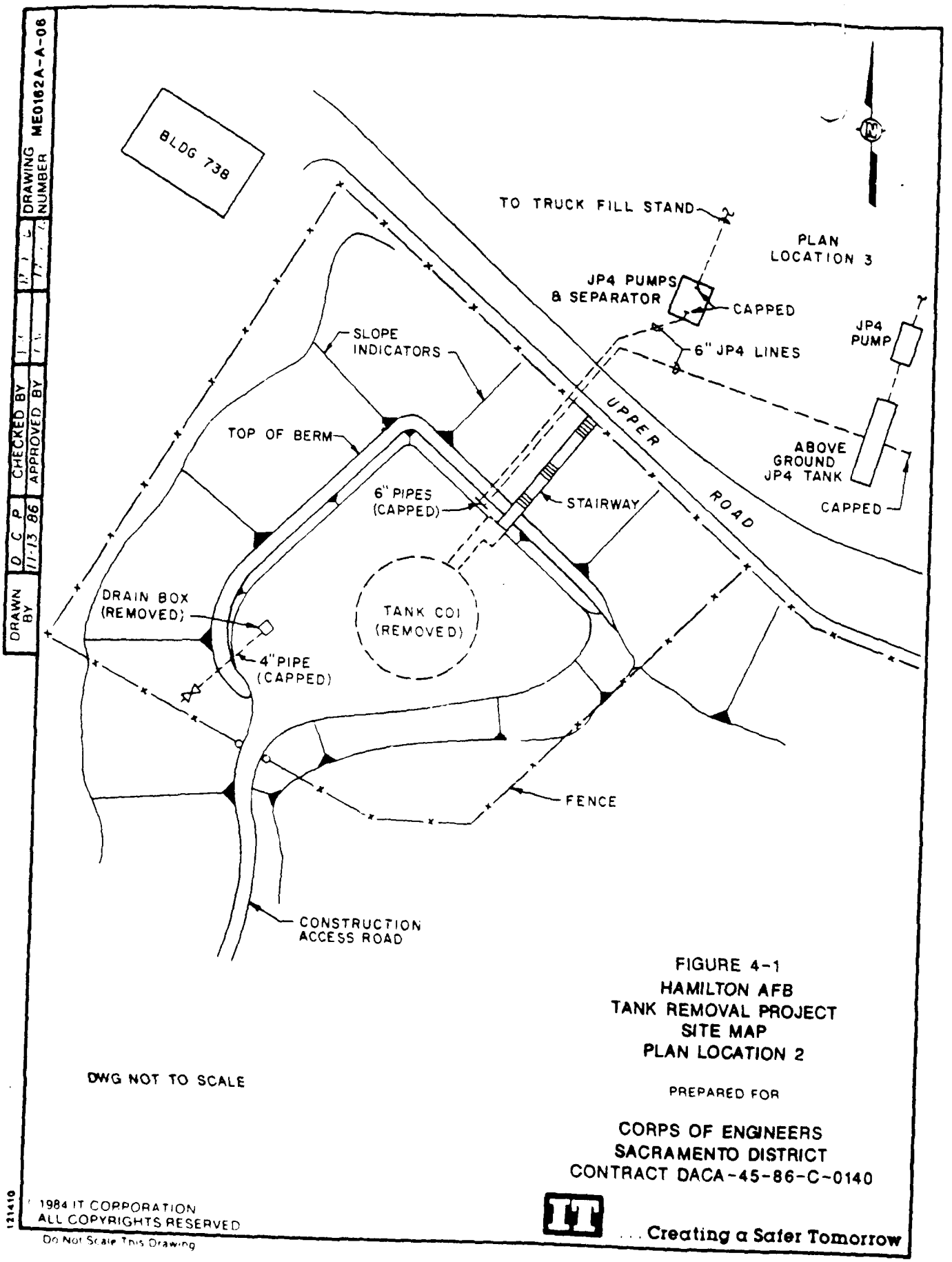
Plan Loc.	Tank No.	Tank Vol(gal.)	Liquid[a] Level (in.)	Liquid[a] Vol.(gal.)	Hydrocarbon Level (in.)	Hydrocarbon Vol.(gal.)	Orig Use[b]
4	F01	25,000	126.0	25,000	TRACE	>0	Av-Gas
4	F02	25,000	126.0	25,000	TRACE	>0	Av-Gas
5	G01	10,000	5.5	250	0.0	0	Diesel
5	G02	10,000	90.0	9,750	0.0	0	Mo-Gas
5	G03	10,000	3.0	100	0.0	0	Mo-Gas
5	H01	100	Sludge	--	--	--	Unknown
6	J01	750	3.5	20	2.0	15	Kerosene
6	J02	2,000	64.0	2,000	0.0	0	Solvent
6	J03	2,000	64.0	2,000	0.0	0	Solvent
7	K01	5,000	3.0	50	3.0	50	Fuel Oil
8	L01	5,000	96.0	5,000	0.0	0	Fuel Oil
9	M01	1,000	0.0	0	0.0	0	Mo-Gas
9	M02	1,000	0.0	0	0.0	0	Mo-Gas
9	N01[d]	500	29.5	230	9.5	75	Grease[c]
9	N02[d]	250	30.0	180	10.0	60	Grease
10	R01	25,000	--	--	--	--	Av-Gas
10	R02	25,000	--	--	--	--	Av-Gas
10	R03	25,000	--	--	--	--	Av-Gas
10	R04	25,000	--	--	--	--	Av-Gas
10	R05	25,000	--	--	--	--	Av-Gas
10	P01	25,000	--	--	--	--	Av-Gas
10	P02	25,000	--	--	--	--	Av-Gas
10	P03	25,000	--	--	--	--	Av-Gas

NG:1035-t1/02117

TABLE 1-1 (CONTINUED)

