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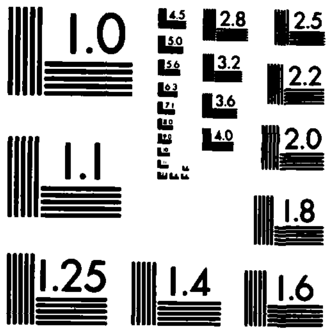
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SD-TR-85-30

INSTALLATION RESTORATION PROGRAM
PHASE I: RECORDS SEARCH
FORT MacARTHUR, CALIFORNIA

FINAL REPORT

PREPARED FOR
DEPARTMENT OF THE AIR FORCE
HQ SPACE DIVISION (DEV)
P.O. BOX 92960, WORLDWAY POSTAL CENTER
LOS ANGELES, CALIFORNIA 90009

JULY 1985

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This program was conducted with the assistance of AFESC/DEVP, Tyndall AFB, Florida, and AFSC/DEMV, Andrews AFB, Maryland. It will be used by the U.S. Air Force Occupational and Environmental Health Laboratory to conduct Phase II actions. Point of contact was Mr. Tom Sisson, Pacifica Services, Inc.

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Installation Restoration Program	Ground Water
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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

An Installation Restoration Program Phase I Records Search was conducted of Ft. MacArthur from Jan. 21 to Jan. 25, 1985. Past and current employees were interviewed, records were reviewed, regulatory agencies were contacted, and a ground reconnaissance was conducted. Past waste handling and disposal practices were evaluated, and nine past waste disposal or spill sites were identified. The sites were evaluated for potential for contamination and migration of contaminants using a decision tree process. All nine sites were found to have no potential for residual contamination and/or contaminant

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20. ABSTRACT (Continued)

migration. Therefore, no Phase II confirmatory sampling and analysis programs are recommended for these sites. Operations at one of the sites need to be reviewed by the base environmental program and modifications made in accordance with state and federal regulations.

Additional keywords: hazardous waste; hazardous materials; civil engineering; environmental planning; hydrology; ground water; aquifers.

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PREFACE

The Installation Restoration Program Phase I: Records Search, Fort MacArthur, California was prepared by Environmental Science and Engineering, Inc., Gainesville, Florida.

It describes the installation missions, environment including geology and hydrology, findings of the records search for past hazardous material disposal sites, conclusions and recommendations. It will be used to identify and control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from past disposal practices.

This work was initiated in September, 1984 and was completed in July, 1985. Mr. John R. Edwards, Headquarters Space Division was the Project Manager.

This report has been reviewed by the office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At the NTIS, it will be available to the general public, including foreign nations.

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INSTALLATION RESTORATION PROGRAM
PHASE I: RECORDS SEARCH
FORT MACARTHUR, CALIFORNIA

Prepared for:

UNITED STATES AIR FORCE
HQ SD/DEV
Los Angeles AFS, California

Submitted by:

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Gainesville, Florida

July 1985

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EXECUTIVE SUMMARY

INTRODUCTION

The Department of Defense (DOD) has developed a program to identify and evaluate past hazardous material disposal sites on DOD property, to control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from these past disposal operations. This program is known as the Installation Restoration Program (IRP) and consists of four phases: Phase I--Initial Assessment/Records Search, Phase II--Confirmation and Quantification, Phase III--Technology Base Development, and Phase IV--Operations/Remedial Actions. Environmental Science and Engineering (ESE), Inc. conducted the Phase I study of Fort MacArthur (FMA), with funds provided by the Air Force Systems Command (AFSC). This volume contains the Initial Assessment/Records Search of FMA. The Phase I assessments of Los Angeles Air Force Station (AFS) and Sunnyvale AFS are presented in separate documents.

INSTALLATION DESCRIPTION

FMA is situated approximately 21 miles south of downtown Los Angeles, Calif., in the community of San Pedro. FMA was originally an Army installation with approximately 561 acres divided into four reservations: Lower Reservation; Upper Reservation; Whites Point Reservation; and Point Vicente Reservation. All of FMA but 96 acres of the Lower Reservation was declared excess in 1974. The 96-acre parcel, now known as the Middle Reservation, was transferred to the Air Force in October 1982.

The original site of FMA was a 50-acre parcel (known as 500 Varas Square) reserved from public domain as a military reservation in 1888 (FMA, 1983). During the following 26 years, additional land was acquired by the War Department from the State of California, City of Los

Angeles, and other sources. In 1914, the reservation was designated Fort MacArthur in honor of Lt. Gen. Arthur MacArthur.

FMA has been used as a training area by the California National Guard and the U.S. Army and as a harbor defense and antiaircraft artillery post. The mission of FMA is to provide military family housing, administrative offices, warehouses, Civil Engineering shops, and a parade ground in support of Los Angeles AFS.

ENVIRONMENTAL SETTING

FMA is located on the southeastern end of the Palos Verdes Peninsula, along the western edge of Los Angeles Harbor. This area lies within a topographic northwest-trending lowland plain known as the Los Angeles Basin. Most of the reservation consists of a gently sloping, nearly level area that contains residential housing; administrative, maintenance, and recreational buildings; paved streets; and parking areas. Elevations on the reservation range from 50 to 70 ft above mean sea level (MSL).

There are no surface water features on FMA. The reservation is drained by a series of independent stormwater drainage systems, all of which drain toward the east 100 to 200 yds with eventual discharge into Los Angeles Harbor. These normally contain no flow, except during rain storms.

The climate of the area is mild, with temperatures moderated by the Pacific Ocean. The average monthly temperature ranges from a low of 55.2°F in January to a high of 73.9°F in August. The average annual rainfall is 11.54 inches, 88 percent of which occurs in the winter months (November through March). Net precipitation is -34.46 inches per year, and the 1-year, 24-hour rainfall event is 2 inches. The low value for net precipitation indicates a low potential for significant infiltration or the formation of permanent surface water features. The 1-year, 24-hour rainfall event of 2 inches indicates a moderate potential for runoff and erosion. The majority of the installation, however, is asphalt-paved and contains stormwater drainage systems to control runoff, thus eliminating any significant potential for flooding and soil erosion.

The surficial lithology on the reservation consists of terrace deposits of sand, silt, and clay. Shallow soil borings on FMA reveal 8 to 12 ft of silty clay overlying weathered and fractured shale units. On several areas of the installation, there is 1 to 14 ft of fill material consisting of clay, clayey sand, silty sand, and debris from previous construction. A unit of natural soil ranging from 0 to 8 ft in thickness underlies the fill material. This unit consists of silty clay and is underlain by fairly well indurated diatomaceous shale.

Due to the nature of the underlying geologic units, a well-developed aquifer system is not present beneath FMA. The shale is considered highly impervious, with ground water occurring in localized sand units. This water is highly saline and represents connate formation water without hydraulic connection to freshwater recharge. Small, localized perched water tables may occur on top of the silty clay units; however, a series of recent 10-ft to 15-ft soil borings revealed no well-developed water table. There are no industrial or potable water supply wells on or in the vicinity of the reservation.

As a result of the developed nature of the installation and its urban location, wildlife habitat on or adjacent to the reservation is small. Vegetation is limited to cultivated species such as ornamental shrubs, bushes, and trees. Various urban bird species forage in the trees and on the lawns. Common rodents (e.g., mice) occur on base. No state-listed or Federally listed threatened or endangered species are present.

METHODOLOGY

During the course of the Phase I investigation of FMA, interviews were conducted with base personnel (past and current) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with local, state, and Federal agencies; and ground reconnaissance inspections were conducted at past hazardous waste activity sites.

The review of past operation and maintenance functions and past waste management practices at FMA resulted in the identification of nine sites that were initially considered areas of concern, with potential for contamination.

FINDINGS AND CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is potential for environmental contamination resulting from past waste disposal practices and to assess the potential for contaminant migration from these sites.

Nine sites were initially considered areas of concern with potential for contamination. Information and evaluations of each site are summarized in Table 1, and the locations of the sites are shown on Fig. 1. Six of these sites were former stormwater drainage disposal sites that have little potential for residual contamination. Site No. 7 is an operating stormwater drainage disposal site that will require a National Pollutant Discharge Elimination System (NPDES) permit; therefore, this site was determined to warrant review and modification under the base environmental program. Two former chemical disposal sites, while having a potential for residual contamination, do not present potential for migration or for endangerment of human health or environmental quality.

All nine sites were evaluated using the decision process. Because the sites were found to have little or no potential for contamination or contaminant migration, none of the sites were evaluated using the HARM system.

Table 1. Summary of Information on Potential Contamination Sites on FMA

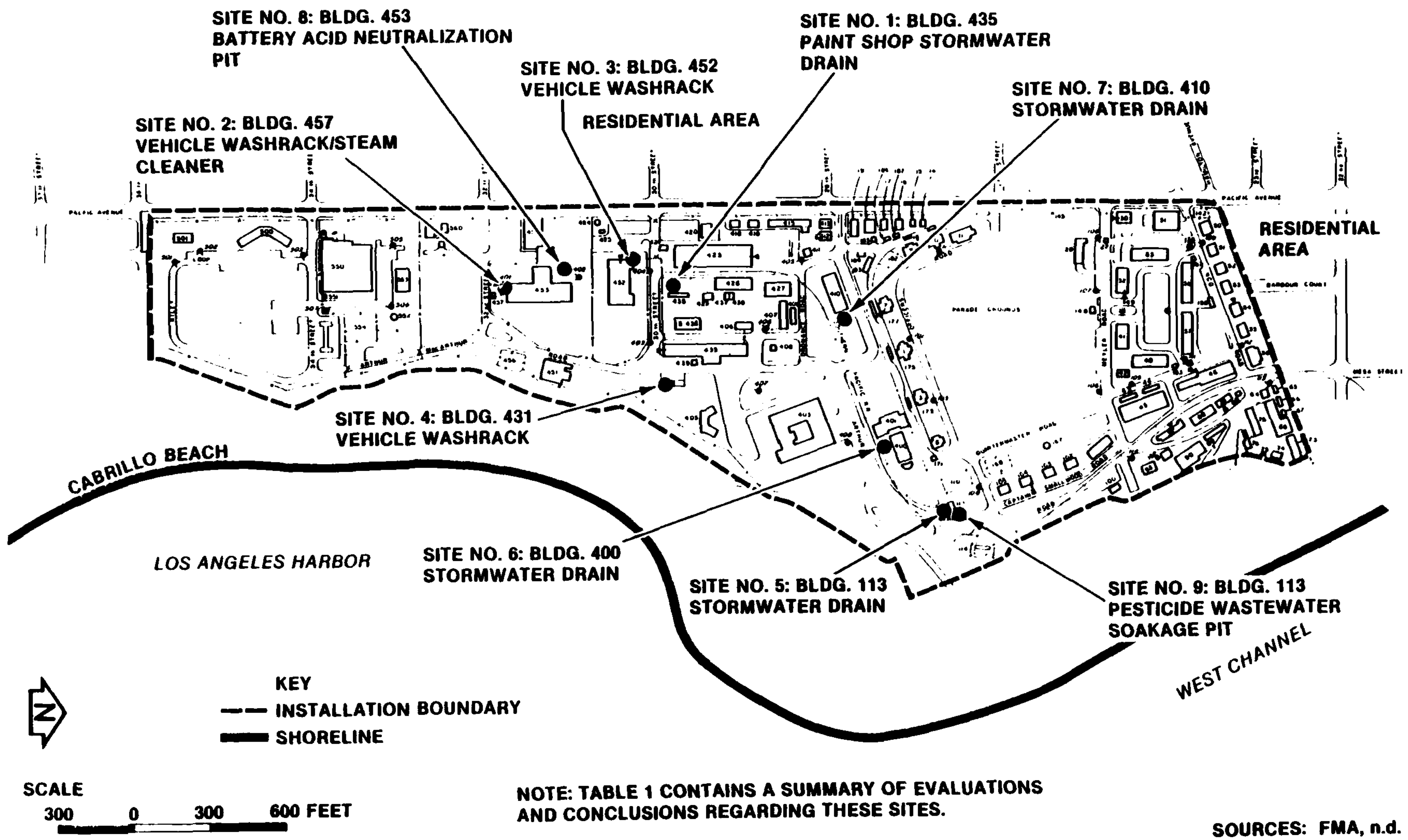
Site No.	Site Description	Report Designation	Dates of Operation	Waste Description	Conclusion
1	Bldg. 435, Paint Shop Stormwater Drain	SD-1	1948-1958	Paint wastes containing residual paint, thinner, and water curtain paint spray booth sludges	No potential for residual contamination. Disposal practice ceased. No HARM score. No Phase II recommendations.
2	Bldg. 457, Vehicle Washrack/Steam Cleaner	SD-2	1945-1965	Vehicle wash wastewater containing detergent surfactants, oil, and grease	No potential for residual contamination. Disposal practice ceased. No HARM score. No Phase II recommendations.
3	Bldg. 452, Vehicle Washrack	SD-3	1945-1965	Vehicle wash wastewater containing detergent surfactants, oil, and grease	No potential for residual contamination. Disposal practice ceased. No HARM score. No Phase II recommendations.
4	Bldg. 431, Vehicle Washrack	SD-4	1945-1965	Vehicle wash wastewater containing detergent surfactants, oil, and grease	No potential for residual contamination. Disposal practice ceased. No HARM score. No Phase II recommendations.
5	Bldg. 113, Stormwater Drain	SD-5	1945-1973	Pesticide-contaminated wastewater	No potential for residual contamination. Disposal practice ceased. No HARM score. No Phase II recommendations.

Table 1. Summary of Information on Potential Contamination Sites on FMA (Continued, Page 2 of 2)

Site No.	Site Description	Report Designation	Dates of Operation	Waste Description	Conclusion
6	Bldg. 400, Storm-water Drain	SD-6	1945-1965	Filter backwash waste-water	No potential for residual contamination. Disposal practice ceased. No HARM score. No Phase II recommendations.
7	Bldg. 410, Storm-water Drain	SD-7	1980 - Present	Vehicle wash wastewater containing detergent surfactants, oil, and grease	Refer to base environmental program for review of operation. No HARM score. No Phase II recommendations.
8	Bldg. 453, Battery Acid Neutralization Pit	DS-1	1959-1975	Waste battery acid (electrolyte/sulfuric acid) containing lead	Potential for residual contamination. No potential for migration or endangerment to human health or environment. No HARM score. No Phase II recommendations.
9	Bldg. 113, Pesticide Wastewater Soakage Pit	DS-2	1945-1973	Pesticide-contaminated wastewater	Potential for residual contamination. No potential for migration or endangerment to human health or environment. No HARM score. No Phase II recommendations.

Note: See Fig. 1 for site locations.

Source: ESE, 1985.



NOTE: TABLE 1 CONTAINS A SUMMARY OF EVALUATIONS AND CONCLUSIONS REGARDING THESE SITES.

SOURCES: FMA, n.d.
ESE, 1985.

Figure 1
LOCATION OF POTENTIAL CONTAMINATION SITES ON FMA

INSTALLATION RESTORATION PROGRAM
FORT MACARTHUR

RECOMMENDATIONS

No sites on FMA were identified as having potential for contamination and contaminant migration; therefore, no Phase II actions are recommended. Site No. 7 needs to be reviewed by the base environmental program, and appropriate operational modifications should be made in accordance with state and Federal regulations. In addition, it would be good engineering practice to inspect and clean all abandoned underground tanks and to close them in accordance with applicable state and Federal regulations.

1.0 INTRODUCTION

1.1 BACKGROUND

Due to its primary mission, the U.S. Air Force (USAF) has long been engaged in operations dealing with toxic and hazardous materials. Federal, state, and local governments have developed strict regulations to require that disposers identify the locations and contents of disposal sites and take action to eliminate the hazards in an environmentally responsible manner. The primary Federal legislation governing disposal of hazardous waste is the Resource Conservation and Recovery Act (RCRA) of 1976, as amended. Under Sec. 6003 of the Act, Federal agencies are directed to assist the U.S. Environmental Protection Agency (EPA), and under Sec. 3012, state agencies are required to inventory past disposal sites and make the information available to the requesting agencies. To assure compliance with these hazardous waste regulations, the Department of Defense (DOD) developed the Installation Restoration Program (IRP). The current DOD IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated Dec. 11, 1981, and implemented by USAF message dated Jan. 21, 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the IRP. DOD policy is to identify and fully evaluate suspected problems associated with past waste disposal practices and to control hazards to health and welfare that resulted from these past operations. The IRP will be the basis for response actions on USAF installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as clarified by Executive Order 12316. CERCLA is the primary Federal legislation governing remedial action at the past hazardous waste disposal sites.

1.2 PURPOSE, AUTHORITY, AND SCOPE OF THE ASSESSMENT

The IRP has been developed as a 4-phase program, as follows:

Phase I--Initial Assessment/Records Search
Phase II--Confirmation and Quantification
Phase III--Technology Base Development
Phase IV--Operations/Remedial Actions

Environmental Science and Engineering, Inc. (ESE) conducted the records search at Fort MacArthur (FMA), with funds provided by the Air Force Systems Command (AFSC). This report contains a summary and evaluation of the information collected during Phase I of the IRP and recommendations for any necessary Phase II action.

The objective of Phase I was to identify the potential for environmental contamination from past waste disposal practices at FMA and to assess the potential for contaminant migration. Activities performed in the Phase I study included the following:

1. Review of site records;
2. Interviews with personnel familiar with past generation and disposal activities;
3. Inventory of wastes;
4. Determination of estimated quantities and locations of current and past hazardous waste treatment, storage, and disposal;
5. Definition of the environmental setting at the base;
6. Review of past disposal practices and methods;
7. Performance of field inspections;
8. Gathering of pertinent information from Federal, state, and local agencies;
9. Assessment of potential for contaminant migration; and
10. Development of conclusions and recommendations for any necessary Phase II action.

ESE performed the onsite portion of the records search during January 1985. The following team of professionals was involved:

- Charles D. Hendry, Jr., Ph.D., Staff Chemist and Project Manager; Team Leader for FMA, Los Angeles Air Force Station (AFS), and Sunnyvale AFS records searches; 11 years of professional experience.
- Allen P. Hubbard, P.E., Engineer, 6 years of professional experience.
- Jeffrey J. Kosik, Engineer, 3 years of professional experience.
- Donald F. McNeill, Geologist, 3 years of professional experience.

Detailed information on these individuals is presented in App. B.

1.3 METHODOLOGY

The methodology utilized in the FMA records search began with a review of past and current industrial operations conducted at the base. Information was obtained from available records such as shop files and real property files, as well as interviews with past and current base employees from the various operating areas. Interviewees included current and former personnel associated with the mission of FMA and tenant organizations onbase. A list of interviewees, by position and approximate years of service, is presented in App. C.

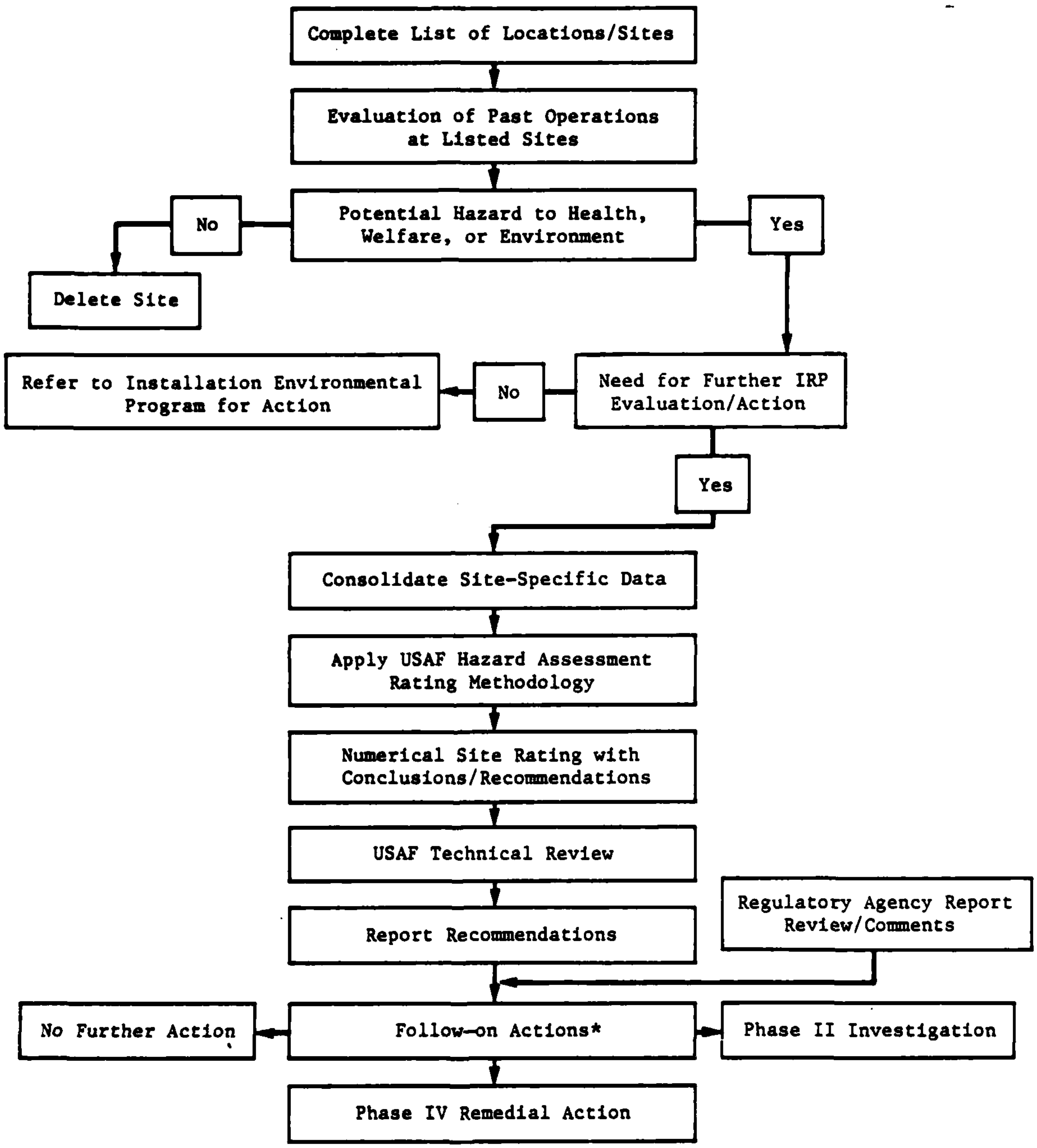
Concurrent with the base interviews, the applicable Federal, state, and local agencies were contacted for pertinent base-related environmental data. The outside records centers and agencies contacted and personnel interviewed are listed in App. C.

The next step in the activity review was to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various operations on the base. Included in this part of the activities review was the identification of all known past disposal sites and other possible sources of contamination such as spill areas.

A general ground tour of the identified sites was then made by the ESE Project Team to gather site-specific information including: (1) visual evidence of environmental stress, (2) the presence of drainage ditches and systems, and (3) visual inspection for any obvious signs of contamination or leachate migration. Due to the relatively small size of the installation, a helicopter overflight was not included as part of the onsite visit.

Using the process shown in Fig. 1.3-1, a decision was then made, based on all of the above information, regarding the potential for hazardous material contamination at any of the identified sites. If no potential existed, the site was deleted from further consideration. If potential for contamination was identified, the potential for migration of the contaminant was assessed based on site-specific conditions. If there were no further environmental concerns, the site was deleted. If the potential for contaminant migration was considered significant, the site was evaluated and prioritized using the Hazard Assessment Rating Methodology (HARM). A discussion of the HARM system is presented in App. G.

PHASE I INSTALLATION RESTORATION PROGRAM
RECORDS SEARCH FLOWCHART



*Beyond scope of Phase I.

