INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT

HEADQUARTERS, 172ND MILITARY AIRLIFT GROUP
MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD
JACKSON, MISSISSIPPI

AIR NATIONAL GUARD

HAZWRAP SUPPORT CONTRACTOR OFFICE
Oak Ridge, Tennessee 37831
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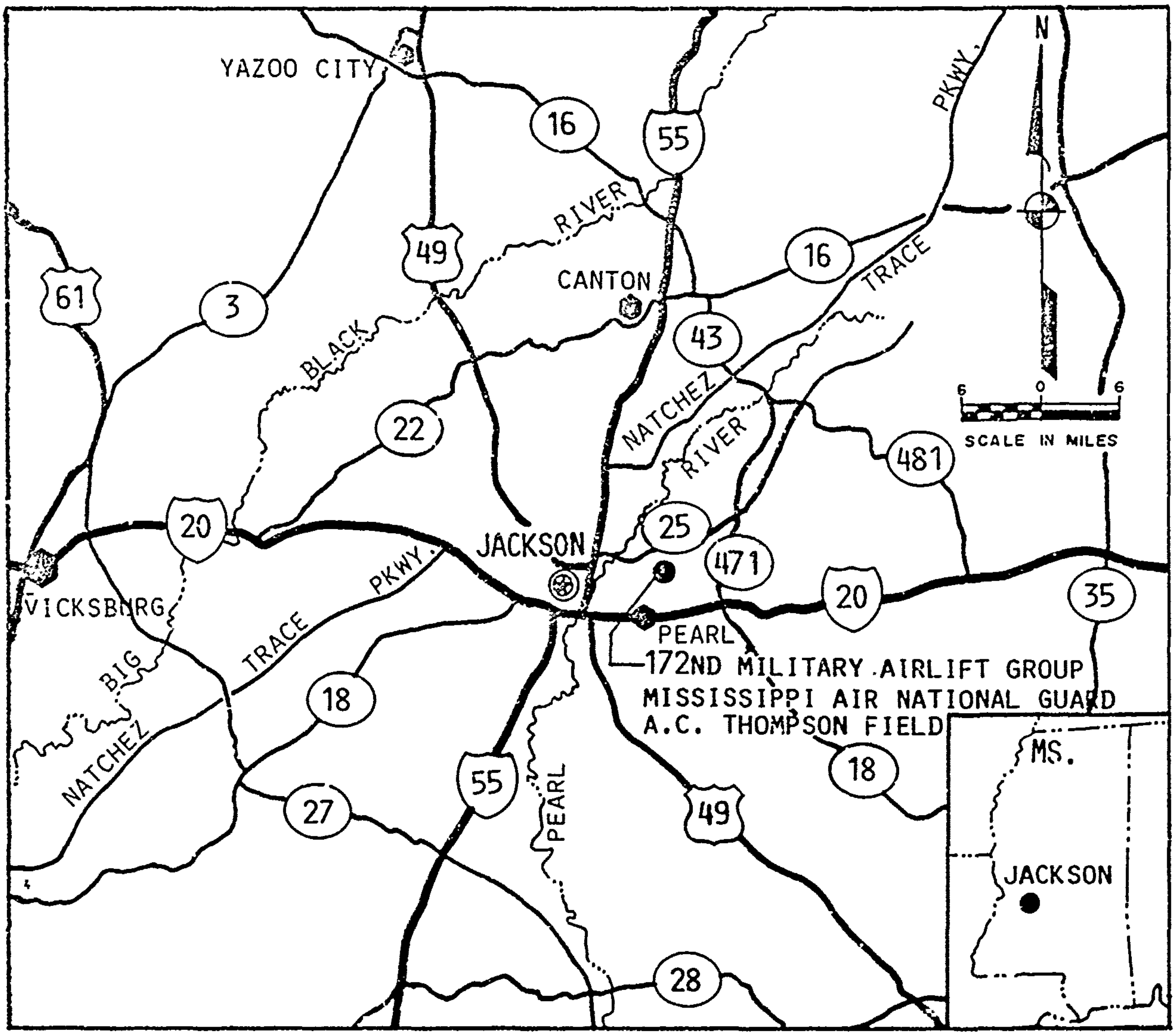

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TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLES

TABLE OF CONTENTS
(continued)
FIGURES

EXECUTIVE SUMMARY

A. INTRODUCTION

PEER Consultants, P.C., was retained by the HAZWRAP Support Contractor office in January 1988 to conduct an Installation Restoration Program (IRP) Preliminary Assessment of the 172nd Military Airlift Group (MAG), Mississippi Air National Guard, A. C. Thompson Field, Jackson, Mississippi, under Contract No. DE-AC05-870R21705. The Preliminary Assessment included:

- an on-site visit including interviews with 15 Air National Guard Base (ANGB) employees conducted by PEER personnel March 28 through April 1, 1988;

(cont) The PA includes data

- the acquisition and analysis of pertinent information and records on past hazardous materials use and past hazardous wastes generation and disposal at the ANGB;

hydrological and geological surveys

- the acquisition and analysis of available geologic, hydrologic, meteorologic, and environmental data from pertinent federal, state, and local agencies; and

and

- the identification of sites on the ANGB which may be contaminated with hazardous materials/hazardous wastes.

B. MAJOR FINDINGS

The major operations of the 172nd Military Airlift Group that have used and disposed of hazardous materials/hazardous wastes include aircraft maintenance, ground vehicle maintenance, aerospace ground equipment, fire department training, and petroleum, oil and lubricant (POL) management and distribution. The operations involve such activities as corrosion control, nondestructive inspection, fuel cell maintenance, and engine maintenance. Varying quantities of waste oils, recovered fuels, spent cleaners, strippers, and solvents were generated and disposed of by these activities.

Interviews with 15 ANGB personnel, analysis of pertinent information and records, and a field survey resulted in the identification of five disposal/spill/storage sites on or near the ANGB. The five sites are potentially contaminated with hazardous materials and/or hazardous wastes and were assigned a score according to the U.S. Air Force Hazard Assessment Rating Methodology (HARM). The five potentially contaminated sites (Figure ES-A) are as follows:

Site No. 1 - Old Fire Training Area

Site No. 2 - New Fire Training Area

Site No. 3 - Waste Storage Area at New Fire Training Area

Site No. 4 - Waste Spillage at the Underground Storage Tank (UST) at Vehicle Maintenance

Site No. 5 - Drainage Ditch and Retention Pond

C. CONCLUSIONS

The five sites identified as potentially contaminated are referenced as Sites 1-5. These sites have been further evaluated and assigned a HARM score.

Site No. 1 - <u>Old Fire Training Area</u> (HARM Score - 55.5)
This site, located outside the boundaries of the ANGB, was used from 1964 to 1978 for fire training exercises. The exercises were conducted approximately four times per year by igniting 200 to 1,000 gallons of various liquid wastes produced at the ANGB.

Site No. 2 - <u>New Fire Training Area</u> (HARM Score - 74.2)
The practice initiated at Site No. 1 was moved to a new area in 1978, also located outside the boundaries of the ANGB, when the land at Site No. 1, which was owned by the city of Jackson, was leased to the National Weather Service. A more elaborate system of supplying fuel to the burn pit was put

LOCATION OF HARM SCORED SITES	FIGURE ES-A

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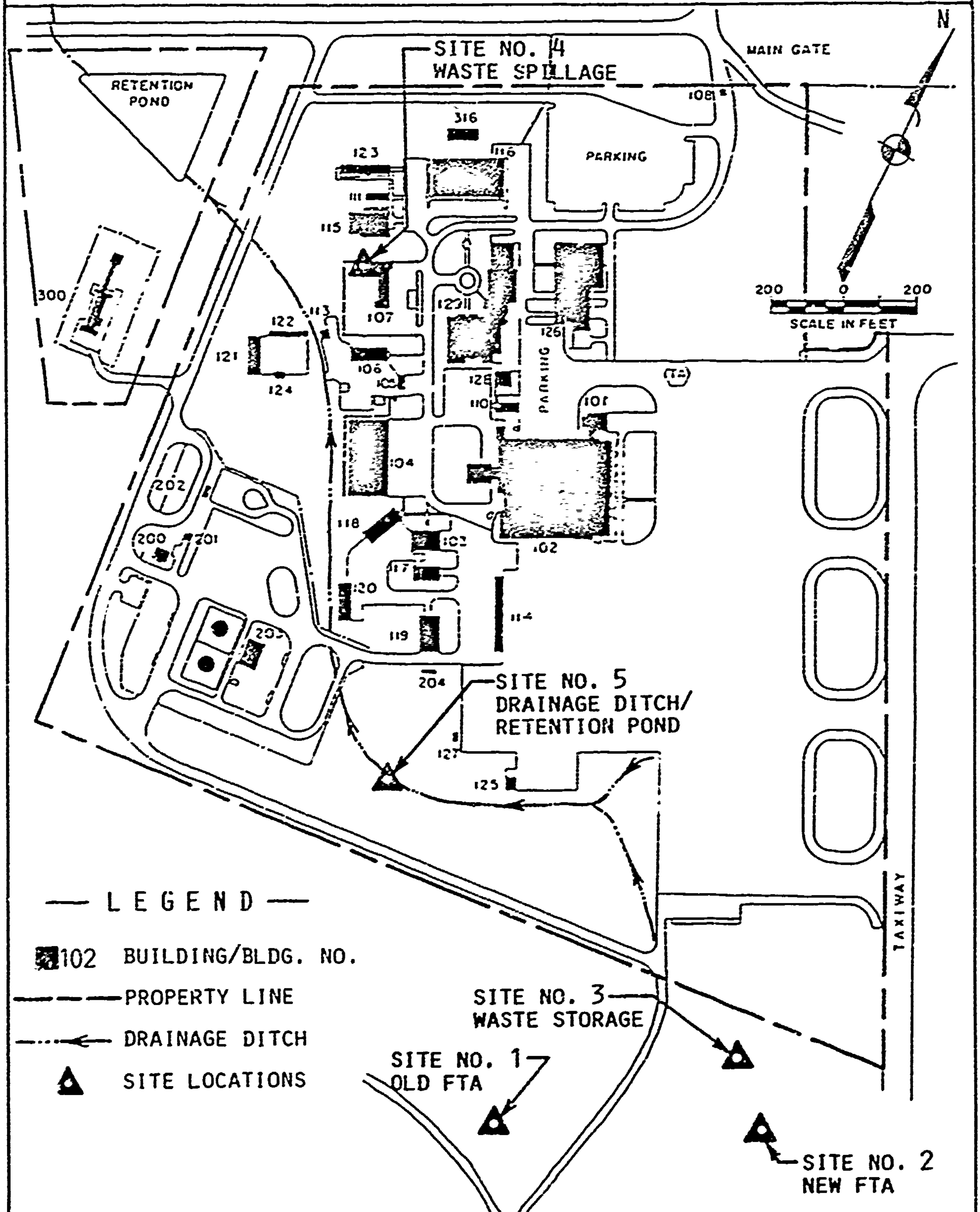

into use by using a railroad tanker car as a storage vessel for various waste fuels, oil, and solvents.

Site No. 3 - Waste Storage Area at New Fire Training Area (HARM Score 55.5)
Thirty-five 55-gallon drums containing various waste oils/materials were observed at the New Fire Training Area. These drums have been stored here for an undetermined amount of time and have caused an obvious amount of environmental stress noticed on the ground surrounding the site.

Site No. 4 - Waste Spillage at Underground Storage Tank (UST) at Vehicle Maintenance (HARM Score - 56.8)
Severe environmental stress was observed near the filling port of a 500-gallon UST at Vehicle Maintenance. The probable cause was spillage during deposits of waste oil into the UST.

Site No. 5 - Drainage Ditch and Retention Pond (HARM Score - 60.3)
A drainage ditch collects surface runoff and effluent from various oil/water separators on-base. Past sampling has indicated the presence of oils, grease, and JP-4 jet fuel in the ditch. Due to the large number of contributory shops and other areas on-base, the drainage ditch needs to be evaluated further..

D. RECOMMENDATIONS

Because of the potential for contaminant migration, it is recommended that the next phase in the IRP process, the site investigation (SI), be implemented. This phase is recommended for the five identified sites described in the PA. It is believed that the five sites may be potentially contaminated with hazardous wastes/hazardous materials and that migration of these materials to groundwater supplies is possible. The primary purposes of the subsequent investigations are:

1. To determine whether pollutants are present at each site.

2. To determine whether groundwater and/or surface water at each site has been contaminated and, if it has, give quantification with respect to contaminant concentrations, the boundary of the contaminant plume in the groundwater, and the rate of contaminant migration.

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I. INTRODUCTION

A. BACKGROUND

The 172nd Military Airlift Group, Mississippi Air National Guard, is located at A. C. Thompson Field, Jackson, Mississippi (hereinafter referred to as 172nd Military Airlift Group, the ANGB, or the Base). The ANGB relocated from Hawkins Field in west Jackson to A. C. Thompson Field in east Jackson in 1963. The ANGB has continued to be in service, and over the years the types of military aircraft based and serviced there have varied. Because of the use of hazardous materials and disposal of hazardous wastes, the Department of Defense (DoD) has implemented its Installation Restoration Program (IRP).

THE INSTALLATION RESTORATION PROGRAM

The DoD IRP is a comprehensive program designed to:

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

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

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

The most important changes effected by SARA included the following:

- Section 120 of SARA provides that federal facilities, including those in DoD, are subject to all the provisions of CERCLA/SARA concerning site assessment, evaluation under the National Contingency Plan (NCP) [40 CFR 300], listing on the National Priorities List (NPL), and removal/remedial actions. DoD must therefore comply with all the procedural and substantive requirements (guidelines, rules, regulations, and criteria) promulgated by the USEPA under Superfund authority.

- Section 211 of SARA also provides continuing statutory authority for DoD to conduct its IRP as part of the Defense Environmental Restoration Program (DERP). This was accomplished by adding Chapter 160, Sections 2701-2707 to Title 10 United States Code (10 USC 160).

- SARA also stipulated that terminology used to describe or otherwise identify actions carried out under the IRP shall be substantially the same as the terminology of the regulations and guidelines issued by the USEPA under their Superfund authority.

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

Preliminary Assessment (PA)

The PA is a records search designed to identify and evaluate past disposal and/or spill sites which might pose a potential and/or actual hazard to public health, welfare, or the environment.

Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS)

The SI consists of confirmation and/or quantification of contamination at the sites identified as a result of the PA. The RI consists of field activities designed to further quantify the types and extent of contamination present, including migration pathways.

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

- No further action - Investigations do not indicate harmful levels of contamination and do not pose a significant threat to human health or the environment. The site does not warrant further IRP action and a decision document will be prepared to close out the site.

- Long-term monitoring - Evaluations do not detect sufficient contamination to justify costly remedial actions. Long-term monitoring may be recommended to detect possible future problems.

