N00216.AR.000001
NAS CORPUS CHRISTI
5090.3a

FEBRUARY 1984

INITIAL ASSESSMENT STUDY OF NAVAL AIR STATION CORPUS CHRISTI, TEXAS

NEESA 13-039

NAVAL ENERGY AND ENVIRONMENTAL
SUPPORT ACTIVITY
Port Hueneme, California 93043

RELEASE OF THIS DOCUMENT REQUIRES PRIOR NOTIFICATION
OF THE CHIEF OFFICIAL OF THE STUDIED ACTIVITY

DISTRIBUTION:
CNO (OP-45)
CHNAVMAT (04H)
CNET (N10B4)
COMNAVFACENGCOM (112)
NAVENVIRHLTHCEN
CNATRA (N6)
CO SOUTHNAVFACENGCOM (114)
CO NAS CORPUS CHRISTI (000) (PWD 183)

INITIAL ASSESSMENT STUDY

NAVAL AIR STATION, CORPUS CHRISTI, TEXAS

UIC: 00216

Prepared by:

Harmon Engineering & Testing
1550 Pumphrey Ave.
Auburn, AL 36830

Contract No. N62474-82-C-C358

Initial Assessment Study Team Members

Bruce Ferguson, Project Manager/Field Team Leader, Chemist
Mark Shearon, Project Manager/Report Team Leader, Biologist
Steve Jones, Biologist
Cameron McDonald, Chemist/Health Physicist
Robert Cook, Hydrogeologist
Ronald Thompson, Civil Engineer
Jim Johnson, Document Coordinator

Naval Energy and Environmental Support Activity
Contract Coordinator
Patricia A. Gandy, P.E.

Prepared for:

NAVY ASSESSMENT AND CONTROL
OF INSTALLATION POLLUTANTS DEPARTMENT
Naval Energy and Environmental Support Activity
Port Hueneme, California 93043

EXECUTIVE SUMMARY

This report presents the results of an Initial Assessment Study (IAS) conducted for the Naval Air Station (NAS) Corpus Christi, Texas, including Naval Auxiliary Landing Field (NALF) Cabaniss, and NALF Waldron. The purpose of an IAS is to identify and assess sites posing a potential threat to human health or to the environment due to contamination from past hazardous materials operations.

NAS Corpus Christi is located within the western section of the Gulf of Mexico Coastal Plain Province adjacent to the Gulf of Mexico. Salinity of the shallow water table in the area precludes its use for potable water. Also, as NAS Corpus Christi is located on the gulf, no down stream potable use of surface water exists. Migration of contaminants from NAS Corpus Christi would present an environmental hazard to marine life in Corpus Christi Bay and Cayo del Oso however.

Based on information from historical records, aerial photographs, field inspections, and personnel interviews, a total of 15 potentially contaminated sites were identified at NAS Corpus Christi, NALF Cabaniss, and NALF Waldron. Each site was evaluated with regard to contamination characteristics, migration pathways, and pollutant receptors.

The study concludes that while none of the sites pose an immediate threat to human health or to the environment, two warrant further investigation under the Navy Assessment and Control of Installations Pollutants (NACIP) Program, to assess potential long-term impacts. One additional site may also be recommended for confirmation depending on results of confirmation at the two recommended sites. A confirmation study, involving actual sampling and monitoring of the two sites, is recommended to confirm or deny the existence of the suspected contamination and to quantify the extent of any problems which may exist. The two sites recommended for confirmation are listed below in order of priority:

- CCAD Liquid Waste Disposal Area, Site 3
- DPDO Landfill, Site 1

The results of the confirmation study will be used to evaluate the necessity of conducting mitigating actions or clean up operations.

NEPSS

Naval
Environmental
Protection
Support
Service

FOREWORD

The Department of the Navy developed the Navy Assessment and Control of Installation Pollutants (NACIP) Program to identify and control environmental contamination from past use and disposal of hazardous substances at Navy and Marine Corps installations. The NACIP Program is part of the Department of Defense Installation Restoration Program, and is similar to the Environmental Protection Agency's "Superfund" Program authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

In the first phase of the NACIP Program, a team of engineers and scientists conducts an Initial Assessment Study (IAS). The IAS team collects and evaluates evidence of contamination that may pose a potential threat to human health or the environment. The IAS includes a review of archival and activity records, interviews with activity personnel, and an on-site survey of the activity. This report documents the findings of an IAS at Naval Air Station (NAS) Corpus Christi, Texas.

Further confirmation studies under the NACIP Program were recommended at two areas at NAS Corpus Christi, Texas. One additional site (Site 9, North Gate Disposal Area) may also be recommended for confirmation, depending on results of confirmation at Site 1, DPDO Landfill, and Site 3, CCAD Liquid Waste Disposal Area. Site 9 has a lesser potential for residual contamination than sites 1 or 3. Southern Division, Naval Facilities Engineering Command will assist NAS Corpus Christi in implementing those recommendations.

Questions regarding this report should be referred to the Naval Energy and Environmental Support Activity, 112N, at AUTOVON 360-3351, FTS 799-3351, or commercial (805) 982-3351. Questions concerning confirmation work or other follow-on efforts should be referred to Southern Division at AUTOVON 794-5510, FTS 679-5510, or commercial (805) 743-5510.

W. L. Nelson

W. L. NELSON, LCDR, CEC, USN
Environmental Officer
Naval Energy and Environmental Support Activity

ACKNOWLEDGEMENTS

The Initial Assessment Study (IAS) at Naval Air Station Corpus Christi, Texas, was completed thanks to the support, assistance, and cooperation of numerous Navy personnel. In addition to our appreciation to the entire naval organization, the IAS team expresses its gratitude to Patricia Gandy, P.E.--Naval Energy and Environmental Support Activity, and Dick Bozung--Southern Division, Naval Facilities Engineering Command.

CONTENTS

			Page
		Executive Summary	i
		Foreword	ii
		Acknowledgements	iii
CHAPTER	1.	INTRODUCTION	1-1
	1.1	Program Background	1-1
	1.1.1	DOD Program	1-1
	1.1.2	Navy Program	1-1
	1.2	Authority	1-1
	1.3	Scope	1-1
	1.3.1	Past Operations	1-1
	1.3.2	Results	1-1
	1.4	Initial Assessment Study	1-2
	1.4.1	Record Search	1-2
	1.4.2	On-Site Survey	1-2
	1.4.3	Confirmation Study Ranking System	1-2
	1.4.4	Site Ranking	1-2
	1.4.5	Confirmation Study Criteria	1-2
	1.5	Confirmation Study	1-3
	1.6	IAS Report Contents	1-3
CHAPTER	2.	SIGNIFICANT FINDINGS AND CONCLUSIONS	2-1
	2.1	Introduction	2-1
	2.2	Migration Potential	2-1
	2.3	Sites Recommended for Confirmation	2-3
	2.3.1	Site 1, DPDO Landfill	2-3
	2.3.2	Site 3, CCAD Liquid Waste Disposal Area	2-8
	2.4	Sites Not Recommended For Confirmation Study	2-8
	2.4.1	Site 2, NAS Corpus Christi Landfill	2-8
	2.4.2	Site 4, Aircraft Fire Training Area	2-8
	2.4.3	Site 5, Runway 31 Landfill	2-8
	2.4.4	Site 6, Patrol Road East Landfill	2-8
	2.4.5	Site 7, Patrol Road West Landfill	2-11
	2.4.6	Site 8, Cayo Del Oso Disposal Site	2-11
	2.4.7	Site 9, North Gate Disposal Area	2-11
	2.4.8	Site 10, Radioactive Waste Disposal Area	2-11
	2.4.9	Site 11, Cabaniss Sanitary Landfill	2-11
	2.4.10	Site 12, Cabaniss Hurricane Celia Rubble Area	2-12
	2.4.11	Sites 13, 14, and 15 Waldron Rubble Disposal Areas	2-12
CHAPTER	3.	RECOMMENDATIONS	3-1
	3.1	Introduction	3-1
	3.2	Confirmation Studies	3-1
	3.2.1	Site 1, DPDO Landfill	3-1
	3.2.2	Site 3, CCAD Liquid Waste Disposal Area	3-1
	3.3	Additional Recommendations	3-4

CONTENTS (Continued)

			Page
	3.3.1	Site 9, Gate Disposal Area	3-4
	3.3.2	Future Development	3-4
CHAPTER	4.	BACKGROUND	4-1
	4.1	General	4-1
	4.1.1	Location and Organization	4-1
	4.1.2	Host/Tenant Relationships	4-1
	4.1.3	Leases and Agreements	4-4
	4.2	History	4-5
	4.3	Physical Features	4-5
	4.3.1	Climatology	4-5
	4.3.2	Topography	4-9
	4.3.3	Geology	4-9
	4.3.4	Soils	4-13
	4.3.5	Hydrology and Migration Potential	4-15
	4.3.6	Hydrogeology	4-20
	4.4	Biological Features	4-23
	4.4.1	Ecology, Terrestrial and Aquatic Flora and Fauna	4-23
	4.4.2	Rare, Threatened and Endangered Species, Critical Habitats	4-25
	4.4.3	Impacts on Habitats	4-25
	4.5	Water Quality	4-25
	4.5.1	Surface Water	4-25
	4.5.2	Ground Water	4-26
	4.6	Water Supply	4-26
	4.7	Adjacent Land Use	4-26
	4.7.1	NAS Corpus Christi	4-26
	4.7.2	NALF Waldron	4-27
	4.7.3	NALF Cabaniss	4-27
	4.8	Legal Action	4-27
CHAPTER	5.	WASTE GENERATION	5-1
	5.1	General	5-1
	5.2	Public Works Department (PWD)	5-1
	5.2.1	Water Treatment Plants	5-1
	5.2.2	Boiler Plants	5-1
	5.2.3	Electrical Shop	5-2
	5.2.4	Air Conditioning Shop	5-3
	5.2.5	Maintenance Paint Shop	5-3
	5.2.6	Woodworking Shop	5-3
	5.2.7	Metal Trades Shop	5-3
	5.2.8	Pipe Shop	5-3
	5.2.9	Transportation Paint and Body Shop	5-3
	5.2.10	Garage	5-3
	5.3	Operations Maintenance Division (OMD)	5-4
	5.4	Operations Fire Department	5-4
	5.5	Aircraft Intermediate Maintenance Department (AIMD)	5-4

CONTENTS (Continued)

			Page
	5.6	Beechcraft Aerospace Services Incorporated (BASI)	5-4
	5.7	Corpus Christi Army Depot (CCAD)	5-5
	5.8	Naval Regional Medical Center	5-6
	5.8.1	Medical	5-6
	5.8.2	Dental	5-7
	5.9	Coast Guard Air Station	5-8
	5.10	NALF Cabaniss	5-8
	5.10.1	Cabaniss Abandoned Sewage Treatment Plant	5-8
	5.10.2	Aircraft De-arming Area	5-9
CHAPTER	6.	MATERIAL HANDLING: STORAGE AND TRANSPORTATION	6-1
	6.1	General	6-1
	6.2	Material Storage: Defense Property Disposal Office (DPDO)	6-1
	6.3	Chemical and Hazardous Material Storage	6-2
	6.4	Petroleum, Oils and Lubricants (POL)	6-2
	6.5	Pesticide Storage	6-3
	6.6	Polychlorinated Biphenyl (PCB) Storage	6-3
	6.7	Storage Lots and Scrap Yards	6-3
	6.8	Ordnance	6-3
CHAPTER	7.	WASTE PROCESSING	7-1
	7.1	Introduction	7-1
	7.2	Sanitary Sewer Treatment Plant	7-1
	7.3	Industrial Waste Treatment Plants	7-1
	7.3.1	Industrial Waste Water Pretreatment Plant (IWPP)	7-1
	7.3.2	Industrial Waste Water Treatment Plant (IWTP)	7-4
CHAPTER	8.	DISPOSAL SITES AND POTENTIALLY CONTAMINATED AREAS	8-1
	8.1	Introduction	8-1
	8.2	Site 1, Defense Property Disposal Office (DPDO) Landfill	8-1
	8.3	Site 2, NAS Corpus Christi Landfill	8-5
	8.4	Site 3, CCAD Liquid Waste Disposal Area	8-5
	8.5	Site 4, Aircraft Fire Training Area	8-5
	8.6	Site 5, Runway 31 Landfill	8-7
	8.7	Site 6, Patrol Road East Landfill	8-7
	8.8	Site 7, Patrol Road West Landfill	8-7
	8.9	Site 8, Cayo Del Oso Disposal Site	8-7
	8.10	Site 9, North Gate Disposal Area	8-7
	8.11	Site 10, Radioactive Waste Disposal Area	8-7

CONTENTS (Continued)

		Page
8.12	Site 11, Cabaniss Sanitary Landfill	8-8
8.13	Site 12, Cabaniss Hurricane Celia Rubble Area	8-8
8.14	Sites 13, 14, 15, Waldron Rubble Disopsal Areas	8-8
References		R-1
Appendix A	Agencies Contacted During Study	A-1
Appendix B	CCAD Typical Annual Chemical Usage	B-1
Appendix C	PCB Transformer Locations	C-1

FIGURES

Figure No.	Title	Page
2-1	Location Map	2-2
2-2	NAS Corpus Christi Disposal Sites	2-4
2-3	NALF Cabaniss Disposal Sites	2-5
2-4	NALF Waldron Rubble Disposal Sites	2-6
3-1	Proposed Monitoring Well Locations for Sites 1 and 3.	3-3
4-1	Location Map	4-2
4-2	NAS Corpus Christi Facility Location Map	4-3
4-3	NAS Corpus Christi Lease Tracts	4-6
4-4	NALF Cabaniss Lease Tracts	4-7
4-5	NALF Waldron Lease Tracts	4-8
4-6	Topographic Map	4-10
4-7	Stratigraphic Units and Generalized Cross Section	4-12
4-8	General Soil Map NAS Corpus Christi	4-14
4-9	Soil Map for NALF Waldron	4-16
4-10	Soils Map for NALF Cabaniss	4-17
4-11	Flood Map for NAS Corpus Christi	4-18
4-12	Flood Map for NALF Cabannis	4-19
4-13	Flow Net of Water Table Aquifer	4-21
4-14	Fresh to Slightly Saline Artesian Ground Water Conditions	4-22
4-15	Adjacent Land Use Map NAS Corpus Christi	4-28
4-16	Adjacent Land Use Map NALF Waldron	4-29
4-17	Adjacent Land Use Map NALF Cabaniss	4-30
7-1	Sanitary Sewer Treatment Plant	7-2
7-2	Industrial Waste Water Pretreatment Plant	7-3
7-3	Industrial Waste Water Treatment Plant	7-5
8-1	NAS Corpus Christi Disposal Sites	8-4
8-2	Site 3, CCAD Liquid Waste Disposal Area	8-6
8-3	NALF Cabaniss Disposal Sites	8-9
8-4	NALF Waldron Rubble Disposal Sites	8-10

TABLES

Table No.	Title	Page
2-1	Sites Recommended for Confirmation at NAS Corpus Christi	2-7
2-2	Non-confirmation Sites at NAS Corpus Christi	2-9
3-1	Summary of Confirmation Study Recommendations NAS Corpus Christi	3-2
5-1	Satellite Boilers	5-2
6-1	POL Spills at NAS Corpus Christi	6-2
6-2	Fuel Storage Facilities	6-2
6-3	Pest Control Chemicals	6-4
6-4	Ordnance Storage Facilities	6-5
8-1	Disposal Sites Investigated at NAS Corpus Christi	8-2

CHAPTER 1. INTRODUCTION

1.1 PROGRAM BACKGROUND. Past hazardous waste disposal methods, although acceptable at the time, have often caused unexpected long-term problems through release of hazardous pollutants into the soil and ground water. In response to increasing national concern regarding these problems, the U.S. Congress directed the Environmental Protection Agency (EPA) to develop a comprehensive national program to manage disposal sites. The program is outlined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of December 1980.

1.1.1 DOD Program. Department of Defense (DOD) efforts in this area preceded the nationwide CERCLA program. In 1975, the U.S. Army developed for DOD a pilot program to investigate past disposal sites at military installations. DOD defined the program as the Installation Restoration Program in 1980, and instructed the services to comply with program guidelines.

1.1.2 Navy Program. The Navy manages its part of the program, the Navy Assessment and Control of Installation Pollutants (NACIP), in three phases. Phase one, the Initial Assessment Study (IAS), identifies potential threats to human health or to the environment caused by past hazardous substance storage, handling, or disposal practices at naval activities. Phase two, the Confirmation Study, analyzes contaminants present at sites of concern and determines their migration paths. Phase three, Remedial Action, provides the required corrective measures to mitigate or eliminate confirmed problems.

1.2 AUTHORITY. The Chief of Naval Operations initiated the NACIP Program in OPNAVNOTE 6240 of 11 September 1980, superseded by OPNAVINST 5090.1. Commander, Naval Facilities Engineering Command (COMNAVFACENGCOM) manages the program within the existing structure of the Naval Environmental Protection Support Service (NEPSS), which is administered by the Naval Energy and Environmental Support Activity (NAVENENVSA). NAVENENVSA conducts the program's first phase, the IAS, in coordination with COMNAVFACENGCOM Engineering Field Divisions (EFDs). Activities are selected for an Initial Assessment Study by the Chief of Naval Operations (CNO), based on the recommendations by COMNAVFACENGCOM, the regional EFDs, and NAVENENVSA. Approval of the Naval Air Station (NAS) Corpus Christi, Texas for an IAS is contained in CNO letter serial 451/391407 of 31 March 1982.

1.3 SCOPE.

1.3.1 Past Operations. The NACIP Program focuses attention on past hazardous substance storage, use, and disposal practices on Navy property. Current practices are regularly surveyed for conformity to state and federal regulations and, therefore, are not included in the scope of the NACIP Program. The IAS addresses operating non-hazardous disposal and storage areas, only if they were hazardous waste disposal or storage areas in the past. Current operations are investigated solely to determine types and quantities of chemicals used, and disposal methods practiced.

1.3.2 Results. An IAS recommends, if necessary, mitigating actions to be performed by the activity or EFD, or any sampling and monitoring (confirmation studies) to be administered by the EFD under the NACIP Program. Based on

these recommendations, COMNAVFACENGCOM schedules confirmation studies for those sites which have been determined by scientific and engineering judgment to be potential hazards to human health or to the environment.

1.4 INITIAL ASSESSMENT STUDY.

1.4.1 Record Search. The IAS begins with an investigation of activity records followed by record searches at various government agencies including EFDs, national and regional archives and record centers, and U.S. Geological Survey offices. In this integral step, study team members review records to assimilate information about the activity's past missions, industrial processes, waste disposal records, and known environment contamination. Typical examples of records include activity master plans and histories, environmental impact statements, cadastral records, and aerial photographs. Appendix A lists the agencies contacted during this study.

1.4.2 On-Site Survey. After the record search, the study team conducts an on-site survey to complete documentation of past operating and disposal operations and to identify potentially contaminated areas. With the assistance of an activity point-of-contact, the team inspects the activity during ground and aerial tours and interviews long-term employees and retirees. The on-site survey for NAS Corpus Christi was conducted during the period of 18-22 April 1983 and the information in this report is current as of those dates.

Information obtained from interviews is verified by data from other sources or corroborating interviews before inclusion in the report. If information for certain sites is conflicting or inadequate, the team may collect samples for clarification.

1.4.3 Confirmation Study Ranking System. With information collected during the study, team members evaluate each site for its potential hazard to human health or to the environment. A two-step Confirmation Study Ranking System (CSRS), developed at NAVENENVSA, is used to systematically evaluate the relative severity of potential problems. When using the CSRS, as the first step, a flowchart, based on type of waste, type of containment, and hydrogeology, eliminates innocuous sites from further consideration. If the flowchart indicates a site has potential contamination, a rating model is applied. The rating model assigns a numerical score from 0 to 100 to each site. The score reflects the characteristics of the waste, the potential migration pathways from the site, and possible contaminant receptors on and off the activity.

1.4.4 Site Ranking. After rating a site, engineering judgment is applied to determine the need for a confirmation study or for immediate mitigating action. At sites recommended for further work, CSRS scores are used to develop a priority list for scheduling projects. For a more detailed description, refer to NEESA 20.2-042, NAVENENVSA Confirmation Study Ranking System.

1.4.5 Confirmation Study Criteria. A Confirmation Study is recommended for sites at which (1) sufficient evidence exists to indicate the presence of contamination and (2) the contamination poses a potential threat to human health or to the environment.

1.5 CONFIRMATION STUDY. The EFD conducts the confirmation study which in itself has two phases--verification and characterization. In the verification phase, short-term analytical testing and monitoring determines whether specific toxic and hazardous materials, identified in the IAS are present in concentrations considered to be hazardous. If required, a characterization phase, using longer-term testing and monitoring, provides more detailed information concerning the horizontal and vertical distribution of migrating contamination from sites, as well as site hydrogeology. If sites require Remedial Actions or additional monitoring programs, the confimation study recommendations include the necessary planning information for the work such as design parameters.

1.6 IAS REPORT CONTENTS. In this report, the significant findings and conclusions from the IAS are presented in Chapter 2. Recommendations are presented in Chapter 3. Chapter 4 describes general activity information, history, physical features, and biology. Chapters 5 through 8 trace the use of chemicals and hazardous materials, from storage and transfer, through manufacturing and operations, to waste processing and disposal. Chapter 8 provides detailed documentation to support the findings and conclusions in Chapters 2 and 3.

CHAPTER 2. SIGNIFICANT FINDINGS AND CONCLUSIONS

2.1 INTRODUCTION. This chapter summarizes the significant findings and conclusions of the Initial Assessment Study (IAS) at Naval Air Station (NAS) Corpus Christi concerning potential contamination from past waste disposal practices. Hydrogeology is first discussed with regard to those aspects most relevant to potential contaminant migration pathways and to receptors of contaminants. Sites recommended for confirmation work are next discussed summarizing those findings which are most significant with respect to the presence of toxic or hazardous contaminants. Two sites (1 and 3) are recommended for confirmation work. One additional site (9) may also be recommended for confirmation study depending on results of confirmation work conducted at sites 1 and 3. Lastly, sites identified but not recommended for confirmation work are discussed.

2.2 MIGRATION POTENTIAL. NAS Corpus Christi is located within the western section of the Gulf of Mexico Coastal Plain Province (Figure 2-1). The region is characterized by a gently sloping coastal plain surface. Maximum relief of the Corpus Christi area is 80 feet with slopes toward the gulf of about five and six feet per mile. Mean elevation averages +15 to +22 feet mean sea level (MSL).

Stratigraphic units include the Goliand Sand, Willis Formation, Lissie Formation, Montgomery Formation, and the Beaumount Formation. The subject area is all underlain by the Beaumont Formation, typically less than 60 feet thick.

Soils at NAS Corpus Christi and Naval Auxiliary Landing Field (NALF) Waldron are generally characterized as nearly level, well-drained, sandy, with a very shallow water table. United States Department of Agriculture (USDA) has mapped three soil units, Galveston-Mustang, Made Land, and Fill. Generally, they may be described as having a surface layer less than 10 inches thick, underlain by a three to four foot thick layer of fine-grained sand, and a parent material of saturated fine white sand at depths of four to ten feet.

These soils are typically moist in their lower layers. Permeability ranges from five to eight inches per hour for upper Galveston series soils to three to four inches per hour at greater depths. Mustang series soils reflect permeability ranging from two inches per hour to 0.0 inches per hour.

NALF Cabaniss surface material is characterized by clay and mud of low permeability and poor drainage.

Surface runoff from NAS Corpus Christi is semiradial, draining to the north and northeast into Corpus Christi Bay and to the west into Cayo del Oso. Minor drainages around NALF Waldron form a radial pattern to Cayo del Oso and Laguna Madre. NALF Cabaniss runoff is south-southwesterly into Oso Creek, ultimately to Cayo del Oso and Corpus Christi Bay.

Important units of the Chicot Aquifer system, Beaumont and Lissie formations, lie beneath the Corpus Christi area from surface to 1,000 feet deep. At near surface depths (less than 250 feet) this system is considered to be a water table aquifer; at greater depths, it is artesian. Deeper still is the artesian Evangeline Aquifer at about 2,800 feet.

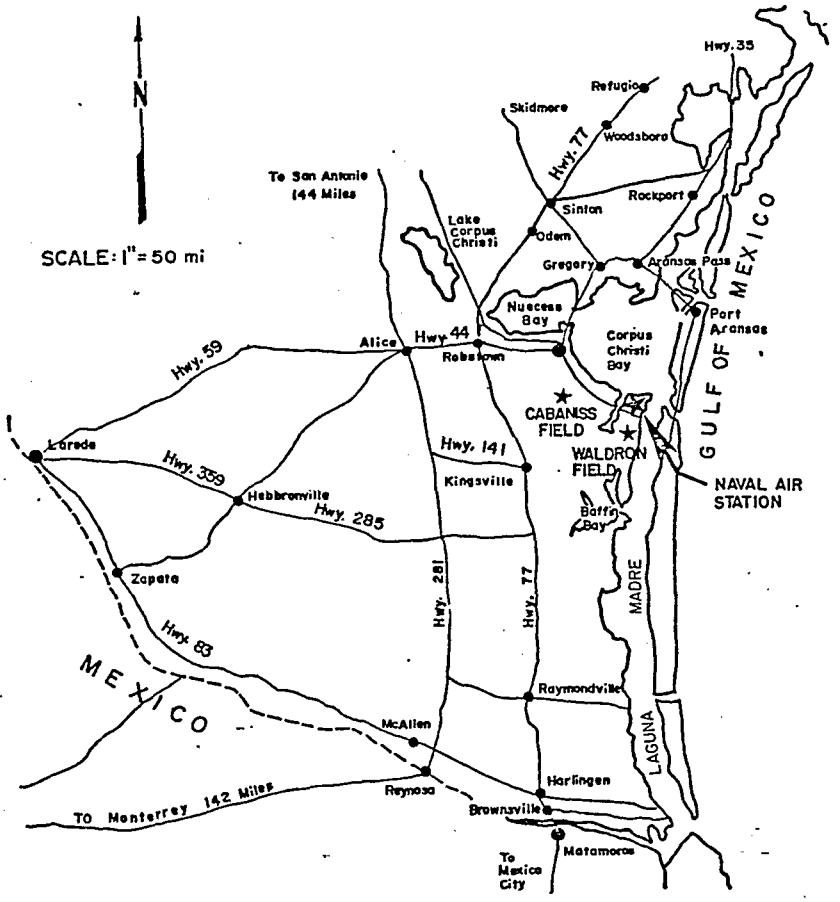


FIGURE 2-1
LOCATION MAP

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

Water table aquifers in the vicinity of NAS Corpus Christi and NALF Waldron are limited to sand-dominated material overlying clay-dominated material which has low permeability rates. Impermeable materials underlie NALF Cabaniss creating runoff rather than recharge. The regional flow direction of water table aquifers is to the northeast toward Corpus Christi Bay. Localized flow directions may be influenced by local topography (e.g., west toward Cayo del Oso from NAS Corpus Christi). In short, migration through water table aquifers is limited to shallow soils and surficial materials at NAS Corpus Christi and NALF Waldron and would rapidly reach Corpus Christi Bay. Migration through shallow geologic and soil units at NALF Cabaniss would be unlikely. Migration would be limited to runoff.

Artesian aquifers underlying the NAS Corpus Christi sites are moderately to highly saline, and therefore, have little or no potential use. Potable water for the subject areas is supplied from Lake Corpus Christi located 40 miles to the northwest.

The criteria developed in Chapter 4, only briefly summarized here, support the conclusions that contaminants could migrate to Corpus Christi Bay, Cayo del Oso, Laguna Madre and/or Oso Creek, but are unlikely to endanger potable ground water.

Specifically, potential for contaminant migration at each site is as follows:

- NAS Corpus Christi--shallow, subsurface movement into Cayo del Oso and Corpus Christi Bay.
- NALF Waldron--shallow, subsurface movement into Cayo del Oso and Languna Madre.
- NALF Cabaniss--surface movement into Oso Creek with no subsurface migration likely.

In addition, high salinity of artesian ground water, which precludes its use for potable water, makes contamination irrelevant.

2.3 SITES RECOMMENDED FOR CONFIRMATION. Figures 2-2, 2-3, and 2-4 provide the locations of the disposal sites examined during the on-site survey. Two sites are recommended for confirmation study. These sites, Site 1 and Site 3, are both located at NAS Corpus Christi and were used for disposal of liquid waste generated by Corpus Christi Army Depot (CCAD) (Table 2-1). A third site, Site 9, may have also received a limited amount of the liquid waste; however, there is less substantial evidence of the disposal of hazardous material at this site than for sites 1 and 3. If contamination is identified at sites 1 and 3, consideration of further study should be given to Site 9.

2.3.1 Site 1, DPDO Landfill. The Defense Property Disposal Office (DPDO) Landfill was reportedly used for disposal of bulk chemicals generated by overhaul operations (helicopter maintenance) conducted at CCAD. Operation started at the landfill around 1949 and continued until the early 1960s. Four or five seepage pits were dug in the area for direct disposal of liquid from bowsers. These materials included organic solvents, H_2SO_4, HCl, paint remover and thinner, and plating waste. Estimated quantities of disposal range between 2,000 and 5,000 gallons per week. The area was also used for disposal of general solid wastes.

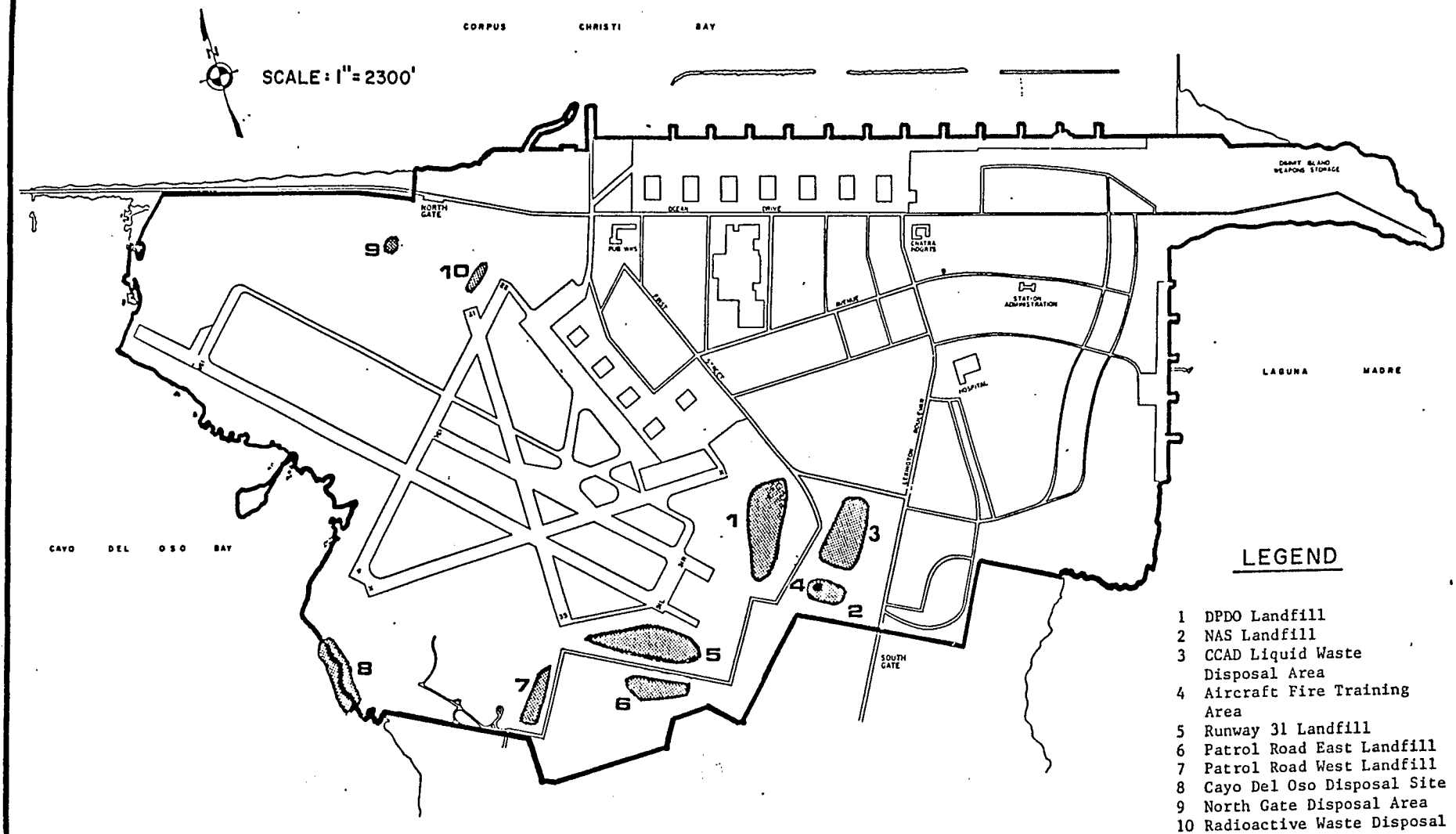
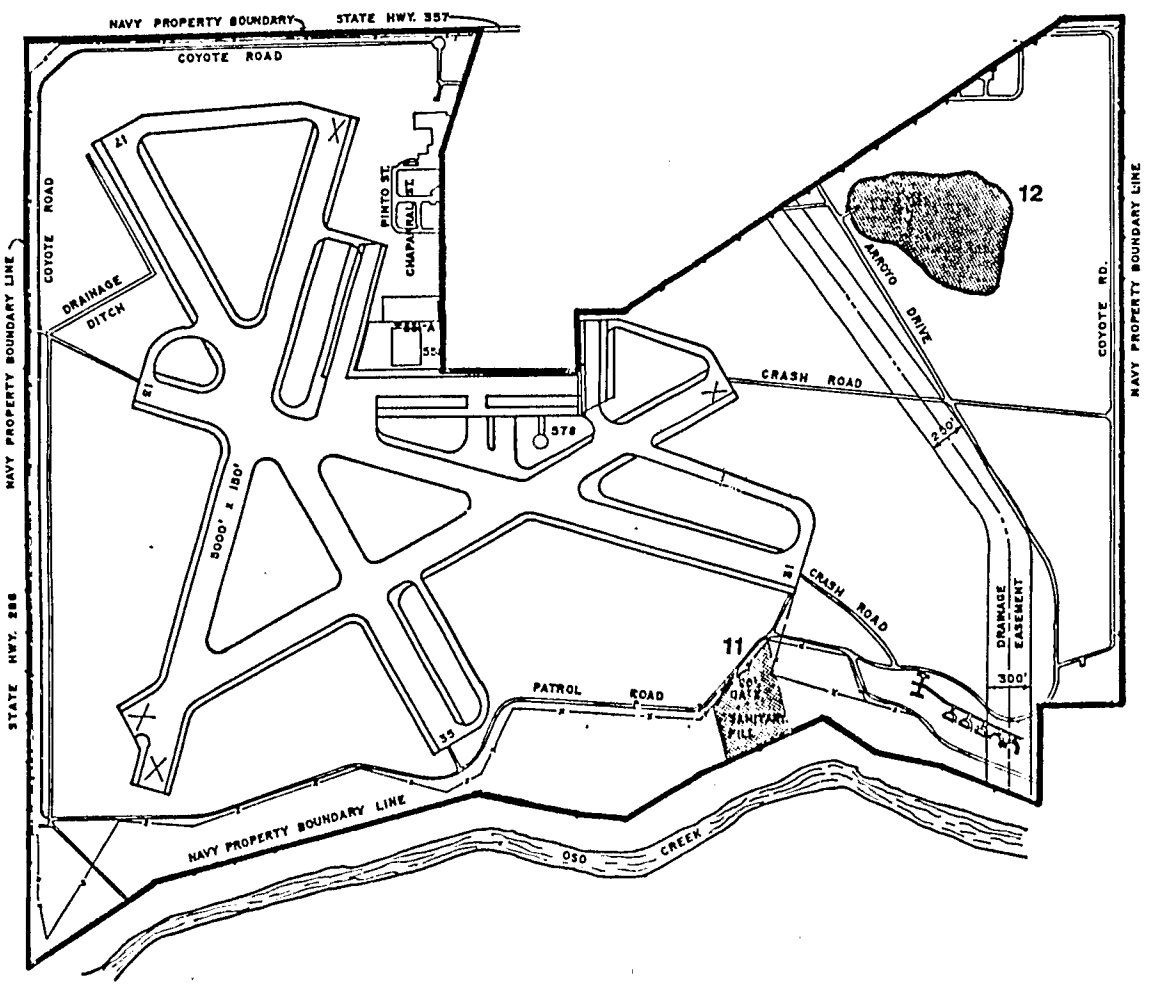


