# INITIAL ASSESSMENT STUDY NAS WHITING FIELD FL

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# INITIAL ASSESSMENT STUDY OF NAVAL AIR STATION WHITING FIELD MILTON, FLORIDA

## NEESA 13-072


**NAVAL ENERGY AND ENVIRONMENTAL SUPPORT ACTIVITY**

**Port Hueneme, California 93043**

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# INITIAL ASSESSMENT STUDY
# NAVAL AIR STATION, WHITING FIELD
# MILTON, FLORIDA

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# EXECUTIVE SUMMARY

This report presents the results of an Initial Assessment Study (IAS) conducted at the Naval Air Station (NAS), Whiting Field, Milton, Florida. The purpose of an IAS is to identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous materials disposal operations.

Based on historical data, aerial photographs, field inspections, and personnel interviews, 16 potentially contaminated sites were identified at NAS Whiting Field. Each of the sites were evaluated with regard to contamination characteristics, migration pathways, and pollutant receptors.

The major pathways for contamination migration from the sites potentially contaminated at NAS Whiting Field include erosion, surface runoff and ground water movement through the surficial sand and gravel aquifer to the receiving waters of Clear Creek and Big Coldwater Creek. Aquatic organisms in these receiving waters are potential receptors. Bio-accumulation in the tissues of these organisms could be conveyed to preditors that inhabit this drainage system. Both these creeks are classified by the Florida Department of Environmental Regulations as Class III Water-Recreation, Propogation and Management of Fish and Wildlife.

The study concludes that 15 of the sites warrant futher investigation under the Naval Assessment and Control of Installation Pollutants (NACIP) Program, to assess potential long-term impacts. A Confirmation Study, including actual sampling and monitoring of the 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 15 sites recommended for confirmation are listed below in order of priority.

1) Site 5, Battery Acid Seepage Pit
2) Site 15, Southwest Landfill
3) Site 14, Short-term Sanitary Landfill
4) Site 3, Underground Waste Solvent Storage Area
5) Site 6, South Transformer Oil Disposal Area
6) Site 4, North AVGAS Tank Sludge Disposal Area
7) Site 7, South AVGAS Tank Sludge Disposal Area
8) Site 8, AVGAS Fuel Spill Area
9) Site 1, Northwest Disposal Area
10) Site 16, Open Disposal and Burning Area
11) Site 11, Southeast Open Disposal Area (B)
12) Site 12, Tetraethyl Lead Disposal Area
13) Site 13, Sanitary Landfill
14) Site 9, Waste Fuel Disposal Pit
15) Site 10, Southeast Open Disposal Area (A)

The results of the Confirmation Study will be used to evaluate the necessity of conducting mitigating actions or cleanup operations.

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# 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 the Naval Air Station (NAS), Whiting Field, Milton, Florida.

A Confirmation Study, Phase II of the NACIP Program, is recommended for 15 sites identified during the IAS. Southern Division of the Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) will assist NAS Whiting Field in implementing the recommendations.

Questions regarding this report should be referred to the Naval Energy and Environmental Support Activity, Code 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 SOUTHNAVFACENGCOM, 114, at AUTOVON 794-5510, FTS 679-5510, or commercial 803-743-5510.

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## ACKNOWLEDGEMENTS

The Initial Assessment Study (IAS) Team expresses its thanks for the support, assistance and cooperation provided by personnel at Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM); Naval Energy and Environmental Support Activity; and Naval Air Station (NAS), Whiting Field, Milton, Florida. Without their support, the IAS at NAS Whiting Field could not have been successfully completed. In particular, the team acknowledges the effort provided by the following people:

- Daniel Locklear, Environmental Coordinator, NAS Whiting Field
- A. L. "Sonny" Chestnut, SOUTHNAVFACENGCOM

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## 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 groundwater. In response to a growing recognition of these problems, the U.S. Congress directed the U.S. Environmental Protection Agency (EPA) to develop a comprehensive national program to manage past disposal sites. The program is outlined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of December 1980.

1.1.1 Department of Defense (DOD) Program. 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. In 1980, DOD named this program the Installation Restoration Program 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) Program, in three phases. Phase one, the Initial Assessment Study (IAS), identifies disposal sites and contaminated areas caused by past hazardous substance storage, handling or disposal practiced at naval activities. These sites are then individually evaluated with respect to their potential threat to human health or to the environment. Phase two, the Confirmation Study, verifies or characterizes the extent of contamination present and provides additional information regarding migration pathways. Phase three, Remedial Action, provides the required corrective measure to mitigate or eliminate confirmed problems.

1.2 AUTHORITY. The Chief of Naval Operations (CNO) initiated the NACIP program in OPNAVNOTE 6240 of 11 September 1980, superseded by OPNAVINST 5090.1 of 26 May 1983. Naval Facilities Engineering Command (NAVFACENGCOM) 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 (NEESA). NEESA conducts the program's first phase, the IAS, in coordination with NAVFACENGCOM Engineering Field Divisions (EFDs). Activities are selected for an IAS by CNO, based on recommendations by NAVFACENGCOM, the EFDs, and NEESA. Approval of the Naval Air Station (NAS) Whiting Field, Milton, Florida, for an IAS is contained in CNO letter ser 451/3U392444 of 5 July 1983.

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 operational 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 what types and quantities of chemicals or other materials were used and what disposal methods were practiced.

1.3.2 Results. If necessary, an IAS recommends mitigating actions to be performed by the activity or EFD, or recommends Confirmation Studies to be administered by the EFD under the NACIP program. Based on these recommendations, NAVFACENGCOM 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 Records Search. The IAS begins with an investigation of activity records followed by a records search at various government agencies including EFDs, national and regional archives and records 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 environmental contamination. Examples of records include activity master plans and histories, environmental impact statements, cadastral records, and aerial photographs. Appendix A lists agencies contracted during this study.

1.4.2 On-Site Survey. After the records search, the study team conducts an on-site survey to complete documentation of past operations and disposal practices 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 Whiting Field was conducted from 6-10 August, 1984; information in this report is current as of those dates.

Information obtained from interviews is verified by data from other sources or from 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 NEESA is used to systematically evaluate the relative severity of potential problems. The two steps of the CSRS are a flow- chart and a numerical ranking model. The first step is a flowchart based on type of waste, containment, and hydrogeology. This step eliminates innocuous sites from further consideration. If the flowchart indicates a site poses a potential threat to human health or to the environment, the second step, the model, is applied. This 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 scoring 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 rank the sites in a prioritized list for scheduling projects. For a more detailed description, refer to NEESA 20.2-042, 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. Generally, the EFD conducts the Confirmation Study in 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. Normally, the IAS recommends verification phase sampling and monitoring. The design of the characterization phase usually depends on results form the verification phase. If required, a characterization phase, using longer-term testing and monitoring, provides more detailed information concerning the horizontal and veritical distribution of contamination migrating from sites, as well as site hydrogeology. If sites require remedial actions or additional monitoring programs, the Confirmation 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, biology and physical features. 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. The latter chapters provide detailed documentation to support the findings, conclusions and recommendations in Chapters 2 and 3. An overall location map indicating the extent of Navy property managed by NAS Whiting Field is shown in Figure 1-1.

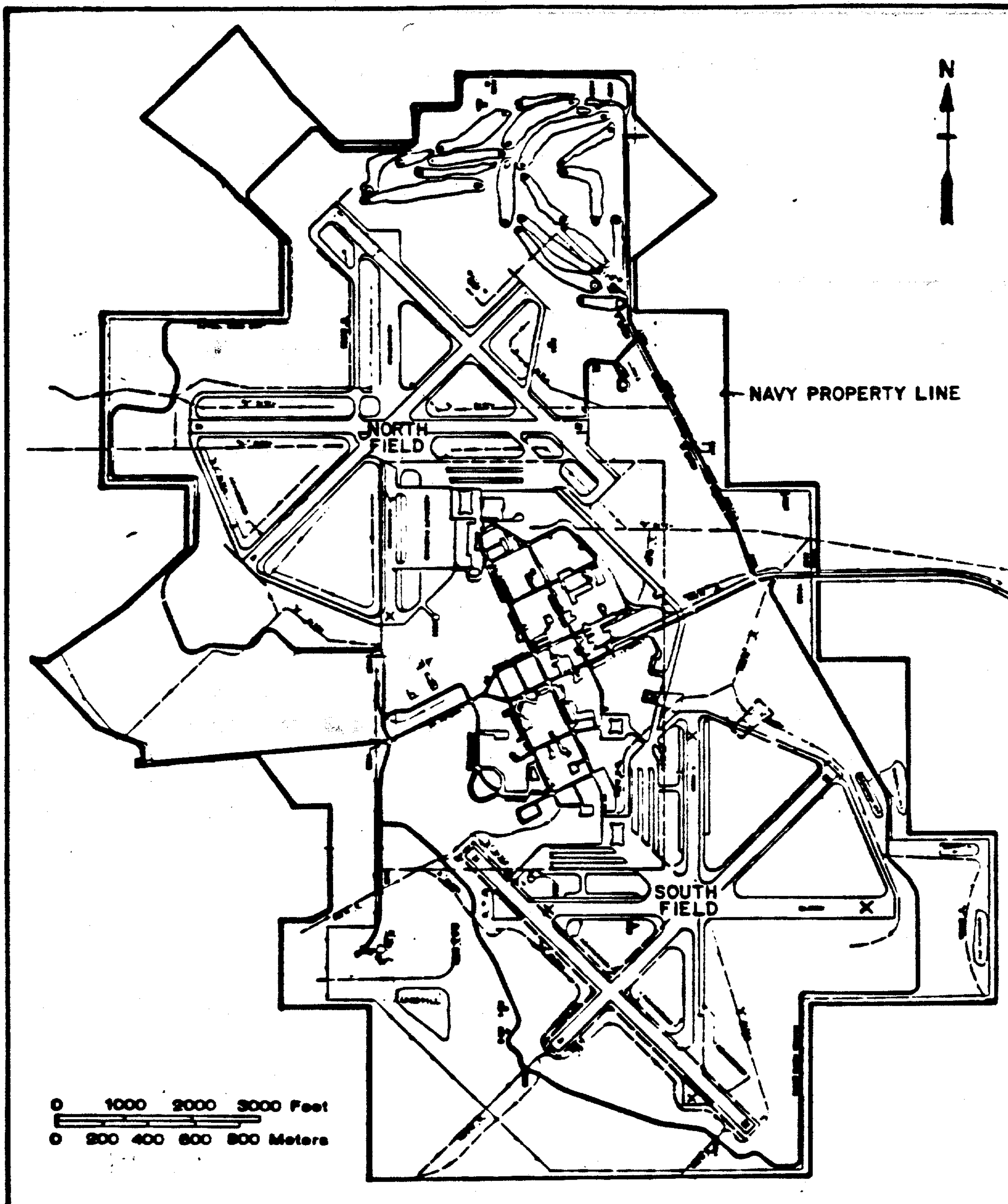



FIGURE 1-1

Location Map

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

# CHAPTER 2. SIGNIFICANT FINDINGS AND CONCLUSIONS

2.1 INTRODUCTION. This chapter summarizes significant findings concerning the physical setting, geology, hydrogeology and biology, as well as evidence of past contamination that may represent a threat to human health or a potential impact to the environment. Information is generated from extensive review of available data, the results of the on-site survey, and interviews with current and retired key employees, military personnel and contractors. Conclusions are made using professional judgment in the determination that a past disposal area warranted further action. Of the 16 sites identified during the on-site survey at the Naval Air Station (NAS) Whiting Field, Milton, Florida, 15 are recommended for further study under the Navy Assessment and Control of Installation Pollutants (NACIP) Program. Specific recommendations for these sites are presented in Chapter 3. Complete descriptions of each site can be found in Chapter 8.

2.1.1 Location. NAS Whiting Field is located in Florida's northwest coastal area approximately seven miles north of Milton and 20 miles northeast of Pensacola. It is divided into two fields. The North Field is used for fixed-wing training, while the South Field is used for helicopter training. NAS Whiting Field provides support services and facilities for flight and academic training. Most of the services and support activities are provided by private contractors such as Beech Aerospace Services, Inc., Bell Helicopter Textron, Burnside-Ott and RCA/Operational Maintenance Service.

2.1.2 Climate. The climate in the region is subtropical with warm and humid weather occurring for most of the year. Summers are long and warm and winters are short and mild. Average annual precipitation at NAS Whiting Field is 53 inches with July and September having the most precipitation. Thunderstorms are evident all year, but especially so during the summer months. The area is subject to hurricane activity as 12 hurricanes have passed within a 50 mile radius of Pensacola since 1886. The hurricane season is from June through October.

2.1.3 Biology. NAS Whiting Field can best be classified as paved surfaces immediately surrounded by mowed, open, grassy fields. Small stands of pine have been left for landscaping purposes. The remainder of NAS Whiting Field is comprised of a centrally located building complex and Navy housing on the west side of the station. With the exception of a few ground foraging birds and some opportunistic scavengers, NAS Whiting Field furnishes little natural habitat for the variety of animals that inhabit the region.

There are several species of animals listed by the U.S. Fish and Wildlife Service (USFWS), Florida Game and Fresh Water Fish Commission (FGFWFC), or the Florida Committee on Rare and Endangered Plants and Animals (FCREPA) as endangered, threatened or rare that potentially inhabit the area of NAS Whiting Field (see Table 4-5). There are several plants listed by USFWS, FCREPA or the Florida Department of Agriculture (FDA) as endangered, threatened or rare that may be present in the vicinity (See Table 4-6).

2.1.4 Geology. NAS Whiting Field is geologically located in the Coastal Plain Province which consists primarily of unconsolidated sands, silts, limestones and clays of Cretaceous to recent age. The soils in this area are generally sandy with a loamy subsoil and belong to the Troup-Dothan-Bonifay map unit. They are characterized as gently sloping to strongly sloping, well drained soils.

2.1.5 Hydrology. The elevation of NAS Whiting Field is approximately 150 to 190 feet above sea level which is situated on a plateau above the 100-year flood elevation. Storm sewers and surface drainage ditches keep the air fields drained. The drainage ditches eventually discharge to nearby Clear Creek to the south and west, and to Big Coldwater Creek to the east. Surface erosion is a concern because of the 100-foot drop in elevation between NAS Whiting Field and the receiving creeks.

Both Clear Creek and Big Coldwater Creek drain south to the Blackwater River. The creeks are classified by the Florida Department of Environmental Regulation (DER) as Class II Waters - Recreation - Propogation and Management of Fish and Wildlife. Blackwater River is classified as an Outstanding Florida Water and is afforded the highest protection by the State. Outstanding waters are considered to be of exceptional recreational and ecological significance.

The three major groundwater aquifers within the region are the surficial sand and gravel aquifer from which virtually all groundwater in the county is drawn, including three wells at NAS Whiting Field; the Upper Floridian limestone aquifer; and the lower Floridian limestone aquifer. Water in the sand and gravel aquifer is characteristically low in hardness, low in mineral content and slightly acidic, due to the presence of dissolved carbon dioxide. Numerous lenses and layers of clay and gravel occur throughout the aquifer, causing perched water table conditions in some areas. The upper Floridian aquifer is separated from the overlying surficial sand and gravel aquifer by the relatively impermeable Pensacola clay which would tend to keep pollutants from migrating down into the lower aquifers.

2.1.6 Migration Potential. The major pathways for contaminant migration from sites potentially contaminated at NAS Whiting Field include surface runoff and groundwater movement to the nearby receiving waters of Clear Creek and Big Coldwater Creek. On average, over half the flow in the rivers and creeks in the area is from groundwater seepage. Erosion is also a concern because it may expose buried materials and allow direct contact with surface runoff. Contaminants that enter the surficial sand and gravel aquifer may be impeded from migrating to the Station's production wells, due to two major clay lenses in the aquifer. The screened interval of all three production wells is below the clay lenses.

2.1.7 Potential Contaminant Receptors. Although the surface waters are not a source of potable water for the area, they are protected by the Florida Department of Environmental Regulations. The aquatic organisms that inhabit the receiving waters around NAS Whiting Field are potential receptors. Bioaccumulation of materials in the tissue of these organisms could be conveyed to higher trophic levels in the predators that inhabit or forage in this drainage system.

2.1.8 Waste Disposal Sites. Sixteen waste disposal sites were identified at NAS Whiting Field during the on-site survey (Figure 2-1). The significant findings and conclusions concerning all 16 sites are outlined below.

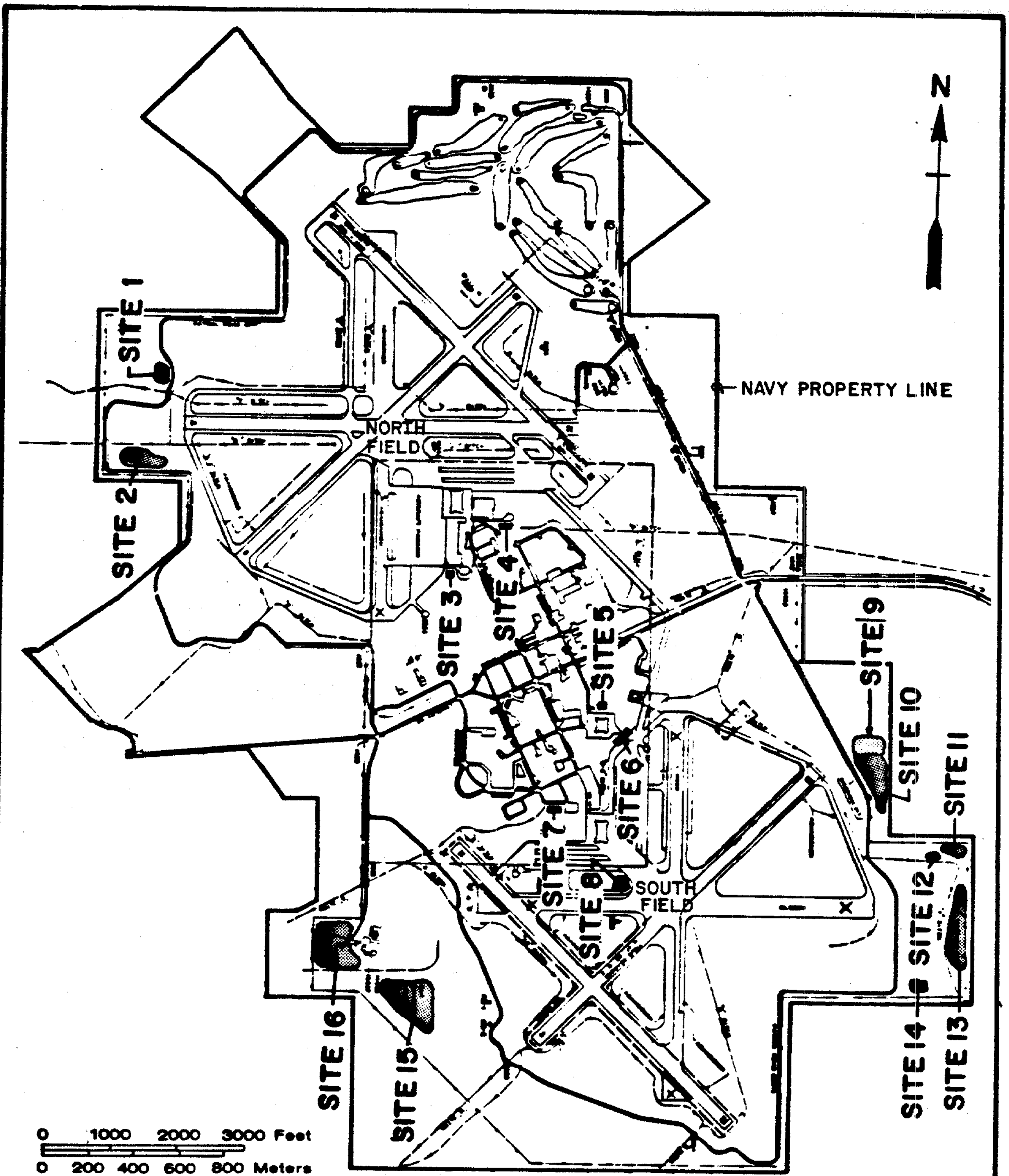



FIGURE 2-1

**Waste Disposal Sites**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

2.2 SITES RECOMMENDED FOR CONFIRMATION STUDY. Of the 16 disposal and spill sites identified at NAS Whting Field, 15 are recommended for Confirmation Studies. Table 2-1 summarizes the findings of the disposal and spill sites.

2.2.1 Site 1: Northwest Disposal Area. Site 1 covers an area of approximately five acres and is located just west of the perimeter patrol road and north of "E" drainage ditch. This site was used as a general refuse disposal area from the time NAS Whiting Field was established in 1943 until around 1965. Waste disposed at this site included primarily general refuse, and wastes associated with the operation and maintenance of aircraft (paint, paint thinner, solvents, waste oils and hydraulic fluid).

With the site being in a depressed area, much of the precipitation infiltrates directly into the soil. Any surface drainage from the site occurs along the southwestern edge and is ultimately intercepted by the concrete-lined "F" ditch just to the south. This ditch drains into Clear Creek which is located approximately 1,300 feet west of the disposal area. Clear Creek in turn drains south to the Blackwater River. Ground water flows into Clear Creek and Blackwater River also. Contaminants entering these waters could impact aquatic organisms which could be conveyed to predators that inhabit this drainage system.

Based on the types of wastes possibly disposed at Site 1, the high potential for migration and the presence of receptors, this site is recommended for a Confirmation Study.

2.2.2 Site 3: Underground Waste Solvent Storage Area. Site 3 is located approximately 90 feet south of Building 2941 and just north of Paint Locker 2987. Two 500-gallon underground metal tanks were used from 1980 to April of 1984 for the storage of waste solvents and residue generated from paint-stripping operations conducted at Building 2941. In April of 1984, use of the underground tanks was discontinued and the two tanks were removed from the site. During excavation operations at the site, one of the tanks was punctured by a backhoe, resulting in the spillage of approximately 120 gallons of waste solvents onto the ground. Clean-up operations conducted at the site resulted in the recovery of approximately 50 gallons of the waste solvent. In addition, approximately six cubic yards of contaminated soil was removed from the site and taken off Navy property for disposal.

NAS Whiting Field's north potable supply well (W-N4) is located approximately 1,400 feet southeast of the site. Contaminants are known to have leaked at the site. Depending upon the influence of the cone of depression for the north potable supply well, and clay lenses in the aquifer, the north well may become contaminated.

Based on the types of waste disposed at Site 3, the high potential for migration and the location of the north potable supply well, this site is recommended for a Confirmation Study.

2.2.3 Site 4: North AVGAS Tank Sludge Disposal Area. Site 4 is located North of the Tow Lane on the North Field. From 1943 until 1968, the eight underground steel tanks at the site were cleaned approximately every four years. The tank bottom sludge, which contained tetraethyl lead, was then buried in the area immediately surrounding the tanks. Roughly 1,000 to 2,000 gallons of sludge is buried throughout the tank farm.

Table 2-1

Summary of Disposal and Spill Sites at NAS Whiting Field

| Site No. | Site Name | Location | Period of Operation | Types of Material Disposed | Comments |
|---|---|---|---|---|---|
| Sites Recommended for Confirmation Studies: | | | | | |
| 1 | Northwest Disposal Area | North Field, West Side | 1943-1965 | Refuse, waste paints, paint thinners, solvents, waste oils, hydraulic fluids | Secondary disposal area during this period; site covers 5 acres |
| 3 | Underground Waste Solvent Storage Area | North Field, South of Building 2941 | 1980-1984 | Waste solvents, paint stripping residue | Wastes generated by paint stripping operations |
| 4 | North AVGAS Tank Sludge Disposal Area | North Field, North of Tow Lane | 1943-1968 | Tank bottom sludge containing tetraethyl lead | Sludge disposal in shallow holes near tanks |
| 5 | Battery Acid Seepage Pit | South Field, near Building 1478 | 1964-1984 | Waste electrolyte solution containing heavy metal | Pit located 110 feet from potable supply well (W-S2) |
| 6 | South Transformer Oil Disposal Area | South Field, Building 1478 | 1940s-1964 | PCB-contaminated dielectric fluid | Disposal in "0-2" drainage ditch |
| 7 | South AVGAS Tank Sludge Disposal Area | South Field, West of Building 1406 | 1943-1968 | Tank bottom sludge containing tetraethyl lead | Sludge disposed in shallow holes near tanks |
| 8 | AVGAS Fuel Spill Area | South Field, South of Building 1406 | Summer 1972 | AVGAS containing tetraethyl lead | Fuel spill of about 25,000 gallons on an area of about 2 acres |
| 9 | Waste Fuel Disposal Pit | South Field, East Side | 1950s-1960s | Waste AVGAS containing tetraethyl lead | Fuel disposed in former borrow pit |
| 10 | Southeast Open Disposal Area (A) | South Field, Southeast Area | 1965-1973 | Construction and demolition debris, waste solvents, paint, oils, hydraulic fluid, PCBs, pesticides, herbicides | Secondary disposal area during this period; site covers about 4 acres |
| 11 | Southeast Open Disposal Area (B) | South Field, Southeast Area | 1943-1970 | Construction and demolition debris, waste solvents, paint, oils, hydraulic fluid, PCBs | Secondary disposal area during this period; site covers about 3 acres |
| 12 | Tetraethyl lead Disposal Area | South Field, Southeast Area | May 1, 1968 | Tank bottom sludge and fuel filters contaminated with tetraethyl lead | Disposal area posted with date and warning, site consists of two earth covered mounds, 25 ft x 25 ft area |
| 13 | Sanitary Landfill | South Field, Southeast Area | 1979-1984 | Refuse, waste solvent, paint, asbestos | Primary sanitary landfill, potentially received hazardous wastes the first year of operation |
| 14 | Short-Term Sanitary Landfill | South Field, Southeast Area | 1978-1979 | Refuse, waste solvent, oils, paint, hydraulic fluids | Primary sanitary landfill for brief period; relocated due to drainage problems |
| 15 | Southwest Landfill | South Field, Southwest Area | 1965-1979 | Refuse, waste paint, oils, solvents, thinners, asbestos, hydraulic fluid | Primary landfill for this time period; covers about 15 acres |
| 16 | Open Disposal and Burning Area | South Field, Southwest Area | 1943-1965 | Refuse, waste paint, oils, solvents, thinners, PCBs hydraulic fluid | Primary disposal area for this time period; covers about 10 acres |
| Sites Not Recommended for Confirmation Studies: | | | | | |
| 2 | Northwest Open Disposal Area | North Field, West Side | 1976-1984 | Construction and demolition debris, tires, furniture | Former borrow pit location, commonly referred to as the "Wood Dump" |

Surface drainage from the relatively flat site would most likely discharge to the "P" ditch which is located near the southeast corner of the site. This ditch ultimately drains to Big Coldwater Creek, which is approximately 2.6 miles east of the site. NAS Whiting Field's north production well (W-N4) is located approximately 1,100 feet southeast of the site. Groundwater movement in the area may be east toward Big Coldwater Creek or southeast toward the north production well depending upon the influence of the cone of depression.

Based on the potential for tetraethyl lead contamination at Site 4, the high potential for migration and the presence of receptors, this site is recommended for a Confirmation Study.

2.2.4 <u>Site 5: Battery Acid Seepage Pit</u>. Site 5 is located west of Building 1478. From 1964 to 1984, waste battery acid from the battery shop was poured down the drain of a sink which was connected to a dry well. An estimated 180 gallons of waste electrolyte solution was discharged to the dry well annually. The dry well is located just west of the battery shop and consists of a 60-inch diameter concrete culvert set vertically into the ground and filled with limerock. The sink drain was disconnected fom the dry well in 1984 and connected to the sanitary sewer.

NAS Whiting Field's south potable supply well (W-S2) is located approximately 110 feet east of the dry well. Ground water movement in the area is most likely to be toward the south production well based on monthly 24 hours drawdown tests of the well conducted by the activity. Therefore, the site is within the influence of the cone of depression of the south production well.

Based on the potential for heavy metal contamination, the high potential for migration and the nearby location of the south potable water supply well. A Confirmation Study is recommended for this site.

2.2.5 <u>Site 6: South Transformer Oil Disposal Area</u>. Site 6 is located southeast of Building 1454. From the 1940s until 1964, transformers were reportedly drained into the grassed "O-2" ditch located approximately 500 feet southeast of the old transformer repair shop, Building 1478, and east of Building 1454. The dielectric fluid could have been contaminated with polychlorinated biphenyls (PCBs). The grassed "O-2" ditch drains in a northeasterly direction to the "O" ditch which connects to the "P" ditch which drains into Big Coldwater Creek located approximately 2.3 miles east of the disposal site.

Based on the potential for PCB contamination, the high potential for migration and the potential impact on receptors, a Confirmation Study is recommended for this site.

2.2.6 <u>Site 7: South AVGAS Tank Sludge Disposal Area</u>. Site 7 is located west of Building 1406. From 1943 until 1968, the eight underground steel tanks at the site were cleaned approximately every four years. The tank bottom sludge, which contained tetraethyl lead, was then buried in the area immediately surrounding the tanks. Roughly 1,000 to 2,000 gallons of sludge is buried throughout the tank farm.

Surface runoff from the grass covered site would probably discharge to the "A" ditch located west of the site. The "A" ditch ultimately discharges to Clear Creek, which lies approximately 0.8 mile southwest of the site. Ground water movement in the area of the site may be southwest toward Clear

Creek, or toward the NAS production wells depending upon the influence of the cone of depression. The south potable supply well (W-S2) is located 1,700 feet northwest of the site.

Based on the potential for tetraethyl lead contamination, the high potential for migration and the potential impact on receptors, a Confirmation Study is recommended for this site.

2.2.7 Site 8: AVGAS Fuel Spill Area. Site 7 is located south of Building 1406. High octane aviation fuel (25,000 gallons) was spilled at the South Field in the Summer of 1972. The fuel flowed approximately 200 feet across a concrete apron and onto a grassed area where it ponded in an area of approximately two acres.

NAS Whiting Field's south potable well (W-S2) is located approximately 2,600 feet north of the site. Groundwater movement in the area of the site may be southwest toward Clear Creek, or toward the south production wells depending upon the influence of the cone of depression. Clear Creek is located approximately one mile southwest of the site.

Based on the potential for tetraethyl lead contamination, the high potential for migration and the potential impact on receptors, a Confirmation Study is recommended for this site.

2.2.8 Site 9: Waste Fuel Disposal Pit. Site 9 is located along the eastern property line near South Field. During the 1950s and 1960s, waste fuel containing tetraethyl lead was disposed in the northern portion of an existing borrow pit. The precise location of the disposal pit is unknown. A tank truck with a capacity of around 500 gallons was used to transport the waste fuel to the disposal pit where it was drained. Approximately 200 to 300 gallons of fuel was disposed at the site per trip. The total quantity of fuel disposed at the site is unknown.

The disposal pit is located in a depressed area which is approximately ten feet below the grade of the perimeter road. Surface drainage for most of the area is into the northeastern most corner of the depressed area where it ponds and slowly infiltrates into the soil. Water was ponded in this area during the on-site survey. Any surface runoff from the area flows east, with eventual discharge to Big Coldwater Creek approximately 1.9 miles east of the site.

Based on the potential for tetraethyl lead contamination, the high potential for migration and the potential impact on receptors, a Confirmation Study is recommended for this site.

2.2.9 Site 10: Southeast Open Disposal Area (A). Site 10 is located near an old borrow pit located in the southeastern portion of the air station. It was used as an open disposal area from 1965 to 1973. The site covers an area of approximately four acres and was used for the disposal of inert wastes such as construction debris, trees, brush, metal cans and similar materials not suitable for landfill disposal. Transformer oil potentially contaminated with PCBs and empty pesticide/herbicide containers were also reportedly disposed at the site. Access to the site was uncontrolled and other potentially hazardous wastes may have been disposed at the site, including waste solvents, paint, oil and hydraulic fluid.

Surface runoff from a major portion of the site drains north to a depression adjacent to the site. Any surface runoff from the depressed area, along with the remaining areas of the site, is east toward Big Coldwater Creek which is located approximately 1.9 miles away.

Based on the types of wastes potentially disposed at Site 10, the high potential for migration and the potential impact on receptors, a Confirmation Study is recommended for this site.

2.2.10 Site 11: Southeast Open Disposal Area (B). Site 11 is located in the southeastern portion of the station near the eastern property line. This site was used as an open disposal area from 1943 until approximately 1970. The disposal area covers approximately three acres and is located at the site of an old borrow pit. The site had uncontrolled access and there was no record of the types of wastes disposed. A wide variety of wastes were disposed at the site including general refuse, construction debris, tree clippings and furniture. Transformers, potentially containing PCBs, were also drained at the site. Other potentially hazardous wastes may have been disposed at the site, including waste solvents, paint, oil and hydraulic fluid.

When disposal operations were discontinued in 1970, a final covering was placed over the site and pine trees planted. There is a low point in the northeastern corner where surface drainage ponds. Any runoff from the site is in a northeasterly direction toward Big Coldwater Creek which is approximately 1.7 miles away.

Based on the types of wastes potentially disposed at Site 11, the high potential for migration and the potential impact on receptors, a Confirmation Study is recommended for this site.

2.2.11 Site 12: Tetraethyl Lead Disposal Area. Site 12 is located on the eastern property line of South Field. Tank bottom sludge and fuel filters contaminated with tetraethyl lead were disposed at this site on 1 May 1968. The sludge was generated during the cleaning of both the North and South field aqua system fuel storage tanks. The disposal area consists of two earth covered mounds within a fenced area of approximately 50 feet by 25 feet. Each of the mounds is approximately five feet high and ten feet in diameter with between 200 to 400 gallons of sludge in each mound.

The "Y" drainage ditch, which is not concrete lined, is located immediately adjacent to the southern border of the site and receives any surface runoff from the area. The drainage ditch ultimately discharges to Big Coldwater Creek approximately 1.7 miles east of the site.

Based on the potential for tetraethyl lead contamination, the high potential for migration and the potential impact on receptors, this site is recommended for a Confirmation Study.

2.2.12 Site 13: Sanitary Landfill. Site 13 is located on the eastern property line of South Field. This is the site of the currently operating sanitary landfill for NAS Whiting Field. The landfill covers approximately four acres and has been in operation since 1979. During approximately the first year of operation, waste solvents and residue from paint stripping operations may have been disposed at the site. Since 1980 the landfill has received only general refuse and non-hazardous waste.

Big Coldwater Creek is located approximately 1.7 miles east of the site. However, the landfill is depressed from surrounding areas and runoff typically ponds on-site.

Based on the type of wastes potentially disposed at Site 13, the high potential for migration and the potential impact on receptors. This site is recommended for a Confirmation Study.

2.2.13 Site 14: Short-Term Sanitary Landfill. Site 14 is located in the southeastern portion of the station near the end of abandoned runway 27. This site was used for 6 to 9 months starting in 1978 and continuing into 1979 as a sanitary landfill. The site covers an area of approximately 2.5 acres. During the short-period of time that the landfill was operated, waste solvents and residue from paint stripping operations may have been disposed at the site. However, the majority of wastes disposed at the site would have been general refuse and non-hazardous waste.

The site was abandoned because of excessive clay content in the soil. This caused ponds throughout the site. Surface drainage from the area is in an easterly direction toward the vegetated "Y" ditch which borders the site on the east. The ditch drains east towards Big Coldwater Creek which is located approximately 1.8 miles east of the site.

Based on the type of wastes potentially disposed at Site 14, the high potential for migration and the potential impact on receptors, a Confirmation Study is recommended for this site.

2.2.14 Site 15: Southwest Landfill. Site 15 is located southeast of the Wastewater Treatment Plant. This site was operated as a landfill from 1965 until 1979 during which time it received the majority of wastes generated at NAS Whiting Field. The site covers an area of approximately 15 acres. Wastes disposed at this site included primarily general refuse, and waste paint, paint thinner, solvents, waste oil, and hydraulic fluid. Bagged asbestos was also reportedly disposed at the site, and potentially PCB-contaminated transformer oil. Approximately 3,000 to 4,500 tons of waste were disposed at the site annually.

The site slopes from east to west towards Clear Creek which is approximately 1,200 feet west of the site. Much of the site is covered with small pine trees. However, there are numerous areas void of vegetation and there has been severe surface erosion at the site resulting in the exposure of some buried wastes.

Based on the type of wastes potentially disposed at Site 15, the high potential for migration and the potential impact on receptors, a Confirmation Study is recommended.

2.2.15 Site 16: Open Disposal and Burning Area. Site 16 is located just east of Clear Creek and west of the Wastewater Treatment Plant. This site was used as an open disposal and burning area from 1943 until around 1965. During this period of time, the site reportedly received the majority of wastes generated at the air station. The site covers an area of ten acres. Wastes disposed at the site included primarily general refuse, and waste oil, paint, solvents and hydraulic fluid. PCB-contaminated transformer oil may also have been disposed at the site. Approximately 3,000 to 4,500 tons of waste was disposed at the site annually. The majority of the wastes were burned for volume reduction using waste diesel fuel. Since the burning operation was not a controlled process, it can be assured that not all the wastes were completely destroyed.

Surface runoff from the site is to the west to Clear Creek which is located approximately 200 feet from the site. Ground water flow in the area of the site is expected to follow that of surface water, flowing to the west toward Clear Creek.

Based on the type of wastes potentially disposed at Site 16, the high potential for migration and the potential impact on receptors, a Confirmation Study is recommended.

2.3 SITES NOT RECOMMENDED FOR CONFIRMATION STUDY. One of the 16 potentially contaminated sites is not recommended for Confirmation Studies. Significant findings on this site are summarized in Table 2-1.

2.3.1 Site 2: Northwest Open Disposal Area. Site 2 is located at a borrow pit in the northwestern portion of Whiting Field. The borrow pit covers an area of approximately six acres and is about 20 feet below the surrounding ground, at its lowest point. Between 1976 and 1984, the site was used as an open disposal area primarily for construction and demolition debris. Wastes disposed at the site included asphalt, wood, tires, furniture and similar materials which were not suitable for landfill disposal.

Due to the steep side slopes of the borrow pit, no surface drainage would occur from the site. Surface drainage within the borrow pit would be down the partially vegetated side slopes to low areas near the middle of the pit where infiltration into the soils would occur.

Due to the non-hazardous nature of the wastes reportedly disposed here, this site is judged not to pose a potential threat to human health or the environment, therefore a Confirmation Study is not recommended.

# CHAPTER 3. RECOMMENDATIONS

3.1 INTRODUCTION. This chapter presents the recommended actions for the potentially contaminated sites at Naval Air Station (NAS) Whiting Field. Based on the significant findings and conclusions developed in Chapter 2, 15 sites are recommended for Confirmation Studies under Phase two of the Navy Assessment and Control of Installation Pollutants (NACIP) Program. The two-step Confirmation Study Ranking System (CSRS), developed at Naval Energy and Environmental Support Activity (NEESA), was used to systematically evaluate the relative severity of potential problems.

The results of the CSRS and a summary of the recommended actions for the sites recommended for Confirmation Studies are listed in Table 3-1. These sampling recommendations are designed to first verify the presence of contamination. Depending on the results of the recommended actions for verification, a characterization of the extent of contamination at the sites may be required. The design of the characterization phase will depend on the results from the verification phase.

All recommendations for drilling, sampling and analyses should be conducted in accordance with applicable federal and state regulations and requirements. Additional sampling and analysis may be required at these sites to fully locate and define the extent of contamination migration.

3.2 CONFIRMATION STUDY RECOMMENDATIONS. This section contains the detailed recommendations for the 15 sites suggested for Confirmation Studies. A background well is required to establish ground water quality. The North potable supply well (W-N4) should be used since previous analysis indicates it is not contaminated.

3.2.1 Site 1: Northwest Disposal Area. It is recommended that a ground water monitoring well should be installed downgradient (southwest) of Site 1 to detect contaminant migration from the site as shown in Figure 3-1. The monitoring well should be screened in the shallowest, permeable, saturated zone as determined in the field. Quarterly monitoring the first year is recommended. The site should be inspected semi-yearly to ensure that the vegetative cover and soil are intact and erosion is not taking place.

| | |
|---|---|
| Type of Samples: | Ground water |
| Ground Water Monitoring Wells: | One |
| Frequency: | Quarterly for one year |
| Number of Samples: | Four |
| Testing Parameters: | See Table 3-2 |

Remarks: The list of Testing Parameters given in Table 3-2 is as site-specific as possible. However, certain parameters are listed as typical indicators of contamination based on the knowledge of operations conducted at NAS Whiting Field.

