

INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT

148th Combat Communications Squadron

**Ontario Air National Guard Station
California Air National Guard
Ontario, California**

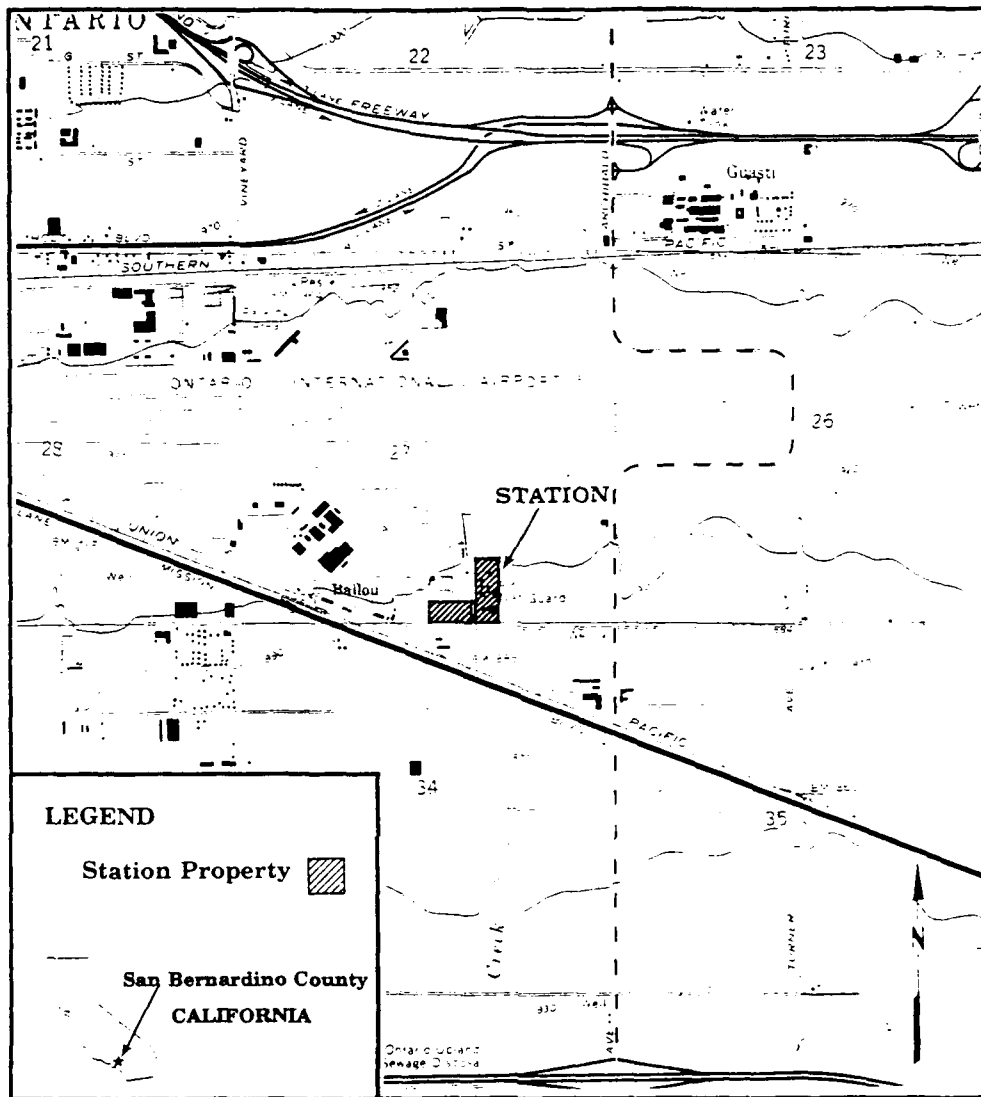
December 1990

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**INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT**

**148th COMBAT COMMUNICATIONS SQUADRON
ONTARIO AIR NATIONAL GUARD STATION
CALIFORNIA AIR NATIONAL GUARD
ONTARIO, CALIFORNIA**

Prepared for

**National Guard Bureau
Andrews Air Force Base, Maryland 20331-6008**

Prepared by



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Submitted to

**HAZWRAP Support Contractor Office
Oak Ridge, Tennessee
Operated by Martin Marietta Energy Systems, Inc.
for the Department of Energy,
Under Contract DE-AC05-84OR21400**

December 1990

TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY	ES-1
I. INTRODUCTION	I-1
A. Background	I-1
B. Purpose	I-5
C. Scope	I-5
D. Methodology	I-6
II. INSTALLATION DESCRIPTION	II-1
A. Location	II-1
B. Organization and History	II-1
III. ENVIRONMENTAL SETTING	III-1
A. Meteorology	III-1
B. Geology	III-1
C. Hydrology	III-5
1. Surface Water	III-5
2. Groundwater	III-9
D. Critical Habitats/Endangered or Threatened Species	III-9
IV. SITE EVALUATION	IV-1
A. Activity Review	IV-1
B. Disposal/Spill Site Information, Evaluation, and Hazard Assessment	IV-1
C. Other Pertinent Facts	IV-6
V. CONCLUSIONS	V-1
VI. RECOMMENDATIONS	VI-1
BIBLIOGRAPHY	Bi-1
GLOSSARY OF TERMS	Gl-1

APPENDICES

	<u>Page</u>
APPENDIX A. Outside Agency Contact List	A-1
APPENDIX B. USAF Hazard Assessment Rating Methodology (HARM)	B-1
APPENDIX C. Site Hazard Assessment Rating Forms and Factor Rating Criteria	C-1

LIST OF FIGURES

	<u>Page</u>
Figure I.1 Preliminary Assessment Methodology Flow Chart	I-7
Figure II.1 Location Map of the Ontario Air National Guard Station	II-2
Figure III.1 Physiographic Map of California	III-2
Figure III.2A Regional Geomorphic/Structural Map	III-3
Figure III.2B Local Structural/Physiographic Map	III-4
Figure III.3 Generalized Stratigraphic Column of the Area	III-6
Figure III.4 Diagrammatic Cross Section San Gabriel Mountains-Chino/San Bernardino Basin	III-7
Figure III.5 Drainage Map of the Ontario Air National Guard Station	III-8
Figure III.6 Surface Water Runoff Route Map of the Area	III-10
Figure III.7 Approximate Altitude of 1989 Water Levels in Chino Basin	III-11
Figure IV.1 Potential Sites At the Ontario Air National Guard Station	IV-5

LIST OF TABLES

Table IV.1 Hazardous Materials/Hazardous Wastes Disposal Summary: Ontario Air National Guard, San Bernardino, California	IV-2
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ACRONYM LIST

AGE	Aerospace Ground Equipment
CCSQ	Combat Communications Squadron
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EO	Executive Order
EPA	Environmental Protection Agency
FR	Federal Register
FS	Feasibility Study
FTA	Fire Training Area
HARM	Hazard Assessment Rating Methodology
HAS	Hazard Assessment Score
HAZWRAP	Hazardous Waste Remedial Actions Program
IAP	International Airport
IRP	Installation Restoration Program
JP-4	Jet Fuel
MOGAS	Automotive Gasoline
NDDDB	Natural Diversity Data Base
NGB	National Guard Bureau
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
PL	Public Law
POC	Point of Contact
RCRA	Resource Conservation and Recovery Act of 1976
R&D	Research and Development
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
SciTek	Science & Technology, Inc.
SI	Site Investigation
USAF	United States Air Force
USC	United States Code
UTA	Unit Training Assembly

EXECUTIVE SUMMARY

A. INTRODUCTION

Science & Technology, Inc. (SciTek) was retained to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 148th Combat Communications Squadron (CCSQ), Ontario Air National Guard Station [hereinafter referred to as the Station] located at Ontario, California. For the purpose of this document, the Station shall include the total area leased by the 148th CCSQ at Ontario, California.

The PA included the following activities:

- o an on-site visit, including interviews with a total of 14 persons familiar with Station operations, and field surveys by SciTek representatives during April 23 through May 4, 1990;
- o acquisition and analysis of information on past hazardous materials use, waste generation, and waste disposal at the Station;
- o acquisition and analysis of available geological, hydrological, meteorological, and environmental data from federal, state, and local agencies; and
- o the identification and assessment of sites on the Station that may have been contaminated with hazardous wastes.

B. MAJOR FINDINGS

The 148th CCSQ has used hazardous materials and generated small amounts of wastes in mission-oriented operations and maintenance at the Station since 1984.

Operations that have involved the use of hazardous materials and the disposal of hazardous wastes include vehicle maintenance and maintenance of aerospace ground equipment (AGE). The hazardous wastes disposed of through these operations include varying quantities of fuels, acids, paints, thinners, strippers, solvents, and oils.

The field surveys and interviews resulted in one site being identified that exhibits the potential for contaminant presence and migration.

C. CONCLUSIONS

It has been concluded there is one site where a potential for contaminant presence exists. This site is as follows:

Site No. 1 - Area behind Vehicle Maintenance (HAS - 50)

D. RECOMMENDATIONS

Further work under the IRP is recommended for the identified site to determine the presence or absence of contamination.

I. INTRODUCTION

A. Background

The 148th Combat Communications Squadron (CCSQ), Ontario Air National Guard Station [hereinafter referred to as the Station] is located at Ontario, California. The 148th CCSQ has been active at its present location since 1984. Both past and current operations have involved the use of potentially hazardous materials and the disposal of wastes. Because of the use of these materials and the disposal of resultant wastes, the National Guard Bureau (NGB) has implemented the Installation Restoration Program (IRP).

The IRP is a comprehensive program designed to:

- o Identify and fully evaluate suspected problems associated with past hazardous waste disposal and/or spill sites on Department of Defense (DoD) installations and
- o Control hazards to human health, welfare, and the environment that may have resulted from these past practices.

During June 1980, DoD issued a Defense Environmental Quality Program Policy Memorandum (DEQPPM 80-6) requiring identification of past hazardous waste disposal sites on DoD installations. The policy was issued in response to the Resource Conservation and Recovery Act of 1976 (RCRA) and in anticipation of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, Public Law (PL) 96-510), commonly known as "Superfund." In August 1981, the President delegated certain authority specified under CERCLA to the Secretary of Defense via an Executive Order (EO 12316). As a result of EO 12316, DoD revised the IRP by issuing DEQPPM 81-5 (December 11, 1981), which reissued and amplified all previous directives and memoranda.

Although the DoD IRP and the Environmental Protection Agency (EPA) Superfund programs were essentially the same, differences in the definition of program activities and lines of authority resulted in some confusion between DoD and state/federal regulatory agencies. These difficulties were rectified via passage of the Superfund Amendments and Reauthorization Act (SARA, PL-99-499) of 1986. On January 23, 1987, Presidential Executive Order EO 12580 was issued. EO 12580 effectively revoked EO 12316 and implemented the changes promulgated by SARA.

The most important changes effected by SARA included the following:

- o Section 120 of SARA provides that federal facilities, including those in DoD, are subject to all provisions of CERCLA/SARA concerning site assessment, evaluation under the National Contingency Plan [40CFR300], listing on the National Priorities List, and removal/remedial actions. DoD must therefore comply with all the procedural and substantive requirements (guidelines, rules, regulations, and criteria) promulgated by the EPA under Superfund authority.
- o Section 211 of SARA also provides continuing statutory authority for DoD to conduct its IRP as part of the Defense Environmental Restoration Program (DERP). This was accomplished by adding Chapter 160, Sections 2701-2707 to Title 10 United States Code (10 USC 160).
- o SARA also stipulated that terminology used to describe or otherwise identify actions carried out under the IRP shall be substantially the same as the terminology of the regulations and guidelines issued by the EPA under their Superfund authority.

As a result of SARA, the operational activities of the IRP are currently defined and described as follows:

- o **Preliminary Assessment**

The Preliminary Assessment (PA) process consists of personnel interviews and a records search designed to identify and evaluate past disposal and/or spill sites that might pose a potential and/or actual hazard to public health, public welfare, or the environment. Previously undocumented information is obtained through the interviews. The records search focuses on obtaining useful information from aerial photographs; Station plans; facility inventory documents; lists of hazardous materials used at the Station; Station subcontractor reports; Station correspondence; Material Safety Data Sheets; federal/state agency scientific reports and statistics; federal administrative documents; federal/state records on endangered species, threatened species, and critical habitats; documents from local government offices; and numerous standard reference sources.

- o **Site Inspection/Remedial Investigation/Feasibility Study**

The Site Inspection consists of field activities designed to confirm the presence or absence of contamination at the potential sites identified in the PA. An expanded Site Inspection has been designed by the Air National Guard as a Site Investigation. The Site Investigation (SI) will include additional field tests and the installation of monitoring wells to

provide data from which site-specific decisions regarding remediation actions can be made. The activities undertaken during the SI fall into three distinct categories: screening activities, confirmation and delineation activities, and optional activities. Screening activities are conducted to gather preliminary data on each site. Confirmation and delineation activities include specific media sampling and laboratory analysis to confirm either the presence or the absence of contamination, levels of contamination, and the potential for contaminant migration. Optional activities will be used if additional data is needed to reach a decision point for a site. The general approach for the design of the SI activities is to sequence the field activities so that data are acquired and used as the field investigation progresses. This is done in order to determine the absence or presence of contamination in a relatively short period of time, optimize data collection and data quality, and to keep costs to a minimum.

