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INSTALLATION RESTORATION PROGRAM

PHASE I - RECORDS SEARCH

ANDREWS AFB, MARYLAND

PREPARED FOR

UNITED STATES AIR FORCE
AFESC/DEV
Tyndall AFB, Florida
and
HQ MAC/DEEV
Scott AFB, Illinois

JUNE 1985

ES ENGINEERING-SCIENCE

NOTICE

This report has been prepared for the United States Air Force by Engineering-Science for the purpose of aiding in the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, nor the Department of Defense.

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INSTALLATION RESTORATION PROGRAM
PHASE I: RECORDS SEARCH
ANDREWS AFB, Maryland

Prepared For

UNITED STATES AIR FORCE
AFESC/DEV
Tyndall AFB, Florida
and
HQ MAC/DEEV
Scott AFB, Illinois

June 1985

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EXECUTIVE SUMMARY

The Department of Defense (DOD) has developed a program to identify and evaluate past hazardous material disposal sites on DOD property, to control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from these past disposal operations. This program is called the Installation Restoration Program (IRP). The IRP has four phases consisting of Phase I, Installation Assessment/Records Search; Phase II, Confirmation/Quantification; Phase III, Technology Base Development; and Phase IV, Remedial Actions. Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I, Initial Assessment/Records Search for Andrews Air Force Base (AFB) under Contract No. F08637 84 C0070.

INSTALLATION DESCRIPTION

Andrews AFB is located within the city of Camp Springs, Maryland, in Prince George's County. The Base is approximately 15 miles southeast of Washington D.C. The main base site consists of approximately 4300 acres comprised of runways and airfield operations, industrial areas, housing and recreational facilities. Remote installation facilities include the Brandywine Receiver Site comprising 1640 acres and its associated 5 acre housing annex; the eight acre Brandywine DPDO; and the Davidsonville Transmitter Site consisting of 863 acres and an 8 acre housing annex. Land use immediately surrounding the base is primarily residential, commercial or wooded.

Andrews AFB was officially established August 25, 1942 as the Camp Springs Army Air Field. The base name was modified to Andrews Air Force Base in 1947, when the Air Force was established as a separate military service. The base has served as the headquarters base for the Continental Air Command, Strategic Air Command, the Military Air Transport Service and Air Force Systems Command. The Naval Air Facility has been located at the base since 1963 as a major tenant. This facility handles

Naval VIP flight operations and flies photo reconnaissance missions. In 1976 the 76th Airlift Division, under the Military Airlift Command (MAC), was established, making Andrews officially a MAC base. The mission of Andrews AFB changed from flight operations to a base supporting numerous operational units when the aircraft inventory was reduced in 1977.

Andrews AFB serves as the main aerial port of entry for foreign government and military officials enroute to the Capital. The base also serves as the home of the official presidential air fleet, including "Air Force One".

ENVIRONMENTAL SETTING

The environmental setting data reviewed for this investigation identified the following points relevant to Andrews AFB:

- The mean annual precipitation is 42.6 inches and net annual precipitation is calculated to be 5.6 inches.
- Flooding is not known to be a problem at the base or its annexes.
- Base and annex surface soils are predominantly sandy, permeable materials.
- Upper aquifers exist at or near ground surface at the base and at both satellite facilities. Ground water is present in these units at shallow depths ranging from five to twenty feet below grade.
- The installation and its respective annexes are located in the recharge zones of these upper aquifers.
- The upper aquifers have been a historical source of water to domestic or agricultural consumers near the base and its annexes.
- Although the upper aquifers are not a significant source of water supplies in the study area at present, they are known to furnish baseflow to local streams and to provide recharge to underlying regional aquifers.
- Several aquifers of regional importance have been identified in the study area. Most are separated from overlying shallow

units by clays or other low-permeability strata, however, the degree of protection is uncertain and it has been reported that upper aquifers do provide a certain amount of recharge to the underlying major units.

- Base surface water quality generally conforms to the standard required for the designated use classifications of local streams.
- No threatened or endangered species of plants or animals have been identified on Andrews AFB or its satellite facilities. However, some animal species could conceivably be transients in the remote areas where the Brandywine and Davidsonville Annexes are located.

METHODOLOGY

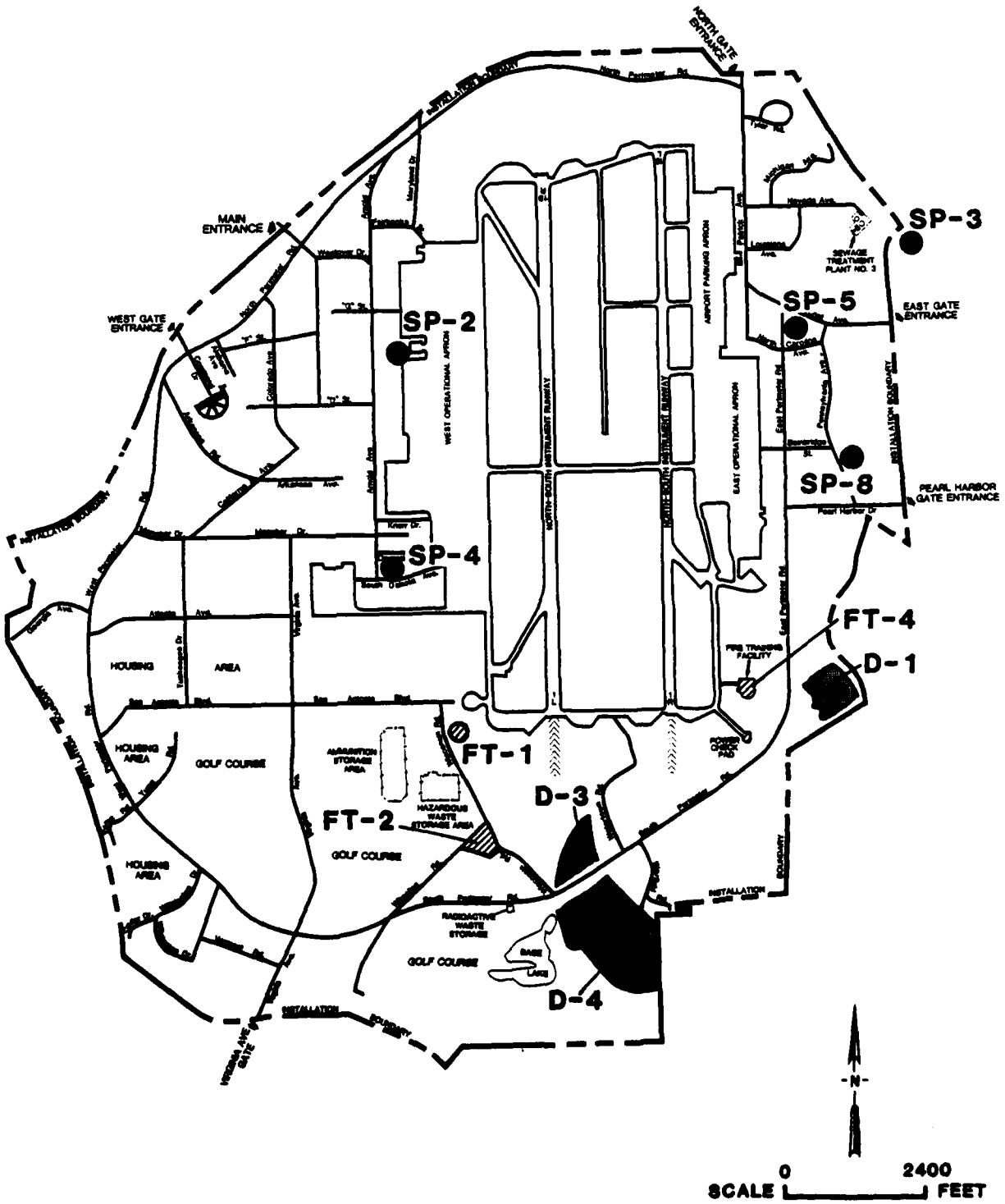
During the course of this project, interviews were conducted with installation personnel (past and present) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with local, state and federal agencies; and field surveys were conducted at suspected past hazardous waste activity sites. Fourteen sites were initially identified as potentially containing hazardous contaminants and having the potential for contaminant migration resulting from past activities. Eleven of these sites are located at the main base and are shown on Figure 1. Figures 2-4 show the location of the three sites located at base annexes. These sites have been assessed using a Hazard Assessment Rating Methodology (HARM) which takes into account factors such as site characteristics, waste characteristics, potential for contaminant migration and waste management practices. The details of the rating procedure are presented in Appendix G and the results of the assessment are given in Table 1. The rating system is designed to indicate the relative need for followup investigation.

FIGURE 1

ANDREWS AFB

SITES OF POTENTIAL ENVIRONMENTAL CONTAMINATION

Main Base Site



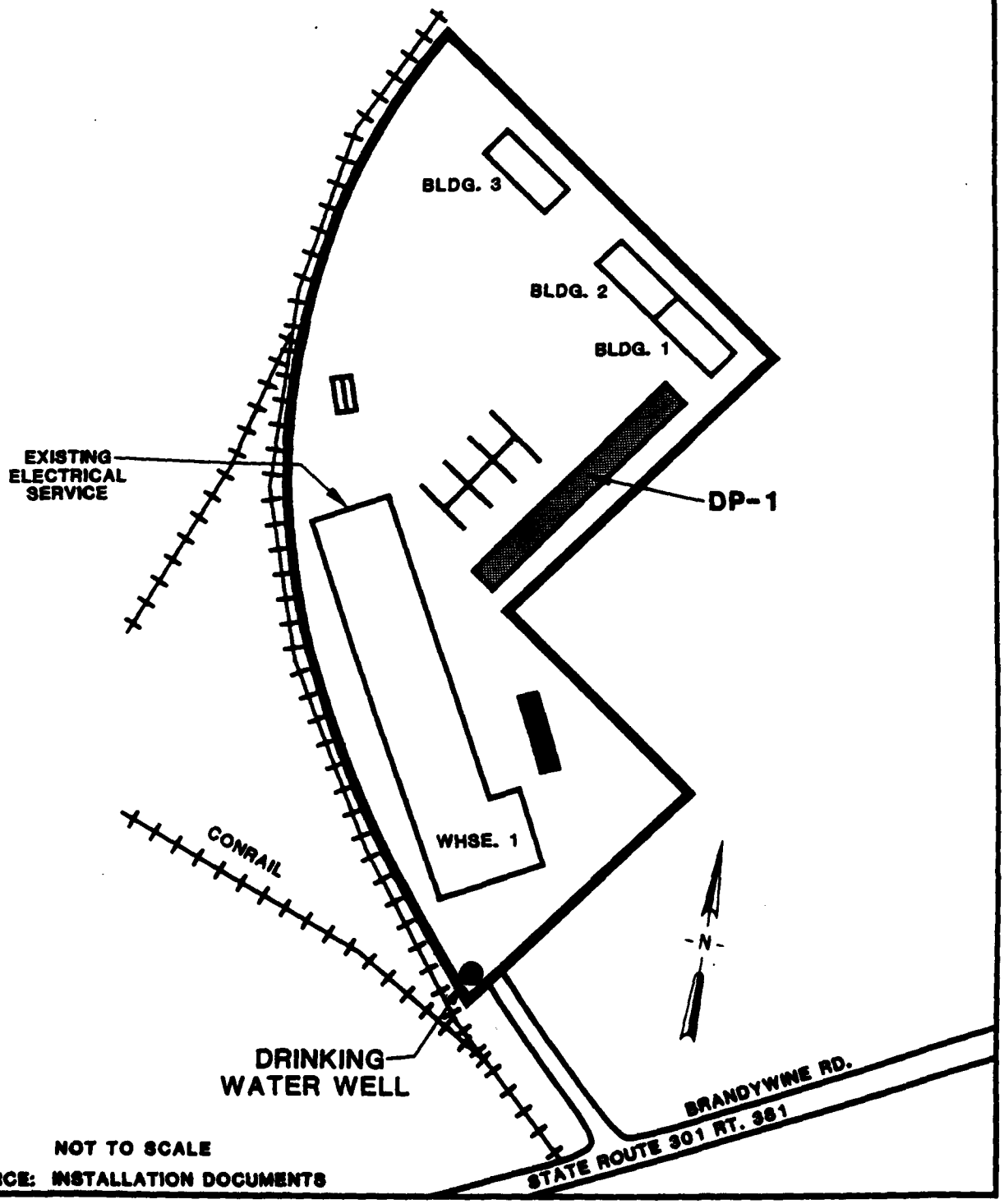
SOURCE: INSTALLATION DOCUMENTS

FIGURE 2

ANDREWS AFB

SITE OF POTENTIAL ENVIRONMENTAL CONTAMINATION

BRANDYWINE DPDO STORAGE AREA



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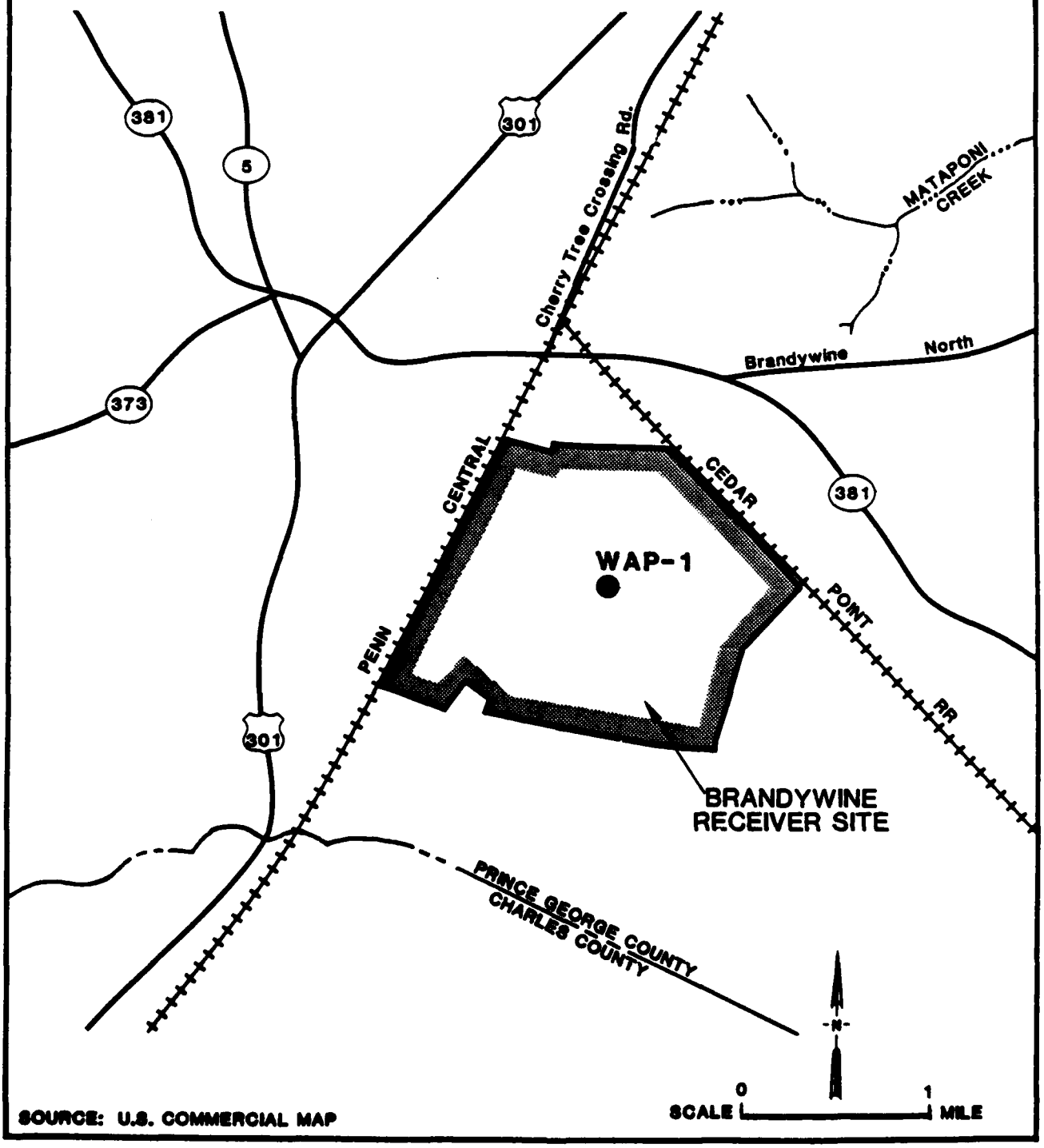
SOURCE: INSTALLATION DOCUMENTS

FIGURE 3

ANDREWS AFB

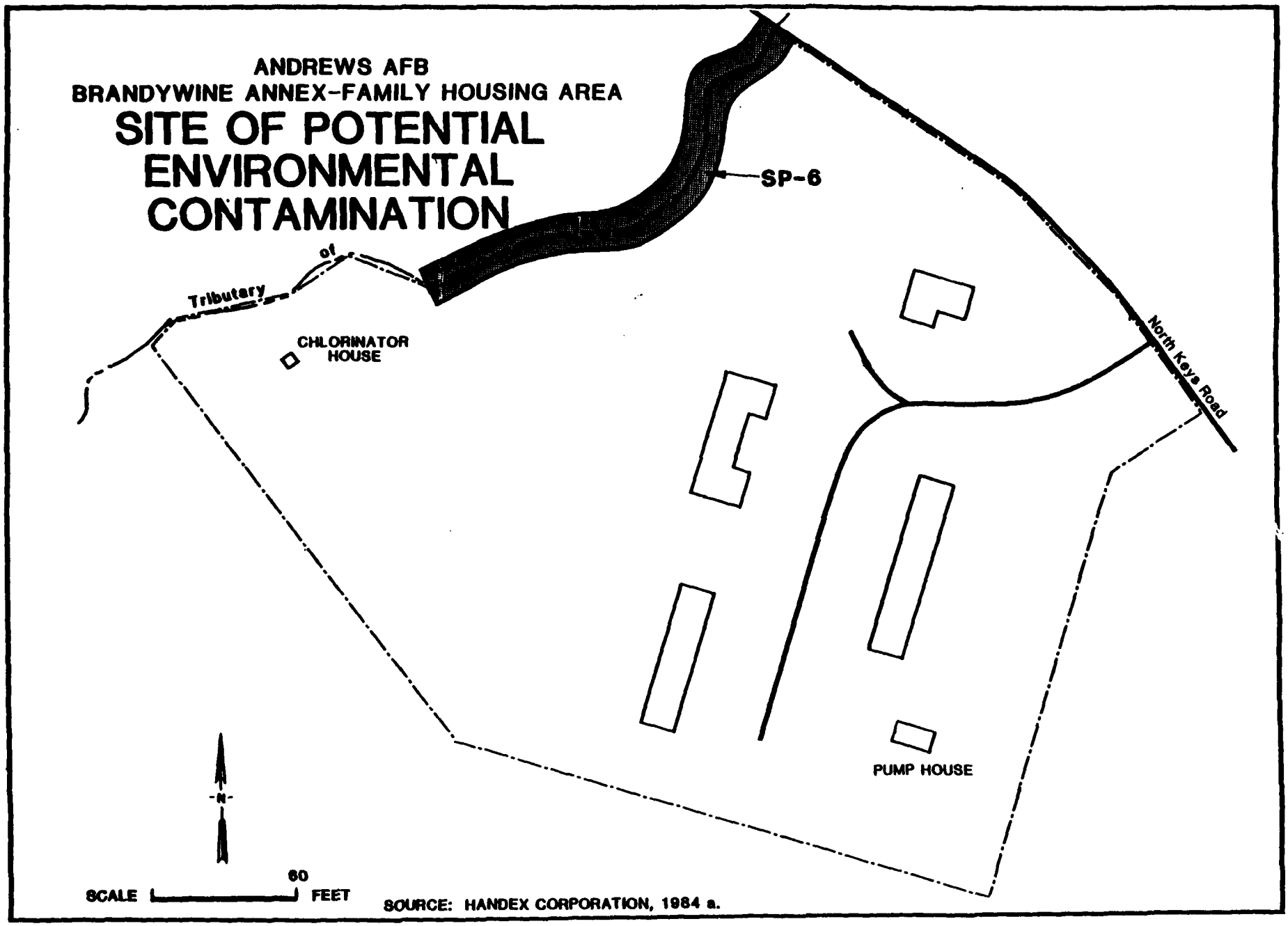
SITE OF POTENTIAL ENVIRONMENTAL CONTAMINATION

BRANDYWINE ANNEX



SOURCE: U.S. COMMERCIAL MAP

ES ENGINEERING-SCIENCE


ANDREWS AFB
BRANDYWINE ANNEX-FAMILY HOUSING AREA
SITE OF POTENTIAL ENVIRONMENTAL CONTAMINATION
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CHLORINATOR HOUSE
North Keys Road
PUMP HOUSE
N
SCALE
60
FEET
SOURCE: HANDEX CORPORATION, 1984 a.

FIGURE 4

TABLE 1
SITES EVALUATED USING THE
HAZARD ASSESSMENT RATING METHODOLOGY
ANDREWS AFB

Rank	Site	Operation Period	HARM Score(1)
1	Fire Protection Training Area No. 2 (FT-2)	1959-1972	70
2	Leak Area - PD680 (SP-2)	Early 1970's	69
3	Landfill No. 1 (D-1)	1960's-1980's	68
4	Fire Protection Training Area No. 1 (FT-1)	Early 1950's-1958	67
5	Landfill No. 3 (D-3)	Late 1950's-1960's	64
6	Spill Site - East Side Gas St. (SP-5)	1982,1984	61
7	Brandywine DPDO Storage Yard (DP-1)	1961-Present	61
8	Spill Site - No. 2 Fuel Oil (SP-4)	Early 1980's	60
9	Spill Site - JP-4 (SP-3)	1978	56
10	Brandywine Receiver Site (WAP-1)	1970's-Present	56
11	Spill Site - Brandywine Hsg. (SP-6)	1984	55
12	Fire Protection Training Area No. 4 (FT-4)	1972-Present	52
13	Landfill No. 4 (D-4)	1960's-1980's	51
14	Leak Area - MOGAS (SP-8)	Early 70's, 1979	48

(1) This ranking was performed according to the Hazard Assessment Rating Methodology (HARM) described in Appendix G. Individual rating forms are in Appendix H.

FINDINGS AND CONCLUSIONS

The following conclusions have been developed based on the results of the project team field inspection, reviews of base records and files, interviews with base personnel, and evaluations using the HARM system. The areas found to have sufficient potential to create environmental contamination are as follows:

- Fire Protection Training Area No. 2 (FT-2)
- Leak Area - PD-680 (SP-2)
- Landfill No. 1 (D-1)
- Fire Protection Training Area No. 1 (FT-1)
- Landfill No. 3 (D-3)
- Spill Site - East Side Gas Station (SP-5)
- Brandywine DPDO Storage Yard (DP-1)
- Spill Site - No. 2 Fuel Oil (SP-4)
- Spill Site - JP-4 (SP-3)
- Brandywine Receiver Site (WAP-1)
- Spill Site - Brandywine Housing (SP-6)
- Fire Protection Training Area No. 4 (FT-4)
- Landfill No. 4 (D-4)
- Leak Area - MOGAS (SP-8)

RECOMMENDATIONS

Recommended guidelines for future land use restrictions at the disposal sites are presented in Section 6. A program for proceeding with Phase II and other IRP activities at Andrews AFB is also presented in Section 6. The recommended actions include soil borings, monitoring wells, and a sampling and analyses program to determine if contamination exists. This program may be expanded to define the extent and type of contamination if the initial step reveals contamination. The Phase II recommendations are summarized in Table 2.

TABLE 2
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
Fire Protection Training Area No. 2 (FT-2)	70	At least three test borings should be taken within site limits; perform sampling up to 15 ft. below grade and at three ft. vertical intervals; conduct geophysical survey; install and sample one upgradient and 3 downgradient wells.	A	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Leak Area - PD680 (SP-2)	69	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one upgradient and three downgradient wells.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Landfill No. 1 (D-1)	68	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one background well and one downgradient well for each 250 feet of downgradient frontage; sample at one upgradient and two downgradient surface water points.	C	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necesary to assess extent of contamination.

TABLE 2
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB
(Continued)

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
Fire Protection Training Area No. 1 (FT-1)	67	At least three test borings should be taken within site limits; perform sampling up to 15 ft. below grade and at three ft. vertical intervals; conduct geophysical survey; install and sample one upgradient and three downgradient wells.	A	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Landfill No. 3 (D-3)	64	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one background well and one downgradient well for each 250 feet of downgradient frontage; sample surface water and sediments downgradient from the site.	C	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Spill Site - East Side Gas Station (SP-5)	61	Geophysical study to determine the areal limits of the contaminants and the optimum sampling depths; install and sample monitoring wells.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination. Care must be taken to ensure that wells are installed so that the normal water table intersects the well screen.

TABLE 2
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB
(Continued)

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
DPDO Storage Yard (DP-1)	61	Soil samples in vicinity of transformer storage site; water sample taken from well.	D	Additional soil borings and placement of wells may be necessary if contamination is seen.
Spill Site - No. 2 Fuel Oil (SP-4)	60	Two soil samples in vicinity of sewer line discharge point; sediment sampling of Piscataway creek (one upgradient and two downgradient samples).	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Spill Site - JP4 (SP-3)	56	Sample surface water and sediment from adjacent creek, one upgradient and two downgradient samples should be taken.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Brandywine Receiver Site (WAP-1)	56	Remove stained, visibly contaminated soil and gravel; if extent of contamination is high, soil sampling should be performed to a depth of 15 feet below grade.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.

TABLE 2
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB
(Continued)

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
Spill Site - Brandywine Housing (SP-6)	55	Geophysical study to confirm existing well locations and vertical sampling intervals; map plume; surface water monitoring and sediment sampling on one upgradient and two downgradient samples.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contimations. Care must be taken to insure that wells are installed so that the normal water table intersects the well screen.
Fire Protection Training Area No. 4 (FT-4)	52	Soil sampling in the vicinity of the burn area and leaching pond.	A	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess estent of contimations.

TABLE 2
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB
(Continued)

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
Landfill No. 4 (D-4)	51	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one background well and one downgradient well for each 250 feet of downgradient frontage; sample surface water and sediments upgradient and downgradient from the site.	C	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Leak Area - MOGAS (SP-8)	48	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one upgradient and three downgradient wells.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.

SECTION 1
INTRODUCTION

BACKGROUND AND AUTHORITY

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

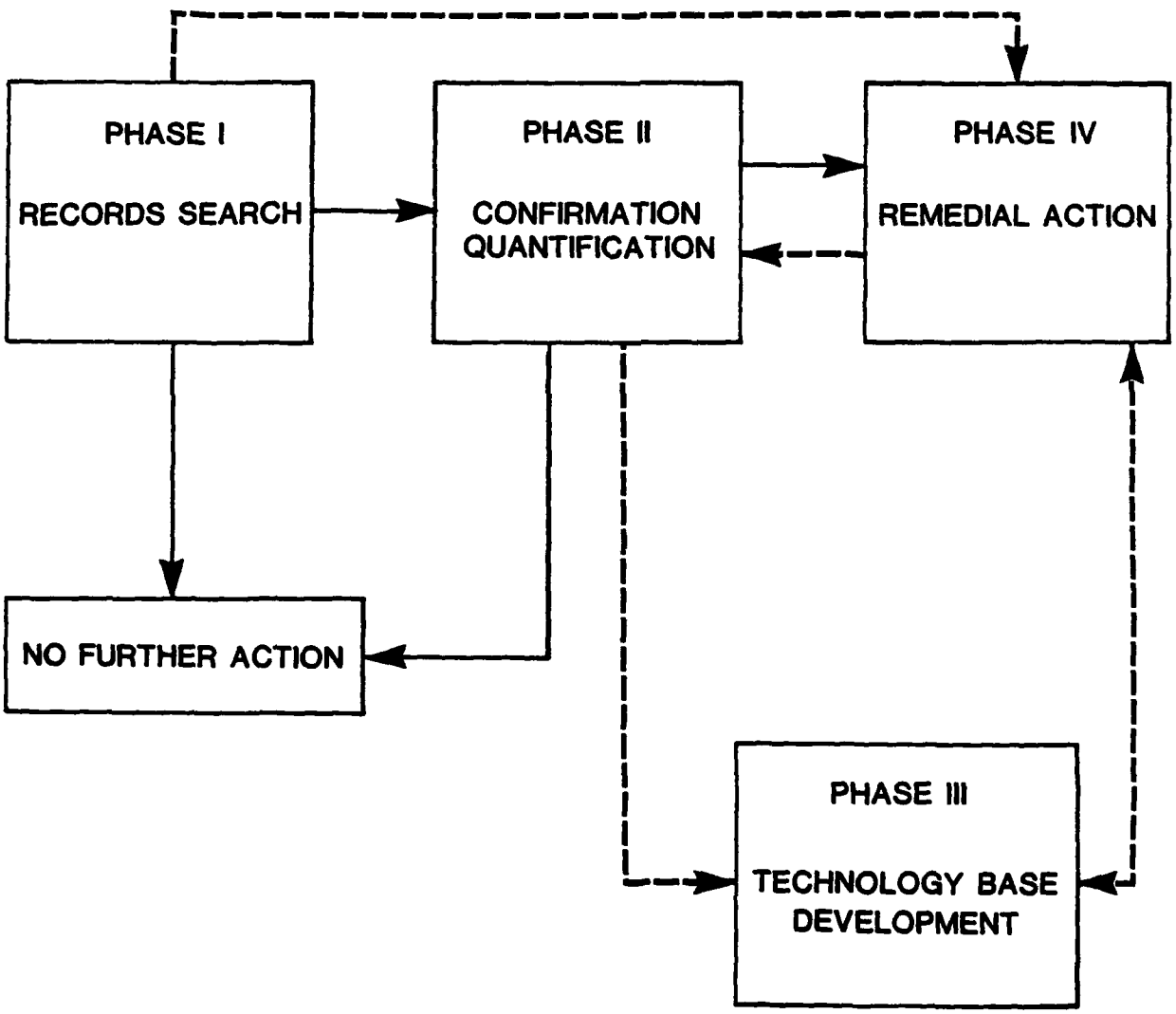
PURPOSE AND SCOPE

The Installation Restoration Program is a four-phased program (Figure 1.1) designed to assure that identification, confirmation/quantification, and remedial actions are performed in a timely and cost-effective manner. Each phase is briefly described below:

- Phase I - Installation Assessment/Records Search - The purpose of phase I is to identify and prioritize those past disposal sites that may pose a hazard to public health or the environment as a result of contaminant migration to surface or ground waters, or have an adverse effect by its persistence in the environment. In this phase, it is determined whether a site requires further action to confirm an environmental hazard or whether it may be considered to present no hazard at this time. If a site requires immediate remedial action, such as removal of abandoned drums, the action can proceed directly to Phase IV. Phase I is a basic background document for the Phase II study.
- Phase II - Confirmation/Quantification - The purpose of phase II is to define and quantify, by preliminary and comprehensive environmental and/or ecological survey, the presence or absence of contamination, the extent of contamination, waste characterization (when required by the regulatory agency), and to identify sites or locations where remedial action is required in Phase IV. Research requirements identified during this phase will be included in the Phase III effort of the program.
- Phase III - Technology Base Development - The purpose of phase III is to develop a sound data base upon which to prepare a comprehensive remedial action plan. This phase includes implementation of research requirements and technology for objective assessment of adverse effects. A Phase III requirement can be identified at any time during the program.
- Phase IV - Remedial Actions - The purpose of phase IV includes the preparation and implementation of the remedial action plan.

FIGURE 1.1

U.S. AIR FORCE INSTALLATION RESTORATION PROGRAM



SOURCE: AFESC

Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I Records Search at Andrews AFB under Contract No. F08637 84 C0070. This report contains a summary and an evaluation of the information collected during Phase I of the IRP and recommended follow-on actions. The land area included as part of the Andrews AFB study is as follows:

Main Base Site	4,300 Acres
Brandywine Housing Annex	5 Acres
Brandywine Receiver Site	1,640 Acres
Davidsonville Housing Annex	8 Acres
Davidsonville Transmitter Site	863 Acres
Brandywine DPDO	8 Acres

The activities performed as a part of the Phase I study scope included the following:

- Review of site records
- Interviews with personnel familiar with past generation and disposal activities
- Survey of types and quantities of wastes generated
- Determination of current and past hazardous waste treatment, storage, and disposal activities
- Description of the environmental setting at the base
- Review of past disposal practices and methods
- Reconnaissance of field conditions
- Collection of pertinent information from federal, state and local agencies
- Assessment of the potential for contaminant migration
- Development of recommendations for follow-on actions

ES performed the on-site portion of the records search during January 22-28, 1985. The following team of professionals was involved:

- W. G. Christopher, P.E., Environmental Engineer and Project Manager, 10 years professional experience.

- S. K. Minicucci, Chemical/Environmental Engineer, 4 years professional experience.
- J. R. Absalon, CPG, Hydrogeologist, 12 years professional experience.

More detailed information on these three individuals is presented in Appendix A.

METHODOLOGY

The methodology utilized in the Andrews AFB Records Search began with a review of past and present industrial operations conducted at the installation. Information was obtained from available records such as shop files and real property files, as well as interviews with past and present base employees from various operating areas. Those interviewed included current and past personnel associated with civil engineering, fuels management, roads and grounds maintenance, fire protection, real property, history, and various shop personnel. A listing of interviewee positions with approximate years of service is presented in Appendix B.

Concurrent with the employee interviews, the applicable federal, state and local agencies were reviewed for pertinent study area related environmental data. The agencies contacted are listed below and in Appendix B.

- U.S. Geological Survey - Water Resources Division
- RCRA Enforcement Section,
  U.S. Environmental Protection Agency, Region III
- Federal Facilities Program,
  U.S. Environmental Protection Agency, Region III
- Office of Environmental Programs, Technical Analysis Division,
  Maryland Department of Health and Mental Hygiene
- Office of Environmental Programs, Hazardous Waste Division,
  Maryland Department of Health and Mental Hygiene
- Office of Environmental Programs, Municipal Waste Division,
  Maryland Department of Health and Mental Hygiene
- Oil Spill Control Division,
  Maryland Water Reources Administration

- Maryland Geological Survey
- Industrial Discharge Control Section, Washington Suburban Sanitary Commission
- Modern Military Field Branch, Washington National Records Center
- Cartographic and Architectural Branch, National Archives
- Modern Military Branch, National Archives
- Office of Air Force History, Bolling AFB

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

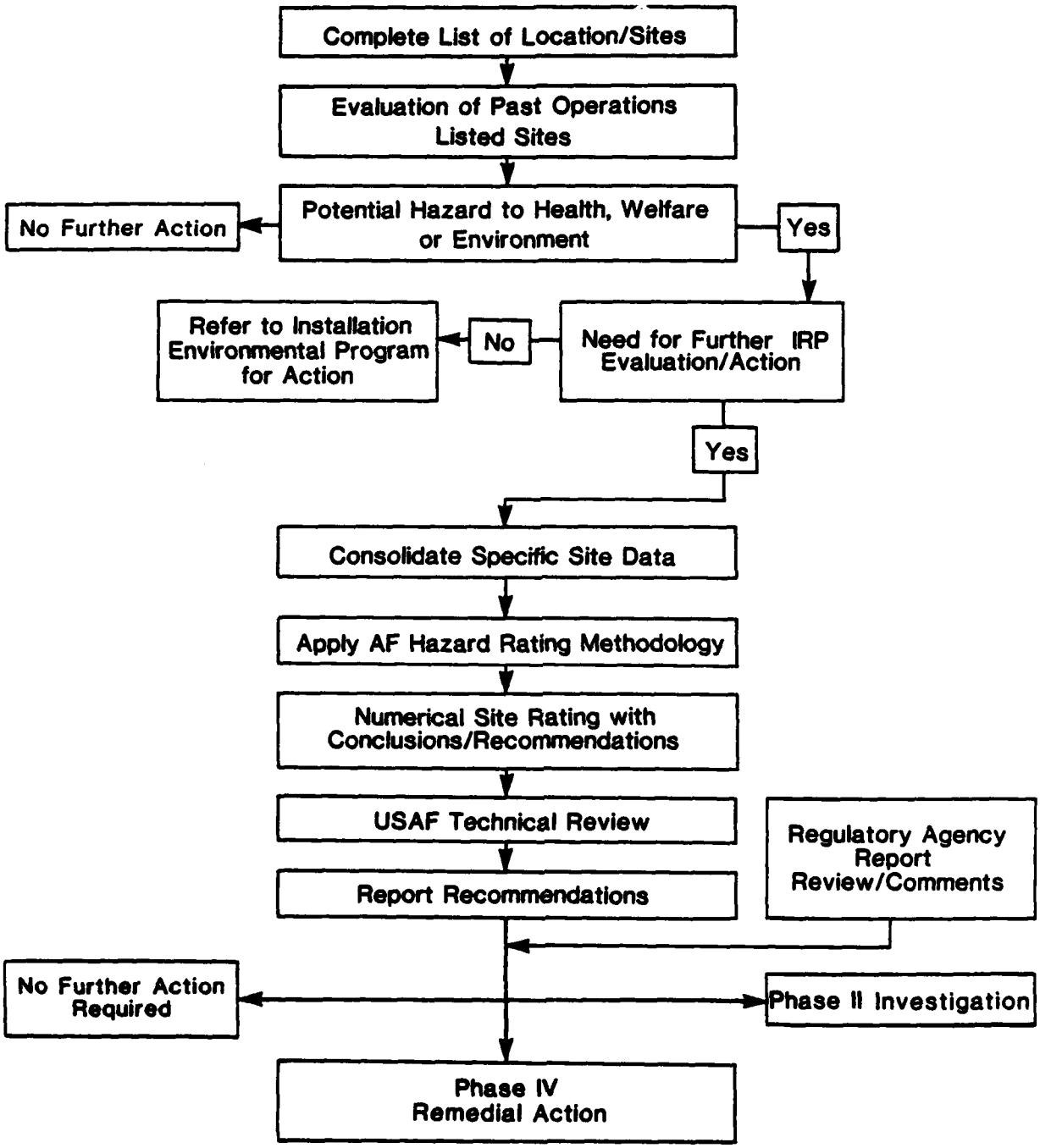
A general ground tour and an overflight of the identified sites was made by the ES Project Team to gather site-specific information including: (1) general observations of existing site conditions; (2) visual evidence of environmental stress; (3) presence of nearby drainage ditches or surface waters; and (4) visual inspection of these water bodies for any obvious signs of contamination or leachate migration.

A decision was then made, based on all of the above information, whether a potential hazard to health, welfare or the environment exists at any of the identified sites using the Flow Chart shown in Figure 1.2. If no potential existed, the site was deleted from further consideration. For those sites where a potential hazard was identified, a determination of the need for IRP evaluation/action was made by considering site-specific conditions. If no further IRP evaluation was determined necessary, then the site was referred to the installation environmental program for appropriate action. If a site warranted further investigation, it was evaluated and rated using the Hazard Assessment Rating Methodology (HARM). The HARM score indicates the relative potential for adverse effects on health or the environment at each site evaluated.

FIGURE 1.2

PHASE I INSTALLATION RESTORATION PROGRAM

RECORDS SEARCH FLOW CHART



Source: AFESC

SECTION 2

INSTALLATION DESCRIPTION

LOCATION, SIZE AND BOUNDARIES

Andrews AFB is located within the city of Camp Springs, Maryland, in Prince George's County (see Figures 2.1 and 2.2). The base is approximately 15 miles southeast of Washington D.C. and is bounded on the southwest by State Route 5 and to the northwest by Allentown Road. Land areas immediately adjacent to the base are primarily residential, commercial or wooded. The main base site comprises approximately 4,300 acres (see Figure 2.3). Remote installation facilities consist of the following:

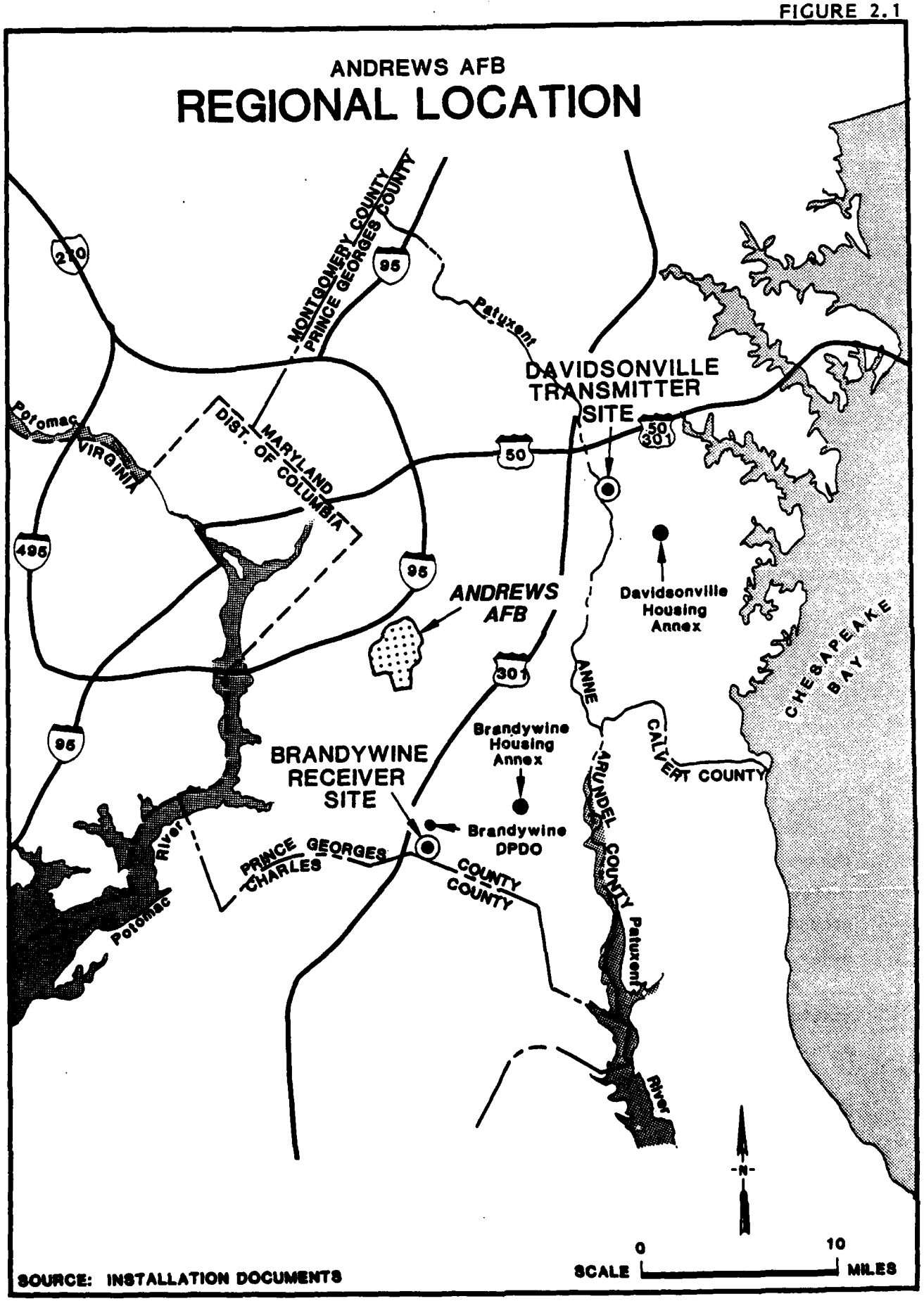
o Brandywine Receiver Site	1640 acres
o Brandywine Housing Annex	5 acres
o Davidsonville Transmitter Site	863 acres
o Davidsonville Housing Annex	8 acres
o Brandywine DPDO	8 acres

Brandywine Receiver Site is located approximately 11 miles south of the main base off of U.S. Highway 301 (see Figure 2.4). The site is occupied by the 2045th Information Systems Group which provides air-to-ground HF Communications in support of the Andrews Presidential/VIP Radio Station and other agencies.

A small housing annex to serve the needs of the military families stationed at the Brandywine Site is located northeast of the receiver site.

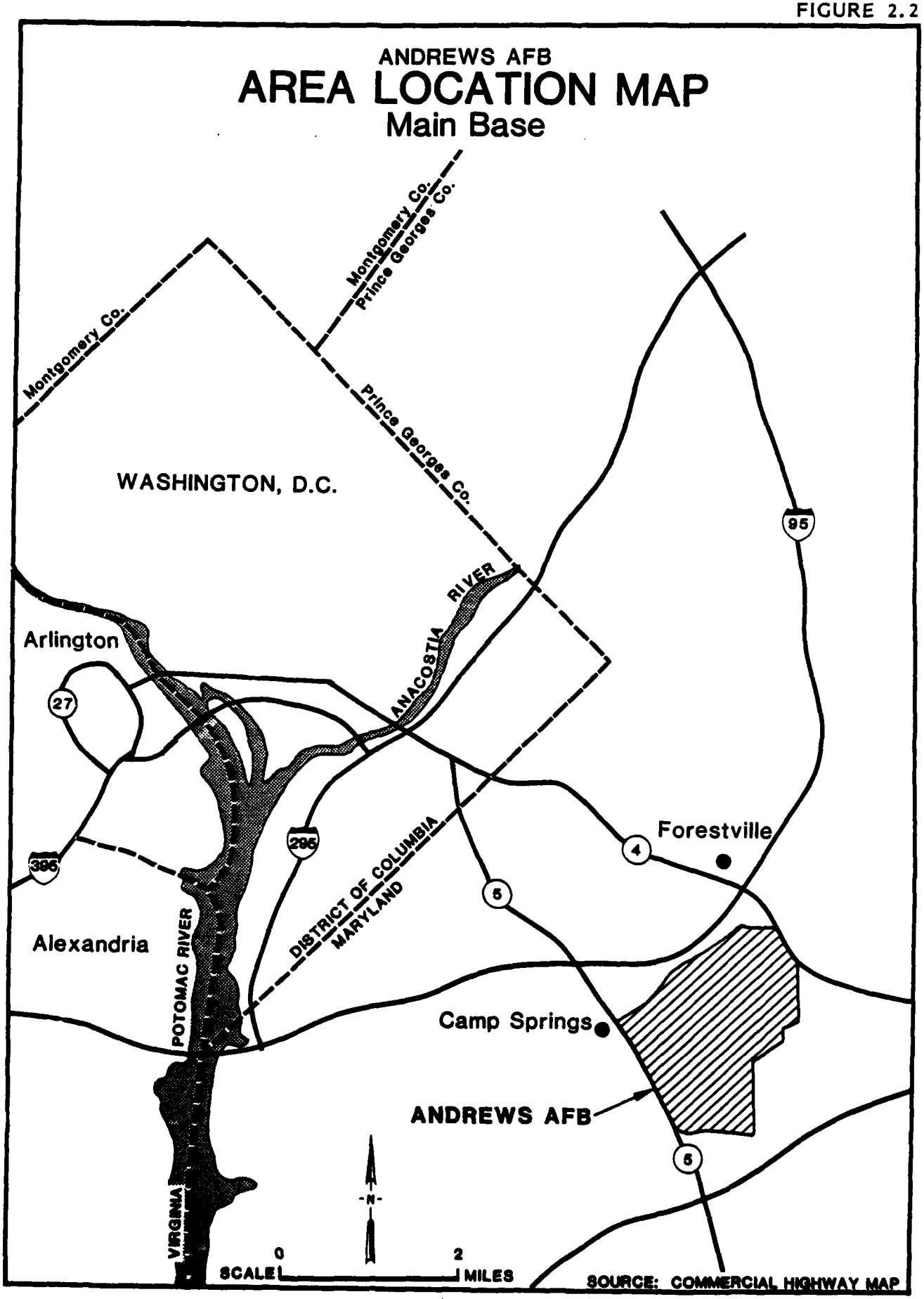
Additionally, the Brandywine DPDO occupies 8 acres of land just north of Brandywine Road near Cherry Tree Crossing Road (See Figure 2.4). The site currently operates as the Defense Property Disposal Office (DDPO) which is used primarily for storage of used office equipment.

FIGURE 2.1



SOURCE: INSTALLATION DOCUMENTS

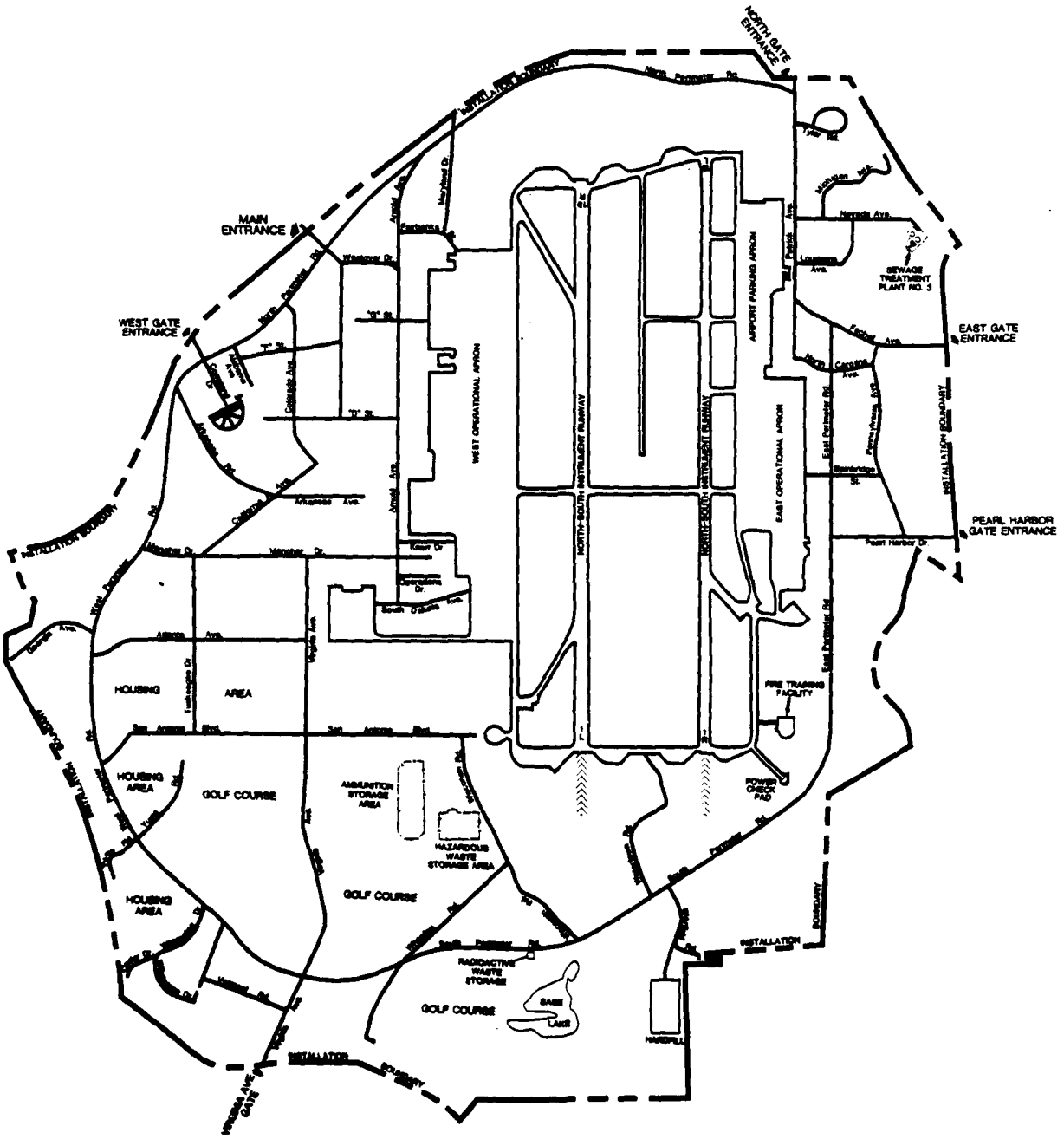
FIGURE 2.2



ES ENGINEERING-SCIENCE

FIGURE 2.3

ANDREWS AFB
INSTALLATION SITE PLAN

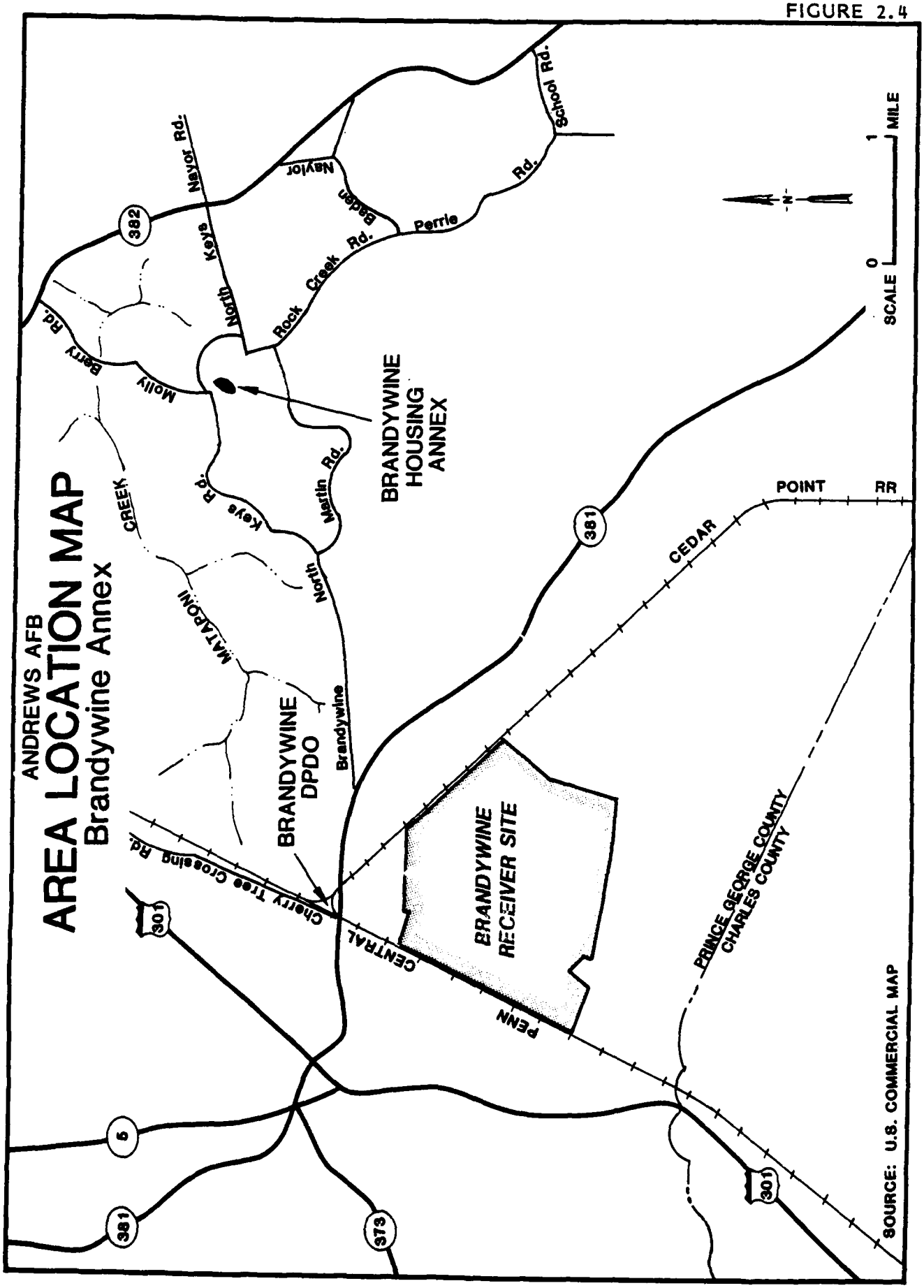


SOURCE: INSTALLATION DOCUMENTS

SCALE 0 2400 FEET

ES ENGINEERING-SCIENCE

FIGURE 2.4


ANDREWS AFB
AREA LOCATION MAP
Brandywine Annex
BRANDYWINE HOUSING ANNEX
BRANDYWINE DPDO
BRANDYWINE RECEIVER SITE
Navor Rd.
Keys
North
Rock Creek Rd.
Baden
Navior
Perrie
Rd.
School Rd.
Molly
Berry Rd.
CREEK
MATAPONI
Keys Rd.
Martin Rd.
North
Brandywine
Cherry Tree Crossing Rd.
CENTRAL
PENN
CEDAR
POINT
RR
PRINCE GEORGE COUNTY
CHARLES COUNTY
382
381
301
5
373
SCALE
0
1
MILE
N
SOURCE: U.S. COMMERCIAL MAP

The Davidsonville Transmitter Site occupies a total of 863 acres and is located approximately 30 miles northeast of the main base site off of MD. Route 424 (see Figure 2.5). Communication antennas occupy the majority of the land area. The site is used for providing air/ground communications for the President and for high ranking civilian, military, and foreign dignitaries.

The Davidsonville Housing Annex is located approximately 10 miles southeast of the transmitter site, off State Route 214. The site is used to house families of military personnel assigned to the Davidsonville Site.

BASE HISTORY

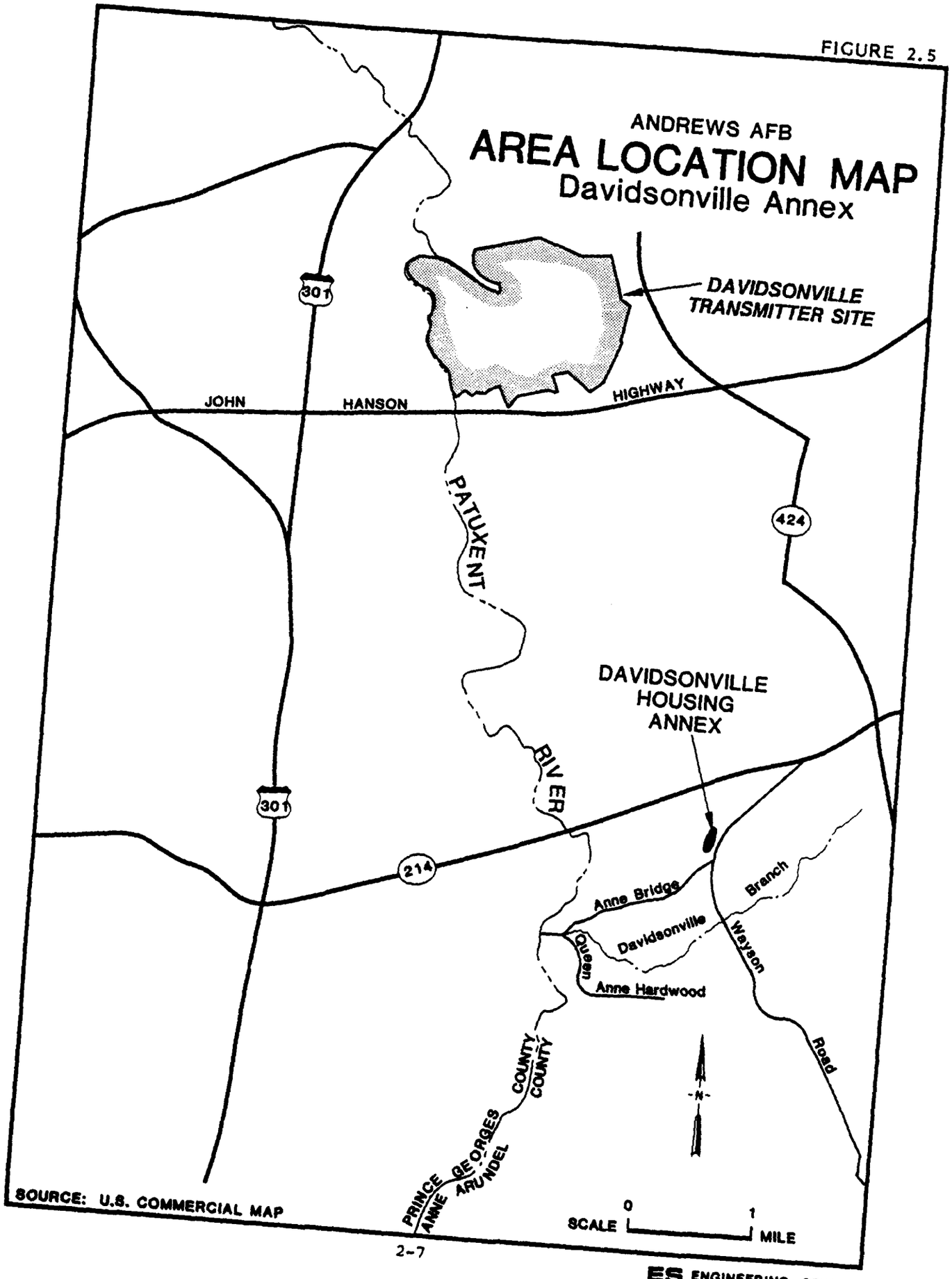
Andrews Air Force Base was established August 25, 1942 as the Camp Springs Army Air Field. The base served as a combination pilot training and air defense base throughout the war years. In 1945 the name of the base was officially changed to Andrews Air Field. In 1947, when the Air Force was established as a separate military service, the name was modified to Andrews Air Force Base.