SOURCES: HQ AFESC, 1983.
ESE, 1985.

Figure 1.3-1
DECISION PROCESS

INSTALLATION RESTORATION PROGRAM
FORT MACARTHUR

2.0 INSTALLATION DESCRIPTION

2.1 LOCATION, SIZE, AND BOUNDARIES

FMA is situated approximately 21 miles south of downtown Los Angeles, Calif., in the community of San Pedro (Fig. 2.1-1). FMA was originally an Army installation with approximately 561 acres divided into four reservations: Lower Reservation; Upper Reservation; Whites Point Reservation; and Point Vicente Reservation. All of FMA except 96 acres of the Lower Reservation was declared excess in 1974. The 96-acre parcel, now known as the Middle Reservation, was transferred to the Air Force in October 1982.

[In 1981, the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) performed a Phase I records search for all of FMA (Chemical Systems Laboratory, 1983). The records search of FMA performed by ESE addresses only the Middle Reservation.]

A map of the Middle Reservation at the time of transfer is shown in Fig. 2.1-2. The Middle Reservation is bordered by 22nd St. on the north, Stephen M. White Drive on the south, Pacific Ave. on the west, and Los Angeles Harbor on the east. The surrounding community is comprised of medium-density housing and light industrial and commercial development. The former Lower Reservation, which is administered by the Los Angeles Harbor Dept. and Cabrillo Beach and Museum (LAAFS, 1983), lies immediately east of FMA. The installation has a population of 22 military and 54 civilian personnel.

2.2 HISTORY

The history of FMA is summarized in this section. A number of organizational and real property changes that have affected FMA and its subinstallations have occurred during the past 100 years. A brief chronology of the major historical events is presented in Table 2.2-1, Rev. Ft. Mac. 4/16/85

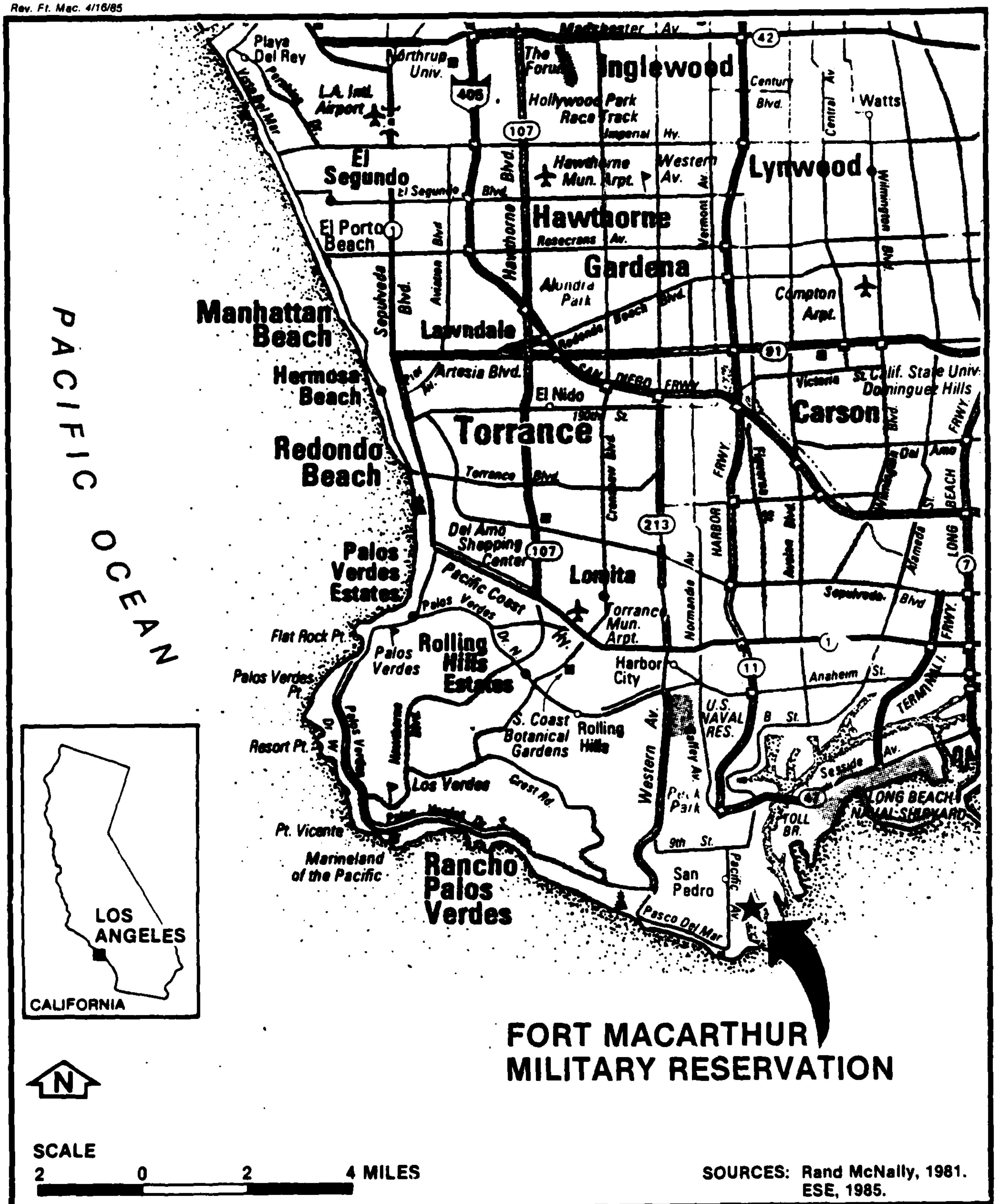


Figure 2.1-1 LOCATION MAP	INSTALLATION RESTORATION PROGRAM FORT MACARTHUR

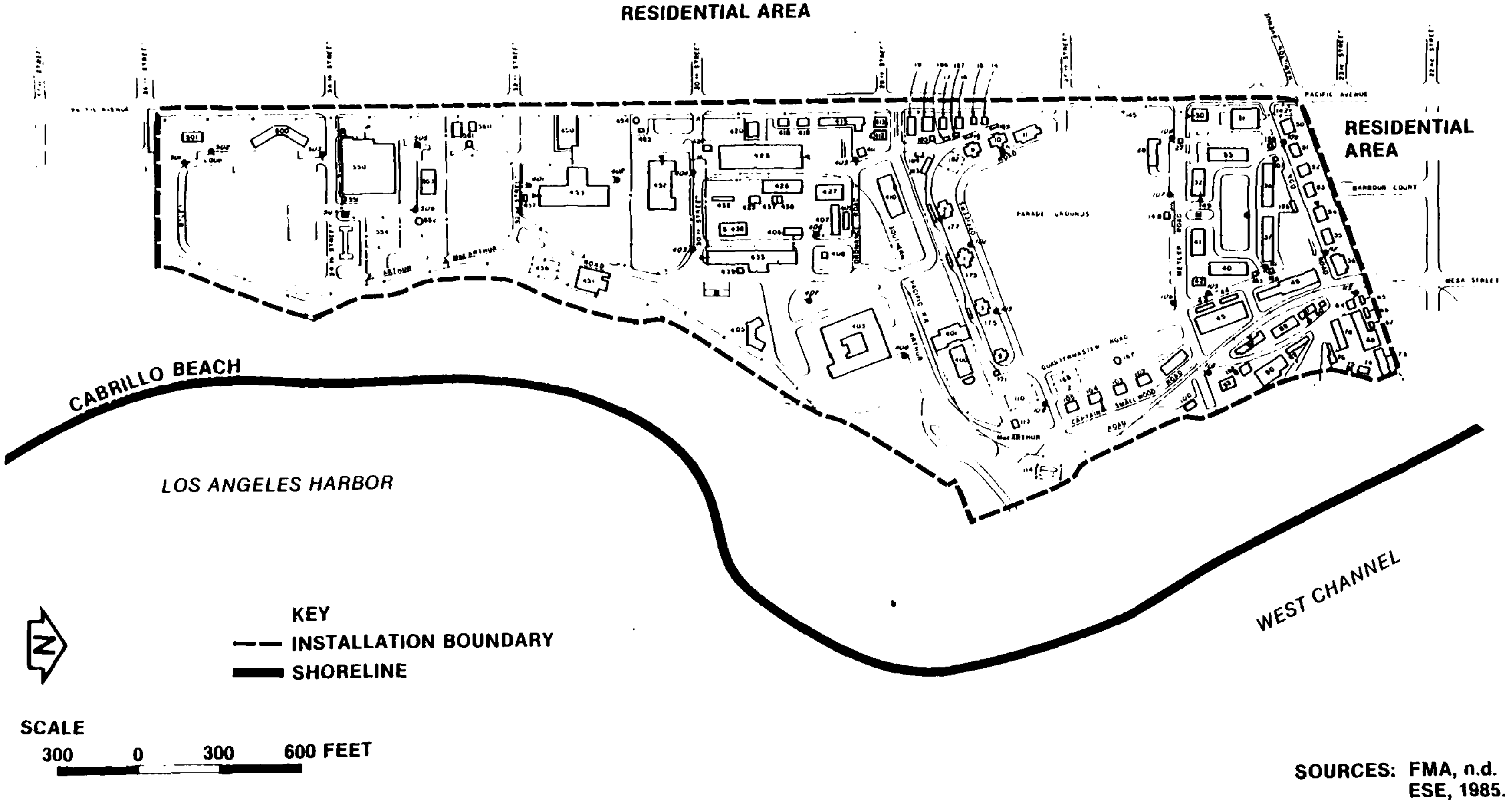


Figure 2.1-2
MAP OF FMA AT TIME OF TRANSFER
FROM ARMY TO AIR FORCE

INSTALLATION
RESTORATION PROGRAM
FORT MACARTHUR

Table 2.2-1. Summary of FMA Historical Events

Date	Event
Sept. 14, 1888	A 50-acre parcel (known as 500 Varas Square) reserved from public domain as a military reservation.
Jan. 10, 1914	The reservation was designated Fort MacArthur (FMA) and construction work was initiated on a permanent harbor defense at FMA.
Mar. 23, 1917	The 4th Company, 38th Artillery unit arrives. This is the first regular Army unit to occupy FMA.
Fall 1917	Completion of the construction of the Batteries Barlow and Saxton, Osgood-Farley, and Merriam-Leary on the upper reservation.
1917-1918	During WW I, FMA served as a reception and training center for inductees.
March 1930	The 63rd Coast Artillery assigned to FMA.
1930s	Acquisition of land south of the 500 Varas Square.
1941-1945	During WW II, in addition to providing defense of Los Angeles Harbor, FMA served as a recruit reception and training center.
1943	Battery 127 at Whites Point was constructed to house two 16-inch rifles.
July 1, 1945	A recruit separation center was activated at FMA.
1945-1946	Removal of the 12-inch mortars of Batteries Barlow and Saxton and the 14-inch rifles of Batteries Osgood-Farley and Merriam-Leary from the upper reservation. Removal of the 16-inch rifles from Battery 127 at Whites Point.
1950	Activation of the 409th Engineer Special Brigade at FMA.
Nov. 16, 1951	Headquarters III Corps assumed command of FMA.
Nov. 21, 1952	The Headquarters 47th Artillery Brigade arrived at FMA and assumed command of the antiaircraft defenses of southern California.

Table 2.2-1. Summary of FMA Historical Events (Continued, Page 2 of 3)

Date	Event
1953-1954	Establishment of Nike missile batteries at the FMA upper reservation, Whites Point, Pt. Vincente, and other sites around the Los Angeles metropolitan area. These sites were under control of the 47th Artillery Brigade.
Apr. 15, 1954	Headquarters, III Corps departs FMA for Fort Hood, Tex.
1958	The title (Air Defense) added to the designation of the 47th Artillery Brigade.
Sept. 1958	Operational control of four Nike Ajax missile sites turned over to the California National Guard's 4th Missile Battalion, 251st Artillery from the 47th Artillery Brigade.
1962	Operational control of the first of the 47th Artillery Brigade's Nike Hercules sites turned over to the Army National Guard.
1965	Transfer of 50 acres of land at Whites Point to the Dept. of Navy for construction of housing.
Nov. 15, 1968	As part of the reorganization of the U.S. Army Air Defense Command (ARADCOM), the 47th Artillery Brigade became the 19th Artillery Group (Air Defense).
Feb. 4, 1974	The Dept. of Army announced plans to close FMA. The Air Defense System, comprised mainly of Nike missiles, had been declared obsolete, and the sites in and around Los Angeles were to be closed.
June 25, 1974	The Dept. of Army announced that FMA would not be closed entirely, but that 96 acres of the middle reservation would be retained for support of active and reserve Army units in southern California.
July 1, 1974	The 19th Artillery Group was deactivated.
Sept. 27, 1974	Pt. Vicente Reservation released for excessing.
Jan. 1, 1975	FMA was realigned as a subinstallation of Fort Ord, Calif.

Table 2.2-1. Summary of FMA Historical Events (Continued, Page 3 of 3)

Date	Event
July 1, 1975	The remaining workforce at FMA was designated U.S. Army Support Detachment, Fort MacArthur (USASDFMA).
Aug. 5, 1975	The Upper Reservation, Lower Reservation, Whites Point Reservation, and the Hospital Area released for excessing.
Oct. 1, 1982	FMA (middle reservation) was transferred to the U.S. Air Force for construction of military housing. All Army assets were relocatd to Los Alamitos Armed Forces Reserve Center.

Sources: Fort MacArthur, 1983.
Air Force Systems Command (AFSC), 1981.
Los Angeles Air Force Station (LAAFS), 1983.

and additional details associated with these events are provided in the following paragraphs.

The original site of FMA was a 50-acre parcel (known as 500 Varas Square) reserved from public domain as a military reservation by an Executive Order dated Sept. 14, 1888 (FMA, 1983). During the next 26 years, additional land was acquired by the War Department from the State of California, City of Los Angeles, and other sources. On Jan. 10, 1914, the reservation was designated Fort MacArthur in honor of Lt. Gen. Arthur MacArthur, the father of Gen. Douglas MacArthur (FMA, 1983).

Due to the advent of World War I, construction work began on permanent harbor defense at FMA in 1914. The fort was used as a training area by the California National Guard from 1914 to 1916. The original mission of FMA was to protect Los Angeles Harbor. United States involvement in World War I accelerated the building program at FMA. Many temporary buildings were constructed in 1917-1918.

The first regular Army unit to occupy FMA was the 4th Company, 38th Artillery, which arrived in March 1917 and assumed the mission of post operating company. The unit was redesignated the 3rd Company, Antiaircraft prior to its departure for France in November 1917. Several units of the California National Guard were mobilized into Federal service in late 1917 and stationed at FMA. The first group of trainees departed for France in May 1918. During the war, FMA's population increased to more than 4,000.

Between World Wars I and II, FMA was used as a harbor defense and antiaircraft artillery post of the coast artillery. During the American Defense Program in 1939-41, the facilities and land area of FMA were greatly expanded.

During World War II, artillery training was added to FMA's mission. More than 200 officers and 2,500 enlisted men were trained and sent overseas. After the war, artillery was dismantled and installation personnel decreased to 300.

After the outbreak of the Korean War in 1950, the 409th Engineer Special Brigade was activated at FMA. In November 1951, the Headquarters (HQ) III Corps assumed command of FMA. HQ 47th Artillery Brigade assumed command of the antiaircraft defenses of the area in November 1953. After the first Nike Ajax surface-to-air missile battery became operational at Fort Meade, Md., in 1953, Nike guided missile sites of the 47th Artillery Brigade were situated in a ring around a 25,000-square-mile area including all of greater Los Angeles.

In April 1954, HQ III Corps was transferred from FMA to Fort Hood, Texas, and the mission of FMA changed. As HQ Southern California Subdistrict of the California Military District and HQ FMA, the mission was command supervision and training of all U.S. Army Reserve units and personnel and Reserve Officers Training Corps (ROTC) units in southern California and providing logistical support to the 47th Artillery Brigade. The headquarters facilities were situated in the Lower Reservation of FMA.

As part of the reorganization of the Army Air Defense Command, the 47th Artillery Brigade was redesignated the 19th Artillery Group (Air Defense) in November 1968.

On Feb. 4, 1974, the Dept. of the Army announced that FMA would be closed as an economy measure. The air defense missile system, comprised mainly of Nike missiles, was declared obsolete. The Nike missile sites in and around Los Angeles were to be closed, the land excessed, and the 19th Artillery Group deactivated by July 1, 1974. In the spring of 1974, the Post Commander requested that an area known as the Middle Reservation (Zones 1, 4, and 5 of the Lower Reservation) be retained for support of active and reserve Army units in southern California. On June 25, 1974, the Dept. of the Army announced that FMA would not be closed entirely. All land except the Middle Reservation was declared excess to Army needs (Fig. 2.2-1). The 96-acre Middle Reservation included 40 acres of the original 50-acre site of FMA (500 Varas Square). The excessed areas, acreages, and dates of release to the General Services Administration (GSA) are listed in Table 2.2-2.

On July 1, 1975, the retained area of FMA was realigned as a subinstallation of Fort Ord, Calif.

Jurisdiction of FMA was transferred to USAF on Oct. 1, 1982. All Army assets were relocated to Los Alamitos Armed Forces Reserve Center in Los Alamitos, Calif.

The property transferred to USAF contained 105 buildings, including 42 family housing units. Since the transfer, most of the buildings south of the parade ground (500 Varas Square) have been demolished to make way for construction of approximately 400 family housing units (AFSC, 1981; LAAFS, 1983). The area of FMA designated for housing development is shown in Fig. 2.2-2.

2.3 MISSION AND ORGANIZATION

The mission of FMA is to provide military family housing, administrative offices, warehouses, Civil Engineering shops, and a parade ground in support of Los Angeles Air Force Station (LAAFS).

The U.S. Army National Guard is the only tenant on FMA. Pacifica Services, Inc. is the only civilian contractor providing support to FMA. Organizations, missions, and tenant activities are described in App. D.

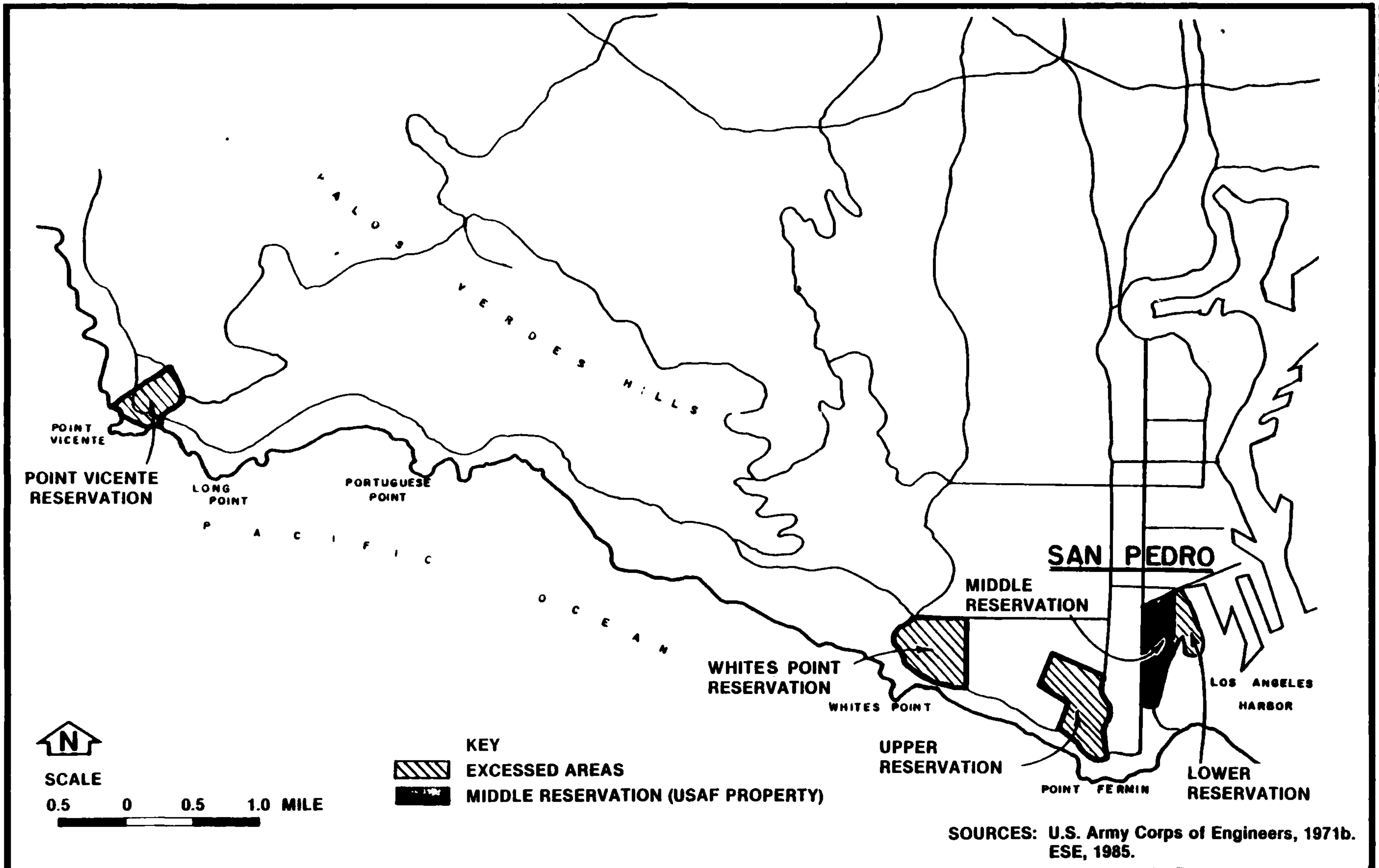


Figure 2.2-1
EXCESSED AREAS OF FMA

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Table 2.2-2. Excessed Areas of FMA

Excessed Area	Acreage	Date of Release to GSA
Lower Reservation*	53	Aug. 5, 1975
Upper Reservation	119	Aug. 5, 1975
Whites Point Reservation	170	Aug. 5, 1975
Point Vicente Reservation	116	Sept. 27, 1974
Hospital Area	5	Aug. 5, 1975

*Fifty-three acres of the Lower Reservation were excessed; 96 acres, known as the Middle Reservation, were retained.

Sources: FMA, 1964.
ESE, 1985.