The Remedial Investigation (RI) consists of field activities designed to quantify and identify the potential contaminant, the extent of the contaminant plume, and the pathways of contaminant migration.

If applicable, a public health evaluation is performed to analyze the collected data. Field tests, which may necessitate the installation of monitoring wells or the collection and analysis of water, soil, and/or sediment samples, are required. Careful documentation and quality control procedures in accordance with CERCLA/SARA guidelines ensure the validity of data. Hydrogeologic studies are conducted to determine the underlying strata, groundwater flow rates, and direction of contaminant migration. The findings from these studies result in the selection of one or more of the following options:

1. **No Further Action** - Investigations do not indicate harmful levels of contamination that pose a significant threat to human health or the environment. The site does not warrant further IRP action, and a Decision Document will be prepared to close out the site.
2. **Long-Term Monitoring** - Evaluations do not detect sufficient contamination to justify costly remedial actions. Long-term monitoring may be recommended to detect the possibility of future problems.
3. **Feasibility Study** - Investigation confirms the presence of contamination that may pose a threat to human health and/or the environment, and some sort of remedial action is indicated. The Feasibility Study (FS) is therefore designed and developed to identify and select the most appropriate remedial action. The FS may include individual sites, groups of sites, or all sites on an

installation. Remedial alternatives are chosen according to engineering and cost feasibility, state/federal regulatory requirements, public health effects, and environmental impacts. The end result of the FS is the selection of the most appropriate remedial action with concurrence by state and/or federal regulatory agencies.

o **Remedial Design/Remedial Action**

The Remedial Design involves formulation and approval of the engineering designs required to implement the selected remedial action. The Remedial Action is the actual implementation of the remedial alternative. It refers to the accomplishment of measures to eliminate the hazard or, at a minimum, reduce it to an acceptable limit. Covering a landfill with an impermeable cap, pumping and treating contaminated groundwater, installing a new water distribution system, and in situ biodegradation of contaminated soils are examples of remedial measures that might be selected. In some cases, after the remedial actions have been completed, a long-term monitoring system may be installed as a precautionary measure to detect any contaminant migration or to document the efficiency of remediation.

o **Research and Development**

Research and Development (R&D) activities are not always applicable for an IRP site but may be necessary if there is a requirement for additional research and development of control measures. R&D tasks may be initiated for sites that cannot be characterized or controlled through the application of currently available, proven technology. It can also, in some instances, be used for sites deemed suitable for evaluating new technologies.

o **Immediate Action Alternatives**

At any point, it may be determined that a former waste disposal site poses an immediate threat to public health or the environment, thus necessitating prompt removal of the contaminant. Immediate action, such as limiting access to the site, capping or removing contaminated soils, and/or providing an alternate water supply may suffice as effective control measures. Sites requiring immediate removal action maintain IRP status in order to determine the need for additional remedial planning or long-term monitoring. Removal measures or other appropriate remedial actions may be implemented during any phase of an IRP project.

B. Purpose

The purpose of this IRP PA is to identify and evaluate suspected problems associated with past waste handling procedures, disposal sites, and spill sites on Station property.

The potential for migration of hazardous contaminants was evaluated by visiting the Station, reviewing existing environmental data, analyzing Station records concerning the use of hazardous materials and the generation of hazardous wastes, and conducting interviews with current Station personnel who had knowledge of past waste disposal techniques and handling methods. Pertinent information collected and analyzed as part of the PA included a records search of the history of the Station; the local geological, hydrological, and meteorological conditions that might influence migration of contaminants; and ecological settings that indicate environmentally sensitive conditions.

C. Scope

The scope was limited to the identification of sites at or under primary control of the Station and evaluation of potential receptors. The PA included:

- o an on-site visit and field surveys during the period April 23 through May 4, 1990;
- o acquisition of records and information on hazardous materials use and waste handling practices;
- o acquisition of available geological, hydrological, meteorological, land use and zoning, critical habitat, and related data from federal and state agencies;
- o a review and analysis of all information obtained; and
- o preparation of a summary report to include recommendations for further action.

The subcontractor effort was conducted by the following Science & Technology, Inc. (SciTek) personnel: Mr. Ray S. Clark, Civil/Environmental Engineer; Mr. P. J. McMullen, Geologist/Hydrogeologist; and Mr. Jack D. Wheat, Geologist. Ms. Carol Ann Beda of the NGB is Project Officer for this Station and participated in the overall assessment during the Station visit. Mr. Bob Combs of the Hazardous Waste Remedial Actions Program (HAZWRAP) also participated in the Station visit.

The point of contact (POC) at the Station was Major Cunningham (Detachment Commander).

D. Methodology

The PA began with a visit to the Station to identify all operations that may have utilized hazardous materials or may have generated hazardous wastes. Figure I.1 is a flow chart of the PA methodology.

A total of 14 current and past Station employees familiar with the various operating procedures were interviewed. These interviews were conducted to determine those areas where waste materials (hazardous or nonhazardous) were used, spilled, stored, disposed of, or released into the environment. The interviewees' knowledge and experience with Station operations averaged 16 years and ranged from 4 to 29 years. Records contained in the Station files were collected and reviewed to supplement the information obtained from the interviews.

Detailed geological, hydrological, meteorological, and environmental data for the area were obtained from the appropriate federal and state agencies. A listing of federal and state agency contacts is included as Appendix A.

After a detailed analysis of all the information obtained, one potential site was identified to be potentially contaminated with hazardous wastes. Under the IRP program, when sufficient information is available, sites are numerically scored and assigned a Hazard Assessment Score (HAS) using the Air Force Hazard Assessment Rating Methodology (HARM). However, the absence of a HAS does not necessarily negate a recommendation for further IRP investigation, but rather, may indicate a lack of data. A description of HARM is presented in Appendix B.

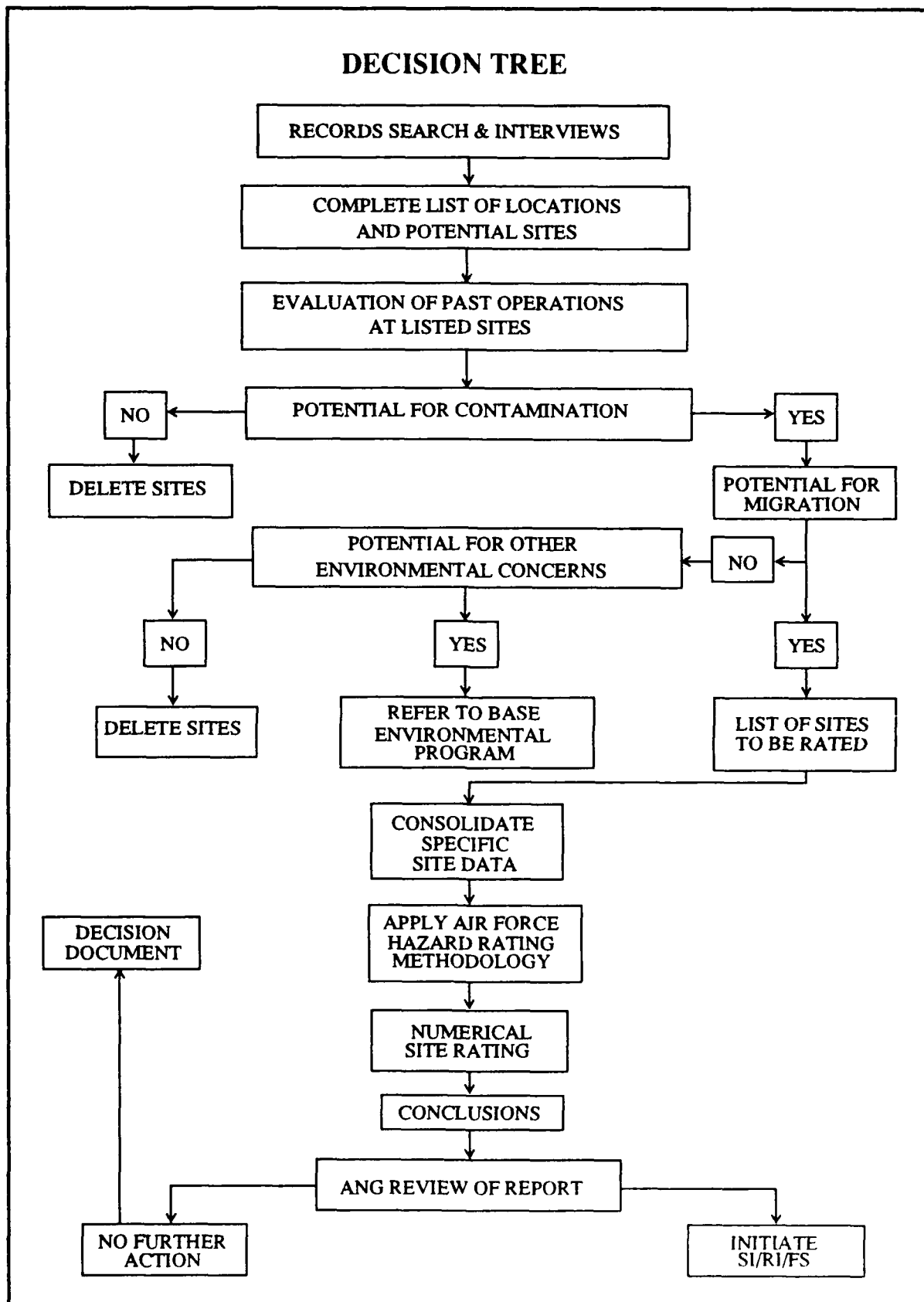


Figure I.1
Preliminary Assessment Methodology Flow Chart

II. INSTALLATION DESCRIPTION

A. Location

The Station is located approximately 14 miles southwest of San Bernardino and adjacent to Ontario International Airport (IAP) within San Bernardino County, California. The major route to the Station is Interstate 10.

The Station occupies approximately 13 acres along Arcacia Street at the Ontario IAP. Figure II.1 illustrates the location and boundaries of the Station. On weekdays, the population at the Station is approximately 29. Unit Training Assembly (UTA) occurs one weekend per month. The Station population during this weekend is approximately 161. The Station is completely fenced with controlled access. The unimproved acreage is used to conduct training and for parking of equipment.

B. Organization and History

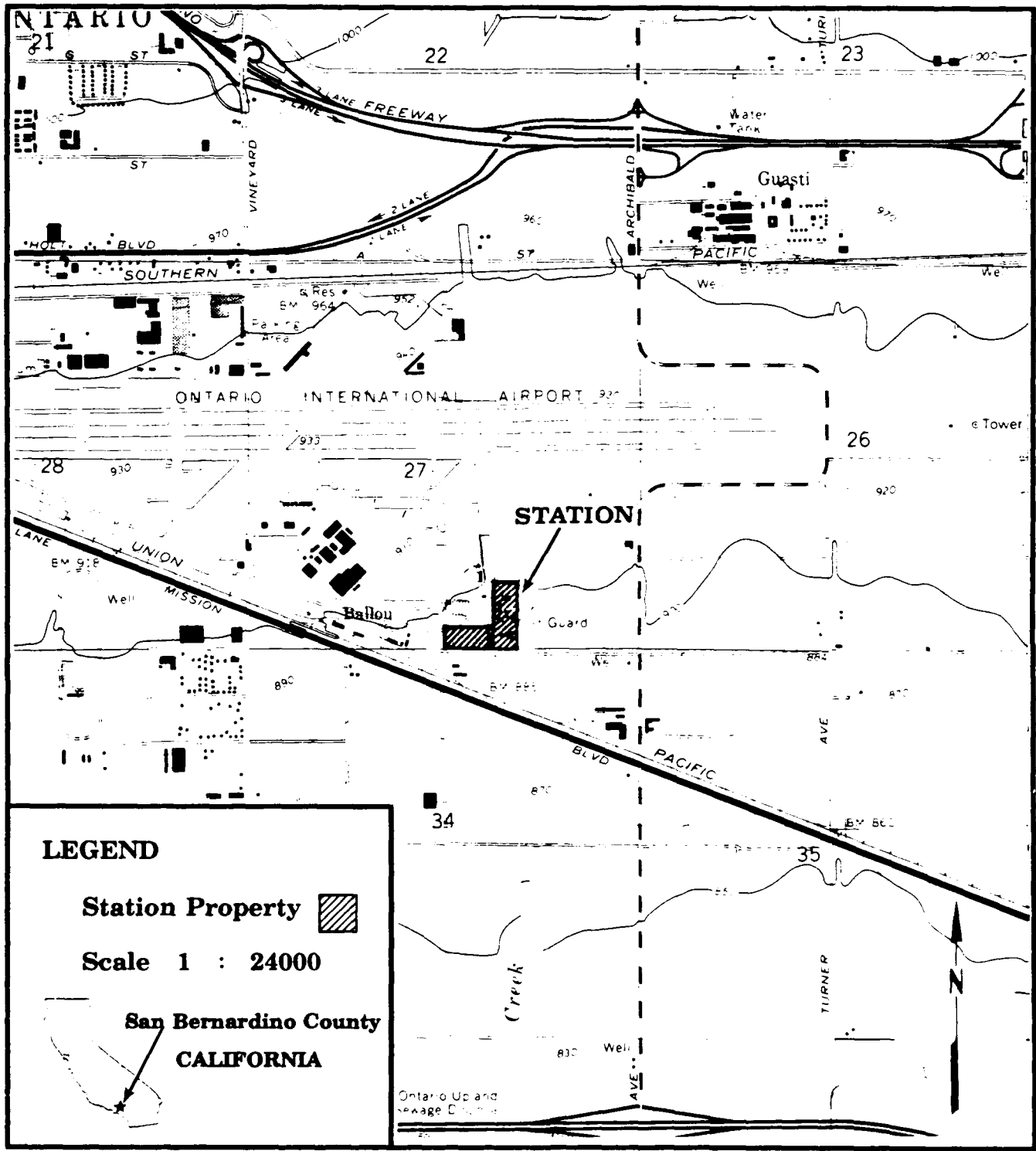
The 148th CCSQ has been at the Station since 1984. The 148th conducts radar operations, maintenance, and training on the property. These operations have generated waste oils, fuels, paints, thinners, and solvents requiring disposal. Wastes are now collected and disposed of by a contractor or through the Defense Reutilization and Marketing Office (DRMO).

