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INSTALLATION RESTORATION PROGRAM

PHASE I - RECORDS SEARCH

CHANUTE AFB, ILLINOIS

PREPARED FOR

UNITED STATES AIR FORCE
HQ AFESC/DEV
Tyndall AFB, Florida
and
HQ ATC/DEV
Randolph AFB, Texas

DECEMBER 1983

ES ENGINEERING-SCIENCE

NOTICE

INSTALLATION RESTORATION PROGRAM
PHASE I - RECORDS SEARCH
CHANUTE AFB, ILLINOIS

Prepared For

UNITED STATES AIR FORCE
HQ AFESC/DEV
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and
HQ ATC/DEV
Randolph AFB, Texas

December 1983

Prepared By

ENGINEERING-SCIENCE
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#36337

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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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, Initial Assessment/Records Search; Phase II, Confirmation and Quantification; Phase III, Technology Base Development; and Phase IV, Operations/Remedial Actions. Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I, Initial Assessment/Records Search for Chanute Air Force Base (AFB) under Contract No. F08637 80 G0009 5007.

INSTALLATION DESCRIPTION

Chanute Air Force Base is in the Village of Rantoul which is located in east-central Illinois (Champaign County), approximately 12 miles north of Champaign-Urbana. The main base has an area of 2,125 acres. Two off-base annexes include the Chapman Courts Housing Area (49 acres) in Rantoul and the Paxton Recreation Area (approximately 70 acres) about 11 miles north.

Chanute Field, was activated in 1917 and has served as a training facility throughout its history. In the early 1930's activity at the base reduced until 1938 when Chanute's technical training facilities were expanded and modernized. In 1959 the installation was designated the Chanute Technical Training Center. Runways at Chanute were closed in July 1971 for military operations.

ENVIRONMENTAL SETTING

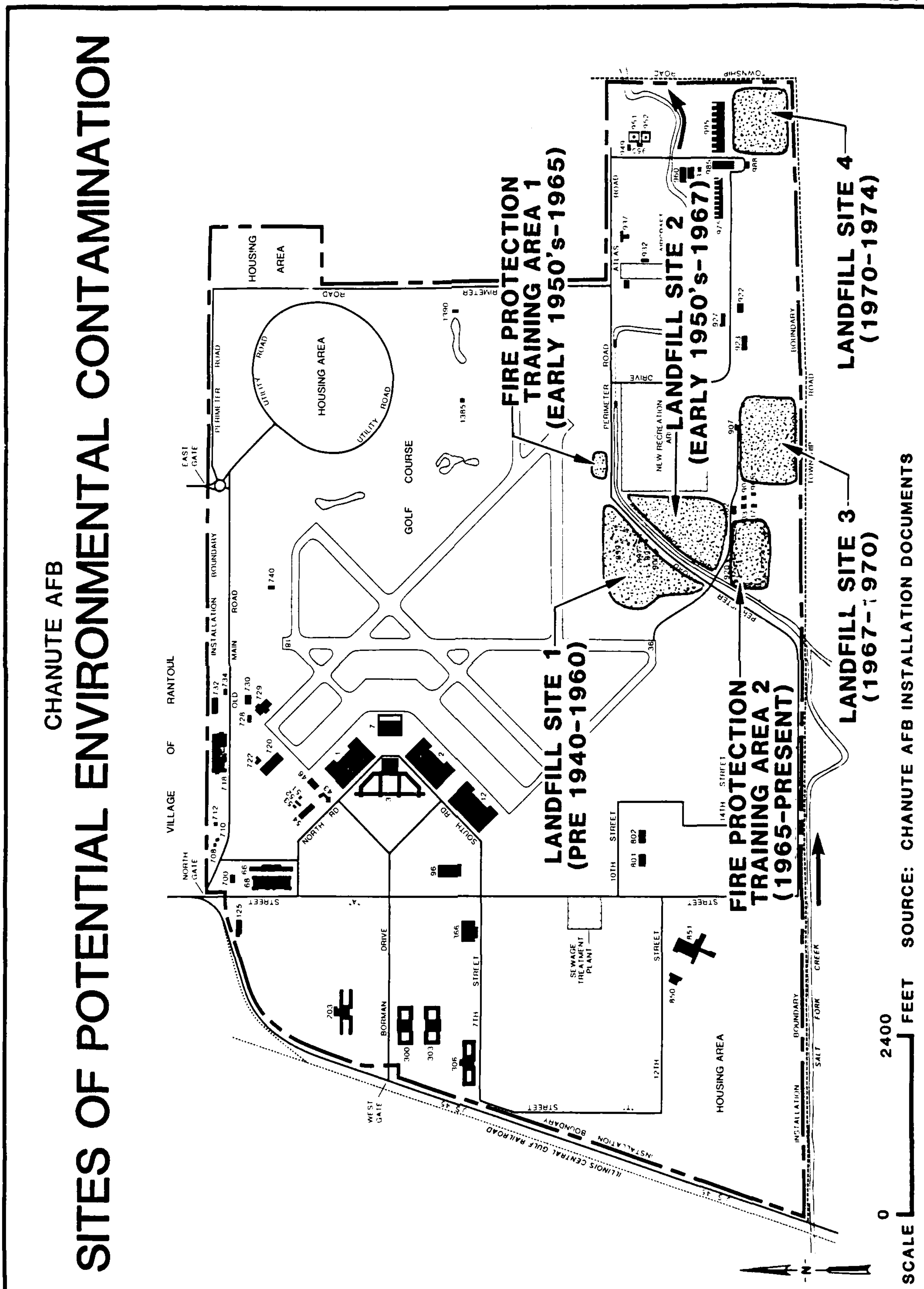
The environmental setting data reviewed for this investigation indicate that the following elements are relevant to the evaluation of past hazardous waste management practices at Chanute Air Force Base:

- The mean annual precipitation is 36 inches and net precipitation is calculated to be 4.5 inches.
- Flooding is not normally a problem at the base.
- Base surface soils are fine-grained, slow draining and slowly permeable at the top of a typical soil profile. Soils become sandier, quicker draining and more permeable with depth.
- A shallow aquifer underlies the base and is present at or near ground surface. The depth to the permanent water table in this aquifer is about 10 to 15 feet below land surface. Smaller perched water bearing zones may be present locally or on a seasonal basis.
- The base is located in the recharge zone of the shallow aquifer.
- Two aquifers of regional significance underlie the shallow aquifer at the base. They receive recharge from the overlying shallow aquifer. The regional aquifers furnish water supplies to the base, the Village of Rantoul, Urban Estates municipal distribution system and the homes and farms proximate to the installation.
- Water quality in Salt Fork Creek normally meets established standards for the Illinois General Use classification.
- No threatened or endangered plant and animal species have been observed recently on the base.
- No visible evidence of contamination from past disposal practices was observed.

METHODOLOGY

During the course of this project, interviews were conducted with base personnel (past and present) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with state and federal agencies; and field and aerial surveys were conducted at suspected past hazardous waste activity sites. Six sites (Figure 1) were identified as potentially containing hazardous contaminants and having the potential for migration resulting from past activities. These sites have been assessed using a

FIGURE 1



SITES OF POTENTIAL ENVIRONMENTAL CONTAMINATION
CHANUTE AFB
VILLAGE OF RANTOUL
HOUSING AREA
GOLF COURSE
SEWAGE TREATMENT PLANT
NEW RECREATION AREA
FIRE PROTECTION TRAINING AREA 1 (EARLY 1950's-1965)
LANDFILL SITE 2 (EARLY 1950's-1967)
LANDFILL SITE 4 (1970-1974)
LANDFILL SITE 1 (PRE 1940-1960)
FIRE PROTECTION TRAINING AREA 2 (1965-PRESENT)
LANDFILL SITE 3 (1967-1970)
NORTH GATE
EAST GATE
WEST GATE
INSTALLATION BOUNDARY
PERIMETER ROAD
OLD MAIN ROAD
NORTH RD
SOUTH RD
BORMAN DRIVE
7TH STREET
10TH STREET
12TH STREET
14TH STREET
ILLINOIS CENTRAL GULF RAILROAD
SALT FORK CREEK
TOWNSHIP ROAD
SOURCE: CHANUTE AFB INSTALLATION DOCUMENTS
SCALE
0
2400
FEET
N

Hazard Assessment Rating Methodology (HARM) which takes into account factors such as site characteristics, waste characteristics, potential for contaminant migration and waste mangement 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 follow-on action.

FINDINGS AND CONCLUSIONS

The following conclusions have been developed based on the results of the project team's 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 2
- Landfill Site 2
- Landfill Site 3
- Landfill Site 1
- Landfill Site 4
- Fire Protection Training Area 1

RECOMMENDATIONS

Recommended guidelines for future land use restrictions at the training and disposal sites are presented in Section 6. A program for proceeding with Phase II of the IRP at Chanute AFB is also presented in Section 6. Several of the sites recommended for additional investigation in Phase II are located close together. Monitoring individual sites at different times would not be efficient and may not provide the desired results. Thus, the Phase II recommendations are grouped into two separate areas with Area 1 including Fire Protection Training Areas 1 and 2 and Landfill Sites 1, 2 and 3; and Area 2 including Landfill Site 4. The Phase II recommendations are summarized as follows:

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

Rank	Site	Operation Period	Final Score
1	Fire Protection Training Area 2	1965 - Present	73
2	Landfill Site 2	Early 1950's - 1967	72
3	Landfill Site 3	1967 - 1970	66
4	Landfill Site 1	Pre 1940 - 1960	66
5	Landfill Site 4	1970 - 1974	61
6	Fire Protection Training Area 1	Early 1950's - 1965	53

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

Area 1

o Fire Protection Training Area 2	Install four monitoring wells around the site. Initiate a ground-water monitoring program to establish flow direction and to characterize water quality around the site.
o Landfill Site 2	Coordinate monitoring information from the other sites in Area 1 since it will serve as the initial assessment of potential contamination from this site.
o Landfill Site 3	Install three wells, two along the installation boundary and the third north toward the new recreation area. Initiate a ground-water monitoring program to be coordinated with data obtained from the FPTA-2 wells.
o Landfill Site 1	Install two wells, one to the north and the other southwest. Initiate a ground-water monitoring program. Coordinate with other Area 1 data as one of the wells at this site may serve to establish background quality for all sites.
o Fire Protection Training Area 1	Install one monitoring well, between the site and the creek. Initiate a ground-water monitoring program to be coordinated with other Area 1 data.

Area 2

o Landfill Site 4	Install three wells, two along the installation boundary and one between the landfill and the 900 area base wells. Initiate a ground-water monitoring program.

SECTION 1

INTRODUCTION

BACKGPOUND 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 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 will be the basis for response actions on Air Force installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, and clarified by Executive Order 12316.

PURPOSE AND SCOPE OF THE ASSESSMENT

The Installation Restoration Program has been developed as a four-phased program as follows:

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

Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I Records Search at Chanute Air Force Base (AFB) under Contract No. F08637 80 G0009 5007. 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 areas included as part of the Chanute AFB study are as follows:

Main Base Site (owned)	2125 acres
Chapman Court Off-Base Housing Area (owned)	49 acres
Paxton Recreation Area (leased)	70 acres

The objective of the first phase of the program was to identify the potential for environmental contamination from past waste disposal practices at Chanute AFB, and to assess the potential for contaminant migration. 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
- Field and aerial reconnaissance
- 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 August and September, 1983. The following team of professionals were involved:

- R. L. Thoem, Environmental Engineer and Project Manager, MS Sanitary Engineering, 20 years of professional experience
- J. R. Absalon, Hydrogeologist, BS Geology, 9 years of professional experience
- E. H. Snider, Chemist/Chemical Engineer, Ph.D. Chemical Engineering, 7 years of professional experience

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

METHODOLOGY

The methodology utilized in the Chanute AFB Records Search began with a review of past and present industrial operations conducted at the base. Information was obtained from available records such as shop files and real property files, as well as interviews with 29 past and present base employees from the various operating areas. Those interviewed included current and past personnel associated with civil engineering, bioenvironmental engineering, fuels management, equipment maintenance training, base equipment and grounds maintenance, entomology, fire protection, fire protection training, property disposal, real property and recreation. A listing of interviewee positions with approximate years of service is presented in Appendix B.

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

- U.S. Environmental Protection Agency, Region V (Chicago)
- Illinois Environmental Protection Agency, Region VI (Champaign)
- Illinois State Water Survey (Champaign)
- Illinois State Geological Survey (Champaign)

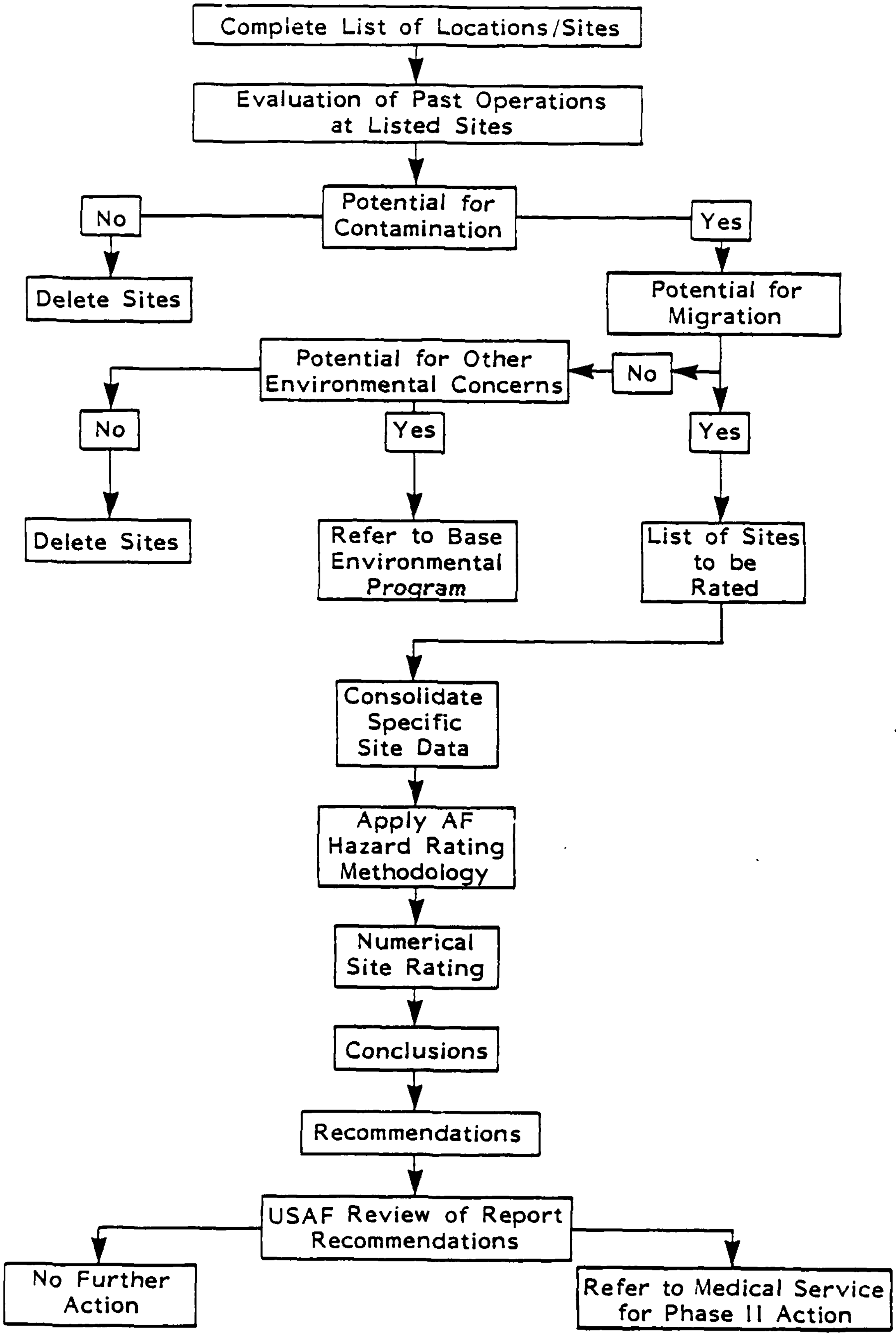
The next step in the activity review was to identify all sources of hazardous waste generation and to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various sources on the base. Included in this part of the activities review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

A general ground tour and a light aircraft overflight of the identified sites were then made by the ES Project Team to gather site-specific information including: (1) general characteristics of waste management practices; (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 exists for hazardous material contamination at any of the identified sites using the Decision Tree shown in Figure 1.1. If no potential existed, the site was deleted from further consideration. For those sites where a potential for contamination was identified, a determination of the potential for contaminant migration was made by considering site-specific conditions. If there were no further environmental concerns, then the site was deleted. If there are other environmental concerns then these were referred to the base environmental program. If the potential for contaminant migration was considered significant, then the site was evaluated and prioritized using the Hazard Assessment Rating Methodology (HARM). The HARM score indicates the relative potential for environmental contamination at each site. The score serves as a basis for making recommendations for additional IRP activities.

PHASE I INSTALLATION RESTORATION PROGRAM

DECISION TREE



SECTION 2

INSTALLATION DESCRIPTION

LOCATION, SIZE AND BOUNDARIES

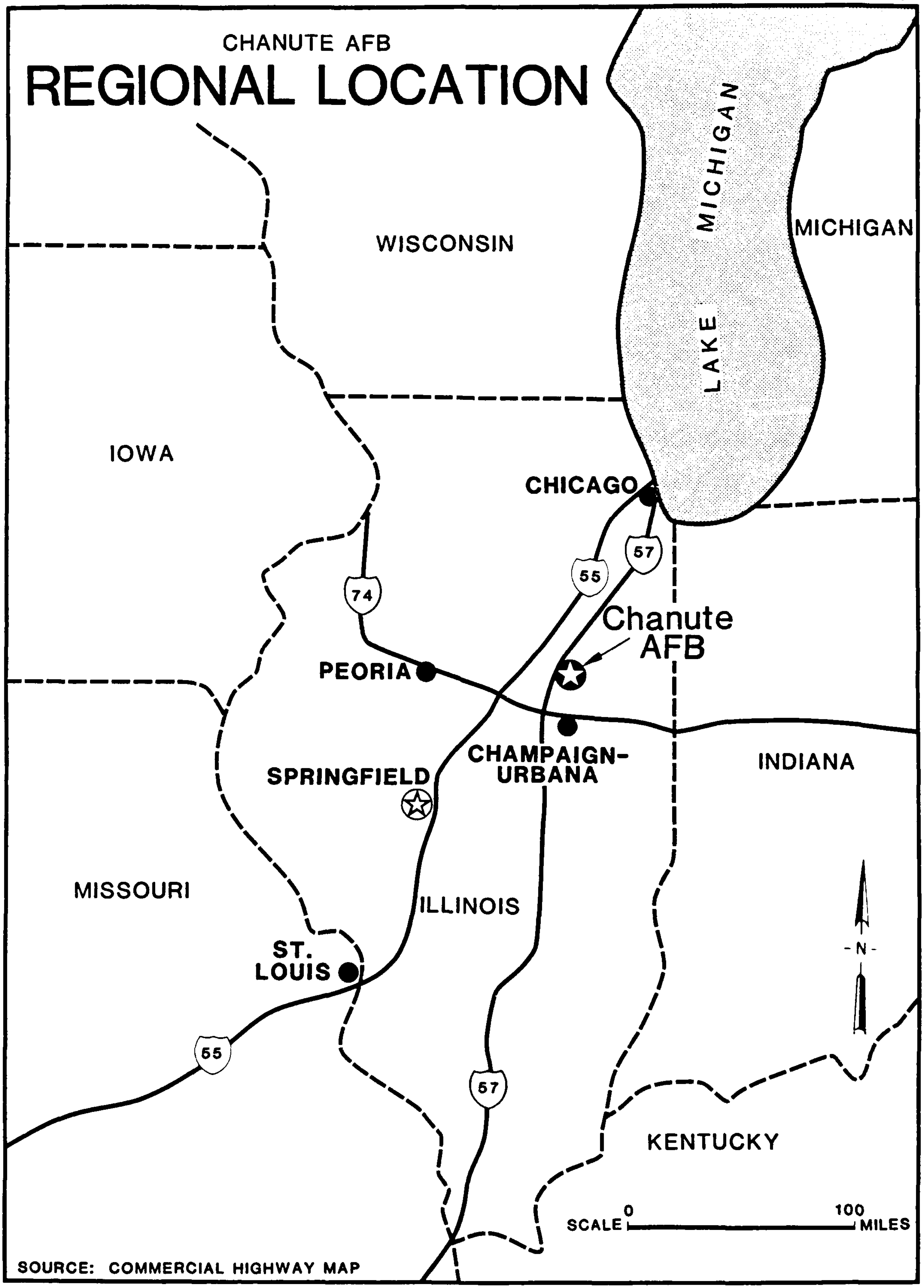
Chanute Air Force Base is in the Village of Rantoul which is located in east-central Illinois (Champaign County), approximately 12 miles north of Champaign - Urbana (see Figures 2.1 and 2.2). The base has agricultural land abutting three sides with residential and commercial land along the northern boundary. A small stream, Salt Fork Creek, flows along the southern perimeter boundary and then through the southeastern corner of the base.

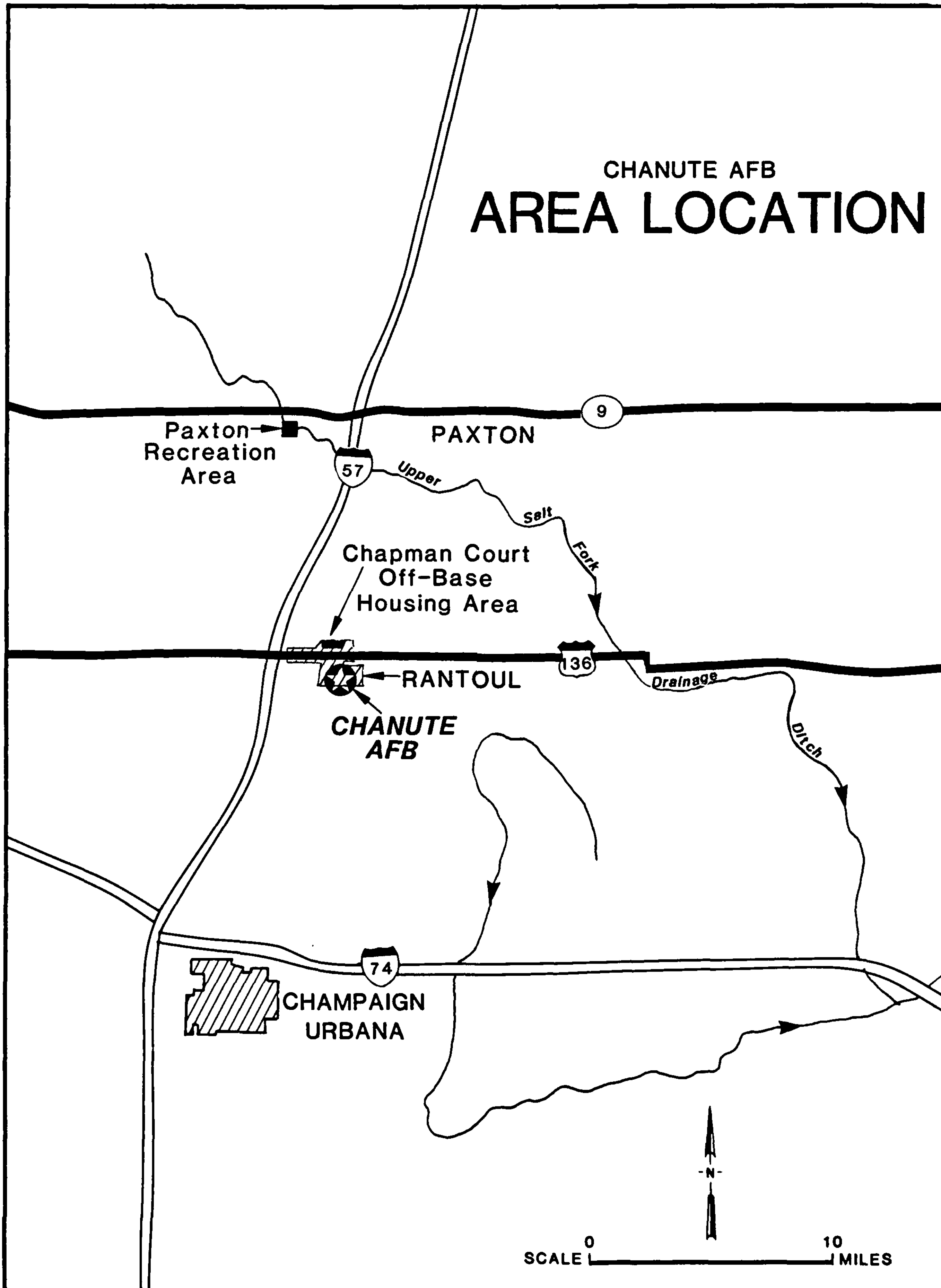
The main base comprises 2125 acres of U.S. government owned land (see Figure 2.3). Two remote installation facilities exist as shown in Figure 2.2 and described below:

- Chapman Court Off-Base Housing Area - This site consists of 49 acres of land owned by the U.S. government since 1947 in the Village of Rantoul. The property includes family, dormitory and temporary living facilities and is surrounded on all sides by residential/ commercial developments. Services such as water and sewer are provided by Rantoul, while solid waste collection is provided by the base.
- Paxton Recreation Area - This site consists of 70 acres (approximate) of land which has been leased since about 1960 for recreational use by Chanute military personnel. Several small lakes exist on the site. One well and two latrines are provided and the base arranges for solid waste collection.

BASE HISTORY

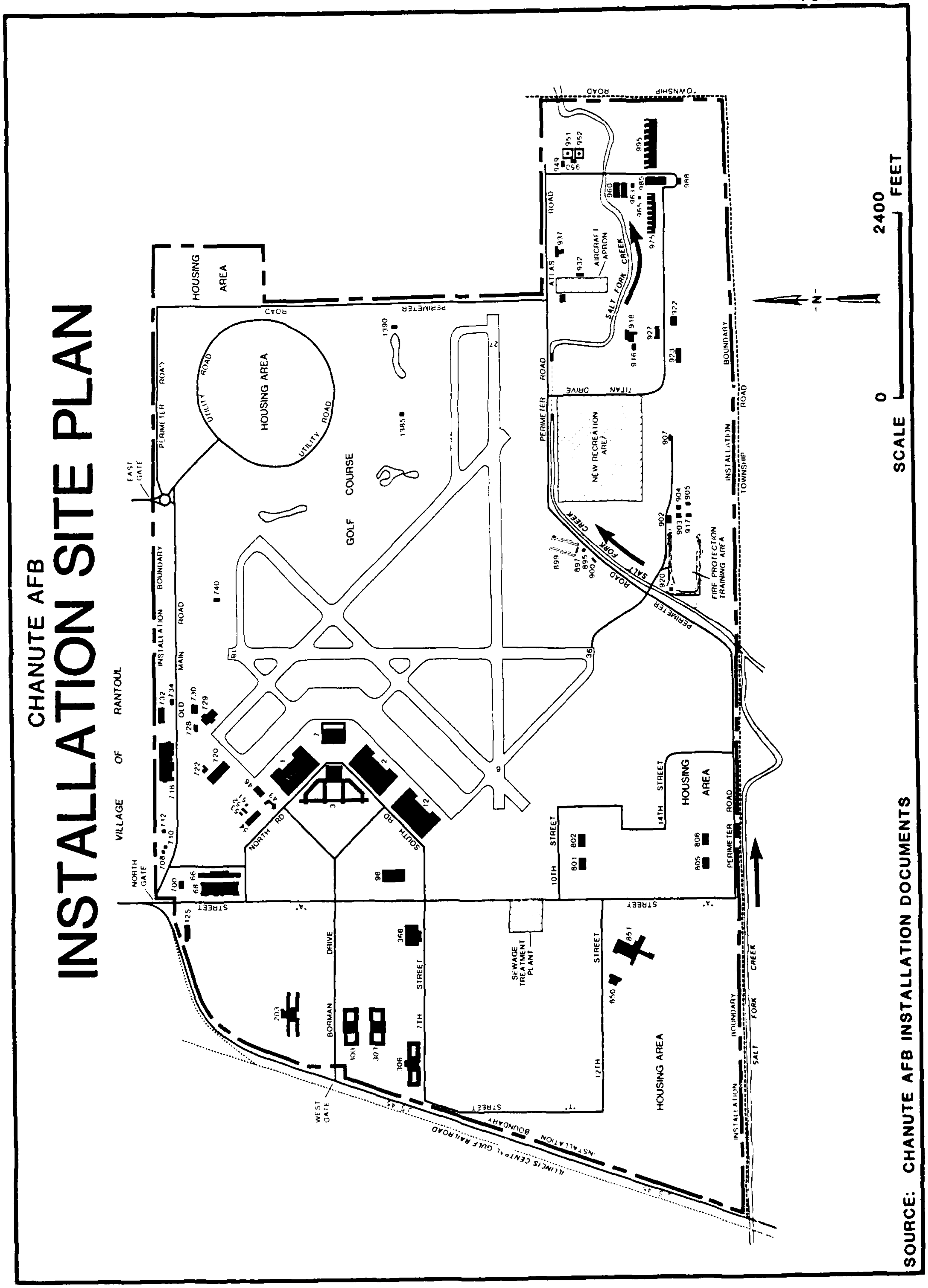
In 1917 Chanute Field (640 acres) was constructed adjacent to the Village of Rantoul, Illinois. It initially served as a pilot


CHANUTE AFB
REGIONAL LOCATION
WISCONSIN
MICHIGAN
LAKE MICHIGAN
IOWA
CHICAGO
57
55
74
Chanute AFB
PEORIA
CHAMPAIGN-URBANA
SPRINGFIELD
INDIANA
MISSOURI
ILLINOIS
ST. LOUIS
-N-
55
57
KENTUCKY
SCALE 0 100 MILES
SOURCE: COMMERCIAL HIGHWAY MAP



SOURCE: CHANUTE AFB INSTALLATION DOCUMENTS

FIGURE 2.3



CHANUTE AFB

INSTALLATION SITE PLAN

SOURCE: CHANUTE AFB INSTALLATION DOCUMENTS

training facility and a storage depot for aircraft engines and paint. In the period 1921-22, mechanic, photographic and communications training activities were transferred from other installations to Chanute. From 1922-1938 Chanute served as a technical school for all Air Corps mechanics.

In the early 1930's activity at Chanute reduced and facilities deteriorated. However, in 1938 major appropriations were made to modernize and expand Chanute's technical training facilities. In 1941 the Air Corps Technical Training Command had its first headquarters at Chanute Field. During World War II training included several areas such as aircraft maintenance, weather observation, life support and metal processing.

Since the war, Chanute has continued to serve as a training installation for aerospace and weapon system support personnel under a variety of changing organizational titles. In 1959 the installation was designated the Chanute Technical Training Center. Currently the Chanute Technical Training Center is designated the 3330th Technical Training Wing.

The runways at Chanute were closed in July 1971 for military operations, resulting in a non-flying training base. Prior to this closing the facility was used only as support for Army units in the region.

ORGANIZATION AND MISSION

The host unit at Chanute Air Force Base is the HQ Chanute Technical Training Center. Major units at the Training Center include Deputy Commander for Resource Management, 3330th Technical Training Wing, 3345th Air Base Group and the USAF Hospital. The primary mission of the base is to provide military and technical training for Air Force officers, airmen and civilian employees, and other Department of Defense agencies. Training is provided to enable operation and maintenance of aerospace vehicles and ground equipment. Specific areas include life support systems, vehicle maintenance, airframe repair, metals processing, fire protection, engine maintenance, aircraft fuel systems, weather systems, missile maintenance, pneudraulics, aerospace ground equipment, electrical systems, cryogenic and conventional fuels, and others.

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

- 3505th Recruiting Group
- 1963rd Communications Squadron
- Air Force Audit Agency
- Air Force Office of Special Investigation, Detachment 514
- Management Engineering Squadron
- HQ Air Weather Service
- U.S. Army Corps of Engineers
- Defense Investigative Service
- Area Defense Counsel
- Defense Property Disposal
- Air Force Commissary Service
- Navy/Marine Detachments
- Personnel Support Detachments

SECTION 3

ENVIRONMENTAL SETTING

The environmental setting of Chanute Air Force Base is described in this section with the primary emphasis directed toward identifying features that may facilitate the movement of hazardous waste-related contamination off-base. Environmentally sensitive conditions pertinent to this study are highlighted at the end of this section.

CLIMATE

Temperature, precipitation, snowfall and other relevant climatic data obtained from installation documents are presented as Table 3.1. The period of record is 42 years for precipitation data and 33 years for recorded humidity observations. The summarized data indicate that mean annual precipitation is 36.07 inches. Net precipitation is calculated to be 4.5 inches, based upon a Class A pan evaporation of 41 inches and an evaporation coefficient of 77 percent (from data published by NOAA, 1977). The net precipitation is the amount of meteoric water estimated to be available for infiltration. The one-year, 24-hour rainfall for east-central Illinois in the vicinity of Chanute AFB is approximately 2.5 inches.

GEOGRAPHY

The study area lies on the Bloomington Ridged Plain subdivision of the Till Plains Section of the Central Lowlands Physiographic Province (Figure 3.1). The Bloomington Ridged Plain has prominent glacial topography characteristic of Wisconsinan glaciation (Willman, et al., 1975). Chanute AFB is situated in a relatively level area between two notable expressions of glacial activity called moraines, which are low, rounded ridges composed of sand, silt, gravel and clay. The Rantoul Moraine is located northwest of the installation and the Urbana Moraine, located

TABLE 3.1
CHANUTE AIR FORCE BASE CLIMATIC CONDITIONS

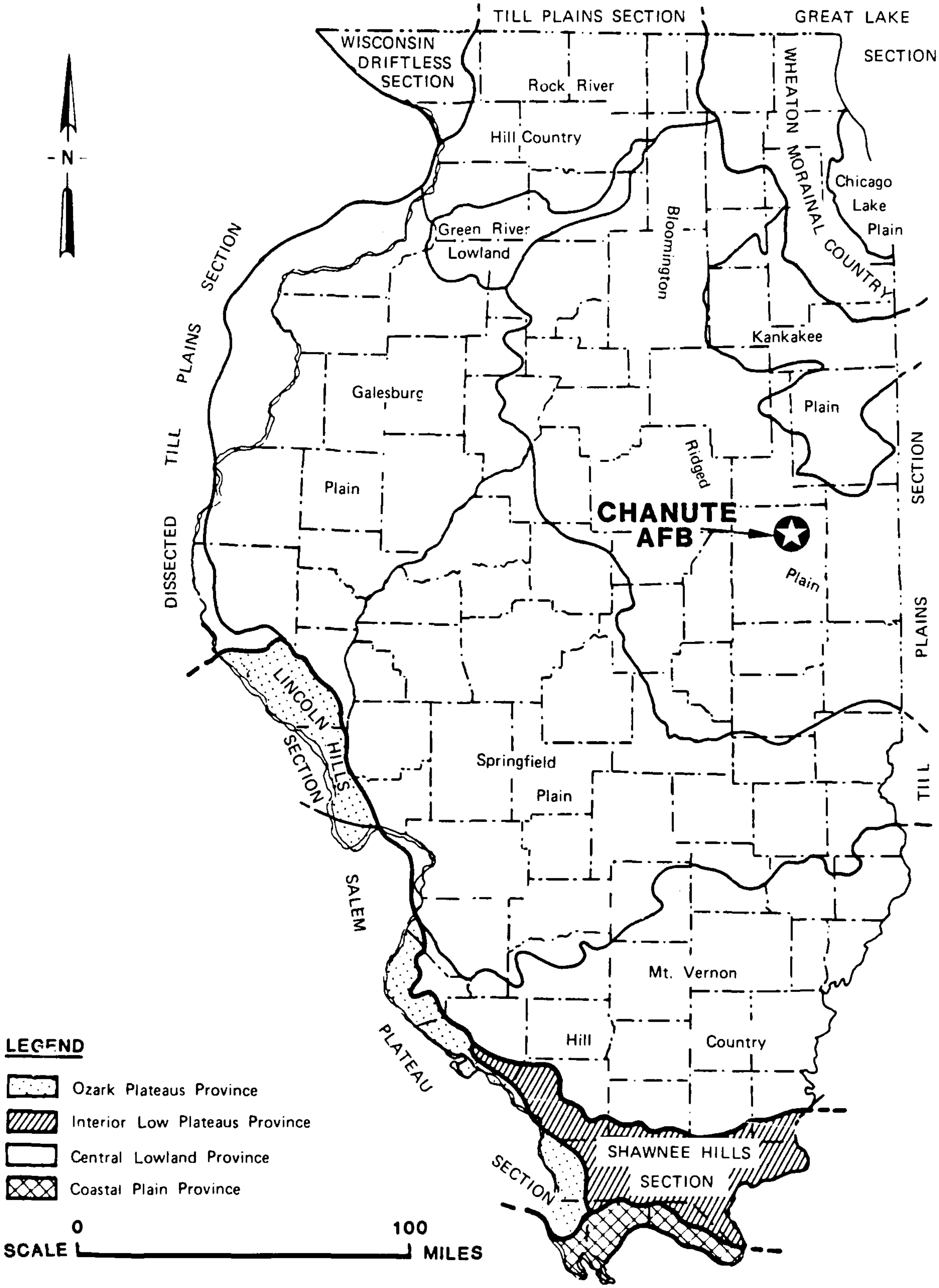
Month	Temperature (°F) Mean Max	Daily Min	Extreme Max	Extreme Min	Precipitation (In.)[1] Monthly Mean	Snowfall (In.)[1] Monthly Mean	Relative Humidity (In.) Monthly Mean
Jan	23.7	8.7	70	-22	1.34	18.5	81
Feb	25.4	10.8	70	-25	1.18	13.7	79
Mar	40.7	26.3	85	-5	3.70	13.1	75
Apr	61.7	41.6	91	15	2.62	0	70
May	69.8	51.2	97	26	4.38	0	69
Jun	83.2	61.9	103	34	1.96	0	70
Jul	83.5	64.0	107	41	5.53	0	69
Aug	81.7	63.0	101	37	5.57	0	72
Sep	82.6	58.8	102	24	1.83	0	68
Oct	63.6	42.2	93	12	1.75	0	69
Nov	63.6	35.7	80	-5	2.26	0.2	76
Dec	37.7	23.4	70	-20	3.39	0.7	80
Annual	58.7	40.6	107	-25	36.07	46.2	73

1) For 33 years of record maximum 24-hour precipitation is 2.49 in. and maximum 24-hour snowfall is 9.4 in.