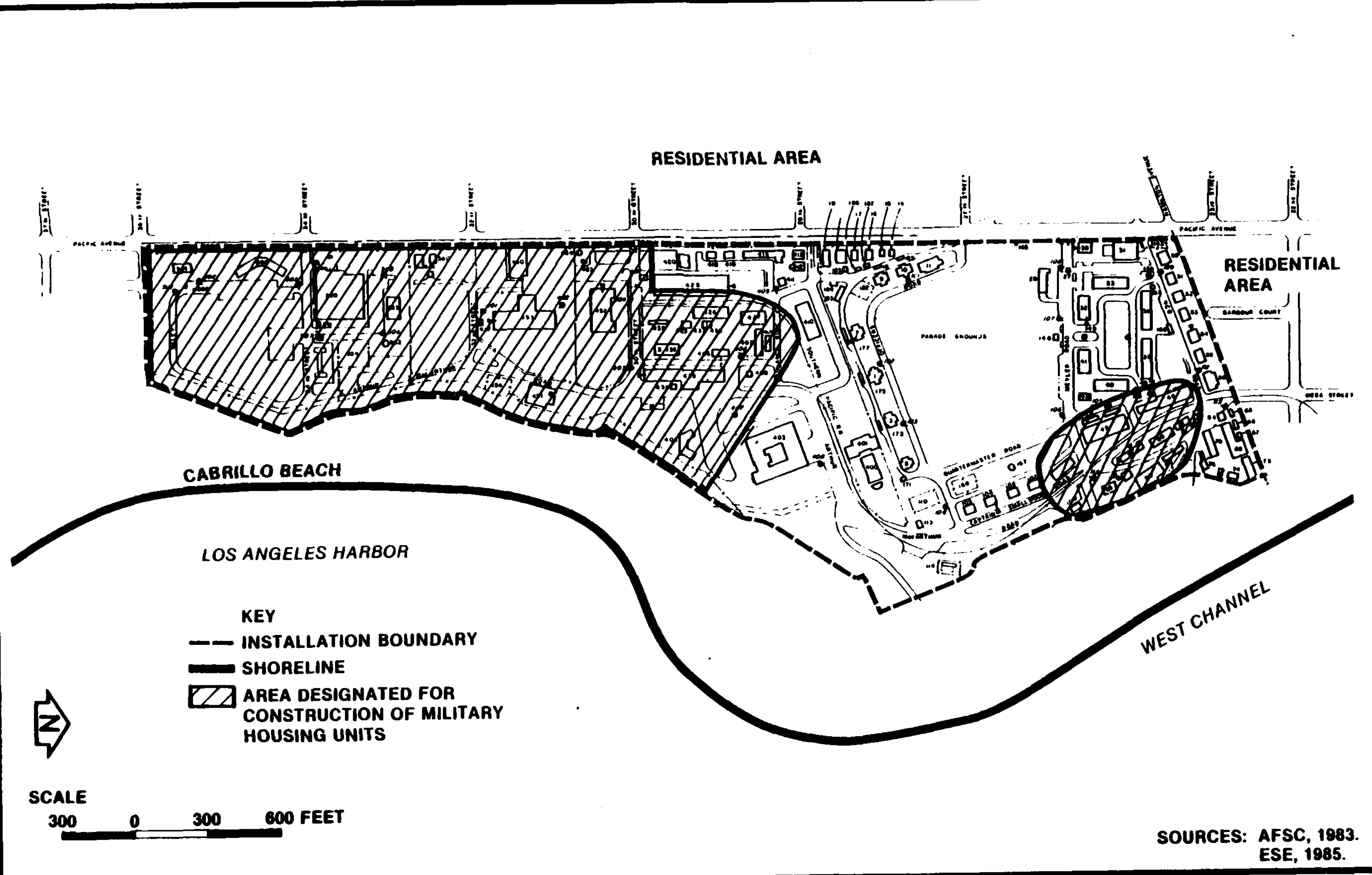

Figure 2.2-2
AREA OF FMA DESIGNATED FOR CONSTRUCTION OF FAMILY HOUSING UNITS

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3.0 ENVIRONMENTAL SETTING

This section describes the environmental conditions at FMA, including specific site data for meteorology, geology, soils, surface hydrology, geohydrology, and biota. These data are required for the HARM scoring system to numerically assess the pollutant transport mechanisms and potential receptors present at the site. App. F describes the factors used in the HARM system.

3.1 METEOROLOGY

Climatological data for FMA are summarized in Table 3.1-1. These data were collected at the National Weather Service meteorological station at Long Beach Airport, which is located approximately 5 miles northeast of FMA. The period of record for the data is 29 years (1951 to 1980).

The climate of the FMA area is mild, with temperatures moderated by the Pacific Ocean. The average monthly temperature ranges from a low of 55.2°F in January to a high of 73.9°F in August. The annual average temperature is 63.8°F.

Based on the data in Table 3.1-1, the annual average rainfall for the area is 11.54 inches. The winters are wet, with 88 percent of the rain occurring from November through March at a rate of approximately 2 inches per month. In contrast, the summer (April to October) is dry. Summer rainfall rates range from 0.00 to 0.83 inch per month, with an average rate of 0.2 inch per month.

The pathways category of the HARM scoring system includes surface water migration, flooding, and ground water migration routes. Numerical evaluation of these routes involves factors associated with the particular migration route (see App. F). Two meteorological factors used in this evaluation are net precipitation and the 1-year, 24-hour rainfall event. Mean annual evaporation for FMA is 46 inches per year

Table 3.1-1. Climatological Data for Fort MacArthur

Month	Temperature (°F)	Precipitation (inches)
January	55.2	2.98
February	56.6	2.50
March	57.9	1.69
April	60.9	0.83
May	64.3	0.16
June	68.2	0.04
July	72.8	0.00
August	73.9	0.09
September	72.1	0.16
October	67.5	0.15
November	61.2	1.36
December	56.1	1.58
Annual	63.8	11.54
Period of Record	1951-1980	1951-1980

Note: Data are for Long Beach Airport, Calif.; Station Index No. 5085; Los Angeles Co.; 33°49'N 118°9'W; elevation = 34 ft above mean sea level (MSL).

Sources: National Climatic Data Center, 1983.
ESE, 1985.

(U.S. Dept. of Commerce, 1968); therefore, net precipitation, which is the difference between annual precipitation and evaporation, is -34.46 inches per year. The 1-year, 24-hour rainfall event is 2 inches (U.S. Dept. of Commerce, 1961). The low value for net precipitation indicates a low potential for significant infiltration or the formation of permanent surface water features. The 1-year, 24-hour rainfall event of 2 inches indicates a moderate potential for runoff and erosion. The majority of the installation, however, is asphalt-paved and contains stormwater drainage systems to control runoff, thus eliminating any significant potential for flooding and soil erosion.

3.2 GEOGRAPHY

3.2.1 PHYSIOGRAPHY

FMA is located on the southeastern end of the Palos Verdes Peninsula, along the western edge of Los Angeles Harbor. This area lies within a topographic northwest-trending lowland plain known as the Los Angeles Basin. To the west this lowland plain is interrupted by the Palos Verdes Hills, which form an uplifted peninsula jutting into the Pacific Ocean (AFSC, 1981).

Most of FMA consists of a gently sloping, nearly level area that contains residential housing; administrative, maintenance, and recreational buildings; paved streets; and parking areas. Elevations on the reservation range from 70 ft above mean sea level (MSL) along Pacific Ave. at the western boundary to 50 ft above MSL along the top of the bluff bordering the western edge (U.S. Geological Survey, 1981). A benchmark is located on the northwest corner of Bldg. 425 at an elevation of 69 ft above MSL.

The bluff bordering the eastern boundary is a descending, east-facing, 25- to 40-ft-high escarpment with variable slopes ranging from approximately 45 degrees to near vertical (AFSC, 1981). The topographic gradient across FMA from Pacific Ave. to the top of the bluff (west to east) in a line with 28th St. is approximately -1 ft per 60 ft (U.S. Geological Survey, 1981).

3.2.2 SURFACE HYDROLOGY

There are no surface water features on FMA. The reservation is drained by a series of independent stormwater drainage systems, all of which drain toward the east with eventual discharge into Los Angeles Harbor. The principal stormwater drainage facilities on FMA are shown on Fig. 3.2-1. These systems consist of a series of catch basins that collect street and parking area runoff and transmit the runoff through 4- to 24-inch-diameter concrete pipes into open ditches that drain 100 to 200 yds to Los Angeles Harbor (Dept. of the Air Force, 1982f).

The City of Los Angeles maintains a 45-inch-diameter reinforced concrete storm drain, which follows the extension of 34th St. across FMA and into Los Angeles Harbor. Several drains on the reservation connect to this drain; however, the line was designed principally to drain the hillside residential area of San Pedro west of FMA (AFSC, 1981).

3.3 GEOLOGY

3.3.1 GEOLOGIC SETTING

FMA lies within the Los Angeles Basin, a topographic lowland plain with a northwest trending axis approximately 50 miles long and 20 miles wide. Bedrock in the vicinity of FMA consists of Jurassic schist and Miocene age volcanics. Immediately west of the site, the Palos Verdes Hills represent an uplifted block from movement along the Palos Verdes fault. This faulting has resulted in exposure of Jurassic age Catalina Schist, Miocene age volcanics, and the Miocene Monterey Formation (see Fig. 3.3-1). The Palos Verdes Fault is a northwest-to-southeast trending feature (see Fig. 3.3-1). This fault is a southward dipping reverse fault with little surficial displacement having occurred in the last 10,000 years (HQ, 7th Infantry Division at Fort Ord, 1977).

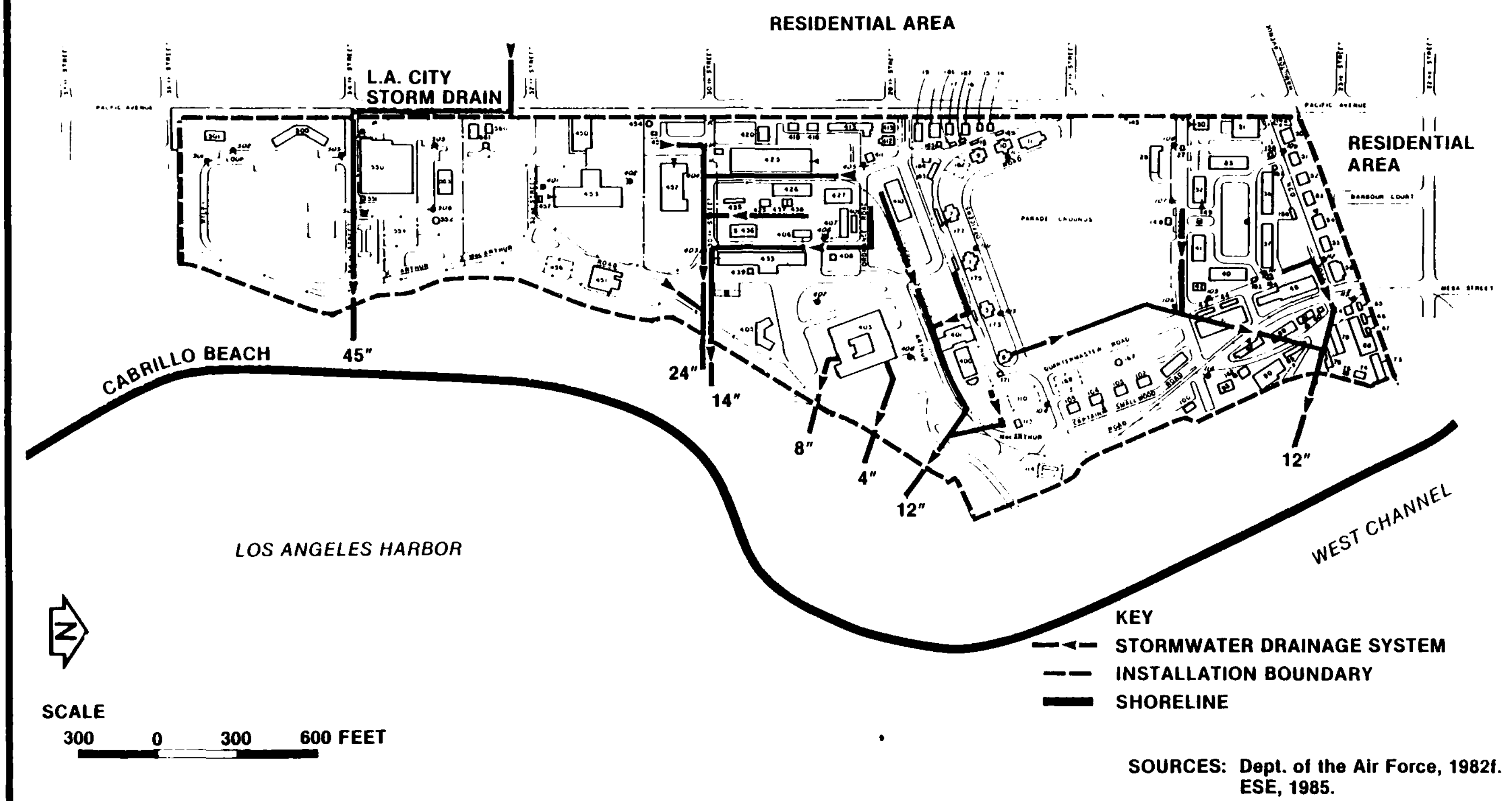

Figure 3.2-1
STORMWATER DRAINAGE FACILITIES

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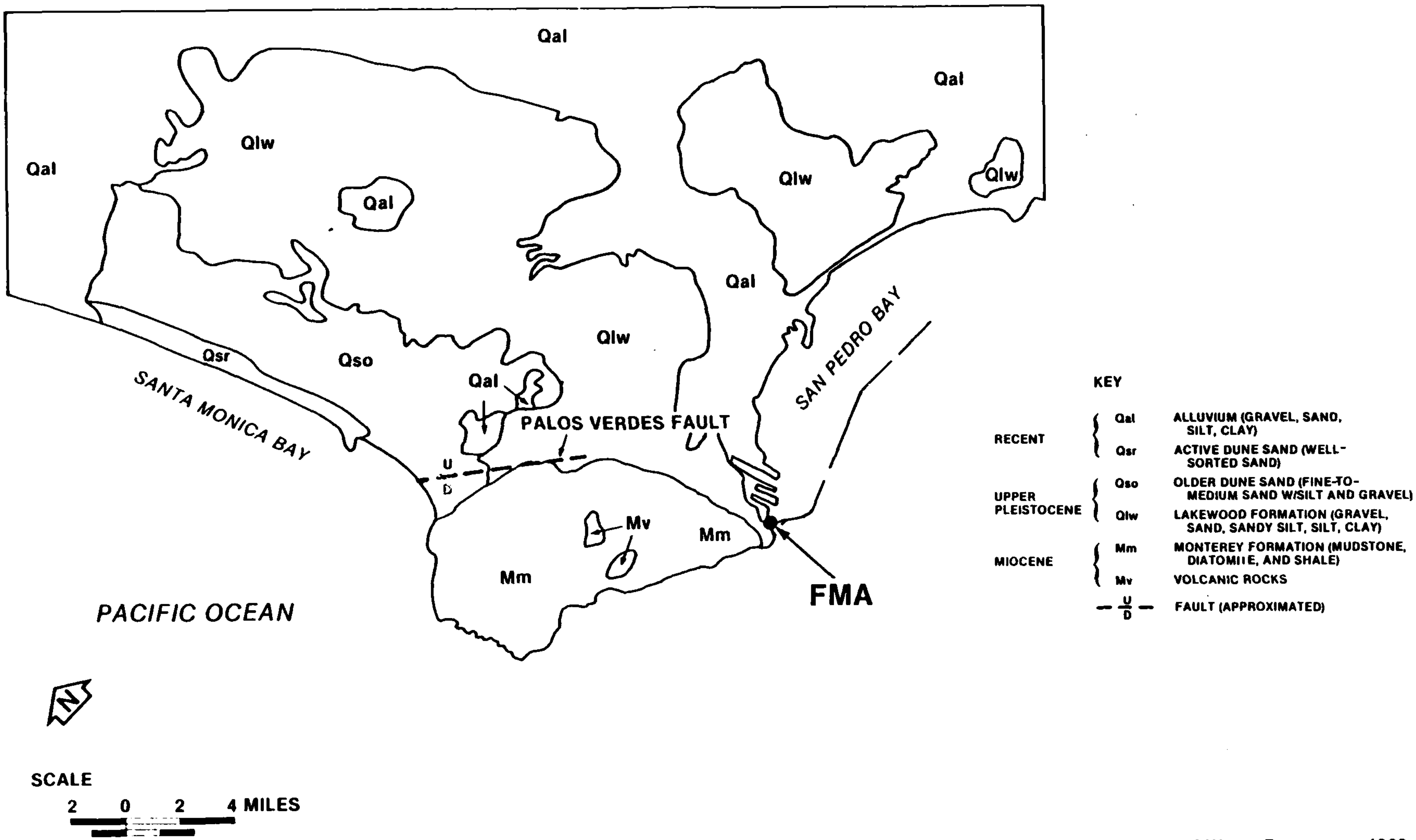

SOURCES: California Dept. of Water Resources, 1962.
ESE, 1985.

Figure 3.3-1
SURFICIAL GEOLOGY IN THE VICINITY OF FMA

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The Monterey Formation consists of predominantly massive shale, micaceous siltstone, and lesser amounts of fine to medium-grained sandstone. This uplifted sequence exceeds 2,000 ft in thickness immediately north of FMA. The Monterey Formation is generally considerd impervious, although localized units of highly saline connate water do occur in the sand members. The Pliocene Repetto Formation unconformably overlies the Monterey in the vicinity of FMA. The Repetto Formation consists of marine, sandy siltstone; claystone; and shales.

The surficial lithology at FMA consists of terrace deposits of sand, silt, and clay. Shallow soil borings on FMA (see Figs. 3.3-2 and 3.3-3) reveal 8 to 12 ft of silty clay overlying weathered and fractured shale units.

3.3.2 SOILS

Subsurface soil conditions at FMA were compiled from existing soil boring data collected as part of a subsurface investigation for housing installation (AFSC, 1983). On the northern section of the installation, the soils consist of 1 to 14 ft of fill material (see Fig. 3.3-2). The fill soil consists of clay, clayey sand, silty sand, and debris from previous construction. A unit of natural soil ranging from 0 to 8 ft in thickness underlies the fill material. This unit consists of silty clay that is moderately firm and subject to shrinkage and swelling with changes in moisture content. The natural silty clay is underlain by fairly well indurated diatomaceous shale. Moisture content of the soil ranged from 23 to 26 percent; however, no water table was encountered in the boring depths.

The southern section of the installation exhibits a similar soil unit morphology (see Fig. 3.3-3). The fill material in this part of the installation is somewhat thinner, although localized filled areas of up to 13 ft were encountered (AFSC, 1983). The fill material again consists of clay, clayey sand, silty sand, and concrete debris. Beneath

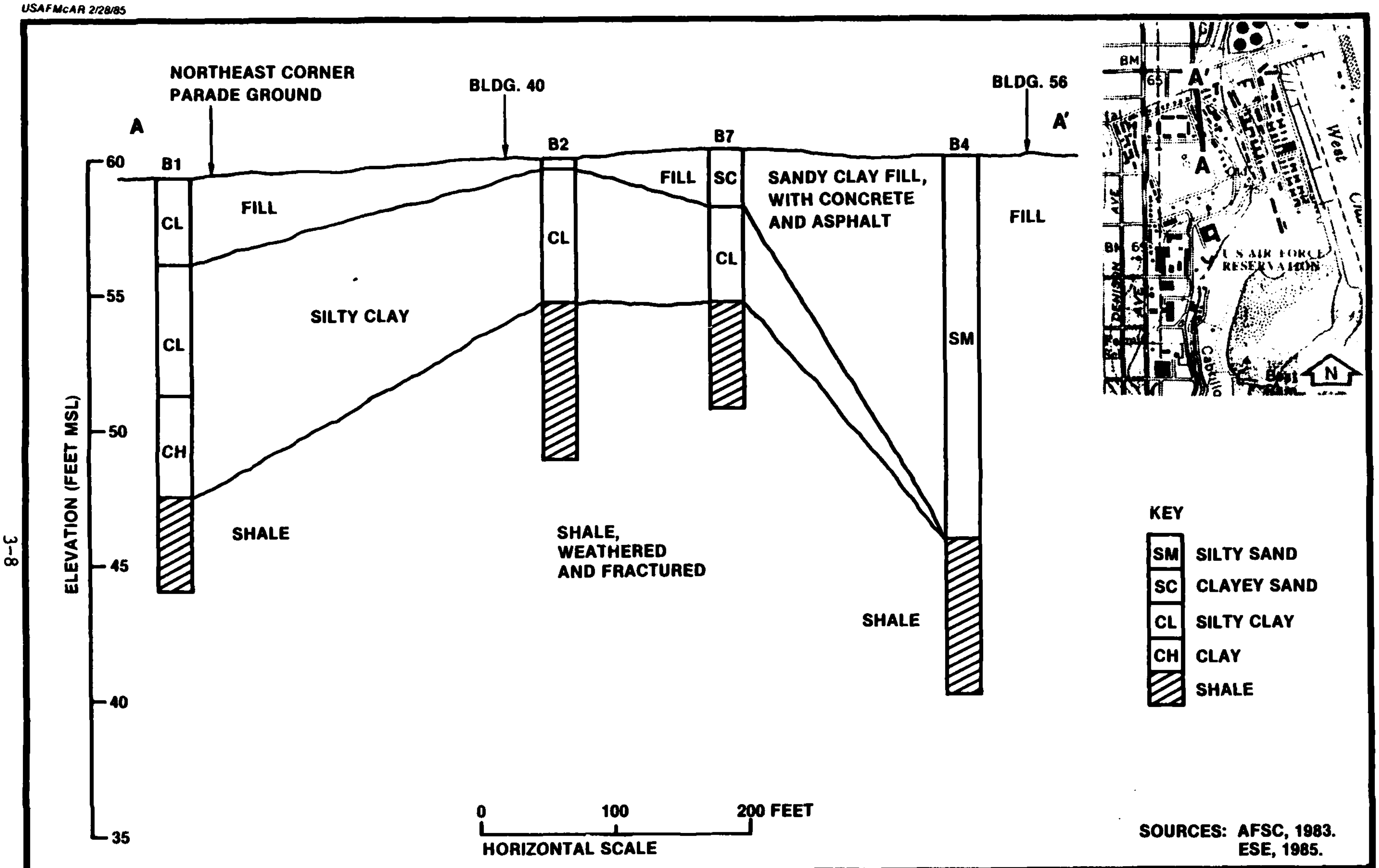

Figure 3.3-2
SHALLOW SOIL PROFILE AT NORTH END OF FORT MACARTHUR

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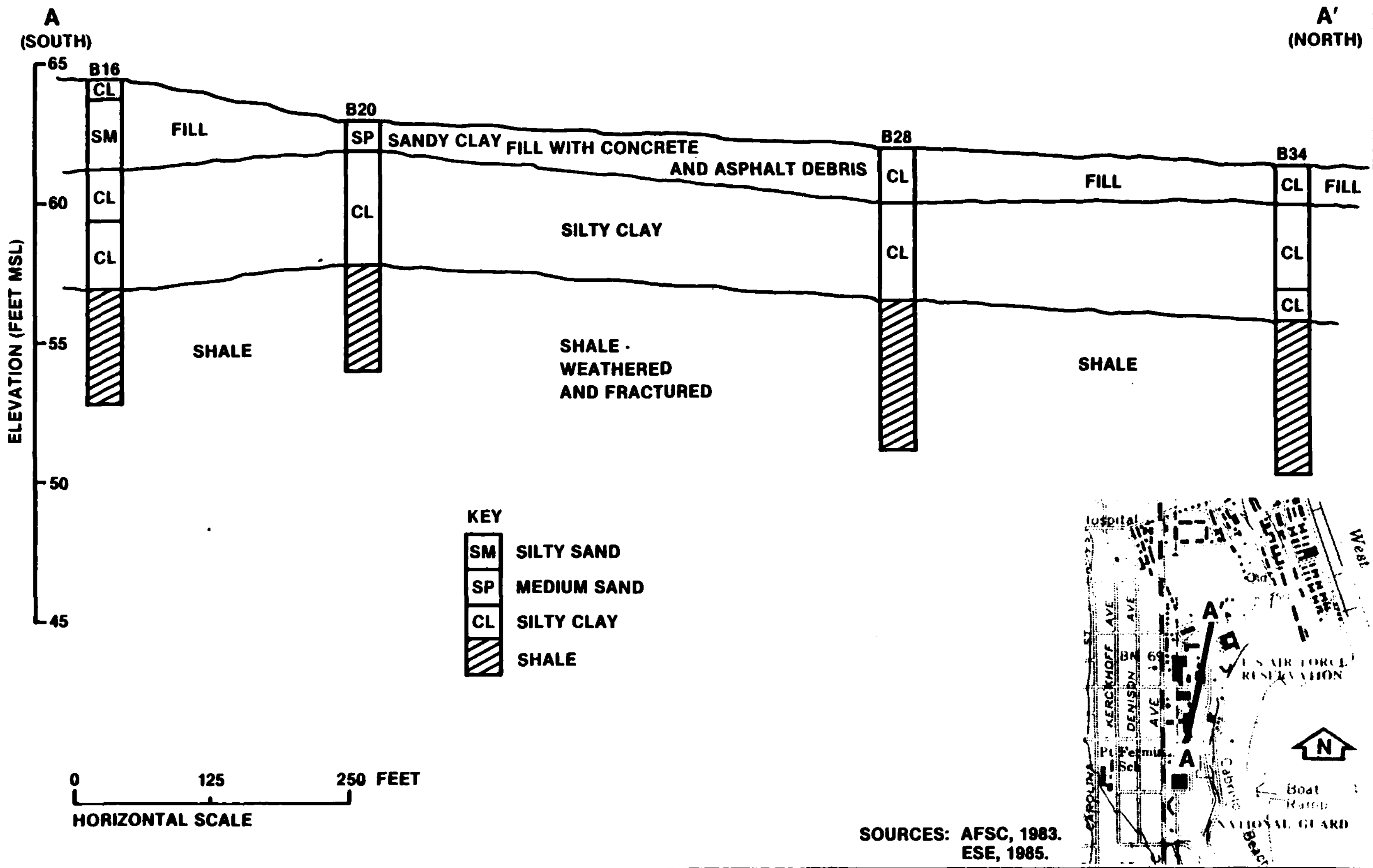
USAFMcAR 2/28/85



SOURCES: AFSC, 1983.
ESE, 1985.