FIGURE 2-2
NAS CORPUS CHRISTI DISPOSAL SITES

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI



SCALE: 1" = 1400'

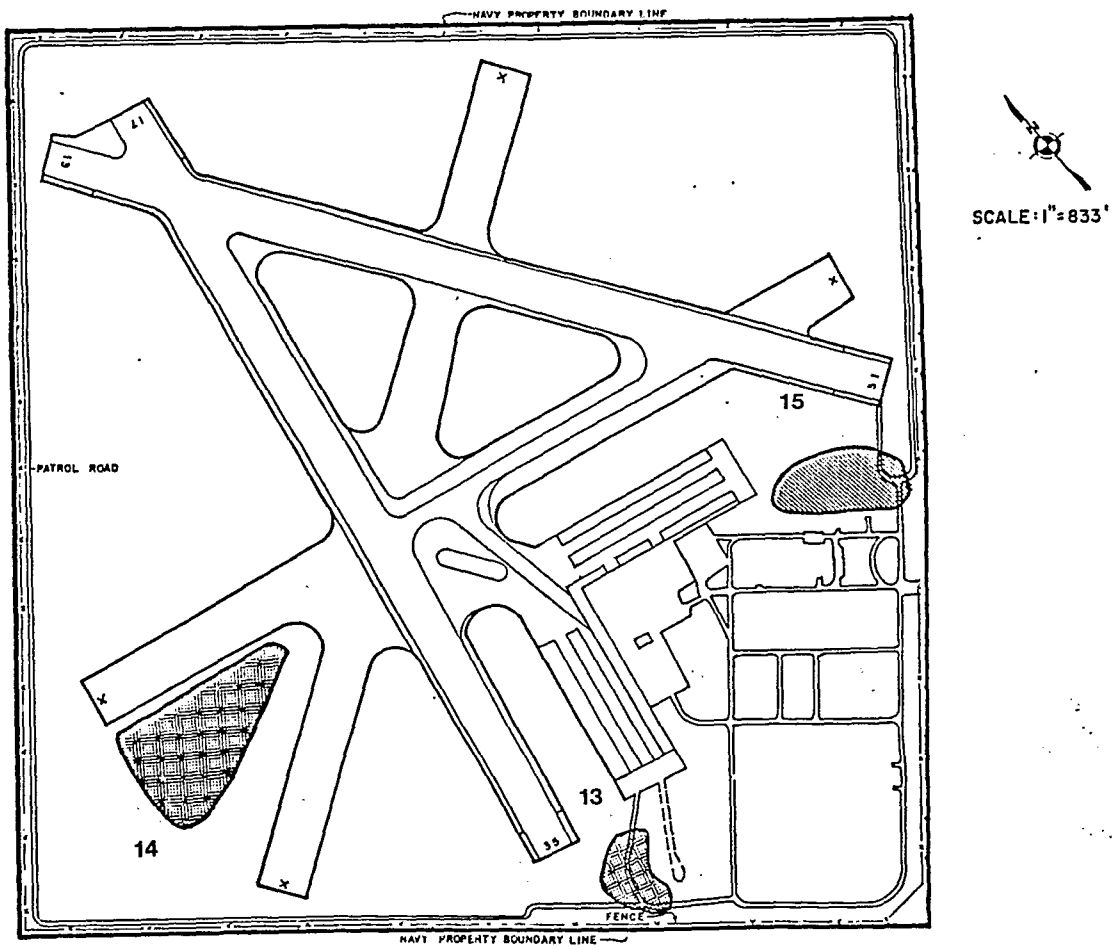
LEGEND

SITE 11 CABANISS
SANITARY LANDFILL

SITE 12 CABANISS
HURRICANE CELIA RUBBLE
AREA

FIGURE 2-3
NALF CABANISS DISPOSAL SITES

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI



LEGEND

SITE 13 WALDRON RUBBLE DISPOSAL AREA

SITE 14 WALDRON RUBBLE DISPOSAL AREA

SITE 15 WALDRON RUBBLE DISPOSAL AREA

FIGURE 2-4
NALF WALDRON RUBBLE
DISPOSAL SITES

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

Table 2-1

SITES RECOMMENDED FOR CONFIRMATION
AT NAS CORPUS CHRISTI

SITE NAME	SITE NO.	MAP COORDINATES[1]	APPROXIMATE PERIOD OF OPERATION	TYPES MATERIAL DISPOSED OF	COMMENTS
DPDO Landfill	1	31,W	1949-1960s	Solid waste and bulk chemical liquid waste from CCAD	Materials disposed included H_2SO_4, organic solvents, paint remover, etc. These were disposed of at a rate of 2,000 to 5,000 gallons per week.
CCAD Liquid Waste Disposal Area	3	34,V	1960-1972	Solid waste and bulk chemical liquid waste from CCAD	Materials disposed included H_2SO_4, organic solvents, paint remover, etc. These were disposed of at a rate of 2,000 to 5,000 gallons per week.

1. General Development Map.

Due to the discharge of large quantities of uncontainerized potentially hazardous wastes directly into the shallow ground water, confirmation study is recommended for this site. Migration of hazardous wastes from this site presents an environmental hazard to marine life in Corpus Christi Bay and Cayo del Oso.

2.3.2 Site 3, CCAD Liquid Waste Disposal Area. The CCAD Liquid Waste Disposal Area was the primary area used for disposal of bulk chemical waste generated at CCAD between 1960-1972. Aerial photographs taken in 1967 show several pits located in the area which were reportedly used as seepage pits for chemicals collected in bowsers at CCAD. Quantities of waste disposed of in this manner were estimated at 2,000 to 5,000 gallons per week. The chemicals disposed of included organic solvents, H_2SO_4, HCl, paint remover and thinner, and plating chemicals.

Due to the discharge of large quantities of uncontainerized potentially hazardous material directly into the shallow ground water, confirmation study to determine the level of contamination for the site is recommended. Migration of hazardous wastes from this site presents an environmental hazard to marine life in Corpus Christi Bay and Cayo del Oso.

2.4 SITES NOT RECOMMENDED FOR CONFIRMATION STUDY. Table 2-2 contains a list of the non-confirmation sites which were identified during the IAS. No additional study is recommended for these sites.

2.4.1 Site 2, NAS Corpus Christi Landfill. The NAS Corpus Christi Landfill was used between 1956 and 1962 for disposal of municipal solid waste generated by NAS Corpus Christi and tenant activities. The area is characterized by a series of equally spaced east-west ridges, each about 1.5 to two feet in elevation, which represent the areas of excavation and refill of trenches for disposal of material. Disposal in this area was reportedly confined to non-hazardous solid waste; therefore, confirmation study is not recommended.

2.4.2 Site 4, Aircraft Fire Training Area. The Aircraft Fire Training Area, in use since the 1960s, is located in a portion of the old NAS Corpus Christi Landfill (Site 2). Training is conducted at the site for five to six months each year. The training activities utilize approximately 3,000 gallons per month of waste fuel. The fuel is discharged to a clay-lined bermed area and ignited to allow practice in extinguishing the blaze. The clay liner and berms were added to the area in 1973 prior to which the fuel was discharged directly to the surface.

Since the fuel was burned after being discharged to the ground, only small quantities infiltrated into the ground; therefore, confirmation study is not recommended.

2.4.3 Site 5, Runway 31 Landfill. This site was used from the early 1940s to the early 1950s for limited disposal of municipal solid waste. Due to the innocuous nature of the material, confirmation study is not recommended.

2.4.4 Site 6, Patrol Road East Landfill. This is the most recently active landfill at NAS Corpus Christi, with activity starting in the late 1960s and

Table 2-2

NON-CONFIRMATION SITES AT NAS CORPUS CHRISTI

SITE NAME	SITE NO.	MAP COORDINATES[1]	APPROXIMATE PERIOD OF OPERATION	TYPES MATERIAL DISPOSED OF	COMMENTS
NAS Corpus Christi Landfill	2	33,X	1956-1962	Municipal solid waste	
Aircraft Fire Training Area	4	33,X	1960s-1973	Waste fuels	Approximately 3000 gallons per month of fuel were used five to six months per year.
Runway 31 Landfill	5	27,AA	1940s-1950s	Municipal solid waste	
Patrol Road East Landfill	6	27,AA	1960s-1979	Municipal waste	
Patrol Road West Landfill	7	23,AA	1955-1958	Municipal waste	
Cayo Del Oso Disposal Site	8	15,BB	1970s	Construction debris	Material was used for erosion control
North Gate Disposal Area	9	17,K	1960s-1970s	Bulk chemical liquid waste from CCAD	Information indicating use of this site was not as substantial as sites 1 and 3.

CONTINUED

Table 2-2

NON-CONFIRMATION SITES AT NAS CORPUS CHRISTI

SITE NAME	SITE NO.	MAP COORDINATES[1]	APPROXIMATE PERIOD OF OPERATION	TYPES MATERIAL DISPOSED OF	COMMENTS
Radioactive Waste Disposal Area	10	20,L	1950s	Possible radioactive promethium and isotopes of krypton and cesium	Survey by the Army found no levels of radiation above background.
Cabaniss Sanitary Landfill	11	15,M	until 1980	Municipal solid waste and some ordnance burning	
Cabaniss Hurricane Celia	12	19,D	1970s	Construction rubble	Site agreed upon by Navy and city of Corpus Christi for disposal of hurricane rubble.
Waldron Rubble Disposal Area	13	12,O	1950s-1970s	Construction rubble	
Waldron Rubble Disposal Area	14	5,M	1970s	Construction rubble	Site agreed upon by Navy and city of Corpus Christi for disposal of hurricane rubble. Large quantities of material do not appear to be disposed at this site.
Waldron Rubble Disposal Area	15	14,J	1950s-1970s	Construction rubble	

continuing until approximately 1979. The landfill was reportedly used for disposal of municipal solid wastes originating from NAS Corpus Christi and tenant activities. Due to the nature of the waste, confirmation study is not recommended.

2.4.5 Site 7, Patrol Road West Landfill. The Patrol Road West Landfill was active from approximately 1955 to 1958. The area was used for disposal of municipal solid waste generated at NAS Corpus Christi during this period of operation. Due to the innocuous nature of the waste, no confirmation study is recommended.

2.4.6 Site 8, Cayo Del Oso Disposal Site. The Cayo del Oso Disposal Site was used for disposal of construction rubble during the 1970s. Apparently the material was deposited along the shore of the Bay as a means of erosion control. Due to the innocuous nature of the waste, confirmation study is not recommended for this site.

2.4.7 Site 9, North Gate Disposal Area. The North Gate Disposal Area was located approximately 1,600 feet west of the North Gate and 600 feet south of the Patrol Road. Reportedly, pits were dug in this area during the late 1960s and early 1970s for disposal of liquid hazardous wastes generated at CCAD. Disposal at this site was reportedly not on a consistent basis. Primary disposal of liquid waste material occurred at Site 1 and Site 3 as previously mentioned.

Because the site was used infrequently and evidence supporting the use of the area is not as substantial as the previous two sites, a confirmation study is not presently recommended for this site. A confirmation study may be recommended at a later date contingent upon confirmation study results at sites 1 and 3.

2.4.8 Site 10, Radioactive Waste Disposal Area. The Radioactive Waste Disposal Area was reportedly used for disposal of small amounts of promethium and radioactive isotopes of krypton and cesium. The disposal area was a small cistern-like concrete pit in the ground with a manhole-type cover. Uncertainty exists concerning the exact location and material disposed at the site. Reportedly, the Army conducted a radiation survey in the area but was unable to locate any radiation above background levels.

Efforts to find the area have already been conducted and no sources of radiation above background levels were identified. Additionally, as quantities reportedly disposed of were small, confirmation study is not recommended for this area.

2.4.9 Site 11, Cabaniss Sanitary Landfill. The Cabaniss Sanitary Landfill is located near the south end of Runway 31 at NALF Cabaniss. The site covers approximately six acres and was used for disposal of sanitary wastes generated at Cabaniss. In addition, the city of Corpus Christi and the Army used a portion of the site until approximately 1980. The area used by the City and the Army was an eight-foot long five-foot diameter boiler. The boiler was used by the City for incineration of confiscated drug material and by the Army for burning small ordnance items. The site affected by these operations covered less than 200 square feet. Only small quantities of ash were generated from the boiler operations.

Since no hazardous materials were reportedly disposed of at this site and only limited ordnance burning operations were conducted and little residual generated, no confirmation study is recommended for the site.

2.4.10 Site 12, Cabaniss Hurricane Celia Rubble Area. An agreement establishing this as a hurricane debris disposal site was reached in 1971 with the city of Corpus Christi. The Hurricane Celia Rubble Area covers approximately 50 acres in the northeast corner of the NALF Cabaniss. The area was used for disposal of construction and other debris generated by Hurricane Celia. Due to the innocuous nature of the waste, confirmation study is not recommended at this site.

2.4.11 Sites 13, 14, and 15, Waldron Rubble Disposal Areas. These disposal sites are all located at NALF Waldron. Use of these sites was limited to disposal of construction rubble and debris. Site 13 and Site 15 were used primarily for disposal of debris generated by removal of buildings at the NALF Waldron site. These sites did receive limited use for disposal of hurricane debris.

Site 14 was established for disposal of waste from Hurricane Celia, based on an agreement between the Navy and the city of Corpus Christi. On-site survey of the area indicates that the site was used less extensively than sites 13 and 15. Due to the innocuous nature of the wastes, confirmation study is not recommended for this site.

CHAPTER 3. RECOMMENDATIONS

3.1 INTRODUCTION. Two sites are recommended for confirmation studies. Both of the sites resulted from the disposal of uncontainerized liquid chemical wastes generated by Corpus Christi Army Depot (CCAD). The sites, along with the recommended study actions, are listed in Table 3-1. Ground water monitoring in the vicinity of these two sites should provide information on the extent of the contamination if any exists. The primary concern for each of these sites is the migration of contaminants through shallow ground water to Cayo del Oso and Corpus Christi Bay.

3.2 CONFIRMATION STUDIES.

3.2.1 Site 1, DPDO Landfill.

Type of samples: Ground water
Ground water monitoring wells: four
Number of samples: 16
Frequency: quarterly for one year

Analytical parameters: pH, total organic carbon (TOC), total organic halide (TOX), and TDS, chlorinated solvents, total Cn, Cd, Cr, Ag, Ni, and Pb.

Remarks: The pH and specific conductance will provide an indicator for inorganic compounds present in the ground water and TOC and TOX will provide an indicator for organic compounds. The remaining analyses will determine the existence of the specific parameters indicated. The wells should be installed at the approximate locations indicated on Figure 3-1. Well elevation should be established at the time wells are drilled. In addition, ground water levels should be measured before each sample is collected. An upgradient well should be installed on higher ground south of the landfill. Location at or just outside of the facility boundary would be most desirable. As the landfill is located on ground sloping north and northeast, the three downgradient wells should be located as shown. Flow measurements or water level measurements made at the time of well installation will confirm ground water flow direction.

3.2.2 Site 3, CCAD Liquid Waste Disposal Area.

Type of samples: Ground water
Ground water monitoring wells: three
Number of samples: 12
Frequency: quarterly for one year

Analytical parameters: pH, total organic carbon (TOC), total organic halide (TOX), and TDS, chlorinated solvents, total Cn, Cd, Cr, Ag, Ni, and Pb.

TABLE 3-1

SUMMARY OF CONFIRMATION STUDY RECOMMENDATIONS
NAS CORPUS CHRISTI

SITE NAME; NO.	MAP COORDINATES	RECOMMENDED ACTION	NO. OF WELLS	NO. OF SAMPLES	TYPE ANALYSIS	ANALYSIS FREQUENCY	CSRS SCORES
Defense Property Disposal Office Landfill, 1	31, W	Ground water Monitoring	four	16	pH, TOX, TOC, TDS, Total CN, Cd, Cr, Ag, Ni, Pb, and Chlorinated Solvents	Quarterly for one year	13.96
Corpus Christi Army Depot Liquid Waste Disposal Area, 3	34, V	Ground water Monitoring	three	12	pH, TOX, TOC, TDS, Total CN, Cd, Cr, Ag, Ni, Pb and Chlorinated Solvents	Quarterly for one year	16.47

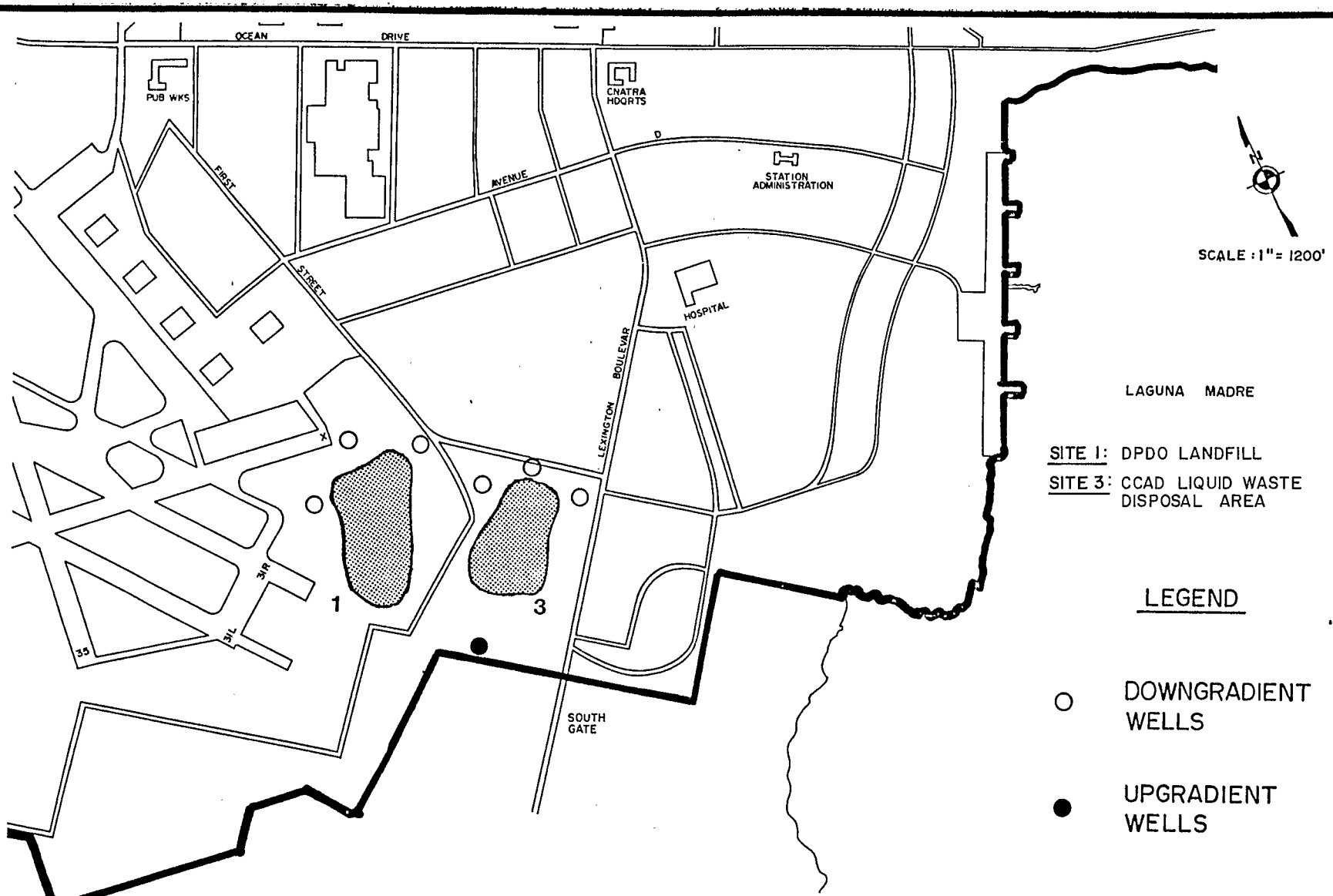


FIGURE 3-1

PROPOSED MONITORING WELL LOCATIONS FOR SITES 1 AND 3

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

Remarks: The pH and specific conductance will provide an indicator for inorganic compounds present in the ground water and TOC and TOX will provide an indicator for inorganic compounds. The remaining analyses will determine the existence of the specific parameters indicated. The wells should be installed at the locations indicated on Figure 3-1. Well elevation should be established at the time wells are drilled. In addition, ground water levels should be measured before each sample is collected. The upgradient well for Site 1 should serve also as upgradient for Site 3. This well would be south-southwest of this landfill which lies on ground sloping to the northeast. The three downgradient wells should be located as shown. Ground water flow direction will be confirmed at the time of well installation.

3.3 ADDITIONAL RECOMMENDATIONS.

3.3.1 Site 9, Gate Disposal Area. A third site, the North Gate Disposal Area, Site 9, may require a confirmation study if results at sites 1 and 3 indicate significant levels of contamination. Site 9 received the same waste material as sites 1 and 3, but the frequency of use was less; therefore, if no contamination is found at sites 1 and 3, little potential exists for contamination at Site 9.

3.3.2 Future Development. To aid in future development, locate the following sites on the General Development Map for NAS Corpus Christi.

- Site 1, Defense Property Disposal Office Landfill
- Site 2, NAS Corpus Christi Landfill
- Site 3, CCAD Liquid Waste Disposal Area
- Site 4, Aircraft Fire Training Area
- Site 5, Runway 31 Landfill
- Site 6, Patrol Road East Landfill
- Site 7, Patrol Road West Landfill
- Site 8, Cayo del Oso Disposal Site
- Site 9, North Gate Disposal Area
- Site 10, Radioactive Waste Disposal Area

The sites listed below should be located on the NALF Cabaniss General Development Map:

- Site 11, Cabaniss Sanitary Landfill
- Site 12, Cabaniss Hurricane Celia Rubble Area

The NALF Waldron Rubble Disposal Areas, sites 13, 14, and 15 should be located on the Waldron General Development Map.

CHAPTER 4. BACKGROUND

4.1 GENERAL

4.1.1 Location and Organization. The Naval Air Station (NAS) Corpus Christi is located on the Gulf of Mexico in South Texas adjacent to the city of Corpus Christi (Figure 4-1). The facility is located approximately 200 miles southwest of Houston and 160 miles north of Brownsville, on a peninsula surrounded by Laguna Madre on the east, Corpus Christi Bay on the north, and Cayo del Oso Bay on the west (Figure 4-2).

NAS Corpus Christi has been a center for training pilots since it was commissioned in 1941. Three major sites utilized to conduct training operations are:

- Naval Air Station--2340 acres
- Naval Auxiliary Landing Field (NALF) Cabaniss--844 acres
- NALF Waldron--640 acres

NALF Cabaniss is located adjacent to the Corpus Christi city limits at the intersection of Saratoga Boulevard and Chapman Ranch Road (Figure 4-1). NALF Waldron is located three miles south of NAS Corpus Christi in the Flour Bluff area at the intersection of Waldron Road and Yorktown Boulevard.

NAS Corpus Christi provides facilities operation, maintenance and logistical support of aviation activities and units of the Naval Air Training Command, as well as other activities and units as designated by the Chief of Naval Operations. The major commands at NAS Corpus Christi are:

- Headquarters, Naval Air Training Command
- Training Air Wing Four Staff
- Naval Air Station, Corpus Christi
- Training Squadron 27 (VT-27)
- Training Squadron 28 (VT-28)
- Training Squadron 31 (VT-31)
- Naval Regional Medical Center
- Naval Regional Dental Center
- Commissary Store
- Navy Reserve Center
- Coast Guard Air Station
- Corpus Christi Army Depot (CCAD)

4.1.2 Host/Tenant Relationships. NAS Corpus Christi provides support functions as required for the following tenant activities.

- Chief of Naval Air Training (CNATRA), headquartered at NAS Corpus Christi. Provides training coordinated through six Training Air Wings located at Naval Air Stations in Meridian, Mississippi, Pensacola, Florida, Whiting Field, Florida, Corpus Christi, Texas, Kingsville, Texas, and Chase Field, Texas.

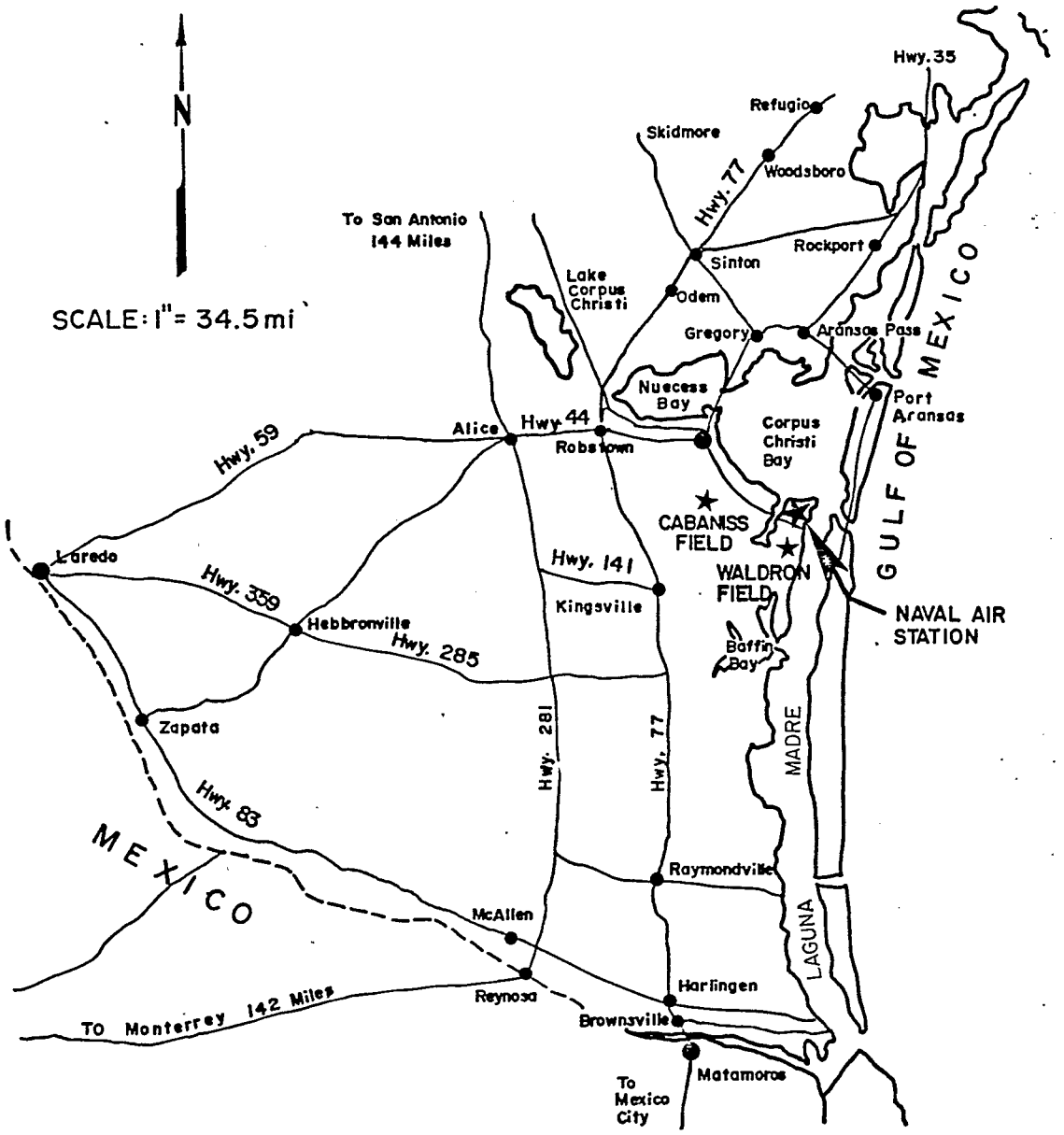


FIGURE 4-1
LOCATION MAP

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

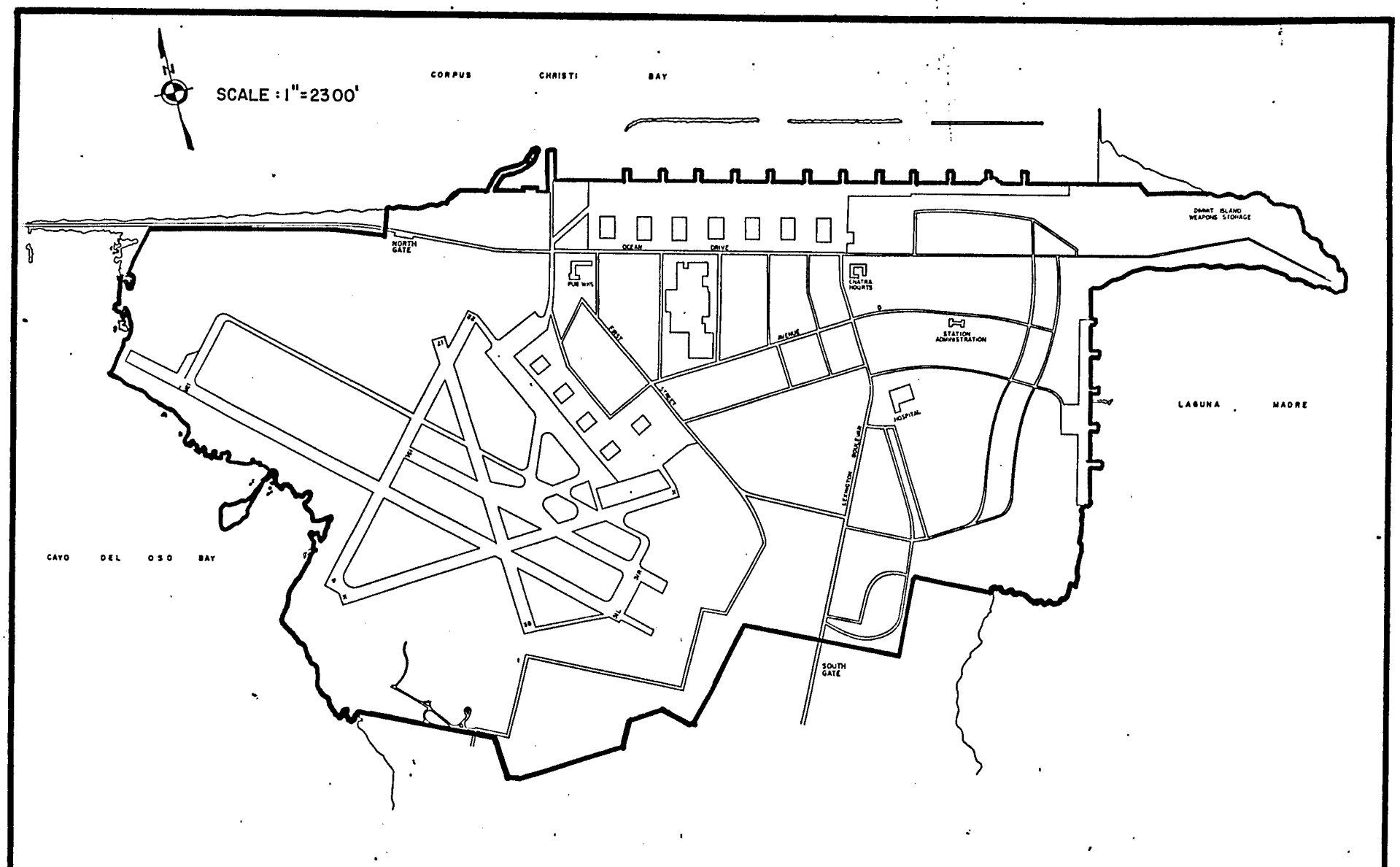


FIGURE 4-2
NAS CORPUS CHRISTI FACILITY LOCATION MAP
(Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

Under these training wings are 20 squadrons, 900 aircraft, and 14,000 personnel. The command includes the USS Lexington, the Blue Angels, and the Naval Aviation School in Pensacola.

- Training Air Wing Four, NAS Corpus Christi. Consists of training squadrons 27, 28, and 31. These include 2,241 personnel and 130 aircraft. These wings are responsible for supervision, coordination, and administration of subordinate squadrons.

- Auxiliary Fields

  - Cabaniss Auxiliary Landing Field--landing strip for training landings.
  - Waldron Auxiliary Landing Field--landing strip for training landings.