3.2.2 Site 3: Underground Waste Solvent Storage Area. Two ground water monitoring wells should be installed, one east of the site between the site and the

Table 3-1

Summary of Confirmation Study Recommendations - NAS Whiting Field
Study Number 72

| Site No. | Site Identification | CSRS Score | No. of Wells | No. and Type of Samples | Frequency | Testing Parameters |
|---|---|---|---|---|---|---|
| 72-1 | Northwest Disposal Area | 24 | 1 | 4 Ground water | Quarterly* | ** |
| 72-3 | Underground Waste Solvent Storage Area | 29 | 2 | 8 Ground water<br>6 Soil | Quarterly*<br>One time only | Toluene, xylene, chromium, 1,1,1-trichloroethane, lead cadmium, zinc |
| 72-4 | North AVGAS Tank Sludge Disposal Area | 26 | - | 25 Soil | One time only | Lead |
| 72-5 | Battery Acid Seepage Pit | 37 | 3 | 12 Ground water<br>5 Soil | Quarterly*<br>One time only | Cadmium, lead, nickel, zinc, pH |
| 72-6 | South Transformer Oil Disposal Area | 27 | - | 1 Soil | One time only | PCBs |
| 72-7 | South AVGAS Tank Sludge Disposal Area | 26 | - | 25 Soil | One time only | Lead |
| 72-8 | AVGAS Fuel Spill Area | 25 | - | 12 Soil | One time only | Lead |
| 72-9 | Waste Fuel Disposal Pit | 18 | - | 12 Soil | One time only | Lead |
| 72-10 | Southeast Open Disposal Area (A) | 17 | 1 | 4 Ground water | Quarterly* | ** |
| 72-11 | Southeast Open Disposal Area (B) | 20 | 1 | 4 Ground water | Quarterly* | ** |
| 72-12 | Tetraethyl Lead Disposal Area | 20 | - | 2 Soil | One time only | Lead |
| 72-13 | Sanitary Landfill | 19 | 1 | 4 Ground water | Quarterly* | ** |
| 72-14 | Short-Term Sanitary Landfill | 29 | 1 | 4 Ground water | Quarterly* | ** |
| 72-15 | Southwest Landfill | 33 | 1 | 4 Ground water | Quarterly* | ** |
| 72-16 | Open Disposal and Burning Area | 23 | 1 | 4 Ground water | Quarterly* | ** |

*Quarterly for one year.

**2,4-D
2,4,5-TP Silvex
Endrin
Lindane
Kepone
Toxaphene
Chlordane
Malathion
Cadmium
Chromium
Lead
Copper
Nickel
Zinc
1,1,1-Trichlorethane
Toluene
Xylene
Methyl Ethyl Ketone
Oil and Grease
PCBs
Tetraethyl Lead
pH
Alkalinity
Conductivity

Table 3-2

List of Indicator Testing Parameters

| |
|---|
| **Herbicides:** |
| 2,4-D |
| 2,4,5-TP Silvex |
| **Pesticides:** |
| Endrin |
| Lindane |
| Kepone |
| Toxaphene |
| Chlordane |
| Malathion |
| **Metals:** |
| Cadmium |
| Chromium |
| Lead |
| Copper |
| Nickel |
| Zinc |
| **Solvents:** |
| 1,1,1-trichlorethane |
| Toluene |
| Xylene |
| Methyl Ethyl Ketone |
| **Others:** |
| Oil and Grease |
| PCBs |
| Tetraethyl Lead |
| pH |
| Alkalinity |
| Conductivity |

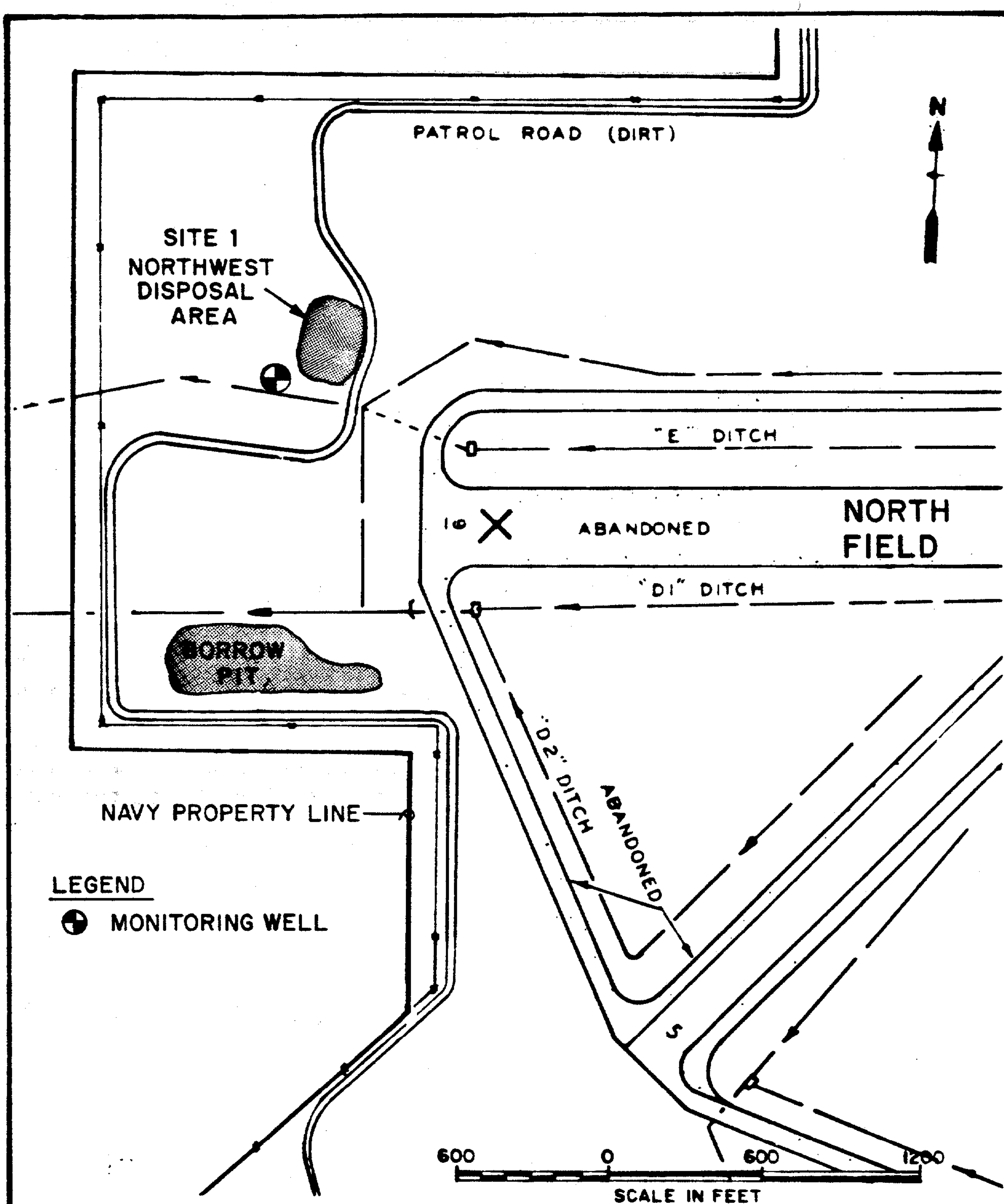



FIGURE 3-1

**Site 1**
**Recommended**
**Sampling Locations**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

north potable supply well (W-N4), and one west of the site, as shown in Figure 3-2. The monitoring wells should be screened in the shallowest, saturated zone, as determined in the field, to detect contaminant migration toward the supply well. In addition, representative soil samples should be taken at the site in the area of the underground tank locations to determine if solvent contamination still exists. Soil borings should be taken into undisturbed soil and analyzed for the solvents listed below. This will confirm that all the contaminants have been removed.

| | |
|---|---|
| Type of Samples: | Ground water and soil |
| Ground Water Monitoring Wells: | Two |
| Frequency: | Ground water - Quarterly for one year<br>Soil - One time only |
| Number of Samples: | Ground water - Eight<br>Soil - Six |
| Testing Parameters: | Toluene, xylene, chromium, cadmium, zinc, lead, 1,1,1-trichloroethane |

3.2.3 Site 4: North AVGAS Tank Sludge Disposal Area. The recommended soil sampling program is designed to detect the presence of tetraethyl lead contaminants in the soil around the tanks. Soil samples should be taken to a depth of two to three feet below grade. A pattern similar to the one shown in Figure 3-3 is recommended for a one time sampling effort. An initial screening analysis consisting of two soil composites should be performed to determine if lead contamination is present before analyzing the rest of the samples.

| | |
|---|---|
| Type of Samples: | Soil |
| Frequency: | One time only |
| Number of Samples: | 25 |
| Testing Parameters: | Lead |

3.2.4 Site 5: Battery Acid Seepage Pit. The recommended soil sampling program is designed to detect contamination in the area of the dry well. A soil boring to 30 feet should be taken at the dry well with samples collected at five foot intervals. In addition, three ground water monitoring wells should be installed as shown in Figure 3-4. The monitoring wells should be screened in the shallowest, saturated zone, as determined in the field.

| | |
|---|---|
| Type of Sample: | Ground water and soil |
| Ground Water Monitoring Wells: | Three |
| Frequency: | Ground water - Quarterly for one year<br>Soil - One time only |
| Number of Soil Samples: | Ground water - 12<br>Soil - Five |
| Testing Parameters: | Cadmium, lead, nickel, zinc and pH |

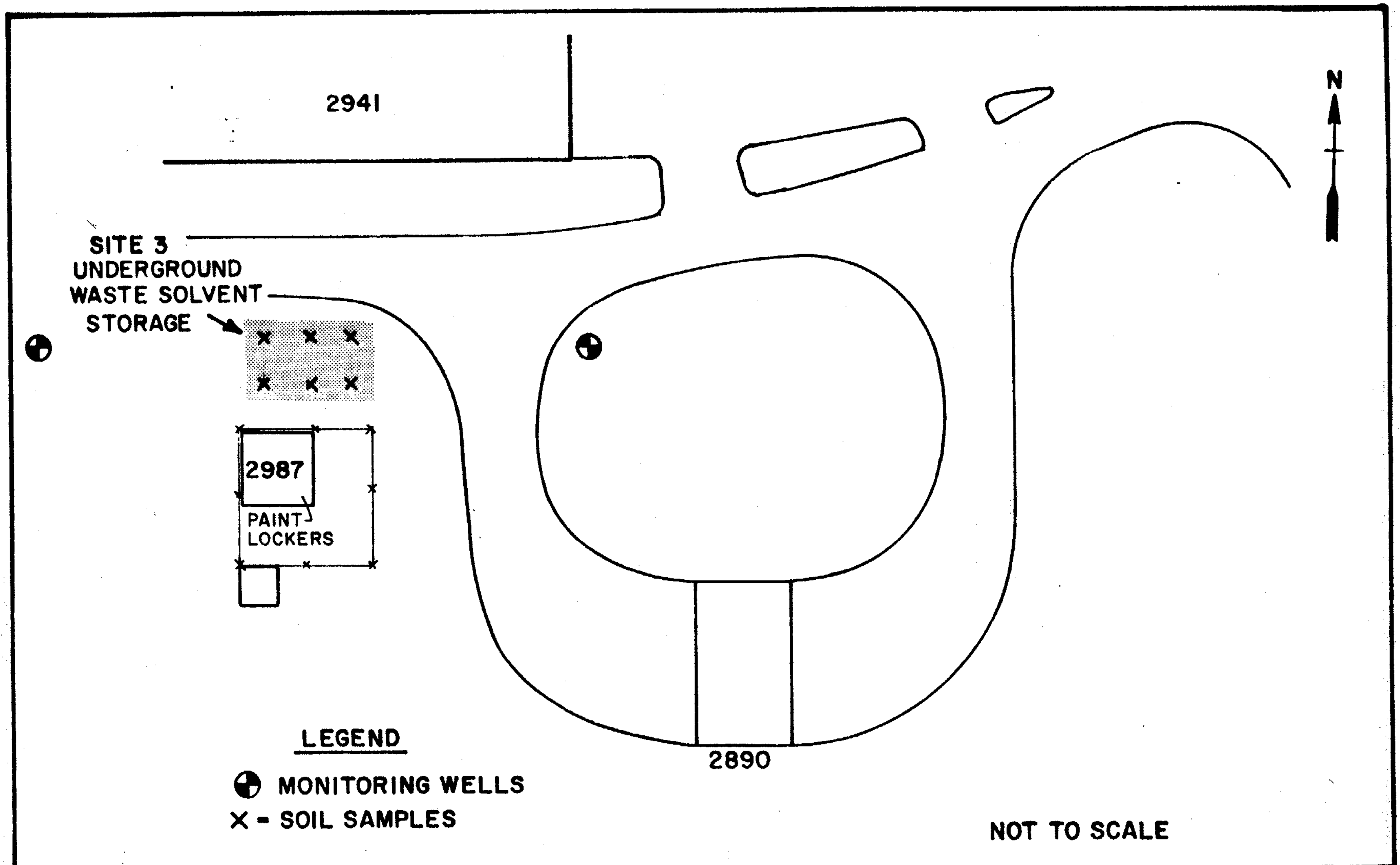



FIGURE 3-2
Site 3
Recommended Sampling Locations

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

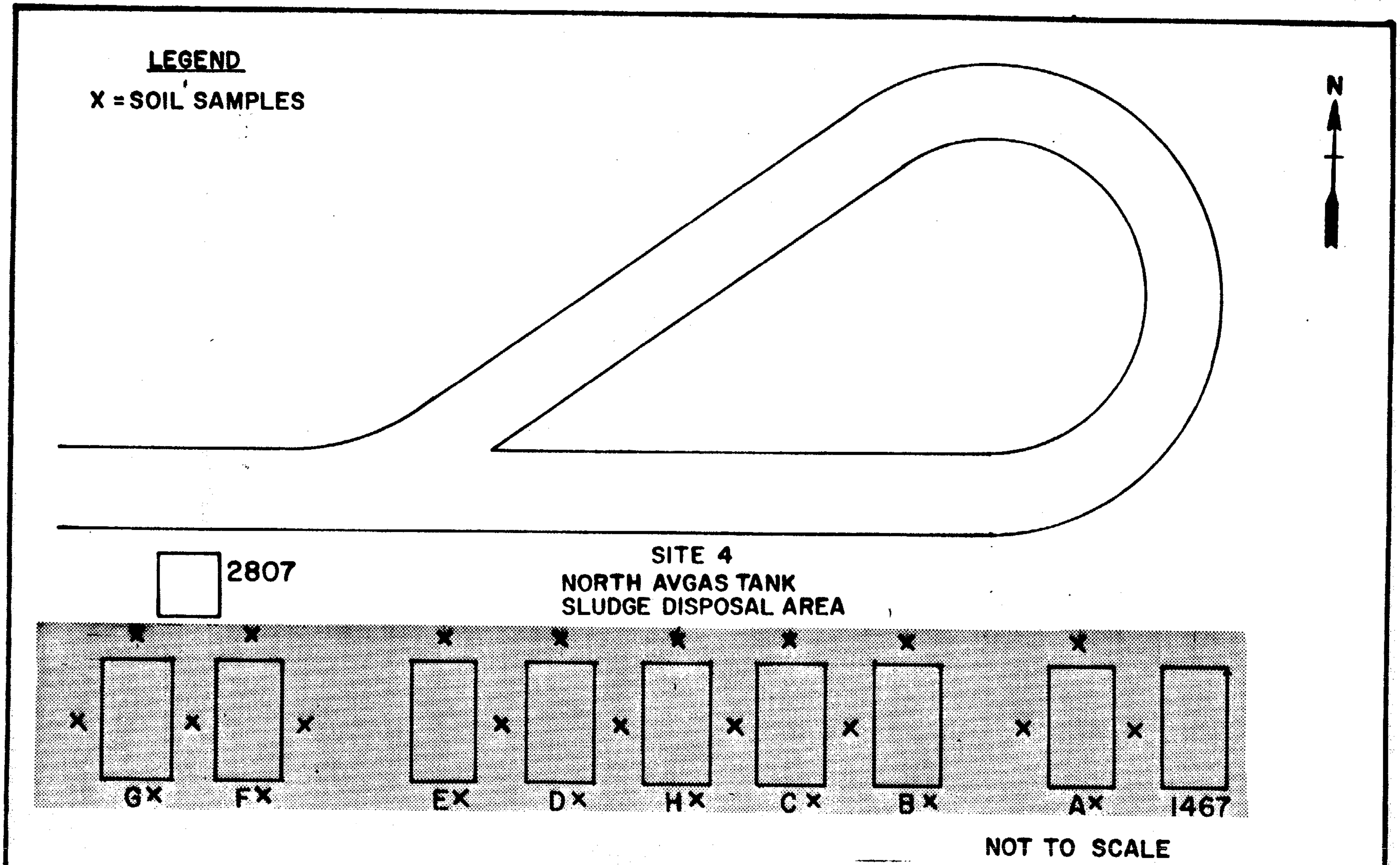



FIGURE 3-3
Site 4
Recommended Sampling Locations

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

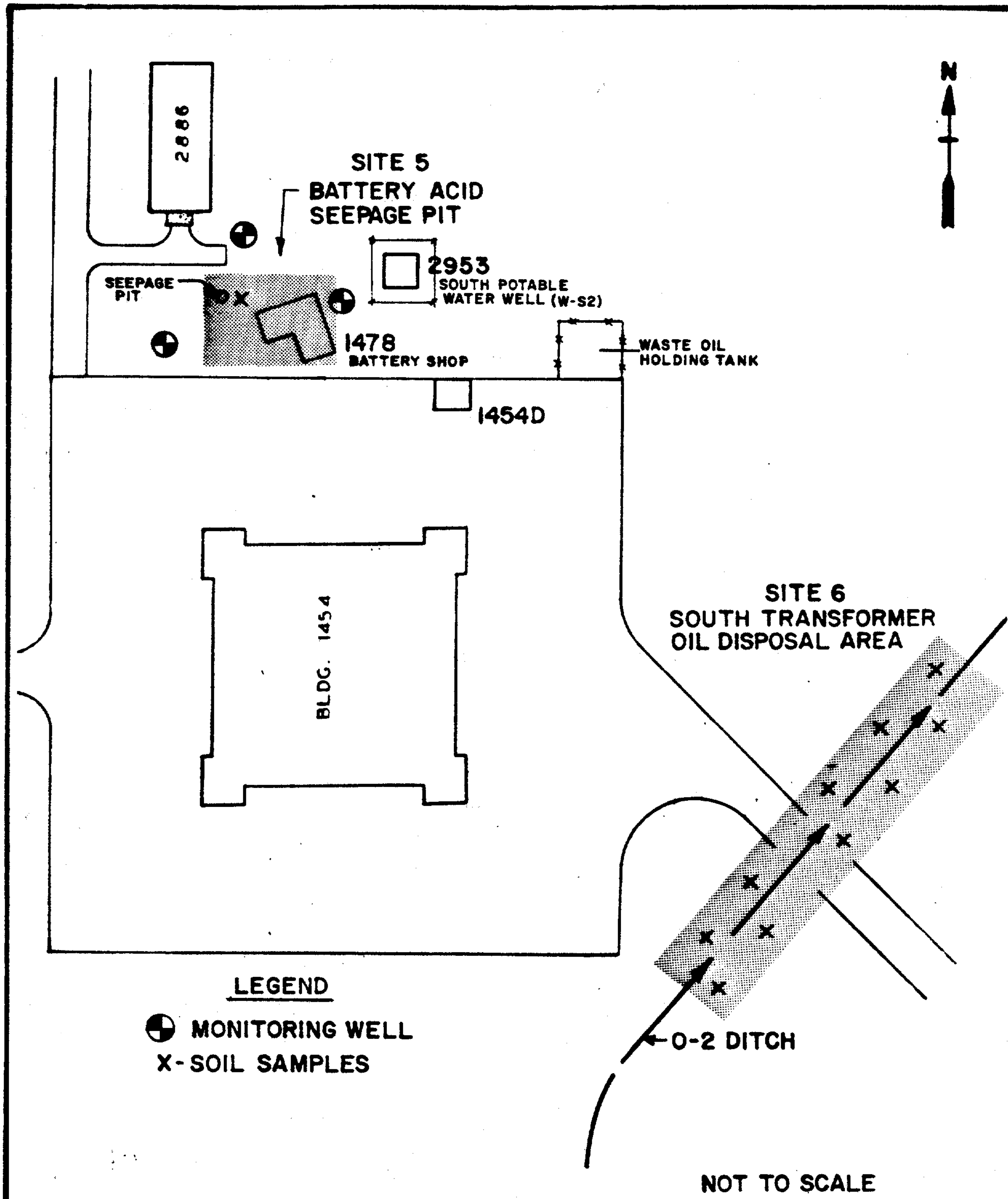



FIGURE 3-4

**Site 5 & 6 Recommended Sampling Locations**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

3.2.5 Site 6: South Transformer Oil Disposal Area. It is recommended that soil sampling be conducted in the grassed "0-2" ditch southeast of the old transformer repair shop, Building 1478, and east of Building 1454. Samples should be taken along the sides and bottom of the "0-2" ditch for a distance of several hundred feet as shown in Figure 3-4. Core samples should be taken to a depth of 18 inches at intervals along the ditch. The individual cores collected along the ditch should be composited for the initial screening to determine whether polychlorinated biphenyls (PCBs) contamination is present.

| | |
|---|---|
| Type of Samples: | Soil |
| Frequency: | One time only |
| Number of Samples: | Ten |
| Testing Parameters: | PCBs |

3.2.6 Site 7: South AVGAS Tank Sludge Disposal Area. The recommended soil sampling program is designed to detect the presence of tetraethyl lead contamination in the soil around the tanks. Soil samples should be taken at a depth of two to three feet below grade. A pattern similar to the one shown in Figure 3-5 is recommended for a one-time sampling effort. An initial screening analysis consisting of two soil composites should be performed to determine if lead contamination is present before analyzing the rest of the samples.

| | |
|---|---|
| Type of Samples: | Soil |
| Frequency: | One time only |
| Number of Samples: | 25 |
| Testing Parameters: | Lead |

3.2.7 Site 8: AVGAS Fuel Spill Area. The recommended soil sampling program is designed to detect the presence of tetraethyl lead contamination in the soil around the fuel spill area. Soil samples should be taken at a depth of one to three feet below grade. A pattern similar to the one shown in Figure 3-6 is recommended for a one-time sampling effort. An initial screening analysis on two composites should be performed to determine if lead contamination is present before analyzing the rest of the samples.

| | |
|---|---|
| Type of Samples: | Soil |
| Frequency: | One time only |
| Number of Samples: | 12 |
| Testing Parameters: | Lead |

3.2.8 Site 9: Waste Fuel Disposal Pit. The recommended soil sampling program is designed to detect the presence of tetraethyl lead contamiation in the sediments of the borrow pit. Samples should be taken in two zones of the sediment; the top 6 to 12 inches and one to two foot zones as shown in Figure 3-7. This will indicate if erosion is causing migration of contaminated soil.

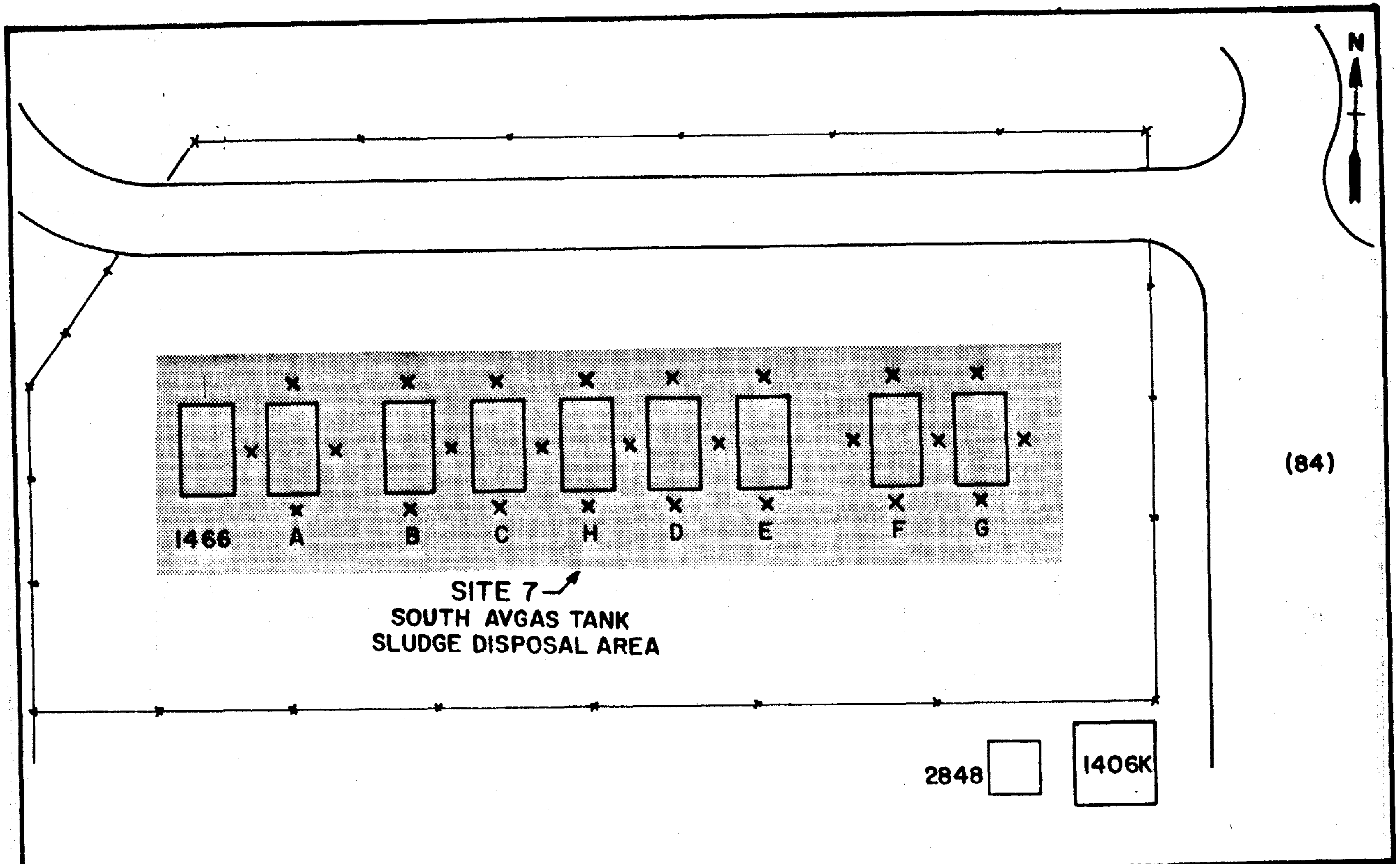



FIGURE 3-5

Site 7
Recommended Sampling Locations

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

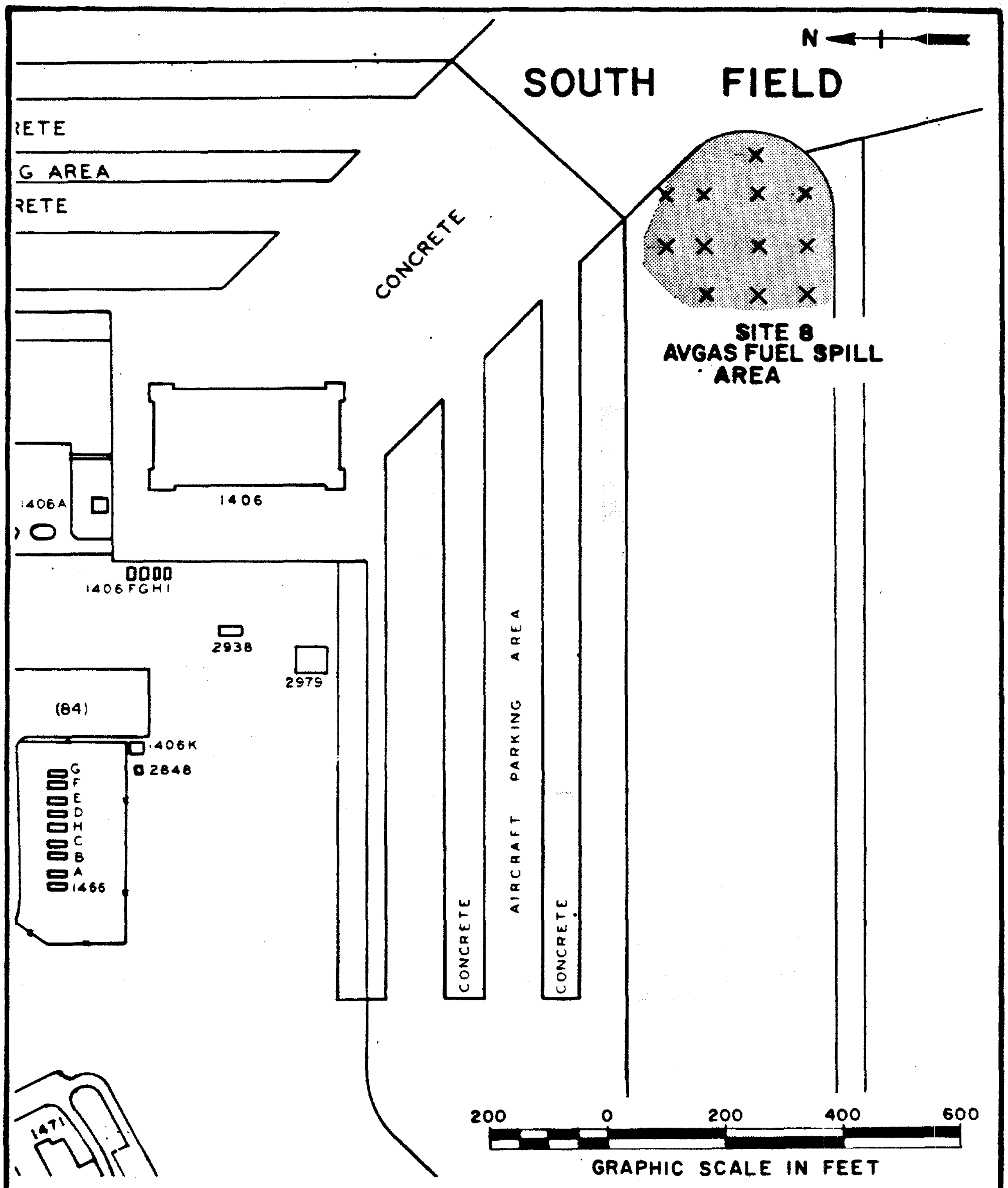



FIGURE 3-6

**Site 8**
**Recommended**
**Sampling Locations**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

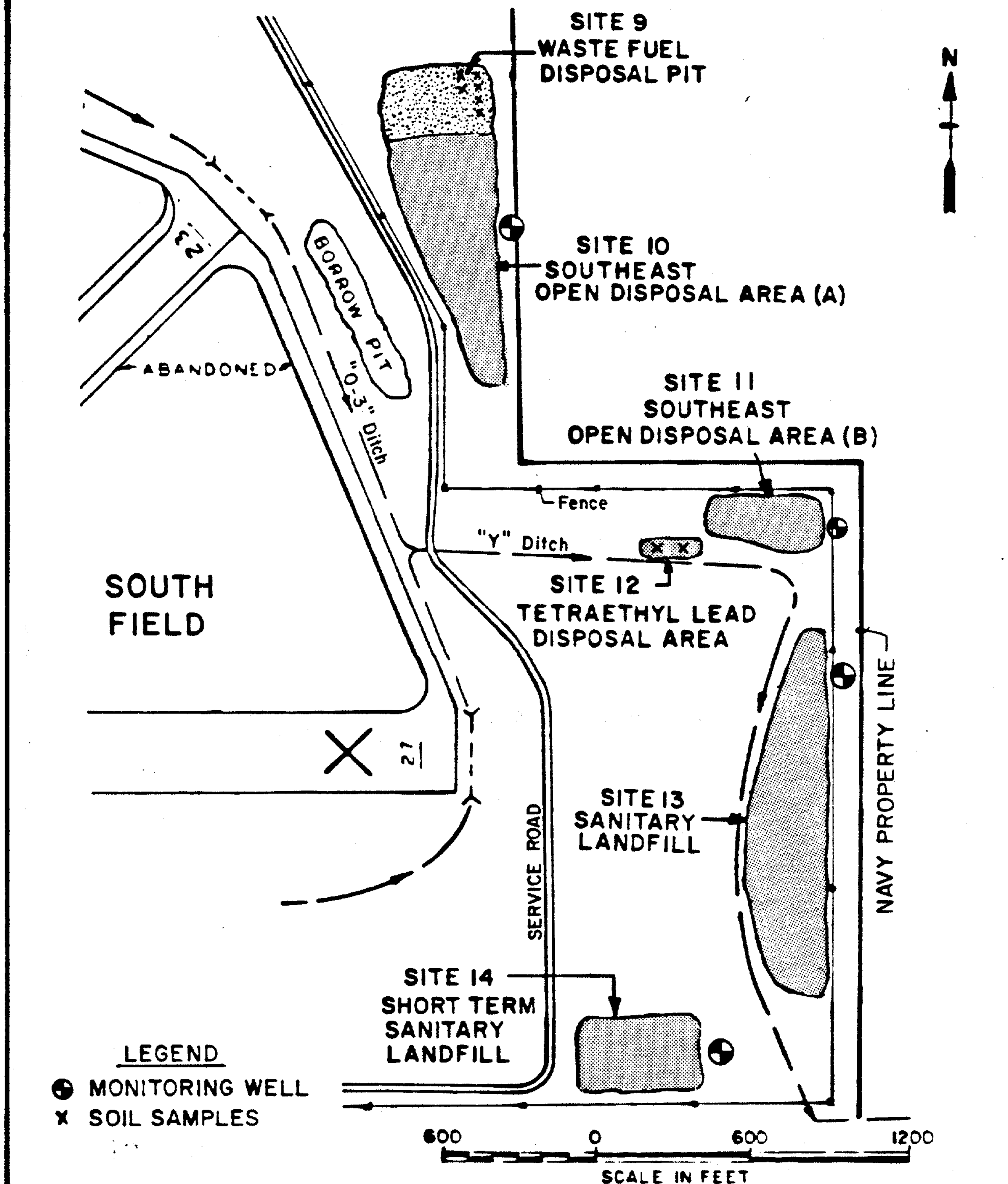



FIGURE 3-7

**Site 9,10,11,12,13&14 Recommended Sampling Locations**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

Type of Samples: Soil

Frequency: One time only

Number of Samples: 12

Testing Parameters: Lead

3.2.9 Site 10: Southeast Open Disposal Area (A). One ground water monitoring well is recommended for Site 10. The monitoring well should be installed east of the site location as shown in Figure 3-7. The monitoring well should be screened in the shallowest saturated zone, as determined in the field. This monitoring well is designed to detect contaminant migration as it moves away from Site 10.

Type of Samples: Ground water

Ground Water Monitoring Wells: One

Frequency: Quarterly for one year

Number of Samples: Four

Testing Parameters: See Table 3-2

Remarks: The list of Testing Parameters given in Table 3-2 is as site-specific as possible. However, certain parameters are listed as typical indicators of contamination based on the knowledge of operations conducted at NAS Whiting Field.

3.2.10 Site 11: Southeast Open Disposal Area (B). One ground water monitoring well is recommended for this site. The monitoring well should be installed east of the site location as shown in Figure 3-7. The monitoring well should be screened in the shallowest saturated zone. This monitoring well is designed to detect contaminant migration as it moves away from Site 11.

Type of Samples: Ground water

Ground Water Monitoring Wells: One

Frequency: Quarterly for one year

Number of Samples: Four

Testing Parameters: See Table 3-2

Remarks: The list of Testing Parameters given in Table 3-2 is as site-specific as possible. However, certain parameters are listed as typical indicators of contamination based on the knowledge of operations conducted at NAS Whiting Field.

3.2.11 Site 12: Tetraethyl Lead Disposal Area. The recommended soil sampling program is designed to define the extent of tetraethyl lead contamination in the two earth covered mounds within the site. Six soil samples should be taken from each mound at a depth of two to three feet below grade and composited. An initial screening analysis on the two composites should be performed to determine if lead contamination is present.

Type of Samples: Soil

Frequency: One time only

Number of Samples: 2

Testing Parameters: Lead

3.2.12 Site 13: Sanitary Landfill. One ground water monitoring well is recommended for this site. The monitoring well should be installed east of the site on the north end as shown in Figure 3-7. This is the area first used and potentially contains hazardous wastes. The monitoring well should be screened in the shallowest saturated zone. This monitoring well is designed to detected contamination before it migrates away from the site.

Type of Samples: Ground water

Ground Water Monitoring Wells: One

Frequency: Quarterly for one year

Number of Samples: Four

Testing Parameters: See Table 3-2

Remarks: The list of Testing Parameters given in Table 3-2 is as site-specific as possible. However, certain parameters are listed as typical indicators of contamination based on the knowledge of operations conducted at NAS Whiting Field.

3.2.13 Site 14: Short-Term Sanitary Landfill. One ground water monitoring well is recommended for this site. The monitoring well should be installed east of the site location as shown in Figure 3-7. The monitoring well should be screened in the shallowest saturated zone. This monitoring well is designed to detected contamination before it migrates off-site.

Type of Samples: Ground water

Ground Water Monitoring Wells: One

Frequency: Quarterly for one year

Number of Samples: Four

Testing Parameters: See Table 3-2

Remarks: The list of Testing Parameters given in Table 3-2 is as site-specific as possible. However, certain parameters are listed as typical indicators of contamination based on the knowledge of operations conducted at NAS Whiting Field.

3.2.14 Site 15: Southwest Landfill. One ground water monitoring well is recommended for this site. The monitoring well should be installed west of the site location as shown in Figure 3-8. The monitoring well should be screened in the shallowest saturated zone. This monitoring well is designed to detected contamination before it migrates away from the site.

| | |
|---|---|
| Type of Samples: | Ground water |
| Ground Water Monitoring Wells: | One |
| Frequency: | Quarterly for one year |
| Number of Samples: | Four |
| Testing Parameters: | See Table 3-2 |

Remarks: The list of Testing Parameters given in Table 3-2 is as site-specific as possible. However, certain parameters are listed as typical indicators of contamination based on the knowledge of operations conducted at NAS Whiting Field.

3.2.15 Site 16: Open Disposal and Burning Area. One ground water monitoring well is recommended for this site. The monitoring well should be installed west of the site location as shown in Figure 3-8. The monitoring well should be screened in the shallowest saturated zone. This monitoring well is designed to detect contamination before it migrates away from the site.

| | |
|---|---|
| Type of Samples: | Ground water |
| Ground Water Monitoring Wells: | One |
| Frequency: | Quarterly for one year |
| Number of Samples: | Four |
| Testing Parameters: | See Table 3-2 |

Remarks: The list of Testing Parameters given in Table 3-2 is as site-specific as possible. However, certain parameters are listed as typical indicators of contamination based on the knowledge of operations conducted at NAS Whiting Field.

3.3 OTHER RECOMMENDATIONS. All 16 sites identified in this study should be documented and it is recommended that the Engineering Field Division's real estate maps, activity maps and NAS Whiting Field master plan be annotated with the locations of the sites. Additional precautions should be taken to prevent accidental contamination exposure at the sites once the results from the Confirmation Study are available.

3.3.1 Site 2: Northwest Open Disposal Area. No Confirmation Study is recommended. It is recommended that activity maps and base master plans be annotated with the location of this site.