Figure 3.3-3
SHALLOW SOIL PROFILE AT SOUTH END
OF FORT MACARTHUR

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the fill material, approximately 5 ft of natural silty clay overlie shale bedrock.

3.3.3 HYDROGEOLOGY

Due to the nature of the underlying geologic units, a well-developed aquifer system is not present beneath FMA. The Monterey shale is considered highly impervious, with ground water occurring in localized sand units. This water is highly saline and represents connate formation water without hydraulic connection to freshwater recharge. Small, localized perched water tables may occur on top of the silty clay units; however, a series of recent 10-ft to 15-ft soil borings (AFSC, 1983) revealed no well-developed water table. Moisture contents of the silty clay and weathered shale units were as high as 25 and 26 percent (weight), respectively.

Regional ground water flow in the unconsolidated deposits to the north of FMA occurs primarily in the Silverado Aquifer of the Lower Pleistocene San Pedro Formation. Ground water is also encountered in a shallow aquifer in the Upper Pleistocene Lakewood Formation. In sections of the deeper Silverado Aquifer north of FMA, flow is in an easterly direction (see Fig. 3.3-4). Approximately 2 miles north of FMA, a saltwater barrier project consisting of artificial recharge is used to protect potable sources from saltwater intrusion. In the shallow, unconfined Gage and Gaspur Aquifers, ground water flow is in a more southerly direction (see Fig. 3.3-5). Flow is from a ground water high near the city of Torrance toward lower elevations near Los Angeles Harbor. The potentiometric map represents ground water elevation contours in a specific subsurface aquifer. In each aquifer, flow is perpendicular to the contours from areas of higher elevation (ft, MSL) to areas of lower elevation, as indicated by the flow direction arrows. The generalized hydrogeologic units to the north of FMA are presented in Fig. 3.3-6.

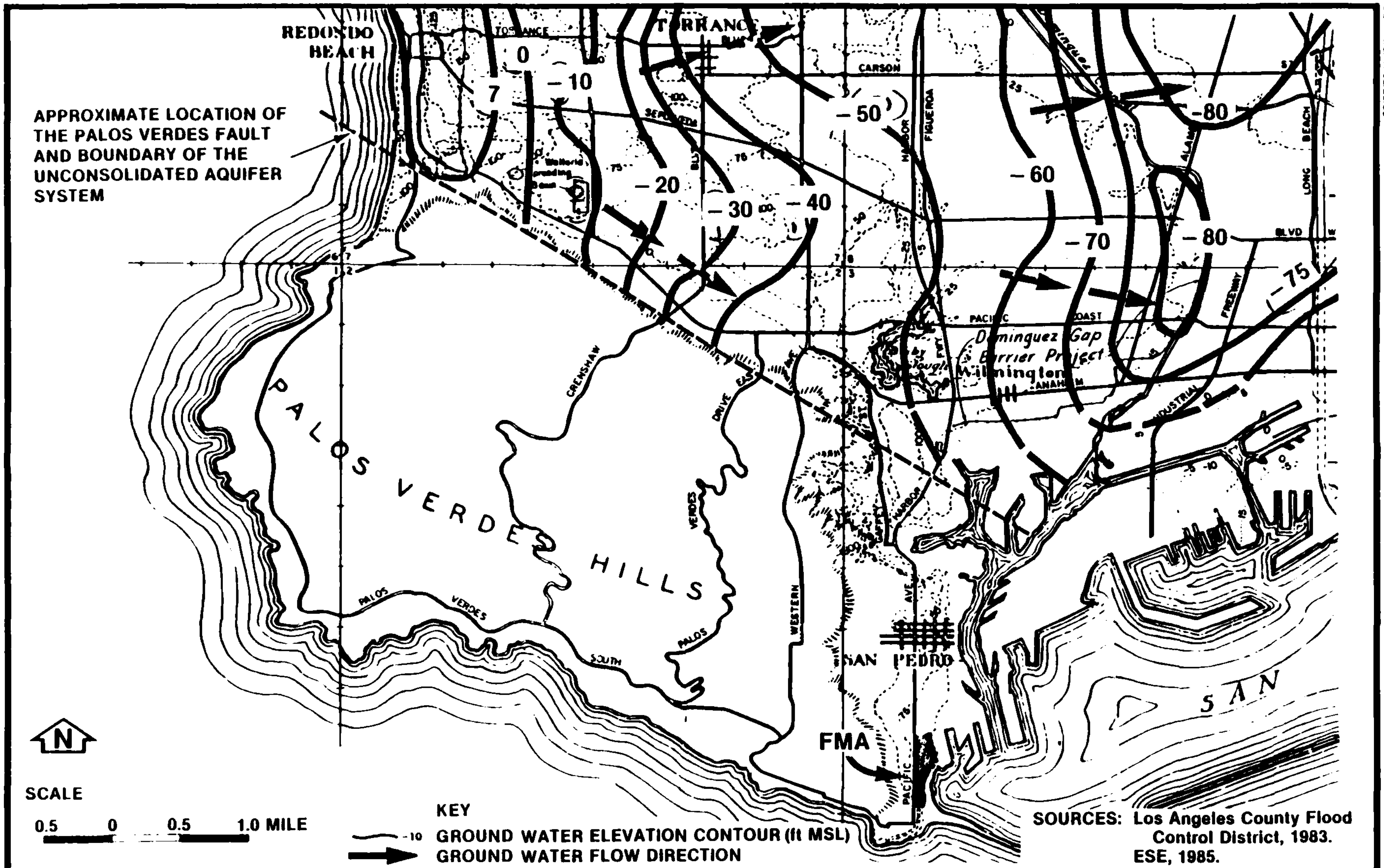

Figure 3.3-4
POTENTIOMETRIC SURFACE (ft MSL) OF
THE SILVERADO AQUIFER NEAR FMA, FALL 1983

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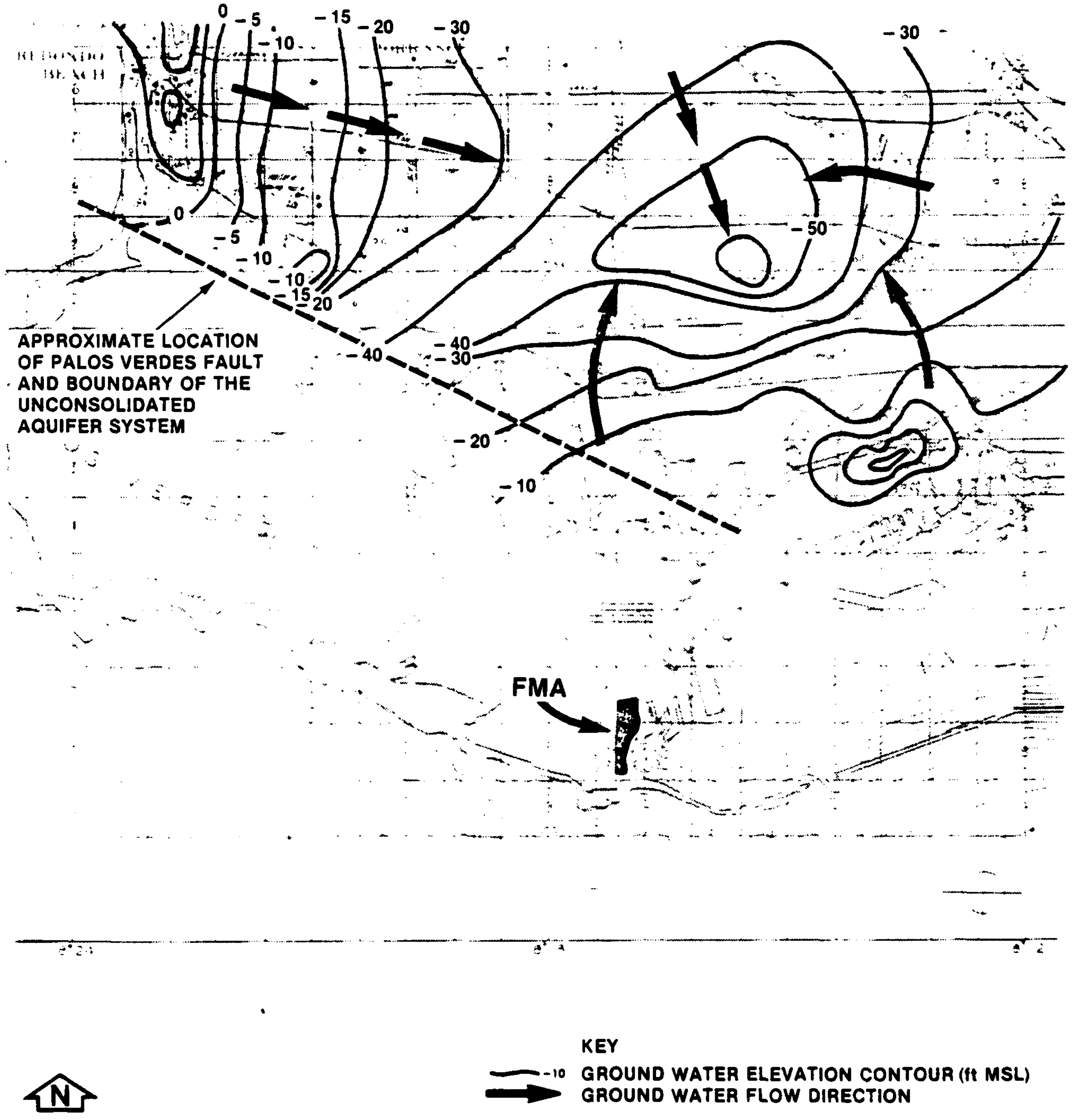

SOURCES: Los Angeles County Flood Control District, 1978.
ESE, 1985.

Figure 3.3-5
POTENTIOMETRIC SURFACE (ft MSL) OF THE SHALLOW (GAGE AND GASPUR) AQUIFER NEAR FMA, FALL 1978

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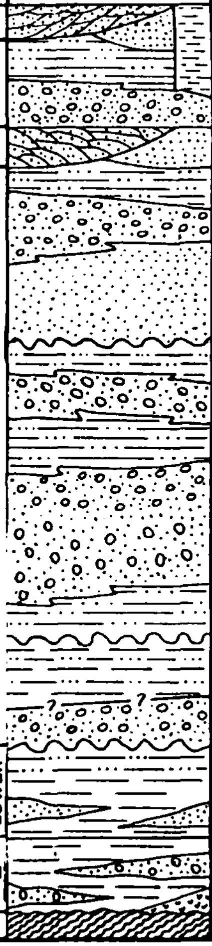
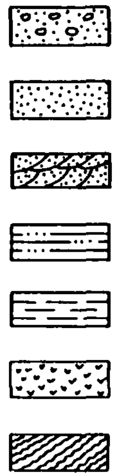
	AGE	FORMATION	LITHOLOGY	AQUIFER AND AQUICLUDE	MAXIMUM THICKNESS (FEET)	PREVIOUS FORMATION NAMES✿	PREVIOUS AQUIFER NAMES ✿
QUATERNARY	RECENT	ACTIVE DUNE SAND		SEMIPERCHED BELLFLOWER GASPUR (PLAYA AND LAGOONAL)	60	DUNE SAND ALLUVIUM	SEMIPERCHED†
		ALLUVIAL DEPOSITS			140		
					60		GASPUR†
	LATE PLEISTOCENE	OLDER DUNE SAND		SEMIPERCHED BELLFLOWER GARDENA GAGE	—	TERRACE COVER PALOS VERDES SAND	SEMIPERCHED†
		LAKEWOOD FORMATION			200	UNNAMED UPPER PLEISTOCENE	GARDENA†
					160		
					160		"200-FOOT SAND"†
		LOCAL UNCONFORMITY				LOCAL UNCONFORMITY	
	EARLY PLEISTOCENE	SAN PEDRO FORMATION		UNNAMED AQUICLUDE	—	SAN PEDRO FORMATION	
					200		"400-FOOT GRAVEL" †
				LYNWOOD	—		
				UNNAMED AQUICLUDE			SILVERADO†
				SILVERADO	500		
		LOCAL UNCONFORMITY				LOCAL UNCONFORMITY	
TERTIARY	LATE PLIOCENE	PICO FORMATION — UPPER			1,80^	PICO FORMATION	
				LOCAL UNCONFORMITY			
		PICO FORMATION — MIDDLE AND LOWER			1,700		
	MIOCENE-EARLY PLIOCENE	REPETTO FORMATION MONTEREY FORMATION MIOCENE VOLCANICS			14,000	REPETTO, PUENTE, AND MONTEREY FORMATIONS	
				UNCONFORMITY			
		CATALINA SCHIST			—	FRANCISCAN FM.	

LEGEND OF LITHOLOGY



✿ DESIGNATIONS AND TERMS UTILIZED IN "REPORT OF REFEREE" DATED JUNE 1952 PREPARED BY THE STATE ENGINEER COVERING THE WEST COAST BASIN.

† DESIGNATED AS "WATER BEARING ZONES" IN ABOVE NOTED REPORT OF REFEREE.

SOURCES: California Dept. of Water Resources, 1962. ESE, 1985.

Figure 3.3-6
GENERALIZED HYDROGEOLOGIC UNITS OF THE LOS ANGELES BASIN IN THE VICINITY OF FMA

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Installation Wells

Because of the characteristics of the underlying geologic units and lack of aquifer systems, there are no wells on or in the vicinity of FMA. The nearest potable supply wells are located approximately 5 miles north of FMA. These wells are located inside the saltwater intrusion barrier project injection wells and draw water from aquifer systems in the unconsolidated deposits of the Los Angeles Basin.

3.4 WATER QUALITY

3.4.1 SURFACE WATER QUALITY

No surface water features exist on FMA. A number of surface drainage catch basins are located on the installation and these normally contain no flow, except during rain storms. The discharges from these catch basins flow into Los Angeles Harbor.

Prior to the early 1970s, various small industrial discharges were connected to the stormwater drainage system. These included vehicle washracks, boiler and air conditioner blowdown, and swimming pool filter backwash. With the enactment of water quality regulations in the early 1970s associated with the Clean Water Act (Public Law 92-500), these discharges were routed to the sanitary sewer system for treatment. In 1975, industrial wastewater was being discharged into the stormwater collection system (USAEHA, 1975a). Currently, there are no NPDES permits for industrial wastewater discharges at FMA. During the site visit, however, it was determined that vehicle wash wastewater containing detergent surfactants, oil, and grease is being discharged to a storm drain near Bldg. 410. This discharge will require an NPDES permit (see Sec. 4.2.1).

3.4.2 GROUND WATER QUALITY

There are no wells on or in the vicinity of FMA; thus no data are available for ground water quality. As described previously, small quantities of ground water may occur in localized sand deposits of the shale units underlying FMA. This water would be highly saline without hydraulic connection to freshwater recharge.

3.4.3 POTABLE WATER QUALITY

Potable water on FMA is supplied by the City of Los Angeles Department of Water and Power (Harbor District). No potable wells have been operated on FMA by the U.S. Army or U.S. Air Force.

Available analytical data of the FMA water supply (USAEHA, 1981) in July 1972 include a number of health-related National Interim Primary Drinking Water Regulations (NIPDWR) and EPA National Secondary Drinking Water Regulations (NSDWR) parameters. Results of the analyses from 1972 (see App. G) indicate a number of elevated parameters such as sodium, mercury, and total dissolved solids. No information regarding sampling locations or followup analyses was available at FMA. However, averages of 1982-1983 data from potable water analyses performed by the City of Los Angeles indicated acceptable levels of the above-mentioned parameters and additional NIPDWR and NSDWR parameters (see App. G).

Results of trihalomethane (THM) analyses performed in 1980 by the U.S. Army Environmental Hygiene Agency (USAEHA) of the drinking water supplied to FMA indicated a yearly average of 0.106 milligram per liter (mg/l), which is slightly above the 0.10-mg/l maximum allowable concentration (USAEHA, 1981). No subsequent analyses were performed by USAEHA due to transfer of the installation to the Air Force in 1980. Results of analysis by the City of Los Angeles indicate a systemwide average of 0.04 mg/l of THM for water supplied to FMA. THMs are formed in municipal water supplies as a result of disinfection with chlorine, which reacts with naturally occurring dissolved organic materials in the water.

Bacteriological analytical data available at FMA and LAAFS indicate acceptable water quality conditions for FMA. Bacteriological water quality is currently monitored by Bioenvironmental Engineering (BEE) through LAAFS. Sampling locations and a schedule for bacteriological sampling are presented in Table 3.4-1.

Table 3.4-1. Bacteriological Collection Schedule, Locations, and Water Purveyors at FMA

Collection Point	Building	Water Purveyor
Week A (first week of the month)		
Ft. MacArthur		
Security Police Snack Room	28	City of Los Angeles (Harbor District)
CE Kitchen	56	City of Los Angeles (Harbor District)
Week B (second week of the month)		
Ft. MacArthur		
Mess Hall Sink	410	City of Los Angeles (Harbor District)
Youth Center Kitchen	425	City of Los Angeles (Harbor District)
Week C (third week of the month)		
Housing Area (FMA)	31st St.	City of Los Angeles (Harbor District)
Housing Area (FMA)	32nd St.	City of Los Angeles (Harbor District)
Rm. 1310 (LAAFS)	115 (Area A)	Southern California Water Company
Week D (fourth week of the month)		
Ft. MacArthur		
Housing Area	33rd St.	City of Los Angeles (Harbor District)
Housing Area	35th St.	City of Los Angeles (Harbor District)

Sources: BEE, 1985.
ESE, 1985.

3.5 BIOTIC COMMUNITIES

The reservation is situated in a residential area of San Pedro. Single-family and multifamily housing units surround the reservation on three of its four sides. Immediately to the east is a large marina being developed by the Los Angeles Harbor Department and Cabrillo Beach and Museum. The reservation consists almost entirely of buildings, paved streets, parking areas, and lawns. No natural vegetation communities and only scattered, cultivated plantings of ornamental trees and shrubs (e.g., on the parade ground) occur on the reservation. There are approximately 110 Washington palms (Washingtonia filifera) surrounding the parade ground, adjacent to the administrative buildings, and along the north side of Stephen M. White Drive. As a result of the developed nature of the reservation and its urban setting, wildlife diversity is low. No wildlife surveys or species counts have been conducted for the installation. The following paragraphs describe species that generally occur in urban areas of southern California.

Birds that may occur on base are those species that typically inhabit urban areas of southern California. Included among these are the mourning dove (Zenaidura macroura), raven (Corvus corax), robin (Turdus migratorius), yellow-rumped warbler (Dendroica coronata), flicker (Colaptes auratus), and downy woodpecker (Dendrocopus publescens). These birds may forage in the shrubs and trees and on the lawns of the reservation. A large population of wild parakeets inhabits the palms surrounding the parade ground. Additionally, several common coastal species could frequent the reservation. These include the western gull (Larus occidentalis) and glaucous-winged gull (Larus glaucesens) (Yocom and Dasmann, 1965).

Due to the human activity and lack of habitat on or adjacent to the reservation, few mammalian wildlife species are expected to occur. These would be limited to mice (Peromyscus maniculatus) and possibly moles (Scapanus townsendi). Herpetiles would be limited to possibly the western garter snake (_Thammophis sirtalis_), western skink (_Eumeces skiltoniamus_), and western toad (_Bufo boreas_).

No state-listed or Federally listed threatened or endangered species are expected to occur on base due to the lack of suitable habitat.

3.6 ENVIRONMENTAL SETTING SUMMARY

FMA is located on the southeastern end of the Palos Verdes Peninsula, along the western edge of Los Angeles Harbor. This area lies within a topographic northwest-trending lowland plain known as the Los Angeles Basin. Most of the reservation consists of a gently sloping, nearly level area that contains residential housing; administrative, maintenance, and recreational buildings; paved streets; and parking areas. Elevations on the reservation range from 50 to 70 ft above MSL.

There are no surface water features on FMA. The reservation is drained by a series of independent stormwater drainage systems, all of which drain several hundred yards toward the east 100 to 200 yds with eventual discharge into Los Angeles Harbor. These normally contain no flow, except during rain storms.

The climate of the area is mild, with temperatures moderated by the Pacific Ocean. The average monthly temperature ranges from a low of 55.2°F in January to a high of 73.9°F in August. The average annual rainfall is 11.54 inches, 88 percent of which occurs in the winter months (November through March). Net precipitation is -34.46 inches per year, and the 1-year, 24-hour rainfall event is 2 inches. The low value for net precipitation indicates a low potential for significant infiltration or the formation of permanent surface water features. The 1-year, 24-hour rainfall event of 2 inches indicates a moderate potential for runoff and erosion. The majority of the installation, however, is asphalt-paved and contains stormwater drainage systems to control runoff, thus eliminating any significant potential for flooding and soil erosion.

The surficial lithology on the reservation consists of terrace deposits of sand, silt, and clay. Shallow soil borings on FMA reveal 8 to 12 ft of silty clay overlying weathered and fractured shale units. On several areas of the installation, there is 1 to 14 ft of fill material consisting of clay, clayey sand, silty sand, and debris from previous construction. A unit of natural soil ranging from 0 to 8 ft in thickness underlies the fill material. This unit consists of silty clay and is underlain by fairly well indurated diatomaceous shale.

Due to the nature of the underlying geologic units, a well-developed aquifer system is not present beneath FMA. The shale is considered highly impervious, with ground water occurring in localized sand units. This water is highly saline and represents connate formation water without hydraulic connection to freshwater recharge. Small, localized perched water tables may occur on top of the silty clay units; however, a series of recent 10-ft to 15-ft soil borings revealed no well-developed water table. There are no industrial or potable water supply wells on or in the vicinity of the reservation.

As a result of the developed nature of the installation and its urban location, wildlife habitat on or adjacent to the reservation is small. Vegetation is limited to cultivated species such as ornamental shrubs, bushes, and trees. Various urban bird species forage in the trees and on the lawns. Common rodents (e.g., mice) occur on base. No state-listed or Federally listed threatened or endangered species are present.

4.0 FINDINGS

To assess hazardous waste management at FMA, past activities of waste generation and disposal methods were reviewed. This section contains a summary of hazardous wastes generated, descriptions of waste disposal methods, identification of the disposal sites on base, and evaluation of the potential for environmental contamination.