- Area Commands

  - Corpus Christi Army Depot (CCAD)--serves under U.S. Army Material Development and Readiness Command; performs depot level maintenance of Army aircraft and aeronautical equipment, trains military personnel in depot level maintenance, prepares aircraft for overseas shipment, with additional worldwide responsibilities in logistics, mobilization, and mission support.
  - Aircraft Intermediate Maintenance Department (AIMD)--provides skills and equipment not normally available in organizational maintenance support to NAS Corpus Christi and tenant squadron.
  - Air Operations Department--provides 24-hour operation of main airfield, two outlying fields, and all air traffic control services.
  - Construction Battalion Unit (CBU) 407--provides construction support for projects ranging from small remodeling jobs to major new construction among all the various commands on the station.
  - Civilian Personnel Department--staffs and coordinates civilian clerical, technical, professional as well as blue collar trades and crafts personnel.
  - Comptroller Department--responsible for all financial matters, including budgets, accounting, audit, and internal review functions.
  - Marine Aviation Training Support Group--provides administrative and fiscal support for locally-assigned Marine units, as well as the Marine Aerial Navigation School in California.

Additional administrative and facilities support groups include U.S. Marine Corps Reserve Training Center, Naval Legal Service Office (NAVLEGSVCOFF), Naval Reserve Center, Personnel Support Activity (PERSUPPACT), Public Works, Supply Department, and Training Department.

- Area Commands and Auxiliary Fields not included in Initial Assessment Study

  - Kingsville Naval Air Station--presently conducts jet training.
  - Chase Field--presently conducts jet training.

4.1.3 Leases and Agreements. Leased property held by the Navy at the NAS Corpus Christi is used for flight path and runway clearances at the NAS Corpus Christi proper, at NALF Cabaniss Field, and at NALF Waldron Field. Leased acreage at the NAS Corpus Christi is located at the southwest end of runways

35 and 31 Right. Combined, these two leased areas total 374.37 acres.

Leased acreage at the Cabaniss Airstrip includes two sections located at the north end of Runway 17 and the northwest end of Runway 13. These two sections make up 48.33 acres of the leased area at Cabaniss Field.

Leased acreage at Waldron Field totals 122.45 acres. The leased areas are located at the north and northwest section of runways 17 and 13, at the southeast end of Runway 31, and the south end of Runway 35. Figures 4-3, 4-4, and 4-5 illustrate the location of the leased areas at each of the three described fields.

4.2 HISTORY. During the 1930s, American interest in the war in Europe ranged from isolationist sentiment and non-involvement to a steadily increased involvement and supporting role. As realization increased that a second world war seemed inevitable, so did the awareness of necessity for increased and more sophisticated pilot training. More and better military pilots would require expanded training programs and facilities. Decisions about location had to consider climate, land area, and air space. Based on the requirements of the times, the War Department chose Corpus Christi. It and its surrounding rural and fishing communities seemed ideal as the site for the Navy's $100 million new university of the air. The climate was moderate the year around, and there was plenty of room for land expansion as well as air space.

After the official announcement, President Roosevelt signed the appropriation bill on 13 June 1940, construction began a week later, and the partially operational station was commissioned in only nine months, when 70 percent complete. When the job was done, the project, which should normally have required three years, had been accomplished in less than two.

The original mission of NAS Corpus Christi was to supplement pilot training at Pensacola. By the end of 1941 Corpus Christi was turning out 300 new aviators every month. After war was declared, this figure doubled. By the end of World War II, more than 35,000 pilots had been trained at NAS Corpus Christi.

NAS Corpus Christi has grown and evolved through several phases, from beach-head and planned build-up, through peak activity, and near shut-down, as reflected in the varying requirements of World War II, demobilization, the Cold War, Korea, and Vietnam.

The original mission of NAS Corpus Christi as a supplement to then-existing pilot training has been greatly increased in scope. NAS Corpus Christi has seen direct changes in mission, regrouping, and the establishment of a major maintenance facility, as well as in the increased complexity and sophistication of aircraft, associated equipment, training programs, and the requirements of supporting units and commands.

4.3 PHYSICAL FEATURES.

4.3.1 Climatology. The climate of Corpus Christi is similar to that found in the semitropical regions and the semiarid areas of the southwest and west. The mean annual temperature for the Corpus Christi area is 71°F. Cold fronts

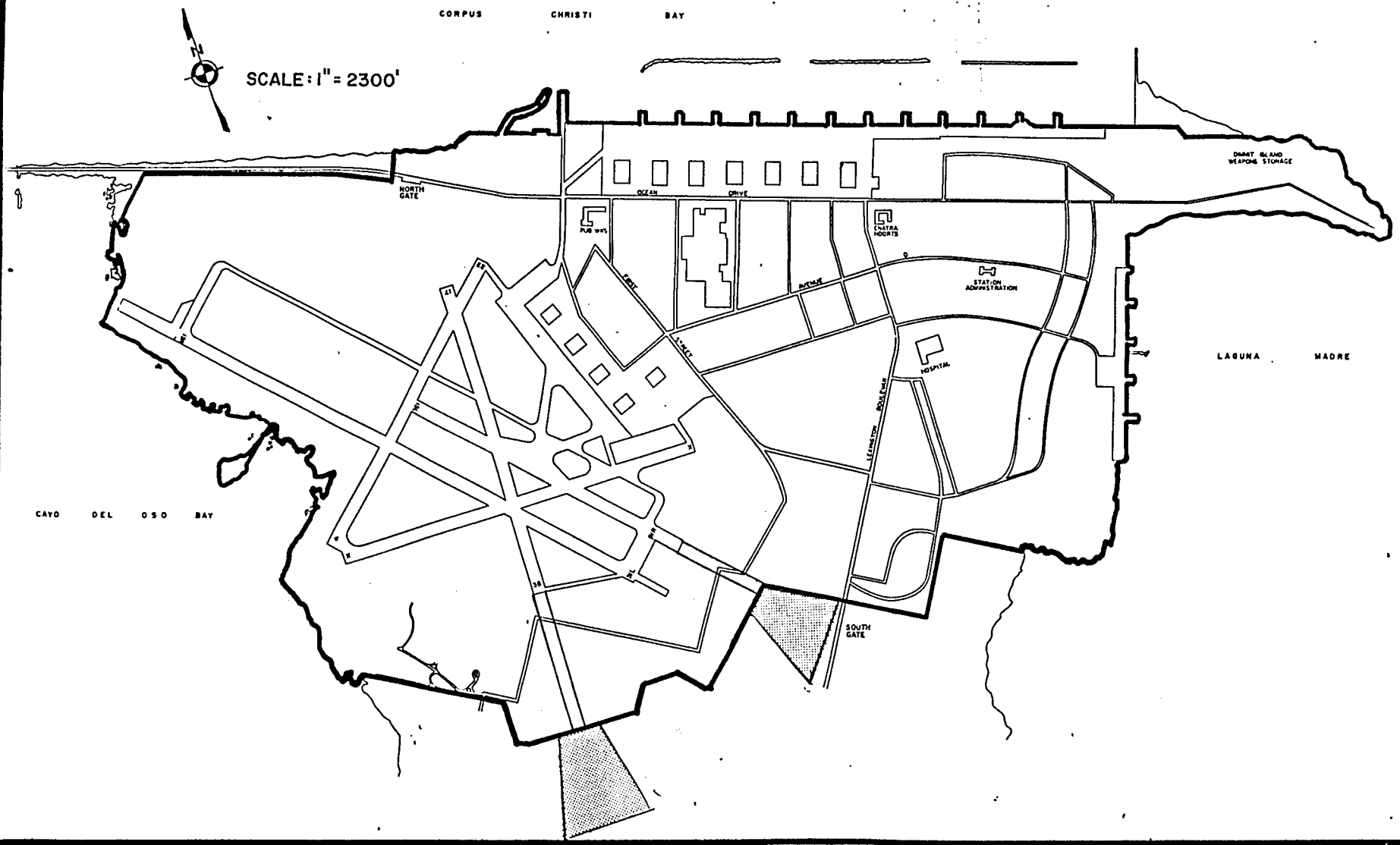


FIGURE 4-3
NAS CORPUS CHRISTI LEASE TRACTS

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

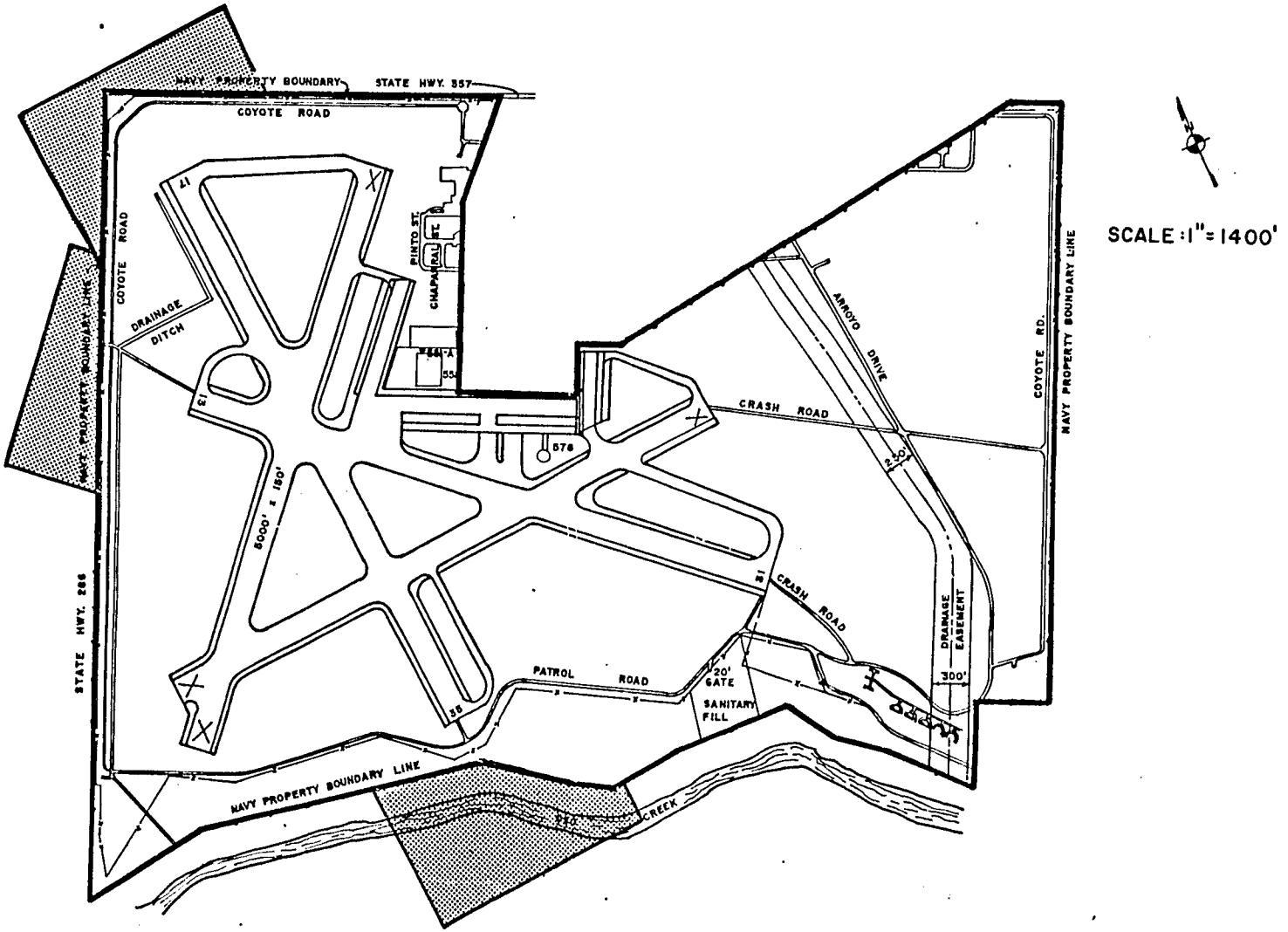


FIGURE 4-4
NALF CABANISS LEASE TRACTS
(Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

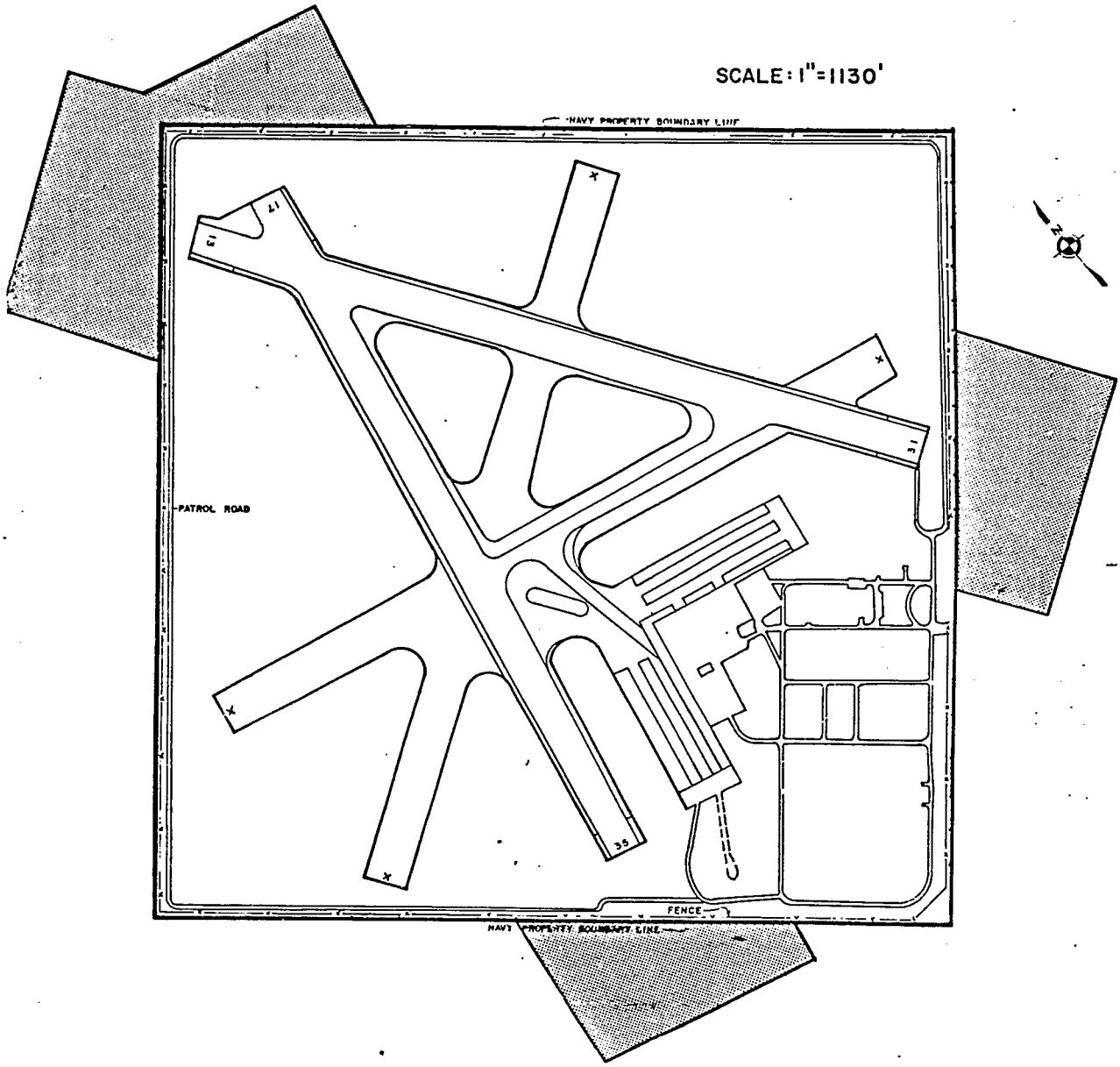


FIGURE 4-5
NALF WALDRON LEASE TRACTS

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

pass through the area in January, February, and March creating rapid temperature drops of 20 to 30 degrees. July, August, and early September are especially hot and humid.

Wind direction is variable, shifting quite frequently. Extremely high winds have resulted from hurricanes.

Rainfall for the Corpus Christi area averages 30 inches per year. Maximum rainfall occurs in September and October and the minimum occurs in December and February.

4.3.2 Topography. The general Corpus Christi area lies within the western section of the Gulf of Mexico Coastal Plain Province. The region is characterized by a gently sloping coastal plain surface broken only by entrenched streams. Highest elevations are approximately +200 feet mean sea level (MSL) in western San Patricio County. Maximum relief is 80 feet in the western part of the Corpus Christi area, with slopes toward the gulf averaging between five and six feet per mile (Woodman and others, 1978).

Topography of NAS Corpus Christi and NALF Waldron is shown on the U.S. Geological Service (USGS) Oso Creek Northeast, 7 1/2' topographic quadrangle. Topography of NALF Cabaniss is similarly shown on the Oso Creek Northwest 7 1/2' topographic quadrangle. Elevations range from sea level at various points in NAS Corpus Christi to approximately +30 feet MSL at NALF Cabaniss (Figure 4-6).

4.3.2.1 NAS Corpus Christi. NAS Corpus Christi occupies the northern limit of the Encinal Peninsula, a feature bounded on the southeast by Laguna Madre, the northwest by Cayo del Oso, and the northeast by Corpus Christi Bay. Topography of the Encinal Peninsula is generally flat (low relief) with highest elevations to the South. Mean elevation at NAS Corpus Christi is approximately +15 feet MSL while the airfield elevation is +19 feet MSL.

4.3.2.2 NALF Waldron. NALF Waldron occupies an inland position on the Encinal Peninsula south-southwest of NAS Corpus Christi. Mean elevation at NALF Waldron is approximately +22 feet MSL and airfield elevation is +25 feet MSL. Severe erosion is notable in the NALF Waldron area due to past overgrazing and the effects of both wind and water.

4.3.2.3 NALF Cabaniss. NALF Cabaniss is inland (southwest) from Corpus Christi Bay on Oso Creek. Topography is gently sloping to the south across the airfield. Steeper slopes occur along the banks of the Oso Creek which forms the south-southwestern boundary of NALF Cabaniss. Mean elevation is approximately +22 feet MSL and airfield elevation is +25 feet MSL.

4.3.3 Geology. The Corpus Christi area lies within the western Gulf of Mexico Coastal Plain Province and is characterized by presently active, dynamic geologic systems that are the modern expression of similar processes that formed the near-surface geologic framework. The geology of Corpus Christi and environs has been described in relative detail in recent publications such as those of Brown and others (1976), Woodman and others (1978), and Kier and White (1978), and is illustrated on the Geologic Atlas of Texas, Corpus Christi Sheet (1975).

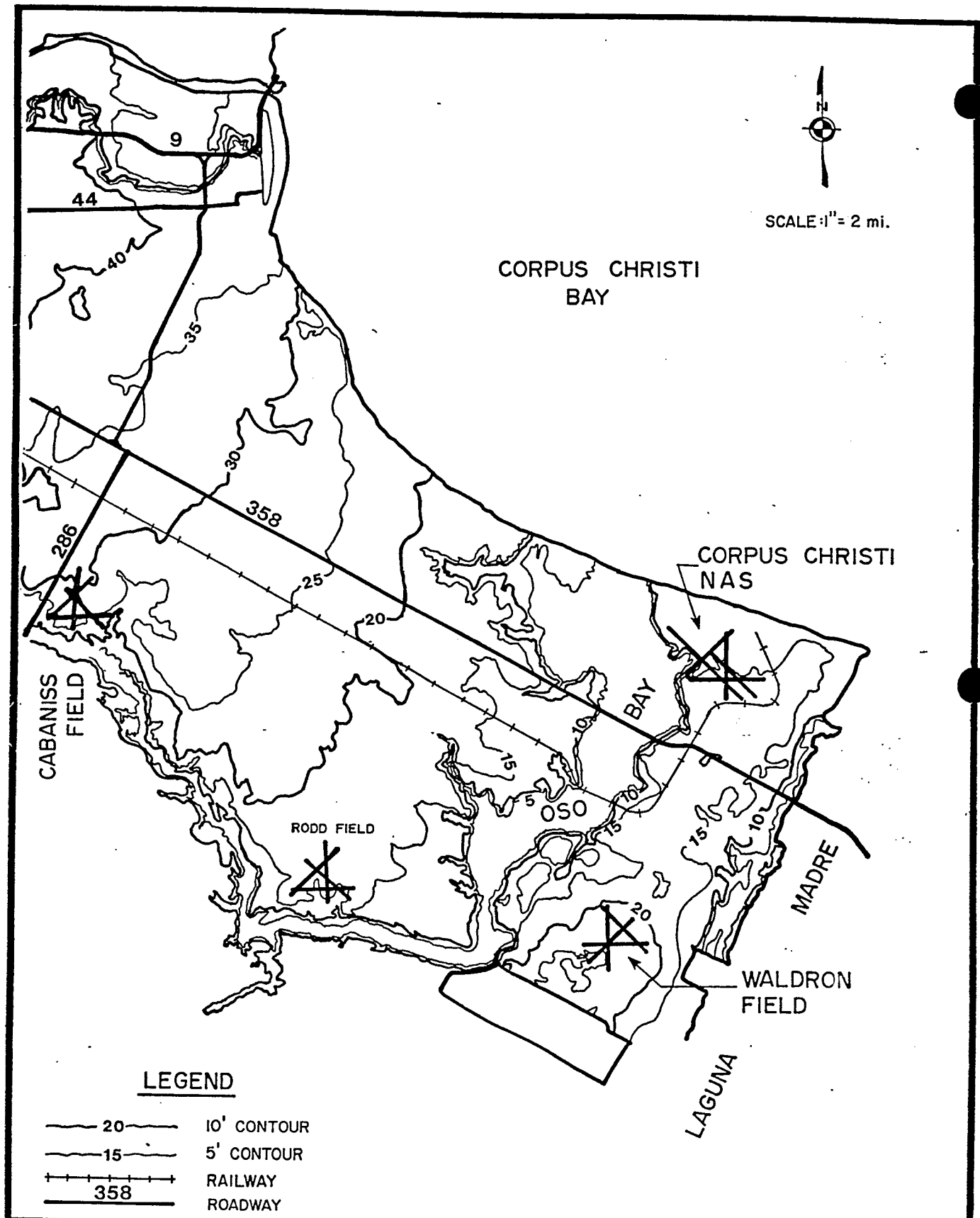


FIGURE 4-6
TOPOGRAPHIC MAP

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

The coastal plain of the Corpus Christi area is underlain by Pleistocene river, delta, and shoreline sediments deposited during interglacial periods. Approximately 30,000 years ago, deep erosion occurred in the valleys of Nueces, Oransis, and Mission Rivers in response to sea-level decline during continental glaciation. Approximately 18,000 years ago, sea level rose during its final transgression marking the initiation of the Holocene. During this interval, river valleys which formerly extended across the dry continental shelf slowly filled with estuarine and then marine sediments. Sea level reached its approximate present position about 3,000 years ago. Presently active geologic processes include fluvial-deltaic, barrier-strandplain-chenier, and bay-estuary-lagoon and eolian.

Deeper sedimentary units beneath the Corpus Christi area generally strike parallel to the present Gulf of Mexico shoreline and dip gently to moderately gulfward. Distribution of these units is well known due to the extensive history of petroleum exploration in the area. The stratigraphic and hydrogeologic framework of the Corpus Christi part of the Texas coastal plain has been described on the basis of such drilling data (Baker, 1978). Numerous such wells, some extending to -7,600 feet MSL, occur on and in the immediate vicinity of the NAS Corpus Christi. These include wells belonging to Sinclair, Exxon, and Louisiana Land and Exploration.

Stratigraphic units underlying the Corpus Christi area, in order of decreasing age, include the Goliad Sand, Willis Formation, Lissie Formation, Montgomery Formation, and Beaumont Formation (Figure 4-7). The four youngest units correspond generally with coastal plain terraces formed by successive lowerings of sea level. The Goliad Sand, Lissie, and Beaumont Formations are known to contain fresh to slightly saline water in the Corpus Christi area.

NAS Corpus Christi, NALF Waldron and NALF Cabaniss are all immediately underlain by the Beaumont Formation. NAS Corpus Christi and NALF Waldron are underlain by a facies of the Beaumont Formation characterized by barrier island and beach deposits consisting of mostly fine-grained sand and shells. The land surface is slightly higher than that of surrounding areas and is characterized by numerous pimple mounds and poorly defined relic beach ridges, most of which have been destroyed by actions of man in the immediate vicinity of the facilities. Recent, locally active sand dunes are present in undisturbed areas. The barrier island and beach deposits of the Beaumont Formation are typically less than 60 feet thick and are probably part of the Ingleside barrier island system.

NALF Cabaniss is immediately underlain by a facies of the Beaumont Formation that is characterized by a dominant clay and mud component with coincident low permeability, high water-holding capacity, high compressibility, high- to very high-shrink/swell potential, and poor drainage. Geologic units within this interval include interdistributary muds, abandoned channel-fill muds, and fluvial overbank muds. The present drainage course of Oso Creek immediately south of NALF Cabaniss contains unconsolidated Quaternary (Holocene) alluvium of unknown thickness.

Corpus Christi is located within Zone 0 of the Seismic Risk Map of the Conterminous United States. Areas within this zone are those with essentially no potential risk of damage. There have been no recorded earthquakes of local origin in the Corpus Christi area. However, photolineament interpretation

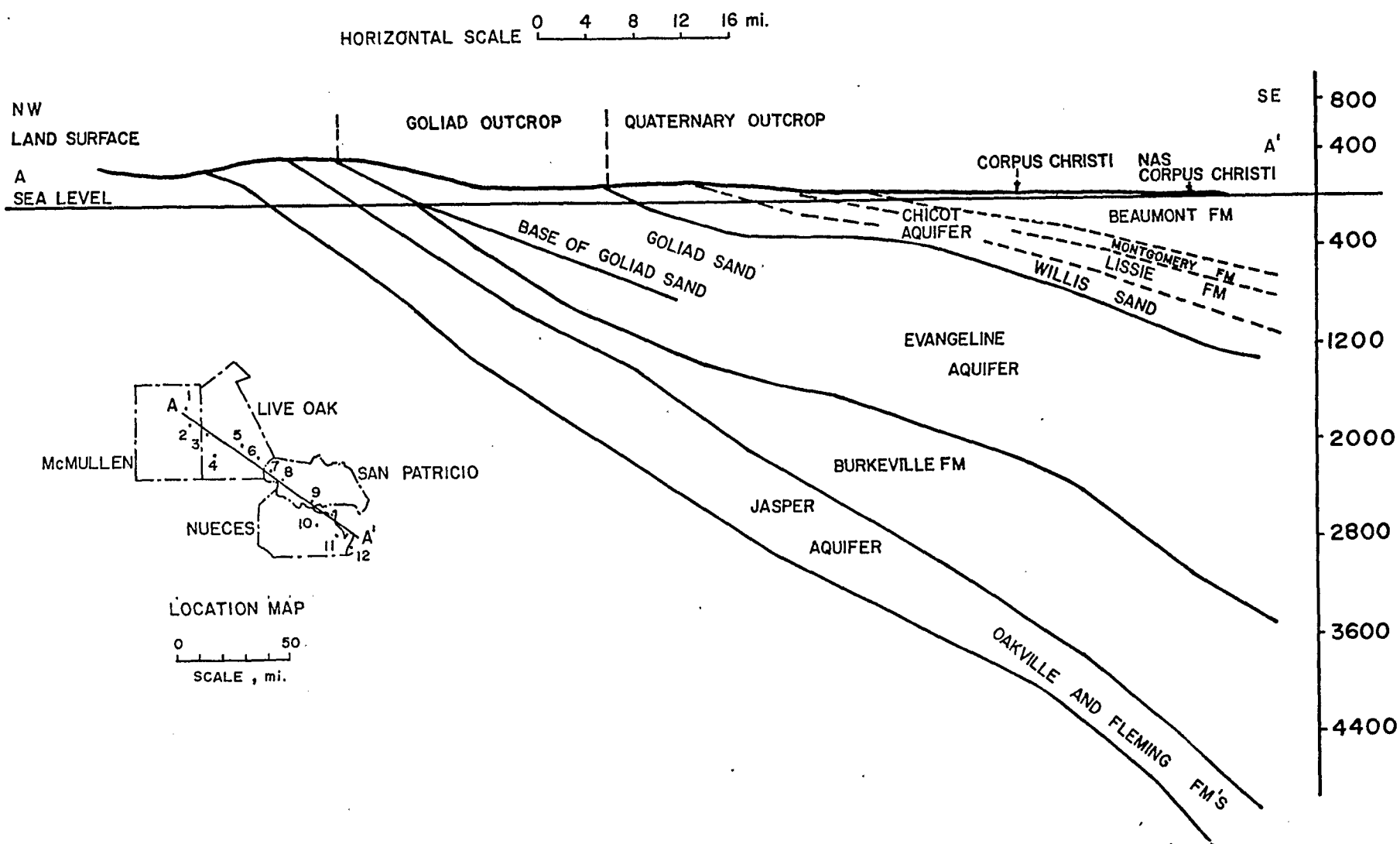


FIGURE 4-7
STRATIGRAPHIC UNITS AND GENERALIZED CROSS SECTION
(Modified from Baker, 1978)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

presented on the Physical Properties Map accompanying the work of Kier and White (1978) indicates a potential fault that crosses NALF Cabaniss in a northwesterly direction.

4.3.4 Soils. Soils of Nueces County have been described in general by Franki and others (1965) and with respect to their specific characteristics, problems, and relationships to other Texas Coastal Plain soils in a later U.S. Department of Agriculture publication (USDA, 1972).

NAS Corpus Christi and NALF Waldron are located on deep, nearly level, well-drained sandy soils with a very shallow water table, predominantly below a depth of 4 feet. NALF Cabaniss is located on deep, nearly level, clayey soils with very slow internal drainage when wet, but which crack to depths of several feet when dry. These soils have developed over clayey, coastal plain terrace deposits.

4.3.4.1 NAS Corpus Christi. The USDA has mapped three soil units at NAS Corpus Christi (Figure 4-8) (Guida, F. E., 1965). These units are the Galveston-Mustang soil series, Made Land, and Fill.

Galveston soil consists of a surface layer ranging from nearly white to grayish-brown. This layer is slightly salty on the Gulf of Mexico side of the Encinal Peninsula but is slightly acidic farther from the shore. The surface layer is normally less than 10 inches thick, contains minor humus and typically is light gray. It is underlain by a zone of light-gray, fine-grained sand that ranges from three to four feet thick. Parent material consisting of white fine sand occurs at depths of from four to ten feet. This material is usually saturated.

Runoff from Galveston soils is very slow due to high porosity and permeability. The soils remain moist in their lower layers throughout most of the year. Permeability for the upper foot of Galveston series soils is between five and eight inches per hour. At depths of between seven inches and five feet, the permeability decreases to between three and four inches per hour.

Mustang series soils consist of nearly level, deep, sandy soils that are wet and locally salty. These soils generally occupy low areas and are occasionally flooded at high tide. In general, they are found at elevations below +5 feet MSL, are young, and contain only very minor humus. The soil consists of an upper layer that is light gray and approximately 12 inches thick. The subsoil is typically white and is approximately two feet thick. It is moist throughout the year and has a few faint yellowish-brown mottles. Generally, in much of this soil a water table stands at a depth of approximately three to four feet. The parent material is similar to the subsoil but is more salty and is normally saturated.

Mustang series soils from surface to a depth of 2.5 feet are typically characterized by a permeability ranging from two inches to three inches per hour. At depths between 2.5 and four feet the permeability ranges from 0.0 through 0.05 inches per hour.

Made Land consists of sand, mud and shells that have been excavated from the floor of lagoons and bays. Within NAS Corpus Christi these soils are typically deep, undulating, and of variable permeability. They are generally

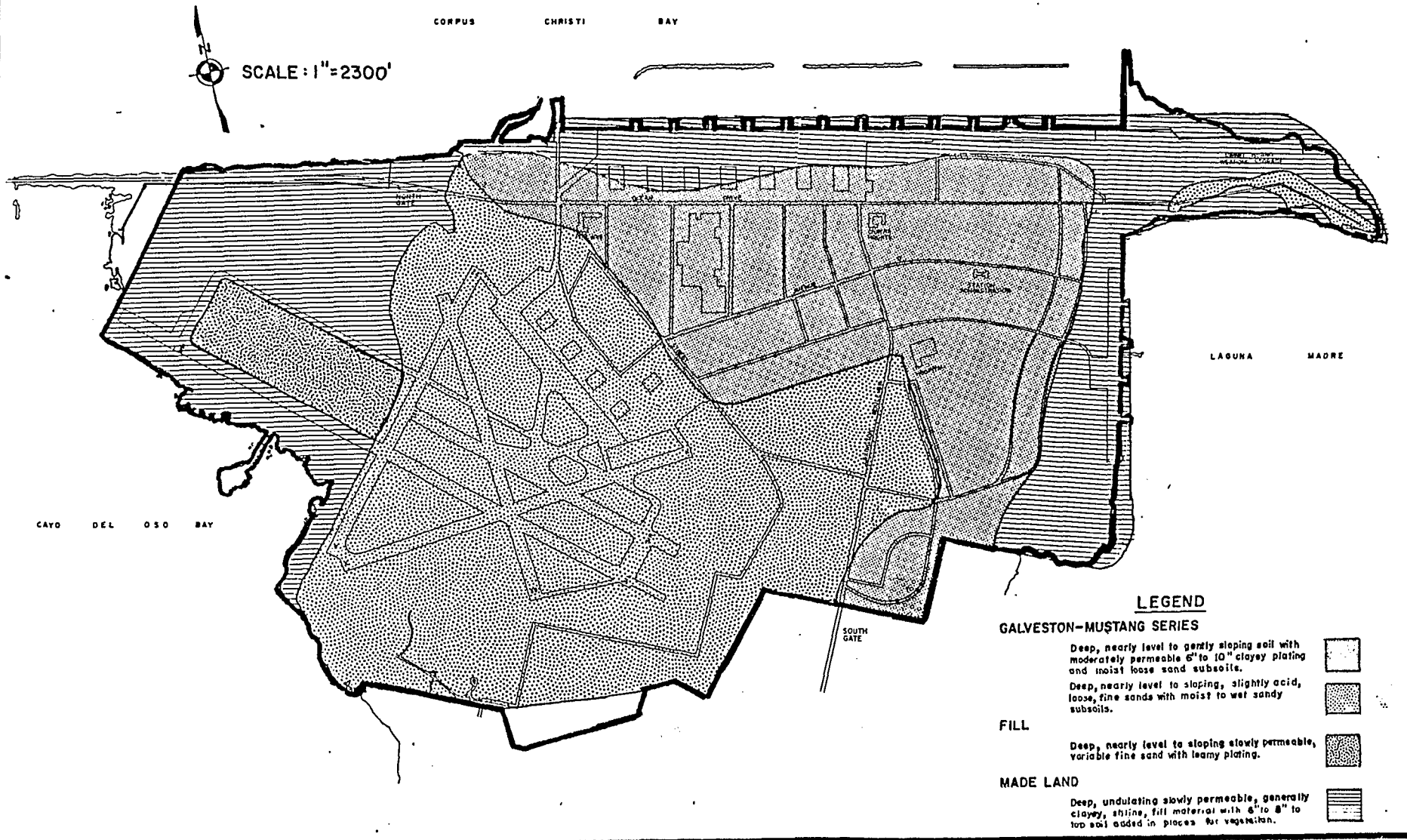


FIGURE 4-8
GENERAL SOIL MAP NAS CORPUS CHRISTI
(After Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

clayey, saline, and covered with six to eight inches of topsoil that has been added locally for vegetative purposes. Made land soils bound the west, north, and east sides of NAS Corpus Christi with Galveston-Mustang series soils found in the central portion of the facility. Fill consists of sandy soil which has been used to raise the original land surface to a uniform height for runway sites.