Source: Installation Documents (Tab D-1), dated 1 Jan 1979, revised 10 May 1983.

CHANUTE AFB

PHYSIOGRAPHIC DIVISIONS



SOURCE: REINERTSEN, ET AL., 1977

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immediately southeast of the base. Both moraines are "Woodfordian" in age, a term used to identify the approximate period of glacial deposition, estimated to be 12,500 - 20,000 years ago. Figure 3.2 shows the base location with respect to the prominent Woodfordian moraines. Locally, ground surface appears level to gently rolling, with little spatial variation apparent.

Topography

Local relief is primarily the result of glacial and erosional processes or due to stream development. Installation elevations range from 715 feet, MSL along the alignment of Salt Fork at the eastern installation boundary to 750 feet, MSL near Building 136.

Drainage

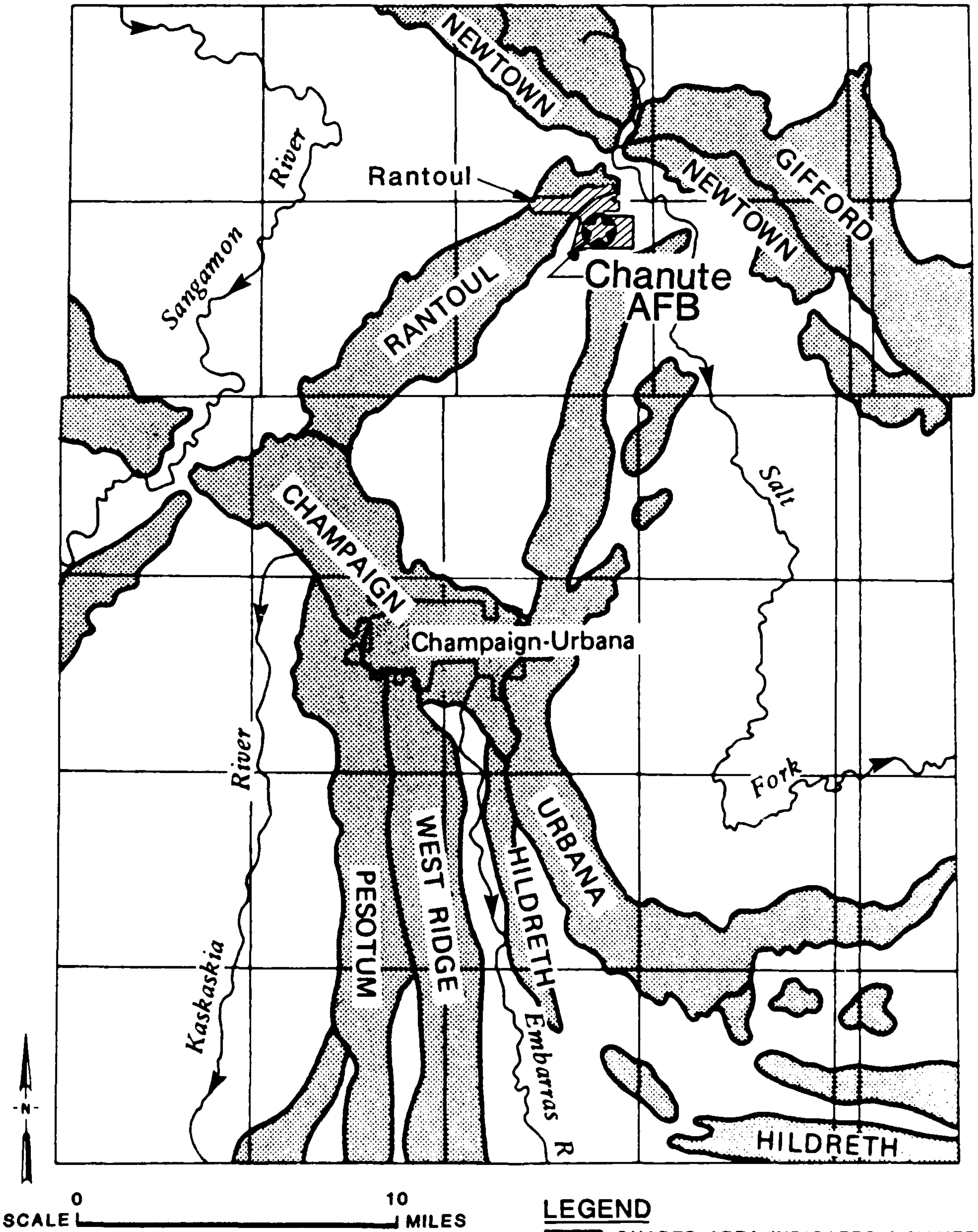
Drainage of installation surface areas is accomplished by a combination of overland flow, ditches, french drains, and sewers. In addition, a 24 inch connection is maintained with the Village of Rantoul storm sewer system at Chanute Street. Nearly all drainage is in a southerly direction, terminating at Salt Fork Creek. Salt Fork Creek then conducts surface flow eastward from the study area to the Upper Salt Fork Drainage Ditch. Figure 3.3 depicts installation surface drainage features. Study area drainage is generally considered to be slow to poor due to the presence of slow-draining soils at ground surface and little local relief (USDA, SCS, 1982).

Surface Soils

Surface soils of Champaign County have been described in a report published by the USDA, Soil Conservation Service (1982). Modern soils found within the study area have formed over loess (wind-blown silt) and glacial materials and are quite variable. Most installation soils are fine-grained and slow-draining in the upper portion of their profile and tend to be sandy and free-draining in the lower section of a typical profile. (A typical profile is sixty inches thick, measured from ground surface). Table 3.2 describes the principal characteristics of the 13 soil types that have been mapped within installation boundaries and Figure 3.4 shows the location of these soils. Eight of the soil units mapped impose severe constraints on the development of waste disposal facilities, primarily due to wetness. All of the units experience a seasonal high water table (less than ten feet below ground surface) and

CHANUTE AFB

STUDY AREA GLACIAL FEATURES



LEGEND

SHADED AREA INDICATES A NAMED MORAINE

SOURCE: SANDERSON AND ZEWDE, 1976

FIGURE 3.3

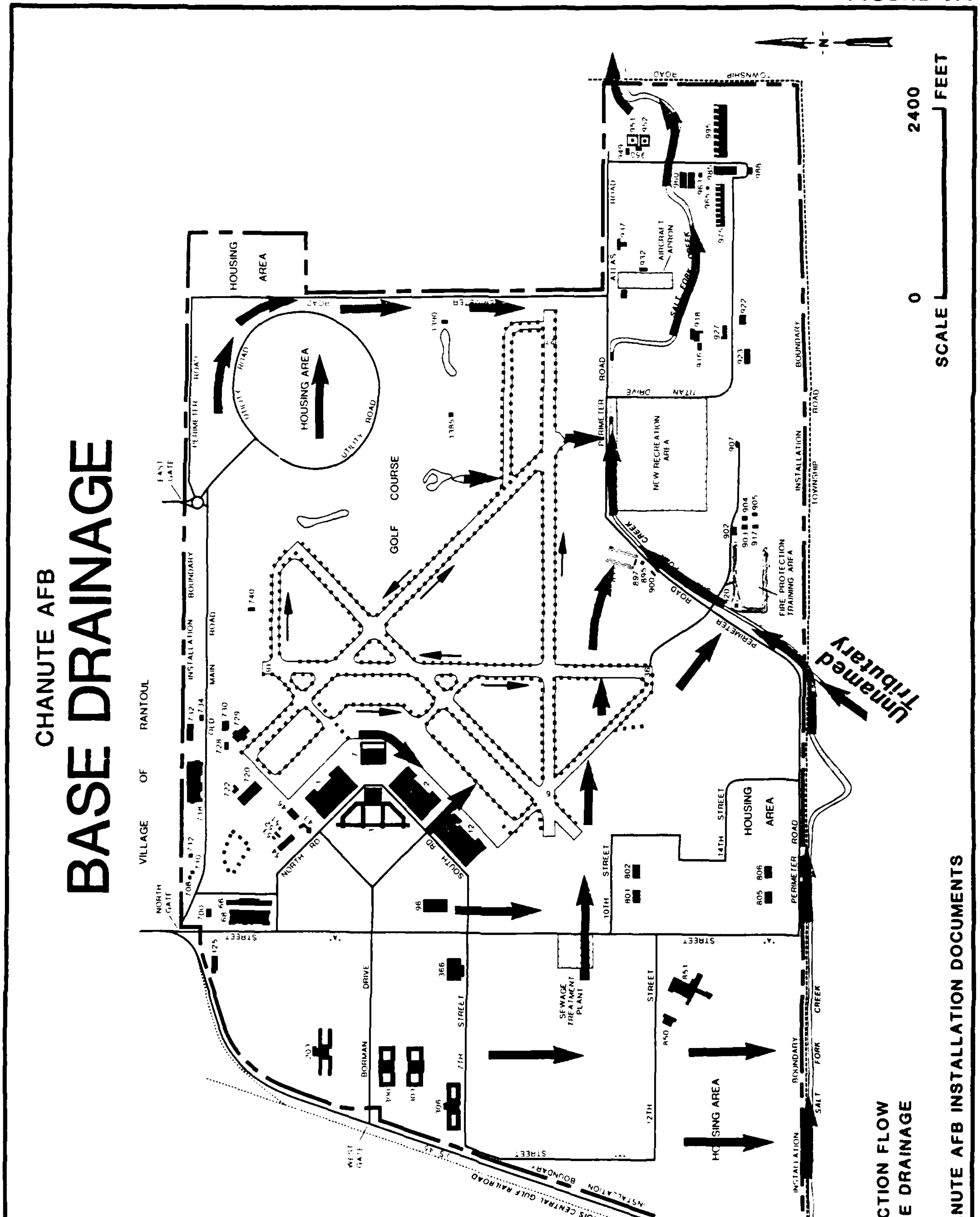
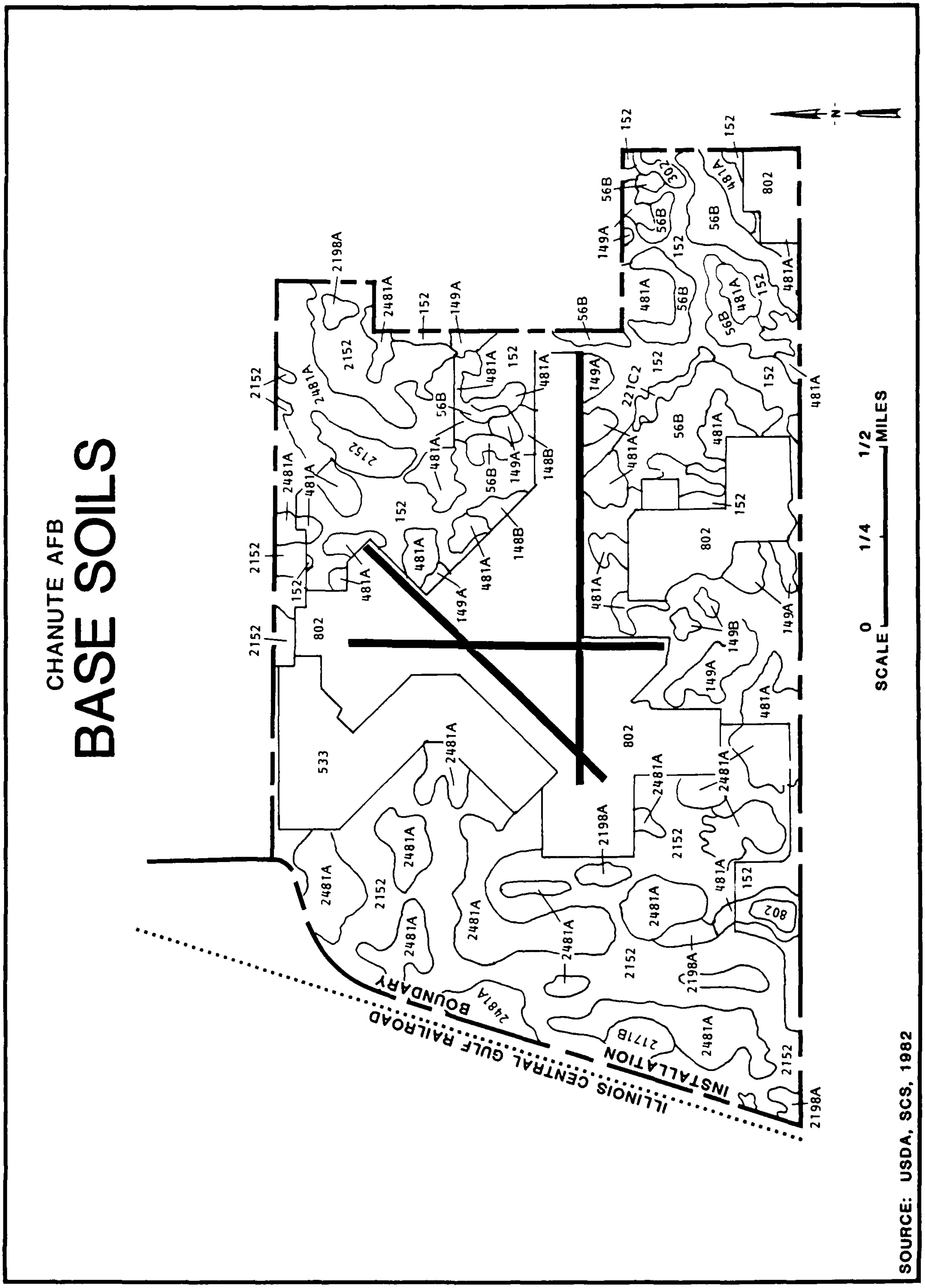

CHANUTE AFB
BASE DRAINAGE
VILLAGE OF RANTOUL
HOUSING AREA
GOLF COURSE
NEW RECREATION AREA
FIRE PROTECTION TRAINING AREA
AIRCRAFT APRON
ATLAS
SALT FORK CREEK
Unnamed Tributary
SEWAGE TREATMENT PLANT
NORTH GATE
EAST GATE
WEST GATE
PERIMETER ROAD
INSTALLATION BOUNDARY ROAD
TOWNSHIP ROAD
OLD MAIN ROAD
UTILITY ROAD
NORTH RD
SOUTH RD
BORMAN DRIVE
TITAN DRIVE
10TH STREET
12TH STREET
14TH STREET
ILLINOIS CENTRAL GULF RAILROAD
SCALE
0
2400
FEET
LEGEND
DIRECTION FLOW
FENCE DRAINAGE
SOURCE: CHANUTE AFB INSTALLATION DOCUMENTS

TABLE 3.2
CHANUTE AIR FORCE BASE SOILS

Map Symbol	Unit Description	USDA Texture (Major Fraction)	Thickness (Inches)	Unified Classification (Major Fraction)	Unit Permeability (Inches/Hour)	Disposal Facility Use Constraints
56B	Dana silt loam, 2-5% slopes	Silt loam, silty clay loam, clay loam.	60	CL, ML	0.6 - 2.0	Slight
148B	Proctor silt loam, 1-5% slopes	Silt loam, silty clay loam, clay loam, sand.	66	CL, SC, SM, SC	0.6 - 6.0	Severe - wetness
149A	Brenton silt loam, 0-3% slopes	Silt loam, silty clay loam, loamy sand.	60	CL, ML, SC	0.6 - 2.0	Severe - wetness
152	Drummer silty clay loam	Silty clay loam, silt loam, clay loam.	60	CL, CH, SC	0.6 - 2.0	Severe - ponding
221C2	Parr silt loam, 5-10% slopes	Silt loam, clay loam, loam	60	CL, ML	0.6 - 2.0	Slight
302	Ambraw silty clay loam	Silty clay loam, clay loam, loam	60	ML, CL, SC, SM	0.2 - 2.0	Severe - flooding
481A	Raub silt loam, 0-3% slopes	Silt loam, silty clay loam, clay loam, loam.	60	CL, CH, ML, SC, SM	0.2 - 2.0	Severe - wetness
533	Urban land	*	*	*	*	*
802	Orthents, loamy	*	*	*	*	*
2152	Drummer - urban land complex, 0 - 2% slopes	Silty clay loam, silt loam, clay loam, loam	60	CL, CH, SC	0.6 - 2.0	Severe - ponding
2171B	Catlin - urban land complex, 2 - 7% slopes	Silt loam, silty clay loam, loam, clay loam	60	ML, CL, CH, OL	0.6 - 2.0	Moderate - wetness
2198A	Elbum - urban land complex, 0 - 3% slopes	Silt loam, silty clay loam, loam, sandy loam, sand.	66	CL, SC, SM, SC	0.6 - 6.0	Severe - wetness
2481A	Raub - urban land complex, 0 - 3% slopes	Silt loam, silty clay loam, clay loam, loam.	60	CL, CH, ML, SC, SM	0.2 - 2.0	Severe - wetness

* Properties not estimated
Source: USDA, Soil Conservation Service, 1982.


CHANUTE AFB
BASE SOILS
ILLINOIS CENTRAL GULF RAILROAD
INSTALLATION BOUNDARY
N
SCALE
0
1/4
1/2
MILES
152
802
56B
302
481A
149A
2198A
2481A
2152
149B
148B
221C2
533
2171B
SOURCE: USDA, SCS, 1982

have moderately slow to moderate permeabilities. Two units, urban land (533) and orthents (802) were not described in Table 3.2, as their profiles have been altered, buried or completely removed locally as a result of extensive site use modifications and base construction.

GEOLOGY

Information describing the geologic setting of the Chanute AFB area has been obtained from Selkregg and Kempton (1950); Willman, et al. (1967 and 1975); Sanderson and Zewde (1976); Reinertsen, et al. (1977); Lineback (1979) and Lineback, et al. (1979). A brief review of their work and pertinent comments have been summarized in the following discussion.

Stratigraphy and Distribution

The geologic units of Champaign County include Paleozoic (major systems range from Silurian through Pennsylvanian) sedimentary rocks and Cenozoic (Quaternary) unconsolidated materials. These units are listed in stratigraphic sequence and are briefly described in Table 3.3. The principal rock stratigraphic unit characteristic of each major chronologic series or group is listed.

Study area surficial geology is dominated by glacial deposits of Wisconsinan age (7,000 to 75,000 years ago). Their distribution relative to Chanute Air Force Base is shown in Figure 3.5. In many areas of Champaign County, the uppermost glacial deposits are covered by a thin mantle of loess. The loess varies from two to four feet in thickness across the county and may be absent locally (Selkregg and Kempton, 1958). It is significant because most modern soils of the county have formed in this layer. Daily and Associates (1982) report that the loess layer is three to six feet thick in the vicinity of the former base wastewater lagoons.

Three major glacial stratigraphic units have been described in the study that are relevant to this discussion. They are alternately identified in the literature by their chronological occurrence: Wisconsinan, Illinoian and Kansan stages, or by their respective geological descriptors: Wedron, Glasford and Banner Formations. The individual formations are further subdivided into "members", a term used to delineate sections of a unit having unique lithologies that were deposited

TABLE 3.3

GEOLOGIC UNITS OF CHAMPAIGN COUNTY, ILLINOIS

GLACIAL DRIFT SECTION

TIME STRATIGRAPHY			PRINCIPAL ROCK STRATIGRAPHIC UNITS		GRAPHIC LOG	DESCRIPTION OF UNITS
QUATERNARY SYSTEM	PLEISTOCENE SERIES	HOLOCENE STAGE	Cahokia Alluvium			Mostly water-laid silt and sand, local gravel
		WISCONSINAN STAGE	WEDRON Fm. (15-140 ft)	Snyder till mbr		Gray clayey, silty till, NE part of county only; local sand and gravel at base and at till margin
				Batestown till mbr		Gray silty till, thin local sand at base
				Glen Burn till mbr		Grayish brown, thin, sandy, silty till. Locally thin basal sand
			Robein Silt			Organic silt "soil"
		SANGAMONIAN STAGE	GLASFORD Fm. (10-155 ft)	Berry Clay mbr		Thin silty clay "soil"
		ILLINOIAN STAGE		Radnor till mbr		Gray, silty till, locally thin lenses of sand and gravel
				Vandalia till mbr		Brownish gray, sandy till, locally extensive sand and gravel at top and bottom
				Smithboro till mbr		Dark brown, dark gray silty till
		YARMOUTHIAN STAGE	BANNER Fm. (0-240 ft)	Lierle Clay mbr		Thin, silty clay "soil"
		KANSAN STAGE		Tilton till mbr		Brownish gray, sandy silty till
				Hillery till mbr		Brown, reddish brown silty till
				Harmatton till mbr		Gray, olive gray silty till
				Hegeler till mbr		Greenish gray silty till
				Mahomet Sand		Fine, medium sand in upper part, grading to medium to coarse sand and gravel, locally coarse at base

UPPER BEDROCK SECTION

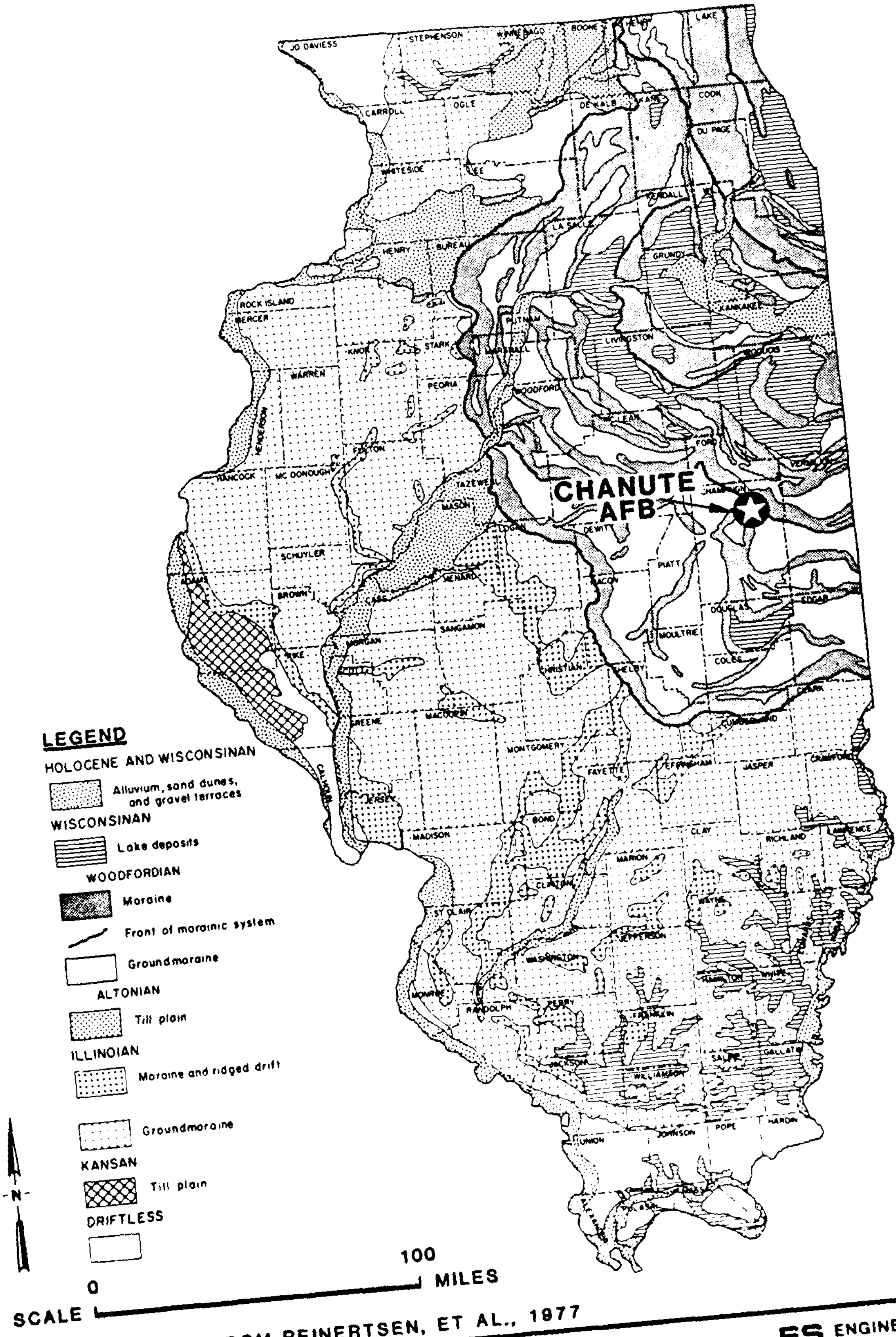
TIME STRATIGRAPHY: SYSTEM	TIME STRATIGRAPHY: SERIES OR GROUP	PRINCIPAL ROCK STRATIGRAPHIC UNITS	GRAPHIC LOG	DESCRIPTION OF UNITS
PENNSYLVANIAN	McLEANSBORO GROUP	0-630 ft		Mainly shale with thin sandstone, limestone, coal beds
	KEWANEE GROUP	0-350		
	McCORMICK GROUP	0-200		
MISSISSIPPIAN	CHESTERIAN SERIES	0-150		Shale, limestone, and sandstone
	VALMEYERAN SERIES	Ste. Genevieve Fm St. Louis Fm 0-170		Limestone
		Borden Fm 0-700		Limestone with intermediate shale, cherty in lower part
	KINDERHOOKIAN SERIES	0-100		Shale
DEVONIAN	UPPER SERIES MIDDLE SERIES	0-180		Shale and limestone
SILURIAN	NIAGARAN SERIES	0-600		Dolomite and limestone
	ALEXANDRIAN SERIES	0-25		

SOURCE: SANDERSON AND ZEWDE, 1976

FIGURE 3.5

CHANUTE AFB

SURFICIAL GEOLOGY OF ILLINOIS



SOURCE: MODIFIED FROM REINERTSEN, ET AL., 1977

ES ENGINEERING-SCIENCE

during a specific time interval. The lithologies of the glacial deposits include cobbles, gravel, sand, silt and clay, frequently occurring as "till". a somewhat dense, homogeneous mixture of particle sizes. Some of the formations include members composed partially of discreet sand and gravel layers. Only the Mahomet Sand of the Banner Formation (Kansan Stage) is composed principally of sand and gravel.

Study area bedrock consists primarily of Devonian age shale and limestone (Willman, et al., 1967). The distribution of bedrock units in the study area is illustrated in Figure 3.6.

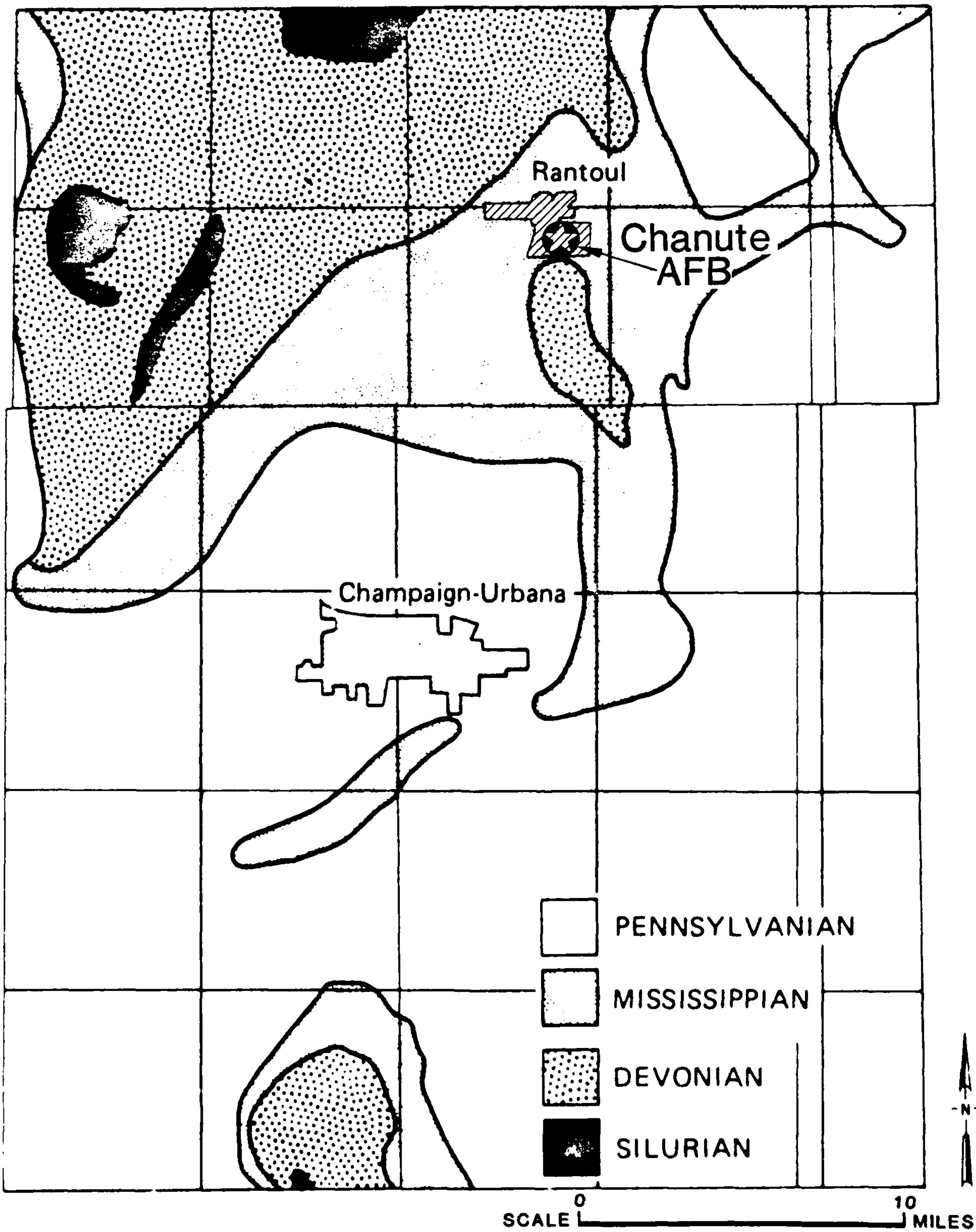
Structure

The structural relationships of study area geologic units is unique and has a direct bearing on their occurrence and character. One major structural feature is the LaSalle Anticlinal Belt, a narrow band along which the bedrock units have been folded upward into a ridge. The belt extends from Ogle County in northern Illinois to Wabash County in the southeast part of the state. It occurs approximately two miles west of Chanute Air Force Base. Prior to the deposition of glacial debris in the study area, a major regional drainage system developed. As a result of this, the bedrock surface was severely eroded into clearly definable valleys which extend across Illinois. One of the most significant of such erosional surfaces, called the Mahomet Valley, extends across Champaign County just northwest of the base. The location of the anticlinal belt and the axes (deepest part) of the region's bedrock valleys with respect to the installation area are shown in Figure 3.7. Chanute is located along the southeast wall of the Mahomet Valley. Glacial deposits are approximately 290-300 feet thick at Chanute AFB, due to its position above the now buried bedrock valley. The relatively "clean" (i.e.: few fine-particled sediments such as silts and clays) sands and gravels of the Mahomet Sand are concentrated in this valley area at the lower extent of glacial materials. Figure 3.8, a structural block diagram of the study area illustrates these significant features. The figure shows that the three major Pleistocene units appear to occur as relatively flat-lying sheets of unconsolidated deposits in chronological succession.

According to Chanute AFB well logs (obtained from the files of the Illinois State Water Survey) the Wedron Formation (Wisconsinan Stage,

CHANUTE AFB

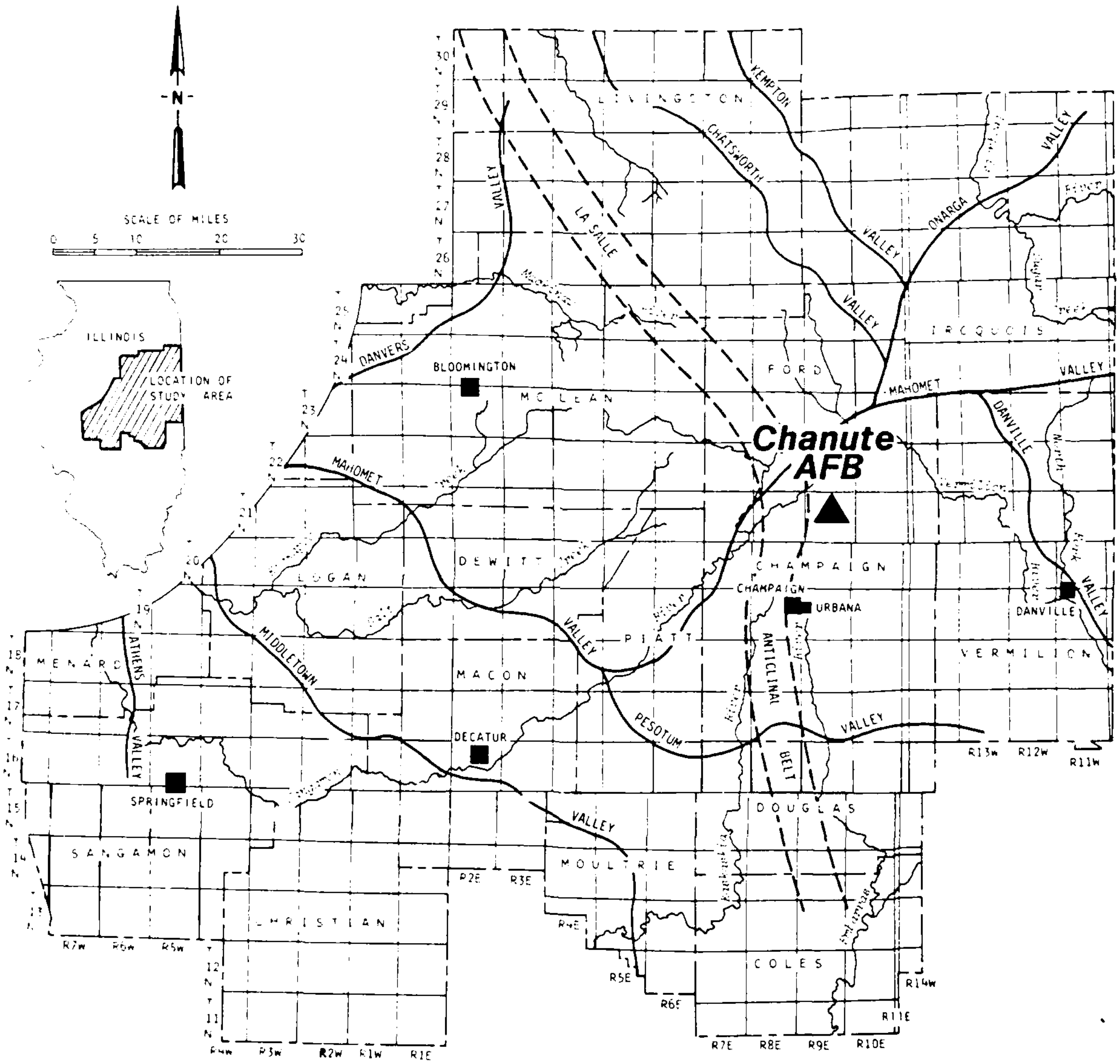
STUDY AREA BEDROCK GEOLOGY



SOURCE: MODIFIED FROM SANDERSON AND ZEWDE, 1976

CHANUTE AFB

STUDY AREA STRUCTURAL GEOLOGY



LEGEND

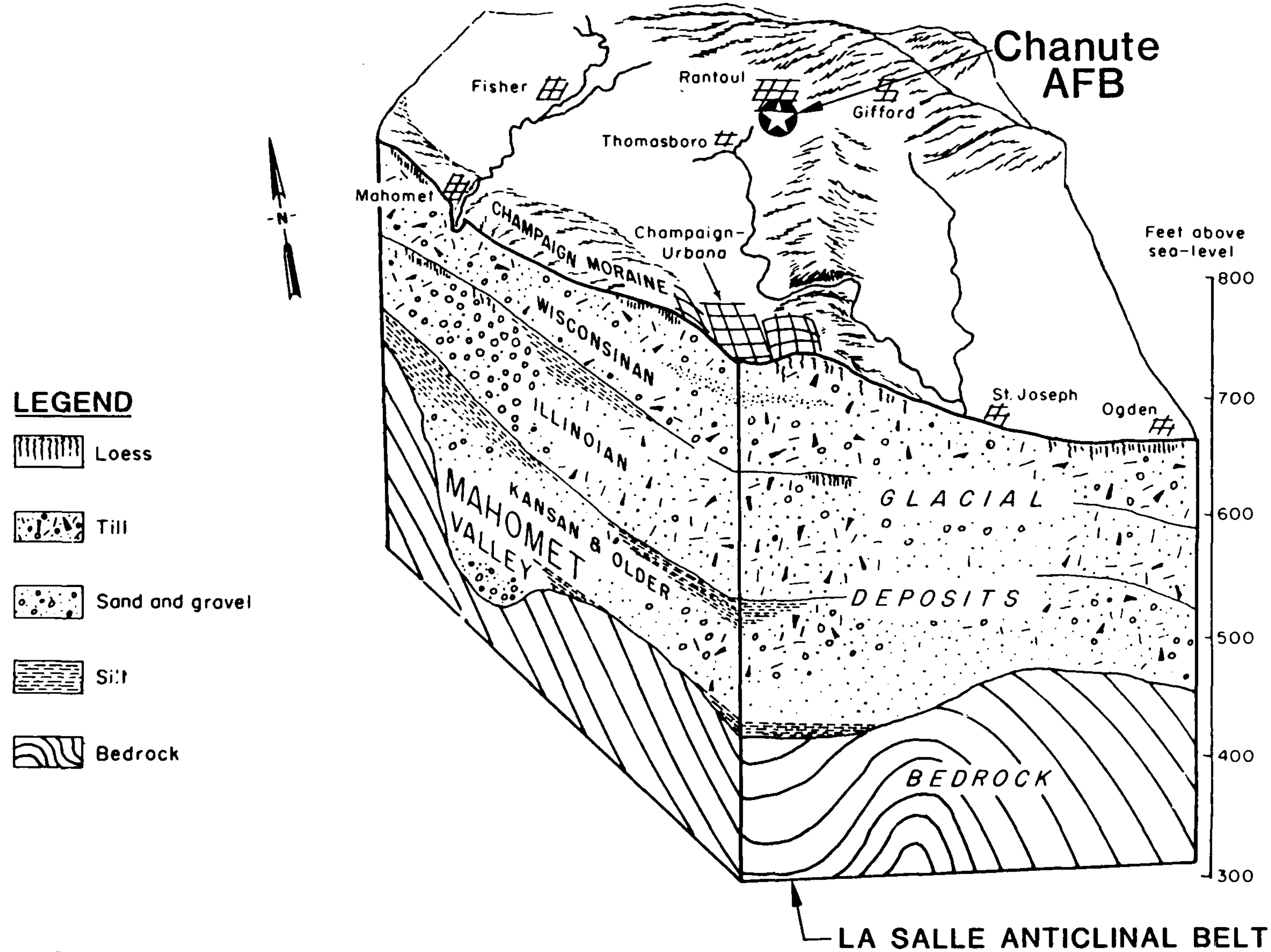
APPROXIMATE AXIS OF BEDROCK VALLEY

LIMITS OF ANTICLINAL BELT

SOURCE: VISOCKY AND SCHICHT, 1969

FIGURE 3.8

CHANUTE AFB
STUDY AREA BLOCK DIAGRAM



SOURCE: REINERTSEN, ET AL., 1977

youngest deposits) is approximately 70 feet thick. The next unit, the Glasford Formation (Illinoian Stage) is approximately 130 feet thick and the oldest unit, the Banner (Kansan Stage) is some 100 feet thick, below the installation.