4.1 CURRENT AND PAST ACTIVITY REVIEW

To identify past activities that resulted in generation and disposal of hazardous waste, current and past waste generation and disposal methods were reviewed. This activity consisted of a review of files and records, examination of engineering diagrams for buildings and sanitary and storm sewer systems, interviews with current and former base employees, and site inspections.

FMA operations described in this section are those which handle, store, or dispose of potentially toxic or hazardous materials. These operations include industrial and laboratory operations and activities in which pesticides; polychlorinated biphenyls (PCB); petroleum, oils, and lubricants (POL) (including organic solvents); radiological materials; and explosives are handled. While under military ownership, no large-scale product-manufacturing operations have been conducted at FMA. The industrial operations conducted at FMA are primarily maintenance-support functions provided for facilities, missiles, shore batteries, and ground vehicles.

Since the initiation of industrial activity in 1911, various disposal practices for wastes (both onsite and offsite) have been used. In general, past waste disposal methods conformed to standard practices for that time period. With the promulgation of State of California and U.S. EPA regulations in the 1970s controlling toxic and hazardous materials, many disposal practices changed. Since then, regulated wastes have been disposed of by hazardous waste contractors in approved hazardous waste disposal facilities.

Industrial activity at FMA has cycled from nearly no activity to several times the amount of today's activity (e.g., during wartime). Often, specific information concerning waste generation rates and waste types of the early industrial activity was not available during the onsite survey. Industrial operations performed by the Army included many activities currently performed by the Air Force (e.g., pest control, painting, and other base support activities). The activities generated many of the same types of wastes as current Air Force operations. App. E contains a list of shops currently operating on FMA. Past and current shops, activities, and waste treatment, storage, and disposal practices are discussed in this section.

A summary of waste generation from FMA industrial operations is presented in Table 4.1-1. Industrial shops; activities; and waste treatment, storage, and disposal are described in the following paragraphs. (Waste disposal, hazardous or otherwise, that is handled by contract will be referred to as "contract disposal" throughout this report.)

4.1.1 INDUSTRIAL OPERATIONS

4.1.1.1 FORMER CIVILIAN OPERATIONS

The south end of FMA (Zones 4 and 5) was privately owned before acquisition by the U.S. Army in 1938. From 1911 to 1938, many different commercial and industrial operations were located on the property. Due to the time period involved (50 to 70 years ago), available records and personnel interviews yielded little specific information on waste generation types, rates, and disposal methods for these operations. It is, however, unlikely that significant amounts of wastes classified as toxic or hazardous were used or disposed of onsite. For example, chlorinated hydrocarbons [e.g., PCB, trichloroethylene (TCE), DDT] were not manufactured until the 1930s. Additionally, examination of engineering diagrams for the buildings and their associated sanitary

Table 4.1-1. Fort MacArthur Industrial Operations--Waste Generation

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity (gal/yr)*	Waste Management Practices (1920 – 1930 – 1940 – 1950)
I. FORMER CIVILIAN OPERATIONS				
A. Trona Co.	410, 411, 424, 425, 426, 427, 433	Wastes from the refining of nitrate salts†	Unknown	Direct discharge to San Pedro Bay
B. American Mineral Co.	**	Unknown	Unknown	Unknown
C. Color-Kote Co.	410	Unknown organics†	Unknown	Unknown
D. American Cardboard and Cartage Co.	**	Glue, solvent, paint, and thinner†	Unknown	Unknown
E. Oil pumping station	Near Bldg. 500	Oil spillage†	Unknown	Unknown
F. Asphalt paving company	Near Bldg. 500	Asphalt, solvent, and lube oil†	Unknown	Unknown
II. U.S. ARMY OPERATIONS				
A. 48th Motor Repair Unit	46	Waste POL (lube oil, solvent, fuel, and transmission fluid)	Unknown	Unknown
		Batteries and battery acid	Unknown	Unknown

Table 4.1-1. Fort MacArthur Industrial Operations--Waste Generation (Continued, Page 2 of 5)

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity (gal/yr)*	Waste Management Practices (1950 – 1960 – 1970 – 1980)
B. Consolidated Maintenance Division				
1. Vehicle Maintenance Shop	42, 78, 88, 100, 408, 433, 453	POL (lube oil, solvent, fuel sludge, ethylene glycol, and transmission fluid)	10,000 (until 1981); 110 (1981-1982)	(1942) Contract disposal
2. Battery Shop	453	Batteries	200/yr	(1942) Returned to vendor for credit
		Battery acid	100	(1929) Discharged to sanitary sewer; Discharged to soakage pit behind Bldg. 453; Neutralized and discharged to sanitary sewer
3. Paint Shop	435, 436	Paint wastes (residual paint, thinner, and water curtain paint booth sludge)	Variable (small)	Discharged to storm drain; Contract disposal
		Empty paint cans and glass fiber paint booth filters	Variable (small)	Hauled to offpost sanitary landfill
4. Vehicle Washracks	431 (1945-1965), 452, 457	Washrack/steam cleaner wastewater	2,000 gpd	Discharged to storm drain; Discharged to sanitary sewer
	452, 457	Clarifier wastes	Variable	Contract disposal

Table 4.1-1. Fort MacArthur Industrial Operations--Waste Generation (Continued, Page 3 of 5)

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity (gal/yr)*	Waste Management Practices (195[illegible] – 1960 – 1970 – 1980)
C. PX Service Station	42 (1951-1959), 100 (1959-1979)	Waste POL (lube oil, solvent, and ethylene glycol)	Variable	Unknown; suspected contract disposal
D. Facilities Engineering				
1. Paint Shop	75, 76	Paint, thinner, stripper (methylene chloride)	Variable (small)	Hauled to offpost sanitary landfill
2. Furniture Repair Shop	67, 68 (1934-1963), 436 (1963-1972), 457 (1972-1982)	Paint, thinner, ethanol, and methylene chloride	130	(1934) Discharged to sanitary sewer; Contract disposal
		Empty paint/solvent cans	250/yr	(1934) Hauled to offpost sanitary landfill
3. Entomology Section	113	Empty pesticide containers	Variable	(1934) Hauled to offpost sanitary landfill
		Pesticide-contaminated rinse water	Variable	(1934) Discharged to storm drain and/or soakage pit near Bldg. 113; Discharged to sanitary sewer or reused as diluent
4. Swimming Pool	400	Filter back-wash water	100 gpd	(1943) Discharged to storm drain; Discharged to sanitary sewer
		Filter back-wash sludge	Variable	(1943) Hauled to offpost sanitary landfill

Table 4.1-1. Fort MacArthur Industrial Operations--Waste Generation (Continued, Page 4 of 5)

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity (gal/yr)*	Waste Management Practices (1950–1980)
5. Sanitation Section	Basewide	Sanitary sewage	Variable	(1918) Pumped to Los Angeles County sewage treatment plant
		Solid waste (refuse)	Variable	(1918) Hauled to offpost sanitary landfill
E. Guided Missile Maintenance Shop	452	Paint and stripping wastes	≤100	Contract disposal
		TCE	≤2,000	Contract disposal
		Battery acid	≤300	Discharged to soakage pit behind Bldg. 453
		Stoddard solvent	≤4,000	Contract disposal
		Hydraulic fluid	≤3,800	Contract disposal
F. U.S. Army Reserve--Carpentry Shop	403	Paint and thinner	Variable (small)	Hauled to an offpost sanitary landfill
II. U.S. AIR FORCE				
A. Civil Engineering				
1. Pavement and Grounds Section	88	Waste oil, kerosene, and ethylene glycol mixture	110	Contract disposal
2. Electrical Shop	89	PCB transformers	25 in 1983, <5 since 1983	Contract disposal

Table 4.1-1. Fort MacArthur Industrial Operations--Waste Generation (Continued, Page 5 of 5)

Shop Name	Location (Bldg. No.)	Waste Material	Waste Quantity (gal/yr)*	Waste Management Practices (1950 / 1960 / 1970 / 1980)
3. Paint Shop	75, 76	Paint, thinner, stripper (methylene chloride)	Variable (small)	Hauled to offpost sanitary landfill →
4. Entomology Section	75 (1982-4), 113 (1984), 75 (since 1984)	Pesticide-contaminated rinse water	Variable	Used as diluent for subsequent mixtures →
		Pesticide containers	Variable	Contract disposal →
5. Swimming Pool	400	Filter back-wash water	100 gpd	Discharged to sanitary sewer →
		Filter back-wash sludge	Variable	Contract disposal →
6. Facilities Engineering	Basewide	Sanitary sewage	Variable	Pumped to Los Angeles County sewage treatment plant →
		Solid waste	Variable	Hauled to offpost sanitary landfill →
B. Tenant-- U.S. Army National Guard	410	Vehicle washwater containing detergents	Variable	Discharged to storm drain →

*Unit of measurement is gallons per year (gal/yr) unless indicated otherwise.
†Unverified potential waste materials based on type of operations.
**Shop was located in southern portion of Middle Reservation; specific site is unknown.

Key:

- ______ Confirmed timeframe and disposal data from shop personnel.
- ------ Estimated timeframe and disposal data from shop personnel.
- ---- > Arrow indicates current practice at time of site visit.
- gpd Gallons per day.
- TCE Trichloroethylene.

and stormwater drainage systems indicates that sanitary wastes have been discharged to the San Pedro municipal system since 1918, and storm water has been discharged to vitrified clay or concrete drain systems that discharged into the harbor. No sumps or dry wells were found on the historical diagrams; furthermore, the subsurface geology is not conducive to these types of systems. The only septic tank system used on FMA was at Bldg. 405, which was constructed in 1944 for use as stables. Later it was converted to a youth center, and it was recently demolished for construction of housing units. Based on the use of this building, it is unlikely that any toxic or hazardous materials were disposed of in this system. Retired personnel who lived in San Pedro during this era indicated that no landfills were located on this property. The area adjacent to and south of the former Trona plant (Bldg. 425) has recently been completely developed by the construction of new USAF housing units. Soil borings and extensive subsurface excavations for construction of fountains and installation of utilities in this area did not reveal the presence of former landfills, disposal sites, or spillage.

Available information on former civilian operations on the property acquired by USAF in 1982 is summarized in the following paragraphs.

TRONA COMPANY

The Trona complex included Bldgs. 410, 411, 424, 425, 426, 427, and 433, which were constructed in 1918 and used by the Trona Co. for the processing of nitrate salts. The Trona Co. went out of business in the early 1920s, and the buildings were subsequently used by the American Mineral Co., the American Cardboard and Cartage Co., and the Color-Kote Co. Other minor industrial operations included a sawmill and fertilizer production. Of the original Trona complex, only Bldgs. 410, 411, and 425 remain. The other buildings have been demolished to provide for construction of USAF housing units.

The Trona Co. operated the nitrate processing plant for the refinement of minerals used in the production of military munitions. Raw minerals (e.g., saltpeter, potassium and sodium nitrate) were transported from the town of Trona in the Mojave Desert to the Trona plant for processing. Available records and retired FMA personnel who lived in San Pedro during the Trona plant era indicate that only nitrate salts were produced by the Trona plant, while actual munitions manufacturing occurred offpost. Bldg. 425 was used for the refined nitrate salts storage, and Bldg. 426 contained the evaporation process facility. The refined salts were shipped out by the Southern Pacific Railroad, which maintained tracks adjacent to Bldg. 425.

The compositions and quantities of waste materials generated from the Trona plant are unknown. Based on information about the operation, the wastes likely contained nitrate, potassium, and sodium. These materials are nutrients and are used as components of fertilizers. Disposal of the waste products was by direct discharge to San Pedro Bay via sewer and storm drains.

AMERICAN MINERAL COMPANY

The American Mineral Co. occupied at least one of the buildings in the former Trona complex. The American Mineral Co. produced roofing material described as "granules" (Chemical Systems Laboratory, 1983) from the early 1920s to late 1930s. Waste composition, generation rates, and disposal methods are unknown.

COLOR-KOTE COMPANY

The Color-Kote Co. occupied a small portion of the basement in Bldg. 410 from about 1920 to 1941 after shutdown of the Trona plant. The Color-Kote Co. was reported to have produced a one-step polish/cleaner for automobiles (Chemical Systems Laboratory, 1983). Potential waste materials were organics. Waste composition, generation rates, and disposal methods are unknown.

AMERICAN CARDBOARD AND CARTAGE COMPANY

The American Cardboard and Cartage Co. occupied at least one of the former Trona complex buildings from the early 1920s to late 1930s. Potential waste materials were glue, solvent, paint, and thinner. Waste generation rates and disposal methods are unknown.

OIL PUMPING STATION

An oil pumping station was located near Bldg. 500 on the south side of FMA from approximately 1920 to the late 1930s. The pumping station was used to lift petroleum products from the harbor to the city of San Pedro. A potential waste material was oil spillage. Waste quantities and disposal methods are unknown.

ASPHALT PAVING COMPANY

An asphalt paving company was located near Bldg. 500 from about 1920 to the late 1930s. Potential waste materials from asphalt production and equipment maintenance were asphalt, solvent, and lube oil. Waste quantities and disposal methods are unknown.

4.1.1.2 U.S. ARMY OPERATIONS

48TH MOTOR REPAIR UNIT

The 48th Motor Repair Unit was stationed at FMA (Bldg. 46) from approximately 1935 to 1945 and was responsible for vehicle maintenance. Wastes generated as the result of normal activity were reported to have been waste POL (lube oil, solvent, fuel, and transmission fluid), automotive batteries, and battery acid. Due to the length of time since the 48th Motor Repair Unit was active at FMA, no information concerning waste generation rates and disposal practices was available at the time of the site visit.

CONSOLIDATED MAINTENANCE DIVISION

Vehicle Maintenance Shop

The Vehicle Maintenance Shop was operated from 1942 to 1982. Vehicle maintenance was conducted in Bldgs. 42, 78, 88, 100, 403, 433, and 453.

Waste materials included lube oil, solvent, fuel sludge, ethylene glycol, and transmission fluid. The types of solvents reportedly used included Stoddard solvent, TCE, and methylene chloride (HQ, 6th U.S. Army Medical Laboratory, 1969). Generation rates for all the above wastes averaged 10,000 gallons per year (gal/yr) until 1981, when the generation rate dropped to approximately 110 gal/yr as a result of the drastic reduction in the number of vehicles serviced. From 1942 to 1982, all waste POL (including ethylene glycol) were contract disposed (USAEHA, 1975b).

Battery Shop

The Battery Shop (Bldg. 453) produced an average of 200 used lead acid automotive batteries and 100 gal of battery acid annually. From 1942 to 1982, battery carcasses were returned to the vendor for credit. Battery acid was discharged directly to the sanitary sewer from 1929 to 1959, discharged to a soakage pit behind Bldg. 453 from 1959 to 1975, and neutralized and discharged to the sanitary sewer from 1975 to 1982.

Paint Shop

The Maintenance Division Paint Shop (Bldgs. 435 and 436) generated varying amounts of paint wastes, empty paint cans, and spray booth filters. Paint wastes (residual paint, thinner, chlorinated and non-chlorinated strippers, and water curtain paint booth sludge) were discharged to a storm drain from 1948 to 1958 and contract disposed from 1958 to 1982. However, the paint booth in Bldg. 435 was reportedly out of service during a 1969 engineering survey (HQ, 6th U.S. Army Medical Laboratory, 1969) and, therefore, was not generating wastes. The survey did not indicate how long the booth had been unused. Empty paint cans and spray booth filters were hauled to an offpost sanitary landfill.

Vehicle Washracks

Vehicle washracks were operated at Facilities 431, 452, and 457. Washrack wastewaters were produced at an average rate of 2,000 gallons per day (gpd). These wastewaters were discharged to the storm sewer from 1945 to about 1965. Oil/water clarifiers were installed in about 1965 on the washracks at Facilities 452 and 457, and connections were made with the sanitary sewer systems. Clarifier wastes were contract disposed from 1965 to 1982. A 1975 water quality engineering survey (USAEHA, 1975a) indicated that washrack discharge to the sanitary sewer was permitted by the City of Los Angeles.

Post Exchange Service Station

The Post Exchange (PX) Service Station was in Bldg. 42 from 1951 to 1959 and Bldg. 100 from 1959 to 1979. This station accumulated waste POL (lube oil, solvent, and ethylene glycol) at a variable rate from minor vehicle maintenance. The method used for disposal of the waste POL is unknown, but it is suspected that the POL were contract disposed with wastes from the Vehicle Maintenance Shop.

FACILITIES ENGINEERING

Paint Shop

The Facilities Engineering Paint Shop was in Bldg. 75, and the spray booth was in Bldg. 76. Wastes generated included paint, thinner, and stripper (HQ, 6th U.S. Army Medical Laboratory, 1969). Waste quantities varied with the type and number of items being stripped or painted. All wastes were hauled to an offpost sanitary landfill for disposal from 1951 to 1982.

Furniture Repair Shop

The Furniture Repair Shop was in Bldgs. 67 and 68 from 1934 to 1963, Bldg. 436 from 1963 to 1972, and Bldg. 457 from 1972 to 1982. This shop produced wood-finishing and stripping wastes (130 gal/yr) and empty paint and solvent cans (250/yr). Wood-finishing and stripping wastes (paint, thinner, ethanol, and methylene chloride) were discharged to the sanitary sewer from 1934 to 1972 and contract disposed from 1972 to 1982. Empty paint and solvent cans were hauled to an offbase sanitary landfill from 1934 to 1982. A 1969 engineering survey (HQ, 6th U.S. Army Medical Laboratory, 1969) indicated that the spray paint booth

(Bldg. 436) was equipped for dry filtration of workplace air. Disposition of spent filters was not discussed in the report; however, the filters were most likely hauled to an offbase sanitary landfill.

Entomology Section

Entomology Section (Bldg. 113) generated empty pesticide containers and pesticide-contaminated rinse water. Until 1982, the empty pesticide containers were hauled to an offpost sanitary landfill for disposal. Former employees reported that pesticide-contaminated rinse water was discharged to a storm drain until 1970 and reused as diluent for subsequent pesticide mixtures from 1970 to 1982. However, a 1973 survey (HQ, 6th U.S. Army Medical Laboratory, 1973) reported that pesticide wastewater was poured into a gravel soakage pit located near Bldg. 113. A 1975 engineering survey (USAEHA, 1975b) and a 1977 pesticide management survey (Dames and Moore, 1977) both reported that the rinse water was being discharged to the sanitary sewer system.

Swimming Pool

The swimming pool (Facility 400) and associated filtration equipment were constructed in 1943. Filtration wastes included backwash water and sludge. Backwash water (100 gpd) was discharged to the storm sewer until about 1965, when connections were made to the sanitary sewer system. Filter backwash sludge (quantity varied with pool use) was hauled to an offpost sanitary landfill from 1943 to 1982.

Sanitation Section

Sanitary sewage (variable quantity) was collected and pumped to the Los Angeles County Bureau of Sanitation Terminal Island screening plant from 1918 to 1936 and Terminal Island sewage treatment plant from 1936 to 1982. Solid waste (refuse) was collected and hauled to an offpost sanitary landfill from 1918 to 1982. Solid waste varied in quantity from 600 to 3,200 cubic meters (m^3) per month. Some solid wastes were reported to have been landfilled on other FMA property, specifically Whites Point and the Lower Reservation (see Sec. 4.2.2 for details).

GUIDED MISSILE MAINTENANCE SHOP

The Guided Missile Maintenance Shop (Bldg. 452) provided maintenance and equipment repair support for the Ajax and Hercules missiles located in the Los Angeles area from 1954 to 1974. Wastes generated from maintenance activities included paint and stripping wastes ($\leq$100 gal/yr), trichloroethylene (TCE) ($\leq$2,000 gal/yr), battery acid ($\leq$300), Stoddard solvent ($\leq$4,000 gal/yr), and hydraulic fluid ($\leq$3,800 gal/yr). The paint and stripping wastes, TCE, Stoddard solvent, and hydraulic fluid were contract disposed from 1959 to 1972. Former employees reported that from 1959 to 1972, battery acid was discharged to an acid soakage pit adjacent to Bldg. 453.

U.S. ARMY RESERVE

Carpentry Shop

The Army Reserve Carpentry Shop (Bldg. 403) generated varying amounts of waste paint and thinner from 1974 to 1982. From 1974 to 1982, waste paint and thinner were hauled to an offpost sanitary landfill for disposal.

4.1.1.3 U.S. AIR FORCE OPERATIONS

CIVIL ENGINEERING

Pavement and Grounds Section

The Civil Engineering Pavement and Grounds Section (Bldg. 88) generates 110 gal/yr of a lube oil, kerosene, and ethylene glycol mixture. Since operational startup in 1982, the POL mixture has been contract disposed.

Electrical Shop

The Electrical Shop (Bldg. 89) was responsible for the removal of PCB transformers and PCB-contaminated materials from the buildings being demolished in the south end of FMA. In 1983, 25 PCB transformers were contract disposed. Since 1983, less than five PCB transformers have been taken out of service for contract disposal. PCB handling, storage, and disposal are discussed in Sec. 4.1.4.

Paint Shop

The Air Force Paint Shop (Bldgs. 75 and 76) operates in the same manner as did the Army's Facilities Engineering Paint Shop (prior to 1982). Waste paint, thinner, and stripper are generated. Waste quantities vary with the type and number of items being stripped or painted. Wastes are hauled to an offpost sanitary landfill for disposal.

Entomology Section

The Entomology Section was located in Bldg. 75 from 1982 to 1984 and Bldg. 113 for 6 months in 1984, then moved back to Bldg. 75 in 1984. Empty pesticide containers have been contract disposed since 1982. Pesticide-contaminated rinse water has been used as diluent for subsequent pesticide mixtures. Waste quantities are variable due to the steady addition of new residential housing at FMA.

Swimming Pool

The swimming pool (Facility 400) and associated filtration equipment were constructed in 1943. Filtration wastes include backwash water and sludge. Backwash water (100 gpd) is discharged to the sanitary sewer system. Filter backwash sludge is generated at varying quantities and is contract disposed to an offpost sanitary landfill.

Facilities Engineering

FMA sanitary sewage is discharged to the Los Angeles County Terminal Island treatment plant. Solid wastes (refuse) are hauled by contractors to an offbase sanitary landfill. Since 1982, renovation, demolition, and construction of FMA facilities have caused sanitary and solid waste quantities to vary considerably.

TENANT

U.S. Army National Guard

The Army National Guard (Bldg. 410) operates a washing area for National Guard vehicles. Vehicle washwater containing detergents has been discharged to a storm drain adjacent to the washing area since 1981. No vehicle maintenance is performed at this location.

4.1.2 LABORATORY OPERATIONS

Laboratory operations at FMA were performed by the Army through the TASO photographic laboratory. The operations of the TASO photo laboratory are summarized in the following paragraph and in Table 4.1-2.

TASO PHOTO LABORATORY

The TASO photo laboratory (Bldg. 403) was located offpost prior to 1974. From 1974 to 1982, lab operations generated waste developer (150 gal/week), fixer (150 gal/week), rinse water (200 gpd), and film scraps (variable quantity). Waste developer, fixer, and rinse water were discharged to the sanitary sewer. Film scraps were hauled to an offpost sanitary landfill for disposal.

4.1.3 PESTICIDE HANDLING, STORAGE, AND DISPOSAL

Pesticides are used on FMA by Pacifica Services, Inc. Facilities Engineering to maintain grounds and structures and to prevent pest-related problems. Since acquisition of FMA by the Air Force in 1982, the only other contractor responsible for pest control has been Trend Western Technical Corp. Prior to 1982, the Army was responsible for pest control, and pesticides were stored and mixed in Bldg. 113. Pesticide inventories taken in 1976 and 1982 are presented in Table 4.1-3.