During the post war years the base served largely as a headquarters base in a curtailed operational capacity. Andrews has served as the headquarters base for the Continental Air Command, Strategic Air Command, the Military Air Transport Service and Air Force Systems Command. Headquarters Command USAF held command at Andrews from 1947 through 1952 and again after 1957. Headquarters Military Air Transport Service controlled the base in the interim period.

In 1947 the F-80 became the first permanently assigned jet powered aircraft at the base. Later, during the 1950 Korean Conflict, Andrews became involved in combat readiness training for B-25 medium bomber crews. Combat readiness training and proficiency flying for military pilots were two key elements of the local mission.

In 1961 the last of the Military Airlift Command's flying units at Washington National Airport transferred to Andrews. This was followed a year later by the transfer, to Andrews, of all fixed wing flying activities from Bolling Air Force Base and Anacostia Naval Air Station.

FIGURE 2.5



SOURCE: U.S. COMMERCIAL MAP

ES ENGINEERING-SCIENCE

In 1963 the Naval Air Facility moved to Andrews and is currently headquartered on the east side of the base. The primary mission of this facility is to train assigned units for their mobilization assignments and to provide administrative coordination and logistic support for tenant commands.

In 1976 the 76th Airlift Division, under the Military Airlift Command (MAC), was established, making Andrews officially a MAC base.

The major mission of Andrews Air Force Base was changed in the 1970's from a flight operations base to a base supporting numerous operational units. The number of aircraft assigned to the base and the number of flight missions was reduced during this time period.

Andrews serves as the main aerial port of entry for foreign government and military officials enroute to the Capital. The base also serves as the home of the official presidential air fleet, including "Air Force One".

Organization and Mission

The host unit at Andrews AFB is the 1776th Air Base Wing. After the disestablishment of Headquarters Command, USAF, in 1976, the base was taken over by the Military Airlift Command and now comes under the direct control of the 76th Airlift Division (ALD), the highest-level MAC unit at Andrews.

The mission of the 76th ALD is to provide support to Headquarters USAF and other agencies in the National Capital Region. Their mission also includes providing safe and reliable airlift for the President, Vice President, Cabinet Members, and other high ranking civilian and military dignitaries. The 76th is also responsible for providing operational and support functions for Andrews and Bolling. The 76th Airlift Division's operational flying unit, the 89th Military Airlift Wing, is also located at the base. The mission of the 89th is to provide worldwide airlift for top U.S. and foreign government officials. The wing is also responsible for the 1st Helicopter Squadron, at Andrews AFB.

The major tenant organizations at Andrews AFB are listed below. Descriptions of the major tenant organizations and their missions are presented in Appendix C.

Headquarters Air Force Systems Command

Naval Air Facility

Air National Guard Support Center

459th Tactical Airlift Wing

2045th Information Systems Group

1361 Audiovisual Squadron, Det. 11

15 Weather Squadron, Det. 1

1600 Management Engineering Squadron, Det. 4

375 Aeromedical Airlift Wing, Det. 1

AF Audit Agency

Air Force Audit Agency, Det. 900

Federal Aviation Administration

Andrews Federal Credit Union

First National Bank of Southern Maryland

Defense Property Disposal Office, DLA

Defense Investigative Service (DIS)

Civil Air Patrol

1402 Military Airlift Squadron

1500 Computer Services Squadron, Det. 1

113 Tactical Fighter Wing (ANG)

AF Commissary SVC, Det. 3

3535th USAF Recruiting Squadron

Army - Air Force Exchange Service

AF Element DOD, Medical Support

AF Command, Det. 8

DC Air National Guard

2 Weather Squadron

219 Field Training

231 Combat Communications Squadron

SECTION 3
ENVIRONMENTAL SETTING

The environmental setting of Andrews Air Force Base is described in this section with the primary emphasis directed toward the identification of features or conditions that may facilitate the generation and migration of hazardous waste related contamination off-base. Environmentally sensitive conditions pertinent to this study are summarized at the end of this section.

CLIMATE

Temperature, precipitation, snowfall and other relevant climatic data furnished by Detachment 1, 15th Weather Squadron, Andrews Air Force Base, MD are listed on Table 3.1. The period of record is 38 years. The summarized data indicate that mean annual precipitation is 42.6 inches. Net annual precipitation is calculated to be 5.6 inches, based on National Oceanographic and Atmospheric Administration data (NOAA, 1983). The net precipitation is an estimate of the amount of meteoric water potential available for infiltration into the subsurface and does not consider evapotranspiration, which varies seasonally. The infiltration potential for Andrews AFB is moderate. The one-year, twenty-four hour rainfall value for the study area is reported to be approximately three inches (U.S. Department of Commerce, Weather Bureau, 1961). This figure suggests that a moderate potential for the development of erosion exists.

The study area experiences a continental-type of climatic pattern, with warm, humid summers and relatively mild winters. The warmest months are June to August; the coldest include December through February. Precipitation occurs with regularity; most rainfall occurs during the late spring and summer months of May through September.

TABLE 3.1
ANDREWS AFB CLIMATOLOGICAL DATA

MONTH	Temperature (°F)					Precipitation (In)				Snowfall (In)			Wind	
	Mean													
	Daily		Monthly	Extreme		Monthly			Max	Monthly		Max	Mean	Prevailing
	Max	Min		Max	Min	Mean	Max	Min	24 Hrs	Mean	Max	24 Hrs	Speed (kts)	Direction
JAN	42	27	35	77	-3	3.2	8.0	.3	2.3	6	27	10	7	NW
FEB	44	28	36	80	-4	2.7	6.7	.4	1.7	6	31	14	8	NW
MAR	53	36	45	87	10	3.7	6.6	1.1	2.0	4	28	13	8	NW
APR	65	45	55	96	23	2.9	7.2	1.0	2.7	#	3	3	8	NW
MAY	74	54	64	96	33	4.0	11.3	1.0	3.1	#	#	#	6	S
JUN	82	63	72	100	42	3.6	10.5	.6	3.9	0	0	0	6	S
JUL	86	68	77	102	48	4.4	14.3	.6	4.3	0	0	0	5	S
AUG	84	67	76	100	48	4.5	14.2	.4	7.1	0	0	0	4	S
SEP	78	60	69	100	38	3.7	12.6	.6	7.2	0	0	0	5	S
OCT	67	49	58	92	28	3.3	7.5	#	3.0	#	4	4	6	W
NOV	56	39	48	84	13	3.2	7.1	.2	3.1	1	11	11	7	NW
DEC	45	30	38	75	7	3.4	6.9	.5	3.0	4	18	10	8	NW
ANN	65	47	56	102	-4	42.6	14.3	#	7.2	21	31	14	6	NW
EYR	38	38	38	38	38	38	38	38	38	35	35	35	10	10

Note: # indicates trace accumulations.

Period of Record: 1943 - 1981

Source: Detachment 1, 15th Weather Squadron, Andrews AFB, MD

EYR: Years of Record

ANN: Annual Average

Surface wind directions favor the northwest during the winter and fall seasons and tend to prevail in a southerly direction during the spring and summer seasons.

GEOGRAPHY

The study area lies within the Inner Coastal Plain subdivision of the Atlantic Coastal Plain Physiographic Province, south east of the Fall Line (Otton, 1970). The Fall Line is an arbitrary zone of delineation (not a distinct line as the term implies), ten to thirty miles wide marking the boundary between the Piedmont Province inland and the Coastal Plain. Study area terrain consists of well dissected to rolling upland areas underlain by unconsolidated Coastal Plain deposits. Prominent surface features include hills, terraces and well defined stream valleys with steep walls. Local relief is usually the result of erosional activity or stream channel development. Study area physiographic divisions are shown on Figure 3.1.

Topography

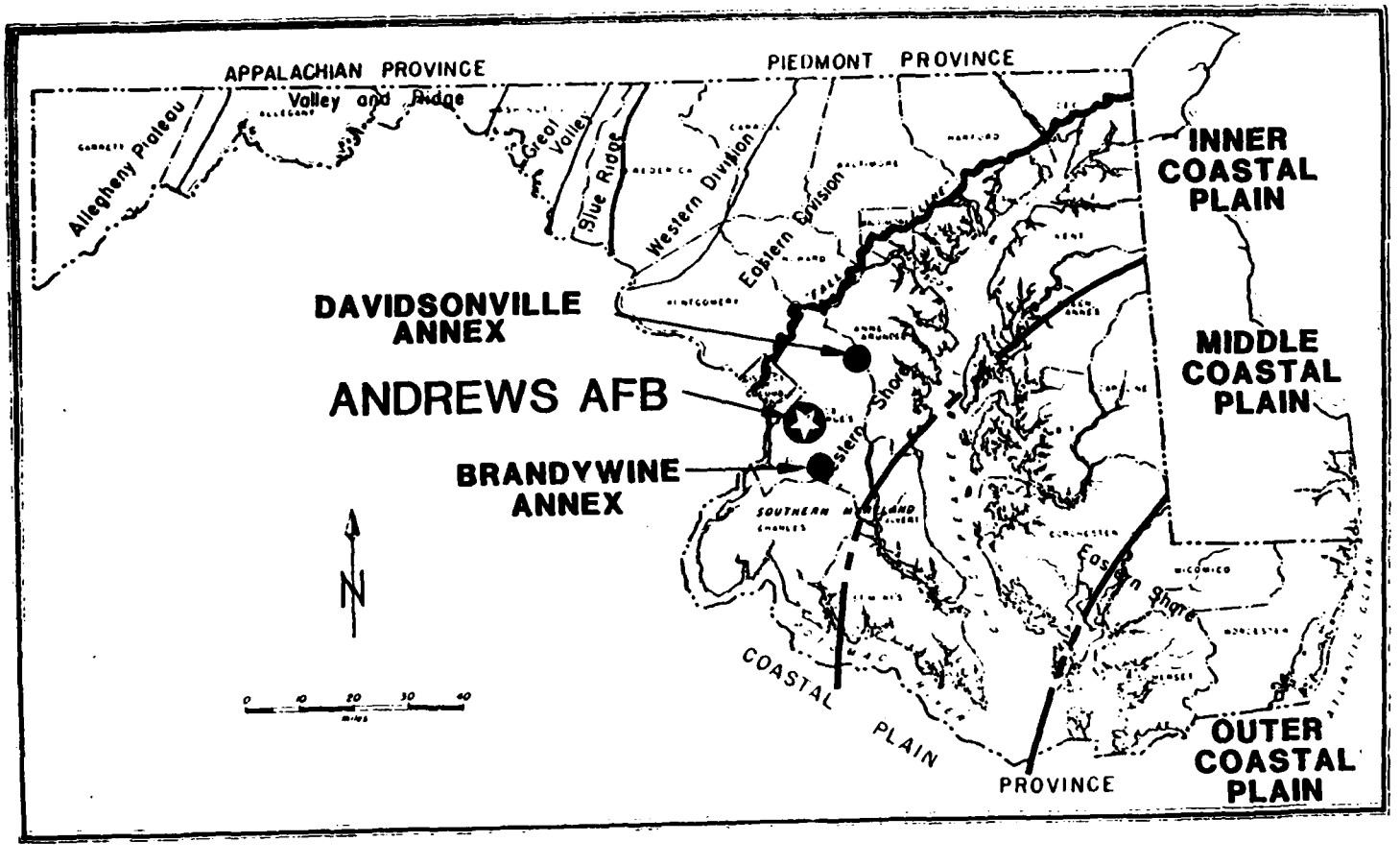
The land surface at Andrews Air Force Base appears to be generally level with little spatial variation apparent. Base surface elevations range from 281 feet, National Geodetic Vertical Datum of 1929 (NGVD) at Hangar 11, to 215 feet NGVD in the Piscataway Creek channel at the confluence of the creek and drainage from the base lake. The greatest relief evident on base is approximately twenty feet which occurs along the course of Meetinghouse Branch near Building 4666.

The land surface at the Brandywine Transmitter Annex is generally level averaging 220 feet, NGVD. Relief on the order of twenty feet is apparent along the channels of two unnamed tributaries of Mattawoman Creek. In these areas, the surface elevation slopes to 200 feet, NGVD. The surface elevations at the Brandywine family housing area slope from a high of about 140 feet NGVD to the north to 120 feet NGVD. The housing area is situated on a relatively small parcel of land which is gently sloping in appearance.

The Davidsonville Annex is located on a bluff overlooking the Patuxent River which forms the western site boundary. The Annex land surface slopes from a high of 140 feet NGVD in the northeast quadrant to about 100 feet NGVD along the top of the slope defining the Patuxent River floodplain. The surface elevation drops sharply to approximately

ANDREWS AFB

STUDY AREA PHYSIOGRAPHIC DIVISIONS



SOURCE: MODIFIED FROM OTTON, 1970 AND VOKES AND EDWARDS, 1957, REVISED 1974

FIGURE 3.1

20 feet NGVD along the Patuxent River channel (west site boundary). Relief on the order of forty feet occurs along the alignment of Ropers Branch and the unnamed Patuxent River tributary. The surface elevation at the family housing area is about 140 feet, NGVD. The site is generally level.

Surface Soils

The surface soils of Andrews Air Force Base have been mapped in detail by the USDA, Soil Conservation Service (report undated). Modern soils found within the installation boundaries have formed over Quaternary unconsolidated upland deposits common to the Maryland western shore. Most installation soils are fine-grained, silty, loamy and somewhat clayey in their upper extent and are sandy and gravelly in the lower segment of the reported profiles. Consequently, unit permeabilities are lower near the surface and increase significantly with depth. A total of twenty-eight soil units have been mapped on the installation, most of which impose moderate to severe constraints on the development of disposal facilities due to permeability or high water tables (0 to 3 feet below grade). The four Udorthents (U1-4) are primarily a fill and consequently may be highly variable. The unit identified as Urban land (Ub) represents land that has been developed. Soil units present in this area have been cut, filled or removed locally by many years of site use modifications. Their character is uncertain. It is believed that all of the soil units present on base are relatively free-draining as high permeability sand and gravel is present in most subsoils of the study area. One area located between the base lake and Piscataway Creek was described as "landfill" by the Soil Conservation Service. The landfill was reported to be located in a former gravel quarry. Andrews AFB soils information is summarized on Table 3.2. The distribution of Andrews AFB soil units is shown on Figure 3.2.

Soils present in the Brandywine Annex area are similar in character to those of Andrews AFB. Modern soils of the Annex and its associated housing area have formed in unconsolidated Upland deposits. The materials tend to be fine-grained and have low permeabilities with increasing depth. These soils are typically free-draining and possess high water tables.

TABLE 3.2
SOIL CLASSIFICATION
ANDREWS AFB

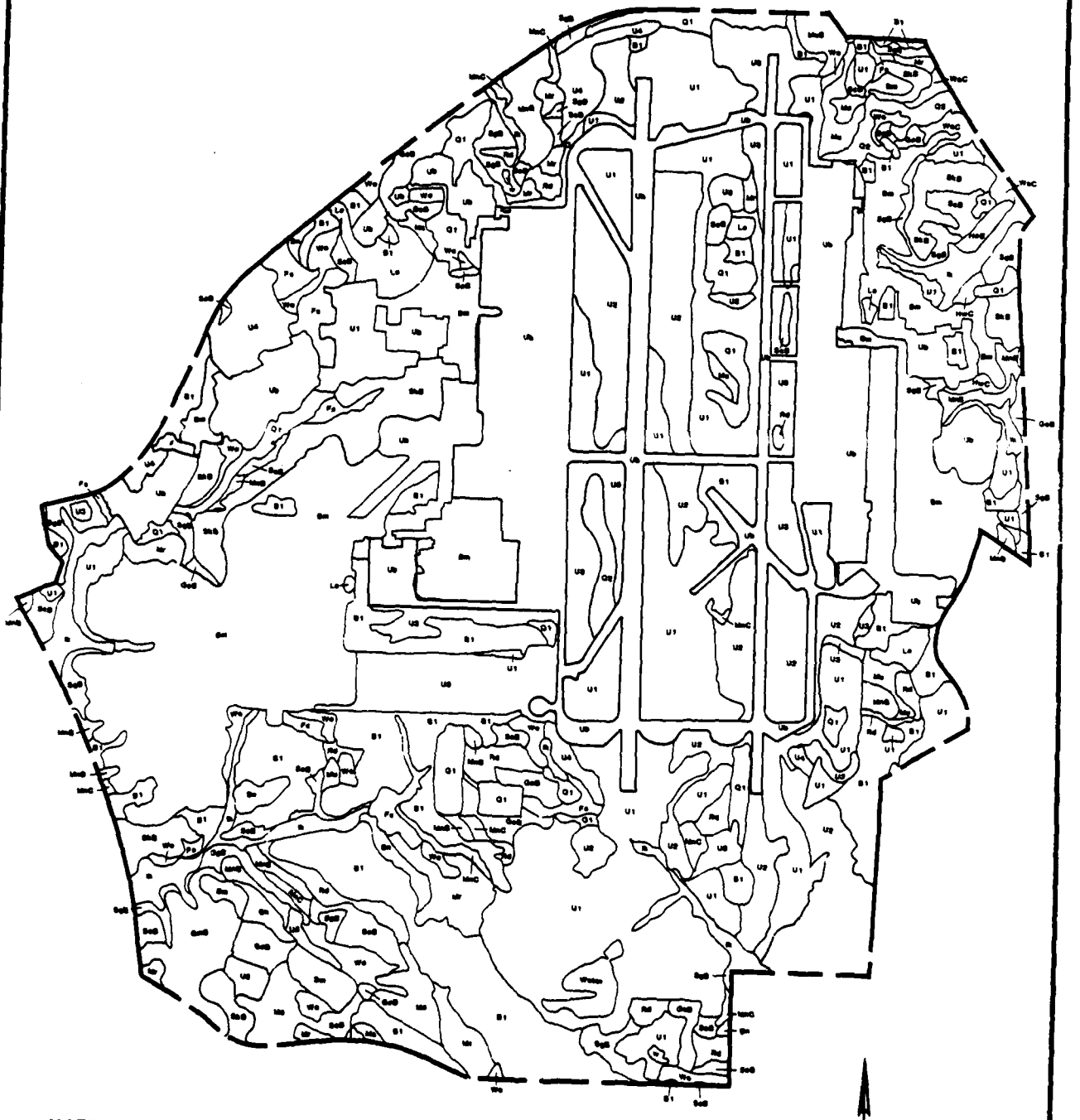
Map Symbol	Unit Name	USDA Texture (Major Fraction)	Thickness (Inches)	Unified System Classification (Major Fraction)	Unit Permeability (Inches/Hour)	Disposal Facility Use Constraints (4)
Bl	Beltsville silt loam	Silt, loam, silty clay, gravel	72	ML,CL,SM	0.2-6.0	Severe. Seasonal water table 1.5-2.5
Bm	Beltsville urban land complex	Silt, loam, silty clay, gravel	72	ML,CL,SM	0.2-6.0	Severe. Seasonal water table 1.5-2.5
Bn	Bourne fine sandy loam	Sandy loam, sandy clay, clay, loam	80	ML,SM,SC,CL	< 0.2-6.0	Severe. Seasonal water table 1.5-2.5
Fs	Fallsington sandy loam	Sandy loam, loam, sandy clay, sand	60	SM,ML,SC,CL,SP-SM	0.6-6.0	Severe. Water table 0-1.0
GeB	Galestown-Evesboro Complex	Loamy sand, sand, gravelly sand	60	SP,SM	> 6.0	Severe. Permeability
GmB	Galestown-Urban land complex	Loamy sand, sand, gravelly sand	60	SP,SM	> 6.0	Severe. Permeability
HoB	Howell fine sandy loam	Sandy loam, loam, silt, sandy clay, gravel	60	SM,ML,SC,CL,CH,MH,GC	0.2-2.0	Moderate. Water table 3±
HwC	Howell silt loam	Sandy loam, loam, silt, sandy clay, gravel	60	SM,ML,SC,CL,CH,MH,GC	0.2-2.0	Moderate. Water table 3±
Ik	Iuka fine sandy loam	Loamy sand, sandy loam, loam, silt	60	SM,ML,CL-ML	0.6-20.0	Severe. Water table 1.0-3.0
Le	Leonardtown silt loam	Silt, loam, clay, sandy loam, silty clay, gravel	70	ML,CL,SM,SC	< 0.2-6.0	Severe. Seasonal water table 0-1.0
MuB	Matapeake silt loam, 0-5% slopes	Silt, sandy loam, loam, silty clay, sand	62	ML,SM,CL,SM-SP	0.2-6.0	Slight. Permeability
MuC	Matapeake silt loam, 5-10% slopes	Silt, sandy loam, loam, silty clay, sand	62	ML,SM,CL,SM-SP	0.2-6.0	Slight. Permeability
Mr	Matawan fine sandy loam	Loamy sand, sandy clay, clay, sand	60	SM,ML,SC	0.06-20.0	Severe. Water table 2.0-3.0
Ms	Matawan loamy sand	Loamy sand, sandy clay, clay, sand	60	SM,ML,SC	0.06-20.0	Severe. Water table 2.0-3.0
Mu	Mattapex silt loam	Loam, silt, sandy laom, silty clay	60	ML,CL,SC,SM	0.2-6.0	Severe. Water table 1.5-2.5
Q1	Quartzipsamments, sandy, smooth	Loamy sand, sand, sandy clay	60	SP,SM,SC	0.6-20.0	Moderate. Permeability
Q2	Quartzipsamments, sandy, steep	Loamy sand, sand, gravelly sand	60	SP,GP,SM	2.0-20.0	Severe. Permeability
Rd	Rumford loamy sand	Loamy sand, sandy clay, gravelly sand	60	SM,SC,SM,SP,GP,GM	2.0 - >6.0	Severe. Permeability
ScB	Sassafras sandy loam	Sand, sandy loam, loam, sandy clay, gravel	70	SM,CL,ML,SC	0.6-20	Severe. Permeability
SgB	Sassafras gravelly sandy loam	Gravelly loam, loam, sand, sandy clay	70	SM,CL,ML,SC	0.6-6.0	Moderate. Permeability
SkB	Sassafras-Urban land complex	Sand, sandy loam, loam, sandy clay, gravel	70	SM,CL,ML,SC	0.6-20.0	Severe. Permeability
U1	Udorthents, smooth (1)	Miscellaneous earth fill	20+	Varies	Unknown	Unknown
U2	Udorthents, gravelly, smooth (2)	Gravelly loam, gravelly sandy loam fill	0-60	GM,GP,GW,GC	0.2-20.0	Severe. Permeability
U3	Udorthents, loamy, smooth (2)	Loam, silty loam, sandy loam fill	0-60	ML,CL,SM	0.2-6.0	Moderate. Permeability
U4	Udorthents, clayey, smooth (2)	Clay, silty clay, clayey loam fill	0-60	CL,CH,MH	0.06-0.6	None
Ub	Urban land (3)	Unknown, paved, built-up areas	--	Varies	Unknown	Unknown
WaC	Westphalia fine sandy loam	Sandy loam, fine sand	72	ML,CL,SM,SC	0.6-6.0	Moderate. Permeability
Wo	Woodstown sandy loam	Sandy loam, loam, sandy clay, gravelly sand	60	SM,SC,ML,SP-SM,CL-ML	0.6-6.0	Severe. Water table 1.5-2.5

Notes: (1) Unit is a miscellaneous earth fill which may contain construction debris, rubble, etc.
(2) Unit is highly variable.
(3) Underlying material is unknown. May be highly variable.
(4) Water table refers to depth in feet below land surface.

Source: Modified from USDA, SCS, undated

FIGURE 3.2

ANDREWS AFB
SOIL MAP



NOTE: REFER TO TABLE 3.2
FOR SOIL DESCRIPTIONS

SOURCE: USDA, SCS, UNDATED

SCALE 0 1/2 1 MILE

The Brandywine family housing area is located in an area where modern soils have formed over the Tertiary Calvert Formation. These well-drained soils are loose to compact clayey sand, silt and diatomaceous silt. They are moderately permeable and tend to possess shallow water tables (ten to twenty feet below grade).

Modern soils present in the Davidsonville Transmitter Annex have formed over Quaternary Terrace Deposits. These soils are typically layered sand, gravel, silt and clay with the coarser fraction occurring at the lower section of the soil profile. These soils possess generally high permeabilities and shallow water tables (five to ten feet below grade). Modern soils present in the family housing area have formed over the Tertiary Calvert Formation. These soils are loose to well compacted clayey sands possessing low to moderate permeabilities and shallow water tables. They are reported to be well-drained.

Drainage

The drainage of installation land areas is accomplished by overland flow to diversion structures and drainage ditches and finally to local surface streams. Andrews AFB drainage features are illustrated on Figure 3.3; the individual base drainage subbasins are identified by letter. Several local streams rise on Andrews AFB. These include Piscataway and Meetinghouse Branch, Paynes Branch and Charles Branch. An unnamed tributary of Henson Creek is fed by flow from the two ponds located in Drainage Area D. The flow of Piscataway Creek is augmented by drainage from the base lake located in Drainage Area C. All of the streams proximate to Andrews AFB are located within the drainage basin of the Potomac River. Flooding is not known to be a recurrent problem at Andrews AFB.

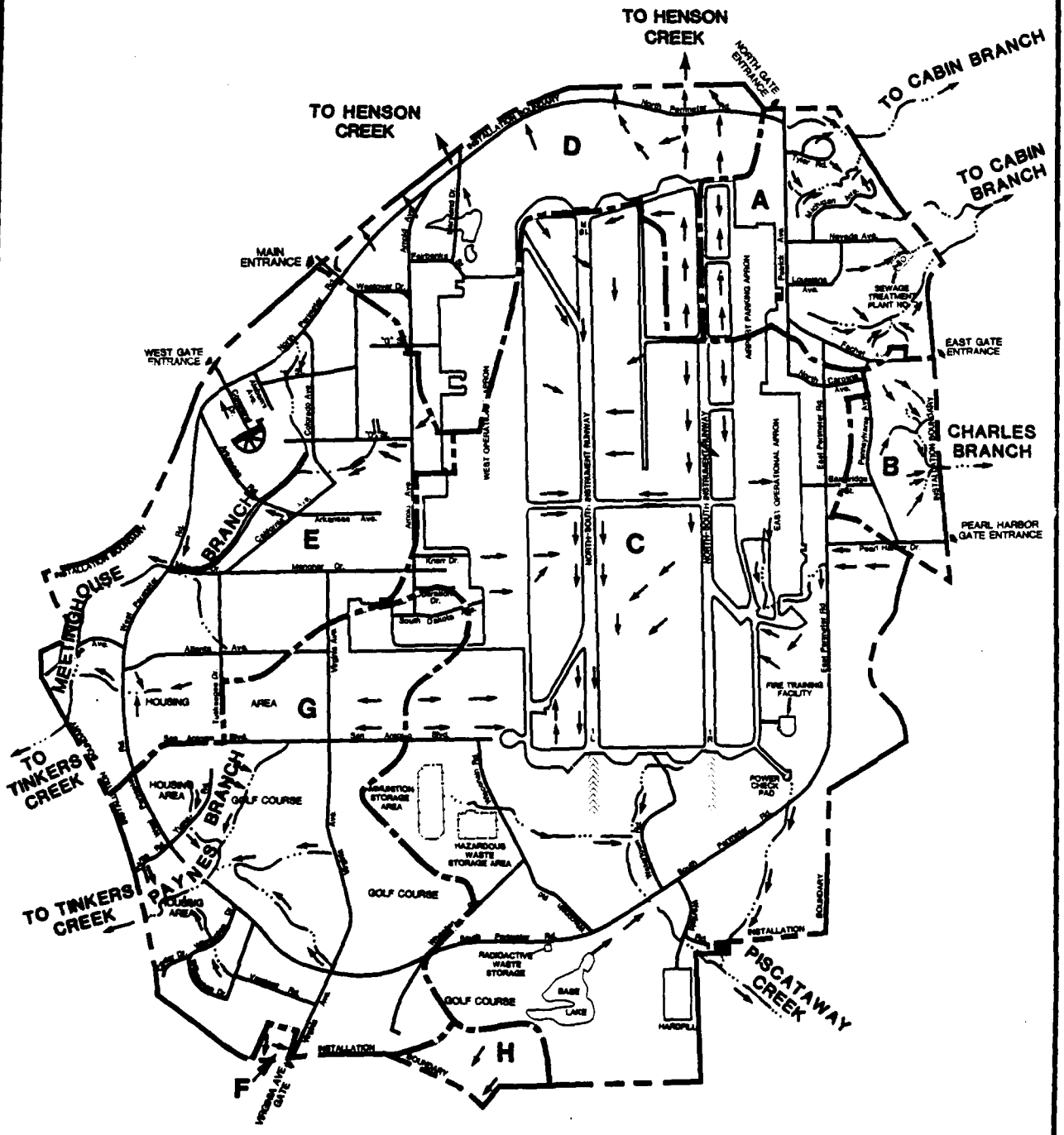
Runoff originating from the Brandywine Transmitter Annex is directed via overland flow to two unnamed tributaries of Mattawoman Creek and thence to the Potomac River. Runoff from the family housing area is directed via overland flow to a tributary of Mataponi Creek. The drainage features of the Brandywine Annex are shown on Figure 3.4. Flooding has not been reported to be a problem at Brandywine.

Approximately one-half of the surface runoff originating from the Davidsonville Transmitter Annex is directed via overland flow to Ropers Branch, a tributary of the Patuxent River. Runoff developing in the

FIGURE 3.3

ANDREWS AFB

SURFACE DRAINAGE



LEGEND

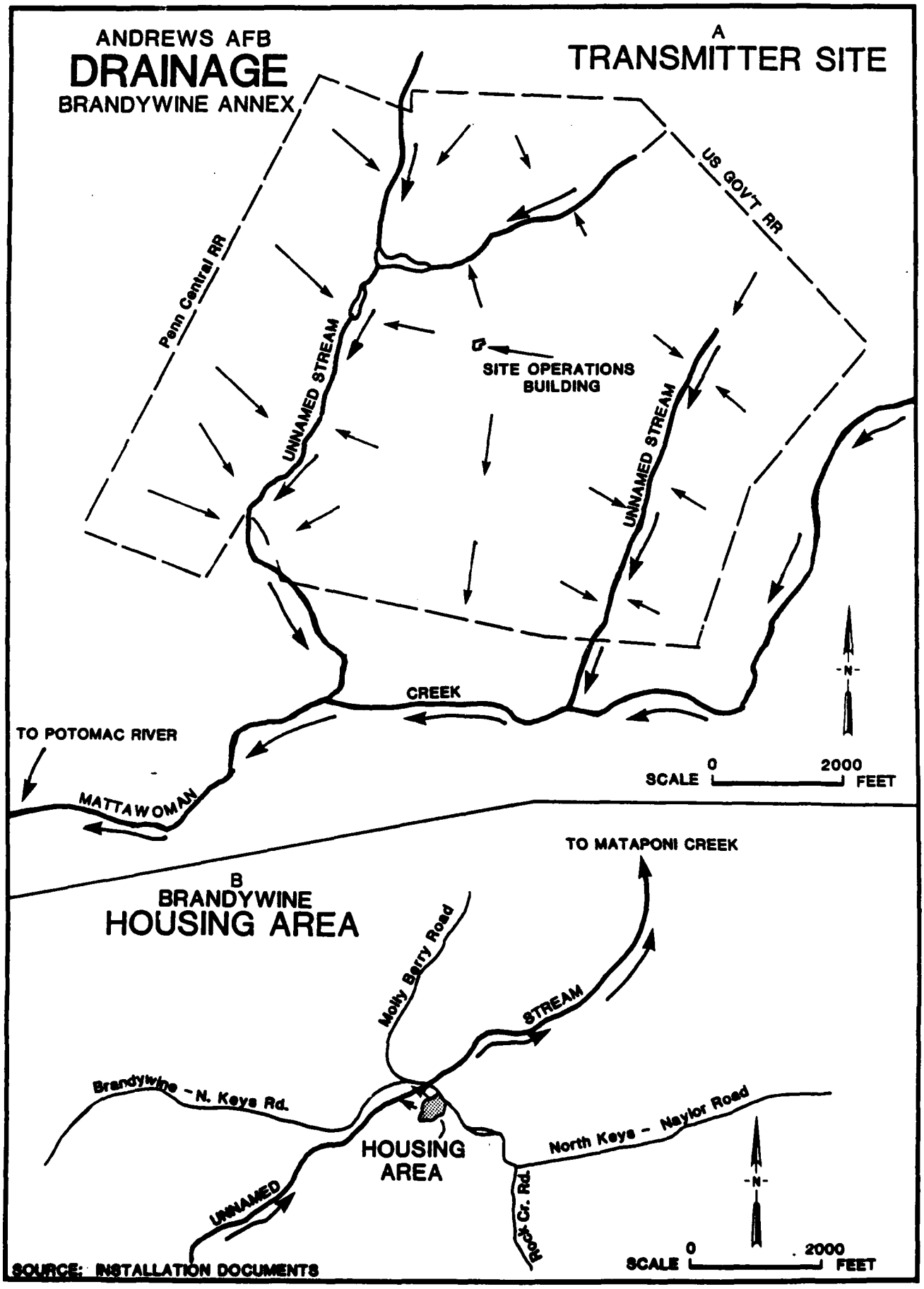
- DRAINAGE LIMITS
- DIRECTION OF FLOW
- A DESIGNATION OF DRAINAGE AREA

SOURCE: INSTALLATION DOCUMENTS

N

SCALE 0 2400 FEET

FIGURE 3.4 A & B



SOURCE: INSTALLATION DOCUMENTS

southern portion of the annex is directed to an unnamed tributary of the Patuxent River. Family housing area drainage is also directed to an unnamed tributary of the Patuxent. Davidsonville Annex drainage features are shown on Figure 3.5. Flooding has not been reported to be a problem at Davidsonville.

GEOLOGY

Information describing the geology of the Andrews Air Force Base, Brandywine and Davidsonville areas has been obtained from the following published sources:

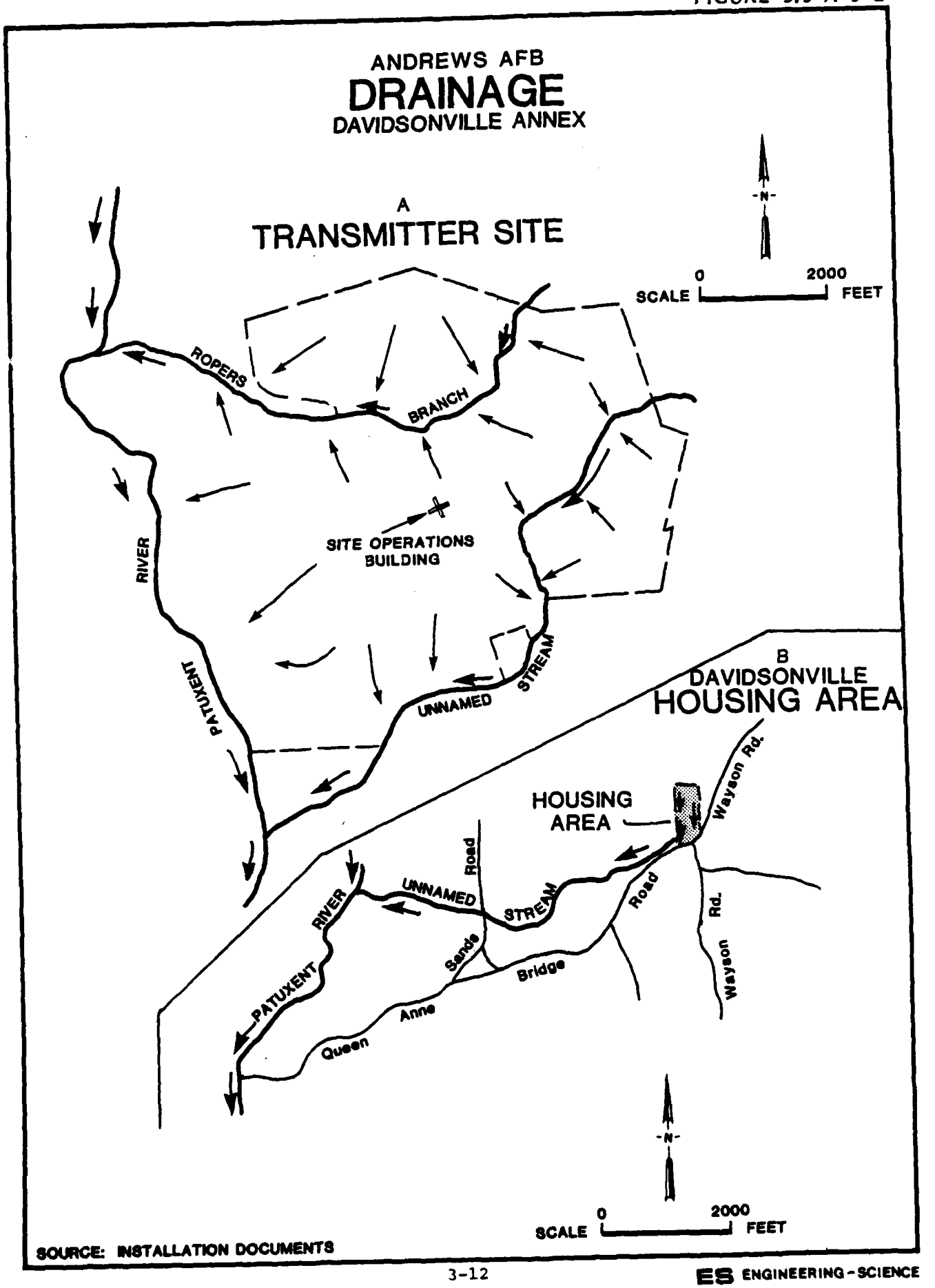
- Johnston, 1964
- U.S. Geological Survey, 1967
- Cleaves, et al., 1968
- Otton, 1970 and 1972
- Glaser, 1971, 1973 and 1976
- Enviro/Earth Ltd., 1974
- Handex Corporation, 1984a, 1984b and 1984c

Additional information has been obtained from interviews with Maryland Geological Survey and U.S. Geological survey scientists. A brief overview of the available information with pertinent comments is included in the following discussion.

Stratigraphy

Geologic units ranging in age from Cretaceous to Quaternary have been identified in the Coastal Plain of southern Maryland. These units are typically composed of unconsolidated materials, including sand, gravel, silt, clay, marl, glauconite, shells, organic materials, etc., reposing on a pre-Cambrian/paleozoic crystalline (consolidated) basement complex. Although some of the units may be similar in character, they can usually be differentiated by variations in mineralogy, micro and macro structure, color (related to depositional environment) and fossils. Table 3.3 summarizes the principle Maryland Coastal Plain geologic formations and describes their significant features, in chronological sequence.

FIGURE 3.5 A & B



SOURCE: INSTALLATION DOCUMENTS

ES ENGINEERING-SCIENCE

TABLE 3.3
GENERALIZED STRATIGRAPHY OF SOUTHERN MARYLAND

System	Series	Stratigraphic Unit		Thickness (feet)	Dominant Lithologic Character	Water-Bearing Properties
Quaternary and Tertiary (?)	Holocene Pleistocene Pliocene (?)	Lowland and upland deposits, Qcu and Ql		0-190	Sand, gravel, and silt; tan to rusty orange; predominantly quartz.	Yields small to moderate amounts of water to wells. Utilized primarily as a water source for shallow, domestic, and farm wells. The upper recharging water-table aquifer to the Aquia and Piney Point-Nanjemoy aquifers in southern Maryland.
Tertiary	Miocene	Chesapeake Group	St. Marys Formation, Ts	0-80	Clay, sandy, silty; greenish-blue to yellow; fossiliferous.	Functions as a confining bed.
			Choptank Formation, Tch	0-60	Clay, silty; olive-green to gray; fossiliferous	A poor local aquifer in Prince Georges County.
			Calvert Formation, Tc	0-180	Clay, silty; olive-green to gray; fossiliferous; lower member is diatomaceous and contains phosphatic pebbles.	A poor local aquifer in Prince Georges and Calvert Counties.
	Eocene	Piney Point Formation, *		0-80	Sand; grayish-green to grayish-white; medium- to coarse-grained; quartz is most common mineral; glauconitic; calcite-cemented shell beds common.	Important source of water in southern Calvert and St. Marys Counties. Hydraulically connected to the upper sandy portion of the Nanjemoy Formation.
		Nanjemoy Formation, Tn		0-250	Sand, silt, clay; balckish-green to gray; quartz most common mineral; glauconitic; the upper portion of formation is predominantly sand; the lower portion is predominantly silt and clay.	The upper sandy portion is an important source of water in Calvert and St. Marys Counties and is hydraulically connected to the overlying Piney Point Formation. The lower portion of the formation functions as a confining bed.
	Paleocene	Marlboro Clay Formation, *		0-35	Clay, pinkish-red to silvery-gray; very plastic; thin lenses of pale gray silt.	Functions as a confining bed.
		Aquia Formation, Ta		0-230	Sand, greenish-black; quartz most common mineral; glauconitic; lenses of silty-clay and shell beds common; calcite cementation common.	A primary source of water in southern Anne Arundel County and in St. Marys and Calvert Counties. An important source of water in southern Charles and Prince Georges Counties.
		Brightseat Formation, *		0-40	Silt, clayey; gray to dark gray; micaceous.	Functions as a confining bed.
Cretaceous	Upper Cretaceous	Monmouth Formation, Kmo		0-50	Silt, sand, clay, glauconitic	A poor local aquifer.
		Severn and Magothy Formations, undifferentiated, Km		350-1,700	Silt, sand, clay, interbedded.	Magothy is a primary water source in northern Anne Arundel County but is not present in southern Calvert or St. Marys Counties. Severn and Matawan function as confining beds.
	Lower Cretaceous	Potomac Group, (Patapsco, Arundel, and Patuxent Formations), Kp		300-2,500	Silt, sand, clay, gravel interbedded.	Yields large amounts of water in Charles, Prince Georges, and northern Anne Arundel Counties. Untested in southern Calvert and St. Marys Counties.
Paleozoic and Precambrian		Crystalline rocks (basement), *		Unknown	Complex assemblage of schists, granites, gneisses, and gabbros.	Untested.

Source: Modified from Chapelle and Drummond, 1983; Tompkins, 1983 and Lucas, 1976.

Note: * Not exposed at or near ground surface in the project area.

Distribution

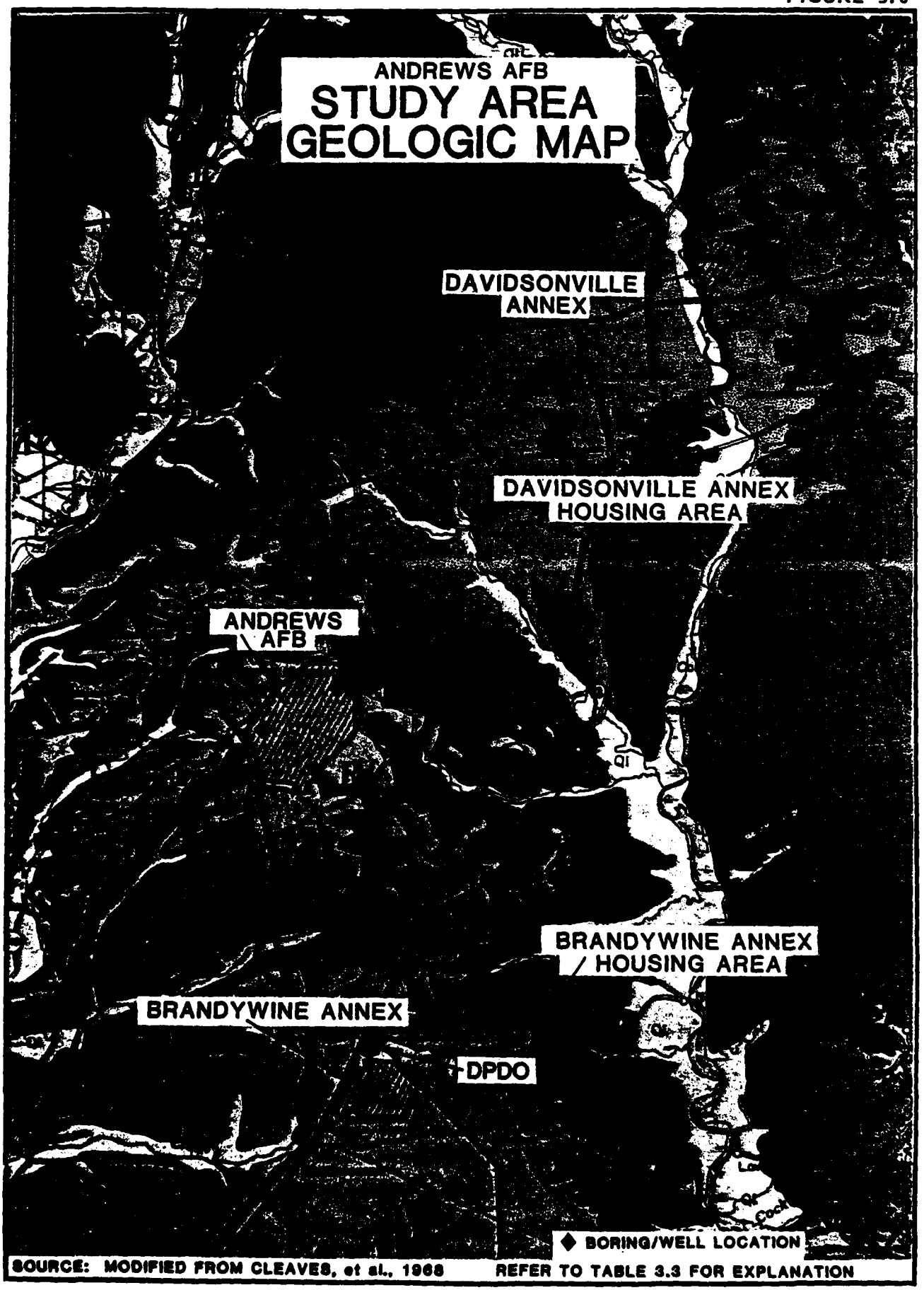
The surface distribution of geologic units relevant to this study is presented as Figure 3.6, which has been modified from the work of Cleaves, et al. (1968). Generally, the geology of Andrews AFB, Brandywine Annex and Davidsonville Annex is dominated by moderately thick sequences of interbedded continental and marine sediments of the Upland Deposits (Qtu), Terrace Deposits (qt), Calvert (Tc), Nanjemoy (Tn) and Aquia (Ta) Formations.

The Upland Deposits underlie most of Andrews AFB and the Brandywine Transmitter Annex. The Upland Deposits include the Brandywine, Bryn Mawr and Sunderland Formations described in older literature. These deposits are usually less than fifty feet thick in the study area and are noted for their substantial sand and gravel deposits that make them economically attractive to develop for construction fill and aggregate. The Brandywine family housing area is underlain by the Calvert Formation. The Calvert includes the Plum Point and Fairhaven Members. It consists of sandy clay, clay, sand and shell beds and reaches a maximum thickness of 150 feet in the study area.

The Davidsonville Transmitter Annex is underlain by Terrace Deposits some twenty-five feet thick that are somewhat different from the Upland Deposits discussed previously. They consist of interbedded sand, silt, clay and gravel. The sand and gravel sequences are "cleaner" (do not contain as much clay and silt) than similar strata of the Upland Deposits, exhibit cross-bedding and may contain large boulders. Terrace Deposits are reported to be quite permeable. The Terrace Deposits are underlain by the Calvert and Aquia Formations at the Annex. The housing area associated with the Davidsonville Annex is underlain by the Calvert (or Nanjemoy) formation.

The site-specific geology of Andrews AFB has been explored by Enviro/Earth Ltd. (1974) and Handex Corporation (1984). The Enviro/-Earth study was conducted in the 2000-area located on the west side of the base. The study consisted of a number of shallow (ten-foot deep) test borings, sampling and soil mechanics laboratory tests. The borings encountered clayey sand, silty sand and well-graded sand with minor amounts of gravel. These materials are generally typical of the Upland Deposits mapped in the study area. Ground water was encountered in

FIGURE 3.6



SOURCE: MODIFIED FROM CLEAVES, et al., 1968 REFER TO TABLE 3.3 FOR EXPLANATION

several of the borings at depths ranging from two to ten feet below grade. Figure 3.7 is the log of a test boring typical of the Enviro/-Earth Ltd. study area. It illustrates the general near-surface conditions along the west side of Andrews AFB. The Handex Corporation study (1984a) was conducted in response to a suspected gasoline leak at the site of the former Fechet Avenue service station. This study consisted of the drilling of several test borings and the installation of monitoring wells at depths ranging from twelve to twenty-seven feet below grade. The materials encountered included miscellaneous fill, silty clay, clay, sand and gravel. The geologic formations encountered were described in the report as either "Fill" or "Brandywine" (probably corresponding to Upland Deposits). Ground water was encountered at depths ranging from 4.98 to 22.22 feet below the exposed well casings. Figure 3.8 is the log of a typical well installed during the Handex study. It illustrates both local subsurface conditions and also the fact that shallow geologic units present on base cannot be traced over long distances. The subsurface conditions reported by Enviro/Earth and Handex appear to be quite different.

The site-specific subsurface conditions of the Brandywine Annex family housing area have been reported by the Handex Corporation (1984b). The report indicated that the site was underlain by either weathered Calvert Formation materials or Upland Deposits. The borings penetrated stratified clayey silt, sand and gravel. Ground water was encountered at depths ranging from ten to twenty feet below grade.

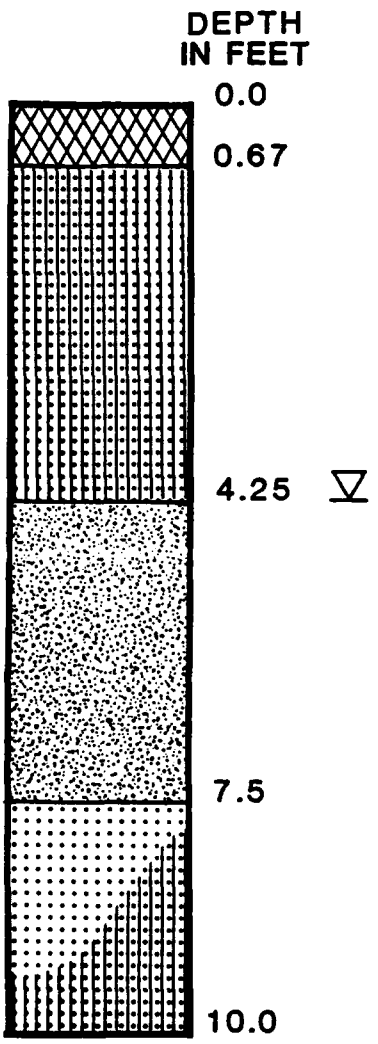
The site-specific subsurface conditions at the Davidsonville Annex have been reported by Handex Corporation (1984c). The primary geologic unit encountered was reported to be Terrace Deposits, interbedded sand and gravel with minor amounts of silt and clay. Four borings were drilled an average of thirteen feet deep and were finished as monitoring wells. The borings encountered sand, clayey silt and silt with fine sand. The reported stabilized water table was four to five feet below grade during August 1984. Figure 3.9 is the log of a representative boring advanced at the Davidsonville Annex.

Structure

The Maryland Coastal Plain sediments form a southeast dipping wedge, with a point of origin at the Fall Line in Washington, D.C.

FIGURE 3.7

ANDREWS AFB
TEST BORING LOG



LEGEND

- TOP SOIL
- MEDIUM TO FINE SAND, SILT-CLAY
- FINE SAND, MEDIUM TO FINE GRAVEL
- MEDIUM TO FINE SAND, TRACE FINE GRAVEL, SILT-CLAY

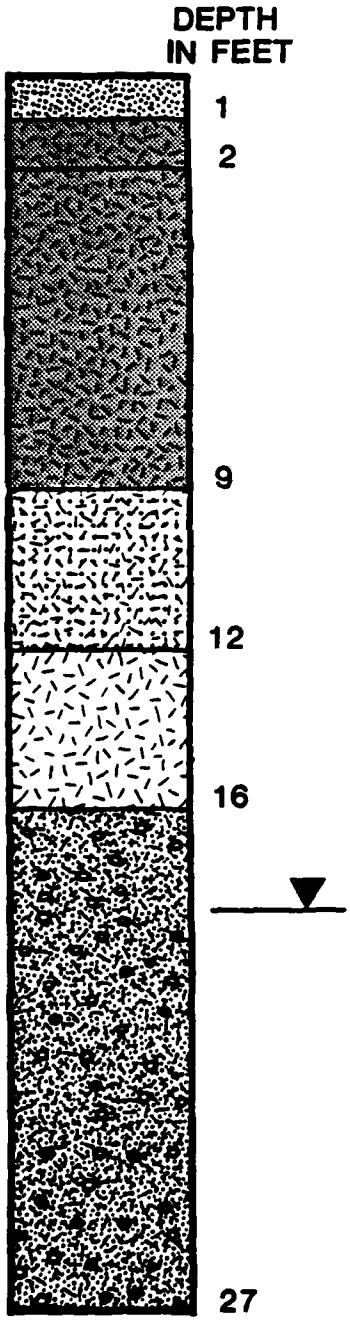
SOURCE: ENVIRO/EARTH Ltd., 1974

FIGURE 3.8

ANDREWS AFB

Monitoring Well Log

Fechet Ave. Service Station

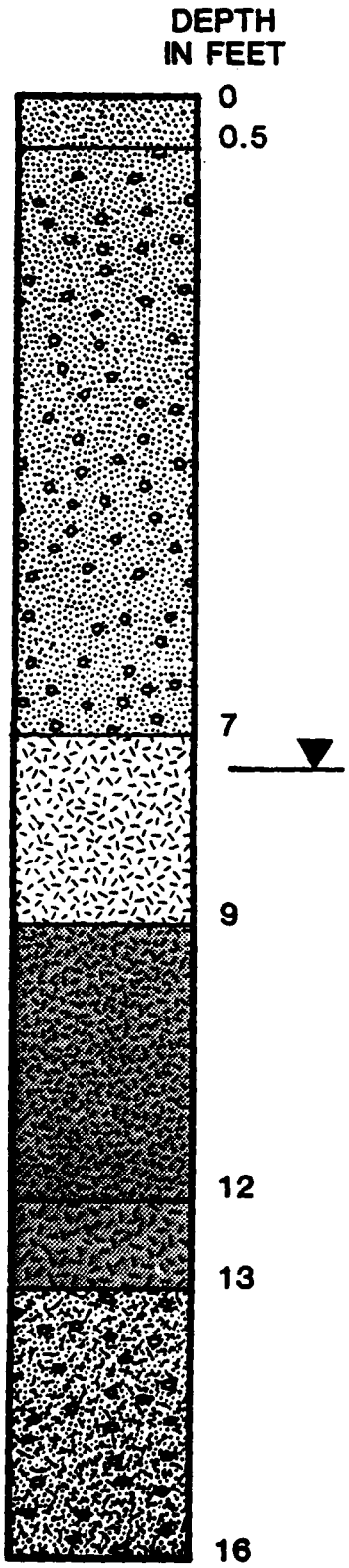


LEGEND

- ASPHALT AND GRAVEL
- SILT, FINE SANDFILL
  SILTY CLAY, MEDIUM TO FINE SAND
- SILTY CLAY, VERY FINE GRAVEL,
  MEDIUM GRAVEL
- SILTY CLAY TRACE
  MEDIUM TO FINE SAND
- COARSE TO FINE GRAVEL

SOURCE: HANDEX CORP., 1984 b

FIGURE 3.9



ANDREWS AFB

Monitoring Well Log

Davidsonville Annex

LEGEND

- FINE SAND, COARSE TO FINE SAND, TRACE SILT
- COARSE TO FINE SAND, TRACE SILT
- CLAYEY SILT , COARSE TO FINE SAND-MOIST
- CLAYEY SILT TRACE, FINE SAND
- GRAY SILT, MEDIUM TO FINE SAND
- COARSE TO FINE SAND, SILT, MEDIUM TO FINE GRAVEL

SOURCE: HANDEX CORP., 1984 c.

(refer to Figure 3.1) and thicken to the southeast (seaward). At the Fall Line, sediment thickness may be measured in inches; however at the coast, their total accumulation is several thousand feet. The bedding of the coastal plain geologic units strikes generally northeast-southwest and dips southeast at low angles, usually less than one degree (Glaser, 1971). The outcrop geometry is a succession of arcuate bands which are youthful to the southeast. The younger Upland, Terrace and modern alluvial deposits are more flat-lying. The older units are exposed where the younger deposits have been eroded. The major geologic units present in the study area are not known to be disrupted by faulting or other discontinuities; however, depositional or past erosional events may cause some isolated beds to occur at steeply dipping angles or be replaced abruptly on a local scale. Figure 3.10, a generalized subsurface section of the Maryland Coastal Plain, depicts the significant structural and stratigraphic relationships of the principal geologic units.