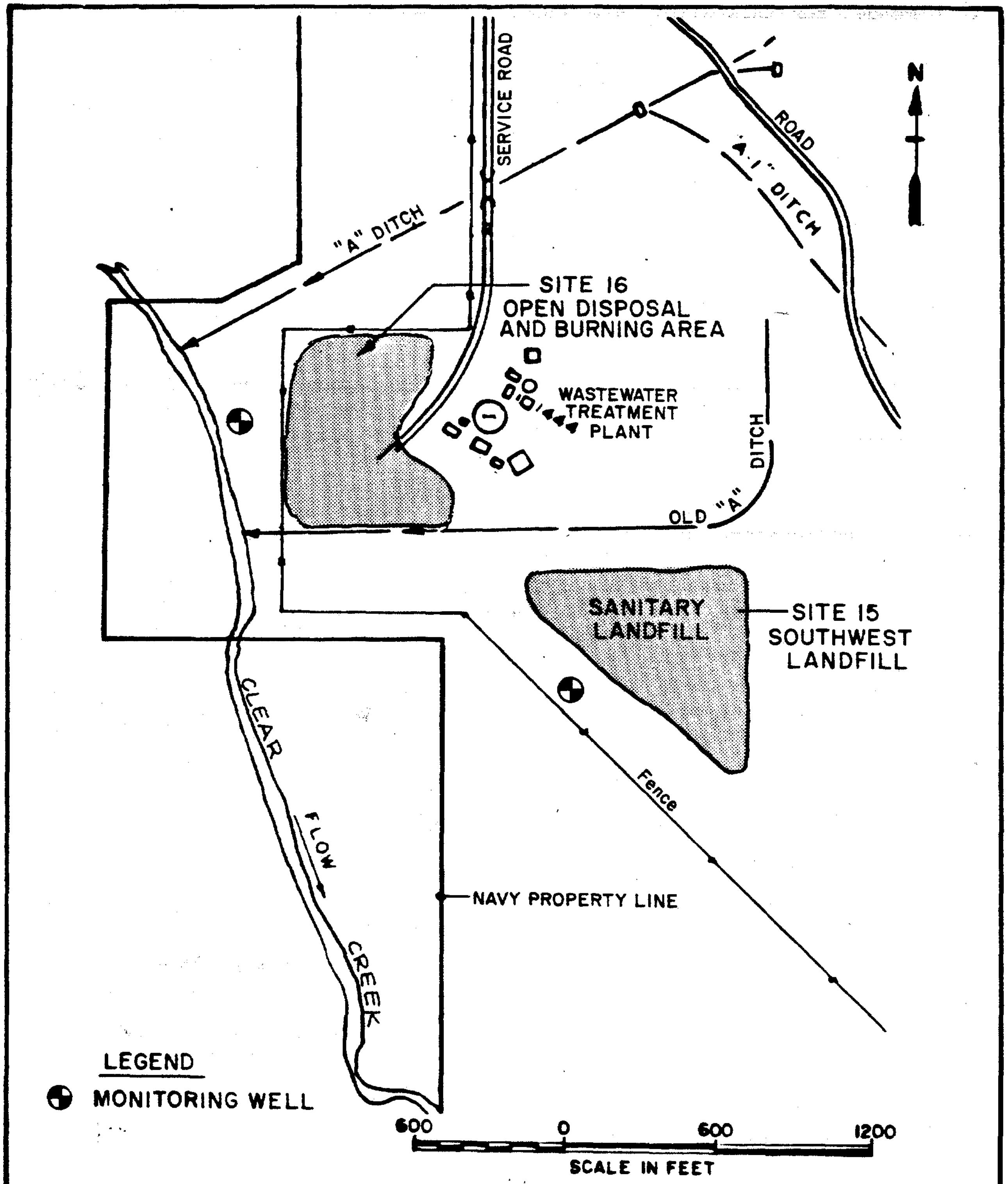



FIGURE 3-8

**Site 15 & 16**
**Recommended**
**Sampling Locations**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

# 4. BACKGROUND

4.1 GENERAL. Naval Air Station (NAS) Whiting Field is located in Florida's northwest coastal area approximately seven miles north of Milton and 20 miles northeast of Pensacola. Mobile, Alabama is approximately 79 miles west of the air station, with Tallahassee, the capital of Florida, 174 miles to the east. A general vicinity map of the area is shown in Figure 4-1.

NAS Whiting Field is on a 3,490-acre tract of land, with easement rights to an additional 457 acres. NAS Whiting Field is divided into a North and South Field. The North Field is used as a fixed-wing training base, while South Field is used for helicopter training. Dividing the North and South Air Fields are station support facilities. Figure 4-2 shows the layout of the Air Station.

4.1.1 Tenant/Host Relationship. NAS Whiting Field's mission is "to maintain and operate facilities and provide services and material to support operations of aviation activities and units of the Naval Air Training Command and other activities and units as designated by the Chief of Naval Operations." Specifically, NAS Whiting Field provides support services and facilities to Training Air Wing Five (TRAWING FIVE) activities and to other tenant commands through its organization and host activity.

The principal tenant command at NAS Whiting Field is TRAWING FIVE. It's mission is "to administer, coordinate and supervise flight and academic training and support thereof as directed by Chief of Naval Air Training."

Five training squadrons are based at NAS Whiting Field; three fixed-wing (VT-2, VT-3 and VT-6) and two helicopter (HT-8 and HT-18) training squadrons. The mission of VT-2, VT-3 and VT-6 is to provide primary and intermediate-stage flight training to aviators of the U.S. Navy, Marine Corps, Coast Guard and several allied nations. Each VT squadron trains aviators in Familiarization, Precision Aerobatics, Basic and Radio Formation Tactics, and Night Familiarization. In addition, student aviators learn the basic techniques for takeoff, landing, spin-and-stall recoveries, and aerobatics.

HT-8 is the Navy's primary helicopter training squadron, involved in all aspects of basic helicopter flight, including night flight. HT-18 provides the last phase of training for a helicopter pilot. Training is provided in basic instruments, familiarization, radio instrument and tactics flying.

Other support groups stationed at Whiting Field are the Naval Air Maintenance Training Group Detachment (NAMTRAGRUDET) and the Naval Oceanography Command Detachment (NAVOCEANCOMDET). NAMTRAGRUDET teaches systems familiarization to prospective Naval aviators and provides instruction on aircraft maintenance and corrosion control. NAVOCEANCOMDET provides meteorological and oceanograhic series to the Air Station. A Seabee division is assigned to the Air Station to provide maintenance on the runways and provide self-help projects throughout the Station.

Most of the remaining services and support activities at the NAS are provided by private contractors. A list of the major contractors and the services they provide follow.

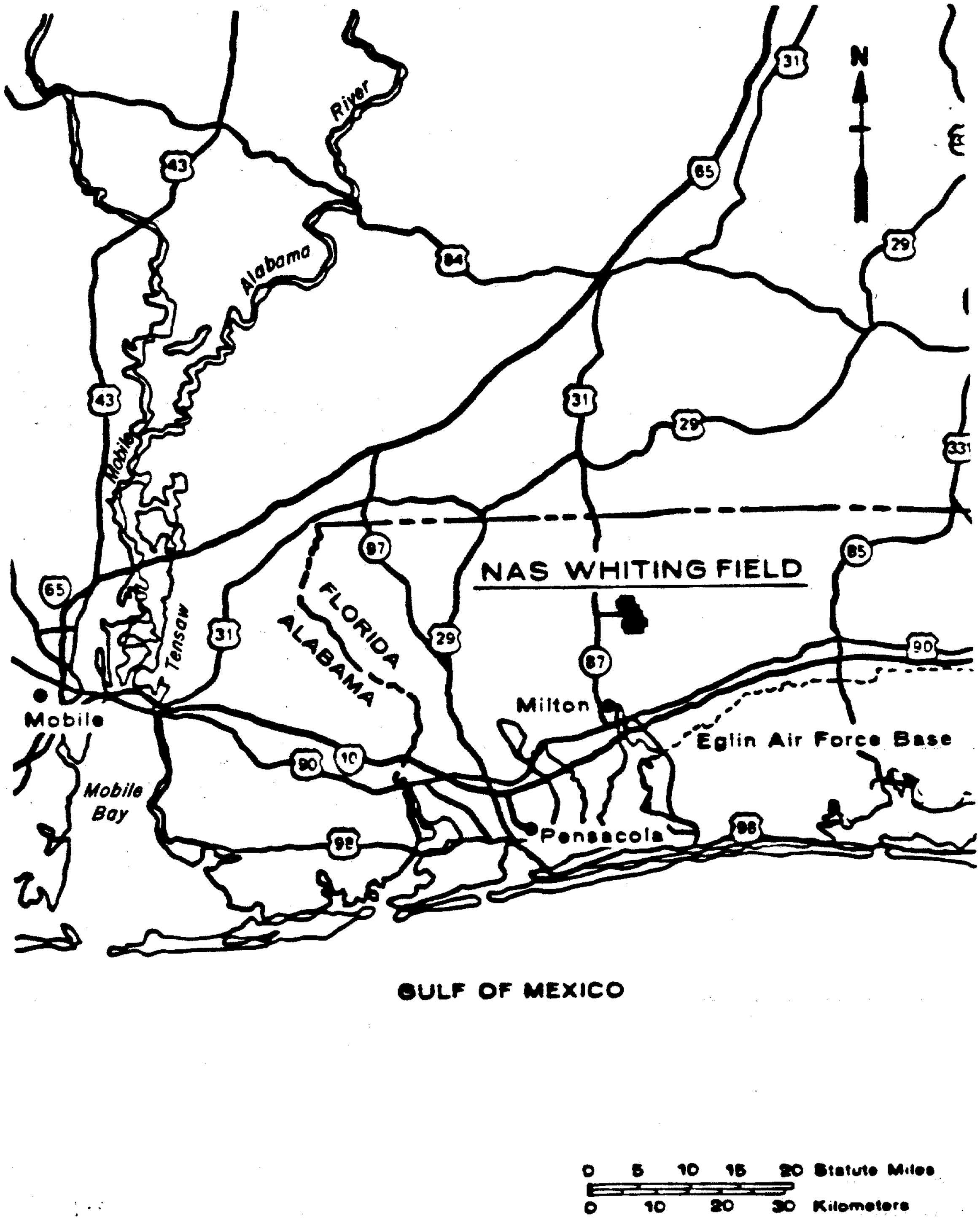



FIGURE 4-1

VICINITIES MAP

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

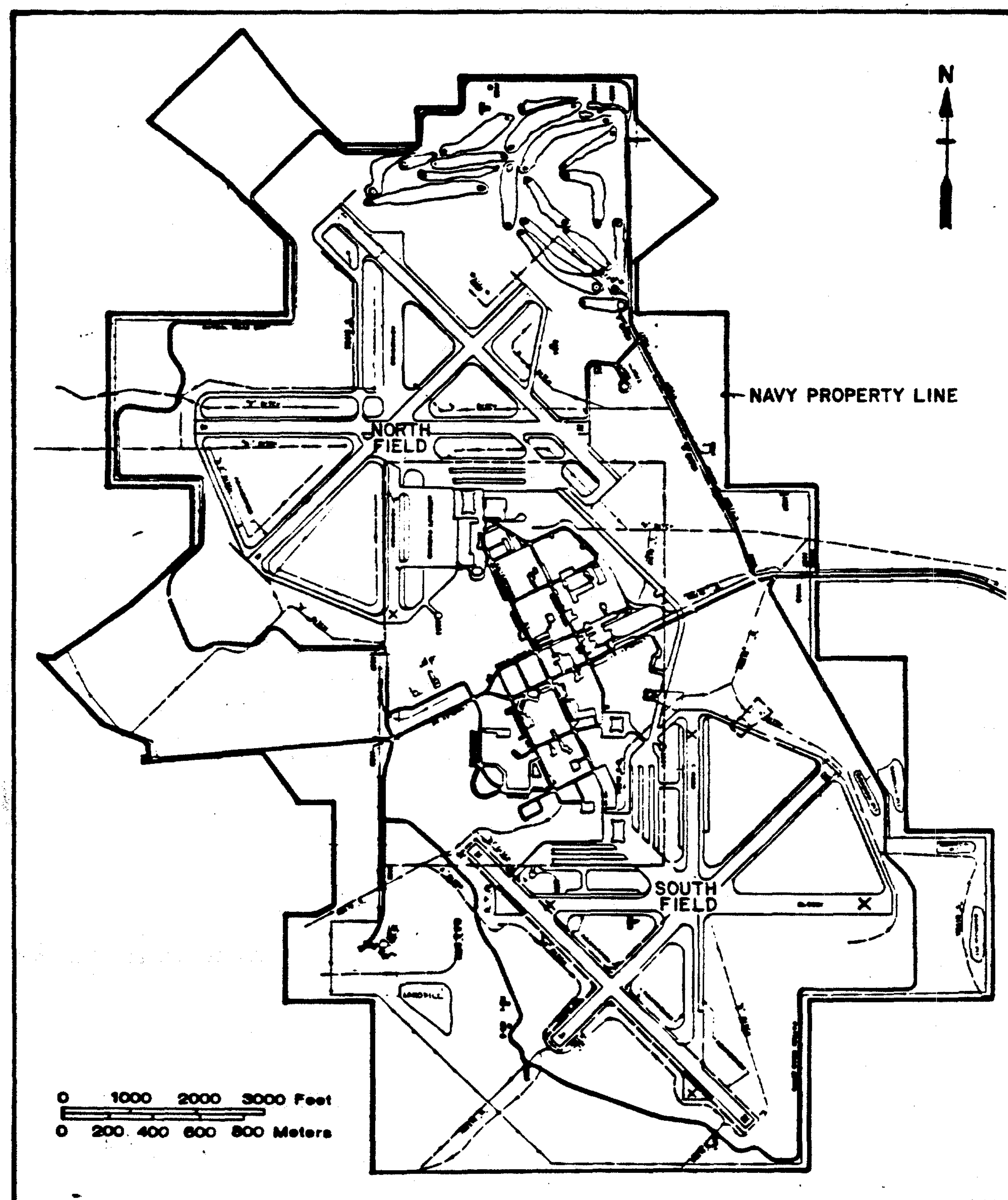



FIGURE 4-2

**Installation Map**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

Beech Aerospace Services, Inc. (BASI) provides administrative, maintenance and support for the T-34C aircraft assigned to TRAWING FIVE.

Bell Helicopter Textron provides spare parts to support the Navy's helicopter training program.

Burnside-Ott provides complete maintenance servies for the H-1 and H-57 helicopters stationed at Whiting Field. They also provide simulator instructions in cockpit and emergency procedures, basic and radio instruments, and airways navigation procedures.

RCA/Operational Maintenance Service provides public works functions at Whiting Field which encompasses the maintenance and operation of the Air Station's grounds, utilities, wastewater treatment, potable water, transportation, telephone and messenger services, and building maintenance.

4.1.2 Adjacent Land Use. Lands bordering Whiting Field consist primarily of agricultural lands to the northwest, residential and forested areas to the south and southwest, and forested lands around the remaining borders (City of Milton, 1978). Santa Rosa County primarily consists of forested area (64.5 percent), with a large amount of agricultural land (13.2 percent) and only a small amount of developed land (4.0 percent) (SOUTHNAVFACENGCOM, 1983).

Eglin AFB, located approximately ten miles southeast of Whiting Field, occupies about ten percent of the county's area (SOUTHNAVFACENGCOM, 1983). Residential areas nearby include Point Baker (approximately 1.5 miles southeast), the City of Milton (approximately five miles southwest), East Milton (approximately five miles south), and Allentown (approximately two miles north). The Blackwater River State Forest, which occupies an area of approximately 60,000 acres, is located about six miles northwest of Whiting Field.

Whiting Field is situated on a plateau with low-lying, receiving waters to the west, south and east. Any potential off-base sources of contamination, which may threaten the human health or the environment at NAS Whiting Field, would be primarily limited to the areas of higher ground to the north. The areas north of Whiting Field consist primarily of agricultural and forested lands. There are no known sources of contamination reported for these areas.

4.2 HISTORY. NAS Whiting Field was commissioned as a Naval Auxiliary Air Station on 16 July 1943. Throughout the remainder of World War II, Whiting Field's mission was to provide primary training to Naval aviators for the fleet and has remained the same in the 41 years since its inception.

In July of 1945, a prisoner-of-war (POW) camp for German soldiers was established at Whiting Field. The German POWs were used to furnish manual labor details for construction and soil erosion projects at Whiting Field. Two hundred twenty-five prisoners were held at Whiting Field until the war ended.

After World War II, Whiting Field was elevated to a NAS. For a short time after the war, medium and heavy bombers were stationed at the NAS. In 1948, it was converted back to auxiliary status, but this was short-lived and was later reinstituted as NAS Whiting Field. NAS Whiting Field continued to be used extensively for basic Naval aviation training, becoming the backbone of the Navy's flight training program. During 1949 and 1950, the Navy's precision flying team, the Blue Angels, were stationed at Whiting Field. The Navy's first jet training unit was also commissioned at Whiting Field.

With the outbreak of the Korean War in 1950, NAS Whiting Field again concentrated on basic pilot training. The Blue Angel team was disbanded and sent into combat, and the jet training unit was transferred to Kingsville, Texas.

During the mid-1950s, NAS Whiting Field began using the T-28 "Trojan." By 1957, the fighter attack syllabus of flight training was phased into the flight program. In December of 1959, multi-engine training was transferred fom NAS Pensacola to Whiting Field for a short period of time.

In 1960, Training Squadrons Two (VT-2) and Three (VT-3) were commissioned at NAS Whiting Field. Training Squadron Six (VT-6) was transferred from NAS Pensacola to Whiting Field in 1971. These are the three fixed-wing training squadrons currently stationed at NAS Whiting Field.

In January of 1972, a major reorganization of the Naval Air Training Command occurred. At this time, NAS Whiting Field became the home of TRAWING FIVE. In 1974, the Navy's helicopter training program moved to NAS Whiting Field from Ellyson Field. Helicopter Training Squadrons EIGHT and EIGHTEEN were transferred to Whiting's South Field. This led to the relocation of Training Squadron THREE (VT-3) to the North Field, making North Field the home of three fixed-wing squadrons (VT-2, VT-3 and VT-6). This relationship has continued to the present, with North Field used for fixed-wing training and South Field for helicopter training. Since the relocation, all graduates of Navy helicopter training have received their wings at Whiting Field.

Academic and simulated-flight-trainer instructions are also now provided at NAS Whiting Field. Beginning in 1977, Whiting Field began its transition to the T-34c "Turbomentor" as the primary fixed-wing trainer. This led to the total phasing-out of the T-28 as of the Spring of 1983.

4.3 LEGAL ACTIONS. There were no reported legal actions concerning contamination incidents at NAS Whiting Field prior to the on-site survey.

4.4 BIOLOGICAL FEATURES.

4.4.1 Ecosystems. The immediate area of NAS Whiting Field was originally characterized by the sandhill plant association (Davis, 1980). This habitat type is dominated by longleaf pine (*Pinus palustris*), turkey oak (*Quercus laevis*), bracken fern (*Pteridum aquilinum*) and wire grass (*Aristida stricta*) (Ward, 1979). In the general vicinity of the Air Station, this community has been entirely replaced or altered by the airfield, and nearby silviculture and agriculture.

To the west and southwest of the Air Station, the elevations drop off rapidly toward Clear Creek. This topographical change likewise causes a change in the plant community fringing the airfield, giving way to the swamp forest association bordering the creek. This association is characteristic of low moist areas along streams and creeks and is typically the most diverse in this part of Florida. The association is dominated by deciduous trees such as red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), sweetbay magnolia (*Magnolia virginiana*), and the buckwheat tree (*Cliftonia monophylla*). The understory is generally diverse (Ward, 1979).

The property to the east and southeast of the Air Station slopes less steeply to Big Coldwater Creek, where the plant communities again grade into a swamp forest association.

NAS Whiting Field can best be classified as paved surfaces (runways, roads) immediately surrounded by mowed open grassy fields. Small stands of pine have been left for landscaping purposes. The remainder of NAS Whiting Field is comprised of a centrally located building complex associated with the maintenance and functioning of the airport, and a community of 82 single family dwellings for NAS personnel at the west edge of the property.

Concrete lined ditches throughout NAS Whiting Field collect surface water run-off and discharge to Clear Creek to the south and west and Big Coldwater Creek to the east. The majority of the groundwater seepage from the NAS is assumed to ultimately percolate to Clear and Big Coldwater creeks.

4.4.1.1 Flora. General descriptions of the vegetative associations/habitat types are discussed above. The on-site survey showed no detectable impact or stress to the vegetation either at the disposal site or the surrounding areas.

4.4.1.2 Fauna. With perhaps the exceptions of a few ground foraging birds and songbirds, and some opportunistic scavengers (raccoons, oppossums), NAS Whiting Field furnishes little natural habitat for the variety of the animals presumed to inhabit this region. The surrounding pinelands and swamp forests might be expected to harbor the following mammals: deer, bobcat, raccoon, fox, squirrel, mink and rabbits. Black bear are known to inhabit Blackwater River State Forest and Eglin Reservation, so the possibility exists for their occurrence in local habitat providing dense cover and foraging grounds.

Numerous species of songbirds, waterfowl, woodpeckers, hawks, as well as shorebirds are anticipated to be found throughout the region of NAS Whiting Field.

A variety of herpatofauna occurs in the Florida Panhandle. The swamp forest and creeks just off NAS Whiting Field's property would provide suitable habitat for many of these species. One possible and noteworthy exception might be the gopher turtle (Gopherus polyphemus) which may utilize the sandy soils afforded by the high ground around the Air Station.

The numerous species of fish and invertebrates indigenous to the Blackwater River drainage are presumed to inhabit the creeks (Big Coldwater and Clear creeks) which border the NAS Whiting Field.

Tables 4-1 through 4-4 list many of the fauna expected to occur in the area.

4.4.1.3 Blackwater River Drainage System. As was stated above, both Clear and Big Coldwater creeks act as receiving waters for the drainage ditches from NAS Whiting Field. In addition, seepage of groundwater from the site ultimately will make its way to these natural drainage systems. Both of these creeks are classified as Class III Waters-Recreation, Propogation and Management of Fish and Wildlife. These, in turn, drain into the Blackwater River which is classified as an Outstanding Florida Water; this river is considered ecologically significant and is given the highest protection by the State. The literature shows this river to be a primary or potential habitat for a number of threatened and rare fish and invertebrate species (see Section 4.4.2.1).

The aquatic organisms inhabiting the receiving waters around the NAS are potential receptors of contaminants that may migrate off Navy property.

Table 4-1

Mammal Species Expected Near NAS Whiting Field

| Scientific Name | Common Name |
| --- | --- |
| Blarina brevicauda | Shortail shrew |
| Cryptotis parva | Least shrew |
| Dasypus novemcinctus | Armadillo |
| Didelphis marsupialis | Opossum |
| Geomys pinetis | Southeastern pocket gopher |
| Lasiurus spp. | Bats |
| Lutra canadensis | River otter |
| Lynx rufus | Bobcat |
| Mephitis mephitis | Striped skunk |
| Neotoma floridana | Eastern wood rat |
| Odocoileus virinianus | Whitetail deer |
| Oryzmys palustris | Rice rat |
| Peromyscus gossypinus | Cotton mouse |
| Pipistrellis subflavus | Eastern pipistrel |
| Procyon lotor | Racoon |
| Reithrodontomys humulis | Eastern harvest mouse |
| Scalopus aquaticus | Eastern mole |
| Sciurus carolinensis | Eastern gray squirrel |
| Sciurus niger | Eastern fox squirrel |
| Sigmodon hispidus | Cotton rat |
| Spiologale putorius | Spotted skunk |
| Sus scrofa | Hog |
| Sylvilagus floridanus | Eastern cottontail |
| Sylvilagus palustris | Marsh rabbit |
| Urocyon cinereoargenteus | Gray fox |

Table 4-2

Bird Species Expected Near NAS Whiting Field

| Scientific Name | Common Name |
|---|---|
| Agelaius phoeniceus | Red-winged blackbird |
| Aimophila aestivalis | Bachman's sparrow |
| Aix sponsa | Wood duck |
| Anhinga anhinga | American anhinga |
| Ardea Herodias | Great blue heron |
| Buteo jamaicensis | Red-tailed hawk |
| Buteo lineatus | Red-shouldered hawk |
| Cardinalis cardinalis | Northern cardinal |
| Casmerodius albus | Great egret |
| Cathartes aura | Turkey vulture |
| Colinus virginianus | Common bobwhite |
| Columbina passerina | Ground dove |
| Coragyps atratus | Black vulture |
| Corvus brachyrhynchos | American crow |
| Cyanocitta cristata | Blue jay |
| Dryocopus pileatus | Pileated woodpecker |
| Hydranassa tricolor | Louisiana heron |
| Megaceryle alcyon | Belted kingfisher |
| Meleagris gallopavo | Wild turkey |
| Melanerpes carolinus | Red-bellied woodpecker |
| Mimus polyglottos | Northern mockingbird |
| Podilymbus podiceps | Pied-billed grebe |
| Sturnella magna | Eastern meadowlark |
| Zenardia macroura | Mourning dove |

Table 4-3

Reptile and Amphibian Species Expected Near NAS Whiting Field

| Scientific Name | Common Name |
|---|---|
| *Abastor erythrogrammus* | Rainbow snake |
| *Agkistrodon piscivorus* | Cottonmouth |
| *Anolis carolinensis* | Green anole |
| *Chelydra serpentina* | Common snapping turtle |
| *Chrysemys floridana* | Florida cooter |
| *Coluber constrictor* | Southern black racer |
| *Crotalus adamanteus* | Eastern diamondback rattlesnake |
| *Deirochelys reticularia* | Eastern chicken turtle |
| *Elaphe guttata* | Corn snake |
| *Eumeus inexpectatus* | Southeastern five-lined skink |
| *Kinosternon subrubrum* | Eastern mud turtle |
| *Macroclemys temmincki* | Alligator snapping turtle |
| *Nerodia cyclopion* | Green water snake |
| *Nerodia sipedon* | Banded water snake |
| *Ophisaurus ventralis* | Eastern glass lizard |
| *Pituophis melanolaucus* | Florida pine snake |
| *Rana grylio* | Pig frog |
| *Rana utricularia* | Southern leopard frog |
| *Sceloporus undulatus* | Southern fence lizard |
| *Sistrurus miliarius* | Pigmy rattlesnake |
| *Terrapene carolina* | Gulf coast box turtle |
| *Thamnophis sauritus* | Southern ribbon snake |
| *Thammophis sirtalis* | Garter snake |

Table 4-4

Fish Species Expected Near NAS Whiting Field

| Scientific Name | Common Name |
|---|---|
| *Amia calva* | Bowfin |
| *Ammocrypta bifascia* | Florida sand darter |
| *Aphredoderus sayanus* | Pirate perch |
| *Erimyzon tenuis* | Sharpfin chubsucker |
| *Etheostoma davisoni* | Choctowhatchee darter |
| *Etheostoma edwini* | Brown darter |
| *Etheostoma swaini* | Gulf darter |
| *Fundulus escambiae* | Eastern starhead minnow |
| *Gambusia affinis* | Mosquitofish |
| *Ictalurus natalis* | Yellow bullhead |
| *Ictalurus nebulosus* | Brown bullhead |
| *Lepisosteus oculatus* | Spotted gar |
| *Lepiosteus osseus* | Longnose gar |
| *Lepomis gulosus* | Warmouth |
| *Lepomis marcrochirus* | Bluegill |
| *Leomis microlophus* | Redear sunfish |
| *Leptolucania ommata* | Pygmy killifish |
| *Micropterus salmoides* | Largemouth bass |
| *Notemigonus crysoleucas* | Golden shiner |
| *Notropis hypselopterus* | Sailfish shiner |
| *Notropis venustus* | Blacktail shiner |
| *Notropis welaka* | Bluenose shiner |
| *Percina nigrofasciata* | Blackbanded darter |

Bio-accumulation of materials in the tissue of these organisms could be conveyed to higher trophic levels in the predators that inhabit or forage in this drainage system.

4.4.2 Endangered, Threatened and Rare Species

4.4.2.1 Fauna. There are 36 species of animals in Florida that are on the U.S. Fish and Wildlife Service (USFWS) list of endangered or threatened species (Wood, 1984). Of these, only seven have the potential to be in the area surrounding NAS Whiting Field. Florida Game and Fresh Water Fish Commission's (FGFWFC) list of threatened or endangered species contains an additional 30 species in its listing for the state (Wood, 1984). Three of these have ranges which may include the study area. The Florida Committee on Rare and Endangered Plants and Animals' (FCREPA) inventory of the state's fauna includes 55 endangered, 146 threatened, and 73 rare species (274 total). From the FCREPA list, 32 additional species have ranges or specific habitat requirements present in the area of concern. Each of these species are briefly addressed below and listed in Table 4-5.

The cypress minnow (Hybognathus hayi) is found in the Escambia River drainage in the Florida panhandle. This herbivorous feeder prefers the sluggish backwaters of streams. It is thought that it may occur at other suitable localities nearby (Gilbert, 1978). This species is listed as threatened by FCREPA.

The blackmouth shiner (Notropis, new species) is presently known only from Pond Creek near Milton, Santa Rosa County, Florida. Very little is known about this enigmatic species, but it is believed to range into the adjacent waters (Gilbert, 1978). This fish is currently considered threatened by both FGFWFC and FCREPA.

The cypress darter (Etheostoma proeliare) has been recorded in the Escambia and Choctawhatchee River systems in Florida. It inhabits the bottom vegetation and detritus along shores of swamps and backwaters. Little else is known of this fish (Gilbert, 1978). FCREPA lists this darter as threatened.

The gopher turtle (Gopherus polyphemus) can occur throughout Florida where suitable habitat exists. Dry, well-drained soils associated with longleaf pine-turkey oak, live oak hammocks, among others, provide the necessary habitat. They tend to show non-random distributions in uniform, suitable habitats (McDiarmid, 1978). Gopher turtles are considered threatened by FCREPA and a species of special concern by FGFWFC. USFWS is still reviewing this species for possible listing.

The eastern indigo snake (Drymarchon corais couperi) is found throughout the majority of peninsular Florida with disjunct colonies known from the western panhandle. This species is apparently tolerant of a wide vareity of habitats such as pine flatwood, moist tropical hammocks, and more typically, sandhill habitats. The indigo snake is one of many species known to utilize the burrow of the gopher turtle for shelter. It feeds on a variety of prey species including poisoness snakes (McDiarmid, 1978). This species is listed as threatened by both the USFWS and FGFWFC. The FCREPA categorizes it as a species of special concern.

The Alabama map turtle (Graptemys pulchra) is reported to have a limited range in the Escambia and Yellow rivers' drainage in the Florida panhandle.

Table 4-5

List of Endangered, Threatened and Rare Species
Potentially Present Near NAS Whiting Field

| Scientific Name | Common Name | USFWS | FGFWFC | FCREPA* |
|---|---|---|---|---|
| Mammals: | | | | |
| Eptesicus fuscus | Big brown bat | - | - | R** |
| Felis concolor | Panther | E | E | E |
| Lasiurus cinereus | Hoary bat | - | - | R |
| Mustela frenata | Southeastern weasel | - | - | R |
| Mustela vison | Southern mink | - | - | R |
| Plecotous rafinequii | Southeastern big-eared bat | - | - | R |
| Birds: | | | | |
| Campephilus principalis | Ivory-billed woodpecker | E | E | E |
| Falco peregrinus | Peregrine falcon | T | E | E |
| Falco sparverius | Southeastern American kestrel | - | T | T |
| Haliaeetus leucocephalus | Bald eagle | E | T | T |
| Pandion haliaetus | Osprey | - | - | T |
| Picoides borealis | Red-cockaded woodpecker | E | T | E |
| Seiurus motacilla | Louisiana Water Thrush | - | - | R |
| Setophaga ruticilla | American redstart | - | - | R |
| Reptiles and Amphibians: | | | | |
| Amphiuma pholeter | One-toed Amphiuma | - | - | R |
| Alligator mississippiensis | American alligator | T | - | - |
| Drymarchon corais | Eastern indigo snake | T | T | - |
| Gopherus polyphemus | Gopher turtle | - | - | T |
| Graptemys pulchra | Alabama map turtle | - | - | R |
| Rana areolata aesopus | Florida gopher frog | - | - | T |
| Trionyx muticus calvatus | Gulf coast smooth softshell | - | - | R |

*USFWS - U.S. Fish and Wildlife Service
FGFWFC - Florida Game and Fresh Water Fish Commission
FCREPA - Florida Committee on Rare and Endangered Plants and Animals

**R - Rare
E - Endangered
T - Threatened

Table 4-5

List of Endangered, Threatened and Rare Species
Potentially Present Near NAS Whiting Field
(Continued)

| Scientific Name | Common Name | USFWS | FGFWFC | FCREPA* |
|---|---|---|---|---|
| Fish: | | | | |
| Etheostoma proeliare | Cypress darter | - | - | T** |
| Hybognathus hayi | Cypress minnow | - | - | T |
| Notropis (new species) | Blackmouth shiner | - | T | T |
| Insects: | | | | |
| Cordulegaster sayi | Say's spiketail | - | - | T |
| Dalania americana | Mayfly | - | - | T |
| Dromogomphus armatus | Southeastern rakeleg | - | - | R |
| Gomphaeschna antilope | Sooty darter | - | - | R |
| Gomphus diminutus | Diminutive clubtail | - | - | T |
| Gomphus geminatus | Twin-striped clubtail | - | - | R |
| Gomphus hodgesi | Hodge's clubtail | - | - | R |
| Helocordulia selysii | Selys skimmer | - | - | R |
| Homoeoneuria dolani | Mayfly | - | - | T |
| Macromia alleghaniensis | Allegheny River cruiser | - | - | T |
| Nannothemis bella | Small bog elf | - | - | R |
| Neurocordulia molesta | Smokey shadowfly | - | - | T |
| Progomphus bellei | Belle's sand clubtail | - | - | R |
| Psendiron meridionalis | Mayfly | - | - | T |
| Stylurus potulentus | Yellow-sided clubtail | - | - | T |
| Tachopteryx thoreyi | Gray petaltail | - | - | R |

*USFWS - U.S. Fish and Wildlife Service
FGFWFC - Florida Game and Fresh Water Fish Commission
FCREPA - Florida Committee on Rare and Endangered Plants and Animals

**R - Rare
E - Endangered
T - Threatened

This species can be found where nesting areas and food (freshwater snails and clams) are most available (McDiarmid, 1978). The Alabama map turtle is listed as rare by FCREPA.

Although the Gulf Coast smooth softshell turtle (Trionyx muticus calvatus) is known from a limited region on the Escambia River, the literature suggests the possibility of a more extensive range through the Florida panhandle. Typically found in rivers and streams, this reptile may also be found in impoundments and lakes (McDiarmid, 1978). FCREPA lists this species as rare until more becomes known.

The American alligator (Alligator mississippiensis) ranges throughout Florida occurring in a variety of aquatic habitats. The number of animals inhabiting the panhandle is reported to be fewer than on the peninsula (McDiarmid, 1978). The status of the alligator has been changed to threatened by USFWS. FCREPA and FGFWFC consider this a species of special concern.

The Florida gopher frog (Rana areolata aesopus) can be found in dry, well-drained soils throughout the northern part of Florida (sandhill communities and sand pine scrub habitats). They are usually associated with the burrows of the gopher turtle (McDiarmid, 1978). FCREPA lists this frog as threatened; FGFWFC considers it a species of special concern and USFWS still has the species under review.

The one-toed Amphiuma (Amphiuma pholeter) is nearly exclusive to the Florida Gulf Coastal Plain, from Levy to Santa Rosa County. To date, Santa Rosa County has only yielded specimens from the Yellow River. Their preferred habitats are mucky swamps or flood plains composed of decomposing deciduous hardwood and cypress leaf litter (McDiarmid, 1978). FCREPA considers this species rare due to its extremely limited range.

The ivory-billed woodpecker's (Campephilus principalis) historic distribution once included a majority of Florida. It is thought that this bird requires extensive mature lowland hardwood forests away from man's perturbations. There have been possible sightings in Texas and Florida, but it is feared that this woodpecker may be near extinction (Kale, 1978). USFWS, FGFWFC and FCREPA list this species as endangered.

The red-cockaded woodpecker's (Picoides borealis) range extends form Virginia to Texas and correlates with the distribution of a number of southern pines. They tend to utilize longleaf pine more frequently, preferring mature trees infected with a fungus disease named heart rot for roosting and nesting. Although the bird can be found throughout Florida, it is more common in the northern portions of the state (Kale, 1978). Currently, this woodpecker is considered endangered by USFWS and FCREPA; it is listed as threatened by FGFWFC.

The cosmopolitan peregrine falcon (Falco peregrinus) is not known to breed in Florida; however, Florida is an important wintering area for this species. Peregrines can be found in those areas that harbor other birds which it utilizes for prey. They tend to stay in the same area for the winter period before migrating north (Kale, 1978). This species is listed as endangered by FGFWFC and FCREPA. USFWS considers this species to be threatened.

The southern bald eagle (Haliaeetus leucocephalus) was once considered widespread in Florida; its numbers have diminished considerably since the 1940s.

The bald eagle is generally associated with lakes, rivers and shallow coastal areas, particularly during their nesting season, as they depend extensively upon fish as their food source; they will, however, feed on any suitably sized vertebrates, either dead or alive (Kale, 1978). The southern bald eagle is listed as endangered by USFWS and threatened by FGFWFC and FCREPA.

The osprey (Pandion haliaetus) can be found throughout North America. It nests throughout Florida particularly near its favored habitats: shallow coastal waters, rivers and lakes. Also known as the fish hawk, this raptor preys almost exclusively on fish. The osprey seems tolerant to man and most of his activities, however, being a top predator, it is sensitive to pesticide pollution (Kale, 1978). FCREPA categorizes this species as threatened.

The southeastern American kestrel (Falco sparverius paulus) represents a race found from South Carolina to southern Alabama and Florida. This species can be found nearly statewide. It prefers an open habitat, adapting to pine forests, along rivers and coastal areas. It sometimes finds suitable habitat within cities (Kale, 1978). Both FGFWFC and FCREPA consider this bird to be threatened; USFWS is still reviewing it for possible listing.

The southern limit of the Louisiana water thrush's (Seiurus motacilla) breeding range includes only northwestern Florida, primarily the panhandle. This large warbler utilizes wooded streams and swamps during breeding. It is occasionally found in drier habitats (Kale, 1978). While the Florida population is considered stable, this species is considered to be rare by FCREPA.

The American redstart (Setophaga ruticilla) occurs throughout much of North America. However, the northern Florida panhandle represents the extreme southeast limits of its breeding range. The habitat for nesting is mature deciduous woodlands (with undergrowth) along streams (Kale, 1978). FCREPA lists this bird as rare.

The Florida panther (Felis concolor coryi) has a broad habitat preference and at one time could be found throughout Florida. At the present time, due to the perturbation of large tracts of panther habitat and past hunting pressures, the population has dwindled to dangerously low levels. Although the panther will prey on a number of species, it depends primarily on the population of deer within its hunting range. A limited number of sightings have taken place in central and southern Florida in recent years (Layne, 1978). Northern portions of the state, including the panhandle, may still harbor a few individuals of the carnivore (Layne, 1984). The panther is presently listed in the endangered category by USFWS, FGFWFC and FCREPA.

The Florida black bear (Ursus americanus floridanus) was once found in dense forests, thickets and swamplands throughout much of Florida. Presently, two main populations exist in Florida's national forests; however, they are known to occur in areas of dense vegetation in scattered locations throughout the state. Apalachicola National Forest and "titi" swamps afford suitable habitat for the black bear in the panhandle (Layne, 1978). The black bear is classified as threatened by FGFWFC and FCREPA, and is still under review by USFWS.

Very few big brown bats (Eptesicus fuscus) live in the southeast. The range in Florida extends as far south as Lake Okeechobee. Habitats for colonies include buildings, bridges and hollow trees (Layne, 1978). They are listed as rare by FCREPA.

Hoary bats (Lasiurus cinereus cinereus) occur in moderate numbers throughout North America, however, they are rare or absent from most of the southeast. These bats are considered tree-dwellers (Layne, 1978). FCREPA presently considers this species as rare.

The southeastern big-eared bat (Plecotous rafinequii) is found in the southeastern United States occurring in northern Florida and the panhandle. This bat utilizes hollow trees, bark crevices and abandoned structures within the heavily forested regions of Florida (Layne, 1978). This secretive bat is not considered abundant and thus listed as rare by FCREPA.

The southeastern weasel (Mustela frenata olivacea) can be found from North Carolina to Mississippi. However, only a limited number of records for this species in Florida exists. It is considered among the state's rarest carnivores. This species apparently does not display a distinct habitat preference, sometimes occurring near residential areas (Layne, 1978). FCREPA presently considers this species as rare.

The southern mink (Mustela vison mink) is found in the panhandle and along the northern border of Florida. The mink occurs in a wide variety of aquatic habitats (Layne, 1978). FCREPA lists this species as rare.

The mayfly (Dalania americiana) was perhaps common throughout the southeast but is now present in limited areas due to pollution or siltation of the streams and rivers once suitable for its propogation. The nymphs require streams offering a substrate of clean shifting sand and takes one year to develop. Presently, the species is known to occur in the Shoal, Yellow and Blackwater rivers, and a few streams north of Choctawatchee Bay in the Florida panhandle. Populations also exist in Georgia and South Carolina. Further environmental perturbation in these areas may lead to the extinction of this vulnerable species (Franz, 1982). FCREPA lists this mayfly as threatened.

A second species of mayfly (Psendiron meridionalis) is limited to the same river systems in northwest Florida. It also requires shifting-sand-bottom streams (Franz, 1982). FCREPA lists this species as threatened.

A third species of mayfly under consideration (Homoeoneuria dolani) also requires a habitat of clean shifting sand in the fastest portions of the rivers to ensure the survival of the nymph. This species is limited to the Shoal, Yellow and Blackwater rivers in the Florida panhandle (Franz, 1982). FCREPA classifies this species as threatened.

The diminutive clubtail (Gomphus diminutus) is found exclusively along the western tributaries of the Blackwater River in Santa Rosa County, Florida. The larvae burrow in the loose silt deposits of the undisturbed streams (Franz, 1982). FCREPA classifies this species as threatened.

The larvae of the Townes' clubtail (Stylurus townesi) burrow only in the sand bottom of the Blackwater River in the Florida panhandle (Franz, 1982). This species is considered threatened by FCREPA.

The yellow-sided clubtail (Stylurus potulentus) is known from Mississippi and three counties of the Florida panhandle. These larvae require silt deposits in sand-bottomed streams for burrowing (Franz, 1982). FCREPA lists this dragonfly as threatened.