4.3.4.2 NALF Waldron. Soil conditions at NALF Waldron (Figure 4-9) are similar to those at NAS Corpus Christi. Here, the soils are deep, slightly acidic and composed of loose, fine sand with moist to wet sandy subsoils of the Galveston fine sand series. No Made Land or Fill is present.

4.3.4.3 NALF Cabaniss. NALF Cabaniss is situated on deep, clayey soils that exhibit very slow internal drainage when wet. During dry periods, these clayey soils crack to depths of several feet. Such soils are characteristic of the Victoria Clay. Victoria Clay is the natural surface material over essentially all of NALF Cabaniss with the exception of the immediate vicinity of Oso Creek (Figure 4-10), where gullied saline deposits and tidal flat materials occur. Gullied lands exhibit clayey soils which are severely eroded and locally saline. The tidal flats are composed of sandy and clayey soils.

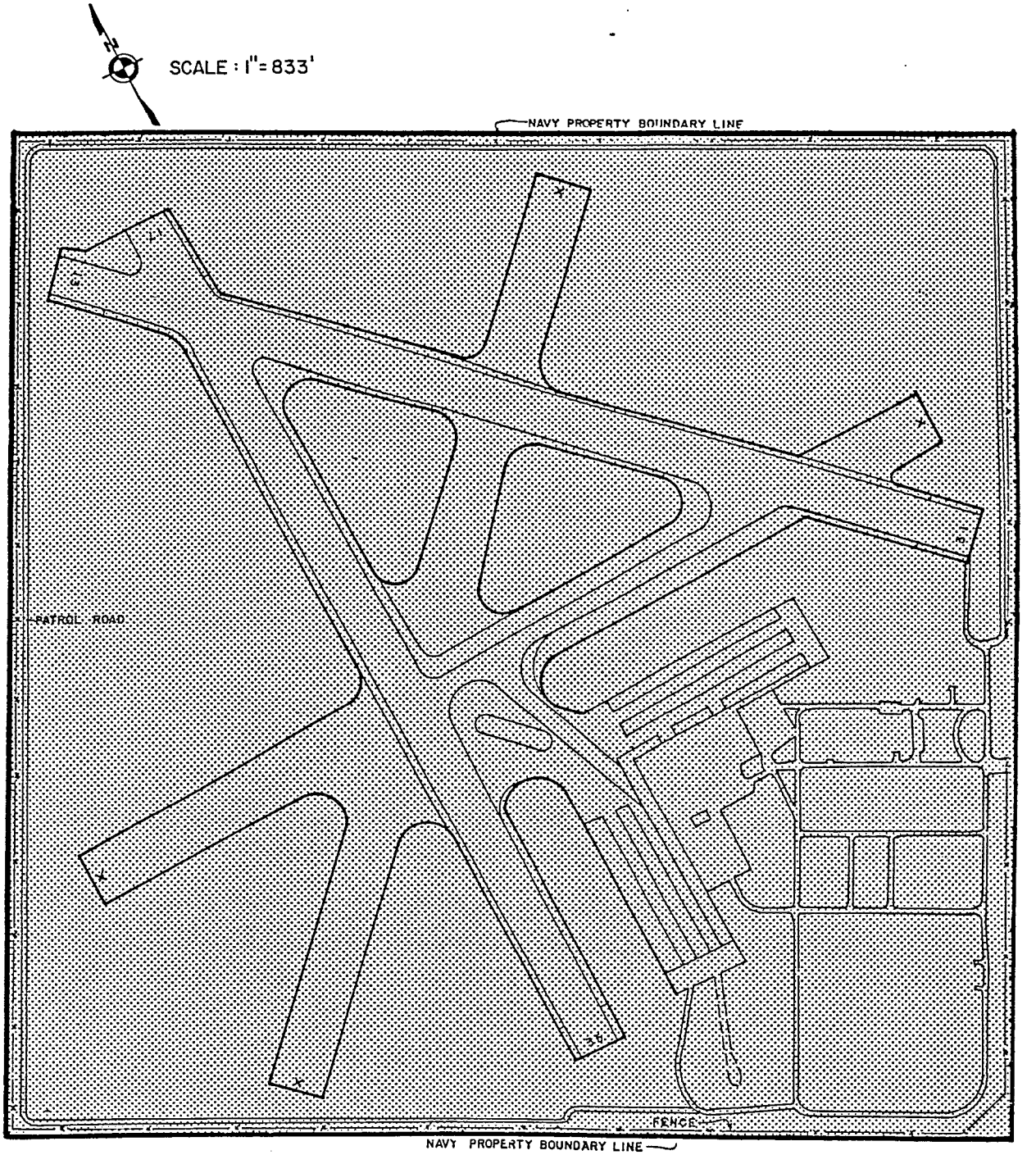
4.3.5 Hydrology and Migration Potential.

4.3.5.1 Surface Waters. NAS Corpus Christi and NALF Waldron are located on the Encinal Peninsula, a topographically flat surface feature bounded on the northwest by Cayo del Oso, the northeast by Corpus Christi Bay, and the southeast by Laguna Madre. Cayo del Oso results from the confluence of the southeasterly-flowing Oso Creek with Corpus Christi Bay. NALF Cabaniss is bounded on the southwest by Oso Creek.

The surface runoff from NAS Corpus Christi is generally to the northeast into Corpus Christi Bay with lesser runoff into Cayo del Oso and Laguna Madre. The distribution of minor drainages around NALF Waldron forms a generally radial pattern supplying runoff to Cayo del Oso and Laguna Madre. Topographic features indicate that all runoff at NALF Cabaniss is southwesterly into Oso Creek. Thus, drainage from this facility ultimately enters Cayo del Oso and Corpus Christi Bay.

Both NAS Corpus Christi and NALF Waldron lie within the affected zone for 100-year frequency hurricane tides. Such tides are estimated to be between +10 and +13 feet MSL in the vicinity of the Encinal Peninsula. Such an event could inundate the north half of Runway 13R-31L of NAS Corpus Christi and much of the maintenance and taxiway area adjacent to Corpus Christi Bay (Figure 4-11). The last major hurricane to cause severe flooding at NAS Corpus Christi was Hurricane Celia (August 3, 1970).

Studies conducted by the U.S. Army Engineer District, Galveston, Texas, indicate a 100-year flood elevation of 50.6 feet MSL at the eastern boundary of NALF Cabaniss and +17.0 feet MSL at the western boundary. General areas of flooding during the 100-year event as shown on Figure 4-12 indicate overbank conditions for Oso Creek and flooding within the Complex area exclusive of runways.



LEGEND

GALVESTON-MUSTANG SERIES

Deep, nearly level to sloping, slightly acid, loose, fine sands with moist to wet sandy subsoils.

FIGURE 4-9
SOIL MAP FOR NALF WALDRON
(After Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

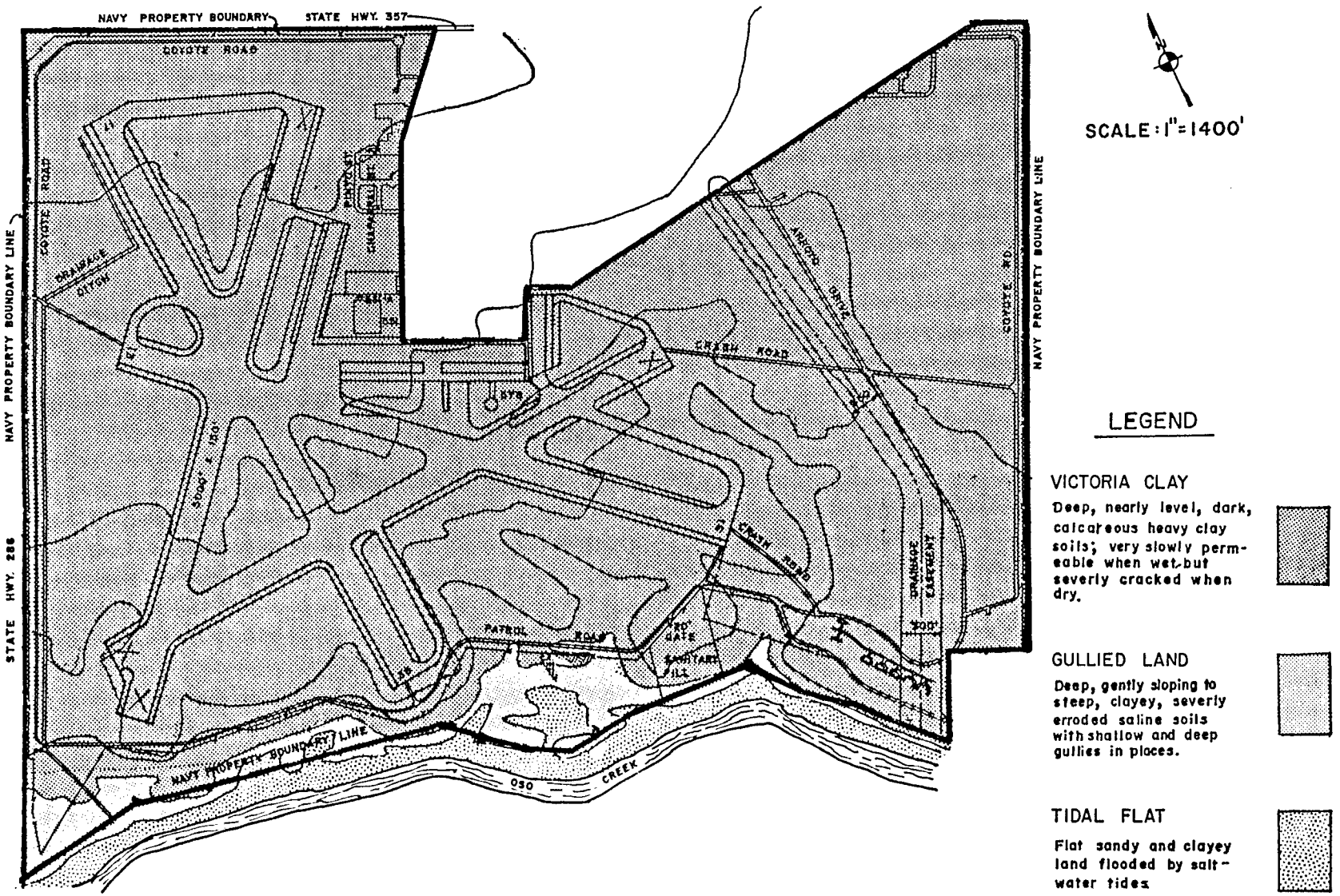


FIGURE 4-10
SOILS MAP FOR NALF CABANISS
(After Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

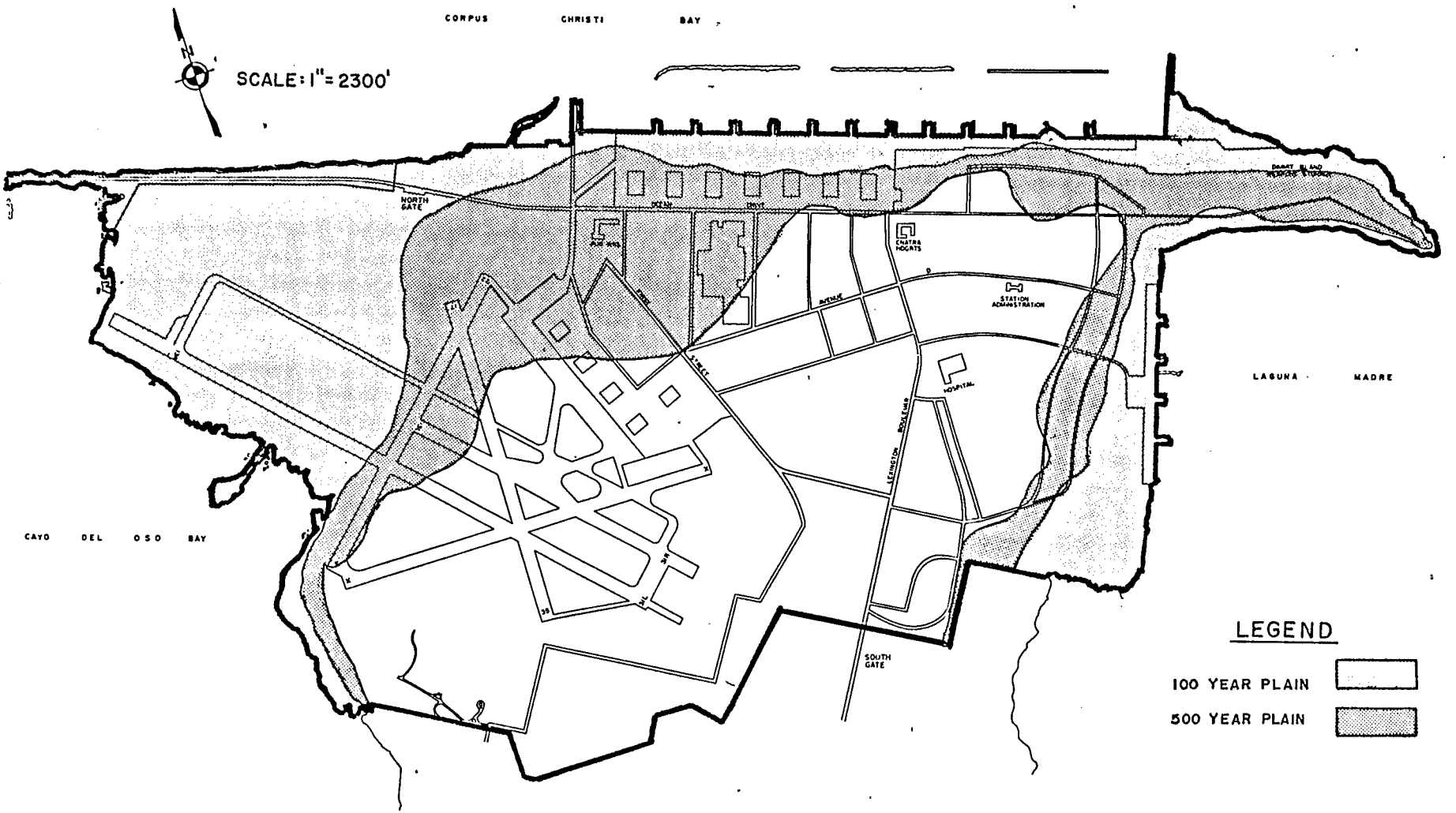


FIGURE 4-11
FLOOD MAP FOR NAS CORPUS CHRISTI
(Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

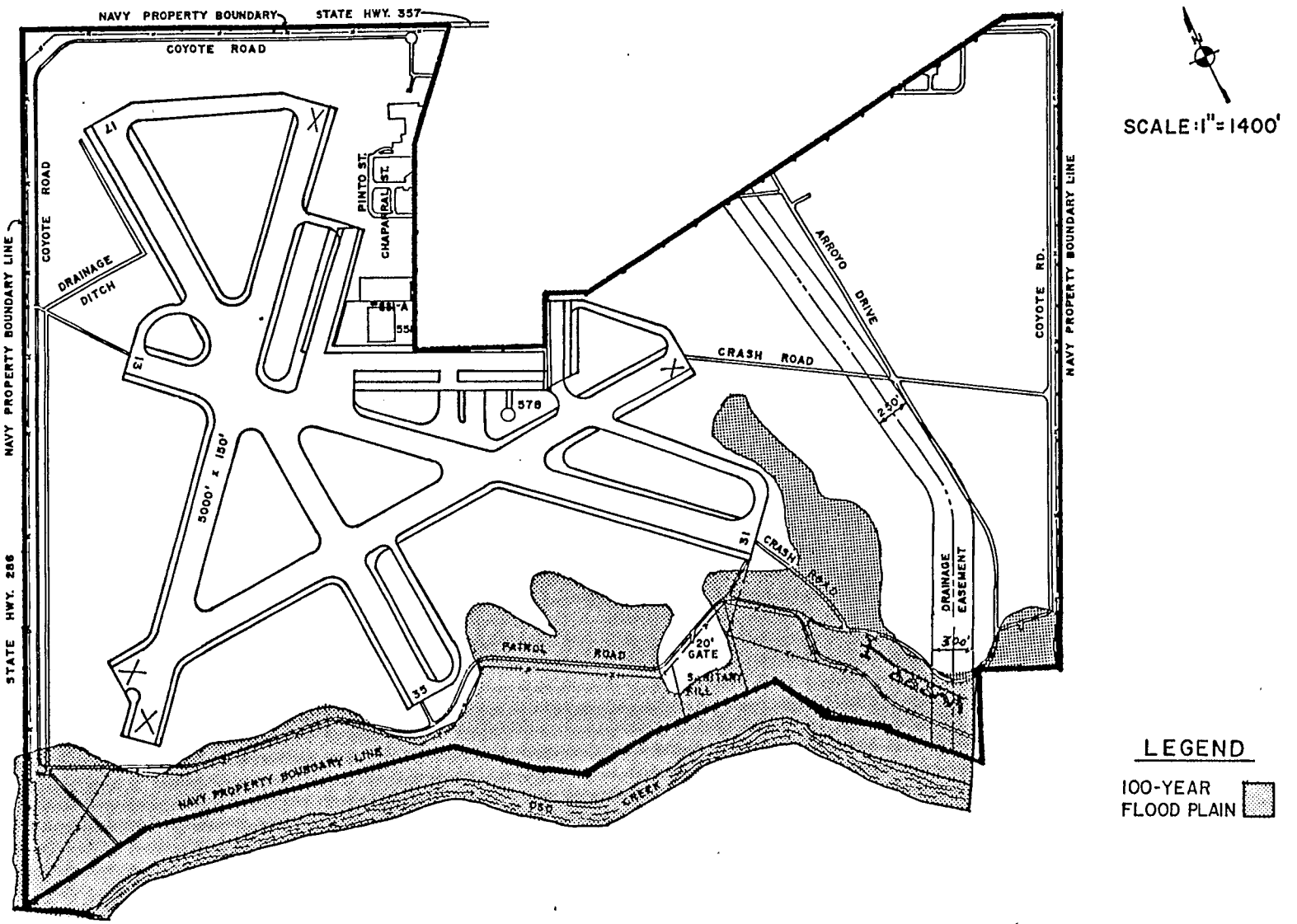


FIGURE 4-12
FLOOD MAP FOR NALF CABANISS
(Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

4.3.6 Hydrogeology. Details of the Corpus Christi area hydrogeology have been published by Woodman and others (1978) and, in a more general sense, by Baker (1978). Water table aquifers consist of unconsolidated alluvium and barrier island deposits of Holocene Age and of the Lissie and Beaumont formations of Pleistocene Age which comprise important units of the Chicot Aquifer system beneath the Corpus Christi area. The Chicot aquifer varies in depth from surface and near-surface to approximately 1,000 feet. Woodman and others (1978) suggest that although no exact distinction between water table and artesian aquifers can be determined, wells greater than 250 feet deep generally encounter artesian conditions. Beneath the Chicot Aquifer and extending to a depth of approximately 2,800 feet is the artesian Evangeline Aquifer of the Pliocene Goliad Sand.

Shallow water table conditions exist within the immediate NAS Corpus Christi and NALF Waldron areas in the upper, sand-dominated units of the Beaumont Formation and unconsolidated Holocene deposits. This sand-dominant material has the highest permeability of material encountered in the Corpus Christi area, with an estimated permeability of 10^{-1} through 10^{-2} centimeter per seconds (cps) (Woodman and others, 1978). Shallow water table conditions are essentially non-existent at NALF Cabaniss which is underlain by the clay-dominant phase (Victoria Clay) of the Beaumont where permeabilities are estimated at approximately 10^{-6} through 10^{-3} cps (Woodman and others, 1978).

The flow net of water table aquifers (Figures 4-13) presented by Woodman and others (1978) indicates a flow direction for the general area to the northeast directly toward Corpus Christi Bay. Equal potential lines indicate water table conditions in this area at less than 10 feet.

Impermeable materials underlying NALF Cabaniss create significant runoff rather than recharge. The proximity of NALF Cabaniss to the Oso Creek drainage suggests that the migration of potential contaminants in this area would be toward Oso Creek (south-southwest).

As indicated by permeability data presented for surficial and shallow soils and shallow geologic units, migration within the NAS Corpus Christi and NALF Waldron vicinities is possible with flow within the saturated zone of the shallow water table aquifer toward Corpus Christi Bay, Laguna Madre, and Cayo del Oso.

Artesian aquifers in the vicinity of NAS Corpus Christi, NALF Waldron, and NALF Cabaniss (Evangaline Aquifer and confined portion of Chicot Aquifer) become increasingly saline with depth. Only fresh to slightly saline (less than 3,000 milligrams per liter total dissolved solids) ground water has a significant potential for development and use. Figure 4-14 shows the approximate elevation of the base of fresh to slightly saline artesian ground water; ground water below this elevation has little potential due to high salinity. At NAS Corpus Christi and NALF Waldron, the base of fresh to slightly saline water is at or above sea level (0 elevation). This represents a very limited potential for fresh artesian water at these sites where surface elevations are low to moderate (NAS Corpus Christi, +15 feet MSL and NALF Waldron, +22 feet MSL). At NALF Cabaniss, no fresh artesian water potential exists.

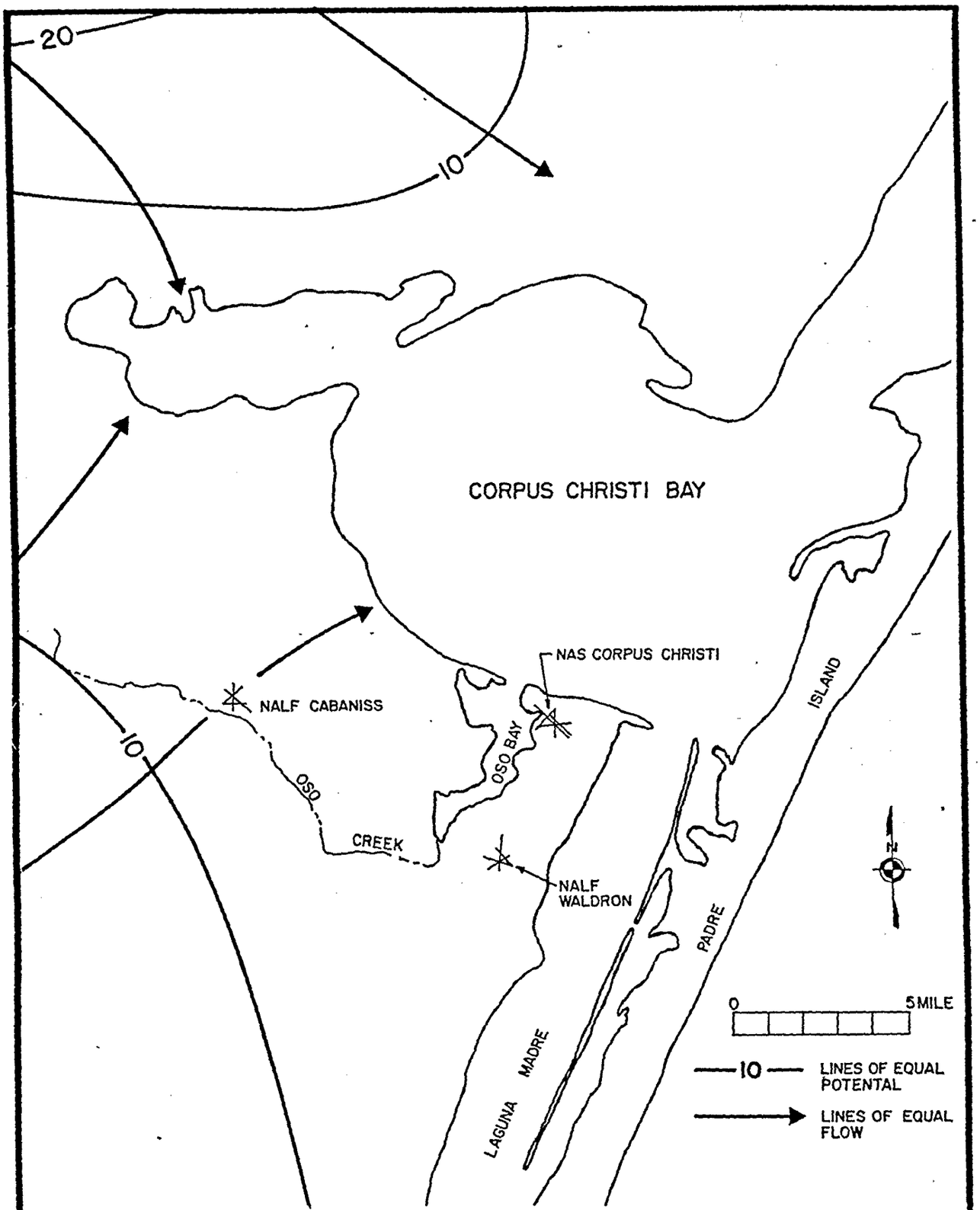


FIGURE 4-13
FLOW NET OF WATER TABLE AQUIFER
(Modified from Woodman and others 1978)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

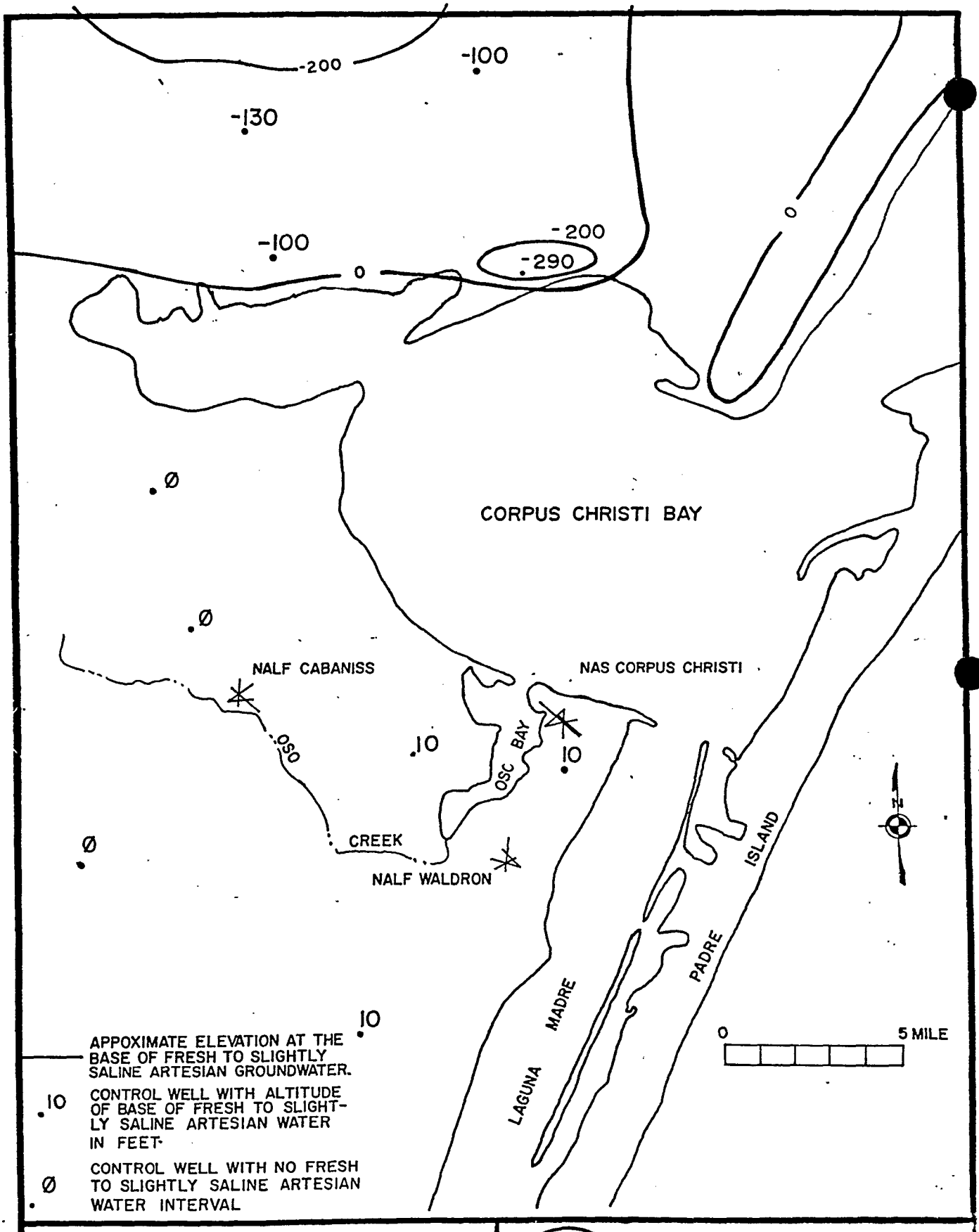


FIGURE 4-14
FRESH TO SLIGHTLY SALINE ARTESIAN GROUND WATER CONDITIONS
(Woodman and others, 1978)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

Flow direction in the artesian aquifer is similar to that for water table aquifer.

Potable water in the NAS Corpus Christi, NALF Waldron, and NALF Cabaniss areas is obtained entirely from surface water impounded in Lake Corpus Christi on the Nueces River near Mathis, approximately 40 miles northwest of the Complex. No active, shallow domestic or livestock wells in near proximity to the facilities were identified in this study. This, coupled with unsuitability of water quality in artesian aquifers and the implied migration of potential pollutants to discharge into Corpus Christi Bay, Laguna Madre, Cayo del Oso, or Oso Creek, implies negligible potential for possible contamination of significant ground water supplies in the vicinity of the facilities.

Ground water data are contained in a report entitled "Assessment of Fugitive Oil Contamination at the Naval Air Station, Corpus Christi, Texas" dated March 1983 by Geraghty and Miller, Inc. This investigation followed a fuel leak in an underground facility in the vicinity of AVGAS/JP4 Tank Farm No. 216. The study was in response to a bookkeeping audit at NAS Corpus Christi which indicated an evident loss of approximately 20 million gallons of fuel over a 40-year period. The Public Works Department initially constructed a large-diameter well that indicated a thickness of 3.4 feet of fuel-saturated sand at a depth of less than 15 feet below surface. Data in this consulting report were generated by the installation of 15 boring observation wells. Laboratory analyses of select samples from boring 2 and 6 gave calculated porosities of 0.52 and 0.44, respectively. In Site 2, hydraulic conductivity tests for wells 5 and 6 indicated conductivities of 2.06×10^{-4} cps and 2.05×10^{-2} cps, respectively. In the restricted area of the study, the shallow ground water appeared to be moving generally westward toward Cayo del Oso. In general, water elevations appeared to be very locally controlled by the specific characteristics of the sub-surface materials; for instance, a low water table observed in Well 12 coincided with more permeable soil, while the water table observed in Well 3 appears to be perched above a thick sequence of low permeability clay.

4.4 BIOLOGICAL FEATURES.

4.4.1 Ecology, Terrestrial and Aquatic Flora and Fauna.

4.4.1.1 Corpus Christi Bay Area. The general ecological environments associated with NAS Corpus Christi, NALF Cabaniss, and NALF Waldron are estuarine marshes and prairie grasslands. The estuarine marshes are dominated by salt tolerant vegetation, such as the cordgrass Spartina (Master Plan, 1983). The areas associated with NAS Corpus Christi and NALF Waldron are comprised of loose sand and loess prairies. Vegetation representative of these areas includes bunchgrasses, scattered oak mottes, and freshwater marshes. NALF Cabaniss is located in an area which is characterized by prairie grasslands. This area is a flat to gently rolling upland consisting of mud and sand substrates. Vegetation indicative of this area includes blue stem, Indian grass, chaparral, mesquite, hackberry, huisache, and cactus (Master Plan, 1983).

Over 500 species of wildlife inhabit the coastal region. This wildlife is represented by upland game, marsh inhabitants, and inhabitants of the marine environment, including finfish and shellfish.

Game species found along the upland areas of the Corpus Christi Bay area include bob-white quail, javelina, white-tailed deer, quail, wild turkey, squirrels, and waterfowl.

Finfish species which inhabit the Corpus Christi Bay area and shorewaters of the Gulf include trout, redfish, and drone. The shallow, vegetative flats used as spawning grounds or nursery areas for finfishes, commercial shellfish, and crustaceans are utilized by speckled trout, redfish, black drone, sheepshead, pinfish, shrimp, and blue crab. Commercially important marine life includes channel bass, pompano, bonita, cobia, black grouper, red snapper, snook, tarpon, oysters, and shrimp.

Marshes, land and riverine habitats support alligators and various fur mammals. Common species include rabbit, skunk, muskrat, and racoon (Master Plan, 1983). Marshes in coastal marine habitats support abundant and diverse rain species and waterfowl. In contrast, other forms of animal life are relatively scarce. Among the representative mammals are rodents, gophers, coyote, and black-tailed jackrabbit. Reptiles include loggerhead turtle, bullsnake, coachwhip, garter snake, and western diamondback rattlesnake (Master Plan, 1983).

Corpus Christi Bay area is located in the middle of the largest migratory route in the United States for waterfowl and other migratory species. Predominant species of migratory waterfowl known to winter in this area include the canvasback, redhead, lesser scaup, American Widgeon, pintail, blue-winged and green-winged teal, shoveler, Canadian goose, and snow goose. Shore and wading birds which nest on vegetative islands in this area include herron, reddish egret, roseate spoonbill, gull, brown and white pelican, ibis, and tern (Master Plan, 1983). Laguna Madre, located southwest of NAS Corpus Christi, supports 70 to 80 percent of the entire redhead (duck) population of the United States during the winter months.

4.4.1.2 NAS Corpus Christi, NALF Cabaniss, NALF Waldron. Inasmuch as most of the areas associated with NAS Corpus Christi, NALF Cabaniss, and NALF Waldron are improved or semi-improved grounds, wildlife habitats are scarce due to the lack of appropriate areas for nesting and foraging. Vegetative cover at NAS Corpus Christi consists of sweet bay, mesquite, native grasses, and a stunted form of live oak (Master Plan, 1983). Grasses established on the improved areas include Bermuda grass, St. Augustine grass, long-stem paspalum, blue-stem, and windmill grass. Common wildlife species include rabbit, skunk, muskrat, racoon, and ground squirrels. Migratory birds and other birds commonly associated with the Corpus Christi Bay area are found infrequently on the NAS Corpus Christi grounds; however, nesting areas are limited or non-existent in most areas.