HYDROLOGY

Study area hydrology has been described in the following published reports:

- Bennion and Brookhart, 1949
- Johnston, et al., 1964
- Back, 1966
- Brown, et al., 1972
- Papadopulos, et al., 1974
- Lucas, 1976
- Woll, 1978
- Tompkins, 1983
- Chapelle and Drummond, 1983

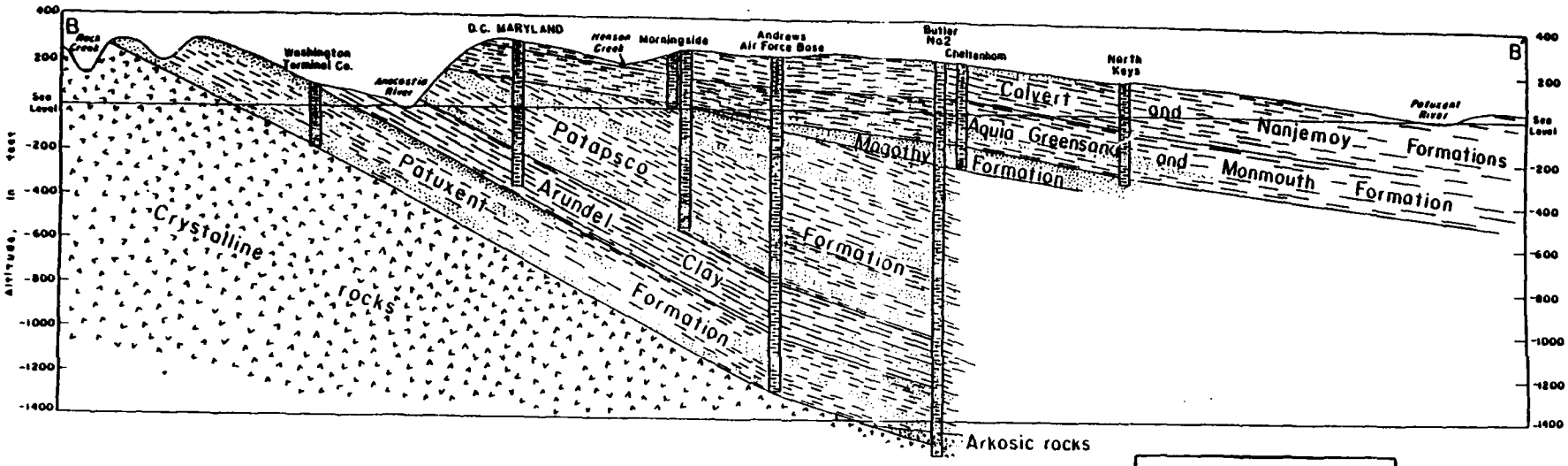
Additional information has been obtained from interviews with Maryland Geological Survey and U.S. Geological Survey scientists.

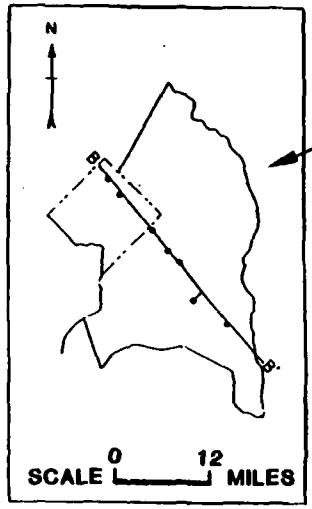
Ground-Water Resources

Andrews Air Force Base and its associated satellite facilities are located in a section of the Inner Coastal Plain where several minor and

ANDREWS AFB

GEOLOGIC CROSS-SECTION OF THE MARYLAND COASTAL PLAIN





SOURCE: MODIFIED FROM MACK, 1966

SCALE 0 5 MILES

FIGURE. 3.10

regional aquifers exist. These aquifers are identified by their respective stratigraphic nomenclature, as described in the previous section, Geology. The aquifers present in the study area are listed in Table 3.4. Several of these hydrogeologic units occur at or near ground surface at the respective facilities included within the scope of this study. The units of particular interest are:

- Andrews AFB: Upland Deposits underlain by the Calvert Formation.
- Brandywine Site and Housing Area: Upland Deposits underlain by the Calvert Formation.
- Davidsonville Site: Terrace Deposits underlain by the Aquia Formation.
- Davidsonville Housing Area: Calvert formation underlain by the Aquia Formation.

Precipitation is the primary source of ground water in the project area. Although a portion of rainfall is lost as runoff directed to local surface waters or as evapotranspiration, a small amount is able to infiltrate downward until it reaches a level in the unconsolidated deposits where all available voids between soil particles are water-filled. Water contained in these void spaces is called ground water and is constantly in motion. Ground water tends to move from the points it enters the subsurface, recharge areas, where water levels are highest, to discharge areas where the water levels are lowest. A review of available data, topographic and surface water information and site inspections suggest that Andrews AFB and its satellite facilities are located in the recharge areas of the uppermost aquifers present in their respective locations. Ground water moving from the recharge zone may flow into hydraulically communicating hydrogeologic units, recharging them or may be directed to local surface waters as base flow (that portion of stream flow contributed by ground water). The actual directions of flow, flow velocities, etc. for each water-bearing unit present in the project area are site-specific. The following discussion describes the significant properties of the study area aquifers.

TABLE 3.4

STUDY AREA AQUIFERS

ANDREWS AFB

Stratigraphic Unit	Prince George's	Anne Arundel
Upland/Terrace Deposits	Minor	Minor
Choptank Formation*	Minor	Not Present
Calvert Formation*	Minor	Minor
Aquia Formation	Major	Major
Monmouth Formation	Minor	Minor
Magothy Formation	Major	Major
Patapsco Formation	Major	Major
Patuxent Formation	Major	Major

* Unit may supply water to local domestic or farm consumers. It is considered to be a confining bed by Chapelle and Drummond (1983) and is reported to be a minor aquifer by Lucas (1976) and Tompkins (1983).

Note: Minor refers to units that may supply water to local farm or domestic consumers. Major refers to regional aquifers capable of furnishing large quantities of ground water.

Source: Modified from Lucas (1976); Tompkins (1983); Chapelle and Drummond (1983).

Andrews Air Force Base and the Brandywine Annex are located in an area where several aquifers have been identified. The Upland Deposits and the Calvert Formation of the Chesapeake Group are present at or near ground surface. At Andrews AFB, the Upland Deposits have been described as stratified sand, silt, clay and gravel (Handex Corporation, 1984b) in the northeast section of the base. Enviro/Earth Ltd. (1974) reported that surficial materials (apparently corresponding to the Upland Deposits) consisted of clayey sand, silty sand and wellgraded sand with gravel in the western portion of the installation. Ground water was usually encountered at shallow depths of twenty feet or less below grade. The principal source of Upland Deposits ground-water recharge is precipitation. Water contained in these shallow deposits probably exists under water table (unconfined) conditions. In similar geologic conditions, the water table appears to be a subdued replica of local surface topography. The movement of ground water is usually directed toward local surface waters where it contributes baseflow, or as recharge to underlying aquifers. Handex Corporation (1984b) reported a notheast flow direction in the Upland Deposits at the Fechet Avenue service station.

The Upland Deposits were investigated at the Brandywine Annex housing area as part of a ground-water monitoring study. (Handex Corp., 1984a). Unit lithology was similar to that observed in the same stratum at Andrews AFB. Ground-water flow was reported to be generally northwest to an unnamed tributary of Mataponi Creek. The Upland Deposits are reported to be underlain by the Calvert Formation in the study area. The Calvert is a silty clay with local sand beds. It is reported to be a poor aquifer and is considered to be a confining bed in southern Maryland (Chapelle and Drummond, 1983). Locally, it may yield small amounts of ground water to farm or domestic wells. Recharge to the Calvert is probably transmitted from overlying units and discharge is likely directed either to local surface waters or to water-bearing units at greater depth. Water contained in the Calvert may exist under water table or artesian (confined) conditions.

Several major or regionally significant aquifers underlie Andrews AFB at substantial depth. These include (in descending order of occurrence): the Aquia, Magothy, Patapsco and Patuxent Formations. The

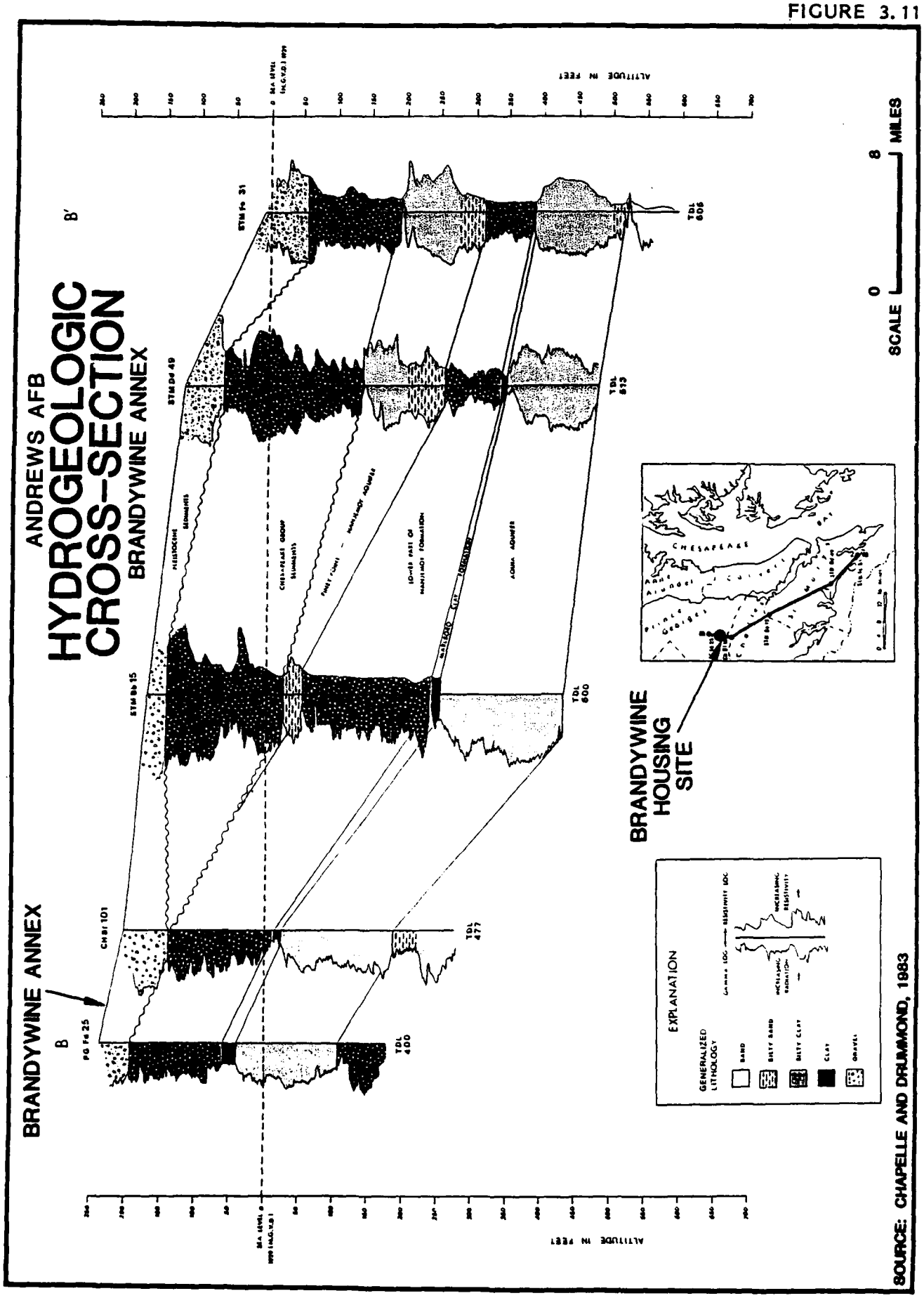
Aquia occurs at a depth of approximately 150 feet below grade, underlying the Calvert Formation. It receives much of its recharge northwest of Andrews AFB where it directly underlies the Upland Deposits (this is referred to as the "subcrop area"). Additional recharge flows through confining beds into the aquifer. Ground water may exist in the Aquia under artesian conditions. Flow is directed downdip, toward Chesapeake Bay. The Aquia is not a major aquifer in the Andrews AFB area, but is a significant source of ground-water supplies in southern Prince George's, Anne Arundel, Charles and St. Marys Counties.

At Brandywine Annex, the Aquia is separated from the overlying Upland Deposits by the lower part of the Nanjemoy Formation and the Marlboro Clay. Together, these units form an effective low-permeability barrier of some 150 feet in thickness. Figure 3.11 is a hydrogeologic section drawn through the Brandywine Annex. Shallow hydrogeologic conditions at the Brandywine annex were reported by Handex Corporation (1984a).

The Monmouth and Magothy Formations underlie the Aquia (Figure 3.10). The Monmouth is reported to be a poor local aquifer in the study area. The Magothy is a significant regional aquifer in northern Anne Arundel County and in some areas of Prince George's County. The Brandywine Annex and associated family housing wells draw waters from the Magothy. Recharge to these units is received from overlying aquifers; discharge is directed downdip toward Chesapeake Bay.

The lowermost hydrogeologic units present at Andrews AFB and the Brandywine Annex are the Patapsco Formation, the Arundel Clay and the Patuxent Formation, collectively identified as the Potomac Group (Johnston, 1964). The Patapsco and the Patuxent are regional aquifers, furnishing water supplies to consumers in Prince George's Anne Arundel and Charles Counties. Where it is present, the Arundel Clay effectively separates the two aquifers. Most recharge to the Potomac Group aquifers is received in their outcrop areas, generally northwest of Andrews AFB and the Brandywine Annex (Figure 3.10). Discharge is directed downdip, toward the Chesapeake Bay. In the outcrop area, water is contained in these aquifers under water table conditions and under artesian conditions further downdip. The Patapsco is significant to Andrews AFB as the lake supply well located near the base lake draws water from it.

FIGURE 3.11

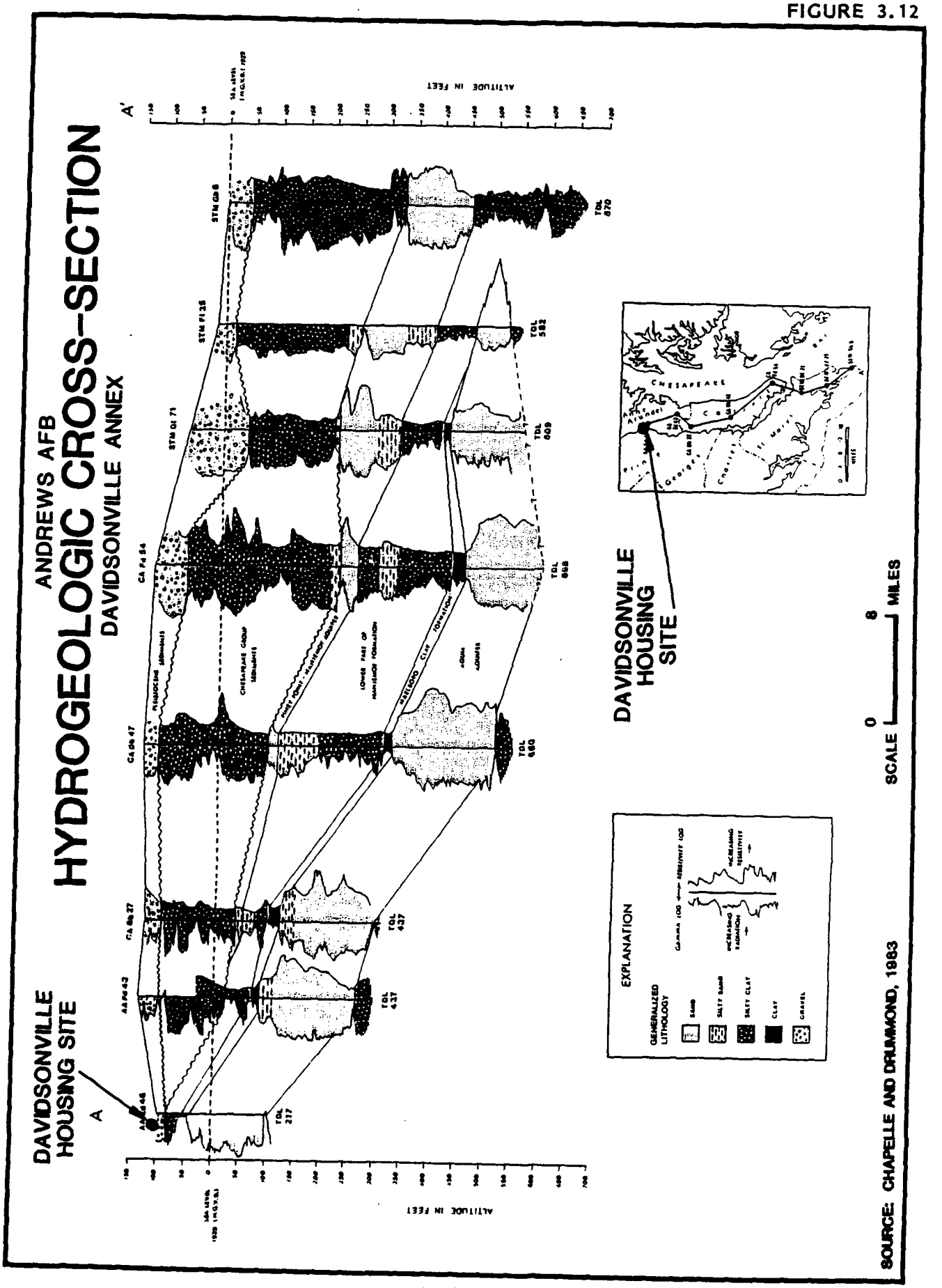

ANDREWS AFB
HYDROGEOLOGIC CROSS-SECTION
BRANDYWINE ANNEX
BRANDYWINE ANNEX
B
B'
ALTITUDE IN FEET
SCALE
0
8
MILES
BRANDYWINE HOUSING SITE
EXPLANATION
GENERALIZED LITHOLOGY
SAND
SILTY SAND
SILTY CLAY
CLAY
GRAVEL
CHESAPEAKE
SOURCE: CHAPELLE AND DRUMMOND, 1983

The Davidsonville Annex is underlain by the Terrace Deposits, a relatively coarse-grained geologic unit, some twenty-five feet thick in the study area. Shallow hydrogeologic conditions at the site have been investigated by Handex Corp (1984c). Figure 3.12 is a hydrogeologic section drawn through the Davidsonville Annex. Ground water is contained in the Terrace Deposits under unconfined conditions. Recharge occurs from precipitation. The flow of ground water in this unit probably follows local topography. Discharge is directed to local surface water or to underlying aquifers. Ground-water levels at the Annex have been reported as being in the range of five to eight feet below grade. The Terrace Deposits may be utilized as a source of water supplies where they are thicker, but may run dry during summer months in the immediate Annex area. An important function of the Terrace Deposits is the recharge of underlying units.

The permeable Terrace Deposits are the uppermost hydrogeologic unit present at the Davidsonville Annex. The Terrace materials are underlain in turn by the lower part of the Nanjemoy Formation (a clayey glauconitic sand, two to thirty feet thick) and the Marlboro Clay (a plastic clay with silt partings, two to sixteen feet thick). The relatively thin segment formed by the Nanjemoy and the Marlboro is significant in that it forms a barrier between the upper permeable Terrace Deposits and the next aquifer in the stratigraphic succession, the Aquia Formation. The Aquia is a major source of water supplies for the region. It consists of well-sorted medium-grained glauconitic sand with coarse sand and gravel layers; fossils and sandstone boulders may be present. The unit is reported to be 25 to 110 feet thick in the study area. The Aquia is the principal source of water supplies in southern Anne Arundel County. Water enters the Aquia in its outcrop area generally north of the Davidsonville Annex study area or in the subcrop areas east and west of the facility. Some recharge may be directed into the Aquia from overlying units such as the Terrace Deposits. Discharge from the unit is likely directed downdip or to underlying aquifers.

The hydrogeologic setting at the Davidsonville housing area is slightly different. Thin or scattered Terrace Deposits overlie the Calvert Formation of the Chesapeake Group in this area. The Calvert, a fine-grained sand, silt and diatomaceous silt varies in thickness from

FIGURE 3.12


ANDREWS AFB
HYDROGEOLOGIC CROSS-SECTION
DAVIDSONVILLE ANNEX
DAVIDSONVILLE HOUSING SITE
A
A'
ALTITUDE IN FEET
CHESAPEAKE GROUP SEDIMENTS
LOWER PART OF HAMPTON FORMATION
NASSAWADOX CLAY FORMATION
TOTOKAY SANDS
TDL 237
TDL 437
TDL 660
TDL 868
TDL 609
TDL 582
TDL 870
DAVIDSONVILLE HOUSING SITE
CHESAPEAKE
SCALE
0
8
MILES
EXPLANATION
GENERALIZED LITHOLOGY
SAND
SILTY SAND
SILTY CLAY
CLAY
GRAVEL
GAMMA LOG
RESISTIVITY LOG
INCREASING RADIATION
INCREASING RESISTIVITY
SOURCE: CHAPELLE AND DRUMMOND, 1983

five to fifty feet in the study area and may be completely absent locally. It in turn overlies the lower part of the Nanjemoy Formation, described earlier in this subsection. The two low-permeability units form a barrier above the Aquia Formation, the regional aquifer. The barrier, however, is thin and could be discontinuous locally. The Aquia has been the subject of detailed study by the U.S. Geological Survey Water Resouces Division and the Maryland Geological Survey. Water level, aquifer characterization and water quality parameters are monitored routinely in this aquifer. A USGS test well is located some 1200 feet east of the Davidsonville Annex housing area. The well is sealed into the Aquia and is used to monitor aquifer conditions. This well indicates that the average Aquia water level for 1984 has been about 66 feet below grade.

Ground-Water Quality

The quality of water resources obtained from major study area aquifers has been reported by Woll (1978). Water quality is generally good; however, local variations in hardness and iron content may make some water sources unattractive. BES at Andrews AFB maintains quality records for the water supplies obtained from wells at the Brandywine and Davidsonville Annexes. A review of the recent records indicates that water obtained from annex wells is generally of acceptable quality, with the notable exception of the well located at the Brandywine Transmitter Site. This well was inactivated in 1970 due to objectionable taste and odor problems in water pumped from it. This problem was thought to be due to high iron levels.

Study Area Ground-Water Use

Andrews Air Force Base obtains its water supplies from a local municipal distribution system, as do the businesses and homes proximate to the installation. At the time (1940's) the base was developed, however, it was common practice to obtain needed water supplies from individual wells, as a number of prolific aquifers were available to the consumer at relatively shallow depths. Shallow dug wells (thirty feet deep or less) constructed into the Upland Deposits were capable of supplying domestic or farm irrigation requirements. Such wells may run dry during the summer months. Wells screened into the Chesapeake Group (Calvert Formation or equivalent unit) at slightly greater depths could

also provide limited supplies. The modern constraints imposed by health and economic concerns have made municipal system use more attractive and have decreased the former dependence on ground-water supplies in the Andrews AFB study area. Figure 3.13 is a map depicting the estimated locations of study area wells. The wells shown outside the base are believed to be active. Eight inactive wells are shown within the installation boundaries. These are illustrated as they probably still exist, but may not be properly abandoned (by pressure grouting). Only the base lake well, used for irrigation purposes, remains in operation. A large capacity industrial well, utilized for washing sand and gravel, is located at the quarry east of the base lake (well number Ed 51, installed in 1981 and rated for 150 gpm).

Table 3.5 summarizes the information describing base wells. At least four other wells (or simply test holes) were drilled on base prior to its inception as a military installation. The accurate locations or status of these wells are uncertain; it is assumed that wells installed prior to base construction were covered or destroyed by site development activities. The table also lists well data for the Brandywine and Davidsonville Annexes.

Municipal water service may not be available to all consumers located near the Brandywine and Davidsonville Annexes. Some local wells are known to have been installed and may remain in service near these sites. At Brandywine Annex, water supplies adequate for domestic, farm or industrial consumers may be obtained from Upland Deposits, the Aquia or Magothy Formations. At Davidsonville Annex, water supplies adequate for most consumers may be obtained from the Terrace Deposits or the Aquia Formation, using wells screened to moderate depths (100 to 200 feet below grade). Water quality data indicates that water obtained from the Davidsonville Site operations well may contain excessive iron levels.

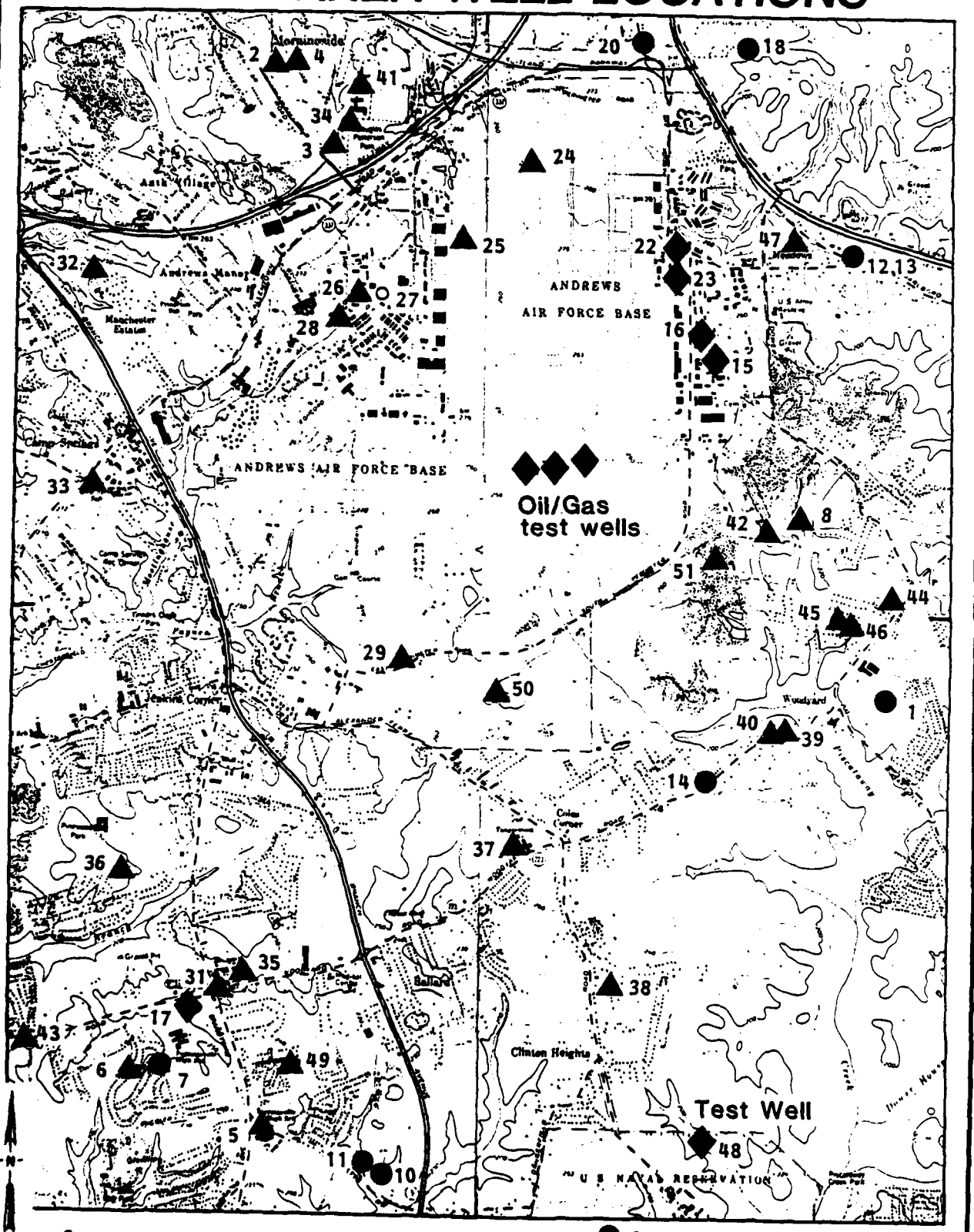
Ground-Water Monitoring

Ground-water quality monitoring of shallow aquifers has been performed at Andrews AFB, Brandywine Annex and Davidsonville Annex. Monitoring was performed at the former Fechet Avenue service station site in response to a suspected gasoline leak from one or more subsurface storage tanks. The monitoring effort was reported by Handex Corporation

FIGURE 3.13

ANDREWS AFB

STUDY AREA WELL LOCATIONS



SOURCE: MODIFIED FROM TOMPKINS, 1983

ES ENGINEERING-SCIENCE

TABLE 3.5
WELL RECORDS
ANDREWS AFB

Well No.	Location	Construction Date	Depth ft.	Diameter in.	Aquifer	State Water Level/Date		Yield gpm	Water Use	Remarks
Ed 22	Andrews AFB	[illegible]	427	-	Patapsco	-	-	-	None	Base Well No. 1, Caved in
Ed 23	Andrews AFB	1942/43	-	-	-	-	-	-	None	Base Well No. 2
Ed 24	Andrews AFB	1943	595	-	Patapsco/Magothy	-	-	-	None	Base Well No. 3
Ed 25	Andrews AFB	1943	345	-	Magothy	-	-	-	None	Base Well No.4
Ed 26	Andrews AFB	1943	332	8	Patapsco	-	-	-	None	Base Well No. 5
Ed 27	Andrews AFB	1942	338	6	Magothy	195	October 1942	25	None	Base Well No. 5A, Covered
Ed 28	Andrews AFB	1943	400	-	Patapso/Magothy	-	-	-	None	Base Well No. 6
Ed 29	Andrews AFB	1942/43	-	-	-	-	-	-	None	Base Well No. 7
Ed 50	Andrews AFB	1979	780	8	Patapsco	199.25	July 1979	175	Agricultural/ Irrigation	Base Lake Well
Fd 63	Brandywine Site	-	390	-	Magothy	183.81	April 1963	29	Institution	Site Well
Fd 66	Brandywine Site	1965	390	4	Magothy	190	August 1965	15	Institution	Naval Lab Well (DPDO)
Fe 25	Brandywine Housing	1956	450	6	Magothy	105	October 1956	30	Public	Housing Well
DC 7	Davidsonville Site	1951	183	6	Magothy	82	April 1951	47	-	Site Well
DC 13	Davidsonville Site	1960	272	10	Magothy	89	August 1960	335	Institution	Site Well
Ed 24	Davidsonville Housing	1954	310	8	Magothy	148	November 1954	60	-	Housing Well

Source: Modified from Lucas (1976) and Tompkins (1983)

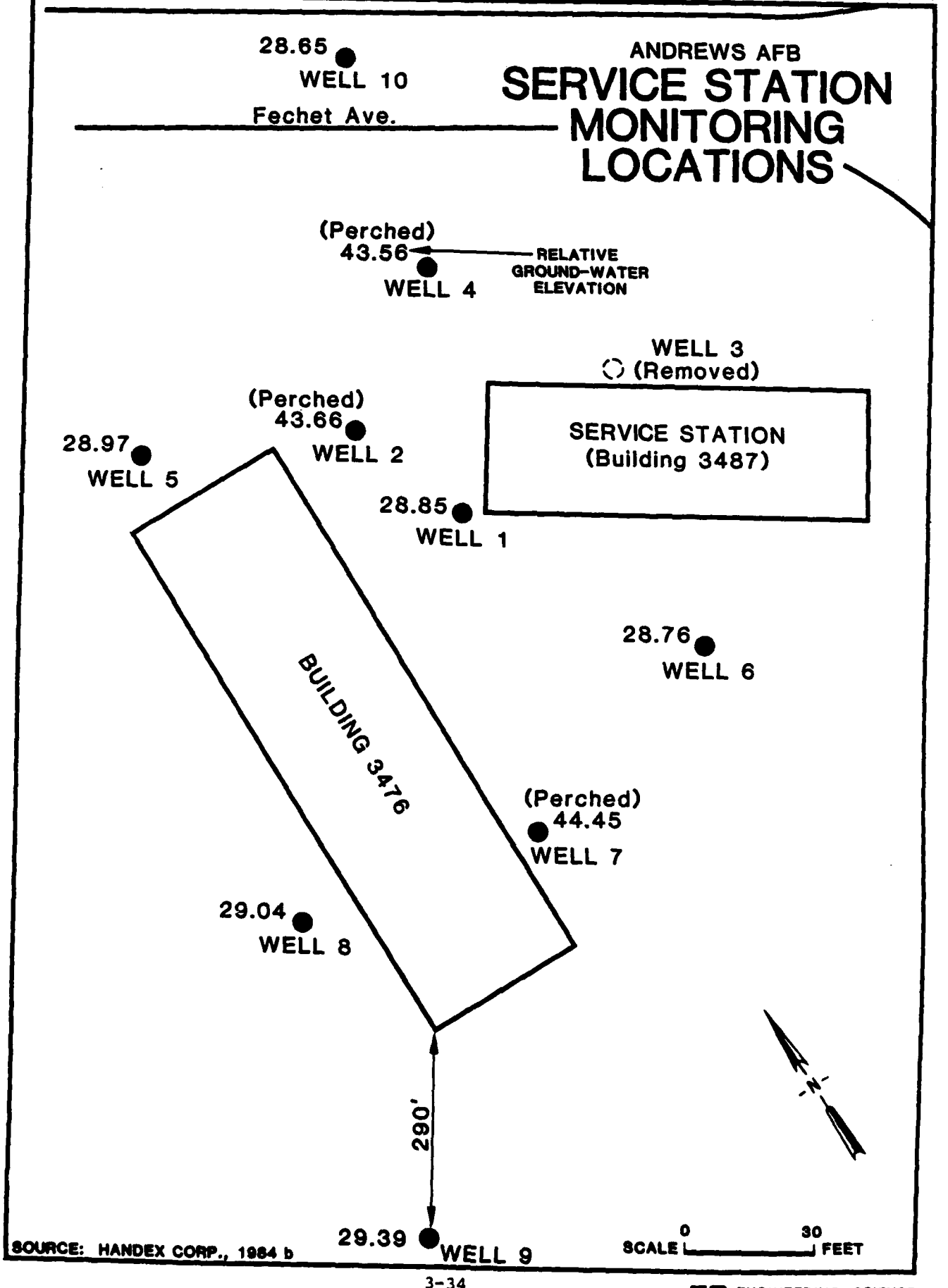
(1948b) and concentrated on ground water present in the upland Deposits (the uppermost aquifer at the base). Ground-water levels were reported to range from 4.98 to 22.22 feet below grade. The study results were inconclusive. This may be due to several factors:

- Subsurface conditions were identified by using the cuttings brought to ground surface during the drilling process, rather than by direct sampling. This may have caused difficulty in the identification of strata changes.
- Not all wells were screened into the same stratum. Water levels for some of the wells showed marked differences. It is assumed that some of the wells were monitoring conditions in one water-bearing unit (fill), while the remaining wells were monitoring conditions in yet another unit (Upland Deposits). Water level, flow direction and quality information obtained from such a monitoring system may be misleading.
- Because the monitoring system detected only odors, not gasoline, it is possible that (a) gasoline migration from the source was minimal, or (b), the detection system missed the plume.

The study reported that the ground-water flow direction in the vicinity of the service station was northeast. Service station monitoring well locations are shown on Figure 3.14.

Ground-water monitoring was conducted at the Brandywine Annex family housing area in response to a suspected fuel oil leak. A system of ten wells was installed into the uppermost aquifer, identified as Upland Deposits (or weathered Calvert Formation) overlying a portion of unweathered Calvert Formation. The leak problem at this site came to the attention of the Maryland Water Resources Administration as fuel was observed seeping from a streambank near the suspected source into an unnamed tributary of Mataponi Creek. Three wells encountered product shortly after installation; an inspection of all the wells following installation and stabilization of water levels indicated that no product (or plume) was present. A northwest ground-water flow direction, from

FIGURE 3.14



SOURCE: HANDEX CORP., 1984 b

ES ENGINEERING-SCIENCE

the site to the creek was postulated. Other flow directions were reported to be possible. The report recommended the routine water-quality sampling of downgradient production wells for the presence of free floating product and dissolved hydrocarbons. Monitoring well locations are shown on Figure 3.15.

Ground-water quality monitoring was performed at the Davidsonville Annex site operations building in response to a suspected leaking underground fuel oil storage tank (Handex Corporation, 1984c). Four monitoring wells were installed into the uppermost aquifer at the site (Terrace Deposits). Stabilized water levels ranged from 4.5 to 5 feet below grade; a southwest flow direction was reported. One well encountered floating product and oil was observed in a conduit vault. The suspected leaking tank was removed; it was concluded that further assessment was necessary to determine if product recovery was feasible. Monitoring well locations are shown on Figure 3.16.

SURFACE WATER RESOURCES

Andrews Air Force Base occupies a rolling upland position with respect to the surrounding terrain. Because of this relatively high topographic setting, the base straddles the drainage divide separating the Potomac River Basin to the west and the Patuxent River Basin to the east. The surface water drainage divide probably extends north-south through the base in the vicinity of the two runways; its actual delineation on base is difficult to determine as base surface drainage has been substantially modified by drainage improvements installed as part of numerous site use modifications.

Andrews AFB surface drainage originating from the western portion of the base is ultimately directed to the Potomac River via its tributaries, Henson Creek, Meetinghouse Branch, Paynes Branch and Piscataway Creek. Base surface water drainage flowing from the eastern sections of the installation is ultimately directed to the Patuxent River via its tributaries Cabin Branch and Charles Branch.

The segments of the Potomac and Patuxent River Basins receiving drainage from Andrews AFB are designated Class I waters by the Maryland

FIGURE 3.15

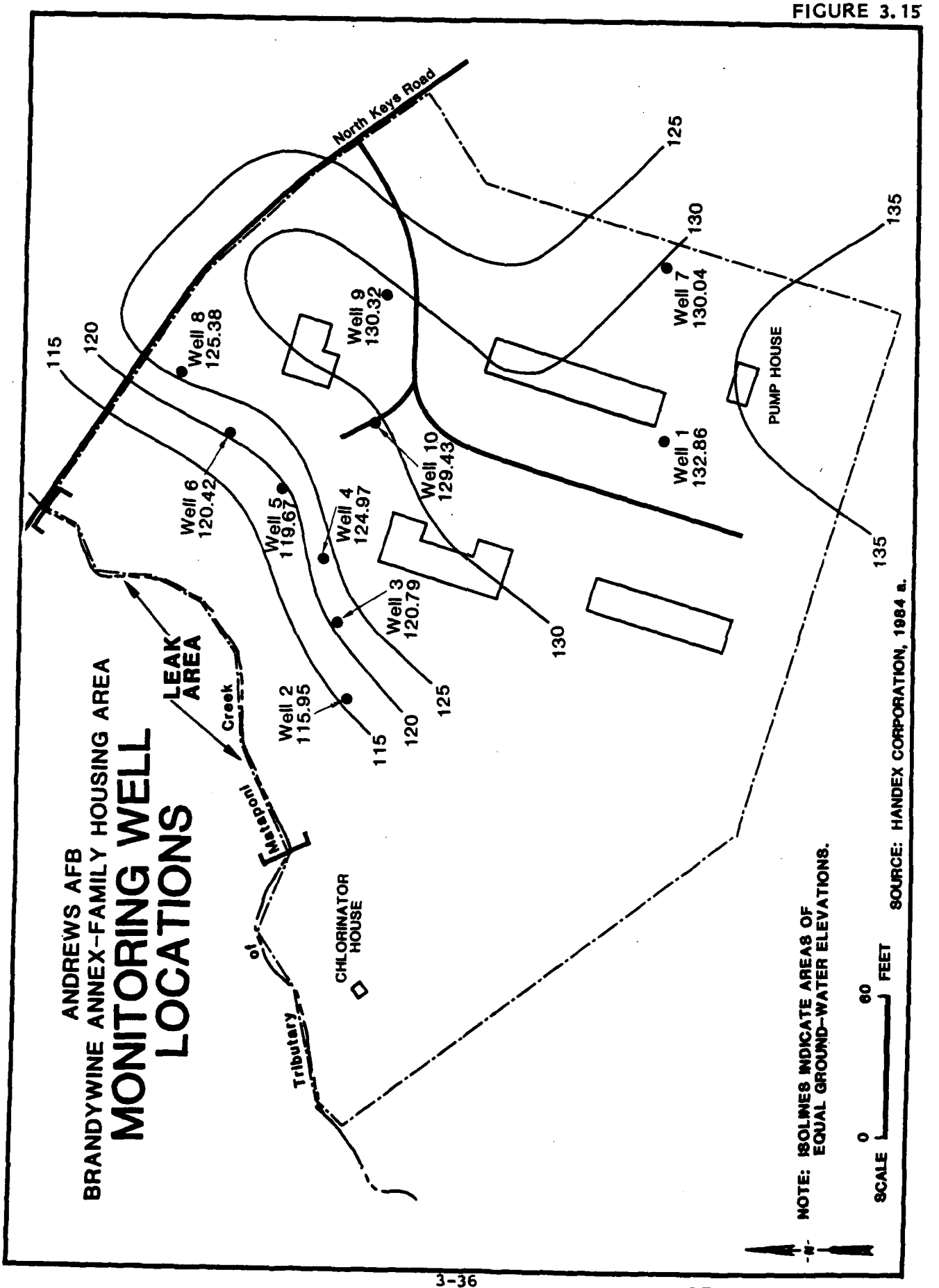
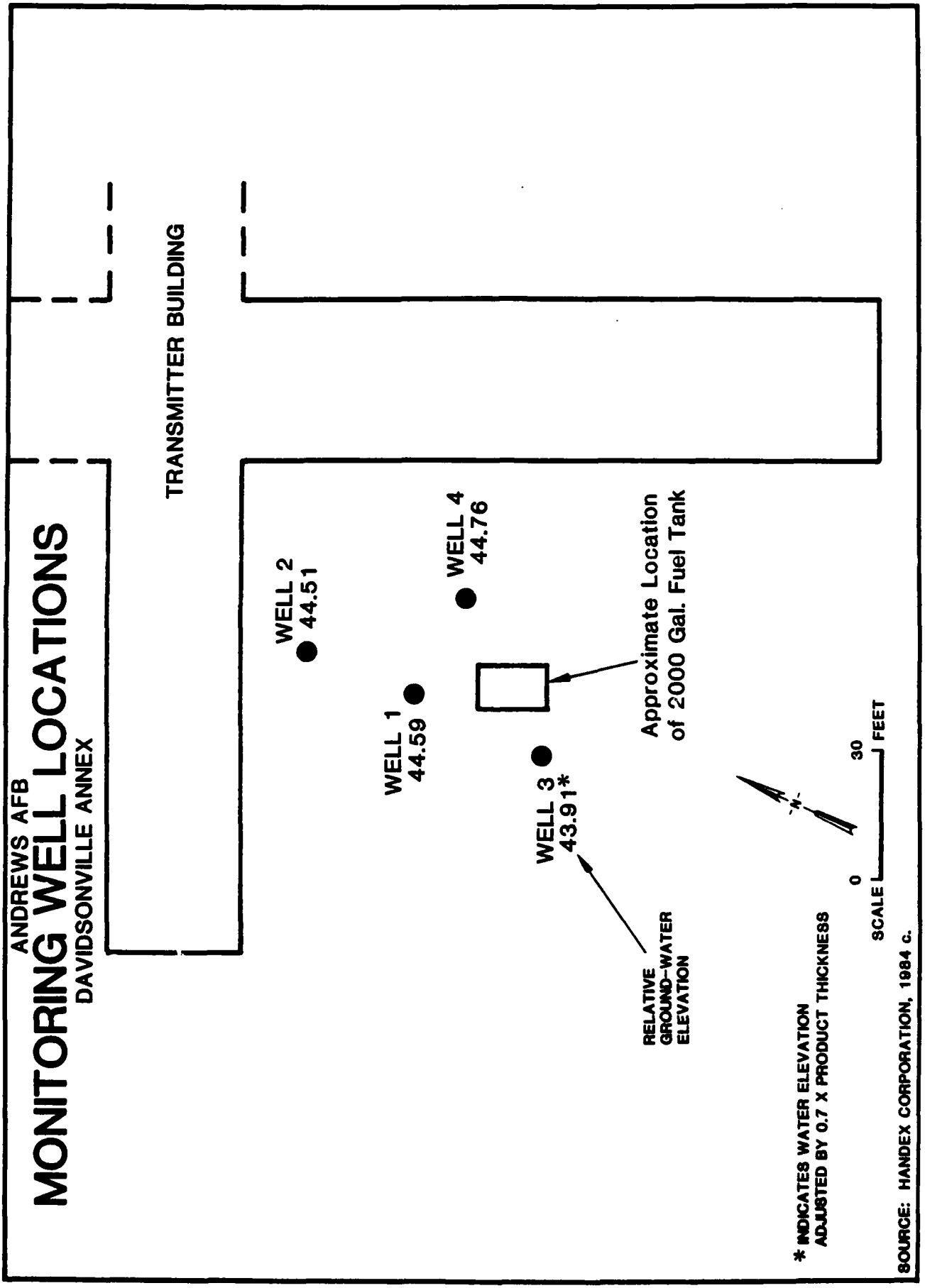

ANDREWS AFB
BRANDYWINE ANNEX-FAMILY HOUSING AREA
MONITORING WELL LOCATIONS
North Keys Road
LEAK AREA
Creek
Matapoul
of
Tributary
CHLORINATOR HOUSE
PUMP HOUSE
Well 1 132.86
Well 2 115.95
Well 3 120.79
Well 4 124.97
Well 5 119.67
Well 6 120.42
Well 7 130.04
Well 8 125.38
Well 9 130.32
Well 10 129.43
115
120
125
130
135
NOTE: ISOLINES INDICATE AREAS OF EQUAL GROUND-WATER ELEVATIONS.
SCALE 0 60 FEET
SOURCE: HANDEX CORPORATION, 1984 a.

FIGURE 3.16


ANDREWS AFB
MONITORING WELL LOCATIONS
DAVIDSONVILLE ANNEX
TRANSMITTER BUILDING
WELL 2
44.51
WELL 1
44.59
WELL 4
44.76
WELL 3
43.91*
Approximate Location
of 2000 Gal. Fuel Tank
RELATIVE
GROUND-WATER
ELEVATION
N
0
30
SCALE
FEET
* INDICATES WATER ELEVATION
ADJUSTED BY 0.7 X PRODUCT THICKNESS
SOURCE: HANDEX CORPORATION, 1984 c.

Department of Health and Mental Hygiene (1983). The beneficial uses of Class I waters include contact recreation and the propagation of fish, other aquatic life and wildlife.

Surface water drainage originating from the Brandywine Annex site operations facility is directed to the Potomac River. Runoff originating from the site operations area is directed to two unnamed tributaries of Mattawoman Creek which cross the annex. Flow then proceeds to Mattawoman Creek and finally to the Potomac. Runoff developing at the associated family housing area flows to an unnamed tributary of Mataponi Creek. Flow continues in Mataponi Creek and terminates in the Patuxent River. The surface waters receiving drainage from the Brandywine Annex and its associated family housing complex are also designated as Class I waters.

Surface drainage originating from the north section of the Davidsonville Annex site operations area is directed to Ropers Branch, a tributary of the Patuxent River and finally to the major stream. Drainage from the south section of the site operations complex flows to an unnamed tributary of the Patuxent and then to the major stream. Drainage from the Davidsonville Annex family housing area flows to the Patuxent River via an unnamed tributary. The local surface waters receiving drainage from the Davidsonville Annex and its associated housing area are designated as Class I waters.

Surface Water Quality Monitoring

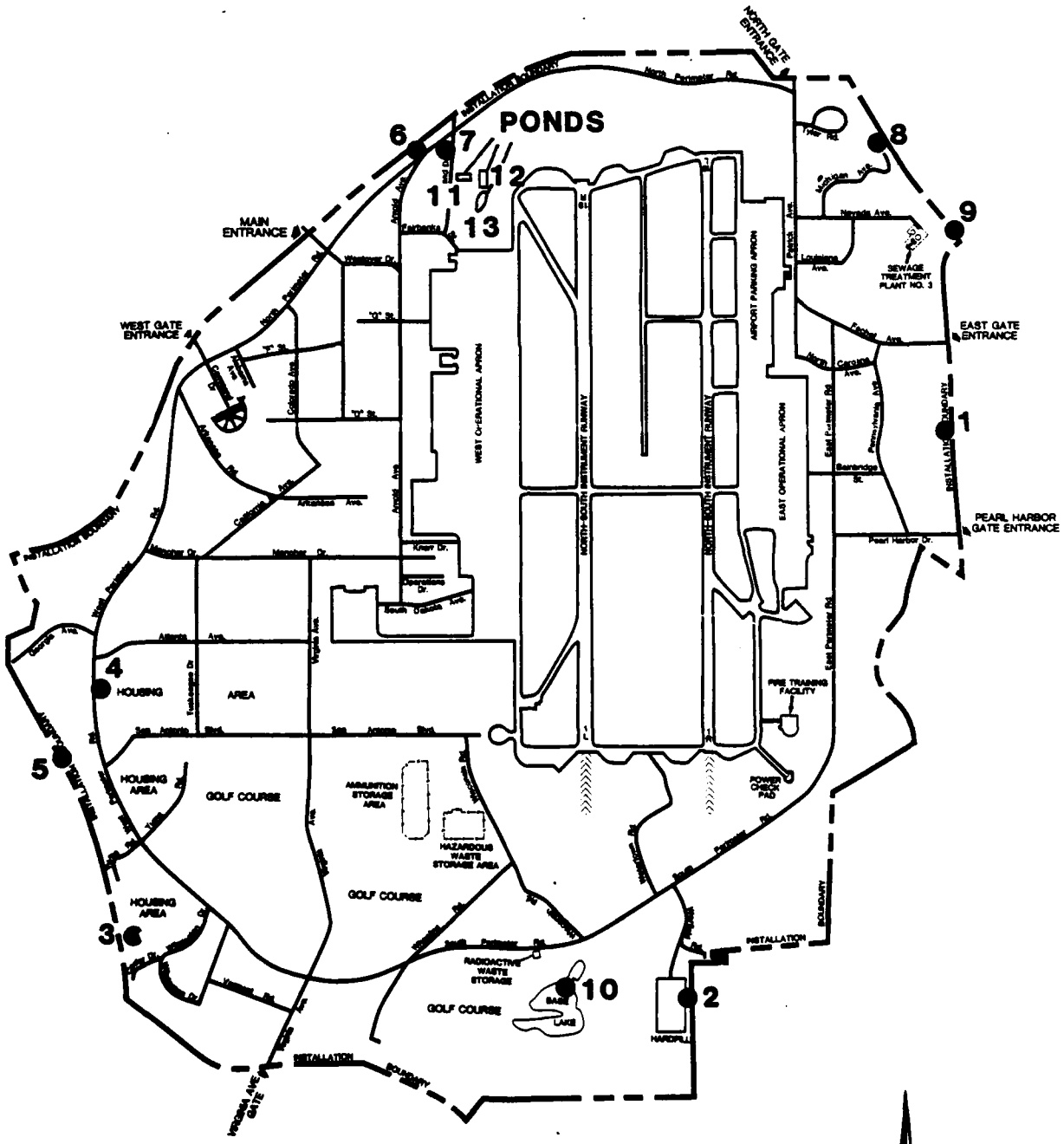
Historical documents indicate that an agressive surface water quality monitoring program was conducted at Andrews Air Force Base during the period February 1976 to June 1978. This program utilized thirteen monitoring stations, located at the approximate positions depicted on Figure 3.17. The program followed during this time frame was relatively comprehensive; all major drainage courses leaving the base were sampled and analyses for many potential pollutants were performed. Sampling data representative of the period is included in Appendix D, Table D.7. Historical sampling analytical results indicate that base surface water quality was generally within the levels required for "Class I" waters. A few excursions from the permissable concentrations of specific constituents were noted. Specifically, the data indicates that occasionally high iron levels were detected in the surface

FIGURE 3.17

ANDREWS AFB

HISTORICAL SURFACE WATER QUALITY MONITORING STATION LOCATIONS

(February 1976 - June 1978)



SOURCE: INSTALLATION DOCUMENTS

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water drainage to Cabin Branch (south point), Piscataway Creek. Henson Creek (both east and west points) and in all three north ponds. Also, elevated sulfate levels were detected in Meetinghouse Branch during the period when the initial monitoring program was performed.

After June 1978, the surface water quality monitoring program at Andrews AFB was discontinued. No data describing the quality of base surface waters is available during the period 1978-1984.

On 1 May 1982, a substantial fish kill was reported to have occurred in Meetinghouse Branch (on base) and further downstream in Tinker's Creek (off base). The incident was investigated by the Maryland Office of Environmental Programs, Waste Management Administration Enforcement Division. The event was traced to Andrews AFB from a point extending three miles downstream. The kill included carp, eels and snapping turtles. Further study by Andrews AFB personnel indicated that a contractor engaged in the cleaning of the base officer's club pool had been using hydrochloric acid and had discharged to the effected stream(s). It was determined that the discharge of the acid was the only reasonable cause for the event. Andrews AFB personnel provided for the proper supervision of the contractor so that discharges would be properly neutralized and diluted prior to release in order to maintain local stream quality.

During Fiscal year 1984, a new surface water quality monitoring program was developed for Andrews AFB in order to comply with all applicable regulations. The newly implemented program utilizes nine water sampling stations; their locations are shown on Figure 3.18. A review of this data indicates that base surface water quality generally falls within the range considered acceptable for Class I waters. The only notable exception to this is the concentration of iron observed at the discharges to Henson Creek (both east and west) and Piscataway Creek.

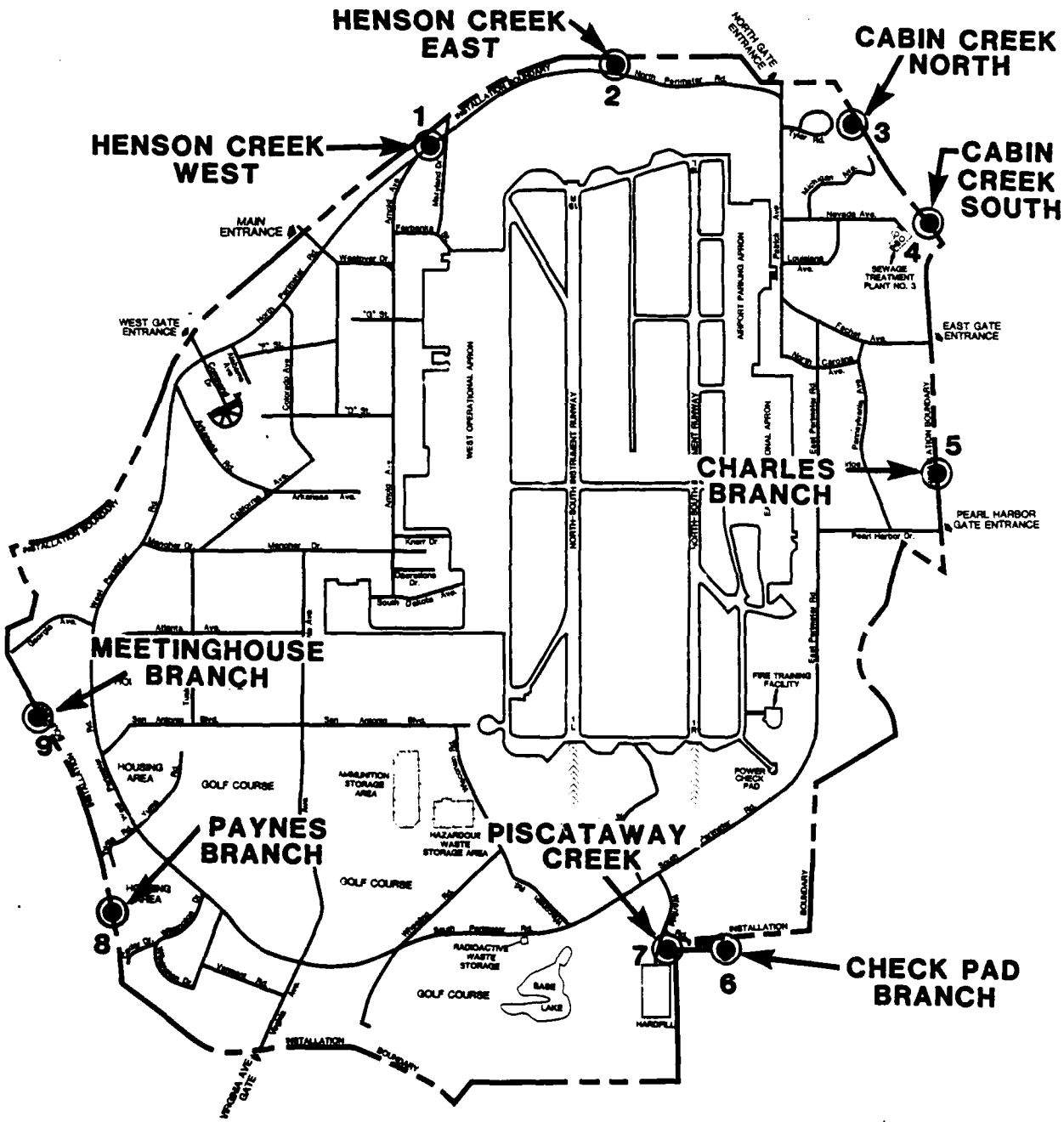
THREATENED AND ENDANGERED SPECIES

The land area of Andrews AFB includes some 4300 acres, of which approximately 780 acres is classified as unimproved property. The unimproved property includes open fields and woodlots dispersed in irregular fashion about the installation periphery. The principal types

FIGURE 3.18

ANDREWS AFB

CURRENT SURFACE WATER MONITORING STATION LOCATIONS



SOURCE: INSTALLATION DOCUMENTS

of growth include grasses, shrubs and mature deciduous trees including beech, oak and gum. Small stands of Virginia pine occur locally. This type of environment provides habitat for common small upland animals and birds.

No threatened or endangered species of plants or animals have been indentified on Andrews Air Force Base or its satellite installations (TAB A-1, 1975; 1766 ABW [MAC], 1983). Further, it has been determined that no potential critical habitat for such species exists on Andrews AFB. Four endangered animal species may exist within a fifty-mile radius of the base and include the following:

- Bald Eagle - nesting areas in Anne Arundel County
- Peregrine Falcon - being reintroduced to Prince George's County
- Red-cockaded Woodpecker - restricted to Dorchester County
- Delmarva Fox Squirrel - resident to Kent and Queen Annes Counties

Due to the lack of suitable habitat for the above, it is unlikely that they would even be transient to the Andrews AFB area. These species could be transients, however, in the unimproved sections (periphery) of the Brandywine and Davidsonville Annexes or the associated housing areas.

SUMMARY OF ENVIRONMENTAL SETTING

The environmental setting data reviewed for this investigation indicate that the following elements are relevant to the evaluation of past hazardous waste management practices at Andrews Air Force Base and its satellite facilities:

- The mean annual precipitation is 42.6 inches and net annual precipitation is calculated to be 5.6 inches.
- Flooding is not known to be a problem at the base or its annexes.
- Base and annex surface soils are predominantly sandy, permeable materials.

- Upper aquifers exist at or near ground surface at the base and at both satellite facilities. Ground water is present in these units at shallow depths ranging from five to twenty feet below grade.
- The installation and its respective annexes are located in the recharge zones of these upper aquifers.
- The upper aquifers have been a historical source of water to domestic or agricultural consumers near the base and its annexes.
- Although the upper aquifers are not a significant source of water supplies in the study area at present, they are known to furnish baseflow to local streams and to provide recharge to underlying regional aquifers.
- Several aquifers of regional importance have been identified in the study area. Most are separated from overlying shallow units by clays or other low-permeability strata, however, the degree of protection is uncertain and it has been reported that upper aquifers do provide a certain amount of recharge to the underlying major units.
- Base surface water quality generally conforms to the standard required for the designated use classifications of local streams.
- No threatened or endangered species of plants or animals have been identified on Andrews AFB or its satellite facilities. However, some animal species could conceivably be transients in the remote areas where the Brandywine and Davidsonville Annexes are located.

It may be seen from these key elements that potential pathways facilitating the migration of hazardous-waste related contamination exist. Hazardous waste constituents present at ground surface could be mobilized to the upper aquifer and subsequently to either local surface waters or to regional aquifers present at greater depths.