Plan Loc.	Tank No.	Tank Vol.(gal.)	Liquid[a] Level (in.)	Liquid[a] Vol.(gal.)	Hydrocarbon Level (in.)	Hydrocarbon Vol.(gal.)	Orig. Use[b]
10	P04	25,000	--	--	--	--	Av-Gas
10	P05	25,000	--	--	--	--	Av-Gas
10	P07	500	--	--	--	--	Unknown
10	S01	25,000	--	--	--	--	Av-Gas
10	S02	25,000	--	--	--	--	Av-Gas
10	S04	25,000	--	--	--	--	Av-Gas
10	S05	25,000	--	--	--	--	Av-Gas
10	S06	25,000	--	--	--	--	Av-Gas
10	S07	25,000	--	--	--	--	Av-Gas
10	S08	25,000	--	--	--	--	Av-Gas
10	S09	25,000	--	--	--	--	Av-Gas
10	S10	25,000	--	--	--	--	Av-Gas
10	S11	25,000	--	--	--	--	Av-Gas
11	T01	550	30.0	500	6.0	40	Waste Oil

[a] Tanks at Plan Location 10 originally were used to store Av-Gas but had been filled with sand.
[b] Based on Army Corps of Engineer records.
[c] Trap N01 contained 20 inches of sludge.
[d] Grease traps


DRAWING NUMBER ME0162A-A-08
DRAWN BY O C P
CHECKED BY
APPROVED BY
11-13-86
BLDG 738
TO TRUCK FILL STAND
PLAN LOCATION 3
JP4 PUMPS & SEPARATOR
CAPPED
JP4 PUMP
SLOPE INDICATORS
6" JP4 LINES
TOP OF BERM
UPPER ROAD
ABOVE GROUND JP4 TANK
CAPPED
6" PIPES (CAPPED)
STAIRWAY
DRAIN BOX (REMOVED)
TANK C01 (REMOVED)
4" PIPE (CAPPED)
FENCE
CONSTRUCTION ACCESS ROAD
DWG NOT TO SCALE
FIGURE 4-1
HAMILTON AFB
TANK REMOVAL PROJECT
SITE MAP
PLAN LOCATION 2
PREPARED FOR
CORPS OF ENGINEERS
SACRAMENTO DISTRICT
CONTRACT DACA-45-86-C-0140
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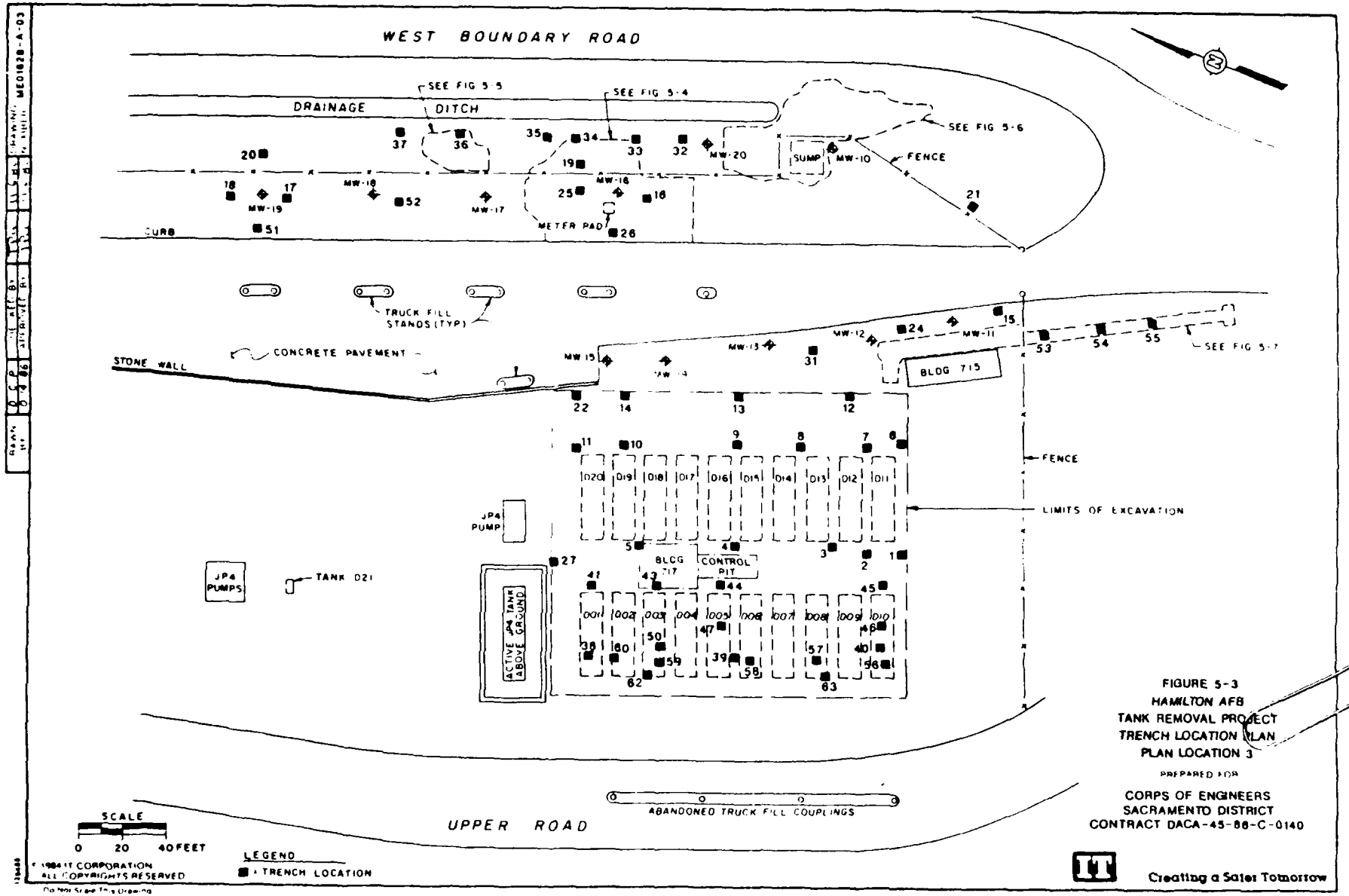

FIGURE 5-3
HAMILTON AFB
TANK REMOVAL PROJECT
TRENCH LOCATION PLAN
PLAN LOCATION 3

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SACRAMENTO DISTRICT
CONTRACT DACA-45-86-C-0140