GROUND-WATER HYDROLOGY

Information describing the hydrology of the project area has been obtained from Selkregg and Kempton (1958); Csallany (1966); Visocky and Schicht (1969); Theodosis (1973); Woller (1975); Sanderson and Zewde (1976); Burris, et al. (1981) and Kempton and Morse (1982). Additional data has been obtained from an interview with an Illinois State Water Survey hydrologist (Appendix B).

Chanute AFB lies in northern Champaign County where several major hydrogeologic units have been identified. The units of particular interest to this investigation include the following:

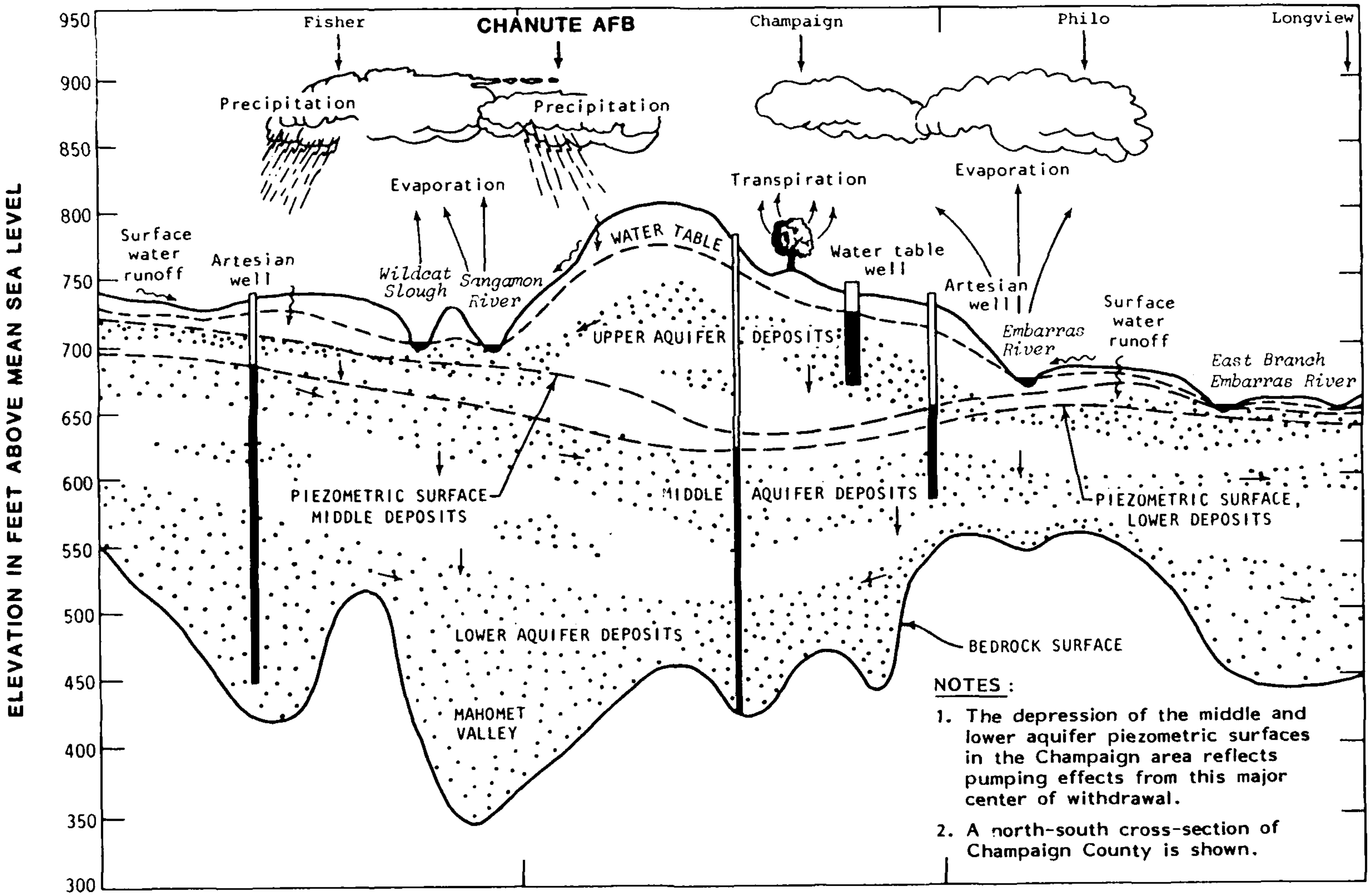
- o Upper glacial deposits: Wedron Formation (Wisconsinan)
- o Middle glacial deposits: Glasford Formation (Illinoian)
- o Lower glacial deposits: Banner Formation (Kansan)
- o Bedrock (Devonian sedimentary rocks)

Occurrence and Movement

Precipitation is the primary source of water entering the project area (Sanderson and Zewde, 1976). Although a portion of rainfall is lost as runoff directed to area streams or as evapotranspiration, a major percentage infiltrates downward until it reaches a level in the upper glacial materials where all available voids between soil particles are water-filled. Ground water moving through these upper glacial materials may be discharged either as base flow to area streams or as recharge to lower aquifers. Water occurring in deeper water-bearing units may be confined by overlying geologic units which can create artesian conditions. Figure 3.9 illustrates the hydrologic cycle of Champaign County and the relationships of the major features pertinent to this study. The water levels shown in the figure are successively lower in elevation for each succeeding aquifer. This indicates that water continues to move downward, recharging each aquifer in order. The

CHANUTE AFB

HYDROLOGIC CYCLE OF CHAMPAIGN COUNTY



NOTES:

1. The depression of the middle and lower aquifer piezometric surfaces in the Champaign area reflects pumping effects from this major center of withdrawal.
2. A north-south cross-section of Champaign County is shown.

SOURCE: SANDERSON AND ZEWDE, 19 6

rate with which ground water may move through the study area hydrologic system may range from a few hundred feet per year in unconsolidated materials to only a few feet per year in rock (Sanderson and Zewde, 1976). The actual rate of ground-water movement is influenced by gravity, pressure differences and the permeability of the geologic materials through which it moves.

Upper Glacial Deposits

Sand and gravel deposits contained in the Wedron Formation form the Wisconsinan aquifer (uppermost) in the Chanute area. The water-bearing sands and gravels occur as either scattered pockets or enclosed sheds in less permeable strata. The Wedron, which occurs at ground surface in the study area, is about 70 feet thick in its total sequence beneath the installation. The Wisconsinan aquifer is recharged by precipitation falling on exposed portions of the unit. Chanute Air Force Base is situated in a recharge area for this unit. Water occurs in this unit under generally unconfined conditions at depths ranging from 5 to 25 feet below ground surface. Locally, seasonally perched water table conditions may exist at or near ground surface. Daily and Associates (1982) report ground-water depths of about six feet below land in the vicinity of the former wastewater lagoons. Water levels may fluctuate from 5 to 8 feet seasonally (Sanderson and Zewde, 1976). Figure 3.10 indicates that ground water is present some 15 feet below land surface in the study area (seasonal average). Figure 3.11 depicts upper glacial aquifer water elevations and estimated flow directions with respect to Chanute Air Force Base.

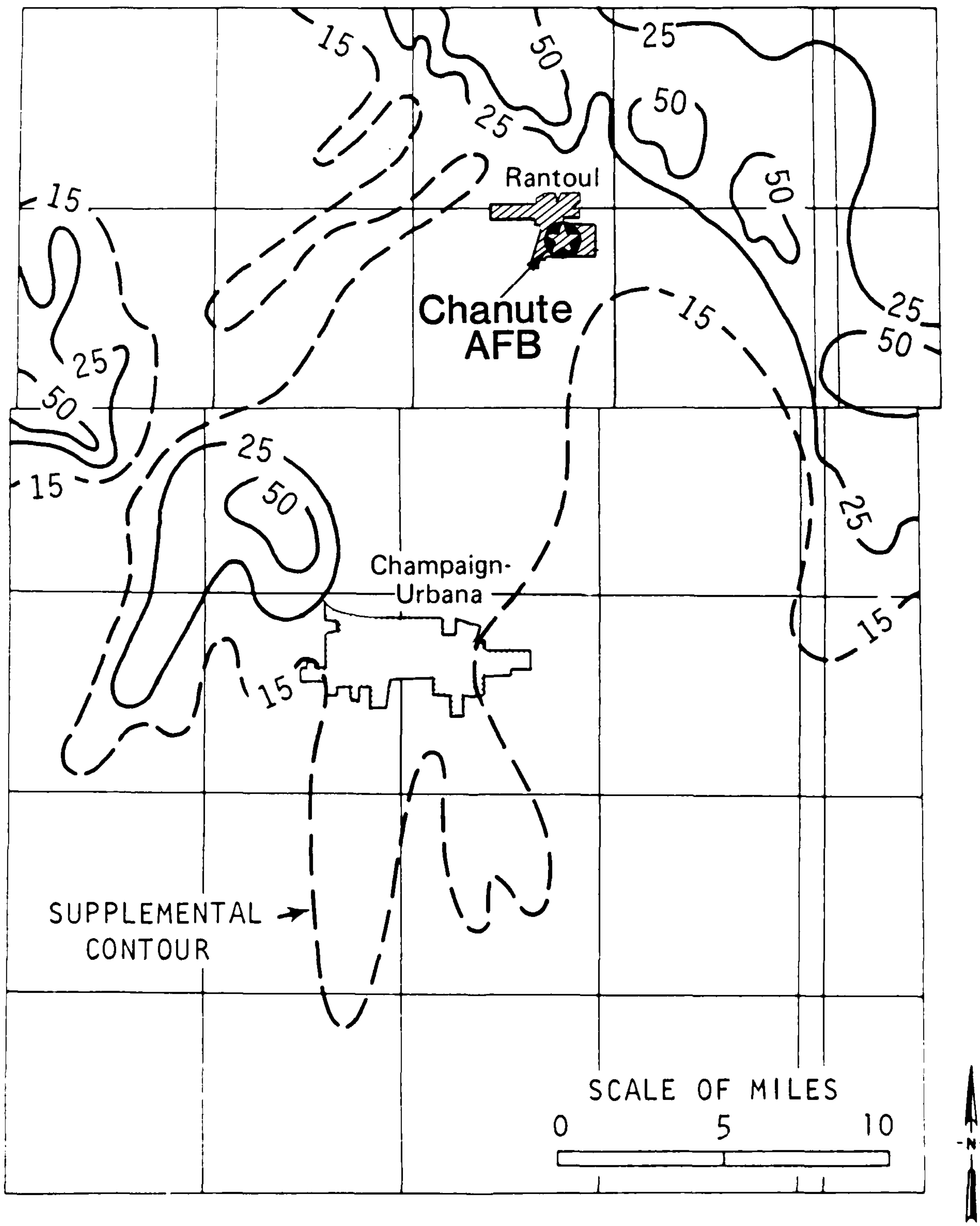
Water yields of wells tapping this unit range from 3 to 60 gallons per minute. The large variation in yields may be due to the inconsistent nature of the aquifer, as the most transmissive sand and gravel layers tend to thicken and pinch out over relatively short land distances. Wells bored or drilled into this aquifer range from 25 to 100 feet in depth in the vicinity of southern Rantoul (Sanderson and Zewde, 1976).

Middle Glacial Deposits

The middle glacial deposits of the Glasford Formation (Illinoian) underlie the upper deposits. The aquifers present in the two glacial deposits are separated by a sandy clayey silt confining layer estimated

CHANUTE AFB

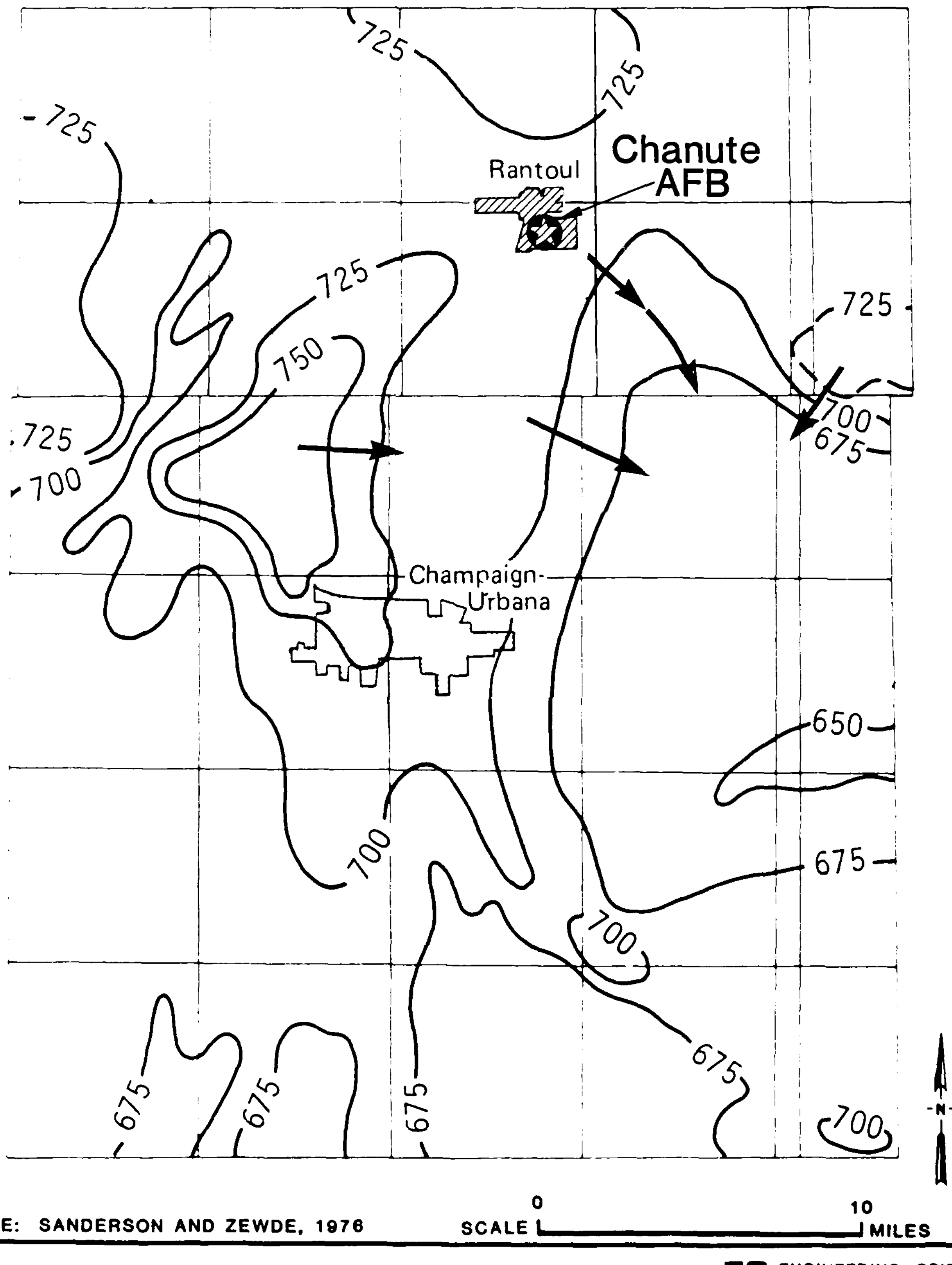
DEPTH TO GROUND WATER IN UPPER GLACIAL DEPOSITS



SOURCE: SANDERSON AND ZEWDE, 1976

CHANUTE AFB

UPPER GLACIAL AQUIFER WATER ELEVATIONS AND FLOW DIRECTIONS



SOURCE: SANDERSON AND ZEWDE, 1976

to be 50 to 100 feet thick in the vicinity of Chanute AFB. The confining layer has been shown to be both leaky and discontinuous in Champaign County (Visocky and Schicht, 1969).

Nearly continuous sand and gravel layers probably corresponding to the Vandalia Till Member occur within the Glasford and form the Illinoian aquifer. The Illinoian aquifer occurs at depths ranging from 75 to 125 feet below land surface in the Rantoul area (Sanderson and Zewde, 1976). Water occurs in this unit under generally confined conditions. The depth to water contained in the Illinoian aquifer is shown in Figure 3.12 and generalized ground-water elevations and flow directions are shown in Figure 3.13. Thicker sand and gravel sections of this aquifer are capable of producing up to 800 gallons per minute.

Lower Glacial Deposits

The Mahomet Sand of the Banner Formation forms the Kansan, or lower glacial aquifer. The Kansan underlies the Illinoian aquifer and is separated from it by a leaky, discontinuous confining layer some 40 feet thick (regional estimate from Visocky and Schicht, 1969). The Kansan aquifer usually occurs some 200 feet below land surface and averages 60 feet in thickness at Chanute (Theodosis, 1973). Water occurs in the unit under generally confined conditions. Figure 3.14 depicts the depth to water below land surface in the Kansan aquifer. Figure 3.15 illustrates generalized water elevations and flow directions in this aquifer.

During periods of heavy Kansan pumpage, Kansan and overlying Illinoian aquifer water levels decline and stablilize at nearly common elevations. This suggests that the deep and middle aquifers may act as a single hydraulic unit during periods of large-scale withdrawals (Visocky and Schicht, 1969). Such conditions may occur at Chanute AFB.

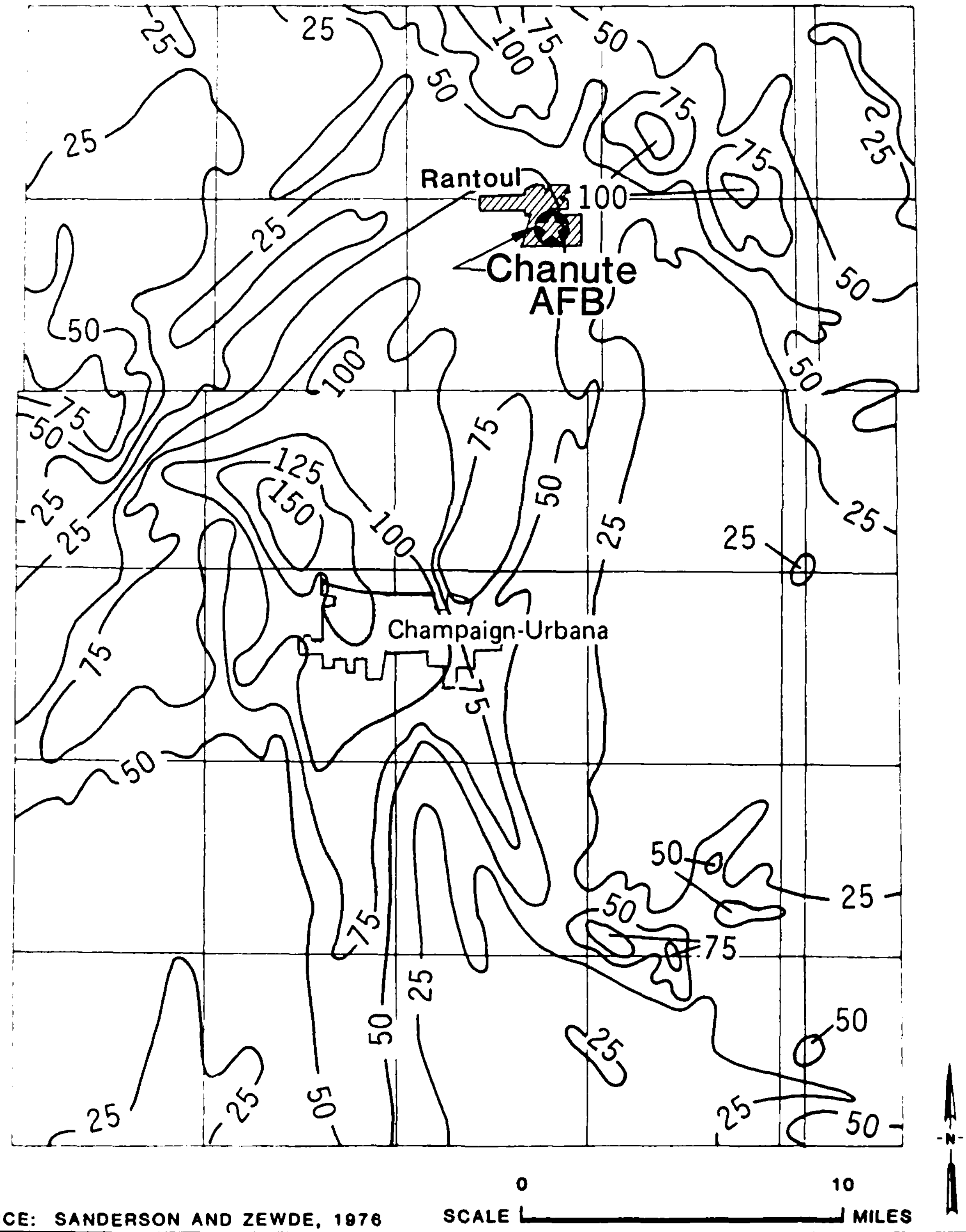
The Kansan or lower glacial aquifer is the most prolific aquifer of the region. It is capable of producing yields of 3500 gallons per minute.

Bedrock

Devonian age sedimentary rocks contain water in fractures, fissures, along bedding planes and crevices at depths below land surface of 300 feet or more. Because the water resources of rock aquifers are usually undependable and most often highly mineralized, rock wells are

CHANUTE AFB

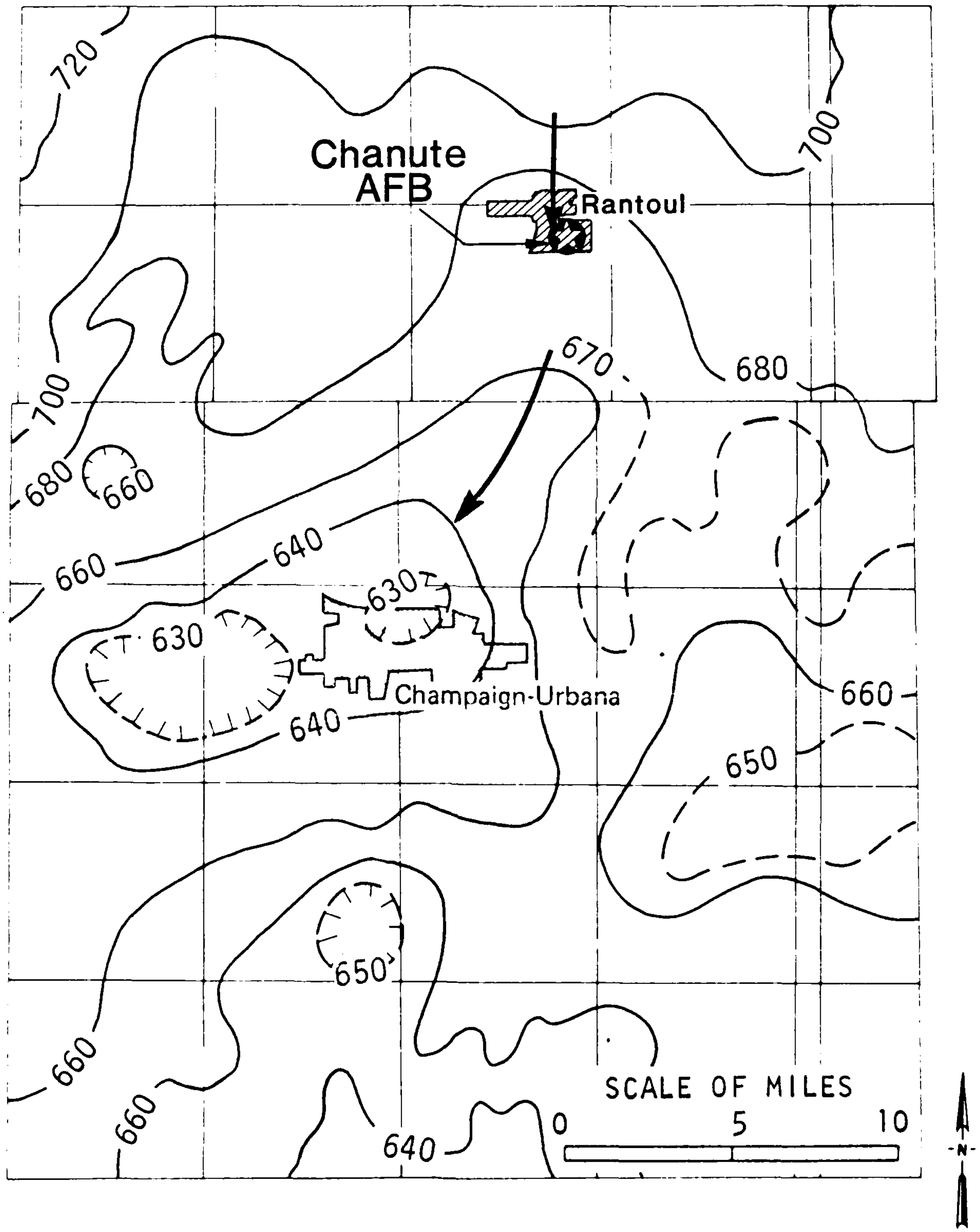
DEPTH TO GROUND WATER IN MIDDLE GLACIAL DEPOSITS



SOURCE: SANDERSON AND ZEWDE, 1976

CHANUTE AFB

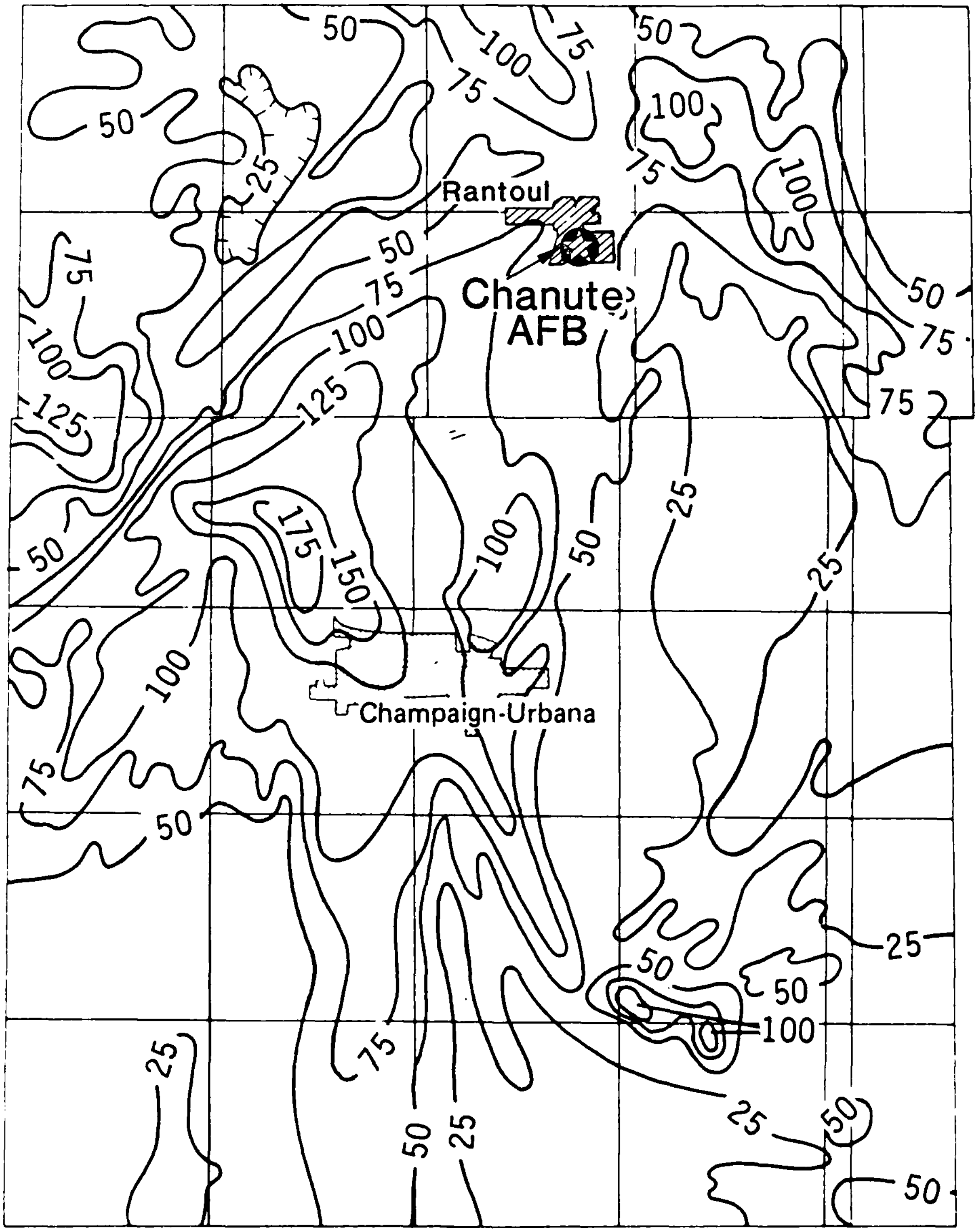
MIDDLE GLACIAL AQUIFER WATER LEVELS AND FLOW DIRECTIONS



SOURCE: SANDERSON AND ZEWDE, 1976

CHANUTE AFB

DEPTH TO GROUND WATER IN LOWER GLACIAL DEPOSITS



SOURCE: SANDERSON AND ZEWDE, 1976 SCALE 0 10 MILES

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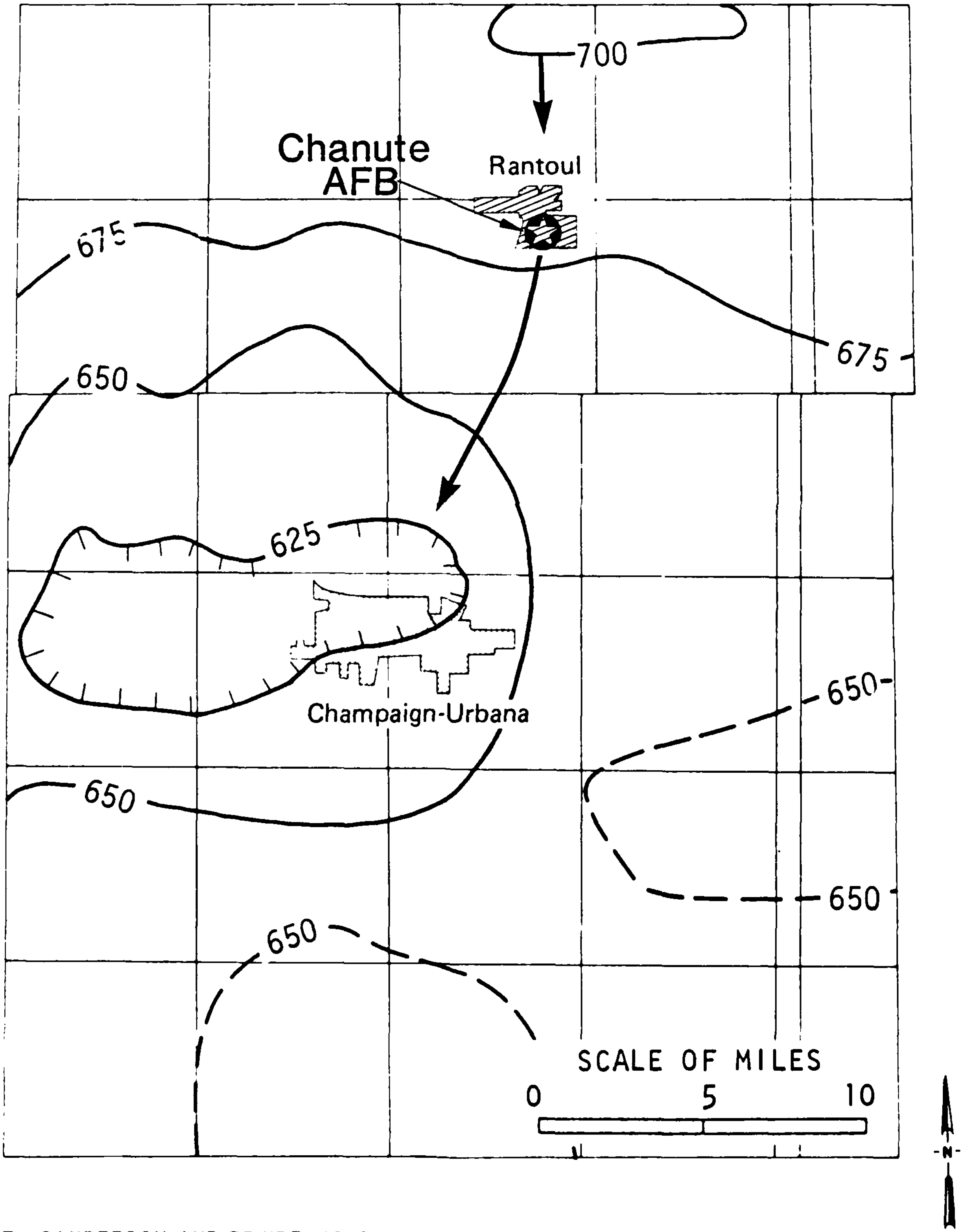
FIGURE 3.15

CHANUTE AFB

LOWER GLACIAL AQUIFER WATER LEVELS AND FLOW DIRECTIONS



SOURCE: SANDERSON AND ZEWDE, 1976

rarely constructed in the study area and no data is available to describe rock aquifer characteristics in the vicinity of the base.

Water Use

Project area ground-water use data, obtained from Sanderson and Zewde (1976) are summarized in Table 3.4. This information indicates that the most heavily utilized aquifer in Champaign County is the lower glacial (Kansan - Mahomet Sand) unit, due to its favorable characteristics that permit large-scale water resource development. The middle glacial (Illinoian) unit is favored as a source of water supplies by county domestic and agricultural consumers. The upper glacial deposits are reported to be utilized by some twenty-nine percent of all county consumers (1976 data).