Before 1948 the Station was occupied by the Army. The operations and waste disposal practices performed during this time are not known.

Prior to 1984, the land was occupied by the 196th Tactical Air Support Group/163rd Tactical Air Support Group. These units were organized at Ontario IAP on July 10, 1952. In 1983 they were moved to March Air Force Base, where jet operations present fewer environmental problems. Operations included aircraft maintenance, vehicle maintenance, AGE maintenance, and non-destructive inspection testing. Waste materials from these activities included fuels, oils, thinners, paints, and solvents.

The mission of the 148th is to maintain an optimal capability to install, operate, and maintain mobile communication facilities providing interbase and intrabase communications in support of tactical air forces and state emergencies. This mission has basically remained the same through the years.

The unit's mission necessitates the use of potentially hazardous materials that require disposal. These hazardous materials include waste oils, fuels, solvents, paints, and thinners. Such materials are largely generated through vehicle maintenance and aerospace ground equipment (AGE) operations.



SOURCE: Guasti Quad N3400-W11730/7.5, 1966 (photo revised 1981).

Figure II.1
Location Map of
the Ontario Air National Guard Station

Washrack activity and the routine maintenance of vehicles, generators, and other equipment result in varying quantities of hazardous materials.

In recent years, hazardous wastes have typically been collected and disposed of either through a contractor or the DRMO. However, in the past, small amounts of hazardous materials have been spilled or released into the environment at the Station.

III. ENVIRONMENTAL SETTING

A. Meteorology

The following climatological data is taken from Climatic Atlas of the United States (U.S. Department of Commerce, National Climatic Center, Asheville, N.C., 1979) and Climatology of the United States, no. 81 - California (U.S. Department of Commerce, National Climatic Center, Asheville, N.C., 1982).

In the inland areas of southern California within the Los Angeles Basin, Pomona Cal Poly (4-7050) data, for elevations below 1000 feet, reflect an annual average temperature of 62.8°F, and the range is from a low of 52.4°F in January to a high of 74.9°F in August.

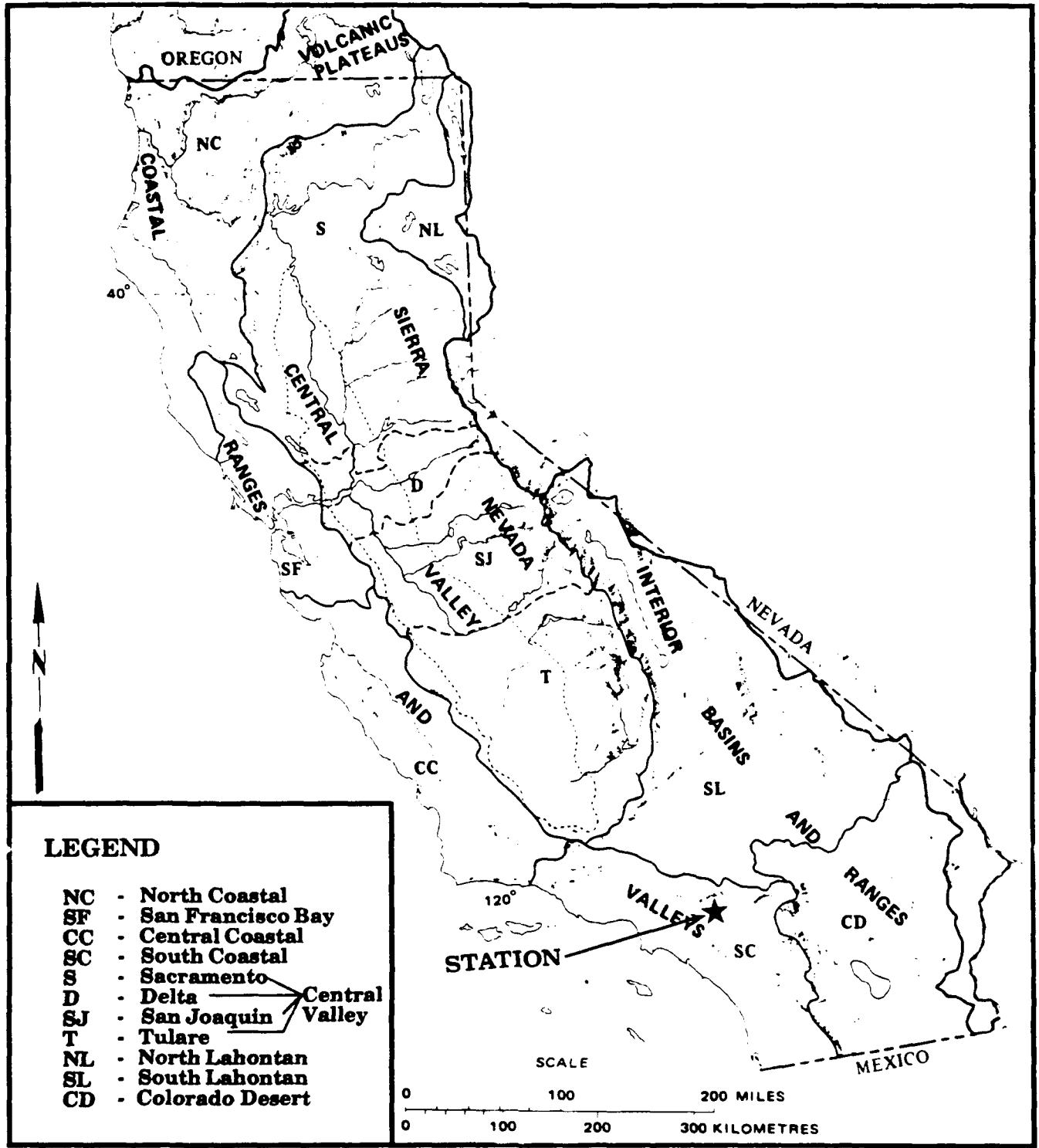
Average annual precipitation is 17.0 inches. Mean annual lake evaporation is 60 inches. Net precipitation, which is the difference between mean annual lake evaporation and the average annual precipitation, is -43 inches per year (47 FR 31224 July 16, 1982). Maximum rainfall intensity, based on a 1-year, 24-hour rainfall, is 1.5 inches (47 FR 31235 July 16, 1982, Figure No.8).

B. Geology

The Station elevation is 890 feet above sea level, and slopes are generally to the south at approximately 1 degree per mile.

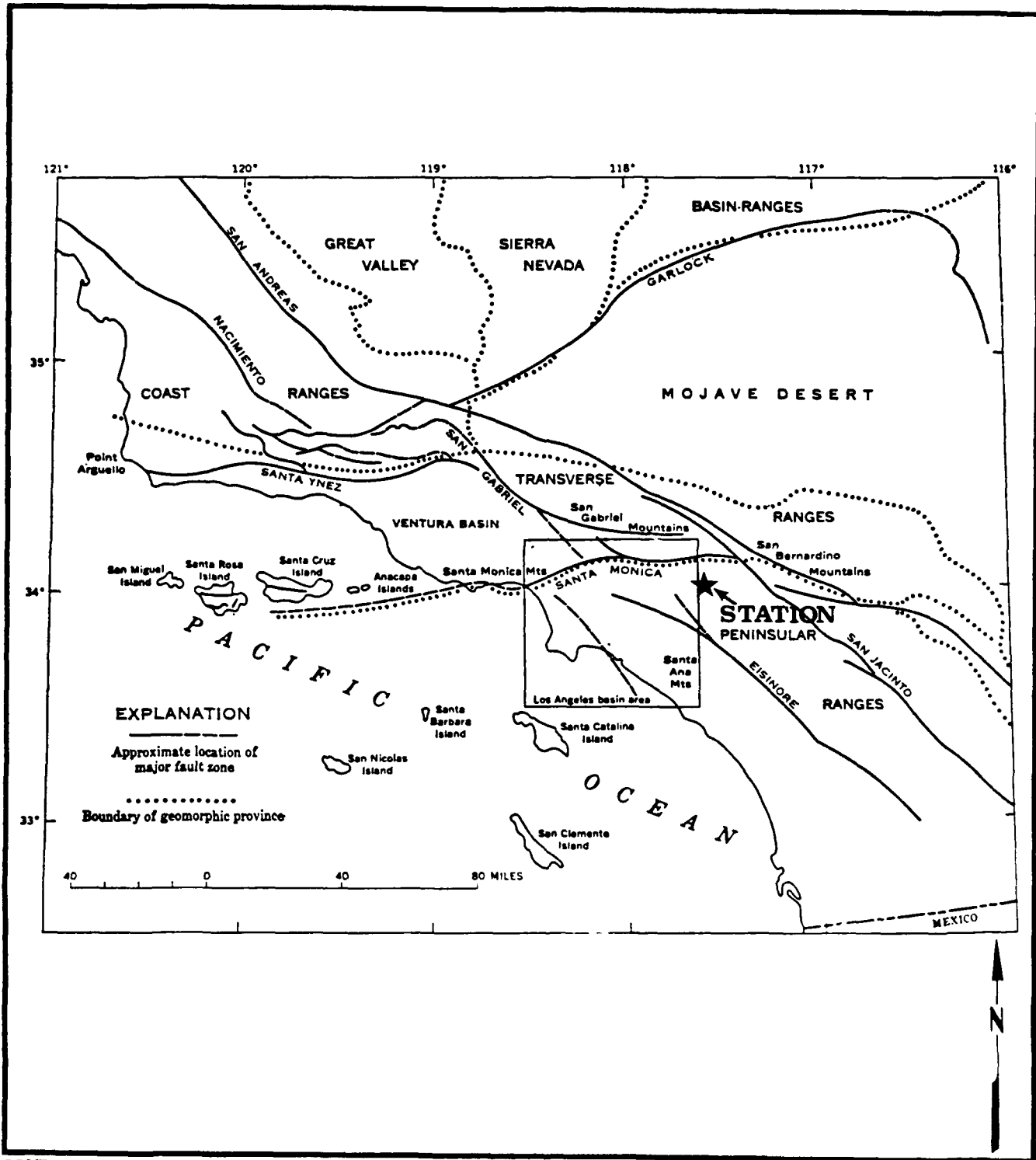
Yerkes, 1965, states that southern California includes portions of three geomorphic provinces: the Coastal Ranges, the Transverse Ranges, and the Peninsular Ranges (Figures III.1, III.2A). Although the Station falls within the Peninsular Ranges province, it is located in the Chino-San Bernardino Basin portion which is adjacent to and influenced by the San Gabriel-San Bernardino Mountain trend of the Transverse Ranges province.

The Peninsular Ranges province is characterized by elongate northwest-trending mountain ridges separated by straight-sided sediment-floored valleys (Figure III.2B). The onshore exposed portion of the province is approximately 55 to 80 miles wide and extends from the Los Angeles area southeastward for approximately 900 miles to the tip of Baja California. The province has been uplifted, tilted seaward, and sliced longitudinally into subparallel blocks by northwest to west-northwest trending fault sequences. These separate, large elongated blocks stand at different structural elevations and, on the northwest, merge with or are terminated by the east-trending steep reverse faults that form the southern margin of the Transverse Ranges province.



SOURCE: USGS, Summary Appraisals of Nation's Ground Water Resources-California Region, Professional Paper 813-E, 1976.

Figure III.1
Physiographic Map of California



SOURCE: Yerkes, R. F. et al, *Geology of the Los Angeles Basin, California - An Introduction*, USGS Professional Paper 420A.

Figure III.2A
Regional
Geomorphic/Structural Map



SOURCE: Yerkes, R. F. et al. *Geology of the Los Angeles Basin, California - An Introduction*. USGS Professional Paper 420A.

Figure III.2B
Local
Structural/Physiographic Map

The Transverse Ranges province extends from Point Arguello on the Pacific Coast to approximately 275 miles eastward into the Mojave Desert. With a general east-west trend, the province is at a conspicuous angle to the northwest-southeast trend of the adjacent Peninsular and Coastal Ranges. At its maximum width, the province is 50 miles wide and is bounded on the north by the transcurrent Santa Ynez-San Andreas fault sequence and on the south by the Santa Monica - Sierra Madre - Cucamonga fault zone (Yerkes, 1965). The east-west trending San Gabriel - San Bernardino Mountain sequence is underlain, for the most part, by pre-Tertiary metamorphic and plutonic igneous rocks ranging in age from Precambrian gneisses to Mesozoic age plutonic intrusions. Detritus derived from this sequence is present everywhere in the superjacent sedimentary strata such as the Chino-San Bernardino Basin (Figures III.3, III.4).