- Feasibility Study - Investigations confirm the presence of contamination that may pose a threat to human health and/or the environment, and some form of remedial action is indicated. The FS is therefore designed and developed to identify and select the most appropriate remedial action. The FS may include individual sites, groups of sites, or all sites on an installation. Remedial alternatives are chosen according to engineering and cost feasibility, state/federal regulatory requirements, public health effects, and environmental impacts. The end result of the FS is the selection of the most appropriate remedial action by the ANGB with concurrence by state and/or federal regulatory agencies.

Remedial Design/Remedial Action (RD/RA)

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

Research and Development (R&D)

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

Immediate Action Alternatives

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

B. PURPOSE

The purpose of the PA is to identify and evaluate potential sites associated with past hazardous waste handling procedures, disposal sites, and spill sites on the Base and to assess the potential for the migration of hazardous contaminants. PEER Consultants, P.C., visited the Base, reviewed existing environmental information, analyzed the Base records concerning the use and generation of hazardous materials/hazardous wastes, and conducted interviews with Base personnel who are familiar with past hazardous materials management activities. Relevant information collected and analyzed as a part of the PA included the history of the Base, with special emphasis on the history of the shop operations and their past hazardous materials/hazardous wastes management procedures; the local geologic, hydrologic, and meteorologic conditions that may affect migration of potential contaminants; local land use, public utilities, and zoning requirements that affect the potentiality for exposure to contaminants, and the ecological settings that indicate environmentally sensitive habitats or evidence of environmental stress.

C. SCOPE

The scope of this PA is limited to the property situated within the boundaries of the Base and property which is or has been controlled by the Base and included the following:

- an on-site visit;

- the acquisition of pertinent information and records on hazardous materials use and past hazardous wastes generation and disposal practices at the Base in order to establish the source and characteristics of hazardous wastes or spills;

- the acquisition of available geologic, hydrologic, meteorologic, land use and zoning, critical habitat and utility data from various federal, state, and local agencies in order to establish potential pathways and receptors of hazardous wastes or spills;

- a review and analysis of all information obtained; and

- the preparation of a report, to include recommendations for further actions.

The on-site visit, interviews with Base personnel, and meetings with local agency personnel were conducted during March 28-April 1, 1988. The PEER PA team consisted of the following individuals (resumes!are included as Appendix A):

- Mr. Tom Webb, Senior Project Manager
- Mr. Anthony Wagner, Geologist
- Mr. Kevin Pack, Civil/Environmental Engineer
- Mr. Harlan Faulk, Environmental Engineer Technician

Individuals from the ANGB who assisted in the Preliminary Assessment include Major Paul J. Barlow, 172 Civil Engineering Squadron, MSgt Otha Shivers, 172 USAF Clinic, and selected members of the 172nd MAG. Also assisting were Lt. Col. Michael Washeleski, USAF, BSC, and Mr. Donald Williams, Headquarters Air National Guard Support Center (ANGSC), Project Officers.

D. METHODOLOGY

A flowchart of the PA methodology is presented in Figure I-A. This PA methodology ensures, to the greatest extent possible, a comprehensive collection and review of pertinent site-specific information, and is used in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

The PA began with a site visit to the Base to identify all shop operations or activities that may have used hazardous materials or generated hazardous wastes. Next, an evaluation of past and present hazardous materials/hazardous wastes handling procedures at the identified locations was made to determine whether environmental contamination may have occurred. The evaluation of past hazardous materials/hazardous wastes handling practices was facilitated by extensive interviews with 15 ANGB employees with an average of 20 years' experience with the various operating procedures at the Base. These interviews were also used to define the areas on the Base where any waste materials, either intentionally or inadvertently, may have been used, spilled, stored, disposed of or released into the environment in order to establish the source and characteristics of hazardous wastes or spills.

Historical records contained in the Base files were collected and reviewed to supplement the information obtained from interviews. Using the information outlined above, a list of waste spill/disposal/storage sites on the Base was identified for further evaluation. A general survey tour of the potential sites, the Base, and the surrounding area was conducted to determine the presence of visible contamination and to help the PEER survey team assess the potential for contaminant migration. Particular attention was given to locating nearby drainage ditches, surface water bodies, residences, and wells in order to establish potential pathways for migration.

Detailed geologic, hydrologic, meteorologic, developmental (land use and zoning), and environmental data for the area of study were also obtained from appropriate federal, state and local agencies as identified in Appendix B

PRELIMINARY ASSESSMENT METHODOLOGY FLOWCHART	FIGURE I-A

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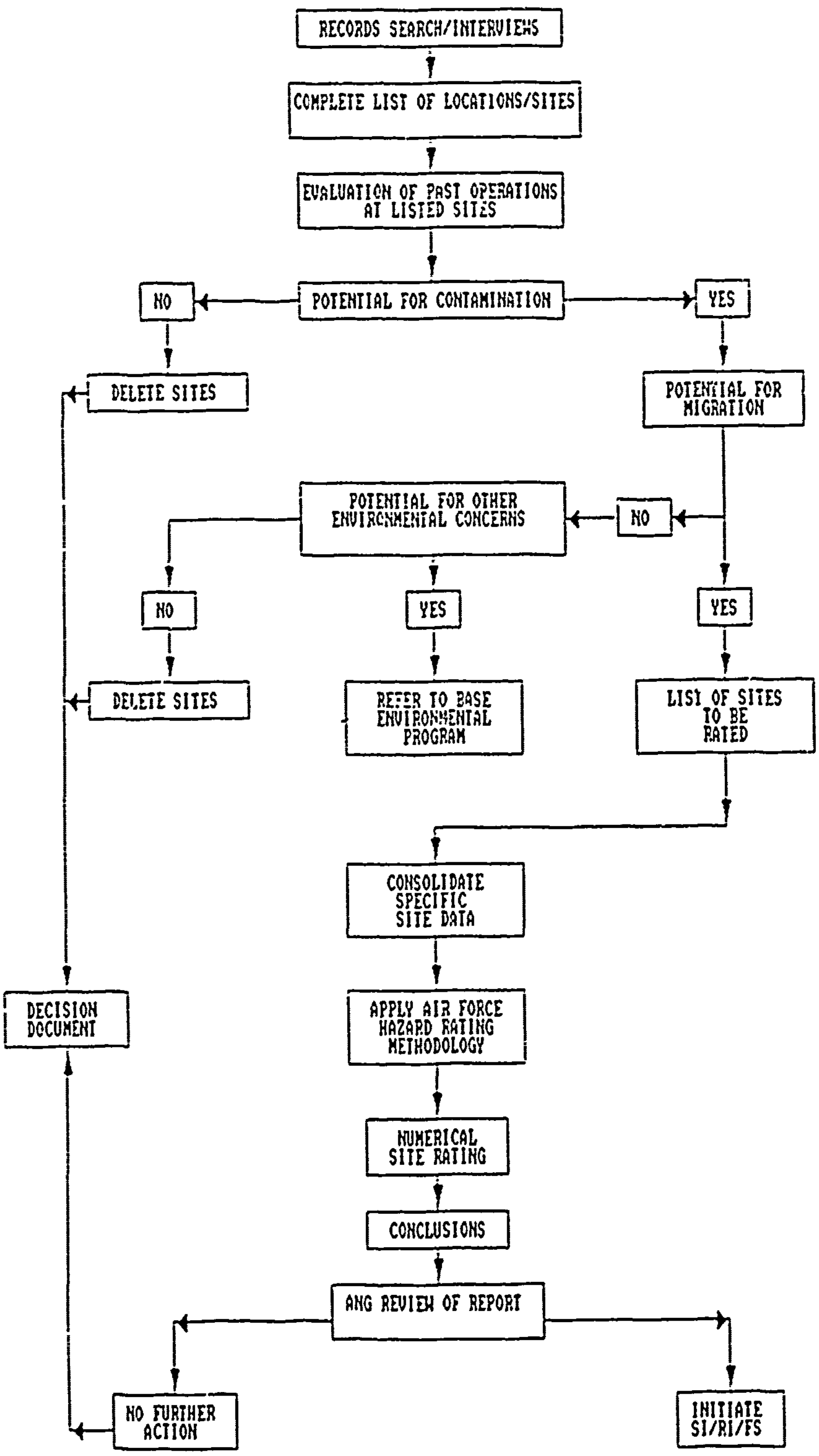

for the purpose of establishing potential receptors of hazardous wastes or spills.

Using the process shown in Figure I-A, a decision was then made, based on all the above information, regarding the potential for hazardous materials contamination and migration to receptors. If no potential existed for contamination, migration, or reception, a decision document was implemented in order to delete the site from further consideration. If potential for contamination was identified, the potential for migration of the contaminant was assessed based on site-specific conditions. If there was potential for contamination migration, the site was evaluated using the Hazard Assessment Rating Methodology (HARM). A discussion of the HARM system is presented in Appendix C. Appendix D contains the HARM rating forms for the five potentially contaminated sites.

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II. INSTALLATION DESCRIPTION

A. LOCATION

The Base is located at A. C. Thompson Field approximately seven miles east of downtown Jackson, Mississippi. The Base occupies 84 acres of land. The Base operation has a population of 1,122 military (during unit training assembly weekends) and 315 full-time civilian and military personnel. The 172nd MAG is stationed at the Base. Figure II-A shows the location and boundaries of the Base.

B. ORGANIZATION AND HISTORY

The 172nd MAG traces its origin back to June 24, 1953, when the National Guard Bureau organized a new Air Guard unit. The 172nd was originally established as the 183rd Tactical Reconnaissance Squadron, Night Photo, and was located at Hawkins Field approximately three miles northwest of downtown Jackson. The new unit was the only Night Photo Reconnaissance organization in the nation.

Modernization of the Air National Guard required the 183rd to change to jet aircraft. In October 1954, the Federal Airport Use Panel ruled that neither civil nor military activities should plan to use jet aircraft at Hawkins Field because of its congested location. With this decision, plans were developed for a new airport that would be used for both civilian and military jet aircraft.

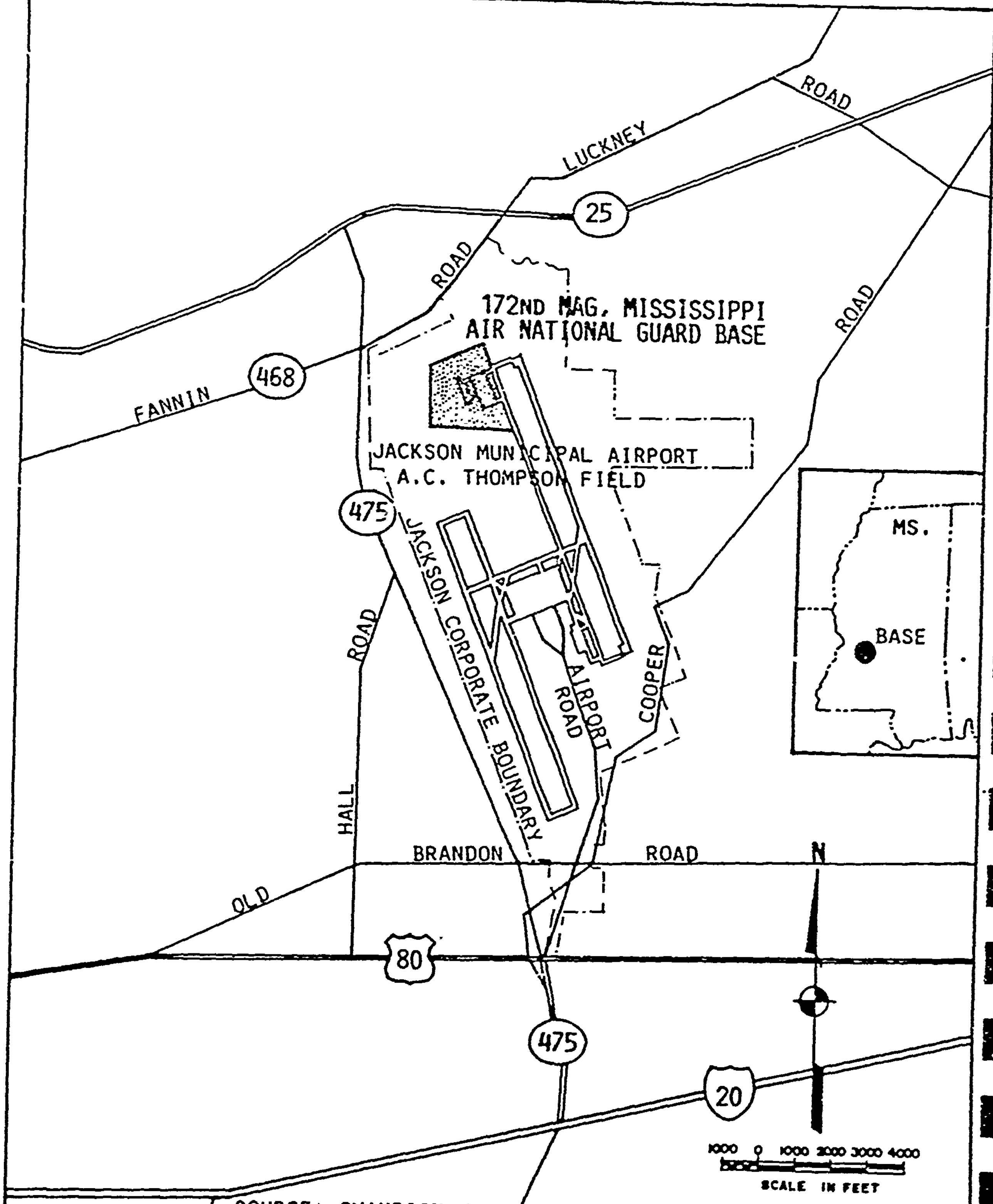
In 1961, the federal government leased 64 acres of land from the city of Jackson for the new Air Guard complex at the northwest corner of the new airport site in Rankin County. Construction of the new facilities began on the new Base on April 15 with a planned completion date of July 1962.

The 183rd moved to the new A. C. Thompson Municipal Airport on January 19, 1963. By this time, the 183rd had seven C-121 "Super Constellation" aircraft. On January 11, 1964, the Jackson Air Guard unit was

LOCATION MAP

FIGURE II-A

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



(SOURCE: CHAMPION MAP OF METROPOLITAN JACKSON, MS. 1987) upgraded to Group status as the 172nd Air Transport Group, with an authorized complement of 927 officers and airmen. Between February and June of 1967, eight C-124 Globemasters had arrived. In December 1971, the 172nd transitioned to the C-130 E-model Hercules transport aircraft, and by June 1972 all of the Globemasters were phased out. The unit's new mission then was to provide air transportation for airborne forces and their cargo. In 1980, after several missions, the 172nd received eight C-130 H-model Hercules. From October 1985 to August 1986, the aircraft parking ramp was expanded and a 15,000 barrel jet fuel storage and hydrant distribution system was installed. In July 1986 the unit was designated as the 172nd Military Airlift Group as a result of an aircraft conversion to the C-141B Starlifter. (See Table II-A.)