Water Quality

Water resources obtained from glacial aquifers throughout Champaign County are typically hard (250 to 600 milligrams per liter as $CaCO_3$) and possess iron levels of 1.0 to 5.0 milligrams per liter (Sanderson and Zewde, 1976). These natural constituents may be removed by local or municipal treatment facilities.

Nitrates and bacterial contamination have been found in some shallow wells, apparently contaminated by nearby septic tanks, feedlots and pastures. This suggests the ease with which shallow ground-water supplies may be contaminated by surface activities.

The bedrock aquifer is considered to be a source of poor quality ground water in Champaign County. Chloride, sulfate and sodium are reported to be present in concentrations high enough to preclude the use of bedrock as a source of potable water supplies (Sanderson and Zewde, 1976).

Base Wells

Chanute Air Force Base derives its water resources from a supply system based on nine deep wells, all screened into the lower glacial deposits (Kansan aquifer) described previously. The base supply system is cross-connected with the Rantoul municipal water system. Figure 3.16 is a hydrogeologic section drawn through the installation depicting base well information. Base static water levels averaged 70 feet below ground surface for the Kansan aquifer (Theodosis, 1973). The locations of installation water supply wells are shown in Figure 3.17.

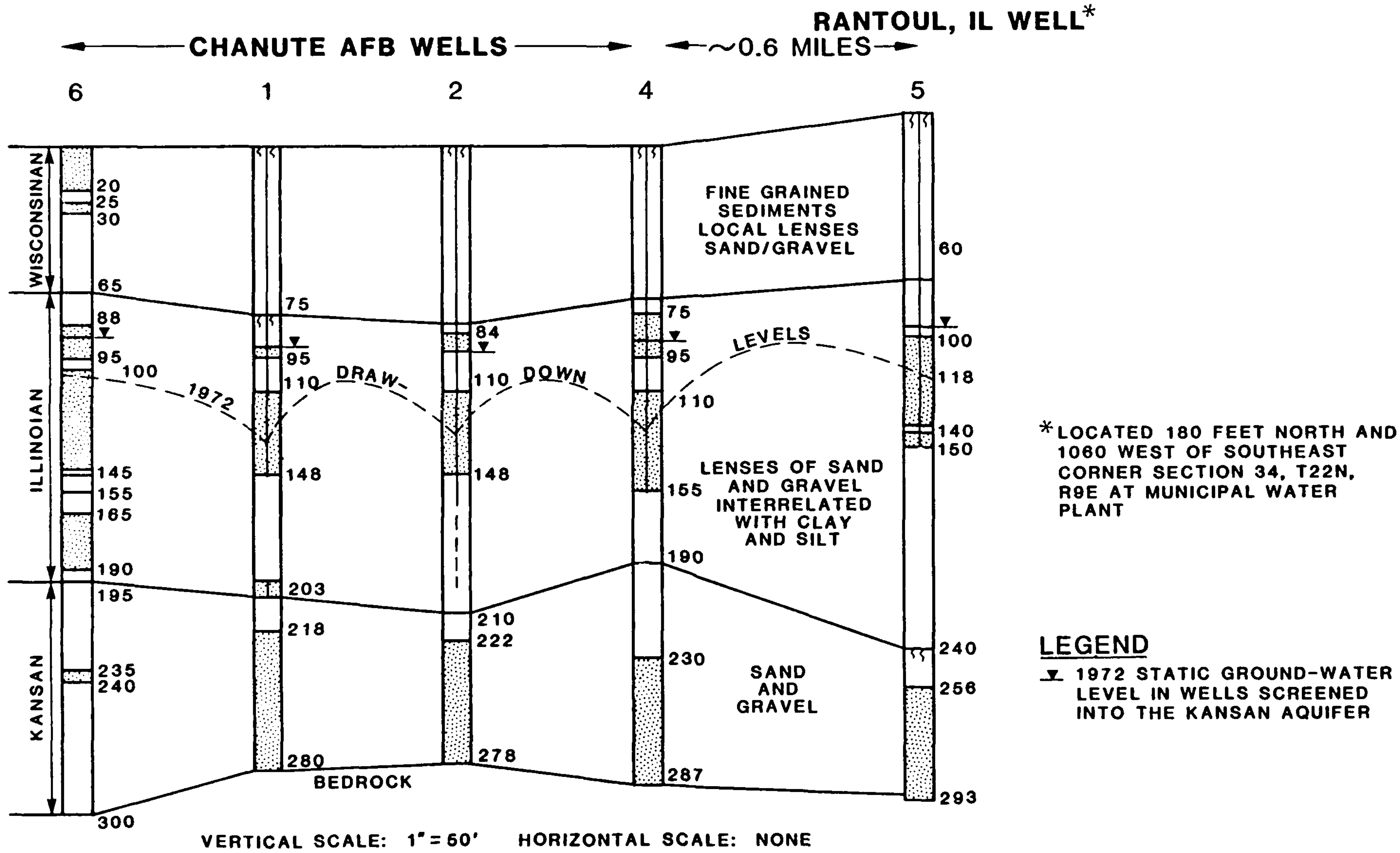
TABLE 3.4
CHAMPAIGN COUNTY GROUND-WATER USE

Aquifer	Percent of Total Consumers		Estimated Production (mgd)
	Domestic/Farm	Municipal	
Upper Glacial	29	0.5	0.5
Middle Glacial	55	12.5	3.1
Lower Glacial	16	87	19.6
Bedrock	-	-	-

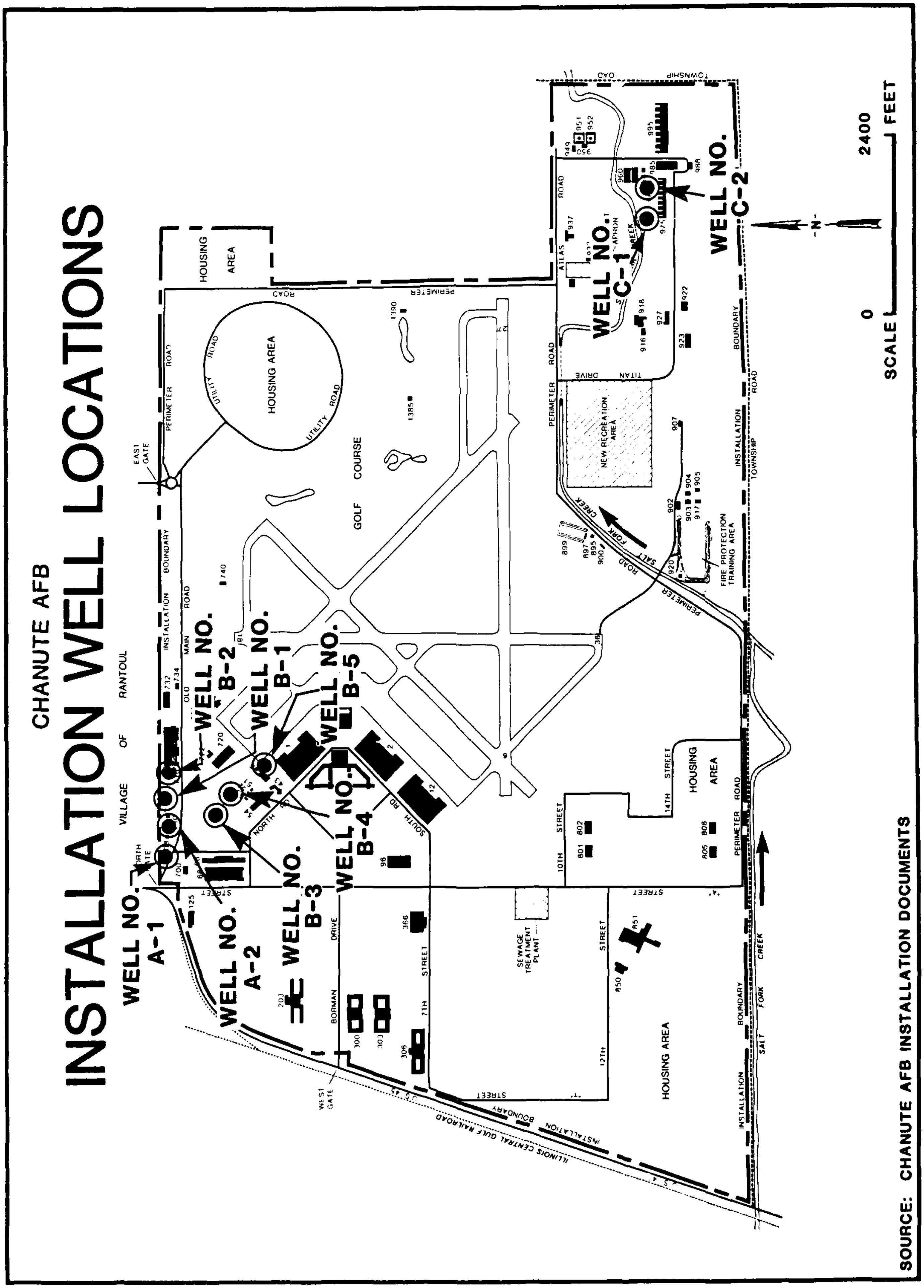
Source: Sanderson and Zewde, 1976

CHANUTE AFB

HYDROGEOLOGIC CROSS-SECTION



SOURCE: MODIFIED FROM THEODOSIS, 1973


CHANUTE AFB
INSTALLATION WELL LOCATIONS
WELL NO. A-1
WELL NO. A-2
WELL NO. B-1
WELL NO. B-2
WELL NO. B-3
WELL NO. B-4
WELL NO. B-5
WELL NO. C-1
WELL NO. C-2
VILLAGE OF RANTOUL
HOUSING AREA
GOLF COURSE
NEW RECREATION AREA
FIRE PROTECTION TRAINING AREA
SEWAGE TREATMENT PLANT
EAST GATE
WEST GATE
NORTH GATE
PERIMETER ROAD
INSTALLATION BOUNDARY
OLD MAIN ROAD
UTILITY ROAD
TITAN DRIVE
ATLAS ROAD
APRON
SALT FORK CREEK
TOWNSHIP ROAD
ILLINOIS CENTRAL GULF RAILROAD
BORMAN DRIVE
NORTH RD
SOUTH RD
7TH STREET
10TH STREET
12TH STREET
14TH STREET
SCALE
0
2400
FEET
N
SOURCE: CHANUTE AFB INSTALLATION DOCUMENTS

Area Wells

The Village of Rantoul obtains water supplies from a municipal distribution system supplied by five wells. Three wells are screened into the Illinoian deposits and two wells into the Kansan aquifer. The system is centered around the municipal water treatment plant, located approximately 0.6 mile northwest of the base. The Village of Rantoul furnishes water to over 3,000 connections.

A second municipal water distribution system is located at the Urban Estates mobile home park, immediately south of the base. This municipal system utilizes two wells, screened into the Middle (Illinoian) aquifer.

A survey of the lands immediately adjacent to Chanute AFB on the south and east indicate that eight dwellings and one church are located near the installation boundary. These consumers are not connected to the Rantoul municipal water distribution system and therefore derive water supplies from individual wells. The study of area water well data furnished by the Illinois State Water Survey indicate that the Middle (Illinoian) aquifer is favored as a source of water supplies by individual consumers located near the Air Force base. The locations of study area municipal and domestic wells are shown in Figure 3.18.

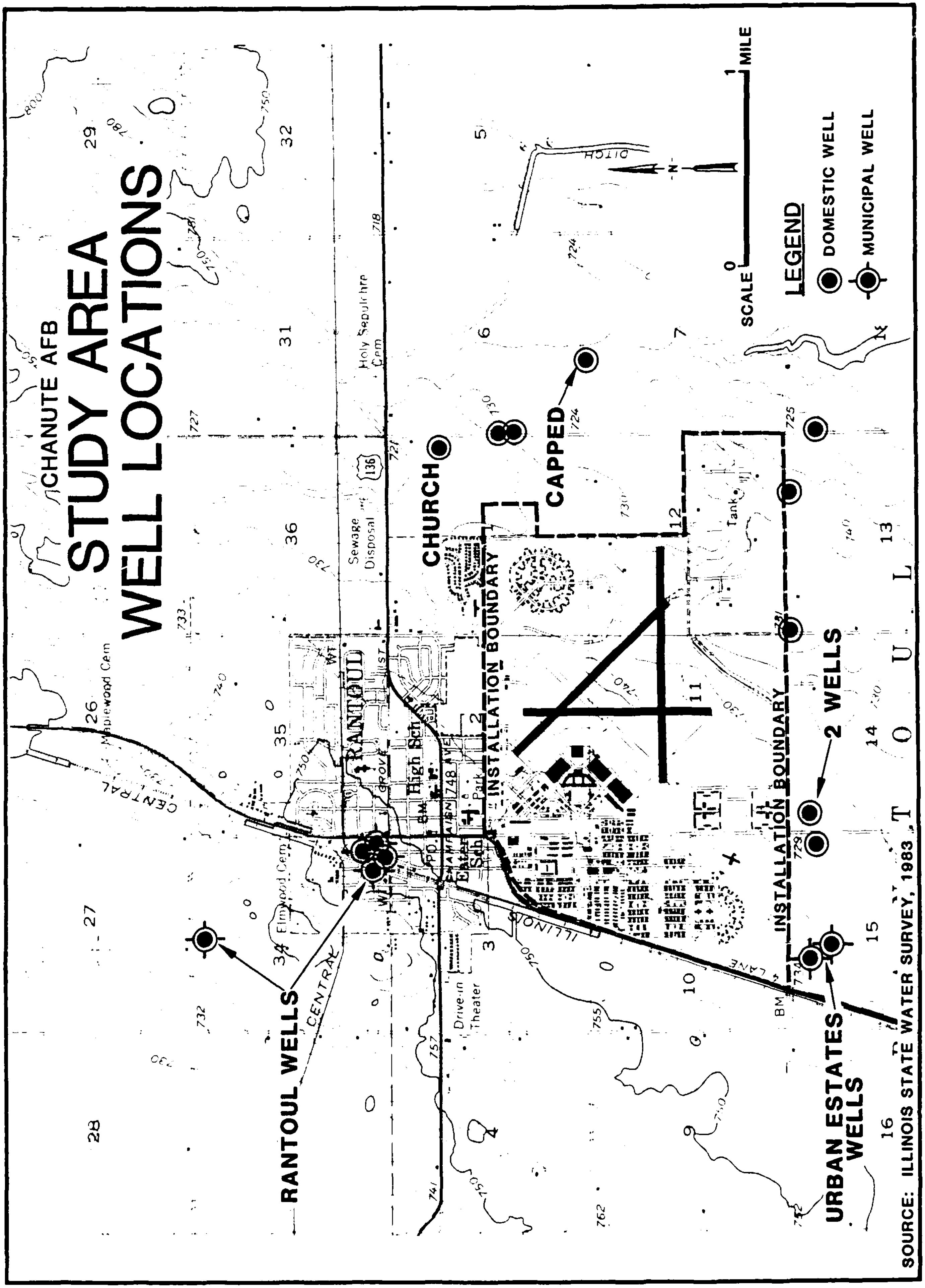
SURFACE WATER

Hydrology

Essentially all base drainage goes to Salt Fork Creek which passes through the southeastern part of the installation. In addition, about 70 percent of the wastewater produced by Chanute is discharged from two treatment plants to the creek. The watershed upstream of the base is relatively small and consists primarily of agricultural land (see Figure 3.18). USGS maps show Salt Fork Creek to be an intermittent stream until where it and an unnamed tributary enter the base (southern boundary); then it is shown as a perennial watercourse.

Intense rainfall may cause local flooding in low areas on base until such time as drainage structures and other surface features permit temporarily impounded water to dissipate. Interviews with base personnel indicate overland runoff to be a more significant problem than

FIGURE 3.18


CHANUTE AFB
STUDY AREA
WELL LOCATIONS
RANTOUL WELLS
CHURCH
CAPPED
INSTALLATION BOUNDARY
2 WELLS
URBAN ESTATES WELLS
RANTOUL
LEGEND
DOMESTIC WELL
MUNICIPAL WELL
SCALE
0
1 MILE
N
SOURCE: ILLINOIS STATE WATER SURVEY, 1983

flooding within Salt Fork Creek. No data is available to define the 100-year or other flood levels in Salt Fork Creek at the base.

Salt Fork Creek is classified a "General Use" stream by the Illinois Environmental Protection Agency. A "General Use" stream classification provides for agriculture use, primary and secondary contact use, aquatic life and most industrial uses. Other Illinois stream classifications provide for water supply and secondary contact/aquatic life.

Water Quality

Surface water sampling is routinely conducted at six points on the base. Surface water sampling locations are shown in Figure 3.19. Appendix D summarizes available data for these monitoring points. Sampling results show water quality generally to be within the levels required for "General Use" waters. However, there have been occasional slightly elevated levels of copper, chromium and mercury. Some of these parameters exceed the state "General Use" standards in the creek before it enters the base.

THREATENED AND ENDANGERED SPECIES

There are no known threatened or endangered plants on the base. While some threatened and endangered animals have been known to reside in the Chanute vicinity, there have been no recent observations of any on the installation.

SUMMARY OF ENVIRONMENTAL SETTING

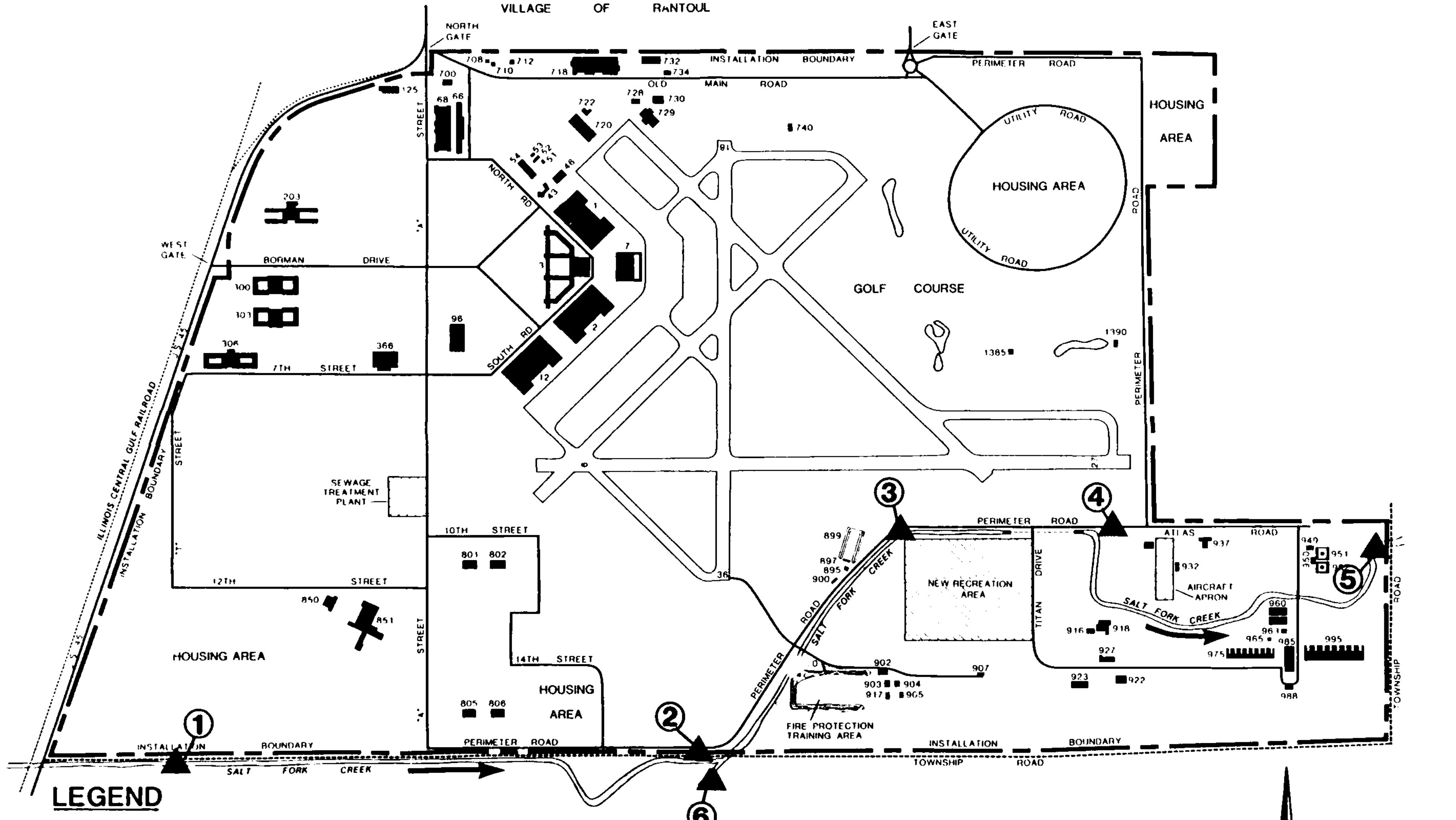
The environmental setting data reviewed for this investigation indicate that the following elements are relevant to the evaluation of past hazardous waste management practices at Chanute Air Force Base:

- The mean annual precipitation is 36 inches and net precipitation is calculated to be 4.5 inches.
- Flooding is not normally a problem at the base.
- Base surface soils are fine-grained, slow draining and slowly permeable at the top of a typical soil profile. Soils become sandier, quicker draining and more permeable with depth.

FIGURE 3.19

CHANUTE AFB

BASE SURFACE WATER SAMPLING LOCATIONS



LEGEND

① CREEK BELOW TRAILER PARK 24-IN. PIPE
② CREEK BEFORE CONFLUENCE
③ OUTFALL SEWER CARRYING TREATMENT PLANT EFFLUENT AND STORM DRAINAGE
④ STORM DRAINAGE PIPE OUTLET
⑤ CREEK
⑥ CREEK BEFORE CONFLUENCE

SCALE 0 — 2400 FEET

SOURCE: CHANUTE AFB INSTALLATION DOCUMENTS

- A shallow aquifer underlies the base and is present at or near ground surface. The depth to the permanent water table in this aquifer is about 10 to 15 feet below land surface. Smaller perched water bearing zones may be present locally or on a seasonal basis.
- The base is located in the recharge zone of the shallow aquifer.
- Two aquifers of regional significance underlie the shallow aquifer at the base. They receive recharge from the overlying shallow aquifer. The regional aquifers furnish water supplies to the base, the Village of Rantoul, Urban Estates municipal distribution systems and the homes and farms proximate to the installation.
- Water quality in Salt Fork Creek normally meets established standards for the Illinois General Use classification.
- No threatened or endangered plant and animal species have been observed recently on the base.

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 shallow aquifer and subsequently to the two deeper regional aquifers.

SECTION 4

FINDINGS

This section summarizes hazardous wastes generated by installation activities, identifies disposal sites located on base, and evaluates the potential environmental contamination. Past waste generation and disposal methods were reviewed to assess hazardous waste management at Chanute Air Force Base.

REMOTE ANNEXES REVIEW

A review of file data and interviews with base employees was carried out to identify past activities at the Chapman Court and Paxton Recreation Area annexes that could have resulted in disposal of hazardous waste. Neither of these annexes was found to have significant waste generation or disposal activities, past or present.

PAST BASE ACTIVITY REVIEW

A review was made of past and present base activities that resulted in generation and disposal of hazardous waste. Information was obtained from files and records, interviews with past and present base employees, and facility inspections.

It is noted that file data and interviews did not enable determination of waste handling activities prior to about 1940. From the historical descriptions of the training activities at the base, it is believed that the generation of hazardous materials was probably small. In addition, many of the currently known hazardous chemicals were developed during and after World War II. In any event, it appears likely that at least some wastes in the pre-1940 era went to Landfill Site 1 (discussed later).

Hazardous waste sources at Chanute AFB are grouped into the following:

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

The following discussion addresses only those wastes generated on Chanute AFB which are either hazardous or potentially hazardous. In this discussion a hazardous substance is defined by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), except that it does not exclude materials such as waste oils and liquid fuels which are of concern for Air Force operations. 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)

The industrial operations at Chanute AFB can be divided into five major units as follows:

1. 3345th Air Base Group
2. Resource Management
3. USAF Hospital
4. 3330th Technical Training Wing
5. Tenant Activities

Within each unit are various branches and offices, many of which use and/or generate hazardous materials. In order to identify those which handle hazardous materials and/or generate hazardous waste, a review was made of the Bioenvironmental Engineering (BEE) Services Division shop files. The results of this file review are shown in Appendix E, Master List of Industrial Shops.

For those shops identified as handling hazardous material or generating hazardous waste, key personnel were interviewed. A timeline of disposal methods was established for major wastes generated. The information from the interviews with base personnel and base records is summarized in Table 4.1. This table shows the shop name and building

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)
3345 AIR BASE GROUP				
3345 SERVICES DIVISION	801	2-CHLOROPHENOL	1-3 GALS./YR.	1950 LANDFILL (confirmed) → 1974 DPDO (confirmed)
		ACETONE	1-3 GALS./YR.	LANDFILL (confirmed) → DPDO (confirmed)
		TRICHLOROETHENE	180 GALS./YR.	SANITARY SEWER (estimated → confirmed, continuing)
3345 CIVIL ENGINEERING SQUADRON				
ELECTRIC SHOP	55	CREOSOTE/POWER POLES	0.2 LB./POLE	BURNED IN FPTA 1983 →
		MERCURY VAPOR	3 LBS./YR.	LANDFILL (confirmed) → DPDO (confirmed, continuing)
EXTERIOR ELECTRIC	724	TRANSFORMER OIL	UNKNOWN	LANDFILL (estimated → confirmed) → DPDO (confirmed, continuing)
PAVEMENTS AND GROUNDS	66	ETHYL ETHER	18 LBS./YR.	LANDFILL (confirmed) → DPDO (confirmed, continuing)
		TRICHLOROETHYLENE OR NAPHTHA	36 GALS./YR.	DPDO (estimated → confirmed, continuing)
ENTOMOLOGY	43	PESTICIDES	RESIDUAL	APPLIED TO GROUND IN 900 AREA (estimated) → USED WITH RINSEWATER FOR DILUTION OR TO GROUND (confirmed, continuing)
PAINT SHOP	55	PAINT RESIDUE CONT'G. TOLUENE, METHYL ETHYL KETONE, XYLENE	72 GALS./YR.	DPDO (estimated → confirmed, continuing)

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

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

FPTA - FIRE PROTECTION TRAINING AREA

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

TABLE 4.1 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

2 of 6

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 – 1960 – 1970 – 1980)
3345 MORALE, WELFARE, RECREATIONAL DIVISION				
CLUBS	349, 269 AND 589	FORMALDEHYDE, 1, 1, 1 - TRICHLOROETHANE, CYCLOHEXANONE	120 LBS./YR.	1960 LANDFILL (estimated) → DPDO
AUTO HOBBY SHOP	519	WASTE OIL AND TRANSMISSION FLUID	600 GALS./YR.	1950 (estimated) → DPDO
3345 SECURITY POLICE SQUADRON				
SECURITY POLICE SQUADRON	66	DRY-CLEANING SOLVENT	30 GALS./YR.	1955 LANDFILL AND 900 AREA DITCHES → DPDO
		CARBON REMOVING COMPOUND	5 GALS./YR.	LANDFILL AND 900 AREA DITCHES → 1974 DPDO
3345 CENTRAL BASE ADMINISTRATION				
REPRODUCTION MANAGEMENT BRANCH	23	TETRACHLOROETHENE	24 LBS./YR.	LANDFILL AND 900 AREA DITCHES → DPDO
RESOURCE MANAGEMENT				
3345 CONSOLIDATED MAINTENANCE SQUADRON				
SRAM	12	THINNER, ACETONE, MEK, NAPHTHA, ISOPROPANOL, WD-40, CLEANING COMPOUND, FREON, BORIC ACID, KOH, TRIETHYLENETETRAMINE, PD-680	12 GALS./YR.	1950 (estimated) → DPDO

KEY

——— CONFIRMED TIME-FRAME DATA BY SHOP PERSONNEL

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

FPTA - FIRE PROTECTION TRAINING AREA

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

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
3345 CONSOLIDATED MAINTENANCE SQUADRON (CONT'D)				
AGE	720	WASTE ENGINE OIL (30 WT)	420 GALS./YR.	1950 DPDO
		SOLVENT	240 GALS./YR.	DPDO
		HYDRAULIC FLUID	240 GALS./YR.	DPDO
		WASTE JET ENGINE OIL	240 GALS./YR.	DPDO
CORROSION CONTROL	720	THINNER	180 GALS./YR.	DPDO
		ACETONE	180 GALS./YR.	DPDO
		PAINT REMOVER	120 GALS./YR.	DPDO
ELECTRIC/BATTERY SHOP	720	SULFURIC ACID	72 GALS./YR.	DPDO
PNEUDRAULICS	720	JP-4	50 GALS./YR.	BURNED IN FPTA; 1978 BURNED IN ENVIRONMENTAL TURBINE ENGINE ON FLIGHT LINE
		LUBE OIL	1 QT./YR.	1970 USED IN MACHINE: NO RESIDUAL
		SOLVENT (PD-680)	55 GALS./YR.	BURNED IN FPTA; 1980 DPDO
		HYDRAULIC FLUIDS	200 GALS./YR.	BURNED IN FPTA; DPDO FROM BARREL IN HANGAR 4
REPAIR AND RECLAMATION	720	ANDERSON SYNTHETIC LUBE	10 GALS./YR.	CO-DISPOSED WITH AGE WASTES

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

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

FPTA - FIRE PROTECTION TRAINING AREA

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

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
3345 CONSOLIDATED MAINTENANCE SQUADRON (CONT'D)				
TRAINER EQUIPMENT/ENGINE BRANCH	1	ENGINE OIL	12 GALS./YR.	1950 - - - - - DPDO ——→
TRANSPORTATION DIVISION				
GENERAL PURPOSE MAINTENANCE VEHICLE MAINTENANCE	729	OILS AND LUBRICANTS	3000 GALS./YR.	- - - PART BURNED IN LANDFILL, PART BURNED IN FPTA ——→ 1977 DPDO; DRUMS IN CMS STORAGE AREA ——→
		SOLVENTS IN TUBES	24 LBS./YR.	- - - LANDFILL ——→ 1974 DPDO ——→
USAF HOSPITAL CHANUTE				
CENTRAL SUPPLY	851	XYLENE	12 GALS./YR.	1960 - - - - - DPDO ——→
3330 TECHNICAL TRAINING WING				
3340 TECHNICAL TRAINING GROUP				
METALS TECHNOLOGY BRANCH	1	NAPHTHALENE	110 GALS./YR.	- - - - - DPDO - - - ——→
		EMULSFIER	220 GALS./YR.	- - - - - DPDO - - - ——→
AUTOMOTIVE MECHANICS BRANCH	2	METHANOL	150 GALS./YR.	- - - - - DPDO - - - ——→

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

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

FPTA - FIRE PROTECTION TRAINING AREA

DPDO - DEFENSE PROPERTY DISPOSAL OFFICE

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)
3350 TECHNICAL TRAINING GROUP				
JET ENGINE BRANCH	96, 937	METHYL ETHYL KETONE	12 GALS./YR.	1950 DPDO
		METHYL ISOBUTYL KETONE	60 GALS./YR.	DPDO
3370 TECHNICAL TRAINING GROUP				
AGE/EGRESS BRANCH	68	NAPHTHA	55 GALS./YR.	DPDO
		DRY CLEANING SOLVENT	50 GALS./YR.	DPDO
FUELS BRANCH	932	FUEL	50 GALS./YR.	BURNED IN FPTA; DPDO
CRYOGENICS, FUELS BRANCH	923/927	TRICHLOROETHYLENE	55 GALS./YR.	1960 DPDO FROM SUMP
FUEL SPEC, FUELS BRANCH	922	PETROLEUM ETHER	60 GALS./YR.	DPDO FROM UNDERGROUND FUEL WASTE TANK
FUELS SYSTEM MAINTENANCE	995	PD-680	2 GALS./YR.	DPDO FROM UNDERGROUND FUEL WASTE TANK
		TRICHLOROETHYLENE	24 GALS./YR.	DPDO FROM UNDERGROUND FUEL WASTE TANK

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

- - - - ESTIMATED TIME FRAME DATA BY SHOP PERSONNEL

FPTA - FIRE PROTECTION TRAINING AREA

DPDO DEFENSE PROPERTY DISPOSAL OFFICE

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
VISUAL SERVICES DIVISION				
PHOTO LAB VISUAL SERVICES DIVISION	505	1, 1, 2 TRICHLOROETHANE	1 3 GALS./YR.	LANDFILL → DPDO
		1, 2, 2 TRIFLUOROETHANE	1-3 GALS./YR.	LANDFILL → DPDO
		PD-680 TYPE 2	3 GALS./YR.	DPDO →
GRAPHIC ARTS BRANCH, VISUAL SERVICES DIVISION	1	MERCURY (LAMPS)	3 LBS./YR	LANDFILL → DPDO →
		SOLVENT MIXTURES	96 LBS./YR.	LANDFILL → DPDO →

KEY

——— CONFIRMED TIME FRAME DATA BY SHOP PERSONNEL

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

FPTA - FIRE PROTECTION TRAINING AREA

DPDO DEFENSE PROPERTY DISPOSAL OFFICE

location, the waste materials, quantities, and the disposal method timelines.

Until 1964, many waste oils, solvents, greases, hydraulic fluids, and fuels were burned in the various landfills operating at the base or at the fire department fire protection training area (FPTA). In 1964, many of these materials were then burned at the new technical school FPTA on the base. Beginning in 1974, the landfills on the base were closed and disposal of those materials was performed through the Defense Property Disposal Office (DPDO) by off-base contractors.

Pesticide Utilization

Pest and weed control has been an on-going program at Chanute Air Force Base for many years. Prior to about 1952, the Entomology Shop handled all pesticide activities, including those involving herbicides, insecticides, and rodenticides, with the exception of the golf course, which has traditionally maintained its own weed and pest control activities. From about 1952 until 1979, the Entomology Shop handled pesticides activities and Roads and Grounds handled all herbicide activities. Since 1979, the Entomology Shop has again been responsible for all pesticides (herbicides, insecticides, and rodenticides) with the exception of those used on the golf course. Traditionally all pesticides activities have been performed by base personnel; recently two exceptions have arisen. First, since early 1983, the dining hall insect control program has been performed by an outside contractor, and second, beginning in 1983 broadleaf weed control was performed by an outside contractor.

The Entomology Shop has been located in numerous buildings. Location information for the years prior to 1952 was not readily available. During the 1950's, the Entomology Shop was located in Buildling 705 and later in Building 54. During the 1960's, the shop was located in an abandoned sewage treatment plant (Building 965, now demolished), and during the mid-1960's was moved to its present location in Building 43. The Road and Grounds Shop during the 1950's was located first in the original Building S-1, now demolished, and later in the motor pool area near the site of present Building 730. In the early 1960's the shop moved to Building 125, and in the early 1970's to Building 66. In 1983 it moved to Building 732. The Golf Course Maintenance Shop has been located in Building 740 during the period of record. Storage for each of the shops has been as follows:

- o Entomology Shop - Building 45
  Building 1390 (past five years)

- o Road and Grounds Shop - Building 975

- o Golf Course Maintenance Shop - Building 1385
  Building 975

The pesticide program entails both routine and specfic job-order spraying. Several types of spraying equipment are used, including two-gallon hand-held compressed air sprayers, high-pressure truck-mounted sprayers, a ULV (ultra low volume) truck-mounted fogger, and portable high-pressure sprayers. Vehicle cleaning occurs at the golf course wash rack; the collected water from this operation is discharged to the storm drain.

A listing of the pest and weed control chemicals presently used is contained in Appendix D. This appendix contains information for both the Entomology Shop and the Golf Course Maintenance Shop, and includes data on the years of use and storage location. A current Entomology Unit inventory is also contained in Appendix D. Standard procedures include mixing and using all pesticides immediately; on occasion mixed pesticides may be kept in sprayer containers overnight, but are used the following day. Pesticide mixing with water is performed in the Entomology Shop for portable equipment and on-site for truck-mounted units, using water from fire hydrants. An attempt is made to purchase all pesticides in containers of five gallon capacity or less so that rinsing and disposal of containers can occur without undue effort. Presently all empty pesticide containers are triple-rinsed, punctured or crushed, and disposed along with the base refuse. The container rinse water is used in mixing the pesticides for use. Tanks are normally drained after use into a five gallon holding tank at the Entomology Shop; the holding tank water is reused as mix water. If a larger volume of pesticide solution must be disposed of, the solution is sprayed over a large plot in the 900 area and subsequent rinse water goes to the storm drains. Prior to the early 1970's pesticides containers were disposed of in the base dumpsters without rinsing.

Base personnel indicated that, so far as is known, only three instances of pesticide materials having an ultimate fate other than consumption in use have occurred. First, during the 1960's, four 55-gallon drums containing 2,4-D and 2,4,5-T were buried in an on-base landfill (Landfill Sites 2 or 3 as discussed later). Second, during the late 1960's, fifty 1-ounce wax-encased sealed containers of zinc phosphide were disposed in a landfill across the creek from the firing range. Third, during the late 1960's, an unknown quantity of DDT was disposed of through DPDO; this material left the base in appropriate containers.