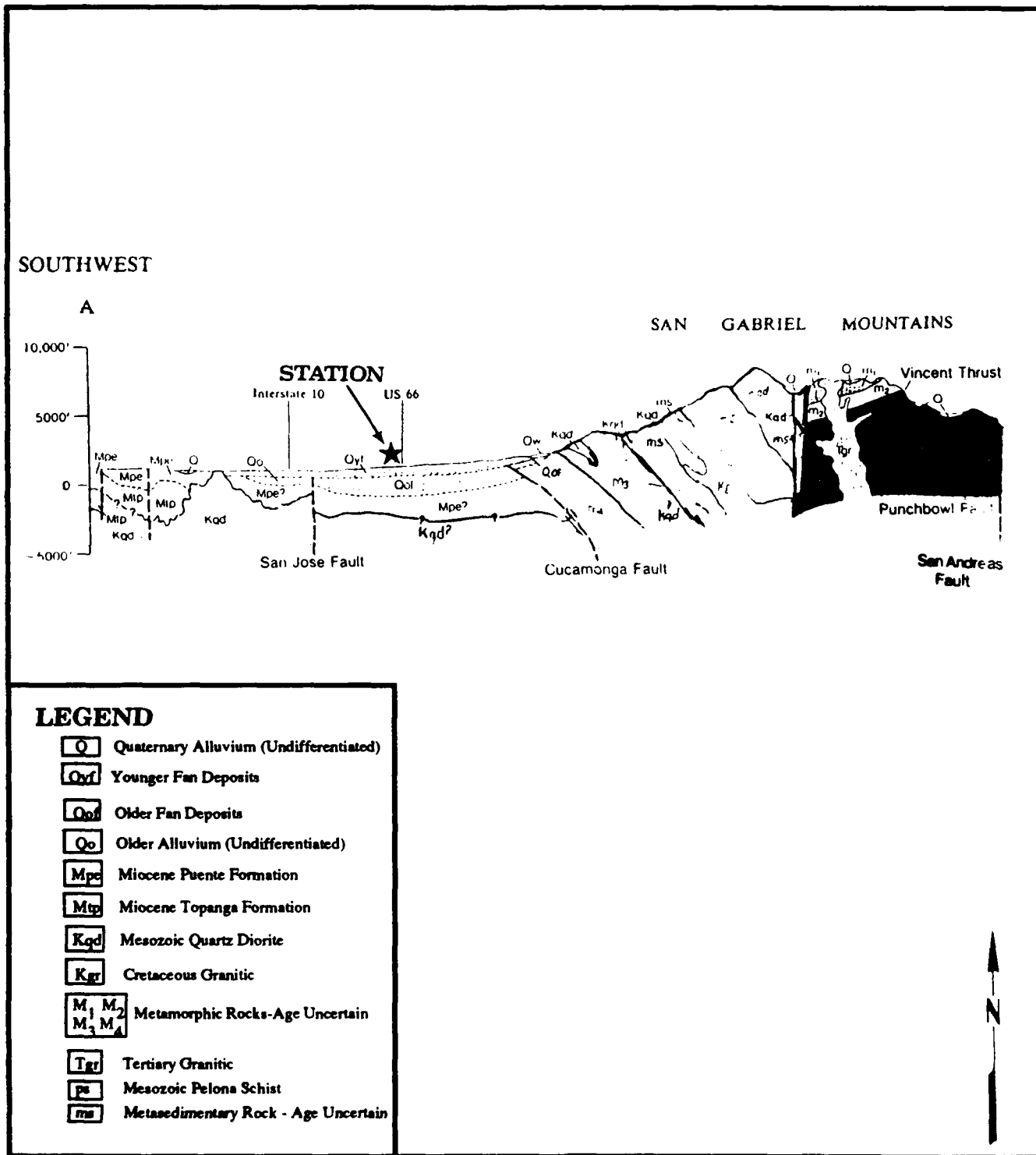
The Chino-San Bernardino Basin below the Station has a Cretaceous quartz diorite basement below 5500 feet (Figure III.4). This is overlain by approximately 2000 feet of marine siltstone, sandstone, and shales belonging to the Miocene Priente Formation which in turn is overlain by approximately 3500 feet of Quaternary fan and alluvial materials as well as marine derived sediments that are highly porous and permeable (Bortungo and Spittler, 1986). The valley material trends generally east-west and dips to the south between 1 and 3 degrees.

The Tujunga soil profile that underlies the majority of the Station area is nearly level to moderately sloping (0 to 5 percent) soil that formed on alluvial fans in granitic alluvium. The surface layer, which can be up to 10 inches in thickness, is a slightly acid, brown, loamy sand. The substratum, which can be up to 54 inches in thickness, is a pale brown, coarse sand that is slightly acid. In some areas, the substratum is composed of gravel that may range from 0 to 30 percent by volume. Runoff is slow to very slow as this soil is rapidly permeable (4.24×10^{-3} cm/sec to 1.41×10^{-2} cm/sec). The information pertaining to soils contained in the text was derived from the Soil Survey of San Bernardino County Southwestern Part, California (United States Department of Agriculture, Soil Conservation Service, January 1980).

C. Hydrology

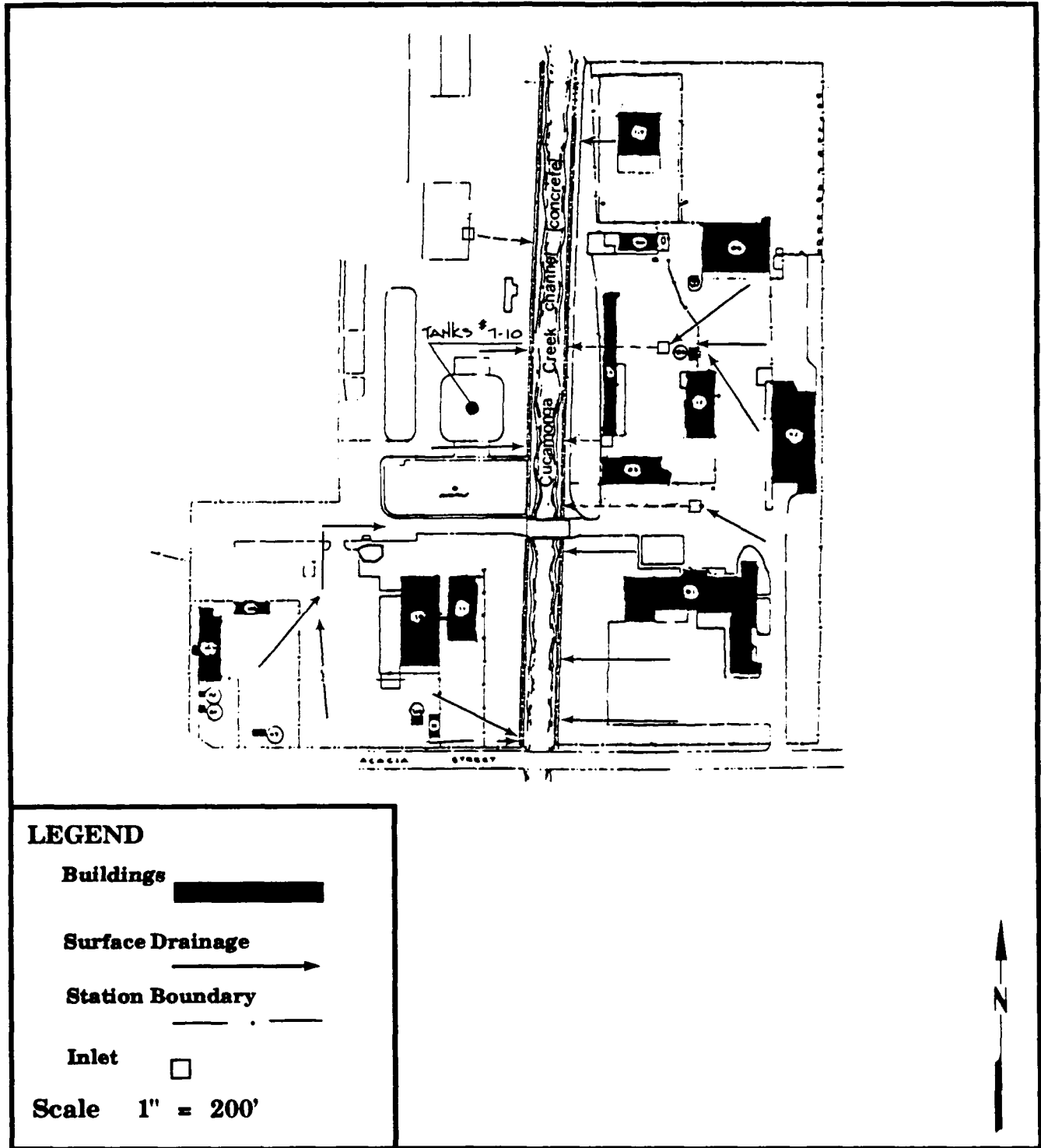
1. Surface Water

The Station is located in the Upper Santa Ana/Chino Basin drainage area, approximately nine miles south of the base of the San Gabriel Mountains (Figure III.4). Surface water flows directly into Cucamonga Creek, which is intermittent in nature, and bisects the Station in a north-south direction (Figure III.5). This surface flow enters the Creek directly off the pavement and/or through storm drains. The Station has been classified as being within



SOURCE: Bortugno, E. J. and T. E. Spittler, *Geologic Map of the San Bernardino Quadrangle*, Map No. 3A, 1986.

Figure III.4
Diagrammatic Cross Section
San Gabriel Mountains-Chino/San Bernardino Basin



SOURCE: Ontario ANGS Base Plans.

Figure III.5
Drainage Map
of the Ontario Air National Guard Station

the 100-year flood plain of the perennial Santa Ana River which is located approximately seven miles south/southeast of the Station. Areal drainage in the vicinity of the Station is shown in Figure III.6.

2. Groundwater

With the Station being located in the Chino-San Bernardino Basin, large volumes of Quaternary clastic material in the form of alluvium, alluvial terraces, and alluvial fans exist. These deposits consist of sand and gravel layers, which in the vicinity of the Station, form the principal confined aquifers. Regional data suggests that this sequence of alluvium, terraces, and fans interfinger with one another both laterally as well as vertically and pinch-out or have groundwater barriers in the upslope direction (north towards the base of the mountains). These upslope barriers can be formed by faults and/or clay and silty-clay layers that act as aquitards. These clay, silty-clay aquitards pinch-out before reaching the base of the mountains, and this allows for an effective recharge zone to exist between the upslope pinch-out and the base of the mountains. Groundwater elevation measurements for 1989 by the California Regional Water Quality Control Board, Santa Ana Region, have determined that the approximate altitude of water levels beneath the Station are 615 feet above mean sea level (Figure III.7). These 1989 measurements do not differ significantly from those mapped by Carson and Matti, 1985, for the period 1973-1979. The direction of groundwater flow is toward the west-southwest.

D. Critical Habitats/Endangered or Threatened Species

According to records maintained by the California Department of Fish and Game, Natural Diversity Data Base (NDDDB), no endangered or threatened species exist within a 1-mile radius of the Station.