SECTION 4
FINDINGS

This section summarizes the hazardous wastes generated by installation activities, identifies hazardous waste accumulation and disposal sites located on the installation, and evaluates the potential environmental contamination from hazardous waste sites. Past waste generation and disposal methods were reviewed to assess hazardous waste management practices at Andrews AFB.

SATELLITE FACILITIES REVIEW

Brandywine Receiver Site

The Brandywine Receiver Site provides air-to-ground HF Communications in support of the Andrews Presidential/VIP radio station. Minor quantities of waste oil and paint thinner are generated as a result of minor shop activity at this location. An area outside building 10 has been used as a drum accumulation area in the recent past. Although no drums were stored at this location during the site visit, evidence of past spills and drum leaks was observed. The storage site is located adjacent to the southeast corner of building 10 and consists of a layer of gravel on top of the soil. Oil stains were observed on the walls of the building and on the ground. This site is discussed in more detail in subsequent sections.

The Brandywine housing area is located several miles to the east of this site. This area is used to house dependents of personnel stationed at the Brandywine Annex. A fuel oil leak occurred at this site in the Spring of 1984 and is discussed in detail in the Spill and Leak section of this report.

Davidsonville Transmitter Site

The Davidsonville Transmitter Site, formerly known as Governor Bridge Annex, is used to provide full time communications in support of the Defense Communications System. The site provides air-to-ground HF communications in support of the President of the United States and

other dignitaries. The site consists of a transmitter building, electric power generator plant, water pump stations, a base engineers storage building, a dormitory and dining hall, a wastewater treatment facility, and several small shop facilities. A small waste accumulation point is located at this site to collect the small quantities of waste generated at the auto hobby shop and power plant. A hardfill site is located at the boundary of the annex. A fuel oil leak developed at the annex, behind building 1, in the Spring of 1984 and is discussed in detail in the Spills and Leaks section.

A small housing area is located several miles east of the site. This site provides military family housing for dependents of military personnel stationed at Davidsonville. A small sewage treatment facility serves this site.

INSTALLATION HAZARDOUS WASTE ACTIVITY REVIEW

A review was made of past and present installation activities that resulted in generation, accumulation and disposal of hazardous wastes. Information was obtained from files and records, interviews with past and present installation employees and site inspections.

The sources of hazardous waste at Andrews AFB are grouped into the following categories:

- Industrial Operations (Shops)
- Waste Accumulation and Storage Areas
- Fuels Management
- Spills and Leaks
- Pesticide Utilization
- Fire Protection Training

The subsequent discussion addresses only those wastes generated at Andrews AFB which are either hazardous or potentially hazardous. Potentially hazardous wastes are grouped with and referenced as "hazardous wastes" throughout this report. A hazardous waste, for this report, is defined by, but not limited to, The Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Compounds such as polychlorinated

biphenyls (PCB) which are listed in the Toxic Substances Control Act (TSCA) are also considered hazardous. For study purposes, waste petroleum products such as contaminated fuels, waste oils and waste nonchlorinated solvents are also included in the "hazardous waste" category.

No distinction is made in this report between "hazardous substances/materials" and "hazardous wastes". A potentially hazardous waste is one which is suspected of being hazardous although insufficient data are available to fully characterize the material.

Industrial Operations (Shops)

Summaries of industrial operations at Andrews AFB were developed from installation files and interviews. Information obtained was used to determine which operations handle hazardous materials and which ones generate hazardous wastes. Summary information on all installation shops is provided as Appendix E, Master List of Shops.

Industrial Operations at Andrews AFB were grouped into 18 main units:

- Malcolm Grow Medical Center
- 89th Military Airlift Wing
- 1700 Supply Squadron
- 1700 Transportation Squadron
- 1776 Civil Engineering Squadron
- 113th Tactical Fighter Wing, DCANG
- HQ DCANG
- 459th Tactical Airlift Wing
- 2045th Information Systems Group
- 55 Organizational Maintenance Squadron
- 136' Audiovisual Squadron
- 231st Combat Comm. Squadron, DCANG
- HQ AFSC
- Air Force Office of Special Investigations
- Detachment 1, 4950th Test Wing
- 1776 Security Police Squadron
- 1776th Air Base Wing
- Naval Air Facilities

Bioenvironmental Engineering Services (BES) provided a listing of industrial shops as well as individual shop files indicating past waste generation and hazardous material disposal practices. For the shops identified as generating hazardous wastes, file data was reviewed and personnel were interviewed to determine the types and quantities of waste materials generated and present and past disposal methods. Information developed from base files and interviews with installation employees is summarized in Table 4.1.

Many of the shops at Andrews AFB were established in 1944-1953, as the base first began operations. Most shops have changed locations at least once and some have changed locations as often as seven times. The structure of these industrial operations has also undergone significant change as the base underwent reorganization and change of commands. Waste generation and disposal practices for the base from its onset to the mid-sixties are not well documented. Interviews were conducted with civilian and military personnel who had been at the base during this period and this information was used in developing the time lines in Table 4.1.

The wastes generated in the past in the shops at Andrews AFB have consisted primarily of contaminated jet fuels, waste oils, solvents, cleaning solutions, acids, and paint strippers. The organizations that have generated the majority of waste at the base include the 89th Military Airlift Wing, the Naval Air Facility and the 1700 Transportation Squadron. Wastes are grouped and discussed separately below.

Jet Fuels

Jet fuels, including JP-4 and JP-5, have been used in many of the shops. A majority of this fuel was recycled and reused on the base, however some of this fuel was generated as hazardous waste. Since 1944, contaminated fuel has been collected in bowsers or drums at various shop locations. When bowsers/drums became full they were either taken to fire training areas where the fuel was used in fire protection training exercises or they were emptied in one of several underground storage tanks. Two storage tanks located between hangers 2 and 3 (behind buildings 1770 and 1773) and two storage tanks near the POL storage area were used for this purpose. These tanks were periodically pumped out by

TABLE 4.1

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 – 1960 – 1970 – 1980)
MALCOLM GROW MEDICAL CENTER				
HEMATOLOGY	1050	BODY FLUIDS AND PROCESSING CHEMICALS	1,600 GALS./YR.	1958 DILUTED TO SANITARY SEWER →
		METHANOL	65 GALS./YR.	DILUTED TO SANITARY SEWER →
		ACETONE	7 GALS./YR.	DILUTED TO SANITARY SEWER →
CHEMISTRY LAB	1050	ACIDS	7 GALS./YR.	DILUTED TO SANITARY SEWER →
CYTOLOGY	1050	SOLVENTS	48 GALS./YR.	DILUTED TO SANITARY SEWER →
		POLYETHYLENE GLYCOL	6 GALS./YR.	DILUTED TO SANITARY SEWER - - - → 1980 DPDO →
HISTOPATHOLOGY	1050	SOLVENTS	130 GALS./YR.	DILUTED TO SANITARY SEWER →
		ACIDS	30 GALS./YR.	DILUTED TO SANITARY SEWER →
		ETHANOL	1,500 GALS./YR.	DILUTED TO SANITARY SEWER →
GRAPHICS AND PHOTO REPRODUCTION	1050	DEVELOPER	72 GALS./YR.	DILUTED TO SANITARY SEWER →
		FIXER	15 GALS/YR.	SILVER RECOVERY/ DILUTED TO SANITARY SEWER - - - →
DENTAL CLINIC	1601	ACID	6 GALS./YR.	DILUTED TO SANITARY SEWER →

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
MEDICAL X-RAY	1050	DEVELOPER	4,500 GALS./YR.	1958 DILUTED TO SANITARY SEWER
		FIXER	4,500 GALS./YR.	SILVER RECOVERY/ DILUTED TO SANITARY SEWER
NUCLEAR MEDICINE	1050	SHORT LIVED RADIOISOTOPES	<1 CURIE/YR.	DILUTED TO SANITARY SEWER
89TH MILITARY AIRLIFT WING				
ELECTRIC SHOP	1714	PD-680	10 GALS./YR.	1960 LANDFILL/FPTA 1972 DPDO
BATTERY SHOP	1714	ACID	50 GALS./YR.	NEUTRALIZED/ DILUTED TO SANITARY SEWER
PNEUDRAULICS	1714	PD-680	220 GALS./YR.	DPDO/OIL/WATER SEPARATOR 1958 LANDFILL/FPTA 1972
		HYDRAULIC FLUID	3 GALS./YR.	LANDFILL/FPTA DPDO
WHEEL AND TIRE	1734	PD-680	825 GALS./YR.	DILUTED TO SANITARY SEWER DPDO/OIL/WATER SEPARATOR 1960
CORROSION CONTROL	1791	METHYL ETHYL KETONE	275 GALS./YR.	DRUMMED/LANDFILL DPDO 1954 LANDFILL/FPTA 1976
		HOT PAINT STRIPPER	385 GALS./YR.	DPDO OIL/WATER SEPARATOR 1982
		COLD PAINT STRIPPER	165 GALS./YR.	DILUTED TO SANITARY SEWER
		LACQUER AND DOPE THINNER	225 GALS./YR.	DRUMMED/LANDFILL DPDO OIL/WATER SEPARATOR 1976
		CORROSION REMOVER	600 GALS./YR.	DPDO LANDFILL/FPTA
		TOLUENE	5 GALS./YR.	DRUMMED/LANDFILL DPDO LANDFILL/FPTA 1976 1982

KEY

———— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 – 1960 – 1970 – 1980)
NDI	1791	DEVELOPER	25 GALS./YR.	1966 DILUTED TO SANITARY SEWER
		PENETRANT	3 GALS./YR.	LANDFILL/FPTA → 1972 DPDO
		OIL	110 GALS./YR.	LANDFILL/FPTA → DPDO
		FIXER	10 GALS./YR.	SILVER RECOVERY/ DILUTED TO SANITARY SEWER
AGE	1933	PD-680	1,155 GALS./YR.	1954 OIL/WATER SEPARATOR → 1972 DPDO/ OIL/WATER SEPARATOR
		WASTE OIL	1,200 GALS./YR.	LANDFILL/FPTA → DPDO
		HYDRAULIC FLUID	480 GALS./YR.	OIL/WATER SEPARATOR → DPDO
JET ENGINE SHOP	1932	CARBON REMOVER	5 GALS./YR.	DILUTED TO SANITARY SEWER → LANDFILL → DPDO
		WASTE OILS	3,000 GALS./YR.	DUST CONTROL/ LANDFILL → DPDO
		PD-680	480 GALS./YR.	LANDFILL/DILUTED TO SANITARY SEWER; DILUTED TO SANITARY SEWER → DPDO/DILUTED TO SANITARY SEWER
		JP-4	600 GALS./YR.	DILUTED TO SANITARY SEWER → LANDFILL → DPDO
JET ENGINE TEST CELL	1950, 1951	JP-4	2 GALS./YR.	LANDFILL/FPTA → 1961 OIL/WATER SEPARATOR
OMS SUPPORT BRANCH	1706	HYDRAULIC FLUID	100 GALS./YR.	LANDFILL/FPTA → 1963 DPDO
		WASTE OIL	500 GALS./YR.	LANDFILL/FPTA → DPDO

KEY

———— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
INSPECTION BRANCH	1280	PD-680	55 GALS./YR.	1960 LANDFILL/FPTA 1972 DPDO
		HYDRAULIC FLUID	70 GALS./YR.	LANDFILL/FPTA DPDO
		ETHYLENE GLYCOL	110 GALS./YR.	DILUTED TO SANITARY SEWER
		JP-4	5,000 GALS./YR.	LANDFILL/FPTA 1972 DPDO
PNEUDRAULICS (1ST HELI)	1914	PD-680	100 GALS./YR.	LANDFILL/FPTA DPDO
		HYDRAULIC FLUID	3 GALS./YR.	LANDFILL/FPTA DPDO
ENGINE SHOP (1ST HELI)	1914	PD-680	6 GALS./YR.	LANDFILL/FPTA DPDO
		WASTE OILS	150 GALS./YR.	LANDFILL/FPTA DPDO
AGE (1ST HELI)	1914	PD-680	72 GALS./YR.	RAGS TO DUMPSTER
		WASTE OILS	12 GALS./YR.	LANDFILL/FPTA 1972 DPDO
AVIONICS (1ST HELI)	1914	CONTACT CLEANER	24 OZ./YR.	RAGS TO DUMPSTER
		TRICHLOROTRIFLUOROETHANE	150 OZ./YR.	RAGS TO DUMPSTER
		CORROSION PREVENTION COMPOUND	24 OZ./YR.	RAGS TO DUMPSTER

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
PHASE INSPECTION (1ST HELI)	1914	GREASE	72 GALS./YR.	1960 LANDFILL/FPTA 1972 DPDO
		WASTE OIL	3,000 GALS./YR.	LANDFILL/FPTA DPDO
		HYDRAULIC FLUID	1,000 GALS./YR.	LANDFILL/FPTA DPDO
A & C FLIGHT (1ST HELI)	1914	HYDRAULIC FLUID	72 GALS./YR.	LANDFILL/FPTA DPDO
		LUBRICANT	400 OZ./YR.	DUMPSTER DPDO
		WASTE OIL	400 OZ./YR.	LANDFILL/FPTA DPDO
1700 TRANSPORTATION SQUADRON				
PAINT SHOP	3333	THINNER	110 GALS./YR.	1960 FPTA 1956 LANDFILL/FPTA 1972 DPDO
MINOR MAINTENANCE	3334, 3342	PD-680	1,000 GALS./YR.	DPDO/OIL WATER SEPARATOR 1948 FPTA LANDFILL/FPTA
		WASTE OIL	2,000 GALS./YR.	FPTA LANDFILL/FPTA DPDO
		BRAKE FLUID	36 GALS./YR.	FPTA LANDFILL/FPTA DPDO

KEY

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DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
BASE MAINTENANCE	3347	ETHYLENE GLYCOL	300 GALS./YR.	DILUTED TO SANITARY SEWER (1953) → DPDO/DILUTED TO SANITARY SEWER (1960) → DPDO (1972)
		PD-680	180 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		WASTE OILS	2,000 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		BRAKE FLUID	12 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		TRANSMISSION FLUID	60 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		LUBRICANTS	60 LBS./YR.	FPTA → LANDFILL/FPTA → DPDO
REFUELING MAINTENANCE	3257	PD-680	165 GALS./YR.	OIL/WATER SEPARATOR
		ETHYLENE GLYCOL	55 GALS./YR.	OIL/WATER SEPARATOR
		WASTE OILS	220 GALS./YR.	OIL/WATER SEPARATOR → DPDO
		POWER STEERING/TRANSMISSION FLUID	10 GALS./YR.	OIL/WATER SEPARATOR → DPDO
SPECIAL PURPOSE MAINTENANCE	3355	ETHYLENE GLYCOL	120 GALS./YR.	1960 OIL/WATER SEPARATOR
		PD-680	110 GALS./YR.	LANDFILL/FPTA → 1972 DPDO
		WASTE OILS	440 GALS./YR.	LANDFILL/FPTA → DPDO
		BRAKE FLUID/TRANSMISSION FLUID	14 GALS./YR.	OIL/WATER SEPARATOR → DPDO
GENERAL PURPOSE MAINTENANCE	3354	HYDRAULIC FLUID	150 GALS./YR.	1944 FPTA → LANDFILL/FPTA → DPDO
		TRANSMISSION FLUID	150 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
GENERAL PURPOSE MAINTENANCE (CONT'D)	3354	WASTE OILS	660 GALS./YR.	1946 FPTA → LANDFILL/FPTA 1972 DPDO
		ETHYLENE GLYCOL	240 GALS./YR.	1960 DILUTED TO SANITARY SEWER
MACHINE SHOP	3354	PD-680	120 GALS./YR.	FPTA → 1960 LANDFILL/FPTA 1972 DPDO/ OIL/WATER SEPARATOR
FIRE TRUCK MAINTENANCE	1206	ETHYLENE GLYCOL	240 GALS./YR.	DILUTED TO SANITARY SEWER → DPDO
		PD-680	200 GALS./YR.	FPTA → 1960 LANDFILL/FPTA → DPDO
		WASTE OIL	600 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		BRAKE FLUID/TRANSMISSION FLUID	45 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
1776 CIVIL ENGINEERING SQUADRON				
PAINT SHOP	3608	ALCOHOL	48 GALS./YR.	1946 DILUTED TO SANITARY SEWER → 1972 DPDO
		THINNER	180 GALS./YR.	DILUTED TO SANITARY SEWER → DPDO
		NAPTHA	5 GALS./YR.	DILUTED TO SANITARY SEWER → DPDO
REFRIGERATION AND A/C	3449	SAFETY SOLVENT	25 GALS./YR.	DILUTED TO SANITARY SEWER
ENTOMOLOGY	3459	EMPTY CANS/CONTAINERS	100 CONTAINERS/YR.	TRIPLE RINSE TO LANDFILL
		EQUIPMENT WASH	200 GALS./YR.	DILUTED TO SANITARY SEWER
HEATING MAINTENANCE	3449	WASTE OIL	12 GALS./YR.	1946 DILUTED TO SANITARY SEWER → 1972 DPDO
		SAFETY SOLVENT	35 GALS./YR.	DILUTED TO SANITARY SEWER

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY TRAINING OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
HEATING PLANT 1, 2 AND 3	1515, 1732, 3409	ACIDS	6 GALS./YR.	1946 DILUTED TO SANITARY SEWER
		PHENOLIC INDICATOR	3 GALS./YR.	DILUTED TO SANITARY SEWER
		REAGENT	6 GALS./YR.	DILUTED TO SANITARY SEWER
POWER PRODUCTION	3604	ETHYLENE GLYCOL	300 GALS./YR.	1948 DILUTED TO SANITARY SEWER 1972 DPDO/DILUTED TO SANITARY SEWER
		ACID	360 GALS./YR.	NEUTRALIZED/DILUTED TO SANITARY SEWER
		WASTE OILS	360 GALS./YR.	FPTA 1960 LANDFILL/FPTA 1972 DPDO
GOLF COURSE MAINTENANCE	4881	EMPTY CANS/CONTAINERS	20 CONTAINERS/YR.	TRIPLE RINSE TO LANDFILL
		EQUIPMENT WASH	100 GALS./YR.	DILUTED TO SANITARY SEWER
SMART	1527	DETERGENT	24 GALS./YR.	1963 DILUTED TO SANITARY SEWER
		PAINT CANS	300 CANS/YR.	LANDFILL ON BASE DUMPSTER
		EXCESS PAINT	20 GALS./YR.	LANDFILL ON BASE 1981 DPDO
113TH TACTICAL FIGHTER WING, DCANG				
TEST CELL	3000	WASTE OIL	100 GALS./YR.	1952 FPTA LANDFILL/FPTA 1972 DPDO
		CARBON REMOVER	5 GALS./YR.	FPTA LANDFILL/FPTA DPDO
		PD-680	100 GALS./YR.	LANDFILL/FPTA DPDO

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
JET ENGINE	3031	HYDRAULIC FLUID	12 GALS./YR.	1952 FPTA → 1966 LANDFILL/FPTA → 1972 DPDO
		PD-680	110 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
AGE	3032	PD-680	165 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO/DILUTED TO SANITARY SEWER
		WASTE OILS	12 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		HYDRAULIC FLUID	720 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		ETHYLENE GLYCOL	75 GALS./YR.	DILUTED TO SANITARY SEWER
PNEUDRAULICS	3119	HYDRAULIC FLUID	200 GALS./YR.	FPTA → 1966 LANDFILL/FPTA → 1972 DPDO
		PD-680	200 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO/DILUTED TO SANITARY SEWER
REPAIR & RECLAMATION	3119	CLEANING SOLVENT	220 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		PAINT REMOVER	300 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
NDI	3032	DEVELOPER	55 GALS./YR.	DILUTED TO SANITARY SEWER → DPDO
		PENETRANT	55 GALS./YR.	LANDFILL/FPTA → DPDO
		1,1,1-TRICHLOROETHANE	55 GALS./YR.	LANDFILL/FPTA → DPDO
		FIXER	60 GALS./YR.	SILVER RECOVERY/ DILUTED TO SANITARY SEWER
		PHOTOGRAPHIC SOLUTION	60 GALS./YR.	DILUTED TO SANITARY SEWER
		PD-680	55 GALS./YR.	LANDFILL/FPTA → 1972 DPDO

KEY

———— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
WEAPONS RELEASE	3032	WASTE OILS	12 GALS./YR.	1952 LANDFILL/FPTA 1972 DPDO
		PAINT	8 GALS./YR.	LANDFILL/FPTA DPDO
ECM	3109	ADHESIVE	2 GALS./YR.	DUMPSTER
		WASTE OILS	1 GAL./YR.	OIL/WATER SEPARATOR
		ALCOHOL	2 GALS./YR.	RAGS TO DUMPSTER
WEAPONS CONTROL	3109	HYDRAULIC FLUID	12 GALS./YR.	1951 FPTA 1960 LANDFILL/FPTA 1972 DPDO
TRANSPORTATION	3217	WASTE OILS	220 GALS./YR.	FPTA LANDFILL/FPTA DPDO
		DEGREASING AGENT	33 GALS./YR.	FPTA LANDFILL/FPTA DPDO
		SOLVENT	33 GALS./YR.	FPTA LANDFILL/FPTA DPDO
PHOTOGRAPHY LAB	3119	DEVELOPER	314 GALS./YR.	DILUTED TO SANITARY SEWER
		FIXER	349 GALS./YR.	SILVER RECOVERY/DILUTED TO SANITARY SEWER
		PHOTO CHEMICALS	550 GALS./YR.	DILUTED TO SANITARY SEWER

KEY

———— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
CORROSION CONTROL	3119	COATINGS	12 GALS./YR.	1951 FPTA → 1960 LANDFILL/FPTA → DPDO
		PRIMER	10 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		1,1,1-TRICHLOROETHANE	8 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		THINNERS	10 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		PAINT REMOVER	10 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		PAINT CANS	25 CANS/YR.	DUMPSTER
HQ DCANG				
PNEUDRAULICS	3121	HYDRAULIC FLUID	110 GALS./YR.	1951 FPTA → 1960 LANDFILL/FPTA → 1972 DPDO
AGE	3121	WASTE OIL	385 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		SOLVENTS	220 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
PROPULSION	3121	WASTE OIL	108 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
		SOLVENTS	60 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
WHEEL AND TIRE	3121	SOLVENT	1,500 GALS./YR.	1952 FPTA → LANDFILL/FPTA → DPDO
FLIGHTLINE MAINTENANCE	3129	HYDRAULIC FLUID	42 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO
VEHICLE MAINTENANCE	3129	ETHYLENE GLYCOL	55 GALS./YR.	DILUTED TO SANITARY SEWER
		WASTE OIL	110 GALS./YR.	1952 FPTA → 1960 LANDFILL/FPTA → 1972 DPDO

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
PHASE INSPECTION	3129	METHYL ETHYL KETONE	6 GALS./YR.	1952 FPTA → 1960 LANDFILL/FPTA → 1972 DPDO →
CORROSION CONTROL	3121	THINNER	20 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO →
		METHYL ETHYL KETONE	10 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO →
459TH TACTICAL AIRLIFT WING				
PNEUDRAULICS	3635	PD-680	3 GALS./YR.	1949 FPTA → LANDFILL/FPTA → DPDO →
		HYDRAULIC FLUID	300 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO →
WHEEL AND TIRE	3640	PD-680	220 GALS./YR.	FPTA/DILUTED TO SANITARY SEWER → LANDFILL/FPTA/DILUTED TO SANITARY SEWER → DPDO/DILUTED TO SANITARY SEWER
ELECTRIC/BATTERY SHOP	3635	ACID	200 GALS./YR.	NEUTRALIZED/DILUTED TO SANITARY SEWER →
JET ENGINE/PROP. PROPELLER	3635	PD-680	100 GALS./YR.	FPTA → 1960 LANDFILL/FPTA → 1972 DPDO →
		HYDRAULIC FLUID	300 GALS./YR.	FPTA → LANDFILL/FPTA → DPDO →
		WASTE OILS	100 GALS./YR.	OIL/WATER SEPARATOR →
NON-POWERED AGE	3640	PD-680	1 GAL./YR.	OIL/WATER SEPARATOR →

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
AGE	3639	WASTE OILS	1,200 GALS./YR.	1944 FPTA → 1960 LANDFILL/FPTA → 1972 DPDO
		ACIDS	100 GALS./YR.	NEUTRALIZED/DILUTED TO SANITARY SEWER
		PD-680	2,200 GALS./YR.	FPTA → 1960 LANDFILL/FPTA/DILUTED TO SANITARY SEWER → 1972 DPDO/DILUTED TO SANITARY SEWER
		HYDRAULIC FLUID	30 GALS./YR.	DILUTED TO SANITARY SEWER → DPDO
2045TH INFORMATION SYSTEMS GROUP				
RECEIVER STATION	BRANDYWINE	WASTE OIL	120 GALS./YR.	FPTA → 1960 LANDFILL/FPTA → 1972 DPDO
		ETHYLENE GLYCOL	26 GALS./YR.	DILUTED TO SANITARY SEWER
		PAINT/PAINT THINNER	25 GALS./YR.	DILUTED TO SANITARY SEWER → 1972 DPDO
TRANSMITTER SITE	DAVIDSON-VILLE	WASTE OILS	85 GALS./YR.	1951 FPTA → 1960 LANDFILL/FPTA → 1972 DPDO
		ETHYLENE GLYCOL	60 GALS./YR.	DILUTED TO SANITARY SEWER
POWER PRODUCTION	1558	WASTE OILS	220 GALS./YR.	1953 OIL/WATER SEPARATOR
		ETHYLENE GLYCOL	55 GALS./YR.	OIL/WATER SEPARATOR
		ACIDS	4 GALS./YR.	DILUTED TO SANITARY SEWER → 1972 DPDO
		PD-680	25 GALS./YR.	FPTA → 1960 LANDFILL/FPTA → 1972 DPDO
TELETYPE MAINTENANCE	1558	PD-680	48 GALS./YR.	FPTA → 1960 LANDFILL/FPTA → 1972 DPDO

KEY

———CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

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DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
55 ORGANIZATIONAL MAINTENANCE SQUADRON				
AGE	1225	WASTE OILS	3 GALS./YR.	DILUTED TO SANITARY SEWER (1972) → DPDO
		ETHYLENE GLYCOL	8 GALS./YR.	DILUTED TO SANITARY SEWER
		HYDRAULIC FLUID	9 GALS./YR.	DILUTED TO SANITARY SEWER → DPDO
1361 AUDIOVISUAL SQUADRON				
PHOTO/GRAPHICS LAB	3821	FIXER	12 GALS./YR.	DILUTED TO SANITARY SEWER (1970) → SILVER RECOVERY/DILUTED TO SANITARY SEWER
		DEVELOPER	5 GALS./YR.	DILUTED TO SANITARY SEWER
		PHOTO CHEMICALS	60 GALS./YR.	DILUTED TO SANITARY SEWER
231ST COMBAT COMM. SQUADRON, DCANG				
ELECTRICAL POWER PRODUCTION	3227	WASTE OILS	12 GALS./YR.	(1978) DPDO
VEHICLE MAINTENANCE	3227	WASTE OILS	330 GALS./YR.	DPDO
		SOLVENTS	220 GALS./YR.	DPDO
		THINNERS	1 GALS./YR.	DPDO

KEY

———— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
HQ AFSC				
GRAPHICS	1522, 1535	DEVELOPER	150 GALS./YR.	1959 DILUTED TO SANITARY SEWER
		FIXER	270 GALS./YR.	SILVER RECOVERY/ DILUTED TO SANITARY SEWER
		PHOTO CHEMICALS	16 GALS./YR.	DILUTED TO SANITARY SEWER
AFOSI				
PHOTO LAB	1609	DEVELOPER	40 GALS./YR.	DILUTED TO SANITARY SEWER 1975
		FIXER	12 GALS./YR.	SILVER RECOVERY/DILUTED TO SANITARY SEWER
		PHOTO CHEMICALS	6 GALS./YR.	DILUTED TO SANITARY SEWER
TECH SERVICES	1609	FIXER	5 GALS./YR.	DILUTED TO SANITARY SEWER
		DEVELOPER	10 GALS./YR.	DILUTED TO SANITARY SEWER
1776TH AIR BASE WING				
AUTO HOBBY	3537	PD-680	165 GALS./YR.	1961 OIL/WATER SEPARATOR

KEY

———— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
NAVAL AIR FACILITY				
HANGER 12	3188	PETROLEUM SULFONATE	300 GALS./YR.	1963 LANDFILL/FPTA 1972 → DPDO
		CARBON REMOVER	840 GALS./YR.	LANDFILL/FPTA → DPDO
		PD-680	900 GALS./YR.	LANDFILL/FPTA → DPDO
		PAINT SLUDGE	50 GALS./YR.	DUMPSTER →
		WASTE OIL	1,290 GALS./YR.	LANDFILL/FPTA 1972 → DPDO
		PAINT REMOVER	440 GALS./YR.	STORM SEWER → 1982 DPDO
		ACID	200 GALS./YR.	NEUTRALIZED/DILUTED TO SANITARY SEWER →
		HYDRAULIC FLUID	100 GALS./YR.	LANDFILL/FPTA 1972 → DPDO
HANGER 13	3158	WASTE OIL	1,000 GALS./YR.	LANDFILL/FPTA → DPDO
		PD-680	240 GALS./YR.	LANDFILL/FPTA → DPDO
		METHYL ETHYL KETONE	100 GALS./YR.	LANDFILL/FPTA → DPDO
		NAPTHA SOLVENT	100 GALS./YR.	LANDFILL/FPTA → DPDO
		PAINT REMOVER	120 GALS./YR.	LANDFILL/FPTA → DPDO

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

TABLE 4.1 (CONT'D)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
HANGER 14	3148	WASTE OIL	850 GALS./YR.	1963 LANDFILL/FPTA → DPDO
		HYDRAULIC FLUID	420 GALS./YR.	LANDFILL/FPTA → DPDO
		PD-680	1,300 GALS./YR.	LANDFILL/FPTA → DPDO
		TOLUENE	15 GALS./YR.	LANDFILL/FPTA → DPDO
		JP-4, JP-5	2,600 GALS./YR.	LANDFILL/FPTA → DPDO
		TRICHLOROTRIFLUOROETHANE	50 GALS./YR.	LANDFILL/FPTA → DPDO
PHOTO LAB	3282	DEVELOPER	900 GALS./YR.	DILUTED TO SANITARY SEWER
		FIXER	2,000 GALS./YR.	SILVER RECOVERY/DILUTED TO SANITARY SEWER; DILUTED TO SANITARY SEWER (1980)
		PHOTO CHEMICALS	180 GALS./YR.	DILUTED TO SANITARY SEWER

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

- - - - - ESTIMATED TIME-FRAME DATA BY SHOP PERSONNEL

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

FPTA - FIRE PROTECTION TRAINING AREA

civil engineering. Although some of this waste was sold to an off-base contractor for reclamation, there is evidence that a portion of it was placed into an open waste pit area at landfill site D-1. Some contaminated fuel was washed to the drain system and collected in oil water separators. Actual disposition of this fuel varied throughout the years. From 1944 to 1960, most of this waste was taken to the fire protection training area (FPTA). After 1960 and until circa 1972 waste fuel was split between disposal through the FPTA and the base landfill, as described above. Since circa 1972 waste fuel collected from the underground storage tanks has been sold to off-base contractors through the DPDO. Waste fuel is currently collected in drums and/or bowsers at waste accumulation points and is periodically dumped to one of the appropriate underground tanks, as listed in Appendix D, Table D.1.

Acid/Alkaline Solutions

Waste acid and alkaline solutions have generally been disposed of by dilution to the sanitary sewer system. Industrial shops currently neutralize acids with sodium bicarbonate and then dilute this waste into the sanitary sewer. This practice, however, has only been adopted in the last 10-15 years. Laboratories at the Malcolm Grow Medical Center have not practiced neutralization of their wastes prior to discharge.

Solvents/Strippers

Solvents and paint strippers have been used in many of the shops at the base. During the 1944-1970 period, these wastes were sometimes discharged directly into the sanitary sewer system. Underground tanks designed to store contaminated jet fuel and/or waste oils were often also used to dispose of solvents and paint strippers. Drums and/or bowsers were also used to collect this waste. There is evidence to indicate that some of this stored waste was also used in fire protection training exercises. From 1960-1972 two base landfills (sites D-1 and D-3) which operated on base also accepted this waste. Shops delivered full drums to the landfill, the contents were dumped to the landfill trenches and the drums reused. Currently, solvents and paint strippers are stored in drums at hazardous waste accumulation points in or near shops. These drums are periodically picked up and sent to the hazardous waste storage igloos to await final disposition through the Brandywine DPDO.

Film Processing Waste

There are a number of photo laboratories and x-ray film processing laboratories located at Andrews AFB. Many of these facilities have been located at the base since the 1950's. Spent developer and photo chemicals have been, and continue to be, discharged directly into the sanitary sewer. Fixer has also been discharged to the sewer, however, in the early 1970's most laboratories on the base began practicing silver recovery before discharge.

Waste Oils and Automotive Fluids

Waste oils, hydraulic fluid, brake fluid and transmission fluid are also generated in the Andrews shops. Waste oils have been generated in large amounts at most of the industrial shops at the base. In the past, waste oils were disposed in the same way JP-4 and JP-5 were. Waste oils were often mixed with transmission fluid, brake fluid and hydraulic fluid for disposal. These wastes were also sometimes mixed with jet fuels for ultimate disposal. In addition to previously mentioned disposal techniques, waste oils were sometimes sprayed on roadways for dust control. Currently these wastes are collected in drums and/or bowsers at hazardous waste accumulation points. Periodically, these containers are emptied into underground storage tanks. These wastes are eventually disposed by an off-base contractor through the DPDO.

In addition to the above disposal methods, there was indication that some shops occasionally dumped wastes to the ground surrounding the shops. On at least one occasion, reported at a shop near the Old Mill pond area, such dumping caused wildlife in the vicinity of the pond and fish in the pond to die.

Naval Air Facility Shops

The Naval Air Facility (NAF), a tenant at Andrews AFB, is a major contributor of waste. This facility operates out of four primary buildings. Shops within each building are divided into work centers. Table 4.1 provides timelines for this facility. Naval records track waste not by individual shop but by building and timelines have been illustrated accordingly. When the Navy first moved to the base there was no formal system of waste disposal. At that time, much of the waste went directly to the sanitary sewer. Starting in the late 1960's, wastes were stored in bowsers outside hangars. These bowsers were dumped to underground

tanks as they became full. The Air Force maintained these tanks and periodically pumped them for ultimate disposal. It is expected that a portion of this waste was also placed into one of the two base landfills. Later, when the Brandywine DPDO was established, this waste was disposed through their office.

Shop Summary

Large quantities of waste have been generated in the industrial shops at Andrews AFB. Program updates and changes have resulted in procedures which adequately deal with waste disposal. Shops apparently follow the current hazardous waste management plan fairly closely and no shops stand out as posing a threat to health, welfare or the environment as a result of their current waste disposal practices.

Waste Accumulation and Storage Areas

Waste materials are stored at several designated waste accumulation points (WAP) at Andrews AFB. These waste accumulation points are listed in Appendix D, Table D.2. The WAP's are utilized to accumulate and temporarily hold waste materials until transport to the base hazardous waste storage area or to underground tanks is possible. Storage at a WAP does not exceed 90 days. WAP's are located inside shop areas or in secured areas outside a shop or group of shops. Several of these drum storage areas were toured during the site visit. Most of these facilities exhibited little or no visual contamination of the surface material (asphalt, gravel or concrete). None of the WAP's located at the main base site exhibited the potential for future contamination.

Waste segregation has been a problem at the WAP's in the past. Many shop personnel, not familiar with proper procedures, have mixed various wastes together, often making them unsuitable for resale or recycle. This practice is currently being conrolled by locking containers and requiring the presence of the WAP manager during disposal.

In addition to these drum storage areas, there are several large waste storage underground tanks located on the base. The location of these tanks and their intended use is given in Appendix D, Table D.1. In some cases, when storage drums become full, they are taken to designated underground storage tanks for disposal. Underground storage tanks containing jet fuel or oil are periodically pumped out by off-base firms contracted through the DPDO.

When waste containers are full (or upon the 90-day deadline), a transfer document is completed and the containerized waste is transported to the permitted Hazardous Waste Storage Area (site HW-1) (Buildings 4956, 4957, 4959, 4966, See Figure 4.1). This area was examined and found to be totally enclosed and to contain a concrete pad and dike. There was no evidence of spills or leaks in this area and the general condition was good. These buildings have been used for this purpose since approximately 1980.

Both the Brandywine and Davidsonville Annexes have waste accumulation points located at the site. These areas follow the operating procedure outlined above. The Brandywine Annex WAP, located adjacent to the site operations building (see Figure 3.4a), was noted to have excessive oil spillage on the gravel base and on the adjacent walls. The quantity of spillage was unknown. Visual examination and knowledge of wastes used in this area indicated that the spilled material was waste oil. Potential for contamination at this site (WAP-1) exists and the area was included for HARM evaluation. The Davidsonville WAP (WAP-2) is used primarily for disposal of motor oil. There was very little surficial spillage on the gravel base. No significant potential for contamination was identified. This site is located adjacent to the site operations building (see Figure 3.5a).

Chemical storage has been performed at several locations on the base. Civil engineering has maintained storage areas at the base. An area behind building 3459 (site HW-2) has been used for storage of transformers and various chemicals and materials used in the Civil Engineering shops (Figure 4.1). PCB transformers are not normally stored in this area but are placed here temporarily until disposal off-base can be arranged.

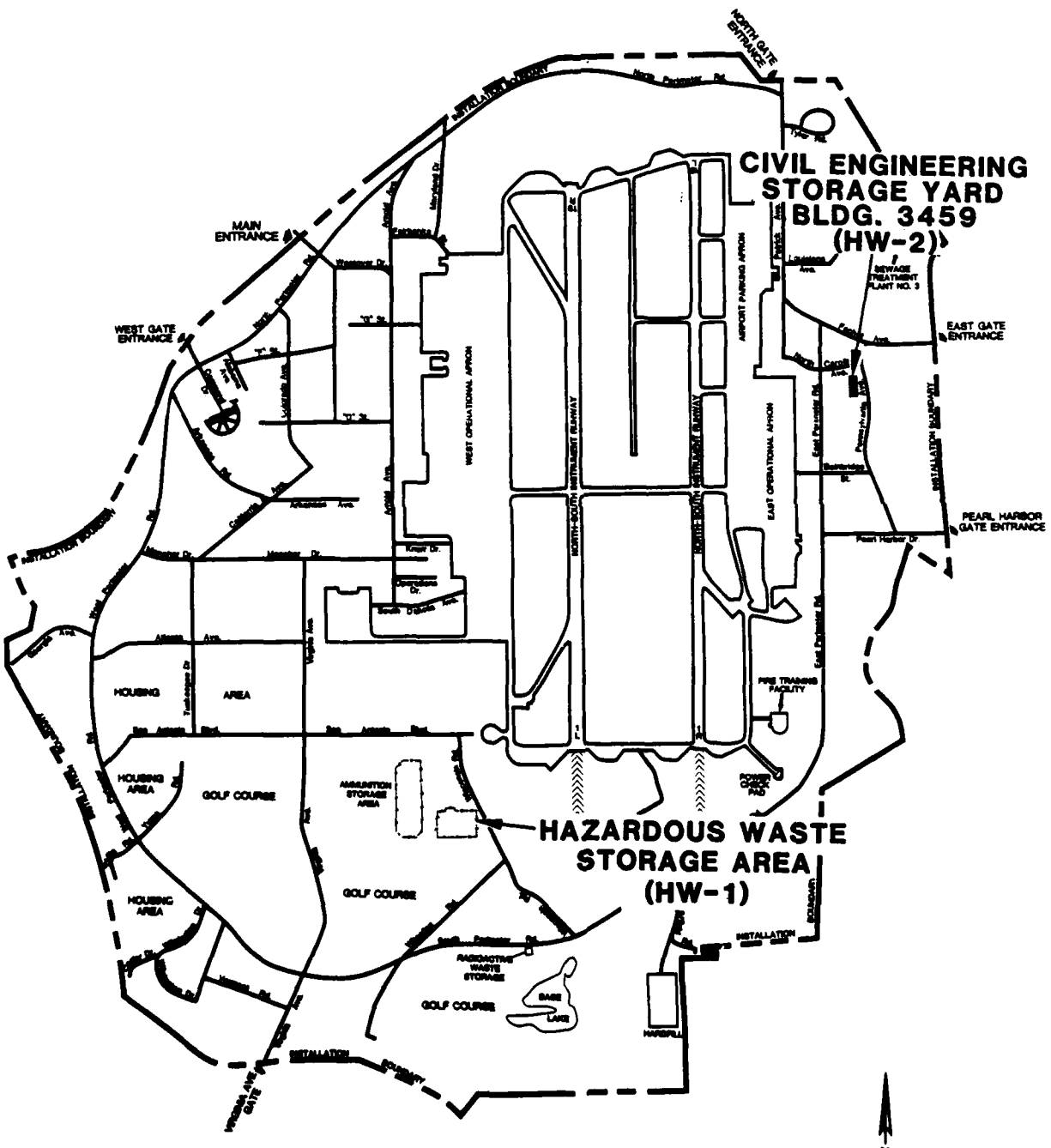
The Defense Property Disposal Office (DPDO), formerly known as Air Force Redistribution and Marketing (R&M), has been located just off Brandywine Road since 1961. Previously, R&M was located at Building 2326 on Andrews AFB. Prior to 1961 (Circa 1953) the Navy used the Brandywine Site as a storage yard.

The Brandywine DPDO (Figure 4.2) accepts materials from not only Andrews AFB, but also the Navy Research Lab, White Oak, Bolling AFB, the Washington Naval Yard and the Naval Ordnance Station, Indian Head.

FIGURE 4.1

ANDREWS AFB

WASTE STORAGE AREAS



SOURCE: INSTALLATION DOCUMENTS

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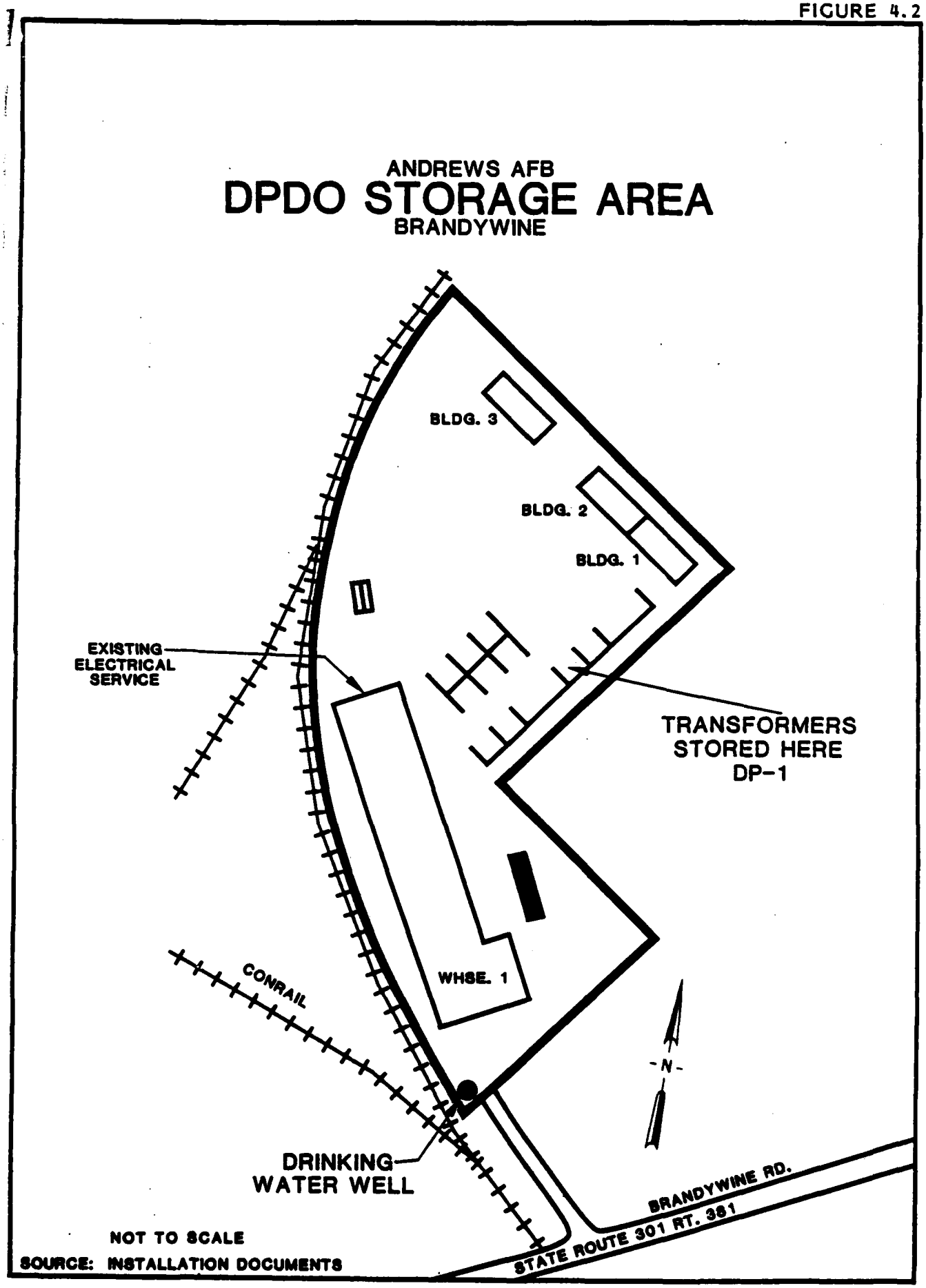
FIGURE 4.2



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Prior to 1980, waste solvent drums were stored at Brandywine DPDO from each of these locations. However, since 1980 no hazardous wastes have been stored at Brandywine DPDO, although a hazardous material storage area presently exists on site.

During the 1960's and 1970's spent paints, containers, or lubricants from Brandywine DPDO, which could not be recycled or sold, (approximately 1 dump truck every 3 months) were delivered to Andrews AFB and disposed in one of the south base landfills (Sites D-3 or D-4 see Figure 4.6). No waste materials are known to have been buried at the Brandywine DPDO since the Air Force has had control of the site. However, several bins have been used for storage of PCB capacitors and transformers in the past (Figure 4.2, site DP-1). Some leakage is known to have occurred onto the adjacent soils. In addition, the drinking water supply well at the DPDO has not been used for drinking water purposes since prior to 1970. The extent of well contamination is unknown, but it is believed by a number of employees at Brandywine DPDO to be the result of high iron levels. Well sampling and analysis data does not exist.

Due to the nature of materials stored at this location (site DP-1), the liklihood of transformer leakage in the past, and the permeable nature of local soils, the potential for contamination exists.

Fuels Management

In the past, Andrews AFB fuels management system included substantial quantities of jet fuel and smaller quantities of diesel fuel, AVGAS and motor vehicle fuel (MOGAS). A complete listing of storage facilities and their location and capacities are identified in Appendix D, Table D.3.

From 1944 to 1961, all fuels were delivered to the base by tank trucks. In 1961 a fuel transfer line was put into service and since that time all jet fuel has been delivered to the base through this line. Other fuels continue to be delivered to the base by tank truck.

Fuels are delivered to the POL storage area on the east side of the base. This area has two 420,000 gallon aboveground tanks and two 210,000 gallon aboveground tanks for JP-4 storage, each surrounded by a

dike. There are numerous underground storage tanks in this area for diesel fuel, JP-5, JP-4, AVGAS, and MOGAS. The entire POL area is fenced and has continual security.

JP-4 and JP-5 are transferred from this storage area to one of two hydrant fueling buildings (each containing 2-50,000 gallon tanks) by an underground transfer line. Fuel is then pumped into an underground hydrant system which is used to fuel aircraft on the flightline. All underground tanks and lines use cathodic protection to reduce corrosion. Annual pressure testing is performed on each POL tank and its associated lines.

Periodic cleaning of fuel tanks has been performed by an off-base contractor since this fuel system was established. No tank sludges are known to have been disposed at Andrews AFB.

Several spills and leaks have been associated with this fuels management program. These incidents are discussed below.

Spills and Leaks

A number of significant spill and leak events have occurred at Andrews AFB. Figure 4.3 shows the location of these sites. The available written history of major spills at Andrews AFB is quite limited. Hence, the spill events presented in this report are primarily the result of extensive personnel interviews with present and past employees. A summary of major spill/leak events is presented in Table 4.2.

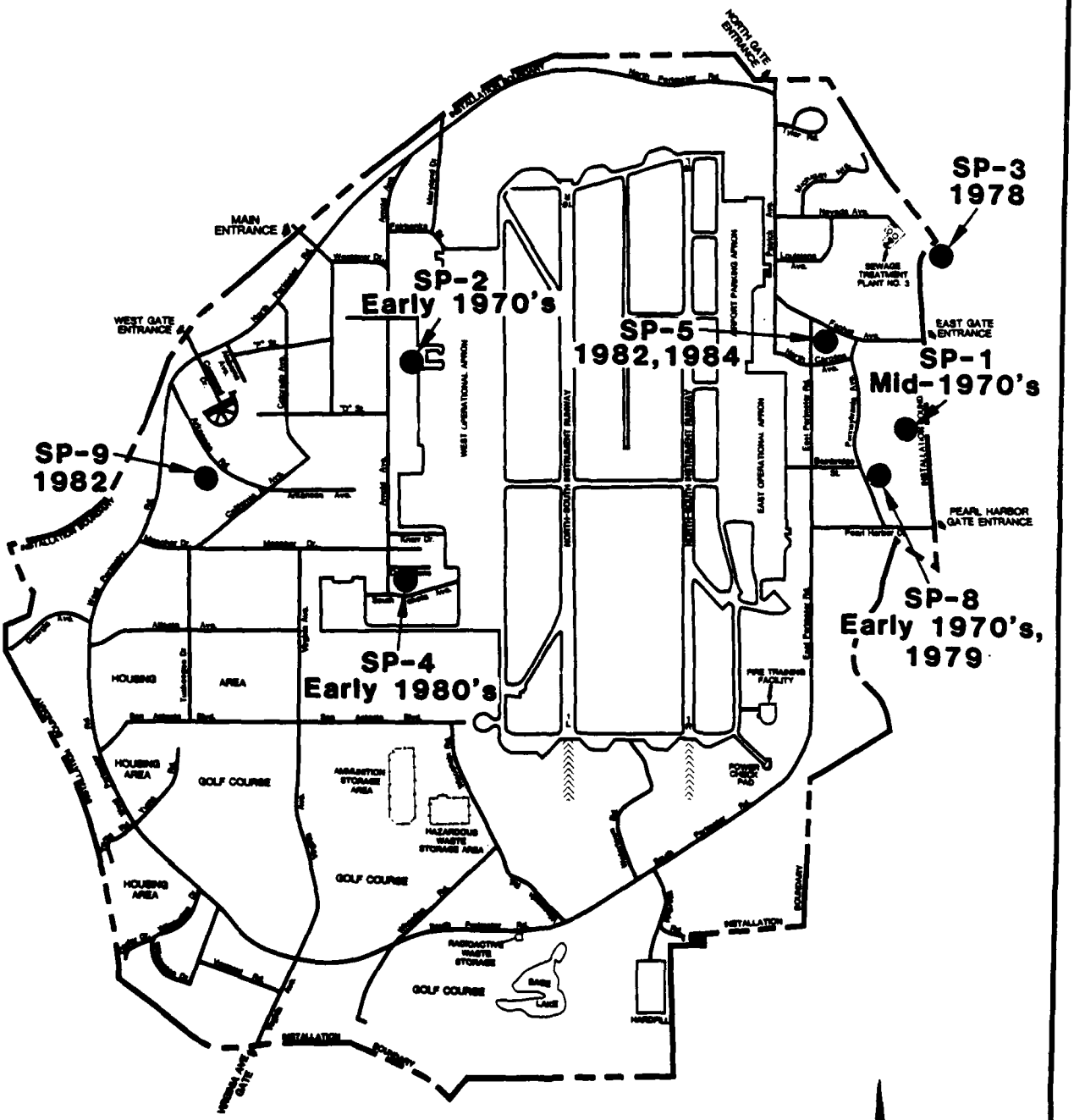
Site SP-1 - Diesel Fuel Oil No. 6 (Fuel Oil Burner FS6) Spill

During the mid-1970's an estimated 50,000 gallons of diesel fuel No. 6 was spilled at Building 3409. This spill resulted from an unattended tank transfer operation. The diesel fuel flowed to a pit into the storm sewer adjacent to Building 3409 and then flowed into the low lying area east of the building. Within this area, several sumps were installed so that the diesel fuel could be pumped into transfer trucks. The cleanup effort lasted 60 days. During this period, an unknown quantity of diesel fuel escaped due to rainfall runoff into adjacent surface waters and then flowed into Charles Branch on the east side of the base. Since diesel fuel No. 6 is quite viscous, and the clean-up operation occurred during cool weather, most of the diesel fuel and contaminated soil was contained and cleaned up. No evidence was seen to indicate that a potential for contaminant migration exists.

FIGURE 4.3

ANDREWS AFB

SPILL AND LEAK AREAS



SOURCE: INSTALLATION DOCUMENTS

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TABLE 4.2
SPILL AREA INFORMATION SUMMARY

Site No.	Site Description	Date of Spill	Type of Waste Spilled	Quantity of Waste Spilled (gallons)	Extent of Cleanup Action
SP-1	Diesel Fuel Oil No. 6 Spill (Bldg. 3409)	Mid-1970's	Diesel Fuel Oil No. 6	50,000-60,000	Majority of Spill flowed to low lying area along Dowerhouse Road near base boundary. Material was cleaned up over 2 month period. Unknown quantities seeped into Charles Creek.
SP-2	PD680 Leak (Building 1773)	Early 1970's	PD-680 Solvent	Estimated > 5000	A 15,000 gallon underground tank leaked twice in the early 1970's. No PD680 was recovered. The leaking tanks were replaced with a new tank in mid 1970's.
SP-3	JP-4 Spill	1978	JP-4	1000 (Estimated)	No fuel recovered. Some JP-4 seeped into Cabin Creek South.
SP-4	Fuel Oil No. 2 Spill (Bldg. 1204)	Early 1980's	Fuel Oil No. 2	20,000	No fuel was recoverd.
SP-5	East Side Gas Station Spill (Building 3487)	1982, 1984	Mogas	Unknown	No fuel recovered. Ten monitoring wells have been installed at the site.
SP-6	Brandywine Housing Heating Oil Spill	1984	Fuel Oil No. 2	Unknown	Wood, absorbent and filter booms have been placed in creek at various locations down stream of point of fuel oil leakage from embankment below housing area. Ten monitoring wells have been installed at the site.
SP-7	Davidsonville Heating Oil Tank Leak	1984	Fuel Oil No. 2	Unknown	Tank and contaminated soil removed. Monitoring wells installed.
SP-8	Mogas Leak (Building 3342)	Early 1970's, 1979	Mogas	Unknown	No fuel recovered.
SP-9	Hydrochloric Acid Discharge	May, 1982	Hydrochloric Acid	Unknown	No cleanup performed, contractor began neutralizing prior to discharge after incident.

Site SP-2 PD 680 Leak

Underground storage tanks (Site SP-2) near the washrack at Building 1773 have been the site of several leaks in the past. In either 1973 or 1974 a 15,000 gallon underground tank was replaced because it was leaking PD 680. A new fiberglass tank was installed in its place. Unfortunately, the new tank was improperly installed on top of a cinder block. Consequently, when this tank was filled with PD 680 it also leaked.

This leak was estimated to be approximately 5,000 gallons. None of the solvent was recovered. At present a 15,000 gallon underground tank is used to store waste oil at the same location. As a result of this past spill, and the permeable nature of area soils, a potential for contamination exists at this location.

Site SP-3 JP-4 Spill

In the fall of 1978 an estimated 1,000 gallons of JP-4 fuel was spilled at the intersection of Route 4 and Dowerhouse Road. This spill was the result of a puncture in the pressurized JP-4 transfer line which delivers jet fuel to Andrews AFB from Anacostia. JP-4 saturated the surrounding soil and seeped into Cabin Creek South which discharges to the east side of the base. No cleanup of either contaminated soil or surface water was implemented. Since JP-4 saturated the surrounding soil and leaked into Cabin Creek South, a potential for contamination exists at Site SP-3.

Site SP-4 Fuel Oil No. 2 Spill

During the early 1980's approximately 20,000 gallons of fuel oil No. 2 was accidentally pumped out of a storage tank at Building 1204 during transfer operations. The fuel oil drained into a pit adjacent to the aboveground storage tank, moved under the flightline apron, and ultimately moved through the storm sewer system to three 36 inch culverts on the south side of the base to Piscataway Creek. The spill was not detected until several days after the incident. No containment or cleanup of the spill occurred on base. A potential for contamination exists at Site SP-4.

Site SP-5 East Side Gas Station Spill

The underground tanks and piping system at the East Side Gas Station have been the site of several gasoline leaks in the past. These leaks were a result of poor construction of pipeline joints. On several

occasions, excavations have been conducted to recover gasoline. The most recent excavation in November, 1983 resulted in recovery of 20,000 gallons of gasoline to a depth of 14 feet. At that time, three underground tanks and the associated distribution lines were removed. On May 31, 1984 and July 27, 1984 ten monitoring wells were installed in the vicinity of the service station (Figure 3.14). This work was undertaken as a result of gasoline vapors which were detected in excavation for the replacement of steam lines adjacent to the east wall of building No. 3476. During the installation of the wells, gasoline vapors were detected in several of the borings (Boring Nos. 1, 2, 3 and 4). However, no free floating hydrocarbons have been detected.

Due to the nature of the material spilled at Site SP-5 and the porous nature of the subsurface soils a potential for contamination exists at Site SP-5.

Site SP-6 Brandywine Housing Heating Oil Spill

In the spring of 1984 fuel oil was observed seeping into a tributary of Mataponi Creek in the vicinity of the Brandywine Housing Project. This leak was apparently the result of leakage of one or more of seven, 30-year old, 550 gallon underground heating oil storage tanks located adjacent to the apartment buildings. An unknown quantity of heating oil leaked into an unnamed tributary of Mataponi Creek. A series of five filter fences were installed at the source of the seepage as well as at several locations downstream to contain the oil. In addition, the underground tanks were excavated and replaced by an aboveground storage tank. In May of 1984, ten monitoring wells were installed at the site, as illustrated in Figure 3.15. These wells were installed to a depth of up to 22 feet. Fuel oil odors were detected in soil samples from borings 4, 5, and 6 during drilling. However, no appreciable quantity of oil was found in the ground water at these well locations. Due to the nature of the material spilled and the fact that there continues to be seepage from the bank, contamination still exists and the site should be included for further consideration.

Site SP-7 Davidsonville Heating Oil Tank Leak

The Davidsonville Transmitter Site was the site of a fuel oil leak in the spring of 1984. This leak originated from a 2,000 gallon underground fuel tank and associated fuel lines. The tank was located

directly behind building 1 at the transmitter station. The approximate location of this site is shown in Figure 4.4. The fuel leak was discovered when fuel consumption increased and when seepage was noted in two utility vaults beneath Building 1. The fuel was suspected to be leaking from the tanks and moving along the fuel lines into the vaults. The total quantity of lost fuel was unknown. The area in the vicinity of the spill is generally flat, topographically high area with surface drainage to the south and southwest, toward the Patuxent River drainage system. Cleanup measures included excavation of the tank with subsequent removal of all visually contaminated soil. Additionally the vault areas affected by the leak were pumped out.