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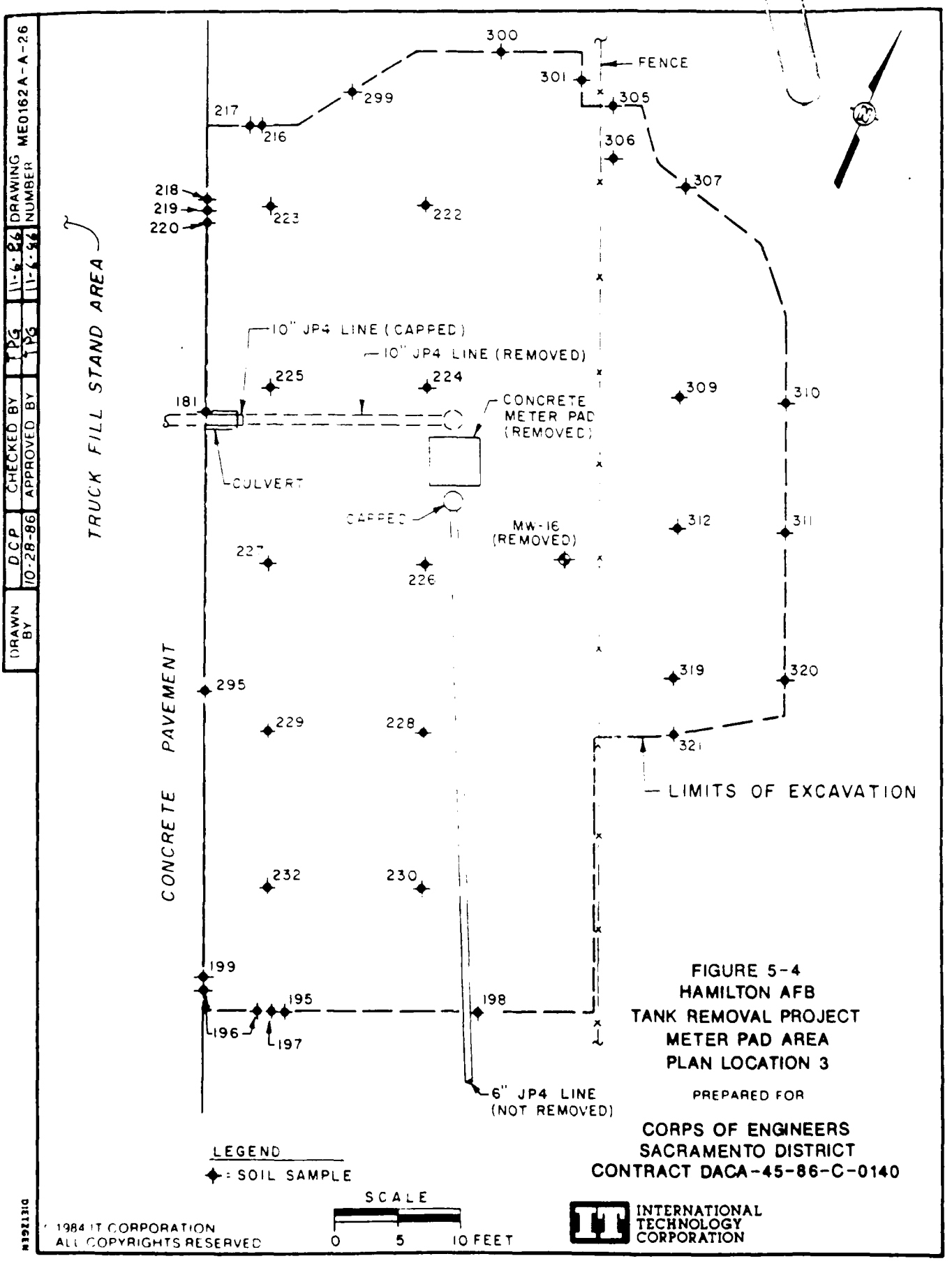

FIGURE 5-4
HAMILTON AFB
TANK REMOVAL PROJECT
METER PAD AREA
PLAN LOCATION 3

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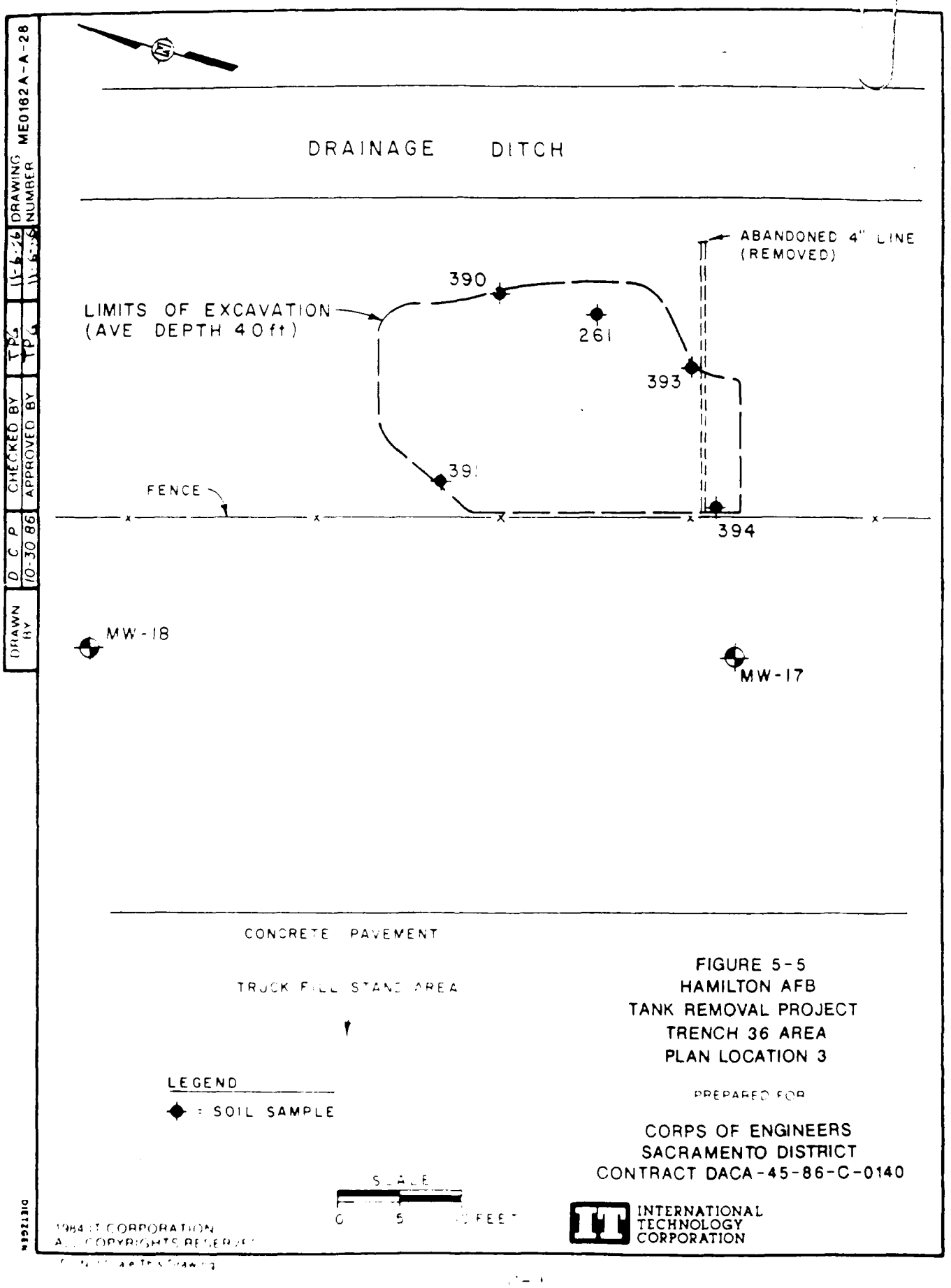