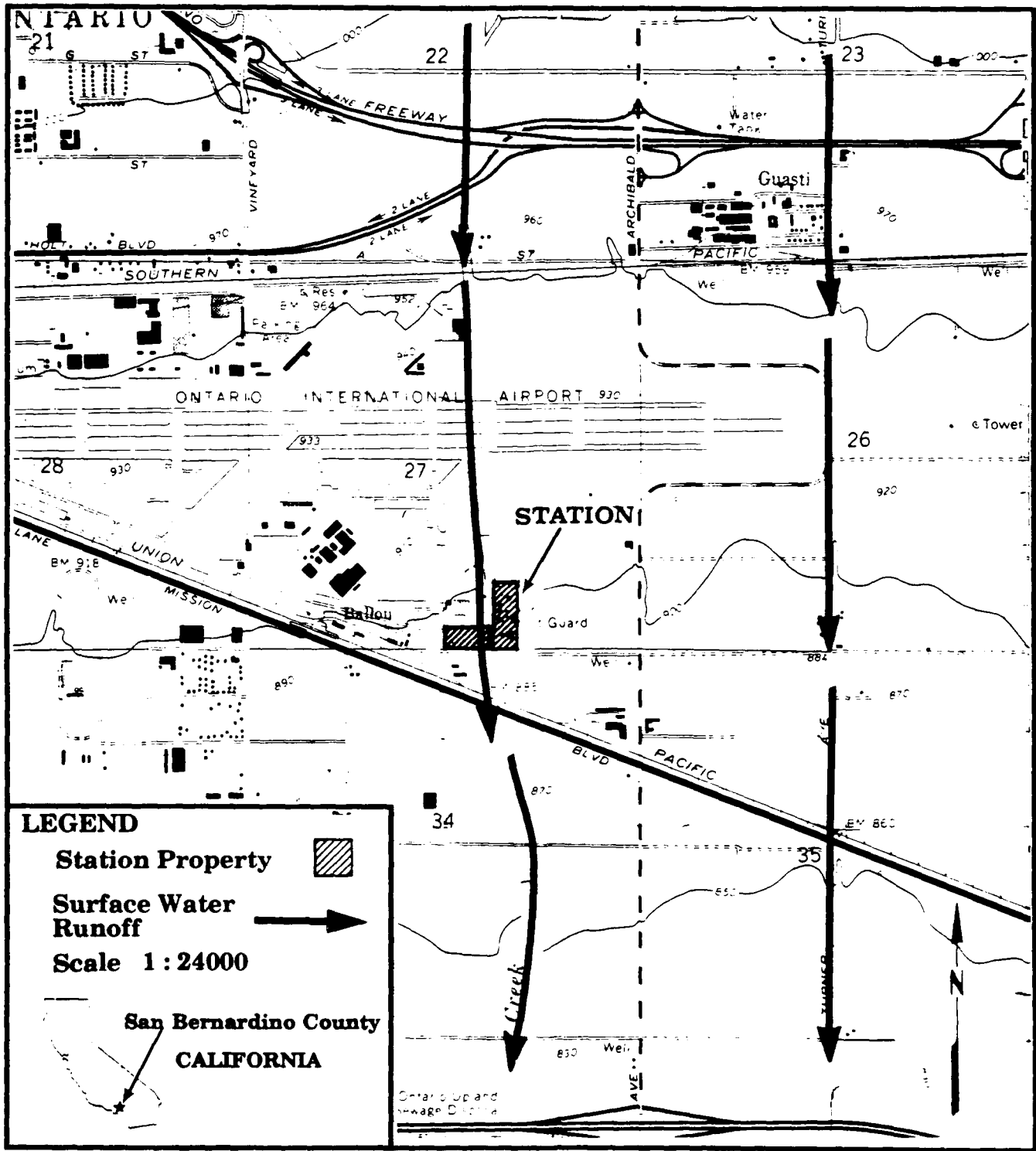
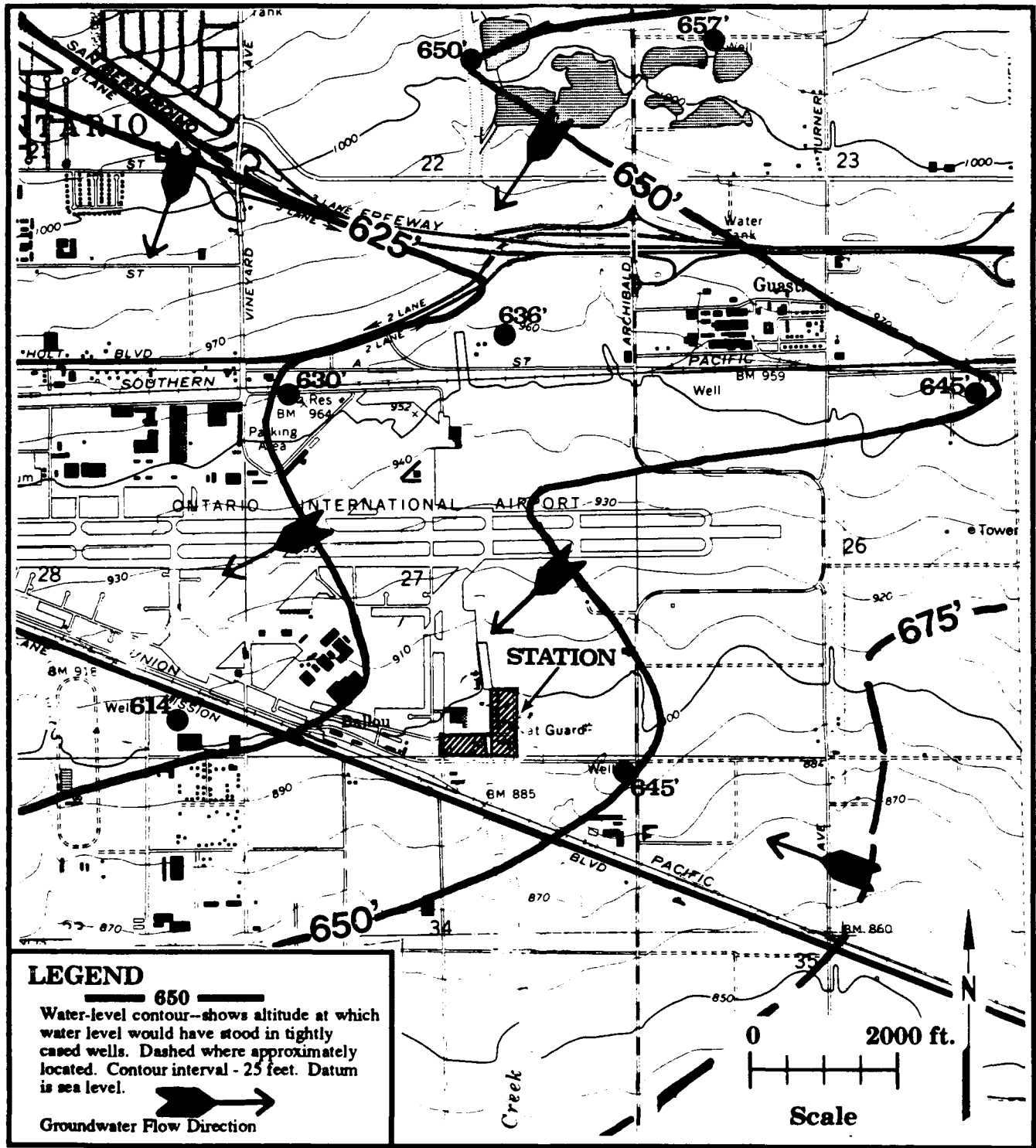


Figure III.6
Surface Water Runoff Route Map of the Area



SOURCE: Quasi Quad N3400-W11730/7.5, 1966 (photo revised 1981).

Figure III.7
 Approximate Altitude
 of 1989 Water Levels in Chino Basin

IV. SITE EVALUATION

A. Activity Review

A review of Station records and interviews with personnel were used to identify specific operations in which the majority of hazardous materials and/or hazardous wastes are used, stored, disposed of, and processed. Table IV.1 provides a history of waste generation and disposal for operations conducted by shops at the Station. If an item is not listed on the table on a best-estimated basis, that activity or operation produces negligible (less than 1 gallon/year) waste requiring disposal.

Fresh product diesel fuel and MOGAS are stored in underground storage tanks at the Station. In addition, tank trucks and fuel trailers parked at the Station are used to store fuels. The 148th CCSQ generates hazardous wastes primarily through vehicle and AGE maintenance operations.

The potable water supply and sanitary sewer service for the Station is provided by the city of Ontario. No water wells are present within the Station's boundaries.

B. Disposal/Spill Site Information, Evaluation, and Hazard Assessment

Fourteen persons were interviewed to identify and locate potential sites that may have been contaminated by hazardous wastes as a result of past Station operations. One potentially contaminated site was identified through the interviews. This site identification was followed-up by visual field examinations of the site. This site was then rated by application of the United States Air Force (USAF) HARM, and since the potential for contaminant migration exists at this potential site, it is recommended for further investigation under the IRP program. Copies of completed HARM forms and an explanation of the factor rating criteria used for sites scoring are contained in Appendix C.

The potential exists for contaminant migration at the rated site. Contaminants that may have been released at these sites have the potential to be transported by groundwater and surface water. The seasonal high water table is greater than 10 feet below the ground surface at the Station. If the groundwater becomes contaminated by hazardous wastes, then, under certain circumstances, the deeper aquifers may also be contaminated by groundwater migration.

Released contaminants that are exposed on the ground surface have the potential to be transported by surface waste migration into Cucamonga Creek.

Table IV.1

Hazardous Materials/Hazardous Wastes Disposal Summary: Ontario Air National Guard Station, Ontario, California.

Shop Name and Location	Possible Hazardous Wastes	Estimated Quantities (Gallons/Year)	1984	1986	1988	1990	Method of Disposal
Vehicle Maintenance (Bldg. 3)	Engine Oil	200					CONTR/DRMO
	PD-680	100					CONTR/DRMO
	Battery Acid	30		NSTORM			DRMO
	Ethylene Glycol	100		STORM			DRMO
	Hydraulic Oil	20					CONTR/DRMO
	Transmission Fluid	10					CONTR/DRMO
	Paint Thinner	20					CONTR/DRMO
	Brake Fluid	4					CONTR/DRMO
	Lubricating Oil	20					CONTR/DRMO

KEY:

- CONTR - Disposed of through a Contractor.
- DRMO - Disposed of through the Defense Reutilization & Marketing Office. (Prior to 1986, this office was known as the Defense Property Disposal Office (DPDO).)
- NSTORM - Neutralized and disposed down drains leading to the storm sewer.
- STORM - Disposed down drains leading to the storm sewer.
- WASH - Disposed of in drains during washing operations. Water at the washrack drains into an oil/water separator and then into the storm sewer.

Table IV.1

Hazardous Materials/Hazardous Wastes Disposal Summary: Ontario Air National Guard Station, Ontario, California (continued).

Shop Name and Location	Possible Hazardous Wastes	Estimated Quantities (Gallons/Year)	1984	1986	1988	1990	Method of Disposal
Aerospace Ground Equipment (AGE) Maintenance (Bldg. 6)	Engine Oil	200					CONTR/DRMO
	Strippers/Thinners	70					CONTR/DRMO
	Hydraulic Oil	40					CONTR/GRND
	Battery Acid	100					NSTORM DRMO
	Cleaning Compound	110					WASH
	Safety Kleen	200					CONTR

KEY:

- Disposed of through a Contractor.
- Disposed of through the Defense Reutilization & Marketing Office. (Prior to 1986, this office was known as the Defense Property Disposal Office (DPDO).)
- Neutralized and disposed down drains leading to the storm sewer.
- Disposed down drains leading to the storm sewer.
- Disposed of in drains during washing operations. Water at the washrack drains into an oil/water separator and then into the storm sewer.

Location of the identified site is provided in Figure IV.1. The following items are descriptions of the potential site identified at the Station:

Site No. 1 - Area behind Vehicle Maintenance (HAS - 50)

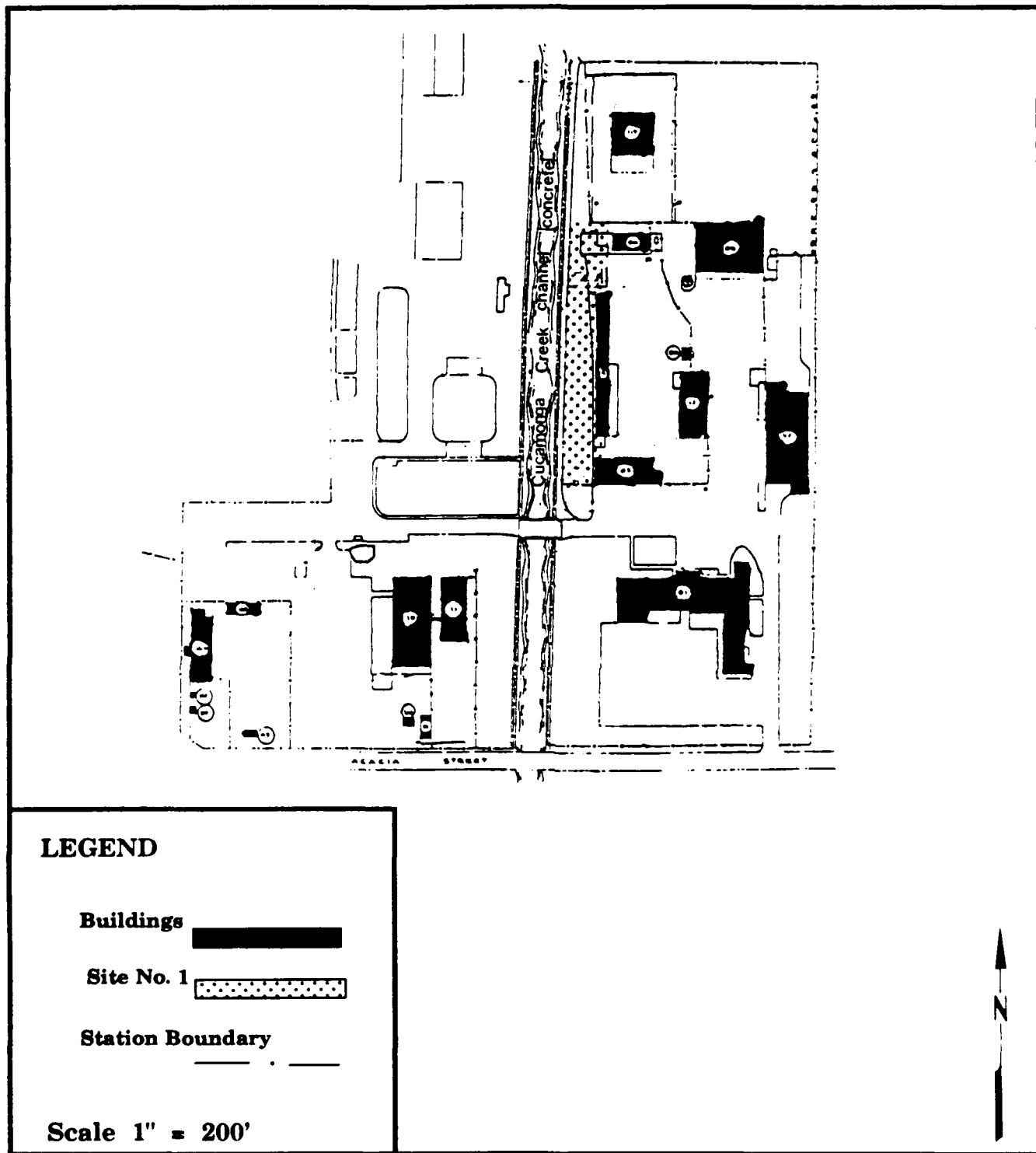
The area between the Vehicle Maintenance Shop (Buildings Nos. 3 and 14) and the drainage channel (Cucamonga Creek) was used to dispose of small amounts of waste materials resulting from the vehicle maintenance and power production shops. This site is approximately 40 feet wide and extends an estimated 250 feet (Figure IV.1). Interviewees reported that small quantities of hazardous materials were disposed at this site from the 1950s until the early 1980s. Much of the hazardous materials included waste oils, fuels, paints, and solvents that were disposed at the site during occupancy of the Station by the 163rd Tactical Air Support Group. Interviewees could not provide quantities and materials released. Since the identity and quantity of wastes disposed of are unknown, these wastes are not included in Table IV.1. However, this site is similar to sites at other bases with flying groups, and likely has similar kinds and quantities of wastes.