There have been no significant events or change of organization between 1986 and the present time.

Table II-A

Summary of Organization Structure and Historical Events Affecting 172nd Military Airlift Group, Mississippi Air National Guard

June 1953	Activation of the 183rd Tactical Reconnaissance Squadron, Night Photo, at Hawkins Field, west Jackson.
January 1954	Aircraft arrival completed with 18 RB-26 aircraft, 2 AT-6 aircraft, and 1 C-47 aircraft.
November 1957	Squadron reorganized as the 183rd Aeromedical Transport Squadron and received first of six C-119 aircraft.
April 1961	Construction of new Air Guard complex began at the new airport site east of Jackson.
July 1962	Arrival of seven C-121 "Super Constellation" aircraft.
January 1963	183rd moved to new A. C. Thompson Airport in east Jackson.
January 1964	Guard unit upgraded to Group status and redesignated as the 172nd [illegible] Transport Group.
February-June 1967	Arrival of eight C-124 Globemaster aircraft.
October 1969	Air Guard's 1,000th mission in support of Southeast Asia.
1972	Transition to C-130 E-model Hercules aircraft.
1980	Arrival of eight C-130 H-Model Hercules aircraft.
1985-1986	$30 million construction program to support the C-141B aircraft began with the construction of a 15,000 BBL jet fuel storage and hydrant distribution system and expansion of the aircraft parking apron.
July 1986	Unit redesignated as the 172nd Military Airlift Group. Transition to eight C-141B aircraft.

III. ENVIRONMENTAL SETTING

A. METEOROLOGY

The climate that is prevalent over southwest central Mississippi which includes the city of Jackson and the Base is considered to be humid-subtropical. In general, the summers are long and humid while winters are mild and short. Freezing and snowfall are uncommon, but temperatures approaching 100°F are frequent during the summer and early fall. Table III-A gives a statistical picture of the climate at the Base.

Table III-A
Climatic Data for Jackson, Mississippi

Sources: Baughman (1971), Spiers (1979), and U.S. Department of Agriculture (1987)

Temperature (in degrees Fahrenheit)	
Average winter temperature	46°
Average summer temperature	79°
Mean annual temperature	65°
Coldest month	January
Warmest month	July
Absolute maximum temperature	104° in July 1980
Absolute minimum temperature	-3° in January 1962
Average frost-free period	225 days
Precipitation (in inches)	
Mean annual precipitation	52"
Wettest month	December > 5"
Driest month	October > 2"
Mean annual relative humidity	70%
Highest precipitation in one month	13.5" in April 1964
Lowest precipitation in one month	0" in October 1961

As noted above, rainfall in Rankin County, Mississippi, averages 52 inches annually, based on the most readily available information which was the 25-year interval, 1931-55. No evidence of significant climatic change since 1955 was uncovered. By calculating net precipitation according to the method outlined in the Federal Register (47 FR 31224, July 16, 1982), a net precipitation value of 8.0 inches per year is obtained. The maximum rainfall intensity, based on a one-year frequency, 24-hour duration rainfall, is 5.58 inches.

B. GEOLOGY

1. Geomorphology

The Base at Jackson, Mississippi, is situated in the Coastal Plain Physiographic Province. This province is an extensive seaward-sloping plain that extends from near Cape Cod, Massachusetts, along the northern Atlantic coast of the United States southwestward in a broadening belt encompassing the Florida peninsula, then westward along the Gulf Coast and some 1,000 miles into Mexico (Figure III-A). The sediments underlying the Gulf portion of the province are estimated to exceed 30,000 feet in thickness and are primarily Tertiary in age (Thornbury, 1965) (Figure III-A).

The Coastal Plain Province is further divided into sections based on differences in geology and topography. Jackson, Mississippi, and the immediate area, including the Base lie within the East Gulf Coastal Plain section which consists of a series of alternating cuestas with escarpments that face inland and broad lowlands in young to maturely dissected belts (Figure III-B). Coastwise terraces are present along the outer margin of the section.

The East Gulf Coastal Plain represents an increase westward in number and thickness of the Cretaceous and Eocene formations and a greater variability in their lithological characteristics. This results in a northward widening of the Coastal Plain (Figure III-A) and a considerable variation in the erosional pattern of the rocks which accounts for the alternating belts of cuestas and lowlands (Figure III-C).

The Base is contained within the lowland belt known as the Jackson Prairie. This 40-mile-wide belt stretches northwest to southeast across Mississippi, where it is primarily confined. It is developed mainly on the clays of the Eocene Jackson Formation, in particular the massive Yazoo Clay. The extent of the Yazoo Clay is from south of Plain, Mississippi, in west

COASTAL PLAIN PHYSIOGRAPHIC PROVINCE

FIGURE III-A.

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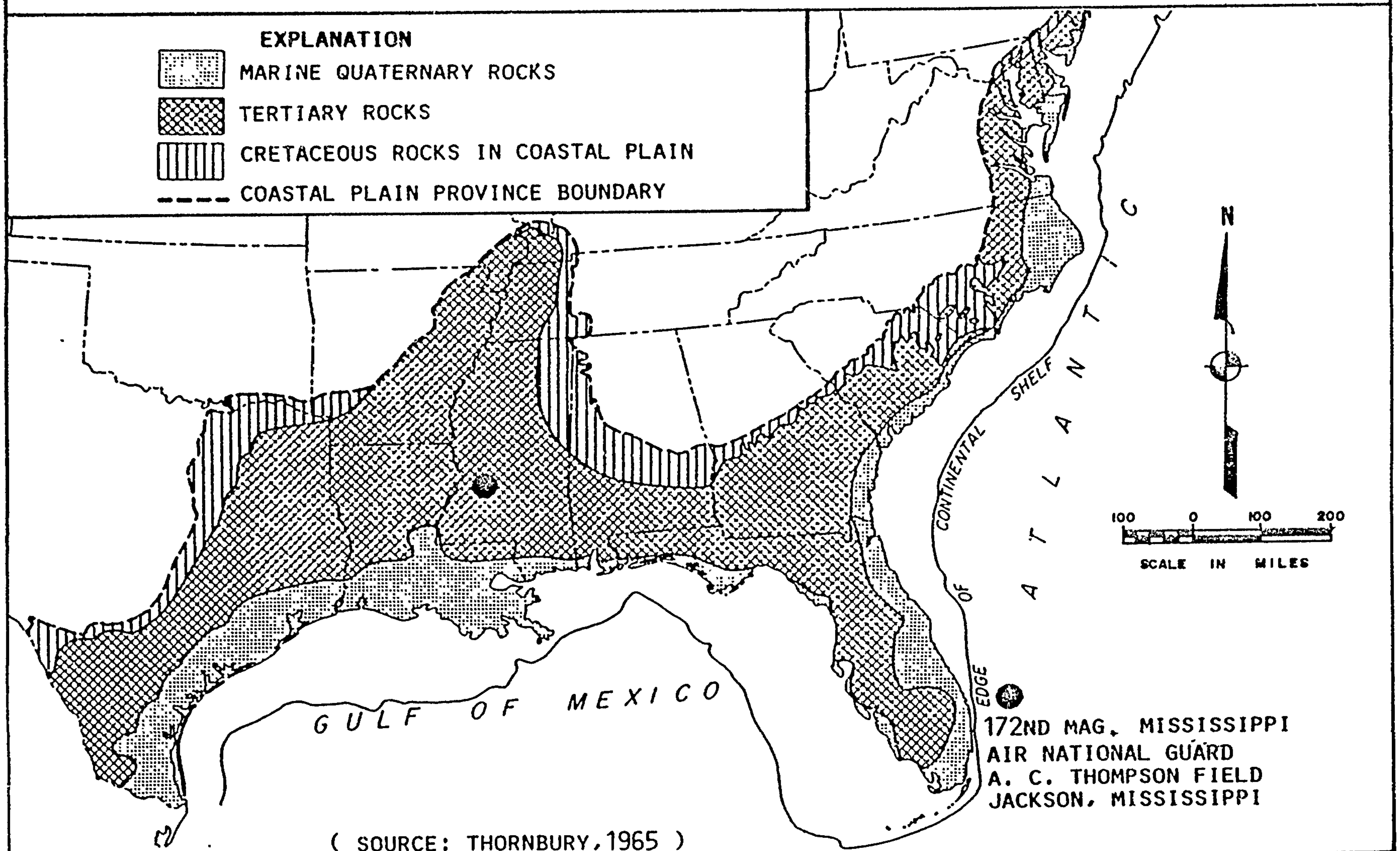

(SOURCE: THORNBURY, 1965)

GEOMORPHIC UNITS OF THE EAST GULF COASTAL PLAIN — FIGURE III-B

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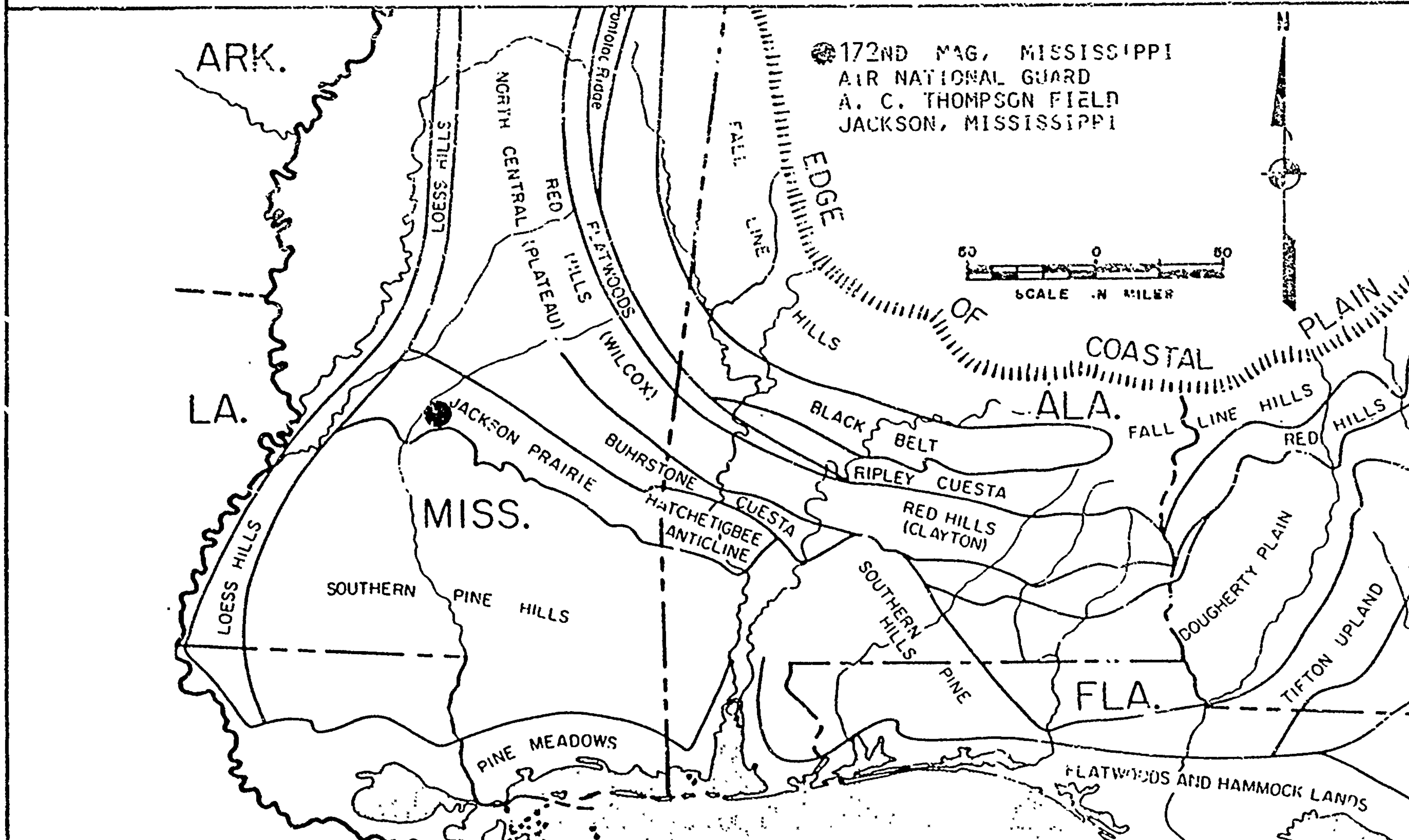

(SOURCE: THORNBURY, 1965)

RELATIONSHIP BETWEEN TOPOGRAPHIC BELTS, LITHOLOGY, AND STRUCTURE | FIGURE III-C

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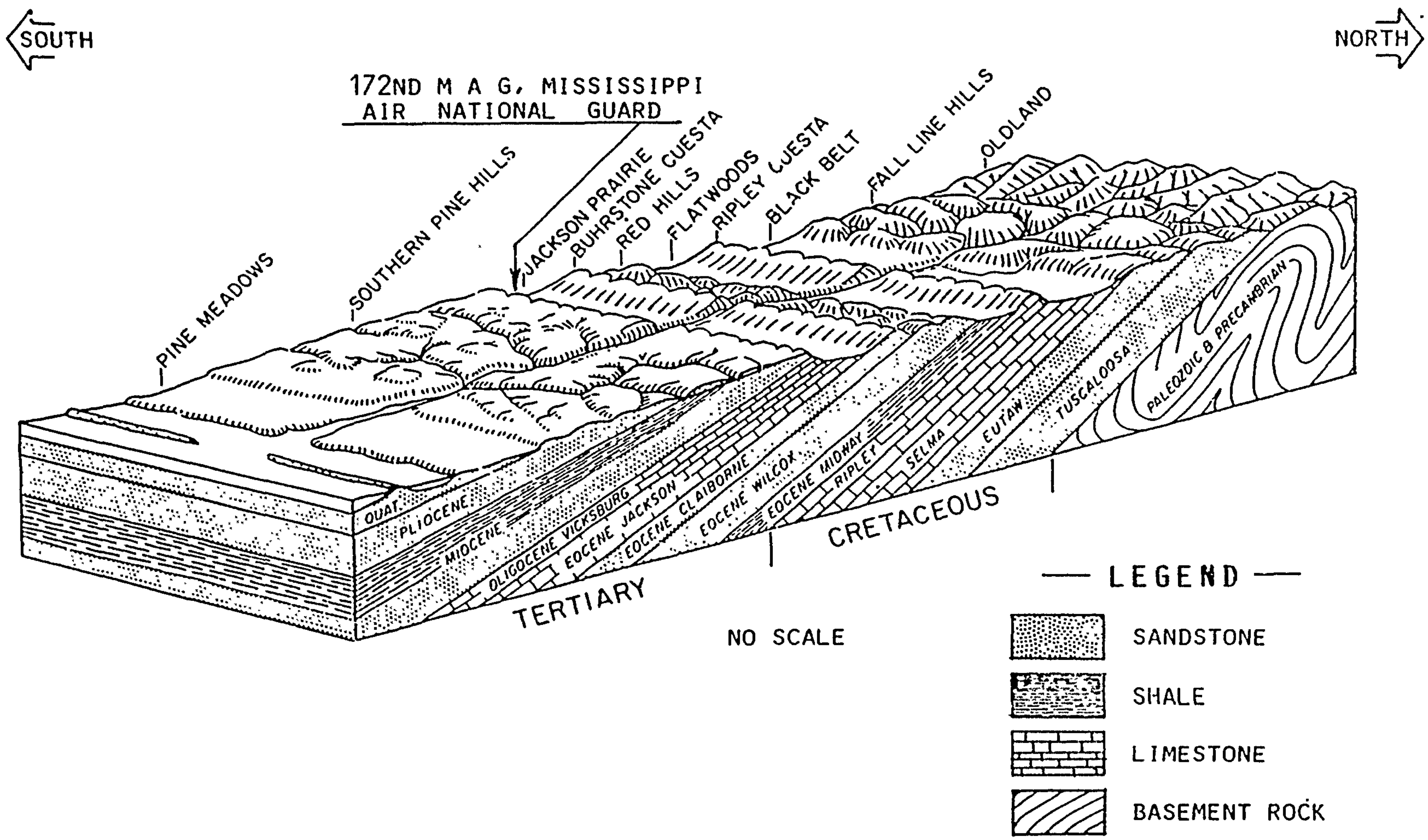


(SOURCE: THORNBURY, 1965)

Rankin County north through the county, and from south of Pelahatchie in east Rankin County north to the northern tip of the county. The area in the vicinity of the Base is characterized by gently rolling terrain with deposits of terrace sands capping the higher hills. The topography of the Base is flat. The elevation of the Base is approximately 290 feet above sea level. Elevations decrease to the north and west of the Base to about 265 feet above sea level at the Pearl River. South and east of the Base, elevations increase up to about 400 feet above sea level.