Fuels Management

The Chanute AFB Fuels Management storage system consists of numerous storage tanks in various locations throughout the base. A description of major fuel, oil, and chemical bulk storage capabilities is summarized in Table 4.2. These include storage for diesel fuel, gasoline, jet fuel, fuel oil, lubricating oil, solvent, sulfuric acid, liquid nitrogen and liquid argon. Some of the tanks have been deactivated but left in place (containing a "pickling" caustic). Inspection of base records indicates that approximately 20 tanks on the base (including the seven "pickled" tanks) are presently not in use; inactive tank sizes range from several hundred gallons to over 200,000 gallons. The tank inventory lists the condition of several inactive tanks as "bad" or "fair", so it is doubtful that these tanks could be reactivated.

All bulk fuels are transported on to the base in tank trucks; no fuels are transferred by pipelines crossing base boundaries.

Fuel storage tanks are inspected every three years or when excessive solids are detected in fuel analyses or in fillstand filter separator elements. A cleaning interval of three to five years has been typical. Since the base does not have a flying mission, the fuel tanks do not see large flows and so only minimal volumes of sludge have been generated and removed; in fact, no tank sludges apparently have been removed during the past four or five years. When sludge was removed it

TABLE 4.2
MAJOR FUEL, OIL, AND CHEMICAL STORAGE FACILITIES

Organization - Item	No. of Containers	Elevation Aboveground Underground	Maximum Volume (gal)	Minimum Volume (gal)	Total Storage (gal)
3345/SUPS/LGSF					
Diesel fuel (DF-1)	4	U	14,500	1,200	29,000
Leaded gasoline (MGR)	4	U	25,000	1,200	63,200
Unleaded gasoline (MUR)	1	U	12,000	12,000	12,000
Jet fuel (JP-4)	4	U	25,000	1,500	53,000
Deactivated ("Pickled")	7	U	25,000	12,000	136,000
3370/TCHTG/TTMH					
JP-4	6	A+U	250,000	10,000	585,000
JP-4 refueling trucks	9	A	5,000	500	41,500
Lube oil	1	A	55	55	55
Solvent	1	A	55	55	55
General, 3330 TCHTW					
JP-4	4	A	2,500	1,000	7,000
Kerosene	1	A	500	500	500
Diesel fuel	2	A	1,000	1,000	2,000
Lube oil	4	A	55	55	220
3340 TCHTG/TTMF					
JP-4	1	A	10,000	10,000	10,000
JP-4	1	A	450	450	450
3340 TCHTG/TTMC					
Diesel fuel	1	A	1,000	1,000	1,000
Gasoline	2	A	1,000	250	1,250
Lube oil	4	A	55	55	220
Emergency Generators					
Diesel	5	A+U	2,000	200	4,400
Civil Engineering and Miscellaneous					
Gasoline	10	U	12,000	200	55,250
No. 2 fuel oil	53	A+U	12,000	250	94,720
No. 5 fuel oil	2	U	25,000	25,000	50,000
Solvent	8	A+U	1,500	300	10,200
Sulfuric acid	6	A+U	1,000	15	1,235
Liquid nitrogen	6	A	2,000	300	4,300
Liquid argon	1	A	5,000	5,000	5,000

Sources: Chanute Technical Training Center (CTTC) Spill Prevention and Countermeasures Plan, CAFB Plan 705, 1 October 1981, 2) Tabular information provided by Chief of Supply, Chanute AFB, 3) Fuel storage report, file 18 from Environmental Coordinator, Chanute AFB.

was placed in small bermed drying areas near Buildings 932 and 950 (discussed later). In 1979 a policy was initiated to discontinue use of the drying areas and all tank sludge will not be drummed for off-site disposals. All used fuel filters are burned at the fire protection training area.

Fire Protection Training

There are two known areas where fire protection training activities have been conducted on the base (Figure 4.1). Fire protection training activities in the 1940's and earlier in the base history are believed to have been minimal. Appendix F contains photographs of the fire protection training areas.

Fire Protection Training Area 1 (Early 1950's - 1965)

From the early 1950's until construction of the existing training facilities (1965), fire protection training was conducted by the fire department in an area (FPTA-1) between the Perimeter Road and the East-West Runway and north of the new recreation area that is being constructed. Old planes were moved off the runway at this location and utilized for the training activities. Waste fuels, paints, solvents, thinners and other combustibles reportedly were burned at this site on the ground. Protein foam was used for extinguishing fires. There is no physical evidence of this site today and the area is used for agricultural purposes.

Fire Protection Training Area 2 (1965 - Present)

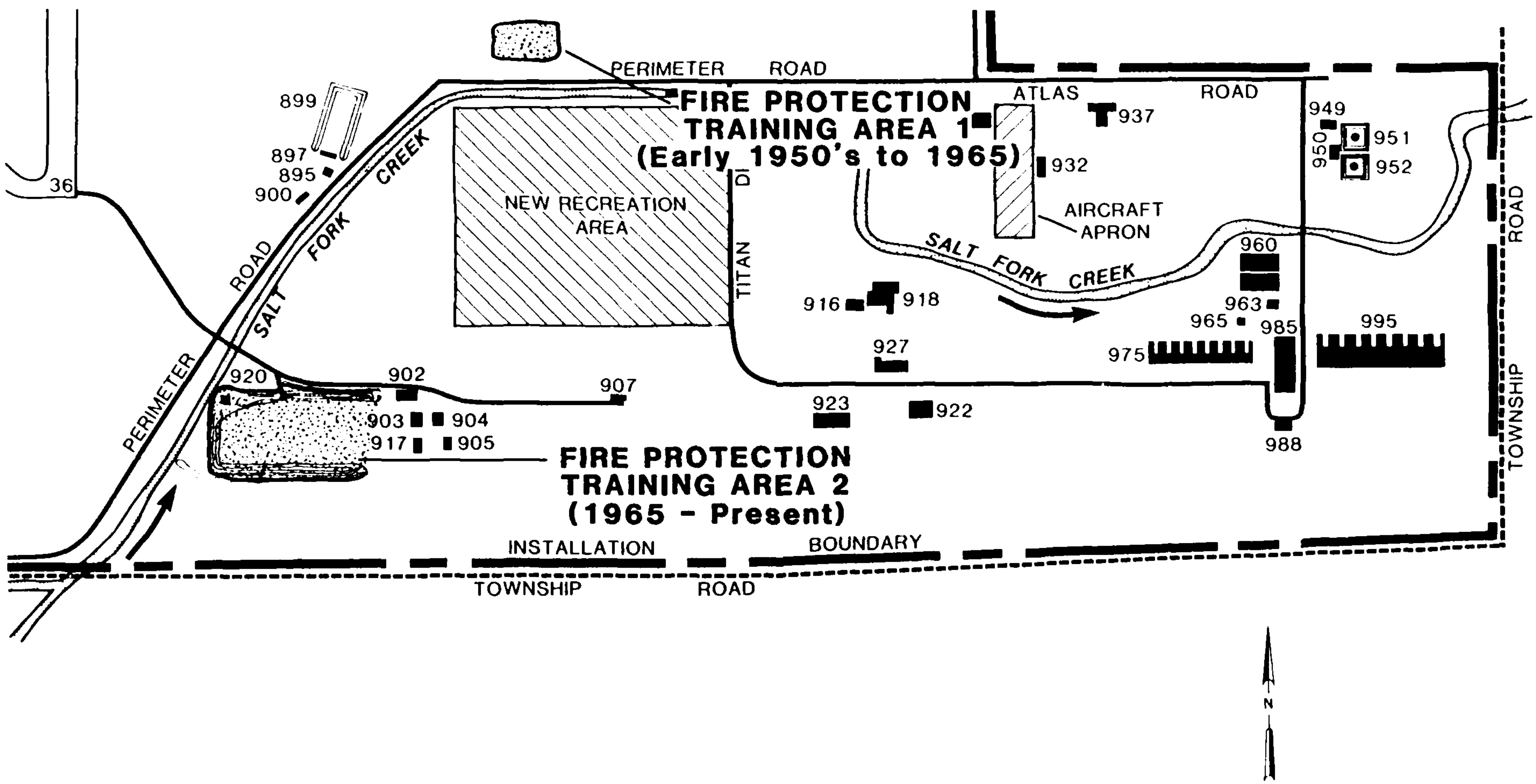
In 1965 fire protection training began as a part of the CTTC program. The existing training site (FPTA-2) was constructed in 1965. Until the late 1970's some waste oils, solvents and hydraulic fluids were burned at this site along with clean JP-4 and used fuel filters. In recent years JP-4 has predominantly been used due to air emission requirements; however, some waste materials (fuel filters, creosoted utility poles) have also been burned in the area.

About 300 gallons of fuel is now used for a typical large fire, but in the earlier years as much as 1000 gallons is reported to have been used. Three to six fires are ignited approximately two days per week; in the 1960's and 1970's the activity was typically three days per week. The surface is not routinely wetted with water prior to a fire. Extinguishing agents used at the site until the early 1970's were protein

FIGURE 4.1

CHANUTE AFB

FIRE PROTECTION TRAINING AREAS



SOURCE: CHANUTE AFB INSTALLATION DOCUMENTS

foam and carbon dioxide. Aqueous film forming foam (AFFF) has been used since 1972-73 and dry chemicals and halon were initiated in 1981.

The training area is a gravel surface over the ground which permits drainage of unburned fuel and fire fighting chemicals to a ditch surrounding the fire training area. In 1981 an oil-water separator was installed at the peripheral collection ditch. Prior to the installation of the separator, the accumulated residuals in the ditch were drained to an open pit or pond on the FPTA-2 site. From about 1977-1981 a skimmer was installed in the pond but it was inoperative much of the time. Prior to 1977 the accumulated fuel on the pond was set on fire on a weekly basis. The water and extinguishing agents in the pond were periodically drained to Salt Fork Creek.

Storage Areas

At the present time waste materials are stored at several locations on Chanute Air Force Base, as follows:

1. Temporary storage at waste generation site.
2. Short term storage at Hazardous Waste Accumulation Points (HWAP).
3. Longer term storage prior to off-base contract disposal at Building 975 (engine test cells).
4. Underground waste oil/fuel storage.
5. Oil-water separators.

There are numerous hazardous waste generation sites on the base; these are summarized in Chanute Air Force Base (CAFB) Plan 708. Containers for small volume generators are normally five gallon to 55 gallon drums, all DOT approved. Upon filling, the containers are transferred to the HWAPs.

There were seven HWAP locations as outlined in CAFB Plan 708 (15 March 1982). Waste containers are stored for no longer than 90 days at the HWAP. All HWAP's have telephone, barriers, fire extinguishers, and sorbent material.

Storage of waste materials prior to disposal through off-base contract occurs at Building 975, Cell 15, the Engine Test Cell facility.

Four underground waste storage tanks are present on the base are used to store waste fuel, oil, solvents, and hydraulic fluids. These tanks are pumped out by an off-base contractor for recycle.

The above describes the method of storing wastes as initiated in the last several years. In previous years wastes were primarily held at the generating site prior to collection for disposal. Other than the areas described above, there are no known major storage sites where wastes were accumulated on the base.

Spills and Leaks

Base records and interviews with present and former personnel indicate no major spills or leaks of pesticides, fuels, oils, chemicals, or other hazardous materials beginning with the early 1950's. Records kept since the mid 1970's indicate several small spills since 1975 and one larger fuel bladder leak in 1972; these are summarized in Appendix D.

None of the areas with reported spills and leaks reveal vegetation stress. Due to the small amounts of spills and leaks, the type of material lost, and the observed site areas, these incidents are not believed to pose a potential for contamination or migration.

PAST BASE TREATMENT AND DISPOSAL METHODS

The facilities at Chanute AFB which have been used for management and disposal of waste are as follows:

- Landfills
- Wastewater Treatment System
- Sludge Disposal Areas
- Oil-Water Separators
- Surface Drainage System

As noted earlier in this section, information delineating waste activities prior to 1940 is essentially nonexistent. No physical evidence exists of environmental contaminations resulting from base activities in the period 1917 - 1940.

Landfills

Four landfills have been operated on base property (Figure 4.2). The first landfill apparently was operated prior to 1940 and the last was completed in 1974. After 1974 all wastes were disposed off-base by a contractor. Table 4.3 summarizes the landfill operations. Appendix F shows present and historic photographs of the landfill sites.

Landfill Site 1 (Pre 1940 - 1960)

The property where Landfill Site 1 is located was purchased by the U.S. Government in 1941. However, an interview with a retired landfill equipment operator indicates that this site was being operated in 1940 prior to purchase. Thus, it appears at least some wastes from the base were taken to Landfill Site 1 prior to 1940.

This landfill received garbage, paper, wood, metal, ashes, aircraft parts, unrinsed pesticide containers, shop wastes (see Table 4.1), and construction/demolition debris. A major portion of the wastes generated on the base in this early period were taken to Landfill Site 1. The wastes were deposited in an area fill method with a depth of approximately 8 to 10 feet. The site is about 19 acres and located adjacent to Salt Fork Creek. Material deposited at this landfill was routinely burned.

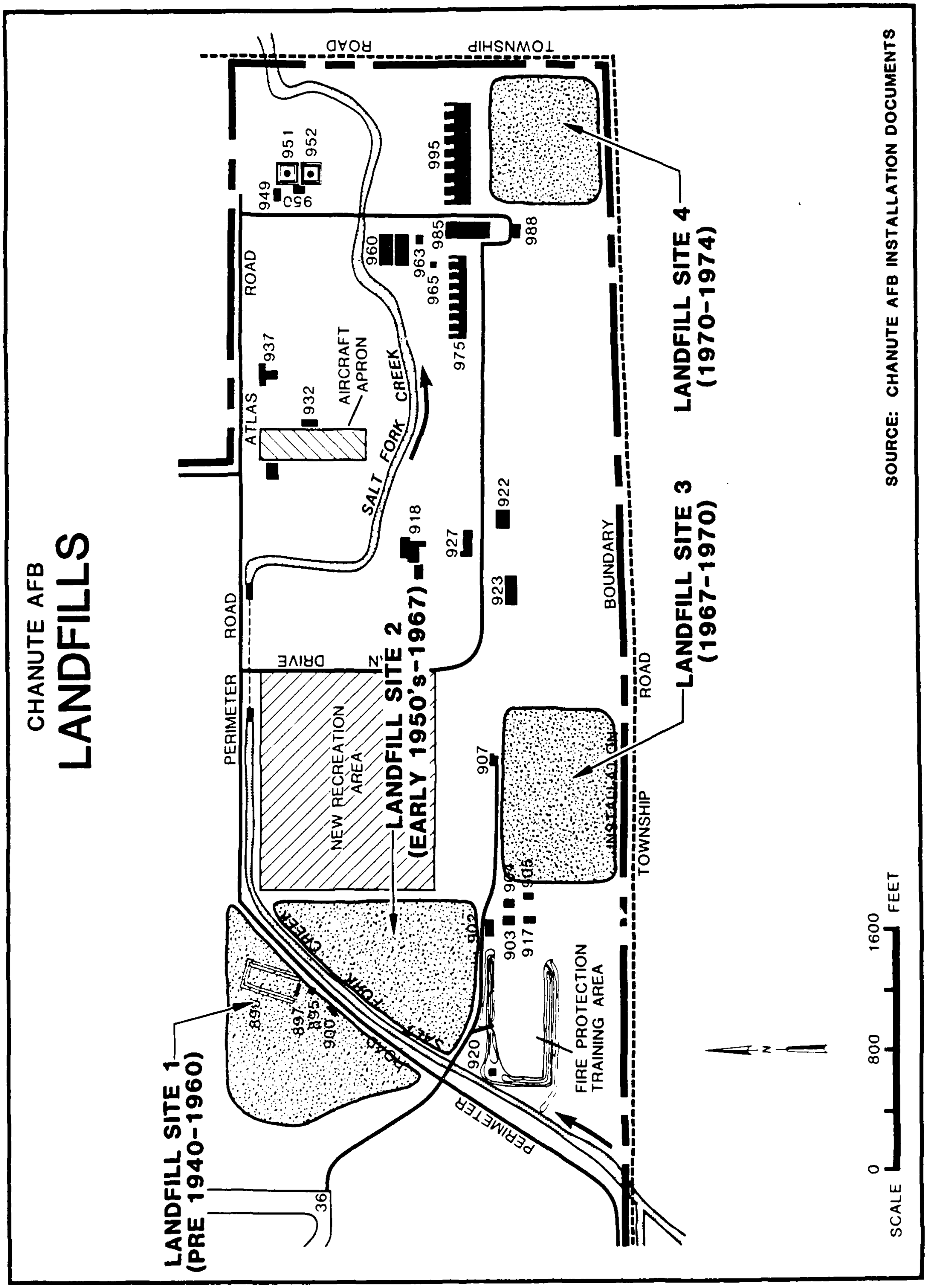
Since completion of Landfill 1 a small arms firing range has been constructed along with a few other buildings which serve a trap shooting range. Well established vegetation exists on the site. Agricultural crops are planted adjacent to the site. All surface drainage is to Salt Fork Creek.

Landfill Site 2 (Early 1950's - 1967)

Use of Landfill Site 2 partially overlapped the time period when Landfill Site 1 was in operation. This landfill received the same type of base wastes as did Landfill Site 1 including garbage, trash, shop residuals (Table 4.1) and construction rubble. This landfill may have received the four pesticide drums discussed previously.

Operation of Landfill Site 2, located adjacent to Salt Fork Creek, was an area fill method at a depth of 8 to 10 feet. Periodic burning at the site also occurred. The site is about 20 acres. All drainage is to

FIGURE 4.2



ES ENGINEERING-SCIENCE

TABLE 4.3
LANDFILL SITES

Site	Period of Operation	Approximate Area (acres)	Type of Wastes	Method of Operation	Comments
1	Pre 1940-1960**	19	Garbage, refuse, shop wastes, construction/demolition rubble, metal parts, etc.	Area fill; burning; 8-10 ft deep	*
2	Early 1950's-1967	20	Same as Site 1 plus possibly 4 drums of pesticide	Area fill; burning; 8-10 ft deep	*
3	1967-1970	20	Same as Site 1 plus possibly 4 drums of pesticide	Area fill; burning; 6-8 ft deep	*
4	1970-1974	16	Same as Site 1	Trench and area fill; probably minimal burning; 8-10 ft deep	*

* All sites are closed and covered, drain to Salt Fork Creek and have no surface evidence of contamination or vegetation stress. Operating depths shown are total fill depths and not necessarily cuts into the original terrain.

**The property where Landfill Site 1 is located was purchased by the U.S. Government in 1941; however, there is reason to believe this area received wastes from the base prior to this ownership.

Source: Interviews and Chanute AFB file data.

Salt Fork Creek. Some vegetation exists on the site but additional demolition rubble and spoil materials are currently being placed on the site.

Landfill Site 3 (1967 - 1970)

This landfill was utilized after closure of Site 2. Base garbage, refuse, shop wastes (Table 4.1), other rubble, and possibly the previously noted pesticide drums were deposited at Landfill 3 during the operations.

Wastes were placed at the 20 acre site approximately 6 to 8 feet deep, probably using an area fill method. Some waste burning occurred. The site has little slope which inhibits drainage; runoff is to Salt Fork Creek. Vegetation exists on the site except in two areas which apparently have been disturbed due to the nearby recreation lake construction activities.

Landfill Site 4 (1970 - 1974)

Landfill 4, approximately 16 acres, is located in the southeast corner of the base. Wastes buried at this site include garbage, refuse, shop residues (Table 4.1) and construction/demolition debris.

Filling at this site, included both trench and area methods. Depth of fill is estimated 8 to 10 feet. Burning at this site probably occurred less frequently than at the earlier fill areas. Local drainage at the site was modified, through the filling operation, to the southeast direction instead of north. Runoff still reaches Salt Fork Creek, however.

Vegetation exists on most of the site but several areas are disturbed from either vehicles, erosion or disposed wastes.

Sanitary Sewerage System

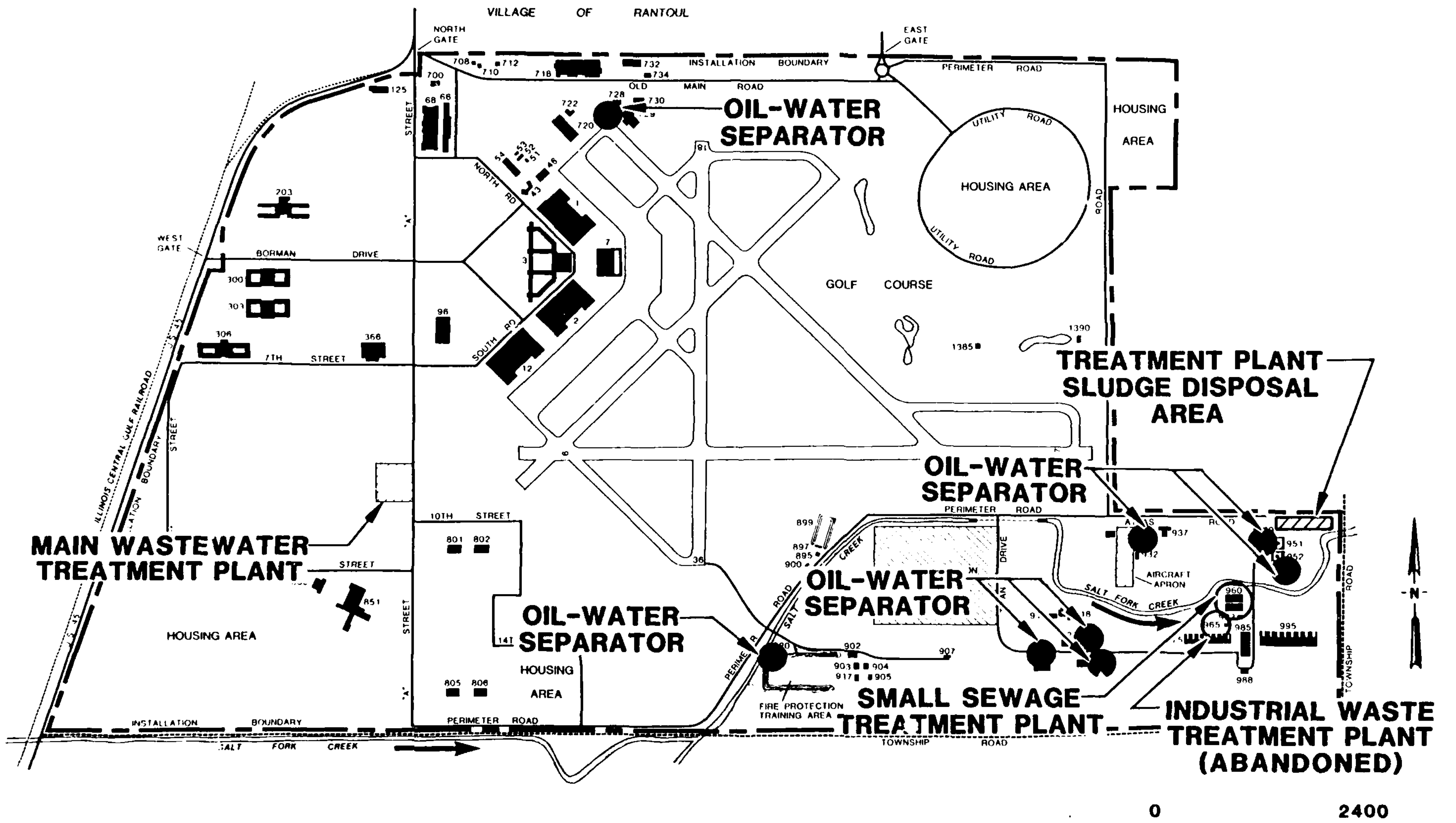
Wastewater from the base is collected in a separate system and treated at both on-base and off-base facilities. About one-third of the base-generated sewage flows (northern part of base) discharge to the Village of Rantoul where treatment is provided prior to discharging to the Upper Salt Fork Drainage Ditch. On-base treatment is provided at the main wastewater treatment plant and the small sewage treatment (Figure 4.3).

The main plant handles nearly all of the wastewater treated on-base. Wastewater receives secondary treatment followed by carbon

FIGURE 4.3

CHANUTE AFB

WASTEWATER TREATMENT, SLUDGE DISPOSAL AND OIL-WATER SEPARATORS



SOURCE: CHANUTE AFB INSTALLATION DOCUMENTS

adsorption before discharging to Salt Fork Creek. Effluent from the main plant currently discharges to a storm sewer outfall which terminates at the creek near the small arms range (Facility 899).

The main treatment plant was originally constructed in 1940. In 1972 some effluent polishing lagoons were built in the area now under construction for a recreation lake. The lagoons were discontinued in 1975 and in 1979 the carbon system was installed.

In 1956 a small Imhoff tank followed by sand filtration beds was built to serve the domestic wastes originating in the 900 area of the base. This plant (Facility 960 and 963) continues to treat a low domestic flow with discharge to Salt Fork Creek.

In 1956 a small industrial waste treatment plant (Facility 965) was also constructed in the 900 area. This plant was used for about three years to treat petrochemical wastes originating from the engine test cells and was abandoned when the test facility closed.

Sludge Disposal Areas

Since the mid 1950's, sludge has been disposed of on land just north and east of the 951 and 952 fuel tanks (see Figure 4.3). Sludge is piled randomly in the disposal area. Considerable vegetation exists at the disposal site. The hazardous materials sent to the sanitary sewerage system are low in volume and the sludge diposal area is not considered a potential for contamination or migration.

Until 1979, sludges from fuel tank cleaning were disposed of in two diked areas (less than 400 square feet each), one located east of Building 932 and the other east of Building 950. The 950 pit has been filled in and grassed over; the 932 pit has not been filled in but has considerable vegetation in it. The 932 pit currently contains a drum, which stores sludge prior to removal by contractor, and some miscellaneous filter materials. Waste quantities disposed of at the two fuel tank sludge disposal areas were small.

Oil-Water Separators

Oil-water mixtures and fuel-water mixtures generated on the base are treated in oil-water separators. There are eight oil-water separators on the base; building locations and descriptions are provided in Table 4.4. The approximate physical locations of the separators are shown in Figure 4.3. The present facilities at Building 932 are limited

TABLE 4.4

OIL-WATER SEPARATORS/HOLDING TANKS

Separator Number	Building Location	Description	Capacity (gal)	Typical Drainage Frequency*	Aqueous Phase Discharge
1	923	Cryogenic oil and water	1,000	67 days	To ditch which drains to Salt Fork Creek.
2	927	Compressor oil and water	300	73 days	To sanitary sewer.
3	922	Fuel (JP-4) Lab water, acid waste	5,000	2-4 years	To Salt Fork Creek.
4	932	JP-4 and water sump pump	2,000	60 days	No outlet for aqueous sump pump phase; cleanout connection is used to drain the unit in a batch operation periodically.
5	950	JP-4 and water from sump in pumping station	1,000	22 days	To ditch which drains to Salt Fork Creek.
6	952	JP-4 and water	3,000	2-4 years	To Salt Fork Creek. This discharge is NPDES-permitted.
7	920	JP-4 and water (Fire Training School)	20,000	Recycled to Tank Storage	Pumped to the main wastewater treatment plant.
8	728	Oil and fuel from cleaning vehicles	300	2-4 years	To ditch which to Salt Fork Creek.

*Typical drainage frequency values obtained by interviews with base personnel and by consulting the contract log sheet for contract disposal.

Source: Base file data and interviews.

to a 2000 gallon separator operating primarily as a holding tank; during FY84 a concrete collection system will be installed surrounding the fuels and mini-flight-line area with drainage to an oil-water separator. The new oil-water separator at Building 932 will operate concurrently with the existing equipment at this location.

Separators are inspected visually and normally pumped out by an off-base contractor before completely filling; thus they serve primarily as holding tanks. In the event that a tank does fill, the aqueous phase is discharged either to the sanitary sewer system or to Salt Fork Creek.

The organic phase from all separators except Separator 7 is disposed of off-base by contract disposal. Separator 7 collects unburned JP-4 from fire training exercises at the Fire Protection Training Area (FPTA-2). This unburned fuel is recycled to tank storage and then reapplied for subsequent training exercises.

Surface Drainage System

Surface drainage at Chanute AFB is accomplished by french drains and overland flow discharging to open drainage ditches and/or storm sewers. As shown in Figure 3.3 all drainage goes to Salt Fork Creek.

As noted previously, the drainage system at times receives effluents from five oil-water separators and pesticide vehicle wastewater. Minor fuel spills have also periodically been washed to the drainage system. The storm sewer system also receives water from automobile and truck wash racks. Final effluent from the main wastewater treatment plant also is discharged to a storm sewer

Considering the types and quantities of materials that have been discharged to the surface drainage system it is concluded that the potential for contamination or migration is minimal.

EVALUATION OF PAST DISPOSAL ACTIVITIES AND FACILITIES

Review of past waste generation and management practices at Chanute AFB has resulted in identification of twelve sites and/or activities which were considered as areas of concern for potential contamination and migration of contaminants. These sites were evaluated using the Decision Tree Methodology presented in Figure 1.1.

The sites which have the potential for contamination and migration of contaminants were evaluated using the Hazard Assessment Rating

Methodology (HARM). Table 4.5 summarizes the results of the decision tree logic for each of the areas of initial concern.

Six of the twelve sites assessed did not warrant further evaluation. The rationale for omitting these sites from HARM evaluation is discussed below.

The spills and leaks at the base have been relatively small in quantity. There is no evidence to suggest potential for environmental contamination from the sites identified.

The hazardous materials sent to the sanitary sewerage system have been low in volume; therefore the sludge disposal area is not considered a potential for contamination. The fuel tank sludge disposal areas have received small and infrequent quantities of wastes and are judged to result in minimal contamination or migration of contaminants.

The practices employed for the waste storage areas and for pesticide handling areas are not considered contaminating. No major spills or leaks have been reported to suggest potential contamination.

Both the surface drainage system and the sanitary sewerage system have been assessed to have no potential for contamination. Hazardous waste materials discharged to either system have been minimal.

The remaining six sites identified in Table 4.5 were evaluated using the Hazard Assessment Rating Methodology. The HARM process takes into account characteristics of potential receptors, waste characteristics, pathways for migration and specific characteristics of the site related to waste management practices. Table 4.6 summarizes the result of the HARM evaluation for the six sites.

The procedures used in the HARM system are outlined in Appendix G. The detailed rating forms for the six sites at Chanute AFB are presented in Appendix H. The HARM system is designed to indicate the relative need for followup action. Ratings shown in Table 4.6 provide the basis for establishing priorities for further evaluation of disposal areas as discussed in Sections 5 and 6.

TABLE 4.5
SUMMARY OF DECISION TREE LOGIC FOR
AREAS OF INITIAL ENVIRONMENTAL CONCERN
AT CHANUTE AFB

Site	Potential for Contamination	Potential for Contaminant Migration	Potential for Other Environmental Concern	HARM Rating
Pesticide Handling Areas	NO	NO	NO	NO
Fire Protection Training Area 1	YES	YES	N/A	YES
Fire Protection Training Area 2	YES	YES	N/A	YES
Waste Storage Areas	NO	NO	NO	NO
Spill and Leak Areas	NO	NO	NO	NO
Landfill Site 1	YES	YES	N/A	YES
Landfill Site 2	YES	YES	N/A	YES
Landfill Site 3	YES	YES	N/A	YES
Landfill Site 4	YES	YES	N/A	YES
Sanitary Sewerage System	NO	NO	NO	NO
Sludge Disposal Areas	NO	NO	NO	NO
Surface Drainage System	NO	NO	NO	NO

Source: Engineering-Science

TABLE 4.6
SUMMARY OF HARM SCORES FOR POTENTIAL
CONTAMINATION SOURCES AT CHANUTE AFB

Rank	Site	Receptor Subscore	Waste Characteristics Subscore	Pathway Subscore	Waste Management Factor	Total Score
1	Fire Protection Training Area 2	71	80	69	1.00	73
2	Landfill Site 2	68	80	68	1.00	72
3	Landfill Site 3	71	60	68	1.00	66
4	Landfill Site 1	65	64	68	1.00	66
5	Landfill Site 4	67	48	68	1.00	61
6	Fire Protection Training Area 1	59	32	69	1.00	53

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 contaminant 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 state and federal government employees; and assessments using the HARM system. Table 5.1 contains a list of the potential contamination sources identified at Chanute AFB and a summary of the HARM scores for those sites.

FIRE PROTECTION TRAINING AREA 2

Fire Protection Training Area 2 has sufficient potential to create environmental contamination and follow-on investigations are warranted. From 1965 to the present, FPTA 2, located south of the small arms range, has been very active in training fire fighting personnel as a part of the Technical Training Center. Large quantities of clean JP-4 have been regularly burned at the site, but in the late 1960's and early 1970's it is reported that some waste oils, lubricants, hydraulic fluids and solvents were also used for fires. Several burning areas exist on the site. No liner system exists under the gravel site. Preapplication of water on the site to inhibit fuel and fire fighting materials from percolating into the soil has not always been done. Even though the underlying soils are relatively impermeable, intensive use of the site with a large number of fires over many years, together with a shallow water table and recharge area results in a HARM score of 73.

LANDFILL SITE 2

Landfill Site 2 has sufficient potential to create environmental contamination and follow-on investigations are warranted. This site,

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

Rank	Site	Operation Period	Final Score
1	Fire Protection Training Area 2	1965 - Present	73
2	Landfill Site 2	Early 1950's - 1967	72
3	Landfill Site 3	1967 - 1970	66
4	Landfill Site 1	Pre 1940 - 1960	66
5	Landfill Site 4	1970 - 1974	61
6	Fire Protection Training Area 1	Early 1950's - 1965	53

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

north of FPTA 2, operated from the early 1950's to 1967. Oils, lubricants, solvents and other shop wastes were incorporated at this site. Burning of wastes occurred. In addition, four drums of waste pesticides may have been buried at the site. The HARM score of 72 for this site reflects the length of operating service, the potential for migration of contaminants to the groundwater, the recharge area, receptor impacts, and waste persistence.

LANDFILL SITE 3

Landfill Site 3 has sufficient potential to create environmental contamination and follow-on investigations are warranted. In the late 1960's (1967-1970) this site, located east of FPTA 2, served as the base-operated disposal facility. Small quantities of oils, lubricants, solvents and other shop wastes were buried along with refuse and garbage. Four drums of waste pesticides may have been disposed at this site. Some waste burning was practiced. Although the period of service at this site was relatively short, it received a HARM score of 66 due to the recharge area, the potential receptor impacts, groundwater migration pathways, and waste persistence.

LANDFILL SITE 1

Landfill Site 1 has sufficient potential to create environmental contamination and follow-on investigations are warranted. This site, situated under and adjacent to the small arms range, is known to have operated from at least 1940 (and probably earlier) until to 1960. Oils, lubricants, solvents and other shop wastes were disposed at the site over an extended period of time. Burning of wastes at the site occurred. Due to the length of service at this location, the potential migration pathways to ground water, and the recharge area, this site received a HARM score of 66.

LANDFILL SITE 4

Landfill Site 4 has sufficient potential to create environmental contamination and follow-on investigations are warranted. The last landfill operated on the base (1970-1974) was at Landfill Site 4. Small quantities of waste oils, lubricants, solvents and other shop wastes were disposed with other base-generated wastes. Minimal burning occurred. This site received a HARM score of 61, primarily due to the potential receptor impacts and ground water migration pathways.

FIRE PROTECTION TRAINING AREA 1

Fire Protection Training Area 1 has sufficient potential to create environmental contamination and follow-on investigations are warranted. This site, used by the fire department north of Perimeter Road and east of the small arms range from the early 1950's to 1965, received a HARM score of 53. Small quantities of waste oils, lubricants, solvents and fuels were used for setting fires at the site. The considerably lower frequency of fires at this site and the lower receptor impact results in a smaller HARM score compared with FPTA 2.

SECTION 6

RECOMMENDATIONS

Six sites were identified at Chanute AFB as having the potential for environmental contamination. These sites have been evaluated using the HARM system which assesses their relative potential for contamination and provides the basis for determining the need for additional Phase II, IRP investigation. All of the sites have sufficient potential to create environmental contamination and Phase II investigations are recommended. All sites have been reviewed with regard to land use restrictions which may be applicable.