FIGURE 5-5
HAMILTON AFB
TANK REMOVAL PROJECT
TRENCH 36 AREA
PLAN LOCATION 3

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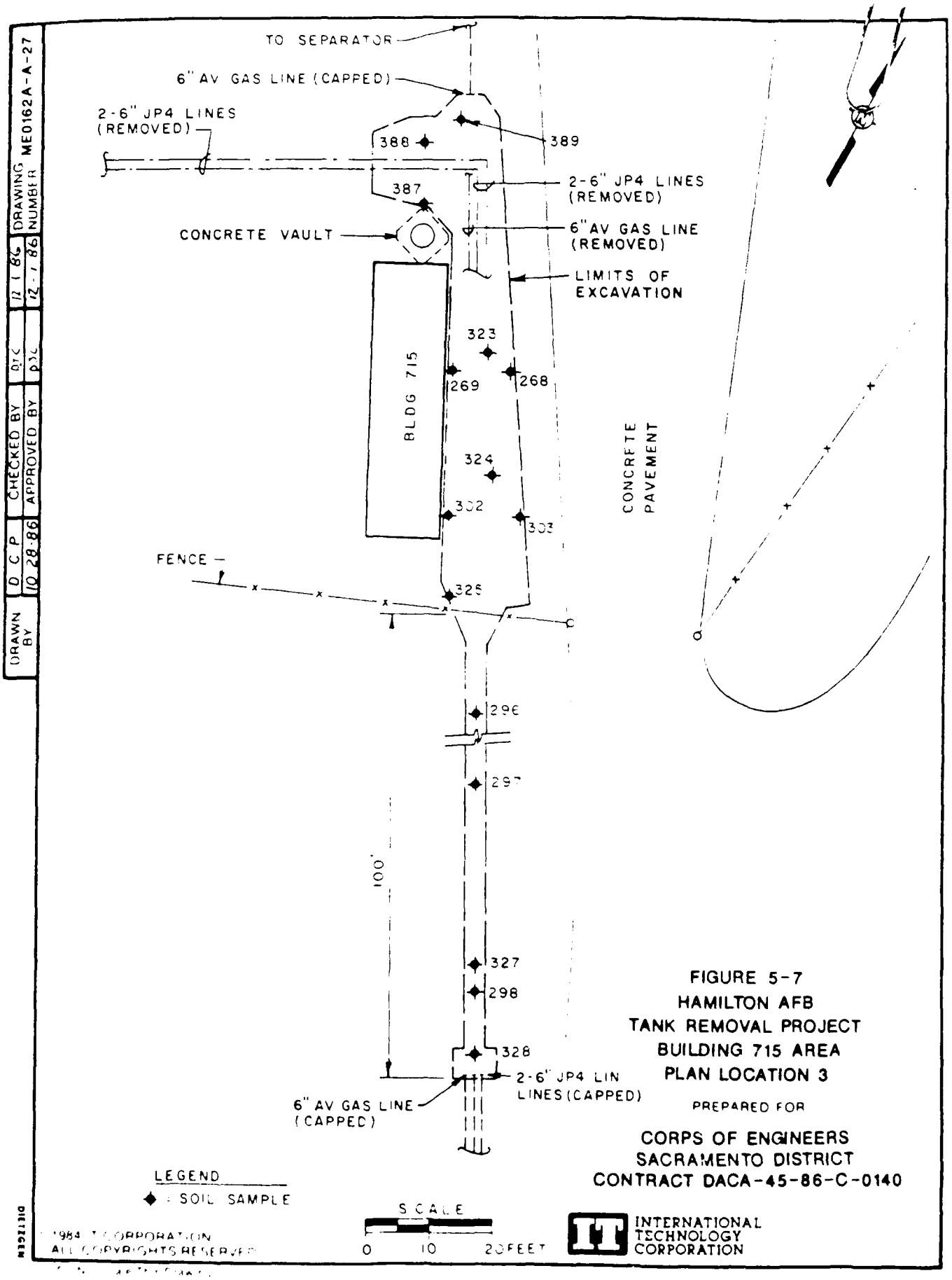