2. Stratigraphy

There is no bedrock exposed at the Base; however, in other parts of Rankin County, exposed bedrock consists of marine and nonmarine deposits that include clay, sand, silt, siltstone, sandstone, marl, and limestone of the Eocene, Oligocene, and Miocene Series of the Tertiary System. The total thickness of strata exposed in Rankin County is greater than 1,200 feet with the youngest strata at higher elevations in southern Rankin County. The oldest strata crop out under the alluvium of the Pearl River on the Jackson Dome, west of the Base. In a large portion of Rankin County, including the Base, surface materials of alluvium, colluvium, terraces, and soils cover the bedrock. These materials are of the Pleistocene and Recent Series of the Quaternary System. Table III-B depicts the Tertiary and Upper Cretaceous portion of the stratigraphy of the area with a description of the lithological units.

3. Structure

Figure III-D shows the major structural features of the central Gulf Coastal Plain, with Rankin County stippled and the approximate location of the Base as indicated. Note that the Base is situated on the east flank of the Mississippi Embayment portion of the Gulf Coast Geosyncline. The Mississippi Embayment (syncline) plunges to the south and the axis is about 25 miles west of the Base. This syncline is responsible for the regional dip as all strata are folded downward toward the axis. Except in the vicinity of the Jackson Dome (uplift) (shown in Figure III-D), the regional dip is approximately 25 feet per mile south-southwest. The rate of dip increases with depth. The

STRATIGRAPHIC CHART FOR A.C. THOMPSON FIELD	TABLE III-B

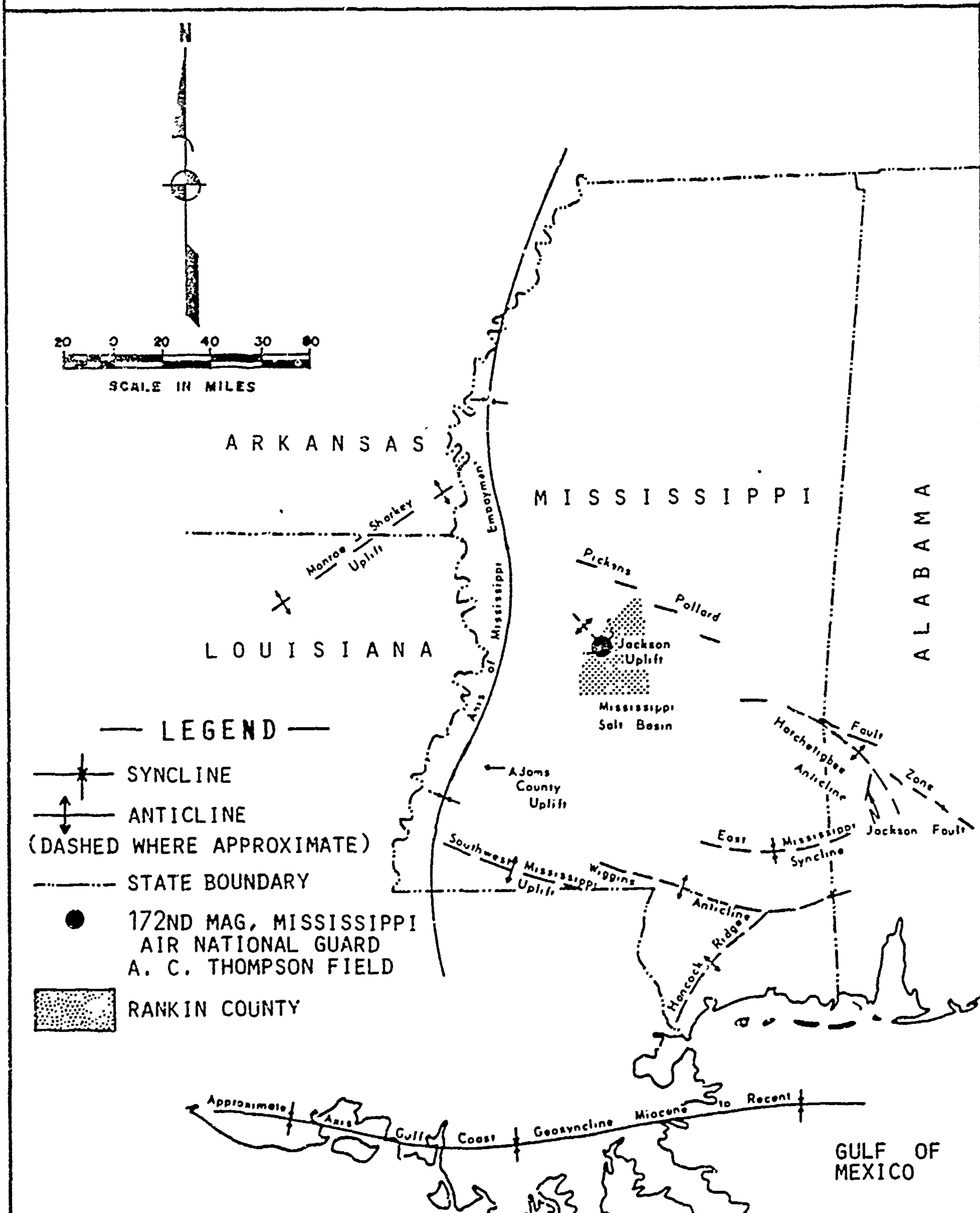
172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI

SYSTEM	SERIES	GROUP	FORMATION	THICKNESS (Feet)	GENERAL LITHOLOGY
TERTIARY	EOCENE	JACKSON	Moodys Branch	15-40	Light-green to greenish-gray calcareous fossiliferous clayey glauconitic conglomeratic sands and pale-gray and pale-green fossiliferous sandy glauconitic marls.
		CLAIBORNE	Cockfield	200-300	Light-grey to gray, usually silty, variably sandy, micaceous and lignitic or carbonaceous clays. Argillaceous or clayey variably lignitic or carbonaceous and micaceous sands and silts.
			Cook Mountain	100-190	Light brownish-gray finely lignitic or carbonaceous variably silty clays and a few lenticular sands in the upper part. Lower sequence of interbedded brownish-gray slightly calcareous sparingly lignitic or carbonaceous fossiliferous glauconitic clays and light-gray and pale-gray silty occasionally sandy chalks marls and limestones.
			Kosciusko	250-500	Gray often lignitic or carbonaceous silty clays, clay shales and clayey commonly lignitic or carbonaceous silts and sands.
			Zilpha	200-420	Gray slightly fossiliferous clay shales and lignitic clay shales, variably sandy in the upper part of the formation.
			Winona	10-65	Pale-gray and pale grayish-white silty glauconitic chalks, sandy marls and light-gray and light greenish-gray slightly calcareous and fossiliferous clays and clay shales.
			Tallahatta	70-270	Pale-gray, white and light-grey calcareous slightly fossiliferous finely glauconitic finely micaceous siltstones and light-gray and light-green slightly calcareous sparingly fossiliferous clay shales.
		WILCOX	Wilcox (Undifferentiated)	1100-2830	Pale-gray to dark-gray variably lignitic or carbonaceous clays, very fine- to coarse-grained sands and silts, thin seams of lignite.
	PALEOCENE	MIDWAY	Midway Shale	70-800	Dark-gray and grey occasionally finely micaceous silty shales and clay shales.
			Clayton	5-85	Pale-gray and light-gray impure chalks and calcareous sparingly fossiliferous shales. Locally a limestone facies over the Jackson Dome.
UPPER CRETACEOUS	GULF	SELMA	(Navarro age beds) (Taylor age beds) (Aus[illegible] age beds)	230-1240	Light-gray, grey and pale-gray and white chalks and interbedded grey and dark-grey shales and calcareous shales. Generally minor amounts of volcanic material. Locally a reef-type carbonate complex over the Jackson Dome.
		EUTAW	Eutaw	0-670	Dark-grey, grey and black finely micaceous sparingly sandy calcareous and fossiliferous shales. Very fine-to medium-grained slightly micaceous sparingly fossiliferous glauconitic sandstones and siltstones.
		TUSCALOOSA	Upper Tuscaloosa	500-800	Vari-colored mudstones, some containing siderite concretions. Red, purple and gray to black shales. Very fine-to medium-grained sandstones. Basal strata generally containing vari-colored chert and quartz pebbles.
			Middle Tuscaloosa	70-165	Grey, dark-grey, red dark-red and purple shales and vari-colored mudstones. Subordinate amounts of very fine-grained calcareous micaceous occasionally slightly ashy sandstones and siltstones.
			Lower Tuscaloosa	170-600	Dark-grey, black, red and purple shales. Vari-colored mudstones. Very fine and fine-grained sandstones and siltstones in the upper part. Fine-to coarse-grained occasionally slightly ashy sandstone in the lower part, with a basal sequence of coarser conglomeratic sands.

(SOURCE: BAUGHMAN, 1971)

STRUCTURAL FEATURES OF THE GULF COASTAL PLAIN | FIGURE III-D

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



(SOURCE: BAUGHMAN, 1971)

Pickens-Pollard Fault Zone lies just to the northeast of the Base, as is also shown in Figure III-D.

Jackson Dome is the main structural feature dominating Rankin County and influences the bedrock geology beneath the Base. The crest of the dome lies in Hinds County near the west-central boundary of Rankin County. The city of Jackson is located at the topographically highest point on the dome. Dips exceeding 100 feet per mile occur in several areas on the flanks of the dome. Steeper dips exist in deeper formations at the dome. Figures III-E and III-F are cross-sections depicting the structural and stratigraphic relationship of local geologic formations and the Jackson Dome. Figure III-G shows the locations of the cross-sections. Note that the Cockfield Formation, which is a major aquifer in the area and the one from which water at the Jackson Municipal Airport and the Base is produced, rises sharply to the west and subcrops beneath the alluvium less than one mile east of the Pearl River due to the influence of the dome. The Cockfield Aquifer is recharged from near-surface water near the Pearl River.

There is no known significant faulting in Rankin County or on the Base; however, lack of surface exposures of reliable marker beds limits mapping of possible surface faults. The presence of faulting would be a controlling factor in groundwater movement. Small synclinal and anticlinal features are noticeable east-southeast of the Jackson Dome. These features may be related to minor faulting, but further evidence for this hypothesis in nonexistent.

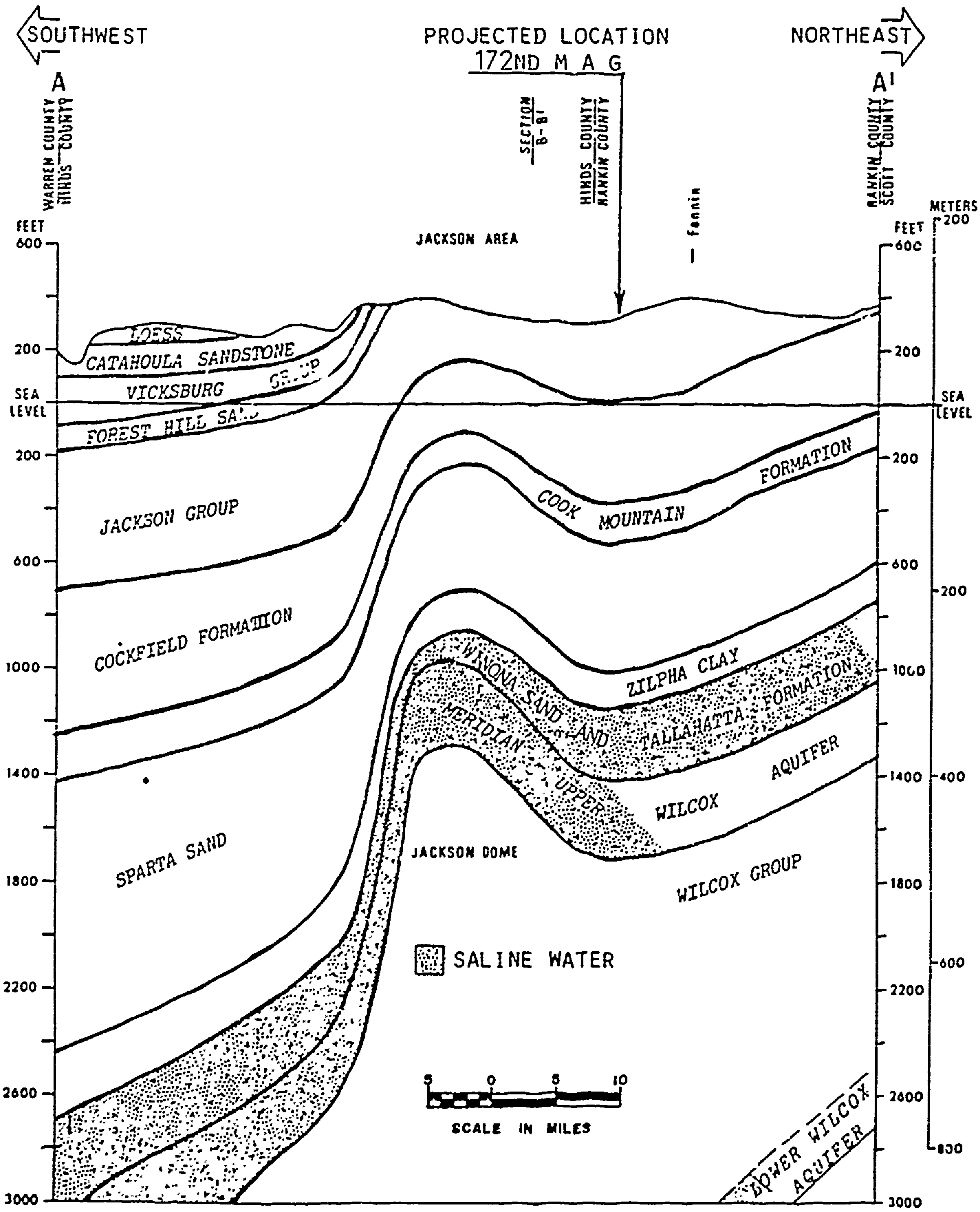
C. SOILS

The soils present at the Base are represented by two Series as defined by the U.S. Department of Agriculture Soil Conservation Service (Figure III-H). The Leverett Series originally occupied a peninsula-shaped area of the Base extending from the northwest corner southeastward slightly more than halfway to the southeastern corner of the Base. Over one-third of the area of the Base was originally covered by the Leverett Series. The remainder of the Base was covered by the Tippo Series. According to the Base Civil Engineer, the Series has been mostly replaced through construction activities by cut and fill.