PHASE II MONITORING

The subsequent recommendations are made to further assess the potential for environmental contamination from waste disposal areas at Chanute 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 define the extent of contamination. The recommended monitoring program, including analytical parameters, is summarized in Table 6.1. Figure 6.1 illustrates the proposed Phase II monitoring well locations. The proposed well locations are based upon upper aquifer flow directions estimated from Figure 3.11. Monitoring wells should be constructed of two(2)-inch diameter PVC, using a ten foot machine-slotted screened section mechanically fitted to solid wall casing. Based upon the information given in Figure 3.10, total well depth should be on the order of 25 to 30 feet. A sand pack should be provided to protect the well screen. Wells should be sealed into the zone of interest by use of cement-bentonite grout, applied under continuous pressure. Additional wells may be necessary to assess the extent of contamination. Several of the sites in the recommended Phase II monitoring are very close together. Monitoring individual sites at different time periods

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

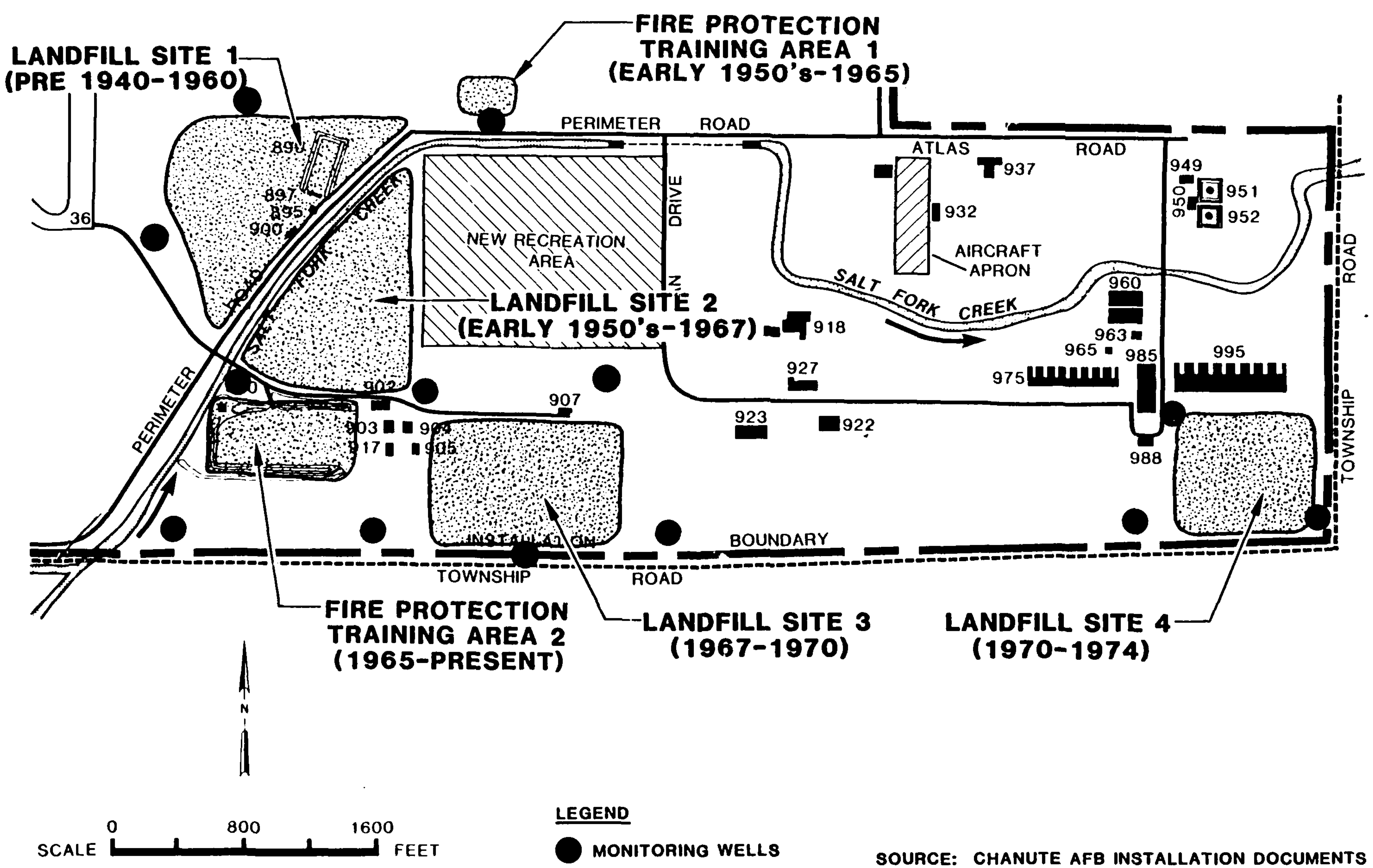
Area/Site (Rating Score)	Recommended Monitoring[1)]	Recommended Analytical Parameters
AREA 1		
Fire Protection Training Area 2 (73)	Install monitoring wells at four locations around the site. Construct wells with Schedule 40 PVC and screen 10-20 feet into the upper aquifer. Sample and analyze as recommended. Determine hydraulic gradient to assess flow direction.	pH Total dissolved solids Oil and grease Total organic carbon Total organic halogens Phenols Chromium[2)] Lead[2)] 2,4-D and 2,4,5-T pesticides[2]
Landfill Site 2 (72)	Monitoring wells recommended for FPTA-2 and Landfills 1 and 3 can be used to make an initial assessment of the potential contamination from this site.	N/A
Landfill Site 3 (66)	Install three monitoring wells, two near the installation boundary and one between the site and the recreation Construct well with Schedule 40 PVC and screen 10-20 feet into the upper aquifer. Sample and analyze as recommended. Coordinate the FPTA-2 monitoring to assess flow direction.	pH Total dissolved solids Oil and grease Total organic carbon Total organic halogens Phenols Chromium Lead 2,4-D and 2,4,5-T pesticides
Landfill Site 1 (66)	Install two monitoring wells adjacent to the site. Construct well with Schedule 40 PVC and screen 10-20 feet into the upper aquifer. Sample and analyze as recommended. Coordinate data with all other sites to assess flow direction and background quality data.	pH Total dissolved solids Oil and grease Total organic carbon Total organic halogens Phenols Chromium Lead
Fire Protection Training Area 1 (53)	Install one monitoring well between the creek and the site. Construct well with Schedule 40 PVC and screen 10-20 feet into the upper aquifer. Sample and analyze as recommended. Coordinate with data from Landfill Site 2.	pH Total dissolved solids Oil and grease Total organic carbon Total organic halogens Phenols Chromium Lead
AREA 2		
Landfill Site 4 (61)	Install three monitoring wells, two at the installation boundary and the third between the site and base wells. Construct well with Schedule 40 PVC and screen 10-20 feet into the upper aquifer. Sample and analyze as recommended. Coordinate with monitoring in Area 1 to assess flow direction.	pH Total dissolved solids Oil and Grease Total organic carbon Total organic halogens Phenols Chromium Lead

1) See Figure 6.1 for locations.
2) Analyzed for the north and two east side wells since data will assist assessing Landfill Sites 2 and 3.

FIGURE 6.1

CHANUTE AFB

PROPOSED MONITORING WELL LOCATIONS



SOURCE: CHANUTE AFB INSTALLATION DOCUMENTS

would not be efficient and may not provide the necessary results. Therefore, the recommended Phase II program for Chanute AFB has been separated into two areas as discussed below.

Geophysical techniques have not been recommended for use at this installation for several reasons including the high clay content of surficial soils, the proximity of several sites to each other and to area surface waters (LF-1, LF-2 and FPTA-2 border on Salt Fork). Clay soils tend to degrade the performance of geophysical instruments, while the proximity to other sites and the stream could make data interpretation questionable.

Area 1

Fire Protection Training Area 2 - Four monitoring wells surrounding the site and tapping the upper aquifer are recommended. Observations of water table elevations in each well will permit assessment of the local ground-water flow direction. Ground-water sampling and analyses will confirm whether the site is contributing contaminants to the shallow aquifer. It is noted that the analytical parameters recommended in Table 6.1 are intended to serve as the first step in a tiered approach to screening for potential contamination. If total organic halogens or total organic carbon are abnormal, then a gas chromatograph/mass spectrophotometer (GC/MS) scan is recommended to identify specific constituents. The chromium and lead analyses are for the wells that will be jointly used to assess Landfill Sites 2 and 3.

Landfill Site 2 - The monitoring wells recommended for FPTA-2 and Landfill Site 3 in the Area 1 investigations will be used to make the initial assessment of this site.

Landfill Site 3 - Three monitoring wells are recommended for this site, two along the installation boundary adjacent to this site and one north toward the new recreation area. This recommendation is made due to the close proximity of off-base dwellings and as a means of confirming containment of wastes at the disposal site. These wells will supplement data obtained for ground water flow directions around the FPTA-2. A step approach in the analytical work is recommended as previously for FPTA-2. If total dissolved solids, chromium and lead are abnormal, then additional tests for other metals are recommended.

Landfill Site 1 - Two monitoring wells are recommended for this site. It is believed that ground-water flow is from the north, so one well will serve to determine background quality data. This data may possibly be used for assessing background for FPTA-2 and Landfill Sites 2 and 3. The step approach to the analytical work, as discussed for FPTA-2 and Landfill Site 3, is also recommended.

Fire Protection Training Area 1 - One monitoring well is recommended between this site and the creek. The step analytical approach is recommended as with other sites. Information from this well will be coordinated with others in Area 1.

Area 2

Landfill Site 4 - Three monitoring wells are recommended around his site for the same reasons as discussed for Landfill Site 3. Two of the wells would be placed near the installation boundary and a third one located between the landfill and the two base wells located near Buildings 975 and 995. The same analytical program is recommended.

RECOMMENDED GUIDELINES FOR LAND USE RESTRICTIONS

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

The recommended guidelines for land use restrictions at each identified disposal site at Chanute AFB are presented in Table 6.2. A description of the land use restriction guidelines is included in Table 6.3. Land use restrictions at sites recommended for on-site monitoring should be reevaluated upon completion of the Phase II program and appropriate changes made.

TABLE 6.2
RECOMMENDED GUIDELINES AT POTENTIAL CONTAMINATION SITES FOR LAND USE RESTRICTIONS
CHANUTE AFB

Site	Recommended Guidelines for Future Land Use Restrictions [1]											
	Construction on the site	Excavation	Well construction on or near the site	Agricultural use	Silvicultural use	Water infiltration (Run-on, ponding, irrigation)	Recreational use	Burning or ignition source	Disposal operations	Vehicular traffic	Material storage	Housing on or near the site
Fire Protection Training Area 1	NR	NR	R	NR	R	R	NR	NR	R [2]	NR	NR [3]	R
Fire Protection Training Area 2	NR	NR	R	NR	R	R	NR	NR	R [2]	NR	NR [3]	R
Landfill Site 1	R	R	R	NR	R	R	NR	NR	R [2]	NR	NR [3]	R
Landfill Site 2	R	R	R	NR	R	R	NR	NR	R [2]	NR	NR [3]	R
Landfill Site 3	R	R	R	NR	R	R	NR	NR	R [2]	NR	NR [3]	R
Landfill Site 4	R	R	R	NR	R	R	NR	NR	R [2]	NR	NR [3]	R

(1) See Table 6.3 for description of guidelines.
Note the following symbols in this table:
R = Restrict the use of the site for this purpose
NR = No restriction of the site for this purpose

(2) Restrict for all wastes except for construction/demolition debris.

(3) No restriction on solid materials but liquids undesirable.

Source: Engineering-Science

TABLE 6.3
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

Biographical Data

ROBERT L. THOEM
Civil/Environmental Engineer

Personal Information

Date of Birth: August 26, 1940

Education

B.S. Civil Engineering, 1962, Iowa State University, Ames, IA
M.S. Sanitary Engineering, 1967, Rutgers University, New Brunswick, NJ

Professional Affiliations

Registered Professional Engineer (Alabama No. 10580, Georgia No. 10391, Iowa No. 5802, Illinois No. 62-32684, South Carolina No. 9178 and Virginia No. 13461)
American Academy of Environmental Engineering (Diplomate)
American Society of Civil Engineers (Fellow)
National Society of Professional Engineers (Member)
Water Pollution Control Federation (Member)

Honorary Affiliations

Who's Who in Engineering
Who's Who in the Midwest
USPHS Traineeship

Experience Record

1962-1965 U.S. Public Health Service, New York, NY. Staff Engineer, Construction Grants Section (1962-1964). Technical and administrative management of grants for municipal wastewater facilities in New York, Pennsylvania, New Jersey and Delaware.

Water Resources Section Chief (1964-1965). Supervised preparation of regional water supply and pollution control reports.

1966-1983 Stanley Consultants, Muscatine, IA and Atlanta, GA. Project Manager and Project Engineer (1966-1973). Responsible for managing studies and preparing reports for a variety of industrial and governmental environmental projects.

Environmental Engineering Department Head (1973-1976). Supervised staff involved in conducting studies and preparing reports concerning water and wastewater

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Robert L. Thoem (Continued)

systems, solid waste and resource recovery and water resources projects (industrial and governmental).

Resource Management Department Head (1976-1982). Responsible for multidiscipline staff engaged in planning and design of water and wastewater systems, solid waste and resource recovery, water resources, bridge, site development and recreational projects (industrial, domestic and foreign governments).

Associate Chief Environmental Engineer (1980-1983). Corporate-wide quality assurance responsibilities on environmental engineering planning projects.

Operations Group Head and Branch Office Manager (1982-1983). Directed multidiscipline staff responsible for planning and design of steam generation, utilities, bridge, water and wastewater systems, solid waste and resource recovery, water resources, site development and recreational projects (industrial, domestic and foreign governments). Administered branch office support activities.

Project Manager/Engineer for over 25 industrial projects including iron and steel, industrial coke, distillery, tannery, poultry, meat, automotive, forging, plating, paper, plastic and aluminum operations. Responsibilities included studies, reports and preliminary designs for service water systems, wastewater treatment and pretreatment, oil removal, recirculation and cooling (water/wastewater/recirculation flows to 47,000 gpm at one plant), boiler feedwater treatment, storm drainage, residual waste disposal (to 1,000 tons per day) and/or solid waste disposal with energy recovery (to 45 tons per day).

Project Manager for over 25 city and county projects ranging in present study area population from 1,400 to 1 700,000. Investigations included water supply and treatment; water storage, pumping and distribution using computer modeling; wastewater collection and treatment (201 studies for plants to 120 mgd); sludge processing and disposal; storm drainage; and/or solid waste collection, disposal and resource recovery systems (to 4500 tons per day for one county).

Project Manager for over 10 regional (multi-county) planning or operating agency projects. Projects included comprehensive evaluation of sludge thickening, conditioning, stabilization, dewatering, incineration, thermal treatment, drying, fertilizer production, landspreading and landfill (at a 290 mgd metro plant with 460 tons dry solids per day); solid waste collection, resource recovery, and disposal; water and

Robert L. Thoem (Continued)

sewer master plans; and 208 areawide plans for major metropolitan regions covering point source wastewater management, nonpoint source controls, water quality management, and institutional/financial arrangements.

Project Manager for five state agency projects concerning water quality management, waste load allocations (303e and 208 programs), statewide sewage sludge disposal guidelines, and/or statewide solid waste resource recovery options. Also served three state universities on water distribution system, refuse incineration with energy recovery and steam plant planning projects.

Project Manager/Engineer on over 10 projects for federal agencies. Studies included wastewater management for several major urban areas; leather tanning and finishing industry wastewater effluent guidelines; wastewater and water planning, design and operation manuals; solid waste collection and disposal; flood control and statewide river navigability.

Project Manager on several projects for Middle East governments including design of a 48-inch diameter high-pressure water transmission line and an environmental assessment of a $1.7 billion wastewater system improvement program serving a metropolitan area of over nine million people.

1983-Date Engineering-Science. Senior Project Manager. Responsible for managing a variety of environmental projects. Investigated the potential migration of contaminants resulting from past disposal practices at a U. S. Air Force base under the Phase I Installation Restoration Program. Evaluated solid waste collection, disposal and potential for resource recovery at a U. S. Army post. Performed cost allocation study for purposes of determining financial responsibilities among major users of a wastewater treatment plant.

Publications and Presentations

"Analysis of Dissolved Oxygen and the Application of Artificial Aeration in the Upper Passaic River," M.S. Thesis, Rutgers University, January 1967.

"Solid Waste System Cost Evaluation and Financing," presented at the Eleventh Annual Water Resources and Design Conference, Iowa State University, February 1973 (Coauthor L. J. Larson).

"Financing Sanitary Landfills," Iowa Municipalities, September 1973.

Discussion of "Basic Data for Solid Waste Pilot Study," ASCE Journal of the Environmental Engineering Division, October 1973.

"Sludge Handling and Disposal Comparisons in the Minneapolis-St. Paul Area," presented at the ASCE Environmental Engineering Division National Specialty Conference, July 1974.

"Project Cost Evaluation Using Probability Concepts," Consulting Engineer, November 1974 (Coauthor K. A. Smith).

"Planning Solid Waste Management for an Urban County," Public Works, November 1974 (Coauthor L. J. Larson).

"Using Probability Concepts for Project Cost Evaluation," Modern Government/National Development, January-February 1978 (Coauthor K. A. Smith).

"New Potable Water Supply for Jordan," presented at the Fiftieth Annual Georgia Water and Pollution Control Association Conference, August 1981.

"New Potable Water Supply for Jordan," presented at the ASCE Water Resources Planning and Management Division National Speciality Conference, March 1983 (Coauthors L. L. Pruitt and R. F. Haskins).

"Jordan Meets Water Supply Challenges," presented at the AWWA Annual National Conference, June 1983 (Coauthor L. L. Pruitt).

"Steel Pipeline Provides New Water Supply for Jordan," presented at the ASCE Speciality Conference on Pipelines in Adverse Environments II, November 1983 (Coauthors C. L. Meyer and M. C. Boner).

10.22

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)
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

10.22
John R. Absalon (Continued)

facilities. General experience included planning and management of several ground-water monitoring programs, 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 other industrial 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

"An Investigation of the Brunswick Formation at Roseland, NJ," 1973, with others, The Bulletin, Vol 18, No. 1, NJ Academy of Science, Trenton, NJ.

"Engineering Geology of Fort Bliss, Texas," 1978, coauthor: R. Barksdale, in Terrain Analysis of Fort Bliss, Texas, US Army Topographic Laboratory, Fort Belvoir, VA.

"Geologic Aspects of Waste Disposal Site Evaluations," 1980, with others, Program and Abstracts AEG-ASCE Symposium on Hazardous Waste Disposal, April 26, Raleigh, NC.

"Practical Aspects of Ground-Water Monitoring at Existing Disposal Sites," 1980, coauthor: R.C. Starr, Proceedings of the EPA National Conference on Management of Uncontrolled Hazardous Sites, HMCRI, Silver Spring, MD.

"Improving the Reliability of Ground-Water Monitoring Systems," 1981, Proceedings of the Madison Conference of Applied Research and Practice on Municipal and Industrial Waste, University of Wisconsin-Extension, Madison, WI.

10.22
John R. Absalon (Continued)

Ground-Water Monitoring Workshop, 1982. Presented to Mississippi Bureau of Pollution Control, Jackson, 15-17 February.

Ground-Water Monitoring Workshop, 1982. Presented to Alabama Division of Solid and Hazardous Waste, Huntsville, 20-21 July.

Ground-Water Monitoring Workshop, 1982. Presented to Kentucky Waste Management Division, Bowling Green, 27-28 July.

"Identification and Treatment Alternatives Evaluation for Contaminated Ground Water," 1982, coauthor: M. R. Hockenbury. Presented to Association of Engineering Geologists Symposium on Hazardous Waste Disposal, Atlanta, 17 September.

"Preliminary Assessment of Past Waste Storage and Disposal Sites," 1982, coauthor: W. G. Christopher. Presented to Association of Engineering Geologists Symposium on Hazardous Waste Disposal, Atlanta, 17 September.

"Treatment Alternatives Evaluation for Aquifer Restoration," 1983, coauthor: M. R. Hockenbury, Proceedings of the Third National Symposium on Aquifer Restoration and Ground Water Monitoring, NWWA, Worthington, OH.

BIOGRAPHICAL DATA

Eric Heinman Snider

Senior Engineer

Personal Information

Date of Birth: 14 April 1951

Education

B.S. in Chemistry (Magna Cum Laude), 1973, Clemson University, Clemson, S.C.
M.S. in Chemical Engineering, 1975, Clemson University, Clemson, S.C.
Ph.D. in Chemical Engineering, 1978, Clemson University, Clemson, S.C.

Professional Affiliations

Registered Professional Engineer (Oklahoma Number 15647)
American Institute of Chemical Engineers
American Chemical Society
American Society for Engineering Education
Certified Professional Chemist, A.I.C.

Honorary Affiliations

Sigma Xi
Tau Beta Pi
Phi Kappa Phi
Who's Who in the South and Southwest, 1981
Outstanding Young Men of America, 1983

Experience Record

1971-1975 Texidyne, Inc., Clemson, S.C., Staff Chemist. Responsible for routine and specialized chemical analyses for water, wastewater, solid wastes, and air pollution testing. Experience in gas chromatography, atomic absorption, microbiological testing.

1975-1978 Texidyne, Inc., Clemson, S.C., Part-time Consultant. Responsible for overall management of laboratory facilities and some wastewater engineering studies. Also ran incinerator performance studies.

1976-1977 Clemson University, Clemson, S.C., Chief Analyst on airborne fluoride monitoring project in Chemical Engineering Department, performed for Owen-Corning Fiberglas Corp., Toledo, Ohio.

1978-1982 The University of Tulsa, Tulsa, OK., Assistant Professor of Chemical Engineering and Associate Director, University of Tulsa Environmental Protection Projects (UTEPP) Program. Normal teaching duties; research centered on specialized petroleum refinery problems of water and solid wastes.

1982-1983 The University of Tulsa, Tulsa, OK., Associate Professor of Chemical Engineering and Director of UTEPP Program. Normal teaching duties; researched and wrote five monographs on environmental areas; including incineration, flotation, gravity separation, screening/sedimentation, and equalization.

1981-1983 Editor, CACHE Corporation, Editor of a series of 20 modules for self-study in the area of Material and Energy Balances.

1983 Engineering-Science, Senior Engineer. Corps of Engineers-Johnston Atoll incinerator project. Duties included engineering calculations of waste types and amounts, energy content, incinerator parameters, and check of design against normal municipal refuse design. Waste heat recovery, site preparations, ash removal and disposal, auxiliary fuel requirements, and preprocessing of incinerator feeds were considered as parts of the overall design. Other duties included vendor contacts and preparation of several engineering alternatives.

Publications

Journal Articles

Snider, E.H., and J.J. Porter: Ozone Destruction of Selected Dyes in Wastewater, Am Dyestuff Rep., 63 (8), 36-48, 1974.

Porter, J.J., and E.H. Snider: Thirty Day Biodegradability of Textile Chemicals and Dyes, Book of Papers of 1974 National Technical Conference of AATCC, 427-436 (1974).

Snider, E.H., and J.J. Porter: Ozone Treatment of Dye Waste, J. Water Pollut. Control Fed., 46, 886-894, 1974.

Porter, J.J., and E.H. Snider: Long Term Biodegradability of Textile Chemicals, J. Water Pollut. Control Fed., 48, 2198-2210, 1976.

Snider, E.H., and J.J. Porter: Comparison of Atmospheric Hydrocarbon Levels with Air Quality Standards, Am. Dyestuff Ref., 65 (8), 22-31, 1976.

Snider, E.H.: Organization of a Functional Chemical Engineering Library; Chem. Eng. Ed., 11 (1), 44-48, 1977.

Snider, E.H., and F.C. Alley: Kinetics of the Chlorination of Biphenyl Under Conditions of Waste Treatment Processes, Env. Sci. Tech., 13, 1244-1248 (1979).
Snider, E.H. and F.C. Alley: Kinetics of Biphenyl Chlorination in Aqueous Systems in the Neutral and Alkaline pH Ranges, Chapter 21 in Proceedings Third Conference on Chlorination, Ann Arbor Science Publishers, Inc., Ann Arbor, MI, 1980.

Sublette, K.L., E.H. Snider, and N.D. Sylvester: Powdered Activated Carbon Enhancement of the Activated Sludge Process: A Study of the Mechanisms, in Proceedings of the Eighth Annual Water and Wastewater Equipment Manufacturers Association (WWEMA) Industrial Pollution Conference, pp. 351-369, 1980.

Snider, E.H.: "Chemical Engineering Laboratory Courses at The University of Tulsa: Improving the Communication of Technical Results," in Proceedings of the Fifteenth Midwest Section Conference of ASEE, pp. IIB28-IIB35, 1980.

Snider, E.H.: "Chemical Engineering Laboratory Experiment: Mass Transfer Tray Hydraulics," in Proceedings of 16th Midwest Section Conference of ASEE, pp. II A-9 - II A-16, 1981.

Snider, E.H.: "Chemical Engineering Laboratory Experiment: Mass Transfer Tray Hydraulics," in Proceedings of 1981 ASEE National Meeting, Vol. II, pp. 360-363, 1981.

Snider, E.H. and R.S. Manning: "A Survey of Pollutant Emission Levels in Wastewaters and Residuals from the Petroleum Refining Industry," Env. International (paper accepted 1981).

Sublette, K.L., E.H. Snider and N.D. Sylvester: "A Review of the Mechanism of Powdered Activated Carbon Enhancement of Activated Sludge Treatment," Water Research, 16, 1075-1082 (1982).

Books; Monographs; Chapters

Manning, F.S., and E.H. Snider; "Equalization," Invited Monograph in Series on Wastewater Treatment Technology, W.W. Eckenfelder and J.W. Patterson, ed., 1981.

Ford, D.L., F.S. Manning, and E.H. Snider: "Flotation," Invited Monograph in Series on Wastewater Treatment Technology, W.W. Eckenfelder and J.W. Patterson, ed., 1981.

Manning, F.S., and E.H. Snider; "Oil and Grease Removal by Gravity," Invited Monograph in Series on Wastewater Treatment Technology, W.W. Eckenfelder and J.W. Patterson, ed., 1981.

Manning, F.S., and E.H. Snider; "Incineration: Wastewater Treatment Applications," Invited Monograph in Series on Wastewater Treatment Technology, W.W. Eckenfelder and J.W. Patterson, ed., 1981.

Manning, F.S., E.H. Snider, and E.L. Thackston: "Screening and Sedimentation," Invited Monograph in Series on Wastewater Treatment Technology, W.W. Eckenfelder and J.W. Patterson, ed., 1981.

Short Courses and Presentations

January 1973	Presentation of paper, "Treatment of Dyewaste with Ozone," at 2nd Annual Conference on Textile Wastewater Treatment and Air Pollution Control," Hilton Head Island, S.C.
January 1974	Presentation of paper, "Comparison of Existing Air Pollution Levels with Standards," Third Annual Conference on Textile wastewater and Air Pollution Control, Hilton Head Island, S.C.
May 1974	Presentation of paper, "Thirty Day Biodegradability of Textile Chemicals and Dyes," 1974 Annual Technical Conference of American Association of Textile Chemists and Colorists, New Orleans, LA., Presentation, "Air Pollution Instrumentation"; Short Course on Industrial Pollution Control, Clemson University, Clemson, S.C.
June 1977	Presentation, "Air Pollution Instrumentation"; Short Course on Industrial Pollution Control, Clemson University, Clemson, S.C.
June 1977	Presentation, "Industrial Sludge Treatment and Disposal"; Short Course on Industrial Pollution Control, Clemson University, Clemson, S.C.
October 1977	Presentation, "A Kinetic Study of the Reactions of Biphenyl and Chlorine in Water to Form Chlorobiphenyls"; Chem. Eng. Dept. seminar, Clemson University, Clemson, S.C.
January 1978	Presentation of paper, "Carbon Adsorption for Removal of Gaseous Pollutants," 1978 Technical Meeting of American Association of Textile Chemists and Colorists, New York, N.Y.
November 1978	Presentation of paper, "Biphenyl Chlorination Under Water Treatment Conditions," Industrial Pollution Control Symposium, Clemson University, Clemson, S.C.

June 1980	Presentation of paper, "Powdered Activated Carbon Enhancement of the Activated Sludge Process," Eighth Annual Meeting of the Water and Wastewater Treatment Manufacturers Association, Austin, TX.
June 1981	Presentation of paper, "The Valve Tray Column: An Experiment in Tray Hydraulics," Annual National Meeting of Am. Soc. for Engr. Education, Los Angeles, CA.
March 1982	Presentation of paper, "PAC Enhancement of the Activated Sludge Process," Chem. Engr. Dept. seminar series, University of Oklahoma, Norman, OK.
February 1983	Presentation of paper, "Physical and Chemical Treatment of Petroleum Refinery Slop Oil Emulsions," Chem. Engr. Dept. Seminar Series, Oklahoma State University, Stillwater, OK.

APPENDIX B
LIST OF INTERVIEWEES AND OUTSIDE AGENCY CONTACTS

TABLE B.1

LIST OF INTERVIEWEES

	Position	Years of Service
1.	Heavy Equipment Operator (retired)	27
2.	Contract Programmer	15
3.	Instructor, Fuels Training	18
4.	Real Property Officer	20
5.	Fire Inspector	27
6.	Bulldozer and Crane Operator (retired)	28
7.	Assistant Chief, Fire Department	15
8.	Truck Driver (retired)	26
9.	Deputy Chief, Operations (retired)	28
10.	Chief, DPDO	26
11.	Warehouse Leader, DPDO	35
12.	NCOIC, Fire Protection Training	3
13.	Foreman, Water and Wastewater	23
14.	Chief, Environmental & Contract Planning	4
15.	Deputy Chief, Operations	27
16.	Deputy Base Civil Engineer	11
17.	Supervisor, Fire Protection Training	16
18.	NCOIC, Liquid Fuels System Maintenance Training	4

TABLE B.1
(Continued)
LIST OF INTERVIEWEES

	Position	Years of Service
19.	Chief, Financial Management	16
20.	NCOIC, Arms and Equipment, Security Police	2
21.	Chief, Fire Department	1
22.	Chief, Training and Development Section, Pneudraulics	12
23.	Mechanic, Refueling Shop, Vehicle Maintenance	30
24.	Manager, Vehicle Maintenance	1
25.	Instructor, Mechanical, Cryogenics	28
26.	Instructor, Liquid Fuels Maintenance	36
27.	Foreman, Repair and Reclamation Shop	28
28.	NCOIC, Fire Protection Training	3
29.	NCO, Technical Writer, Pneudraulics	14

TABLE B.2

OUTSIDE AGENCY CONTACTS

1. Kenneth Baumann, Environmental Protection Engineer
   Surveillance Section, Division of Water Pollution Control
   Illinois Environmental Protection Agency, Region VI
   2125 South First Street
   Champaign, IL 61820
   217/333-8361

2. Cecil Van Etten, Environmental Protection Engineer
   Field Operations Section, Division of Public Water Supplies
   Illinois Environmental Protection Agency, Region VI
   2125 South First Street
   Champaign, IL 61820
   217/333-8361

3. Robert D. Olson, Assistant Hydrologist
   Ground Water Section, Illinois State Water Survey
   Box 5050, Station A
   Champaign, IL 61820
   217/333-6800

4. Librarian
   Illinois State Geological Survey
   615 East Peabody Drive
   Champaign, IL 61820
   217/344-1481

5. Bob Stone, Solid Waste
   U.S. Environmental Protection Agency, Region V
   Chicago, IL
   312/886-6151

APPENDIX C

TENANT ORGANIZATIONS AND MISSIONS

APPENDIX C

TENANT ORGANIZATIONS AND MISSIONS

Following is a listing of the tenant organizations stationed at Chanute Air Force Base, along with their respective missions.

3505th Recruiting Group

The mission of the 3505th Recruiting Group is to recruit qualified men and women from civilian sources in a nine-state area to meet the requirements of the United States Air Force.

1963rd Communications Squadron

The 1963rd Communications Squadron's mission is to manage and execute Air Force responsibilities of the telecommunications in support of the Air Force and other government or civilian agencies as directed by the Chief of Staff, USAF.

Air Force Audit Agency

This unit provides Air Force managers at all levels of command with the independent evaluation of operations being conducted at Chanute.

Air Force Office of Special Investigation, Detachment 514

This tenant's mission is to provide criminal, counterintelligence, internal security, and special investigative services to all Air Force activities on Chanute, northern Illinois and Wisconsin.

Management Engineering Squadron

This unit is a base tenant organization with headquarters at Air Training Command, Randolph AFB, Texas. The assigned organizational mission is to determine, justify, validate utilization and provide control of all manpower authorizations for host and tenant organizations using approved and tested Air Force procedures. In addition, a management consultant service is provided to functional managers or commanders upon request.

HQ Air Weather Service

Primary mission of this unit is to act as liaison between Chanute Technical Training Center (ATC) and Headquarters Air Weather Service (MAC) in matters pertaining to students enrolled in basic and advanced weather courses conducted at Chanute.

U.S. Army Corps of Engineers

This is a field office under the direction of an area office at Indianapolis, Indiana. It provides engineering assistance in the construction of authorized military facilities.

Defense Investigative Service

The Defense Investigative Service is responsible for all Department of Defense (DOD) directed investigation for 24 counties in central Illinois and western Indiana. Its mission is to conduct personnel security investigations for DOD components and, when authorized, other US government departments and agencies; and to provide liaison with and support for law enforcement investigations involvong DOD, conducted by the FBI or other federal investigative agencies in those instances which restrict participation by military personnel.

Area Defense Counsel

The mission of this office is to defend all military personnel (Army, Navy, Air Force, and Marines), against military charges of misbehavior.

Defense Property Disposal Office (DPDO)

The DPDO provides service and support to Chanute AFB, and several other military units in Illinois. DPDO maintains liaison and provides technical assistance to generating activities. They receive, segregate, inspect, classify and store excess, surplus and scrap property turned in by organizations assigned to it. The property turned in is disposed through reutilization, transfer, donation, sale or destruction.

Air Force Commissary Service

The mission of the commissary is to provide quality and reasonably priced food supplies to base personnel and retirees.

Navy/Marine Detachment

The Navy/Marine detachment's mission is to act as liaison between the Chanute Technical Training Center and Navy/Marine students enrolled in basic and advanced weather courses.

Personnel Support Detachment

This group provides administrative support for all navy personnel assigned at the Chanute Technical Training Center.

APPENDIX D

SUPPLEMENTAL BASE FINDINGS INFORMATION

TABLE D.1

PESTICIDE UTILIZATION

Chanute AFB

Name	Classification: I-Insecticide H-Herbicide R-Rodenticide	Estimated Years Used (Including 1983)	Storage Location (Bldg. No.)
Chlordane	I	25	1390
Malathion 57%	I	20	45
Malathion 91%	I	5	45
Diazinon	I	15	45
Diazinon Dust	I	15	45
2-4-D	H	20	1390
U Rox (Monurun Granules)	H	15	1390
Rhodia (2-4-D Granules)	H	15	1390
Monuron Liquid	H	10	1390
Round-up	H	2	45
Warfarin	R	25	45
Dursban	I	10	45
Pyrethrin	I	20	45
Baygon "G"	I	5	45
Ficam	I	3	45
Gopher Bait (Strychnine)	R	1	45
Phostoxin	I	12	43

Source: Entomology Unit, Chanute AFB

TABLE D.2

PESTICIDES USED BY GOLF COURSE MAINTENANCE UNIT

Chanute AFB

Material	Classification: I-Insecticide H-Herbicide R-Rodenticide
Weed Killer Aqua Shade	H
Roundup Herbicide	H
Dacamine Herbicide	H
Selective MCPP Herbicide	H
Daconell Fungicide	I
Oftanol	
Dursban	I
Diazinon	I
Tersan SP	I
Tersan 1991	I
Tersan LSR	I
Acti-dione	I
Scotts Proturf Insecticide	I
Scotts Proturf Fungicide	I
Tuco Actidtone TGF	I

Source: Entomology Unit, Chanute AFB

TABLE D.3

PESTICIDES INVENTORY - CHANUTE AFB

ENTOMOLOGY UNIT, 3345 CES, AUGUST 1983

Name	Classification: I-Insecticide H-Herbicide R-Rodenticide	On Hand	Location
Chlordane	I	2 Gal	1390
Malathion 57%	I	50 Gal	45
Malathion 91%	I	115 Gal	45
Diazinon	I	25 Gal	45
Diazinon Dust	I	60 Lb	45
2-4-D	H	330 Gal	1390
U Rox (Monuron Dry)	H	50 Lb	1390
Rhodia (2-4D Pellets)	H	150 Lb	1390
Monuron - Liquid	H	20 Gal	1390
Round-up	H	20 Gal	45
Warfarin	R	40 Lb	45
Dursban	I	20 Gal	45
Pyrethrin Bombs	I	335 Cans	45
Baygon "G"	I	10 Lb	45
Ficam	I	30 Lb	45
Gopher Bait (Strychnine)	R	10 Lb	45
Phostoxin	I	2 Lb	43

Source: Entomology Unit, Chanute AFB

TABLE D.4

SUMMARY OF SPILLS AND LEAKS INFORMATION

Chanute Air Force Base

Date of Record	Estimated Volume (gal)	Material	Spill/Leak Description
June - August 1972	2,000-4,000	JP-4	Fuel bladders on the west side of the aircraft apron from Building 932. Valve accidently left open causing leak to drainage ditch and then Salt Fork Creek; a fish kill occurred several miles downstream from the base.
17 March 1975	10-15	Fuel Oil	Grounds near Buildings 801, 802, 805.
2 November 1977	1-3	JP-4	JP-4 and water washdown from fire training area in Test Cell area; floor drains discharged to ditch and creek. Corrective action -- dam construction in building.
23 February 1979	2500	Gasoline	Leak from tank at BX Service Station (Building 700) into storm sewer. Information obtained from memo for record.
7 March 1979	30	Oil	Oil spill in Fire Protection Training Area.
6 August 1982	300	JP-4	A rupture of an F-100 aircraft fuel tank in 900 area.
25 February 1983	10-15	JP-4	Parking lot adjacent to Building 68; sorbent materials used in cleanup.

Source: Spill Report Files and Interviews, Chanute AFB.