Say's spiketail (Cordulegaster sayi) has a patchy distribution in northern Florida apparently due to precise habitat requirements for both the larvae and adults, namely silt-bottomed spring seepages in hardwood forests for the larvae with weedy clearings nearby for the adult (Franz, 1982). FCREPA lists this species as threatened.

The Allegheny River cruiser (Macromia alleghanienis), which occurs in much of the eastern United States, is found only from Pond Creek in Santa Rosa County, Florida. The larvae of this species are found among roots, etc., on the bottom of clean rivers and streams (Franz, 1982). FCREPA lists this species as threatened.

The smokey shadowfly (Neurocordulia molesta) is known to occur in Florida on the Apalachicola, Choctawhatchee and Escambia rivers. They may represent a taxon distinct from those specimens from other eastern states. The larvae cling to logs and roots (Franz, 1982). FCREPA classifies this species as threatened.

The gray petaltail (Tachoptergx thoreyi) occurs in scattered colonies, being represented in five counties of the Florida panhandle. The larvae inhabit the dead leaffall of hardwoods in hillside seepages (Franz, 1982). FCREPA classifies this species as rare.

The larvae of the southeastern rakeleg (Dromogomphus armatus) require a specific habitat: thick layers of liquid muck overlain by clear flowing water (Franz, 1982). This species is considered rare by FCREPA.

The adult sooty darter (Gomphaeschna antilope) has only been found at scattered locations in Florida. However, only one larvae has been found (Franz, 1982). FCREPA considers this species to be rare.

The scarce Hodge's clubtail (Gomphus hodgesi) is found in the Florida panhandle west of the Apalachicola River. Silt deposits of clean sand-bottomed streams constitutes the habitat of this larvae (Franz, 1982). FCREPA lists this dragonfly as rare.

The twin-striped clubtail (Gomphus geminatus) occurs in at least six counties of the Florida panhandle. The larvae burrows in silt deposits of unpolluted sand-bottomed streams (Franz, 1982). FCREPA lists this species as rare.

The Florida populations of Belle's sand clubtail (Progomphus bellei) occurs only in the panhandle. The larvae are found burrowed in sand bottoms of small streams (Franz, 1982). FCREPA lists this species as rare.

The Selys skimmer (Helocordulia selysii) occurs throughout many states of the southeast, but only occurs in Florida west of the Apalachicola River. The larvae sprawl among debris in streams with a clean sandy substrate (Franz, 1982). FCREPA lists this species as rare.

The small bog elf (Nannothemis bella) can be found in the eastern states north into Canada. The Florida population is restricted to the panhandle west of the Apalachicola River. The larvae inhabit Sphagnum bogs (Franz, 1982). FCREPA considers this species to be rare.

4.4.2.2 Flora. The USFWS lists three plants in Florida as endangered. None of these plants are known to occur in Santa Rosa County. There are 325 plants listed as either endangered or threatened by the Florida Department of Agriculture (FDA); three of these may occur in the environs surrounding NAS Whiting Field. The inventory of plants prepared by FCREPA includes a total of 168 endangered, threatened or rare species. Thirteen of these may be present in the vicinity of the study area. None of these species were noted during the on-site survey. The 13 species under consideration are discussed below and listed in Table 4-6.

The hairy wild-indigo (Baptisia hirsuta) is found only in the Florida panhandle. Associated with longleaf pine-scrub oak barrens, this perennial herb is found primarily in the region near DeFuniak Springs (Ward, 1979). It is listed as threatened by FCREPA and is currently under review by USFWS.

The insectivorous water sundew (Drosera intermedia) can be found throughout much of eastern North America, but due to its specialized habitat requirements (wet, boggy soils) is becoming uncommon. It is known to occur in scattered localities throughout the panhandle (Ward, 1979). FCREPA lists this species as rare.

The trailing-arbutus or ground-laurel (Epigaea repens) prefers dry, acid, sandy or rocky soils in open woods. While this species ranges as far north as Canada, it is known from only four locations in the extreme western portion of the Florida panhandle (Ward, 1979). It is listed as rare by FCREPA.

The heartleaf (Hexastylis arifolia) is an evergreen, perennial herb found in rich, deciduous woods on ravine slopes. It occurs in isolated populations in the Florida panhandle (Ward, 1979). It is classified as a rare species by FCREPA.

The mountain-laurel (Kalmia latifolia), though common throughout much of the eastern United States, is restricted to small populations in the Florida panhandle. Rich, shady woods along streams and wooded ravine slopes are the habitats in which this species is likely to be encountered (Ward, 1979). FCREPA lists this species as rare.

The range of the panhandle lily (Lilium iridollae) is quite limited, being restricted to the four westernmost counties of the Florida panhandle. Its habitat requirements are fairly specific: black, mucky soils and peaty sands found on the banks of backwater creeks and the borders of shrub-bogs (Ward, 1979). This species is listed as endangered by FCREPA and is presently under review by USFWS.

While Ashe's magnolia (Magnolia ashei) occurs sporadically in Santa Rosa County, it is probably restricted to the southern half. This magnolia grows in rich hardwood or mixed pine-hardwood forests on ravine slopes and bluffs. Occasionally, it may be found on level uplands (Ward, 1979). This species is listed as rare by FCREPA, endangered by FDA, and is currently under review by USFWS.

The Indian cucumber-root (Medeola virginiana) reaches its southeastern-most range in the Florida panhandle. The species is found in hardwood forests, generally near small streams; however, few populations of this plant are known to occur in Florida (Ward, 1979). This species is listed as rare by FCREPA.

Table 4-6

List of Endangered, Threatened and Rare Plant Species
Potentially Present Near NAS Whiting Field

| Scientific Name | Common Name | USFWS | FGFWFC | FCREPA* |
|---|---|---|---|---|
| Baptisia hirsuta | Hairy wild-indigo | - | - | T** |
| Drosear intermedia | Water sundew | - | - | R |
| Epigaea repens | Trailing arbutus | - | - | R |
| Hexastylis arifolia | Heartleaf | - | - | R |
| Kalmia latifolia | Mountain laurel | - | - | R |
| Lilium iridollae | Panhandle lily | - | - | E |
| Magnolia ashei | Ashe's magnolia | - | E | R |
| Medeola virginiana | Indian cucumber root | - | - | R |
| Rhododendron austrinum | Orange azalea | - | - | T |
| Sarracenia leucophylla | White-top pitcher plant | - | E | T |
| Sarracenia rubra | Red-flowered pitcher plant | - | E | R |
| Smilax smallii | Jackson vine | - | - | T |
| Stewartia malacodendron | Silkly camellia | - | - | T |

*USFWS - U.S. Fish and Wildlife Service
FGFWFC - Florida Game and Fresh Water Fish Commission
FCREPA - Florida Committee on Rare and Endangered Plants and Animals

**R - Rare
E - Endangered
T - Threatened

The orange azalea (Rhododendron austrinum) is found throughout the Florida panhandle. Due to its popularity with gardeners, it is subject to intense collecting presure. It can be found in slopes of moist, wooded ravines, but apparently will grow more profusely in cut-over areas (Ward, 1979). FCREPA classifies this species as threatened.

The white-top pitcher plant (Sarracenia leucophylla) is limited regionally to the Florida panhandle, southwestern Georgia and southeastern Mississippi. This insectivorous species grows in the wet, acid soils found in open acid bogs and low-lying moist pinelands (Ward, 1979). FCREPA classified this species as threatened; FDA lists the plant as endangered.

While the red-flowered pitcher plant (Sarracenia rubra) may be found in other areas of the western panhandle, it is primarily found in the drainage of the Yellow River. This species seems to prefer the edges of clear, swift flowing streams and is occasionally found in wet slash pine woodlands and bogs (Ward, 1979). This species is listed as rare by FCREPA and endangered by FDA.

The Jackson-vine (Smilax smallii) is found from Virginia south and westward to eastern Texas. It can be found throughout the Florida panhandle in its preferred habitat: rich woods, hammock ravines and along streams (Ward, 1979). This species is listed as threatened by FCREPA.

The silky camellia (Stewartia malacodendron) is found in Florida in the area of the Apalachicola River drainage and westward through the panhandle. This shrub occurs in the understory of wooded ravines preferring moist but well drained acid soils. However, many seemingly suitable habitats will not harbor this rare species (Ward, 1979). FCREPA lists this species as threatened.

4.5 PHYSICAL FEATURES.

4.5.1 Climatology. The climate in the region is subtropical with warm and humid weather occurring for most of the year. Sunshine occurs on the average of 343 days during the year. Summers are long and warm, and winters are short and mild. Average temperatures at Whiting Field range from 54°F in winter to 81°F during the summer. Temperatures fall below freezing levels on an average of 14 days per year. Temperatures of 90°F or more occur on an average of 31 days per year (SOUTHNAVFACENGCOM, 1983).

Average annual precipitation at Whiting Field is 53 inches, with July and September being the months of greatest precipitation. On the average, measurable amounts of rainfall occur on 108 days per year. Along the Gulf Coast in general, precipitation occurs predominantly in the day time. The period of high frequency of thunderstorms is evident all year, but especially so during the summer months. On any day during the summer months in the Milton-Pensacola area, there is better than a 30 percent probability of having a thunderstorm between 1200-1800 CST (SOUTHNAVFACENGCOM, 1983).

Winds are primarily from the north from September through March and from the south from April through August. Winds are generally under 20 knots though gusting is typical. On the basis of average hourly velocity in the Pensacola area, March is the windiest month of the year while August has the lowest average wind velocity (National Oceanic and Atmospheric Administration, 1980). During the months of April through September, sea breezes are common, generally starting in the late morning and lasting until after sunset (SOUTHNAVFACENGCOM, 1983).

The area is subject to hurricane activity. For the northwest Florida coast, the hurricane season consists of the months of June through October. Twelve hurricanes have passed within a 50-mile radius of Pensacola since 1886 and approximately 40 percent of these occurred in the month of September (City of Milton, 1978).

Snow is not common in this area. For the Pensacola area during 86 years of record, measurable amounts of snow occurred only during eight years. The greatest depth on record was three inches on February 15, 1895, which also represents the greatest annual total on record (National Oceanic and Atmospheric Administration, 1980).

4.5.2 Topography. Santa Rosa County lies within the Coastal Plain Province, which extends eastward from Texas and northward to New York. The County is divided into two main physiographic divisions, the Western Highlands and the Gulf Coastal Lowlands. Most of Santa Rosa County, including NAS Whiting Field, lies within the Western Highland which can be characterized as a well drained southward sloping plateau with numerous streams. The maximum elevation is approximately 290 feet above see level and occurs in the northern part of Santa Rosa County (City of Milton, 1978).

The Gulf Coastal Lowlands is located in southern Santa Rosa County and is characterized as relatively undisected, nearly level plains. The area is low-lying with elevations ranging from sea level to 30 feet above sea level (Soil Conservation Service, 1980). The Gulf Coastal Lowlands extend approximately 12 miles inland from the coast and at this point, the Western Highlands begin (SOUTHNAVFACENGCOM, 1983).

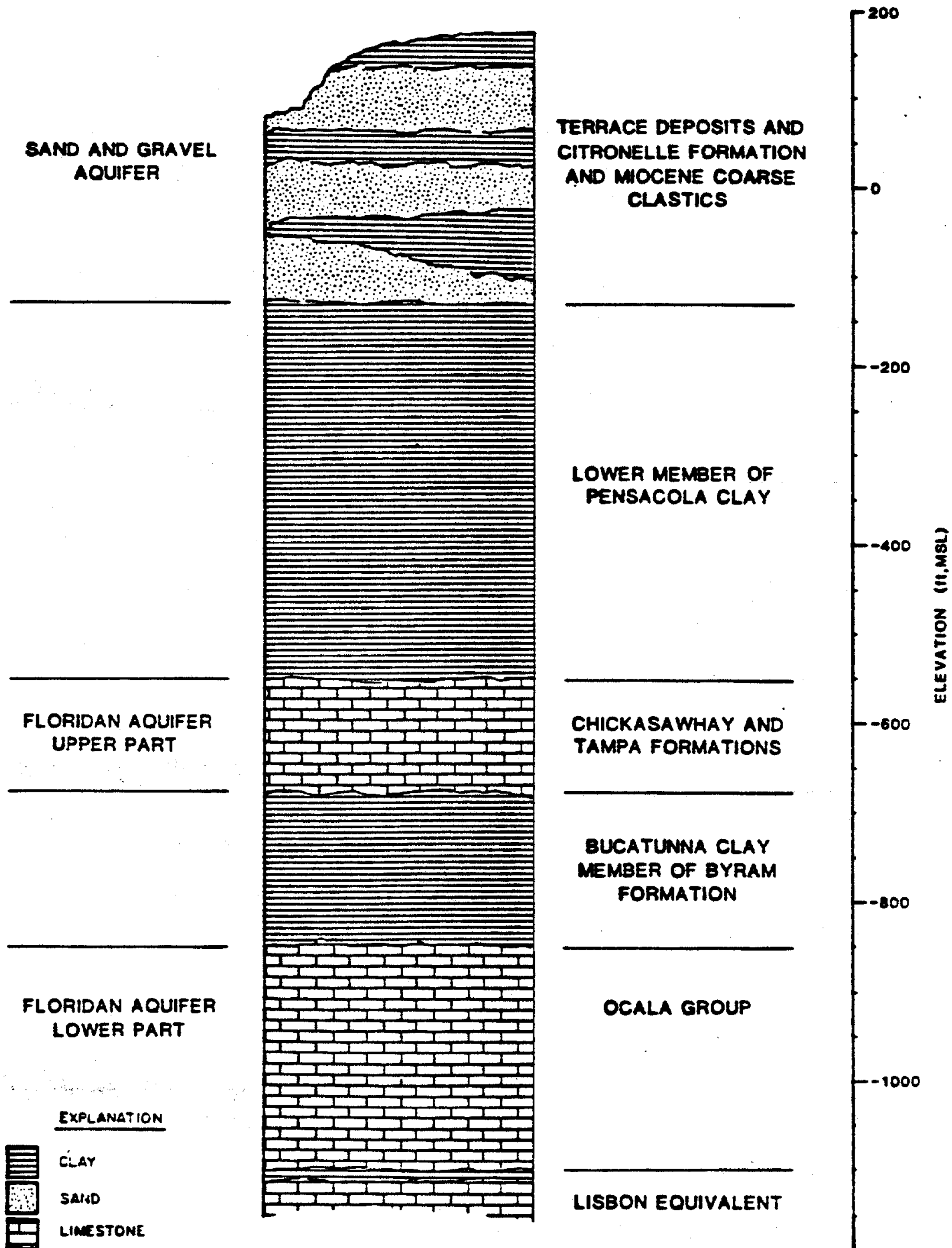
Whiting Field is located in the Blackwater River drainage basin. The Blackwater River drains an area of approximately 280 square miles in both Okaloosa County and Alabama and 580 square miles in Santa Rosa County (City of Milton, 1978). Whiting Field typically ranges from 150 to 190 feet above sea level. The Air Station is located in an upland area which is bounded by receiving waters, Clear Creek to the west and south, and Big Coldwater Creek to the east. These two creeks are tributaries to the Blackwater River located to the south.

4.5.3 Geology. The region is located in the Coastal Plain Province which consists primarily of unconsolidated sands, silts, limestones and clays of Cretaceous to recent age (City of Milton, 1978).

Santa Rosa County lies on the north flank of the Gulf Coast geosyncline and on the east flank of the Mississippi Embayment. Consequently, all the formations in the area above the base of the Cretaceous deposits have a southwestward dip (City of Milton, 1978).

4.5.3.1 Stratigraphy. The geologic sequences found in the Whiting Field area are illustrated in Figure 4-3 (Geraghty and Miller, 1984). A geologic cross-section through NAS Whiting Field is shown in Figure 4-4. A detailed description of the various geologic formations found in the western Florida Panhandle, in ascending order, follows (Marsh, 1966).

4.5.3.1.1 The Citronelle Formation underlies all of Santa Rosa and Escambia counties and is overlain in most places by Pleistocene terrace deposits. The thicknesses of the individual units are usually not apparent because it is virtually impossible to differentiate Pleistocene sand and gravel of the




SOURCE: GERAGHTY and MILLER, 1984

FIGURE 4-3

**Generalized Geologic Column**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

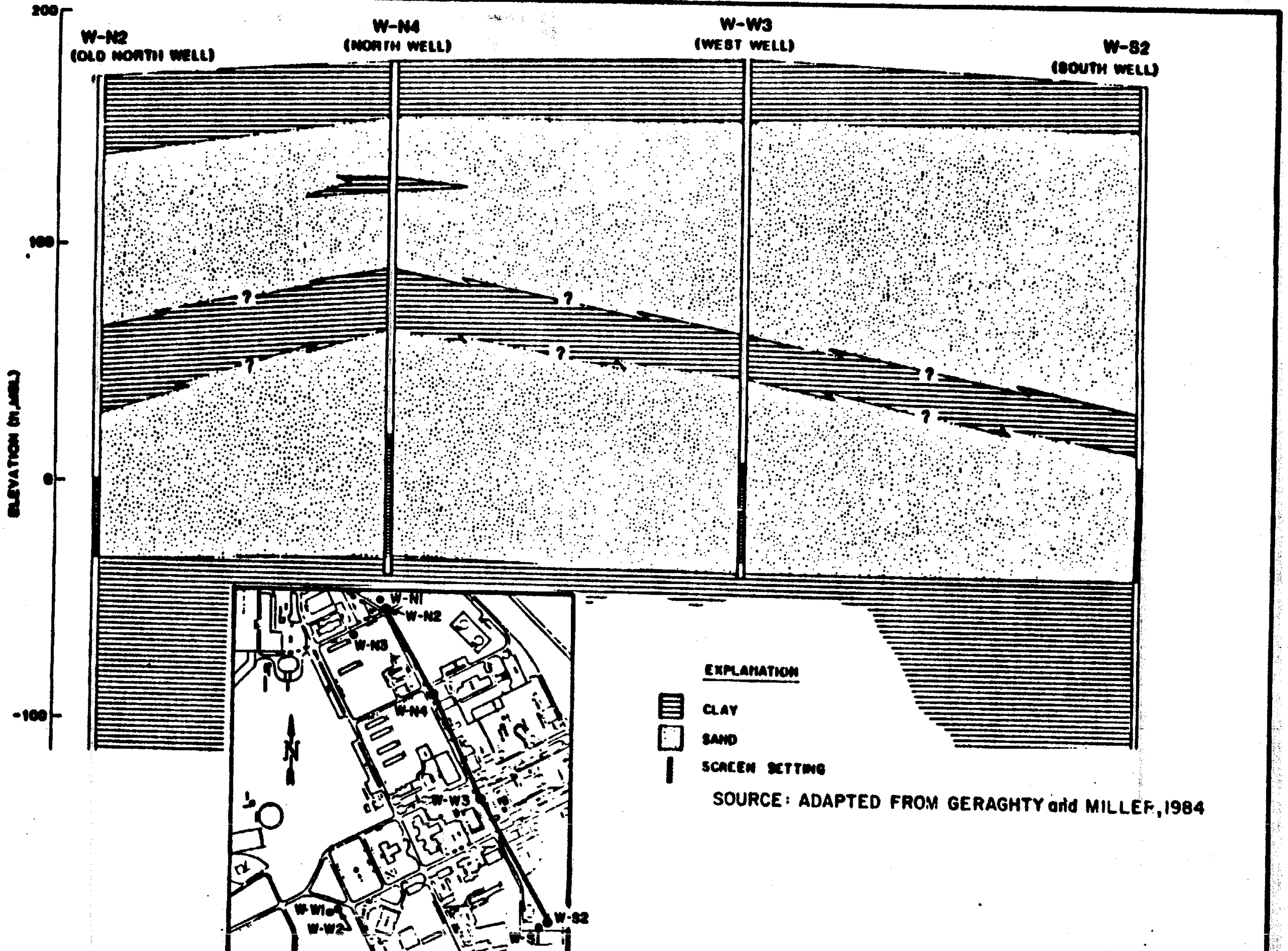



FIGURE 4-4

**Geologic Cross-Section**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

marine terrace from the Citronelle sand and gravel. Together, the terrace deposits and Citronelle range in thickness from about 30 feet at the southern border of Santa Rosa County to about 790 feet in northwestern Escambia County.

The Citronelle consists principally of quartz sand which contains numerous lenses, beds, and stringers of clay and gravel, and the lithology changes abruptly. The sand is typically light, yellowish-brown to reddish-brown, although some is white or light-gray. The grains are mostly angular to sub-angular and very poorly sorted, ranging from very fine to very coarse. Muscovite is abundant throughout. In places, the sand grades into gravel composed of quartz and chert pebbles up to an inch in diameter. A few pebbles of silicified, oolitic limestone were noted in samples from the northern part of the area. Elsewhere the sand grades into siltstone and clay. The siltstone is light-gray to light-yellow and in places contains abundant carbonized plant remains. The clay occurs in lenses as much as 60 feet thick and is chiefly white or gray, although some is lavender, yellow or brown. Fragments of carbonized wood are common in the gray clay. Although it is difficult to ascertain the horizontal extent of the clay beds within Citronelle, they probably range from a few feet to two or three miles in length.

A distinctive rock type that occurs in the Cintronelle Formation throughout western Florida is a limonite-cemented sandstone called "hardpan." This rock, formed by cementation of sand with iron oxides probably precipitated from groundwater, is dark, rusty-brown and is generally extremely hard, although some may be relatively soft. The "hardpan" most commonly occurs as layers that parallel the enclosing sediments. These layers range from a fraction of an inch to three to four feet in thickness. In places, the "hardpan" is filled with peculiar curving tubular structures of uncertain origin, from a fraction of an inch to several inches in diameter. These tubular structures parallel the bedding and are filled with some loose sand that enclosed the "hardpan" layers. Little is known concerning the lateral extent of these hardpan layers, but it is unlikely that any given layer extends for more than a few thousand yards.

4.5.3.1.2 The Miocene Coarse Clastics are present everywhere in the western Panhandle except in an area between central Escambia County and southwestern Santa Rosa County, where the Citronelle Formation lies unconformably upon the upper member of the Pensacola Clay, and in an area east of Fort Walton Beach, Florida, where the Citronelle lies unconformably upon the lower member of the Pensacola Clay. The thickness of the Miocene Coarse Clastics is variable, generally ranging from about 70 feet in north-central Escambia County to as much as 500 feet in west-central Santa Rosa County. The Miocene Coarse Clastics consists chiefly of light-brown to light-gray, poorly sorted, fine to very coarse sand and granules and small pebbles of quartz. Muscovite is abundant throughout, and at several places in both the northern and southern parts of the area, the sand contains abundant fragments of carbonized wood. Light to dark-gray, carbonaceous clay and siltstone that are somewhat calcareous occur throughout the unit as lenses up to 180 feet thick. In northeastern Santa Rosa County, about 60 feet of pea-sized gravel is present near the top of the coarse clastics. The most distinctive feature of the Miocene Coarse Clastics is the numerous shell beds that occur throughout. These beds consist mostly of minute mollusks that commonly make up to 50 percent of some well samples.

4.5.3.1.3 The Pensacola clay underlies the area at depths ranging from 135 feet below sea level in central Santa Rosa County to 1,000 feet below sea level in the southwest corner of Escambia County. The total thickness of the formation ranges from 380 feet in the area four miles northwest of Pensacola to more than 1,000 feet at Mobile Bay. The upper member, which is not present in the Whiting Field area, ranges in thickness from 240 feet about ten miles east of Pensacola to 680 feet two miles southwest of Pensacola. The lower member ranges in thickness from 150 feet at the eastern edge of Santa Rosa County on Santa Rosa Island to 330 feet at Fort Walton Beach, Florida. The Escambia Sand Member thickens southwestward from a minimum of 20 feet about six miles north of the mouth of the Escambia River to a maximum of 160 feet in the area 4.5 miles west of the mouth of Perdido River.

The upper and lower members of the Pensacola Clay consists of tough, dark to light-gray clay, but at a few localities it is brownish-gray. The clay is typically silty and contains variable amounts of very fine to very coarse quartz sand. Bits of carbonized wood and plant remains, such as leaves and reeds, are present throughout the formation. The clay is micaceous and slightly calcareous with some pyrite present. Locally, the formation grades into a clayey siltstone. Mollusk shells and foraminifers are abundant through the Pensacola Clay. The former are especially abundant in the upper part of the upper member in west-central and southern Escambia County, where thick beds consisting almost entirely of shells are found near the top of the upper member.

The Escambia Sand Member consists predominantly of light-gray to brownish-gray, fine-to-coarse sand and quartz granules in the lower part and pea-size gravel in the upper part. In southern Santa Rosa County, the Escambia Sand Member contains some carbonaceous material and abundance of black grains, possibly phosphate, in the lower five feet.

4.5.3.1.4 The Tampa Formation, removed by erosion in the northern parts of Santa Rosa and Escambia counties, reaches its maximum thickness of about 270 feet in southern Escambia County. The formation is hard, light-gray to grayish-white, although in places it contains several beds of clay, especially in the upper part.

4.5.3.1.5 The Chickasawhay Limestone underlies all of Escambia and Santa Rosa counties, thickening gulfward from 30 to 40 feet along the northern border of the area to as much as 130 feet along the margin of the gulf. The formation consists of gray to light-gray, hard, highly porous or vesicular limestone and dolomitic limestone; interbedded with light brown, hard, vesicular to compact dolomitic limestone; or dolomite that has a distinctive sugary texture. Fragments of the Chickasawhay Limestone have a knobby, rough surface that gives the impression of a microcoquina of obscure fossil fragments, although few can actually be distinquished as such.

4.5.3.1.6 The Bucatunna clay member of the Byram Formation underlies the entire western Panhandle of Florida and, in Santa Rosa and Escambia counties occurs at depths below sea level ranging from about 200 feet in northeastern Santa Rosa County to about 1,760 feet in southern Escambia County. Its thickness ranges from 45 feet in northeastern Santa Rosa County to 215 feet in southwestern Santa Rosa County. The Bucatunna generally thickens toward the Gulf of Mexico. In western Florida, the Bucatunna consists of fossilferous, calcareous clay, dark lignitic clay, laminated fine sand and clay, and laminated argillaceous fine sand with some beds of coarser sand.

4.5.3.1.7 The Ocala Group underlies the western Florida Panhandle at depths ranging from 290 feet below sea level in the northeast corner of Santa Rosa County to 1,940 feet below sea level at the southern end of Escambia County. the Ocala thickness ranges from 90 feet just east of Pensacola to 235 feet in northeastern Santa Rosa County. In western-most Florida, the Ocala is typically a light-gray or grayish-cream limestone near the upper contact, changing downward to chalky white limestone. Locally, all limestone in the Ocala may be white. The Ocala Group consists mostly of large foraminifers and other fossils. Commonly, the limestone is somewhat glauconitic, with local replacement of fossils by glauconite in a few places.

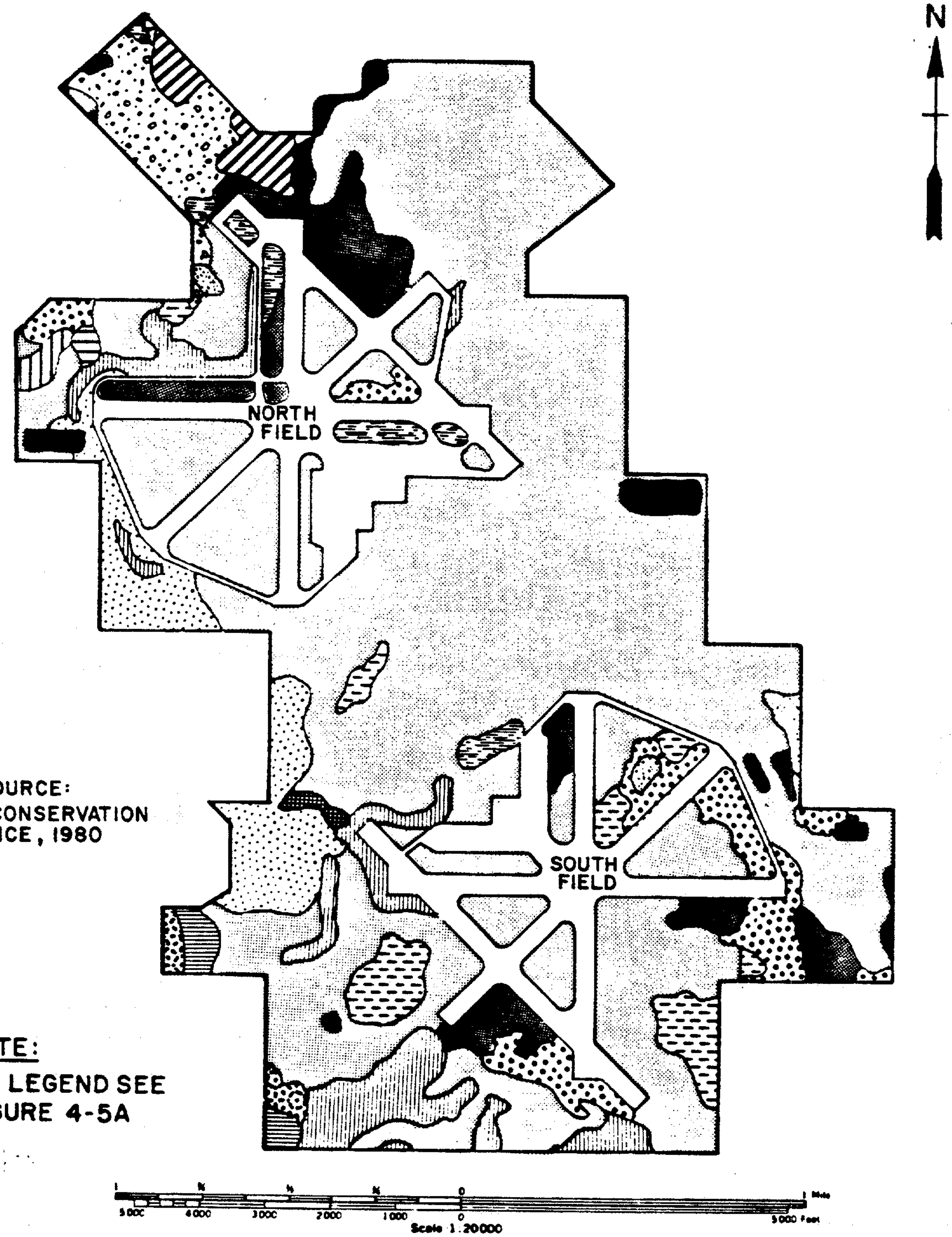
4.5.3.1.8 The Lisbon Equivalent underlies Santa Rosa and Escambia counties at depths ranging from 510 feet below sea level in the northeast corner of the area, to 2,090 feet in the southwest corner of the area. The formation ranges in thickness from 345 feet in northern Escambia County to 600 feet in east-central Santa Rosa County. The Lisbon Equivalent consists chiefly of shaley limestone whose color ranges from dark-gray to brownish-gray to very light-grayish cream. The rock is more massive and compact than the overlying Ocala Group and breaks into hard, blocky fragments speckled with glauconite. The Lisbon Equivalent contains a number of shale zones. The material making up the shaley zones ranges from a silty shale to shaley siltstone which is generally hard, light-grayish tan to light-gray, calcareous and glauconitic. The Lisbon Equivalent also contains some gray clay, and, in southern Escambia County, a concentration of glauconite and/or phosphate occurs at the base of the unit.

4.5.4 Soils. The general soils at NAS Whiting Field are sandy with a loamy subsoil and belong to the Troup-Dothan-Bonifay map unit (SOUTHNAVFACENGCOM, 1983). They are characterized as gently sloping to strongly sloping, well drained soils. This map unit covers about 27 percent of Santa Rosa County and consists of 53 percent Troup soils, 15 percent Dothan soils, 12 percent Bonifay soils and 20 percent soils of minor extent (Soil Conservation Service, 1980).

A detailed soils map of NAS Whiting Field is provided in Figure 4-5. A description of the various soil types identified in the soils map follows (Soil Conservation Service, 1980).

4.5.4.1 Bibb-Kinston Association. These poorly drained, nearly level soils are in drainageways and on flood plains along streams. Slopes range from zero to two percent. The areas are interspersed with depressions, old stream channels, and meandering sloughs. Bibb and Kinston soils occur in a regular and repeating pattern. The Bibb soil is near the stream edge, and the Kinston soil is in the wider areas generally back from the stream edge. This association is about 50 percent Bibb soil, 25 percent Kinston soil, and 25 percent minor soils.

Typically, the Bibb soil has a surface layer of very dark gray silt loam about six inches thick. The subsurface layer is dark dray silt loam about 11 inches thick. The underlying material extends to a depth of 65 inches; the upper 25 inches is gray silt loam that has yellowish-brown mottles, the next 18 inches is light brownish-gray fine sand that has a few thin streaks of silt loam and loamy fine sand, and the lower 25 inches is light brownish-gray fine sand that has light gray and light yellowish-brown mottles. The water




SOURCE:
SOIL CONSERVATION
SERVICE, 1980

NOTE:
FOR LEGEND SEE
FIGURE 4-5A

FIGURE 4-5

**Soils Map**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

| Description | Permeability (inch/hour) (Surface Layer) |
|---|---|
| Bibb-Kinston Association | 6-2 |
| Bonifay loamy sand, 0 to 5 % slopes | 6-20 |
| Dothan find sand loam, 0 to 2% slopes | 2-6 |
| Dothan find sandy loam, 2 to 5% slopes | 2-6 |
| Fuquay loamy sand, 0 to 5% slopes | 6 |
| Gullied land | — |
| Lakeland sand, 0 to 5% slopes | 20 |
| Lakeland sand, 5 to 15% slopes | 20 |
| Lucy loamy sand, 0 to 5% slopes | 6-20 |
| Orangeburg sandy loam, 0 to 2% slopes | 2-6 |
| Pits | — |
| Red Bay sand loam, 0 to 2% slopes | 2-6 |
| Tifton sandy loam, 2 to 5% slopes | 6-20 |
| Troup loamy sand, 0 to 5% slopes | 6-20 |
| Troup loamy sand, 5 to 8% slopes | 6-20 |
| Troup loamy sand, 8 to 12% slopes | 6-20 |
| Troup-Orangeburg-Cowarts complex, 5 to 12% slopes | Troup: 6-20<br>Orangeburg and Cowarts: 2-6 |
| Urban land | — |

Source: Soil Conservation Service, 1980

FIGURE 4-5A

**Legend, Soils Map**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

table is at a depth of less than ten inches for six months or more during most years. This soil is also subject to frequent flooding. Permeability is moderate, and available water capacity is medium.

Typically, the Kinston soil has a surface layer of very dark gray silt loam about nine inches thick. The subsoil is 41 inches thick; the upper nine inches is dark gray silt loam that has very dark gray and gray mottles, the next 23 inches is gray sandy clay loam that has dark gray and brownish-yellow mottles, and the lower nine inches is light brownish-gray sand clay loam that has gray mottles. The underlying material extends to a depth of 65 inches; the upper ten inches is dark gray sand with pockets of sandy loam and loamy sand, and the lower five inches is brown sand. The water table is at a depth of less than ten inches for six months or more during most years. This soil is subject to frequent flooding. Permeability is moderate, and available water capacity is medium to high.

The most common minor soils are Escambia, Johns, Pactolus, Pamlico and Rutlege soils. Most of these soils are poorly drained to very poorly drained and are in small ares through the association. In a few of the higher areas on low knolls and along the edge of mapped areas, the soils are moderately well drained to somewhat poorly drained; these are the least expensive of the minor soils mapped in this association. Also included in mapping are small areas of soils that are similar to Bibb and Kinston soils but in which the subsoil is not as gray.

4.5.4.2 Bonifay Loamy Sand, Zero to Five Percent Slopes. This well drained, nearly level to gently sloping soil is on broad and narrow ridgetops in the uplands. Slopes are smooth to concave.

Typically, the surface layer is very dark grayish-brown loamy sand about four inches thick. The subsurface layer is loamy sand; the upper two inches is dark grayish-brown, the next 24 inches is yellowish-brown, and the lower 17 inches is brownish-yellow with strong brown and very pale brown mottles. The upper four inches of the subsoil is yellowish-brown sandy loam with strong brown, yellowish-red, and brownish-yellow mottles; and the lower 12 inches is mottled yellowish-brown, very pale brown, strong brown, yellowish-red, and red sandy loam or sandy clay loam. Common plinthite nodules make up 5 to 20 percent, by volume, of the subsoil.

Included with this soil in mapping are small areas of Albany, Fuquay, Lakeland, Pactolus and Troup soils. Also included are a few small areas of soils that are similar to Bonifay soils but that contain less than five percent plinthite nodules above a depth of 60 inches or that have a sand and loamy find sand surface layer. Also included are small areas where the slope is five to eight percent. Inclusions make up less than 15 percent of any mapped area.

In this Bonifay soil, the water table is normally at a depth of more than six feet. However, water is perched above the plinthite layer for one to five days after heavy rainfall. Available water capacity is low in the upper 40 inches and moderate in the subsoil. Permeability is rapid in the surface layer and moderate in the plinthic subsoil. Natural fertility and organic matter content are low throughout. Runoff is slow, and the erosion hazard is slight.

4.5.4.3 Dothan Find Sandy Loam, Zero to Two Percent Slopes. This well drained, nearly level soil is on broad and narrow ridgetops in the uplands. Slopes are smooth to concave.

Typically, the surface layer is fine sandy loam about nine inches thick; the upper five inches is dark grayish-brown, and the lower four inches is yellowish-brown. The upper four inches of the subsoil is yellowish-brown fine sandy loam; the next 30 inches is yellowish-brown sandy clay loam; and the lower 20 inches is yellowish-brown sandy clay loam or sandy clay with strong brown, red, brownish-yellow, dark red, and very pale brown mottles. Common plinthite nodules make up more than 5 percent, by volume, of the lower part of the subsoil.

Included with this soil in mapping are small areas of Orangeburg and Fuquay soils. Also included are areas of soils that are similar to Dothan soils but that have a surface layer of loamy sand or loamy fine sand, a few areas where the slope is two to five percent, and a few small wet areas that are shown by a wet spot symbol. Also included are some areas of soils that are similar to Dothan soils but that contain less than five percent plinthite in the lower part of the subsoil. Inclusions make up less than 15 percent of any mapped area.

In this Dothan soil, the water table is normally below a depth of six feet. After heavy rainfall, the water table is perched at a depth of 42 to 48 inches for one or two weeks. Available water capacity is medium. Natural fertility and organic matter content are low. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. Surface runoff is slow and the erosion hazard is slight.

4.5.4.4 Dothan Fine Sandy Loam, Two to Five Percent Slopes. This well drained, gently sloping soil is on broad and narrow ridgetops in the uplands. Slopes are smooth to concave.

Typically, the surface layer is dark grayish-brown fine sandy loam about 6 inches thick. The subsurface layer, where present, is brown or yellowish-brown fine sandy loam about six inches thick. The subsoil is at a depth of less than 20 inches. The upper eight inches of the subsoil is yellowish-brown fine sandy loam; the next 16 inches is yellowish-brown sandy clay loam; the next 13 inches is brownish-yellow sandy clay loam with common strong brown and red mottles; and the lower 17 inches is mottled yellow, brown and red sandy clay loam or sandy clay. Common plinthite nodules make up more than five percent, by volume, of the lower part of subsoil.

Included with this soil in mapping are small areas of Esto, Fuquay and Orangeburg soils. Also included are small areas where slopes are zero to two percent and five to eight percent, a few small wet areas that are shown by a wet spot symbol, a few small areas of eroded soils, and areas of soils that are similar to Dothan soils but that have a surface layer of loamy sand or loamy fine sand. In some areas, primarily in the northeast part of the county in the Blackwater State Forest, there are soils similar to Dothan soils but that contain less than five percent plinthite above a depth of 60 inches and more than 20 percent silt in the upper 20 inches of the subsoil. Also included are a few areas of poorly drained soils in and along small stream bottom lands and drainageways. Inclusions make up less than 17 percent of any mapped areas.

In this Dothan soil, the water table is normally above a depth of six feet. After heavy rainfall, the water table is perched at a depth of 42 to 48 inches for one to two weeks. Available water capacity is medium. Natural fertility and organic matter content are low. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. Runoff is moderate on unprotected areas and the erosion hazard is moderate.

4.5.4.5 Fuquay Loamy Sand, Zero to Five Percent Slopes. This well drained, nearly level to gently sloping soil is primarily on broad and narrow ridgetops in the uplands. Slopes are smooth to concave.

Typically, the surface layer is dark grayish-brown loamy sand about four inches thick. The subsurface layer is brown loamy sand in the upper three inches and yellowish brown loamy sand in the lower 19 inches. The upper 17 inches of the subsoil is yellowish-brown sandy loam with strong brown mottles in the lower part; the next 16 inches is brownish mottles; and the lower 21 inches is sandy loam mottled in shades of brown, yellow, gray and red. The lower part of the subsoil contains more than five percent plinthite nodules above a depth of 60 inches.