Present vegetation at NALF Cabaniss consists of bufflegrass, a variety of native grasses and brush species including mesquite, huisache, and landbank bacchris. Grasses established on improved and semi-improved areas include Bermuda grass, St. Augustine grass, long-stem paspalum, blue-stem, and windmill grass. Unimproved areas provide habitats for such wildlife as quail, mourning dove, rabbits, and snakes (Master Plan, 1983).

Vegetative cover at NALF Waldron consists of medium to heavy brushes which are characterized by huisache, mesquite, and willow. Mammals found here include rodents, gophers, coyote, and black-tailed jackrabbit.

4.4.2 Rare, Threatened and Endangered Species, Critical Habitats. The three subject areas, NAS Corpus Christi, NALF Cabaniss and NALF Waldron, support no known rare or endangered species of flora or fauna.

4.4.3 Impacts on Habitats. Because of the improved nature of the ground associated with NAS Corpus Christi, NALF Waldron, and NALF Cabaniss and the activities associated with the facilities, wildlife habitats are limited. Current activities of the three facilities have no adverse effect on wildlife habitats; ruderal areas presently support small populations of wildlife, which include native vegetation, small game, and waterfowl. The U.S. Army Environmental Hygiene Agency Environmental Survey Report (January 1977) cites minor problems in the immediate vicinity of industrial and domestic waste outfalls at NAS Corpus Christi. The report indicates an obvious absence of shoreline algae and sessile fauna in the immediate vicinity of the outfall. The report does note the presence of numerous organisms which thrive in the effluent outwash. These organisms consist mainly of microscopic plants and animals which can quickly repopulate the area after having died off (U.S. Army Environmental Agency, January 1977). This phenomenon appears limited to the outfall area proper and of very little significance to the overall ecology and impact of the Corpus Christi Bay area. The above-referenced report indicates that degradation of the biological community in the outfall area may be attributable to the toxic nature of the outfall itself. One opposing theory is the cyclic influx and outflow of saltwater in conjunction with the outflow of the freshwater discharged from the treatment plant. The constant and abrupt changes in salinity of the area in the vicinity of this outfall (freshwater during low tide and saltwater during high tide) would make it difficult for the establishment of a variety of marine flora and fauna normally associated with the Corpus Christi shoreline areas.

4.5 WATER QUALITY.

4.5.1 Surface Water. Lotic (moving water) and lentic (still water) systems are non-existent at the NAS Corpus Christi as well as at NALF Waldron and NALF Cabaniss. However, three major water bodies are associated with NAS Corpus Christi. These are Corpus Christi Bay, Cayo del Oso, and Laguna Madre.

Due to the relatively shallow nature of Corpus Christi Bay, occasional periods of high wind re-suspend bottom sediments, causing a turbid condition in the Bay. Water quality within the Bay meets all Texas Water Quality Board standards established for contact and non-contact recreation, and for the propagation of fish and wildlife (Master Plan, 1983). Although areas of localized waste problems are known to exist, pollution is not a general problem for the Corpus Christi Bay system.

Oso Bay is a flooded riverbed adjacent to the NAS Corpus Christi and the southern extent of Corpus Christi Bay. It is separated from Corpus Christi Bay by a barrier island. Hydrologic recharge is provided to Oso Bay via tide and rainfall. The primary source of urban discharge affecting Oso Bay is the Oso Sewage Treatment Plant which discharges directly into the Bay. Runoff from the adjacent watershed is modified by urban and agricultural activities.

Laguna Madre is a long, narrow body of water which stretches in a northeast-southwest direction and is located to the east of Corpus Christi Bay in the Naval Air Station. Laguna Madre is separated from the Gulf of Mexico via a barrier island system, which includes Mustang Island and Padre Island in the Corpus Christi Bay area. The lagoon is narrow with an average three-foot depth throughout its three-mile width in the northern section. Water conditions in the lagoon are characterized by hypersalinity, attributed to the absence of freshwater streams, curtailed water circulation in the shallow depths, and rapid evaporation. The use of pesticides in the agricultural community of the Corpus Christi Bay area has posed problems in the lower Laguna Madre area. DDT levels have been reported to be extremely high in tributary inlets discharging in the Laguna Madre (Master Plan, 1983).

Although no surface water systems are associated with any of the three subject airfields proper, NALF Cabaniss is bordered by Oso Creek along its southern boundary. Oso Creek, a part of the Nueces River Basin System, drains directly into Cayo del Oso. General water quality for the creek can be characterized as similar to the west Gulf Coastal Plain section of the Nueces River Basin. Water quality of these streams varies from poor to excellent. During low flow conditions, the water is generally high in dissolved solids, of which sodium and chloride are predominant. During occasional high flow conditions, dissolved solid concentrations are low and calcium and bicarbonate are the principal constituents (Kunze, 1971).

4.5.2 Ground water. Ground water levels associated with the NAS Corpus Christi area are located approximately one meter below surface level. The water table is in a sandy material just above clay and is slightly saline. Ground water quality in the NAS Corpus Christi area is poor due to the saline condition of the water. This ground water is not generally utilized for potable water supplies, for irrigation, or livestock watering.

4.6 WATER SUPPLY. The potable water supply for NAS Corpus Christi, NALF Waldron and NALF Cabaniss is obtained from the city of Corpus Christi. The city of Corpus Christi obtains its water for the supply system from the Nueces River system, which is impounded into a reservoir, making up the Corpus Christi Lake located approximately 40 miles northwest of NAS Corpus Christi. Water is received at NAS Corpus Christi via a 20-inch main at an approximate pressure of 50 pounds per square inch gauge. The distribution lines on the base are 12-inch diameters, with a 16-inch feed line for an emergency fire pump. NAS Corpus Christi's storage capacity includes eight million gallon total ground reserves and a 200,000-gallon elevated reservior (Master Plan, 1983).

4.7 ADJACENT LAND USE.

4.7.1 NAS Corpus Christi. NAS Corpus Christi is surrounded on three sides by water: Corpus Christi Bay, Oso Bay, and Laguna Madre. Corpus Christi Bay is located to the north of the Naval Air Station, Oso Bay to the west and Laguna Madre to the east. The area to the south of the base has a moderate density of residential areas with some commercial and mixed development (Master Plan, 1983). Acreage directly adjacent to the base on the southern boundary has very limited residential development due to the clearance zones for flight approaches to the runways.

4.7.2 NALF Waldron. The land adjacent to NALF Waldron consists mostly of unimproved pasturelands with scattered areas of residential development. The bulk of this development is located to the north and east of the airfield with extremely limited development on the west and south boundaries.

4.7.3 NALF Cabaniss. Land usage adjacent to NALF Cabaniss is primarily agricultural with some low density residential. Primary areas of residential development are located to the northeast of the airfield. Directly adjacent to the western boundary of the field is the city of Corpus Christi Sanitary Landfill. Bordering the southern boundary of NALF Cabaniss property is the Oso Creek, which drains directly into Oso Bay. Figures 4-15, 4-16, and 4-17 depict the adjacent land use for the three subject project areas.

4.8 LEGAL ACTION. No past hazardous material-related legal claims against NAS Corpus Christi were identified during the survey. According to the NAS Corpus Christi Legal Claims Office, no claims of interest to the survey have occurred in the immediate past, and none of the personnel interviewed could recall any mention of such claims at any time in the operation of NAS Corpus Christi.

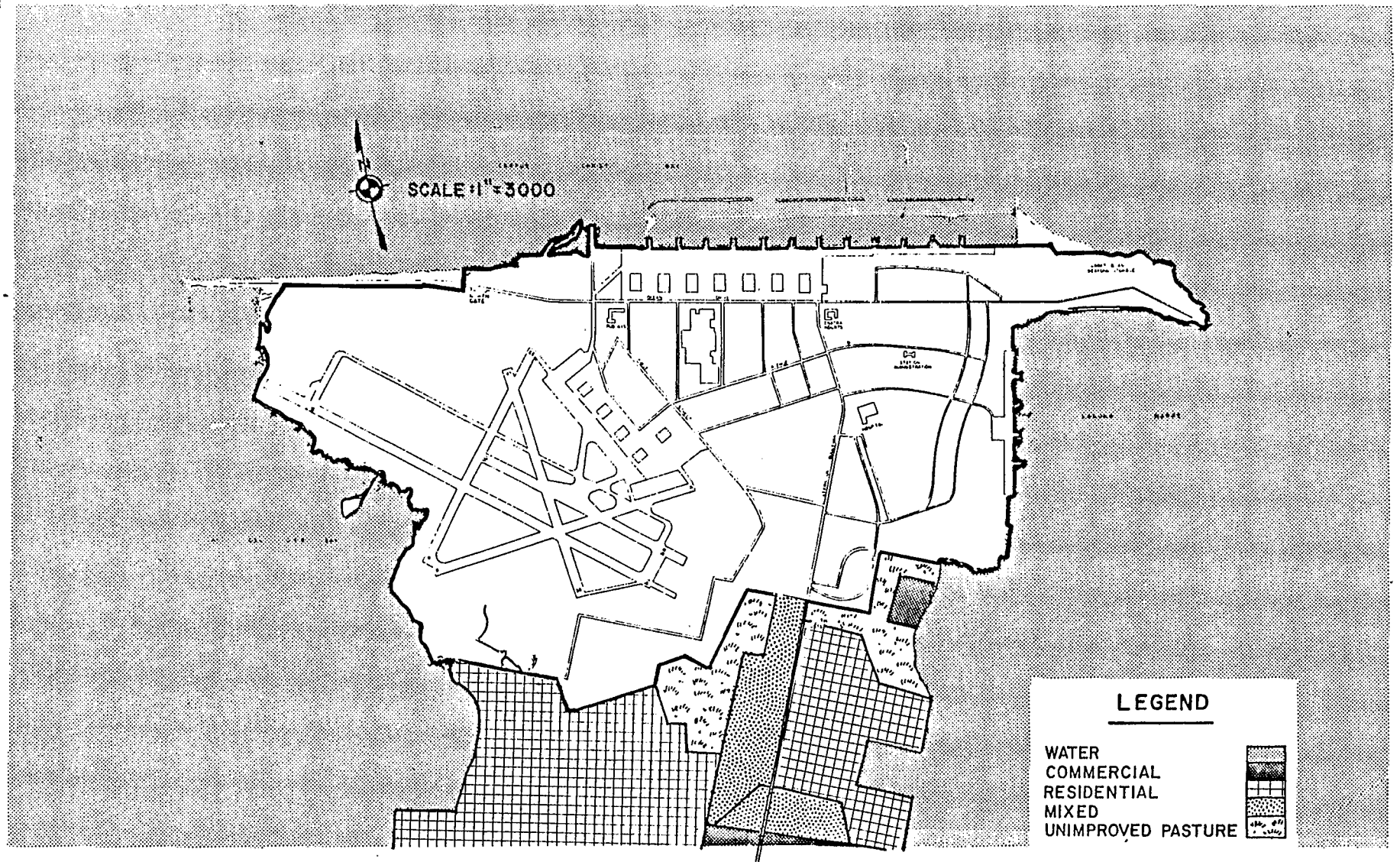


FIGURE 4-15
ADJACENT LAND USE MAP NAS CORPUS CHRISTI
(Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

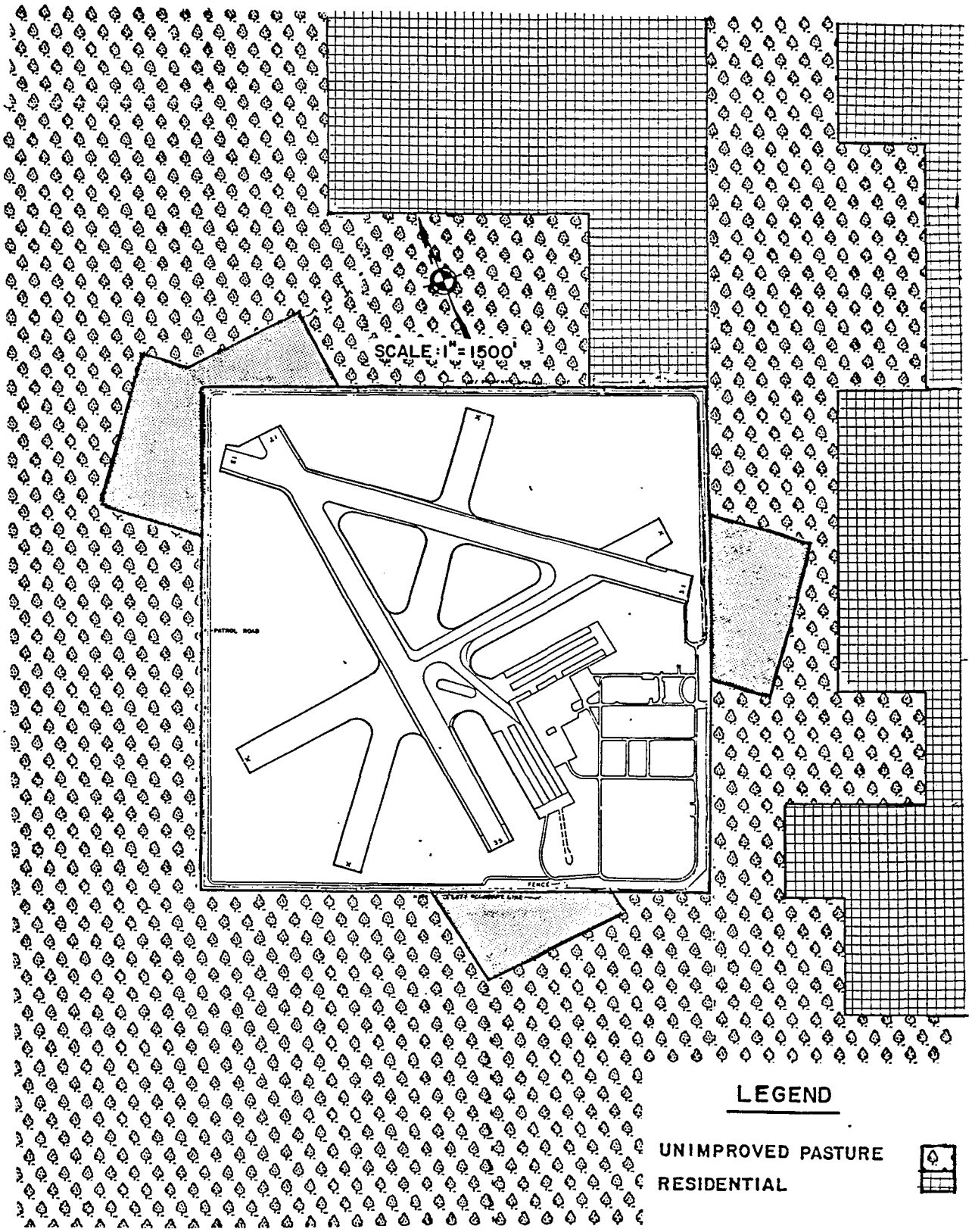


FIGURE 4-16
ADJACENT LAND USE MAP NALF
WALDRON
(After Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

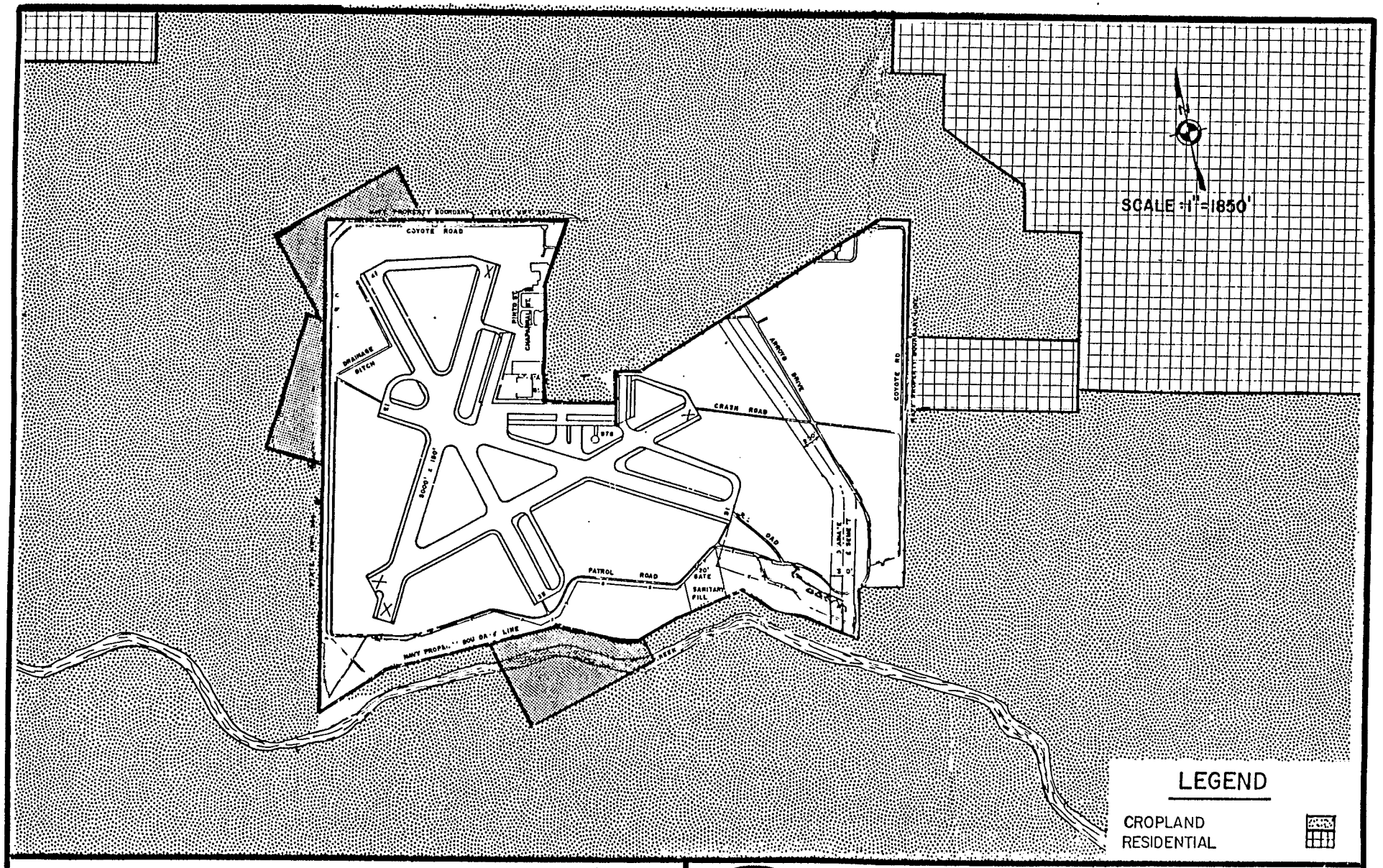


FIGURE 4-17
ADJACENT LAND USE MAP NALF CABANISS
(After Master Plan, 1983)

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

CHAPTER 5. WASTE GENERATION

5.1 GENERAL. The organizations responsible for waste generation at NAS Corpus Christi are: the Aircraft Intermediate Maintenance Department (AIMD), Operations Maintenance Department (OMD), Beech Aerospace Services Incorporated (BASI), Public Works Department (PWD), Naval Regional Medical Center (NAVREGMEDCEN), U.S. Coast Guard Air Station (USCG), and Corpus Christi Army Depot (CCAD). The major waste-generating activity is CCAD, which generates 80 to 90 percent of the waste materials at NAS Corpus Christi.

Two auxiliary landing fields supplement the pilot training activities conducted at NAS Corpus Christi: Naval Auxiliary Landing Field (NALF) Cabaniss and NALF Waldron. Located northwest of NAS Corpus Christi, NALF Cabaniss operations consist of control tower and aircraft fire fighting facilities. All operations are accomplished by a staff of five to ten personnel. NALF Waldron is located four miles south of NAS Corpus Christi and provides the same functions as NALF Cabaniss with similar staffing levels. Very little waste is generated at these facilities, nor have any waste-generating operations existed in the past.

5.2 PUBLIC WORKS DEPARTMENT (PWD). The PWD has been a part of NAS Corpus Christi since NAS Corpus Christi was established in 1941. The PWD Complex is located between First and Second Streets just south of Ocean Drive. Wastes are generated within the PWD as a result of maintenance activities conducted on equipment owned by PWD and other NAS Corpus Christi tenants.

5.2.1 Water Treatment Plants. The operation of the potable water system is confined to pumping water supplied by the city of Corpus Christi from the various storage locations to the point where the water will be used at NAS Corpus Christi. No hazardous wastes are generated from these activities.

5.2.2 Boiler Plants. The main steam generation facility is located at Building 13. The plant has a total capacity of 140,000 pounds per hour. The primary fuel source for the four 750-horsepower boilers located at the building is natural gas. In addition, the plant has two above-ground 400,000-gallon fuel oil tanks which provide a standby fuel source. Boiler blowdown from the main plant is discharged to the Industrial Waste Treatment Plant (Section 7.3).

In 1978 a project was undertaken to upgrade the main boiler plant. All the pipe insulation was removed and replaced with new insulation. Asbestos insulation removed from the pipe was disposed of at an off-base landfill.

In addition to the main boiler plant, there are 18 satellite boilers. These boilers are maintained by Utilities Division Staff. Table 5-1 is a partial list of the location and fuel type for the boilers.

TABLE 5-1

SATELLITE BOILERS

LOCATION	FUEL TYPE	COMMENTS
Building 12	No. 2 fuel oil	2 boilers; 20,000 gal fuel tank
Building 90	Natural gas	
Building 141	No. 2 fuel oil	2,000 gal tank
Building 1	No. 2 fuel oil	Used for heating; 2,000 gal tank
Building 89	Natural gas	
Hangar 55	Natural gas	
Hangar 56	Natural gas	
Hangar 57	Natural gas	
Hangar 51	Natural gas	
Hangar 58	Natural gas	
Building 252	Natural gas	Heating
Building 119	Natural gas	Heating
CPO Club	Natural gas	Hot water
Building 1282	Natural gas	
H-100	No. 2 fuel oil	3 boilers; Two-20,000 gal tanks

Fuel tanks used at the satellite boiler locations are all underground. No cleaning of these tanks has been undertaken. When cleaning is required, the work will be done under contract.

Blowdown from all the satellite boilers is discharged to the storm drainage system near each boiler location. Sludge from cleaning of main and satellite boilers is collected in drums and transported to the Industrial Waste Treatment Plant.

5.2.3 Electrical Shop. The electrical shop, Building 19, is responsible for maintaining the electrical distribution system and electrical equipment at NAS Corpus Christi. Major waste materials of concern generated by this shop are transformer coolants which contain polychlorinated biphenyls (PCBs). The PCB-containing fluids are not removed from the transformers by PWD maintenance staff. A total of 257 PCB transformers are still located on NAS Corpus Christi (Appendix C). The transformers that have been removed in the past have been stored by Defense Property Disposal Office (DPDO) on the NAS Corpus Christi in buildings designed for hazardous wastes prior to off-base disposal. As many as 155 PCB transformers have been disposed of over the past three years. Around 1980, transformer coolant containing PCB was spilled at the DPDO scrap yard. The area where the spill occurred was cleaned up and contaminated material was drummed for off-base disposal.

In addition to the PCB transformers, approximately 50 gallons of spent solvents are generated by the electrical shop annually; these are transported to DPDO. A few dozen aerosol paint cans are also generated from limited painting which occurs.

5.2.4 Air Conditioning Shop. The air conditioning shop is responsible for preventive maintenance and repairs for air conditioning systems located at NAS Corpus Christi. Waste materials generated by this shop are freon and oil drained from compressor units. This oil, which amounts to less than 100 gallons per year, is placed in 55 gallon drums for disposal by DPDO.

5.2.5 Maintenance Paint Shop. The paint shop conducts painting on items generated by the woodworking shop such as signs and furniture. Wastes generated from the paint shop are paint sludges, solvents and thinners. The waste material is collected in drums and picked up by a contract disposer. Disposal by contract has been conducted for approximately six years. Prior to this method of disposal, the material was collected in drums and transported to DPDO for disposal. Approximately 300 gallons of paint sludges and mixed solvents are generated yearly. Larger quantities of wastes were generated in the past when the operation was larger and fewer water-base paints were available.

5.2.6 Woodworking Shop. No measurable quantities of hazardous waste are generated by the woodworking shop.

5.2.7 Metal Trades Shop. The metal trades shop contains a number of machines used for the grinding, cutting, and shaping of metals. The primary wastes generated by the shop are metal shavings and scrap metals. Cutting oil used in the machinery requires replenishing as a result of dragout on the pieces of metal being worked on. Reportedly, no substantial quantities of cutting oil are collected and disposed of from the shop.

5.2.8 Pipe Shop. The pipe shop provides minor maintenance and construction on the piping systems at NAS Corpus Christi. Waste materials generated from the shop include small amounts of various piping materials, pipe shavings, and cutting oil.

Metal cuttings and shavings are separated by composition, drummed, and sent to DPDO for resale. Other waste generated from the shop has always been placed in dumpsters for disposal. Cutting oil is generated as dragout from pipe threading operations conducted in the shop.

5.2.9 Transportation Paint and Body Shop. The paint and body shop generates 400 to 600 empty paint containers per year which are placed in dumpsters. Spent solvents are disposed of by DPDO.

5.2.10 Garage. Wastes are generated from maintenance related activities on 326 pieces of equipment. Oil generated from maintenance activities has always been stored in a 500-gallon tank until full and then transported to DPDO for sale. Less than 500 gallons per year of oil are generated by shop activities. In addition, the shop generates approximately 25 gallons of spent solvents, 200 gallons of waste battery acid, 200 pounds of degreasing sludge, and 100 gallons of waste fuels on an annual basis, which has always been disposed of by DPDO.

5.3 OPERATION MAINTENANCE DIVISION (OMD). In 1979 the OMD was moved from Building 42 to Building 58. The division has 87 enlisted men and one civilian who are engaged in helicopter and aircraft maintenance. A minimal amount of touch-up painting (1.5 gallons per month) is conducted in the hangar using approximately three gallons per month of thinner. The shop also generates approximately 100 gallons per year of oil and grease waste from aircraft lubrication activities. Turco G850-05-045-7931 is used at the shop wash rack on the north side of the building at a rate of approximately 200 gallons per year. The discharge from the wash rack goes to the sanitary sewer. Paint strippers are very seldom used. It is estimated that approximately one gallon of alodine in a 1:10 ratio with water is used per year.

5.4 OPERATIONS FIRE DEPARTMENT. The Fire Department has maintained a fire fighter training area east of the DPDO scrap yard since approximately 1965. A tank of approximately 1,000-gallon capacity is used to store waste fuel for this operation. A mixture of AVGAS and JP4 fuel is used to generate fires which are then extinguished for training purposes. Estimated usage for the site has been approximately 3,000 gallons per month for a five-to six-month period each year.

A clay base was added to the bottom of the pit in 1973. Reportedly this construction was carried out by the Public Works Department. Prior to this time, no provisions for containment of the fuel existed. Prior to its use as the fire fighter training area, the site was a portion of one of the early landfills.

5.5 AIRCRAFT INTERMEDIATE MAINTENANCE DEPARTMENT (AIMD). AIMD maintains approximately 80 aircraft, mainly T-28s (73). According to station personnel, 141 aircraft were maintained in 1954. Waste oil generated by the maintenance operations is discharged to a 100-150 gallon bowser. It normally takes approximately six months to fill the bowser. The oil has always been disposed of through DPDO.

Approximately 100 lead acid batteries are serviced each month. These operations generate approximately 15 gallons of waste electrolyte each month.

Since 1968 the material has been drummed for disposal at the Industrial Pretreatment Plant. Current personnel are unaware of the disposal methods prior to 1968, but assume waste electrolyte went to DPDO. In addition to the waste electrolyte, approximately 20 waste batteries are generated from the battery maintenance operations and transported to DPDO for disposal. AIMD employs a paint booth for maintenance painting. Painting currently generates two gallons of thinner per month which is placed in a waste barrel for transport to DPDO each month. Ten to twelve years ago, several times this quantity was generated.

5.6 BEECHCRAFT AEROSPACE SERVICES INCORPORATED (BASI). BASI has been at NAS Corpus Christi for seven years. Approximately 140 people work during three shifts. BASI is responsible for maintenance of aircraft from training wing 31 and 28. Painting wastes generated from operations include two to three gallons per week of paint and five to ten gallons of thinner and solvents per week. Wastes are segregated and stored in drums and transported to DPDO. In addition, MEK, Toluene, Naptha, Varsol, and hydraulic fluid wastes are generated from maintenance operations. Six to eight 55-gallon drums are

generated every two weeks. The training wing has a contract for disposal. Waste engine oil generated by the operation amounts to approximately 20 gallons per week.

5.7 CORPUS CHRISTI ARMY DEPOT (CCAD). CCAD has been located at NAS Corpus Christi since 1961. Its mission is the complete overhaul, repair, modification, and test of rotary wing aircraft. Major growth in operations at CCAD occurred between 1961 and 1966. The largest portion of the waste generated (80 to 90 percent) at NAS Corpus Christi results from operations conducted by CCAD. Hazardous wastes are generated from a number of industrial operations conducted in Building 8. A brief description of the activities follows.

Plating Shop-- Contains 82 process tanks and 67 rinse tanks with capacities from 45 to 951 gallons, with a total capacity of 41,600 gallons. Metals in solution include cadmium, chromium, copper, lead, nickel, and silver. Estimates indicate this shop accounts for approximately 30 percent of the liquid to the NAS Corpus Christi Industrial Treatment Plant.

Engine Cleaning Shop-- Contaminated rinsewater results from alkaline cleaning, acid cleaning, emulsion cleaning, degreasing, carbon removal and stripping of aircraft engines, transmissions, and rotor heads. The quantity of wastes generated from this shop is estimated to be 16 percent of the flow to the Industrial Treatment Plant.

Air Frame Cleaning Shop-- Contaminated rinsewater results from steam cleaning, paint stripping, corrosion removal, and chromate conversion coating of air frames. The air frame cleaning shop generates approximately 10 percent of the waste discharged to the Industrial Treatment Plant.

Miscellaneous Testing-- Transmission testing cells, miscellaneous engine components testing, structural support shop, engine container repair shop, and heat treat shop generate small amounts of rinsewater for cleaning engine parts and non-contact cooling water.

Appendix B contains information of the typical annual chemical usage at CCAD and annual waste production rates at CCAD.

Prior to 1975 when the Industrial Wastewater Treatment Plant became operational, liquid waste from CCAD was discharged to the storm sewer system. In addition, reportedly 3,000 to 5,000 gallons of liquid waste were disposed of weekly at the DPDO Landfill and CCAD Liquid Waste Disposal Area prior to 1972.

Estimates of typical solid waste generated by CCAD indicated approximately 7,800 uncompacted cubic meters of lumber, sludges, sawdust, and cardboard are generated each month. The composition of the waste is as follows.

Mixed Refuse	3,105 cubic meters
Lumber	547 cubic meters
Metal	367 cubic meters
Sludges	135 cubic meters
Sawdust	303 cubic meters
Cardboard	3,364 cubic meters

The material was disposed of at the on base landfills until approximately 1979 when the last landfill was closed.

5.8 NAVAL REGIONAL MEDICAL CENTER. The Naval Regional Medical Center (NAVREGMEDCEN) consists of a 195-bed hospital and a number of clinics contained within a single structure on 32.2 acres of land within NAS Corpus Christi. The mission of the NAVREGMEDCEN is to provide general clinical (out-patient) and hospitalization (in-patient) services for active duty Navy and Marine Corps personnel and for active duty members of other Federal Uniformed Services.

5.8.1 Medical. Services available at the hospital include general surgery, nursing, orthopedic care, blood collection and exchange, obstetrics and gynecology, radiology, psychiatry, and alcohol recovery.

The existing hospital building has been occupied since 1974. From 1941 to 1974 medical services were provided in a much larger, spread-out hospital complex located due south of the existing structure. The buildings were heavily damaged by Hurricane Celia in 1970. NAS Corpus Christi decided to build a new hospital rather than repair all of the damage done to the old hospital complex. Construction took three to four years and during that time limited medical services were provided in the "patched-up" buildings of the old hospital. There was also an old dispensary in Building 17 which was used until 1974.

The waste streams of concern in the existing NAVREGMEDCEN are solid waste, wet garbage, pathological wastes, spent photographic fixer, waste chemical solvents, waste pharmaceuticals, and low-level radioactive waste. Solid wastes such as paper, laboratory wastes, and empty chemical containers are collected from the hospital by a local contractor and deposited in the local city landfill. Most wet garbage generally ends up in the sanitary sewer system via a disposal grinder. Some empty chemical containers are returned to NAS Corpus Christi Supply for disposal.

Pathological wastes at the NAVREGMEDCEN consist of bacteriologically contaminated laboratory wastes (petri dishes of cultures), bandages, and general trash from isolation patients. These wastes may vary in volume from a pound to several pounds per day. Since about 1960, pathological wastes have been disposed of locally. They are autoclaved for sterilization and deposited in the general trash. Any tissue samples from the operating room are sent to Brooke Army Medical Center in San Antonio or Memorial Medical Center in Corpus Christi for analysis. All autopsies have been contracted out to the county coroner, so no organs or other autopsy samples are disposed of directly from NAVREGMEDCEN. Before 1960, pathological wastes and tissue samples were disposed of in an incinerator in the old NAVREGMEDCEN hospital.

Spent photographic fixer from the radiology department, the dental clinic, and hospital photo labs is collected by hospital Medical Repair, and the silver is extracted by a filtration process. The hospital Supply Department weighs the silver and then turns it over to the DPDO salvage yard for sale through the Battle Creek, Michigan or Colts Neck, New Jersey, DPDMRO. Amounts salvaged vary from several ounces to a few pounds per quarter.

Spent or contaminated chemicals are taken to the NAS Corpus Christi Industrial Waste Treatment Plant for disposal. Approximately 10 gallons of solvents per year are taken to the plant. Waste pharmaceuticals have always been disposed of either in the general trash or at the Memorial Medical Center in Corpus Christi.

At one time in 1980, a covered pea gravel bed, 20 feet by 20 feet, adjacent to the existing hospital property was used for disposal of volatile solvents. Solvents were poured over the gravel and allowed to evaporate or to seep into the ground through the gravel. Apparently no more than 20 gallons of xylene, acetone, ethanol, and methanol were disposed in this fashion. Stocks of ether may have been disposed of in the same manner when the hospital stopped its use.