TABLE D.5
WATER QUALITY MONITORING DATA
SALT FORK CREEK BELOW TRAILER PARK 24-IN. PIPE

(Before Entering Chanute AFB)
Station 1

Date	COD (mg/l)	Oil & Grease (mg/l)	Ammonia (*) (mg/l)	Phosphorus (mg/l)	Cadmium (50)* (ug/l)	Chromium (1000)* (ug/l)	Copper (20)* (ug/l)	Iron (1000)* (ug/l)	Lead (100)* (ug/l)	Mercury (0.5)* (ug/l)	Nickel (1000)* (ug/l)	Silver (5)* (ug/l)
Mar 26, 1980	-	<0.3	<0.2	<0.2	<10	<50	<20	-	-	-	<50	<10
May 11, 1981	23	-	<0.2	<0.2	<10	<50	<20	390	<50	<5	<50	<10
Jun 6, 1981	<10	-	0.7	0.15	<10	<50	<44	239	<50	<5	-	<10
Aug 10, 1981	12	<0.3	<0.2	0.16	<10	<50	<20	<100	<50	<5	<50	<10
Aug 24, 1981	40	<5	0.5	0.1	<10	<50	<50	210	<20	<2	<100	<10
Oct 14, 1981	50	0.7	0.6	1.08	<10	<50	37	2825	<50	0.9	<50	5
Oct 29, 1981	<10	0.36	1.0	<0.1	<10	<50	<50	200	<20	<2	<100	<10
April 8, 1982	16	<3	<.2	0.1	<10	<50	37	117	<50	<2	<50	<5
May 12, 1982	<10	<0.3	<.2	<.1	<10	<50	57	123	<50	<5	<50	<10
Jun 8, 1982	<10	0.3	0.2	<.1	<10	<50	36	303	<50	<5	<50	<10
Jun 24, 1982	<10	<0.3	0.2	0.1	<10	<50	<20	353	<50	<5	<50	<10
Sep 1, 1982	-	-	-	-	<10	101	37	378	<50	<5	<50	<10
Oct 14, 1982	<10	<0.3	0.4	0.22	<10	53	25	855	<50	<22	<50	<5
Nov 8, 1982	30	<0.3	0.2	0.19	<10	<50	<20	253	<50	<5	<50	<10
May 9, 1983	50	<0.3	<0.2	<0.1	<10	<50	<20	242	<50	<2	<50	<2
Jun 2, 1983	17	0.5	<0.2	<0.10	<10	<50	<20	<100	-	<2	<50	<10
Jul 18, 1983	<10	0.5	<0.2	0.12	<10	<50	<20	<100	-	<1	<50	<5
Jul 29, 1983	20	<0.3	<0.2	<0.1	<10	<50	<20	174	-	<1	63	<5

*Constituent levels specified in Illinois "General Use Water Quality Standards", which are applicable to Salt Fork Creek, are shown in parentheses. Ammonia standards vary from 1.5-15 mg/l depending on pH and temperature.

Source: Chanute AFB documents and State of Illinois Rules and Regulations.

TABLE D.6
WATER QUALITY MONITORING DATA
SALT FORK CREEK BEFORE TRIBUTARY CONFLUENCE

(Before Entering Chanute AFB)
Station 2

Date	COD (mg/l)	Oil & Grease (mg/l)	Ammonia (*) (mg/l)	Phosphorus (mg/l)	Cadmium (50)* (ug/l)	Chromium (1000)* (ug/l)	Copper (20)* (ug/l)	Iron (1000)* (ug/l)	Lead (100)* (ug/l)	Mercury (0.5)* (ug/l)	Nickel (1000)* (ug/l)	Silver (5)* (ug/l)
Mar 26, 1980	-	<0.3	<0.2	<0.2	<10	<50	<20	-	-	<5	<50	<10
May 11, 1981	10	-	0.2	<0.2	<10	<50	300	1600	<50	<5	<50	<10
Jun 6, 1981	<10	-	0.4	<0.10	<10	<50	<20	196	<50	<5	<50	<10
Aug 10, 1981	<10	<0.3	<0.2	0.2	<10	<50	36	419	<50	<5	<50	<10
Aug 24, 1981	<10	<5	0.2	0.2	<10	<50	<50	220	<20	<2	<100	<10
Oct 14, 1981	<10	0.4	0.6	0.44	<10	<50	27	1591	<50	0.9	<50	5
Oct 29, 1981	<10	0.3	0.7	<0.1	<10	<50	<50	250	<20	<2	<100	<10
Apr 8, 1982	23	<0.3	<0.2	<0.1	<10	<50	<20	138	<50	<2	<50	<5
May 12, 1982	<10	<0.3	<0.2	<0.1	<10	<50	50	141	<50	<5	<50	<10
Jun 8, 1982	<10	0.5	0.2	0.12	<10	<50	<20	419	<50	<5	<50	<10
Jun 24, 1982	<10	<0.3	0.23	0.10	<10	<50	<20	232	<50	<5	<50	<10
Sept 1, 1982	-	-	-	-	<10	103	36	637	<50	<5	<50	<10
Nov 8, 1982	21	<0.3	<0.2	<0.1	<10	<50	<20	1421	<50	<5	<50	<10
May 9, 1983	25	<0.3	<0.2	<0.1	<10	<50	<20	259	-	<2	<50	<2
Jun 2, 1983	24	<0.3	<0.2	<0.1	<10	<50	<20	144	-	<2	<50	<10
Jul 18, 1983	<10	0.5	<0.2	0.13	<10	<50	<20	115	-	<1	<50	<5
Jul 29, 1983	15	0.4	<0.2	<0.1	<10	<50	<20	223		<1	<50	<5

*Constituent levels specified in Illinois "General Use Water Quality Standards", which are applicable to Salt Fork Creek, are shown in parentheses. Ammonia standards vary from 1.5-15 mg/l depending on pH and temperature.

Source: Chanute AFB documents and State of Illinois Rules and Regulations.

TABLE D.7
WATER QUALITY MONITORING DATA
SEWAGE TREATMENT PLANT OUTFALL

Station 3

Date	COD (mg/l)	Oil & Grease (mg/l)	Ammonia (*) (mg/l)	Phosphorus (mg/l)	Cadmium (50)* (ug/l)	Chromium (1000)* (ug/l)	Copper (20)* (ug/l)	Iron (1000)* (ug/l)	Lead (100)* (ug/l)	Mercury (0.5)* (ug/l)	Nickel (1000)* (ug/l)	Silver (5)* (ug/l)
Mar 26, 1980	35	<0.3	4.0	0.3	<10	<50	<33	-	-	<5	<50	<10
May 11, 1981	<10	-	0.9	<0.2	<10	<50	38	1200	<50	<5	<50	<10
Jun 6, 1981	20	-	5.0	0.98	<10	<50	149	1320	<50	<5	<50	<10
Aug 10, 1981	<10	<0.3	<0.2	0.17	<10	<50	47	707	<50	<5	<50	<10
Aug 24, 1981	<10	<5	0.4	0.2	<10	<50	<50	600	<20	<2	<100	<10
Oct 14, 1981	66	0.6	0.4	0.21	<10	<50	<20	408	<50	0.9	<50	5
Oct 29, 1981	<10	0.72	0.7	<0.1	<10	<50	<50	1810	<20	<2	<100	<10
Apr 8, 1982	42	0.6	6.2	1.38	<10	<50	24	617	<50	<2	<50	9
May 12, 1982	15	<0.3	0.4	<0.10	<10	<50	54	192	<50	<5	<50	<10
June 8, 1982	29	0.6	2.6	0.32	<10	<50	<20	350	<50	<5	<50	<10
June 24, 1982	23	1.2	3.0	0.32	<10	<50	<20	561	<50	<5	<50	<10
July 26, 1982	19	<0.3	1.35	0.31	<10	<50	34	520	<50	<5	<50	<10
Aug 21, 1982	12	<0.3	1.14	0.86	<10	133	27	697	<50	<5	<50	<10
Oct 14, 1982	<10	0.5	1.58	2.33	<10	<50	<20	416	<50	<2	<50	<5
Nov 8, 1982	26	<0.3	0.7	0.65	<10	<50	<20	334	<50	<5	<50	<10
May 9, 1983	80	0.5	0.8	0.1	<10	<50	<20	187	-	<2	<50	<2
Jun 2, 198	34	0.5	0.7	0.22	<10	<50	<20	220	-	<2	<50	<10
July 18, 1983	<10	0.5	0.2	0.55	<10	<50	<20	134	-	<1	<50	<5
July 29, 1983	20	0.4	0.4	0.88	<10	124	<20	617	-	<1	<50	<5

*Constituent levels specified in Illinois "General Use Water Quality Standards", which are applicable to Salt Fork Creek, are shown in parentheses. Ammonia standards vary from 1.5-15 mg/l depending on pH and temperature.

Source: Chanute AFB documents and State of Illinois Rules and Regulations.

TABLE D.8
WATER QUALITY MONITORING DATA
STORM DRAINAGE PIPE OUTLET

Station 4

Date	COD (mg/l)	Oil & Grease (mg/l)	Ammonia (*) (mg/l)	Phosphorus (mg/l)	Cadmium (50)* (ug/l)	Chromium (1000)* (ug/l)	Copper (20)* (ug/l)	Iron (1000)* (ug/l)	Lead (100)* (ug/l)	Mercury (0.5)* (ug/l)	Nickel (1000)* (ug/l)	Silver (5)* (ug/l)
May 11, 1981	20	-	2.5	1.3	<10	<50	79	170	<5	<5	<50	<10
Jun 6, 1981	<10	-	1.1	0.33	<10	<50	<20	326	<50	<5	<50	<10
Aug 24, 1981	<10	<5	0.2	0.1	<10	<50	<50	170	<20	<2	<100	<10
Oct 14, 1981	<10	1.0	2.8	2.15	<10	137	63	1106	<50	0.6	<50	5
Oct 29, 1981	61.5	1.79	2.7	0.88	<10	<50	<50	3140	<20	<2	<100	<10
Apr 8, 1982	<10	0.5	0.7	0.31	<10	<50	<20	261	<50	<2	<50	<5
May 12,1982	25	1.3	3.0	0.82	<10	<50	72	770	<50	<5	<50	<10
Jun 8, 1982	23	0.5	0.7	0.20	<10	<50	46	1489	<50	<5	<50	<10
Jun 24, 1982	20	<0.3	1.25	0.20	<10	<50	<20	499	<50	<5	<50	<10
July 26, 1982	-	-	-	-	<10	<50	23	809	<50	<5	<50	<10
Aug 21, 1982	-	-	-	-	<10	127	24	825	<50	<5	<50	<10
Oct 14, 1982	16	2.8	0.32	0.51	<10	<50	<20	1609	<50	<2	<50	<5
Nov 8,1982	15	<0.3	<0.2	0.38	<10	<50	<20	1202	<50	<5	<50	<10
May 9, 1983	18	0.5	0.4	<0.1	<10	<50	<20	342	-	<2	<50	<2
Jun 2, 1983	17	<0.3	0.2	0.12	<10	<50	<20	159	-	<2	<50	<10
Jul 18, 1983	<10	0.5	0.3	0.60	<10	<50	<20	202	-	<1	<50	<5
Jul 29, 1983	15	0.4	0.5	0.63	<10	<50	<20	147	-	<1	<50	<5

*Constituent levels specified in Illinois "General Use Water Quality Standards", which are applicable to Salt Fork Creek, are shown in parentheses. Ammonia standards vary from 1.5-15 mg/l depending on pH and temperature.

Source: Chanute AFB documents and State of Illinois Rules and Regulations.

TABLE D.9
WATER QUALITY MONITORING DATA
SALT FORK CREEK EXIT FROM CHANUTE AFB

Station 5

Date	COD (mg/l)	Oil & Grease (mg/l)	Ammonia (*) (mg/l)	Phosphorus (mg/l)	Cadmium (50)* (ug/l)	Chromium (1000)* (ug/l)	Copper (20)* (ug/l)	Iron (1000)* (ug/l)	Lead (100)* (ug/l)	Mercury (0.5)* (ug/l)	Nickel (1000)* (ug/l)	Silver (5)* (ug/l)
Mar 26, 1980	-	-	0.8	0.2	<10	<50	29	-	-	<5	<50	<10
May 11, 1981	10	-	0.5	0.2	<10	<50	49	2700	<50	<5	<50	<10
Jun 6, 1981	<10	-	1.5	1.07	<10	<50	249	5570	<50	<5	<50	<10
Aug 10, 1981	<10	3.6	0.2	0.24	<10	<50	113	371	<50	<5	<50	<10
Aug 24, 1981	<10	<5	<0.1	0.3	<10	<50	<50	380	<20	<2	<100	<10
Oct 14, 1981	<10	-	0.7	2.0	<10	69	<20	398	<50	0.6	<50	5
Oct 29, 1981	25.9	0.51	1.4	0.31	<10	<50	<50	510	<20	<2	<100	<10
April 8, 1982	-	-	-	-	<10	<50	<20	134	<50	<2	<50	<5
May 12, 1982	11	0.5	1.4	0.21	<10	<50	37	215	<50	<5	<50	<10
Jun 8, 1982	<10	0.5	0.35	0.14	<10	<50	38	614	<50	<5	<50	<10
Jun 24, 1982	15	<0.3	<0.2	<0.1	<10	<50	<20	429	<50	<5	<50	<10
Jul 26, 1982	10	<0.3	0.28	0.21	-	-	-	-	-	-	-	-
Aug 21, 1982	16	<0.3	1.13	0.63	<10	137	<20	403	<50	<5	<50	<10
Oct 14, 1982	<10	<3	0.50	0.70	<10	<50	69	400	<50	<2	<50	<5
Nov 8, 1982	38	<0.3	0.4	0.59	<10	<50	<20	362	<50	<5	<50	<10
May 9, 1983	<10	0.9	0.3	<0.1	<10	<50	<20	431	-	<2	<50	<2
Jun 2, 1983	11	<0.3	<0.2	0.11	<10	<50	<20	431	-	<2	<50	<10
Jul 18, 1983	10	0.5	<0.2	0.31	<10	<50	<20	181	-	<1	<50	<5
Jul 29, 1983	15	0.4	<0.2	0.41	<10	<50	<20	183	-	<1	<50	<5

*Constituent levels specified in Illinois "General Use Water Quality Standards", which are applicable to Salt Fork Creek, are shown in parentheses. Ammonia standards vary from 1.5-15 mg/l depending on pH and temperature.

Source: Chanute AFB documents and State of Illinois Rules and Regulations.

TABLE D.10
WATER QUALITY MONITORING DATA
TRIBUTARY TO SALT FORK CREEK

(Before Entering Chanute AFB)

Station 6

Date	COD (mg/l)	Oil & Grease (mg/l)	Ammonia (*) (mg/l)	Phosphorus (mg/l)	Cadmium (50)* (ug/l)	Chromium (1000)* (ug/l)	Copper (20)* (ug/l)	Iron (1000)* (ug/l)	Lead (100)* (ug/l)	Mercury (0.5)* (ug/l)	Nickel (1000)* (ug/l)	Silver (5)* (ug/l)
May 11, 1981	10	-	0.2	0.2	<10	<50	140	2600	<50	<5	<50	<10
Jun 6, 1981	<10	-	0.4	<0.1	<10	<50	<20	109	<50	<5	<50	<10
Aug 10, 1981	<10	<0.3	0.2	0.27	<10	<50	30	409	<50	<5	<50	<10
Aug 24, 1981	70	<5	0.4	0.2	<10	<50	<50	130	-	<2	<100	<10
Oct 14, 1981	12	0.6	0.8	1.88	<10	68	<20	248	<50	0.7	<50	5
Oct 29, 1981	<10	0.63	1.0	0.19	<10	<50	<50	140	<20	<2	<100	<10
Apr 8, 1982	<10	0.5	<0.2	0.10	<10	<50	<20	<100	<50	<2	<50	<5
May 12, 1982	<10	<0.3	<0.2	<0.10	<10	<50	25	366	<50	<5	<50	-
Jun 8, 1982	11	<0.3	0.25	<0.10	<10	<50	28	435	<50	<5	<50	<10
Jun 24, 1982	17	<0.3	0.20	<0.10	<10	<50	<20	237	<50	<5	<50	<10
Jul 26, 1982	-	-	-	-	<10	<50	44	122	<50	<5	55	<10
Aug 21, 1982	15	<0.3	1.13	0.75	<10	122	23	632	<50	<5	<50	<10
Oct 14, 1982	<10	3.3	0.14	0.24	<10	<50	<20	876	<50	<2	<50	12
Nov 8, 1982	30	<0.3	0.2	0.19	<10	<50	<20	253	<50	<5	<50	<10
May 9, 1983	24	0.5	<0.2	<0.1	<10	<50	<20	172	-	<2	<50	<2
Jun 2, 1983	20	<0.3	<0.2	<0.10	<10	<50	<20	137	-	<2	<50	<10
Jul 18, 1983	<10	0.5	<0.2	0.12	<10	<50	<20	<10	-	<1	<50	-
Jul 29, 1983	20	<0.3	<0.2	0.12	<10	<50	<20	260	-	<1	<50	<5

*Constituent levels specified in Illinois "General Use Water Quality Standards", which are applicable to Salt Fork Creek, are shown in parentheses. Ammonia standards vary from 1.5-15 mg/l depending on pH and temperature.

Source: Chanute AFB documents and State of Illinois Rules and Regulations.

APPENDIX E

MASTER LIST - INDUSTRIAL SHOPS

APPENDIX E

MASTER LIST - INDUSTRIAL SHOPS

Name	Present Location Bldg. No.	Handles Hazardous Materials	Generates Hazardous Wastes	Past TSD
3345 AIR BASE GROUP				
Services Division	801	YES	NO	Consumed in Process
3345 Civil Engineering Squadron				
Civil Engineering Squadron	54, 55	NO	NO	--
Sewage Treatment Plant	550	YES	NO	Consumed in Process
Central Heating Plant	46	YES	NO	Consumed in Process
Oil Fired Heating Plant	988	NO	NO	--
Water Treatment Plant	705	YES	NO	Consumed in Process
Fire Department	43	NO	NO	--
Carpenter Shop	57	NO	NO	--
Refrigeration Shop	55	NO	NO	--
Instrument Control	54	NO	NO	--
Electric Shop	55	YES	YES	DPDO
Exterior Electric	724	YES	YES	DPDO
Fuel Shop	54	YES	NO	Consumed in Process
Bldg. 950	950	YES	NO	Consumed in Process
Power Production	66	YES	NO	Consumed in Process
Pavements	732	YES	YES	DPDO

APPENDIX E
(Continued)
MASTER LIST - INDUSTRIAL SHOPS

Name	Present Location Bldg. No.	Handles Hazardous Materials	Generates Hazardous Wastes	Past TSD
3345 Civil Engineering Squadron (Continued)				
Heavy Equipment	732	YES	NO	Consumed in Process
Entomology	43	YES	YES	Reused in Mix Water
Plumbing Shop	54	YES	NO	Consumed in Process
Steamfitters/Heat Shop	Steam Pits	NO	NO	--
Mason Shop	54	YES	NO	Consumed in Process
Paint Shop	55	YES	YES	DPDO
Fabrication Shop	55	YES	NO	Consumed in Process
Grounds	732	YES	YES	DPDO
Golf Course	740	YES	NO	Consumed in Process
3345 Marksmanship Training, Readiness Division	899	YES	NO	Consumed in Process
3345 Morale, Welfare, Recreational Division				
Clubs, 3345 MWR	349, 269, 589	YES	NO	Consumed in Process
Recreational Facilities, 3345 MWR	111	NO	NO	--
Photo Hobby Shop, 3345 MWR	386	YES	NO	Consumed in Process
Arts & Crafts Shop, 3345 MWR	519	NO	NO	--

APPENDIX E
(Continued)
MASTER LIST - INDUSTRIAL SHOPS

Name	Present Location Bldg. No.	Handles Hazardous Materials	Generates Hazardous Wastes	Past TSD
3345 Morale, Welfare, Recreational Division (Continued)				
Wood Hobby Shop, 3345 MWR	519	YES	NO	Consumed in Process
Auto Hobby Shop, 3345 MWR	519	YES	YES	DPDO
3345 Security Police Squadron				
Security Police Squadron	66	YES	YES	Consumed in Process or Recycled
3345 Central Base Administration				
Reproduction Mgt. Br.	23	YES	YES	DPDO
RESOURCE MANAGEMENT				
3345 Consolidated Maintenance Squadron				
PMEL	722	YES	NO	Consumed in Process
Weather Equipment Maintenance	2	YES	NO	Consumed in Process
Gd Missile Maint.	12	YES	NO	Consumed in Process
SRAM	12	YES	YES	DPDO
Cryogenics Maint.	922	NO	NO	--
Synthetic Training	3	NO	NO	--
Autopilot/Instrument Maint.	3	NO	NO	--
AGE, 3345 FMS (Field Maintenance)	720	YES	YES	DPDO

APPENDIX E
(Continued)
MASTER LIST - INDUSTRIAL SHOPS

Name	Present Location Bldg. No.	Handles Hazardous Materials	Generates Hazardous Wastes	Past TSD
<u>3345 Consolidated Maintenance Squadron (Continued)</u>				
Propulsion, 3345 FMS	720	NO	NO	--
Corrosion Control, 3345 FMS	720	YES	YES	DPDO
Structural Repair/Survival, 3345 FMS	720	NO	NO	--
Electric/Battery Shop, 3345 FMS	720	YES	YES	DPDO
Pneudraulics, 3345 FMS	720	YES	YES	DPDO
Repair & Reclamation, 3345 FMS	720	YES	YES	DPDO
Metals Processing, 3345 FMS	720	NO	NO	--
Trainer Equip./Engine Branch	1	YES	YES	DPDO
<u>3345 Supply Squadron</u>				
3345 Supply Squadron	718	NO	NO	--
Materials Storage & Distribution	718	YES	NO	Consumed in Process
Customer Support Br.	718	NO	NO	--
Fuels Branch	718, 51	YES	NO	Consumed in Process
<u>Comptroller Division</u>				
Data Automation Branch	114	NO	NO	--
<u>Transportation Division</u>				
General Purpose Maintenance, Veh. Maint. Br.	729	YES	YES	DPDO
Refueling Maintenance, Veh. Maint. Br.	728	NO	NO	--

APPENDIX E
(Continued)
MASTER LIST - INDUSTRIAL SHOPS

Name	Present Location Bldg. No.	Handles Hazardous Materials	Generates Hazardous Wastes	Past TSD
<u>3345 Supply Squadron (Continued)</u>				
Packing & Crating, Traffic Management Br.	718	YES	NO	Consumed in Process
<u>USAF HOSPITAL - CHANUTE</u>				
Radiology	851	NO	NO	--
Medical Laboratory	851	NO	NO	--
Histo-Pathology Laboratory	851	NO	NO	--
Plant Management	851	YES	NO	Consumed in Process
Medical Maintenance	851	YES	NO	Consumed in Process
Dental Laboratory	851	YES	NO	Consumed in Process
Dental Clinic	850	YES	NO	Consumed in Process
Central Supply	851	YES	YES	DPDO
Surgery	851	NO	NO	--
Orthopedics Brace Shop	851	NO	NO	--
Veterinary Clinic	851	NO	NO	--
<u>3330 TECHNICAL TRAINING WING</u>				
<u>3340 Technical Training Group</u>				
Life Support Systems Branch	3	YES	NO	Consumed in Process
Metals Technology Branch	1	YES	YES	DPDO

APPENDIX E
(Continued)
MASTER LIST - INDUSTRIAL SHOPS

Name	Present Location Bldg. No.	Handles Hazardous Materials	Generates Hazardous Wastes	Past TSD
3340 Technical Training Group (Continued)				
Welding/Metals Processing	1	NO	NO	--
Heat Treatment-Electroplating/ Metals Processing	1	NO	NO	--
NDI, Air Force Part 1 & 2	1	NO	NO	--
NDI, Navy	1	NO	NO	--
Airframes	1	NO	NO	--
Fire Protection Branch	1	YES	NO	Consumed in Process
Automotive Mechanics Branch	2	YES	YES	DPDO
3350 Technical Training Group				
Jet Engine Branch	96,937	YES	YES	DPDO
Weather Training Branch	2	NO	NO	--
Weather Eqt. Br. (AF & Navy)	3	NO	NO	--
3360 Technical Training Group				
Flight Training Devices/ Instrument Branch	3	NO	NO	--
Electronic Principles Branch	3	NO	NO	--
Missile Maint./Electronics Br.	12	NO	NO	--
Tech. Engine Analysis Tng.	12	NO	NO	--
Missile Systems Analysis Spec.	12	NO	NO	--
Missile Electronics Equipment Spec.	12	YES	NO	Consumed in Process
Missile Maintenance Mechanic	12	NO	NO	--

APPENDIX E
(Continued)
MASTER LIST - INDUSTRIAL SHOPS

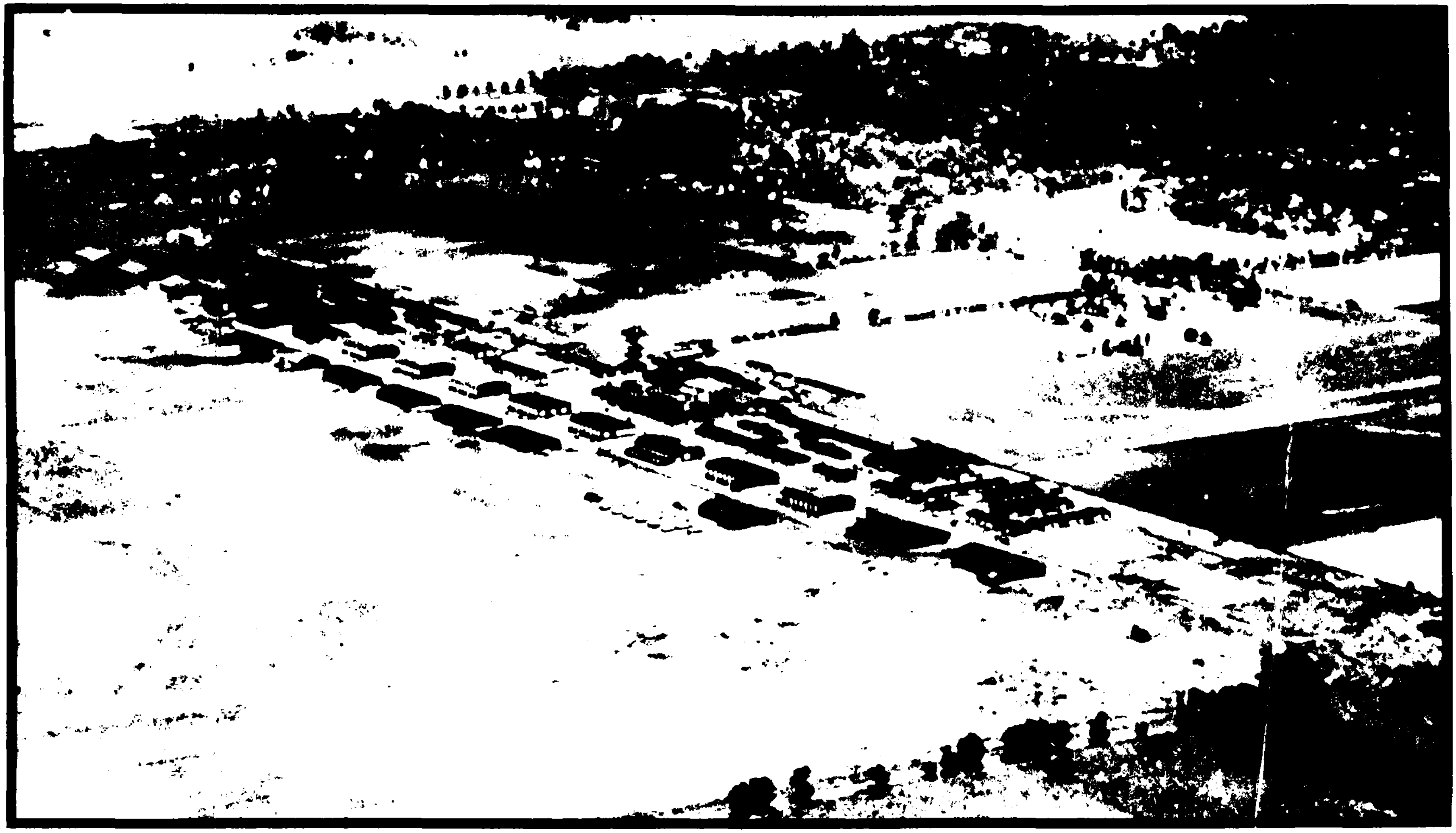
Name	Present Location Bldg. No.	Handles Hazardous Materials	Generates Hazardous Wastes	Past TSD
3360 Technical Training Group (Continued)				
Missile Facilities Specialist	12	NO	NO	--
Missile Systems Analysis Aircraft	12	NO	NO	--
3370 Technical Training Group				
AGE/Egress Branch (Folder 1)	68	YES	YES	DPDO
AGE/Egress Branch (Folder 2)	68	NO	NO	--
Electrical Branch	12	YES	NO	Consumed in Process
Environmental/ Pneudraulics Br.	3, 12	YES	NO	Consumed in Process
Fuels Branch	932	YES	YES	DPDO
ryogenics, Fuels Branch	923/927	YES	YES	DPDO
Fuels Spec, Fuels Branch	922	YES	YES	DPDO
Fuels Systems Maint., Fuels Branch	995	YES	YES	DPDO
Visual Services Division				
Photo Lab, Visual Services Division, 3330 TTW	505	YES	YES	DPDO
Graphic Arts Branch, Visual Services Division, 3330 TTW	1	YES	YES	DPDO
TENANT ACTIVITIES				
1963 Communications Squadron				
1963 Communications Squadron	6	NO	NO	--
Teletype Maintenance, 1963 Comm.	6	NO	NO	--

APPENDIX E
(Continued)
MASTER LIST - INDUSTRIAL SHOPS

Name	Present Location Bldg. No.	Handles Hazardous Materials	Generates Hazardous Wastes	Past TSD
1963 Communications Squadron (Continued)				
DSTE Maintenance, 1963 Comm.	6	NO	NO	--
Outside Plant Maintenance, 1963 Comm.	32	NO	NO	--
Inside Plant Maintenance, 1963 Comm.	3	YES	NO	Consumed in Process
Radio/TV Maintenance, 1963 Comm.	3	NO	NO	--
Teletype Operations, 1963 Comm.	6	NO	NO	--
AF Commissary Services				
Commissary	348	NO	NO	--
Defense Property Disposal Office (DPDO)				
DPDO	734, 735, 736	YES	NO	Stored and Contract Disposal