GEOLOGIC CROSS SECTION A-A' | FIGURE III-E

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD

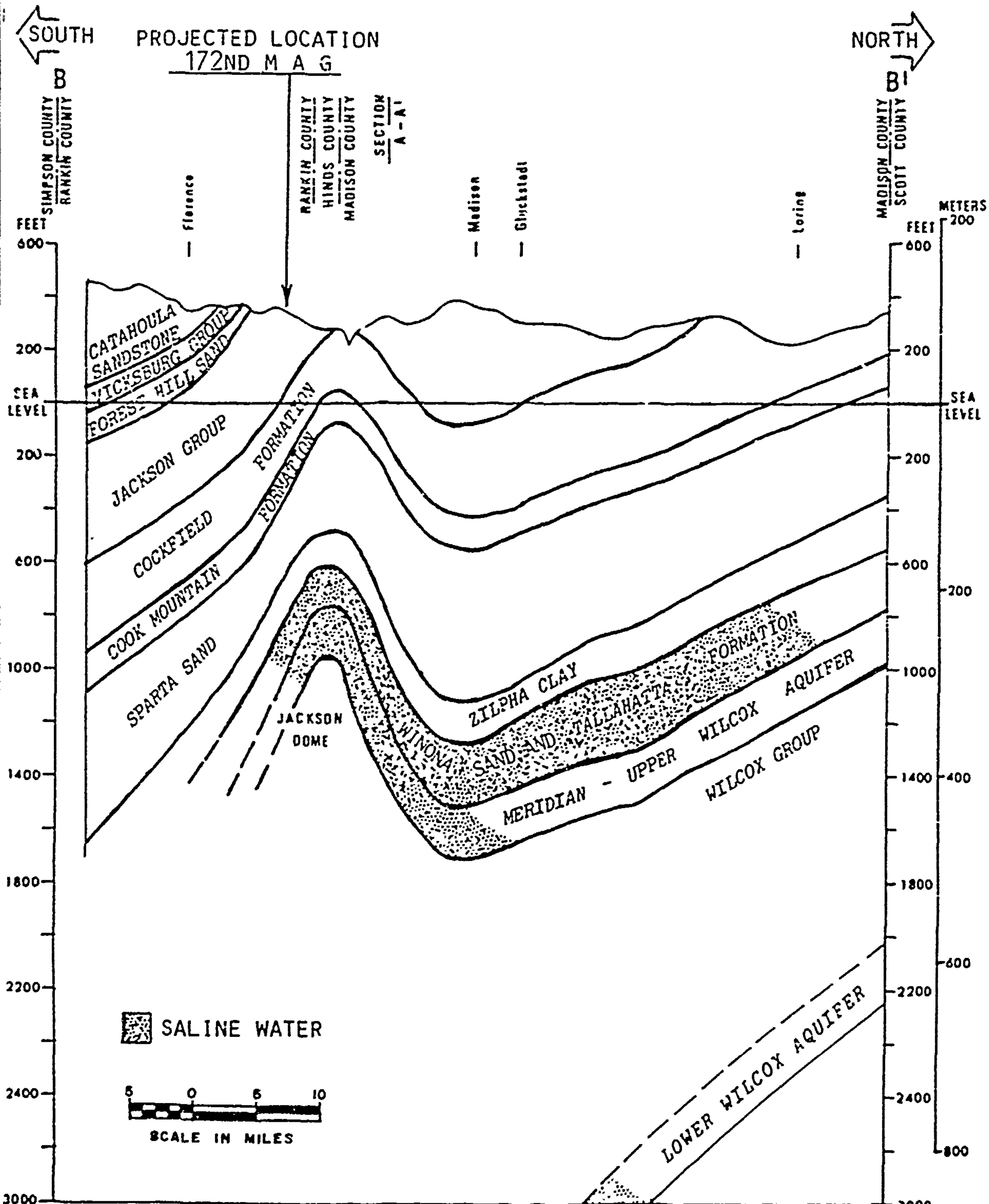
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



(SOURCE: SPIERS, 1979)

GEOLOGIC CROSS SECTION B-B' | FIGURE III-F

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI

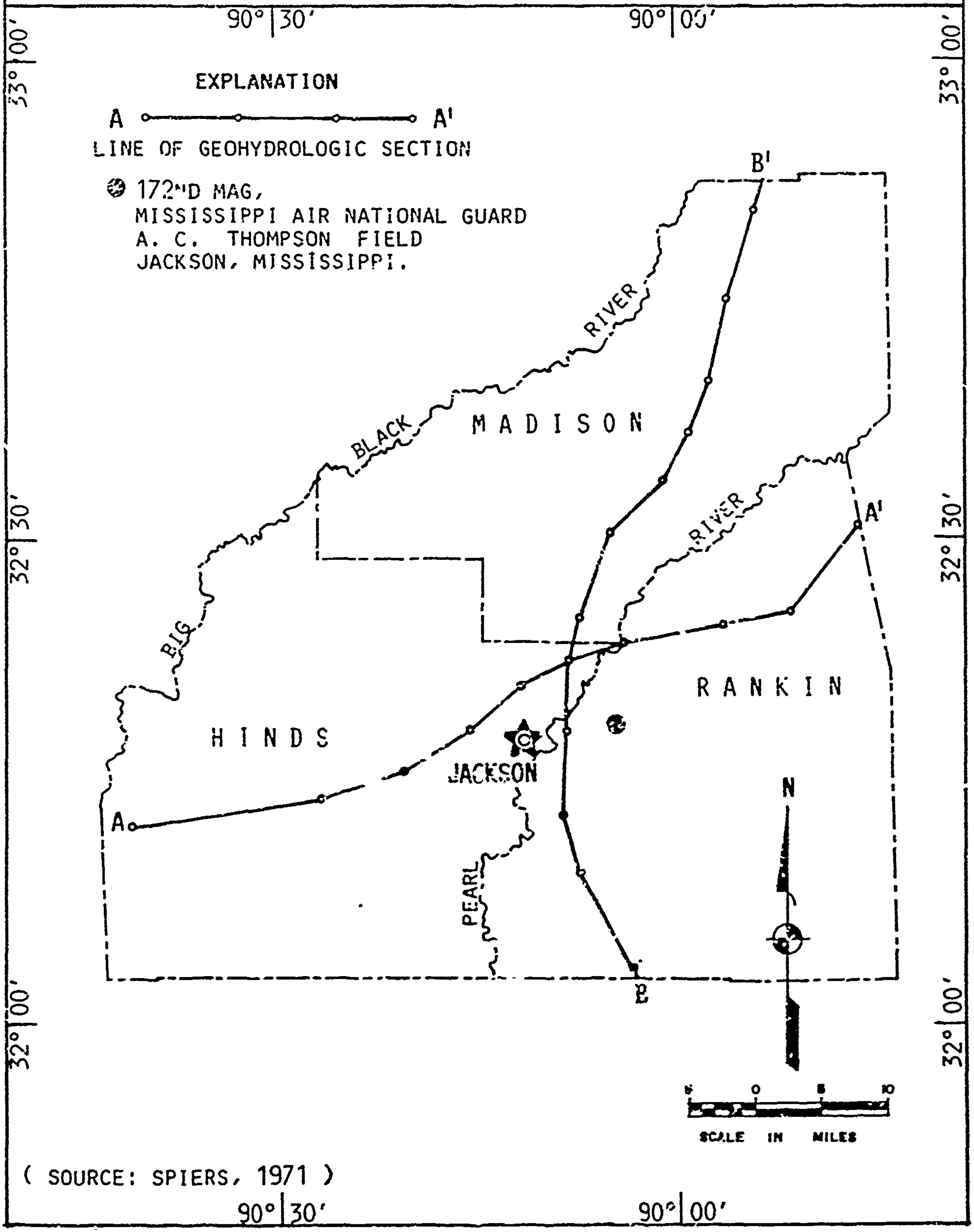


(SOURCE: SPIERS, 1971)

CROSS-SECTION LOCATION MAP | FIGURE III-G

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD

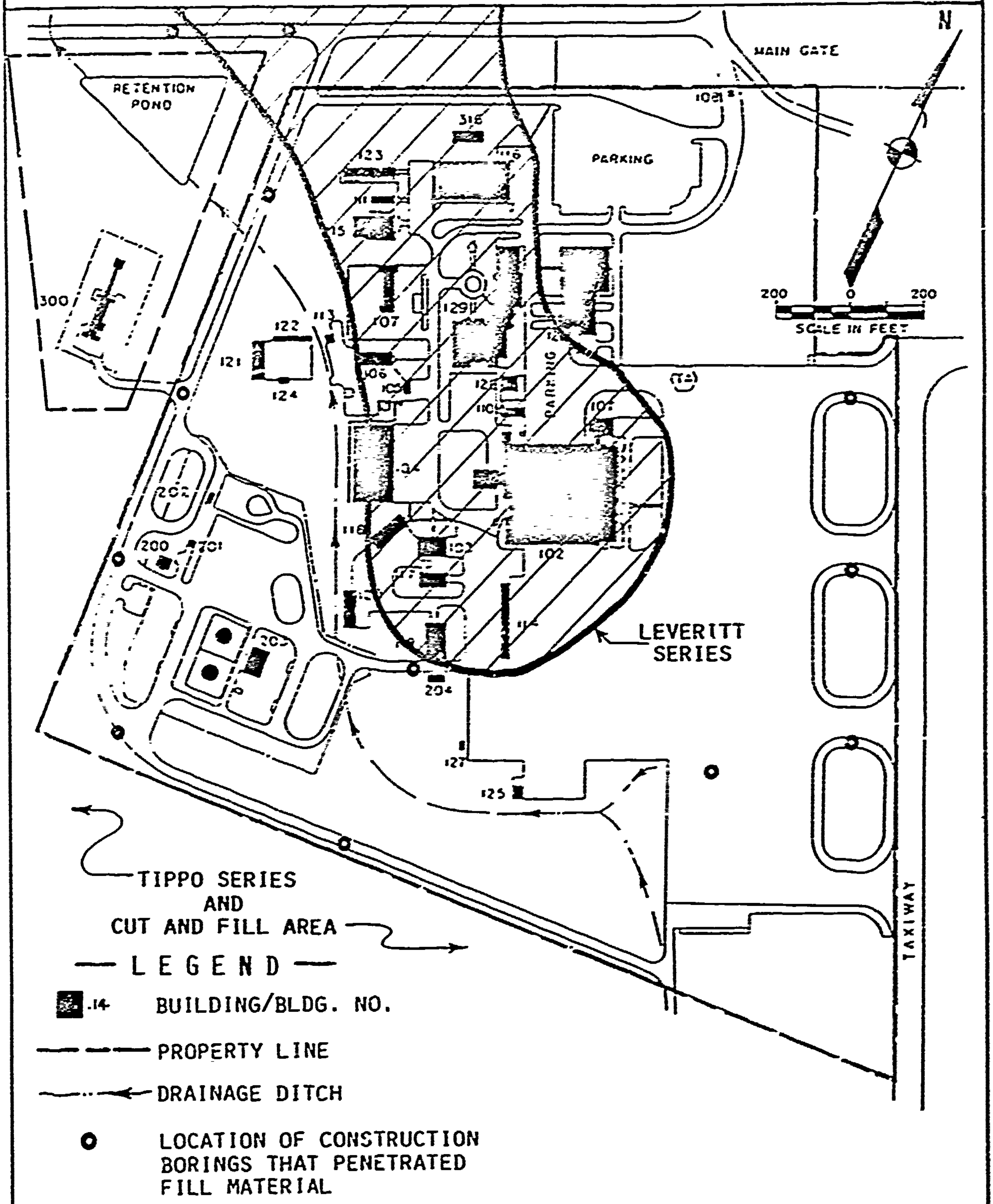
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



(SOURCE: SPIERS, 1971)

SOILS MAP	FIGURE III-H

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



(SOURCE: U.S. DEPT. OF AGRICULTURE, 1987)

The soil boring logs provided indicate that 22 of the 51 borings on-base penetrated fill material at the surface. The locations of these borings are shown on Figure III-H and are in agreement with the Base Civil Engineer's description. The fill material appears to consist of mostly clayey sand and some silty clay. The thickness of the fill is between 1.5 and 9 feet but averages 3.6 feet thick.

The remainder of the borings throughout the Base indicate a sequence of clay ranging in thickness from 3.5 to 21 feet thick, underlain by silt and/or sand. The clays are described in varying degrees of siltiness and sandiness.

The Leverett Series, a silt loam with 0 to 2% slopes, is a deep, well drained, nearly level soil on low stream terraces. It formed in silty alluvium. Individual areas range from 10 to more than 200 acres. The surface layer of the Leverett silt loam is generally 0 to 6 inches and has a yellowish-brown color. The subsoil consists of a sequence as follows: (1) 6 to 18 inches--strong brown silt loam, (2) 18 to 37 inches--strong brown silt loam mottled in shades of brown, (3) 37 to 48 inches--yellowish-brown silt loam mottled in shades of brown and gray, (4) 48 to 53 inches--yellowish-brown silt loam mottled in shades of gray and brown, (5) 53 to 65 inches--silt loam mottled in shades of gray and brown.

The Leverett silt loam is a slightly eroded soil and has a few rills. In a few areas, evidence of accelerated erosion is in the surface layer but not enough to greatly modify the thickness and the characteristics of the original plow layer. The permeability of the Leverett silt loam is moderate and available water capacity is high. This soil series is very strongly acid to medium acid throughout, except in areas where the surface layer has been limed. It has a slow surface runoff and therefore presents only a slight erosion hazard. The water table is seasonal with a perched water table at a depth of 2.5 to 3 feet late in winter and early spring. Flooding is not a problem. The root zone is deep, but the seasonal high water table in winter and early spring limits plant growth. The shrink-swell potential of the Leverett soil is low.