At present, the gravel bed is enclosed by a cyclone fence and is used for storage of miscellaneous contractor equipment such as cable spools. The roof over the area has been removed. There is no evidence of any damage done by the solvents or of any need for remedial cleanup action by NAS Corpus Christi.

Low-level radioactive wastes are generated in small amounts by the Nuclear Medicine Department. At the present time technetium, iodine, and cobalt are used for diagnostic scans and thyroid treatment in very small quantities and infrequently (five to ten per year). Solid wastes, such as empty containers and contaminated syringes, are stored in barrels for ten half-lives. When measurable radioactivity is at background levels, the wastes are added to the general trash. This procedure has been followed at least since 1977, the earliest date on the low-level radioactive waste log kept in the laboratory. Human wastes from these tests, such as urine and blood, are discharged according to NRC license in the sanitary sewer system.

An in-vitro radioactive laboratory operated at NAVREGMEDCEN for a few years in the late 1970s and early 1980s. It was shut down in 1982 due to expense of operation and additional costs of work needed to upgrade the laboratory. There were no radioisotopes used in the old hospital.

The only other hospital waste stream of note comes from the air conditioning cooling towers. At the present time, sodium hexametaphosphate is added to the cooling towers to control algal and bacteriological growth. The overflow or discharge from the towers goes into the storm sewer and into the bay. Prior to 1975, chromates were used for this purpose.

5.8.2 Dental. The dental clinic is a tenant activity which is housed in the NAVREGMEDCEN Complex. It provides a full range of general dental services to active duty personnel. The previous dental facility was also located in the old NAVREGMEDCEN. It was used until 1974.

Wastes from the dental clinic which are of concern to this study include waste amalgam scraps and spent photographic fixer from X-ray developing equipment. The spent fixer is collected in 5-gallon containers and is disposed of through the hospital Radiology Department.

Amalgam scraps are collected in coffee-can size metal containers with HgX solution to keep mercury vapors down. The containers are taken down to Medical Repair where the HgX solution is poured off for reuse and the amalgam is dried out. The dried amalgam is taken to the pharmacy where it is weighed and transfered by Hospital Supply to the DPDO salvage yard for salvage. Prior to 1980, the amalgam and silver were sent to DPDO at Colts Neck, New Jersey, or Battle Creek, Michigan. These procedures were used at the dental clinic in the old hospital.

A Mercury Control Safety Program was started for the dental facilities in April 1979. It entails the use of a specific type of vacuum system to clean up spills. This equipment is also used when any mercury switches are broken. Since February 1983, the mercury used in amalgams has been received in pre-mixed capsules. The amalgam is formed by shaking the capsules before they are opened, so spills of elemental mercury are highly unlikely in the dental offices. A new form of waste was created by this procedure. The mercury-contaminated empty plastic capsules are being stockpiled and will have to be disposed of in some yet to be determined safe mannner.

5.9 COAST GUARD AIR STATION. Coast Guard Air Station, a tenant activity of NAS Corpus Christi, is a part of the Corpus Christi Coast Guard group, organized in early 1978. The Coast Guard Air Station and the Coast Guard Air Group are located together in Hangar 14 on the NAS Corpus Christi property. The missions of the Coast Guard facility include search and rescue, maintenance of navigation aids, marine drug smuggling interdiction, fisheries law enforcement, and marine environmental protection. The rescue center of the Coast Guard Air Station became operational on 15 October 1980 and the Communications Center, which is now in use, became operational during the following spring. Industrial activities on the Coast Guard Air Station are very limited and consist of sandblasting, painting and welding. All waste generated on the Coast Guard activity is removed under contract with the Navy. The Navy utilizes an outside contracter for disposal of all waste.

5.10 NALF CABANISS. No waste-generating activities are currently in operation at NALF Cabaniss; however, two areas which had waste production potential were in operation in the past.

5.10.1 Cabaniss Abandoned Sewage Treatment Plant. The abandoned sewage treatment facility was located in the southeast corner of NALF Cabaniss. This facility was used for treatment of wastewater generated at Cabaniss in the 1940s. The facility was reportedly used for only a short time prior to connection to the city of Corpus Christi sanitary sewer system. The treatment plant had two concrete digesters, sludge drying beds, and a control room. It is not known where sludge from this facility was disposed.

Deterioration of soil conditions in the area of the digesters has caused one of the units to tilt approximately 20 degrees; additional soil settlement could cause the unit to topple.

5.10.2 Aircraft De-arming Area. The Aircraft De-arming Area is located at NALF Cabaniss at the end of Runway 31 along the taxiway. The site was reportedly used for de-arming planes returning from training missions through the 1970s. The site was not used for disposal of ordnance-related materials. Army ordnance materials remaining in the area would have had to result from materials dropped during transfer operations.

CHAPTER 6. MATERIAL HANDLING: STORAGE AND TRANSPORTATION

6.1 GENERAL. Naval Air Station (NAS) Corpus Christi has a variety of material handling areas. Since the mission of NAS Corpus Christi is pilot training, large scale industrial operations that require major material storage and transportation are not a part of normal operations. Corpus Christi Army Depot (CCAD), however, does conduct large scale industrial operations at the facility, using a number of hazardous materials to accomplish its mission. The following sections discuss those operations relating to the storage and transportation of hazardous material.

6.2 MATERIAL STORAGE: DEFENSE PROPERTY DISPOSAL OFFICE (DPDO). DPDO is responsible for procuring contracts for the disposal of PCB items and selling waste for recycling, such as lead batteries, waste oils, ferrous metals, magnesium, and used chemical containers. The DPDO was established at NAS Corpus Christi in its present location in the early 1950s. The DPDO yard is located near the end of Runway 31R adjacent to the area previously used for landfill operations.

For years, disposal practices have been for all scrap metals and wire to be taken to the yard to keep metal out of the landfill. There are separate barrels for each metal. Burned out motors are burned in the incinerator at the sheet metal shop to remove the varnish and insulation. Wire is cut and pulled out and the motor shell recovered. Wire is placed in the appropriate barrel at the yard. Building electrical wiring is placed in the barrels with insulation intact. When full, the barrels are sold.

Waste oils generated at NAS Corpus Christi have been collected for resale by DPDO since at least 1960. Records were not available for disposal prior to this time; however, reportedly the oils were sold off-base for recycling. Two 12,500-gallon tanks located in a diked area adjacent to the DPDO yard are used for storage. Indications are that between 18,000 to 20,000 gallons of waste oil are sold yearly. Some used oil (non-PCB) is used to wet down roads in the salvage yard; RC-1 and RC-2 (clean) oil is used to wet down other roads at NAS Corpus Christi. Bermuda grass is growing in the area which has been sprayed with oil in the past.

Records indicate that 6,700 pounds of sandblasting waste generated from blasting magnesium-thorium metal have been disposed of by DPDO. The materials were sold in two sales, one in 1981 and one in 1982. These wastes were generated by operations at the CCAD.

All 55-gallon drums containing material must be labeled indicating the contents prior to acceptance by DPDO. All drums containing hazardous materials stored in the yard are disposed of through contract disposal at an off-base location. Empty 55-gallon drums have been sold as scrap in the past.

PCB-containing transformers are collected from the Public Works Department (PWD) Electrical Shop. Around 1980, a spill of PCB oil was reported at the salvage yard. Apparently it was cleaned up and the oil and contaminated soil was put into barrels for off-base disposal. The waste was shipped to a hazardous waste disposal site.

Silver generated by the photography laboratory and the hospital is disposed of through DPDO.

6.3 CHEMICAL AND HAZARDOUS MATERIAL STORAGE. Although NAS Corpus Christi does not have any areas designated specifically for storage of hazardous materials, CCAD, the primary user of large quantities of chemicals and other hazardous materials, maintains storage areas for the materials used. CCAD is not within scope of this report; however, estimated annual chemical usage is listed in Appendix B.

6.4 PETROLEUM, OILS, AND LUBRICANTS (POL). Several fuel spills have been recorded at NAS Corpus Christi through the years; these are shown in Table 6-1. Table 6-2 contains a list of the fuel storage facilities at NAS Corpus Christi.

TABLE 6-1

POL SPILLS AT NAS CORPUS CHRISTI

DATE	LOCATION	AMOUNT (gallons)	TYPE	REMARKS
9/77	Area 217	1500	JP4	Contained
10/79	Area 217	3800	JP4	Very little to Bay; Coast Guard called
2/80	Area 217	1700	JP4	Very little to Bay
12/81	Area 216	1000		

TABLE 6-2

FUEL STORAGE FACILITIES

AREA	NO. OF TANKS	CAPACITY (gallons)	COMMENTS
217	8 ea.	25,000	Underground; six not in use; primarily used for JP4; no leaks suspected
216	8 ea.	25,000	AVGAS
216	24 ea.	25,000	JP4; eight are empty
216	2 ea.	10,000	Diesel
Bldg 1153	3 ea.	6,000	Filling station
Bldg 161	3 ea.	10,000	Lube oil
244	8 ea.	25,000	Abandoned

A bookkeeping audit indicated a potential loss of approximately 20 million gallons of fuel from underground tanks located in Tank Farm No. 216 over the past forty years. Wells drilled in the area indicated fuel was present and methods of recovery of the fuel are now being evaluated. Tanks located in Area 216 were pumped out by a contractor in approximately 1980 to remove all sludge and scale. Material was disposed of off-base.

Waste and contaminated fuel have been collected in a 6,000-gallon bowser and used by the fire department for training purposes.

6.5 PESTICIDE STORAGE. The PWD operates the pest control program for NAS Corpus Christi. The present pest control shop is located in Building 1818 which was constructed in 1971. The previous pest control shop was located in Building 343. This building, of temporary construction, was damaged by Hurricane Celia, which necessitated construction of the existing pest control shop. Table 6-3 includes a list of the materials utilized in the pest control program. The pest control program includes roach, rodent, flea, wasp, mosquito, and termite control for food service and housing. The pest control program also includes fence row weed control and animal control.

6.6 POLYCHLORINATED BIPHENYL (PCB) STORAGE. A number of areas have been used for storage of PCB transformers and contaminated items. Building 207, located near the Industrial Wastewater Treatment Plant, was used for storage of PCB transformers, liquid-filled drums, and solid-filled drums until 1982. No spills or leaks were reported for this building. Four other locations have been or are presently being used as PCB storage areas. These are the ground services storage yard; Building 168, the transformer repair facility; the loading dock outside of Building 24; and the new building constructed by the Construction Battalion Unit 407 (1982). The ground services storage yard and Building 168 were used for storage of PCB materials until 1982. No evidence of contamination was noted at either of these sites nor were any spills reported. The loading dock outside of Building 24 and the newly constructed building in the ground services storage yard both contain PCB transformers. As indicated in section 5.2.3, PCBs were also stored at the DPDO yard in the past.

6.7 STORAGE LOTS AND SCRAP YARDS. With the exception of the DPDO storage yard, the ground services storage yard located adjacent to First Street has been used for storage of bulk materials since the early 1950s. Areas are designated in the yard for lumber storage and scrap and salvage materials. Bulk material for road repair is also stored in the area. These items include gravel, sand, and tanks for asphalt storage. Drums of waste oil and PCB transformers, as mentioned in the previous section, have been stored in the area in more recent years. No spills of hazardous materials have been reported at the storage yard.

6.8 ORDNANCE. There were approximately 16 magazines on Dimmit Island (peninsula located at the northeast end of NAS Corpus Christi) at its maximum activity level. Seven of these, A-64 through A-69 and A-13, have been removed. All of the magazines were condemned, but upgrading of the existing magazines to new standards is being conducted. All the magazines are at ground level on concrete pads. All ammunition utilized at NAS Corpus Christi is stored there. Ordnance is received at the South Gate and is transported by escort to the magazines.

TABLE 6-3

PEST CONTROL CHEMICALS

MATERIAL	LOCATION (BLDG. NO.)	ANNUAL USAGE	TYPICAL QUANTITY STORED
Diazinon Dust 2%	204,1120	400 lbs	37 lbs
Diazinon Granules 14%	204,1120	200 lbs	550 lbs
Diazinon 48%	204,1120	50 gals	4 gals
Diazinon 47.5%	204,1120	5 gals	9 gals
Dichlorvos 22%	204,1120	5 gals	5 gals
Dichlorvos Aerosol 6.51%	204,1120	288 12 oz	144 12 oz
Carbaryl--Wettable Powder 80%	204,1120	300 lbs	150 lbs
Carbaryl Dust 5%	204,1120	100 lbs	50 lbs
Carbaryl Dust 10%	204,1120	100 lbs	170 lbs
Chlorpyrifos 41.2%	204,1120	30 gals	14 gals
Pyrethrins 3%	204,1120	4.5 gals	4.5 gals
Pyrethrins 2%	204,1120	3 gals	3 gals
Chlordane 72%	204,1120	25 gals	17 gals
Chlordane 73.6%	204,1120	15 gals	15 gals
Diquat 35.3%	204,1120	30 gals	22 gals
Alcohol, Denatured 94.9%	1120,1818	62 gals	62 gals
Alcohol, Isopropyl	1120,1818	10 gals	0
Alcohol, 190 proof	1120,1818	12 gals	2 gals
Propanol--2	1120,1818	15 gals	0
Ammonium Sulfonate 95%	1120,1818	530 lbs	530 lbs
Pentachlorophenol 5%	1120,1818	15 gals	15 gals
Naled 85%	1120,1818	15 gals	15 gals
Malathion 57%	1120,1818	230 gals	115 gals
Malathion 95%	1120,1818	40 gals	40 gals
Malathion 91%	1120,1818	55 gals	55 gals
Strychnine Alkaloid 0.35%	1120,1818	10 gals	25 lbs
2,4-D Acid 49.8%	1120,1818	26 gals	26 gals
2,4-D Esters 95%	1120,1818	440 gals	440 gals

The magazines cannot store their full capacity because of limitations of the explosion safety arc requirements. The magazines are currently maintained at 15 to 20 percent capacity. During the Korean War much higher volumes of materials were stored. Most of the ordnance comes from Seal Beach, California, or Indian Head, Maryland, and any excess materials are returned to these locations. Tear gas grenades, pyrotechnics used for search and rescue, and day and night distress signals are kept on hand. Table 6-4 contains a list of the magazines and materials stored. In the past ordnance has always been disposed of off-base.

TABLE 6-4

ORDNANCE STORAGE FACILITIES

MAGAZINE	CLASS	STORED MATERIALS	HAZARD	CAPACITY
A1	1	Flammables	Fire	100,000 lbs
A2	1	Pyrotechnics	Fire	100,000 lbs
A3	1	Small arms	Fire and flying objects	100,000 lbs
A4	1	Pyrotechnics	Fire	15,000 lbs
A5	1	Fuses, detonators	Flying objects; limited explosion	95,000 lbs
A6	1	Bulk explosives	Explosive and missiles	500,000 lbs
A7	1	Chemicals (riot control)	Smoke and respiratory	500,000 lbs
A11	1	Pyrotechnics	Fire	500,000 lbs
A14	1	Fixed ammunition	Explosion and missiles	No limit

CHAPTER 7. WASTE PROCESSING

7.1 INTRODUCTION. The Naval Air Station (NAS) Corpus Christi Public Works Department (PWD) operates three facilities for treatment of waste water generated at NAS Corpus Christi. Two of these facilities, the Industrial Waste Water Treatment Plant and the Industrial Waste Water Pretreatment Plant, treat only water generated by Corpus Christi Army Depot (CCAD). The remaining plant, the Sanitary Sewer Treatment Plant, treats waste generated by both NAS Corpus Christi and CCAD.

The only generator of substantial quantities of waste products is CCAD. On-site processing of material for re-use or alternate use would be uneconomical for other areas of NAS Corpus Christi. The processing of waste materials is primarily confined to the collection and storage of material until transportation off NAS Corpus Christi can be accomplished.

7.2 SANITARY SEWER TREATMENT PLANT (SSTP). The NAS Corpus Christi sewage treatment plant, located at the northwest corner of NAS Corpus Christi, adjacent to Saipan Street, has a design capacity of 1.5 million gallons per day. Building 170 serves as the control building for the plant. The treatment of domestic sewage at the current location dates back to the 1940s. The treatment plant consists of two primary clarifiers, two trickling filters, two secondary clarifiers operated in parallel, three anaerobic digesters, and six sludge drying beds. A schematic drawing of the SSTP is provided in Figure 7-1.

Until 1980, sludge generated from this plant was disposed of as a soil conditioner to various locations on base. Since 1980, waste sludge generated by the domestic plant has been disposed of at an off-base landfill.

7.3 INDUSTRIAL WASTE TREATMENT PLANTS.

7.3.1 Industrial Waste Water Pretreatment Plant (IWP). The IWP is located adjacent to Building 8 which houses all the major overhaul operations of CCAD. The major processes performed at the IWP are acid-caustic neutralization, chrome reduction, cyanide destruction, solids separation, and sludge dewatering (Figure 7-2).

The acid-base neutralization unit consists of an acid wet well, caustic wet well, neutralization tank, mixer, acid feed tank, and caustic feed tank. The wastes generated by the plating shop are neutralized to within the range of 6.5 to 8.5 in order to prevent upsets of the biological process at the Industrial Waste Treatment Plant. Sulfuric acid is used for caustic waste neutralization while sodium hydroxide is used for acid waste neutralization. Sludges generated by these operations are collected in drums for disposal off-base.

The chrome reduction unit receives chrome bearing wastes from the plating shop rinse tanks. Hexavalent chromium is reduced to trivalent chromium by adding a reducing agent. The trivalent chromium is then precipitated by adding sodium hydroxide. The resulting chromic hydroxide sludge is settled and removed to the filter press for dewatering. Sludge generated is containerized and hauled

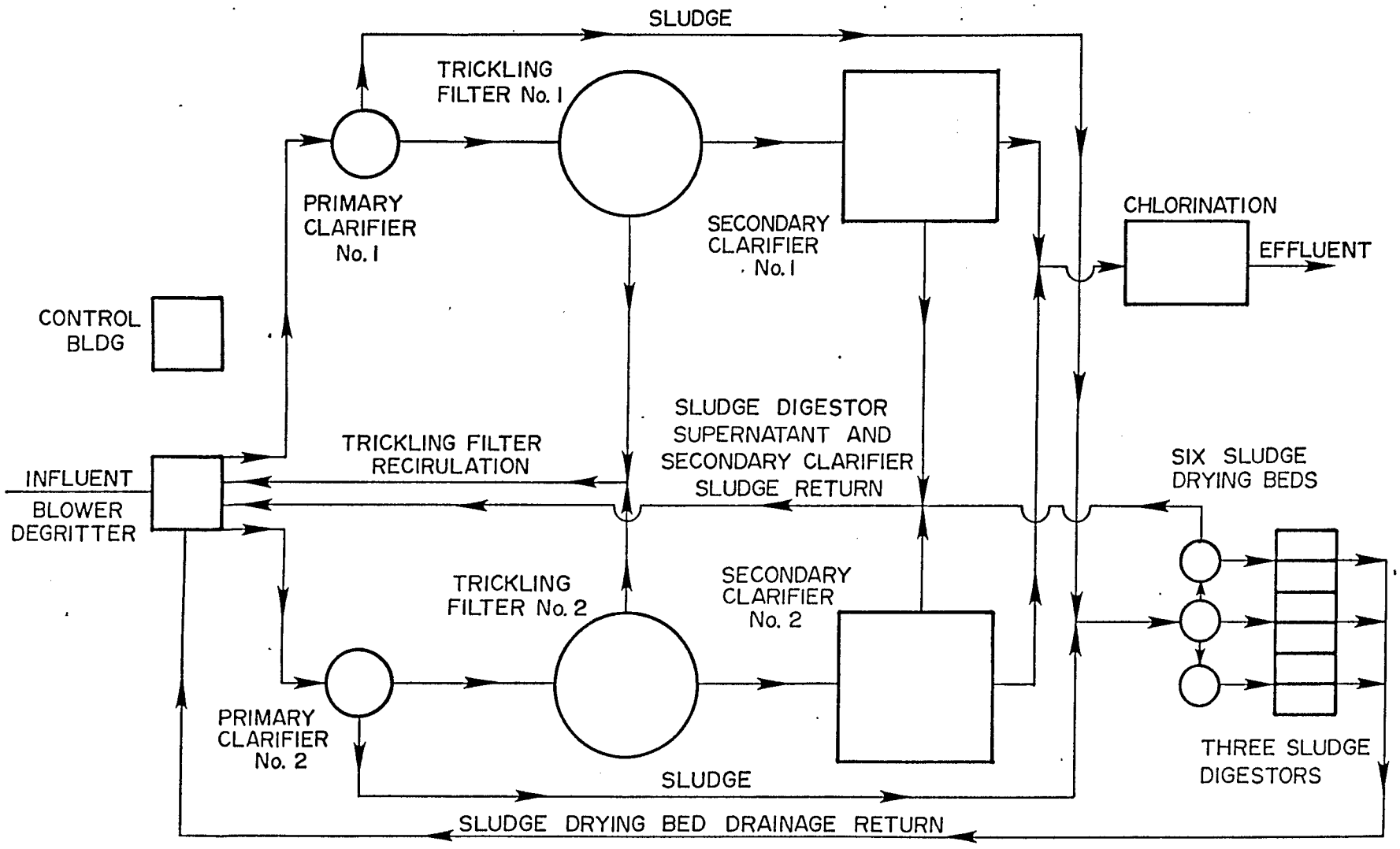


FIGURE 7-1
SANITARY SEWER TREATMENT PLANT

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

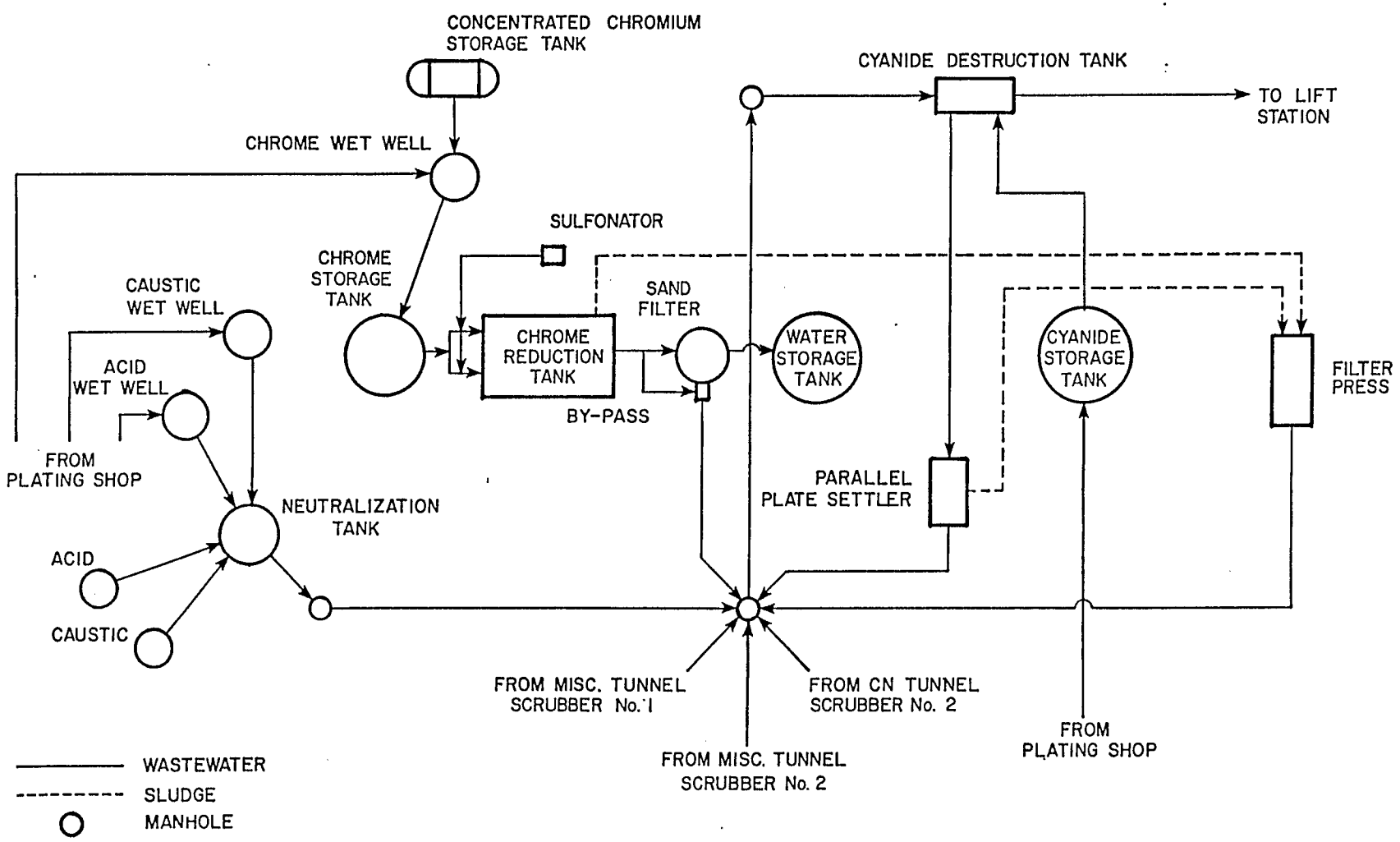


FIGURE 7-2
INDUSTRIAL WASTE WATER PRETREATMENT PLANT

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

off-base by a contract disposer. Treated effluent from the settling tank is pumped through a sand filter and stored for reuse in the plating shop or discharged to the Industrial Waste Treatment Plant (IWTP).

The Cyanide Destruction Unit consists of a rinse water storage tank, pumps to move the waste to the cyanide destruction tank, and the parallel plate settling unit, chlorinator, mixers, and instrumentation. The pH of the waste water is elevated by the addition of caustic soda. Chlorine is added to oxidize the cyanide to cyanate. The second stage consists of reduction of the pH by addition of acid and chlorination to oxidize the cyanate to carbon dioxide and nitrogen gas.

A parallel plate separator equipped with a flash mixer and flocculator compartment is used for solids separation. Polymer is added in the flash mixer compartment to encourage large floc to form in the flocculation compartment which will settle well in the parallel plate section. The clarified water from the separator flows to the IWTP. Sludge generated from the separator is dewatered at the filtering press.

The sludge dewatering filter press receives flow from the chrome reduction tank and the parallel plate separator. The filter press operates at pressures in excess of 3,000 pounds per square inch to dewater the sludge. Filtrate from the press is discharged to the IWTP for additional treatment. The sludge generated by the press is stored for disposal by an off-base contractor. Approximately 120 cubic feet of dewatered sludge is generated per month.

7.3.2 Industrial Waste Water Treatment Plant (IWTP). The IWTP, which has been operational since 1975, consists of an aerated grit chamber, oil concentrator, spill containment tank, storage tank, and a biological waste treatment plant (Figure 7-3). The biological plant is a step-feed contact stabilization process having five compartments: aeration contact zone, re-aeration zone, final settling tank, chlorine contact chamber, and an aerobic digester. The aerated grit chamber removes grit and skims oil from the influent. The oil is discharged to the oil concentrator for additional separation and grit is removed to drums for disposal off-base. The concentrated oil is placed in 55-gallon drums to be sold. The storage tank is utilized to hold flows which exceed the plant capacity until they can be fed back to the plant under low flow conditions.

Although the plant has a design capacity of 1 million gallons per day, the average flow has been substantially less (1979 average flow was 182,000). Prior to discharge into the biological unit, the industrial waste water is mixed with domestic waste water to provide nutrients and solids. The waste water is chlorinated prior to discharge to Corpus Christi Bay. All the waste water discharged to the plant is generated by the Army with the exception of boiler blowdown, which is generated by the Navy. Discharge of boiler blowdown was not started until 1980. In the past, problems have resulted from unexpected spills or dumps of various chemicals which usually contained heavy metals.

A study conducted in 1976 by U.S. Army Environmental Hygiene Agency (USAEHA) indicated the origins of waste discharged to the IWTP were 77 percent from the plating shop, 15 percent from the engine cleaning shop, and 4 percent each from the engine breakdown area and air frame stripping operations.

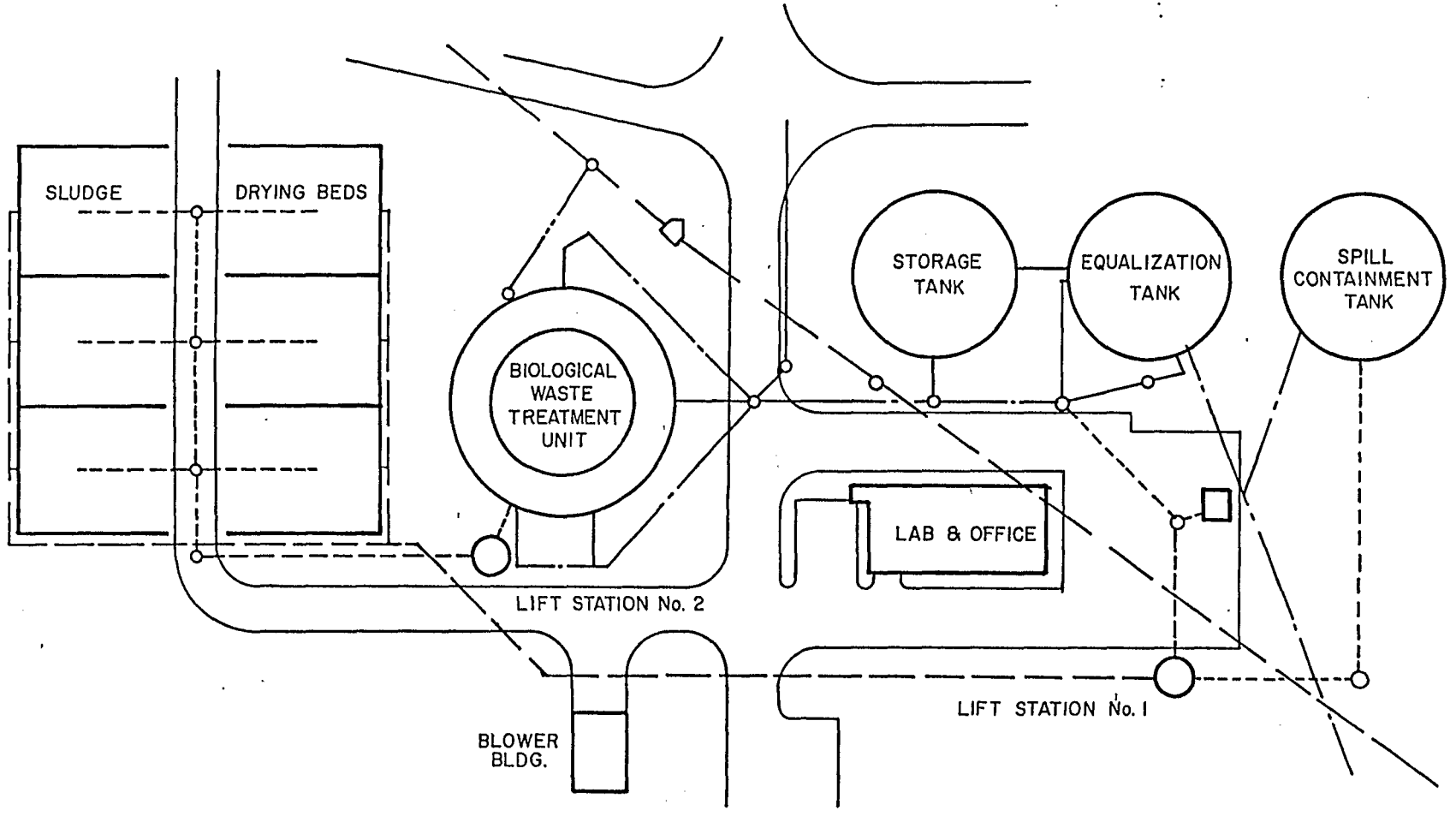


FIGURE 7-3
INDUSTRIAL WASTE WATER TREATMENT PLANT

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

Sludge generated by the biological plant is dried on six 12- by 18-meter open air sludge drying beds. Each of the beds is located adjacent to the IWTP. The sludge quantity generated is approximately 17.5 cubic yards/month.

CHAPTER 8. DISPOSAL SITES AND POTENTIALLY CONTAMINATED AREAS

8.1 INTRODUCTION. Each of the potentially contaminated sites identified during the Initial Assessment Study are discussed in this chapter. Information was compiled from a combination of sources, including personnel interviews, record reviews, and on-site investigation. Table 8-1 summarizes the sites identified during the survey and gives map coordinates for locations based on 1981 general development maps. Through the years, a number of landfills have been utilized for disposal of solid waste generated by NAS Corpus Christi and its tenant activities. As an oil recycle program has been in effect since the early years of the facility, it is doubtful that substantial quantities of oily waste were disposed of at any of the landfill sites. Wastes disposed of at these sites consisted mainly of wood, cardboard, household and office waste, and demolition debris. These materials are referred to in the site description as general solid waste. Where special items of a hazardous or potentially hazardous nature have been disposed of, these are highlighted in the site description.

Water table aquifers in the vicinity of NAS Corpus Christi and NALF Waldron are limited to sand-dominated material overlying clay-dominate material which has low permeability rates. Impermeable materials underlie NALF Cabaniss creating runoff rather than recharge. The regional flow direction of water table aquifers is to the northeast toward Corpus Christi Bay. Localized flow directions may be influenced by local topography (e.g. west toward Cayo del Oso from NAS Corpus Christi). In short, migration through water table aquifers is limited to shallow soils and surficial materials at NAS Corpus Christi and NALF Waldron and would rapidly reach Corpus Christi Bay. Migration through shallow geologic and soil units at NALF Cabaniss would be unlikely. Migration would be limited to runoff.

Artesian aquifers underlying the NAS Corpus Christi sites are moderately to highly saline, and therefore have little or no potential use. Potable water for the subject areas is supplied from Lake Corpus Christi located 40 miles to the northwest.

The criteria developed in Chapter 4, only briefly summarized here, suport the conclusions that contaminants could migrate to Corpus Christi Bay, Cayo del Oso, Laguna Madre and/or Oso Creek, but are unlikely to endanger potable ground water.

8.2 SITE 1, DEFENSE PROPERTY DISPOSAL OFFICE LANDFILL (DPDO). Activity at this landfill started around 1949 and continued until the early 1960s. The site was located at the present location of the DPDO yard and included the area west and south of the yard (Figure 8-1). The site reportedly was used to dispose of one layer of material with a disturbed depth of not more than three or four feet. Exposed debris included wood, rubber, a small amount of asphalt material, brick fragments, tile, broken shingles, glass, and melted aluminum. General solid waste generated by CCAD, NAS Corpus Christi, and NAS Corpus Christi Housing was disposed of in the area. Reportedly, this site was also used for disposal of bulk chemical waste generated by CCAD.