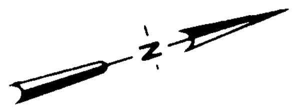
APPENDIX F

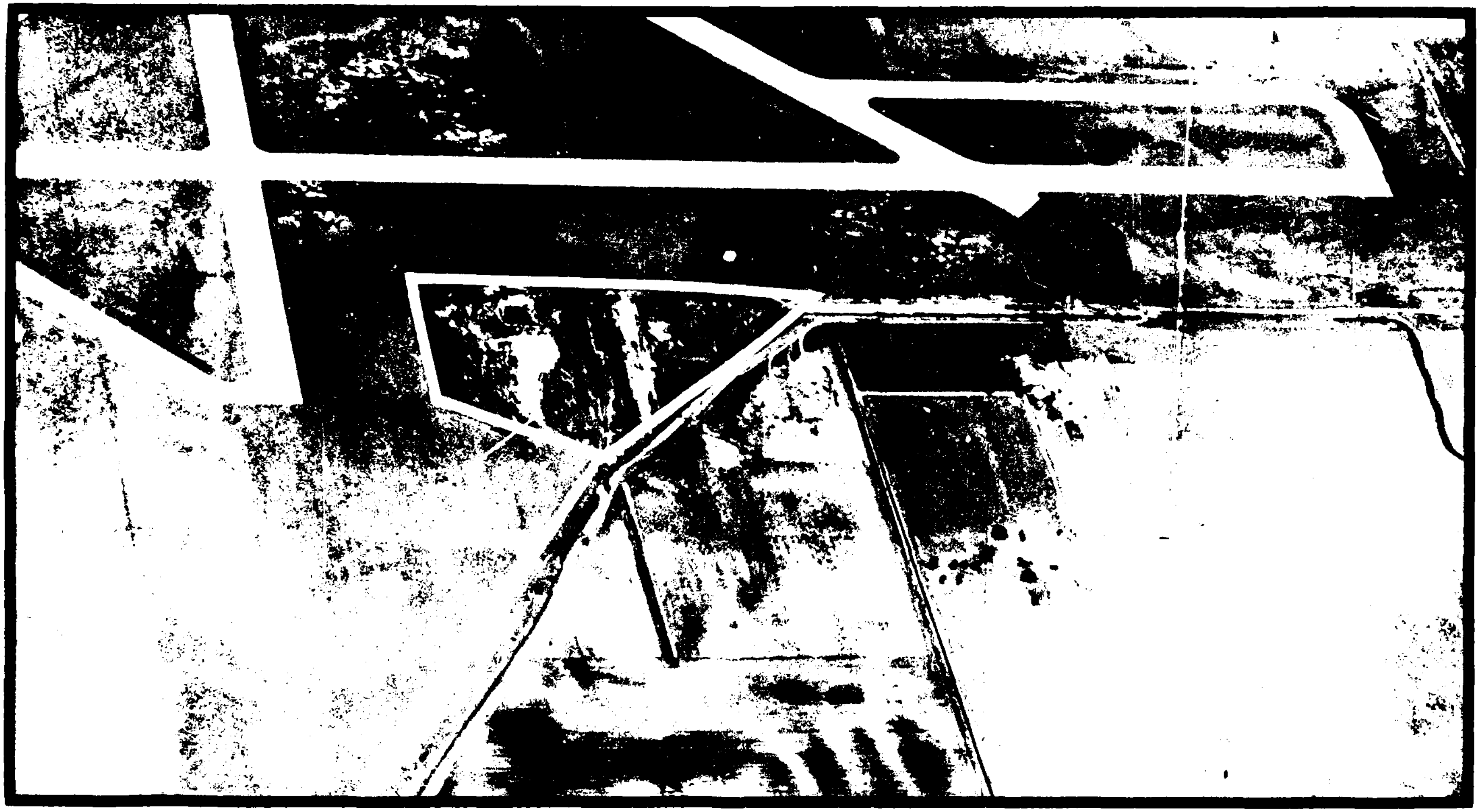
PHOTOGRAPHS



CHANUTE AFB FIELD

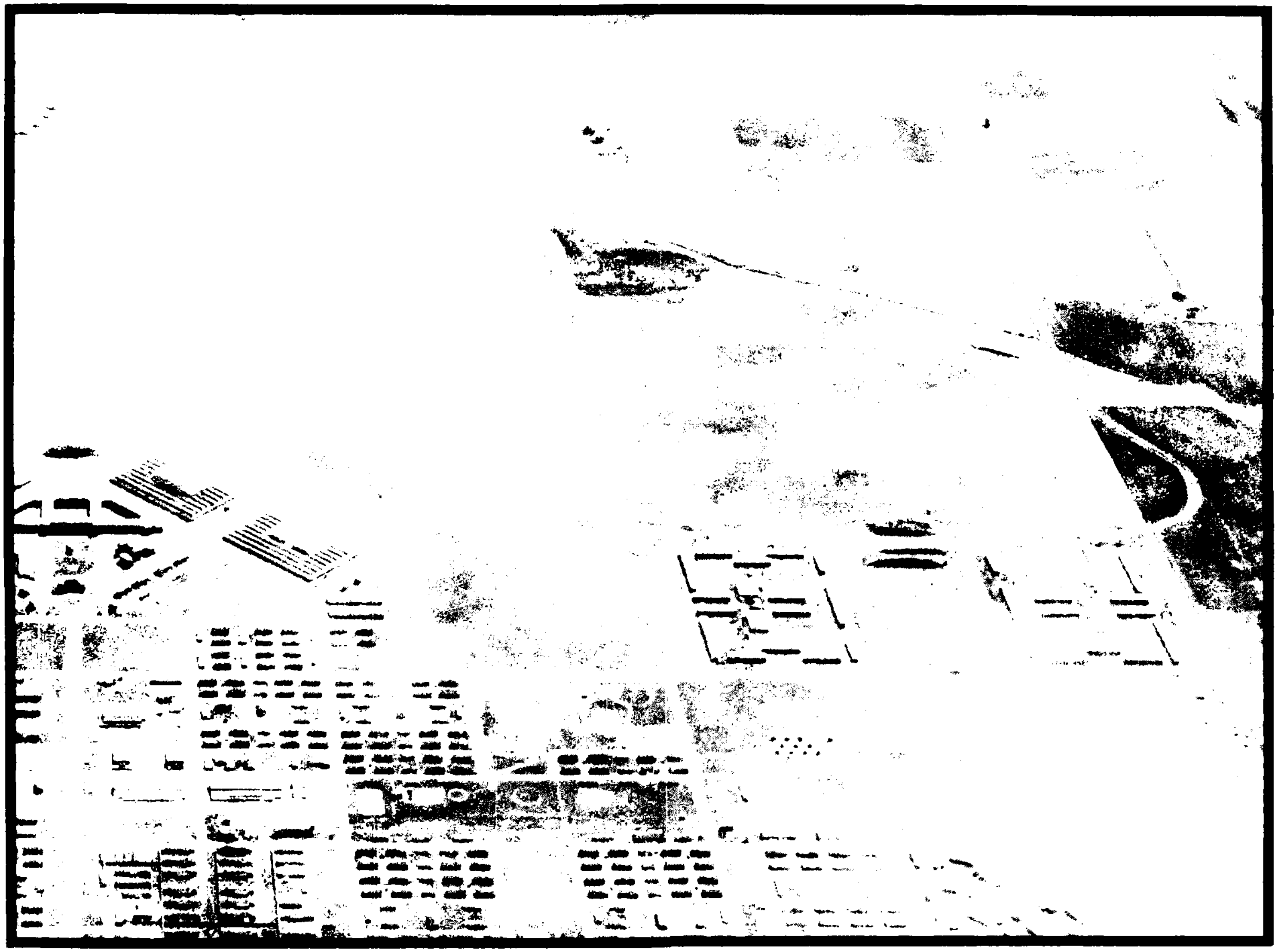
Early 1920's





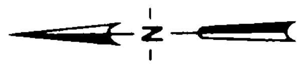
CHANUTE AFB

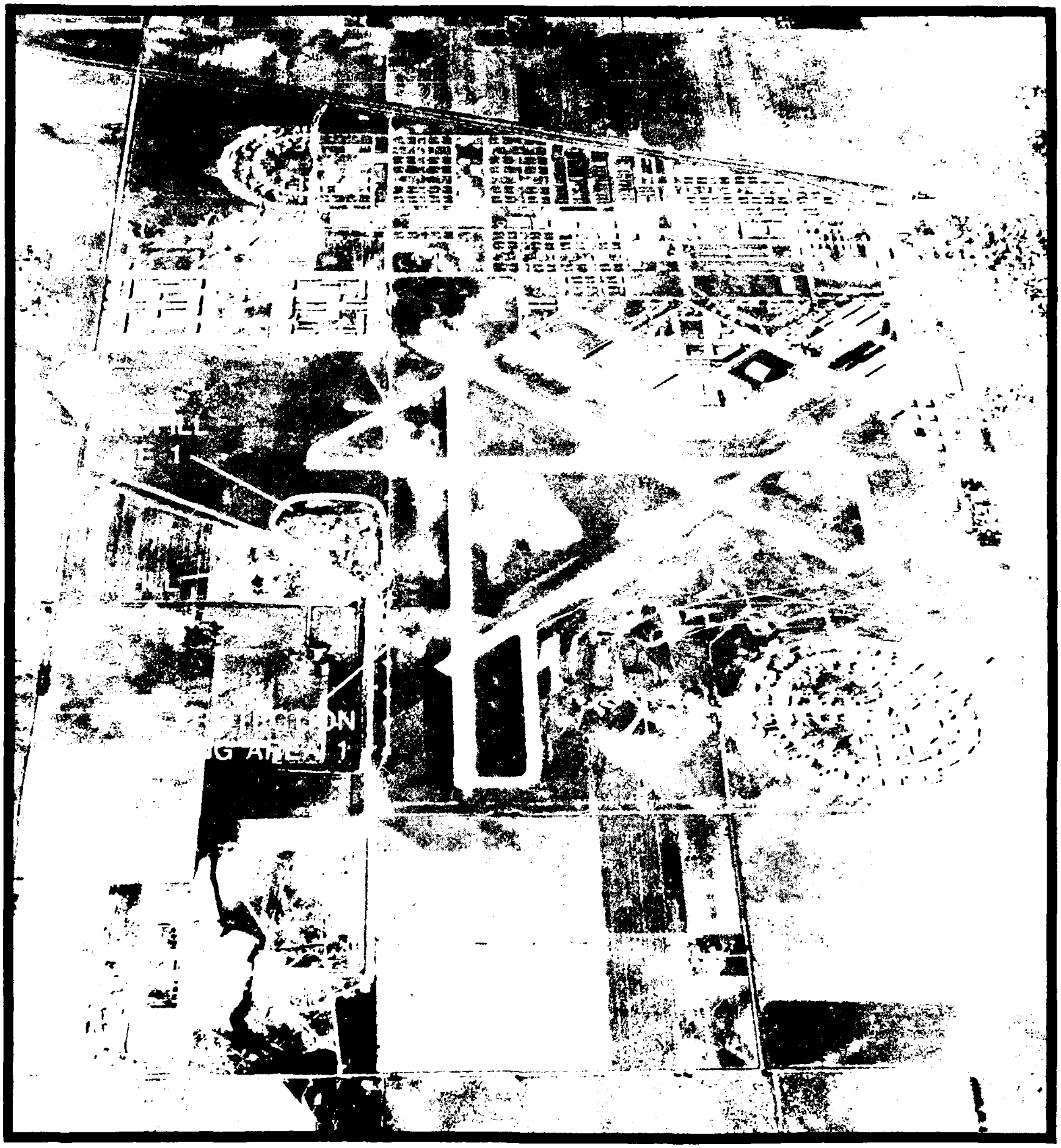
October 14, 1949



CHANUTE AFB

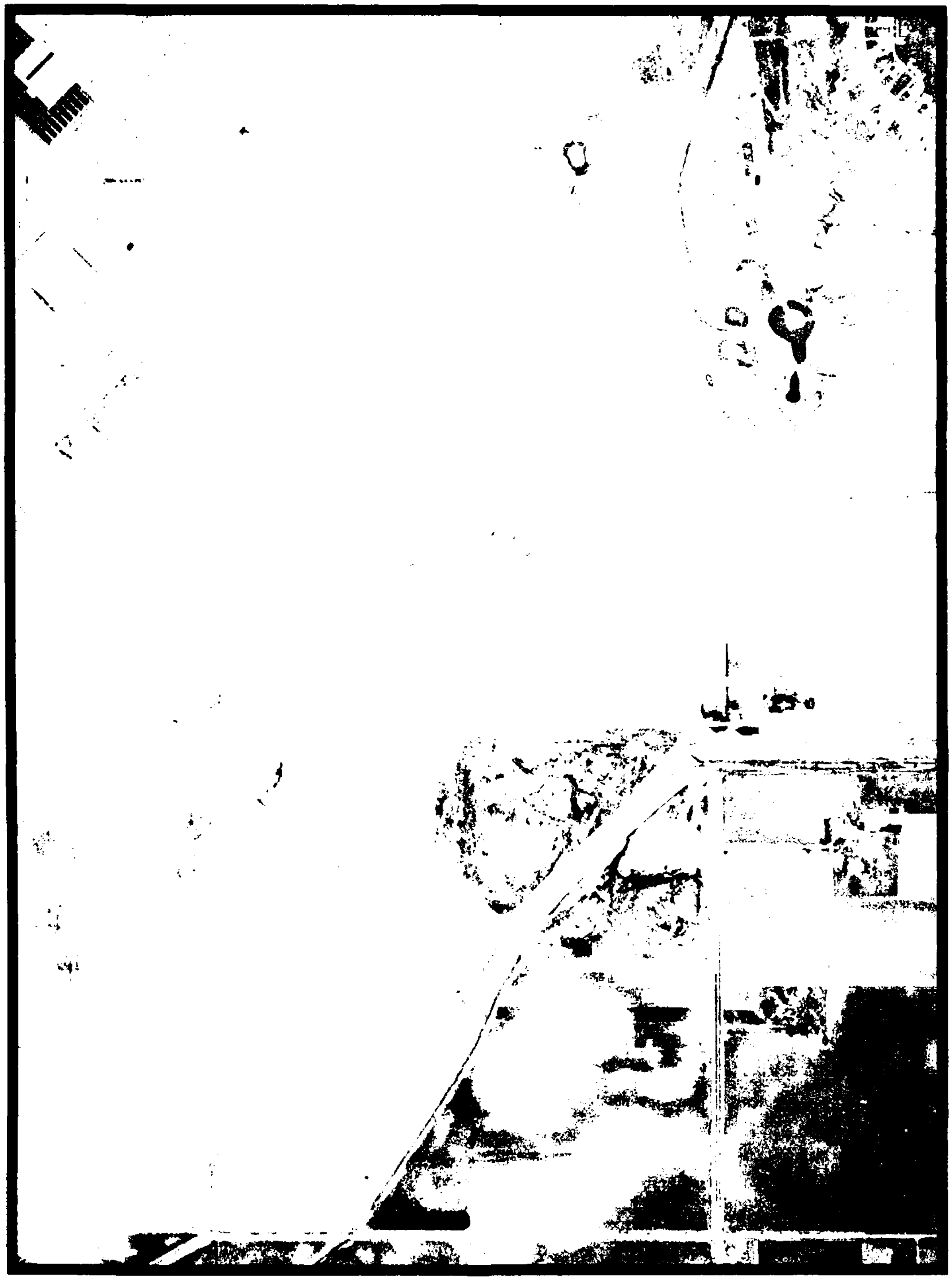
April 14, 1952





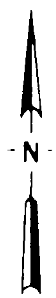
CHANUTE AFB

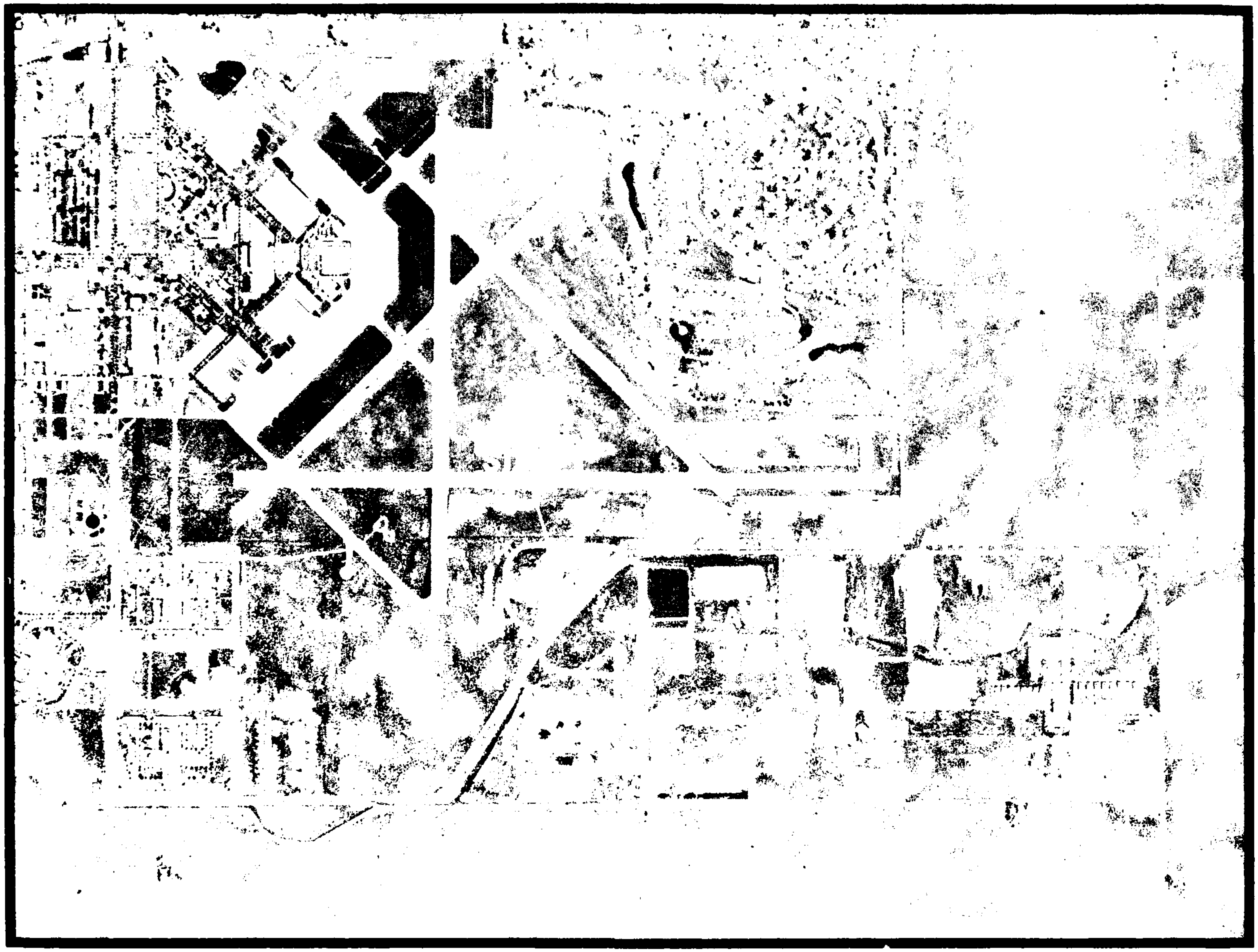
September 26, 1954



CHANUTE AFB

(Date Unknown Probably 1954-1959)



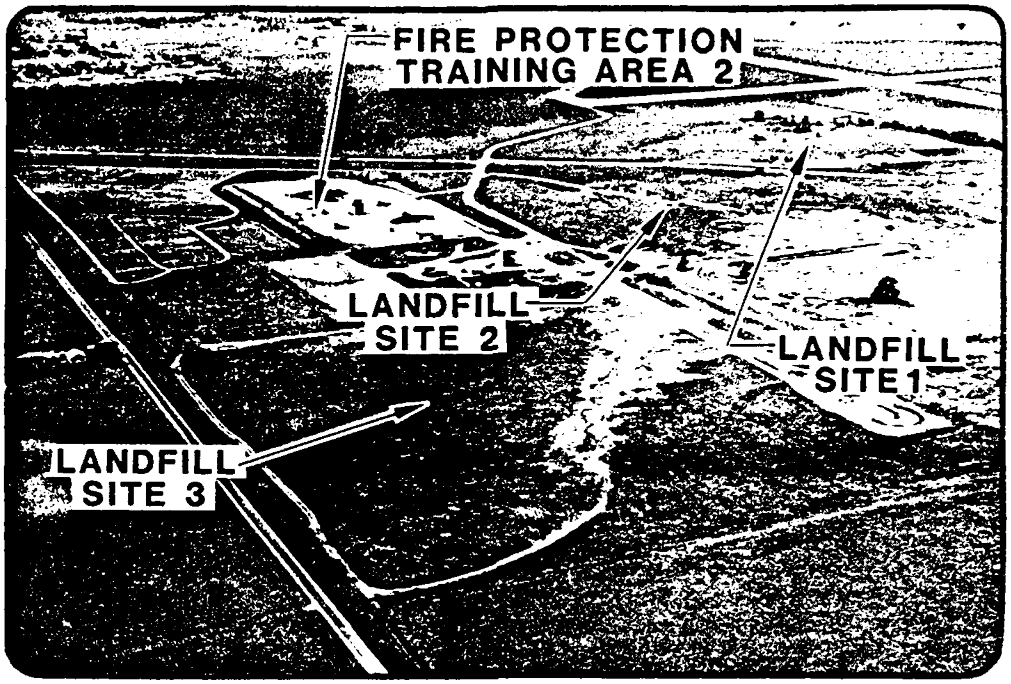


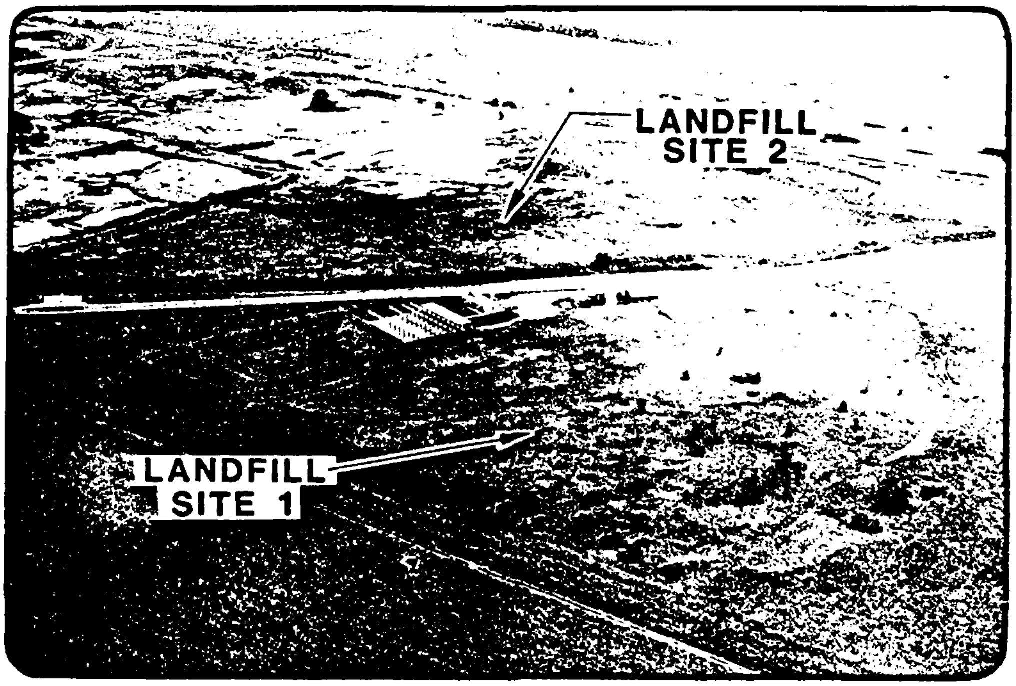
CHANUTE AFB

MAY 22, 1975

CHANUTE AFB

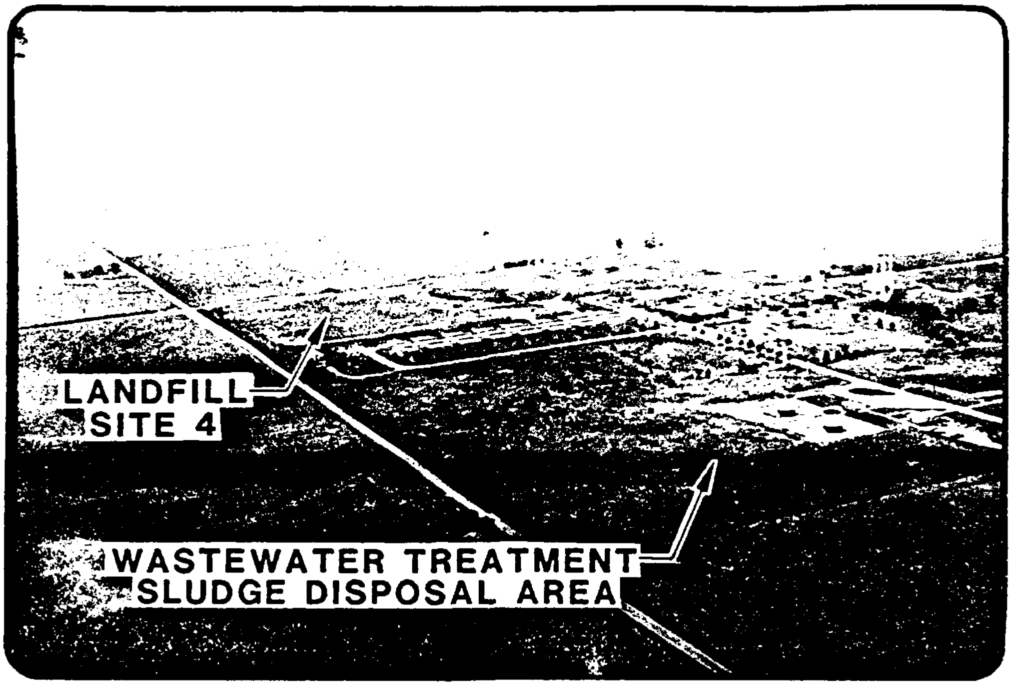
August 31, 1983

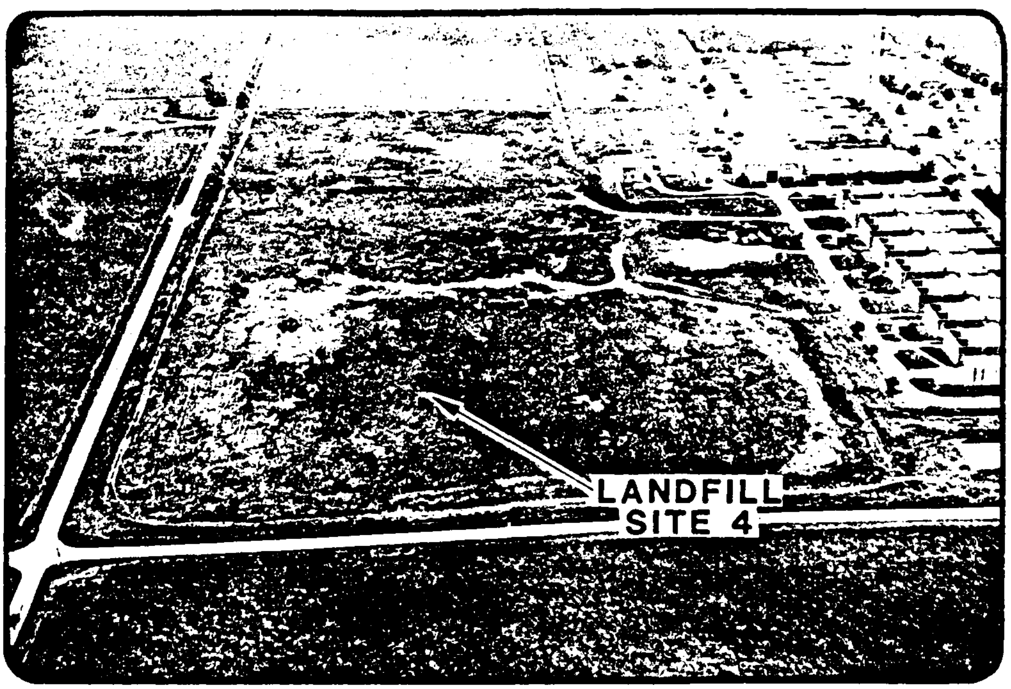




CHANUTE AFB

August 31, 1983





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, aa 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 Secords 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.

FIGURE 1

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

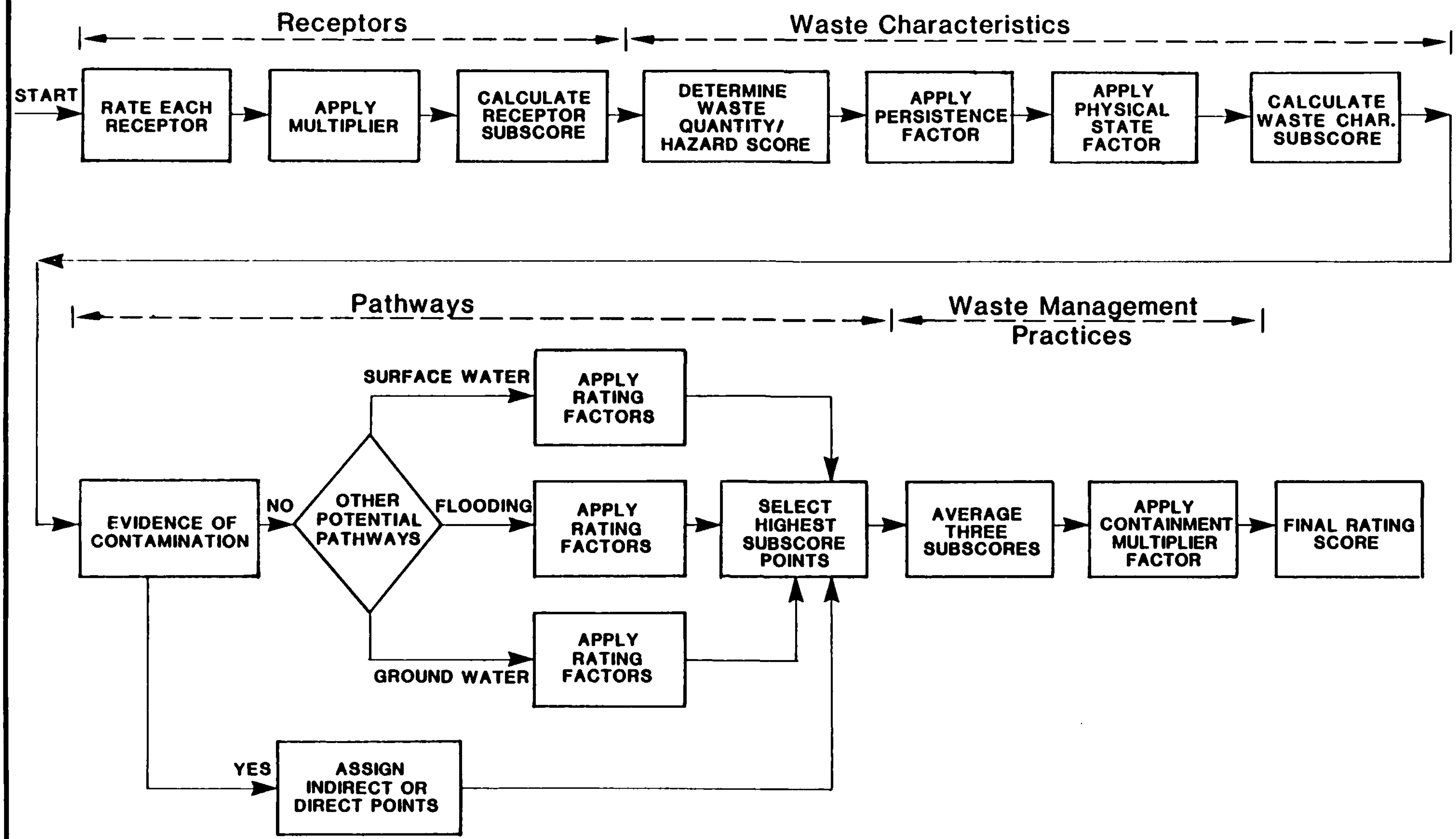


FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE ______

LOCATION ______

DATE OF OPERATION OR OCCURRENCE ______

OWNER/OPERATOR ______

COMMENTS/DESCRIPTION ______

SITE RATED BY ______

I. RECEPTORS

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

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

II. WASTE CHARACTERISTICS

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

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

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

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

______ X ______ = ______

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

______ X ______ = ______

FIGURE 2 (Continued)

III. PATHWAYS

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

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

Subscore ______

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

1. Surface water migration

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

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

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

Subscore (100 x factor score/3) ______

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
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

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

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

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

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

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

B. Persistence Multiplier for Point Rating

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

C. Physical State Multiplier

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

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

III. PATHWAYS CATEGORY

A. Evidence of Contamination

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

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

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

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

B-2 POTENTIAL FOR FLOODING

Rating Factor	0	1	2	3	Multiplier
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1

B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION

Rating Factor	0	1	2	3	Multiplier
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, [illegible].)	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

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FIRE PROTECTION TRAINING AREA NO. 2
Location: WEST OF BUILDING 902
Date of Operation or Occurrence: 1965 - PRESENT
Owner/Operator: CHANUTE AFB
Comments/Description: BURNED CLEAN FUEL AND SOME WASTE FLUIDS UNTIL LATE 1970'S.

Site Rated by: R. L. THOEM

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 reservation boundry	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			127	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 71

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 (1=small, 2=medium, 3=large) 3
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

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	1	6	6	18
Surface erosion	0	8	0	0
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
Subtotals			58	84
Subscore (100 x factor score subtotal/maximum score subtotal)				69
2. Flooding	1	1	1	3
Subscore (100 x factor score/3)				33
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	2	8	16	24
Subtotals			54	114
Subscore (100 x factor score subtotal/maximum score subtotal)				47

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

Pathways Subscore 69

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		71
Waste Characteristics		80
Pathways		69
Total	220 divided by 3 =	73 Gross total score

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

73 x 1.00 = \ 73 \

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: LANDFILL SITE NO. 2
Location: NORTH OF BUILDING 902
Date of Operation or Occurrence: EARLY 1950'S - 1967
Owner/Operator: CHANUTE AFB
Comments/Description: SOLID WASTES, SOME INDUSTRIAL WASTES, AND POSSIBLY PESTICIDE DRUMS. PERIODIC BURNING AT SITE.

Site Rated by: R. L. THOEM

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	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 reservation boundry	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			123	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 68

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 (1=small, 2=medium, 3=large) 2
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

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	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
Subtotals			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	1	1	1	3
Subscore (100 x factor score/3)				33
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	2	8	16	24
Direct access to ground water	3	8	24	24
Subtotals			78	114
Subscore (100 x factor score subtotal/maximum score subtotal)				68

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

Pathways Subscore 68

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		68
Waste Characteristics		80
Pathways		68
Total	216 divided by 3 =	72 Gross total score

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

72 x 1.00 = 72

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: LANDFILL SITE NO. 3
Location: NORTH OF BUILDING 907
Date of Operation or Occurrence: 1967 - 1970
Owner/Operator: CHANUTE AFB
Comments/Description: SOLID WASTES, SOME INDUSTRIAL WASTES, AND POSSIBLY PESTICIDE DRUMS. SOME BURNING AT SITE.

Site Rated by: R. L. THOEM

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 reservation boundry	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			127	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 71

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 (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

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	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
Subtotals			50	108
Subscore (100 x factor score subtotal/maximum score subtotal)				46
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	2	8	16	24
Direct access to ground water	3	8	24	24
Subtotals			78	114
Subscore (100 x factor score subtotal/maximum score subtotal)				68

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

Pathways Subscore 68

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	71
Waste Characteristics	60
Pathways	68
Total	199 divided by 3 = 66 Gross total score

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

66 x 1.00 = 66

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: LANDFILL SITE NO. 1
Location: UNDERNEATH FACILITY 899 & 900
Date of Operation or Occurrence: PRE 1940 - 1960
Owner/Operator: CHANUTE AFB
Comments/Description: SOLID WASTES AND SOME INDUSTRIAL WASTES, ROUTINE BURNING AT SITE.

Site Rated by: R. L. THOEM

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	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 reservation boundry	2	6	12	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			117	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 65

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 (1=small, 2=medium, 3=large) 2
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

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	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
Subtotals			58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
2. Flooding	1	1	1	3
Subscore (100 x factor score/3)				33
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	2	8	16	24
Direct access to ground water	3	8	24	24
Subtotals			78	114
Subscore (100 x factor score subtotal/maximum score subtotal)				68

C. Highest pathway subscore.

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

Pathways Subscore 68

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		65
Waste Characteristics		64
Pathways		68
Total	197 divided by 3 =	66 Gross total score

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

Gross total score x waste management practices factor = final score

66 x 1.00 = \ 66 \

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: LANDFILL SITE NO. 4
Location: NORTH OF BUILDING 995
Date of Operation or Occurrence: 1970 - 1974
Owner/Operator: CHANUTE AFB
Comments/Description: SOLID WASTES AND SOME INDUSTRIAL WASTES. MINIMAL BURNING AT SITE.

Site Rated by: R. L. THOEM

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 reservation boundry	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			121	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 67

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 (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

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	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	2	6	12	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	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	2	8	16	24
Direct access to ground water	3	8	24	24
Subtotals			78	114
Subscore (100 x factor score subtotal/maximum score subtotal)				68

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

Pathways Subscore 68

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		67
Waste Characteristics		48
Pathways		68
Total	183 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 \

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: FIRE PROTECTION TRAINING AREA NO. 1
Location: NORTHEAST OF FACILITY 899
Date of Operation or Occurrence: EARLY 1950'S - 1965
Owner/Operator: CHANUTE AFB
Comments/Description: BURNED OILS, SOLVENTS, FUEL, AND THINNERS.

Site Rated by: R. L. THOEM

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	0	4	0	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 reservation boundry	2	6	12	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			107	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 59

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 (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) 2
3. Hazard rating (1=low, 2=medium, 3=high) 3

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 0.80 = 32

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

32 x 1.00 = 32

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	1	6	6	18
Surface erosion	0	8	0	0
Surface permeability	2	6	12	18
Rainfall intensity	2	8	16	24
Subtotals			58	84
Subscore (100 x factor score subtotal/maximum score subtotal)				69
2. Flooding	1	1	1	3
Subscore (100 x factor score/3)				33
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	1	8	8	24
Subtotals			46	114
Subscore (100 x factor score subtotal/maximum score subtotal)				40

C. Highest pathway subscore.

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

Pathways Subscore 69

IV. WASTE MANAGEMENT PRACTICES

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

Receptors		59
Waste Characteristics		32
Pathways		69
Total	160 divided by 3 =	53 Gross total score

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

Gross total score x waste management practices factor = final score

53 x 1.00 = \ 53 \

APPENDIX I

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

APPENDIX I

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

ABG: Air Base Group

ACFT MAINT: Aircraft Maintenance.

AF: Air Force.

AFB: Air Force Base.

AFESC: . Force Engineering and Services Center.

AFFF: Aqueous Film Forming Foam, a fire extinguishing agent.

AFR: Air Force Regulation.

Ag: Chemical symbol for silver.

AGE: Aerospace Ground Equipment.

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.

ANTICLINE: A fold in which layered strata are inclined down and away from the axes.

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.

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.

ATC: Air Training Command.

AVGAS: Aviation Gasoline.

Ba: Chemical symbol for barium.

BES: Bioenvironmental Engineering Services.

BIOACCUMULATE: Tendency of elements or compounds to accumulate or build up in the tissues of living organisms when they are exposed to these elements in their environments, e.g., heavy metals.

BIODEGRADABLE: The characteristic of a substance to be broken down from complex to simple compounds by microorganisms.

BOWSER: A portable tank, usually under 200 gallons in capacity.

BX: Base Exchange.

$CaCO_3$: Chemical symbol for calcium carbonate.

CAMS: Consolidated Aircraft Maintenance Squadron.

Cd: Chemical symbol for cadmium.

CE: Civil Engineering.

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.

CMS: Component Maintenance Squadron.

CN: Chemical symbol for cyanide.

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.

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.

Cr: Chemical symbol for chromium.

CTTC: Chanute Technical Training Center.

Cu: Chemical symbol for copper.

DET: Detachment.

2,4-D: Abbreviation for 2,4-dichlorophenoxyacetic acid, a common weed killer and defoliant.

DIP: The angle at which a stratum is inclined from the horizontal.

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.

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.

EP: Extraction Procedure, the EPA's standard laboratory procedure for leachate generation.

EPA: U.S. Environmental Protection Agency.

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.

FAA: Federal Aviation Administration.

FACILITY: 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.

GC/MS: Gas chromatograph/mass spectrophotometer, a laboratory procedure for identifying unknown organic compounds.

GLACIAL TILL: Unsorted and unstratified drift consisting of clay, sand, gravel and boulders which is deposited by or underneath a glacier.

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.

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.

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 ground.

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, military jet fuel.

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 rock.

LOESS: An essentially unconsolidated unstratified calcareous silt; commonly homogeneous, permeable and buff to gray in color.

LOX: Liquid oxygen.

LYSIMETER: A vacuum operated sampling device used for extracting pore water samples at various depths within the unsaturated zone.

MAC: Military Airlift Command.

MEK: Methyl Ethyl Ketone.

METALS: See "Heavy Metals".

MGD: Million gallons per day.

MOA: Military Operating Area.

MIBK: Methyl isobutyl ketone.

MOGAS: Motor gasoline.

Mn: Chemical symbol for manganese.

MODIFIED MERCALLI INTENSITY: A number describing the effects of an earthquake on man, structures and the earth's surface. A Modified Mercalli Intensity of I is not felt. An intensity of VI is felt indoors and outdoors and for an intensity of VII it becomes difficult for a man to remain standing. Intensities of IX to XII involve increasing levels of destruction with destruction being nearly total at an intensity of XII.

MONITORING WELL: A well used to measure ground-water levels and to obtain samples.

MORAINE: An accumulation of glacial drift deposited chiefly by direct glacial action and possessing initial constructional form independent of the floor beneath it.

MSL: Mean Sea Level.

MWR: Morale, Welfare and Recreation.

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.

Ni: Chemical symbol for nickel.

NOAA: National Oceanic and Atmospheric Administration

NPDES: National Pollutant Discharge Elimination System.

OEHL: Occupational and Environmental Health Laboratory.

OIC: Officer-In-Charge.

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.

Pb: Chemical symbol for lead.

PCB: Polychlorinated Biphenyl; liquids used as a dielectrics in electrical equipment.

PERCOLATION: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.

PERMEABILITY: The capacity of a porous rock, soil or sediment for transmitting a fluid without damage to the structure of the medium.

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.

PD-680: Cleaning solvent.

pH: Negative logarithm of hydrogen ion concentration.

PL: Public Law.

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 imaginery 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.

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.

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.

RIPARIAN: Living or located on a riverbank.

SANITARY LANDFILL: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes environmental hazards.

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: Any garbage, refuse, or slude 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).

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.

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.

SUPS/LGSF: Supply Squadron/Fuels Management Branch

TCE: Trichloroethylene.

2,4,5-T: Abbreviation for 2,4,5-trichlorophenoxyacetic acid, a common herbicide.

TCHTG/TTMC: Technical Training Group/Automotive Mechanics Branch

TCHTG/TTMF: Technical Training Group/Fire Protection Branch

TCHTG/TTMH: Technical Training Group/Fuels Branch

TCHTW: Technical Training Wing

TDS: Total Dissolved Solids, a water quality parameter.

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.

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.

TSD: Treatment, storage or disposal.

TTG: Technical Training Group.

TTW: Technical Training Wing.

UPGRADIENT: In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of groundwater.

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.

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 K

INDEX OF REFERENCES TO POTENTIAL CONTAMINATIOΝ SITES AT CHANUTE AFB

APPENDIX K
INDEX OF REFERENCES TO POTENTIAL
CONTAMINATION SITES AT CHANUTE AFB

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