Four monitoring wells were installed in the vicinity of the buried tank (See Figure 3.16). Fuel oil odors were detected in well number 3 and some visible product was noted in the well. The contractor reported that there did not appear to be an extensive occurrence of fuel oil contamination in the subsurface, based on their analysis. Monitoring was recommended.

Due to the level of cleanup performed and the monitoring effort undertaken at the site, it is clear that there is no evidence of environmental contamination and no further action is recommended at this time.

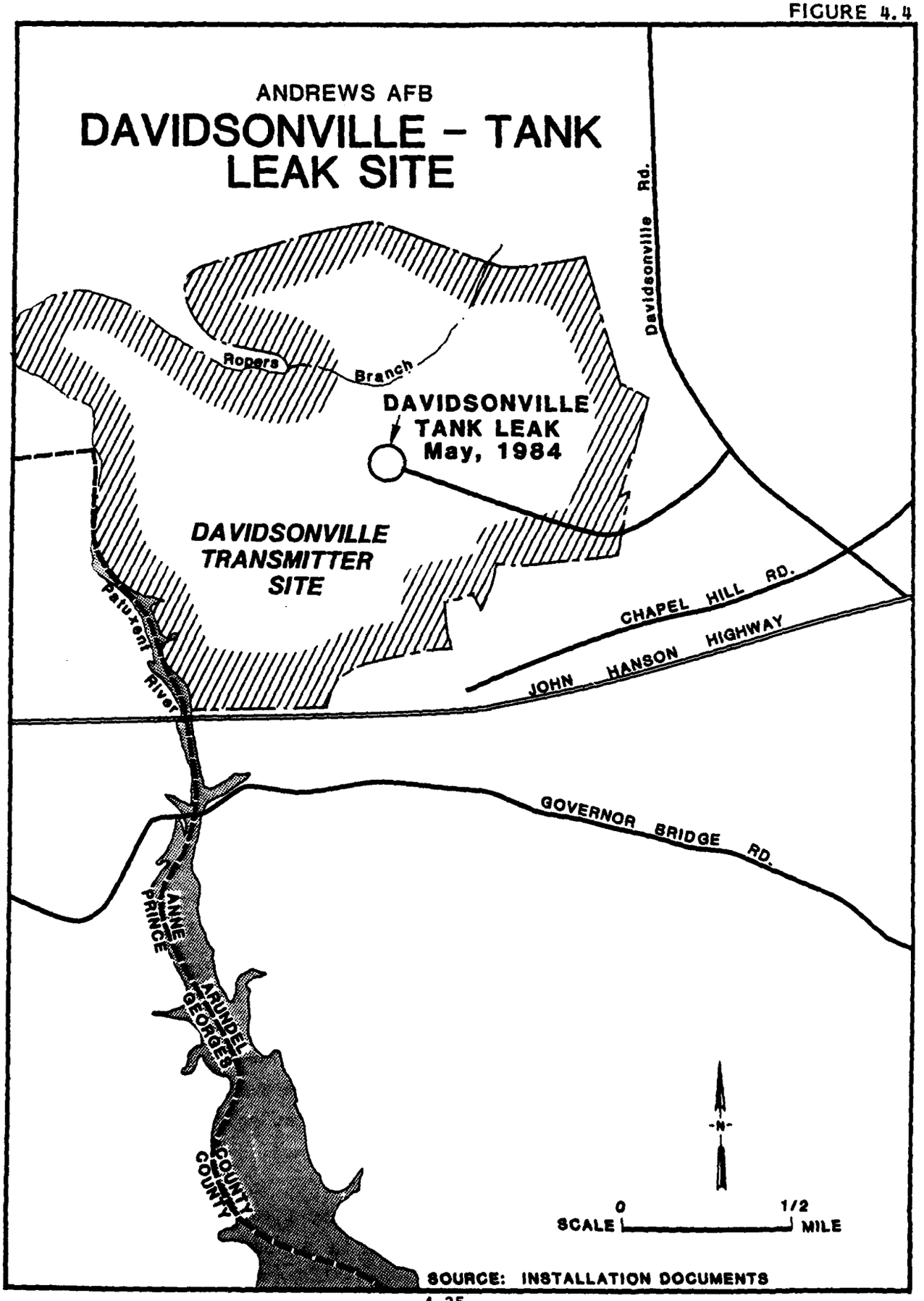
Site SP-8 MOGAS Leak

The military gas station (Site SP-8) has been the location of several tank leaks. The most recent leak occurred in 1979, however, several others occurred in the early 1970's when the base switched from leaded to unleaded gasoline. The quantity of gasoline spilled in each case is unknown, however, in 1979 the ground around the tank was apparently saturated with gasoline. Due to the nature of the material spilled and the permeable nature of surrounding soils a potential for contamination exists at this location.

Site SP-9 Hydrochloric Acid Discharge

In May of 1982, a fish kill in Meetinghouse Branch and Tinker's Creek was traced to the base. An examination of the cause of the fish kill showed that a contractor engaged in cleaning the base Officer's Club pool had allowed a discharge of hydrochloric acid into Meetinghouse Branch. The contractor was instructed to neutralize and dilute all

FIGURE 4.4



SOURCE: INSTALLATION DOCUMENTS

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future acid wastes prior to discharge. No further incidents were reported. Because of the nature of this waste, no further potential hazard is expected to exist and no further action is indicated.

Pesticide Utilization

Pest management has been performed at Andrews AFB since the base was first established in 1944. The majority of this work has been performed by the Civil Engineering entomology shop, housed in building 3459. Pesticides have been stored in a secured area of the shop. This room has no drains and has a small dike so that accidental spills have been contained within the room. Pesticides have also been temporily stored in various buildings on the base previously designated for civil engineering storage. Table D.4 in Appendix D includes a list of pest control agents currently in use or stored at the base.

Pesticide management has been tightly controlled at Andrews AFB. Chemicals have always been mixed as needed and there has typically been little residual leftover. Any leftover unmixed pesticides were sent back to base supply, although this rarely occurred. When the shop was first established, it is likely that residual pesticide was diluted to the sanitary sewer. The procedure for the disposal of pesticide containers has been to triple rinse, puncture, and landfill. This procedure has apparently been followed since the shop was first established. Rinsewater from this procedure was formerly sent to the sanitary sewer. Current practice is to reuse this water in chemical formulation.

In addition to this shop, the Golf Course Maintenance Shop performs entomology services for the golf course area. This shop, located in building 4881, has followed the same practices as those described above. The chemical storage area is not diked or secured. Pesticides are currently stored on pallets.

Fire Protection Training

The Fire Department at Andrews AFB has operated three fire protection training sites at Andrews AFB. In addition, the H-43 Helicoptor Squadron operated one fire protection training site at Andrews. The location of these four sites is illustrated in Figure 4.5.

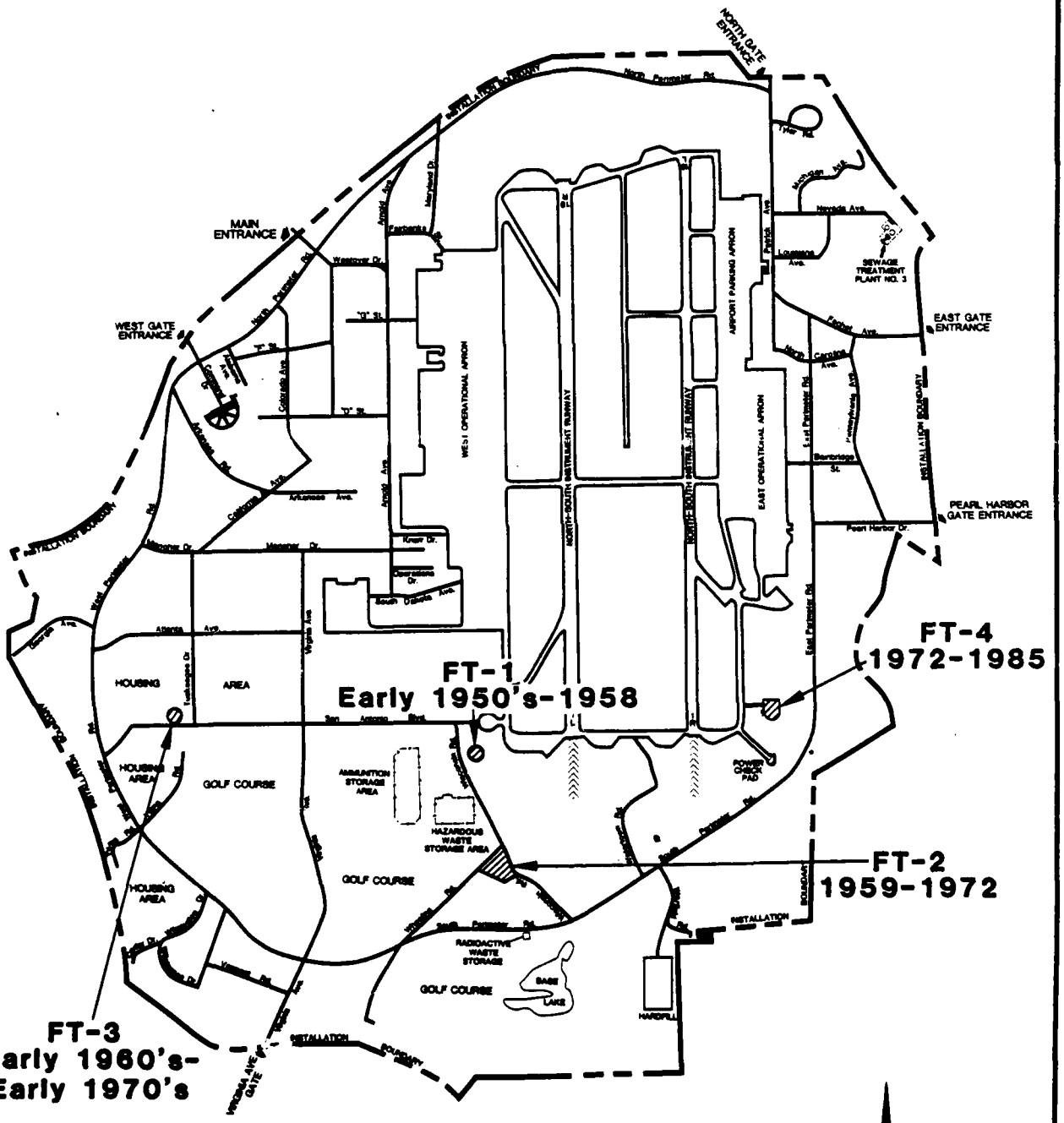
FT-1 Fire Protection Training Area No. 1

Site FT-1 was used from the early 1950's until 1958 as a fire protection training area. This site consisted of a 150 to 200 foot

FIGURE 4.5

ANDREWS AFB

FIRE PROTECTION TRAINING AREAS



SOURCE: INSTALLATION DOCUMENTS

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diameter bermed area and a drum storage area located nearby. Both sites were situated on natural soils. Fifty-five gallon drums of waste oil, waste fuel, paint thinners and waste solvent from aircraft maintenance and other shops on base were stored in the drum storage area. Fire training activities occurred a maximum two to three times per day. During each exercise, as much as 1,000 gallons of waste fuel and oils would be poured into the water saturated, bermed pit and ignited. Protein foams, carbon tetrachloride and chlorobromomethane were then used to extinguish the fire. Visual examination of the site indicated no obvious remnants of contamination on-site, nor evidence of surficial contamination other than a circular area void of vegetation. However, due to the permeable soils at the site a potential for contaminant migration exists since much of the fuel and waste residues may have seeped into the ground.

FT-2 Fire Protection Training Area No. 2

Site FT-2 was used as a fire protection training area from 1959 until 1972. This site, larger than FT-1, consisted of a 300 to 400 foot bermed burn area. An adjacent area was used to store 55 gallon drums of waste oil, jet fuel, paint thinner and other liquid wastes from the shops. Fire training activities were conducted a maximum two to three times per day until the mid-1960's. The frequency of burn activities was reduced to once per day at the site from the mid-1960's until 1972.

During each training episode, approximately 1,000 to 2,000 gallons of waste material from the drums was poured onto the water saturated, bermed burn area and ignited. Protein foams and chlorobromomethane were then used to extinguish the fires.

Visual examination of the area during the site visit indicated no surficial contamination or evidence of previous fire protection training activities. This past burn area is presently used to grow garden vegetables during the summer by base personnel. In addition to the fire training activities conducted at Site FT-2, a small area immediately adjacent to the burn area was used as a burial site for several hundred five gallon cans of MOGAS. This gasoline was left behind by two U.S. Army divisions in the late 1960's. The cans, full of gasoline, were buried in a 100 foot square pit about 25 feet deep. This site is presently covered with soil and stabilized sewage sludge suitable for

gardening. No evidence of contamination presently exists at the site. However, due to the nature of the materials used and disposed of at the site and since much of the material may have seeped into the ground, a potential for contamination exists.

FT-3 H-43 Helicopter Fire Training Area

During the early 1960's through the early 1970's, at the same time FT-2 was being used by the Andrews AFB Fire Department, site FT-3 was being used as a fire training area by the H-43 Helicopter Squadron. Site FT-3 was a 100 foot circular diameter area excavated about 1 foot into the ground and lined with blue-chip stones. Approximately once per day a maximum of 300 gallons of clean fuel was spread over the water saturated pit and ignited. Protein foam was used to extinguish the fire. A site visit revealed no evidence of the former fire protection training area and there is no evidence of a potential for contamination.

FT-4 Fire Protection Training Area No. 4

Site FT-4 has been used for fire protection training activities since 1973. The site contains a 180 foot diameter sloped burn area, a 390-gallon oil interceptor and a 50 foot diameter leaching pond which is 5 feet deep and has concrete sidewalls with a gravel bottom. During training exercises held once per week, about 300-gallons of clean JP-4 and/or motor oil are placed in an above ground tank with inlets and outlets within the burn area. The fuel is ignited and then extinguished with AFFF and water. The spent foam, fuel and water then flows by gravity across the burn area into an oil interceptor. Spent oil is separated then routinely collected by a contractor for off-site disposal. The remaining foam and water then flows by gravity to the 44,700 gallon leaching pond. In the past this material has seeped into the ground through the gravel, however, the pond has a history of plugging and often the material has been discharged either to the ground surface nearby or hauled to an oil separator and into the sanitary collection system. Visual examination of the area showed only a small area of surface contamination around the periphary of the leaching pond.

Due to the nature of the materials disposed of at the site and since much of the spent material may have seeped into the ground, a potential for contamination exists.

INSTALLATION WASTE DISPOSAL METHODS

The facilities at Andrews AFB, which have been used for the management and disposal of waste, can be categorized as follows:

- Landfills/Hardfills
- Incinerators
- Sanitary Sewer System
- Surface Drainage Systems
- Oil-Water Separators
- Radioactive Waste Storage Sites
- Sludge Disposal Areas

Disposal Sites

The majority of general refuse at Andrews AFB was disposed of on base at various landfills prior to the early 1960's. Since then, general refuse has been disposed by a contractor at the Prince George's County Landfill. Limited records exist regarding the disposal sites at Andrews AFB. The majority of information collected regarding disposal sites was obtained through personnel interviews with current and retired employees. A description and evaluation of each site is presented herein. Table 4.3 summarizes pertinent information for each of the disposal sites. Approximate locations of these areas are given in Figure 4.6

Site D-1 Landfill No. 1

During the early 1960's through 1980's Site D-1 was used for disposal of a variety of different wastes generated at Andrews AFB. From the early 1960's through the mid-1970's the southern portion of the site was used for disposal of general refuse, construction rubble, and fly ash. Trenches 10 feet deep and 15 feet wide were excavated in an approximate 400 foot by 150 foot area. General refuse was dumped into these trenches and covered daily with local soils. During the same time period, a 2 to 3 acre pit located in the southern portion of Site D-1 was used for disposal of waste solvents, dilute process wastes and waste oils generated from shop operations. Generally, one 2,000 gallon tank truck of waste was delivered to Site D-1 each week. The waste was drained into the pit which is 2-3 feet deep and allowed to evaporate

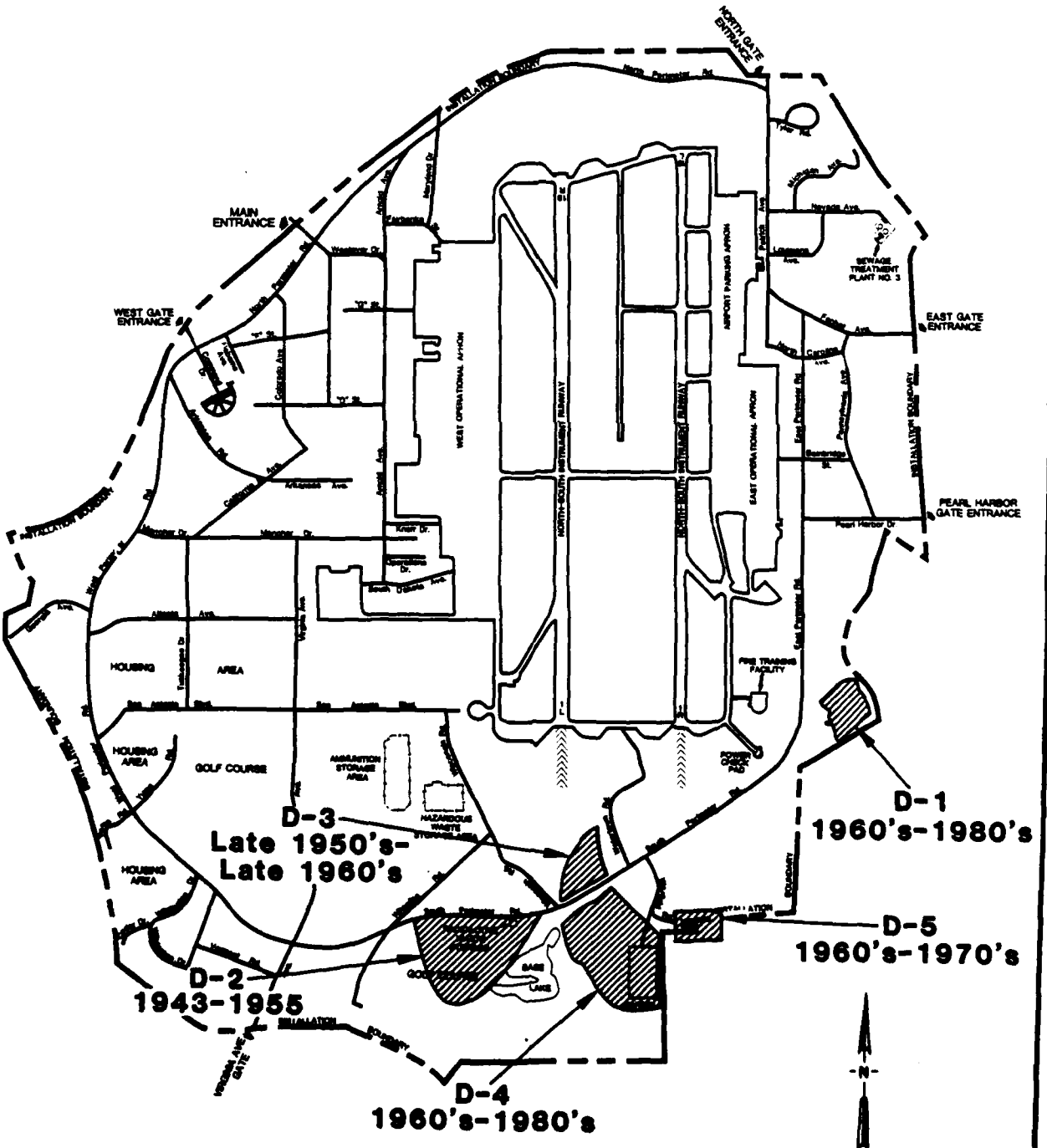
TABLE 4.3
SITE INFORMATION SUMMARY

Site	Operation Period	Approximate Size (acres)	Type of Wastes	Method of Operation	Closure Status	Surface Drainage	Site Visit Comments
D-1	Early 1960's-1980's	90	General refuse, construction rubble, sewage treatment plant sludge, Blue Plains WTP sludge, fly ash, waste oil, waste liquids from shops, paint thinners, solvents	Sludges-land application; landfill-Trench. depth: 10 feet; Waste liquids-pond 2-3 feet depth	Area covered with several feet of soil. Sludge application area is thickly vegetated.	To Piscataway Creek	No evidence of contamination. Area is used for storage of lumber, salt and sand. Two underground waste oil tanks are still used on site.
D-2	1943-1955	217	General refuse, construction rubble	Trench, gravel pit area. Depth: 12 feet	Site is covered with 3-4 feet of topsoil and grass.	West side to Paynes Creek. East side to Piscataway Creek	No evidence of contamination. Portion of site on west end is used as a ball field.
D-3	Late 1950's-Late 1960's	124	General refuse, construction rubble, minor quantities of old paint, old equipment from R&M site (Bldg 2326) aircraft parts, minor quantities of shop waste	Gravel pit area. Depth: 10-15 feet	Site is covered with 3-4 feet of top soil and grass.	To Piscataway Creek	Drainage ditch along south side of fill contained rust colored surface water.
D-4	1960's-1980's	326	Construction rubble, minor quantities of hospital wastes (syringes, bottles, etc.), general refuse	Gravel pit area. Depth: 10-12 feet	Site is covered with topsoil, shrub, vegetation and grass.	To Piscataway Creek	No evidence of contamination.
D-5	1960's-1970's	103	Construction rubble	Gravel pit area. Depth: 10-12 feet	Site is covered with several feet of topsoil, and shrub vegetation.	To Piscataway Creek	No evidence of contamination.
D-6	Early 60's-1980's	80	General refuse, scrap metals, paint cans, used oil filters, scrap lumber.	Waste discarded on top of soil and in natural trenches in area	Some waste covered with topsoil. Most material is exposed and scattered about the area.	Roper's Creek Branch and to the Patuxant River	Primarily hardfill material, no evidence of contamination

FIGURE 4.6

ANDREWS AFB

LANDFILL/HARDFILL DISPOSAL SITES



SOURCE: INSTALLATION DOCUMENTS

ES ENGINEERING-SCIENCE

and/or seep into the underlying soil. Since Site D-1 was subject to frequent flooding in the past, on several occasions the waste pit contents were swept along with the floodwaters of Piscataway Creek. In the mid-1970's two 25,000 gallon underground tanks were installed on the northwest side of Site D-1 to replace the waste oil pit. Since the mid-1970's most of the liquid wastes disposed in the underground tanks have been primarily waste oil. The waste oils are pumped out of the tanks periodically by an off-site contractor for recycle and recovery.

During the late 1950's and 1960's sludge from the waste treatment operations on base was landspread on the eastern side of Site D-1. This sludge was spread in varying lifts of up to six inches or so and gradually worked into the soil. This area was also used through the early 1980's for disposal of grease generated at each of the base waste treatment facilties. Pits were excavated six to ten feet deep for disposal of the grease at several locations throughout Site D-1.

At present the landfill area and waste oil pit are covered with several feet of local soil. Portions of the landfill area are used to store lumber, salt and sand. The old sludge landspread area is covered with shrubs and weeds. The waste oil tanks are still in use.

Although no evidence of contamination of either surface water or site soils was found during the site visit the potential for contamination exists due to the nature of the wastes disposed of and the proximity of the site to both Piscataway Creek and the installation boundary.

Site D-2 Landfill No. 2

During the initial construction and operation of Andrews AFB (1942-1955), Site D-2 was used for the disposal of general refuse and construction rubble. No liquid or hazardous materials are known to have been buried at this location. Trenches were excavated 10 to 12 feet deep and fifteen feet wide within the area. Construction rubble and general refuse were buried in the trenches and covered daily with local soil. At present the site contains 3 to 4 feet of local soil cover and a good crop of grass. A portion of this site is used as a ball field.

Due to the innocuous nature of the wastes disposed at Site D-2 no potential for contamination exists.

Site D-3 Landfill No. 3

Site D-3 was used primarily for disposal of construction rubble during the late 1950's through late 1960's. An old gravel pit approximately 10 to 15 feet deep existed at this location in the 1950's. The area was gradually filled in to its present elevation. Minor quantities of garbage, old paints, and equipment from the old R&M area (Building 2326) were buried at this location. In addition, unknown quantities of liquid waste from the shops (waste oils, paint thinners, and cleaning solvents) were indiscriminately dumped at Site D-3. At present, the site is covered with 2 to 3 feet of soil, topped with grass and bordered by streams on the east and south.

Due to the permeable nature of site soils, the close proximity to surface waters and the unknown quantity and character of shop wastes buried at Site D-3, a potential for contamination exists.

Site D-4 Landfill No. 4

Site D-4 was used primarily as a disposal site for construction rubble during the 1960's through 1980's. However, as recently as April, 1984 such items as the following were found in the landfill: old furniture, washing machines, metal lockers, sheet and scrap metal, household garbage, plastics, empty 55-gallon drums, waste lumber, tires, pipes, and hospital wastes such as unused needles and chemical reagents.
In the past, Site D-4 was an old gravel pit area and construction rubble was used as fill material. In addition some shop wastes may have been indiscriminately dumped at this location.

Due to the nature of wastes disposed at Site D-4 and the proximity of the site to base surface and ground waters a potential for contamination exists.

Site D-5 Hardfill Area

From 1942-1946 construction rubble was buried in an old gravel pit on the south side of the base (Site D-5). No general refuse or shop waste was buried at this location. The site is presently covered with local vegetation and presents no potential for contamination.

Site D-6 Davidsonville Transmitter Site - Hardfill Area

An unauthorized dump site has been operated at the Davidsonville Transmitter Site since approximately 1960. This site has been used for disposal of various types of materials including trash, scrap metal,

full and empty paint cans, old automobiles, scrap lumber, drum carcasses, etc. No evidence of formally constructed trenches exists, however natural depressions in this area served to hold this waste. The site lies on the northwest boundary of the annex, approximately 100 feet from Ropers Creek Branch of the Patuxant River (Figure 4.7). Despite efforts to eliminate its use, there was evidence to indicate that the site is currently in use. Because of the nature of the materials disposed at this site there is no suspected potential for future contamination.

Incinerators

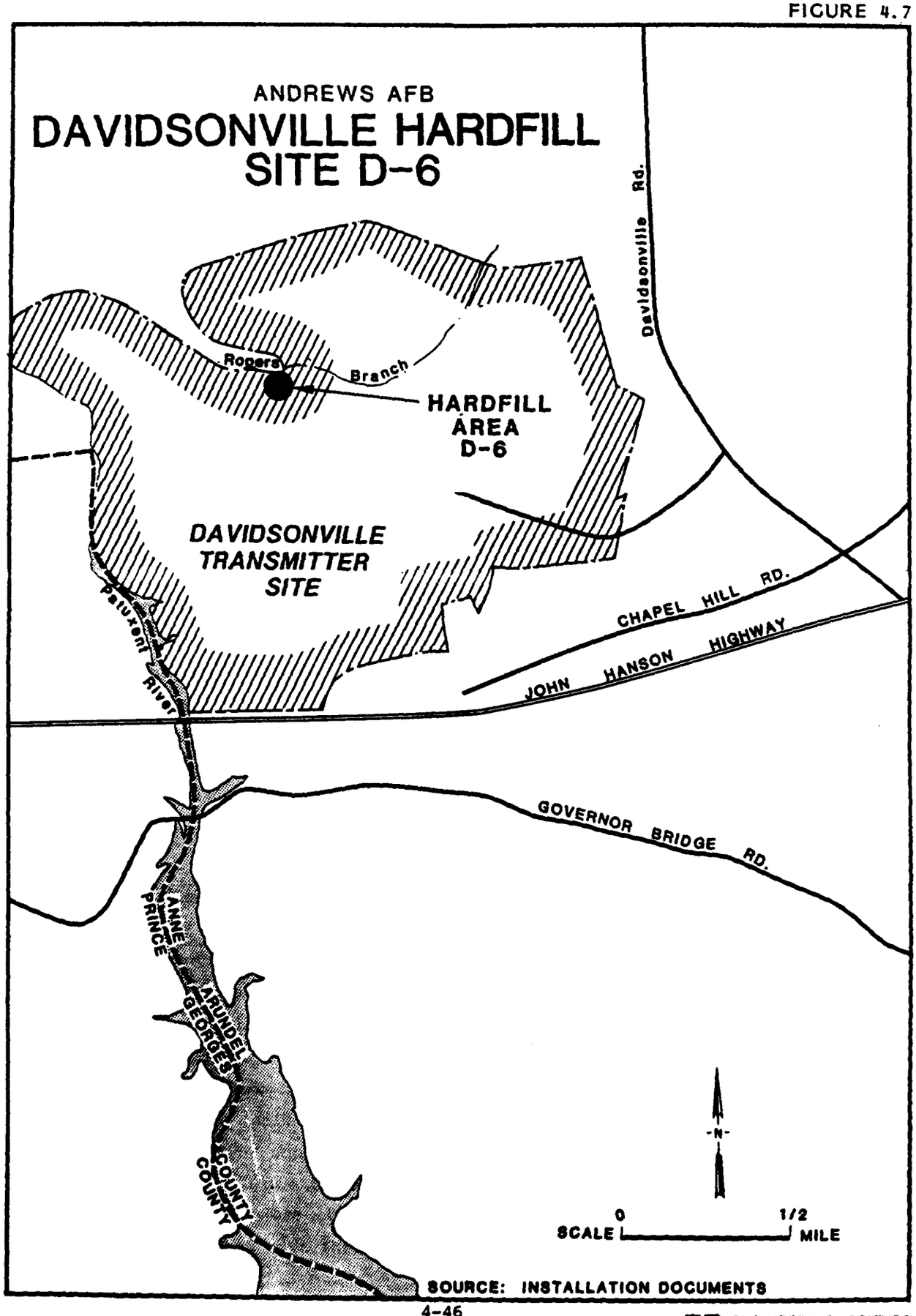
Solid waste from airplane flights which originate overseas have been incinerated in building 3306. Pathological waste from Malcolm Grow Medical Center is incinerated at building 1050. No storage areas associated with these operations are anticipated to pose the potential for contamination of ground water, surface water or soil.

Sanitary Sewer System

The sanitary sewerage collection system for Andrews AFB consists of two separate collection facilities. Sewage from areas of the base east of the major runways is collected by the east side system and discharged to the Washington Suburban Sanitary Commission (WSSC) line, for off-base treatment. This collection system flows by gravity, except in low areas where lift stations are provided. The west end of the base has a separate collection system, which also flows primarily by gravity, to the WSSC line for off-base treatment.

Previously, sewage treatment was performed at the base at one of four sewage treatment facilities. Figure 4.8 shows the location of these facilities. The east side collection system flowed to a 480,000 GPD treatment plant (STP-3). This plant provided primary and secondary treatment and discharged its effluent into Cabin Creek Branch and finally into the Patuxent River. This plant was decommissioned in May, 1984. Sewage collected on the west end of the base was treated in one of two facilities (STP-1 and STP-4). Effluent from Plant No. 1 was discharged into Meetinghouse Branch Creek while effluent from Plant No. 4 was discharged into Paynes Branch Creek. The confluence of these two creeks, Tinkers Creek, eventually empties into the Potomac River. These plants were decommissioned in 1976. Prior to 1967, STP-2, located at the north end of the base was utilized. This plant provided secondary

FIGURE 4.7



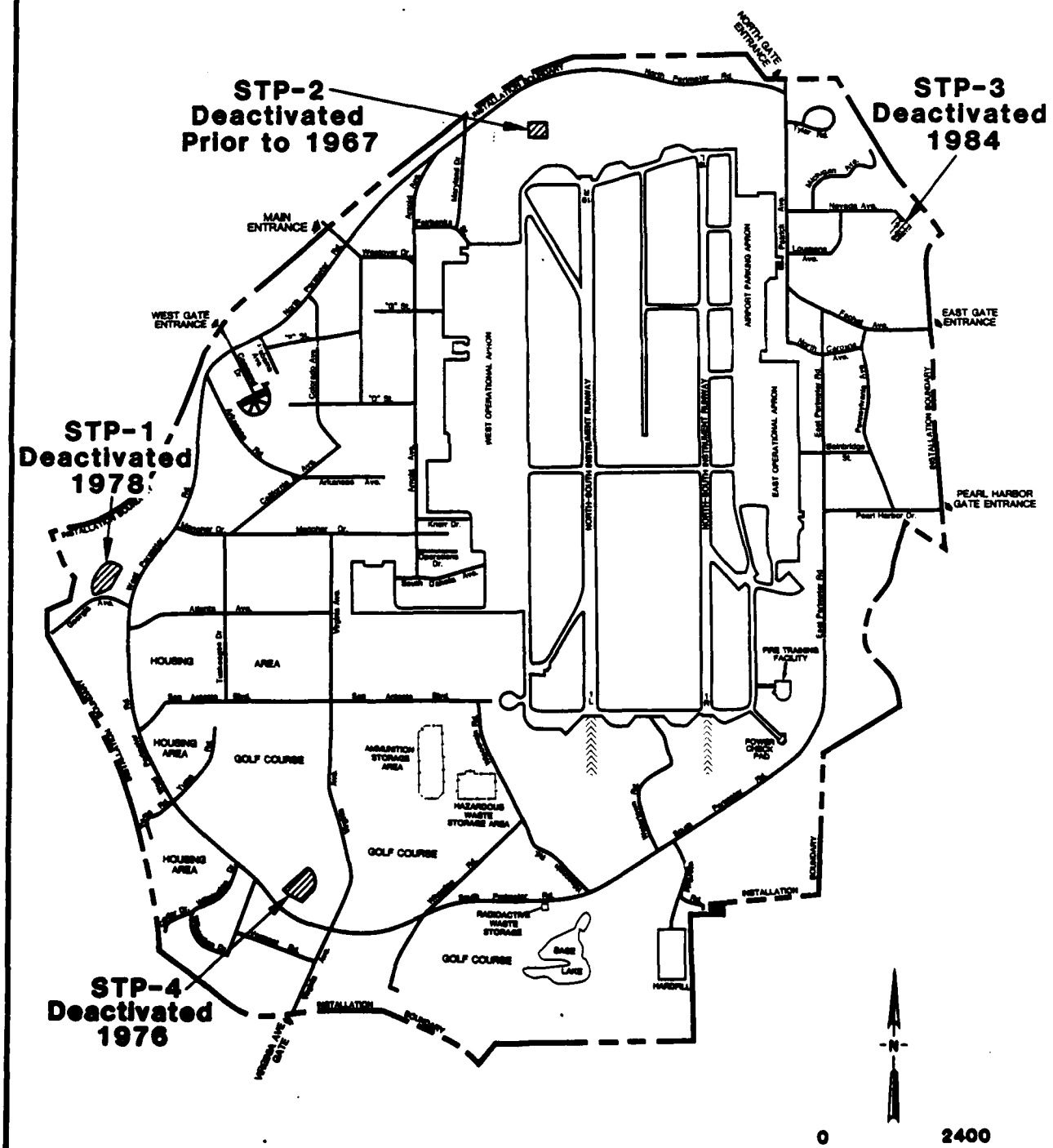
SOURCE: INSTALLATION DOCUMENTS

ES ENGINEERING-SCIENCE

FIGURE 4.8

ANDREWS AFB

FORMER SEWAGE TREATMENT PLANT LOCATIONS



SOURCE: INSTALLATION DOCUMENTS

ES ENGINEERING-SCIENCE

treatment. Grease from each of the treatment plant imhoff tanks was disposed in the past near the facilities on a daily basis. Ten foot deep pits were used for this purpose. These pits have been subsequently covered with soil and local vegetation.

As previously discussed, shops have used the sanitary sewer system as a means of waste disposal. Certain shops and organizations utilized this system fairly extensively. Waste such as ethylene glycol and transmission fluid were commonly discharged directly to the sewer system. Shops which generated small amounts of waste often discharged all waste to the sewer system. Currently, the Malcolm Grow Medical Center discharges the majority of their waste to the sewer (with dilution). Shops typically discharge wastes such as ethylene glycol, aircraft cleaning compound, fixer and developer directly into the sewer. Acids are neutralized and put into the system after dilution.

Both the Davidsonville and Brandywine Annexes and their associated housing annexes have sewage treatment facilities present on the site. These are small, self-sufficient units. There is no evidence to indicate that past treatment plant practices pose a potential for contamination and no further action is recommended.

Surface Drainage Systems

The storm drainage system on Andrews AFB consists of open streams and ditches, culverts, curbs, gutters, road edges with and without drop inlets and an airfield storm collection system consisting of concrete piping with drop inlets and headwalls. Surface drainage originating from the western side of the base is directed to the Potomac River via Henson Creek, Meetinghouse Branch, Paynes Branch and Piscataway Creek. Base surface water drainage from the eastern sections of the installation is directed to the Patuxent River via Cabin Branch and Charles Branch.

Surface water drainage originating from the Brandywine Annex is directed to the Potomac River via two unnamed tributaries of Mattawomen Creek. Runoff from the associated housing annex flows to an unnamed tributary of Mataponi Creek eventually discharing to the Patuxent River.

Surface drainage originating from the northern portion of the Davidsonville Annex is directed to Ropers Branch, a tributary of the Patuxent River. Drainage from the southern end of the site flows to an

unnamed tributary of the Patuxent. Housing area drainage flows to the Patuxent River via an unnamed tributary.

Oil-Water Separators

There are several areas on base currently served by oil-water separators or oil interceptors. Appendix D, Tables D.5 and D.6 list the location of these devices. Oil separators and interceptors are used in areas which have large quantities of waste liquids that may contain oils and grease. These devices are serviced periodically by Andrews Civil Engineering Squadron. Water layers from the separators/interceptors continue to the sanitary sewer, storm sewer or to drainage ditches.

Radioactive Waste Storage Site

Andrews AFB contains a radioactive waste storage site at the south end of the base. This area (See Figure 4.9) was established circa 1953. It is surrounded by a six foot chain link fence and locked gate. The materials disposed in this area were radioactive tubes and dials. Records indicate that five or six concrete containers were buried and covered with at least two feet of earth. This area has not been used for several years. Small trees and shrubs surrounded the site but were recently removed so that the site could be more easily identified. BES recently performed a radiation check on the area and found no radioactivity above background levels. Currently, no potential for contamination exists.

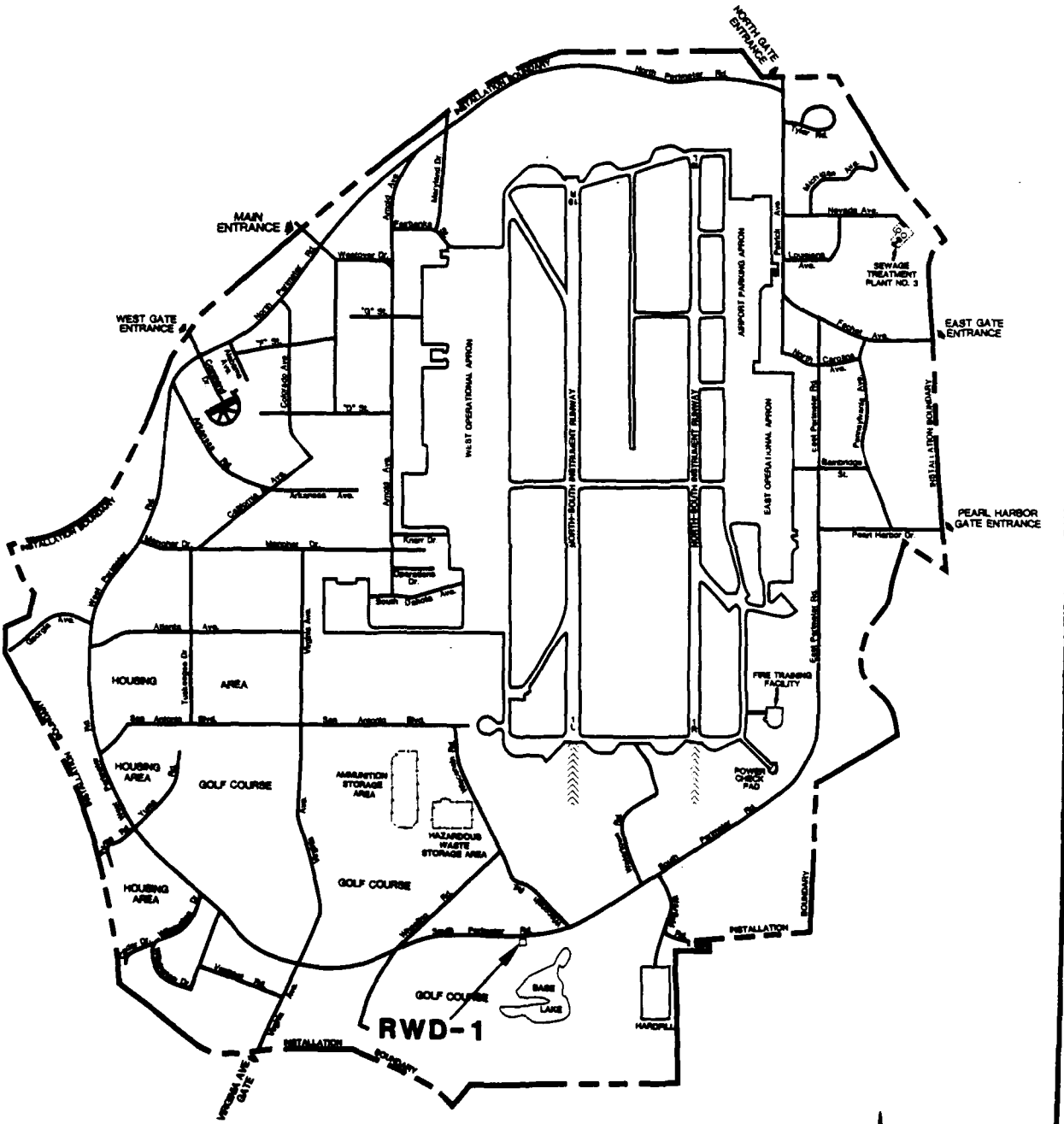
Sludge Disposal Areas

Sewage treatment plant sludge (Site SD-1) has been applied at various locations on Andrews AFB from the early 1960's through the mid-1970's (Figure 4.10). An area on the east side of landfill Site D-1 was used from the early 1960's through the mid-1970's as a sludge application area for on-base waste treatment facilities. The sludge was applied in approximate six inch lifts and gradually worked into the soil. During the late 1960's and early 1970's sludge from the Blue Plains Waste Treatment Plant was transported by truck and landspread on both sides of Perimeter Road and between the runways. Lifts of up to 24 inches were applied to support vegetation growth. In addition sludge was applied in the vicinity of the former fire protection training area

FIGURE 4.9

ANDREWS AFB

RADIOACTIVE WASTE STORAGE SITE



SOURCE: INSTALLATION DOCUMENTS

SCALE 0 2400 FEET

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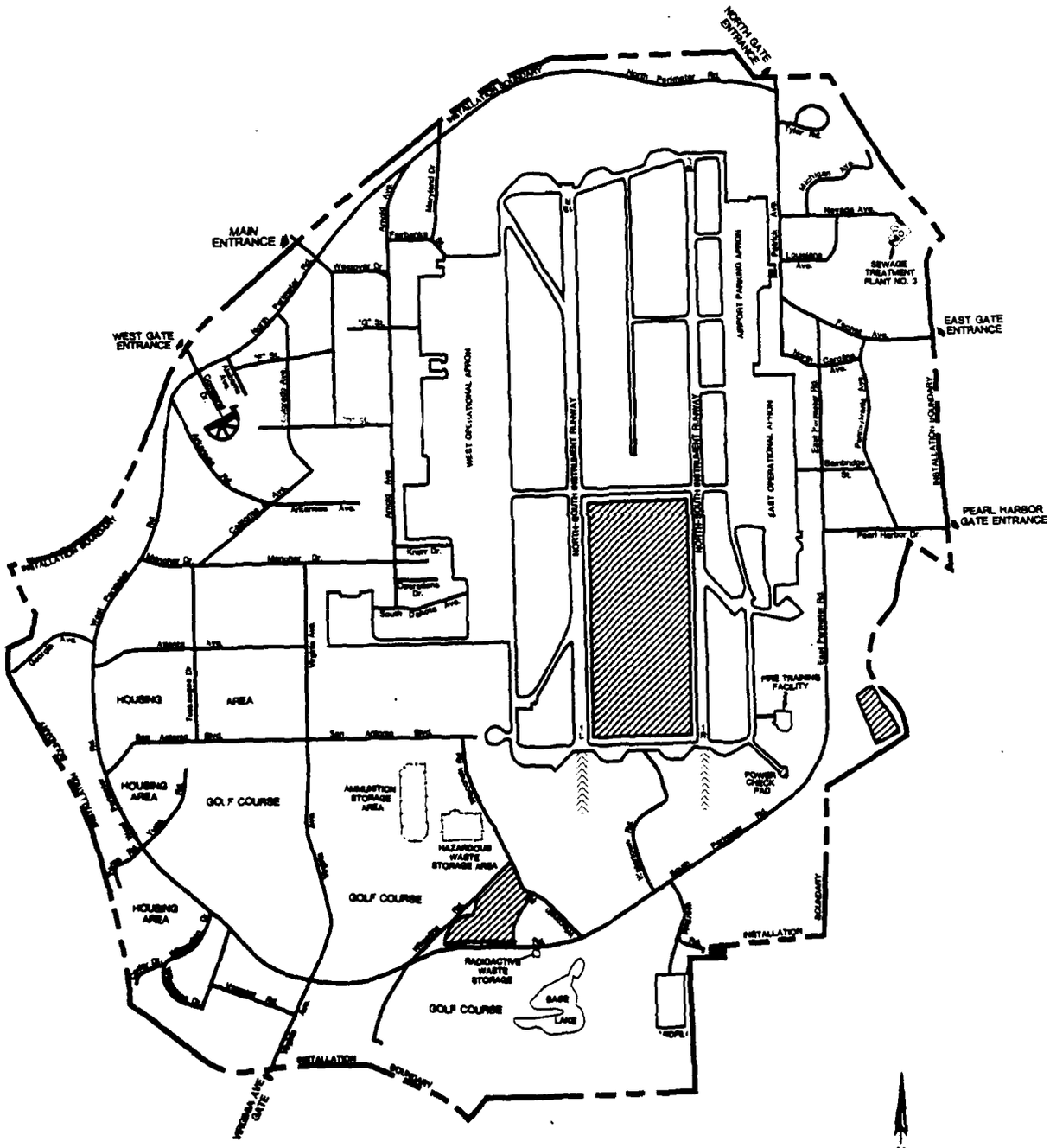
FIGURE 4.10

ANDREWS AFB

SLUDGE DISPOSAL AREAS



LEGEND

SLUDGE APPLICATION AREAS (SD-1)

SOURCE: INSTALLATION DOCUMENTS

N

SCALE 0 2400 FEET

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FT-2. In many cases top soil was applied over the sludge between the runways to prevent crow problems. Eventually, due to odor problems and crow problems, this practice was discontinued.

Analysis of sludge from the Blue Plains Treatment Plant during the 1982-1984 timeframe showed elevated levels of several metals. Zinc, lead, chromium, copper and cadmium levels were slightly above levels which would typically be found in soils. However, analysis of this material has shown that it is acceptable for landfarming. Blue Plains sludge is currently landfarmed at many locations throughout D.C. and Maryland. The sludge application sites were not considered to hold a potential for environmental contamination (see Table 4.4).

EVALUATION OF PAST DISPOSAL ACTIVITIES AND FACILITIES

Review of past waste generation and management practices at Andrews AFB has resulted in identification of 30 sites and/or activities which were considered as areas of concern for potential contamination and migration of contaminants.

Sites Eliminated from Further Evaluation

The H-43 Helicopter FPTA used low levels of clean fuel for training exercises (FT-3). This fuel was spread over the water saturated surface and ignited. There is currently no evidence to indicate the presence of this site. Because of the very low potential for contamination this site was not considered for HARM evaluation.

The radioactive waste storage site (RWD-1) was recently examined by BES and no radioactivity above background levels was found. There is currently no potential for future contamination.

Examination of the four sewage treatment plants (STP1 through STP4) previously operated on base revealed no evidence to indicate any potential health or environmental risks. Disposal of sludge from these facilities is discussed separately. Grease from these plants was buried in disposal pits adjacent to the plants. These areas are currently covered and have vegetative growth.

Landfill No. 2 (D-2), northwest of the base lake, was not considered for further IRP action. No evidence was found to indicate that hazardous materials were placed in this site.

The hardfill area east of the base lake (D-5), and the Davidsonville hardfill area (D-6) were both inspected to determine if hazardous substances had been placed in either area. All evidence indicated that these sites have been used primarily for hardfill materials and no indication of hazardous waste disposal was found.

An estimated 50,000 gallons of diesel fuel No. 6 spilled at building 3409 (SP-1). The spill occurred during cool weather, and due to the viscous nature of the material, the majority of the waste was contained and cleaned up. No significant potential for environmental contamination is expected and no follow on investigation is recommended.

A fuel oil leak in a 2000 gallon underground tank and associated fuel lines was discovered behind Building 1 at the Davidsonville Transmitter Site (SP-7). Monitoring wells were installed in the vicinity of the leak. The tank was excavated and all visibly contaminated soil was removed. Because of the extensive cleanup assoicated with this spill, no significant potential for contamination exists and no follow on investigation is warranted.

The hydrochloric acid spill which occurred at the officers club (Site SP-9) did not warrant further IRP investigation. Because of the nature of this material and the elapsed time period, no potential for contamination was expected.

Sludge from the base sewage treatment facilities and from the Blue Plains Treatment Plant was landfarmed at various locations throughout the base (Site SD-1). Several of these areas lie on land used for landfill or fire training. Although this material has metal levels slightly higher than normal, it is not expected to pose a potential for environmental contamination.

The WAP at the Davisonville Site (WAP-2) showed no evidence of contamination and no further action is indicated at this time.

Both the hazardous waste storage area (HW-1) and CE storage yard (HW-2) were eliminated from further evaluation. There was no evidence to indicate any potential for environmental contamination at either location.

Sites Evaluated Using HARM

The remaining 14 sites identified in Table 4.4 were evaluated using the Hazard Assessment Rating Methodology. The HARM process takes into

TABLE 4.4
SUMMARY OF FLOW CHART LOGIC FOR AREAS OF
INITIAL HEALTH, WELFARE AND ENVIRONMENTAL CONCERN
AT ANDREWS AFB

Site	Potential Hazard to Health, Welfare or Environment	Need for Further IRP Evaluation/ Action	HARM Rating
Fire Protection Training Area No. 1 (FT-1)	Yes	Yes	Yes
Fire Protection Training Area No. 2 (FT-2)	Yes	Yes	Yes
H-43 Helicopter Fire Protection Training Area (FT-3)	No	No	No
Fire Protection Training Area No. 4 (FT-4)	Yes	Yes	Yes
Low-Level Radioactive Waste Storage Site (RWD-1)	No	No	No
Sewage Treatment Plant No. 1 (STP-1)	No	No	No
Sewage Treatment Plant No. 2 (STP-2)	No	No	No
Sewage Treatment Plant No. 3 (STP-3)	No	No	No
Sewage Treatment Plant No. 4 (STP-4)	No	No	No
Landfill No. 1 (D-1)	Yes	Yes	Yes
Landfill No. 2 (D-2)	No	No	No
Landfill No. 3 (D-3)	Yes	Yes	Yes
Landfill No. 4 (D-4)	Yes	Yes	Yes
Hardfill (D-5)	No	No	No
Davidsonville Fill Area (D-6)	No	No	No
Spill Site-Diesel Fuel Oil (SP-1)	No	No	No
Leak Area - PD680 (SP-2)	Yes	Yes	Yes
Spill Site - JP4 (SP-3)	Yes	Yes	Yes
Spill Site - No. 2 Fuel Oil (SP-4)	Yes	Yes	Yes

TABLE 4.4
(Continued)
SUMMARY OF FLOW CHART LOGIC FOR AREAS OF
INITIAL HEALTH, WELFARE AND ENVIRONMENTAL CONCERN
AT ANDREWS AFB

Site	Potential Hazard to Health, Welfare or Environment	Need for Further IRP Evaluation/ Action	HARM Rating
Spill Site - East Side Gas Station (SP-5)	Yes	Yes	Yes
Spill Site - Brandywine Housing (SP-6)	Yes	Yes	Yes
Leak Area - Davidsonville Transmitter Site (SP-7)	No	No	No
Leak Area - Mogas (SP-8)	Yes	Yes	Yes
Spill Site - Officers Club Pool (SP-9)	No	No	No
Sludge Application Areas (SD-1)	No	No	No
Brandywine Receiver Site WAP (WAP-1)	Yes	Yes	Yes
Davidsonville Transmitter Site WAP (WAP-2)	No	No	No
DPDO Storage Yard (DP-1)	Yes	Yes	Yes
Hazardous Waste Storage Area (HW-1)	No	No	No
CE Storage Yard (HW-2)	No	No	No

Source: Engineering-Science

account characteristics of potential receptors, waste characteristics, pathways for migration, and specific characteristics of the site related to waste management practices. Results of the HARM analysis for the sites are summarized in Table 4.5.

The procedures used in the HARM system are outlined in Appendix G and the specific rating forms for the 14 sites at Andrews AFB are presented in Appendix H. The HARM system is designed to indicate the relative need for follow-on action. Photographs of these sites are included in Appendix F.

TABLE 4.5
SUMMARY OF HARM SCORES FOR POTENTIAL
CONTAMINATION SITES AT ANDREWS AFB

Rank	Site	Receptor Subscore	Waste Charac-teristics Subscore	Pathways Subscore	Waste Management Factor	HARM Score
1	Fire Protection Training Area No. 2 (FT-2)	48	100	61	1	70
2	Leak Area - PD680 (SP-2)	47	100	61	1	69
3	Landfill No. 1 (D-1)	49	100	54	1	68
4	Fire Protection Training Area No. 1 (FT-1)	48	100	54	1	67
5	Landfill No. 3 (D-3)	51	80	61	1	64
6	Spill Site - East Side Gas Station (SP-5)	50	80	61	.95	61
7	Brandywine DPDO Storage Yard (DP-1)	61	60	61	1	61
8	Spill Site - No. 2 Fuel Oil (SP-4)	47	80	54	1	60
9	Spill Site - JP4 (SP-3)	50	64	54	1	56
10	Brandywine Receiver Site (WAP-1)	58	48	61	1	56
11	Spill Site - Brandywine Housing (SP-6)	63	48	61	.95	55
12	Fire Protection Training Area No. 4 (FT-4)	49	60	54	.95	52
13	Landfill No. 4 (D-4)	51	40	61	1	51
14	Leak Area - MOGAS (SP-8)	50	48	54	.95	48

Source: Engineering-Science

SECTION 5
CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is potential for environmental contamination resulting from past waste disposal practices and to assess the probability of contamination migration from these sites. The conclusions given below are based on field inspections; review of records and files; review of the environmental setting; interviews with base personnel, past employees and local, state and federal government employees; and assessments using the HARM system. Table 5.1 contains a list of the potential contamination sources identified at Andrews AFB and a summary of the HARM scores for those sites.

FIRE PROTECTION TRAINING AREA NO. 2 (FT-2)

Fire protection training area No. 2 was used at the base from 1959 to 1972. This site has a significant potential for environmental contamination and follow on investigation is warranted. Burn activities were conducted as often as three times per day until the mid 1960's. This frequency was reduced to once per day for the remaining time of operation. Training episodes used approximately 1000 to 2000 gallons of drummed liquid shop waste. This waste was poured onto a water saturated, bermed burn area and ignited. Protein foams and chlorobromomethane were used to extinguish fires. No obvious surficial contamination was noted. A small area adjacent to the burn area was used as a burial site for several hundred, five gallon cans of MOGAS. Sewage treatment plant sludge was landfarmed over portions of this site and the adjacent area. This site is currently used as a garden area by base personnel.

Local surface geology consists of permeable silty or clayey sand and gravel of the Quaternary Upland Deposits (Map symbol: QTU which

TABLE 5.1
SITES EVALUATED USING THE
HAZARD ASSESSMENT RATING METHODOLOGY
ANDREWS AFB

Rank	Site	Operation Period	HARM Score(1)
1	Fire Protection Training Area No. 2 (FT-2)	1959-1972	70
2	Leak Area - PD680 (SP-2)	Early 1970's	69
3	Landfill No. 1 (D-1)	1960's-1980's	68
4	Fire Protection Training Area No. 1 (FT-1)	Early 1950's-1958	67
5	Landfill No. 3 (D-3)	Late 1950's-1960's	64
6	Spill Site - East Side Gas St. (SP-5)	1982,1984	61
7	Brandywine DPDO Storage Yard (DP-1)	1961-Present	61
8	Spill Site - No. 2 Fuel Oil (SP-4)	Early 1980's	60
9	Spill Site - JP-4 (SP-3)	1978	56
10	Brandywine Receiver Site (WAP-1)	1970's-Present	56
11	Spill Site - Brandywine Housing (SP-6)	1984	55
12	Fire Protection Training Area No. 4 (FT-4)	1972-Present	52
13	Landfill No. 4 (D-4)	1960's-1980's	51
14	Leak Area - MOGAS (SP-8)	Early 70's, 1979	48

(1) This ranking was performed according to the Hazard Assessment Rating Methodology (HARM) described in Appendix G. Individual rating forms are in Appendix H.

also includes the Brandywine Formation). Ground water is usually present in this unit at shallow depths.

The site received a HARM score of 70.

LEAK AREA - PD680 (SP-2)

Site SP-2, located near the washrack at building 1973, has a significant potential for environmental contamination and follow on investigation is warranted. This spill involved an estimated 5,000 gallons of PD-680 with no subsequent cleanup efforts. The soils in this area consist of the permeable Quaternary Upland Deposits. Ground water may be present at shallow depths.

The site received a HARM rating of 69.

LANDFILL NO. 1 (D-1)

Landfill No. 1, Site D-1, was used for disposal of a variety of wastes including general refuse, construction rubble, flyash, and shop wastes. Also located at this site was a 2 to 3 acre pit for disposal of waste solvents, dilute process wastes and waste oils from shop operations. Waste evaporated or seeped into surrounding soils from this pit. During the early 1960's through the early 1970's, this site was subject to frequent flooding and much of the waste oil pit material was carried to Piscataway Creek. In the mid-1970's, two underground storage tanks were installed at this site to replace the waste oil pit for storage of reclaimable waste oils. The eastern half of site D-1 was used for land disposal of sludge from the on-base sewage treatment facilities. At present, the landfill area and waste pit are covered with several feet of local soil. This area is used to store lumber, salt and sand. Further investigation of this site is warranted.

The site was constructed into permeable sands and gravels of the Quaternary Upland Deposits. Ground water is suspected to be present at shallow depths below land surface, i.e. ten to fifteen feet.

This site received a HARM score of 68.

FIRE PROTECTION TRAINING AREA NO. 1 (FT-1)

Fire protection training area No. 1 consisted of a 150 to 200 foot diameter bermed area as well as an adjacent drum storage area. Shop wastes including solvents, thinners and fuels were stored in this drum area and used for burn exercises. Burns were conducted 2 to 3 times per day using 1,000 gallons of waste per burn. The burn area was pre-wet and protein foams, carbon tetrachloride and chlorobromomethane were used to extinguish fires. No visual contamination was noted, however a circular area void of vegetation was present. A significant potential for contamination exists at this site and follow on investigation is warranted.