The site is bound on the northeast, east and southeast by railroad tracks and First Street. The site encompasses a maximum of 20 acres. Drainage from the site is into northern, western, and southwestern drainage ditches along the

Table 8-1

DISPOSAL SITES INVESTIGATED AT NAS CORPUS CHRISTI

SITE NAME	SITE NO.	MAP COORDINATES[1]	APPROXIMATE PERIOD OF OPERATION	TYPE MATERIAL DISPOSED OF	COMMENTS
DPDO Landfill	1	31,W	1949-1960s	Solid waste and bulk chemical liquid waste from CCAD	Materials disposed included H_2SO_4, organic solvents, paint remover, etc. These were disposed of at a rate of 2,000 to 5,000 gallons per week.
NAS Corpus Christi Landfill	2	33,X	1956-1962	General non-hazardous solid waste	
CCAD Liquid Waste Disposal Area	3	34,V	1960-1972	Solid waste and bulk chemical liquid waste from CCAD.	Materials disposed included H_2SO_4, organic solvents, paint remover, etc. These were disposed of at a rate of 2,000 to 5,000 gallons per week.
Aircraft Fire Training Area	4	33,X	1960s-1973	Waste fuels	Approximately 3000 gallons per month of fuel were used five to six months per year.
Runway 31 Landfill	5	27,AA	1940s-1950s	General non-hazardous solid waste	
Patrol Road East Landfill	6	27,AA	1960s-1979	General non-hazardous solid waste	
Patrol Road West Landfill	7	23,AA	1955-1958	General non-hazardous solid waste	

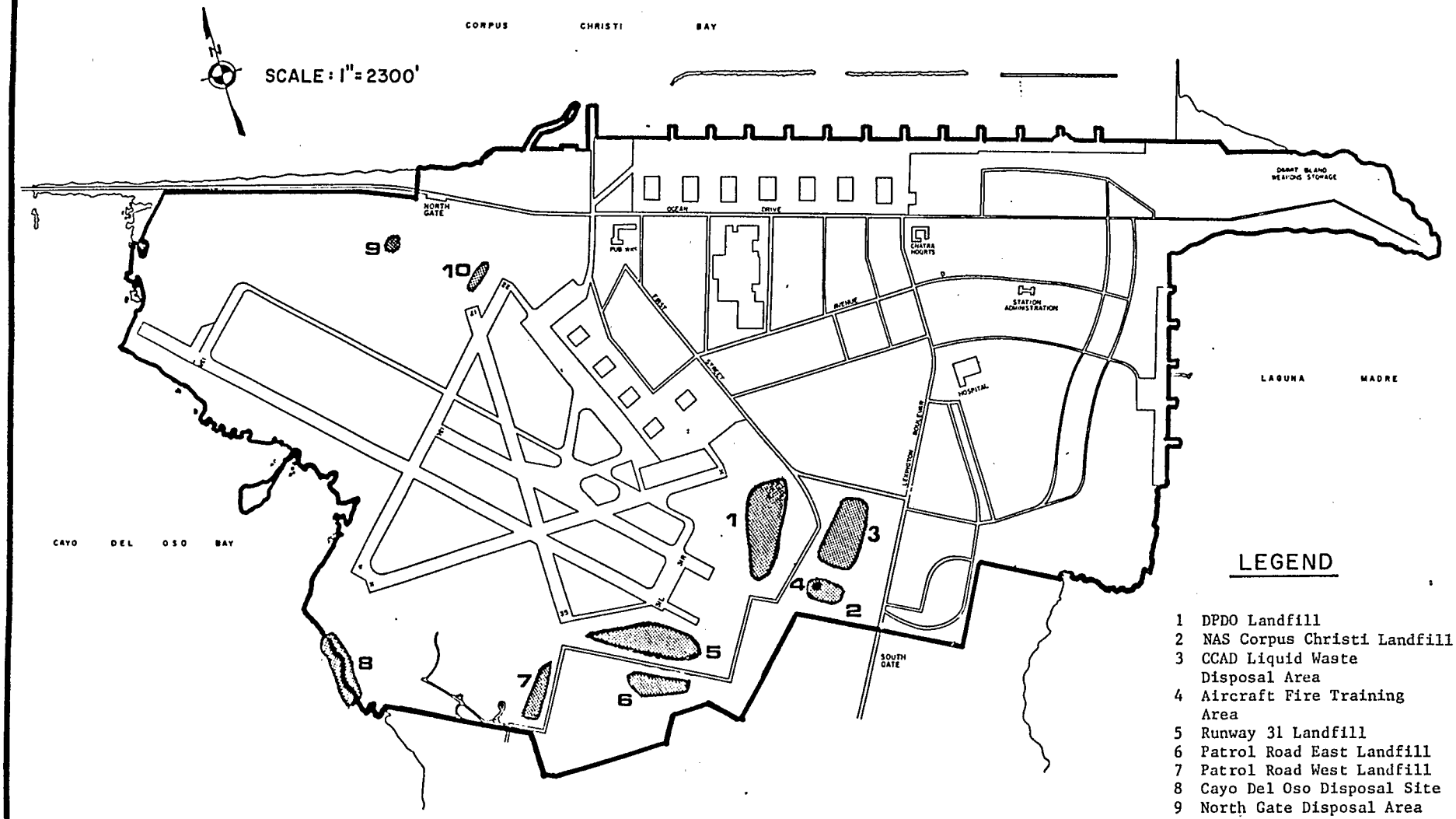
[1] General Development Map

CONTINUED

Table 8-1

DISPOSAL SITES INVESTIGATED AT NAS CORPUS CHRISTI

SITE NAME	SITE NO.	MAP COORDINATES[1]	APPROXIMATE PERIOD OF OPERATION	TYPE MATERIAL DISPOSED OF	COMMENTS
Cayo del Oso Disposal Site	8	15,BB	1970s	Construction debris	Material was used for erosion control
North Gate Disposal Area	9	17,K	1960s-1970s	Bulk chemical liquid waste from CCAD	Information indicating use of this site was not as substantial as sites 1 and 3.
Radioactive Waste Disposal Area	10	20,L	1950s	Possible radioactive promethium and isotopes of krypton and cesium	Survey by the Army found no levels of radiation above background.
Cabaniss Sanitary Landfill	11	15,M	until 1980	General solid waste and some ordnance burning	
Cabaniss Hurricane Celia Rubble Area	12	19,D	1970s	Construction rubble	Site agreed upon by Navy and city of Corpus Christi for disposal of hurricane rubble.
Waldron Rubble Disposal Area	13	12,0	1950s-1970s	Construction rubble	
Waldron Rubble Disposal Area	14	5,M	1970s	Construction rubble	Site agreed upon by Navy and city of Corpus Christi for disposal of hurricane rubble. Large quantities of material do not appear to be disposed at this site.
Waldron Rubble Disposal Area	15	14,J	1950s-1970s	Construction rubble	



LEGEND

1 DPDO Landfill
2 NAS Corpus Christi Landfill
3 CCAD Liquid Waste Disposal Area
4 Aircraft Fire Training Area
5 Runway 31 Landfill
6 Patrol Road East Landfill
7 Patrol Road West Landfill
8 Cayo Del Oso Disposal Site
9 North Gate Disposal Area
10 Radioactive Waste Disposal Area

FIGURE 8-1
NAS CORPUS CHRISTI DISPOSAL SITES

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

boundary which ultimately intersects an easterly flowing ditch that drains to Laguna Madre. Four or five pits were located in the area which were used for disposal of materials drained from bowsers originating at CCAD. Waste disposal at the site was estimated at 2,000 to 5,000 gallons/per week. These chemicals included organic solvents, H_2SO_4, HCl, paint remover, paint thinner, and plating wastes. Due to the disposal of these potentially hazardous materials, which could migrate to the adjacent surface water, confirmation study is recommended for this site.

8.3 SITE 2, NAS CORPUS CHRISTI LANDFILL. Portions of the NAS Corpus Christi Landfill were used between approximately 1956 and 1962. The site was used for disposal of general solid waste generated by NAS Corpus Christi and tenant activities. The site is located at the intersection of First Street and Patrol Road (Figure 8-1). The area contains the Aircraft Fire Training Area (Site 4) in its extreme northwest corner. The old landfill is characterized by a series of equally spaced east-west ridges about 1.5 to two feet in elevation. The northeast corner of the site has a low area approximately 20 feet by 40 feet which contains standing water and is somewhat marshy.

Fragments of concrete and broken shingles were the only exposed material noted. Disposal in this area was confined primarily to non-hazardous waste materials. Due to the innocuous nature of materials disposed of at this site, confirmation study is not recommended.

8.4 SITE 3, CCAD LIQUID WASTE DISPOSAL AREA. This area was used for disposal of liquid waste from approximately 1960 to 1972. Reports indicate that liquid waste generated at CCAD was collected in bowsers and allowed to drain into 50-foot diameter pits located in this area. The 1967 aerial photograph (Figure 8-2) indicates the location of pits in the area. Waste was reportedly disposed of at a rate of 2,000 to 5,000 gallons per week. The chemicals disposed of included organic solvents, H_2SO_4, HCl, paint removers, paint thinners, and plating chemicals. These materials were similar to those now being treated at the Industrial Pretreatment Plant and Industrial Wastewater Treatment Plant and being hauled to off-base disposal sites. Due to the nature and quantity of waste disposed of at this site, confirmation study is recommended.

In addition to liquid waste disposal, the area also served as a landfill. The area is characterized by a series of parallel mounds and low areas which display a difference in elevation of approximately two to three feet. Small amounts of surface debris noted at the site included shingle fragments, tin cans, concrete pipe, reinforcing rod, bottle caps, sheet metal, and wood scraps.

8.5 SITE 4, AIRCRAFT FIRE TRAINING AREA. This site is located east of First Street directly across from the DPDO scrap yard. Fire training has been conducted in this area since the establishment of fire training activites at NAS Corpus Christi in the early 1960s. In 1973 a clay liner and berm were added to the area by PWD to contain fuels used in the training. Two berms exist at the site, one a partial berm which contains runoff along the north, west, and south sides of the training pit. This berm is located about 45 feet away from the center of the area. The inner berm is approximately 12 feet high and completely encircles the burning area. Fuel for training is stored approximately 110 feet due east of the pit in an elevated storage tank. Training is conducted at the site for a five to six month period each year and

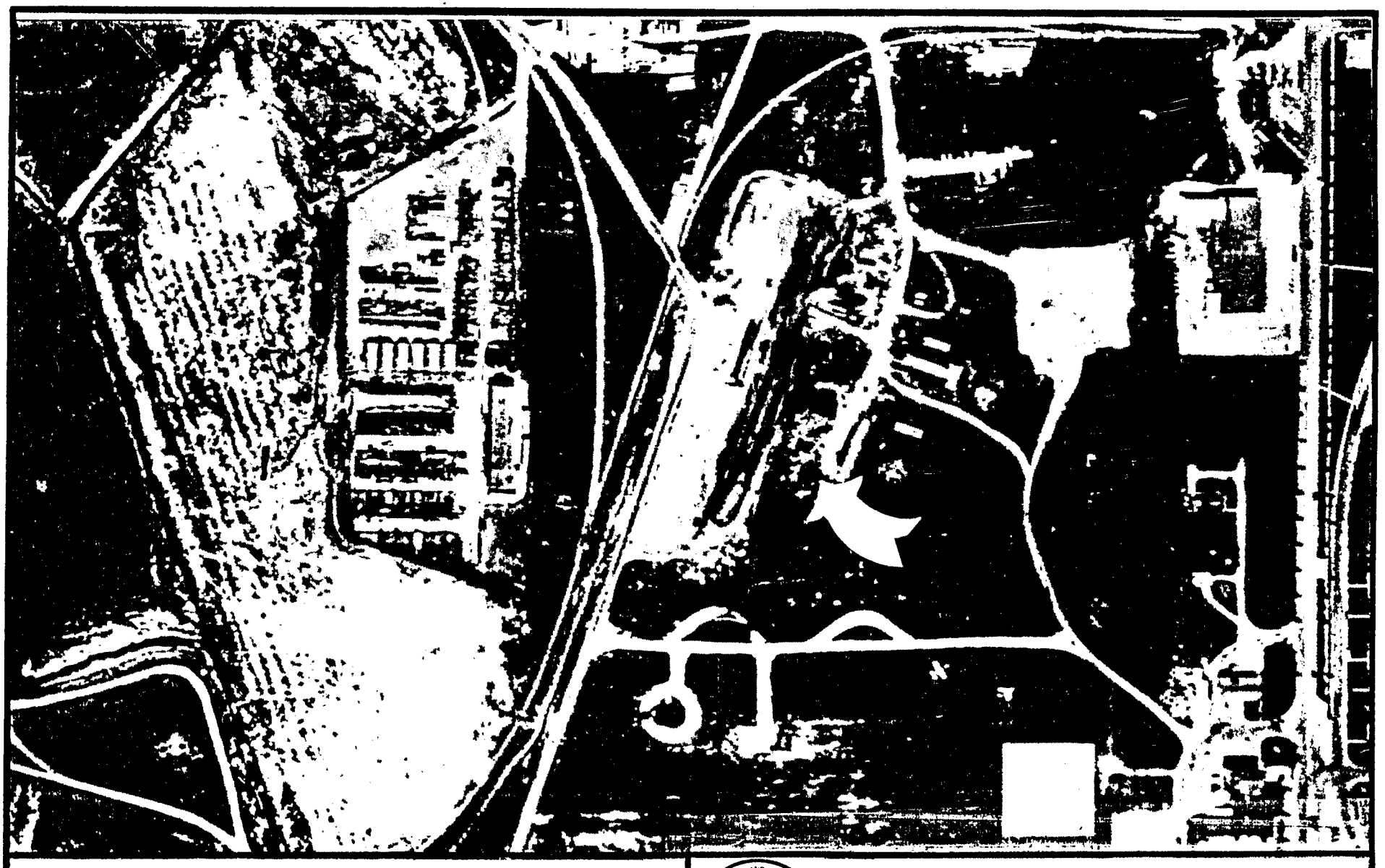


FIGURE 8-2
SITE 3 CCAD LIQUID WASTE DISPOSAL AREA

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

utilizes approximately 3,000 gallons per month of waste fuel. Prior to installation of the clay liner, small amounts of the waste fuel may have percolated into the soil; however, due to the time lapsed since installation of the liner, the area ground water movement should have dispersed any contamination. Since the fuel was ignited after being discharged to the ground only small amounts of fuel remained to percolate into the ground water; therefore, a confirmation study is not recommended.

8.6 SITE 5, RUNWAY 31 LANDFILL. This landfill was used from the early 1940s to the early 1950s. The site is located at the southeast end of runways 31 and 35. The landfill is bound on the east and the south by an out-of-service train line and Patrol Road. Very limited dumping apparently occurred at this site. The site was used for storage of a large number of surplus aircraft around 1946. Due to the innocuous nature of the waste, no confirmation study is recommended.

8.7 SITE 6, PATROL ROAD EAST LANDFILL. This is the most recently active landfill with activity starting in the late 1960s and continuing until 1979. The landfill is bound on the north by the Patrol Road and on the remaining sides by woods and open land.

The landfill was used for disposal of general solid waste originating from NAS Corpus Christi and tenant activities. Reportedly, three layers of material were disposed of at this site, which would account for its higher elevation of approximately 10 feet above the road level. Debris exposed at the surface includes wood, paper, concrete, asphalt fragments, scrap metal, cans, glass, and automobile tires. Reportedly, only innocuous wastes were disposed here; therefore, no confirmation study is recommended.

8.8 SITE 7, PATROL ROAD WEST LANDFILL. The Patrol Road West Landfill was active from approximately 1955 through 1958. The site is bound on the east by Patrol Road and on the west by the railroad track. During its period of operations, the area was used for disposal of general solid waste generated at NAS Corpus Christi. Due to the nature of the waste, no confirmation study is recommended.

8.9 SITE 8, CAYO DEL OSO DISPOSAL SITE. The material disposed of at the Cayo del Oso disposal site was deposited during the 1970s as a means of erosion control along the bay. Material disposed of here reportedly was entirely of an inert nature and included broken concrete, pieces of asphalt up to six inches in diameter, rusted steel pipe, and other construction rubble. Due to the innocuous nature of these materials, confirmation study is not recommended.

8.10 SITE 9, NORTH GATE DISPOSAL AREA. This site is located approximately 1,600 feet west of the North Gate and 600 feet south of the Patrol Road. Pits were reportedly dug in this area in the late 1960s and early 1970s for disposal of liquid hazardous waste generated by CCAD. Reportedly, sites 1 and 3 were the primary disposal areas for disposal of liquid wastes, and Site 9 received only limited use. Confirmation study is not recommended for this site unless major problems are identified during the study at Site 1 and Site 3.

8.11 SITE 10, RADIOACTIVE WASTE DISPOSAL AREA. This site is located approximately 100 yards south-southwest of the present North Gate and immediately

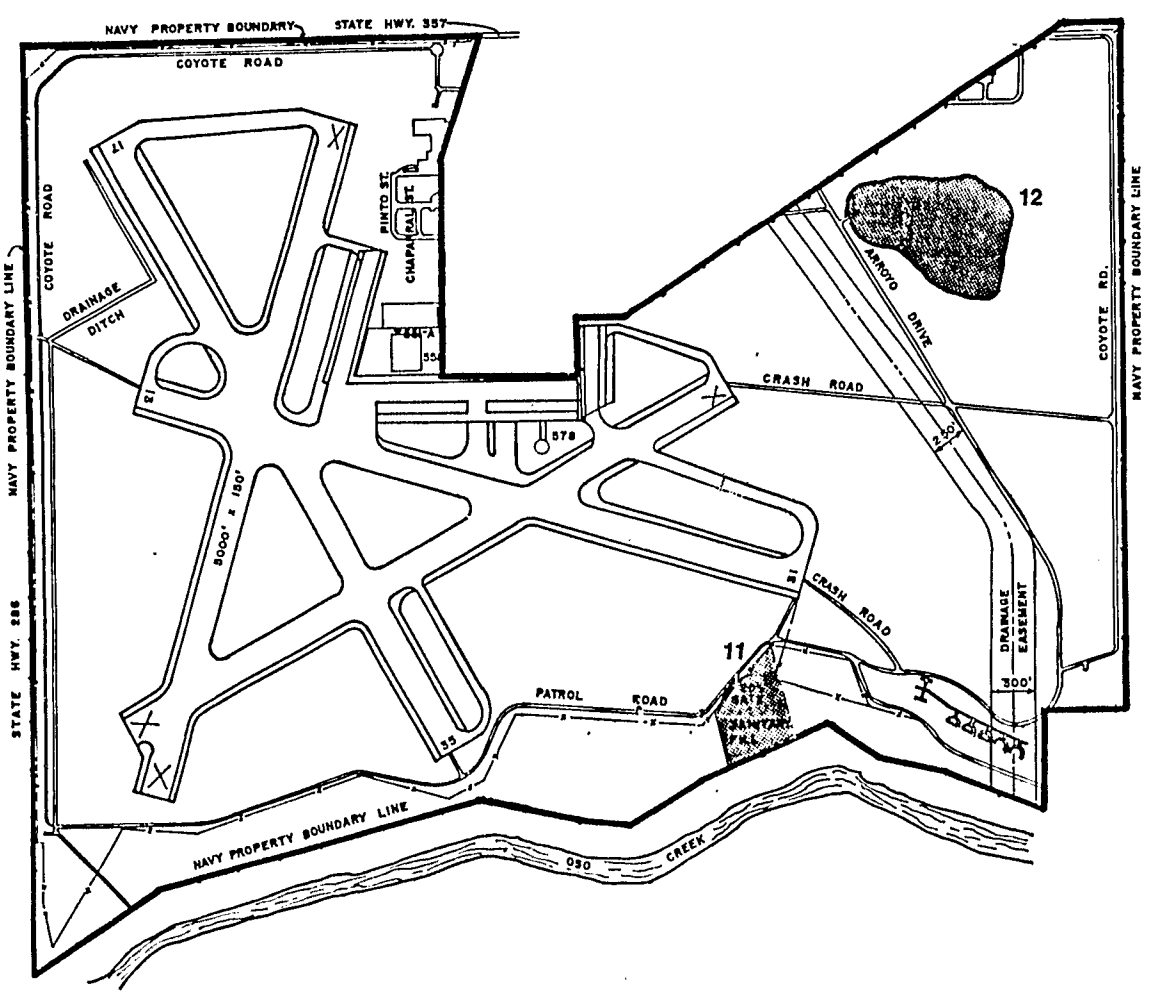
east of the road leading to the jet engine test cells. Reportedly, the disposal area was a small cistern-like enclosure dug into the ground with a manhole-type cover. It is possible that a small amount of radioactive material including promethium and radioactive isotopes of krypton and cesium were occasionally disposed of in the area during the 1950s. Reportedly, a radioactive survey conducted by Army personnel identified no radiation above background levels in the area; therefore, no confirmation study is recommended.

8.12 SITE 11, CABANISS SANITARY LANDFILL. The Cabaniss Sanitary Landfill is south of Patrol Road near the south end of Runway 31 (Figure 8-3) and covers approximately six acres. The site served as a sanitary landfill and received debris disposed of by the city of Corpus Christi resulting from Hurricane Celia.

A portion of the site was used until approximately 1980 by the Army and the city of Corpus Christi. The area used consisted of an old boiler approximately eight feet long and five feet in diameter. The boiler had been modified to handle burning of 30 and 50 caliber ammunition, old flares, explosive cartridges from ejection seats and possibly 80mm rockets. The city of Corpus Christi used the boiler to dispose of confiscated drug material. The old boiler was pushed over the bank toward Oso Creek during repair on the Patrol Road. Very little residual (ash) was generated by the boiler. Burned remains of ordnance cover an area less than 200 square feet. Since only innocuous materials were disposed at this site and only limited residual was generated from ordnance burning, no confirmation study is recommended.

8.13 SITE 12, CABANISS HURRICANE CELIA RUBBLE AREA. The Hurricane Celia rubble area encompasses approximately 50 acres in the northeast corner of the NALF Cabaniss. The area was used for disposal of construction and other debris generated by Hurricane Celia (3 August 1970). An agreement was established between the Navy and the city of Corpus Christi for disposal of debris at this site. The agreement "Special Provisions, Specifications and Forms of Contract and Bonds for Hurricane Celia Debris Burial at Cabaniss and Waldron Fields" was developed by the Department of Public Works, city of Corpus Christi, Texas, in early 1971 prior to beginning disposal operations. Only innocuous material was disposed of at this site; therefore, no confirmation study is recommended.

8.14 SITES 13, 14, 15, WALDRON RUBBLE DISPOSAL AREAS. Sites 13, 14, and 15 located at the NALF Waldron were all used for disposal of construction rubble and debris. The location of these sites are indicated on Figure 8-4. Sites 13 and 15 were used primarily for disposal of debris originating from the demolition of buildings located at NALF Waldron. However, material generated from Hurricane Celia may have also been disposed of in these areas to a limited extent. As shown on Figure 8-4, both of these areas are located in the southeast corner of NALF Waldron. Site 14 is located in the triangular area between runways 4 and 8 in the southwest corner of the facility. this area was one of the areas designated in the 1971 agreement between the Navy and the city of Corpus Christi for disposal of the debris generated by Hurricane Celia. Only innocuous materials were disposed of at these sites; therefore, no confirmation study is recommended.



SCALE: 1" = 1400'

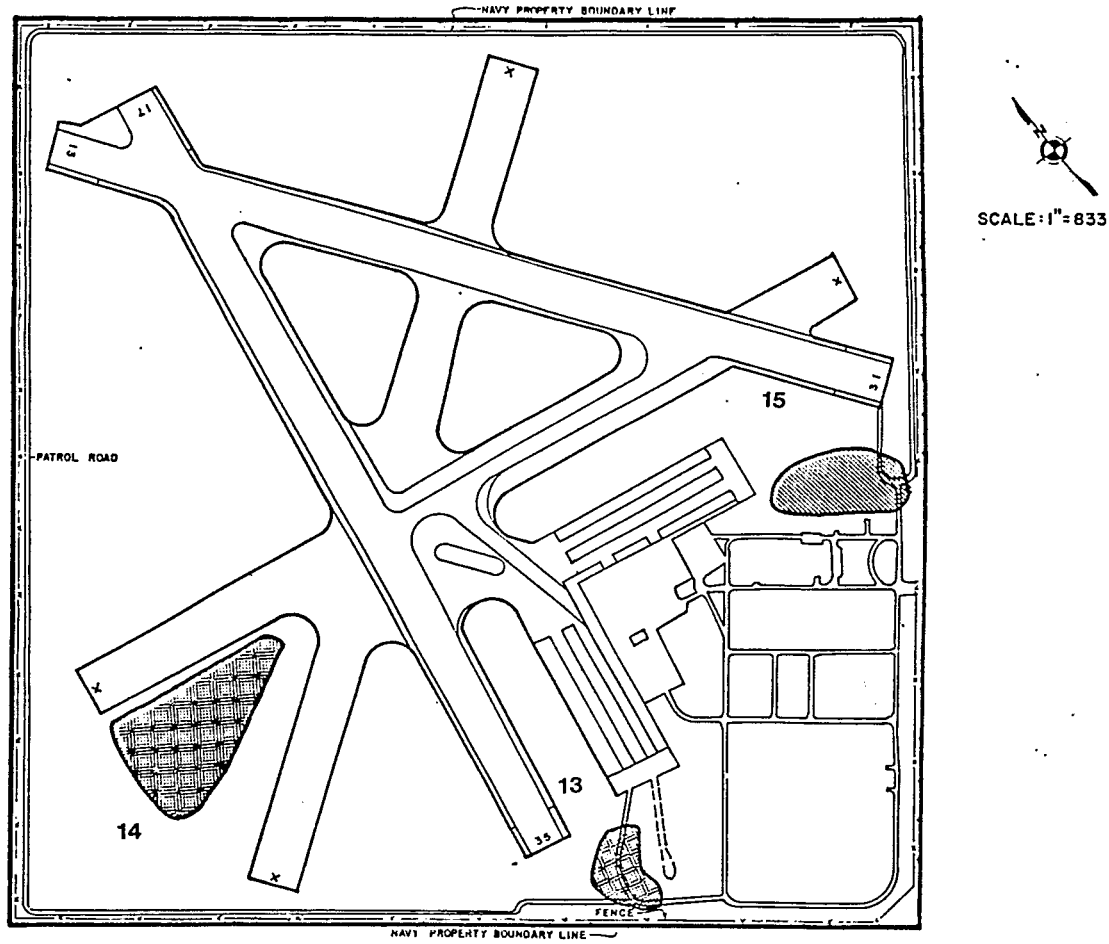
LEGEND

SITE 11 CABANISS
SANITARY LANDFILL

SITE 12 CABANISS
HURRICANE CELIA RUBBLE
AREA

FIGURE 8-3
NALF CABANISS DISPOSAL SITES

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI



LEGEND

SITE 13 WALDRON RUBBLE DISPOSAL AREA

SITE 14 WALDRON RUBBLE DISPOSAL AREA

SITE 15 WALDRON RUBBLE DISPOSAL AREA

FIGURE 8-4 NALF WALDRON RUBBLE DISPOSAL SITES

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
CORPUS CHRISTI

REFERENCES

Baker, E. T., Jr. 1978. Stratigraphic and Hydrogeologic Framework of Part of the Coastal Plain of Texas. In: U.S. Geological Survey, Open-File Report 77-712.

Brown, L. F., Jr., Brewton, J. F. McGowen, J. H., Evans, T. J., Fisher, W. L., and Groat, C. G. 1976. Environmental Geologi Atlas of the Texas Coastal Zone--Corpus Christi Area. In: Univ. Texas, Austin, Bureau of Economic Geology.

Franki, G. E., Garcia, R. N., Hajek, B. F., Arrioga, P., and Roberts, J. C. 1965. Soil Survey of Nueces County, Texas. In: U.S. Dept. of Agriculture, Soil Conservation Service, ser. 1960, no. 20.

Kier, R. S., and White, W. A. 1978. Land and Water Resources of the Corpus Christi Area, Texas. In: Univ. Texas, Austin, Bureau of Economic Geology, Report of Investigation 95.

Kunze, H.L. 1971. Reconnaissance of the Chemical Quality of Surface Waters in the Nueces River Basin, Texas. In: Texas Water Development Board, Report No. 134.

Southern Division, Naval Facilities Engineering Command. 1983. In: Master Plan NAS Corpus Christi, NRMC Corpus Christi, NALF Cabaniss, NALF Waldron, Naval Complex, Corpus Christi, Texas.

University of Texas at Austin. 1975. Geologic Atlas of Texas, Corpus Christi Sheet. In: Univ. Texas, Austin, Bureau of Economic Geology.

U.S. Department of Agriculture. 1972. Soils of the Texas Coastal Basins--Their Characteristics, Uses and Problems, Appendix A of Texas Coastal Basins, v. 2. In: U.S. Dept. of Agriculture, Soil Conservation Service.

U.S. Army Environmental Agency, Aberdeen Proving Grounds. January 1977. In: Water Quality Biological Study No. 24-0018-77, Influence of a Combined Industrial, Domestic Waste Effluent from Corpus Christi Army Depot on Corpus Christi Bay, Corpus Christi, Texas.

Woodman, J. T., Kier, R. S., and Bell, D. L. 1978. Hydrology of the Corpus Christi Area, Texas. In: Univ. Texas, Austin, Bureau of Economic Geology Research Note 12.

APPENDIX A

AGENCIES CONTACTED DURING STUDY

AGENCIES CONTACTED DURING STUDY

1) Naval Energy & Environmental Support Activity (NAVENENVSA), Port Hueneme, Calif.

2) Ordnance Environmental Support Office (OESO), Indian Head, Md.

3) Naval Historical Center, Operation Archives, Building 210-4, Washington Navy Yard, Washington, D.C.

4) National Archives Cartographic Branch, Washington, D.C.

5) National Archives Navy and Old Army Branch. Washington, D.C.

6) Washington National Records Center, GSA Records Branch, Suitland, Md.

7) Washington National Records Center, GSA Archives Branch, Suitland, Md.

8) Federal Archives & Records Center, GSA, Fort Worth, Tex.

9) Naval Facilities Engineering Command Headquarters, Real Estate Branch, Alexandria, Va.

10) Naval Sea System Command, Crystal City, Documents Branch, Alexandria, Va.

11) Naval Sea System Command, Crystal City, Activity Files, Alexandria, Va.

12) DOD Explosives Safety Board, Hoffman Building 1, Alexandria, Va.

13) United States Geological Survey, Reston, Va.

14) United States Environmental Protection Agency, Environmental Photographic Interpretation Center, Warrenton, Va.

15) Texas Energy and Natural Resources Advisory Council, Austin, Tex.

16) U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Md.

17) Southern Division, Naval Facilities Engineering Command, Charleston, S.C.

APPENDIX B

CCAD TYPICAL ANNUAL CHEMICAL USAGE

TABLE 1. METAL PLATING PROCESSES EMPLOYED AT CCAD

Cadmium Plating (Cyanide)	Silver Plating
Hard Chromium Plating	Nickel Plating (Watts)
Lead-Tin Stripping	Tin Plating
Lead Plating	Lead-Tin Plating
Indium Plating	Copper Plating (Acid)
Nickel Plating (Sulfamate)	Copper Plating (Cyanide)
Electroless Nickel Plating	Low Hydrogen Embrittlement Cadmium
Copper Plating (Fluoborate)	Plating (Fluoborate)
Brush Plating	Application of Heath Treat
Electroless Tin Plating	Protective Coating
Chromium Plating, High	Zinc Plating
Speed	Bronze Plating
Chromium Plating,	Aluminum Anodizing
Decorative	Brush Cadmium Plating

TABLE 2. CHEMICAL WASTES COLLECTED DURING CALENDAR YEAR 1978 FOR DEEP WELL INJECTION

Contaminant	Quantity (gal)
Alkaline Rust Removal	2400
Chromic Acid	5300
Phenolic Waste	19500
Cleaning Chemicals	1100
Ammonium Nitrate	1100
Corrosive Waste	1400
Phenolic Cleaner	3550
Pretroleum Cleaner	4800
HCl-Sulfuric Acid	2200
Aladine	3350
Alkaline Waste	7910
HCl Acid	1300
Copper Nitrate	450
Chemical Cleaning Solvent	300
Plating Acids	4750
Chemical Acid	2600

AVERAGE CY 1979 EFFLUENT POLLUTANT CONCENTRATIONS AND NPDES DAILY AVERAGE LIMITATIONS

Effluent Pollutant	Effluent Average (lbs/day)	NPDES Limitation (lbs/day)*
BOD	11.1	108
COD	88.3	813
TSS	8.5	108
O&G	0.91	54.2
Phenols	0.025	0.05
Arsenic	0.01	0.54
Cyanide, A+	< 0.01	0.13
Cyanide, total	< 0.01	0.21
Copper	0.02	2.71
Mercury	< 0.001	0.03
Zinc	0.08	5.42
Nickel	0.05	5.42
Cadmium	0.038	0.54
Lead	0.03	2.71
Cr, total	0.40	2.7
Cr^{+6}	0.07	0.27
pH	7.1 units	Range 6.0 - 9.0 units

* - Flow basis for permit is 0.65 MGD; average CY flow 0.182 MGD

+ - "Cyanide A" is defined as those cyanides amenable to chlorination as described in the 1972 Annual Book of ASTM Standards, Standard D 2036-72, Method B, page 553.