Cucamonga Creek receives all of the surface water from the Station. In addition, the oil/water separator at the maintenance shop is connected to the drainage channel. In the past, items poured onto the ground would often drain into the nearby Cucamonga Creek drainage channel. However, because the soils in this area are very permeable, a large portion of a released material would drain directly into the ground. Reports indicate that small amounts (2 to 3 gallons) of waste materials were periodically disposed of in this area. The initial site visit revealed no noticeable evidence of soil staining or stressed vegetation. According to interviews, the bulk of the waste material generated was used at two fire training areas (FTAs) located off Station property.

One of these FTAs was located approximately one mile north of the Station on Ontario IAP property. This FTA is located just north of the runway. It has been covered with pea gravel and is currently being used to store United Parcel Service containers. According to interviewees, this area was used until the early 1980s. This area was controlled and operated by the airport. Organizations using this FTA included the airport, the city of Ontario, and the Air National Guard.

Another FTA was located just east of the Station at the corner of Arcacia Street and Archibald Avenue. This FTA was owned and operated by the city of Ontario and jointly used by the city, the airport, and the Air National Guard. According to reports, a building has been constructed at the location of this FTA.

The original drainage channel (Cucamonga Creek) was lined with soil and was somewhat wider than it is presently. According to interviewees, the channel was lined with concrete sometime in the early 1980s. This construction



SOURCE: Ontario ANGS Base Plans.

Figure IV.1
 Potential Sites at
 the Ontario Air National Guard Station

disturbed the soils in the original channel; therefore, the original channel was deepened and required large amounts of cut and fill in the immediate vicinity of the Station. Although the original channel used to extend to within 5 feet of the west side of the Motor Pool building, a distance of approximately 40 feet now separates the concrete channel and the building.

Given the small amounts and the infrequent incidents involving waste disposal at this potential site, a small quantity may have been disposed of at this potential site. According to HARM, a small quantity is less than 20 drums (1100 gallons). A high hazard rating is assigned because of the characteristics of solvents disposed of in this area.

C. Other Pertinent Facts

- o Trash and non-hazardous solid wastes are disposed of by a contractor.
- o The Station has no Polychlorinated Biphenyl (PCB) electrical equipment.
- o The Station is not required to have a National Pollutant Discharge Elimination System permit.
- o There is an oil/water separator located at Buildings 3 (Vehicle Maintenance), 13 (Avionics Shop on present airport property), and 10 (Dining Hall). These 750-gallon oil/water separators are constructed of concrete and were installed in 1970.
- o The following two underground storage tanks are currently active. A 6000-gallon steel tank was installed at Building 6 in 1966 and is used to store diesel. A 4000-gallon steel tank was installed at Building 3 in 1958 and contains unleaded gasoline.
- o There are six heating oil tanks at the Station that were abandoned in the mid 1960s when the Station converted to gas heat. The age and exact size of these tanks are not known. Two 1000-gallon tanks are located on the south side of Building No. 8 (Hangar on airport property). There is an abandoned tank at each of the following Buildings: Buildings 1, 2, 3, and 5. It is believed that the capacity of these tanks range from 300 to 500 gallons.
- o Building No. 3 has a 1000-gallon unleaded gasoline tank that has been abandoned. This tank has been out of use since 1983. There are two abandoned tanks at the old service station located at Building No. 111.

These tanks were left by the Army and have not been active since 1954. It is believed that these tanks are constructed of steel, have a capacity of 1000 gallons, and were installed in 1949.

- o There are four 25,000-gallon tanks located east of the Hangar (Building 8) on the present airport property that were abandoned in 1984. Two of these have been pickled with a sodium hydroxide and water solution. These four tanks are scheduled to be removed by the Airport Authority. All other abandoned tanks on the Station are going to be scheduled for removal by the Air National Guard. There are no indications that any of these abandoned tanks have ever leaked.

V. CONCLUSIONS

Information obtained through interviews with 14 present and past Station personnel, reviews of Station records, and field observations resulted in the identification of one potentially contaminated disposal and/or spill site on Station property. This potential site is as follows:

Site No. 1 - Area behind Vehicle Maintenance (HAS - 50)

This site exhibits the potential for contaminant migration through surface water, soil, and/or groundwater.

VI. RECOMMENDATIONS

The PA identified one potentially contaminated site. As a result, additional investigation under the IRP is recommended for this site to confirm the presence or absence of contamination.

BIBLIOGRAPHY

- Bailey, T. L. and R. H. Jahns. Geology of the Transverse Range Province, Southern California. California Division of Mines Bulletin 170, v. 1, chapter 2, p. 83-106, 1954.
- Bortugno, W. J. and T. E. Spittler. Geologic Map of the San Bernardino Quadrangle, California. California Division of Mines and Geology Regional Map Series, Map No. 3A, 1986.
- Carson, S. E. and J. C. Matti. Contour Map Showing Minimum Depth to Ground Water, Upper Santa Ana River Valley, California, 1973-1979. United States Geological Survey Miscellaneous Field Studies Map 1802, 1985.
- Corbato, C. E. Bouguer Gravity Anomalies of the San Fernando Valley, California. California University Publications in Geological Science, v. 46, No. 1, p. 1-32, 1963.
- Davis, T. L. and J. S. Namson. Subsurface Study of the Late Cenozoic Structural Geology of the Los Angeles Area. United States Geological Survey Open-File Report 88-673, p. 140-144, 1988.
- Jennings, C. W. and R. G. Strand. Geologic Map of California, Los Angeles Sheet. California Division of Mines and Geology, scale 1:250000, 1969.
- Koehler, J. H. Artificial Recharge in the Northern Part of the Chino Ground Water Basin, Upper Santa Ana Valley, California. United States Geological Survey Water-Resources Investigation Report 82-4122, 1983.
- Main San Gabriel Watermaster. Seventeenth Annual Watermaster Report for Fiscal Year 1988-89. Upper San Gabriel Valley Municipal Water District, El Monte, CA.
- Moreland, J. A. and J. A. Singer. Evaluation of Water Quality Monitoring in the Orange County Water District, California. United States Geological Survey Open-File Report, 1969.
- Moreland, J. A. and J. A. Singer. A Study of Deep Aquifers Underlying Coastal Orange County, California. United States Geological Survey Open-File Report, 1969.
- Morton, D. M. Geology of Parts of the Azusa and Mount Wilson Quadrangles, California. California Division of Mines and Geology Special Report 105, 1973.

BIBLIOGRAPHY (continued)

- Piper, A. M. et al. Native and Contaminated Ground Water in the Long Beach-Santa Ana Area, California. United States Geological Survey Water-Supply Paper 1136, 1953.
- Poland, J. F. Hydrology of the Long Beach-Santa Ana Area, California. United States Geological Survey Water-Supply Paper 1471, 1951.
- United States Department of Agriculture. Report and General Soil Map of Los Angeles County, California. 1967 (Revised 1969).
- United States Department of Agriculture. Soil Survey of Orange County and Western Part of Riverside County, California. 1978.
- United States Department of Agriculture. Soil Survey of San Bernardino County, Southwestern Part, California. 1980.
- United States Department of Commerce. Climatic Atlas of the United States. National Oceanic and Atmospheric Administration, Environmental Data and Information Service, National Climatic Center, 1979.
- United States Department of Commerce. Climatology of the United States, No. 81 - California; Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1951-1980. National Oceanic and Atmospheric Administration, Environmental Data and Information Service, National Climatic Center, 1982.
- Upper Los Angeles River Area Watermaster. Watermaster Services in the Upper Los Angeles County, October 1, 1988 - September 30, 1989. 1990.
- Woodburne, M. O. Cenozoic Stratigraphy of the Transverse Ranges and Adjacent Areas, Southern California. Geological Society of America Special Paper 162, 1975.
- Yerkes, R. F. et al. Geology of the Los Angeles Basin, California--An Introduction. United States Geological Survey Professional Paper 420-A, 1965.

GLOSSARY OF TERMS

ALLUVIAL - Pertaining to or composed of alluvium or deposited by a stream or running water.

ALLUVIAL FAN - An outspread, gently sloping mass of alluvium deposited by a stream, especially in an arid or semiarid region where a stream issues from a narrow canyon onto a plain or valley floor.

ANNUAL PRECIPITATION - The total amount of rainfall and snowfall for the year.

AQUIFER - A water-bearing layer of rock that will yield water in a usable quantity to a well or spring.

AQUITARD - A confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer.

ARGILLACEOUS - Like or containing clay.

ARKOSE - A feldspar rich sandstone, typically coarse-grained and pink or reddish, that is composed of angular to subangular grains that may be either poorly or moderately well-sorted, is usually derived from the rapid disintegration of granite or granitic rocks, and often closely resembles granite.

BASIN - (a) A depressed area with no surface outlet; (b) A drainage basin or river basin; (c) A low area in the Earth's crust, of tectonic origin, in which sediments have accumulated.

BAY - A wide, curving open indentation, recess, or inlet of a sea or lake into the land or between two capes or headlands, larger than a cove, and usually smaller than, but of the same general character as a gulf.

BED [stratig] - The smallest formal unit in the hierarchy of lithostratigraphic units. In a stratified sequence of rocks it is distinguishable from layers above and below. A bed commonly ranges in thickness from a centimeter to a few meters.

BEDDING [stratig] - The arrangement of sedimentary rock in beds or layers of varying thickness and character.

BEDROCK - A general term for the consolidated (solid) rock that underlies soil or other unconsolidated superficial material. See **HORIZON [soil]** - *R layer*.

BERM - A ledge or space between the ditch and parapet in a fortification.

CLASTIC - Rock or sediments composed principally of fragments derived from pre-existing rocks or minerals and transported some distance from their place or origin source.

CLAY [soil] - A rock or mineral particle in the soil having a diameter less than 0.002 mm (2 microns).

CLAY [geol] - A rock or mineral fragment or a detrital particle of any composition smaller than a fine silt grain, having a diameter less than 1/256 mm (4 microns).

COARSE-TEXTURED (light textured) SOIL - Sand or loamy sand.

CONE OF DEPRESSION - The depression of heads around a pumping well caused by the withdrawal of water.

CONGLOMERATE - A coarse-grained sedimentary rock, composed of rounded pebbles, cobbles, and boulders, set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica, or hardened clay.

CONSOLIDATION - Any process whereby loosely aggregated, soft, or liquid earth materials become firm and coherent rock; specif. the solidification of a magma to form an igneous rock, or the lithification of loose sediments to form a sedimentary rock.

CONTAMINANT - As defined by Section 101(f)(33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

- (a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,
- (b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,
- (c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under

the Solid Waste Disposal Act has been suspended by Act of Congress),

- (d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,
- (e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and
- (f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CONTEMPORANEOUS FAULT - See GROWTH FAULT.

CREEK - A term generally applied to any natural stream of water, normally larger than a brook but smaller than a river.

CRITICAL HABITAT - The specific areas within the geographical area occupied by the species on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection.

DEPOSITS - Earth material of any type, either consolidated or unconsolidated, that has accumulated by some natural process or agent.

DIABASE - An intrusive rock whose main components are labradorite and pyroxene and which is characterized by ophitic texture.

DIORITE - A group of igneous rocks composed of dark-colored amphibole (esp. hornblende) oligoclase, andesine, pyroxene, and small amounts of quartz; the intrusive equivalent of andesite.

DRAINAGE CLASS (natural) - Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained - Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained - Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are

shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well-drained - Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well-drained soils are commonly medium textured and mainly free of mottling.

Moderately well drained - Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained - Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained - Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough periods during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained - Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

DRAINAGEWAY - A channel or course along which water drains or moves.

DRAWDOWN - The reduction in head at a point caused by the withdrawal of water from an aquifer.