The Tippo silt loam occupies the remainder of the Base, generally from 0 to 2% slopes, and is occasionally flooded. This series is a deep, somewhat poorly drained, nearly level soil on low stream terraces and flood plains. It formed in silty alluvium. The surface layer of the Tippo silt loam is commonly 0 to 5 inches and consists of brown silt loam. " . subsoil is comprised of a sequence as follows: (1) 5 to 11 inches--yello..sh-brown silt loam mottled in shades of brown and gray, (2) 11 to 17 inches--yellowish-brown silt loam mottled in shades of gray and yellow, (3) 17 to 22 inches--light brownish-gray silt loam mottled in shades of brown and slightly brittle, (4) 22 to 30 inches--brown silt loam, tongues of pale brown and light brownish-gray silt, and (5) 30 to 64 inches--silt loam mottled in shades of brown and gray.

The Tippo silt loam has a moderate permeability and a very high available water capacity. It is very strongly acid to medium acid throughout except in areas where lime has been applied to the surface layer. The surface runoff is slow and the erosion hazard is slight. There is a seasonal water table with a perched water table at a depth of 1.5 to 2.5 feet during wet periods in winter and early spring. The Tippo soil is occasionally flooded for short periods during the winter and early spring. The root zone is deep, but a seasonal high water table at a depth of 1.5 to 2.5 feet during winter and early spring limits plant growth. The shrink-swell potential of the Tippo silt loam is low.

D. WATER RESOURCES

1. General

Large quantities of fresh water are found underlying Rankin County including the area occupied by the Base. The principal water-bearing units in ascending order are the Meridian Sand Member of the Tallahatta Formation, the Sparta Sand, the Cockfield Formation, the Forest Hill Sand, and the Catahoula Sandstone. Additional water-bearing units of less importance, also listed in ascending order, include the lower Wilcox Aquifer, the Vicksburg Group, the Citronelle Formation, and the alluvium. Table III-C is a chart displaying these formations and several parameters regarding them.

GEOLOGIC FORMATION/WATER-BEARING PROPERTIES CHART

TABLE III-C

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI

System	Series	Group	Formation		Thickness in feet	Physical character	Water-bearing properties
Quaternary	Holocene		Alluvium	Outcropping formations	0-80	Gravel, sand, and silt.	Furnishes some small domestic water supplies along Pearl River. Thicker deposits along Big Black River may yield up to 50 gal/min (gallons per minute) to wells.
Quaternary	Pleistocene		Loess		0-50	Weathered brown loam.	Not an aquifer in this area.
Tertiary	Pliocene		Citronelle Formation			Gravel, sand and clay.	Supplies some rural wells in a few places in southern Hinds and Rankin Counties.
Tertiary	Miocene		Catahoula Sandstond		0-400	White sandstone, siltstone, clay, and sand.	Yields as much as 200 gal/min to wells in southern Hinds and Rankin Counties.
Tertiary	Oligocene	Vicksburg Group	Byram Formation, Marianna Limestone (Mint Spring Marl Member)		0-100+	Limestone, marl, with some clay, and sand.	Mint Spring Marl Member yields small supplies to rural wells southeast of Jackson.
Tertiary	Oligocene		Forest Hill Sand		0-200+	Lignitic clay, lignite, and thin beds of sand.	Supplies water to many rural water systems in southern Hinds and Rankin Counties. Yields up to 350 gal/min.
Tertiary	Eocene	Jackson Group	Yazoo Clay		0-500	Fossiliferous clay.	Confining unit.
Tertiary	Eocene	Jackson Group	Moodys Branch Formation		0-40	Glauconitic, fossiliferous marl and sand.	Yields small supplies to a few rural wells.
Tertiary	Eocene	Claiborne Group	Cockfield Formation		0-530	Sand, clay, and lignite.	Yields as much as 650 gal/min to wells in the three counties but little used in Jackson.
Tertiary	Eocene	Claiborne Group	Cook Mountain Formation		100-200	Clay and glauconitic, fossiliferous sandstone and sandy limestone.	Confining unit.
Tertiary	Eocene	Claiborne Group	Sparta Sand		400-1000	Beds of medium-grained sand as much as 100 feet thick interbedded with clay and lignite.	Yields as much as 1,000 gal/min to wells in Jackson and Clinton. Water may be colored southwest of Jackson.
Tertiary	Eocene	Claiborne Group	Zilpha Clay		250-400	Dark-gray to brown fossiliferous clay.	Confining unit in this area.
Tertiary	Eocene	Claiborne Group	Winona Sand and Tallahatta Formation		50-300	Light-gray to green calcareous sand, shale, and clay.	Not an aquifer in this area.
Tertiary	Eocene	Claiborne Group	Meridian Sand Member of Tallahatta Formation		300-450	Fine-to-coarse sand and lignite.	Potential source of water for Madison and northeastern Rankin Counties.
Tertiary	Eocene	Wilcox Group	Upper part		1150-2500	Sand and shale, with some lignite	Yields over 100 gal/min to a public-supply well in Madison County.
Tertiary	Paleocene	Wilcox Group	Middle part				Not an aquifer in this area.
Tertiary	Paleocene	Wilcox Group	Lower part				Potential aquifer in Madison and northeastern Rankin Counties. Not used as an aquifer because of considerable depth.

(SOURCE: SPIERS, 1971)

Within Rankin County, the lower limit of fresh water ranges from 2,900 feet below sea level in the northern part of the county to 1,500 feet below sea level in the south. Beneath the Base, the lower limit of fresh water is approximately 1,000 feet below sea level. Regional water well depths vary from less than 100 feet to as deep as 1,200 feet with the majority being greater than 500 feet deep.

Water quality of the major aquifers is generally good for most uses. The water is a soft, sodium or calcium bicarbonate type with low to medium mineralization. Some aquifers have the capability of producing 1,000 to 2,000 gallons per minute in wells of proper construction. Other aquifers yield 100 gallons per minute or less. Transmissibility values range from 900 to 154,000 gallons per day per foot.

The Pearl River, which is approximately five miles east of the Base, forms the western boundary of Rankin County. Large quantities of surface water are available from this source. Additional surface sources of water include the Strong River, a medium-size stream that crosses the southeastern corner of the county about 26 miles from the Base, and many smaller streams which form a dendritic drainage pattern in the county. Additionally, the Ross Barnett Reservoir, located approximately 15 miles north-northeast of the Base on the Pearl River, is a major surface source for fresh water. Rankin County Lake, located north of Pelahatchie and 15 miles east-northeast of the Base, is a medium-size lake that is used for recreational purposes.

The lowest stream flows normally occur on most of the streams during late summer and fall. The highest stream flows generally occur in winter and early spring. Flooding can occur along many of the floodplains associated with the streams.

2. Surface Water

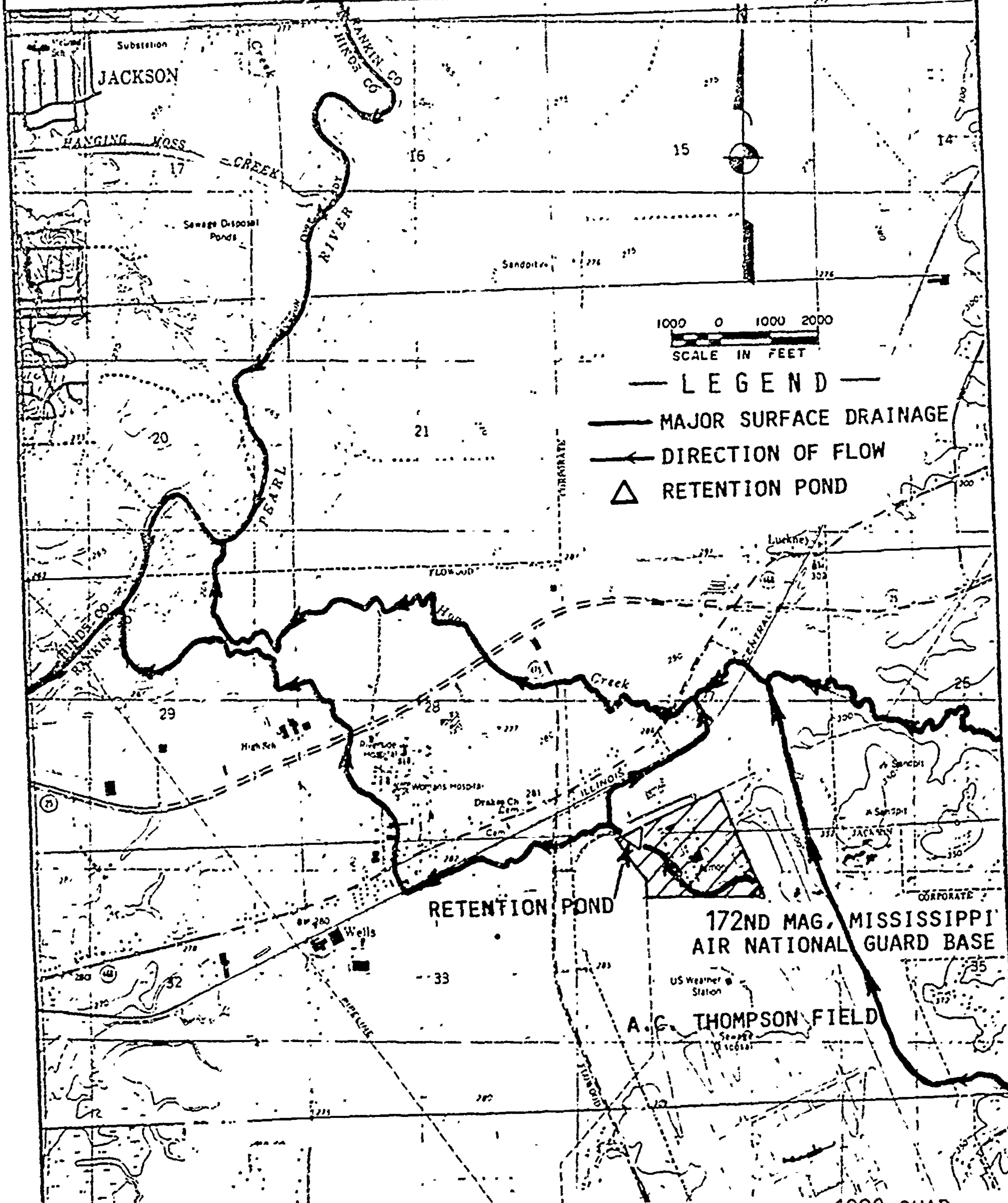
The amount and distribution of precipitation and the size of the drainage basin principally control the flow of streams in Mississippi. The shape of the drainage basin, geology, topography, vegetative cover, and impoundments are other significant factors affecting flow. With regard to the Base, the largest surface water potentials are the Pearl and Strong rivers. Numerous other streams are small and have insufficient flow to be of use to a large user. The Ross Barnett Reservoir on the Pearl River is available for recreation and related use. The drainage from the Base empties into Hog Creek which ultimately discharges to the Pearl River.

Excessive rainfall generally occurring in late winter and early spring is responsible for flooding in Rankin County. All of the local rivers and streams are subject to flooding unless the area is protected by levees or dikes. The closest area to the Base that is protected is about four miles to the west. The Flowood area along the Pearl River has a system of levees and a diversionary canal for flood protection. The drainage system on-base consists of a series of interconnected ditches that connect to one main drainage ditch along the south and west sides of the Base (Figure III-I). A retention pond was constructed in 1986 at the northwest corner of the Base at a point where the drainage ditch turns northwest and flows toward Hog Creek and the Pearl River. The location of the pond is shown on Figure III-I. The purpose of the retention pond is to slow the flow of water from the drainage on the Base to downstream areas during periods of heavy rainfall. The invert elevation (outfall level of the pond) is about five feet above the bottom of the pond. This allows for a significant amount of water collection in the pond before it is discharged. An additional five feet of dike above the inlet pipe surrounds the pond, allowing for a considerable quantity of water to accumulate with only minimal discharge downstream through the culvert at the invert elevation.

Another feature associated with the drainage system on-base is the placement of "sorbent booms" to absorb any floating spilled material that may enter the drainage system. At the time of the initial visit, five of these devices were observed spaced approximately equidistant along the last one-fourth of the ditch on-base upstream of the retention pond.

MAJOR SURFACE DRAINAGE | FIGURE III-1

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



SOURCE: USGS 7½ MINUTE TOPOGRAPHIC MAP, JACKSON SE, MS. 1980 QUAD.

3. Groundwater

The 172nd MAG is underlain by several geologic units that are capable of supplying water to wells. These include the Meridian Sand Member of the Tallahata Formation, the Sparta Sand, the Cockfield Formation, the Forest Hill Sand, and the Catahoula Sandstone. These major aquifers and several minor aquifers are described in Table III-C. All exposed sandy units (permeable strata) serve as recharge areas for the aquifers. Some of the aquifers are recharged within the county or slightly to the north in adjacent counties. Clay beds serve as confining units for major aquifers. Figures III-E and III-F show the geohydrologic section in the area of the Base and surrounding environs.