List of Chemical Wastes Collected by Brine Service Company During Calendar Year 1978 for Disposal

Contaminant	Quantity in Liters
Alkaline Rust Removal	9,084
Chromic Acid	20,061
Phenolic Waste	73,808
Cleaning Chemicals	4,164
Ammonium Nitrate	4,164
Corrosive Waste	5,299
Phenolic Cleaner	13,437
Petroleum Cleaner	18,168
Alkaline Sludge	15,897
HCl-Sulphuric Acid	8,327
Chromic Sludge	214,610
Aladine	12,680
Alkaline Waste	29,940
Oily Waste	17,411
HCL Acid	4,921
Copper Nitrate	1,703
Chemical Cleaning Solvents	1,136
Carbon Remover Sludge	76,381
Chemical Sludge	56,776
Plating Acids	17,979
Chemical Acid	9,841
Silver Strike Sludge	1,893

CCAD TYPICAL ANNUAL CHEMICAL USAGE

Description	Unit Issue	Conversion Factor	Qty.	Annual Qty.
Nickel Brightener NS22	Gal.		5	5
Hydrochloric Acid 20° Baume	Drum	15 Gal.	10	150
Magnesium Fluoride, technical grade, Mallinkrodt #5973	Lb.		80	80
Cadmium, Alkaline, brush	Qt.		48	48
Potassium Fluoride	Lb.		300	300
Potassium Manganate, $K_2M_nO_4$, 97% pure	Lb.		200	200
Ammonium Bifluoride	Lb.		1,200	1,200
Sodium Phosphate, dodecahydrate, anhydrous, technical	Bag	80 lb.	4	320
Ammonium Nitrate, technical, 99% minimum by weight	Bag	50 lb.	45	2,250
Lithium Bromide	Lb.		2,900	2,900
Trichloroethane	Gal.		10,220	10,220
Lithium Bromide (for Air Conditioning)	Drum	30 Gal.	8	240
Sulfuric Acid, Laboratory reagent grade	Bottle	9 Lb.	2	18
Sodium Hydroxide, dry, pure	Lb.		10	10

CCAD TYPICAL ANNUAL CHEMICAL USAGE

Description	Unit Issue	Conversion Factor	Qty.	Annual Qty.
Liquid Scale Remover	Can	5 Gal.	20	100
Sodium Hydroxide, technical, 96% min. by wt.	Drum	100 Lb.	30	3,000
Trichlorethylene, technical	Can	5 Gal.	15	75
Acetone, technical	Can	5 Gal.	29	145
Trichlorethylene, technical	Drum	55 Gal.	17	935
Alcohol, denatured, 94.9%	Drum	54 Gal.	3	162
Alcohol, denatured, 94.9%	Can	5 Gal.	20	100
Ammonium Hydroxide, technical, 27, 30% ammonia	Bottle	80 Oz.	35	22 Gal.
Phenolphthalein, ACS	Bottle	4 Oz.	13	52 Oz.
Hydrogen Peroxide, ACS, 29% minimum	Pint		36	36
Acid, Tartaric, ACS	Bottle	4 Oz.	100	400
Nitric Acid, technical, 61% minimum	Carboy	6.5 Gal.	64	416
Nitric Acid, technical, 61% minimum	Carboy	13 Gal.	7	91
Naptha, Aliphatic, A/A	Drum	55 Gal.	35	1,925
Sodium Stannate, trihydrate, technical, 91% min. by wt.	Lb.		110	110
Cupric Sulfate, pentahydrate, technical, 95-105% by wt.	Lb.		20	20

CCAD TYPICAL ANNUAL CHEMICAL USAGE

Description	Unit Issue	Conversion Factor	Qty.	Annual Qty.
Dichloromethane, technical, 99% pure	Can	5 Gal.	2	10
Naptha, Aromatic	Drum	55 Gal.	3	165
Acid, Sulfuric, electrolyte, 36.5-37.5%	Gal.		152	152
Xylene, technical, 0.86-0.87 spec grav	Can	5 Gal.	46	230
Ethylene Glycol, monoethyl ether acetate, 95% min. by wt.	Gal.		151	151
Chromium Trioxide, technical, 99.5%	Drum	100 Lb.	120	12,000
Boric Acid, ACS	Lb.		72	72
Sodium Carbonate-Sodium Bircarbonate mix, 35 to 50% each	Drum	100 Lb.	1	100
Potassium Permanganate, technical, 97% min. by wt.	Drum	100 Lb.	11	1,100
Molybdenum Disulfide, 98.5% by wt.	Lb.		6	6
Naptha, Aliphatic, A/A	Can	5 Gal.	44	220
Acetic Acid, Glacial, technical, 99.5% by volume	Bottle	5 Lb.	15	75
Ethylene Glycol, monobutyl ether, technical	Gal.		132	132
Sodium Cyanide, technical, 98% by wt.	Bottle	5 Lb.	208	1,040
Sodium Dichromate, Dihydrate, technical, 86.6% min. by wt.	Bag	100 Lb.	66	6,600

CCAD TYPICAL ANNUAL CHEMICAL USAGE

Description	Unit Issue	Conversion Factor	Qty.	Annual Qty.
Methyl Ethyl Ketone, technical, 99% min. by volume	Can	5 Gal.	46	230
Methyl Ethyl Ketone, technical, 99% min. by volume	Drum	55 Gal.	28	1,540
Methyl Ethyl Ketone, technical, 99% min. by volume	Gal.		8	8
Toluene-Methyl Isobutyl Ketone mix, 50% each	Can	5 Gal.	77	385
Toluene-Methyl Isobutyl Ketone mix, 50% each	Gal.		20	20
Toluene, technical, 0.86-0.87 spec. grav.	Drum	55 Gal.	44	2,420
Toluene, technical, 0.86-0.87 spec. grav.	Can	5 Gal.	263	1,315
Hydrochloric Acid, technical, 31.45% min. by wt.	Drum	15 Gal.	6	90
1,1,1-Trichloroethane, technical, 93% min. by wt.	Drum	54 Gal.	547	29,538
Potassium Hydroxide, technical, 85% min. by wt.	Can	5 Lb.	475	2,375
Hydrofluoric Acid, technical	Gal.		28	28
Potassium Hydroxide solution, 31% min. by wt.	Bottle	500 cc	100	50 Liters
Alcohol, denatured, 94.9% by vol.	Gal.		35	35
1,1,1-Trichloroethane, technical, 90% min. by vol.	Drum	55 Gal.	14	770

CCAD TYPICAL ANNUAL CHEMICAL USAGE

Description	Unit Issue	Conversion Factor	Qty.	Annual Qty.
1,1,1-Trichloroethane, technical, 90% min. by vol.	Gal.		279	279
1,1,1-Trichloroethane, technical, 90% min. by vol.	Can	5 Gal.	39	195
Methanol, ACS	Gal.		24	24
Nickel Chloride, hexahydrate, 24.5% min. by wt. nickel	Bag	100 Lb.	6	600
Orthophosphoric Acid, 75% min. by wt.	Drum	15 Gal.	3	45
Sulfuric Acid, electrolyte, 93.2% by wt.	Carboy	13 Gal.	10	130
Sulfuric Acid, electrolyte, 93.2% by wt.	Carboy	6.5 Gal.	105	682
Nitric Acid, technical, 61% min. by wt.	Carboy	13 Gal.	7	91
Nitric Acid, technical, 61% min. by wt.	Carboy	6.5 Gal.	64	416
Hydrochloric Acid, 31.45% min. by wt.	Drum	15 Gal.	104	1,560
Alcohol, isopropyl, technical, grade B	Can	5 Gal.	3	15
1,1,1-Trichloroethane, 90% min. by vol. (aerosol can)	Can	12 Oz.	464	44 Gal.
Diethylenetriamine, technical, 97% min. by wt.	Pint		138	17 Gal.
Lectraclean	Gal.		159	159
Lectraclean	CS		550	

CCAD TYPICAL ANNUAL CHEMICAL USAGE

Description	Unit Issue	Conversion Factor	Qty.	Annual Qty.
Jetosoil	Drum		170	
Cleaner, type SKC-NF	Gal.		120	120
Compound, metal stripping, alkaline, "Enstrip A"	Lb.		1,400	1,400
Compound, anti-rust	Lb.		490	490
Cleaner, Zyglo, Type ZC-7, Magnaflux Corp.	Can		72	
Compound, Cleaning, Oakite 90	Drum	450 Lb.	140	63,000
Compound, Cleaning, Turco 4338	Drum		6	
Compound, Salt, Macro Bronze 3 or Iridite 5P-1	Lb.		200	200
Compound, Water Wash, for paint booths	Lb.		4,150	4,150
Cleaning Solvent, Turco 657	Drum		718	
Compound, cleaning, Pasa-Jell 105	Qt.		275	275
Penetrant, P-133	Drum		19	
Penetrant WP-169	Drum		10	
Cleaner, Alum. Oakite 164 or Altrex B	Lb.		3,175	3,175
Alkaline Rust Remover, Turco 4181	Lb.		10,303	10,303
Compound Cleaning, R423A	Drum		101	

CCAD TYPICAL ANNUAL CHEMICAL USAGE

Description	Unit Issue	Conversion Factor	Qty.	Annual Qty.
Cleaning Compound, Aircraft Surface, 90% biodegradable	Can	5 Gal.	8	40
Cleaning Compound, Aircraft Surface, 90% biodegradable	Drum	55 Gal.	1	55
Cleaner, Compound, engine	Can	5 Gal.	10	50
Cleaning Compound, high pressure for use in steam cleaning machines	Drum	125 Lb.	6	750
Fluid, Calibrating, aircraft fuel systems	Drum	55 Gal.	72	3,960
Desiccant, activated	Drum	200 Lb.	40	8,000
Desiccant	Drum	200 Lb.	167	33,400
Cleaning Solution, watch, Fed Spec O-C-435	Gal.		89	89
Rinsing Solution, watch	Gal.		108	108
Carbon Remover, dip type, requires rinsing, Fed P-C-111	Drum	55 Gal.	1	55
Decontaminating Agent Mercury	Can	11 Lb.	10	110
Corrosion Removing Compound, MIL-C-14460, Type 1	Drum	400 Lb.	39	15,600
Corrosion Removing Compound, MIL-C-10578	Drum	15 Gal.	15	225
Cleaning Compound, solvent, emulsion, Fed. P-C-444	Drum	55 Gal.	2	110

CCAD TYPICAL ANNUAL CHEMICAL USAGE

Description	Unit Issue	Conversion Factor	Qty.	Annual Qty.
Remover, paint, MIL-R-25134	Drum	55 Gal.	337	18,535
Remover, paint, organic solvent MIL-R-81294	Drum	55 Gal.	173	9,515
Remover, paint, organic solvent, water rinse, Fed TT-R-248	Drum	55 Gal.	204	11,220
Remover, paint, organic solvent, water rinse, Fed TT-R-248	Gal.		6	6
Cleaning Compound, solvent, Actusol T776	Drum	55 Gal.	48	2,640
Freon		Gal.		1,200
Varsol		Gal.		84,000

CCAD TYPICAL ANNUAL CHEMICAL USAGE

Description	Unit Issue	Conversion Factor	Qty.	Annual Qty.
Cleaning Compound, alkali, ferrous surfaces, MIL-D-26549	Drum	55 Gal.	24	1,320
Solution, Unichrome Compound	Drum	100 Lb.	54	5,400
Compound, cleaning, high pressure, for use in steam cleaning machines for metallic and painted surfaces, MIL-C-22542	Drum	55 Gal.	128	7,040
Salts, heat treating, MIL-S-10699	Lb.		1,200	1,200
Corrosion removing compound, MIL-C-10578, Type III	Drum	5 Gal.	30	150
Water displacing compound, 98.75% min. by wt. N-butyl alcohol, 1.00% min. basic barium dinonylnapthalene sulfonate	Gal.		54	54
Compound, cleaning, aircraft surface, 90% min. biodegradable	Drum	55 Gal.	12	660
Cleaning	Can		166	
Cleaning compound, high pressure, 80% min. biodegradable	Box	25 Lb.	12	300
Cleaning compound, solvent, for precision parts, MIL-C-81302	Drum	55 Gal.	71	3,905
Stripper, Enthone A-150	Drum		25	
Additive, Enthone A-150	Drum		2	

APPENDIX C

PCB TRANSFORMER LOCATIONS

PCB TRANSFORMER LOCATIONS

SERIAL NUMBER	MANUFACTURER	KVA RATING	PCB WEIGHT	PCB VOLUME	STATUS	LEAKS	LOCATION
79V2073	VANTRAN	50		25.2	OFF	NO	BLDG 168
79V2245	VANTRAN	50		25.2	OFF	NO	BLDG 168
L6F7001	WAGNER	10		10.5	OFF	YES	BLDG 168
64M7356	WESTINGHOUSE	25		57	OFF	NO	BLDG 168
D17710	MOLONEY	10		7.5	OFF	NO	BLDG 168
705912 SEC.M	MOLONEY	75	39		ON	NO	LEYTE CIR
662465	MOLONEY	37.5	55		ON	NO	MOVING & HSING BLDG
662477 SEC.M	MOLONEY	37.5	55		ON	NO	MOVING & HSING BLDG
71V7511 S-M	VANTRAN	225	200		ON	NO	CPO CLUB
D17710 SEC.M	MOLONEY	10	7.5		ON	NO	GOLF COURSE
85669 SEC.M	MARCUS	167	92		ON	NO	HANGAR 56
121632 SEC.M	FEDERAL PACIFIC	167	40.5		ON	NO	HANGAR 57
121634	F.P.E.	167	48.5		ON	NO	HANGAR 57
5PXPI 60571	WESTINGHOUSE	250	46		ON	NO	HANGAR 57
4PXPI 60571	WESTINGHOUSE	250	46		ON	NO	HANGAR 57
6PXPI 60571	WESTINGHOUSE	250	46		ON	NO	HANGAR 57
6536358 SEC.M	WESTINGHOUSE	750	450		ON	NO	HANGAR 51
173270 S-M	ALLIS CHALMERS	75	52		ON	NO	HANGAR 58
1732701 S-M	ALLIS CHALMERS	75	52		ON	NO	HANGAR 58
1732702 S-M	ALLIS CHALMERS	75	52		ON	NO	HANGAR 58
120611 SEC.F	FEDERAL PACIFIC	750	190		ON	NO	BLDG 10
NO PLATE S-F	MOLONEY	10	7.4		ON	NO	NEAR BLDG 13
D2054 SEC.F	MOLONEY	10	7.4		ON	NO	HEAR BLDG 13
D2057 SEC.F	MOLONEY	10	7.4		ON	NO	NEAR BLDG 13
G-858007 S-F	———	1000	155		ON	NO	BLDG 1808
699344 SEC.F	MOLONEY	75	61		ON	NO	BLDG 38
699341 SEC.F	MOLONEY	75	61		ON	NO	BLDG 38
699342 SEC.F	MOLONEY	75	61		ON	NO	BLDG 38
701883 SEC.F	MOLONEY	37.5	52		ON	YES	NEAR BLDG 343
662464 SEC.F	MOLONEY	37.5	55		ON	NO	NEAR BLDG 343
662469 SEC.F	MOLONEY	37.5	55		ON	NO	NEAR BLDG 343

PCB TRANSFORMER LOCATIONS

SERIAL NUMBER	MANUFACTURER	KVA RATING	PCB WEIGHT	PCB VOLUME	STATUS	LEAKS	LOCATION
781124752	RTE CORP	50	29		ON	NO	MODULE 3321
1456006	MOLONEY	50	33		ON	NO	SEC C (BLDG 158)
D34320	MOLONEY	50	23		ON	NO	SEC C (POLE 96)
19081	MOLONEY	50	23		ON	NO	SEC C (POLE 96)
70341843	WAGNER	50	25		ON	NO	SEC C (POLE 96)
70341844	WAGNER	50	25		ON	NO	SEC C (POLE 99)
70341846	WAGNER	50	25		ON	NO	SEC C (POLE 99)
F19078	MOLONEY	50	23		ON	NO	SEC C (POLE 108)
D40703	MOLONEY	50	23		ON	NO	SEC C (POLE 108)
D40700	MOLONEY	50	23		ON	NO	SEC C (POLE 108)
70442854	WAGNER	15	10		ON	NO	SEC C (BLDG 90)
1456007	MOLONEY	50	33		ON	NO	SEC C (BLDG 158)
1456005	MOLONEY	50	33		ON	NO	SEC C (BLDG 158)
146891-1	MOLONEY	25	16		ON	YES	SEC C (POLE 31)
D19095	DELTA-STAR	300	1690	226	ON	NO	SEC C (BLDG 1281)
YAR 80461	WESTINGHOUSE	750		186	ON	NO	SEC C (BLDG 1281)
M319755TGPA	GE	500	1100	160	ON	NO	SEC C (BLDG 1)
2722009-9	CENTRAL	50		250	ON	NO	SEC C (BLDG 141)
81V3366	VANTRAN	25		44	ON	NO	SEC C (PIER RESTROOMS)
7901571202	RTE CORP	37.5		39	ON	NO	SEC C (PAVILLION)
1787758	ALLIS CHALMERS	25		28.4	ON	NO	SEC D (1225)
1787757	ALLIS CHALMERS	25		28.4	ON	NO	SEC D (1225)
1787756	ALLIS CHALMERS	25		28.4	ON	NO	SEC D (1225)
2783124-7	MOLONEY	25		11	OFF	NO	BLDG 168
671329	MOLONEY	7.5		6.5	OFF	NO	BLDG 168
80V1233	VANTRAN	25		44	OFF	NO	BLDG 168
79V1505	VANTRAN	45		130	OFF	NO	BLDG 168
1791988-8	MOLONEY	37.5		17	OFF	NO	BLDG 168
1252767	MOLONEY	25		20	OFF	NO	BLDG 168
1252765	MOLONEY	25		20	OFF	NO	BLDG 168

PCB TRANSFORMER LOCATIONS

SERIAL NUMBER	MANUFACTURER	KVA RATING	PCB WEIGHT	PCB VOLUME	STATUS	LEAKS	LOCATION
1788876 SEC.F	ALLIS CHALMERS	100	57		ON	YES	VAULT 164
1788877 SEC.F	ALLIS CHALMERS	100	57		ON	YES	VAULT 164
1788875 SEC.F	ALLIS CHALMERS	100	57		ON	YES	VAULT 164
F-9578501 SEC.F	_____	2500	440		ON	NO	SE CORNER BLDG 8
F-38 SEC.F SING	MOLONEY	100	50		ON	NO	BLDG 89
F-39 SEC.F SING	MOLONEY	100	50		ON	NO	BLDG 89
F-40 SEC.F SING	MOLONEY	100	50		ON	NO	BLDG 89
1807596 SEC.F	ALLIS CHALMERS	75	53		ON	YES	BLDG 89
1807597 SEC.F	ALLIS CHALMERS	75	53		ON	YES	BLDG 89
1807598 SEC.F	ALLIS CHALMERS	75	53		ON	NO	BLDG 89
1816901 SEC.F	ALLIS CHALMERS	200	99		ON	NO	BLDG 89
1816899 SEC.F	ALLIS CHALMERS	200	99		ON	NO	BLDG 89
6147442 SEC.F	WESTINGHOUSE	167	129		ON	YES	BLDG 89
L9F1226 SEC.F	WAGNER	25	25		ON	NO	BLDG 1217
L9F1224 SEC.F	WAGNER	25	25		OFF	NO	BLDG 1217
L9F1221 SEC.F	WAGNER	25	25		ON	NO	BLDG 1217
73V8308 SEC.F	VANTRAN	300	204		ON	NO	BLDG 258
73V80307 SEC.F	VANTRAN	45	87		ON	NO	BLDG 1133
715502 SEC.F	MOLONEY	37.5	52		ON	NO	BLDG 250
715503 SEC.F	MOLONEY	37.5	52		ON	NO	BLDG 250
701884 SEC.F	MOLONEY	37.5	52		ON	NO	BLDG 250
67U5889 SEC.F	VANTRAN	500	165		ON	NO	BLDG 1728
70060313 S-F	ESCO	500	243		ON	NO	BLDG 1733
662480 SEC.F	MOLONEY	37.5	55		ON	NO	BLDG 32
662470 SEC.F	MOLONEY	37.5	55		ON	NO	BLDG 32
662476 SEC.F	MOLONEY	37.5	55		ON	NO	BLDG 32
7AV7751-01	WESTINGHOUSE	750	329		ON	NO	BLDG 1746
S8004G4N S-F	SQUARE "D" CO.	150	133		ON	NO	BLDG 1733
3931923T71AA	_____	300	190		ON	NO	BLDG 1733
C862042 SEC.F	_____	750	340		ON	NO	BLDG 1260
14704-1 CS-1	SIERRA	300	150		ON	NO	GROUND SEC.1

PCB TRANSFORMER LOCATIONS

SERIAL NUMBER	MANUFACTURER	KVA RATING	PCB WEIGHT	PCB VOLUME	STATUS	LEAKS	LOCATION
6544635 GS-2	WESTINGHOUSE	225	200		ON	NO	GROUND SEC. 2
1732 793 GS-4	ALLIS CHALMERS	150	79		ON	NO	GROUND SEC. 4
1732 795 GS-5	ALLIS CHALMERS	150	79		ON	NO	GROUND SEC. 5
699328 GS-8	MOLONEY	50	56		ON	NO	GROUND SEC. 8
599331 GS-9	MOLONEY	50	56		ON	NO	GROUND SEC. 9
68AE 6569	WESTINGHOUSE	50	644		ON	NO	GROUND SEC. 10
Y99320 GS-11	MOLONEY	37.5	47		ON	NO	GROUND SEC. 11
699318 GS-12	MOLONEY	37.5	47		ON	NO	GROUND SEC. 12
699319 GS-13	MOLONEY	37.5	47		ON	NO	GROUND SEC. 13
1732794	ALLIS CHALMERS	150	79		ON	NO	GROUND SEC. 14
662506	MOLONEY	25	62		ON	NO	GROUND SEC. 17
703156	MOLONEY	50	56		ON	NO	GROUND SEC. 19
700915	MOLONEY	50	56		ON	NO	GROUND SEC. 20
699335	MOLONEY	50	56		ON	NO	GROUND SEC. 21
662473	MOLONEY	37.5	55		ON	NO	GROUND SEC. 22
1468913	MOLONEY	25	16		ON	NO	GROUND SEC. 23
699477	MOLONEY	25	38		ON	NO	GROUND SEC. 25
362606	MOLONEY	25	30		ON	NO	GROUND SEC. 27
362607	MOLONEY	25	30		ON	NO	GROUND SEC. 29
662508	MOLONEY	75	62		ON	NO	GROUND SEC. 30
703146	MOLONEY	50	56		ON	NO	GROUND SEC. 31
700920	MOLONEY	50	56		ON	NO	GROUND SEC. 32
662507	MOLONEY	75	62		ON	NO	GROUND SEC. 33
662493	MOLONEY	50	61		ON	NO	GROUND SEC. 34
668718	MOLONEY	50	61		ON	NO	GROUND SEC. 25
704886	MOLONEY	50	61		ON	NO	GROUND SEC. 36
699327	MOLONEY	50	61		ON	NO	GROUND SEC. 37
662499	MOLONEY	50	61		ON	NO	GROUND SEC. 38
700919	MOLONEY	50	61		ON	NO	GROUND SEC. 39
699330	MOLONEY	50	61		ON	NO	GROUND SEC. 40
662467	MOLONEY	37.5	55		ON	NO	GROUND SEC. 41

PCB TRANSFORMER LOCATIONS

SERIAL NUMBER	MANUFACTURER	KVA RATING	PCB WEIGHT	PCB VOLUME	STATUS	LEAKS	LOCATION
3801-1	MOLONEY	45	50		ON	NO	GROUND SEC. 42
700906	MOLONEY	25	40.5		ON	NO	GROUND SEC. 43
700910	MOLONEY	25	40.5		ON	NO	GROUND SEC. 44
662456	MOLONEY	25	38		ON	NO	GROUND SEC. 45
700614	MOLONEY	25	38		ON	NO	GROUND SEC. 46
699478	MOLONEY	25	38		ON	NO	GROUND SEC. 47
674408	MOLONEY	25	38		ON	NO	GROUND SEC. 50
699478	MOLONEY	25	38		ON	NO	GROUND SEC. 51
674409	MOLONEY	25	38		ON	NO	GROUND SEC. 52
3006218	WESTINGHOUSE	10	52		ON	YES	GROUND SEC. 53
701880	MOLONEY	37.5	52		ON	NO	GROUND SEC. 54
701887	MOLONEY	50	61		ON	NO	GROUND SEC. 55
700917	MOLONEY	50	61		ON	NO	GROUND SEC. 56
68PC4976	WESTINGHOUSE	10KU	43		ON	NO	SEC. A-1 (N.GATE)
1161679T73AA	_____	225	25		ON	NO	SEC. A-2 (BLDG.207)
G1 44950	WESTINGHOUSE	167	121		ON	NO	SEC. A-10 (BLDG. 25 PUMPHOUSE)
GI 44948	WESTINGHOUSE	167	121		ON	NO	SEC. A-11 (BLDG. 25 PUMPHOUSE)
GI 44949	WESTINGHOUSE	167	121		ON	NO	SEC. A-12 (BLDG. 25 PUMPHOUSE)
2808058	WESTINGHOUSE	1.5	07		ON	NO	SEC. A-13 (BLDG.25)
118614	FEDERAL PACIFIC	50	22.9		ON	NO	SEC. A-14 (BLDG.163)
118615	FEDERAL PACIFIC	50	22.9		ON	NO	SEC. A-15 (BLDG.163)
118616	FEDERAL PACIFIC	50	22.9		ON	YES	SEC. A-16 (BLDG.163)
1787866	ALLIS CHALMERS	100	57		ON	NO	SEC. B (BLDG. 41)
1787867	ALLIS CHALMERS	100	57		ON	NO	SEC. B-2 (BLDG. 41)
25547	NIAGRATRANS. CO.	300	143		ON	NO	SEC. B-6 (BLDG. 97)
1732781	ALLIS CHALMERS	100	57		ON	NO	SEC. B-7 (BLDG. 42)
1732782	ALLIS CHALMERS	100	57		ON	NO	SEC. B-8 (BLDG. 42)
1732783	ALLIS CHALMERS	100	57		ON	NO	SEC. B-9 (BLDG. 42)
699337	MOLONEY	75	61		ON	NO	SEC. B-10 (BLDG. 42)

PCB TRANSFORMER LOCATIONS

SERIAL NUMBER	MANUFACTURER	KVA RATING	PCB WEIGHT	PCB VOLUME	STATUS	LEAKS	LOCATION
3740113	ESCO MFG. CO.	500	214		ON	YES	SEC. B-11 (BLDG.43)
181692	STANDARD TRAN.	500	198		ON	NO	SEC. B-12 (BLDG.43)
42511	SQUARE "D" CO.	500	264		ON	NO	SEC. B-13 (BLDG.43)
181694	STANDARD TRAN.	500	198		ON	NO	SEC. B-14 (BLDG.44)
691003444	ESCO MFG. CO.	500	214		ON	NO	SEC. B-15 (BLDG.44)
3740117	ESCO MFG. CO.	500	214		ON	NO	SEC. B-16 (BLDG.45)
181693	STANDARD TRAN.	500	198		ON	NO	SEC. B-17 (BLDG.45)
H884904	_____	500	1450		ON	NO	SEC. B-18 (BLDG.46)
POV0042-01	WESTINGHOUSE	500	2174		ON	YES	SEC. B-19 (BLDG.46)
H886508	_____	1000	156		ON	NO	SEC. B-26 BLDG. 1828 SUBSTATION)
7477947	MOLONEY	150	135		ON	NO	SEC. B-27 (BLDG. 1824)
747949	MOLONEY	150	135		ON	YES	SEC. B-28 (BLDG. 1824)
747948	MOLONEY	150	135		ON	NO	SEC. B-29 (BLDG. 1824)
G 148192	SOLA INDUSTRIES	300	159		ON	NO	SEC. B-30 (BLDG. 1824)
9841382	ESCO TRANS CO.	300	184		ON	NO	BLDG 24
74V7662	VANTRAN	500	245		ON	NO	BLDG 24
6731254	WESTINGHOUSE	167	129		ON	NO	
6693036	WESTINGHOUSE	167	129		ON	NO	BLDG 24
703932	MOLONEY	75	64		ON	NO	BLDG 24
703936	MOLONEY	75	64		ON	NO	BLDG 24
703935	MOLONEY	75	64		ON	NO	BLDG 24
662501	MOLONEY	50	61		ON	NO	BLDG 24
662500	MOLONEY	50	61		ON	NO	BLDG 24
662485	MOLONEY	50	61		ON	NO	BLDG 24
692837	MOLONEY	25	38		ON	NO	BLDG 24
685084	MOLONEY	10	14		ON	NO	BLDG 24
1787863	ALLIS CHALMERS	100	57		ON	NO	BLDG 24
1787865	ALLIS CHALMERS	100	57		ON	NO	BLDG 24

PCB TRANSFORMER LOCATIONS

SERIAL NUMBER	MANUFACTURER	KVA RATING	PCB WEIGHT	PCB VOLUME	STATUS	LEAKS	LOCATION
1787864	ALLIS CHALMERS	100	57		ON	NO	BLDG 24
658442	MOLONEY	5	09		ON	NO	BLDG 24
701882	MOLONEY	37.5	52		ON	NO	BLDG 24
715504	MOLONEY	37.5	52		ON	NO	BLDG 24
701881	MOLONEY	37.5	52		ON	NO	BLDG 24
714168	MOLONEY	37.5	52		ON	NO	BLDG 24
714167	MOLONEY	37.5	52		ON	NO	BLDG 24
714166	MOLONEY	37.5	52		ON	NO	BLDG 24
698657	MOLONEY	25	40.5		ON	NO	BLDG 24
F19080	MOLONEY	50	23		ON	NO	BLDG 24
68A2076	WESTINGHOUSE	15	9.5		ON	NO	BLDG 24
UNKNOWN	WESTINGHOUSE	15	9.5		OFF	NO	BLDG 24
703132	MOLONEY	15	25		OFF	NO	BLDG 24
68A2075	WESTINGHOUSE	15	9.5		OFF	NO	BLDG 24
68A2073	WESTINGHOUSE	15	9.5		OFF	NO	BLDG 24
72E7612N	VANTRAN	25	44		OFF	YES	BLDG 24
699343	MOLONEY	75	61		OFF	NO	BLDG 24
662479	MOLONEY	37.5	55		OFF	NO	BLDG 24
700908	MOLONEY	25	40.5		OFF	NO	BLDG 24
700911	MOLONEY	25	40.5		OFF	NO	BLDG 24
662486	MOLONEY	50	61		OFF	NO	BLDG 24
668719	MOLONEY	50	60		OFF	NO	BLDG 24
662502	MOLONEY	50	61		OFF	NO	BLDG 24
700931	MOLONEY	50	56		OFF	NO	BLDG 24
699336	MOLONEY	75	61		OFF	NO	BLDG 24
C5902	MOLONEY	100	43		OFF	NO	BLDG 24
C-15487	MOLONEY	100	43		OFF	NO	BLDG 24
C-15485	MOLONEY	100	43		OFF	NO	BLDG 24
700933	MOLONEY	50	56		OFF	NO	BLDG 24
671332	MOLONEY	15	23		OFF	NO	BLDG 24
699334	MOLONEY	50	56		OFF	NO	BLDG 24

PCB TRANSFORMER LOCATIONS

SERIAL NUMBER	MANUFACTURER	KVA RATING	PCB WEIGHT	PCB VOLUME	STATUS	LEAKS	LOCATION
705299	MOLONEY	50	56		OFF	NO	BLDG 24
699333	MOLONEY	50	56		OFF	NO	BLDG 24
1788638	ALLIS CHALMERS	5	19		OFF	NO	BLDG 24
19250-2	CENTRAL TRAN. CO.	10	6		OFF	NO	BLDG 24
662478	MOLONEY	37.5	55		OFF	NO	BLDG 24
1761508	ALLIS CHALMERS	100	57		OFF	NO	BLDG 24
1761507	ALLIS CHALMERS	100	57		OFF	NO	BLDG 24
1761506	ALLIS CHALMERS	100	57		OFF	NO	BLDG 24
80957	MARCUS	100	80		OFF	NO	BLDG 24
80958	MARCUS	100	80		OFF	NO	BLDG 24
80959	MARCUS	100	80		OFF	NO	BLDG 24
662496	MOLONEY	50	61		OFF	NO	BLDG 24
2722009-5	CENTRAL MOLONEY	50+	25		OFF	NO	BLDG 24
662492	MOLONEY	50	61		OFF	NO	BLDG 24
668717	MOLONEY	50	60		OFF	NO	BLDG 24
700889	MOLONEY	15	23		OFF	NO	BLDG 24
68PC4978	WESTINGHOUSE	37.5	50		OFF	NO	BLDG 24
71V0823	VANTRAN	25	55		OFF	NO	BLDG 24
W219759	H. K. PORTER CO.	500	247		OFF	NO	BLDG 24
73322437	WAGNER ELECT.	25	14		OFF	NO	BLDG 24
791117219	RTE CORP.	75	58		ON	NO	BLDG 2660, 2661,2662
668715	MOLONEY	50	23		ON	NO	BLDG 149
S222741	ALLIS CHALMERS	100	36		ON	NO	BLDG 120
7222740	ALLIS CHALMERS	100	36		ON	NO	BLDG 120
7222789	ALLIS CHALMERS	100	36		ON	NO	BLDG 120
D37336	MOLONEY	50	23		ON	NO	BLDG 2659
19250-7	CENTRAL	10	06		ON	NO	SPRINKLER-PUMP/ 7TH STREET
19250-6	CENTRAL	10	06		ON	NO	SPRINKLER-PUMP/ 7TH STREET
19250-4	CENTRAL	10	06		ON	NO	SPRINKLER-PUMP/ 7TH STREET

PCB TRANSFORMER LOCATIONS

SERIAL NUMBER	MANUFACTURER	KVA RATING	PCB WEIGHT	PCB VOLUME	STATUS	LEAKS	LOCATION
700890	MOLONEY	15	03		ON	NO	BLDG 2490
S28436	STANDARD TRANS.	75	50		ON	NO	MODULE #3328
804-44603	SESCO	150	77		ON	NO	BLDG 1757
1732792	ALLIS CHALMERS	100	56		ON	NO	BLDG 100
1732790	ALLIS CHALMERS	100	56		ON	NO	BLDG 100
700943	MOLONEY	50	56		ON	NO	BLDG 101-103
703147	MOLONEY	50	56		ON	NO	BLDG 101-103
701888	MOLONEY	50	56		ON	NO	BLDG 101-103
74V2234	VANTRAN	75	85		ON	NO	BLDG 1758
70471510	WAGNER ELEC.	37	07		ON	NO	BASEBALL DIAMOND
70462795	WAGNER ELEC.	37	37		ON	NO	BASEBALL DIAMOND
71030004	WAGNER ELEC.	37	37		ON	NO	BASEBALL DIAMOND
SBV3065-01	WESTINGHOUSE	3000	450		ON	NO	HOSPITAL
J936881T72A	_____	75	170 G.L.		ON	NO	H-101 "G" FLIGHT TEST FACILITY
1980-29	CENTRAL TRANS.	75	72		ON	NO	NEAR HANGAR 54
79V2247	VANTRAN	50	25		ON	NO	BETWEEN RR & SS
700886	MOLONEY	15	23		ON	NO	BLDG 2469-2470
C34740	MOLONEY	50	23		ON	NO	BLDG 2445, 2446, 2447, 2544