EMBAYMENT - A downwarped region of stratified rocks that extends into a region of other rocks.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of the

Class Insecta determined by the secretary to constitute a pest whose protection would present an overwhelming and overriding risk to man.

EROSION - The general process or the group of processes whereby the materials of the Earth's crust are loosened, dissolved, or worn away, and simultaneously moved from one place to another by natural agencies, but usually exclude mass wasting.

EUGEOSYNCLINAL - Like a geosyncline in which volcanism is associated with clastic sedimentation.

EUSALINE - Sodium chloride concentrations of 30 to 35 parts per thousand. Same as normal sea water.

FAULT - A fracture or fracture zone along which there has been displacement of the sides relative to one another parallel to the fracture.

FELDSPAR - Any of several crystalline minerals made up of Aluminum silicates with sodium, potassium, or calcium; most widespread of any mineral group and constitute 60% of the earth's crust; occur in all types of rock.

FELDSPATHIC - Like or as feldspar.

FINE-GRAINED - Said of a soil in which silt and/or clay predominate.

FINE-TEXTURED (heavy textured) SOIL - Sandy clay, silty clay, and clay.

FLOOD PLAIN - The surface or strip of relatively smooth land adjacent to a river channel, constructed by the present river in its existing regimen and covered with water when the river overflows its banks.

FOLD [geol struc] - A curve or bend of a planar structure such as rock strata, bedding planes, foliation or cleavage.

FORMATION - A lithologically distinctive, mappable body of rock.

FRACTURE [struc geol] - A general term for any break in a rock, whether or not it causes displacement, due to mechanical failure by stress. Fracture includes cracks, joints, and faults.

GABBRO - A group of dark-colored, basic intrusive igneous rocks composed principally of basic plagioclase and clinopyroxene, with or without olivine and orthopyroxene; approximate intrusive equivalent of basalt.

GEOLOGIC TIME - See Figure G1.1.

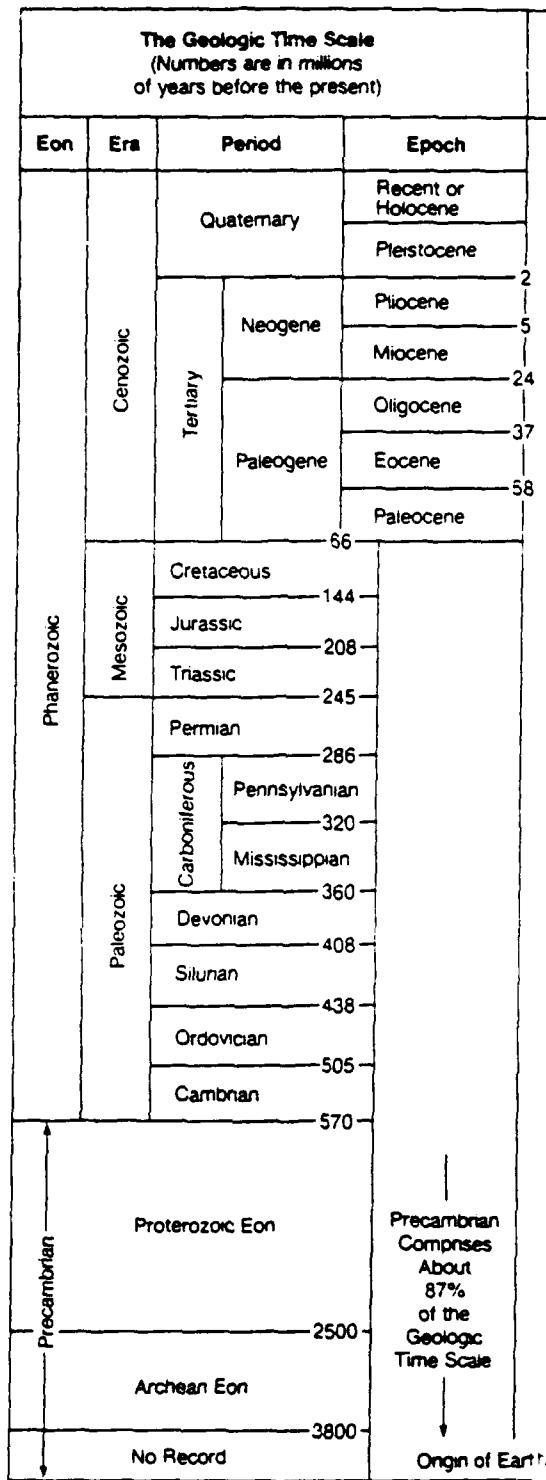


Figure G1.1

The Geologic Time Scale

GNEISS - A coarse-grained, foliated rock produced by regional metamorphism; commonly feldspar- and quartz-rich.

GRANITE - Broadly applied, any crystalline, quartz-bearing plutonic rock; also commonly contains feldspar, mica, hornblende, or pyroxene.

GRANODIORITE - A group of coarse-grained plutonic rocks intermediate in composition between quartz diorite and quartz monzonite, containing quartz, plagioclase, and potassium feldspar with biotite, hornblende, or more rarely, pyroxene, as the mafic contents.

GRAVEL - An unconsolidated, natural accumulation of rounded rock fragments resulting from erosion, consisting predominantly of particles larger than sand, such as boulders, cobbles, pebbles, granules or any combination of these fragments.

GRAYWACKE - A non-porous, dark-colored sandstone containing angular grains and fragments of other rocks; a fine-grained conglomerate resembling sandstone.

GROUNDWATER - Water in the saturated zone that is under a pressure equal to or greater than atmospheric pressure.

GROWTH FAULT - A fault in sedimentary rock that forms contemporaneously and continuously with deposition, so that the displacement (throw) increases with depth and the strata of the downthrown side are thicker than the correlative strata of the upthrown side.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, December 11, 1981.)

HAS - Hazard Assessment Score - The score developed by using the Hazard Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

- a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or
- b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HEAD - See TOTAL HEAD.

HERBICIDE - A weed killer.

HIGHLAND - A general term for a relatively large area of elevated or mountainous land standing prominently above adjacent low areas; and mountainous region.

HILL - A natural elevation of the land surface, rising rather prominently above the surrounding land, usually of limited extent and having a well-defined outline (rounded) and generally considered to be less than 1000 feet from base to summit.

HORIZON [soil] - A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon - An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon - The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon - A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon - The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon - The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties

typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer - Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

HORST - An elongate, relatively uplifted crustal unit or block that is bounded by faults on its long side.

IGNEOUS ROCKS - Rock or mineral that has solidified from molten or partially molten material, i.e. from magma.

INTERBEDDED - Beds lying between or alternating with others of different character; especially rock material laid down in sequence between other beds.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal proportions of sand, silt, and clay particles, and usually containing organic matter.

LOWLAND - A general term for low-lying land or an extensive region of low land, esp. near the coast and including the extended plains or country lying not far above tide level.

MEANDERBELT - The zone along a valley floor across which a meandering stream shifts its channel from time to time.

MEAN LAKE EVAPORATION - The total evaporation amount for a particular area; amount based on precipitation and climate (humidity).

MEAN SEA LEVEL - The average height of the surface of the sea for all stages of the tide over a 19-year period.

MESA - A table-land; a flat-topped mountain or plateau bounded on at least one side by a steep cliff.

METAMORPHIC ROCK - Any rock derived from pre-existing rocks by mineralogical, chemical, and/or structural changes, essentially in solid state, in response to marked changes in temperature, pressure, shearing stress, and chemical environment, generally at depth in the Earth's crust.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

MINERAL - A naturally occurring inorganic element or compound having an orderly internal structure and characteristic chemical composition, crystal form and physical properties.

MONTMORILLONITE - A clay mineral of the smectite group comprising expanding-lattice clay minerals when wetted.

MONZONITE - Plutonic rock intermediate in composition between syenite and diorite, containing approximately equal amounts of alkali feldspar and plagioclase.

MOTTLED [soil] - a soil that is irregularly marked with spots or patches of different colors, usually indicating poor aeration or seasonal wetness.

NET PRECIPITATION - Precipitation minus evaporation.

ORTHOCLASE - See FELDSPAR.

OUTCROP - That part of a geologic formation or structure that appears at the surface of the Earth; also, bedrock that is covered only by surficial deposits such as alluvium.

OVERTURNED - Said of a fold or the limb of a fold, that has tilted beyond the perpendicular. Sequence of strata thus appears reversed.

PD-680 - A cleaning solvent composed predominately of mineral spirits; Stoddard solvent.

PEAT - An unconsolidated deposit of semicarbonized plant remains in a water-saturated environment and of persistently high moisture content (at least 75%).

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure - see SOIL PERMEABILITY.

POND - A natural body of standing fresh water occupying a small surface depression, usually smaller than a lake and larger than a pool.

POROSITY - The voids or openings in a rock. Porosity may be expressed quantitatively as the ratio of the volume of openings in a rock to the total volume of the rock.

POTENTIOMETRIC SURFACE - A surface that represents the total head in an aquifer; that is, it represents the height above a datum plane at which the water level stands in tightly cased wells that penetrate the aquifer.

QUARTZ - A crystalline silica, an important rock forming mineral: SiO_2 . Occurs either in transparent hexagonal crystals (colorless or colored by impurities) or in crystalline or crystalline masses. Forms the major proportion of most sands and has a widespread distribution in igneous, metamorphic and sedimentary rocks.

QUARTZITE [meta] - A granoblastic metamorphic rock consisting mainly of quartz and formed by recrystallization of sandstone or chert by either regional or thermal metamorphism.

RIVER - A general term for a natural freshwater surface stream of considerable volume and a permanent or seasonal flow, moving in a definite channel toward a sea, lake, or another river.

SALINE [adj] - Salty; containing dissolved sodium chloride.

SAND - A rock or mineral particle in the soil, having a diameter in the range 0.52 - 2 mm.

SANDSTONE - A medium-grained fragmented sedimentary rock composed of abundant round or angular fragments of sand, size set in a fine-grained matrix (silt or clay) and more or less firmly united by a cementing material (commonly silica, iron oxide, or calcium carbonate).

SANDY LOAM - A soil containing 43 - 85% sand, 0 - 50% silt, and 0 - 20% clay, or containing at least 52% sand and no more than 20% clay and having the percentage of silt plus twice the percentage of clay exceeding 30% or containing 43 - 52% sand, less than 50% silt, and less than 7% clay.

SATURATED ZONE - The subsurface zone in which all openings are full of water.

SCHIST - A medium- or coarse-grained, strongly foliated, crystalline rock; formed by dynamic metamorphism.

SEDIMENT - Solid fragmental material that originates from weathering of rocks and is transported or deposited by air, water, or ice, or that accumulates by other natural agents, such as chemical precipitation from solution or secretion by organisms, and that forms in layers on the Earth's surface at ordinary temperatures in a loose, unconsolidated form; (b) strictly solid material that has settled down from a state of suspension in a liquid.

SEDIMENTARY ROCK - A rock resulting in the consolidation of loose sediment that has accumulated in layers; e.g., a clastic rock (such as conglomerate or tillite) consisting of mechanically formed fragments of older rock transported from its source and deposited in water or from air or ice; or a chemical rock (such as rock salt or gypsum) formed by precipitation from solution; or an organic rock (such as certain limestones) consisting of the remains or secretions of plants and animals.

SHALE - A fine-grained detrital sedimentary rock, formed by the consolidation (especially by compression) of clay, silt, or mud.

SIALIC - Like the light, granitic rock material near the surface of the earth's crust, underlying the continents.

SILT [soil] - (a) A rock or mineral particle in the soil, having a diameter in the range 0.002-0.005 mm; (b) A soil containing more than 80% silt-size particles, less than 12% clay, and less than 20% sand.

SILT LOAM - A soil containing 50 - 88% silt, 0 - 27% clay and 0 - 50% sand.

SOIL - The layer of material at the land surface that supports plant growth.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as the distance per unit time that water moves downward through the saturated soil.

Terms describing permeability are:

Very Slow	-	less than 0.06 inches per hour (less than 4.24×10^{-5} cm/sec)
Slow	-	0.06 to 0.20 inches per hour (4.24×10^{-5} to 1.41×10^{-4} cm/sec)
Moderately Slow	-	0.20 to 0.63 inches per hour (1.41×10^{-4} to 4.45×10^{-4} cm/sec)
Moderate	-	0.63 to 2.00 inches per hour (4.45×10^{-4} to 1.41×10^{-3} cm/sec)
Moderately Rapid	-	2.00 to 6.00 inches per hour (1.41×10^{-3} to 4.24×10^{-3} cm/sec)
Rapid	-	6.00 to 20.00 inches per hour (4.24×10^{-3} to 1.41×10^{-2} cm/sec)

Very Rapid - more than 20.00 inches per hour (more than 1.41 x 10⁻² cm/sec)

(Reference: United States Department of Agriculture, Soil Conservation Service)

SOIL REACTION - The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests at pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as:

pH

Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

SOIL STRUCTURE - See STRUCTURE [soil].

SOLUM - The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum. See HORIZON [soil].

SOLVENT - A substance, generally a liquid, capable of dissolving other substances.

STRAND PLAIN - A prograded shore built seaward by waves and currents, and continuous for some distance along the coast.

STRATIFIED - Formed, arranged, or laid down in layers or strata; especially said of any layered sedimentary rock or deposit.