The site is underlain by permeable sands and gravels of the Quaternary Upland Deposits. Ground water may be present at shallow depths.

This site received a HARM score of 67.

LANDFILL NO. 3 (D-3)

Landfill No. 3, located north of the base lake, was used primarily for disposal of construction rubble. The site was also used for disposal of minor quantities of garbage, paints and equipment from the old R&M Annex. Additionally, unknown quantities of liquid shop wastes were dumped at this site. The site has a potential for contamination and a follow on investigation is warranted.

The site is underlain by permeable sand and gravel of the Quaternary Upland Deposits. Ground water is usually present in this unit at shallow depths.

This site received a HARM rating of 64.

SPILL SITE - EAST SIDE GAS STATION (SP-5)

The underground tanks and piping system at SP-5 have been the site of several gasoline leaks in the past. This site has a significant potential for environmental contamination and a follow on investigation is warranted. Some excavation has been performed in this area and monitoring wells have been installed. There is however, some concern over the installation and placement of these wells. Gasoline vapors were detected in several borings, but no free floating hydrocarbons were detected.

The site is underlain by permeable sand and gravel of the Quaternary Upland Deposits (includes Brandywine Formation and fill). Ground water is present at shallow depths, usually less than twenty feet below land surface.

This site received a HARM rating of 61.

BRANDYWINE DPDO STORAGE YARD (DP-1)

This yard has been used in the past for temporary storage of PCB transformers. It is suspected that these transformers may have leaked and caused contamination of the surrounding area. Additionally, drummed liquid material stored in this area may have resulted in leaks and spills. There was also some concern that the existing drinking water well may have sustained contamination. This site has a potential for environmental contamination and follow-on investigation is warranted. The site received a HARM score of 61.

SPILL SITE - NO. 2 FUEL OIL (SP-4)

Approximately 20,000 gallons of fuel oil no. 2 was accidentally pumped out of a storage tank at building 1204 into an adjacent pit. The fuel ultimately moved through the storm sewer system to Piscataway Creek. No containment or cleanup occurred and this site is recommended for follow on investigation.

Contamination may be present in the alluvium of Piscataway Creek.

The site received a HARM raring of 60.

SPILL SITE - JP-4 (SP-3)

An estimated 1000 gallons of JP-4 fuel was spilled at the intersection of Route 4 and Dowerhouse Rd. This spill, the result of a puncture in the pressurized transfer line for fuel delivery, has a potential for environmental contamination and follow on investigation is warranted.

This site received a HARM score of 56.

BRANDYWINE RECEIVER SITE WAP (WAP-1)

The waste accumulation point located at the Brandywine Annex was found to be visually contaminated by waste oils. Oil was noted on the

surface of the gravel base and on the surrounding walls. This site has a potential for environmental contamination and follow on investigation is warranted.

The site is underlain by Quaternary Upland Deposits. Ground water may be present at depths of less than twenty feet below land surface.

The site received a HARM score of 56.

SPILL SITE - BRANDYWINE HOUSING (SP-6)

Fuel oil was discovered seeping into a tributary of Mataponi Creek near the Brandywine Housing project. The site where this incident occurred has a significant potential for environmental contamination and follow on investigation is warranted. This leak was the result of leakage of underground heating oil storage tanks. Filter fences were installed and the underground tanks were removed. Additionally, monitoring wells were set in place. Although fuel oil odors were detected in borings, no appreciable quantity of oil was found in the wells.

The site is underlain by permeable strata of the Quaternary Upland Deposits or the Calvert Formation. Ground water is present at shallow depths, five to ten feet below land surface.

This site received a HARM rating of 55.

FIRE PROTECTION TRAINING AREA NO. 4 (FT-4)

Fire protection training area No. 4 is currently in use for training exercises. The site has a potential for environmental contamination and follow on investigation is warranted. The site consists of a 180 foot diameter burn area, an oil interceptor, and a 50 foot diameter leaching pond. Training exercises are held weekly and use approximately 500 gallons of clean JP-4 and motor oil. AFFF and water are used to extinguish fires. Waste liquid flows to the oil interceptor and then to the leaching pond. The leaching pond has a history of plugging and flooding. This material has been hauled to an oil/water separator or been discharged to the nearby ground surface when the leaching pond has failed to work properly.

The site is underlain by permeable sand and gravel of the Quaternary Upland Deposits. Ground water may be present at shallow depths.

This site received a HARM score of 52.

LANDFILL NO. 4 (D-4)

Landfill No. 4 has been used primarily for disposal of construction rubble and other hardfill. The site has recently been used for disposal of some small quantities of hospital waste, household garbage, and general refuse. The exact nature of the waste disposed at this site, along with the quanity is unknown. This site is therefore recommended for further investigation.

The site is underlain by permeable sands and gravels of the Quaternary Upland Deposits. Ground water may be present at shallow depths.

This site received a HARM score of 51.

LEAK AREA - MOGAS (SP-8)

The military gas station has had several spills and leaks occur in the past. The exact quantities of these leaks are unknown. Because of the location of this site and the nature of materials spilled, there is a potential for environmental contamination and follow on investigation is warranted.

The site is underlain by Quaternary Upland Deposits. Ground water may be present at shallow depths.

This site received a HARM score of 48.

SITES IDENTIFIED AND NOT RATED

The H-43 Helicopter FPTA used low levels of clean fuel for training exercises (FT-3). This fuel was spread over the water saturated surface and ignited. There is currently no evidence to indicate the presence of this site. Because of the very low potential for contamination this site was not considered for HARM evaluation.

The radioactive waste storage site (RWD-1) was recently examined by BES and no radioactivity above background levels was found. There is currently no potential for future contamination.

Examination of the four sewage treatment plants (STP1 through STP4) previously operated on base revealed no evidence to indicate any potential health or environmental risks. Disposal of sludge from these facilities is discussed separately. Grease from these plants was buried in disposal pits adjacent to the plants. These areas are currently covered and have vegetative growth.

Landfill No. 2 (D-2), northwest of the base lake, was not considered for further IRP action. No evidence was found to indicate that hazardous materials were placed in this site.

The hardfill area east of the base lake (D-5), and the Davidsonville hardfill area (D-6) were both inspected to determine if hazardous substances had been placed in either area. All evidence indicated that these sites have been used primarily for hardfill materials and no indication of hazardous waste disposal was found.

An estimated 50,000 gallons of diesel fuel No. 6 spilled at building 3409 (SP-1). The spill occurred during cool weather, and due to the viscous nature of the material, the majority of the waste was contained and cleaned up. No significant potential for environmental contamination is expected and no follow on investigation is recommended.

A fuel oil leak in a 2000 gallon underground tank and associated fuel lines was discovered behind Building 1 at the Davidsonville Transmitter Site (SP-7). Monitoring wells were installed in the vicinity of the leak. The tank was excavated and all visibly contaminated soil was removed. Because of the extensive cleanup assoicated with this spill, no significant potential for contamination exists and no follow on investigation is warranted.

The hydrochloric acid spill which occurred at the officers club (Site SP-9) did not warrant further IRP investigation. Because of the nature of this material and the elapsed time period, no potential for contamination was expected.

Sludge from the base sewage treatment facilities and from the Blue Plains Treatment Plant was landfarmed at various locations throughout the base (Site SD-1). Several of these areas lie on land used for landfill or fire training. Although this material has metal levels slightly higher than normal, it is not expected to pose a potential for environmental contamination.

The WAP at the Davidsonville Site (WAP-2) showed no evidence of contamination and no further action is indicated at this time.

Both the hazardous waste storage area (HW-1) and CE storage yard (HW-2) were eliminated from further evaluation. There was no evidence to indicate any potential for environmental contamination at either location.

SECTION 6

RECOMMENDATIONS

Fourteen sites were identified at Andrews AFB as having the potential for environmental contamination. These sites have been evaluated and rated using the HARM system which assesses their relative potential for contamination and provides the basis for determining the need for additional Phase II IRP investigations. All of the fourteen sites have sufficient potential to create environmental contamination and warrant Phase II investigations. The sites evaluated have been reviewed concerning land use restrictions which may be applicable.

PHASE II MONITORING RECOMMENDATIONS

These subsequent recommendations are made to further assess the potential for environmental contamination from waste disposal areas at Andrews AFB. The recommended actions are generally one time sampling programs to determine if contamination does exist at the site. If contamination is identified, the sampling program may need to be expanded to further define the extent of contamination. Of the fourteen sites recommended for further actions, six are previous spill or leak areas. There are also three fire protection training areas, three former landfill areas, the DPDO storage yard and a waste accumulation point included for IRP actions and recommendations.

The hydrogeologic conditions present at each waste disposal facility are entirely site-specific due to variations in geology, topography, land use modifications, etc. These natural conditions or man-made changes in the local environmental setting must be clearly understood in order to design an effective ground-water quality monitoring system. At present, the site-specific conditions existing at the Andrews AFB sites are unknown. Soil test borings and temporary observation wells may be

employed to obtain site-specific information. A systematic, more efficient and cost-effective approach would be to utilize geophysical techniques to obtain local subsurface information. Electrical resistivity (ER) and electromagnetic conductivity (EMC) are geophysical instruments that employ indirect measurement technologies to collect data describing subsurface material electrical properties. They respond to changes or contrasts in either the horizontal or vertical planes which may be correlated to direct sampling methods, such as test borings. Both methods may be utilized in shallow situations (less than thirty feet deep) if local geology permits, to determine stratigraphic changes, depth to ground water, aquifer thickness and contaminated zones if sufficient contrast in the local geology exists. ER may be employed in more complicated terrains or in situations where deep contamination is suspected. Wells may then be installed systematically, in zones selected by the geophysical technique. This approach to monitoring program design significantly reduces both costs and schedules.

The use of geophysical techniques at waste disposal facilities has been well documented in the technical literature. A USEPA guidance manual describes the capabilities and limitations of electrical resistivity at waste disposal facilities and is applicable to the probable conditions that may be encountered at Andrews AFB (USEPA, 1978). Other geophysical methodologies can be utilized for specialized purposes - for example, a metal detector may be used in shallow settings to locate buried ferrous materials and the magnetometer may be utilized to locate either buried objects or disturbed zones (backfilled trenches or pits) in shallow and deep settings.

Ground-water quality monitoring systems must be designed for the site-specific conditions existing at a waste disposal facility. Guidelines for well system design have been published in several USEPA reports. One report indicates that a few guidelines are applicable to conditions such as those noted at Andrews AFB. For large areas/landfills, or for areas with multiple ground-water flow directions, it is recommended that more than the usual four wells (one upgradient and three downgradient, from RCRA, Subpart F, Section 265.91, "Ground-water Monitoring System") may be required. Where multiple flow directions may exist beneath a site, geophysical methods should be utilized to guide

well placement, both the physical location and the screened interval. In situations where the site is physically large or has an unusual geometry and therefore has a long downgradient dimension (the site border, which when sketched on a topographic map, appears to be drawn at a right angle to the principle direction of ground-water flow), the general rule is to install one monitoring well for each 250 feet of downgradient frontage (USEPA, 1980, page 41). This well spacing is considered to be a maximum allowable interval between wells, assuming that local hydrogeologic conditions are reasonably uniform. Wells must be installed at closer intervals if the site subsurface conditions are determined to be complex.

Following geophysical surveys, the proper placement of additional soil borings and/or ground-water quality monitoring wells can be determined. Those sites with a potential for ground-water contamination will be monitored with 4-inch diameter wells consisting of Schedule 40 PVC with solid casing and machine slotted screen. Well screens should be installed to permit sampling of the uppermost aquifer's complete saturated thickness. Well depth should be determined by site geophysics. If the initial ground-water samples indicate contamination, additional wells may be required. The number of wells may be reduced if the geophysical techniques are successful in identifying subsurface plumes. The recommended monitoring program is summarized in Table 6.1 and discussed below for each site. Figures 6.1 and 6.2 illustrates several proposed Phase II monitoring locations.

Fire Protection Training Area No. 2 (FT-2)

Fire protection training area No. 2 has significant potential for environmental contamination and monitoring is recommended. Test borings should be taken at three or more locations within the site limits. Soil sampling should be performed up to 15 feet below grade and samples should be taken at three foot vertical intervals or in areas of obvious visual contamination. Samples should be analyzed for the parameters listed in Table 6.2, list A. Additionally, using geophysics as a guide, one upgradient and three downgradient wells should be installed within the uppermost aquifer. Ground-water well samples should be analyzed for

TABLE 6.1
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
Fire Protection Training Area No. 2 (FT-2)	70	At least three test borings should be taken within site limits; perform sampling up to 15 ft. below grade and at three ft. vertical intervals; conduct geophysical survey; install and sample one upgradient and 3 downgradient wells.	A	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Leak Area - PD680 (SP-2)	69	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one upgradient and three downgradient wells.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Landfill No. 1 (D-1)	68	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one background well and one downgradient well for each 250 feet of downgradient frontage; sample at one upgradient and two downgradient surface water points.	C	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necesary to assess extent of contamination.

TABLE 6.1
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB
(Continued)

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
Fire Protection Training Area No. 1 (FT-1)	67	At least three test borings should be taken within site limits; perform sampling up to 15 ft. below grade and at three ft. vertical intervals; conduct geophysical survey; install and sample one upgradient and three downgradient wells.	A	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Landfill No. 3 (D-3)	64	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one background well and one downgradient well for each 250 feet of downgradient frontage; sample surface water and sediments upgradient and downgradient from the site.	C	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.

TABLE 6.1
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB
(Continued)

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
Spill Site - East Side Gas Station (SP-5)	61	Geophysical study to determine the areal limits of the contaminants and the optimum sampling locations and depths; install and sample monitoring wells.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination. Care must be taken to ensure that wells are installed so that the normal water table intersects the well screen.
Brandywine DPDO Storage Yard (DP-1)	61	Two soil samples in vicinity of transformer storage site; water sample taken from well.	D	Additional soil borings and placement of wells may be necessary if contamination is seen.
Spill Site - No. 2 Fuel Oil (SP-4)	60	Two soil samples in vicinity of sewer line discharge point; sediment sampling of Piscataway creek (one upgradient and two downgradient samples).	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Spill Site - JP4 (SP-3)	56	Sample surface water and sediment from adjacent creek, one upgradient and two downgradient samples should be taken.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of con- [illegible]

TABLE 6.1
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB
(Continued)

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
Brandywine Receiver Site (WAP-1)	56	Remove stained, visibly contaminated soil and gravel; if extent of contamination is high, soil sampling should be performed to a depth of 15 feet below grade at two locations.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Spill Site - Brandywine Housing (SP-6)	55	Geophysical study to confirm existing well locations and vertical sampling intervals; map plume; surface water monitoring and sediment sampling on one upgradient and two downgradient samples.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contimations. Care must be taken to insure that wells are installed so that the normal water table intersects the well screen.
Fire Protection Training Area No. 4 (FT-4)	52	Two soil samples in the vicinity of the burn area and two soil samples in the vicinity of the leaching pond.	A	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess estent of contimations.

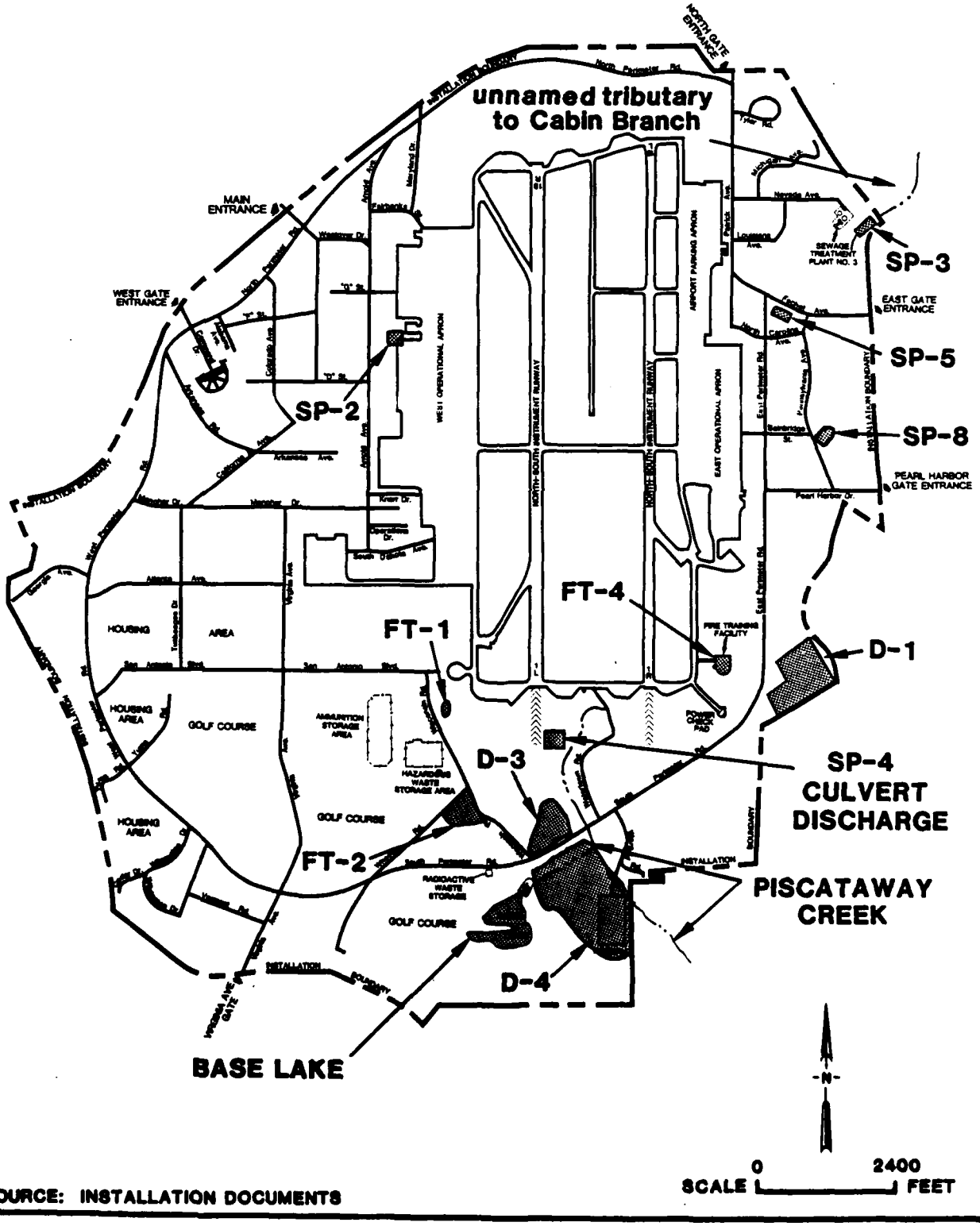
TABLE 6.1
RECOMMENDED MONITORING PROGRAM FOR PHASE II IRP
AT ANDREWS AFB
(Continued)

Site Name	Rating Score	Recommended Monitoring	Sample Analyses List	Comments
Landfill No. 4 (D-4)	51	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one background well and one downgradient well for each 250 feet of downgradient frontage; sample surface water and sediments upgradient and downgradient from the site.	C	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.
Leak Area - MOGAS (SP-8)	48	Geophysical study to determine extent of contamination and to aid in placement of wells; install and sample one upgradient and three downgradient wells.	B	If sampling indicates contamination, continue monitoring. Additional wells and soil borings may be necessary to assess extent of contamination.

FIGURE 6.1

ANDREWS AFB

SITES RECOMMENDED FOR ENVIRONMENTAL MONITORING



SOURCE: INSTALLATION DOCUMENTS

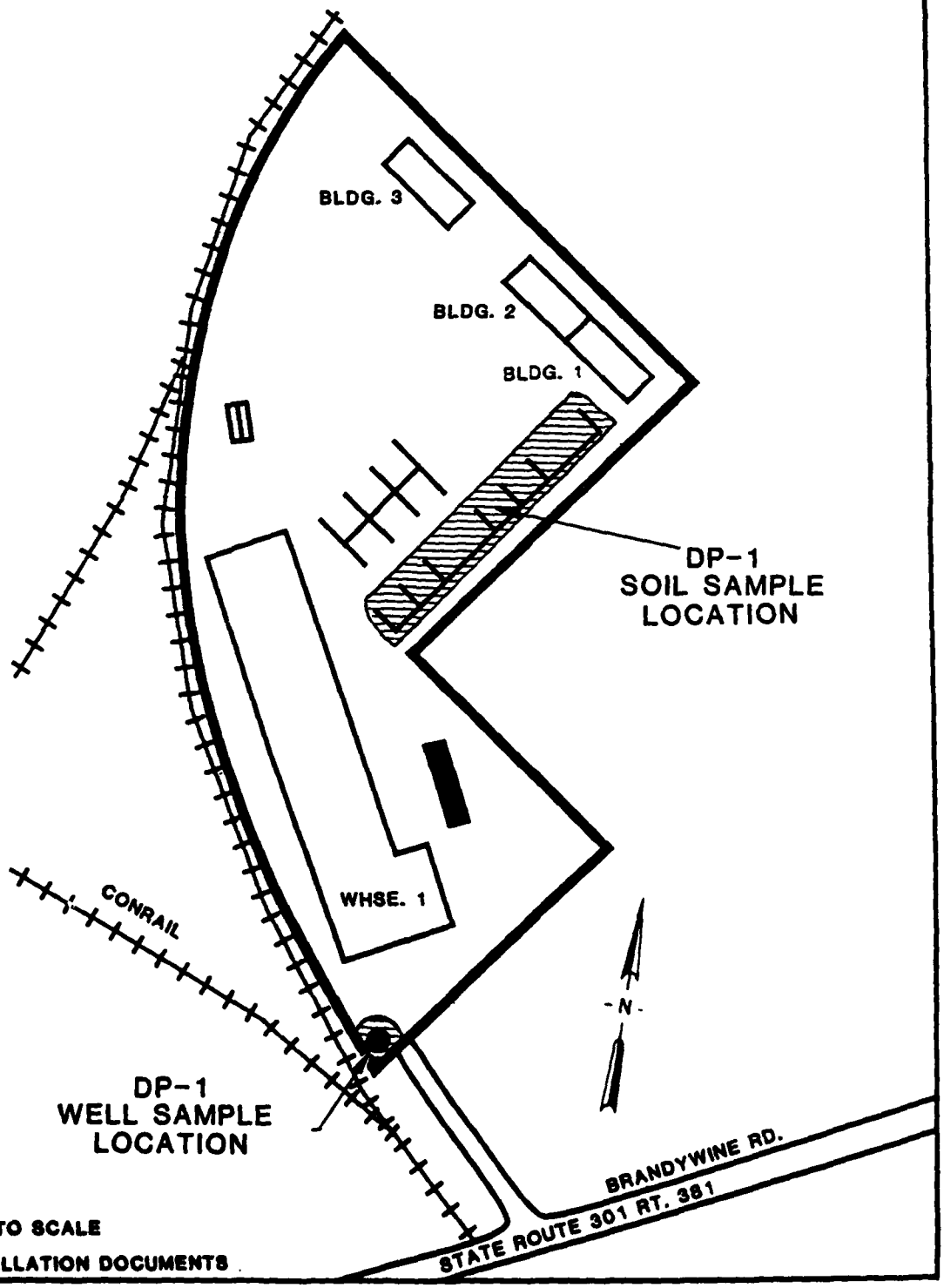
ES ENGINEERING-SCIENCE

FIGURE 6.2

ANDREWS AFB

AREAS FOR ENVIRONMENTAL MONITORING

Brandywine DPDO



NOT TO SCALE

SOURCE: INSTALLATION DOCUMENTS

TABLE 6.2
RECOMMENDED LIST OF ANALYTICAL PARAMETERS FOR PHASE II IRP
AT ANDREWS AFB

LIST A	EPA Method Number
Oil and Grease	413.1
Volatile Organics	624
Total Organic Halogens (Water Samples Only)	9020
Total Organic Carbon (Water Samples Only)	415.1
EP Toxicity (Soil Samples Only)	1310
LIST B	
Total Organic Carbon (Water Samples Only)	415.1
Oil and Grease	413.1
LIST C	
pH	150.1
Total Dissolved Solids (Water Samples Only)	160.2
Oil and Grease	413.1
Total Organic Carbon (Water Samples Only)	415.1
Total Organic Halogens (Water Samples Only)	9020
Phenols	420.1
Chromium (VI)	218.4
Lead	239.1
LIST D	
PCBs	608
GC/MS Priority Pollutant Scan (Water Samples Only)	624/625/608

Source: Engineering-Science

the parameters listed in Table 6.2, list A. If ground-water contamination is confirmed in the uppermost aquifer, deeper wells should then be installed.

Leak Area - PD680 (SP-2)

Site SP-2 was the result of an estimated 5,000 gallon PD-680 spill on which no cleanup efforts were performed. Recommendations for this site include a determination of site specific hydrogeology, including geophysics, to determine the extent of contamination and to aid in the placement of ground-water quality monitoring wells. Following this study, three downgradient wells and one upgradient well are recommended for installation.

Ground-water samples should be analyzed for the parameters listed in Table 6.2, List B.

Landfill No. 1 (D-1)

Landfill No. 1, located south of the current POL storage area, was used not only for landfill of various wastes but was also the site of a 2 to 3 acre liquid waste disposal pit. The eastern portion of this site was used for land disposal of STP sludge. An investigation of the site specific hydrogeologic conditions is recommended with subsequent placement of a ground-water quality monitoring system consistent with local subsurface conditions. The ground-water quality monitoring system should consist of one background well and one downgradient monitoring well for each 250 feet of "downgradient" frontage. These wells should be constructed as previously discussed.

In addition to the above, surface water, in the direction of flow from the site, should be sampled to determine if any significant water quality degradation has occurred. One upgradient sample, and at least two samples downgradient from the site, should be taken. Both ground-water and surface water samples should be tested for the parameters listed in Table 6.2, List C.

Fire Protection Training Area No. 1 (FT-1)

Fire protection training area No. 1 has significant potential for environmental contamination and monitoring is recommended. Test borings should be taken at three or more locations within the site limits. Soil sampling should be performed up to 15 feet below grade and samples should be taken at three foot vertical intervals or in areas of obvious

visual contamination. Samples should be analyzed for the parameters listed in Table 6.2, list A. Additionally, using geophysics as a guide, one upgradient and three downgradient wells should be installed within the uppermost aquifer. Ground-water well samples should be analyzed for the parameters listed in Table 6.2, list A. If ground-water contamination is confirmed in the uppermost aquifer, deeper wells should then be installed.

Landfill No. 3 (D-3)

Landfill No. 3, just north of the base lake, has potential for environmental contamination and further site investigation is recommended. Site specific hydrogeologic conditions should be established, using geophysics, followed by installation of a ground-water quality monitoring system including one background well and one downgradient well for each 250 feet of downgradient frontage. Well installation should be performed as previously noted.

Surface water and sediment sampling should be performed on surface waters to the east and south of the site including the base lake and Piscataway Creek. At least two samples should be taken from the base lake. One creek sample upgradient from the site and two additional downgradient creek samples are also recommended. All samples should be analyzed for the parameters listed in Table 6.2, List C.

Spill Site - East Side Gas Station (SP-5)

Site SP-5 has been the site of several MOGAS leaks in the past. Some excavation of tanks and contaminated soil has occurred and a series of monitoring wells have been installed. There is however, some concern with respect to the installation and placement of these wells and further investigation is recommended.

A geophysical study, including both electromagnetic conductivity and electrical resistivity is recommended. The two survey results should then be compared and the probable contamination migration areal limits and optimum sampling depths determined.

Monitoring wells should then be installed at the locations and depths indicated. Wells installed into zones where floating contaminants are present must be constructed so that the normal water table intersects the well screen. The water level must not be present above

the well screen because light-weight contaminants will float past the monitoring point undetected. Wells should be sampled and analyzed for the parameters listed in Table 6.2, List B.

Brandywine DPDO Storage Yard (DP-1)

This site was formerly used to store PCB transformers and occasionally was used to store drummed liquids. It is recommended that two soil samples be taken in this area to a depth of one foot (See Figure 6.2) and analyzed for the parameters listed in Table 6.2, List D. Additionally, because of the question regarding contamination of the drinking water well at this site, it is recommended that a complete GC/MS scan be done on a sample from this well.

Spill Site - No. 2 Fuel Oil (SP-4)

This spill resulted when 20,000 gallons of fuel oil No. 2 were accidently pumped out of a storage tank at building 1204. This material flowed through the storm sewer to Piscataway Creek. No cleanup efforts were conducted on base. It is recommended that a total of two samples at the land area in the vicinity of the discharge culvert be taken. At least two downgradient and one upgradient sediment samples of Piscataway Creek should also be sampled. These samples should be analyzed for the parameters listed in Table 6.2, List B.

Spill Site - JP-4 (SP-3)

An estimated 1000 gallons of JP-4 were spilled at this site with no subsequent cleanup effort performed. The majority of this fuel went to a small creek serving the area. It is recommended that surface water and sediment samples be collected from the creek and analyzed for the parameters listed in Table 6.2, List B. One upgradient and two downgradient samples are recommended.

Brandywine Receiver Site (WAP-1)

The Brandywine Receiver Site contains one designated Waste Accumulation Point. This site was noted to be visibly contaminated and stained with oils. It is recommended that stained and visibly contaminated soil and gravel be removed from the site. If the extent of contamination is determined to be high, soil sampling should be performed to 15 feet below grade at two locations. These samples should be analyzed for the parameters listed in Table 6.2, List B.

Spill Site - Brandywine Housing (SP-6)

The fuel oil spill at the Brandywine Housing facility was the result of leakage from underground storage tanks. These tanks were excavated and monitoring wells were installed. However, the placement and installation of these wells may have been inadequate and thus, further recommendations are required.

A geophysical study, including both electromagnetic conductivity and electrical resistivity is recommended to confirm existing well locations and vertical sampling intervals. This data should be used to establish a map of the plume. Additional wells may be necessary if existing well locations are found to be significantly in error. Surface water monitoring and sediment sampling should be performed on one upgradient and two downgradient samples. These samples should be analyzed for the parameters listed in Table 6.2, List B.

Fire Protection Training Area No. 4 (FT-4)

FT-4 is the site of the current fire protection training area. No groundwater contamination is expected as a result of this site and thus no monitoring system is recommended. There was however, some visual contamination of the soil noted and further investigation is warranted. Two soil samples in the vicinity of the burn area and two soil samples near the leaching pond should be collected. There was some indication that flooding had previously occurred in the area near the leaching pond and soil samples should be taken accordingly. Samples should be analyzed for the parameters given in Table 6.2, List A.

Landfill No. 4 (D-4)

This site has been used primarily for construction rubble and other hardfill. There is, however, evidence to indicate that various, potentially hazardous substances have also been buried at this location. Site specific hydrogeologic conditions should be established, using geophysics, followed by installation of a ground-water quality monitoring system including one background well and one downgradient well for each 250 feet of downgradient frontage. Well installation should be performed as previously noted.

Surface water and sediment sampling should be performed on surface waters to the east and south of the site including Piscataway Creek. At least one creek sample should be taken upgradient from the site and two

additional creek samples are also recommended. All samples should be analyzed for the parameters listed in Table 6.2, List C.

Leak Area - MOGAS (SP-8)

The military gas station was the site of several gasoline leaks of unknown quantities. Recommendations for this site include a determination of site specific hydrogeology, including geophysics, to determine the extent of contamination and to aid in the placement of ground-water quality monitoring wells. Following this study, three downgradient wells and one upgradient well are recommended for installation.

Ground-water samples should be analyzed for the parameters listed in Table 6.2, List B.

RECOMMENDED GUIDELINES FOR LAND USE RESTRICTIONS

It is desirable to have land use restrictions for the following reasons: (1) to provide for the continued protection of human health, welfare, and the environment, (2) insure that the migration of potential contaminants is not promoted through improper land use, (3) to facilitate the compatible development of future USAF facilities; and (4) to allow for identification of property which may be proposed for excess or outlease.

The recommended guidelines for land use restrictions at each identified disposal site at Andrews AFB are presented in Table 6.3. A description of the land use restriction guidelines is included in Table 6.4. Land use restrictions at sites recommended for on-site monitoring should be re-evaluated upon completion of the Phase II monitoring program and changes made where appropriate.

TABLE 6.3
RECOMMENDED GUIDELINES FOR FUTURE LAND USE RESTRICTIONS
ANDREWS AFB

Site Name	Construction	Excavation	Wells	Agriculture	Silviculture	Water Infiltration	Recreation	Burning	Disposal Operations	Vehicular Traffic	Material Storage	Housing
Fire Training Area No. 2 (FT-2)	R	R	R	R	R	R	R	NR	R	R	NR	R
Leak Area-PD680 (SP-2)	R	R	R	NR	NR	R	NR	R	R	NR	NR	R
Landfill No. 1 (D-1)	R	R	R	R	R	R	R	R	R	R	NR	R
Fire Training Area No. 1 (FT-1)	R	R	R	R	R	R	R	NR	R	R	NR	R
Landfill No. 3 (D-3)	R	R	R	R	R	R	R	R	R	R	NR	R
Spill Site - E. Side Gas Station (SP-5)	NR	NR	R	NR	NR	R	R	R	R	NR	NR	R
DPDO Storage Yard (DP-1)	R	R	R	R	R	R	R	R	PU	NR	PU	R
Spill Site - No. 2 Fuel Oil (SP-4)	NR	NR	R	NR	NR	R	NR	R	R	NR	NR	NR
Spill Site - JP4 (SP-3)	NR	NR	R	NR	NR	R	NR	R	R	NR	NR	NR
Brandywine Receiver Site (WAP - 1)	NR	NR	R	NR	NR	R	NA	R	R	NA	NR	R
Spill Site - Brandywine Housing (SP-6)	NR	NR	R	NR	NR	R	NR	R	R	NR	NR	NR
Fire Training Area No. 4 (FT-4)	R(1)	R	R	R	R	R	R	PU	PU	R	PU	R
Landfill No. 4 (D-4)	R	R	R	R	R	R	R	R	R	R	NR	R
Leak Area - MOGAS (SP-8)	NR	NR	R	NR	NR	R	NR	R	R	NR	NR	NR

Notes: NA = Not Applicable
NR = No Restriction
PU = Present Use
R =
(1) Restriction does not apply to construction of additional fire protection training facilities

TABLE 6.4
DESCRIPTION OF GUIDELINES FOR LAND USE RESTRICTIONS

Guideline	Description
Construction on the site	Restrict the construction of structures which make permanent (or semi-permanent) and exclusive use of a portion of the site's surface.
Excavation	Restrict the disturbance of the cover or subsurface materials.
Well construction on or near the site	Restrict the placement of any wells (except for monitoring purposes) on or within a reasonably safe distance of the site. This distance will vary from site to site, based on prevailing soil conditions and ground-water flow.
Agricultural use	Restrict the use of the site for agricultural purposes to prevent food chain contamination.
Silvicultural use	Restrict the use of the site for silvicultural uses (root structures could disturb cover or subsurface materials).
Water infiltration	Restrict water run-on, ponding and/or irrigation of the site. Water infiltration could produce contaminated leachate.
Recreational use	Restrict the use of the site for recreational purposes.
Burning or ignition sources	Restrict any and all unnecessary sources of ignition, due to the possible presence of flammable compounds.
Disposal operations	Restrict the use of the site for waste disposal operations, whether above or below ground.
Vehicular traffic	Restrict the passage of unnecessary vehicular traffic on the site due to the presence of explosive material(s) and/or of an unstable surface.
Material storage	Restrict the storage of any and all liquid or solid materials on the site.
Housing on or near the site	Restrict the use of housing structures on or within a reasonably safe distance of the site.

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APPENDIX A

BIOGRAPHICAL DATA

APPENDIX A

BIOGRAPHICAL DATA

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Biographical Data

WILLIAM GARY CHRISTOPHER

Environmental Engineer

Personal Information

Date of Birth: 25 January 1953

Education

B.S.C.E. in Civil Engineering, (Magna Cum Laude), 1974
West Virginia University, Morgantown, W.Va.
M.E. in Environmental Engineering, 1975, University of Florida, Gainesville, Florida

Professional Affiliations

Registered Professional Engineer (Georgia No. 11886)
West Virginia Water Pollution Control Federation

Honorary Affilitations

Chi Epsilon
Tau Beta Pi
EPA Traineeship for Master's Degree

Experience Record

1975-1977 Union Carbide Corporation, Chemicals and Plastics Division, Environomental Engineering Department. As a process/project engineer performed environmental protection engineering for Union Carbide's Taft and Texas City Plants. Projects included a contamination survey and remedial alternative evaluations for a 10.-acre hazardous waste disposal area at the Texas City Plant. Also, provided review assistance for a 200-acre regional industrial landfill and landfarm. Evaluated in-place stabilization of 18-acre lagoons of primary sludge and pyrolysis fuel oil mixtures.

1977-Date Engineering-Science, Manager, New York Operations. Mr. Christopher's background includes research and development, engineering, and operations for a variety of industrial environmental engineering projects and activities. During his career with Engineering-Science, he has functioned as Manager of the Industrial Wastes Group and most recently as Manager of the Syracuse, New York operations. Some pertinent management and engineering experience is highlighted below.

William Gary Christopher (Continued)

- Project Manager on remedial investigation/feasibility study, preparation of plans and specifications for the U.S. Army COE at three hazardous waste sites at Edwards AFB, CA.

- Deputy Project Manager for site investigation, feasibility study, design and construction manager of Alcoa Hazardous Waste Site at Olney, Illinois.

- Project Manager of eleven Phase I IRP projects (hazardous waste site identification and assessments at over 200 sites) for the U.S. Air Force.

- Project Manager for 12 major industrial waste treatability process design studies that involved waste characterization, bench-scale and pilot-scale experimental testing, preliminary engineering design and cost estimates.

- Project Manager for 3 major industrial solid and liquid hazardous waste handling treatment and long-term disposal projects involving incineration, landfilling, landfarm, and solidification/fixation technologies for over 50 individual chemical process wastes (sludges, tars, solid wastes, high-strength liquids).

- Project Manager for four other hazardous waste site permit preparation, evaluation and environmental audit projects including General Electric, Schering-Polough, and the State of North Carolina.

Technical Publications (Partial List)

"Magnesium Recovery from a Neutral Sulfite Semi-chemical Pulp and Paper Mill Sludge," Master of Engineering Research Project, University of Florida, Gainesville, Florida 1975.

"Siting Considerations for Hazardous Waste Disposal Facilities," presented at the Georgia Environmental Health Association Conference, Jekyll Island, Georgia, July, 1981. (Co-author T.N. Sargent)

"Preparation of Edwards AFB Remedial Action Plan, Design and Construction Bid Package," presented at the AFSC Environmental Coordinators Installation Restoration Program Workshop, Edwards AFB, California, February 27, 1985.

"Remedial Action Plan Date Needs," (Co-Authors H. D. Harmon, A. O. Kubala) presented at the AFSC Environmental Coordinators Installation Restoration Program Workshop, Edwards AFB, California, February 27, 1985.

Biographical Data

SUSAN K. MINICUCCI

Chemical/Environmental Engineer

Personal Information

Date of Birth: 30 September 1957

Education

B.S.E. Chemical Engineering, Michigan State University, E. Lansing, Michigan, 1980
M.S.E. Environmental Engineering, University of Michigan, Ann Arbor, Michigan, 1984

Professional Affiliations/Honors

Water Pollution Control Federation
American Institute of Chemical Engineers
American Society of Civil Engineers
Society of Women Engineers
U.S.P.H.S. Scholarship
Public Health Service Achievement Medal
Public Health Service Unit Commendation Medal

Experience Record

1978	National Institute for Occupational Safety and Health. Rockville, Maryland. Research work to provide background toxicological information from which recommended standards for occupational exposure may be derived. Responsibilities included assessment of health hazards, environmental fate, and toxic and hazardous properties of various chemicals.
1979	E. I. du Pont de Nemours. Troy, Michigan. Designed and implemented a laboratory research project to improve process time for in-plant procedures.
1980-1983	U.S. Public Health Service, Food & Drug Administration, Office of Radiological Health, Rockville, Maryland. Regulatory Engineer. Evaluation of quality control programs used in the manufacture of diagnostic x-ray equipment, conducted facility inspections to evaluate test programs to assure compliance with federal regulations, procurement and analysis of computer data pertaining to equipment failure and

system design, development of a computerized/compliance status monitoring system which incorporated risk analyses for health and safety for radiological equipment. Involved in assessing risk to populations exposed to various types of ionizing radiation devices. Member of the task force for promulgation of new regulations for computed tomography x-ray systems for publication in the Federal Register. Completed several courses in Basic Radiological Health and Safety.

1983-1984 University of Michigan - Research Assistant. Research involving parameter evaluation for predictive modeling and design of multicomponent adsorption systems.

1984-Present Engineering-Science, Atlanta, Georgia. Project Engineer responsible for various activities within the hazardous waste group. Lead responsibility in preparation of remedial investigation and feasibility study reports for several consenting defendents under a Partial Consent Decree. Included a detailed analysis of remedial action programs. Hazardous waste group activities include landfill evaluations, waste disposal alternative evaluations, permit and regulatory assistance, transportation evaluation, and waste management program development. Design of mobil on-site wastewater treatment facilities.

Biographical Data

JOHN R. ABSALON
Hydrogeologist

Personal Information

Date of Birth: 12 May 1946

Education

B.S. in Geology, 1973, Upsala College, East Orange, New Jersey

Professional Affiliations

Certified Professional Geologist (Indiana No. 46) (Virginia No. 241)
Association of Engineering Geologists
Geological Society of America
National Water Well Association

Experience Record

1973-1974 Soil Testing Incorporated-Drilling Contractors, Seymour, Connecticut. Geologist. Responsible for the planning and supervision of subsurface investigations supporting geotechnical, ground-water contamination, and mineral exploitation studies in the New England area. Also managed the office staff, drillers, and the maintenance shop.

1974-1975 William F. Loftus and Associates, Englewood Cliffs, New Jersey. Engineering Geologist. Responsible for planning and management of geotechnical investigations in the northeastern U.S. and Illinois. Other duties included formal report preparation.

1975-1978 U.S. Army Environmental Hygiene Agency, Fort McPherson, Georgia. Geologist. Responsible for performance of solid waste disposal facility siting studies, non-complying waste disposal site assessments, and ground-water monitoring programs at military installations in the southeastern U.S., Texas, and Oklahoma. Also responsible for operation and management of the soil mechanics laboratory.

1978-1980 Law Engineering Testing Company, Atlanta, Georgia. Engineering Geologist/Hydrogeologist. Responsible for the project supervision of waste management, water quality assessment, geotechnical, and hydrogeologic studies at commercial, industrial, and government facilities. General experience included planning and management of several ground-water monitoring programs,

John R. Absalon (Continued)

development of remedial action programs, and formulation of waste disposal facility liner system design recommendations. Performed detailed ground-water quality investigations at an Air Force installation in Georgia, a paper mill in southwestern Georgia, and industrial facilities in Tennessee.

1980-Date Engineering-Science. Hydrogeologist. Responsible for supervising efforts in waste management, solid waste disposal, ground-water contamination assessment, leachate generation, and geotechnical and hydrogeologic investigations for clients in the industrial and governmental sectors. Performed geologic investigations at twelve Air Force bases and otherindustrial sites to evaluate the potential for migration of hazardous materials from past waste disposal practices. Conducted RCRA ground-water monitoring studies for industrial clients and evaluated remedial action alternatives for a county landfill in Florida. Conducted quality management, hydrogeologic and ground-water quality programs for the pulp and paper industry at several mills located in the Southeast United States.

Publications and Presentations

Eleven presentations and/or papers in technical publications or conferences dealing with geology, ground water, and waste disposal/-ground water interaction.

APPENDIX B

LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS

TABLE B.1
LIST OF INTERVIEWEES

Position	Years of Service at this Installation
Andrews AFB	
1. Chief, Biochemistry	2
2. NCOIC, Hospital Laboratory	3
3. NCOIC, Pentagon Clinic	8
4. NCOIC, Nuclear Medicine	3
5. NCOIC, Medical X-Ray	4
6. Civilian, Aircraft Repair	38
7. NCOIC, Avionics Shop	3
8. Branch Chief, FMS	23
9. Civilian, Sheet Metal and Structural Repair (Retired)	29
10. NCOIC, Wheel and Tire Shop	8
11. Chief, Flightline Maintenance	18
12. NCOIC, Engine Shop	10
13. NCOIC, Jet Engine Shop	3
14. Civilian, AGE Foreman	30
15. NCOIC, Transient Maintenance	3
16. Branch Supervisor, AGE Shop	1
17. NCOIC, NDI Shop	2
18. NCOIC, Corrosion Control Shop	9
19. Assistant NCOIC, Corrosion Control Shop	6
20. Civilian, Paint and Corrosion Control Shop (Retired)	24
21. Assistant NCOIC, Pneudraulics Shop	3
22. Mechanic, Pneudraulics Shop	22
23. Chief, Battery and Electric Shops	26
24. NCOIC, Fire Truck Maintenance	1
25. Shop Supervisor, General Purpose Maintenance	18
26. Shop Supervisor, Special Purpose Maintenance	23
27. Shop Supervisor, Refueling Maintenance	11
28. NCOIC, Base Maintenance	2
29. Civilian, Aerospace Systems Branch (Retired)	39
30. Civilian, Aircraft Inspection (Retired)	35
31. Civilian, Golf Course Maintenance	9
32. Foreman, Exterior Electric	23
33. Work Leader, Entomology	21
34. Supervisor, Refrigeration and A/C	17
35. Shopworker, AGE Shop	19
36. Foreman, Aircraft Maintenance, DCANG	20
37. Foreman, Aircraft Maintenance, DCANG	29
38. Shopworker, HQDCANG	3

TABLE B.1 (Continued)
LIST OF INTERVIEWEES

	Position	Years of Service at this Installation
39.	Assistant NCOIC, Teletype Maintenance	2
40.	NCOIC, Power Production	5
41.	NCOIC, Davidsonville Power Production	4
42.	Civilian, Davidsonville Utility Operator	21
43.	Shopworker, Jet Engine Shop	24
44.	Civilian, Vehicle Maintenance	4
45.	NCOIC, Photo Lab	4
46.	Civilian, Real Property Officer	7
47.	Bio-Environmental Engineer	3
48.	NCOIC, Industrial Hygiene	8
49.	Mechanic, Naval Air Facility (NAF)	24
50.	Mechanic, Naval Air Facility	11
51.	Mechanic, Naval Air Facility	11
52.	Civilian, Former Hazardous Waste Officer, Naval Air Facility	5
53.	Shopworker, Naval Air Facility	14
54.	Assistant Public Works Officer, Naval Air Facility	1
55.	Safety and Hazardous Waste Officer, Naval Air Facility	3
56.	Civilian, Grounds Safety Manager, Naval Air Facility	3
57.	Base Safety Officer, Naval Air Facility	1
58.	Hazardous Waste Disposal Officer, Naval Air Facility	1
59.	Civilian, Deputy Base Civil Engineer	42
60.	Civilian, Deputy Chief of Operations	29
61.	Civilian, Equipment Operator	41
62.	Civilian, Base Historian	12
63.	Civilian, Environmental Planner	1
64.	Civilian, Chief of Fire Protection and Engineering	10
65.	Civilian, Fire Chief	10
66.	Civilian, Shop Foreman Water and Waste	21
67.	Civilian, Chief of Fuels Management	4
68.	Civilian, Chief of Fuels Management	15
69.	Civilian, Chief of Fuels Management	23
70.	Civilian, Sanitation Superintendent (formerly General Maintenance Foreman)	24
71.	Civilian, Chief of DPDO	1
72.	Civilian, DPDO	34
73.	Civilian, DPDO	34
74.	Civilian, DPDO	18
75.	Commander, Brandywine Detachment	1
76.	NCOIC, Brandywine	10
77.	Civilian, Chief of Safety	14
78.	Civilian, General Maintenance Foreman (formerly Sewage Treatment Plant Foreman)	38

TABLE B.1 (Continued)
LIST OF INTERVIEWEES

Position	Years of Service at this Installation
79. Civilian, Equipment Operator	41
80. NCOIC, Brandywine Auto Hobby Shop	1
81. Civilian, Superintendent of Pavements and Grounds (formerly Foreman of Heavy Equipment)	30
82. Civilian, Former Environmental Planner	2

TABLE B.2
OUTSIDE AGENCY CONTACTS

Agency	Point of Contact
US Geological Survey Water Resources Division 208 Carroll Building 8600 LaSalle Road Towson, MD 21204 301/828-1535	Frank Chapelle, Hydrogeologist
RCRA Enforcement Section US Environmental Protection Agency, Region III 841 Chestnut Street Philadelphia, PA 19106 215/597-8392	Vickie Province, Compliance Officer
Federal Facilities Program US Environmental Protection Agency, Region III 841 Chestnut Street Philadelphia, PA 19106 215/597-1168	Steve Hirsch, Environmental Scientist
Office of Environmental Programs Technical Analysis Division Maryland Department of Health and Mental Hygiene 201 West Preston Street Baltimore, MD 21201 301/383-4244	Paul Slunt, Division Chief
Office of Environmental Programs Hazardous Waste Division Maryland Department of Health and Mental Hygiene 201 West Preston Street Baltimore, MD 21201 301/383-5734	Alvin Bowles, Division Chief

TABLE B.2
OUTSIDE AGENCY CONTACTS
(Continued)

Agency	Point of Contact
Office of Environmental Programs Hazardous Waste Division Maryland Department of Health and Mental Hygiene 201 West Preston Street Baltimore, MD 21201 301/383-8334	Peter Schaul, Section Chief
Office of Environmental Programs Municipal Waste Division Maryland Department of Health and Mental Hygiene 201 West Preston Street Baltimore, MD 21201 301/383-2770	Jim Pittman, Geologist
Oil Spill Control Division Maryland Water Resources Administration Lincoln Park West State Office Building Chinquapin Round Road Annapolis, MD 21401	James W. McDairmant, Assistant Chief, Permits
Maryland Geological Survey The Rotunda, Suite 440 711 West 40th Street Baltimore, MD 21211 301/338-7066	Mark T. Duigon, Hydrogeologist
Industrial Discharge Control Section Washington Suburban Sanitary Commission 8103 Sandy Spring Road Laurel, MD 20707 301/441-4082	Jim Gann, Industrial Investigator

TABLE B.2
OUTSIDE AGENCY CONTACTS
(Continued)

Agency	Point of Contact
Modern Military Field Branch Washington National Record Center 4025 Suitland Road Suitland, MD 301/763-1710	Mr. W. Lewis
Cartographic and Architectural Branch National Archives 841 S. Pickett Street Alexandria, VA 22304 703/756-6700	Mr. J. Dwyer
Modern Military Branch National Archives 8th and Pennsylvania Avenue Washington, DC 202/523-3300	Mr. E. Reese
Office of Air Force History Bolling AFB Washington, DC 202/767-5090	Sgt. Jernigan

APPENDIX C

TENANT ORGANIZATIONS AND MISSIONS

APPENDIX C

TENANT MISSIONS - ANDREWS AFB

HEADQUARTERS AIR FORCE SYSTEMS COMMAND (HQAFSC)

The mission of HQAFSC is the advancement of aerospace science and technology. This includes development and improvement of all aerospace systems and equipment needed to accomplish the Air Force mission.

NAVAL AIR FACILITY (NAF)

The mission of the Naval Air Facility is to train all assigned units for their mobilization assignments, provide administrative coordination and logistic support for tenant commands, provide support for associate commands, perform such other functions as directed by the Chief of Naval Operations and to Administer the Naval Reserve Program as directed by the Chief of Naval Reserve.

AIR NATIONAL GUARD SUPPORT CENTER

The ANG Support Center, along with its fifteen operating locations and two detachments, is responsible for the maintenance and operational and technical functions essential for the combat readiness of the Air National Guard Forces.

459TH TACTICAL AIRLIFT WING

The basic mission of the 459th is to airlift tactical units, airbound units, personnel, supplies and equipment into prepared or unprepared landing areas by airdrop or airland procedures and to provide supplies until the units are withdrawn or otherwise supplied.

2045TH INFORMATION SYSTEMS GROUP

Mission responsibilities of the 2045th range from operations of base communications to serving as a link in world-wide satellite communication networks. Among its most important mission is the responsibility of providing world-wide, air/ground communications for the President and for high ranking civilian, military and foreign dignitaries.

DET 11, 1361 AUDIOVISUAL SQUADRON (AVS)

The mission of the 1361 AVS is to provide audiovisual support and products to AFSC and to acquire audiovisual documentation of events of significant interest in support of DOD, HQUSAF, SAFOI, US Red Comm, and agencies supported by the host base. This group provides total audiovisual and library services for Andrews and Bolling Air Force Bases.

DET 1, 15TH WEATHER SQUADRON

The 15th Weather Squadron provides staff meteorological support to HQAFSC and its units. It also operates base weather stations at various CONUS locations. Their mission also includes support of the National Command authorities and management of the DOD Environmental Rocket Sounding System.

DET 4, 1600 MANAGEMENT ENGINEERING SQUADRON

The mission of the 1600 includes the direction and operation of the USAF Management Engineering Team, performance of management engineering studies and development of manpower standards. The mission is accomplished by a systematic and approved industrial engineering technique to achieve better performance and utilization of resources.

DET 1, 375 AEROMEDICAL AIRLIFT WING

The Aeromedical Airlift Wing provides operational and administrative support for Aeromedical Airlift Flights through its area of responsibility which includes 13 Northeastern States.

USAF RESIDENT AUDITORS

Performs the functions of the Auditor General Representative Office on the base.

FEDERAL AVIATION ADMINISRATION (FAA)

The mission of the FAA is to develop appropriate capabilities for Andrews AFB and the Washington complex to insure safe and expeditious flow of military air traffic.

ANDREWS FEDERAL CREDIT UNIT

The mission of the Andrews Federal Credit Unit, as stated in Federal Government policy, is to stimulate systematic savings and also create a source of credit for provident or productive purposes.

1ST NATIONAL BANK OF SOUTHERN MARYLAND

Provides full banking services for Air Force and civilian personnel.

DEFENSE PROPERTY DISPOSAL OFFICE (DPDO)

Maintains and operates facilities under the Defense Logistics Agency (DLA) to provide disposal service for the Department of Defense (Brandywine, Md.).

DEFENSE INVESTIGATIVE SERVICE (DIS)

Charged with the mission of conducting all DOD related background investigations as well as other investigations relating to DOD level activities.

USAF CIVIL AIR PATROL (CAP)

The mission of the CAP is to provide an organization to encourage and aid American citizens in contributions of their efforts, service and resources in the development of aviation and in the maintenance of air supremacy. The CAP also encourages and develops, by example, the voluntary contribution of private citizens to education and training.

1402 MILITARY AIRLIFT SQUADRON (MAS)

The mission of the 1402 MAS is to provide Air Force directed operational support airlift during peacetime, contingencies and wartime. In addition, the 1402 MAS is tasked to: (1) Maintain 24 hour alert status for high priority MAC, USAF and DOD requirements; (2) Fly special air missions (SAM) as directed by chief of staff, USAF; (3) Provide flying support to a number of Foreign officers in the Washington, D.C, area as directed by HQUSAF.

1500 COMPUTER SERVICES SQUADRON DET 1

Provides command and base level automated data processing support to Department of Defense, Air Force, AFRES/ANG, MAC and other MAJOM/SOA organizations in the National Capitol Region from the MAC Washington Area Computer Center (MAC WACC). All personnel and ADPE equipment are assigned to Data Processing Installation (DPI) 5450 Andrews AFB with correlative ADP support responsibility, to Bolling AFB.

113 TACTICAL FIGHTER WING (ANG)

The mission of the 113th Tactical Fighter Wing is to maintain combat effectiveness in attacking the destroying enemy military forces, supplies, equipment and communications systems and intallations with conventional weapons; attacking and destroying targets peculiar with joint operations and surface forces; and providing counter air operation against enemy air forces.

APPENDIX D

SUPPLEMENTAL BASE FINDINGS INFORMATION

TABLE D.1
WASTE POL TANKS
ANDREWS AFB

Location	Capacity	Use
Bldg. 1558 2045 CG	500 gal	Waste Engine Oil
Bldg. 1773 Wash Rack	5,000 gal	PD-680
Bldg. 1933 AGE Maint.	25,000 gal	Reclaimable Fuel
Sanitary Landfill	2-25,000 gal	Standby
Bldg. 2491 Fire Training Pit	2,000 gal	Contaminated Fuels
Bldg. 3026 POL Yard	2,500 gal	Contaminated Fuels
Bldg. 3121 113 ANG	1,900 gal	Not currently in use
Bldg. 3167 NAF Hangar Maint.	4,650 gal	Motor Oil
Bldg. 3227 DCANG Motor Pool	550 gal	Motor Oil
Bldg. 3257 Refueler Maint.	1,800 gal	Contaminated Fuel
Bldg. 3342 76 ALD Motor Pool	275 gal	Motor Oil, Solvents, Transmission Fluid
Bldg. 2187 Abandoned Fuel Hyd. System	5,000 gal	Contaminated Fuel
Bldg. 1770 Wash Rack	23,800 gal	Motor Oil
Bldg. 1206 BX Gas Station	250 gal	Motor Oil

TABLE D.1 (Continued)
WASTE POL TANKS
ANDREWS AFB

Location	Capacity	Use
Bldg. 1685 BX Gas Station	700 gal	Motor Oil
Bldg. 1568 BX Gas Station	500 gal	Motor Oil
Bldg. 3537 Auto Hobby Shop	2,000 gal	Motor Oil
Bldg. 3354 76 ALD Motor Pool	5,000 gal	Motor Oil, Solvents, Transmission Fluid
Bldg. 3034 76 ALD POL Yard	2,500 gal	Reclaimable Fuel
Bldg. 3487 Former Gas Station	250 gal	Motor Oil (abandoned)

Source: Installation Documents.