Pesticide-contaminated rinse water from equipment and container rinsing was discharged to a storm drain or to a gravel soakage pit near Bldg. 113 until the early 1970s (HQ, 6th U.S. Army Medical Laboratory, 1973). Since the early 1970s, rinse water has been discharged to the sanitary sewer or used as diluent for subsequent pesticide applications (USAEHA, 1975b and 1976). Empty pesticide containers have always been hauled to an offpost sanitary landfill for disposal. According to available records, no bulk quantities of pesticides were disposed of on FMA.

Table 4.1-2. Fort MacArthur Laboratory Operations--Waste Generation

Laboratory Name	Location (Bldg. No.)	Waste Material	Waste Quantity	Waste Management Practices 1950 1960 1970 1980
U.S. ARMY TASO Photo Lab	403	Developer	150 gal/week	Discharged to sanitary sewer
		Fixer	150 gal/week	Discharged to sanitary sewer
		Rinse water	200 gpd*	Discharged to sanitary sewer
		Film scraps	Variable	Hauled to offpost sanitary landfill

*gpd = Gallons per day.

Key:

______ Confirmed timeframe and disposal data from shop personnel.

Source: ESE, 1985.

Table 4.1-3. Pesticide Inventories of 1976 and 1984

1976	1984
Diazinon	Diazinon 4E
Baygon®	Malathion 57
Chlordane	Gopha-Rid®
Malathion	
LACCO Summer Spray®	
Sevin-Metaldehyde®	
Tersan OM®	
Baygon Bait®	
Kali-Dust®	
Acti-dione	
Vapo with Baygon®	
Aluminum Phosphide	
Pentachlorophenol	
Dowfume MC-2®	
Dal-E-Rad®	
Diquat	
Dalapon	
Dacthal W-75®	
Amitrole	
Simazine	
Chlorate-Borate	
2,4-D LV Ester	
Dicamba	
MH-30T Malek Hydrazide®	

Sources: 6592d Air Base Squadron/DE, 1984.
ESE, 1985.

4.1.4 PCB HANDLING, STORAGE, AND DISPOSAL

The FMA electrical equipment and distribution system was maintained by the Army until 1982 and by Trend Western Technical Corp. from 1982 to 1984 and has been maintained by Pacifica Services, Inc. since 1984. Minor transformer repair and routine maintenance of the distribution system, poles, and streetlights have been performed by the Army and operating contractors. Major transformer repair has been performed by offbase contractors. Reportedly, no transformers were taken out of service at FMA prior to 1983; instead, defective transformers were either repaired in place or sent offbase for repairs. Since most of the buildings in the south section of FMA were demolished in 1983, approximately 25 PCB transformers have been removed and contract disposed through the Defense Property Disposal Office (DPDO), in accordance with EPA Regulations. Non-PCB transformers were disposed of through the DPDO for salvage. Currently, seven PCB transformers remain at FMA. Two of these PCB transformers already have been removed from service and are awaiting disposal in Bldg. 65. Of the five remaining in-service transformers, two (located in Bldg. 403) are scheduled for removal by July 1, 1985. It is expected that by Aug. 1, 1985, the four out-of-service PCB transformers will be contract disposed through DPDO. The three remaining in-service PCB transformers will be removed from FMA in accordance with EPA regulations.

4.1.5 POL HANDLING, STORAGE, AND DISPOSAL

The types of POL used and stored at FMA include motor gasoline (MOGAS), diesel fuel (DF-2), fuel oil, kerosene, petroleum-based solvent, hydraulic fluid, and lube oil.

In addition to fixed storage tanks, drums and smaller containers are used for aboveground storage of incoming and waste materials such as solvent, hydraulic fluid, and lube oil.

EXISTING UNDERGROUND POL STORAGE

One 500-gal underground fuel oil storage tank was identified at FMA. The tank was installed in 1962 in Bldg. 28, the site of a 30-kilowatt reserve power generator.

ABANDONED UNDERGROUND POL STORAGE

Thirteen former or abandoned underground tanks, ranging in capacity from 200 to 10,000 gal, were identified at FMA. The facilities, POL types, capacities, and dates of operations are listed in Table 4.1-4. The locations of these tanks are shown in Fig. 4.1-1. Three abandoned tanks (in Bldgs. 32 and 105) were filled with sand, capped, and abandoned in place. In 1982, two abandoned tanks (in Bldg. 100) were excavated for disposition off base as scrap metal. During recent construction of housing, the underground tanks at Bldgs. 457 and 553 were also excavated.

There has been no reported leakage or spillage associated with these tanks; thus, no Phase II actions are recommended. It would be, however, good engineering practice to clean any remaining abandoned tanks and close them in accordance with applicable regulations.

WASTE POL STORAGE, HANDLING, AND DISPOSAL

Waste POL at FMA include waste fuel, lube oil, petroleum-based solvent, and hydraulic fluid. The generation and disposal of waste POL are summarized in Table 4.1-1 (in Sec. 4.1.1).

Throughout the installation history, wastes reportedly were stored at their generation points in drums, aboveground tanks, and underground tanks until the maximum storage capacity was reached.

Since around 1942, POL with salvage value have been given or sold to local waste dealers (contract disposal). Little is known about the disposal of waste POL prior to 1942. Reportedly, no waste POL were disposed of at FMA.

Table 4.1-4. Former or Abandoned Underground POL Storage

POL Type	Capacity (gal)	Facility	Dates of Operation
MOGAS	10,000	105*	1930-1945
MOGAS	10,000	105*	1930-1945
MOGAS	10,000	80	1936-1945
Waste Oil	400	457†	1959-1982
Waste Oil	400	457†	1959-1982
DF-2	10,000	553†	1961-1981
MOGAS	5,000	408	1945-1982
DF-2	5,000	408	1945-1982
MOGAS	10,000	100†	1958-1979
MOGAS	10,000	100†	1958-1979
MOGAS	10,000	42	1939-1958
MOGAS	10,000	42	1939-1958
DF-2	200	32*	?-1984

*The tanks in these facilities were sandfilled.
†The tanks in these facilities have been excavated.

Sources: AFSC, 1984.
ESE, 1985.

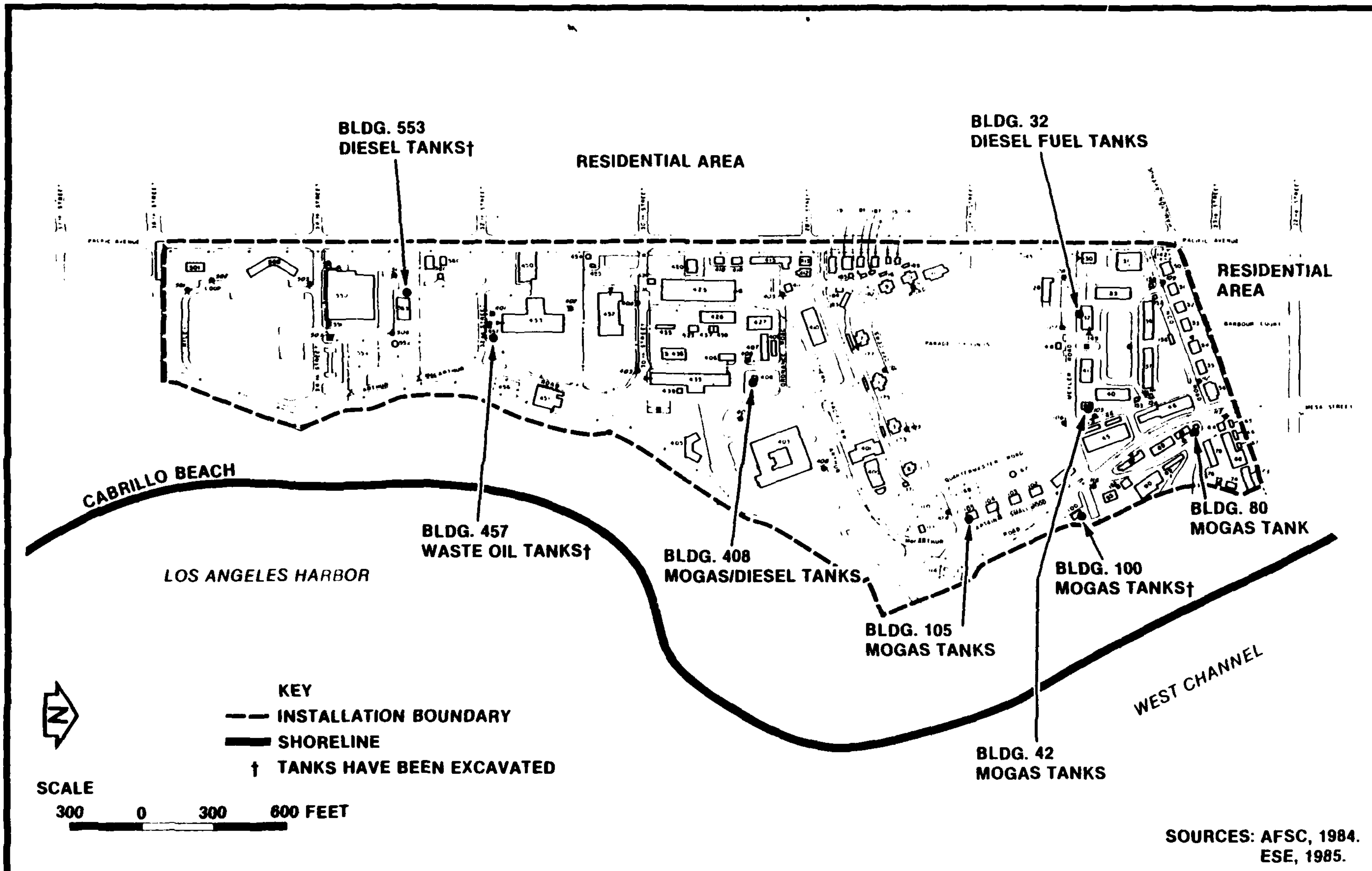

Figure 4.1-1
LOCATIONS OF FORMER OR ABANDONED UNDERGROUND POL STORAGE TANKS

INSTALLATION RESTORATION PROGRAM
FORT MACARTHUR

4.1.6 RADIOACTIVE MATERIALS HANDLING, STORAGE, AND DISPOSAL

Items such as luminous clocks, gauges, and dials containing radioactive materials were collected by the Consolidated Maintenance Division for disposal as radioactive wastes. Until the mid-1970s, approximately 1,000 pounds of these materials were collected annually, stored in lead-lined containers, and disposed of in an approved burial site for radioactive materials in Nevada (HQ, 6th U.S. Army Medical Laboratory, 1973). Reportedly, no radioactive materials were disposed of at FMA.

With the deployment of the Nike Hercules missiles in the early 1960s, special weapons were reportedly stored by FMA (Chemical Systems Laboratory, 1983). The probable storage site was Whites Point, where a missile warhead building (Bldg. 1026) was constructed in 1961. Because of the classified nature of these operations, little information was available. Low-level radioactive wastes from Nike warhead maintenance operations were generally transported to Atomic Energy Commission (AEC) approved disposal sites (ESE, 1983).

4.1.7 EXPLOSIVE/REACTIVE MATERIALS HANDLING, STORAGE, AND DISPOSAL

Explosive materials used and stored at FMA included Army munitions for the coast defense artillery pieces and small arms. Explosive materials used and stored by the Air Force are limited to Security Police small-arms ammunition. According to the records search report prepared for the U.S. Army (Chemical Systems Laboratory, 1983), no explosive or reactive materials were disposed of at FMA. One reference (FMA, 1983), however, indicated that large stocks of smokeless powder remained in storage after removal of the coastal artillery. In February 1949, these stocks were disposed of by burning. The location of the site used for burning was not indicated. Due to the developed nature of the middle and upper reservations, it is unlikely that these were used for the burn site. Whites Point may have been used, although there were no records to confirm the actual burn site.

4.2 WASTE DISPOSAL METHODS AND DISPOSAL SITE IDENTIFICATION, EVALUATION, AND HAZARD ASSESSMENT

As described in the current and past activity review (Sec. 4.1), various methods have been used for disposal of wastes generated by FMA operations. Because of the small size and urban location of the reservation, no large-scale onsite disposal methods such as landfilling, open burning, or landspreading have been used. Additionally, sanitary wastewater has always been discharged to the municipal system for treatment; no wastewater treatment facilities have been operated on FMA.

Depending on type, wastes have either been incinerated, transported offsite to municipal landfills, contract disposed to POL recycling companies, or discharged to the stormwater or sanitary sewer systems. In each of these cases, the wastes ultimately are transported offsite, leaving minimal or no potential for residual onsite contamination. Two sites, however, were identified as having a potential for residual contamination. These are a former battery acid neutralization pit and a pesticide wastewater soakage pit. The following paragraphs describe the disposal sites that were identified in Sec. 4.1.

4.2.1 STORMWATER DRAINAGE DISPOSAL SITES

Seven stormwater drainage disposal sites were identified on FMA. Site descriptions, designations used in this report, dates of operation, and waste descriptions are listed in Table 4.2-1. The locations of these sites are shown in Fig. 4.2-1.

Stormwater Drainage Disposal Site No. 1 (SD-1)

The site designated SD-1 (Fig. 4.2-1) is a stormwater drain used from 1948 to 1958 to dispose of wastes from the Paint Shop (Bldg. 435). Paint wastes containing residual paint, thinner, and water curtain paint spray booth sludge were disposed of by discharging into the stormwater drain. The stormwater drainage system discharged into the harbor. Because of the length of time that has lapsed since the discharges occurred and the flushing and dilution in the stormwater drainage

Table 4.2-1. Summary of Information on FMA Stormwater Drainage System Disposal Sites

Site Description*	Designation	Dates of Operation	Waste Description
Bldg. 435, Paint Shop Stormwater Drain	SD-1	1948-1958	Paint wastes containing residual paint, thinner, and water curtain paint spray booth sludges
Bldg. 457†, Vehicle Washrack/Steam Cleaner	SD-2	1945-1965	Vehicle wash wastewater containing detergent surfactants, oil, and grease
Bldg. 452, Vehicle Washrack	SD-3	1945-1965	Vehicle wash wastewater containing detergent surfactants, oil, and grease
Bldg. 431, Vehicle Washrack	SD-4	1945-1965	Vehicle wash wastewater containing detergent surfactants, oil, and grease
Bldg. 113, Stormwater Drain	SD-5	1945-1973	Pesticide-contaminated wastewater
Bldg. 400†, Stormwater Drain	SD-6	1945-1965	Filter backwash wastewater
Bldg. 410, Stormwater Drain	SD-7	1980 - Present	Vehicle wash wastewater containing detergent surfactants, oil, and grease

*Locations of these sites are shown in Fig. 4.2-1.
†Sites identified in the U.S. Army Phase I Records Search Report (CSL, 1983).

Source: ESE, 1985.

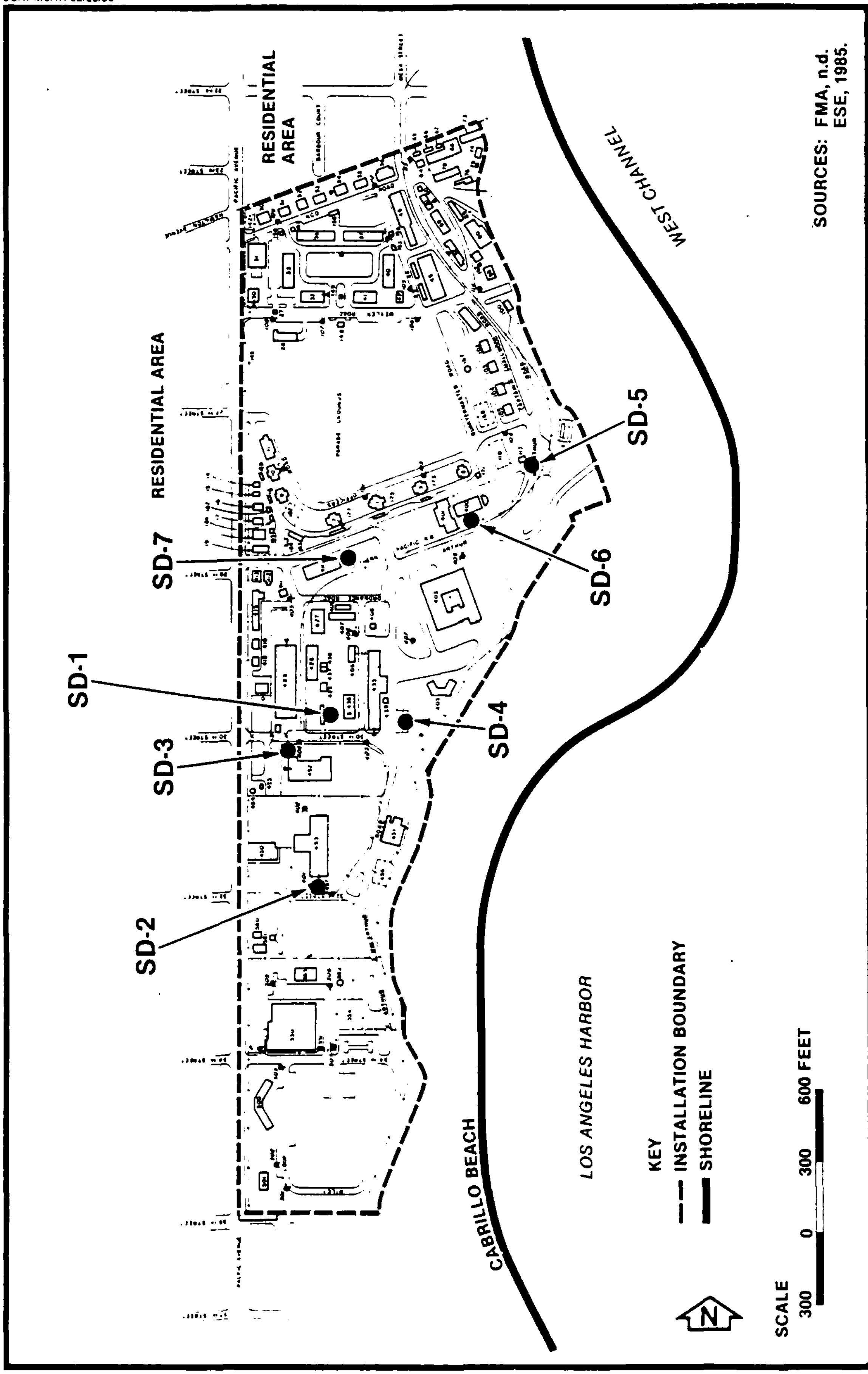

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Figure 4.2-1
STORMWATER DRAINAGE DISPOSAL SITES

system, little residual contamination is expected at this site. Bldg. 435 was recently demolished to construct housing units.

Stormwater Drainage Disposal Sites No. 2, 3, and 4 (SD-2, SD-3, and SD-4)

The sites designated SD-2, SD-3, and SD-4 are stormwater drains that were used for discharge of vehicle wash wastewater. These wastewaters typically contained detergent surfactants, oil, and grease. These sites were used from 1945 until the mid-1960s, when vehicle washracks at FMA were connected to the sanitary sewer system. Because of dilution and flushing in the stormwater drainage sy tem, residual contamination at these sites is minimal. The vehicle maintenance facilities (Bldgs. 431, 452, and 457) that formerly used these sites have been demolished to construct housing units.

Stormwater Drainage Disposal Site No. 5 (SD-5)

The site designated SD-5 is a stormwater drain located adjacent to Bldg. 113. This drain was used for disposal of pesticide-contaminated wastewater generated from equipment and container rinsing. The drain was used until about 1973. In 1973, a medical laboratory survey (HQ, 6th U.S. Army Medical Laboratory, 1973) reported that these wastes were being placed in a gravel soakage pit located near Bldg. 113. This pit is described in Sec. 4.2.5 (Chemical Disposal Sites). Because of dilution and flushing in the stormwater drain, there is minimal potential for residual contamination.

Stormwater Drainage Disposal Site No. 6 (SD-6)

Filter backwash water from the swimming pool (Bldg. 400) was discharged to the stormwater drainage system from 1945 until the mid-1960s, when the drain was connected to the sanitary sewer system. An underground concrete sump was used for settling of the solids in the backwash water. The settleable solids were periodically cleaned out of the sump and disposed of with other solid wastes at offsite landfills. Little residual contamination would remain from this former discharge.

Stormwater Drainage Disposal Site No. 7 (SD-7)

The Army National Guard washes vehicles in an area adjacent to Bldg. 410. Vehicle washwater containing detergent surfactants, oil, and grease drains into a stormwater drain adjacent to the washing area. The drain system is not equipped with an oil/water clarifier. Because this is an ongoing operation, an NPDES permit will be required.

4.2.2 LANDFILLS

No sanitary or debris landfills were identified on FMA (the Middle Reservation). Solid waste generated on FMA was disposed of at the Palos Verdes landfill, a short distance west of San Pedro, until February 1981. Since the closure of the Palos Verdes landfill, solid wastes have been disposed of at the Mullhaulin Drive landfill of San Pedro. Prior to about 1950, two incinerators were operated by FMA for disposal of combustible wastes (e.g., office trash, vegetation clippings) (Chemical Systems Laboratory, 1983). Recent soil borings for construction of USAF housing over much of the reservation have not encountered any buried or landfilled material, although concrete foundations from prior construction have been identified.

Prior to USAF control, FMA was used by the Army as part of the Los Angeles Harbor defense system and consisted of a Lower Reservation (excessed in 1975 and now converted to a marina), a Middle Reservation (FMA), an Upper Reservation (excessed in 1975 and now owned by the City of Los Angeles), Whites Point (excessed in 1975), and Point Vicente (excessed in 1974). Although no landfills existed on the Middle Reservation, disposal of material did occur on the Lower and Upper Reservations and at Whites Point. The landfill on the Lower Reservation was operated from the 1920s through the 1940s. During the 1950s, a landfill was operated at Whites Point for trench burning.

4.2.3 FUEL SPILL SITES

Available USAF records indicate that no fuel spills have occurred at FMA since its acquisition in 1981. Available information and interviews conducted with personnel who were onpost during Army occupation indicate no fuel spills occurred on the Middle Reservation.

4.2.4 FIREFIGHTER TRAINING AREAS

No firefighter training areas were identified at FMA through examination of base records and personnel interviews. No burn pits or other training facilities have been used by the Army or Air Force due to the base mission and installation history.

4.2.5 CHEMICAL DISPOSAL SITES

During the review of past operations, two chemical disposal sites were identified on FMA. One site (DS-1) was used to neutralize and dispose of waste battery electrolyte, and the other site (DS-2) was a soakage pit for disposal of pesticide-contaminated wastewater. Information on these sites is summarized in Table 4.2-2, and the locations of the sites are shown in Fig. 4.2-2.

Chemical Disposal Site No. 1 (DS-1)

The Battery Shop was located in Bldg. 453 from 1942 to 1982. This shop was responsible for maintenance of batteries used in vehicles on FMA. This operation generated approximately 100 gal of spent electrolyte from lead acid batteries. Until 1959, this acid was discharged to the sanitary sewer system. From 1959 to 1975, the acid was neutralized in a pit behind Bldg. 453, and from 1975 to 1982 the acid was neutralized and discharged to the sanitary sewer. Battery acid electrolyte consists of sulfuric acid, and the neutralization process produces (depending upon the neutralizing material) various salts (e.g., calcium, sodium) of sulfate, which are neither toxic nor hazardous. Due to its use in lead cell batteries, however, spent electrolyte also contains high levels of dissolved lead. Upon contact with the neutralizing material, the lead would form carbonates or hydroxides and precipitate from the solution. The soils of the former neutralization pit would, therefore, be expected to contain levels of lead that are elevated above background. Because of the formation of insoluble lead carbonates and/or hydroxides and the

Table 4.2-2. Summary of Information on FMA Chemical Disposal Sites

Site Description*	Designation	Dates of Operation	Waste Description
Bldg. 453†, Battery Acid Neutralization Pit	DS-1	1959-1975	Waste battery acid (electrolyte/sulfuric acid) containing lead
Bldg. 113, Pesticide Wastewater Soakage Pit	DS-2	1945-1973	Pesticide-contaminated wastewater

*Locations of these sites are shown in Fig. 4.2-2.
†Identified in U.S. Army Phase I Records Search Report (CSL, 1983).