FIGURE 5-7
HAMILTON AFB
TANK REMOVAL PROJECT
BUILDING 715 AREA
PLAN LOCATION 3

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CONTRACT DACA-45-86-C-0140

INTERNATIONAL TECHNOLOGY CORPORATION

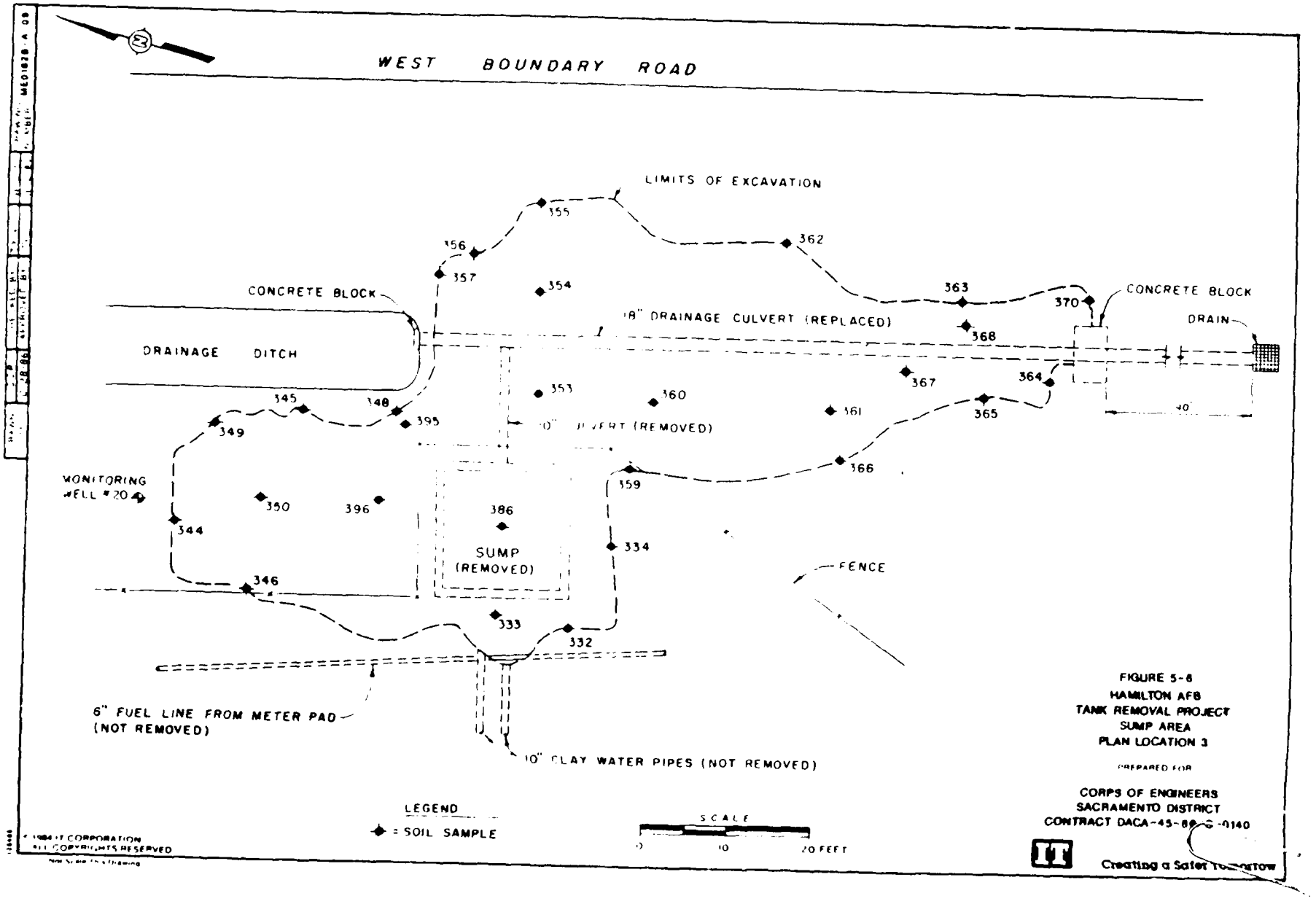

FIGURE 5-6
HAMILTON AFB
TANK REMOVAL PROJECT
SUMP AREA
PLAN LOCATION 3

PREPARED FOR

CORPS OF ENGINEERS
SACRAMENTO DISTRICT
CONTRACT DACA-45-88-C-0140

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APPENDIX D

LIST OF CHEMICALS ASSOCIATED WITH BUILDING 86

HAMILTON ARMY AIRFIELD

NOUN.....	UI	FSCM.	NIN.....	FN.....	DO WE MIX	MIX.....	FREQUENTCY.....	LOCATION..	USE.....
SULFURIC ACID	GL	6810-	00-249-9352	H2SO4	No		SELDOM	NO STOCK	GSE BATTERIES
KETONE	GL	6810-	00-281-2785		No		SELDOM	CONEX #19	LT.MECH.CLEAN
ALCOHOL,ISOPROPYL	CN	6810-	00-855-6160		No		OCCASIONALLY	CONEX #20	T-42 ANTI-ICE
COMPOUND,CLEANING	CN	6850-	00-014-3914		No				
CORROSION PREVENTIVE	CN	6850-	00-142-9582		No		OCCASIONALLY		ACFT
ENG CLEANING COMP	DR	6850-	00-181-7597	MIL-C-85704	Yes	1:4 W/ WATER	TWICE/MONTH	RACK & 42	ENG FLUSH
ANTI-FREEZE FERM	CN	6850-	00-181-7933		No		SELDOM	CONEX #20	VEHICLES
CORROSION PREV COMP	CN	6850-	00-281-2031		No		OCCASIONALLY	CONEX #20	ACFT
SOLVENT,P D 680	DR	6850-	00-285-8011	P D 680	No		DAILY	RACK & #42	PARTS CLEANING
CLEANING COMP.ACFT	DR	6850-	00-935-0955		Yes	1:20 W/ WATER	OFTEN	RACK & #42	ACFT CLEANING
CLEANING COMP,A/C	DR	6850-	01-184-3192		No		WEEKLY	RACK & #43	CLEAN ACFT
POLYURETHANE COAT	KT	8010-	00-138-1760		Yes	1:2 W/ THINNER	SELDOM	CONEX #19	PAINTING
LACQUER,ACID RESISTAN	GL	8010-	00-166-1700		No			NO STOCK	NOT USED.
CORROSION PREVENT	CN	8030-	00-231-2345		No		OCCASIONALLY	CONEX #20	ACFT
CORROSION PREV.COMP	CN	8030-	00-231-2353		No		OCCASIONALLY	CONEX #20	ACFT
ANTI-SEIZE COMPOUND	CN	8030-	00-597-5367		No				
CORROSION PREVENTIVE	CN	8030-	00-838-7783		No		OCCASIONALLY	CONEX #20	ACFT