Included with this soil in mapping are small areas of Albany, Bonifay, Dothan, Lakeland, Lucy and Troup soils. Also included are a few small areas of soils that are similar to Fuquay soils but that contain less than five percent plinthite nodules above a depth of 60 inches or that have a sand and loamy fine sand surface layer. Also included are small areas where slopes are five to eight percent. Inclusions make up less than 15 percent of any mapped area.

In this Fuquay soil, the water table is normally at a depth of more than six feet. However, water is briefly perched above the plinthic layer during wet periods. Permeability is rapid in the surface layer, moderate in the upper part of the subsoil, and slow in the lower part of the horizon that contains plinthite. Available water capacity is low in the sandy layers and moderated in the subsoil. Runoff is slow and the erosion hazard is slight.

4.5.4.6 Gullied Land. Gullied land consists of areas where the soil has been removed by water, resulting in an intricate network of V-shaped or U-shaped channels. Only small patches of narrow strips of soil remain between the gullies. Most of the surface layer has been removed from most of these areas. Gullied land is mainly in the northern part of the county. In most areas, slopes are steeper than five percent.

Included in mapping are a few areas between the large gullies where the soils still have part of the original surface layer. The soils between the gullies are the same as the surrounding soils.

The gullies have cut into soils that range from sandy to clayey. The exposed materials are equally varied in texture. Most of the gullies are more than five feet deep and have steep sides. In many areas erosion is still active, but a few of these gullied areas are stabilized. Runoff is rapid and the erosion hazard is severe.

4.5.4.7 Lakeland Sand, Zero to Five Percent Slopes. The excessively drained, nearly level to gently sloping soil is primarily on broad ridgetops in the uplands.

Typically, the surface layer is dark grayish-brown sand about four inches thick. The underlying layers are sand to a depth of more than 83 inches. The upper 28 inches is yellowish-brown with dark grayish-brown streaks in the upper four inches; the next 30 inches is yellowish-brown with very pale brown mottles; and the lower 21 inches is very pale brown with yellowish-brown and brownish yellow mottles.

Included with this soil in mapping are small areas of Bonifay, Ortega, Pacolus, and Troup soils. Also included are small areas where slopes are five to eight percent and small areas of wetter soils that are shown on the soil map by a wet spot symbol. Inclusions make up about 15 percent of any mapped area.

4.5.4.8 Lakeland Sand, 5 to 12 Percent Slopes. The excessively drained, sloping to strongly sloping soil is primarily on upland hillsides leading to drainageways and around depressions. Slopes are smooth to concave.

Typically, the surface layer is dark grayish-brown sand about three inches thick. The underlying layers are sand to a depth of more than 80 inches. The upper 31 inches is yellowish-brown; the next 23 inches is brownish-yellow with splotches of very pale brown; the next 19 inches is yellowish brown with splotches of very pale brown; and the lower four inches is yellow with splotches of very pale browns.

Included with this soil in mapping are small areas of Albany, Bonifay, Fuquay, Lucy, Pactolus and Troup soils. Also included are small areas of poorly drained soils in and along narrow stream bottoms and drainageways, a few areas where slopes are 12 to 30 percent, and a few shallow and deep gullies. Inclusions make up less than 17 percent of any mapped area.

In this Lakeland soil, the water table is at a depth of more than 72 inches. Available water capacity is low or very low. Organic matter content and natural fertility are very low. Permeability is very rapid. Runoff is slow to medium. The erosion hazard is moderate where the soil is not protected.

4.5.4.9 Lucy Loam Sand, Zero to Five Percent Slopes. This well drained, nearly level to gently sloping soil is primarily on broad ridgetops in the uplands. Slopes are smooth to concave.

Typically, the surface layer is very dark grayish-brown loamy sand about ten inches thick. The subsurface layer is brown loamy sand about eight inches thick. Below this is a layer of yellowish red loamy sand about eight inches thick. The upper eight inches of the subsoil is yellowish red sandy loam, the next seven inches is red sandy loam, and the lower 39 inches is red sandy clay loam.

Included with this soil in mapping are small areas of Dothan, Fuquay, Orangeburg, Red Bay, and Troup soils. Also included are a few areas of soils similar to Lucy soils but that have a sand and loamy fine sand surface layer or darker red colors in the lower part of the subsoil. Also included are small areas where slopes are five to eight percent. Inclusions make up about 15 percent of any mapped area.

In this Lucy soil, the water table is at a depth of more than six feet. Natural fertility and organic matter content are low. Available water capacity is low in the sandy layers and medium in the subsoil. Permeability is rapid in the sandy layers and moderate in the subsoil. Runoff is slow and the erosion hazard is slight.

4.5.4.10 Orangeburg Sandy Loam, Zero to Two Percent Slopes. This well drained, nearly level soil is on broad and narrow ridgetops in the uplands. Slopes are smooth to concave.

Typically, the surface layer is brown sandy loam about eight inches thick. The upper six inches of the subsoil is brown sandy loam, the next 11 inches is red sandy clay loam, and the lower 48 inches is dark red sandy clay loam with strong brown mottles in the lower part.

Included with this soil in mapping are small areas of Dothan, Fuquay, Lucy and Red Bay soils. Also included are a few areas where slopes are two to five percent and a few small wet spots that are shown by a drainage symbol. Also included are a few areas of soils that are similar to Orangeburg soils but that have a loamy sand and loamy fine sand surface layer. Inclusions make up less than 15 percent of any mapped area.

In this Orangeburg soil the water table is at a depth of more than six feet. Available water capacity is medium. Natural fertility and organic matter content are low. Permeability is moderately rapid in the surface layer and moderate in the subsoil. Runoff is slow and the erosion hazard is slight.

4.5.4.11 Pits. Pits are open excavations from which sandy and loamy material has been removed, primarily for use in the construction and repair of roads and as fill material for foundations. Areas of pits are throughout the county. The excavations range from four feet to more than 12 feet in depth.

In some areas, mixtures of sand, sandy loam, sandy clay loam and clayey material are piled or scattered around the edges of the pits. This material has been mixed to the extent that identification of individual soils is not possible.

Most areas are almost barren. Some of the pits have been abandoned, but many are still being used. Pits have little or no value for farming or forestry. Therefore, no interpretations, limitations, or ratings of potential are given.

4.5.4.12 Red Bay Sandy Loam, Zero to Two Percent Slopes. This well drained, nearly level soil is in broad areas in the uplands. Slopes are smooth to concave.

Typically, the surface layer is dark reddish-brown sandy loam about eight inches thick. The upper part of the subsoil is dark reddish-brown sandy clay loam about six inches thick, and the lower part is dark red sandy clay loam to a depth of more than 60 inches.

Included with this soil in mapping are small areas of Dothan, Lucy and Orangeburg soils. Also included are a few areas where slopes are two to five percent and a few small wet spots in drainageways. Also included are a few areas of soils that are similar to Red Bay soils but that have a loamy sand surface layer or that are sandy clay in the lower part of the subsoil. Inclusions make up less thn 15 percent of any mapped area.

In this Red Bay soil, the water table is at a depth of more than six feet. Available water capacity is medium. Natural fertility and organic matter content are moderately low. Permeability is moderately rapid in the surface layer and moderate in the subsoil. Surface runoff is slow, and the erosion hazard is slight. The soil has a well aerated root zone and is loamy enough to have good tilth.

4.5.4.13 Tifton Sandy Loam, Two to Five Percent Slopes. This well drained, gently sloping soil is on broad and narrow ridgetops in the uplands. Slopes are smooth to concave.

Typically, the surface layer is dark grayish-brown sandy loam about nine inches thick. The upper five inches of the subsoil is yellowish brown sandy loam; the next seven inches is yellowish-brown sandy clay loam; the next 12 inches is yellowish-brown sandy clay loam with few strong brown mottles; and the lower 37 inches is sand clay loam mottled in shades of yellow, brown and red. Iron concretions are common in the upper 60 inches. Common plinthite nodules make up about ten percent, by volume, of the lower part of the subsoil.

Included with this soil in mapping are small areas of Dothan, Esto, Fuquay and Orangeburg soils. Also included are a few small areas where slopes are zero to two percent, some areas of eroded soils, and a few small wet spots. Also included are a few areas of soils that are similar to Tifton soils but that have a loamy sand surface layer or have plinthite at a depth of less than 30 inches. Inclusions make up less than 15 percent of any mapped area.

In this Tifton soil, the water table is at a depth of more than six feet. Available water capacity is medium. Permeability is moderate in the subsoil. Natural fertility and organic matter content are low. Runoff is moderate to rapid where the soil is not protected, and the erosion hazard is moderate.

4.5.4.14 Troup Loamy Sand, Zero to Five Percent Slopes. This well drained, nearly level to gently sloping soil is primarily on broad ridgetops in the uplands. Slopes are smooth to concave.

Typically, the surface layer is very dark grayish-brown loamy sand about three inches thick. The upper 18 inches of the subsurface layer is dark yellowish-brown loamy sand, the next 18 inches is strong brown loamy sand, and the lower 16 inches is stong brown loamy sand. The subsoil is yellowish red sandy loam in the upper five inches and red sandy loam to a depth of more than 80 inches.

Included with this soil in mapping are small areas of Bonifay, Fuquay, Lakeland, Lucy and Orangeburg soils. Also included are a few small areas of similar soils on NAS Whiting Field, which have been filled or smoothed or have been stripped to a depth of one to three feet. Inclusions make up less than 15 percent of any mapped area.

In this Troup soil the water table is at a depth of more than six feet. Available water capacity is low in the surface and subsurface layers and medium in the subsoil. Natural fertility and organic matter content are low. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Runoff is slow and the erosion hazard is slight.

4.5.4.15 Troup Loamy Sand, Five to Eight Percent Slopes. This well drained, sloping soil is on side slopes in the uplands. Slopes are smooth to concave.

Typically, the surface layer is dark grayish-brown loamy sand about four inches thick. The upper 50 inches of the subsurface layer is yellowish-brown loamy sand and the lower six inches is strong brown loamy sand. The subsoil is yellowish-red sandy loam in the upper six inches and red sandy clay loam to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Bonifay, Fuquay, Lakeland, Lucy and Orangeburg soils. Also included are areas where slopes are less than five percent or 8 to 12 percent, a few shallow and deep gullies, and many areas of soils that are similar to Troup soils but that have a sand surface layer. Also included are areas of poorly drained soils in and along narrow stream bottom lands and drainageways that are too small to delineate. Inclusions make up less than 15 percent of any mapped area.

In this Troup soil the water table is at a depth of more than six feet. Available water capacity is low in the surface and subsurface layers and medium in the subsoil. Natural fertility and organic matter content are low. Permeability is rapid in the surface and subsurface layers are moderate in the subsoil. Runoff is slow and the erosion hazard is slight.

4.5.4.16 Troup Loamy Sand, 8 to 12 Percent Slopes. This well drained, strongly sloping soil is on side slopes in the uplands. Slopes are smooth to concave.

Typically, the surface layer is dark grayish-brown loamy sand about three inches thick. The subsurface layer is loamy sand about 65 inches thick; it is yellowish-brown in the upper 43 inches and strong brown in the lower 22 inches. The subsoil is yellowish-red sandy loam or sandy clay loam in the upper five inches and red sandy loam or sandy clayloam to a depth of 80 inches or more.

Included with this soil in mapping are small areas of Bonifay, Fuquay, Lakeland, Lucy and Orangeburg soils. Also included are areas where slopes are five to eight percent or more than 12 percent, many deep and shallow gullies, and many areas of soils that are similar to Troup soils but that have a sand surface layer. Also included are areas of poorly drained soils in and along narrow stream bottom lands and drainageways that are too small to delineate. Inclusions make up less than 17 percent of any mapped area.

In this Troup soil the water table is at a depth of more than six feet. Available water capacity is low in the surface and subsurface layers and medium in the subsoil. Natural fertility and organic matter content are low. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. The erosion hazard is moderate where the soil is not protected.

4.5.4.17 Troup-Orangeburg-Cowarts Complex, 5 to 12 Percent Slopes. This complex consists of sloping to strongly sloping, well drained soils on side slopes. Slopes are smooth to concave. The areas of the individual soils are so intermixed they could not be separated in mapping. The complex is 30 to 45 percent Troup loamy sand, 15 to 25 percent Orangeburg sandy loam, 10 to 20 percent Cowarts loamy fine sand, and 10 to 45 percent minor soils.

The Troup soil has slopes of 5 to 12 percent. Typically, the surface layer is yellowish-brown loamy sand about two inches thick. The subsurface layer is loamy sand 50 inches thick; the upper 19 inches is brownish-yellow, the next 20 inches is yellowish-red, and the lower 11 inches is red. The subsoil is red sandy loam and extends to a depth of 80 inches or more.

The Troup soil has slow runoff, and the erosion hazard is moderate in unprotected areas. Natural fertility and organic matter content are low. Permeability is rapid above a depth of 52 inches and moderate below this depth. Available water capacity is low in the surface and subsurface layer and medium in the subsoil. The water table is below a depth of 72 inches.

The Orangeburg soil has slopes of 5 to 12 percent. Typically, the surface layer is dark brown sandy loam about six inches thick. The subsoil is sandy clay loam, and extends to a depth of more than 80 inches; the upper 49 inches is red, and the lower 25 inches is mottled brown, red, yellow and gray. This soil has rapid to very rapid runoff in unprotected areas, and the erosion hazard is severe to very severe. Natural fertility and organic matter content are low. Permeability is moderately rapid above a depth of 6 inches and moderate below this depth. Available water capacity is medium. The water table is below a depth of 72 inches throughout the year.

The Cowarts soil is mainly where slopes are 8 to 12 percent. Typically, the surface layer is loamy fine sand about six inches thick. The upper three inches is dark brown. The upper three inches of the subsoil is yellowish-brown fine sandy loam, and the lower 14 inches is strong brown sandy clay loam. Below a depth of 23 inches is mottled sandy clay loam with pockets of coarser and finer textured material.

The Cowarts soil has rapid to very rapid runoff in unprotected areas, and the erosion hazard is severe to very severe. Natural fertility and organic matter content are low. Permeability is moderately rapid above a depth of nine inches, moderate between depths of 9 to 23 inches, and slow to moderately slow below a depth of 23 inches. Available water capacity is medium. A water table is perched for short periods at a depth of about two to three feet.

Dothan soils make up about ten percent of the map unit; they are mainly where slopes are five to eight percent. Other minor soils are Albany, Esto, Fuquay, Lucy and Lakeland soils. Small, seepy wet spots also occur in a few mapped areas of this complex. Small areas of poorly drained soils in and along narrow stream bottoms and drainageways are shown by drainage symbols. A few areas of soils that have slopes of 12 to 25 percent are included; these ares are relatively small and narrow and occur mainly on the lower part of the mapped areas. These areas are mostly Troup and Lakeland soils and soils similar to Esto and Orangeburg soils. These soils are associated with shallow or deep gullies in many places.

4.5.4.18 Urban Land. Urban land consists of areas that are more than 85 percent covered by streets, parking lots, airports, runways, pavement, and buildings and other structures. This land is so altered or obscured by urban works and structures that identification of soils is not feasible. The original soil in some ares has been modified by grading, filling and shaping. Urban land is mainly nearly level to gently sloping. Slopes range from zero to five percent. In uncovered areas where the soils are identifiable, they are primarily Troup, Lakeland, Fuquay and Lucy soils. These soils are included in mapping because the areas are too small to delineate separately.

Urban land is most likely to remain in its present use. Therefore, no interpretations, limitations or ratings of potential are given for other uses.

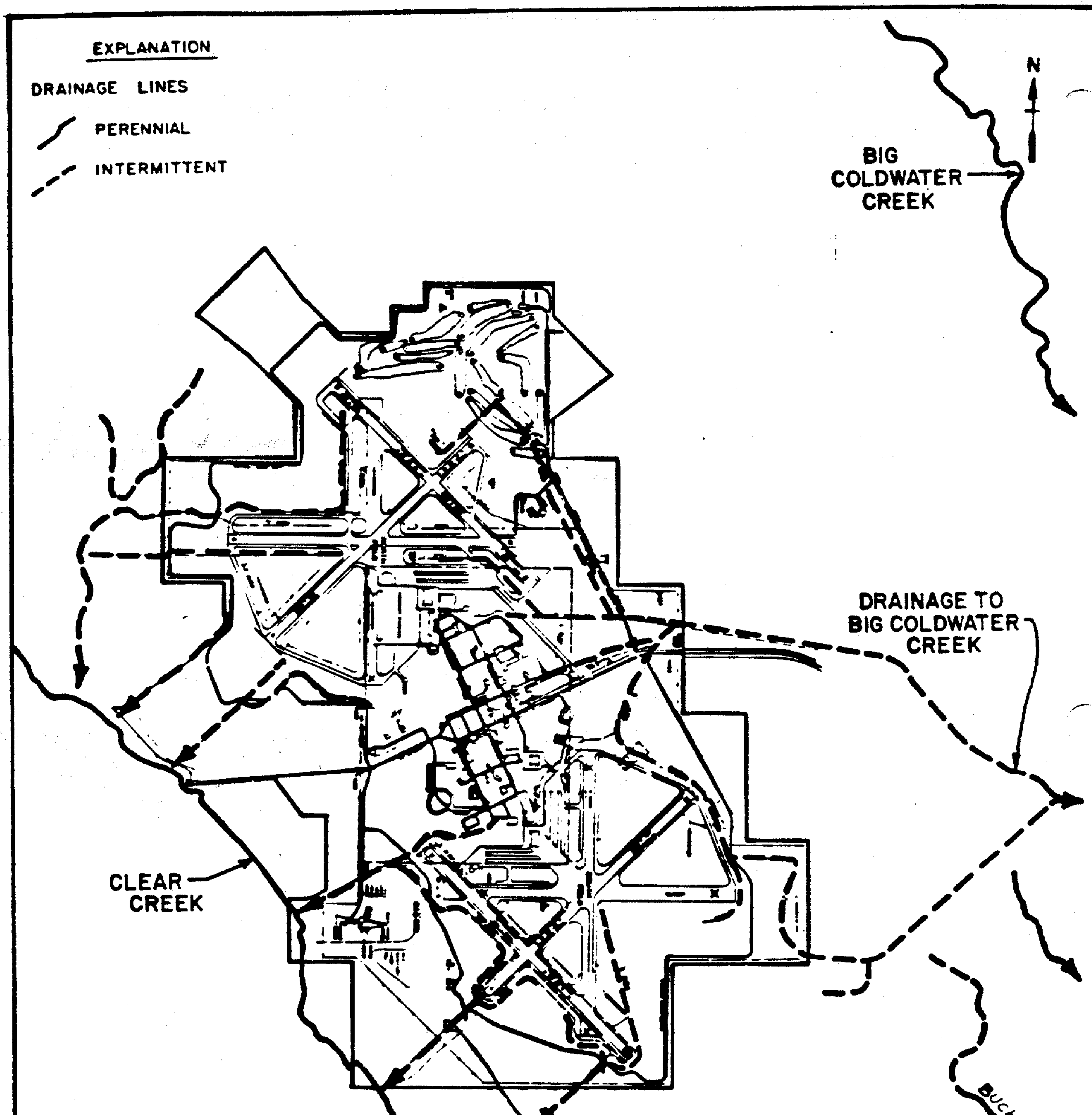
4.5.5 Hydrology.

4.5.5.1 General. NAS Whiting Field is situated on a plateau at an elevation of approximately 150 to 190 feet above sea level. The entire site is above the 100-year flood elevation. Storm sewers and ditches are utilized for air station drainage. This collected surface drainage is then directed off-site via an extensive system of concrete lined and vegetatively lined ditches (see Figure 4-6). The concrete lined ditches are typically large trapezoidal structures with drop structures and water diverters (SOUTHNAVFACENGCOM, 1983). The drainage ditches extend radially from the air station and discharge to nearby Clear Creek to the south and west, and Big Coldwater Creek to the east. There is greater than a 100-foot drop in elevation between the plateau and the receiving waters, which has contributed to severe surface erosion problems at NAS Whiting Field. In many places, the concrete-lined channels have been washed out or undermined, requiring much remedial maintenance (SOUTHNAVFACENGCOM, 1983). Terraces are commonly used in the pervious areas along the periphery of the air station to control erosion.

The air station receiving waters of Clear Creek and Big Coldwater Creek drain south to the Blackwater River. Both creeks are classified by the Florida Department of Environmental Regulation as Class III Water-Recreation, Propogation and Management of Fish and Wildlife. The Blackwater River is classified as an Outstanding Florida Water and is afforded the highest protection by the State. Outstanding waters are considered to be of exceptional recreation and ecological significance. The Blackwater River drains the central portion of Santa Rosa County and drains southward to the tidal East Bay. Water quality conditions of the river have been previously characterized as generally in good health, with localized sedimentation problems and some bacteriological problems at Milton due to the their sewage treatment plant (West Florida Regional Planning Council, 1978). Big Coldwater Creek has an average flow of approximately 542 cubic feet per second (cfs), while the Blackwater River has an average flow of approxiamtely 1,490 cfs (Henningson, Durham and Richardson 1975).

4.5.5.2 Ground Water. There are three major ground water aquifers within the region. The first is a shallow aquifer which is both artesian and non-artesian (sand and gravel aquifer) and the two others are deep artesian aquifers (upper Floridan limestone aquifer and lower Floridan limestone aquifer) (City of Milton, 1978).

Virtually all ground water withdrawn in Escambia and Santa Rosa counties comes from the surficial sand and gravel aquifer. Although composed predominantly of poorly-sorted fine to coarse sands, numerous lenses and layers of clay and gravel (as much as 60 feet thick) occur throughout the aquifer (Geraghty and Miller, 1984). These clay lenses are responsible for the occurence of perched water tables and artesian conditions in the aquifer (Geraghty and Miller, 1984). Thus, both artesian and non-artesian ground water conditions can be found within the aquifer (Henningson, Durham and Richardson, 1975). In the Whiting Field area, major clay lenses occur in the uppermost 30 feet of the aquifer and in the depth interval of approximately 110 to 170 feet. These clay lenses appear to be continuous, but may contain




**NOTE:**
EVENTUAL DISCHARGE OF SURFACE DRAINAGE IS TO THE BLACKWATER RIVER

SOURCE: ADAPTED FROM GERAGHTY and MILLER, 1984

**FIGURE 4-6**

**Surface Drainage Patterns**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

permeable zones (Geraghty and Miller, 1984). There have been no detailed investigations or mappings of the ground water levels in the sand and gravel aquifer at Whiting Field and locally perched water table conditions may exist. A true water table and one or more semi-confined potentiometric levels may exist in the sand and gravel aquifer (Wagner, 1982). Thus, ground water conditions in the sand and gravel aquifer are very complex and require site specific study. It has been reported (Geraghty and Miller, 1984) that static water levels in the sand and gravel aquifer at Whiting Field range from 70 feet mean sea level (msl) in the center of the station to about 30 feet msl along Clear and Big Coldwater creeks. This equates to a gradient of approximately 0.003 to 0.008 feet per foot (ft/ft). A perched water table at a site may result in water levels significantly different from those previously mentioned.

The sand and gravel aquifer is recharged by the infiltration of rain water at the surface. Discharge from the aquifer is by seepage into water courses (City of Milton, 1978). On the average, over half the flow in the rivers and creeks in Escambia and Santa Rosa counties is from ground water seepage (Milo, Smith and Associates, 1981). At NAS Whiting Field, ground water movement is primarily lateral through the sand and gravel aquifer, because vertical movement is impeded by underlying clay lenses (Geraghty and Miller, 1984). Shallow ground water normally moves from topographic highs to areas of discharge such as streams. Figure 4-7 shows inferred directions of ground water flow within the sand and gravel aquifer based on surface topography. It does not reflect the influence of the cones of depression that occur around Navy production wells at Whiting Field. In the Whiting Field area, Clear Creek (which lies to the west and south) and Big Coldwater Creek (which lies to the east) serve as the major receiving waters for ground water seepage. Due to the steep ground water gradient at Whiting Field and the low permeability of the confining deposits (Pensacola clay), there is little potential for movement of ground water vertically between the Floridan and the sand and gravel aquifers (Geraghty and Miller, 1984).

Water in the sand and gravel aquifer is characteristically low in hardness and mineral content, and slightly acidic (pH five to six) due to the presence of dissolved carbon dioxide. Areas of high iron concentration are found in the aquifer.

The Floridan aquifer in Escambia and Santa Rosa counties is subdivided into two parts by the Bucatunna clay. The upper limestone Floridan aquifer is separated from the overlying sand and gravel aquifer by the relatively impermeable Pensacola clay. It can be characterized as typically a brown to light gray hard dolomitic limestone or dolomite with a distinctive spongy looking texture and containing abundant shell fragment. The lower member of the Floridan aquifer is a white to grayish cream, soft and chalky limestone. Both Floridan aquifers are recharged by rainfall in Conecuh, Escambia and Monroe counties (Alabama) where the upper limestone outcrop occurs. The general flow direction of both aquifers is to the south and southeast to the Gulf of Mexico (Henningson, Durham and Richardson, 1975).

A contour map of the potentiometric surface of the upper Floridan aquifer is provided in Figure 4-8. The figure indicates that the potentiometric surface of the aquifer in the Whiting Field area is about 50 feet msl with a gradient to the southeast of approximately 0.0002 ft/ft. The potentiometric surface of the lower Floridan aquifer is approximately 130 feet msl and thus, there is potential for the upward movement of water from the lower to the upper

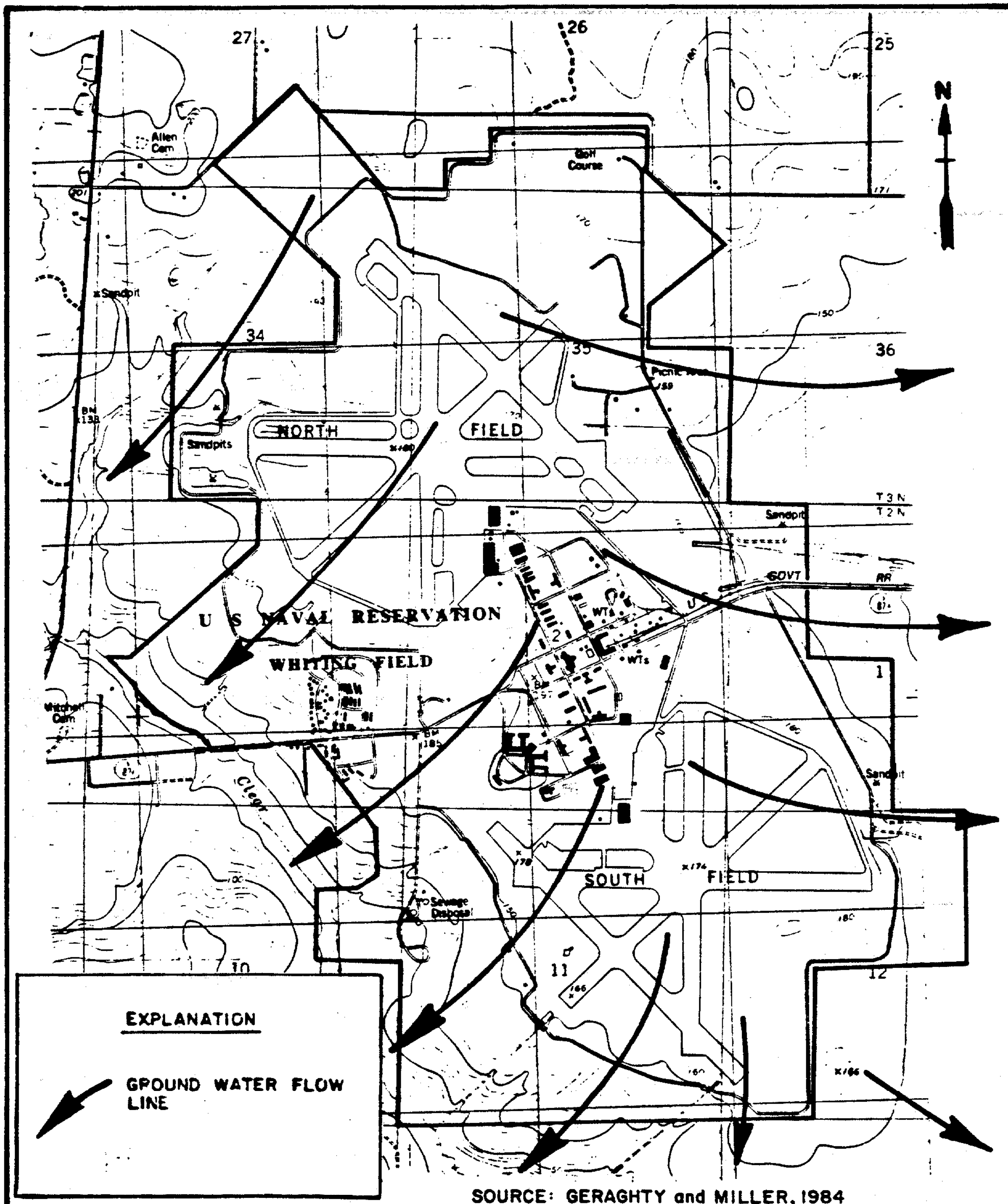



**FIGURE 4-7**

## Directions of Groundwater Movement

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

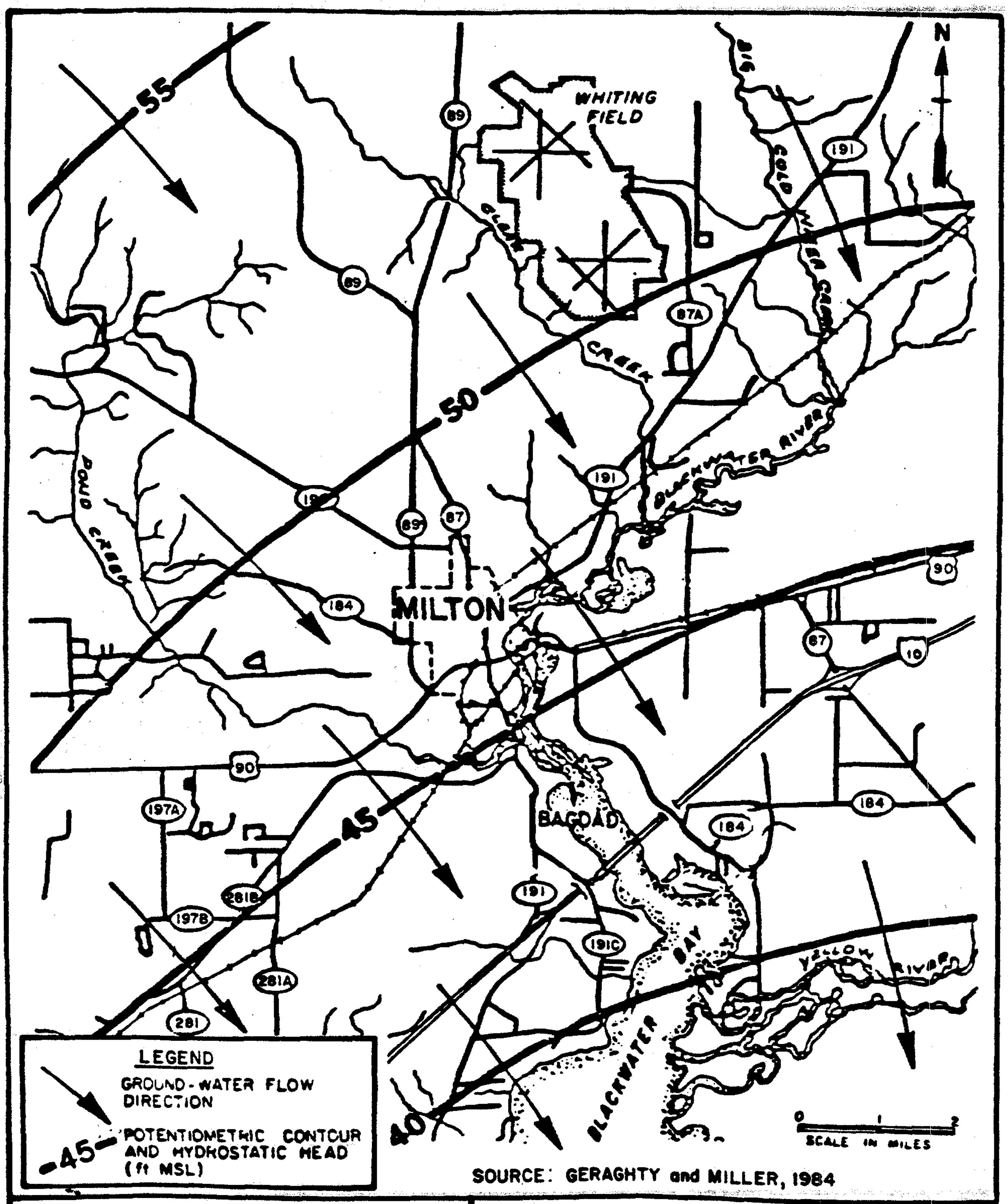



FIGURE 4-8

**Contour Map of Potentiometric Surface**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

Floridan. However, the intervening Bucatunna clay has a low permeability and allows essentially no flow between the two aquifers (Geraghty and Miller, 1984).

The upper Floridan aquifer is an important source of water in areas east of Santa Rosa County. However, toward the west, it is increasingly mineralized and is generally not used as a water supply. In the Whiting Field area, the lower Floridan aquifer is highly mineralized (Geraghty and Miller, 1984).

4.5.5.3 Water Supply. Throughout most of Santa Rosa County, the sand and gravel aquifer is the primary source of potable water supply for both municipal systems and individual, privately-owned wells (City of Milton, 1978).

Essentially, all potable and industrial water supplies in the Whiting Field vicinity are obtained from the sand and gravel aquifer which extends from the surface to an approximate elevation of minus 150 feet msl (Geraghty and Miller, 1984).

Whiting Field currently draws its potable, industrial and irrigation water from three deep wells which tap the sand and gravel (Figure 4-9). These wells are the north well (W-N4), the west well (W-W3) and the south well (W-S2). They have current average pumpage rates of 438, 479 and 474 gallons per minute (gpm) (respectively), and are approximately 218, 215 and 234 feet deep (respectively) (Geraghty and Miller, 1984). The screened interval of all three of these wells is below the two major clay lenses in the sand and gravel aquifer at Whiting Field.

There are other wells on the base used in the past, but due to poor water quality or insufficient capacity, they were abandoned. Table 4-7 presents an inventory of all the wells (both in use and abandoned) at NAS Whiting Field.

The raw water from the wells is pumped to four storage tanks at the Air Station, each having a capacity of 100,000 gallons. The raw water is low in dissolved solids and hardness, and has a pH of 5.5 to 6.0 due to high levels of dissolved carbon dioxide. Treatment consists of chlorination, fluoridation, and the addition of caustic soda and phosphate to increase the pH and reduce water corrosion. There are no back up supplies of potable water at NAS Whiting Field (SOUTHNAVFACENGCOM, 1983).

The City of Milton, located approximately five miles southwest of NAS Whiting Field, uses five wells which tap the sand and gravel aquifer for its potable water. The City's treatment of the raw water consists of chlorination to control bacteria and for stabilization purposes and the addition of lime slurry for pH control. The City's water treatment plant has a capacity of 3.53 million gallons per day (MGD). Three elevated storage tanks, having a combined capacity of 450,000 gallons, are maintained by the City (Milo, Smith and Associates, 1984).

East Milton, located approximately five miles south of NAS Whiting Field, uses two wells which tap the sand and gravel aquifer for its potable water supply. The Point Baker-Allentown area utilizes three wells which tap the sand and gravel aquifer for water supply purposes. Two of the Point Baker-Allentown area wells are located near NAS Whiting Field and are included in Figure 4-9 and Table 4-7. Average pumpage rates for the two wells are 500 and 200 gpm, respectively. Point Baker-Allentown wells make water available

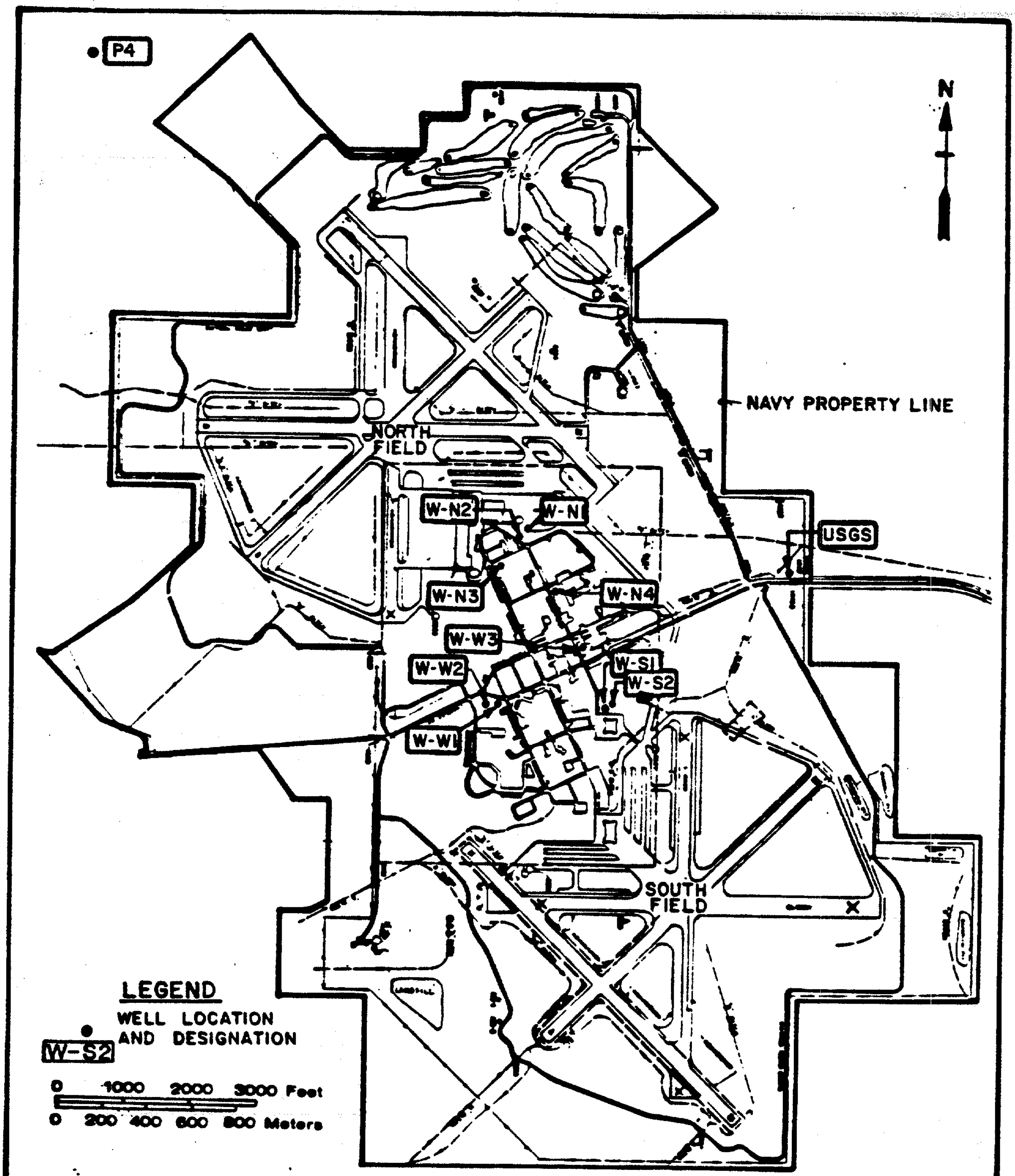



FIGURE 4-9

**Well Location Map NAS Whiting Field And Nearby Areas**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

Table 4-7

Well Inventory of NAS Whiting Field and Nearby Areas

| Well Designation | Owner | Year Installed | Casing Diameter (inches) | Surface Elevation (ft msl) | Bottom of Well Elevation (ft msl) | Screened Interval (ft msl) | Gravel Pack Interval (ft msl) | Status |
|---|---|---|---|---|---|---|---|---|
| W-N1 | Navy | 1943 | | | | | | Abandoned 1951 |
| W-N2 | Navy | 1951 | 16 | 168.1 | (-150.4) | (-1.4)-(-31.4) | 60-(-31) | Not in use |
| W-N3 | Navy | 1975 | | 171.5 | (-58.5) | 36.5-(-23.5) | | Abandoned 1975 |
| W-N4 | Navy | 1975 | 16/12 | 180.0 | (-38.0) | | | In use |
| W-W1 | Navy | 1943 | | | | | | Abandoned 1951 |
| W-W2 | Navy | 1951 | | 197.6 | (-157.4) | 14.1-(-47.0) | | Abandoned 1965 |
| W-W3 | Navy | 1965 | | 180.0 | (-35.0) | 10.0-(-30.0) | 80-(-30) | In use |
| W-S1 | Navy | 1943 | | | | | | Abandoned 1951 |
| W-S2 | Navy | 1951 | | 181.5 | (-52.0) | 12.0-(-33.0) | 17-(-33)[a] | In use |
| P-3 | Point Baker Water System | 1978 | | 200.0[b] | (-20.0)[b] | | | In use |
| P-4 | Point Baker Water System | 1983 | | | | | | In use |
| USGS | U.S. Geological Survey | 1974 | 6 | 125.0 | (-1,165) | cased to (-860) | | Monitor well |

[a]Assumed
[b]Estimated

Source: Adapted from Geraghty and Miller, 1984.

to residences west and north of NAS Whiting Field, while water from the City of Milton system is available to residences east and south (Geraghty and Miller, 1984).