Source: ESE, 1985.

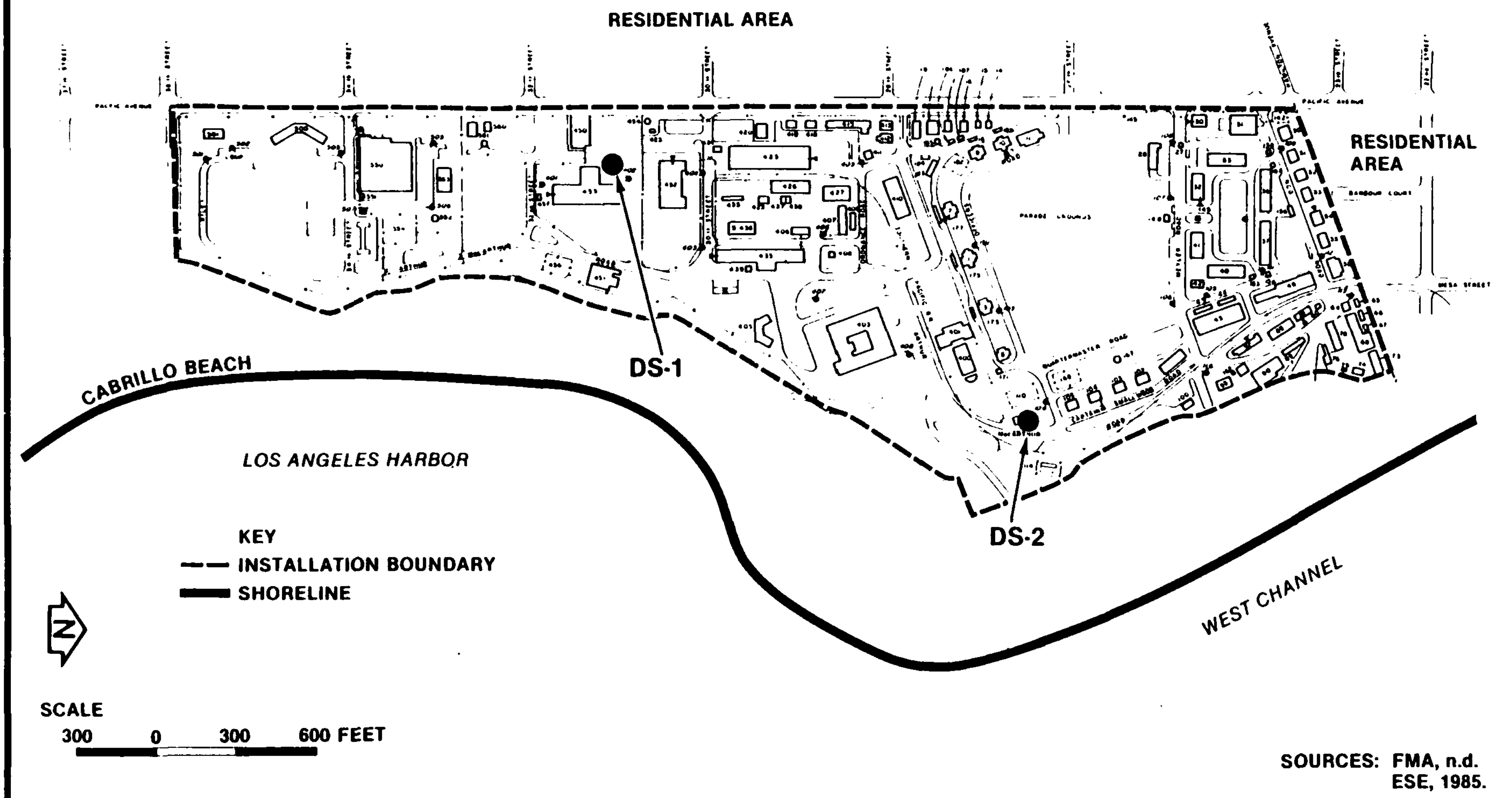

Figure 4.2-2
CHEMICAL DISPOSAL SITES

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low net precipitation (-34.46 in/yr) for the area, the lead would not be expected to present a potential for migration or ground water contamination. Bldg. 453 has recently been demolished for construction of housing units. Because the pit was underground and the area has been filled and leveled to grade, little potential exists for direct contact with the contaminated soils.

Chemical Disposal Site No. 2 (DS-2)

Pesticide-contaminated wastewater generated by rinsing of pesticide application equipment and pesticide containers was disposed of by pouring the wastewater into a gravel pit located near Bldg. 113 (HQ, 6th U.S. Army Medical Laboratory, 1973). This disposal practice occurred over several years (until about 1975). At the time of the site visit, a ground inspection around Bldg. 113 did not reveal the presence of this former soakage pit. The soils adjacent to the former soakage pit are likely contaminated with pesticides. Because the pit was used for such a brief period and due to the hydrophobility of most pesticides (i.e., they are strongly sorbed onto soil particle surfaces), little potential exists for migration of these compounds.

4.2.6 HAZARD EVALUATION ASSESSMENT

The review of past operation and maintenance functions and past waste management practices at FMA has resulted in the identification of nine sites that were initially considered areas of concern, with potential for contamination. These sites, described in Secs. 4.2.1 through 4.2.5, were evaluated using the decision process presented in Fig. 1.3-1 (in Sec. 1.3). The results of this decision process are summarized in Table 4.2-3. All nine sites were found to have little or no potential for contamination or contaminant migration and, thus, were not evaluated using the HARM system. Operational procedures at one of these sites (SD-7) were deemed to warrant review and modification under the base environmental program. This site is identified under the column "Refer to Base Environmental Programs" in Table 4.2-3.

Table 4.2-3. Summary of Decision Process Logic for Areas of Initial Environmental Concern at RMA

Site Description	Designation	Potential For Contamination	Potential For Contaminant Migration	Potential For Other Environmental Concern	Refer to Base Environmental Programs	HARM Rating
Bldg. 435, Stormwater Drainage Disposal Site	SD-1	No	No	No	No	No
Bldg. 457, Stormwater Drainage Disposal Site	SD-2	No	No	No	No	No
Bldg. 452, Stormwater Drainage Disposal Site	SD-3	No	No	No	No	No
Bldg. 431, Stormwater Drainage Disposal Site	SD-4	No	No	No	No	No
Bldg. 113, Stormwater Drainage Disposal Site	SD-5	No	No	No	No	No
Bldg. 400, Stormwater Drainage Disposal Site	SD-6	No	No	No	No	No
Bldg. 410, Stormwater Drainage Disposal Site	SD-7	No	No	No	Yes	No
Bldg. 453, Battery Acid Neutralization Pit	DS-1	Yes	No	No	No	No
Bldg. 113, Pesticide Wastewater Disposal Site	DS-2	Yes	No	No	No	No

Source: ESE, 1985.

5.0 CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is potential for environmental contamination resulting from past waste disposal practices and to assess the potential for contaminant migration from these sites. The conclusions are based on the assessment of the information collected from the project team's field inspection, review of records and files, review of the environmental setting, and interviews with base personnel, past employees, and state and local government employees.

Nine sites were initially considered areas of concern with potential for contamination. The evaluations and conclusions regarding these sites are summarized in Table 5.0-1; site locations are shown in Fig. 5.0-1. Six of these sites were former stormwater drainage disposal sites that have little potential for residual contamination. Site No. 7 is an operating stormwater drainage disposal site that will require an NPDES permit; therefore, this site was determined to warrant review and modification under the base environmental program. Site Nos. 8 and 9, while having a potential for residual contamination, do not present potential for migration or for endangerment of human health or environmental quality. The previous Phase I Records Search (CSL, 1983) that was performed by the U.S. Army concluded also that no potential existed for contaminant migration from FMA.

All nine sites were evaluated using the decision process. Because the sites were found to have little or no potential for contamination or contaminant migration, none of the sites were evaluated using the HARM system, and no Phase II investigations are recommended.

Table 5.0-1. Summary of Information on Potential Contamination Sites on FMA

Site No.	Site Description	Report Designation	Dates of Operation	Waste Description	Conclusion
1	Bldg. 435, Paint Shop Stormwater Drain	SD-1	1948-1958	Paint wastes containing residual paint, thinner, and water curtain paint spray booth sludges	No potential for residual contamination. Disposal practice ceased.
2	Bldg. 457, Vehicle Washrack/Steam Cleaner	SD-2	1945-1965	Vehicle wash wastewater containing detergent surfactants, oil, and grease	No potential for residual contamination. Disposal practice ceased.
3	Bldg. 452, Vehicle Washrack	SD-3	1945-1965	Vehicle wash wastewater containing detergent surfactants, oil, and grease	No potential for residual contamination. Disposal practice ceased.
4	Bldg. 431, Vehicle Washrack	SD-4	1945-1965	Vehicle wash wastewater containing detergent surfactants, oil, and grease	No potential for residual contamination. Disposal practice ceased.
5	Bldg. 113, Stormwater Drain	SD-5	1945-1973	Pesticide-contaminated wastewater	No potential for residual contamination. Disposal practice ceased.
6	Bldg. 400, Stormwater Drain	SD-6	1945-1965	Filter backwash wastewater	No potential for residual contamination. Disposal practice ceased.

Table 5.0-1. Summary of Information on Potential Contamination Sites on FMA (Continued, Page 2 of 2)

Site No.	Site Description	Report Designation	Dates of Operation	Waste Description	Conclusion
6	Bldg. 400, Stormwater Drain	SD-6	1945-1965	Filter backwash wastewater	No potential for residual contamination. Disposal practice ceased.
7	Bldg. 410, Stormwater Drain	SD-7	1980 - Present	Vehicle wash wastewater containing detergent surfactants, oil, and grease	Refer to base environmental program for review of operation.
8	Bldg. 453, Battery Acid Neutralization Pit	DS-1	1959-1975	Waste battery acid (electrolyte/sulfuric acid) containing lead	Potential for residual contamination. No potential for migration or endangerment to human health or environment.
9	Bldg. 113, Pesticide Wastewater Soakage Pit	DS-2	1945-1973	Pesticide-contaminated wastewater	Potential for residual contamination. No potential for migration or endangerment to human health or environment.

Note: See Fig. 5.0-1 for locations of these sites.

Source: ESE, 1985.

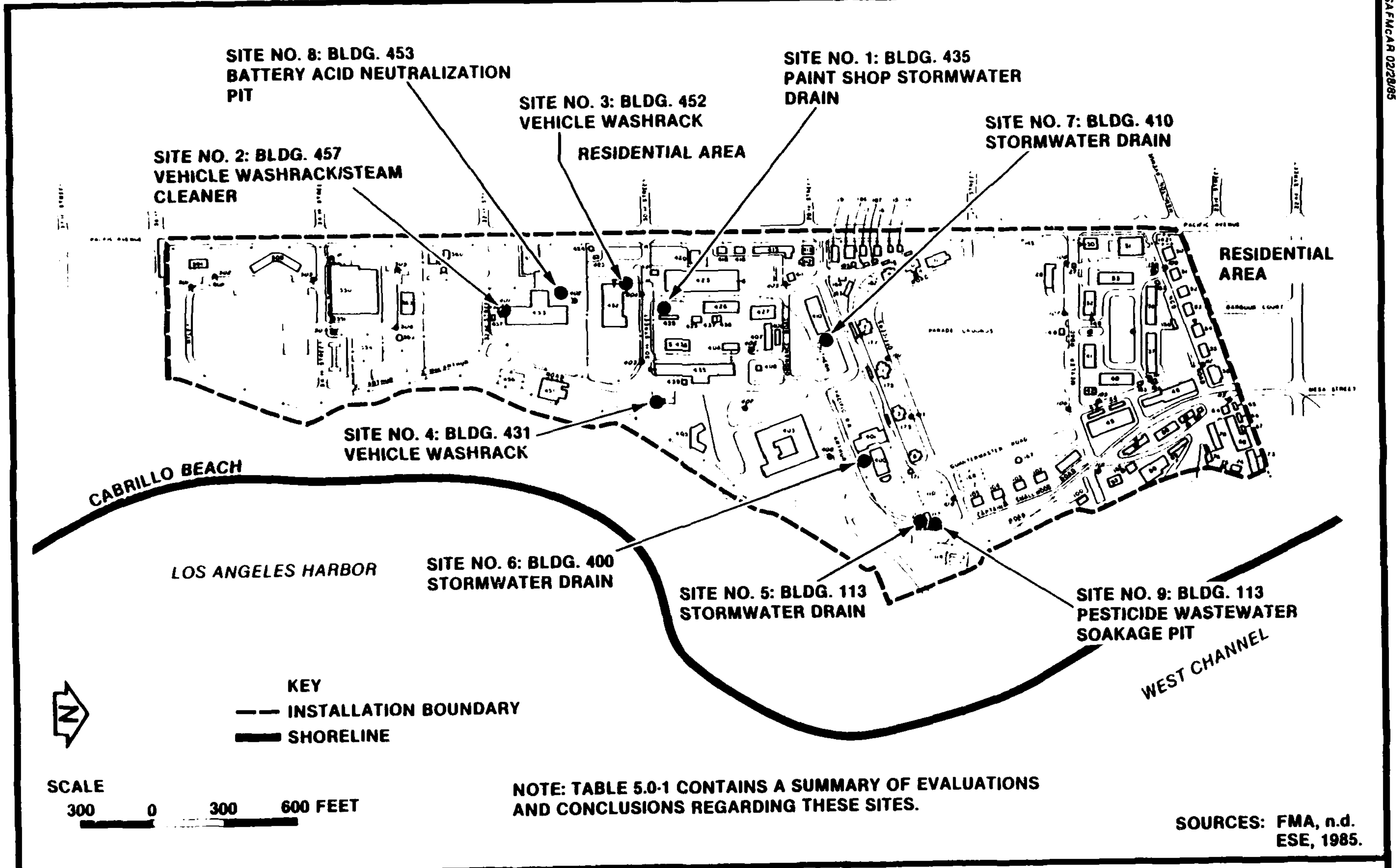

Figure 5.0-1 LOCATION OF POTENTIAL CONTAMINATION SITES ON FMA	INSTALLATION RESTORATION PROGRAM FORT MACARTHUR

6.0 RECOMMENDATIONS

No sites on FMA were identified as having potential for contamination and contaminant migration; therefore, no Phase II actions are recommended. Site No. 7 is an operating stormwater drainage disposal site that needs to be reviewed by the base environmental program, and appropriate operational modifications should be made in accordance with state and Federal regulations. In addition, it would be good engineering practice to inspect and clean all abandoned underground fuel storage tanks and close them in accordance with applicable regulations.

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b. Point Vicente Reservation--General Sanitary Sewer Map,
c. Lower Reservation--General Gas Map,
d. Lower Reservation--General Storm-Drainage Map,
e. Whites Point Reservation--General Storm Drainage Map.
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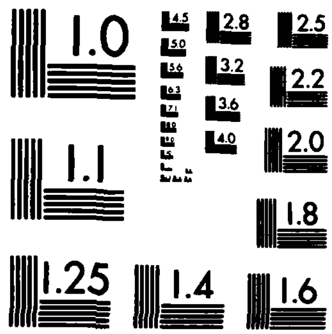

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APPENDIX A

GLOSSARY OF TERMINOLOGY, ABBREVIATIONS, AND ACRONYMS

APPENDIX A
GLOSSARY OF TERMINOLOGY, ABBREVIATIONS, AND ACRONYMS

AEC	Atomic Energy Commission
AFB	Air Force Base
AFS	Air Force Station
AFSC	Air Force Systems Command
Aquifer	A geologic formation, group of formations, or part of a formation capable of yielding water to a well or spring
BEE	Bioenvironmental Engineering
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Contamination	Degradation of natural water quality to the extent that its usefulness is impaired; degree of permissible contamination depends on intended use of water
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DF	Diesel fuel
Disposal of hazardous waste	Discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste, or any constituent thereof, may enter the environment, be emitted into the air, or be discharged into any waters, including ground water
DOD	Department of Defense
Downgradient	In the direction of decreasing hydraulic static head; the direction in which ground water flows
DPDO	Defense Property Disposal Office
DS	Chemical disposal site
Effluent	Liquid waste discharged in its natural state or partially or completed treated, from a manufacturing or treatment process

EPA	U.S. Environmental Protection Agency
ESE	Environmental Science and Engineering, Inc.
FMA	Fort MacArthur
ft	feet
gal	gallon(s)
gal/yr	gallon(s) per year
gpd	gallon(s) per day
Ground water	Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure
GSA	General Services Administration
HARM	Hazard Assessment Rating Methodology
Hazardous waste	As defined in RCRA, a solid waste or combination of solid wastes which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed
HQ	Headquarters
Infiltration	Movement of water through the soil surface into the ground
IRP	Installation Restoration Program
LAAFS	Los Angeles Air Force Station
lb	pound(s)
lb/yr	pound(s) per year
m^3	cubic meter(s)
mg/l	milligram(s) per liter

MOGAS	Motor gasoline
MSL	Mean sea level
NA	Not applicable
NIPDWR	National Interim Primary Drinking Water Regulations
NPDES	National Pollutant Discharge Elimination System
NSDWR	National Secondary Drinking Water Regulation
PCB	Polychlorinated biphenyl--liquid used as a dielectric in electrical equipment; suspected human carcinogen; bioaccumulates in the food chain and causes toxicity to higher trophic levels
Permeability	The capacity of a porous rock, soil, or sediment of transmitting a fluid without damage to the structure of the medium
POL	Petroleum, oils, and lubricants
PX	Post Exchange
RCRA	Resource Conservation and Recovery Act
ROTC	Reserve Officers Training Corps
SD	Stormwater drainage disposal site
Spill	An unplanned release or discharge of a hazardous waste onto or into air, land, or water
STP	Sewage treatment plant
TCE	Trichloroethylene
Upgradient	In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of ground water
USAEHA	U.S. Army Environmental Hygiene Agency
USAF	U.S. Air Force
USASD FMA	U.S. Army Support Detachment, Fort MacArthur
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency

APPENDIX B

TEAM MEMBER BIOGRAPHICAL DATA

ESE PROFESSIONAL RESUME

CHARLES D. HENDRY, JR., Ph.D.
Staff Chemist

SPECIALIZATION

Water Quality Chemistry, Atmospheric Chemistry, Physical-Chemical Transport of Toxic/Hazardous Substances, Environmental Fate of Toxic Substances

RECENT EXPERIENCE

Toxic/Hazardous Materials, Handling and Disposal, USATHAMA and NEESA, Project Manager--Assessment of present and past handling and disposal practices for toxic/hazardous materials on 32 U.S. Army and Navy installations conducted for USATHAMA and NEESA. These sites include seven installations in the southeastern United States. Includes evaluation of the potential for off-post migration of toxic materials, recommendations for sampling and analysis, and compliance with existing federal and state regulations.

Toxic Substances--Fate in the Environment, U.S. Environmental Protection Agency, Subproject Manager--Assessment of the release transport and fate of toxic organic and inorganic substances in the environment. This assessment is based upon physical and chemical properties (e.g., volatility, solubility, photolysis, hydrolysis, sorption, and biodegradation) of the compounds and evaluation of predicted environmental concentrations using computer models.

Toxic/Hazardous Materials Sampling and Analysis-Quality Assurance/Control--Analytical chemistry QA/QC for project involving sampling and analysis of soils, waters, and biota at a U.S. Army ammunition manufacturing plant, Alabama Army Ammunitions Plant, Alabama.

Florida Power Coordinating Group, Atmospheric Deposition Study, Technical Consultant--Three-year study measuring deposition of chemical substances by atmospheric precipitation. Includes monitoring, source attribution studies, and ecological effects evaluation. Emphasis placed upon water quality impacts.

EDUCATION

Ph.D.	1983	Environmental Engineering	University of Florida
M.S.	1977	Environmental Engineering	University of Florida
B.S.	1974	Chemistry	University of Florida

ASSOCIATIONS

American Chemical Society
Water Pollution Control Federation
Air Pollution Control Association

RECENT REPORTS

Approximately 35 hazardous waste site investigations of U.S. military installations.

PUBLICATIONS

Approximately 15 publications related to transport and transformation of pollutants in the atmosphere and the aquatic environment.

ESE PROFESSIONAL RESUME

ALLEN P. HUBBARD, B.S.E.
Department Manager, Remedial Engineering

SPECIALIZATION

Hazardous Waste Management, Remedial Actions, Industrial Waste Operations Design and Permitting

RECENT EXPERIENCE

Design and Implementation of Remedial Actions for Petroleum Product Spill in a Stormwater Detention Basin, Project Manager--Manager for site investigations, alternatives evaluation, engineering design, and confirmation of decontamination. Project involved a site at which an undetermined large volume of petroleum products had been spilled into a stormwater collection system over a period of 10 to 15 years. Site was decontaminated and restored to FDER specifications.

Superfund Site Remedial Action Feasibility Study, Sapp Battery Site, Florida, Project Engineer--Under contract to Florida Department of Environmental Regulation (DER), ESE is evaluating potential remedial actions for this former industrial facility contaminated with lead and sulfuric acid from past battery reclamation operations. Project engineers are responsible for development of initial and long-term remedial measures for eliminating actual and potential contaminant migration with cost and liability as primary factors.

Project Manager/Engineer Hazardous Waste Delisting Projects, Project Manager--Four separate projects for three plants in the steel finishing industry. Projects included negotiation with state and federal agencies (in different states), sampling and analysis, and formal petition documents to exclude listed hazardous wastes from RCRA regulations according to 40 CFR Part 260.22.

Hazardous Waste Inventory and Delisting, Carolina Galvanizing Corporation (CGC), Aberdeen, North Carolina, Project Manager--Developed sampling and analysis plan after evaluating plant processes and regulatory requirements specific to CGC. Sludge analyses demonstrated that the generated sludge met delisting criteria. Delisting petition prepared for EPA Region IV and the North Carolina Department of Human Resources (DHR). Also performed a hydrogeologic survey to demonstrate that sludge could be deposited in an onsite landfill, which was later designed and permitted. Responsibilities included supervising sampling, negotiation with regulatory agencies and clients, preparing and overseeing fixation studies, and evaluating all reports.

Project Manager/Engineer RCRA Closure Plans for Hazardous Waste Treatment and Storage Facilities, Project Manager--Developed plans for five separate clients for closure of hazardous waste treatment, storage, disposal facilities (TSDFs). Types of operations included hazardous waste incinerator, burning ground, and storage tank farm, chemical/physical treatment system, land treatment facility, surface impoundments. Final plans complied with 40 CFR Part 265.

Industrial Wastewater Permit for Coal-Slag Reclamation Facility, Mineral Aggregates, Inc. (Lonestar Minerals), Tampa, Florida, Project Engineer—Prepared engineering report for permit application involving reuse of bottom slag from a coal-fired power plant. Client recycles the slag as sandblasting grit, roofing material, and other products. Runoff from slag piles enters Tampa Bay, necessitating a mixing zone as part of the permit.