GASOLINE,AVIATION	DR	9130-	00-221-0677	MIL-G-5572E	No		OFTEN	TANK F	T-42
GASOLINE,AVIATION	DR	9130-	00-221-0678	MIL-G-5572E	No		OFTEN	TANK F	T-42
LUBE OIL,ENG	QT	9130-	01-178-4726	MIL-L-2104	No		NOT VERY OFTEN	CONEX #20	GSE
GREASE,WTR	CN	9150-	00-145-0268		No		DAILY	CONEX #20	GEN.LUB.
FIRE RET.HYD FLUID	QT	9150-	00-149-7431	MIL-H-83282	No		DAILY	CONEX #20	ACFT HYD SYS
LUBE OIL LAD II	QT	9150-	00-168-6869		No		OFTEN	CONEX #20	T-42
LUBE OIL TURBIN ENG	CN	9150-	00-180-6266	MIL-L-23699	No		DAILY	CONEX #20	UH-1
LUBE OIL ENG.	CN	9150-	00-181-6669	MIL-L-2104	No		NOT VERY OFTEN	CONEX #20	GSE
LUBE OIL	QT	9150-	00-186-6681		No		OCCASIONALLY	CONEX #20	GSE
LUBE OIL	CN	9150-	00-188-9858	MIL-L-2104	No		OCCASIONALLY	CONEX #20	GSE
GREASE,AUTO.AND ARTI	LB	9150-	00-190-0904	MIL-G-10924B	No		SELDOM	CONEX #20	
GREASE,GRAPHITE	CN	9150-	00-190-0918		No			CONEX #20	
HYD.FLUID	QT	9150-	00-252-6393	MIL-H-5606	No		OFTEN	CONEX #20	ACFT HYD SYS
LUBRICATING GREASE	TU	9150-	00-257-5258		No		OCCASIONALLY	CONEX #20	UH-1
GREASE,PLUG VALVE	CN	9150-	00-257-5360		No		SELDOM	CONEX #20	ACFT
OIL,PENETRATING	PT	9150-	00-261-7699		No		SELDOM	CONEX #20	GEN
LUB OIL	QT	9150-	00-263-3490		No		SELDOM	CONEX #20	GSE
LUB OIL JET ENG	QT	9150-	00-273-2388	M310	No		SELDOM	CONEX #20	ENG. PRESERV
LUBRICANT,DRIVESHAFT	TU	9150-	00-506-8497		No		OCCASIONALLY	CONEX #20	DRIVESHAFTS
HYDRAULIC FLUID,AUTO	QT	9150-	00-698-2382		No		SELDOM	CONEX #20	GSE
LUBE OIL LAD II	CN	9150-	00-753-5060		No		OFTEN	CONEX #20	T-42
GREASE,MOLYBDENUM	CN	9150-	00-754-2593		No			CONEX #20	
GREASE,WTR	CN	9150-	00-944-6953		No		DAILY	CONEX #20	GEN LUB
LUBE OIL,TURBIN ENG	QT	9150-	00-985-7099	MIL-L-23699	No		DAILY	CONEX #42	UH-1
GREASE,ACFT & INST	CN	9150-	00-985-7246		No		SELDOM	CONEX #20	
BRAKE FLUID,AUTO	GL	9150-	01-102-9455		No		SELDOM	CONEX #20	GSE
GRAPHITE,DRY	LB	9620-	00-233-6713		No			CONEX #20	