TABLE D.2
WASTE ACCUMULATION POINTS

Location	Storage Type	Material
North of Building 1932	Drum Storage	Waste fuel, solvents and oil
Northwest Corner Building 1933	Drum Storage	PD-680, waste oils
North of Building 1934	Drum Storage	JP-4, JP-5, MOGAS
Northeast Corner Building 1934	Drum Storage	Hydraulic fluid
Northeast Corner Building 1914	Drum Storage	Waste oils and hydraulic fluids
Southwest Corner Building 1791	Drum Storage	Thinners, solvents, corrosion removing compounds
Southeast Corner Building 1791	Drum Storage	Waste oils
Northeast Corner Building 1794	Drum Storage	Waste oils
Between Hangars 2 and 3	Drum Storage	Waste oil, fuel
Southwest Corner Building 1734	Drum Storage	Hydraulic fluid, PD-680
Southwest Corner Building 1708	Drum Storage	Waste oils, lubricants, solvents and fuel
West Side Building 1558	Drum Storage	Paint waste, spent fuel
Southeast Corner Building 1225	5 gallon waste container, drums	PD-680, JP-4, hydraulic fluid
South of Building 1229	Fuel Bowser	JP-4, waste oil

TABLE D.2 (Continued)
WASTE ACCUMULATION POINTS

Location	Storage Type	Material
East of Building 1206	Drum Storage	Waste oils, lubricants, solvents
Northwest of Building 4881	Drum Storage	Waste oils
Northwest Corner Building 3119	Drum Storage	Waste oils, lubricants, solvents
Southwest Corner Building 3121	Drum Storage	Waste oils, lubricants, solvents
Southwest Corner Building 3129	Drum Storage	Waste oils, lubricants, solvents
Southwest Corner Building 3257	Drum Storage	Waste oils and solvents
Southwest Corner Building 3604	Drum Storage	Waste oils and solvents
Northwest Corner Building 3608	Drum Storage	Thinners and waste paints
Northeast of Building 3639	Drum Storage	Waste oil
Northwest of Building 3641	Drum Storage	Waste oil, lubricants, solvents
Northeast Corner Hangar 12	Drum Storage	Waste oil, lubricants, solvents
Southeast Corner Hangar 12	Drum Storage	Waste oil, lubricants, solvents
Between Hangars 13 & 14	Drum Storage	Waste oil, lubricants, solvents
Southeast Corner Hangar 14	Drum Storage	Waste oil, lubricants, solvents
Behind Building 3086	Drum Storage	Waste oil, lubricants, solvents

TABLE D.3
PETROLEUM STORAGE FACILITIES
ANDREWS AFB

Facility Number	Facility	Type of POL	Capacity (gallons)	Storage Description
Hanger 6,7	Refueling Vehicle Parking	JP4, JP5	5,000	Vehicles
Hanger 8,9	Refueling Vehicle Parking	JP4, AVGAS, JP5	5,000	Vehicles
Hanger 17	Refueling Vehicle Parking	JP4	5,000	Vehicles
1025	Green House	#2 Heating Oil	275	Aboveground Tank
1045	Flight Training Center	#2 Heating Oil	2,000	Underground Tank
1050	Hospital	#2 Heating Oil	5,000 & 10,000	Underground Tanks
1101-1154	Housing Units	#2 Heating Oil	1,000/ea.	2-Underground Tanks
			550/ea.	57-Underground Tanks
			275/ea.	12-Underground Tanks
1170	MACMET Facility	#2 Heating Oil	1,000	Aboveground Tank
1171	Warehouse Storage	#2 Heating Oil	1,000	Aboveground Tank
1201	In Flight Kitchen	#2 Heating Oil	2,000	Underground Tank
1204	Utility Vault	#2 Heating Oil	550	Underground Tank
			25,000	Underground Tank
1205	Fire Station	#2 Heating Oil	275	Aboveground Tank
1206	Vehicle Refueling Station	#2 Heating Oil	1,000	Underground Tank
		MOGAS	25,000	Underground Tank
1208	Sector Field Office	#2 Heating Oil	550	Underground Tank
1216	Control Tower	#2 Heating Oil	2,000	Underground Tank
1285	Aeromedical Evac Control Center	#2 Heating Oil	550/ea.	Underground Tank
1287	Fire Station	#2 Heating Oil	2,000	Underground Tank
1304-1330	Housing Units	#2 Heating Oil	550	14-Underground Tanks
1345	Chapel	#2 Heating Oil	1,500	Underground Tank
1353	Bath House	#2 Heating Oil	1,000	Underground Tank
1515	Heat Plant-1	#6 Fuel Oil	150,000	Aboveground Tank
1558	Communications Group	#2 Fuel Oil	50,000	Underground Tank
1530	Communications Facility	Diesel Fuel	2,000	Underground Tank
1568	BX West Side Gas Station	#2 Heating Oil	1,000	Underground Tank
1580	BOQ	#2 Heating Oil	2,000	Underground Tank
1618	BCE Warehouse	#2 Heating Oil	2,000	Underground Tank
			550/ea.	2-Aboveground Tanks
1672	Bowling Alley	#2 Heating Oil	4,000	Underground Tank
1685	BX Main Gas Station	#2 Heating Oil	2,000	Underground Tank
		MOGAS, Diesel	10,000/ea.	4-Underground Tanks
1706	Age Maintenance Shop	#2 Heating Oil	750	Underground Tank
1715	Supply and Offices	#2 Heating Oil	2,000	Underground Tank
1732	Heat Plant #2	#6 Fuel Oil	50,000/ea.	2-Underground Tanks
		#6 Fuel Oil	200,000	Aboveground Tank
1752	Whse Sup & Equip	#2 Heating Oil	1,000	Underground Tank
			275	Aboveground Tank
1781	Veternarian Clinic	#2 Heating Oil	275	Aboveground Tank
1792	Warehouse	#2 Heating Oil	1,000	Underground Tank
			275/ea.	2-Aboveground Tanks

TABLE D.3
PETROLEUM STORAGE FACILITIES
ANDREWS AFB
(Continued)

Facility Number	Facility	Type of POL	Capacity (gallons)	Storage Description
1845	SP Operations	#2 Heating Oil	1,000	Underground Tank
1950	Engine Test Cell	JP4	3,500	Underground Tank
		JP4	2,500	Aboveground tank
1933	Age Facility	JP4	5,000	Underground Tank
		MOGAS	5,000	Underground Tank
1951	Eng Test Cell	#2 Heating Oil	275	Aboveground Tank
1968	Family Housing	#2 Heating Oil	275	Aboveground Tank
2020-2197	Housing Units	#2 Heating Oil	1,000/ea.	58-Underground Tanks
			750/ea.	37-Underground Tanks
			550/ea.	107-Underground Tanks
			275/ea.	7-Underground Tanks
2355	Small Arms Range	#2 Fuel Oil	275	Aboveground Tank
2511	Fuels Storage Area	JP4	50,000/ea.	2-Underground Tanks
2581	Fuels Storage Area	JP5	50,000/ea.	2-Underground Tanks
3007	Fuels Storage Area	#2 Heating Oil	550	Underground Tank
3014	Fuel Storage Operation Bldg.	#2 Heating Oil	550	Underground Tank
3026	Fuels Storage Area	MOGAS	50,000	Underground Tank
		Diesel Fuel	50,000/ea.	2-Underground Tanks
		JP5	50,000/ea.	2-Underground Tanks
		MOGAS	25,000	Underground Tank
		Diesel Fuel	25,000	Underground Tank
		AVGAS	50,000	Underground Tank
3031	ANG Facility	PD 680	70	VAT
		Mil 81886 Oil	40	VAT
		#2 Heating Oil	4,000	Underground Tank
3032	ANG Facility	#2 Heating Oil	4,000	Underground Tank
3035	Fuel Storage Area	JP4	420,000	Aboveground Tank
3036	Fuel Storage Area	JP4	420,000	Aboveground Tank
3045	Fuel Storage Area	JP4	210,000	Aboveground Tank
3046	Fuel Storage Area	JP4	210,000	Aboveground Tank
3109	ANG Facility	#2 Heating Oil	1,000	Underground Tank
3119	ANG Facility	#2 Heating Oil	4,000	Underground Tank
3213	ANG Facility	#2 Heating Oil	1,000	Underground Tank
3217	ANG Facility	#2 Heating Oil	1,000	Underground Tank
		MOGAS	4,000	Underground Tank
3229	Storage Building	#2 Heating Oil	1,500	Underground Tank
3252	ANG Facility	#2 Heating Oil	1,000	Underground Tank
3257	Vehicle Refueling	#2 Heating Oil	1,000	Underground Tank
3296	Storage Shed	#2 Heating Oil	275/ea.	3-Aboveground Tanks
3306	Incinerator	#2 Fuel Oil	4,000	Underground Tank
		#2 Fuel Oil	1,000	Underground Tank
		#2 Heating Oil	275/ea.	2-Aboveground Tanks

TABLE D.3
PETROLEUM STORAGE FACILITIES
ANDREWS AFB
(Continued)

Facility Number	Facility	Type of POL	Capacity (gallons)	Storage Description
3342	Motor Pool Facility	MOGAS	25,000	Underground Tank
3347	Motor Pool Facility	#2 Heating Oil	1,000	Underground Tank
3366	Motor Pool Facility	#2 Heating Oil	275	Aboveground Tank
3367	Motor Pool Facility	#2 Heating Oil	1,000	Underground Tank
3368	Motor Pool Facility	#2 Heating Oil	275	Aboveground Tank
3370	Motor Pool Facility	#2 Heating Oil	550	Aboveground Tank
3382	Motor Pool Facility	#2 Heating Oil	1,000	Underground Tank
3386	Motor Pool Facility	#2 Heating Oil	275	Aboveground Tank
3409	Heat Plant #3	#6 Fuel Oil	50,000/ea.	2-Underground Tanks
		#6 Fuel Oil	200,000	Aboveground Tank
3431	Warehouse	#2 Heating Oil	1,000	Underground Tank
3446	BCE ADMIN	#2 Heating Oil	1,000	Underground Tank
3448	BCE Storage Facility	#2 Heating Oil	275/ea.	2-Aboveground Tanks
3449	BCE Maint Shop	#2 Heating Oil	1,000	Underground Tank
3450	BCE Maint Shop	#2 Heating Oil	275	Aboveground Tank
3452	BCE Maint Shop	#2 Heating Oil	275/ea.	2-Aboveground Tanks
3454	SAM Latrine	#2 Heating Oil	275	Aboveground Tank
3457	BCE Maint Shop	#2 Heating Oil	275/ea.	4-Aboveground Tanks
3459	BCE Storage Facility	#2 Heating Oil	275/ea.	4-Aboveground Tanks
3462	Audit Agency DET 910	#2 Heating Oil	1,000	Underground Tank
3469	Bath House	#2 Heating Oil	1,000	Underground Tank
3471	Material Services	#2 Heating Oil	1,000	Underground Tank
3479	ANG Facility	#2 Heating Oil	550	Underground Tank
3481	Family Housing Mgt. Ofc.	#2 Heating Oil	275	Aboveground Tank
3487	BX-East Gas Station	MOGAS	10,000/ea.	2-Underground Tanks
3492	Family Housing	#2 Heating Oil	275	Aboveground Tank
3534	Contracting	#2 Heating Oil	2,000	Underground Tank
3537	Auto Hobby Shop	#2 Heating Oil	1,000	Underground Tank
3542	OSI Facility	#2 Heating Oil	1,000	Underground Tank
3545	Exchange Warehouse	#2 Heating Oil	1,000	Underground Tank
3552	Family Housing	#2 Heating Oil	275	Aboveground Tank
3554	Base Administration	#2 Heating Oil	1,000	Underground Tank
3556	BX Store	#2 Heating Oil	1,000	Underground Tank
3564	Material Services	#2 Heating Oil	2,000	Underground Tank
3565	Defense Investigation Service	#2 Heating Oil	275/ea.	2-Aboveground Tanks
3573	Reproduction	#2 Heating Oil	275	Aboveground Tank

TABLE D.3
PETROLEUM STORAGE FACILITIES
ANDREWS AFB
(Continued)

Facility Number	Facility	Type of POL	Capacity (gallons)	Storage Description
3575	Medical Facility	#2 Heating Oil	2,000	Underground Tank
3581	Disaster Prep	#2 Heating Oil	1,000	Underground Tank
3583	Comm Storage	#2 Heating Oil	1,000	Underground Tank
3584	ANG Facility	#2 Heating Oil	275/ea.	2-Aboveground Tanks
3593	ANG Facility	#2 Heating Oil	275	Aboveground Tank
3595	ANG Facility	#2 Heating Oil	275/ea.	2-Aboveground Tanks
3602	Fuels Admin Building	#2 Heating Oil	275	Aboveground Tank
3621	Fire Station	#2 Heating Oil	2,000	Underground Tank
3703	Family Housing	#2 Heating Oil	275	Aboveground Tank
3705	Gymnasium	#2 Heating Oil	275	Aboveground Tank
3715	Chapel	#2 Heating Oil	275	Aboveground Tank
3717	ANG Facility	#2 Heating Oil	275/ea.	2-Aboveground Tanks
3719	ANG Facility	#2 Heating Oil	1,000	Underground Tank
3720	ANG Facility	#2 Heating Oil	1,000	Underground Tank
3723	ANG Facility	#2 Heating Oil	275	Aboveground Tank
3744	Aeromedical Evacuation	#2 Heating Oil	1,000	Underground Tank
3753	(Vacant)	#2 Fuel Oil	550	Aboveground Tank
3758	Storage Shed BCE	#2 Heating Oil	275	Aboveground Tank
3754	Reserve Facility	#2 Heating Oil	275/ea.	2-Aboveground Tanks
3759	Sec Pol	#2 Heating Oil	1,000	Underground Tank
3760	Medical Storage	#2 Heating Oil	1,000	Underground Tank
3762	Mobile Aerial Port	#2 Heating Oil	1,000	Underground Tank
3763	Dining Hall #2	#2 Heating Oil	1,000	Underground Tank
3764	Cap Facility	#2 Heating Oil	1,000	Underground Tank
3765	Warehouse	#2 Heating Oil	1,000	Underground Tank
3770-3780	Housing	#2 Heating Oil	1,000/ea.	11-Underground Tanks
3781-3783	Housing	#2 Heating Oil	275	Underground Tank
3801	459th Comm. Flight	#2 Heating Oil	275	Aboveground Tank
3786	STP #3	#2 Heating Oil	275	Aboveground Tank
3802	Audit Agency DET 800	#2 Heating Oil	1,000	Underground Tank
3812	Audit Agency DET 800	#2 Heating Oil	2,000	Underground Tank
3821	Audiovisual Facility	#2 Heating Oil	1,000	Underground Tank
3808	Support Facility	#2 Heating Oil	550	Underground Tank
3813-3816	Housing	#2 Heating Oil	1,000/ea.	4-Underground Tanks
4002	Housing Unit	#2 Heating Oil	275	Underground Tank
4227-4366	Housing Units	#2 Heating Oil	550/ea. 275/ea.	37-Underground Tanks 3-Underground Tanks
4441	Golf Equipment	#2 Heating Oil	275/ea.	2-Aboveground Tanks
4442	Golf Equipment	#2 Heating Oil	1,500	Underground Tank
4445	Golf Equipment	#2 Heating Oil	275/ea.	2-Aboveground Tanks

TABLE D.3
PETROLEUM STORAGE FACILITIES
ANDREWS AFB
(Continued)

Facility Number	Facility	Type of POL	Capacity (gallons)	Storage Description
4522	Recreational Site Lodging	#2 Heating Oil	275	Aboveground Tank
4570	Family Housing	#2 heating oil	275	Aboveground Tank
4524	Recreational Site Lodging	#2 Heating Oil	275	Aboveground Tank
4521	Recreational Site Lodging	#2 Heating Oil	275	Aboveground Tank
4575	Child Care Center	#2 Heating Oil	2,000	Underground Tank
4686	Grounds Maintenance Compound	#2 MOGAS	1,000	Underground Tank
		#2 Heating Oil	2,000	Underground Tank
4670	Housing	#2 Heating Oil	550	Aboveground Tank
4691	Housing	#2 Heating Oil	1,000	Underground Tank
4688	Be Maint Shop	#2 Heating Oil	1,000	Underground Tank
4864	Washington Area Computer Center	#2 Heating Oil	275/ea.	2-Aboveground Tanks
4881	Golf Course & Main. Facility	#2 Heating Oil	275/ea.	2-Aboveground Tanks
		MOGAS	1,000	Underground Tank
4706-4794	Housing Units	#2 Heating Oil	550/ea.	55-Underground Tanks
4922	SP Kennel	#2 Heating Oil	275	Aboveground Tank
4982	SP Entry Con Bldg	#2 Heating Oil	1,000	Underground Tank
4972	Ammunition Storage Facility	#2 Heating Oil	5,000	Underground Tank
5000-5119	Housing	#2 Heating Oil	550/ea.	112-Underground Tanks
			275/ea.	6-Underground Tanks
3048	Steurt Petrolem Co.	JP4	1,050,000	Aboveground Tank
3038	Steurt Petrolem Co.	JP4	1,050,000	Aboveground Tank
3039	Steurt Petrolem Co.	JP5	1,050,000	Aboveground Tank
3049	Steurt Petrolem Co.	#2 Fuel Oil	5,000	Aboveground tank
4700	Youth Center	#2 Heating Oil	1,000	Underground Tank
1226	Emergency Generator	Diesel Fuel	5,000	Underground Tank
1539	Emergency Generator	Diesel Fuel	10,000	Underground Tank
1429	Emergency Generator	Diesel Fuel	15,000	Underground Tank
1225	Emergency Generator	Diesel Fuel	500	Underground Tank
1221	Emergency Generator	Diesel Fuel	525	Underground Tank
3409	Emergency Generator	Diesel Fuel	250	Aboveground Tank
1918	Emergency Generator	Diesel Fuel	250	Aboveground Tank
1220	Emergency Generator	Diesel Fuel	5,000	Underground Tank
1281	Emergency Generator	Diesel Fuel	60	Aboveground Tank
1535	Emergency Generator	Diesel Fuel	250	Aboveground Tank
1732	Emergency Generator	Diesel Fuel	150	Aboveground Tank
3465	Emergency Generator	Diesel Fuel	60	Aboveground Tank

* As of March, 1982

TABLE D.4
PESTICIDE INVENTORY AS OF JULY 1981
ANDREWS AFB

Chemical Name	% Active Ingredient
Dursban 2E	22.2
Dursban 4E	44.4
Diazinon Emul.	47.5
Diazinon Dust	2, 48
Baygon Bait	2
Baygon Emul. 1.5	13.9
Chlordane Emul.	72
Calcium Cyanide	42
Diphacinone Bait	0.0025
Pivalyl Bait	0.025
Ficam-w W/P	76
Malathion Emul.	57
Resmethrin Aerosol	1
Pyrethrins Aerosol	0.4
D-Phenothrin Aerosol	2
Rozol Pellets	2
Rozol Tracking Powder	0.2
Malathion ULV	95
Warfarin Bait	0.025
Carbaryl W/P	80
2-4D Emul.	49.3
Simazine W/P	80
Avitrol W/P	90
Diphacin Bait	0.106
Talon Bait	0.005
Cythion	91
Rozol Canary Bait	0.005
Baygon Oil	1
Zinc Phosphide	--
Sevin (Carbaryl)	--
Proxol	--

Source: Installation Documents

TABLE D.5
OIL-WATER SEPARATORS
ANDREWS AFB

Facility Numbers	Location
1230	Hangar #9 - Pump
1280	Hangar #6
1280	Hangar #6
1774	Aircraft Wash Rack - Pump
1791	Fab. Shop
3121	D.C. Air National Guard - Pump
3348	Base Motor Pool
3537	Auto Hobby Shop
3630	Maint. Dock - Pump
1915	Maint. Dock (Helicopter)
I-13	Navy Separator - Pumps, 4000 gals.
Henson Creek	Near Intersection of Perimeter Rd. and Arnold Ave.
South Stream Separator	Piscataway Creek - Pump
1950	Jet Engine Test Cell
3014	POL Area - Pump
3066	Base Supply Area - Pumps
3640	Hangar Maintenance #10

Source: Installation Documents

TABLE D.6
OIL INTERCEPTORS
ANDREWS AFB

Building Numbers	Location
1734	Hangar #4
1734	Hangar #4
1280	Hangar #6
1280	Hangar #6
1280	Hangar #6
1280	Hangar #6
1754	Hangar #3
1754	Hangar #3
1794	Hangar #2
1794	Hangar #2
1914	Hangar #1
1914	Hangar #1
1515	AFSC Heating Plant
1558	Global Communications
1950	Jet Engine Test Cell
1732	Heating Plant
1714	Hangar #5 (South East Corner)
3355	Automobile Maintenance Shop (Motor Pool)
3257	Refueling Maintenance
1932	Jet Engine Shop (Inside Building)
1206	Military Service Station (West Side)
3188	Between Hangars 12 and 13
3334	Car Wash
3640	Hangar #10
3635	Hangar #11
3217	National Guard (On Pearl Harbor Drive)
1568	Civilian Service Station (Near Global Communications)
1706	Behind Storage Shed Near Hangar #5
3029	National Guard Building
1226	Hangar #8
3537	Auto Hobby Shop
3306	Incinerator
3148	Hangar 14
3158	Hangar 13
3227	Vehicle Maintenance
3604	Maintenance Shop
3629	Maintenance Dock
3639	Storage Facility

Source: Installation Documents.

Table D.7
Historical Surface Water Quality Results
Andrews AFB
February 1976–June 1978

Site #	Date	Color (units)	Turb (units)	pH (units)	Temp (°)	COD	DO	TOC	TDS	SS ~~TSM~~	OGO	Surf	Phenols	Cl (mg/l) ~~Cl2~~	F (mg/l) ~~Fl2~~	NH3 (as N)	N.Nitrate (as N) NO3	N.Nitrite (as N) NO2	PO4	CN	SO4
01 Chandler	15 Sep 77	—	—	6.5	—	—	10.0	—	—	—	0.4	—	—	13	-	—	—	—	—	—	—
01	11 Oct 77	—	—	6.5	—	—	8.0	—	—	—	0.3K	—	—	—	—	—	—	—	—	—	—
01	2 Nov 77	—	—	7.0	—	—	9.0	—	—	—	0.3K	—	—	35	—	—	—	—	—	—	—
01	16 Dec 77	—	—	6.5	—	—	9.0	—	—	—	0.3K	—	—	44	—	—	—	—	—	—	—
01	15 Feb 78	—	—	6.9	—	—	14.0	—	—	10.0	<0.3	—	—	—	—	—	—	—	.	—	—
01	15 Mar 78	—	—	6.5	—	—	11.0	—	—	31.0	<0.3	—	—	—	—	—	—	—		—	—
01	6 Apr 78	—	—	7.0	—	—	10.0	—	—	18.0	<0.3	—	—	—	—	—	—	—		—	—
01	1 May 78	—	—	7.0	—	—	10.0	—	—	37.0	<0.3	—	—	—	—	—	—	—	..	—	—
01	5 Jun 78	—	—	7.0	—	—	9.0	—	—	11.0	<0.3	—	—	—	—	—	—	—	-	—	—
02 Pumphouse	13 Feb 76	5	3	—	—	5.0	—	4.0	77.0	—	0.8	0.4	<0.001	28.0	<0.1	<0.2	8.0	<0.02	<0.2	<0.01	12.0
02	24 Feb 76	5	25	—	—	27.0	—	6.0	127.0	—	2.2	0.2	<0.001	24.0	0.3	1.5	6.0	0.23	<0.2	<0.01	38.0
02	8 Apr 76	10	20	—	—	<5.0	—	3.0	115.0	—	1.4	0.3	<0.001	36.0	<0.1	<0.2	26.0	<0.02	<0.2	<0.01	14.0
02	1 Jul 76	10	20	—	—	11.0	—	4.0	152.0	—	1.4	0.5	<0.001	32.0	0.4	0.8	12.0	<0.02	<0.2	<0.01	50.0
02	22 Jul 76	35	17	—	—	27.0	—	9.0	103.0	—	1.0	2.8	<0.001	24.0	0.3	<0.2	41.0	<0.02	1.0	<0.01	12.0
02	24 Aug 76	11	41.0	—	—	8.0	—	5.0	172.0	—	<0.3	0.4	<0.001	36.0	0.4	<0.2	9.0	<0.02	<0.2	<0.01	8.0
02	19 Oct 76	5.0	16.0	—	—	11.0	—	3.0	160.0	—	<0.3	0.3	<0.001	36.0	0.7	<0.2	9.0	<0.02	<0.2	<0.01	12.0
02	9 Dec 76	10	27.0	—	—	10.0	—	12.0	157.0	—	<0.3	0.3	<0.001	37.0	0.5	1.3	11.0	0.15	<0.2	<0.01	17.0
02	7 Feb 77	—	—	6.5	—	~~TTO~~	7.0	—	—	3.0	0.4	0.2	—	—	—	—	12.5	—	0.1K	—	11.0
02	8 Apr 77	—	—	6.5	—	~~[illegible]~~	6.0	—	—	20.0	0.1K	0.25	—	—	—	—	4.5	—	"	—	14.0
02	11 Oct 77	—	—	6.5	—	~~[illegible]~~	9.0	—	—	16.0	2.0	0.75	—	—	—	—	7.0	—	"	—	40.0
02	7 Mar 77	—	—	6.5	—	~~[illegible]~~	8.0	—	—	11.0	0.4	0.30	—	—	—	—	4.5	—	"	—	30.0
02	16 Dec 77	—	—	6.5	—	~~[illegible]~~	10.0	—	—	4.0	0.3K	—	—	—	—	—	2.0	—	"	—	—
02	15 Feb 78	—	—	6.8	—	—	11.0	—	—	12.0	<0.3	0.3	—	—	—	—	4.2	—	<0.1	—	24.0
02	15 Mar 78	—	—	7.0	—	-	9.0	—	—	24.0	<0.3	<0.1	—	—	—	—	5.0	—	<0.1	—	34.0
02	6 Apr 78	—	—	6.5	—	—	10.0	—	—	3.0	<0.3	0.4	—	—	—	—	5.0	—	<0.1	—	33.0
02	1 May 78	—	—	6.5	—	—	11.0	—	—	4.0	<0.3	0.1	—	—	—	—	5.5	—	<0.1	—	28.0
02	5 Jun 78	—	—	6.5	—	—	9.0	—	—	3.0	<0.3	<0.3	—	—	—	—	5.6	—	0.4	—	19.0
03 Rosies Branch	24 Feb 76	15	28	—	—	53.0	—	4.0	145.0	—	1.6	0.2	<0.001	30.0	0.3	9.3	4.0	<0.02	4.5	<0.01	40.0
03	8 Apr 76	15	11	—	—	<5.0	—	3.0	163.0	—	2.0	0.4	<0.001	24.0	0.4	<0.2	23.0	<0.02	12.0	<0.01	37.0
03	1 Jul 76	15	3	—	—	22.0	—	2.0	260.0	—	0.6	0.4	<0.001	36.0	0.4	<0.2	36.0	<0.02	10.5	<0.01	12.0
03	22 Jul 76	19	2	—	—	5.0	—	5.0	285.0	—	<0.3	0.4	<0.001	36.0	0.6	<0.2	6.0	<0.02	8.0	<0.01	39.0
03	19 Aug 76	10	14	—	—	11.0	—	3.0	175.0	—	<0.3	0.1	<0.001	34.0	0.6	<0.2	19.0	<0.02	2.2	<0.01	28.0
03	8 Oct 76	10	6	—	—	11.0	—	6.0	161.0	—	<0.3	0.1	<0.001	27.0	0.4	<0.2	9.0	<0.02	<0.2	<0.01	18.0
03	8 Dec 77	—	—	6.5	—	—	10.0	—	—	18.0	0.3K	—	—	—	—	—	2.0	—	0.1K	—	—
03	15 Sep 77	—	—	6.5	—	—	8.0	—	—	1000.0	0.4	—	—	—	—	—	4.2	—	0.1K	—	—
03	11 Oct 77	—	—	6.5	—	—	11.0	—	—	—	0.3K	—	—	—	—	—	—	—	—	—	—
03	7 Nov 77	—	—	6.5	—	—	8.0	—	—	8.0	0.3K	—	—	—	—	—	2.5	—	0.1K	—	—
03	15 Feb 78	—	—	6.5	—	—	10.0	—	—	7.0	<0.3	—	—	—	—	—	3.2	—	<0.1	—	—
03	15 Mar 78	—	—	6.5	—	—	10.0	—	—	22.0	<0.3	—	—	—	—	—	3.0	—	<0.1	—	—
03	6 Apr 78	—	—	6.5	—	—	10.0	—	—	41.0	<0.3	—	—	—	—	—	2.6	—	<0.1	—	—
03	1 May 78	—	—	6.5	—	—	12.0	—	—	5.0	<0.3	—	—	—	—	—	3.0	—	<0.1	—	—
04 Restaurant Branch	24 Feb 76	40	55	—	—	43	—	14.0	172.0	—	3.6	0.3	<0.001	24.0	0.2	<0.2	5.0	0.17	0.3	<0.01	49.0
04	8 Apr 76	10	50	—	—	<5.5	—	3.0	91.0	—	3.0	0.3	<0.001	28.0	<0.1	0.7	5.0	<0.02	<0.2	<0.01	8.0
04	1 Jul 76	15	4	—	—	22	—	3.0	158.0	—	0.8	0.3	<0.001	28.0	0.4	<0.2	4.0	<0.02	<0.2	<0.01	40.0
04	22 Jul 76	25	4	—	—	11	—	5.0	148.0	—	<0.3	0.3	<0.001	26.0	0.7	<0.2	3.0	<0.02	<0.2	<0.01	14.0
04	19 Aug 76	5	26	—	—	14	—	5.0	148.0	—	<0.3	0.1	<0.001	8.0	1.1	<0.2	1.0	<0.02	<0.2	<0.01	15.0
04	11 Oct 77	—	—	6.5	—	—	14.0	—	—	—	0.4	—	—	—	—	—	—	—	—	—	—
04	16 Dec 77	—	—	6.5	—	—	11.0	—	—	3.0	0.6	—	—	—	—	—	—	—	—	—	—

Table D.7
Historical Surface Water Quality Results
Andrews AFB
February 1976–June 1978
(continued)

C5 Westbrook	13 Feb 76	4.5	4	—	—	3.3	—	7.0	231.0	—	0.6	0.9	<0.001	44.0	0.5	11.0	3.0	0.88	19.0	<0.01	55.0		
C5	24 Feb 76	3.5	3.5	—	—	3.9	—	5.0	233.0	—	3.0	0.9	<0.001	52.0	0.4	16.0	<0.1	<0.02	17.0	<0.01	45.0		
C5	8 Apr 76	3.0	4.5	—	—	11	—	5.0	251.0	—	1.6	0.7	<0.001	52.0	0.7	2.7	6.0	7.6	20.0	<0.02	60.0		
C5	13 Jul 76	45	25	—	—	33	—	5.0	490.0	—	4.0	0.8	<0.001	72.0	0.5	<0.2	40.0	<0.02	20.3	0.15	11.0		
C5	29 Jul 76	19	1	—	—	33	—	9.0	426.0	—	<0.3	0.5	<0.001	56.0	0.9	<0.2	9.0	13.9	18.0	0.08	70.0		
C5	19 Aug 76	10	35	—	—	11	—	3.0	262.0	—	<0.3	0.2	<0.001	28.0	0.8	<0.2	9.0	<0.02	1.2	<0.01	49.0		
C5	8 Oct 76	10	18	—	—	11	—	1.0	158.0	—	<0.3	0.2	<0.001	32.0	0.4	<0.2	3.0	0.05	<0.2	<0.01	47.0		
C5	8 Aug 77	—	—	6.7	—	—	7.0	—	—	16.0	0.3	—	—	—	—	—	—	—	—	—	70.0		
C5	7 Sep 77	—	—	6.5	—	—	10.0	—	—	5.0	0.4	—	—	—	—	—	—	—	—	—	79.0		
C5	11 Oct 77	—	—	6.5	—	—	12.0	—	—	—	0.3	—	—	47.0	—	—	—	—	—	—	—		
C5	2 Nov 77	—	—	6.8	—	—	8.0	—	—	4.0	0.3	—	—	47.0	—	—	—	—	—	—	43.0		
C5	14 Dec 77	—	—	6.5	—	—	13.0	—	—	1.0	0.3	—	—	36.0	—	—	—	—	—	—	36.0		
C5	15 Feb 78	—	—	6.8	—	—	18.0	—	—	4.0	<0.3	—	—	44.0	—	—	—	—	—	—	15.0		
C5	15 Mar 78	—	—	6.5	—	—	11.0	—	—	30.0	<0.3	—	—	—	—	—	—	—	—	—	43.0		
C5	6 Apr 78	—	—	7.0	—	—	11.0	—	—	4.0	<0.3	—	—	40.0	—	—	—	—	—	—	33.0		
C5	1 May 78	—	—	—	—	—	—	—	—	9.0	<0.3	—	—	32.0	—	—	—	—	—	—	51.0		
C5	6 Jun 78	—	—	7.0	—	—	8.0	—	—	79.0	<0.3	—	—	32.0	—	—	—	—	—	—	42.0		
C6 Hunter Oil West	24 Feb 76	10	85	—	—	27	—	4.0	67.0	—	2.2	0.1	<0.001	24.0	0.2	0.9	1.0	0.02	<0.2	<0.01	13.0		
C6	8 Apr 76	5	45	—	—	17	—	9.0	76.0	—	1.2	0.3	<0.001	36.0	<0.1	1.8	7.0	<0.02	<0.2	<0.01	9.0		
C6	13 Jul 76	15	3	—	—	28	—	7.0	110.0	—	0.8	0.2	<0.001	16.0	0.5	<0.2	4.0	<0.02	<0.2	<0.01	20.0		
C6	8 Oct 76	10	5	—	—	11	—	<1.0	110.0	—	<0.3	0.1	<0.001	21.0	0.4	<0.2	3.0	<0.02	<0.2	<0.01	32.0		
C6	8 Aug 77	—	—	6.5	—	—	10.0	—	—	12.0	0.3K	—	—	9.0	—	—	—	—	—	—	28.0		
C6	7 Sep 77	—	—	6.5	—	—	11.0	—	—	—	0.6	—	—	8.0	—	—	—	—	—	—	—		
C6	11 Oct 77	—	—	6.5	—	—	12.0	—	—	—	0.3K	—	—	—	—	—	—	—	—	—	—		
C6	14 Dec 77	—	—	6.5	—	—	13.0	—	—	1K	0.3K	—	—	20.0	—	—	—	—	—	—	25.0		
C6	15 Feb 78	—	—	6.5	—	—	12.0	—	—	9.0	<0.3	—	—	18.0	—	—	—	—	—	—	30.0		
C6	15 Mar 78	—	—	6.5	—	—	10.0	—	—	3.0	<0.3	—	—	28.0	—	—	—	—	—	—	24.0		
C6	6 Apr 78	—	—	7.5	—	—	11.0	—	—	1.0	<0.3	—	—	18.0	—	—	—	—	—	—	30.0		
C6	1 May 78	—	—	6.5	—	—	10.0	—	—	6.0	<0.3	—	—	20.0	—	—	—	—	—	—	45.0		
C6	5 Jun 78	—	—	6.5	—	—	8.0	—	—	1.0	<0.3	—	—	18.0	—	—	—	—	—	—	23.0		
C7 Hunter Oil East	24 Feb 76	5	18	—	—	<5	—	<1.0	90.0	—	1.5	0.2	<0.001	20.0	<0.1	0.5	4.0	<0.02	0.3	<0.01	21.0		
C7	8 Apr 76	15	6	—	—	<5	—	3.0	62.0	—	1.4	0.2	<0.001	20.0	<0.1	<0.2	5.0	<0.02	<0.2	<0.01	16.0		
C7	28 Jul 76	<5	1.0	—	—	11.0	—	5.0	182.0	—	<0.3	0.4	<0.001	20.0	0.7	<0.2	1.0	<0.02	<0.2	<0.01	22.0		
C7	19 Aug 76	5	20	—	—	27.0	—	9.0	172.0	—	<0.3	0.1	<0.001	52.0	0.5	<0.2	3.0	<0.02	<0.2	<0.01	54.0		
C7	11 Oct 77	—	—	6.5	—	—	6.0	—	—	5.0	0.3K	—	—	—	—	—	—	—	—	—	—		
C7	2 Nov 77	—	—	6.5	—	—	10.0	—	—	10.0	0.6	—	—	—	—	—	—	—	—	—	—		
C7	14 Dec 77	—	—	6.5	—	—	13.0	—	—	—	0.3K	—	—	—	—	—	—	—	—	—	—		
C7	6 Apr 78	—	—	7.0	—	—	7.0	—	—	35.0	<0.3	—	—	—	—	—	—	—	—	—	35.0		
C7	1 May 78	—	—	6.5	—	—	8.0	—	—	44.0	<0.3	—	—	—	—	—	—	—	—	—	9.0		
C7	5 Jun 78	—	—	6.5	—	—	6.0	—	—	24.0	<0.3	—	—	—	—	—	—	—	—	—	24.0		
																					13.0		
C8 Cohen Creek North	8 Aug 77	—	—	6.5	—	—	8.0	1.0	—	13.0	0.3K	—	—	—	—	0.3K	—	0.3K	—	—	—		
C8	7 Sep 77	—	—	6.5	—	11.0	10.0	—	—	6.0	0.4	—	—	—	—	0.3K	0.2K	—	—	—	—		
C8	11 Oct 77	—	—	7.0	—	—	11.0	5.0K	—	—	0.3K	—	—	—	—	—	—	—	—	—	—		
C8	7 Nov 77	—	—	6.5	—	24.0	10.0	8.0	—	4.0	0.3K	—	—	—	—	—	—	0.3K	—	—	—		
C8	14 Dec 77	—	—	6.5	—	—	12.0	1.0K	—	77.0	0.3K	—	—	—	—	0.3K	—	0.3K	—	—	—		
C8	15 Feb 78	—	—	6.5	—	—	14.0	3.0	—	20.0	<0.3	—	—	—	—	3.6	—	<0.02	—	—	—		
C8	15 Mar 78	—	—	7.5	—	—	11.0	3.0	—	30.0	<0.3	—	—	—	—	4.6	—	<0.02	—	—	—		
C8	6 Apr 78	—	—	7.0	—	—	10.0	<1.0	—	1.0	<0.3	—	—	—	—	<0.2	—	<0.02	—	—	—		
C8	1 May 78	—	—	6.5	—	—	10.0	4.0	—	3.0	<0.3	—	—	—	—	<0.2	—	<0.02	—	—	—		
C8	5 Jun 78	—	—	6.5	—	—	9.0	5.0	—	1.0	<0.3	—	—	—	—	3.0	—	<0.02	—	—	—		

Table D.7
Historical Surface Water Quality Results
Andrews AFB
February 1976–June 1978
(continued)

Sta #		Color	Turb	pH	Temp	COD	DO	TOC	TDS	SS	O&G	MBAS S.A.	Phenols	Cl	F	NH_3	NO_3	NO_2	PO_4	CN	SO_4
						mg/l										as N					
09 Cabin Crk South	13Feb76	5	4	–	–	6.0	–	<1.0	167.0	–	0.8	0.1	<0.001	32.0	<0.1	<0.2	2.0	<0.02	<0.2	<0.01	30.0
09	24Feb76	10	45	–	–	32.0	–	2.0	146.0	–	2.2	0.3	<0.001	32.0	<0.1	1.5	1.0	0.05	0.2	<0.01	33.0
09	8Apr76	10	32	–	–	17.0	–	9.0	118.0	–	0.6	0.3	<0.001	28.0	<0.1	0.7	2.0	<0.02	<0.2	<0.01	7.0
09	1Jul76	20	14	–	–	22.0	–	2.0	207.0	–	1.6	0.0	<0.001	38.0	0.3	<0.2	<1.0	<0.02	<0.2	<0.01	15.0
09	22Jul76	5	1	–	–	5.0	–	5.0	149.0	–	<0.3	0.5	<0.001	18.0	0.4	<0.2	3.0	<0.02	<0.2	<0.01	20.0
09	19Aug76	5	34	–	–	5.0	–	2.0	125.0	–	<0.3	0.3	<0.001	38.0	0.4	<0.2	1.0	<0.02	<0.2	<0.01	18.0
09	10Sep76	10	20	–	–	16.0	–	4.0	190.0	–	0.4	0.2	<0.001	32.0	0.4	<0.2	1.0	<0.02	<0.2	<0.01	45.0
09	3Aug77	–	–	6.5	–	–	9.0	–	–	11.0	0.6	–	–	–	–	–	–	–	–	–	–
09	8Aug77	–	–	6.5	–	–	5.0	–	–	21.0	0.3<	–	–	–	–	–	–	–	–	–	–
09	2Nov77	–	–	7.0	–	–	9.0	–	–	17.0	0.6	–	–	–	–	–	–	–	–	–	–
09	16Dec77	–	–	6.5	–	–	12.0	–	–	13.0	0.4	–	–	–	–	–	–	–	–	–	–
09	12Mar78	–	–	6.5	–	–	9.0	–	–	–	<0.3	–	–	36.0	–	–	–	–	–	–	–
09	6Apr78	–	–	8.5	–	–	10.0	–	–	–	0.8	–	–	12.0	–	–	–	–	–	–	–
09	1May78	–	–	6.5	–	–	8.0	–	–	–	<0.3	–	–	32.0	–	–	–	–	–	–	–
10 Bear Lake	24Feb76	5	6	–	–	27.0	–	2.0	43.0	–	1.6	<0.1	<0.001	20.0	<0.1	0.5	<1.0	<0.02	0.3	<0.01	9.0
10	8Apr76	10	10	–	–	5.0	–	3.0	34.0	–	1.4	0.1	<0.001	16.0	<0.1	0.7	2.0	<0.02	<0.2	<0.01	33.0
10	1Jul76	5	3	–	–	10.0	–	4.0	121.0	–	1.2	0.1	<0.001	12.0	<0.1	<0.2	<1.0	<0.02	<0.2	<0.01	24.0
10	22Jul76	<5	3	–	–	5.0	–	5.0	65.0	–	<0.3	0.1	<0.001	20.0	0.4	<0.2	<1.0	<0.02	<0.2	<0.01	4.0
10	19Aug76	10	16	–	–	<5.0	–	<1.0	64.0	–	<0.3	0.1	<0.001	16.0	1.0	<0.2	2.0	<0.02	<0.2	<0.01	5.0
10	8Oct76	10	5	–	–	16.0	–	4.0	47.0	–	0.4	<0.1	<0.001	16.0	0.3	<0.2	<1.0	<0.02	<0.2	<0.01	7.0
10	6Apr78	–	–	8.5	–	–	10.0	<1.0	–	–	0.6	–	–	–	–	–	<0.1	–	<0.1	–	–
11 N Pond #1	24Feb76	15	14	–	–	22.0	–	10.0	55.0	–	1.8	<0.1	<0.001	16.0	<0.1	<0.2	2.0	0.15	0.3	<0.01	16.0
11	8Apr76	15	15	–	–	17.0	–	9.0	84.0	–	1.8	0.2	<0.001	12.0	<0.1	<0.2	11.0	<0.02	0.3	<0.01	16.0
11	19Aug76	10	15	–	–	5.0	–	3.0	137.0	–	<0.3	0.1	<0.001	28.0	1.1	<0.2	2.0	<0.02	<0.2	<0.01	41.0
11	8Oct76	10	8.0	–	–	5.0	–	1.0	142.0	–	0.4	0.1	<0.001	21.0	0.5	<0.2	<1.0	<0.02	<0.2	<0.01	36.0
11	6Apr78	–	–	8.5	–	–	18.0	<1.0	–	–	<0.3	–	–	–	–	–	2.8	–	<0.1	–	–
12 N Pond #2	24Feb76	15	5	–	–	27.0	–	4.0	24.0	–	1.6	0.1	<0.001	8.0	<0.1	<0.2	2.0	0.03	0.3	<0.01	21.0
12	8Apr76	40	12	–	–	39.0	–	14.0	94.0	–	1.4	0.2	<0.001	8.0	<0.1	26.0	6.0	<1.0	0.5	<0.44	10.0
12	19Aug76	10	11	–	–	5.0	–	2.0	197.0	–	<0.3	0.1	<0.001	24.0	1.1	<0.2	2.0	<0.02	<0.2	<0.01	46.0
12	8Oct76	15	7	–	–	14.0	–	3.0	60.0	–	1.8	0.1	<0.001	27.0	0.4	<0.2	1.0	0.11	<0.2	<0.01	14.0
12	6Apr78	–	–	8.5	–	–	19.0	<1.0	–	–	1.3	–	–	–	–	–	1.8	–	<0.1	–	–
13 N Pond #3	24Feb76	15	6	–	–	16.0	–	4.0	4.0	–	2.2	<0.1	<0.001	8.0	<0.1	<0.2	1.0	<0.02	<0.2	<0.01	15.0
13	8Apr76	10	10	–	–	<5.0	–	3.0	55.0	–	1.4	0.2	<0.001	8.0	0.2	<0.2	3.0	<0.02	0.3	<0.01	13.0
13	19Aug76	15	8	–	–	<5.0	–	2.0	216.0	–	<0.3	0.2	<0.001	26.0	1.0	<0.2	1.0	<0.02	<0.2	<0.01	5.0
13	8Oct76	10	6	–	–	27.0	–	3.0	153.0	–	0.4	<0.1	<0.001	27.0	0.5	<0.2	<1.0	<0.02	<0.2	<0.01	36.0
13	6Apr78	–	–	8.5	–	–	12.0	1.0	–	–	<0.3	–	–	–	–	–	1.3	–	<0.1	–	–

Table D.7
Historical Surface Water Quality Results
Andrews AFB
February 1976-June 1978
(continued)

µg/l

		As	Ba	Cd	Cr	Cr(VI)	Cu	Fe	Pb	Mn	Hg	Ni	Se	Ag	Zn	Ca	Mg	K	Na
01 Chaplain	7 Feb 77	–	–	–	–	–	–	200	–	–	–	–	–	–	–	–	–	–	–
01	11 Feb 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
01	2 Mar 77	–	–	–	–	–	–	170	–	–	–	–	–	–	–	–	–	–	–
01	19 Dec 77	–	–	–	–	–	–	210	–	–	–	–	–	–	–	–	–	–	–
01	15 Feb 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
01	15 Mar 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
01	6 Apr 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
01	1 May 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
01	5 Jun 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
02 Pinetree	13 Feb 76	–	–	<10	<50	<10	<20	2090	<50	70	<5.0	–	–	<10	<50	–	–	–	–
	24 Feb 76	–	–	<10	<50	<10	<20	510	<50	<50	<5.0	–	–	<10	<50	–	–	–	–
	2 Apr 76	–	–	<10	<50	<10	<30	1999	<50	100	<5.0	–	–	<10	<50	–	–	–	–
	1 Jun 76	–	–	<10	<50	<50	<20	1400	<50	<50	<5.0	–	–	<10	<50	–	–	–	–
	3 Jul 76	–	–	<10	<50	<50	<20	250	<50	170	<5.0	–	–	<10	<50	–	–	–	–
	22 Jul 76	–	–	<10	<50	<50	<20	1420	<50	60	<5.0	–	–	<10	<50	–	–	–	–
	19 Aug 76	–	–	<10	<50	<50	<20	1990	<50	140	<5.0	–	–	20	<50	–	–	–	–
	20 Oct 76	–	–	<10	<50	<50	<20	140	<50	<50	<5.0	–	–	<10	<50	–	–	–	–
	7 Aug 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	9 Aug 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	6 Oct 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	7 Nov 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	19 Dec 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	15 Feb 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	15 Mar 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	6 Apr 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1 May 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
02	5 Jun 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
03 Pinetree Branch	24 Feb 76	–	–	<10	<50	<10	<20	470	<50	130	<5.0	–	–	<10	<50	–	–	–	–
	2 Apr 76	–	–	<10	<50	<10	<20	<100	<50	<50	<5.0	–	–	<10	<50	–	–	–	–
	1 Jun 76	–	–	<10	<50	<50	<20	180	<50	<50	<5.0	–	–	<10	<50	–	–	–	–
	22 Jul 76	–	–	<10	<50	<50	<20	<100	<50	<50	<5.0	–	–	<10	<50	–	–	–	–
	19 Aug 76	–	–	<10	<50	<50	<20	<100	<50	<50	<5.0	–	–	<10	<50	–	–	–	–
	20 Oct 76	–	–	<10	<50	<50	<20	<100	<50	<50	<5.0	–	–	<10	<50	–	–	–	–
	7 Aug 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	9 Aug 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	6 Oct 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	7 Nov 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	19 Dec 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	15 Feb 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	15 Mar 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	6 Apr 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1 May 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	5 Jun 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
04 Pinetree Branch	24 Feb 76	–	–	<10	<50	<10	<20	4960	<50	360	<5.0	–	–	<10	180	–	–	–	–
	2 Apr 76	–	–	<10	<50	<10	<20	150	<50	950	<5.0	–	–	20	140	–	–	–	–
	1 Jun 76	–	–	<10	<50	<50	<20	<100	<50	<50	<5.0	–	–	<10	<50	–	–	–	–
	22 Jul 76	–	–	<10	<50	<50	<20	1440	<50	180	<5.0	–	–	<10	<50	–	–	–	–
	19 Aug 76	–	–	<10	<50	<50	<20	990	<50	90	<5.0	–	–	<10	<50	–	–	–	–
	20 Oct 76	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	7 Nov 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table D.7
Historical Surface Water Quality Results
Andrews AFB
February 1976–June 1978
(continued)

05 [illegible]	13Feb76	—	—	20	<50	<10	50	410	<50	<50	<50	—	—	<10	180	—	—	—	—				
	24Feb76	—	—	<10	<50	<10	30	470	<50	70	<50	—	—	40	50	—	—	—	—				
	8Apr76	—	—	<10	<50	<10	<30	130	<50	<50	<50	—	—	30	60	—	—	—	—				
	1Jul76	—	—	<10	<50	<50	30	150	<50	<50	<50	—	—	<10	80	—	—	—	—				
	28Jul76	—	—	<10	<50	<50	40	790	<50	<50	<50	—	—	60	100	—	—	—	—				
	19Aug76	—	—	<10	<50	<50	<20	<100	<50	<50	<50	—	—	<10	<50	—	—	—	—				
	8Oct76	—	—	<10	<50	<50	<20	860	<50	<50	<50	—	—	<10	50	—	—	—	—				
	8Dec77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	7Sep77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	11Oct77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	8Mar78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	16Dec77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	15Feb78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	15Mar78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	6Apr78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	1May78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	5Jun78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
06 Hence Ck East	24Feb76	—	—	<10	<50	<10	<20	10410.0	<50	350	<50	—	—	<10	<50	—	—	—	—				
	8Apr76	—	—	<10	<50	<10	<20	2040.0	<50	310	<50	—	—	<10	<50	—	—	—	—				
	1Jul76	—	—	<10	<50	<50	<20	180.0	<50	<50	<50	—	—	<10	180.0	—	—	—	—				
	28Jul76	—	—	<10	<50	<50	<20	830.0	<50	<50	<50	—	—	<10	<50	—	—	—	—				
	8Dec77	—	—	—	—	—	—	160.0	—	—	—	—	—	—	—	—	—	—	—				
	7Sep77	—	—	—	—	—	—	290.0	—	—	—	—	—	—	—	—	—	—	—				
	11Oct77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	16Dec77	—	—	—	—	—	—	100.0	—	—	—	—	—	—	—	—	—	—	—				
	15Feb78	—	—	—	—	—	—	300.0	—	—	—	—	—	—	—	—	—	—	—				
	15Mar78	—	—	—	—	—	—	310.0	—	—	—	—	—	—	—	—	—	—	—				
	6Apr78	—	—	—	—	—	—	150.0	—	—	—	—	—	—	—	—	—	—	—				
	1May78	—	—	—	—	—	—	100.0	—	—	—	—	—	—	—	—	—	—	—				
	5Jun78	—	—	—	—	—	—	340.0	—	—	—	—	—	—	—	—	—	—	—				
07 Hence Ck East	24Feb76	—	—	<10	<50	<10	<20	420.0	<50	<50	<50	—	—	<10	<50	—	—	—	—				
07	8Apr76	—	—	<10	<50	<10	<20	410.0	<50	<50	<50	—	—	<10	<50	—	—	—	—				
07	28Jul76	—	—	<10	<50	<50	<20	300.0	<50	<50	<50	—	—	<10	<50	—	—	—	—				
07	19Aug76	—	—	<10	<50	<50	<20	1450.0	<50	<50	<50	—	—	<10	<50	—	—	—	—				
07	11Oct77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
07	28Mar77	—	—	—	—	—	—	5300.0	—	—	—	—	—	—	—	—	—	—	—				
07	16Dec77	—	—	—	—	—	—	4600.0	—	—	—	—	—	—	—	—	—	—	—				
07	6Apr78	—	—	—	—	—	—	1000.0	—	—	—	—	—	—	—	—	—	—	—				
07	1May78	—	—	—	—	—	—	290.0	—	—	—	—	—	—	—	—	—	—	—				
07	5Jun78	—	—	—	—	—	—	4900.0	—	—	—	—	—	—	—	—	—	—	—				
08 Cabin Ck North	8Aug77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	7Sep77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	11Oct77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	7Mar77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	16Dec77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	15Feb78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	15Mar78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	6Apr78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	1May78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
	5Jun78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				

TAC FORM 333 APR 69 GENERAL PURPOSE FORM TAC-LAFB VA 10-20201

Table D.7
Historical Surface Water Quality Results
Andrews AFB
February 1976-June 1978
(continued)

Sta #		As	Ba	Cd	Cr	Cr (Hex)	Cu	Fe	Pb	Mn	Hg	Ni	Se	Ag	Zn	Ca	Mg	K	Na
09 Cabin Oil Spill	13 Feb 76	–	–	<10	<50	<10	<20	780	<50	110	<50.0	–	–	<10	<50	–	–	–	–
09	24 Feb 76	–	–	<10	<50	<10	<20	3450	460	110	<50.0	–	–	<10	<50	–	–	–	–
09	6 Apr 76	–	–	<10	<50	<10	<20	360	<50	120	<50.0	–	–	<10	<50	–	–	–	–
09	1 Jun 76	–	–	<10	<50	<50	<20	1460	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
09	30 Jul 76	–	–	<10	<50	<50	<20	5790	<50	105	<50.0	–	–	<10	<50	–	–	–	–
09	19 Oct 76	–	–	<10	<50	<50	<20	2100	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
09	8 Oct 76	–	–	<10	<50	<50	<20	180	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
09	7 Aug 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
09	8 Aug 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
09	9 Nov 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
09	16 Dec 77	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
09	15 Mar 78	–	–	–	–	–	–	2560	–	–	–	–	–	–	–	–	–	–	–
09	6 Apr 78	–	–	–	–	–	–	<300.0	–	–	–	–	–	–	–	–	–	–	–
09	1 May 78	–	–	–	–	–	–	220.0	–	–	–	–	–	–	–	–	–	–	–
10 Bum Lake	24 Feb 76	–	–	<10	<50	<10	<20	180.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
10	8 Apr 76	–	–	<10	<50	<10	<20	490.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
10	1 Jun 76	–	–	<10	<50	<50	<20	<100.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
10	30 Jul 76	–	–	<10	<50	<50	<20	<100.0	<50	<50	<50.0	–	–	30	<50	–	–	–	–
10	19 Oct 76	–	–	<10	<50	<50	<20	360.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
10	8 Oct 76	–	–	<10	<50	<50	<20	140	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
10	6 Apr 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
11 N Pond #1	24 Feb 76	–	–	<10	<50	<10	<20	620	70	<50	<50.0	–	–	<10	<50	–	–	–	–
11	8 Apr 76	–	–	<10	<50	<10	<20	100	<50	<50	<50.0	–	–	70	<50	–	–	–	–
11	19 Oct 76	–	–	<10	<50	<50	<20	150	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
11	8 Oct 76	–	–	<10	<50	<50	<20	110.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
11	6 Apr 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
12 N Pond #2	24 Feb 76	–	–	<10	<50	<10	<20	930.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
12	8 Apr 76	–	–	<10	<50	<10	<20	300.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
12	19 Oct 76	–	–	<10	<50	<50	<20	<100.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
12	8 Oct 76	–	–	<10	<50	<50	<20	<100.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
12	6 Apr 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
13 N Pond #3	24 Feb 76	–	–	<10	<50	<10	<20	470.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
13	8 Apr 76	–	–	<10	<50	<10	<20	<100.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
13	19 Oct 76	–	–	<10	<50	<50	<20	340.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
13	8 Oct 76	–	–	<10	<50	<50	<20	140.0	<50	<50	<50.0	–	–	<10	<50	–	–	–	–
13	6 Apr 78	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table D.7
Summary-Historical Surface Water Quality Results
Andrews AFB
February 1976-June 1978
(continued)

		Units			mg/l																µg/l			µg/l						
		Color	Turb.	PH	COD	DO	TOC	TDS	SS	O&G	Surf.	Phenols	Cl	F	NH_3	NO_3	NO_2	PO_4	CN	SO_4	Cd	Cr(tri)	Cr(VI)	Cu	Fe	Pb	Mn	Hg	Ag	Zn
Chaplain Crk.	# samples	—	—	9	—	9	—	—	5	9	—	—	3	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—	—
	Mean	—	—	6.76	—	9.67	—	—	18.4	0.31	—	—	40.7	—	—	—	—	—	—	—	—	—	—	—	193.3	—	—	—	—	—
	Std. Dev.	—	—	0.35	—	1.0	—	—	9.07	0.036	—	—	4.93	—	—	—	—	—	—	—	—	—	—	—	86.8	—	—	—	—	—
Pennsylvania Crk.	# samples	8	8	10	8	10	8	8	10	18	17	8	8	8	8	18	8	18	8	17	8	8	8	8	8	8	8	8	8	8
	Mean	10.0	16.13	6.58	13.4	8.9	5.75	122.8	10	0.7	0.45	<0.001	31.6	0.35	0.6	7.84	0.06	<0.2	<0.01	22.7	<10	<50	<50	<20	1060	<60	86.3	<5	<10	<50
	Std. Dev.	6.13	4.48	0.48	9.3	1.7	3.2	33.1	7.86	0.43	0.34	—	5.6	0.2	0.6	5.95	0.08	—	—	12.2	—	—	—	—	897	—	96.3	—	4.0	—
Phoenix Crk.	# samples	6	6	8	6	8	6	6	7	14	6	6	6	6	6	13	6	18	6	6	6	6	6	6	6	6	6	6	6	6
	Mean	18.5	9.7	6.5	17.8	4.9	3.8	188.2	181.6	0.7	0.27	<0.001	29.8	0.46	1.6	9.04	<0.02	3.3	<0.01	24.0	<10	<50	<50	<20	175	<60	21.7	<5	<10	<50
	Std. Dev.	6.3	7.6	0	16.7	1.3	1.3	64.3	346.5	0.8	0.14	—	8.1	0.11	3.5	16.1	—	4.6	—	10.8	—	—	—	—	135	—	48.5	—	—	—
Huntington Crk.	# samples	7	7	9	7	9	7	7	9	17	7	7	14	7	7	7	7	7	7	16	7	7	7	7	7	7	7	7	7	7
	Mean	23.4	19.6	6.9	27.3	10.2	5.0	244.7	17.1	0.79	0.6	<0.001	43.9	0.6	4.24	10.1	3.21	13.7	0.036	49.4	<15	<50	<50	31.4	401	<50	<60	<5	24.3	72.4
	Std. Dev.	11.3	13.0	0.6	16.5	3.0	2.1	100.1	23.4	1.06	0.3	—	11.5	0.2	6.07	12.5	5.66	8.3	0.054	21.2	—	—	—	9.9	332	—	—	—	18.4	26.0
Hunter Crk. (Mid)	# samples	4	4	9	4	9	4	4	7	13	4	4	12	4	4	4	4	4	4	11	4	4	4	4	12	4	4	4	4	4
	Mean	10	34.5	6.6	20.8	11.1	4.8	95.6	1.86	0.58	0.18	<0.001	23.5	0.3	0.76	3.75	<0.02	<0.2	<0.01	26.4	<10	<50	<50	<20	9547	<50	190	<5	<10	<50
	Std. Dev.	3.5	38.6	0.3	7.1	1.5	3.34	14.8	1.36	0.54	0.08	—	20.8	0.16	0.64	2.16	—	—	—	9.8	—	—	—	—	27416	—	141	—	—	—
Hunter Crk. East	# samples	4	4	6	4	6	4	4	5	10	4	4	4	4	4	4	4	4	4	8	4	4	4	4	4	4	4	4	4	4
	Mean	7.5	5.25	6.6	12.0	8.5	4.5	111.8	23.6	0.59	0.23	<0.001	28.0	0.35	0.35	3.00	<0.02	<0.2	<0.001	28.3	<10	<50	<50	<20	3181	<50	<60	<5	<10	<50
	Std. Dev.	4.3	4.32	0.2	4.0	2.0	3.0	41.2	14.7	0.52	0.11	—	13.4	0.26	0.26	1.58	—	—	—	15.0	—	—	—	—	3412	—	—	—	—	—
Cedar Crk. North	# samples	—	—	10	2	10	9	—	9	10	—	—	—	—	8	1	8	—	—	—	—	—	—	—	—	—	—	—	—	—
	Mean	—	—	6.7	17.5	6.5	3.23	—	17.2	0.31	—	—	—	—	1.43	0.2	0.065	—	—	—	—	—	—	—	—	—	—	—	—	—
	Std. Dev.	—	—	0.37	6.5	1.97	2.26	—	23.1	0.03	—	—	—	—	1.66	—	0.078	—	—	—	—	—	—	—	—	—	—	—	—	—
Cedar Crk. South	# samples	7	7	7	7	7	7	7	4	14	7	7	10	7	7	7	7	7	7	7	7	7	7	7	10	7	7	7	7	7
	Mean	10	21.4	6.86	14.6	8.9	3.6	156.4	15.5	0.68	0.33	<0.001	29.7	0.26	1.3	1.6	0.024	<0.2	<0.01	24.0	<10	<50	<50	<20	1522	<60	84.3	<5	<10	<50
	Std. Dev.	5.5	15.1	0.7	4.6	2.0	2.6	31.3	3.8	0.57	0.16	—	2.0	0.14	0.84	0.73	0.010	—	—	11.8	—	—	—	—	1741	—	30.2	—	—	—