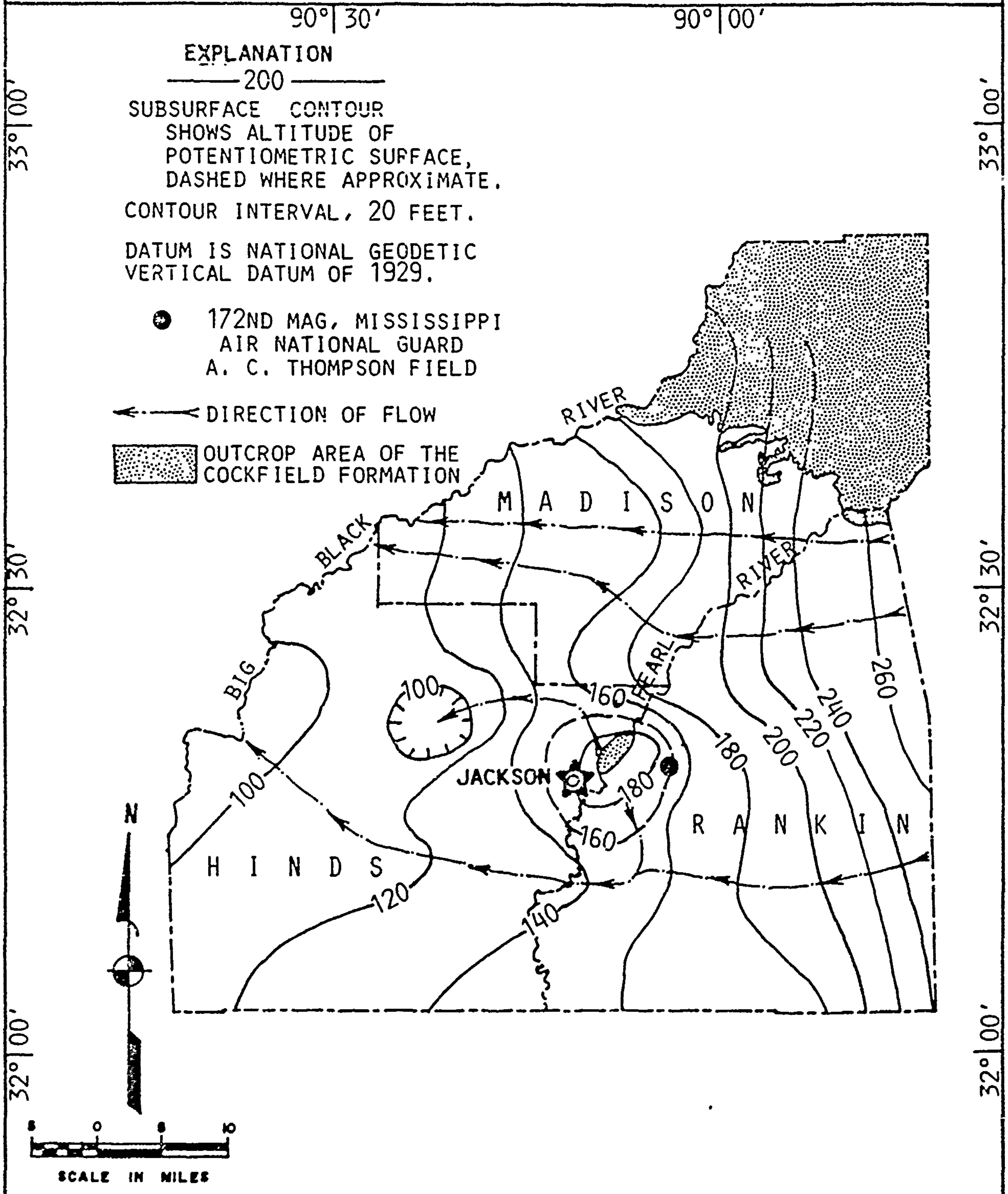
Once entering the recharge zone, water movement in the major aquifers is generally west-southwest in the subsurface. This is determined by drawing a line perpendicular to the potentiometric surface contours. The direction of flow is parallel to this line and downgradient, i.e., from higher to lower elevations.

The principal water-bearing units beneath and near the 172nd MAG are comprised of sand. The shallowest aquifer beneath A. C. Thompson Field ANGB is the Cockfield Formation. Figures III-J and III-K show the potentiometric surface and the base of the Cockfield Formation, respectively. The Cockfield Formation is pushed closer to the surface just west of the Base due to the influence of the Jackson Dome (Figures III-E and III-F). The direction of water movement in the Cockfield Formation beneath the Base has been modified due to the influence of the Jackson Dome and the high amount of pumping in Jackson.

The Cockfield Formation is exposed at the surface about 25 miles northeast of the Base in northern Madison County (north of Rankin County) and also along the Pearl River near Jackson, approximately five miles west of the Base, due to the Jackson Dome. The Cockfield Formation coosists of sand, shale, and lignite. The water-bearing beds consist of fine-grained micaceous sand. The Cook Mountain (underlying) and Yazoo (overlying) Clay (part of the

POTENTIOMETRIC SURFACE OF THE COCKFIELD AQUIFER | FIGURE III-J

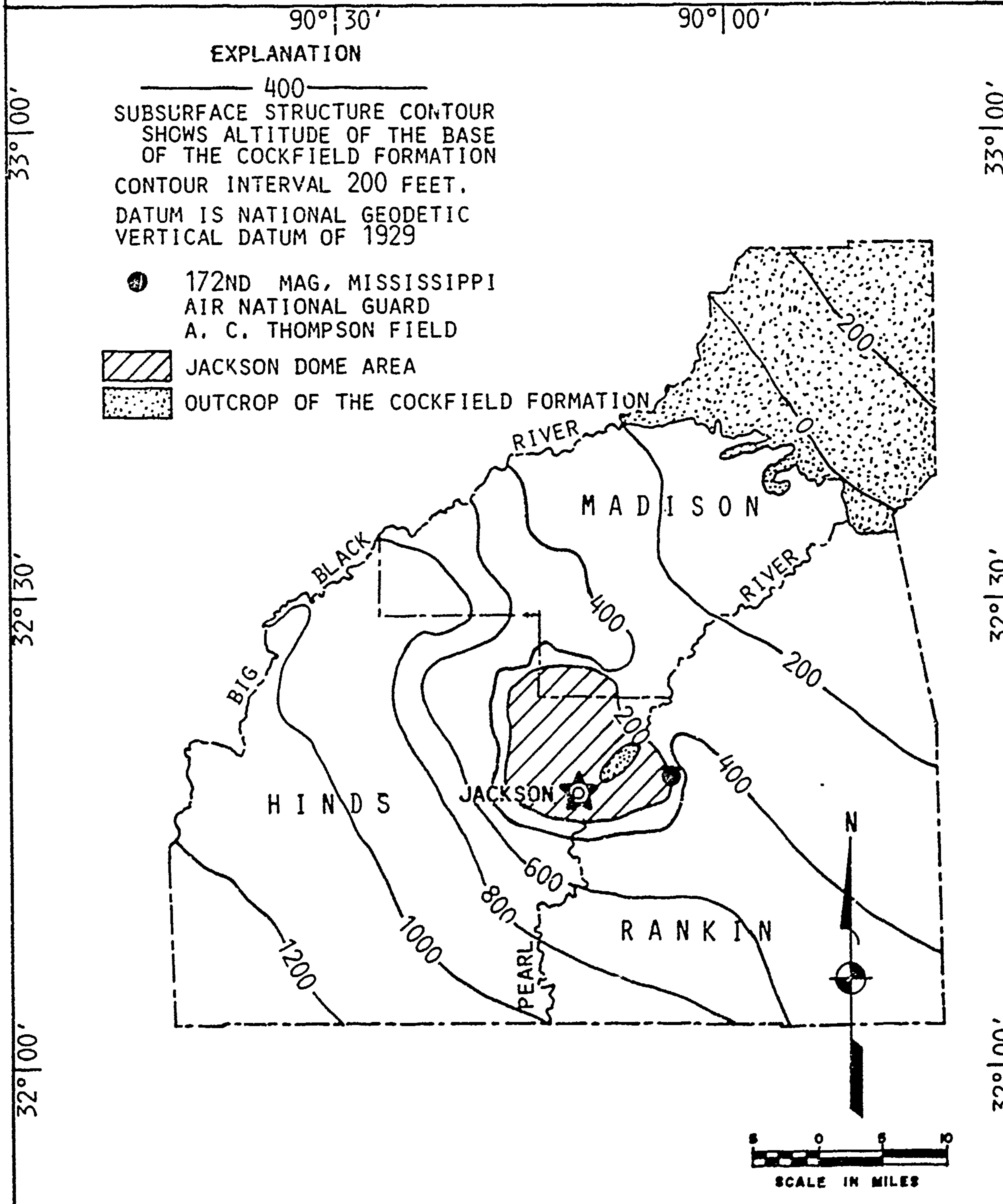
172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



(SOURCE: SPIERS, 1976)

CONFIGURATION OF THE BASE OF THE COCKFIELD FORMATION	FIGURE III-K

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



(SOURCE: SPIERS, 1976)

Jackson Group) are the major confining units for the Cockfield Formation. The Cockfield Formation is between 300 and 400 feet thick but may be thicker or thinner in some areas due to the Jackson Dome.

Groundwater movement is generally from east to west in the Cockfield Aquifer; however, movement beneath the Base is modified due to high pumpage in the city of Jackson and the influence of the Jackson Dome. The effects of these can be seen in Figure III-J. Recharge to the aquifer is from the Pearl River west of the Base where the Cockfield crops out in the river above the Jackson Dome.

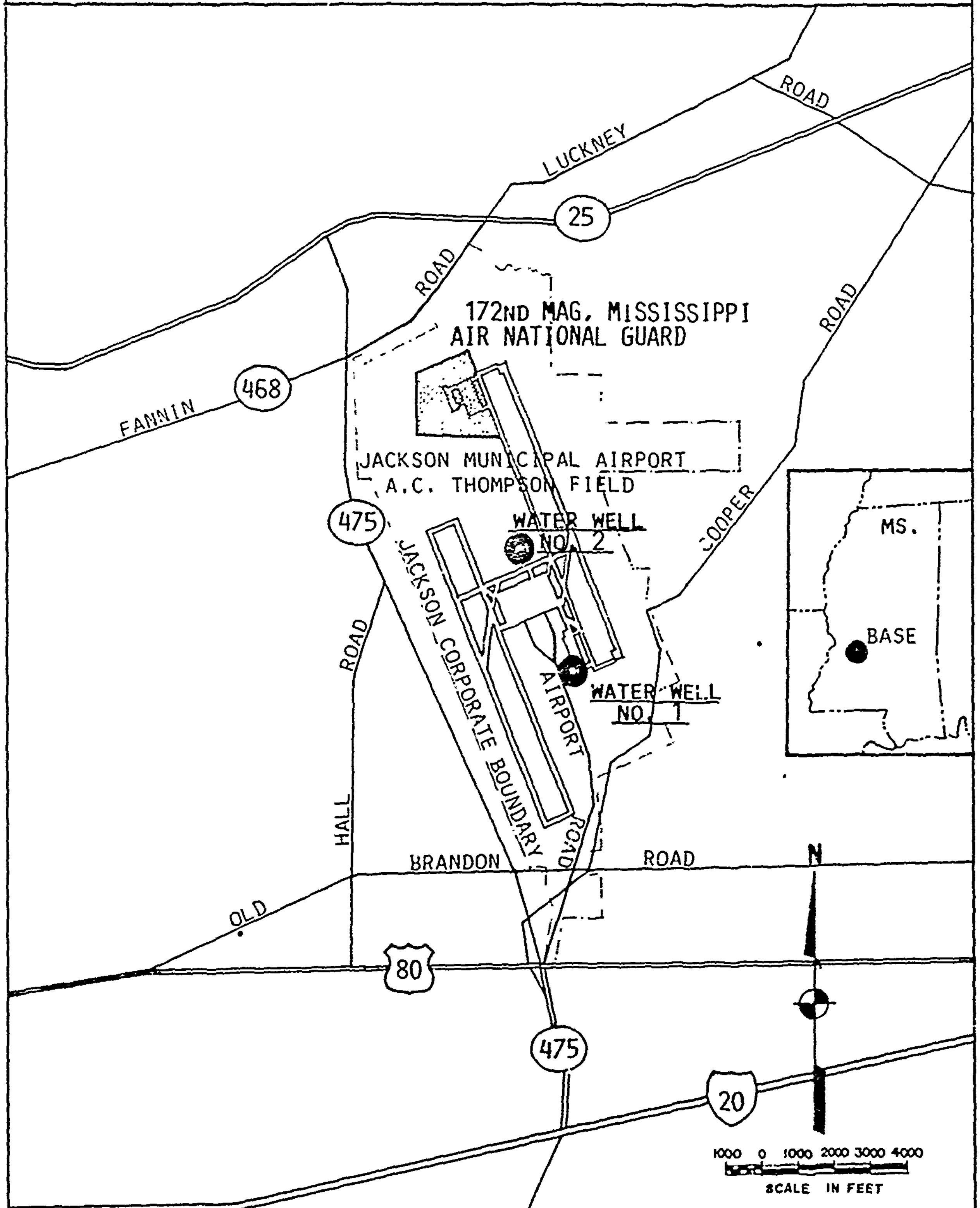
Any of the major and minor aquifers mentioned above and described in Table III-C are capable of supplying water to domestic wells. Industrial water use is primarily confined to major aquifers because the minor aquifers are not capable of producing the large quantities needed.

The municipal airport at A. C. Thompson Field operates two water wells, both tapping the Cockfield Formation reportedly at a depth of about 600 feet below ground level. The location of the wells is shown on Figure III-L. A. C. Thompson Field ANGB receives its entire water supply from these wells, which is purchased from the municipal airport. Water used by nearby residents is purchased by the city of Jackson. The city of Jackson obtains its water supply from the Pearl River.

In February 1986 a groundwater assessment program (GAP) was initiated by the Department of the Air Force to assess the quality of drinking water at A. C. Thompson Field ANGB and other Bases in the U.S. In October 1986 water samples were collected at the distribution point for drinking water at the Base. The results of the analysis were returned in May 1987 and showed the presence of seven chemicals. The seven chemicals, their respective concentrations, and the EPA maximum contaminant limits (MCL) and proposed MCLs (PMCL) are listed in Table III-D.

LOCATION OF WATER WELLS | FIGURE III-L

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



(SOURCE: CHAMPION MAP OF METROPOLITAN JACKSON, MS. 1987)

Table III-D

Chemical Concentrations in Drinking Water
172nd MAG, Mississippi Air National Guard
Jackson, Mississippi

Chemical	Concentration	EPA MCLs & PMCLs
1,1,2-Trichloroethane	7.5 µg/L	NL*
Bromodichloromethane	16.0 µg/L	100 µg/L**
Bromoform	2.3 µg/L	100 µg/L**
Carbon tetrachloride	0.10 µg/L	5 µg/L
Chlorobenzene	0.05 µg/L	60 µg/L***
Chloroform	26.0 µg/L	100 µg/L**
Dibromochloromethane	7.5 µg/L	100 µg/L**

* NL = No MCL or PMCL currently listed.
** MCL is for total Trihalomethanes (THMs) which include Bromodicloromethane, Bromoform, Chloroform, and Dibromochloromethane. No MCLs or PMCLs exist for the individual THMs.
*** Represents PMCL.

E. CRITICAL HABITATS/ENDANGERED OR THREATENED SPECIES

The uncultivated flora within a one-mile radius of the Base is dominantly a transitional to mature pine forest with mixed hardwoods. This association is typical of the region. No wetlands exist within one mile of the ANGB, although there are swamps along the Pearl River 2.5 miles to the north and 2 miles west of the Base. Portions of this area are used for agriculture or are urbanized.

Major wildlife species include deer, fox, raccoon, rabbit, squirrel, turkey, hawk, and a variety of forest and grassland birds. Mr. Wendell Neal of the U.S. Fish and Wildlife Service at Jackson, Mississippi, states that there are no critical habitats or endangered or threatened species in the vicinity of A. C. Thompson Field.

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IV. SITE EVALUATION

A. ACTIVITY REVIEW

A review of ANGB records and interviews with ANGB employees resulted in the identification of specific operations within each activity in which most industrial chemicals are handled and hazardous wastes are generated. Table IV-A summarizes the major operations associated with each activity, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal practices for the wastes. If an operation is not listed in Table IV-A, then that operation has been determined on a best-estimate basis to produce negligible (less than 5 gallons per year) quantities of wastes requiring ultimate disposal. For example, an activity may use small volumes of methyl ethyl ketone. Such quantities commonly evaporate during use, and therefore do not present a disposal problem. Conversely, if a particular volatile compound is listed, then the quantity shown represents an estimate of the amount actually disposed of according to the method shown. Table IV-B contains building names and numbers.