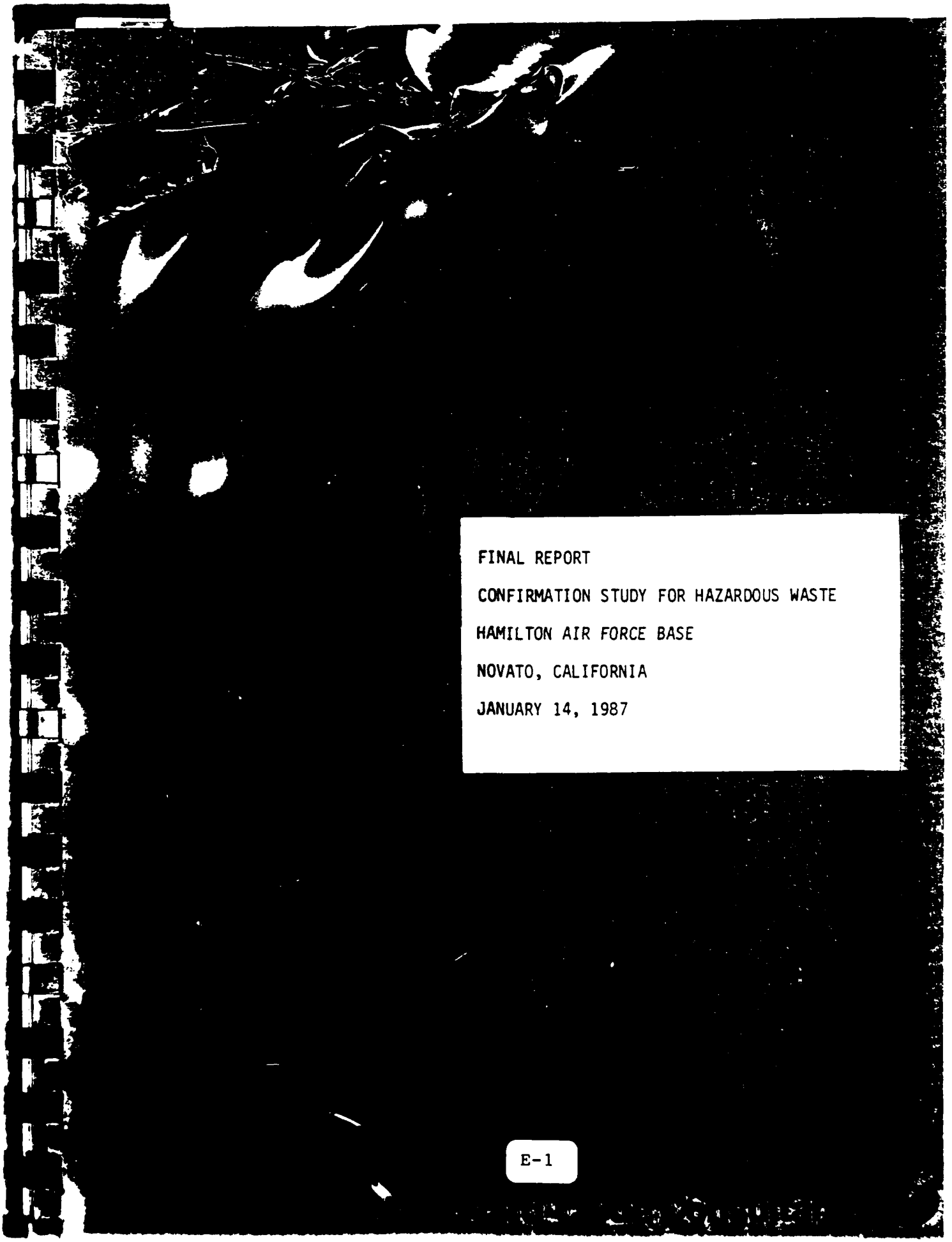
WESTON

APPENDIX E

FINAL REPORT

CONFIRMATION STUDY FOR HAZARDOUS WASTE

(Excerpts)



FINAL REPORT

CONFIRMATION STUDY FOR HAZARDOUS WASTE

HAMILTON AIR FORCE BASE

NOVATO, CALIFORNIA

JANUARY 14, 1987

2.6 BUILDING 26, AREA SEARCH RADAR (SITE 5)

On the HAFB 1967 Base Master Plan, one 1000-gallon underground tank is shown adjacent to Building 26, Area Search Radar (see Figure 2). A thorough search of this site, visually and by geophysical means (vertical-gradient magnetometer), failed to locate the tank. Our conclusion is that the tank was either removed previously or was never set in place. (During a meeting with Mr. Bruce Little of the COE, it was agreed that the proposed exploration effort for Site 5 be transferred to the GSA Landfill Study, as borings HB-98 and HB-99.)

2.7 RADIOLOGICAL DISPOSAL SITE (SITE 6)

According to U.S. Air Force records, one or more containers of low-level radiologic wastes were sealed and buried around 1963 in the vicinity of the earthen levee at the northwest end of the HAFB runaway. This area was used up to that time for disposal of electron tubes (bearing small amounts of radioisotopes), radium-containing luminous dials, and so on. Various efforts by the Air Force and Navy to locate the container(s) during 1975-1976 were unsuccessful. The present effort was directed toward locating the container(s).

Historical Background

In the early 1950's the U.S. Air Force, in line with standard U. S. Atomic Energy Commission practice, buried low-level radioactive wastes. In 1959 the Air Force converted to contractor disposal of most radioactive wastes, but no known arrangements were made at that time for maintaining the old burial sites, or their associated records. In 1971-1972, the Air Force surveyed all of its installations regarding past disposal, and HAFB was identified as having had such a site. Its location, depth, and contents, however, could not be determined clearly from existing records.

In late 1974, in response to an Air Force directive to mark the old disposal sites, HAFB conducted a search for all appropriate records. Some

information on the burial cylinders and burial process were found, but only limited information was found as to location. As of that time, it was determined from two sources that a 14- to- 24-inch-diameter corrugated culvert pipe had been buried vertically and used as a disposal location. In approximately 1963, the upper part of the pipe was cut off, and it was fitted with a cap and lock, and covered with 1 to 3 feet of soil.

In August 1975, the U.S. Energy Research and Development Administration (ERDA) (Successor to the Atomic Energy Commission), at HAFB's request, performed a search in the area indicated by HAFB. Excavation of a 7200-square-foot area, and a radiation survey, yielded negative results; ERDA implied that location information might be inaccurate.

In October of the same year, the Radiation Health Laboratory, Air Force Logistics Command, Wright-Patterson AFB, Ohio, located a fairly precise drawing, based on aerial photographs, of the probable burial site, and estimated that 8 to 12 feet of fill overlay the cylinder. It is not clear whether the drawing was furnished to HAFB at that time.

In January and March 1976, Dr. Pierre St. Amand of the U.S. Navy's Naval Weapons Center, China Lake, California, performed a geophysical and radiological search of an area that appeared to be between the levee and the Perimeter Road on the outer si of the runway. He also consulted with the contractor who did the excavation work. Results were again negative. Some of the contractor's description (for example, location, and the sealing of the pipe with concrete) did not exactly match the original information. From Dr. St. Amand's report, it appears he may not have known about the drawing from the Air Force Radiation Health Laboratory (Wright-Patterson AFB).

On the basis of Dr. Amand's two reports, his hypothesis that the cylinder may have sunk in the Bay Mud, his supposition of only low-level

materials in the cylinder, and the negative radiological search, the HAFB Civil Engineer recommended deletion of the site from the Base Master Plan.

In April 1981, the California Department of Health Services (DOHS) requested information from HAFB on the radiological disposal site, having noted its designation on a USAF map from 1973. HAFB forwarded Dr. St. Amand's reports, from which DOHS also concluded that the site represents a negligible hazard.