A U.S. Geological Survey monitoring well, which taps the lower Floridan limestone aquifer, is located near the east gate entrance of NAS Whiting Field (Figure 4-9 and Table 4-7).

4.6 MIGRATION POTENTIAL. The major migration pathways from sites potentially contaminated at NAS Whiting Field include surface runoff and ground water movement in the sand and gravel aquifer to the nearby receiving waters of Clear and Big Coldwater creeks.

Contaminant migration by the surface runoff pathway could occur in areas where the source of contamination is at or near ground surface. In addition, erosion problems in various areas at the air station, due to very steep slopes, may expose previously buried materials and allow direct contact with surface runoff. The extensive concrete lined channels and ditches which drain the air station could allow relatively direct access of potential contaminants to Clear Creek and Big Coldwater Creek.

Contaminants may enter the surficial sand and gravel aquifer at Whiting Field. However, due to the presence of two major clay lenses in the aquifer at Whiting Field, contaminant movement from a potential site to the station's production wells may be significantly impeded. The screened interval of all three production wells is below both clay lenses. The actual potential for contaminant migration to the wells would depend on the extent of the cone of influence of the wells, the ground water gradient at the site and the continuity of the clay lenses in the area.

Contaminant movement beyond the sand and gravel aquifer is not anticipated since the thick (hundreds of feet) and relatively impermeable Pensacola clay separates the surficial aquifer from the underlying artesian upper limestone Floridian aquifer. In addition, the steep gradient between the ground water level at Whiting Field and the receiving waters' level would promote the horizontal movement of the ground water in the saturated zone away from the site of contamination. Both the upper and lower Floridan aquifers in Santa Rosa County are high in mineral content and not generally used as a water supply.

Impacts to nearby off-base ground water supplies (City of Milton, East Milton, Point Baker-Allentown potable supply wells) due to potential on-base ground water contamination, are not anticipated due to the ground water gradients in the area. On-station shallow ground water drains to nearby receiving waters which essentially isolate Whiting Field from urban areas. Thus, potential impacts from sources of on-station contamination would be primarily limited to Clear Creek and Big Coldwater Creek, which drain south to the Blackwater River. Although these surface waters are not a source of potable water for the area, they are protected by the Florida Department of Environmental Regulation as Class III Waters. Aquatic organsms that inhabit these waters are potential receptors.

Since NAS Whiting Field is essentially located on a plateau with low-lying receiving waters to the west, south and east, potential off Navy property sources of contamination which could forseeably migrate on base would be limited to the higher ground areas to the north. The areas north of Whiting Field consist primarily of agriculture and forested lands and there are no known sources of contamination reported for these areas.

# CHAPTER 5. WASTE GENERATION

5.1 GENERAL. Naval Air Station (NAS) Whiting Field, home of Training Air Wing Five (TRAWING FIVE), was constructed in the early 1940s. It always served as a naval aviation training facility and was commissioned as the Naval Auxiliary Air Station Whiting Field in July 1943. The field's mission was to train student naval aviators in basic instrument, formation and tactic phases of fixed-wing propeller-driven aircraft, and in the basic and advanced portions of helicopter training. NAS Whiting Field generated a variety of wastes related to pilot training, the operation and maintenance of aircraft along with ground support equipment, and the station's facility maintenance activities.

This chapter discusses the various shops and operations that produced hazardous wastes. In addition to a brief discussion of the operations themselves, locations and dates of operation, types and quantities of wastes produced, and disposal practices are identified when that information is available. Most of the operations and activities at NAS Whiting Field are now performed by private contractors. Very few personnel were available who could provide detailed information on disposal practices prior to the last four or five years. Many of the key, long-term personnel who worked in these areas have taken new assignments in different areas or they have retired. It can be reasonably assumed that prior to the establishment of hazardous waste management and recycle of waste oil programs, most of the hazardous wastes were disposed either in dumpsters which found their way to one of the eight operating disposal areas, or it went into waste oil bowsers which probably were used for fire fighting training. Past operations are discussed as completely as possible, however, since most of the operations are now performed under contract, more recent operations are discussed to enhance the understanding of past practices.

5.2 INDUSTRIAL OPERATIONS. NAS Whiting Field's training mission is supported by minor to intermediate aircraft repairs and maintenance operations. The Air Station is not involved with heavy industrial or production type activities. Until about 1980, aircraft requiring complete overhaul or rework were sent to NAS Pensacola. The principal industrial functions were performed by an aircraft maintenance department, the squadrons and the Public Works Department. The departments/shops and tenant activities that have been the major generators of hazardous wastes include:

Aircraft Intermediate Maintenance Department (AIMD)
Operations Department
Public Works Department (PWD)
North Field Aircraft Maintenance Operations
South Field Aircraft Maintenance Operations
Naval Aerospace and Regional Medical Center
Photo Detachment
Auto Hobby Shop

5.2.1 Aircraft Intermediate Maintenance Department. The AIMD, Building 2941, performed intermediate maintenance on aircraft and ground support equipment for the Field's training squadrons since 1968. Prior to 1968, AIMD type operations were performed within the hangars. In 1983, all of the aircraft services shops, except Ground Support Equipment (GSE), were awarded to contractors due to the phase-out of the T-28 aircraft. Prior to this, the

Department's support shops included: airframes, avionics, battery, calibration, electric, GSE, hydraulic, power plants, and painting. Five of the AIMD shops generated industrial wastes. The shops generated wastes such as cleaning solvents, acids, hydraulic fluids, engine oils, paints and thinner along with stripping compounds. Table 5-1 summarizes waste generation from AIMD.

5.2.1.1 Airframes Shop. Airframes performed metal repairs and fabrication of aircraft structural components. This shop generated about 30 gallons per month of wastewater containing paint stripping compounds (See Appendix B for chemical analysis) which were disposed in the underground stripper storage tanks located on the south end of Hangar Building 2941.

5.2.1.2 Power Plants Shop. Engine tear-down and build-up was conducted by this shop along with engine testing. The wastes generated by this shop were from engine maintenance and the test cells. Cleaning of aircraft engine components generated some 50 gallons per month of PD-680 dry cleaning solvent. Freon used at the engine test cell generated about 40 gallons per month of waste. These wastes were reportedly poured into an underground waste oil storage tank located on the southwest corner of Hangar Building 2941.

5.2.1.3 Ground Support Equipment. The GSE shop was responsible for the scheduled and unscheduled maintenance on all ground support equipment (JG-75 Tow Tractors, aircraft jacks and maintenance stands). The operation moved from Hangar Building 2941 to the Central Hangar, Building 1454, in the early 1970s. The shop routinely generated an estimated 30 gallons per month of PD-680 cleaning solvent and about 15 gallons per month of aircraft cleaning compound. Other waste materials generated by GSE included lubricating oil (20 gallons per month), hydraulic fluid (25 gallons per month), transmission fluid (six gallons per month), and antifreeze (nine gallons per month). All of the wastes were disposed either in a bowser or the underground waste oil storage tank located north of Building 1454. This tank was emptied by a contractor on a routine basis for off Navy property reprocessing or disposal.

5.2.1.4 Paint Shop. The AIMD Paint Shop was responsible for repainting of the aircraft and helicopter structural components. The application of paint strippers and parts cleaning agents prior to painting were major steps in the operation. Aluminum and aluminum alloy components constituted roughly 80 percent of the work load while magnesium, titanium and stainless parts comprised the remainder of the load. The stripping process involved the application of a compound by brush or by dipping of the parts into a solution. One bin contained a boric acid solution for stripping steel parts while the other contained a prepared solvent solution for stripping of the aluminum and aluminum alloy parts. The tanks each contained about 15 gallons of stripping agent. After a period of time, the stripper and paint slime was removed from the part with copious amounts of rinse water in an open top catch tank. This step was often followed by the application of an alidine solution to the stripped component. This material was also rinsed into the catch tank.

Prior to about 1980, the wastewater generated by this operation was pumped into 55-gallon drums for transport to an operating on-station landfill. The waste was then poured onto materials at the landfill site and the drums reused. Around 1980, the catch tank was connected to two underground metal holding tanks (used bottled gas tanks), approximately 500 gallons each, located just south of Building 2941. When the open top catch tank was full, a manual valve was opened to drain the wastewater into the underground

Table 5-1

AIMD Waste Generation Rates

| Waste Source | Waste Type | Estimated Waste Generation Rate (gallons per year*) | Period of Generation | Treatment/Disposal Location |
|---|---|---|---|---|
| Airframes Shop | Paint Stripping Compounds | 360 | 1968-1980<br>1980-1983 | On-station landfill<br>Underground storage off Navy property treatment |
| Power Plant Shop | PD-680 | 600 | 1968-1983 | Waste oil storage tank, off Navy property by contractor |
| | Freon | 500 | 1968-1983 | Waste oil storage tank, off Navy property by contractor |
| GSE | PD-680 | 360 | 1968-1984 | Waste oil bowser, waste oil storage tank, off Navy property by contractor |
| | Aircraft Cleaning Compound | 180 | | |
| | Lubricating Oil | 240 | | |
| | Hydraulic Fluid | 300 | | |
| | Transmission Fluid | 70 | | |
| | Antifreeze | 100 | | |
| Paint Shop | Mixed Paint Stripping Wastewater | 24,000 | 1968-1980 | Drums, on-station landfill |
| | | 18,000 | 1980-1983 | Underground storage tanks, off Navy property treatment |
| | | 6,000 | 1983-1984 | Drums, DPDO |
| Battery Shop | Battery Acid | 180 | 1968-1983 | Neutralization, dry well |
| | | 180 | 1983-1984 | Drums, DPDO |

Note: *Rate in gallons except as otherwise noted.

holding tanks. These tanks were emptied as required for treatment and disposal off Navy property. Depending on the work load, this operation generated from 500 to 2,000 gallons per month of rinse water containing epoxy, paint stripper, minearl spirits, lacquer thinner, toluene methyl isobutyl ketone (TMIK), 1,1,1-trichloroethane, toluene, xylene, isopropyl alcohol and zinc chromate coating solution (alidine).

5.2.1.5 Battery Shop/Locker. Maintenance activities of the shop include the repair, testing, flushing and charging of lead-acid batteries used by the squadrons. This operation has been conducted in Building 1478 from the mid-1960s.

The waste battery acid generated by this shop, approximately 180 gallons per year, was routinely poured down a slop sink drain and flushed with rinse water to dilute the acid solution. The waste solution subsequently discharged to a lime rock (neutralization) dry well located on the west side of the shop. This disposal method was used from the 1960s until early 1984. When this disposal technique was discontinued, the sink was connected to the sanitary sewer for disposal of the dilute rinse water only. The waste acid was subsequently handled as hazardous waste and disposed off Navy property by the PWD. Battery cases were given to DPDO for off Navy property disposal or resale.

5.2.2 Operations Department. The Operations Department runs the airfield, provides support services and limited maintenance on the assigned aircraft, and conducts fire fighter training exercises through the fire department. Only the Operations and Maintenance Division generates hazardous wastes, although the Crash/Fire Division consumed some of the wastes generated by the other shop operations. Wastes generated by this department are given in Table 5-2.

5.2.2.1 Operations Maintenance Division. The Operational Maintenance Division (OMD), Hangar Building 1454, has provided line maintenance on transient aircraft and the daily upkeep and maintenance of several assigned aircraft since the 1940s. The activities of the division typically generate less than five gallons per month of mixed waste paint and stripper, TMIK, MEK, toluene and naptha. Waste oil generated by engine oil changes was placed either into a bowser or an underground waste oil storage tank adjacent to Building 1454 prior to off Navy property disposal by contractor. Approximately 400 gallons of waste oil were disposed annually in this manner. Waste fuel, about 100 gallons per year, is placed into drums for use by the Fire Department's fire training exercises.

5.2.2.2 Crash/Fire Division. The division is responsible for all crash and structural fire protection including fire fighter training activities. The fire station is located in Building 2983. Until the early 1970s, all fire division activities were performed solely by military personnel. Since then, these responsibilities have been shared by civilian and military groups. The fire fighter training area has been located on the west side of North Field for the past 25 years or more. Two main sites are used to conduct the training exercises. Flight schedules dictate which site is used for any particular session. During each session, contaminated fuel is poured into a shallow earthen depression, ignited and subsequently extinguished using water, Aqueous Film Forming Foam (AFFF) or other similar extinguisher agent.

Table 5-2

Operation Department Waste Generation Rates

| Waste Source | Waste Type | Estimated Waste Generation Rate (gallons per year*) | Period of Generation | Treatment/Disposal Locations |
|---|---|---|---|---|
| OMD | Mixed waste paint and thinners | 60 | 1960-1984 | Drums, fire fighter training |
| | Waste fuels | 100 | 1960-1984 | Drums, fire fighter training |
| | Waste oils | 400 | 1960-1984 | Waste oil bowser, or waste oil storage tank, off Navy property by contractor |
| Crash/ Fire Division | Mixed fuel, waste oils | 15,000** | 1950-1984 | Burned in fire training pits (partially combusted hydrocarbon residue) |
| | AFFF | 3,000** | 1960-1980 | Fire fighter training pits and crash sites |
| | PCP-Dry Chemical Extinguisher Agent | 3,000** pounds | 1980-1984 | Fire fighter training pits and crash sites |

Notes: *Rate in gallons except as otherwise noted.
**Indicates amount of material used by this operation.

The contaminated fuel (JP-4 or AVGAS mixed with oily wastes) is obtained from the squadrons and shop areas. Materials arrive primarily by truck and pumped into 55-gallon drums for temporary on-site storage. The military group assigned to the station uses about 500 gallons per month of waste petroleum products for their training sessions while the two civilian platoons consume around 800 gallons each month.

5.2.3 Public Works Department. The Whiting Field PWD performs a wide variety of services through an organization of divisions including: facilities planning, design, programming and construction; real estate management; facilities inspection; maintenance, repair, minor construction, alteration and equipment installation; facility disposal; transportation operations and maintenance including weight-handling equipment; housing administration; along with environmental control and conservation programs. RCA/Operational Maintenance Services (OMS) assumed the operations responsibilities of the PWD on a contractual basis on 1 October 1982. They are specifically responsible for the maintenance and operation, at Whiting Field, of grounds, utilities, sewage treatment, potable water, transportation, telephone/messenger services and building maintenance. Two divisions, Transportation and Utilities, generate most of the hazardous wastes from this department. Table 5-3 presents a summary of the wastes generated by the PWD.

5.2.3.1 Transportation Division. This division, located into Building 1429, is responsible for the maintenance of all transportation, construction, material-handling and material moving equipment. They also provided motor vehicles and operators of heavy equipment for the on-station landfills. Maintenance and repair activities typically generate approximately 30 to 50 gallons per year of cleaning solvent. The main hazardous waste from the transportation division is waste oil. Approximately ten gallons are generated each month.

5.2.3.2 Utilities Division. The main function of the division is to operate the station's steam/hot water plant. Other responsibilities of the division include maintenance and repair of power distribution lines and other utility equipment. The facility, built in the 1940s, is located in Building 1429. The division uses a wide variety of boiler water treating chemicals, such as sodium hydroxide, sodium sulfate, sodium hexametaphosphate and other miscellaneous testing reagents. Exact quantities of each chemical used were not recorded. The wastewater containing these chemicals is discharged to the sanitary sewer.

5.2.3.3 Electric Shop. The electrical operations have been conducted in Building 1437 since the 1940s. The shop is responsible for maintenance, minor repairs, installations, modifications and alterations to electrical and electronic equipment and systems on the station. Transformer repair performed by this shop included cleaning of bushing gaskets, repair and replacement of windings, and repainting of cases. The repairs were conducted at several locations on station over the years. Prior to about 1960, some of this work was performed in Building 1478, which later became the Battery Shop. Typically, the transformers were hauled from the shop to the ditch behind the Central Hangar, drained of oil, rinsed with kerosene, and brought back to the shop area for rework, and transformer rework was performed at the Electric Shop, Building 1437, until the mid-1970s. These units were normally hauled to an on-station landfill to dispose of the oil. During the 1960s and 1970s, some minor repairs were also performed on transformers at the North

Table 5-3

PWD Waste Generation Rates

| Waste Source | Waste Type | Estimated Waste Generation Rate (gallons per year*) | Period of Generation | Treatment/Disposal Location |
|---|---|---|---|---|
| Transportation Division Shop | Dry Cleaning Solvent | 50 | 1950-1980 | On-station landfill |
| | PD-680 | 30 | 1980-1982 | On-station landfill |
| | | | 1982-1984 | Off Navy property by contractor |
| | Waste Oil, Brake/Hydraulic Fluid | 120 | 1950-1984 | Off Navy property by contractor |
| Utilities Division Shop | Mixed Boiler Waste Treating Chemicals | - | 1940-1984 | Sanitary Sewer |

Note: *Rate in gallons except as otherwise noted.

Pump House, Building 1479, but reportedly no oil was disposed at this location. Quantities and exact dates of PCBs disposed were not recorded.

5.2.3.4 Pesticide Shop. Pesticide operations are conducted out of Building 1485C at the PWD compound. Golf course pesticide storage and mixing facilities are located at the Golf Maintenance Shop, Building 2877. Pesticide inventories are maintained at a level to meet application requirements based on past records. A comparison of the types and quantities of pesticides applied during 1971 and 1977 are given in Table 5-4. The 1980 Pest Management Plan (Navy, 1984) for Whiting Field presents a list, given in Table 6-3, of the chemicals normally used by PWD to control pests. The list presented in Table 6-4 represents what was normally kept on hand at the Golf Course to meet their needs.

The only wastes the two pest control shops generate are out-of-date pesticides and empty containers. Spray tank rinsates are either used as make-up water for subsequent applications or applied to the job site and, thus, do not constitute a waste. Disposal of empty pesticide containers was conducted as follows. The liquid pesticide containers were triple rinsed, punctured to make them unusable, and placed in a specified dumpster for disposal at an on-station landfill. Containers for dry pesticides, such as bags and fiber drums, were also made unusable by crushing or tearing, placed in the dumpster and landfilled.

5.2.4 North Field Aircraft Maintenance Operations. The North Field of NAS Whiting Field provided primary flight training during the 1940s through the efforts of Basic Training Unit-One A (BTU-1A). In the spring of 1949, the Navy's first jet training unit (JTU-1) was brought to North Field. By the mid-1950s, the nine cylinder radial engine T-28 "Trojan" aircraft came to NAS Whiting Field. This aircraft was used exclusively for training operations until the late 1970s when the T-34C "Turbo Mentor" was introduced. During this transition period, both T-28s and T-34Cs were used by the training squadrons. As of April 1983, North Field had about 40 T-28s and about 172 T-34Cs in service for the training mission. It was not until late 1983 that the last of the T-28s were taken out of service. Minor repair operations included stripping and touch-up painting for corrosion control along with engine maintenance and routine aircraft washing. These activities typically generated waste stripping compounds, cleaning solvents, paint wastes, alkaline cleaners, detergents, oil and hydraulic fluids.

With the introduction of the T-34Cs in the late 1970s, contractual services were initiated to provide full administrative, maintenance, and logistics support for the aircraft assigned to the three fixed-wing squadrons (VT-2, VT-3 and VT-6) of Air Wing Five. This contract continues to provide comprehensive maintenance services. The depth of maintenance performed by the station's contractor includes line, shop, intermediate and depot level.

5.2.4.1 Aircraft Maintenance. As part of the maintenance activities, oil changes were routinely performed on the aircraft. The oil was changed in the T-28s about every 250 hours and required approximately ten gallons of oil. Therefore, assuming that the 350 planes stationed at the field during the early 1970s flew, on average about 50 hours per month, they would have generated about 700 gallons per month of waste engine oil. The waste oil was reportedly poured into the underground waste oil storage tank located adjacent to Hangar 2941. The oil was routinely pumped from the tank by the

Table 5-4

Estimated Annual Pesticide Usage Comparison

| Pesticide | Target Pest** | 1971 | 1977 |
|---|---|---|---|
| Actidione Suspension* | Turf Disease (F) | - | 880 gals |
| Ammate-X Solution | Weeds (H) | 600 gals | 1,250 gals |
| Anticoagulant Baits (0.025%) | Rats/mice | 15 lbs | 50 lbs |
| ARS Emulsion* | Broadleaf Weeds (H) | - | 1,650 gals |
| Balan Granules (2.6%)* | Weeds (H) | - | 400 lbs |
| Baygon Emulsion (1.1%)* | Roaches (I) | - | 50 gals |
| Bromacil Suspension* | Vegetation (H) | - | 1,150 gals |
| Carbaryl Solution* | Leaf Chewer (I) | - | 1,100 gals |
| Chlordane Emulsion (2%) | Ants (I) | 20 gals | - |
| Chlordane Granules/Dust (10%)* | Ants (I) | - | 370 lbs |
| Cycloheximide Suspension | Turf Disease (F) | - | 330 gals |
| Dalapon Suspension | Vegetation (H) | - | 500 gals |
| Diazinon Emulsion (1%)* | Roaches (I) | 370 gals | 270 gals |
| Dicamba Emulsion* | Weeds (H) | - | 110 gals |
| Dicamba Granules (0.35%)* | Weeds (H) | - | 50 lbs |
| Dimethyl-phosphonate Suspension (0.8%)* | Leaf Chewer (I) | - | 300 gals |
| Diuron/Ammate Suspension | Vegetation (I) | 1,150 gals | - |
| 2,4-D Granules* | Weeds (H) | - | 50 gals |
| 2,4-D Emulsion | Weeds (H) | - | 330 gals |
| Kepone Baits (0.15%) | Ants (I) | 520 lbs | - |
| Malathion Solution (7%) | Mosquitos (I) | 700 gals | 800 gals |
| Malathion Emulsion (0.18%) | Leaf Chewer (I) | 3,650 gals | 5,850 gals |
| Methyl Bromide (98%)* | Nematodes (SF) | - | 10 lbs |
| Mineral Oil Solution (100%)* | Mosquitos (I) | 5 gals | - |
| OOR-Proxol Suspension* | Leaf Chewer (I) | - | 4,600 gals |
| Pyrethrim Solution* | Mites (I) | - | 1 gal |
| Thirum Suspension (11%)* | Turf Disease (F) | - | 3,900 gals |
| Silvex* | Weeds (H) | - | 20 lbs |

Notes: *Golf Course Maintenance.
**(F) = Fungicide; (H) = Herbicide; (I) = Insecticide; (SF) = Soil Fumigant.
-Pesticide not in use.

Source: (Pest Control Summary Report Southern Division NAVFACONGCOM, 1971 and 1977 records) contractor for off Navy property disposal. The waste oil volume was dramatically reduced following the introduction of the T-34Cs in the late 1970s. Waste oil volumes were reduced to about 1,500 to 2,000 gallons per year. Table 5-5 summarizes the types and quantities of wastes generated during aircraft maintenance operations.

5.2.4.2 Aircraft Washing Operations. Aircraft washing was performed on a 14 day cycle for each plane. The aircraft cleaning solution was consumed at a rate of about 4,200 gallons per year. Prior to approximately 1972, the wastewater from this operation was discharged to the storm sewer which ultimately discharged to Big Coldwater Creek. The rack was then connected to the sanitary sewer and wastewater treated at the on-station sewage treatment plant.

5.2.5 South Field Aircraft Maintenance Operations. The first squadron assigned to the South Field started conducting training exercises in July of 1943. The mission was carried out by Basic Training Unit-One B (BTU-1B) from the 1940s until the early 1950s. The T-28 served as the principal training aircraft and South Field until the early 1970s. From 1972, two helicopter training squadrons, HT-8 and HT-18, were stationed at the South Field to provide basic and advanced training to student pilots. This reorganization necessitated the transfer of Training Squadron Three (VT-3) to North Field. Basic helicopter flight training was performed using the Bell TH-57A "Sea Ranger" while the advanced training phase was accomplished with the Bell H-1 "Huey" helicopter. As of August 1983, there were approximately 36 Sea Ranger helicoptors assigned to HT-8, while HT-18 had about 92 Hueys. The Hueys were phased out in early 1984 and replaced with about 80 TH-57C series helicopters. The operation and maintenance activities prior to the introduction of this helicopter were reportedly similar to those conducted at North Field.

NAS Whiting Field has used two contractors since the 1970s to provide maintenance for the helicopters at South Field. The one contractor's mission is to expedite routine and special maintenance for the H-57s. These activities, housed in Building 2992, include the service of nickel-cadmium (NICAD) batteries used in the helicopters along with the supply of spare parts to support the Navy TH-57 helicopter training program of HT-8. Sufficient parts were maintained on station to provide daily support on a routine basis.

5.2.5.1 Battery Locker. The battery locker is used to recharge, service and dispose of the 28 volt batteries used in the helicopters. Each battery is routinely serviced every 50 hours. The operation generates very small amounts of waste potassium hydroxide electrolyte, one to two gallons annually. The spent electrolyte is poured into a small can and disposed off Navy property. Waste batteries are also disposed off Navy property by DPDO.

5.2.5.2 Helicopter Maintenance. A second contractor provides complete organizational maintenance services for for all of the H-1 and H-57 aircraft at NAS Whiting Field from Hangar Building 1406. The activities of this contractor include all levels of maintenance service that generate waste engine oil, cleaning solvents, and some paint stripping wastes. The engine oil, approximately one gallon per helicopter, is drained at 200 hour intervals. So, with roughly 50 hours logged on each aircraft per month, this amounts to approximately 350 gallons of waste oil annually. All waste oil is poured into the undergound waste oil storage tank adjacent to the wash rack of Hangar 1406. The waste oil is removed by contractor for off Navy property disposal. Other wastes generated by the maintenance operations included:

Table 5-5

North Field Waste Generation Rates

| Waste Source | Waste Type | Estimated Waste Generation Rate (gallons per year*) | Period of Generation | Treatment/Disposal Location |
|---|---|---|---|---|
| Aircraft Maintenance | Waste Oil | 8,400<br>2,500 | 1940-1978<br>1978-1984 | Waste oil tank/off Navy property by contractor |
| | Mineral Spirits | 1,320 | 1978-1984 | Waste oil tank/off Navy property by contractor |
| | MEK | 360 | 1978-1984 | Waste oil tank/off Navy property by contractor |
| | Isopropyl Alcohol | 180 | 1978-1984 | Waste oil tank/off Navy property by contractor |
| | Mixed Paint and Thinner Wastes | 50 | 1978-1984 | Drums/fire fighter training |
| Aircraft Washing | Aircraft Cleaning Solution | 4,200 | 1942-1972<br>1972-1984 | Storm sewer<br>Sanitary sewer |

Note: *Rate in gallons except as otherwise noted.

mineral spirits, MEK, Lacolene, APU thinner, and paint stripper. Contaminated fuel obtained during the collection of fuel samples was placed in the line shack tank or 55-gallon drums. The fuel was routinely collected by the fuels contractor and hauled to the Fire Fighter Training Area for use in fire drills. A summary of the estimated quantities and ultimate disposition of these wastes are presented in Table 5-6.

5.2.5.3 Helicopter Washing. The helicopter wash rack is used daily to clean aircraft on a 14-day cycle. Around 1972, the rack was disconnected from the storm drain and connected to the sanitary sewer system. Approximately ten helicopters were cleaned each day by the squadrons. This operation generated about 100 gallons of wastewater per aircraft. The aircraft cleaning compound was consumed at about ten gallons per day.

5.2.6 Naval Aerospace and Regional Medical Center.

5.2.6.1 Medical Clinic. NAS Whiting Field's Naval Aerospace and Regional Medical Center (NARMC) was located in Building 1416 from the 1940s until 1976 and provided emergency and outpatient care. The facility has been located in Buiding 2985 since then. Liquid waste chemicals, such as reagents generated by the facility, are generally poured down the sink. Concentrated test acids are diluted with tap water while being poured into the laboratory sink. Solid wastes, like syringes, etc., are first autoclaved and then placed in the dumpster for disposal. The X-ray processing wastes have been passed through a silver recovery unit prior to sewer discharge since the late 1970s. The silver sludge is sent to DPDO for resale to salvage companies.

5.2.6.2 Dental Clinic. This branch, also located in Building 1416 until 1976, provided complete dental health care for active duty personnel. The clinic was moved to building 2985 in 1976. This facility generates approximately 12 pounds per year of mercury amalgam wastes used for dental fillings. This waste has been sent to DPDO for disposal since the late 1970s. Silver recovery wastes from the X-ray film processing operation have also been disposed by DPDO since the 1970s. The types and quantities of wastes generated are given in Table 5-7.

5.2.7 Photo Lab. The photo lab, located in Building 1426 since the 1940s, provides photographic services at NAS Whiting Field for both black and white, and color still photography plus color transparencies. Processing chemicals routinely used included developer (50 pounds), fixer/hardner (50 gallons), and replenisher (30 pounds). The lab generated about ten gallons per month of waste materials. The spent silver recovery unit waste has been sent to DPDO for resale to salvage companies since the 1970s. Waste generation is summarized in Table 5-7.

5.2.8 Auto Hobby Shop. This shop, located in Building 1404, generates solvents waste (PD-680) from a small parts cleaning tank. The tank is cleaned out as required, which varies according to the level of use. It was reported that about one 55-gallon drum every two months was used by this operation. The spent solvent is poured into the waste oil sump and stored until it was pumped out about once every three months. This material is disposed off Navy property. Waste generation is summarized in Table 5-7.

Table 5-6

South Field Waste Generation Rates

| Waste Source | Waste Type | Estimated Waste Generation Rate (gallons per year*) | Period of Generation | Treatment/Disposal Location |
|---|---|---|---|---|
| Aircraft Maintenance | Waste Oil | 8,450<br>2,500 | 1940-1972<br>1978-1984 | Waste oil tank/off Navy by contractor |
| Helicopter Maintenance | Waste Oil | 1,500 | 1972-1984 | Waste oil tank/off Navy by contractor |
| | Mineral Spirits | 240 | 1972-1980 | Drums/fire fighter training |
| | | | 1980-1984 | Drums, off Navy property by contractor |
| | MEK | 240 | 1980-1984 | Drums, off Navy property by contractor |
| | Lacolene | 240 | 1980-1984 | Drums, off Navy property by contractor |
| | APU-Thinner | 180 | 1980-1984 | Drums, off Navy property by contractor |
| | Paint Stripper | 12 | 1980-1984 | Drums, off Navy property by contractor |
| | Contaminated Fuel | 3,000 | 1972-1984 | Drums/fire fighter training |
| Helicopter Washing | Aircraft Cleaning Compound | 3,650 | 1940-1972<br>1972-1984 | Storm sewer<br>Sanitary sewer |

Note: *Rate in gallons except as otherwise noted.

Table 5-7

Waste Generation Rates

| Waste Source | Waste Type | Estimated Waste Generation Rate (gallons per year*) | Period of Generation | Treatment/Disposal Location |
|---|---|---|---|---|
| Medical Clinic | Silver Sludge | | 1976-1984 | DPDO |
| Dental Clinic | Mercury Amalgam | 12 lbs | 1970-1984 | DPDO |
| | Silver Sludge | | 1970-1984 | DPDO |
| Photo Lab | Mixed/Photo Processing Chemicals Wastewater | 120 | 1940-1984 | Sanitary sewer |
| | Silver Sludge | | 1980-1984 | DPDO |
| Auto Hobby Shop | PD-680 | 300 | 1970-1984 | Off Navy property by contractor |
| | Waste Oil | 500 | 1970-1984 | Off Navy property by contractor |

Note: *Rate in gallons except as otherwise noted.

# CHAPTER 6. MATERIAL HANDLING: STORAGE AND TRANSPORTATION

6.1 INTRODUCTION. Naval Air Station (NAS) Whiting Field used a variety of raw materials for servicing, maintaining and operating aircraft and helicopters. Storage tanks and supply areas were located throughout the facility as convenience dictated. This chapter provides a brief review of the main storage areas and their capabilities. Present operations are discussed only as an indication of past practices. Past records on materials and quantities are not available. Key long-term employees, familiar with daily operations of the past, have since relocated or transferred. Most of the information presented is taken from recent reports on materials handling.

6.2 PETROLEUM, OIL, LUBRICANTS. NAS Whiting Field mainly used six types of petroleum, oil, lubricants (POL) over the years. The main POL products used were AVGAS, JP-4, heating fuel oil, vehicle ready fuel, diesel and aviation lube oil (AVLUB). The storage capacities for these products are shown in Table 6-1. These products were brought inside the station by truck. Fuel was delivered by rail to the fuel storage area, but its use was discontinued in the mid to late 1970s. Since that time, fuel operations have been handled by private contractors. The six main storage areas are discussed below.

6.2.1 AVGAS Aqua System - Main Storage. The two main AVGAS storage tanks were rubber lined, reinforced concrete, with a 250,000 gallon capacity (Figure 6-1). AVGAS was brought to the main storage by rail or truck, where it was off-loaded and pumped into the storage tanks. From here it was distributed to the North Field for use by the T-28 trainers or the South Field for storage. Since the jet helicopters and the T-34 Trainers no longer require AVGAS, most of these tanks were filled with water and taken out of use.

The main storage tanks operated on the Aqua System principle. This system utilized potable water to displace gasoline. Water was used to lift the AVGAS level above the pump suction inlet pipe for distribution by pumping to either field. When the storage tanks were refilled, water was displaced over the weir to the drain and discharged untreated into "P" ditch which flows into Coldwater Creek. Approximately 6.2 million gallons of water per year was discharged from this operation. This discharge was monitored and permitted under the National Pollution Discharge Elimination System (NPDES).

6.2.2 North Field AVGAS Aqua System. The North Field AVGAS Aqua System consisted of six underground steel AVGAS tanks and two aviation lube-oil tanks. Each tank had a 23,900-gallon capacity. AVGAS was distributed to the aircraft refueling pits by water pressure through the Aqua System. Aircraft refueling was done on the concrete aprons from the refueling pits (Figure 6-1).

6.2.3 South Field AVGAS Aqua System. The South Field AVGAS Aqua System consisted of six underground steel tanks and two aviation lube-oil tanks. Flight operations at South Field changed from AVGAS burning airplanes to JP-4 burning helicopters, consequently the tank farm was utilized solely for back-up storage during the fuel shortage in 1973. AVGAS was pumped to these tanks from the main storage area where it returned as needed under water pressure (Figure 6-2).

Table 6-1

Fuel Storage Capacity

| Type Fuel | Type Storage | Number of Tanks | Capacity (gallons) |
|---|---|---|---|
| AVGAS 115/145 | Underground Concrete Tanks | 2 | 436,628 |
| JP-4 | Aboveground Steel Tanks | 2 | 402,040 |
| Heating Fuel Oil | Underground Steel Tanks | 4 | 100,000 |
| Vehicle Ready Fuel | Underground Steel Tanks | 3 | 12,434 |
| Diesel | Underground Steel Tanks | 1 | 11,549 |
| Kerosene | Underground Steel Tanks | 4 | 3,704 |
| Aviation Lube Oil | Underground Steel Tanks | 3 | 45,538 |

Note: See Figures 6-1 and 6-2 for locations.

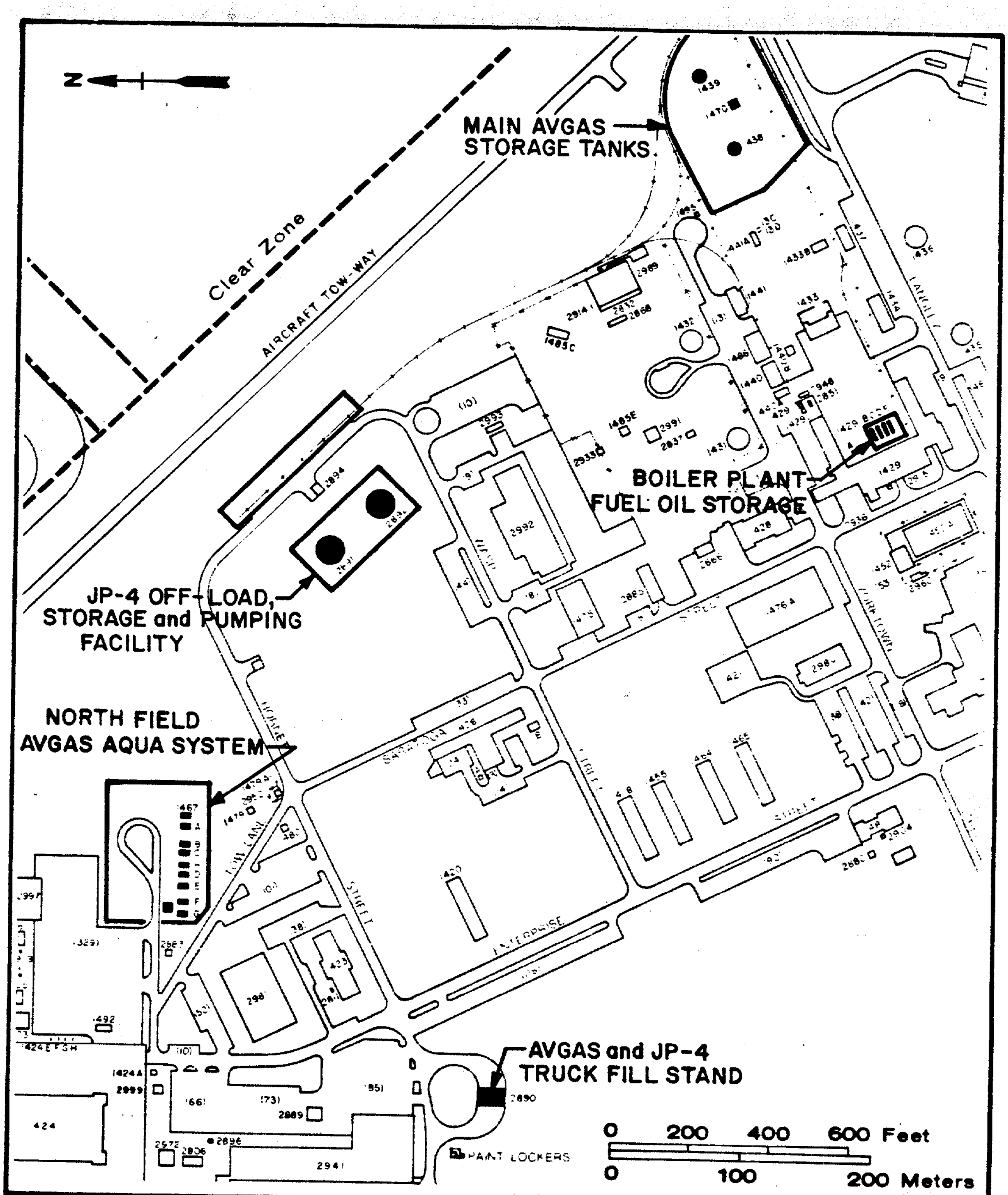



FIGURE 6-1

POL STORAGE

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

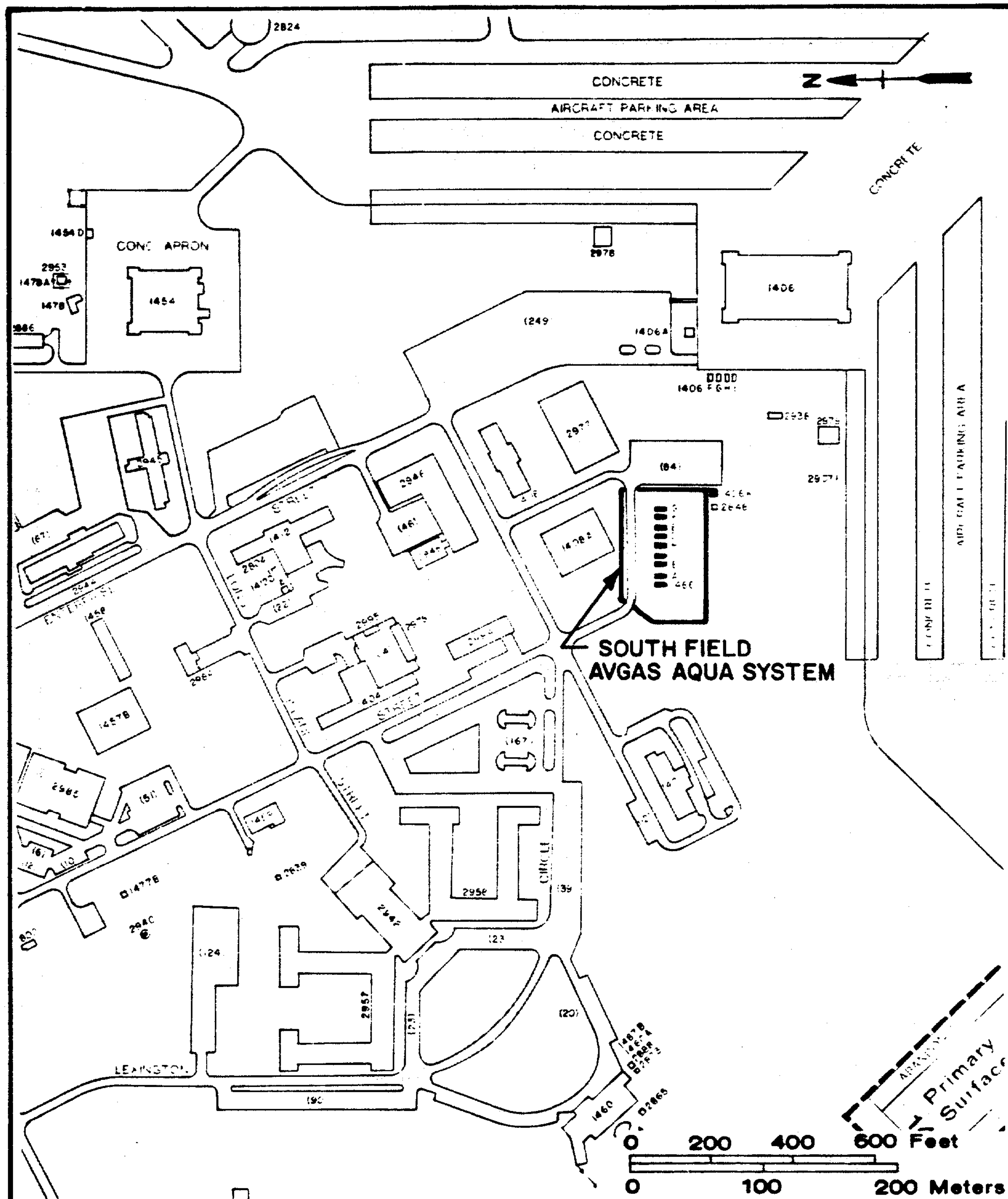



FIGURE 6-2

**POL STORAGE**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

6.2.4 JP-4 Off-Load, Storage and Pumping Facility. The helicopters at South Field were jet engine powered and burned JP-4. JP-4 was delivered by commercial tank truck and pumped into two 230,000 gallon capacity, aboveground, steel storage tanks. The trucks parked on the concrete off-load apron and filled the tanks. JP-4 was pumped from the tanks to the truck fill stand (Figure 6-1).