Hazardous Waste Remedial Action/Decontamination Study, Alabama Army Ammunition Plant, Project Engineer—Project to develop and implement corrective measures for decontamination of buildings, process equipment, sewers and soil to control surface water and ground water contamination at U.S. Army ammunition plant. Developed decontamination alternatives with consideration of risk, cost and technical feasibility.

Industrial Wastewater Treatment/Disposal System Design and Permitting Projects, Project Manager, Project Engineer—Seven permitting projects for industrial clients in various SIC codes (two metal finishing, two food and beverage, one aircraft maintenance, and two cement products). These industrial permitting projects involved conceptual and final design, waste characterization, report preparation, extensive negotiation with regulatory agencies, and interaction with legal counsel for some clients.

Expert Witness Testimony for Industrial Clients, Ardmore Farms and Martin Electronics, Inc., Florida—Testimony helped the clients with a lawsuit and regulatory action to avoid costly penalties.

Preparation of RCRA Part B Permit Applications, Project Engineer—Responsible for various engineering aspects of Part B applications for five industrial clients. Facilities included storage tanks, chemical/physical treatment operations, and land disposal. Permitting involved both federal and state criteria.

Hazardous Waste Landfill Siting Study, Allied Chemical Company, Project Engineer—Evaluation of six existing commercial hazardous waste disposal sites, including development of corrective construction requirements and RCRA comipliance measures required. This study included location of potential sites for a hazardous waste landfill using RCRA siting criteria.

Industrial/Hazardous Waste Characterization and Evaluation, Project Engineer—Evaluation of existing and proposed industrial and hazardous waste treatment storage and disposal facilities at three industrial free zones in Egypt. Project included a characterization of wastes using RCRA regulations.

EDUCATION

B.S.E. 1979 Environmental Engineering University of Florida

REGISTRATION

P.E. Florida 1984

ASSOCIATION

American Society of Civil Engineers

JEFFREY J. KOSIK, B.S.E.
Associate Engineer

ESE PROFESSIONAL RESUME

SPECIALIZATION

Hazardous Waste Management, Water and Wastewater Treatment, Water Supply and Field of Investigations

RECENT EXPERIENCE

Initial Assessment Studies for the United States Air Force, Team Engineer--Comprehensive studies at 2 Air Force bases to determine both past and present history with regard to the use and disposal of toxic and hazardous materials. Conducted in accordance with the Department of Defense Installation Restoration Program policies.

Reassessment for Hazardous Wastes at Army Installation, Team Engineer--Comprehensive study at an Army installation to determine both past and present history with respect to the use of hazardous substances, quantities used, disposal methods and disposal sites. Also includes a current assessment of safety practices and compliance with regulations.

Hazardous Waste Survey and Assessment and Review of Potential Liability for a Major U.S. Industrial Corporation, Project Engineer--Comprehensive survey of over 50 corporate facilities to determine past and present activities with respect to the use of hazardous substances, quantities used, disposal methods, disposal sites and potential legal liability of those activities. Study also includes an assessment of compliance with regulations.

Industrial Wastewater Treatment/Disposal Systems Design and Permitting, Project Engineer--Several projects for the conceptual and final design of a treatment/disposal system, design of treatment instrumentation systems, and permitting.

Effluent Guidelines Development for the Pharmaceuticals Manufacturing Point Source Category, Project Engineer-- Comprehensive study for wastewater characterization, treatment system performance evaluation, and estimation of installation and operating costs for treatment systems to remove toxic and conventional pollutants.

EDUCATION

B.S.E.	1982	Environmental Engineering	University of Florida
1984	Hazardous Materials/Site Investigations Training Course		

AFFILIATIONS

Society of Environmental Engineers
American Water Works Association
Water Pollution Control Federation
Boy Scouts of America
American Red Cross

DONALD F. McNEILL, M.S.
Associate Scientist

ESE PROFESSIONAL RESUME

SPECIALIZATION

Hydrogeology, Ground Water Monitoring and Evaluation, Clastic Sedimentology, Carbonate Sedimentology, Peat and Organic Sediment Analysis, Geomorphology, Stratigraphy, Field Mapping, and Sampling Techniques

RECENT EXPERIENCE

U.S. Army Toxic and Hazardous Materials Agency, Project Geologist--Installation assessment of Ft. Riley, Kansas. Geohydrologic assessment of present and past waste disposal methods, responsible for evaluation of the potential for migration of contaminants in the subsurface.

U.S. Army Toxic and Hazardous Materials Agency, Project Geologist--Installation assessment of Military District of Washington. Geohydrologic assessment of present and past waste disposal methods, responsible for evaluation of the potential for migration of contaminants in the subsurface.

U.S. Army Toxic and Hazardous Materials Agency, Project Geologist--Installation assessment of West Virginia Ordnance Works. Geologic and ground water investigation of past waste disposal methods. Responsible for evaluation of ground water contamination and off-post contaminants migration.

Florida Department of Environmental Regulation, Site Contamination Assessment, Project Hydrogeologist--Investigated organic and inorganic contamination at City Chemical Company, Orlando, Florida. Assessment of shallow aquifer with respect to contaminant migration.

EDB Contamination Investigation, Project Hydrogeologist--Investigated EDB contamination of drinking water wells at Sanford, Florida, including drilling and field sampling, installation of piezometers, measuring water levels and sampling wells, evaluating alternatives, and preparing report.

Adcom Wire Company, Project Hydrogeologist--Development of a ground water monitoring plan for a wire galvanizing plant including site analysis, geohydrology, and proposed ground water monitoring network.

Orange County, Project Hydrogeologist--Development of a ground water monitoring plan for a sanitary landfill near Orange, Florida. Project consisted of monitor well installation, measuring water levels, geohydrologic evaluation and report preparation.

U.S. Air Force Installation Restoration Program, Project Geologist--Installation assessment of Columbus, Andersen, and Vandenburg Air Force Bases. Responsible for geohydrologic evaluation of sanitary and solid waste disposal areas, and the potential for off-post migration.

Minerals Management Service, Project Geologist--Responsible for sediment core and sediment trap analysis for evaluation of sediment transport in selected areas of the Gulf of Mexico.

University of Florida, Research Associate--Texaco U.S.A.- funded research grant involving the development of a method of increasing BTU values in autochthonous mineral-rich peats and organic sediments.

Department of Energy and Governor's Energy Office, State of Florida, Research Assistant--Florida fuel grade peat assessment program conducted through the University of Florida; involved sampling, mapping, and analysis of Florida fuel peat resources.

EDUCATION

M.S.	1983	Geology	University of Florida
B.S.	1981	Geology	State University of New York

AFFILIATIONS

American Association of Petroleum Geologists--Energy Minerals Division
Geological Society of America
Southeastern Geological Society
Society of Economic Paleontologists and Mineralogists

APPENDIX C

LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS

APPENDIX C

LIST OF INTERVIEWEES

	Interviewee	Years of Service at FMA
1.	Retired Maintenance Shop Foreman	48
2.	Retired Draftsman	35
3.	Retired Furniture Shop Foreman	27
4.	Electrical Shop Foreman, Pacifica Services, Inc.	28
5.	Annex Manager, Pacifica Services, Inc.	5
6.	Architect, Pacifica Services, Inc.	9
7.	Civil Engineer, Pacifica Services, Inc.	5
8.	Civil Engineer, Base Civil Engineering	2
9.	Officer-In-Charge, Base Civil Engineering	3
10.	Commanding Officer, U.S. Army National Guard	4

APPENDIX C

OUTSIDE AGENCY CONTACTS

1. George S. Farag
   Ground Water Recharge Section
   Water Conservation Division
   Los Angeles County Flood Control District
   2250 Alcazar Street
   Los Angeles, CA 90033
   213/226-4382

2. Flora T. Baker
   San Pedro Bay Historical Society
   City Municipal Building
   San Pedro, CA
   213/547-2583

3. Dwight Riley, Operator
   Terminal Island Sewage Treatment Plant (STP)
   Los Angeles Bureau of Sanitation
   Dept. of Public Works
   Terminal Island, CA
   213/548-7520

4. Everett Hager (Former Operator at Terminal Island STP)
   2639 Peak Avenue
   San Pedro, CA
   213/833-8567

5. California Division of Mines and Geology, Sacramento, CA

6. Albert F. Simpson Historical Research Center, Maxwell AFB, AL

7. U.S. Geological Survey, Alexandria, VA, and Denver, CO

8. California Dept. of Fish and Game, Sacramento, CA

9. California Dept. of Water Resources, Sacramento, CA

10. Central and West Basin Water Replenishment District, Downey, CA

11. National Archives, Modern Military Branch, Washington, DC

12. DOD Explosives Safety Board, Alexandria, VA

13. USAEHA, Aberdeen Proving Ground, MD

APPENDIX D

ORGANIZATIONS, MISSIONS, AND TENANT ACTIVITIES

APPENDIX D

ORGANIZATIONS, MISSIONS, AND TENANT ACTIVITIES

The mission of FMA is to provide military family housing, administrative offices, warehouses, Civil Engineering shops, and a parade ground in support of LAAFS.

The U.S. Army National Guard, the only tenant on FMA, uses FMA facilities for vehicle storage and washing and for weekend drills.

Pacifica Services, Inc. is the only civilian contractor providing support to FMA. This support includes civil engineering, architectural, and managerial services.

APPENDIX E

MASTER LIST OF SHOPS AND LABS

APPENDIX E

MASTER LIST OF SHOPS AND LABS

Shop Name	Location	Handles Hazardous Materials	Generates Hazardous Wastes	Typical Treatment, Storage, and Disposal Method
CIVIL ENGINEERING				
Pavement and Grounds Section	88	No	Yes	Contract Disposal
Electrical Shop	89	Yes	Yes	Contract Disposal
Paint Shop	75, 76	Yes	Yes	Hauled to offpost sanitary landfill
Entomology Section	75	Yes	Yes	Used as diluent for subsequent pesticide mixtures
Swimming Pool	400	No	No	
Facilities Engineering	Basewide	No	No	
TENANT				
U.S. Army National Guard	410	No	No	

APPENDIX F

USAF IRP HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX F

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, 11 December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Records Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with representatives from USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH_2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering Science, and CH_2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Record Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

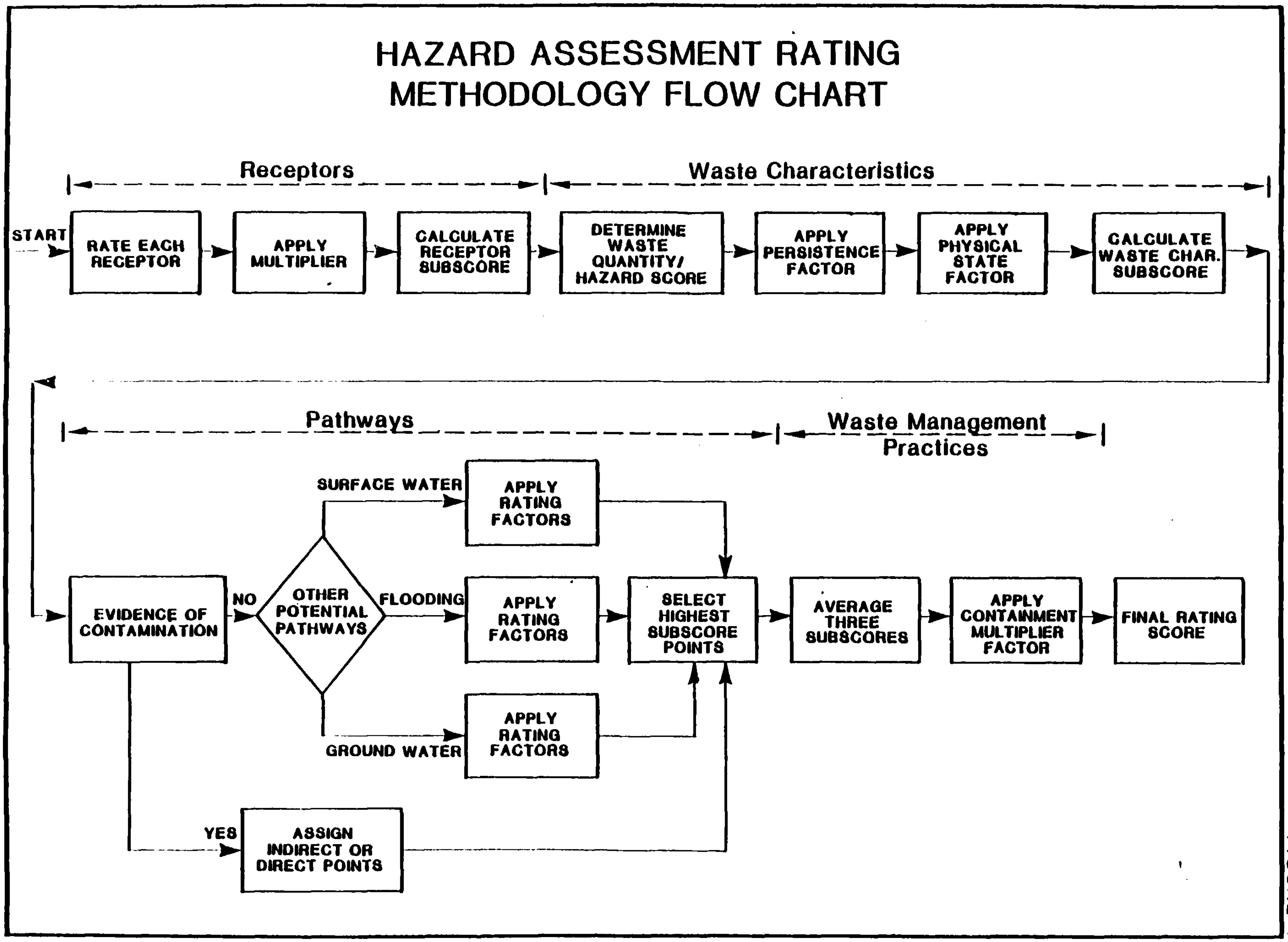
The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

FIGURE 1



HAZARD ASSESSMENT RATING
METHODOLOGY FLOW CHART
Receptors
Waste Characteristics
START
RATE EACH RECEPTOR
APPLY MULTIPLIER
CALCULATE RECEPTOR SUBSCORE
DETERMINE WASTE QUANTITY/ HAZARD SCORE
APPLY PERSISTENCE FACTOR
APPLY PHYSICAL STATE FACTOR
CALCULATE WASTE CHAR. SUBSCORE
Pathways
Waste Management Practices
EVIDENCE OF CONTAMINATION
NO
OTHER POTENTIAL PATHWAYS
SURFACE WATER
FLOODING
GROUND WATER
APPLY RATING FACTORS
APPLY RATING FACTORS
APPLY RATING FACTORS
YES
ASSIGN INDIRECT OR DIRECT POINTS
SELECT HIGHEST SUBSCORE POINTS
AVERAGE THREE SUBSCORES
APPLY CONTAINMENT MULTIPLIER FACTOR
FINAL RATING SCORE

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE ______________________________

LOCATION ______________________________

DATE OF OPERATION OR OCCURRENCE ______________________________

OWNER/OPERATOR ______________________________

COMMENTS/DESCRIPTION ______________________________

SITE RATED BY ______________________________

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	____	____

Receptors subscore (100 X factor score subtotal/maximum score subtotal) ____

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ____
2. Confidence level (C = confirmed, S = suspected) ____
3. Hazard rating (H = high, M = medium, L = low) ____

Factor Subscore A (from 20 to 100 based on factor score matrix) ____

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

____ X ____ = ____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

____ X ____ = ____

FIGURE 2 (Continued)

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
Subtotals			______	______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		

Subscore (100 x factor score/3) ______

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		3		
Subsurface flows		8		
Direct access to ground water		8		
Subtotals			______	______

Subscore (100 x factor score subtotal/maximum score subtotal) ______

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score ______

______ X ______ = ______

TABLE 1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, industrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	- 50	51 - 1,000	Greater than 1, 000	6

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (<5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (>20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

Hazard Category	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:
Confidence Level
- o Confirmed confidence levels (C) can be added
- o Suspected confidence levels (S) can be added
- o Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating
- o Wastes with the same hazard rating can be added
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES,

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8
B-2 POTENTIAL FOR FLOODING					
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1
B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION					
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsurface features, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

<u>Landfills:</u>

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

<u>Surface Impoundments:</u>

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

<u>Spills:</u>

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

<u>Fire Proection Training Areas:</u>

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX G

WATER QUALITY DATA

ANALYSIS OF FT. MACARTHUR WATER SUPPLY
18 July, 1972 - 6th USAML - DEHE

Analysis	Result - mg/L unless indicated otherwise
pH	7.0
Temperature	25°C
Color	10 Chloroplatinate units
Alkalinity	148 (as $CaCO_3$)
Total Hardness	310 (as $CaCO_3$)
Total Dissolved Solids	732
Specific Conductance	3440 Micromhos/cm
Calcium	58.2
Magnesium	21.1
Sodium	186
Potassium	6.6
Nitrate as N	0.9
Total Iron	0.28
Manganese	0.05
Silica	9.4
Fluoride	0.46
Arsenic	0.001
Boron	0.17
Copper	<0.5
Zinc	<1
Total Chromium	<0.1
Mercury	0.022
Silver	<0.05
MBAS	0.11

DEPARTMENT OF WATER AND POWER - CITY OF LOS ANGELES
Water Quality Division

Analyses of Major Los Angeles City Water Sources
1982-1983 Averages

	Units	MCL (1)	RM (2)	Owens River Aqueduct	River Supply Conduit	METROPOLITAN WATER DISTRICT to Eagle Rock Reservoir	METROPOLITAN WATER DISTRICT from Palos Verdes Reservoir
Primary Standards							
Inorganics/Physical							
Arsenic (As)	mg/L	0.05		0.02	0.01	0.003	-
Barium (Ba)	mg/L	1		< 0.1	< 0.1	0.048	-
Cadmium (Cd)	mg/L	0.010		< 0.003	< 0.002	< 0.001	-
Chromium (Cr)	mg/L	0.05		< 0.01	< 0.01	0.005	-
Fluoride (F)	mg/L	1.4-2.4		0.57	0.47	0.23	-
Lead (Pb)	mg/L	0.05		< 0.01	< 0.01	< 0.001	-
Mercury (Hg)	mg/L	0.002		< 0.0001	< 0.0001	< 0.002	-
Nitrate (NO_3)	mg/L	45		0.4	9.3	1.3	1.9
Nitrogen, Nitrate (N)	mg/L	10		0.08	2.1	0.29	0.43
Selenium (Se)	mg/L	0.01		< 0.002	< 0.003	< 0.002	-
Silver (Ag)	mg/L	0.05		< 0.01	< 0.01	< 0.005	-
Turbidity(3)	NTU	1		1.9	0.8	0.11	-
Organics							
Endrin	mg/L	0.0002		< 0.0002	< 0.0002	-	-
Foaming Agents (MBAS)	mg/L		0.5	< 0.05	< 0.05	-	-
Lindane	mg/L	0.004		< 0.00003	< 0.00003	-	-
Methoxychlor	mg/L	0.1		< 0.0005	< 0.0005	-	-
Toxaphene	mg/L	0.005		< 0.001	< 0.001	-	-
Trihalomethanes, Total	mg/L	0.1		System-wide average = 0.04			
2, 4-D	mg/L	0.1		< 0.0003	< 0.0003	-	-
2, 4, 5-TP	mg/L	0.01		< 0.0001	< 0.0001	-	-
Radio Chemistry							
Gross Alpha	pCi/L	15		3.6	2.5	-	-
Gross Beta	pCi/L	50		6.3	5.0	-	-
Hydrogen 3	pCi/L	20000		< 110	150	-	-
Strontium 90	pCi/L	8		0.3	0.4	-	-

(1) Maximum Contaminant Level (2) Recommended Maximum

(3) DWP has exemption from turbidity regulation until 1986 by which time we expect to have a filtration plant constructed.

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Bacteriological							
Coliform Group Portions Positive	%	10		System-wide value = 0.6			
Samples, 3 or more Portions Positive	%	5		System-wide value = 0.4			
Secondary Standards							
Inorganic/Physical							
Chloride (Cl)	mg/L		250	16	32	60	58
Color, Apparent	units		15	5	3	< 5	-
Conductivity	µ mho/cm		900	295	628	693	602
Copper (Cu)	mg/L		1.0	< 0.01	0.08	<0.005	-
H+ Concentration	pH		6.5-8.5	8.01	7.59	8.17	8.21
Iron (Fe)	mg/L		0.3	0.02	0.01	<0.01	-
Manganese (Mn)	mg/L		0.05	< 0.01	< 0.01	<0.005	-
Sulfate (SO_4)	mg/L		250	23	109	161	99
TDS, Calculated	mg/L		500	186	402	422	-
Zinc (Zn)	mg/L		5.0	0.02	0.01	0.005	-
Organics							
Carbon Tetrachloride	mg/L		0.005	-	-	-	-
Trichloroethene (TCE)	mg/L		0.005	-	0.004	-	-
Tetrachloroethene (PCE)	mg/L		0.004	-	0.001	-	-
Unregulated Parameters/Constituents							
Aldrin	mg/L			< 0.00005	< 0.00005	-	-
Alkalinity as $CaCO_3$	mg/L			89	148	88	92
Average Standard Plate Count	CFU/ml			System-wide value = 15			
Boron (B)	mg/L			0.40	0.40	0.14	-
Bromide (Br)	mg/L			0.18	0.38	-	-
Calcium (Ca)	mg/L			21	60	49	38
Carbon Dioxide (CO_2)	mg/L			2	7	-	-
Chlordane	mg/L			< 0.00007	< 0.00007	-	-
Dieldrin	mg/L			< 0.00007	< 0.00007	-	< 0.00007
COD	mg/L			5.7	4.6	-	-
SOC	mg/L			2.6	1.8	-	-
TOC	mg/L			-	-	2.8	-

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1982-1983 Averages

	Units	MCL (1)	RM (2)	Owens River Aqueduct	River Supply Conduit	METROPOLITAN WATER DISTRICT to Eagle Rock Reservoir	METROPOLITAN WATER DISTRICT from Palos Verdes Reservoir
Heptachlor	mg/L			< 0.00003	< 0.00003	-	-
Heptachlor Epoxide	mg/L			< 0.00005	< 0.00005	-	-
Iodide (I)	mg/L			0.01	0.02	-	-
Magnesium (Mg)	mg/L			4.3	17	18	16
Nitrogen, Ammonia (N)	mg/L			0.02	0.009	-	-
Nitrogen, Nitrite (N)	mg/L			< 0.001	< 0.001	-	-
Nitrogen, TKN (N)	mg/L			0.20	0.07	-	-
O, P' DDT	mg/L			< 0.0003	< 0.0003	-	-
P, P' DDT	mg/L			< 0.0003	< 0.0003	-	-
O, P' DDE	mg/L			< 0.00007	< 0.00007	-	-
P, P' DDE	mg/L			< 0.00007	< 0.00007	-	-
Oxygen, Dissolved (O_2)	mg/L			9.1	9.6	-	10.8
Phosphate as PO_4	mg/L			0.1	0.1	0.02	-
Potassium (K)	mg/L			3.4	4.1	3.0	3.3
Radium 226	pCi/L			< 0.1	< 0.1	-	-
Saturation Index				-0.78	-0.49	0.1-0.2	-
Silica (SiO_2)	mg/L			20	23	11.2	-
Sodium (Na)	mg/L			31	43	65	54
Stability Index				9.56	8.57	-	-
Temperature	°C			14	17.3	16.1	15.2
Total Hardness as $CaCO_3$	mg/L			61	220	196	161
2, 4, 5-T	mg/L			< 0.0002	< 0.0002	-	-

(1) Maximum Contaminant Level (2) Recommended Maximum

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