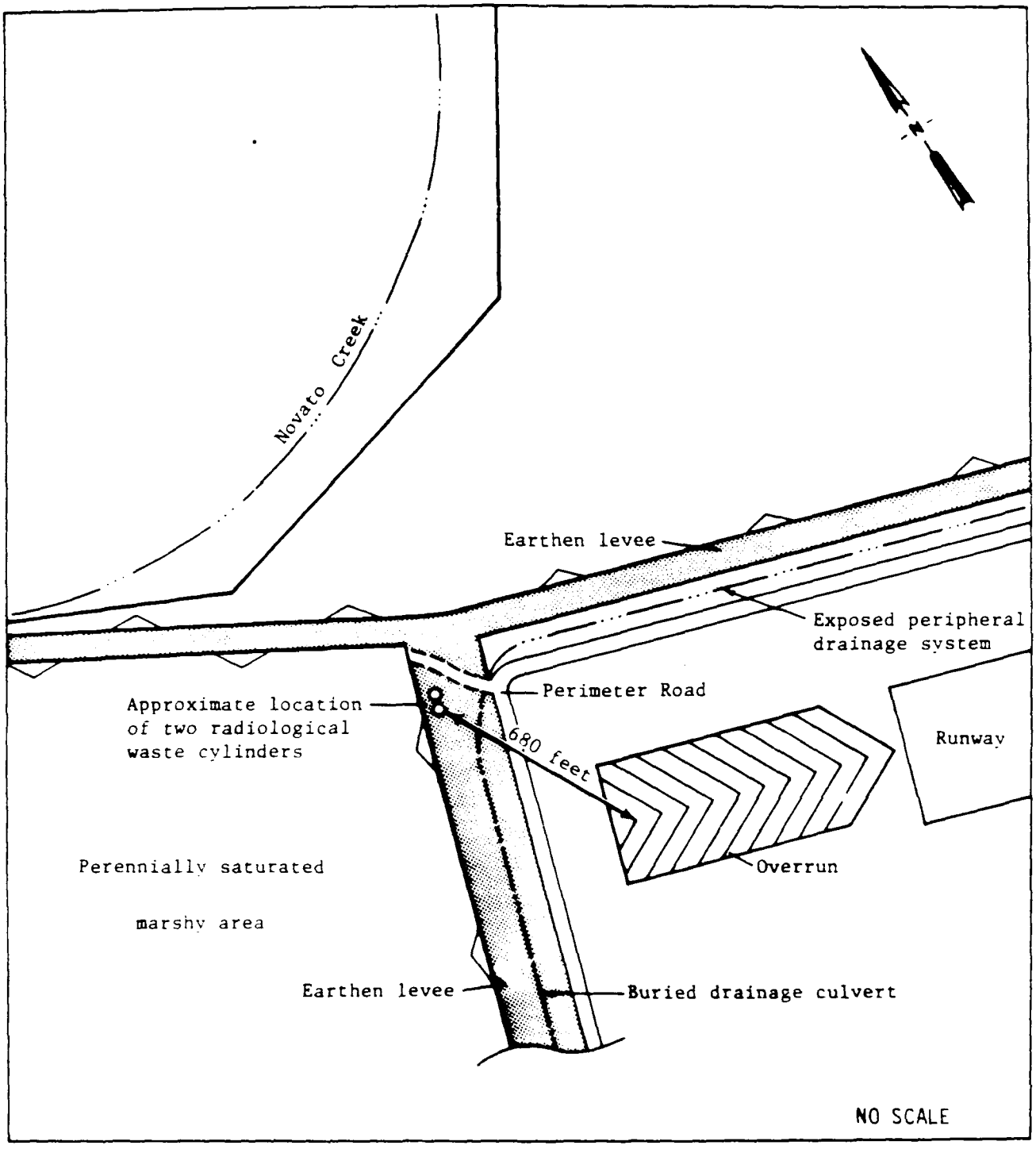
Present Work

A preliminary geophysical survey, using a Geonics EM-31 terrain conductivity meter, was carried out in an area roughly corresponding to that searched by Dr. St. Amand in 1976. This work, part of an early phase of the present study, is described in some detail elsewhere (WCC 1985). Results of the search were negative.

In June 1986, a search was made of the area identified on the hand-drawn map originally provided by the Air Force Radiation Health Laboratory (Wright-Patterson AFB). This area is located on Figure 2, and shown in detail on Figure 7. Both ground-penetrating radar and vertical-gradient magnetometry surveys were conducted in an effort to locate the buried cylinder(s).

The ground penetrating radar survey covered an area of about 30 feet by 30 feet, which had been cleared of brush in preparation for the survey. Lines were located approximately 4 feet apart. No anomaly which could be considered representative of a cylinder or cylinders was observed in the ground penetrating radar data.

The magnetometer survey located a partially-buried drainage culvert, two partially-buried outfall pipes associated with the base's peripheral drainage system, and two other magnetic anomalies not associated with known



Project No. 90316A	HAMILTON AFB	Site 6 - Radiological Disposal Site	Figure 7
Woodward-Clyde Consultants			

or visible features. The unknown anomalies were about 8 feet apart, and were located in agreement with the AF Radiation Health Laboratory's drawing. A search of the adjacent area (approximately a 50-foot radius around the unknown anomalies revealed no other signals.

With personnel wearing EPA Level C protection and using a geiger counter, an excavator was used to expose the two unknown magnetometer anomalies. These turned out to be two vertical corrugated metal cylinders fitting the description of the original radioactive waste disposal system as outlined in the historical background section (pg. 2-13). One had a concrete cap (and may have been filled with concrete), and one did not. Diameter of both was about 24 inches, and their lengths were estimated at 12 and 20 feet. Both were buried beneath about 3 feet of overburden. The concrete-covered cylinder gave no geiger counter readings above background, and the uncovered cylinder emitted alpha and beta readings less than 100 millirems, which were easily attenuated with soil cover. After positive identification the two cylinders were again covered with soil, and their locations marked.

2.8 SOIL STABILIZATION AREA (SITE 7)

For a number of years, graduate geotechnical engineering students from the University of California at Berkeley have come to an area in the east end of HAFB as part of continuing research projects. The research area is shown on Figures 2 and 8. The purpose of one project was to evaluate the effectiveness of certain chemical additives for soil stabilization. According to a report on the project (Tringale and Mitchell 1979), compounds added to the soil at this site included potassium pyrophosphate and quicklime. Mr. Dan Murphy, formerly of the Environmental Office, Presidio of San Francisco, expressed concern as to whether these soil stabilizing compounds might present a potential health risk.

The potential toxicity of the two identified compounds was researched; no groundwater or soil samples were taken at the site. According to the Condensed Chemical Dictionary (10th edition, 1981, ed. G. Hawley),