6.2.5 AVGAS and JP-4 Truck-Fill Stand. The AVGAS and JP-4 truck-fill stand was located at North Field just south of Building 2941. The helicopters at South Field were fueled from tank trucks by a contractor. Also, AVGAS was truck loaded here to refuel trainsient aircraft. AVGAS was pumped to the truck-fill stand by water pressure from the North Field tank farm, while JP-4 was pumped from the storage tanks by pipeline (Figure 6-1).

6.2.6 Boiler Plant Fuel Oil Storage. The main heating plant at NAS Whiting Field has always been located in Building 1429 in the Public Works area. The boilers normally burned natural gas, however, fuel oil was used on a standby basis. It was stored in four 25,000 gallon underground steel tanks. Also in storage was 10,000 gallons of diesel fuel in an underground steel tank for the emergency diesel powered electrical generator (Figure 6-1).

6.3 CHEMICAL AND HAZARDOUS MATERIALS STORAGE. Many hazardous materials including solvents, stripping and cleaning agents, paints, electrolyte and photographic developing chemicals were used in small quantities at NAS Whiting Field. Materials were stored in drums and small containers at various locations throughout the station depending upon their use.

The shops that stored hazardous materials such as paint, thinners and solvents, were Buildings 2997, 2941 and 2987. Building 2922 contained electrolyte and other supplies required to maintain and operate helicopters. Building 1426, the Photo Lab, stored photographic developing chemicals. Building 1406 stored small quantities of paints, solvents, thinners and paint strippers. Building 1454, GSE, stored cleaning compounds.

6.4 POLYCHLORINATED BIPHENYLS (PCBs) STORAGE. PCBs were used as dielectric fluid in capacitors and power transformers throughout NAS Whiting Field. It was reported that PCB-containing dielectric fluid was disposed on-station at the landfills prior to initiation of the collection and disposal program, whereby wastes were turned over to the custody of the Property Disposal Office, Pensacola, Florida. Table 6-2 lists the known PCB containing transformers at NAS Whiting Field. Units in storage were shipped off Navy property on 5 July 1984.

6.5 PESTICIDES. Pesticides, including herbicides and insecticide, were primarily stored in Building 1485 by the Public Works Department (PWD) to meet anticipated needs, and also at the Golf Course Maintenance Shed, Building 2877. Inventories are maintained to meet planned requirements based on past records. All requisitions for pesticides receive technical review and comment by the Southern Division, Naval Facilities Engineering Command, Charleston, South Carolina. Application was by certified personnel in the PWD and at the Golf Course. Disposal of empty containers was conducted in a prescribed manner and included triple rinsing, puncturing and disposal in an on-station sanitary landfill. Rinsate was used for makeup water. Tables 6-3 and 6-4 lists the typical inventory of pesticides used by the PWD and the Golf Course, respectively.

Table 6-2

PCB-Filled Devices at NAS Whiting Field

| Location | Item | Materials | Amount (gallons) |
|---|---|---|---|
| Units in Service: | | | |
| Building 1424 | Transformer | Pyranol | 141 |
| Building 2946 | Transformer | Pyranol | 93 |
| Building 2983 | Transformer | Askarel | 141 |
| Building 2992 | Transformer | Askarel | 105 |
| Building 1429 | Capacitors (18) | Inerteen | 27 |
| Building 1429 | Capacitors (9) | Pyranol | 18 |
| Pole N-87 at Building 2941-1408 | CT-Transformer | Pyranol | 10 |
| Units in Storage:* | | | |
| Public Works Storage Compound | Transformers (2) | Askeral | 40 |
| Public Works Storage Compound | Transformers (2) | Askeral | 45 |
| Public Works Storage Compound | Transformers (2) | Askeral | 65 |

Note: * Units in storage until July 5, 1984

Source: (SOUTHNAVFACENGCOM, April 1979)

Table 6-3

Public Works Department Pesticide Inventory

| Type | Quantity |
|---|---|
| **Insecticides:** | |
| Carboryl, 80% WP | 20 pounds |
| Chlordane, 10% Granular | 350 pounds |
| Diazinon, 2% Dust | 150 pounds |
| Dimethoate, 23.4% EC | 1 gallon |
| Kelthane, 18.5% EC | 19 gallons |
| Malathion, 57% EC | 75 gallons |
| Malathion, 95% Concentrate | 200 gallons |
| Petroleum oil, 97% EC | 21 gallons |
| Propoxur, 13.9% EC (Baygon) | 20 gallons |
| Pyrethrum, 1.9% OS | 3 gallons |
| **Herbicides:** | |
| Ammonium Sulfamate (Ammate-X), 95% Crystals | 840 pounds |
| Bromacil, 2 pounds per gallon EC | 700 gallons |
| Dalapon, 84.5% SP | 700 pounds |
| Diuron, 80% WP | 110 pounds |
| 2,4-D, 4 pounds per gallon Amine | 10 gallons |
| 2,4,5-T, 4 pounds per gallon LVE | 25 gallons |
| **Miscellaneous:** | |
| Avitrol, 0.5% Whole Corn | 9 pounds |
| Captan, 50% WP | 50 pounds |
| Nemacur, 15% Granules | 40 pounds |
| Spreader/Sticker | 64 gallons |

Source: (SOUTHNAVFACENGCOM, March 1984)

Table 6-4

Golf Course Pesticide Inventory

| Type | Quantity |
|---|---|
| **Insecticide:** | |
| Carbaryl, 50% WP | 110 pounds |
| Methyl Bromide, 98% | 10.5 pounds |
| Proxol, 80% SP | 98 pounds |
| **Herbicides:** | |
| Balan, 2.5% granules | 480 pounds |
| MSMA, 35.33% EC | 5 gallons |
| MSMA, 47.8% EC | 48 gallons |
| MSMA, 51.19% EC | 60 gallons |
| 2,4-D, MCPP (Weedicide II) | 35 pounds |
| 2,4-D, 2.2 pounds per gallon; MCPP 1.1 pound per gallon; Dicamba, 0.22 pounds per gallon (Trimec) | 31 gallons |
| **Miscellaneous:** | |
| Kromad, 27.5% WP | 24 pounds |
| Nemacur, 15% Granules | 150 pounds |
| Spreader | 14 gallons |
| Thiram, 75%; Cycloheximide, 0.75% | 155 pounds |

Source: (SOUTHNAVFACENGCOM, March 1984)

6.6 ORDNANCE. Live ordnance was not used for pilot training at NAS Whiting Field. Consequently, the only ordnance storage was for small arms ammunition such as that used by station police. Ordnance was used in small quantities and stored in two ammunition bunkers, 1YC-1 and 1YC-2. Building 1488 was used for storage of small arms ammunition and pyrotechnics. The total storage area was only approximately 400 square feet.

# CHAPTER 7. WASTE PROCESSING

7.1 INTRODUCTION. Naval Air Station (NAS) Whiting Field generated both liquid and solid waste materials in support of its flight training missions. In some cases, the wastes were disposed off Navy property, however, most of the wastes were disposed on-station. Overall, NAS Whiting Field did not generate much hazardous waste.

7.2 WASTE PROCESSING OPERATIONS. Wastes generated at NAS Whiting Field are processed by several methods including sewage treatment, incineration (to a small extent), and off Navy property disposal. The types and quantities of wastes processed by those facilities are discussed below.

7.2.1 <u>Sewage Treatment Plant</u>. The sewage treatment plant at NAS Whiting Field is a secondary treatment system of the low rate, trickling filter type. The process consists of primary clarification and a trickling filter with secondary clarifiers. Post chlorination, aerobic digestion and sludge drying beds. The average daily flow is approximately 0.4 million gallons/day (MGD) with a permited capacity of 0.83 MGD. The raw influent is weak municipal strength and the plant achieves better than 90 percent removal of suspended solids and biochemical oxygen demand. Dryed sludge is either disposed in the sanitary landfill or used for soil conditioner on-station.

7.2.2 <u>Incineration</u>. Incineration was conducted at NAS Whiting on a very limited basis. There were two incinerators on-station. One was for classified documents only at Building 2800, the other was for wet garbage or sludge at Building 1443 and it was only used from the 1940s to the early 1950s.

7.2.3 <u>Waste Fuel Oils and Hazardous Waste Processing</u>. In the past, waste fuels at NAS Whiting Field were collected in drums and tanks and transported by a contractor for use at the Fire Fighting Training Area. Waste oils were collected at several locations around the station in containers and underground tanks. These locations included the following facilities; a waste oil pit southwest of Building 2941, a waste oil tank east of Building 2941, a waste oil tank northwest of Buiding 1454, and a waste oil tank east of Building 1406. Waste oils were routinely transported to the landfills for disposal prior to initiation of the off Navy property disposal program by the Defense Property Disposal Office (DPDO).

Hazardous wastes were generated in several shops and paint stripping wastes from Building 2941 accounted for the majority of these wastes. Wastes have been collected in tanks or drums and transported by NAS Pensacola to NAS Pensacola's industrial wastewater treatment plant for processing. Approximately 6,700 pounds per month of these wastes were generated. Hazardous wastes were also collected in drums in areas adjacent to Buildings 1406A and 1454.

Most unserviceable batteries are used for trade-in purposes. All other lead cases were sent to DPDO for disposal. The battery shop, Building 1478, was responsible for lead-acid battery maintenance. Waste acid or excess solution was washed down the drain with water to dilute the solutions. This drain discharged into a small drain field west of the battery shop. This practice was stopped and a program for the Public Works Center (PWC) Pensacola's disposal was instituted.

## CHAPTER 8. DISPOSAL SITES AND POTENTIALLY CONTAMINATED AREAS

8.1 GENERAL. This chapter presents findings on past waste disposal sites that may be potentially contaminated. As a result of extensive records searches, interviews and on-site examination, 16 potentially contaminated areas were identified at Naval Air Station (NAS) Whiting Field by the IAS team. These are sites where waste disposal occurred in the past. The locations of these 16 waste disposal sites are shown on Figure 8-1. A detailed discussion of each of the identified disposal sites is contained in the remainder of this chapter. Each of the sites is discussed in terms of its location, operational history, types of wastes disposed at the site, and potential contaminant migration pathways and receptors. Table 8-1 summarizes the information collected on these sites.

8.2 SITE 1, NORTHWEST DISPOSAL AREA. Site 1 covers an area of approximately five acres and is located just west of the perimeter patrol road and north of "E" drainage ditch. This site was used as a general refuse disposal area from the time NAS Whiting Field was established in 1943 until around 1965. The site is in a depressed area which is approximately ten feet below the perimeter road. The location of the site is shown on Figure 8-2.

Waste disposed at this site included primarily general refuse, and wastes associated with the operation and maintenance of aircraft (paint, paint thinner, solvents, waste oils and hydraulic fluid). Access to the site was uncontrolled and there were no records on the types of wastes disposed at Site 1. Table 8-2 summarizes the types and quantities of wastes potentially disposed at Site 1.

The site is currently covered with rows of small pine trees approximately five to six feet in height. No buried wastes were exposed at the site, nor were there other indications of past waste disposal operations.

With the site being in a depressional area, much of the precipitation infiltrates directly into the soil. Any surface drainage from the site occurs along the southwestern edge and is ultimately intercepted by the concrete-lined "E" ditch just to the south. This ditch drains into Clear Creek which is located approximately 1,300 feet west of the disposal area. Clear Creek in turn drains south to the Blackwater River.

8.3 SITE 2, NORTHWEST OPEN DISPOSAL AREA. Site 2 is located at a borrow pit in the northwestern portion of Whiting Field. The borrow pit covers an area of approximately 6 acres and is about 20 feet below the surrounding ground, at its lowest point. The location of the site is shown in Figure 8-2.

Between 1976 and 1984, the site was used as an open disposal area primarily for construction and demolition debris. Wastes disposed at the site include asphalt, wood, tires, furniture and similar materials which were not suitable for landfill disposal. Crushed paint cans and scrap metal parts were scattered throughout the site. The wastes disposed at this site are uncovered.

Due to the steep side slopes of the borrow pit, no surface drainage would occur from the site. Surface drainage within the borrow pit would be down the partially vegetated side slopes to low areas near the middle of the pit where infiltration into the soils would occur.

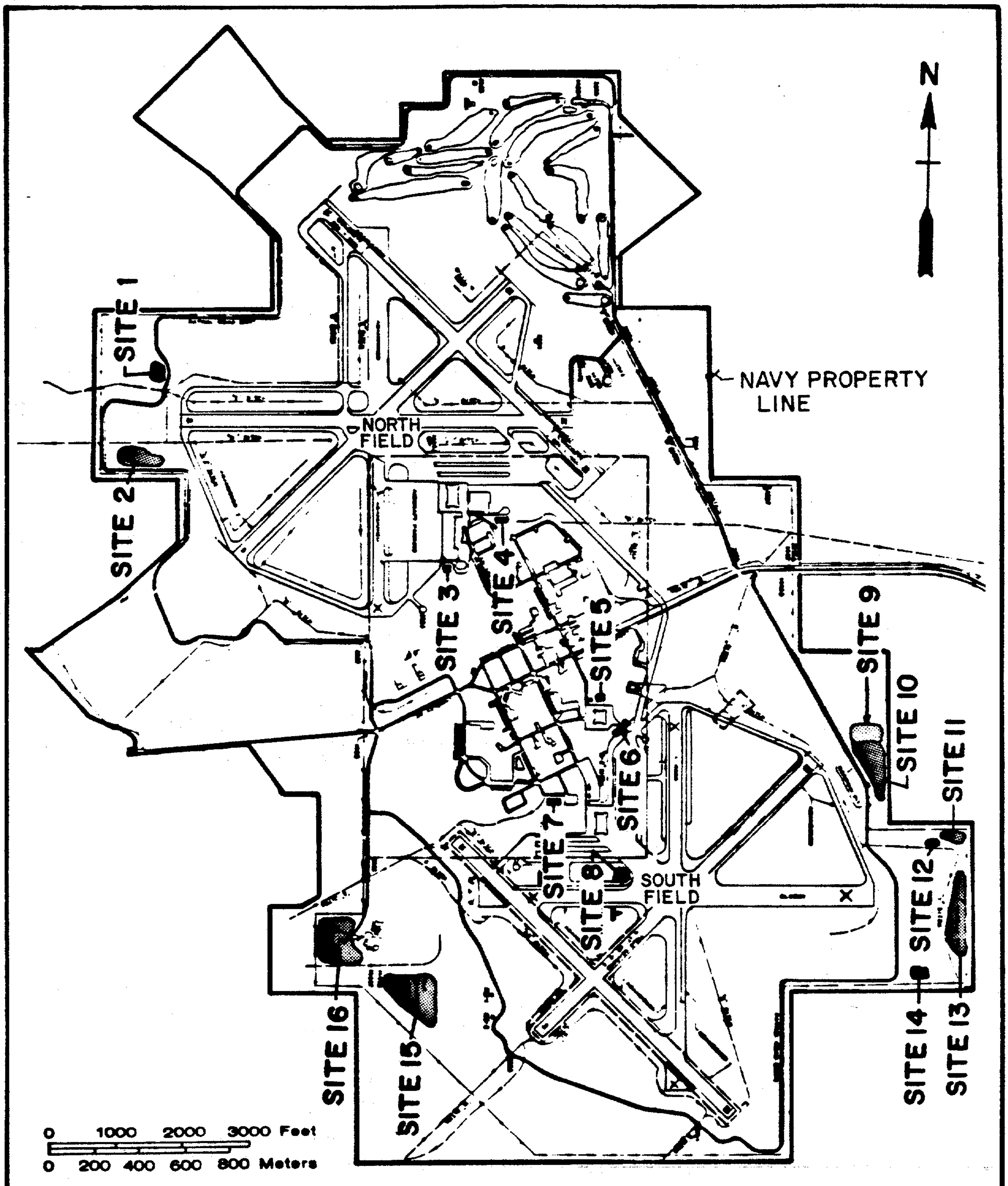



FIGURE 8-1

**Waste Disposal Sites**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

Table 8-1

Potentially Contaminated Sites at NAS Whiting Field

| Site No. | Site Name | Location | Period of Operation | Types of Material Disposed | Comments |
|---|---|---|---|---|---|
| 1 | Northwest Disposal Area | North Field, West Side | 1943-1965 | Refuse, waste paints, paint thinners, solvents, waste oils, hydraulic fluids | Secondary disposal area during this period; site covers 5 acres |
| 2 | Northwest Open Disposal Area | North Field, West Side | 1976-1984 | Construction and demolition debris, tires, furniture | Former borrow pit location, commonly referred to as the "Wood Dump" |
| 3 | Underground Waste Solvent Storage Area | North Field, South of Building 2941 | 1980-1984 | Waste solvents, paint stripping residue | Wastes generated by paint stripping operations |
| 4 | North AVGAS Tank Sludge Disposal Area | North Field, North of Tow Lane | 1943-1968 | Tank bottom sludge containing tetraethyl lead | Sludge disposal in shallow holes near tanks |
| 5 | Battery Acid Seepage Pit | South Field, near Building 1478 | 1964-1984 | Waste electrolyte solution containing heavy metal | Pit located 110 feet from potable supply well (W-S2) |
| 6 | South Transformer Oil Disposal Area | South Field, Building 1478 | 1940s-1964 | PCB-contaminated dielectric fluid | Disposal in "O-2" drainage ditch |
| 7 | South AVGAS Tank Sludge Disposal Area | South Field, West of Building 1406 | 1943-1968 | Tank bottom sludge containing tetraethyl lead | Sludge disposed in shallow holes near tanks |
| 8 | AVGAS Fuel Spill Area | South Field, South of Building 1406 | Summer 1972 | AVGAS containing tetraethyl lead | Fuel spill of about 25,000 gallons on an area of about 2 acres |
| 9 | Waste Fuel Disposal Pit | South Field, East Side | 1950s-1960s | Waste AVGAS containing tetraethyl lead | Fuel disposed in former borrow pit |
| 10 | Southeast Open Disposal Area (A) | South Field, Southeast Area | 1965-1973 | Construction and demolition debris, waste solvents, paint, oils, hydraulic fluid, PCBs, pesticides, herbicides | Secondary disposal area during this period; site covers about 4 acres |
| 11 | Southeast Open Disposal Area (B) | South Field, Southeast Area | 1943-1970 | Construction and demolition debris, waste solvents, paint, oils, hydraulic fluid, PCBs | Secondary disposal area during this period; site covers about 3 acres |
| 12 | Tetraethyl lead Disposal Area | South Field, Southeast Area | May 1, 1968 | Tank bottom sludge and fuel filters contaminated with tetraethyl lead | Disposal area posted with date and warning, site consists of two earth covered mounds, 25 ft x 25 ft area |
| 13 | Sanitary Landfill | South Field, Southeast Area | 1979-1984 | Refuse, waste solvent, paint, asbestos | Primary sanitary landfill, potentially received hazardous wastes the first year of operation |
| 14 | Short-Term Sanitary Landfill | South Field, Southeast Area | 1978-1979 | Refuse, waste solvent, oils, paint, hydraulic fluids | Primary sanitary landfill for brief period; relocated due to drainage problems |
| 15 | Southwest Landfill | South Field, Southwest Area | 1965-1979 | Refuse, waste paint, oils, solvents, thinners, asbestos, hydraulic fluid | Primary landfill for this time period; covers about 15 acres |
| 16 | Open Disposal and Burning Area | South Field, Southwest Area | 1943-1965 | Refuse, waste paint, oils, solvents, thinners, PCBs hydraulic fluid | Primary disposal area for this time period; covers about 10 acres |

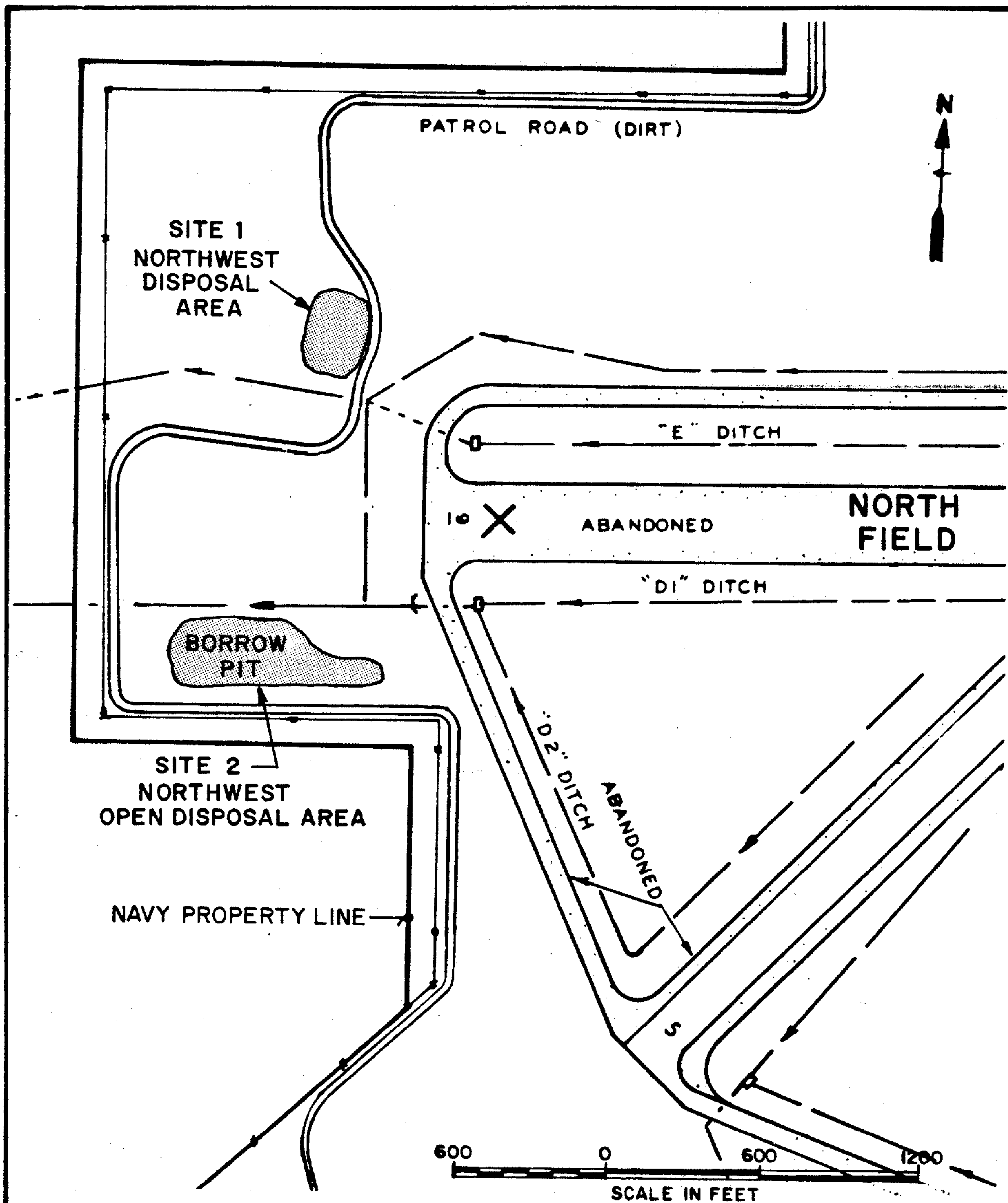



FIGURE 8-2

**Waste Disposal Sites 1 and 2**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

Table 8-2

Wastes Potentially Disposed at Site 1, Northwest Disposal Area

| Waste | Source of Waste | Time Period | Estimated* Total Quantity | Comments |
|---|---|---|---|---|
| General Refuse | Naval Air Station | 1943 to 1965 | - | Site 1 was a secondary disposal during this period (Site 16 the primary) |
| Paint Stripping Wastewater | AIMD Paint Shop | 1943 to 1965 | 200,000 gallons | Paint stripping wastes diluted significantly with copious amounts of rinse water |
| Waste Paints and Thinners | Operations Maintenance Division | 1943 to 1960 | 300 gallons | **After 1960, this waste went to the Fire Fighting Training Area |
| Solvents (MEK, toluene, xylene, PD-680) | Air Frame Shop, Aircraft Maintenance, Transportation Division Shop, | 1943 to 1965 | 20,000 gallons | ** |
| Waste Oils and Hydraulic Fluids | Operations Maintenance Division, Transportation Division Shop, | 1943 to 1965 | 40,000 gallons | ** |

Note: *Assumes 3/10 of the total maximum yearly waste generated disposed at Site 1, 1/5 disposed at Site 11, and 1/2 disposed at Site 16; estimates rounded to one significant figure.
**Maximum quantity disposed at this site and/or Fire Fighting Training Area.

8.4 SITE 3, UNDERGROUND WASTE SOLVENT STORAGE AREA. Site 3 is located approximately 90 feet south of Building 2941 and just north of Paint Locker 2987. Two 500-gallon underground metal tanks were used from 1980 to April of 1984 for the storage of waste solvents and residue generated from paint-stripping operations conducted at Building 2941. Wastes from the tanks were periodically pumped out for off Navy property disposal. The location of the site is shown on Figure 8-3.

In April of 1984, use of the underground tanks was discontinued and the two tanks were removed from the site. During excavation operations at the site, one of the tanks was punctured by a backhoe, resulting in the spillage of approximately 120 gallons of waste solvents onto the ground. Clean-up operations conducted at the site resulted in the recovery of approximately 50 gallons of the waste solvent. In addition, approximately six cubic yards of contaminated soil was removed from the site and taken off Navy property for disposal. Examination of the tanks after their removal revealed holes up to 0.5 inch in diameter. The holes were apparently caused by the waste solvents corroding through the metal tanks. The extent to which the paint-stripping wastes leaked from the tanks is unknown. Appendix B presents a copy of analytical results for the accumulated sludge obtained from the tanks during excavation operations.

Surface runoff from the site enters nearby stormwater inlets. There is one stormwater inlet approximately ten feet west of the site. The storm water drainage system in the area likely drains east into "P" ditch before ultimately outfalling to Big Coldwater Creek, which lies approximately 2.8 miles east of the site.

NAS Whiting Field's north potable supply well (W-N4) is located approximately 1,400 feet southeast of the site. Two additional wells, the west well (W-W3) and the south well (W-S2) are located approximately 2,100 and 3,200 feet southeast of the site. The well taps the surficial sand and gravel aquifer.

8.5 SITE 4, NORTH AVGAS TANK SLUDGE DISPOSAL AREA. Site 4 is located north of the tow lane on the North Field. The site contains eight 23,700-gallon underground steel tanks which were used for AVGAS storage. The tank farm covers an area of approximately 2.5 acres and is surrounded by a fence. The tanks date back to 1943 when NAS Whiting Field first began operations. The location of the site is shown on Figure 8-3.

Approximately every four years, the tanks required cleaning to remove the sludge material which settles on the bottoms of the tanks. Cleaning operations consisted of a workman entering the tanks and removing the accumulated sludge. The sludge material, which contained tetraethyl lead, was then buried in the area immediately adjacent to the tank being cleaned. A hand shovel was used to dig a shallow hole into which the sludge was placed and then covered over. Reportedly, 25 to 50 gallons of sludge were generated per tank during cleaning operations.

From 1943 to 1968, the tank bottom sludge was disposed in this manner. Over this time period, the tanks would have been cleaned an estimated six times. Assuming that 25 to 50 gallons of sludge was disposed per tank during each cleaning, roughly 1,200 to 2,400 gallons of sludge is buried throughout the tank farm in the areas surrounding the tanks.

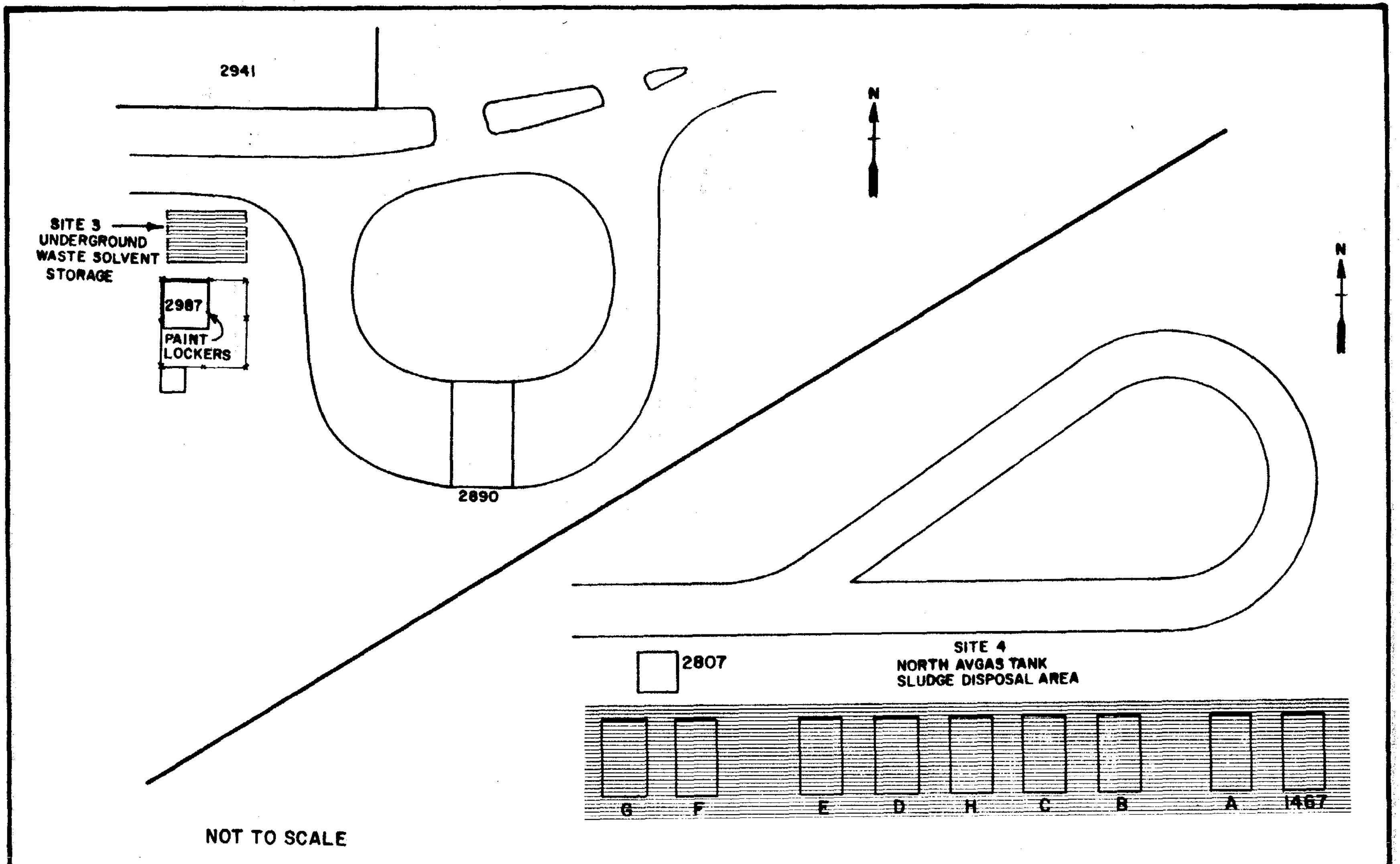



FIGURE 8-3

**Waste Disposal Sites 3 and 4**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

Six of the tanks have been abandoned in place and are filled with water. The remaining two tanks are presently being used for diesel fuel storage. The area is currently grass covered with no visible evidence of contamination. Surface drainage from the relatively flat site would most likely discharge to the "P" ditch which is located near the southeast corner of the site. The "P" ditch ultimately drains to Big Coldwater Creek, which is approximately 2.6 miles east of the site.

8.6 SITE 5, BATTERY ACID SEEPAGE PIT. Site 5 is located west of Building 1478. From 1964 to 1984, waste battery acid and electrolyte solution from the battery shop, Building 1478, were poured down the drain of a sink which was connected to a dry well. An estimated 180 gallons of waste electrolyte solution was discharged to the dry well annually. The dry well is located just west of the battery shop and consists of a 60-inch diameter concrete culvert set vertically into the ground and filled with lime rock. The disposal operations were discontinued in 1984. The sink drain was disconnected from the dry well and connected to the sanitary sewer. The location of the site is shown in Figure 8-4.

NAS Whiting Field's south potable supply well (W-S2) is located approximately 110 feet east of the dry well. Two additional potable wells, the west well (W-W3) and the north well (W-N4), are located approximately 1,200 and 2,100 feet northwest of the site, respectively. All three of these wells tap the surficial sand and gravel aquifer.

8.7 SITE 6, SOUTH TRANSFORMER OIL DISPOSAL AREA. Site 6 is located southeast of Building 1454. From the 1940s until 1964, Building 1478 (currently the battery shop) was used as a transformer repair and rework shop. Prior to servicing the transformers, the dielectric fluid, which probably contained PCBs, was reportedly drained into the grassed "O-2" drainage ditch located approximately 500 feet southeast of the old transformer repair shop and east of Building 1454. The location of the ditch is shown in Figure 8-4. Disposal operations were discontinued in 1964 so Building 1478 could be converted into the battery shop.

The grassed "O-2" drainage ditch into which the transformer oil was disposed drains in a northeasterly direction to the "O" ditch. The "O" ditch connects to the "P" ditch which drains east into Big Coldwater Creek located approximately 2.3 miles east of the disposal site.

NAS Whiting Field's south potable supply well (W-S2) is located approximately 500 feet northwest of the disposal area. Two additional potable wells, the west well (W-W4) and the north well (W-N4) are located approximately 1,700 and 2,600 feet northwest of the site, respectively. All three wells tap the surficial sand and gravel aquifer.

8.8 SITE 7, SOUTH AVGAS TANK SLUDGE DISPOSAL AREA. Site 7 is located west of Building 1406. The site contains eight 23,700-gallon underground steel tanks which were used for AVGAS storage until the late 1970s. The tank farm covers an area of approximately 1.8 acres and is surrounded by a fence. The tanks date back to 1943 when NAS Whiting Field was commissioned. The location of the site is shown on Figure 8-5.

The tanks were cleaned approximately every four years to remove the sludge material which settled on the bottom of the tanks. Cleaning operations consisted of a workman entering the tanks and removing the accumulated sludge.

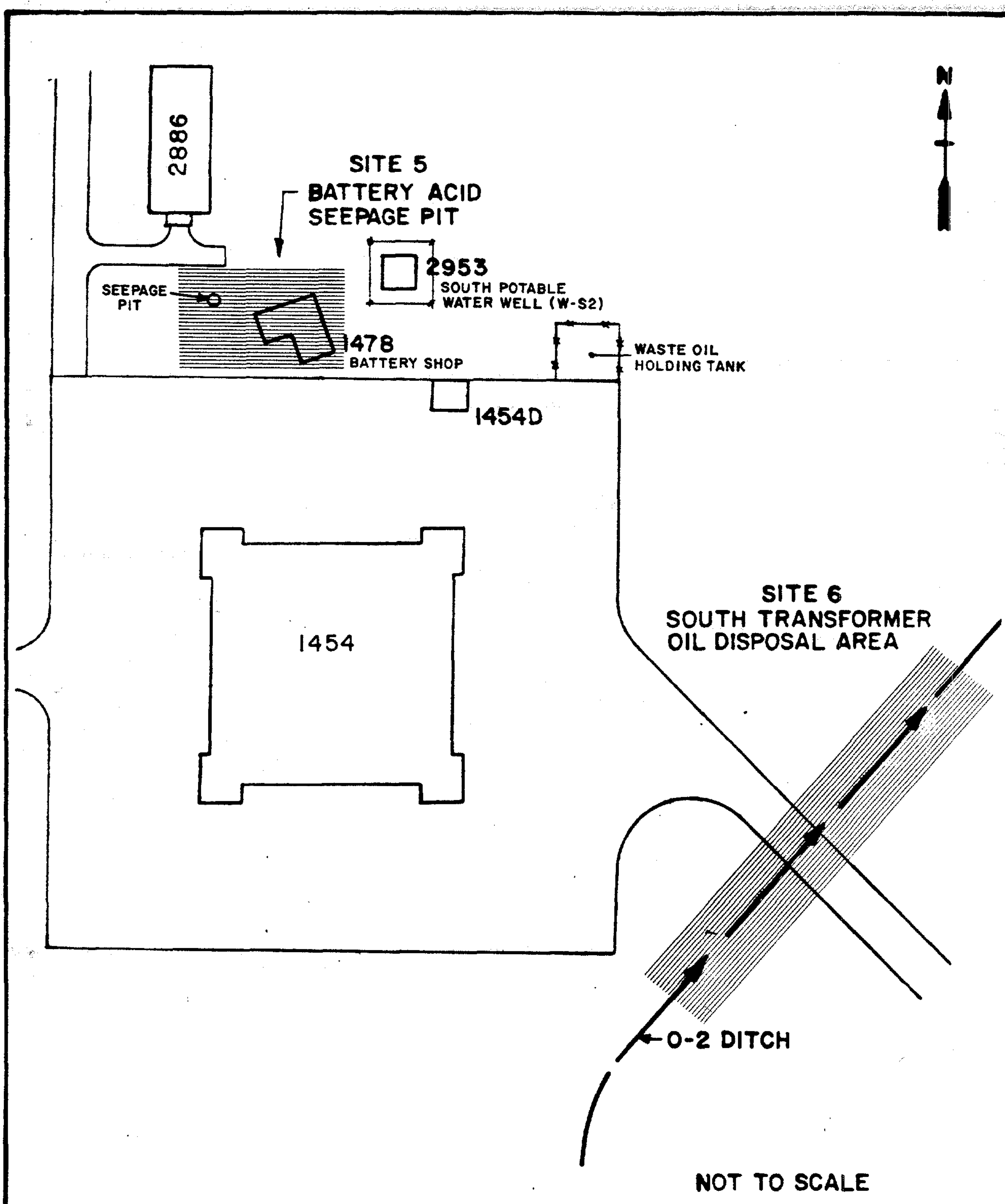



FIGURE 8-4

**Waste Disposal**
**Sites 5 and 6**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

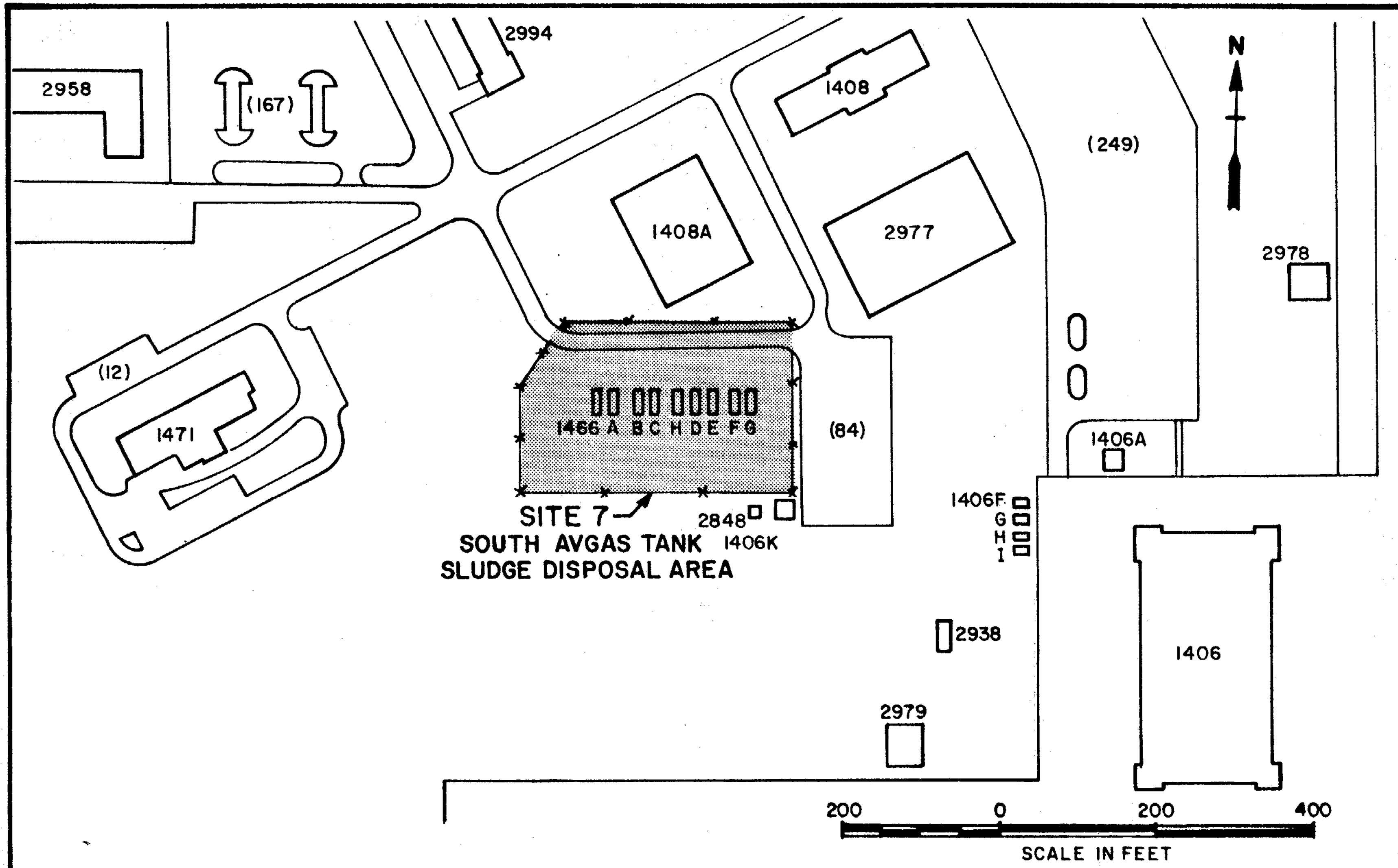



FIGURE 8-5

**Site 7, South AVGAS Tank Sludge Disposal Area**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

The sludge material, which contained tetraethyl lead, was then buried in the area immediately adjacent to the tank being cleaned. A hand shovel was used to dig a shallow hole into which the sludge was placed and covered. Reportedly, 25 to 50 gallons of sludge were generated per tank during cleaning operations.