STRIKE - SLIP FAULT - A fault on which the movement is parallel to the fault's strike. See TRANSCURRENT FAULT.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and man-made features.

TOTAL HEAD - The height above a datum plane of a column of water. In a groundwater system, it is composed of elevation head, pressure head, and velocity head.

TRANSCURRENT FAULT - A large scale strike - slip fault in which the fault surface is steeply inclined.

UNCONSOLIDATED - (a) Sediment that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth. (b) Soil material that is in a loosely aggregated form.

UNDULATING [geomorph] - (a) A landform having a wavy outline or form. (b) A rippling or scalloped land surface, having a wavy outline or appearance.

VALLEY - Any low-lying land bordered by higher ground, especially an elongate, relatively large, gently sloping depression of the earth's surface, commonly situated between two mountains or between ranges of hills and mountains, and often containing a stream or river with an outlet. It is usually developed by stream or river erosion, but can be formed by faulting.

WATER TABLE - The level in the saturated zone at which the pressure is equal to the atmospheric pressure.

WETLANDS - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

Appendix A

Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

- 1) Department of Water Resources
P.O. Box 6598
Los Angeles, CA 90055
(213) 620-4203

- 2) Department of Water & Power
City of Los Angeles
Upper Los Angeles River Area Watermaster
P. O. Box 111, Room 1455
Los Angeles, CA 90051
Melvin L. Blevins, P.E.
(213) 481-6177
Cecilia K. Trehuba, P.E.
(213) 481-6194

- 3) State of California
Department of Fish and Game
P.O. Box 944290
Sacramento, CA 94244-2090
(916) 324-3812

- 4) State of California
Resources Agency
Department of Conservation
California Division of Mines and Geology
P.O. Box 2980
Sacramento, CA 95812
Karen Fleming
(916) 324-3812

- 5) State of California
Water Resources Division
849 South Broadway
Los Angeles, CA 90014
(213) 620-4107

- 6) Timely Discount Topos Inc.
9769 West 119th Drive, Suite 9
Broomfield, Colorado 80020
(303) 469-5022

OUTSIDE AGENCY CONTACT LIST (continued)

- 7) **United States Department of Commerce
National Oceanic and Atmospheric Administration
Environmental Data and Information Service
National Climatic Center
Asheville, NC 28801
(704) 259-0871**

- 8) **United States Geological Survey
Books and Open File Reports Section
P.O. Box 25425
Denver Federal Center, Building 810
Denver, CO 80225**

- 9) **United States Geological Survey
300 North Los Angeles Street
Los Angeles, CA 90012
Dianne Noserale
(213) 894-2850**



Appendix B

**USAF Hazard Assessment
Rating Methodology**

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The DoD has developed a comprehensive program to identify, evaluate, and control hazardous waste disposal practices associated with past waste disposal techniques 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, December 11, 1981).

Accordingly, the USAF has sought to establish a system to set priorities for taking further action at sites based upon information gathered during the PA phase of the IRP.

PURPOSE

The purpose of the site rating model is to assign a ranking to each site where there is suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-up site investigations.

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

DESCRIPTION OF THE MODEL

Like the other hazardous waste site ranking models, the USAF'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 needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment 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 worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors presented in this appendix. The site rating form and the rating factor guidelines are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: (1) possible receptors of the contamination, (2) the waste and its characteristics, (3) the potential pathways for contaminant migration, and (4) any effort that was made to contain the waste resulting from a spill.

The receptors category rating is based on four rating factors: (1) the potential for human exposure to the site, (2) the potential for human ingestion of contaminants should underlying aquifers be polluted, (3) the current and anticipated use of the surrounding area, and (4) the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 X factor subtotal/maximum score subtotal).

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 solids are reduced.

The pathways category rating is based on evidence of contaminant migration along one of three pathways: surface water migration, flooding, and groundwater migration. 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 the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment are not reduced. 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 score for the other three categories.

HAZARD ASSESSMENT RATING 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 1000 ft. of site		4		12
B. Distance to nearest well		10		30
C. Land use-zoning within 1-mile radius		3		9
D. Distance to installation boundary		6		18
E. Critical environments within 1-mile radius of site		10		30
F. Water quality of nearest surface water body		6		18
G. Groundwater use of uppermost aquifer		9		27
H. Population served by surface water supply within 3 miles downstream of site		6		18
I. Population served by groundwater supply within 3 miles of site		6		18

Subtotals _____ 180

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 _____ = _____

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
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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 groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		24

Subtotals _____ 108

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

2. Flooding

		1		3
--	--	---	--	---

Subscore (100 x factor score/3)

3. Groundwater migration

Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24

Subtotals _____ 114

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

C. Highest pathway score

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 _____ =

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels			Multiplier
	0	1	2	
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. Groundwater 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	1-50	51-1,000 Greater than 1,000	6

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)
- S = Suspected confidence level
- 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 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

Rating Factor's	Rating Scale Levels		
	0	2	3
Toxicity	Sax's Level 0	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below 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

11. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
	L	C	H
80	H	C	H
70	L	S	H
	S	C	H
60	H	C	H
	L	S	H
50	L	C	L
	H	S	H
	S	C	H
	S	S	H
	H	S	H
40	H	C	L
	L	S	L
30	S	C	L
	H	S	L
	S	S	H
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., MCH + SCH = LCH if the total quantity is greater than 20 tons.

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

8. Persistence Multiplier for Point Rating

Multiply Point Rating Persistence Criteria	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

Multiply Point Total from Parts A and B by the following

Physical state	Multiply Point Total from Parts A and B by the following
Liquid	1.0
Sludge	0.75
Solid	0.50

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, groundwater, 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 Factors	0			1			2			3			Multiplier
	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	Greater than +20 inches	Severe	Greater than 50% clay (<10 ⁻⁶ cm/sec)	>3.0 inches	>50	100	Floods annually	Bottom of site located below mean groundwater level	
Distance to nearest surface water (includes drainage ditches and storm sewers)	Less than 10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	None	Slight	30% to 50% clay (10 ⁻⁴ to 10 ⁻⁶ cm/sec)	>3.0 inches	0-5	36-49	In 10-year floodplain	Bottom of site frequently submerged	Moderate risk
Net precipitation	None	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	None	Slight	30% to 50% clay (10 ⁻⁴ to 10 ⁻⁶ cm/sec)	>3.0 inches	0	60	In 100-year floodplain	Bottom of site occasionally submerged level	Low risk
Surface erosion	None	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	None	Slight	30% to 50% clay (10 ⁻⁴ to 10 ⁻⁶ cm/sec)	>3.0 inches	0	60	In 100-year floodplain	Bottom of site occasionally submerged level	Low risk
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)	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)	>3.0 inches	0	60	In 100-year floodplain	Bottom of site occasionally submerged level	Low risk
Rainfall intensity based on 1-year, 24 hour rainfall (thunderstorms)	<1.0 inch	1.0 to 2.0 inches	2.1 to 3.0 inches	>3.0 inches	0-5	6-35	36-49	>3.0 inches	0	60	In 100-year floodplain	Bottom of site occasionally submerged level	Low risk

B-2 Potential for Flooding

Floodplain Beyond 100-year floodplain In 100-year floodplain In 10-year floodplain Floods annually 1

B-3 Potential for Groundwater Contamination

Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than 10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	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 groundwater level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean groundwater level	8
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

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):

<u>Waste Management Practices</u>	<u>Multiplier</u>
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

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

Surface Impoundments:

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

Spills:

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

Fire Protection/Training Areas:

- 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 C

**Site Hazard Assessment
Rating Forms and Factor
Rating Criteria**

HAZARD ASSESSMENT RATING FORM

NAME OF SITE Site No. 1 - Area Behind Vehicle Maintenance
 LOCATION West of Buildings 3 and 14.
 DATE OF OPERATION OR OCCURRENCE 1950s thru the early 1980s
 OWNER/OPERATOR Ontario Air National Guard
 COMMENTS/DESCRIPTION Waste fuels, oils, solvents, etc. were periodically disposed at this site.
 SITE RATED BY Science & Technology, Inc.

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1-mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1-mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18

Subtotals 102 180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 57

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) | S |
| 2. Confidence level (C = confirmed, S = suspected) | C |
| 3. Hazard rating (H = high, M = medium, L = low) | H |

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor subscore A x Persistence Factor = Subscore B

$$\frac{60}{\quad} \times \frac{0.8}{\quad} = \frac{48}{\quad}$$

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

$$\frac{48}{\quad} \times \frac{1.0}{\quad} = \frac{48}{\quad}$$

III. PATHWAYS

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

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

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	2	8	16	24
Surface permeability	0	6	0	18
Rainfall intensity	1	8	8	24

Subtotals 48 108

Subscore (100 x factor score subtotal/maximum score subtotal) 44

2. Flooding

	1	1	1	3
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Subscore (100 x factor score/3)

3. Groundwater migration

33

Depth to groundwater	1	8	8	24
Net precipitation	0	6	0	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24

Subtotals 40 114

Subscore (100 x factor score subtotal/maximum score subtotal) 35

C. Highest pathway score

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

Pathways subscore 44

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	57
Waste Characteristics	48
Pathways	44

Total 149 divided by 3 = 50

Gross Total Score

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

50 x 1.0 = 50

**Ontario Air National Guard Station
Los Angeles, California**

**USAF Hazard Assessment Rating Methodology
Factor Rating Criteria**

The following is an explanation of the HARM factor rating criteria for the potential site.

I. Receptors

A. Population Within 1000 feet of Site.

Factor Rating 3.

The population within 1000 feet of Site No. 1 is over 100. On UTA weekends, the station population is approximately 161 persons.

B. Distance to Nearest Water Well.

Factor Rating 3.

There are several water wells within 3000 feet of Station property.

C. Land Use-Zoning (within 1-mile radius).

Factor Rating 2.

The area within a 1-mile radius of the Station is zoned commercial and agricultural.

D. Distance to Installation Boundary.

Factor Rating 3.

Site No. 1 is approximately 330 feet from the Station's east boundary fenceline.

E. Critical Environments (within 1-mile radius).

Factor Rating 0.

There are no endangered or threatened species located within a 1-mile radius of the Station.

F. Water Quality/Use Designation of Nearest Surface Water Body.

Factor Rating 0.

Cucamonga Creek is primarily used for agricultural or industrial purposes.

G. Groundwater Use of Uppermost Aquifer.

Factor Rating 2.

The groundwater is used for drinking water; however, municipal water is available in Ontario, CA.

H. Population Served by Surface Water Supplies Within 3 miles Downstream of Site.

Factor Rating 0.

The local population is supplied with water from aquifers.

I. Population Served by Aquifer Supplies Within 3 miles Downstream of Site.

Factor Rating 3.

Over 1000 persons within a 3-mile radius of the Station are served by aquifer supplies.

II. Waste Characteristics

A-1: Hazardous Waste Quantity - Factor Rating S (Small).
A small quantity, less than 20 drums, of combined wastes is estimated to have been disposed of at this site.

A-2: Confidence Level - Factor Rating C (Confirmed).
Several interviewees reported that wastes were periodically spilled or poured out at this potential site.

A-3: Hazard Rating - Factor Rating H (High).
A high hazard rating was assigned because of the high toxicity of the solvents disposed of at this site.

B. Persistence Multiplier for Point Rating.

Site No. 1 was assigned a persistence multiplier of 0.8 based on the presence of waste petroleum products such as engine oil, hydraulic oil, and fuels. These wastes correspond primarily to the HARM category of "Straight Chain Hydrocarbons."

C. Physical State Multiplier.

A physical state multiplier of 1.0 was applied to the site because the substances released were liquids.

III. Pathways Category

A. Evidence of Contamination.

Site No. 1 was given a score of 0 (no evidence) because there was no noticeable vegetation stress or soil staining, and this potential site is not greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination.

- o Distance to Nearest Surface Water: Factor Rating 3.
Site No. 1 is located within 500 feet of drainage ditches and storm sewers.
- o Net Precipitation: Factor Rating 0.
The average annual net precipitation at the Station is approximately -43 inches.
- o Surface Erosion: Factor Rating 2.
There is moderate erosion of soil at Site No. 1.
- o Surface Permeability: Factor Rating 0.
The permeability rate of the surface soil at Site No. 1 exceeds 10^{-2} cm/sec.
- o Rainfall Intensity Based on 1-year, 24-hour Rainfall: Factor Rating 1.
The rainfall intensity at the Station is approximately 1.5 inches.

B-2 Potential for Flooding.

Factor Rating 1.

The Station is located within the 100-year flood plain of Cucamonga Creek.

B-3 Potential for Groundwater Contamination.

- o Depth to Groundwater: Factor Rating 1.
The depth to groundwater at Site No. 1 is 50 to 500 feet.
- o Net Precipitation: Factor Rating 0.
See B-1.
- o Soil Permeability: Factor Rating 3.
At Site No. 1, the permeability rate of the soil exceeds 10^{-2} cm/sec.

- o Subsurface Flows: Factor Rating 0.
The bottom of Site No. 1 is greater than 5 feet above high groundwater level.
- o Direct Access to Groundwater: Factor Rating 1.
Direct access to groundwater through faults, fractures, faulty well casings, subsidence, etc., is low risk for Site No. 1.

IV. Waste Management Practices Factor

A multiplier of 1.0 is applied to this site because it has no form of containment.