APPENDIX E

MASTER LIST OF INDUSTRIAL SHOPS

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
Malcolm Grow Medical Center				
Bacteriology	1050	yes	no	---
Hematology	1050	yes	yes	Diluted to Sanitary Sewer
Radioimmunoassay	1050	yes	no	---
Serology	1050	yes	no	---
Stat Lab	1050	yes	no	---
Chemistry lab	1050	yes	yes	Diluted to Sanitary Sewer
Cytology	1050	yes	yes	Diluted to Sanitary Sewer
Histopathology	1050	yes	yes	Diluted to Sanitary Sewer
Mycology	1050	yes	no	---
Parasitology	1050	yes	no	---
Urinalysis	1050	yes	no	---
Surgery & Anesthesia	1050	no	no	---
Graphics Reproduction	1050	yes	yes	Diluted to Sanitary Sewer
MERC	1050	yes	no	---
Oral Surgery	1050	yes	no	---
Dental Lab	1601	yes	no	---

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
Malcolm Grow Medical Center (Continued)				
Dental Clinic	1601	yes	yes	Diluted to Sanitary Sewer
Occupational Therapy	1050	yes	no	---
Medical X-Ray	1050	yes	yes	Diluted to Sanitary Sewer
Radiation Therapy	1050	yes	no	---
Nuclear Medicine	1050	yes	yes	Diluted to Sanitary Sewer
Central Supply	1050	no	no	---
Pentagon Clinic	Pentagon	yes	no	---
89th Military Airlift Wing				
Env. Systems	1754	yes	no	---
Electric Shop	1714	yes	yes	DPDO*
Battery Shop	1714	yes	yes	Neutralized & Diluted to Sanitary Sewer
Fuel Systems	1915	yes	no	---
Pneudraulics	1714	yes	yes	DPDO
Repair & Reclamation	1734	yes	no	---
Wheel & Tire	1734	yes	yes	DPDO
Corrosion Control	1791	yes	yes	DPDO

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
89th Military Airlift Wing (Continued)				
Machine Shop	1791	no	no	---
NDI	1791	yes	yes	DPDO & Sanitary Sewer
Plastics	1754	yes	no	---
Sheet Metal	1791	yes	no	---
Welding	1791	no	no	---
Survival Equipment	1931	yes	no	---
Crypto Maintenance	1752	yes	no	---
Life Support	1931	no	no	---
AGE	1933	yes	yes	DPDO
Jet Engine Shop	1932	yes	yes	DPDO
Jet Engine Test Cell	1950	yes	yes	O/W Separator
OMS Support Branch	1706	yes	yes	DPDO
Inspection Branch	1280	yes	yes	DPDO & Sanitary Sewer
Flightline Maintenance	1280	no	no	---
Transient Maintenance	1220	no	no	---
Pneudraulics (1st Heli)	1914	yes	yes	DPDO
Engine Shop (1st Heli)	1914	yes	yes	DPDO

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
89th Military Airlift Wing (Continued)				
AGE (1st Heli)	1914	yes	yes	DPDO
Avionics (1st Heli)	1914	yes	yes	Dumpster
Phase Inspection (1st Heli)	1914	yes	yes	DPDO
Sheet Metal (1st Heli)	1914	yes	no	---
A and C Flight (1st Heli)	1914	yes	yes	DPDO
Auto Pilot	1711	yes	no	---
Instruments	1711	yes	no	---
Radar & Navigation	1711	yes	no	---
Doppler/Inertia	1711	yes	no	---
Radio	1711	yes	no	---
Pkg - Crating	1752	yes	no	---
1700 Transportation Squadron				
Maintenance & Distribution	3014/1228	yes	no	---
POL Lab	3007	yes	no	---

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
1700 Transportation Squadron (Continued)				
Allied Trades	3345	yes	no	---
Paint Shop	3333	yes	yes	DPDO
Diagnostic	3334	yes	no	---
Minor Maintenance	3342	yes	yes	DPDO
Base Maintenance	3347	yes	yes	DPDO
Refueling Maintenance	3257	yes	yes	DPDO & O/W Separator
Special Purpose Maintenance	3355	yes	yes	DPDO & O/W Separator
General Purpose Maintenance	3354	yes	yes	DPDO & Sanitary Sewer
Machine Shop	3354	yes	yes	DPDO
Fire Truck Maintenance	1206	yes	yes	DPDO
Battery	3366	no	no	---
Wheel & Tire	3368	no	no	---
Pkg-Crating	3066	no	no	---
1776 Civil Engineering Squadron				
Mason	3449	yes	no	---
Carpenter & Key Shop	3449	yes	no	---

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
1776 Civil Engineering Squadron (Continued)				
Exterior Electric	3452	no	no	---
Interior Electric	3449	no	no	---
Paint Shop	3608	yes	yes	DPDO
Plumbing	3450	yes	no	---
Refrigeration & A/C	3449	yes	yes	Sanitary Sewer
Hospital Maintenance	1050	yes	no	---
Classified Disposal	3306	yes	no	---
Entomology	3459	yes	yes	Diluted to Sanitary Sewer
Heating Maintenance	3449	yes	yes	DPDO & Sanitary Sewer
Heat Plant 1	1515	yes	yes	Sanitary Sewer
Heat Plant 2	1732	yes	yes	Sanitary Sewer
Heat Plant 3	3409	yes	yes	Sanitary Sewer
Heavy Equipment	3459	no	no	---
Pavements	3457	yes	no	---
Roads & Grounds	4686	yes	no	---
Liquid Fuels	3459	yes	no	---
Metal Fabrication	3608	yes	no	---

APPENDIX E

MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
1776 Civil Engineering Squadron (Continued)				
Power Production	3604	yes	yes	DPDO & Sanitary Sewer
Water & Waste	3459/3786 3449	yes	no	---
Water & Waste	Brandywine	yes	no	---
Water & Waste	Davidsonville	yes	no	---
Water Pump Station	1836	yes	no	---
Fire Station 1	1287	yes	no	---
Fire Station 2	3621	yes	no	---
Fire Ext. Maintenance	1205	yes	no	---
Golf Course Maint.	4887	yes	yes	Diluted to Sanitary Sewer
SMART	1527	yes	yes	Dumpster
113th Tactical Fighter Wing, DCANG				
Int. Phase Maintenance	3119	yes	no	---
Flight Maintenance	3119	yes	no	---
Support Equipment	3119	yes	no	---
Civil Engineering	3213	yes	no	---
Test Cell	3000	yes	yes	DPDO
Jet Engine	3031	yes	yes	DPDO

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
113th Tactical Fighter Wing, DCANG (Continued)				
Survival Equipment & Parachute	3029	yes	no	---
Life Support	3029	yes	no	---
Fuel Systems	3032	yes	no	---
AGE	3032	yes	yes	DPDO
Machine	3119	yes	no	---
Welding	3119	yes	no	---
Sheet Metal	3119	yes	no	---
MARS	3119	no	no	---
Pneudraulics	3119	yes	yes	DPDO
Repair & Reclamation	3119	yes	yes	DPDO
NDI	3032	yes	yes	DPDO, Sanitary Sewer
Weapons Loading	3032	no	no	---
Weapons Release	3032	yes	yes	DPDO
Gun Services	3032	yes	no	---
Munitions Storage	4972	yes	no	---
ECM	3109	yes	yes	Dumpster & O/W Separator
Inst-Auto Pilot	3109	yes	no	---
Doppler/Inertial Nav.	3109	yes	no	---

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
113th Tactical Fighter Wing, DCANG (Continued)				
Comm-NAV	3109	yes	no	---
Weapons Control	3109	yes	yes	DPDO
Sensor-Photo	3109	no	no	---
Pkg-Crating	3612	yes	no	---
Transportation	3217	yes	yes	DPDO
Photo Lab	3119	yes	yes	Sanitary Sewer
Corrosion Control	3119	yes	yes	DPDO
EGRESS	3119	no	no	---
Electric	3119	yes	no	---
Battery	3119	yes	no	---
Reproductions	3252	yes	no	---
Headquarters, D.C. Air National Guard				
Fabrications Shop	3121	yes	no	---
Sheet Metal-Machine	3121	yes	no	---
Pneudraulics	3121	yes	yes	DPDO
AGE Shop	3121	yes	yes	DPDO
Propulsion	3121	yes	yes	DPDO

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
Headquarters, D.C. Air National Guard (Continued)				
EGRESS	3121	no	no	---
Environ. Sys.	3121	yes	no	---
Wheel & Tire Shop	3121	yes	yes	DPDO
Life Support	3129	yes	no	---
Flightline Maintenance	3129	yes	yes	DPDO
Vehicle Maintenance	3129	yes	yes	DPDO
Phase Inspection	3129	yes	yes	DPDO
Corrosion Control	3121	yes	yes	DPDO
459th Tactical Airlift Wing				
Env. systems	3635	yes	no	---
Fuel Systems	3629	yes	no	---
Pneudraulics	3635	yes	yes	DPDO
Wheel & Tire (R&R)	3640	yes	yes	DPDO
Auto Pilot & Instr.	3635	yes	no	---
Radar/Radio/DOP	3635	yes	no	---
Electric/Battery	3635	yes	yes	Neutralized & diluted to sanitary sewer
Corrosion Control	3640	yes	no	---

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
459th Tactical Airlift Wing (Continued)				
Machine	3640	yes	no	---
Welding	3640	yes	no	---
NDI	3640	yes	no	---
Sheet Metal	3640	yes	no	---
Parachute/Surv. Equip.	3635	yes	no	---
Life Support	3635	yes	no	---
Jet Engine/Prop Propeller	3635	yes	yes	DPDO
Scheduled Maintenance	3640	no	no	---
Non-Powered AGE	3629	yes	yes	O/W Separator
Flightline Inspection	3640	no	no	---
AGE	3639	yes	yes	DPDO
Quality Control	3473	no	no	---
2045th Information Systems Group				
Receiver Station	Brandywine	yes	yes	DPDO
Transmitter Site	Davidsonville	yes	yes	DPDO
Power Production	1558	yes	yes	O/W Separator & DPDO
Weather Maintenance	1220/1221	yes	no	---

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
2045th Information Systems Group (Continued)				
Electron Maintenance	1558	yes	no	---
Radio Maintenance	1539	yes	no	---
VIP Radio Maintenance	1538	yes	no	---
Cable Maintenance	1539	yes	no	---
Antenna Maintenance	1529	yes	no	---
Outside Plant Maint.	1539	yes	no	---
Inside Plant Maint.	1539	yes	no	---
Teletype Maintenance	1539	yes	yes	DPDO
Crypto Maintenance	1558	yes	no	---
DSTE	1539	yes	no	---
Comm. Control	1535	no	no	---
Autodin Switch	1558	no	no	---
Tech Control	1558	no	no	---
IBR	HGR15	no	no	---
55 Organizational Maintenance Squadron, SAC				
AGE	1225 (Inactivated 1983)	yes	yes	DPDO
Aircraft Maintenance	1225 (Inactivated 1983)	no	no	---

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
1361 Audiovisual Squadron				
Photo/Graphics Lab	3821	yes	yes	Sanitary Sewer
231st Combat Comm. Squadron, DCANG				
Electrical Power Prod. CEPP	3227	yes	yes	DPDO
Vehicle Maintenance	3227	yes	yes	DPDO
Radio	3236	yes	no	---
Wideband	3236	yes	no	---
Teletype	3236	yes	no	---
Crypto	3236	yes	no	---
Telephone	3236	yes	no	---
NAV Aids	3236	no	no	---
Headquarters, AFSC				
Printing Plate	1522	yes	no	---
Graphics	1535	yes	yes	Sanitary Sewer

APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
AFOSI				
Photo Lab	1609	yes	yes	Silver recovery & dilution to sanitary sewer
Tech Services	1609	yes	yes	Silver recovery & dilution to sanitary sewer
Detachment 1, 4950th Test Wing				
Avionics	1714	yes	no	---
Aircraft Maintenance	1714	yes	no	Sanitary Sewer
Fabrication Sheet Metal	1714	yes	no	---
1776 Security Police Squadron				
Firing Range	2351	yes	no	---
Security	Flightline	no	no	---
1776th Air Base Wing				
Auto Hobby	P8	yes	yes	O/W Separator & Sanitary Sewer
Frame	1642	yes	no	---

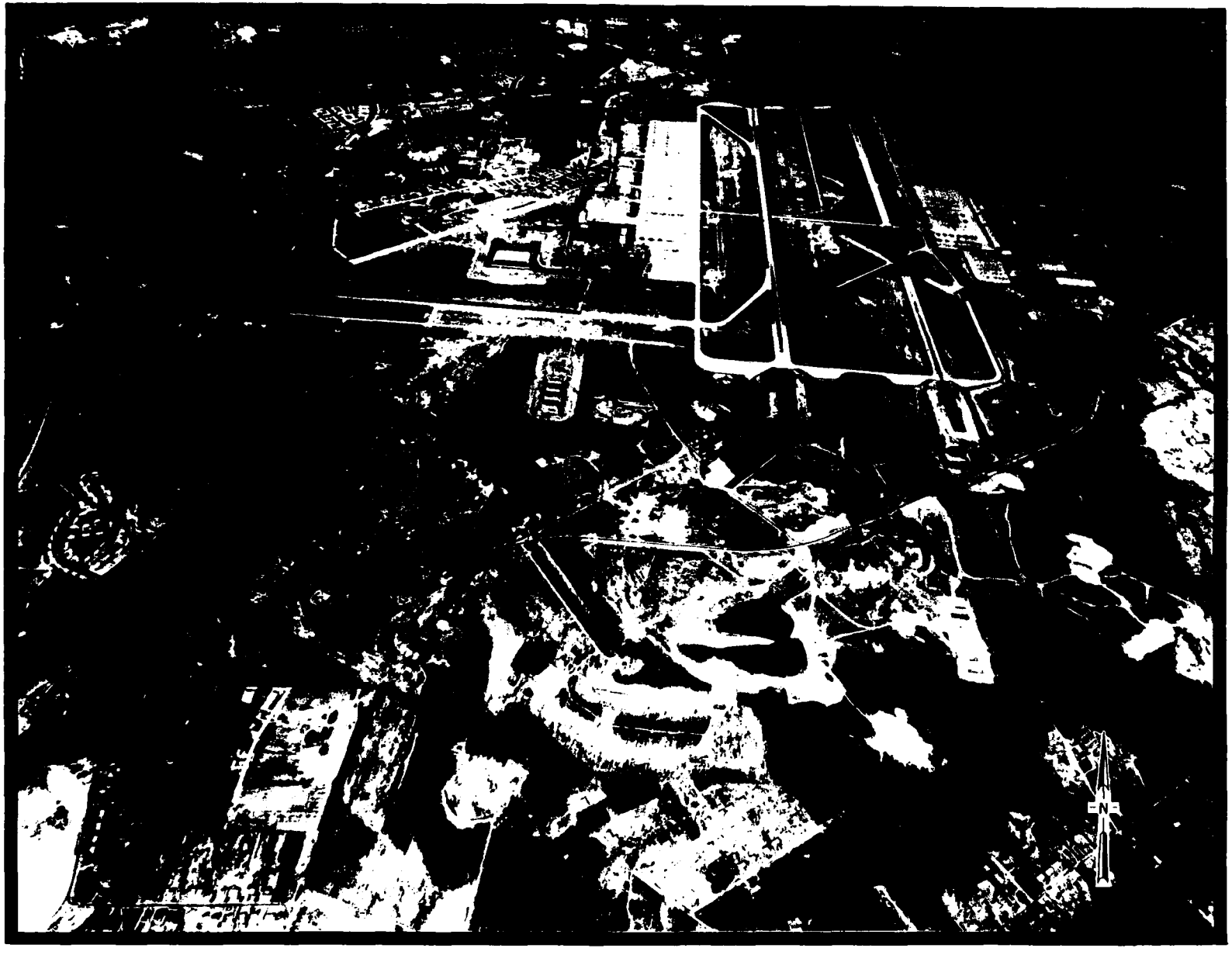
APPENDIX E
MASTER LIST OF INDUSTRIAL SHOPS
ANDREWS AFB
(Continued)

Name	Present Location (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Waste Management Practices
1776th Air Base Wing (Continued)				
Ceramics	1642	no	no	---
Wood Hobby	1642	yes	no	---
Reproductions	3573	yes	no	---
Naval Air Facility				
Hanger 12	3188	yes	yes	DPDO
Hanger 13	3158	yes	yes	DPDO
Hanger 14	3148	yes	yes	DPDO
Photo Lab	3282	yes	yes	DPDO

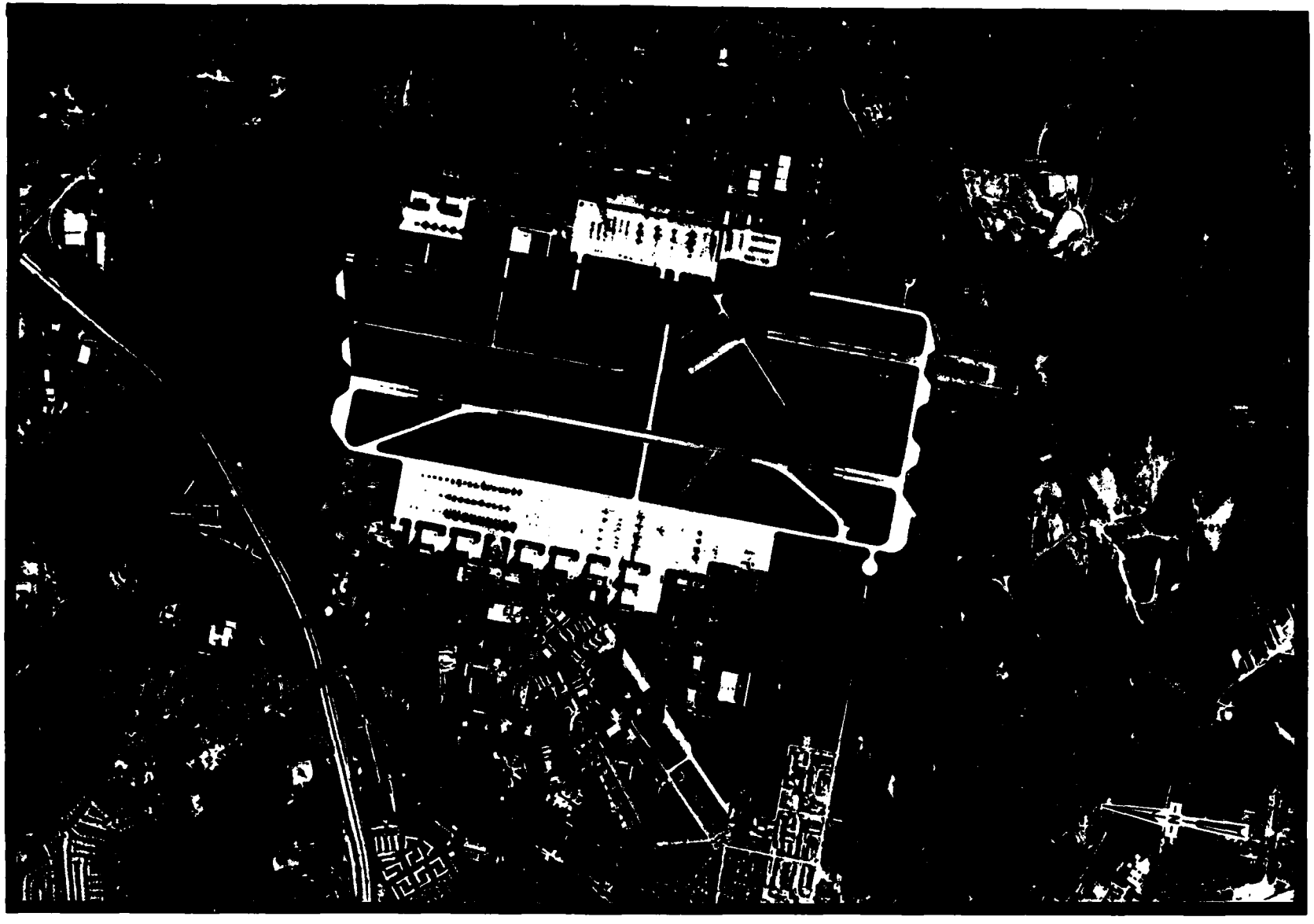
*DPDO-Indicates that waste management is through the Brandywine DPDO.

APPENDIX F

PHOTOGRAPHS



ANDREWS AFB, MARYLAND **CIRCA 1965**



ANDREWS AFB, MARYLAND **CIRCA 1974**

ANDREWS AFB

Landfill No. 1
(D-1)

Brandywine DPDO - Previous PCB
Transformer Storage Site

ANDREWS AFB

JP-4 Spill Site
(SP-3)

JP-4 Spill Site
(SP-3)

ANDREWS AFB

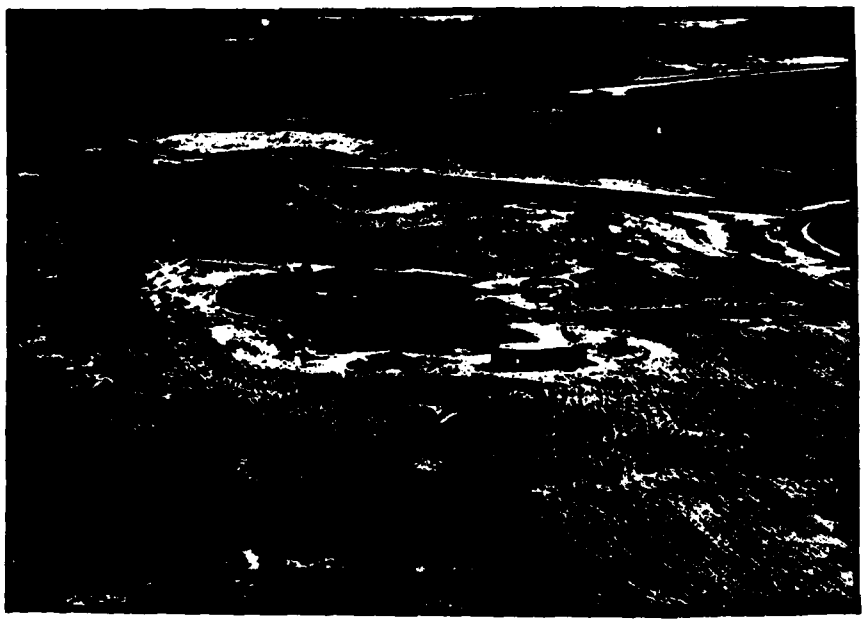
Diesel Fuel Oil Spill Site
(SP-1)

Brandywine WAP
(WAP-1)

ANDREWS AFB

Brandywine Housing Spill Site
(SP-6)

Monitoring Wells
(SP-6)

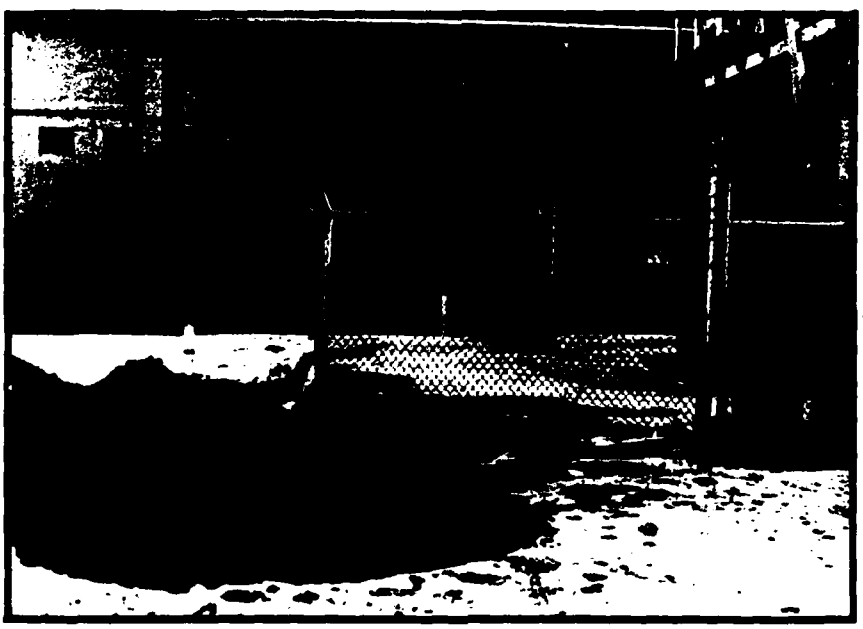


Fire Training Area No. 4
(FT-4)

Fire Training Area Leaching Pond
(FT-4)

ANDREWS AFB

Landfill No. 4
(D-4)



Fuel Oil Leak Area - Davidsonville Annex
(SP-7)

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX G

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

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

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

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

The first site rating model was developed in June 1981 at a meeting with represenatives from USAF Occupational and Environmental Health Laboratory (OEHL), Air Force Engineering and Services Center (AFESC), Engineering-Science (ES) and CH2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering-Science, and CH2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

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

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

DESCRIPTION OF MODEL

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

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

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

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

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

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

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

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

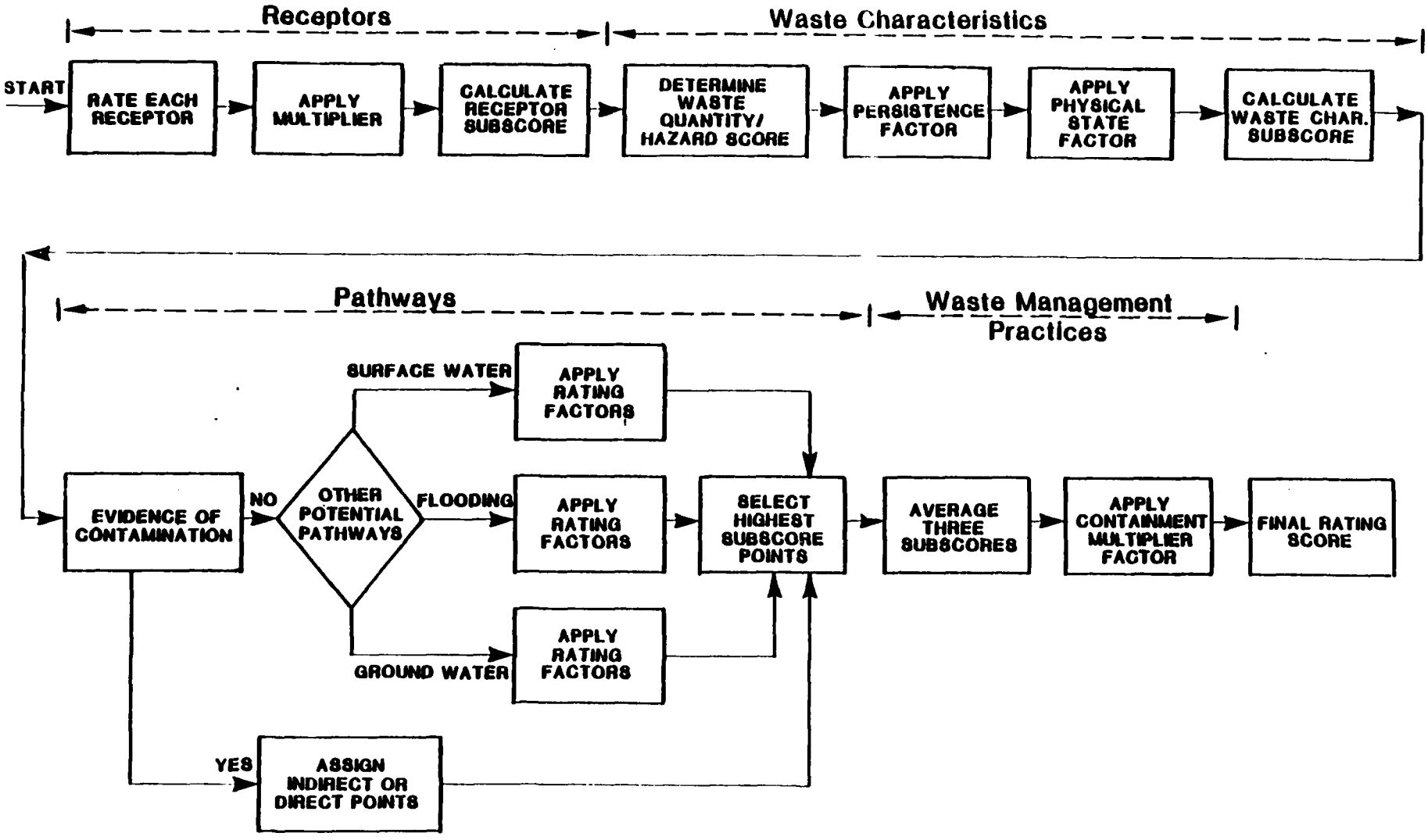


FIGURE 1

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE _____

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

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

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

II. WASTE CHARACTERISTICS

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

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

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

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

_____ X _____ = _____

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

_____ X _____ = _____

FIGURE 2 (Continued)

III. PATHWAYS

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

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

Subscore _____

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

1. Surface water migration

Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	_____	_____

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

2. Flooding

Flooding		1		

Subscore (100 x factor score/3) _____

3. Ground-water migration

Depth to ground water		8		
Net precipitation		6		
Soil permeability		3		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	_____	_____

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

C. Highest pathway subscore.

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

Pathways Subscore _____

IV. WASTE MANAGEMENT PRACTICES

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

Receptors _____
Waste Characteristics _____
Pathways _____

Total _____ divided by 3 = _____
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

_____ X _____ = _____

TABLE 1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

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

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

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

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

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

S = Suspected confidence level

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

A-3 Hazard Rating

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

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

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

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

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

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

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

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

B. Persistence Multiplier for Point Rating

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

C. Physical State Multiplier

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

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

III. PATHWAYS CATEGORY

A. Evidence of Contamination

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

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

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8

B-2 POTENTIAL FOR FLOODING

Floodplain	Beyond 100-year floodplain	In 25-year flood-plain	In 10-year flood-plain	Floods annually	1

B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION

Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

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

B. WASTE MANAGEMENT PRACTICES FACTOR

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

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

Guidelines for fully contained:

Landfills:

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

Surface Impoundments:

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

Spills:

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

Fire Proection Training Areas:

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

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

APPENDIX H

SITE HAZARD ASSESSMENT RATING FORMS

APPENDIX H
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HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Fire Training Area No.2 (FT-2)
Location: Intersection of Wisconsin and Wheeling Roads
Date of Operation: 1959 to 1972
Owner/Operator: Andrews AFB
Comments/Description: 300-400 ft. diameter; All waste types

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			86	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 48

II. WASTE CHARACTERISTICS

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

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

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

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

100 x 1.00 = 100

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

100 x 1.00 = 100

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors			48	
Waste Characteristics			100	
Pathways			61	
Total	209	divided by 3 =		70 Gross total score

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

Gross total score x waste management practices factor = final score

70 x 1.00 = \ 70 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Leak Area - PD680 (SP-2)
Location: Building 1773 , washrack area
Date of Operation: Early 1970
Owner/Operator: Andrews AFB
Comments/Description: PD-680 leak of approximately 5,000 gallons

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			84	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 47

II. WASTE CHARACTERISTICS

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

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

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

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

100 x 1.00 = 100

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

100 x 1.00 = 100

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors			47	
Waste Characteristics			100	
Pathways			61	
Total	208	divided by 3 =		69 Gross total score

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

Gross total score x waste management practices factor = final score

69 x 1.00 = \ 69 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Sanitary Landfill No.1 (D-1)
Location: South of POL storage along perimeter of base
Date of Operation: 1960's to 1980's
Owner/Operator: Andrews AFB
Comments/Description: Various wastes;includes waste oil pit,tanks.

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			89	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 49

II. WASTE CHARACTERISTICS

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

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

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

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

100 x 1.00 = 100

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

100 x 1.00 = 100

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors			49	
Waste Characteristics			100	
Pathways			54	
Total	203	divided by 3 =		68 Gross total score

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

Gross total score x waste management practices factor = final score

68 x 1.00 = \ 68 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Fire Training Area No.1 (FT-1)
Location: SW corner of main runway , East of Wisconsin Road
Date of Operation: Early 1950's to 1958
Owner/Operator: Andrews AFB
Comments/Description: 150 ft. diameter: all waste types

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			86	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 48

II. WASTE CHARACTERISTICS

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

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

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

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

100 x 1.00 = 100

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

100 x 1.00 = 100

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		48	
Waste Characteristics		100	
Pathways		54	
Total	201	divided by 3 =	67 Gross total score

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

Gross total score x waste management practices factor = final score

67 x 1.00 = \ 67 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Landfill No.3 (D-3)
Location: NE corner of intersection of Wisconsin and S.Perimeter Roads
Date of Operation: Late 1950's to late 1960's
Owner/Operator: Andrews AFB
Comments/Description: Various wastes; including some shop waste

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			92	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 51

II. WASTE CHARACTERISTICS

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

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

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

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

80 x 1.00 = 80

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

80 x 1.00 = 80

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	51		
Waste Characteristics	80		
Pathways	61		
Total	192 divided by 3 =	64	Gross total score

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

Gross total score x waste management practices factor = final score

64 x 1.00 = \ 64 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Spill Site - East Side Gas Station (SP-5)
Location: Near building 3469
Date of Operation: 1982,1984
Owner/Operator: Andrews AFB
Comments/Description: Result of several spills and leaks

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			90	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 50

II. WASTE CHARACTERISTICS

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

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

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

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

100 x 0.80 = 80

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

80 x 1.00 = 80

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors			50	
Waste Characteristics			80	
Pathways			61	
Total	191	divided by 3 =		64 Gross total score

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

Gross total score x waste management practices factor = final score

64 x 0.95 = \ 61 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: DPDO Storage Yard
Location: Brandywine DPDO
Date of Operation: 1961 to current
Owner/Operator: Andrews AFB
Comments/Description: Former PCB transformer storage site

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			110	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 61

II. WASTE CHARACTERISTICS

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

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

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

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

60 x 1.00 = 60

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

60 x 1.00 = 60

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			52	114
Subscore (100 x factor score subtotal/maximum score subtotal)				46

C. Highest pathway subscore.

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors			61	
Waste Characteristics			60	
Pathways			61	
Total	182	divided by 3 =		61 Gross total score

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

Gross total score x waste management practices factor = final score

61 x 1.00 = \ 61 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Spill Site - No.2 Fuel Oil (SP-4)
Location: Building 1204
Date of Operation: Early 1980's
Owner/Operator: Andrews AFB
Comments/Description: Transfer operations resulted in fuel spill

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			84	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 47

II. WASTE CHARACTERISTICS

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

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

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

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

100 x 0.80 = 80

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

80 x 1.00 = 80

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors			47	
Waste Characteristics			80	
Pathways			54	
Total	180	divided by 3 =		60 Gross total score

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

Gross total score x waste management practices factor = final score

60 x 1.00 = \ 60 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Spill Site - JP4 (SP-3)
Location: Building 1771
Date of Operation: 1978
Owner/Operator: Andrews AFB
Comments/Description: 1000 gallon spill - transfer line puncture

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			90	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 50

II. WASTE CHARACTERISTICS

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

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

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

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

80 x 0.80 = 64

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

64 x 1.00 = 64

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		50	
Waste Characteristics		64	
Pathways		54	
Total	168 divided by 3 =		56 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

56 x 1.00 = \ 56 \
FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Brandywine Receiver Site WAP (WAP-1)
Location: Outside building 10
Date of Operation: Current
Owner/Operator: Andrews AFB
Comments/Description: Oil stained area at WAP

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to installation boundary	2	6	12	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			104	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 58

II. WASTE CHARACTERISTICS

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

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

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

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

60 x 0.80 = 48

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

48 x 1.00 = 48

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	0	24
Subtotals			52	114
Subscore (100 x factor score subtotal/maximum score subtotal)				46

C. Highest pathway subscore.

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		58	
Waste Characteristics		48	
Pathways		61	
Total	167 divided by 3 =		56 Gross total score

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

Gross total score x waste management practices factor = final score

56 x 1.00 = \ 56 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Spill Site - Brandywine housing (SP-6)
Location: Brandywine housing annex
Date of Operation: May , 1984
Owner/Operator: Andrews AFB
Comments/Description: Fuel leaking from embankment

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
Subtotals			114	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 63

II. WASTE CHARACTERISTICS

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

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

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

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

60 x 0.80 = 48

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

48 x 1.00 = 48

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		63	
Waste Characteristics		48	
Pathways		61	
Total	172 divided by 3 =		57 Gross total score

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

Gross total score x waste management practices factor = final score

57 x 0.95 = \ 55 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Fire Training Area No.4 (FT-4)
Location: SE corner of Flightline , North of power check pad
Date of Operation: 1972 to 1985
Owner/Operator: Andrews AFB
Comments/Description: 150 ft. diameter: clean fuel and motor oil

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			89	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 49

II. WASTE CHARACTERISTICS

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

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

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

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

60 x 1.00 = 60

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

60 x 1.00 = 60

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		49	
Waste Characteristics		60	
Pathways		54	
Total	163 divided by 3 =		54 Gross total score

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

Gross total score x waste management practices factor = final score

54 x 0.95 = \ 52 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Landfill No.4 (D-4)
Location: East of base lake; South of S.Perimeter Road
Date of Operation: 1960's to 1980's
Owner/Operator: Andrews AFB
Comments/Description: Hospital waste, construction rubble, shop wastes

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			92	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 51

II. WASTE CHARACTERISTICS

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

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

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

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

40 x 1.00 = 40

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

40 x 1.00 = 40

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		51	
Waste Characteristics		40	
Pathways		61	
Total	152 divided by 3 =		51 Gross total score

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

Gross total score x waste management practices factor = final score

51 x 1.00 = \ 51 \

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of site: Leak Area - Mogas (SP-8)
Location: Building 3342
Date of Operation: Early 1970's , 1979
Owner/Operator: Andrews AFB
Comments/Description: Gas station Mogas leak

Site Rated by: S.K.Minicucci; W.G.Christopher; J.R.Absalon

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface water body	1	6	6	18
G. Ground water use of uppermost aquifer	1	9	9	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	1	6	6	18
Subtotals			90	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 50

II. WASTE CHARACTERISTICS

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

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

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

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

60 x 0.80 = 48

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

48 x 1.00 = 48

III. PATHWAYS

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

Subscore 0

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

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
Subtotals			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to ground water	1	8	8	24
Subtotals			60	114
Subscore (100 x factor score subtotal/maximum score subtotal)				53

C. Highest pathway subscore.

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors			50	
Waste Characteristics			48	
Pathways			54	
Total	152	divided by 3 =		51 Gross total score

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

Gross total score x waste management practices factor = final score

51 x 0.95 = \ 48 \

FINAL SCORE

APPENDIX I

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

APPENDIX I

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

ANDREWS AFB

ABG: Air Base Group.

ACFT MAINT: Aircraft Maintenance.

ADC: Air Defense Command.

AF: Air Force.

AFB: Air Force Base.

AFCS: Air Force Communications Service.

AFFF: Aqueous Film Forming Foam, a fire extinquishing agent.

AFR: Air Force Regulation.

AFRES: Air Force Reserve.

AFS: Air Force Station.

AFSC: Air Force Systems Command.

Ag: Chemical symbol for silver.

AGE: Aerospace Ground Equipment.

AGS: Aircraft Generation Squadron.

Al: Chemical symbol for aluminum.

ALLUVIUM: Materials eroded, transported and deposited by streams.

ALLUVIAL FAN: A fan-shaped deposit formed by a stream either where it issues from a narrow mountain valley into a plain or broad valley, or where a tributary stream joins a main stream.

AMS: Avionics Maintenance Squadron

ANG: Air National Guard.

ANTICLINE: A fold in which layered strata are inclined down and away from the axes.

AROMATIC: Description of organic chemical compounds in which the carbon atoms are arranged into a ring with special electron stability associated. Aromatic compounds are often more reactive than non-aromatics.

APS: Aerial Port Squadron.

ARTESIAN: Ground water contained under hydrostatic pressure.

AQUICLUDE: Poorly permeable formation that impedes ground-water movement and does not yield to a well or spring.

AQUIFER: A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring.

AQUITARD: A geologic unit which impedes ground-water flow.

ASC: Audiovisual Service Center.

ATC: Air Training Command.

AVGAS: Aviation Gasoline.

BEDROCK: Any solid rock exposed at the surface of the earth or overlain by unconsolidated material.

BEE: Bioenvironmental Engineer.

BES: Bioenvironmental Engineering Services.

BOWSER: A portable tank, usually under 200 gallons in capacity.

BX: Base Exchange.

CAP: Civilian Air Patrol.

Cd: Chemical symbol for cadmium.

CE: Civil Engineering.

CEPP: Civil Engineering Power Production

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act.

CES: Civil Engineering Squadron.

CIRCA: About; used to indicate an approximate date.

CLOSURE: The completion of a set of rigidly defined functions for a hazardous waste facility no longer in operation.

COASTAL PLAINS: Physiographic province of the Eastern United States characterized by a gently seaward sloping surface formed over exposed, unconsolidated, stratified marine fluvial sediments. Typical coastal plain features include low hills and ridges, organic deposits, flood-plains and high water tables.

COD: Chemical Oxygen Demand, a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water.

COE: Corps of Engineers.

COLLUVIUM: Sediments that have moved down slope primarily under the influence of gravity or as periodic, unchannelized flow. It frequently includes large boulders or other fragments which contrast this matrial to alluvium, material deposited by channelized flow which results in some degree of sorting according to particle size.

COMD: Command.

CONFINED AQUIFER: An aquifer bounded above and below by impermeable strata or by geologic units of distinctly lower permeability than that of the aquifer itself.

CONFINING UNIT: An aquitard or other poorly permeable layer which restricts the movement of ground water.

CONTAMINATION: The degradation of natural water quality to the extent that its usefulness is impaired; there is no implication of any specific limits since the degree of permissible contamination depends upon the intended end use or uses of the water.

CONUS: Continental United States.

Cr: Chemical symbol for chromium.

CSG: Combat Support Group.

Cu: Chemical symbol for copper.

D: Disposal Site.

DEQPPM: Defense Environmental Quality Program Policy Memorandum

DET: Detachment.

DISPOSAL FACILITY: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at which waste will remain after closure.

DISPOSAL OF HAZARDOUS WASTE: The discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground water.

DOD: Department of Defense.

DOWNGRADIENT: In the direction of decreasing hydraulic static head; the direction in which ground water flows.

DPDO: Defense Property Disposal Office, previously included Redistribution and Marketing (R&M) and Salvage.

DUMP: An uncovered land disposal site where solid and/or liquid wastes are deposited with little or no regard for pollution control or aesthetics; dumps are susceptible to open burning and are exposed to the elements, disease vectors and scavengers.

ESM: Electronic Counter Measures

EFFLUENT: A liquid waste discharge from a manufacturing or treatment process, in its natural state, or partially or completely treated, that discharges into the environment.

ELECTRICAL RESISTIVITY (ER): Specialized equipment designed to produce an electrical current through subsurface geologic strata. The instrument and the technique permit the operator to examine conditions at specific depths below land surface. Subsurface contrasts indicative of specific geologic or hydrologic conditions may be obtained through correlation of the ER data with known site information such as that provided by test borings or well construction logs.

EMS: Equipment Maintenance Squadron.

EOD: Explosive Ordnance Disposal.

EP: Extraction Procedure, the EPA's standard laboratory procedure for leachate generation.

EPA: U.S. Environmental Protection Agency.

EPHEMERAL: Short-lived or temporary.

EPHEMERAL AQUIFER: A water-bearing zone typically located near the surface which normally contains water seasonally.

EROSION: The wearing away of land surface by wind, water, or chemical processes.

ES: Engineering-Science, Inc.

ESCARPMENT: A long, usually continuous cliff or relatively steep slope facing one general direction, breaking the continuity of the land by separating two level or gently sloping surfaces; produced by erosion or faulting.

FAA: Federal Aviation Administration.

FACILITY (As Applied to Hazardous Wastes): Any land and appurtenances thereon and thereto used for the treatment, storage and/or disposal of hazardous wastes.

FAULT: A fracture in rock along which the adjacent rock surfaces are differentially displaced.

Fe: Chemical symbol for iron.

FLOOD PLAIN: The lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to a one percent or greater chance of flooding in any given year.

FLOW PATH: The direction or movement of ground water as governed principally by the hydraulic gradient.

FMS: Field Maintenance Squadron.

FPTA: Fire Protection Training Area.

FTA: Fire Training Area.

GC/MS: Gas chromatograph/mass spectrophotometer, a laboratory procedure for identifying unknown compounds.

GEOPHYSICS: (Geophysical survey) the use of one or more geophysical instruments or methods to measure specific properties of the earth's subsurface through indirect means. Geophysical equipment may include electrical resistivity, geiger counter, magnetometer, metal detector, electromagnetic conductivity, magnetic susceptibility, etc. Geophysics seeks to provide specific measurements of the earth's magnetic field, the electrical properties of specific geologic strata, radioactivity, etc., by use of indirect techniques.

GLACIAL TILL: Unsorted and unstratified drift consisting of clay, sand, gravel and boulders which is deposited by or underneath a glacier.

GLAUCONITIC SAND AND GRAVEL: A mixture of sand, gravel and glaucomite, an iron-potassium silicate mineral which imparts a green color to the mixture. Glauconite is geologically significant because it indicates slow sedimentation.

GLIDE-BLOCK: A large section of a geologic unit that has separated from the main portion of the unit due to earthquake/landslide-induced lateral movement.

GROUND WATER: Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure.

GROUND WATER RESERVOIR: The earth materials and the intervening open spaces that contain ground water.

HALF-LIFE: The time required for half the atoms present in radioactive substance to disintegrate.

HALOGEN: The class of chemical elements including fluorine, chlorine, bromine, and iodine.

HARDFILL: Disposal sites receiving construction debris, wood, miscellaneous spoil material.

HARM: Hazard Assessment Rating Methodology.

HAZARDOUS SUBSTANCE: Under CERCLA, the definition of hazardous substance includes:

1. All substances regulated under Paragraphs 311 and 307 of the Clean Water Act (except oil);

2. All substances regulated under Paragraph 3001 of the Solid Waste Disposal Act;

3. All substances regulated under Paragraph 112 of the Clean Air Act;

4. All substances which the Administrator of EPA has acted against under Paragraph 7 of the Toxic Substance Control Act;

5. Additional substances designated under Paragraph 102 of the Superfund bill.

HAZARDOUS WASTE: As defined in RCRA, a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

HAZARDOUS WASTE GENERATION: The act or process of producing a hazardous waste.

HEAVY METALS: Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but which become toxic at higher concentrations.

Hg: Chemical symbol for mercury.

HQ: Headquarters.

HWAP: Hazardous Waste Accumulation Point.

HWMF: Hazardous Waste Management Facility.

HYDROCARBONS: Organic chemical compounds composed of hydrogen and carbon atoms chemically bonded. Hydrocarbons may be straight chain, cyclic, branched chain, aromatic, or polycyclic, depending upon arrangement of carbon atoms. Halogenated hydrocarbons are hydrocarbons in which one or more hydrogen atoms has been replaced by a halogen atom.

INCOMPATIBLE WASTE: A waste unsuitable for commingling with another waste or material because the commingling might result in generation of extreme heat or pressure, explosion or violent reaction, fire, formation of substances which are shock sensitive, friction sensitive, or otherwise have the potential for reacting violently, formation of toxic dusts, mists, fumes, and gases, volatilization of ignitable or toxic chemicals due to heat generation in such a manner that the likelihood of contamination of ground water or escape of the substance into the environment is increased, any other reaction which might result in not meeting the air, human health, and environmental standards.

INFILTRATION: The movement of water through the soil surface into the subsurface.

IRP: Installation Restoration Program.

ISOPACH: Graphic presentation of geologic data, including lines of equal unit thickness that may be based on confirmed (drill hole) data or indirect geophysical measurement.

JP-4: Jet Propulsion Fuel Number Four; contains both kerosene and gasoline fractions.

JP-5: Jet Propulsion Fuel Number Five; consists of high boiling kerosene fractions.

LANDFILL: A land disposal site used for disposing solid and semi-solid materials. May refer either to a sanitary landfill or dump.

LEACHATE: A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water.

LEACHING: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

LENTICULAR: A bed or rock stratum or body that is lens-shaped.

LINER: A continous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill, or landfill cell which restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate.

LITHOLOGY: The description of the physical character of a geologic material.

LOESS: An essentially unconsolidated unstratified calcareous silt; commonly homogeneous, permeable and buff to gray in color, primarily deposited by wind.

LYSIMETER: A vacuum operated sampling device used for extracting pore water samples at various depths within the unsaturated zone.

m: Milli (10^{-3}).

MAC: Military Airlift Command.

MAGNETOMETER (MG): A device capable of measuring localized variations in the earth's magnetic field that may be due to disturbed areas such as backfilled trenches, buried objects, etc. Measurements may be obtained at points located on a grid pattern so that the data can be contoured, revealing the location, size and intensity of the suspected anomaly.

MAINT: Recording System Maintenance.

MARS: Military Amateur Radio System.

MATS: Military Air Transport Service.

MAW: Military Airlift Wing.

MEK: Methyl Ethyl Ketone.

METALS: See "Heavy Metals".

mgd: Million Gallons per Day.

MIBK: Methyl Isobutyl Ketone.

MICRO: u (10^{-6})

ug/1: Micrograms per liter.

mg/l: Milligrams per liter.

MOA: Military Operating Area.

MOGAS: Motor gasoline.

Mn: Chemical symbol for manganese.

MONITORING WELL: A well used to measure ground-water levels and to obtain ground-water samples for water quality analyses. As distinguished from observation wells, monitoring wells are often designed for longer term operations. They are constructed of materials for the site-specific climatic, hydrogeologic and contaminant conditions.

mr/hr: Millirem per hour; a measure of radioactivity.

MSL: Mean Sea Level.

MUNITION ITEMS: Munitions or portions of munitions having an explosive potential.

MUNITIONS RESIDUE: Non-explosive segments of waste munitions (i.e., bomb casings).

MWR: Morale Welfare and Recreation.

NAF: Naval Air Facility

NCO: Non-commissioned Officer.

NCOIC: Non-commissioned Officer In-Charge.

NDI: Non-destructive Inspection.

NET PRECIPITATION: The amount of annual precipitation minus annual evaporation.

NGVD: National Geodetic Vertical Datum of 1929. A national datum system, tied to Mean Sea Level, but referenced primarily to land-based benchmarks.

Ni: Chemical symbol for nickel.

NOAA: National Oceanic and Atmospheric Administration.

NON-CALCAREOUS: Not bearing calcium carbonate ($CaCO_3$) a characteristic mineral of marine paleoenvironment.

NPDES: National Pollutant Discharge Elimination System.

OBSERVATION WELL: An informally designed cased well, open to a specific geologic unit or formation, designed to allow the measurement of physical ground-water properties within the zone or unit of interest. Observation wells are designed to permit the measurement of water levels and in-situ parameters such as ground-water (flow velocity and flow direction. Not to be confused with a monitoring well, a well designed to permit accurate ground-water quality monitoring. Monitoring wells are constructed of materials compatible with site-specific climatic, hydrogeologic and contaminant conditions. Monitoring well installation and construction is planned to have minimal impacts on apparent ground-water quality and will often be for longer term operation compared with observation wells.

OEHL: Occupational and Environmental Health Laboratory.

OIC: Officer-In-Charge.

OMS: Organizational Maintenance Squadron.

OPNS: Operations.

ORGANIC: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon.

OSI: Office of Special Investigations.

O&G: Symbols for oil and grease.

O/W Separator: Oil and Water Separator.

OUT CROP: Zone or area of exposure where a geologic unit or formation occurs at or near land surface. "Outcrop area" is an important factor in hydrogeologic studies as this zone usually corresponds to the point where significant recharge occurs. When this term is used as an intransitive verb: "Where the unit crops out....."

OXIDIZER: Material necessary to support combustion of fuel.

Pb: Chemical symbol for lead.

PCB: Polychlorinated Biphenyl; liquids used as a dielectrics in electrical equipment.

PD-680: Cleaning solvent; petroleum distillate, Stoddard solvent.

PERCHED WATER TABLE: A water table above a relatively impermeable zone underlain by unsaturated rocks of sufficient permeability to allow ground-water movement.

PERCOLATION: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.

PERMEABILITY: The relative rate of water flow through a porous medium. The USDA, Soil Conservation Service describes permeability qualitatively as follows:

very slow	<0.06	inches/hour
slow	0.06 to 0.2	inches/hour
moderately slow	0.2 to 0.6	inches/hour
moderate	0.6 to 2.0	inches/hour
moderately rapid	2.0 to 6.0	inches/hour
rapid	6.0 to 20	inches/hour
very rapid	>20	inches/hour

PERSISTENCE: As applied to chemicals, those which are very stable and remain in the environment in their original form for an extended period of time.

PESTICIDE: An agent used to destroy pests. Pesticides include such specialty groups as herbicides, fungicides, insecticides, etc.

pH: Negative logarithm of hydrogen ion concentration.

PIEDMONT: An upland subdivision of the Appalachian Highlands Physiographic Province, extending from Alabama to New York. The zone is characterized by rolling hills and residual ridges formed by dissection of peneplained igneous and metamorphic terrain.

pico: 10^{-12}

PL: Public Law.

PMEL: Precision Measurement Equipment Lab.

POL: Petroleum, Oils and Lubricants.

POLLUTANT: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose.

POLYCYCLIC COMPOUND: All compounds in which carbon atoms are arranged into two or more rings, usually aromatic in nature.

POTENTIALLY ACTIVE FAULT: A fault along which movement has occurred within the last 25-million years.

POTENTIOMETRIC SURFACE: The imaginary surface to which water in an artesian aquifer would rise in tightly screened wells penetrating it.

ppb: Parts per billion by weight.

ppm: Parts per million by weight.

PRECIPITATION: Rainfall.

PROPELLANT: fuels, oxiders and monopropellants.

QUATERNARY MATERIALS: The second period of the Cenozoic geologic era, following the Tertiary, and including the last 2-3 million years.

RCRA: Resource Conservation and Recovery Act.

RD: Low-level radioactive waste disposal site.

RECEPTORS: The potential impact group or resource for a waste contamination source.

RECHARGE AREA: A surface area in which surface water or precipitation percolates through the unsaturated zone and eventually reaches the zone of saturation. Recharge areas may be natural or manmade.

RECHARGE: The addition of water to the ground-water system by natural or artificial processes.

RECON: Reconnaissance.

RESISTIVITY: See Electrical Resistivity

RIPARIAN: Living or located on a riverbank.

RM: Resource Management.

RWDS: Radioactive Waste Disposal Site.

S: Storage site method.

SAC: Strategic Air Command.

SANITARY LANDFILL: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes environmental hazards.

SAPROLITE: A residual soil retaining the physical appearance or relict structure of the parent rock.

SATURATED ZONE: That part of the earth's crust in which all voids are filled with water.

SAX'S TOXICITY: A rating method for evaluating the toxicity of chemical materials.

SCS: U.S. Department of Agriculture Soil Conservation Service.

SEISMICITY: Pertaining to earthquakes or earth vibrations.

SLUDGE: The solid residue resulting from a manufacturing or wastewater treatment process which also produces a liquid stream. The residue which accumulates in liquid fuel storage tanks.

SMART: Structural Maintenance and Repair Team.

SOLE SOURCE: As in aquifer. The only source of potable water supplies of acceptable quality available in adequate quantities for a significant population. Sole source is a legal term which permits use control of the aquifer by designated regulatory authorities.

SOLID WASTE: Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

SP: Spill area.

SPILL: Any unplanned release or discharge of a hazardous waste onto or into the air, land, or water.

SS: Supply Squadron.

STORAGE OF HAZARDOUS WASTE: Containment, either on a temporary basis or for a longer period, in such a manner as not to constitute disposal of such hazardous waste.

STP: Sewage Treatment Plant.

STRIKE: The compass direction or trend taken by a structural feature, such as bedding, folds, faults, etc. Strike is measured at a point when the specific feature intersects the topographic surface.

SUPS: Supply Squadron.

T: Treatment site method.

TAC: Tactical Air Command.

TACC: Tactical Air Control Center.

TASS: Tactical Air Support Squadron.

TCA: 1,1,1,-Trichloroethane.

TCE: Trichloroethylene, a solvent and suspected carcinogen.

TDS: Total Dissolved Solids.

TECTONIC (ally): Said of or pertaining to the forces and resulting structural or deformational features evident in the earth's crust. Tectonics usually deals with the broad architecture of the earth's outer crust.

TFTS: Tactical Fighter Training Squadron.

TFW: Tactical Fighter Wing.

TIDAL STRIP: Physiographic subdivision commonly associated with (ocean) wave activity. Usually includes berms, beach ridges, tidal flats and related landforms typically produced by coastal erosional and depositional processes.

TOC: Total Organic Carbon.

TOXICITY: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism.

TRANS: Transportation Squadron.

TRANSMISSIVITY: The rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

TREATMENT OF HAZARDOUS WASTE: Any method, technique, or process including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous.

TS: Transportation Squadron.

TSD: Treatment, storage or disposal sites/methods.

TTS: Technical Training Squadron.

TTW: Technical Training Wing.

UPGRADIENT: In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of ground-water.

US: United States.

USAF: United States Air Force.

USAFSS: United States Air Force Security Service.

USDA: United States Department of Agriculture.

USFWS: United States Fish and Wildlife Service.

USGS: United States Geological Survey.

USMC: United States Marine Corps.

USN: United States Navy.

WAP: Waste Accumulation Point.

WATER TABLE: Surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

WWTP: Wastewater Treatment Plant.

Zn: Chemical symbol for zinc.

APPENDIX J

ANDREWS AFB REFERENCES

APPENDIX J

ANDREWS AFB REFERENCES

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APPENDIX K

INDEX OF REFERENCES TO POTENTIAL CONTAMINATION SITES AT ANDREWS AFB

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CONTAMINATION SITES AT ANDREWS AFB

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