From 1943 to 1968, the tank bottom sludge was disposed in this manner. Over this time period, the tanks would have been cleaned an estimated six times. Assuming that 25 to 50 gallons of sludge was disposed per tank during each cleaning, roughly 1,200 to 2,400 gallons of sludge is buried throughout the tank farm in the areas surrounding in the tanks. Five of the tanks are currently abandoned at the site and are filled with water.

Any surface runoff from the grass covered site would probably discharge to the "A" ditch which is located west of the site. The "A" ditch ultimately discharges to Clear Creek, which lies approximately 0.8 mile southwest of the site.

8.9 SITE 8, AVGAS FUEL SPILL AREA. Site 8 is located south of Building 1406. In the Summer of 1972, 25,000 gallons of high octane aviation fuel (AVGAS) was spilled at the South Field. The spill occurred when a rubber fueling hose was accidentally cut and leaked unnoticed over a three day weekend. The aviation fuel flowed approximately 200 feet across a concrete apron and onto a grassed area where it ponded and killed the vegetation in an area of approximately two acres (Geraghty and Miller, 1984). The fuel spill area is shown on Figure 8-6.

Due to the high volatility of AVGAS, a significant portion of the spilled fuel probably evaporated, with the remaining fuel seeping into the ground. An earlier investigation of the site estimated that within a depth of 1.2 feet, the AVGAS would have been immobilized by the soil particles (Geraghty and Miller, 1984). Microbial action has likely decomposed essentially all of the fuel held in the soil in the 12 years since the spill. However, the soil could still be contaminated with residual tetraethyl lead.

There is no indication of any contamination at the site. The area where the fuel was ponded is currently covered with grass with no signs of biological stress.

8.10 SITE 9, WASTE FUEL DISPOSAL PIT. Site 9 is located along the eastern property line near South Field. During the 1950s and 1960s, waste fuel was disposed in a clay pit. The waste fuel disposal pit reportedly has been covered over. The precise location of the disposal pit is unknown. However, the pit was reportedly located in the northern portion of an existing borrow pit, as shown in Figure 8-7.

A tank truck with a capaity of around 500 gallons was used to store the waste fuel. The tank truck was also used to transport the waste fuel to the disposal pit where it was subsequently drained. Approximately 200 to 300 gallons of waste fuel was disposed at the site per trip. The total quantity of waste fuel disposed at the site during the period of time that the disposal pit was used is unknown.

During the time period that the site was utilized, AVGAS was being used at the Air Station. Thus, waste fuel disposed at the site would have contained tetraethyl lead. Waste fuel obtained during the cleaning of Tanks 2891 and

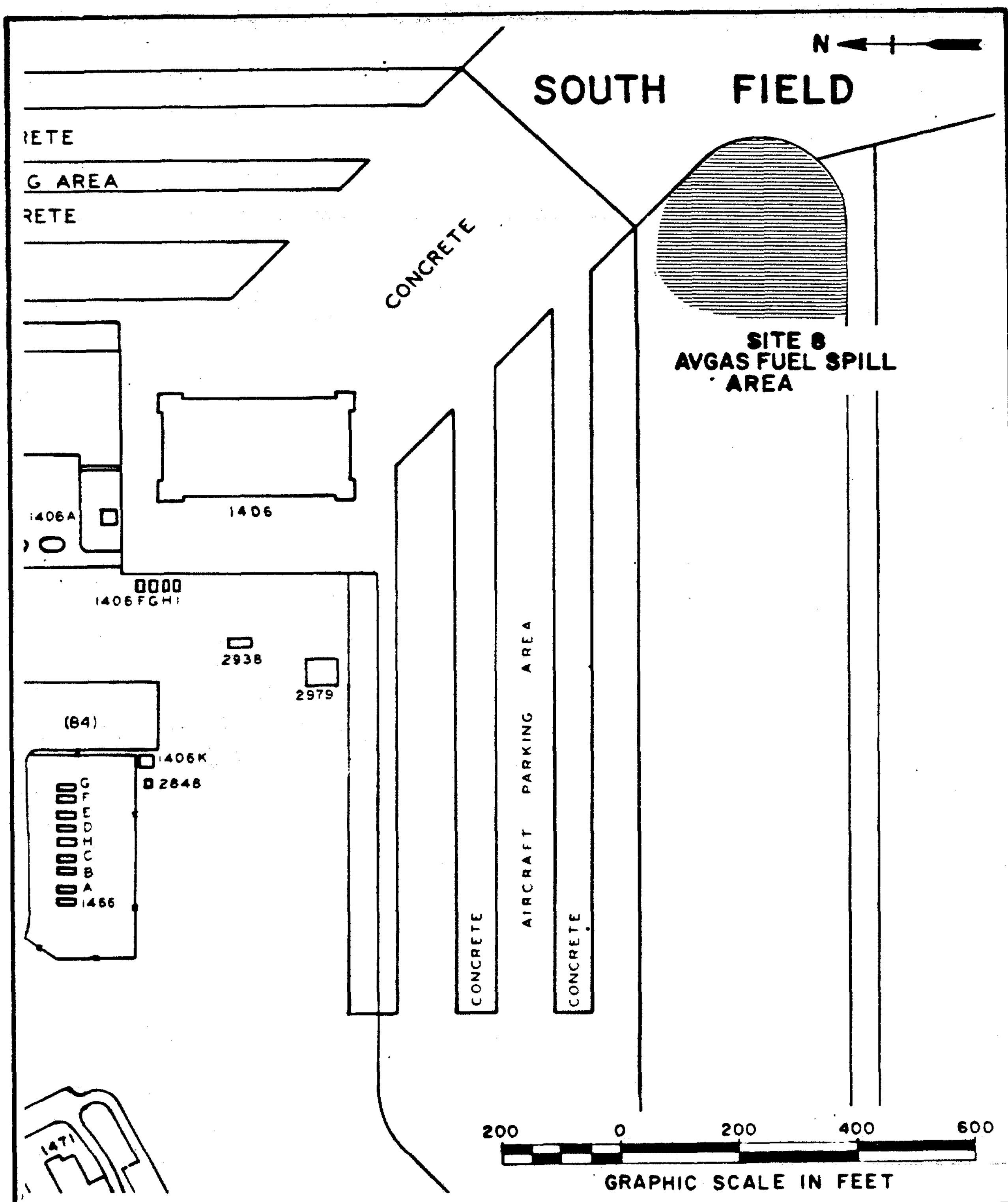



FIGURE 8-6

## Site 8
## AVGAS Fuel Spill Area

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

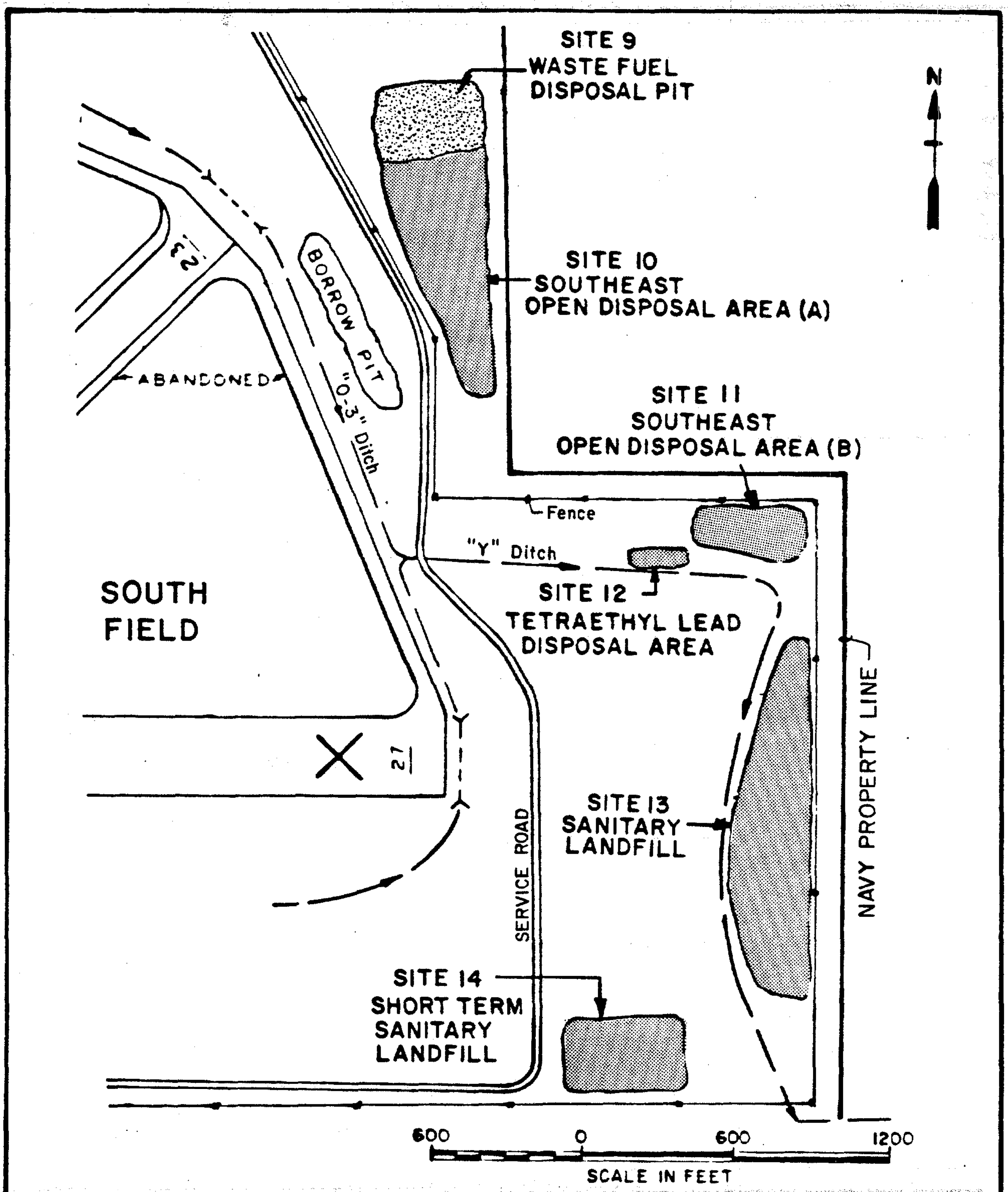



FIGURE 8-7

**Waste Disposal**
**Sites 9,10,11,12,13 & 14**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

2892, both 200,000-gallon aboveground tanks, may also have been disposed at the site. These tanks were also used for AVGAS storage, and thus would have contained tetraethyl lead.

The general area where the disposal pit is located can be characterized as a depressed area, which is approximately ten feet below the grade of the perimeter road. Surface runoff from portions of Site 10 is onto this depressed area. Surface drainage for most of the area is into the northeastern most corner where it apparently ponds and slowly infiltrates into the soil. During the on-site survey, approximately 6 to 12 inches of water was ponded in this area. In addition, there were signs of surface erosion along the eastern embankment of the patrol road, where there is a steep grade.

8.11 SITE 10, SOUTHEAST OPEN DISPOSAL AREA (A). Site 10 is located in the southeastern portion of the air station just east of the perimeter road at the site of an old borrow pit. The site covers an area of approximately four acres. The site was used from 1965 to approximately 1973 as an open disposal area. The location of the site is shown on Figure 8-7.

The site was used mainly for the disposal of inert type wastes such as construction debris (concrete, lumber, asphalt, etc.), trees, brush, metal cans and similar materials not suitable for landfill disposal. Transformer oil, potentially contaminated with PCBs, was also disposed at this site. The transformers were reportedly placed on flatbed trucks and driven to the site where the oil was drained onto the ground. Empty pesticide/herbicide containers from the pesticide shop were also reportedly disposed at this site.

Access to the site was uncontrolled and there were no or records on the types of wastes disposed. Wastes potentially disposed at this site include wastes associated with the operation and maintenance of aircraft such as waste solvents, paint, oil and hydraulic fluid. Table 8-3 summarizes the types and quantities of wastes potentially disposed at Site 10. The site was covered after its closure in 1973, but construction rubble has been disposed at this site since this date.

A major portion of the surface runoff from the site drains north to a depressional area adjacent to the site. During the site inspection, approximately 6 to 12 inches of water was ponded in the depressed area. Runoff from the depressed area, along with the remaining areas of the disposal site is east toward Big Coldwater Creek approximately 1.9 miles away.

8.12 SITE 11, SOUTHEAST OPEN DISPOSAL AREA (B). Site 11 is located in the southeastern portion of the air station near the eastern property line. This site was used as an open disposal area from the time NAS Whiting Field was established in 1943 until approximately 1970. The disposal area covers approximately three acres and is located at the site of an old borrow pit. The location of the site is shown on Figure 8-7.

The site had uncontrolled access and there were no records on the types of wastes disposed. The site was reportedly used to dispose of a wide variety of wastes which included general refuse, construction debris (concrete, asphalt, lumber, etc.), tree clippings and furniture. Transformers, potentially containing PCBs, were also drained at the site. Wastes associated with the operation and maintenance of aircraft (paint, paint thinner,

Table 8-3

Wastes Potentially Disposed at Site 10, Southeast Open Disposal Area (A)

| Waste | Source of Waste | Time Period | Estimated* Total Quantity | Comments |
|---|---|---|---|---|
| Construction and Demolition Debris | Naval Air Station | 1965 to 1973 | - | Site 10 was a secondary disposal area during this period. It was used primarily for the disposal of inert wastes |
| Paint Stripping Wastewater | AIMD Paint Shop | 1965 to 1973 | 40,000 gallons | Paint stripping wastes diluted significantly with copious amounts of rinse water |
| Solvents (MEK, toluene, xylene, PD-680) | Air Frame Shop, Aircraft Maintenance, Transportation Division Shop | 1965 to 1973 | 5,000 gallons | ** |
| Waste Oils and Hydraulic Fluids | Operation Maintenance Division, Transportation Division Shop | 1965 to 1973 | 8,000 gallons | ** |

Note: *Assumes that 1/5 of the total maximum yearly waste generated disposed at Site 10, 4/5 disposed at Site 15.
**Maximum Quantity disposed at this site and/or Fire Fighting Training Area.

solvents, waste oils and hydraulic fluid) may have also been disposed at the site. Table 8-4 summarizes the types and quantities of wastes potentially disposed at Site 11.

Disposal operations at the site were discontinued around 1970. At this time, a final covering was placed over the site and pine trees planted. Pine trees approximately 25 to 30 feet tall now occupy the site, with the exception of the northeastern portion. The areas surrounding the site are also pine covered.

The site generally slopes from south to north and from west to east. Surface runoff from the site is toward the northeastern corner where there is a low point. Runoff apparently ponds in this area. Any runoff from the site would continue in a northeasterly direction across the dirt access road which borders the site on the north. There were signs of surface erosion along the shoulders of the road in this area. Surface runoff from the site would ultimately drain to Big Coldwater Creek located approximately 1.7 miles east of the site. A bermed area with pine trees borders the area on the east. Drainage ditch "Y" is located just south of the site, but does not receive runoff from the site.

8.13 SITE 12, TETRAETHYL LEAD DISPOSAL AREA. Site 12 is located on the eastern property line of South Field. Tank bottom sludge and fuel filters contaminated with tetraethyl lead were disposed at this site on 1 May 1968. A sign is posted at the site with this date and warns of tetraethyl lead. The sludge was generated during the cleaning of both the North and South Field aqua storage tanks. The site location is shown in Figure 8-7.

The disposal area consists of two earth covered mounds within a fenced area of approximately 50 feet by 25 feet. Each of the mounds is approximately five feet high and ten feet in diameter. The sludge was apparently placed directly onto the ground and covered. Sludge from the north Aqua System storage tanks most likely represents one of the mounds, with the other mound being sludge from the south field Aqua System tanks. Each of the mounds contain between 200 to 400 gallons of sludge.

The "Y" drainage ditch is located immediately adjacent to the southern border of the site. Any surface runoff from the site would enter the ditch and ultimately discharge to Big Coldwater Creek, which is located approximately 1.7 miles east of the site. The drainage ditch is not concrete lined. The banks of the ditch are covered with vegetation.

The surficial sand and gravel aquifer underlies the site. Intermediate clay lenses common to the aquifer create the potential for perched water table conditions and low vertical permeabilities at the site. Barring the existence of perched ground water, the water table at the site would be approximately 80 feet below the ground. Ground water movement in the area is in an easterly direction toward Big Coldwater Creek. NAS Whiting Field's three potable wells are upgradient of the site and thus would not be impacted by the site. The closest potable well is the south well (W-S2) which is located approximately one mile northeast of the site.

The major potential contaminant migration pathways for the site are ground water movement and surface runoff. The disposal mounds are covered and there are no signs of exposed sludge or surface erosion within the disposal. However, given the fact that surface runoff from the site goes directly in the

Table 8-4

Wastes Potentially Disposed at Site 11, Southeast Open Disposal Area (B)

| Waste | Source of Waste | Time Period | Estimated* Total Quantity | Comments |
|---|---|---|---|---|
| General Refuse | Naval Air Station | 1943 to 1970 | - | Site 11 was a secondary disposal area during this period, Site 16 was the primary disposal area |
| Paint Stripping Wastewater | AIMD Paint Shop | 1943 to 1970 | 100,000 gallons | Paint stripping wastes diluted significantly with copious amounts of rinse water |
| Waste Paints and Thinners | Operations Maintenance Division | 1943 to 1960 | 200 gallons | **After 1960, this waste went to the Fire Fighting Training Area |
| Solvents (MEK, toluene, xylene, PD-680) | Air Frame Shop, Aircraft Maintenance, Transportation Division Shop | 1943 to 1970 | 20,000 gallons | ** |
| Waste Oils and Hydraulic Fluids | Operation Maintenance Division, Transportation Division Shop | 1943 to 1970 | 30,000 gallons | ** |

Note: *Assumes that 3/10 of the total maximum yearly waste generated disposed at Site 1, 1/5 disposed at Site 11, and 1/2 disposed at Site 16. Estimates rounded to one significant figure.
**Maximum Quantity disposed at this site and/or Fire Fighting Training Area.

"Y" drainage ditch located on 20 feet away and that the sludge is mounded aboveground, and thus more susceptible to erosion, surface runoff could in the future represent a pathway for contaminant migration.

Depending on the extent of clay lenses in the immediate area of the site, ground water could be moving latterally and discharging into the drainage ditch. The ultimate contaminant receptors for the site are the surficial sand and gravel aquifer and Big Coldwater Creek.

8.14 SITE 13, SANITARY LANDFILL. Site 13 is located on the eastern property line of South Field. The landfill currently covers an area of approximately four acres. This is the site of the currently operating sanitary landfill for NAS Whiting Field. Landfill operations at the site began in 1979. Since 1979, this site has received all the NAS wastes disposed on-station except construction and demolition debris which is disposed at Site 2. The location of the site is shown in Figure 8-7.

The trench method is used for disposal operations, with wastes covered on a daily basis. During the first year of operation wastes associated with the operation maintenance of aircraft such as waste solvents, paint, oil, and hydraulic fluid were potentially disposed at the site. Asbestos wrapped in plastic was also disposed at the landfill. The landfill currently receives general refuse and non-hazardous waste. Table 8-5 summarizes the types and quantities of wastes potentially disposed at Site 13.

The vegetated "Y" drainage ditch borders the landfill to the west and south. The general land slope in the area is from the northwest to southeast. However, the landfill is depressed from surrounding ground and runoff typically ponds on-site. At the time of the on-site survey, water was ponded at the site. In the event there is surface runoff from the site, it would drain toward Big Coldwater Creek, located approximately 1.7 miles east of the site.

8.15 SITE 14, SHORT-TERM SANITARY LANDFILL. Site 14 is located in the southeastern portion of the station near the end of abandoned runway 27 on 2.5 acres. This site was used for six to nine months starting in 1978 and continuing into 1979 as a sanitary landfill. The site was abandoned after this short period of time due to excessive amounts of clay which caused water to pond throughout the site. Trucks delivering wastes were continually getting stuck, so the decision was made to relocate the site. The location of Site 14 is shown on Figure 8-7. During the short period of time the landfill was operated, waste solvents and residue from paint stripping operations probably were disposed at the landfill. The majority of wastes that was disposed at the site would have been general refuse and non-hazardous waste. Table 8-6 summarizes the types and quantities of wastes potentially disposed at Site 14.

Much of the central portion of the site is unvegetated, with the area around the periphery of the site being grass or weed covered. The area surrounding the site is covered with pine trees. Access to the site is from the perimeter patrol road. The site generally slopes from west to east. Surface drainage from the area is in an easterly direction toward the vegetated "Y" ditch which borders the site on the east. The ditch drains east towards Big Coldwater Creek which is located approximately 1.8 miles east of the site. The site itself is poorly drained and shows obvious signs of surface erosion.

Table 8-5

Wastes Potentially Disposed at Site 13, Sanitary Landfill

| Waste | Source of Waste | Time Period | Estimated Total Quantity | Comments |
|---|---|---|---|---|
| General Refuse | Naval Air Station | 1979 to 1984 | - | Site 13 is the primary landfill for the Naval Air Station |
| Paint Stripping Wastewater | AIMD Paint Shop | 1979 to 1980 | 24,000 gallons | Paint stripping wastes diluted significantly with copious amounts of rinse water |
| Solvents (MEK, toluene, xylene, PD-680) | Air Frame Shop, Transportation Division Shop, Helicopter Maintenance | 1979 to 1980 | 1,000 gallons | ** |
| Waste Oils and Hydraulic Fluids | Operation Maintenance Division, Transportation Division Shop | 1979 to 1980 | 600 gallons | ** |

Note: **Maximum Quantity disposed at this site and/or Fire Fighting Training Area.

Table 8-6

Wastes Potentially Disposed at Site 14, Short-Term Sanitary Landfill

| Waste | Source of Waste | Time Period | Estimated Total Quantity | Comments |
|---|---|---|---|---|
| General Refuse | Naval Air Station | 1978 to 1979 | - | Site 14 was the primary landfill for this brief period; relocated due to drainage problems |
| Paint Stripping Wastewater | AIMD Paint Shop | 1978 to 1979 | 24,000 gallons | Paint stripping wastes diluted significantly with copious amounts of rinse water |
| Solvents (MEK, toluene, xylene, PD-680) | Air Frame Shop, Transportation Division Shop, Helicopter Maintenance | 1978 to 1979 | 1,000 gallons | ** |
| Waste Oils and Hydraulic Fluids | Operation Maintenance Division, Transportation Division Shop | 1978 to 1979 | 600 gallons | ** |

Note: **Maximum Quantity disposed at this site and/or Fire Fighting Training Area.

8.16 SITE 15, SOUTHWEST LANDFILL. Site 15 is located southeast of the wastewater treatment plant on an area of approximately 15 acres. The landfill was operated from 1965 until 1979. The location of the site is shown on Figure 8-8.

The majority of solid wastes generated during this period at NAS Whiting Field were disposed at this site. Wastes disposed included primarily general refuse and other wastes associated with the operation and maintenance of aircraft (paint, paint thinner, solvents, waste oil and hydraulic fluid). This included wastes from the Aircraft Intermediate Maintenance Department (AIMD) and the training squadrons. Bagged asbestos was also reportedly disposed at the site, and potentially PCB-contaminated dielectric fluid. Approximately 3,000 to 4,500 tons of waste were disposed at the site annually. Table 8-7 summarizes the types and quantities of wastes potentially disposed at Site 15. The site was operated as a landfill, with the waste material being covered on a daily basis. No burning was conducted at the site.

The site is located at the foot of the western highland. The area has a surface slope of about five percent. The land slopes from the east to the west toward Clear Creek. Thus, surface runoff from the site is to Clear Creek which is approximately 1,200 feet west of the site. Much of the site is covered with small pine trees. However, there are numerous areas void of vegetation. Severe surface erosion, as a result of the surface slope, was quite evident at the site during the on-site survey. The erosion problem is compounded by the fact that vegetative cover has not been fully established at the site. As a result of the erosion, some of the buried wastes have been exposed, including paint cans, oil filters, and spark plugs. Berms have been created throughout the landfill area to reduce surface erosion. The site is surrounded by tall pine trees.

Ground water movement in the area is also to the west toward Clear Creek. Since the site is located in the lowland with an elevation of about 75 feet mean sea level (msl), the water table should be close to the land surface. Barring the existence of a perched water table, the ground water would be approximately 30 feet below the ground surface. All the potable wells of NAS Whiting Field are upgradient from the site and would not be affected.

Intermediate clay lenses, which are characteristic of the surficial sand and gravel aquifer underlying the site, create the potential for perched water table conditions and low vertical permeabilities. The presence of clay lenses at the site would restrict the downward movement of contaminants, but could result in perched ground water at or near the buried wastes. Both surface runoff and ground water movement represent pathways for contaminant migration from the site. Clear Creek and the surficial sand and gravel aquifer could be impacted by contaminates migrating from the site.

8.17 SITE 16, OPEN DISPOSAL AND BURNING AREA. Site 16 is located just east of Clear Creek and west of the wastewater treatment plant. The site covers an area of approximately ten acres. This site was used as an open disposal and burning area from the time NAS Whiting Field was established in 1943 until around 1965. During this period of time, the site reportedly received the majority of wastes generated at the air station. The location of the site is shown in Figure 8-8.

Wastes disposed at this site included primarily general refuse and wastes associated with the operation and maintenance of aircraft (paint, solvents,

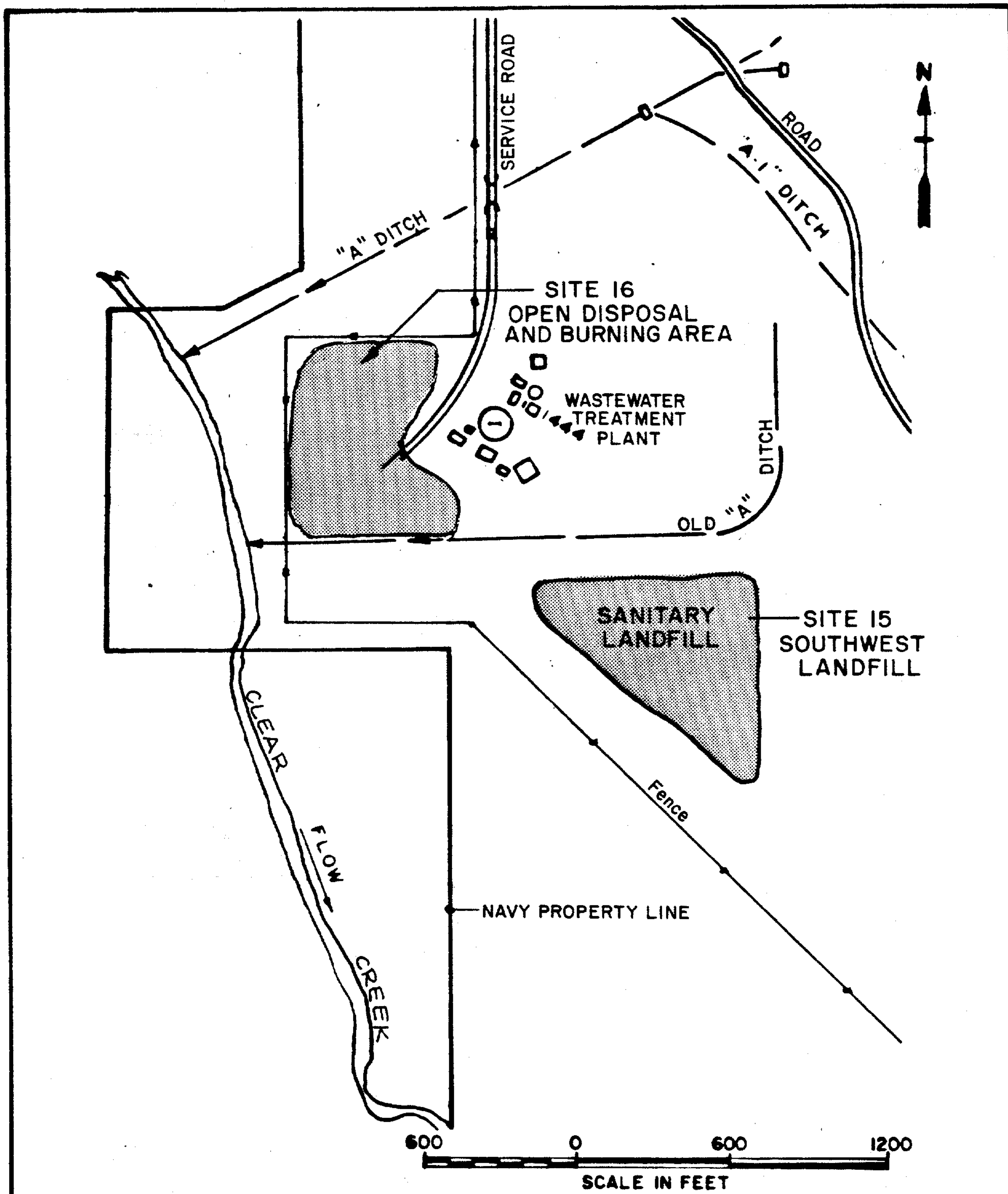



FIGURE 8-8

**Waste Disposal Sites 15 and 16**

INITIAL ASSESSMENT STUDY
NAVAL AIR STATION
WHITING FIELD

Table 8-7

Wastes Potentially Disposed at Site 15, Southwest Landfill

| Waste | Source of Waste | Time Period | Estimated* Total Quantity | Comments |
|---|---|---|---|---|
| General Refuse | Naval Air Station | 1965 to 1979 | - | Site 15 was the primary landfill during this period |
| Paint Stripping Wastewater | AIMD Paint Shop | 1965 to 1979 | 300,000 gallons | Paint stripping wastes diluted significantly with copious amounts of rinse water |
| Solvents (MEK, toluene, xylene, PD-680) | Air Frame Shop, Aircraft Maintenance, Transportation Division Shop | 1965 to 1979 | 40,000 gallons | ** |
| Waste Oils and Hydraulic Fluids | Operation Maintenance Division, Transportation Division Shop | 1965 to 1979 | 60,000 gallons | ** |

Note: *Assumes that 4/5 of the total maximum yearly waste generated disposed at Site 15, 1/5 disposed at Site 10.
**Maximum Quantity disposed at this site and/or Fire Fighting Training Area.

waste oil, and hydraulic fluid). This included wastes from AIMD and the training squadrons. PCB-contaminated dielectric fluid was probably disposed at the site. Approximately 3,000 to 4,500 tons of waste was disposed at the site annually. Table 8-8 summarizes the types and quantities of wastes potentially disposed at Site 16. Reportedly, the majority of waste disposed at the site were burned for volume reduction. Waste diesel fuel was added to the wastes to promote improved burning.

A 1943 topographic map shows that the area of the site was a small plateau situated on the bank of Clear Creek at an elevation of approximately 50 feet MSL. To the east of the site lies the western highland of the coastal plain, and to the west, the land drops to Clear Creek at a slope of about ten percent. Clear Creek is located approximately 200 feet west of the site. The majority of the site and the surrounding area is covered with tall pine trees.

Due to its topographic setting, the site collects surface runoff from areas to the east. Surface runoff from the site is to the west to Clear Creek. Due to the close proximity of the site to Clear Creek, surface runoff is quickly discharged to the Creek.

The ground water flow in the area of the site is expected to follow that of surface water, flowing from east to west toward Clear Creek. The ground water table is expected to be approximately 20 feet below the ground surface. There may be ground water seepage at the banks or direct discharge into Clear Creek. All the potable wells of NAS Whiting Field are upgradient from the site and would not be affected.

Intermediate clay lenses typical of the surficial sand and gravel aquifer underlying the site create the potential for perched water table conditions and low vertical permeabilities. The presence of clay lenses at the site could result in a perched water table at or near the disposed wastes. Both surface runoff and ground water movement represent pathways for contaminant migration from the site with Clear Creek and the surficial sand and gravel aquifer potentially impacted.

Table 8-8

Wastes Potentially Disposed at Site 16, Open Disposal and Burning Area

| Waste | Source of Waste | Time Period | Estimated* Total Quantity | Comments |
|---|---|---|---|---|
| General Refuse | Naval Air Station | 1943 to 1965 | - | Site 16 was the primary disposal area during this period, Site 1 the secondary |
| Paint Stripping Wastewater | AIMD Paint Shop | 1943 to 1965 | 300,000 gallons | Paint stripping wastes diluted significantly with copious amounts of rinse water |
| Waste Paints and Thinners | Operations Maintenance Division | 1943 to 1960 | 500 gallons | **After 1960, this waste went to the Fire Fighting Training Area |
| Solvents (MEK, toluene, xylene, PD-680) | Air Frame Shop, Aircraft Maintenance, Transportation Division Shop | 1943 to 1965 | 40,000 gallons | ** |
| Waste Oils and Hydraulic Fluids | Operation Maintenance Division, Transportation Division Shop, | 1943 to 1965 | 70,000 gallons | ** |

Note: *Assumes that 1/2 of the total maximum yearly waste generated disposed at Site 16, 3/10 disposed at Site 1 and 1/5 disposed at Site 11. Estimates rounded to one significant figure.
**Maximum Quantity disposed at this site and/or Fire Fighting Training Area.

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# APPENDIX A

# AGENCIES CONTACTED DURING INITIAL ASSESSMENT STUDY

# APPENDIX A

## AGENCIES CONTACTED DURING INITIAL ASSESSMENT STUDY

Naval Energy and Environmental Support Activity (NEESA), Port Hueneme, California

NAVFAC Command Historian, Naval Construction Battalion Center, Port Hueneme, California

Southern Division, Naval Facilities Engineering Command Headquarters (SOUTHNAVFACENGCOM), Charleston, South Carolina

Ordnance Environmental Support Office (OESO), Indian Head, Maryland

National Archives, Navy and Old Army Branch, Washington, DC

Navy Historical Center, Operational Archives, Washington Navy Yard, Washington DC

Marine Corps Historical Center, Washington Navy Yard, Washington, DC

National Records Center, General Archives, Suitland, Maryland

DOD Explosive Safety Board, Alexandria, Virginia

Naval Sea Systems Command, Crystal City, Alexandria, Virginia

Naval Facilities Engineering Command Headquarters, Alexandria, Virginia

Naval Air Systems Command, Alexandria, Virginia

U. S. Geological Survey, Reston, Virginia

APPENDIX B

ANALYTICAL RESULTS FROM AIMD PAINT STRIPPING OPERATIONS

Pioneer
LABORATORY, INC.

11 EAST OLIVE ROAD PHONE (904) 474-1001
PENSACOLA FLORIDA 32514

TO: RCA, Whiting Field, Milton, Florida

Date of Order: 3/30/84 I.D.# 689 Job Description: Waste sample from IAMD Paint Stripping Operation

## HAZARDOUS WASTE ANALYSIS

### I. IGNITABILITY

Materials are observed after subjection to the listed conditions to determine ignitability.

| | |
|---|---|
| 1) Flashpoint less than 60° C | 44°C |
| 2) Causes fire through friction | No |
| 3) Causes fire through absorption of moisture | No |
| 4) Causes fire from spontaneous chemical changes | No |
| 5) Causes fire by heat retained from manufacturing | No |
| 6) When ignited burns vigorously | Yes |
| 7) Classification as an oxidizer | Not Classified |

This material (X is) (__is not) classified as hazardous waste from the definition of ignitable waste as specified in Federal Register Volume 45, No. 98, 1980.

### II. CORROSIVITY

Material corrosion rate and pH are determined as specified in Federal Register, Volume 43, No. 243, 1978.

| | |
|---|---|
| 1) pH (if solid material is mixed with deionized water for one hour) | 2.45 |
| 2) Corrosion rate, (SAE 1020 @ 130° F) inch/year | NA |

This material (__is) (X is not) classified as corrosive as specified in Federal Register, Volume 45, No. 98, 1980

RECEIVED
APR 23 1984
F. G. HEALY

Approved by W. F. Bowers
W. F. Bowers
Laboratory Director

PLI LABORATORY, INC.
11 EAST OLIVE ROAD PHONE (904) 474-1001
PENSACOLA, FLORIDA 32514

## III. REACTIVITY

Materials are subjected to the following tests and observations are made.

1) Stability under normal conditions Stable
2) Reactivity with water None
3) Cyanide (when pH between 2 and 12.5) 85.22
4) Sulfide (when pH between 2 and 12.5) 0.125
5) Explosive reaction and classification Not Classified

This material (__is) (_x is not) classified as hazardous waste based on stability, reactivity and explosiveness. The quantity of cyanide and sulfide sufficient to present a danger to human health or the environment depends on the amount of waste and the volume of surrounding area, neither of which is known. Therefore, since no basis is available for determining the quantity of cyanides or sulfides necessary to characterize the waste as hazardous,,this classification is not defined.

| Parameters | Results |
|---|---|
| 1,1,1 Trichloroethane, ppm | 1670 |
| Methylene Chloride, ppm | 4110 |
| Toluene, ppm | 20,600 |
| Xylene, ppm | 18,800 |
| Methyl Isobutyl Keotone, ppm | 1200 |
| Total Organic Carbon, % | 30 |
| Total Phenols, ppm | 9.2 |
| Arsenic, ppm | 8.7 |
| Barium, ppm | 14.1 |
| Cadmium, ppm | 0.995 |
| Chromium, ppm | 80 |
| Lead, ppm | 100 |
| Mercury, ppm | 0.0024 |
| Selenium, ppm | 0.021 |
| Silver, ppm | 0.06 |

NOTE: ppm = parts per million

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APR 23 1984
F. G. HEALY

Approved by W. F. Bowers
W. F. Bowers
Laboratory Director