B. DISPOSAL/SPILL SITE IDENTIFICATION, EVALUATION, AND HAZARD ASSESSMENT

Interviews with 15 ANGB past and present personnel and subsequent site inspections resulted in the identification of five disposal/storage sites. It was determined that the five identified sites are potentially contaminated with hazardous materials/hazardous wastes with a potential for migration; therefore, they should be further evaluated. These sites were scored using HARM (see Appendix C). Figure IV-A illustrates the locations of the scored sites. Copies of the completed site hazard assessment rating forms are found in Appendix D. Table IV-C summarizes the HARM Score for each of the scored sites.

<u>Site No. 1 - Old Fire Training Area</u> (HARM Score - 55.5)

The Old Fire Training Area is located outside of the ANGB boundary and approximately 1,000 feet southeast of the aircraft parking ramp. The exact

Table IV-A. Waste Stream and Disposal Summary:
172nd Military Airlift Group
Mississippi Air National Guard
A. C. Thompson Field
Jackson, Mississippi

Shop	Building No. (Past & Present)	Hazardous Materials/ Hazardous Wastes	Estimated Quantities (Gal/Year)	Method of Treatment/Storage/Disposal* 1963 '70 '78 '80 '87 '88
Repair & Reclamation	102	PD-680	32	----OFTA---->NFTA----DRMO---->
Electric & Battery	102	Battery acid	85	----Neutralized/SS---->
Corrosion Control	114	Paint & paint slops	50	----DPDO---->DRMO----
		Paint remover (water soluble)	56	----DPDO---->DRMO----
		Aliphatic thinner (MEK & toluene)	88	----OFTA---->NFTA---->DRMO----
		PD-680/solvents	25	----OFTA---->NFTA---->DRMO----
		Carbon cleaner	5	----Unknown---->DRMO----
		Spray booth wastewater	unknown	----SS---->DRMO----
Hydraulic	102	Hydraulic fluid	80	----DPDO---->DRMO----
		PD-680	25	----OFTA---->NFTA---->DRMO----
Photo Lab		Photographic developer	8	----SS---->DRMO----
		Fixer	4	----SS---->REC----
Aircraft Wash Rack	Ramp	PD-680	1,100	----OWS-SD---->OWS-SS----
		AC cleaning compound	1,700	----OWS-SD---->OWS-SS----
		Oils & grease from engine cleaning	unknown	----OWS-SD---->OWS-SS ----
Fuel Systems	125	JP-4	100	----OFTA---->NFTA---->REC----
		PD-680	30	----OFTA---->NFTA---->DRMO----
NDI Lab	117	Developer	36	----SS----
		Fixer	24	----SS---->REC----

Table IV-A (Continued). Waste Stream and Disposal Summary:
172nd Military Airlift Group
Mississippi Air National Guard
A. C. Thompson Field
Jackson, Mississippi

Shop	Building No. (Past & Present)	Hazardous Materials/ Hazardous Wastes	Estimated Quantities (Gal/Year)	Method of Treatment/Storage/Disposal* 1963 '70 '78 '80 '87 '88
Aerospace Ground Equipment Maintenance (AGE)	114	Paint strippers/thinners	5	----------Unknown----------------->DRMO---------
		PD-680	50	----------OFTA-------->NFTA----------->DRMO---------
		Diesel fuel	25	----------OFTA-------->NFTA----------->REC---------
		Motor oil	250	------------------------------------->DRMO---------
		Antifreeze	50	------------------------------------->DRMO---------
		Lubricating oil	600	----------OFTA-------->NFTA----------->DRMO---------
		Compressor lube	50	------------------------------------->DRMO---------
		Hydraulic fluid	20	----------Unknown----------------->DRMO---------
		Mogas (used)	unknown	----------OFTA-------->NFTA----------->DRMO---------
		JP-4 (used)	unknown	----------OFTA-------->NFTA----------->REC---------
Vehicle Maintenance (Motor Pool)	107	PD-680	40	----------OFTA-------->NFTA----------->DRMO---------
		Sulfuric acid	24	----------Neutralized/SS-------------------------
		Ethylene glycol	25	------------------------------------->DRMO---------
		Lubricating oil	55	------------------------------------->DRMO---------
		Hydraulic oil	30	------------------------------------->DRMO---------
		Motor oil	600	----------OFTA-------->NFTA----------->DRMO---------
		Brake fluid	2	------------------------------------->DRMO---------
		Diesel fuel	20	----------OFTA-------->NFTA----------->DRMO---------
		Polyurethane/paint slops	24	----------DPDO----------------------->DRMO---------
Engine	126	Jet engine oil	100	----------OFTA-------->NFTA----------->DRMO---------
		PD-680	25	----------OFTA-------->NFTA----------->DRMO---------
		Hydraulic fluid	600	----------OFTA----------------------->DRMO---------
POL Operations & Laboratory	POL	Sulfuric acid	24	----------Neutralized/SS-------------------------
		Avgas	500	----------OFTA-------->NFTA----------->DRMO---------
		JP-4	500	----------OFTA-------->NFTA----------->REC or OWS----

Note: Since the new POL facility started operations in 1986, the majority of JP-4 fuel is recycled for reuse. Fuel which cannot be recycled was burned in the fire training area until November 1987; since that time it is turned into DRMO. Spills are collected in an OWS.

*Legend

F.P. - Fuel Pit
F.L. - Fence Line
S.D. - Storm Drain
OFTA - Old Fire Training Area
NFTA - New Fire Training Area
DRMO - Disposed of by Defense Reutilization and Marketing Office - (Before 1985 disposal was by the Defense Property Disposal Office - DPDO)
REC. - Recycle
S.S. - Sanitary Sewer
OWS - Oil/Water Separator
AC - Aircraft

Table IV-B

List of Building Names and Numbers

172nd Military Airlift Group
Mississippi Air National Guard
A. C. Thompson Field
Jackson, Mississippi

Building Number	Facility
101	Security Police
102	Hangar
103	Communication Center
104	Base Supply
105	Publications, Distribution Storage
106	Civil Engineering
107	Vehicle Maintenance/Motor Pool
108	Security Gatehouse
110	Base Contracting
111	Credit Union
113	Civil Engineering Storage
114	AGE Maintenance/Corrosion Control Booth
115	GMT
116	Headquarters/Clinic
117	NDI Shop
118	Aerial Port
119	Mobility Warehouse
120	Aerial Port Storage
121	Civil Engineering Storage
123	Dormitory
124	Pavement and Grounds
125	Fuel Cell Repair
126	Avionics/Engine I&R
127	Corrosion Control
128	ANG Club
129	Squadron Operations/Dining Hall
200	POL Operations
201	POL Maintenance
202	LOX/LIN Storage
203	POL Pump Shelter
204	Paint Storage
300	T-9, Engine Test Facility
316	Accounting and Finance

LOCATION OF HARM SCORED SITES

FIGURE IV-A

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD

A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI

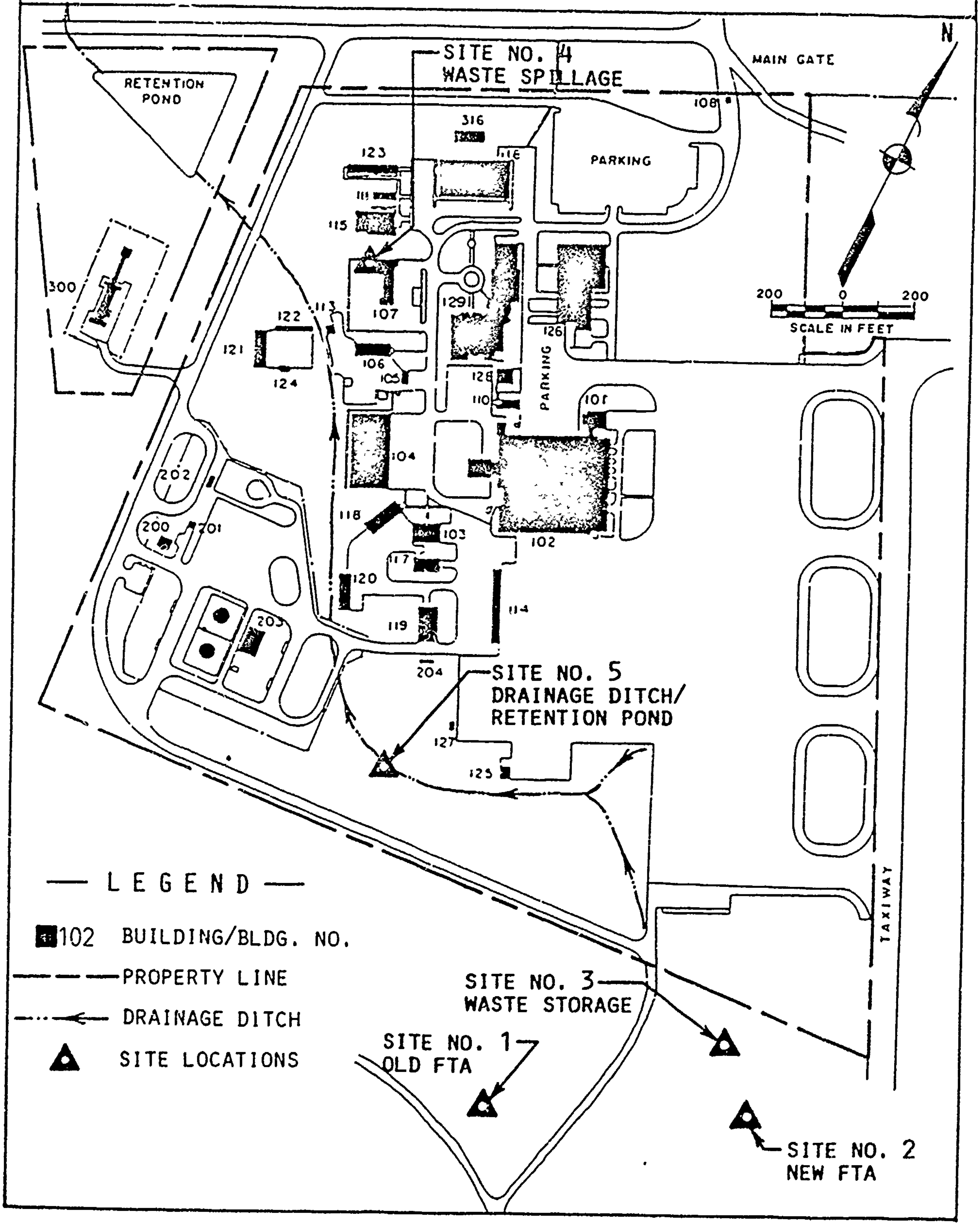

Table IV-C

Site Hazard Assessment Scores (As Derived From HARM):

172nd Military Airlift Group
Mississippi Air National Guard
A. C. Thompson Field
Jackson, Mississippi

Site Priority	Site No.	Site Description	Receptors	Waste Characteristics	Pathway	Waste Mgmt. Practices	Overall Score
1	2	New Fire Training Area	50.5	72	100	1.0	74.2
2	5	Drainage Ditch & Retention Pond	50.5	40	100	.95	60.3
3	1	Old Fire Training Area	50.5	36	80	1.0	55.5
4	3	Waste Storage Area at New FTA	50.5	36	80	1.0	55.5
5	4	Waste Spillage at Underground Storage Tank at Vehicle Maintenance	50.5	40	80	1.0	56.8

location of the pit is unknown, although the area can be detected on aerial photographs taken when the pit was in use. The area had been used for fire training from 1964 to 1978. The area consisted of a shallow, round, unlined pit approximately 50 feet in diameter, with a small earthen berm surrounding the pit. The training exercises usually consisted of preparing the pit by adding water (to float the fuel), applying 200 to 1,000 gallons of fuel, igniting the fuel, then extinguishing the fire with a protein-based foam and/or water. The exercises were conducted about four times a year. Various flammable liquids that were generated by the ANGB operations were used for fueling the fire, mostly JP-4 jet fuel, PD-680, motor oil, and gasoline. Based on the years of operation of the fire training area and the amount of liquid waste that was applied for each exercise, roughly 14,000 gallons of liquid waste may have entered into the ground. The ANGB abandoned this site in 1978. Sources at the Base indicate that the ANGB provided no cleanup efforts subsequent to abandonment. A new weather balloon inflation shelter was built in proximity to the abandoned fire training area. The shelter was completed in October 1978 and has been operated by the National Weather Service. Reportedly, the area surrounding the balloon shelter was disturbed for construction of the shelter by grading with minimal cut or fill operations. Some environmental stress from a black tar-like substance scattered on the ground is evident around the fire training area, although the area exhibits good grass cover.

Site No. 2 - New Fire Training Area (HARM Score - 74.2) *

The New Fire Training Area which ceased operations in November, 1987, is located outside of the ANGB boundary, approximately 300 feet southeast of the edge of the aircraft parking ramp. This area is included as a site because the training activities were controlled by the ANGB. Use of the area began in 1978, shortly after the Old Fire Training Area was abandoned (see Site No. 1).

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* The difference in HARM scores between the Old and New Fire Training Areas is due primarily to the New Fire Training Area pathways score. A high pathways score (100) was earned because of direct evidence of hazardous contaminants.

The area consisted of a shallow, round, unlined pit approximately 50 feet in diameter with a small earthen/gravel dike surrounding the pit. A charred railroad tanker sits inside the pit and was used for training purposes. A 10,000-gallon railroad tanker sits about 150 feet north of the pit and was used to store fuel for fire training. The tanker supplied fuel to the pit by a 2-inch diameter, partially buried plastic pipe which extends from the bottom of the tanker to the pit. Fuel was normally applied from the tanker but was also occasionally applied from other containers. The fuel consisted of JP-4 jet fuel, PD-680, motor oil, gasoline, and other flammable liquid wastes generated by ANGB operations. Approximately 250 to 500 gallons of fuel was used for each exercise with 4 to 6 exercises per year. The fire was extinguished with foam (type AFFF) and/or water. At the time of the site visit in March 1988, the fire pit was full of water with a fuel residue around the edges of the pit and floating on the surface of the water. Based on the years of operation of the fire training area and the amount of liquid waste that was applied for each exercise, roughly 7,000 gallons of liquid waste may have entered into the ground.

Soil samples were taken from the fire training area in October 1986 and submitted to the USAF Occupational and Environmental Health Laboratory (OEHL) at Brooks Air Force Base, Texas. The samples were collected 6 to 8 inches below the ground surface at the perimeter of the pit. Aquatic toxicity tests were performed on water extractions from the soil samples. The water extraction of one of the soil samples was determined to be toxic to the test organisms (fish), killing 50% of the test organisms in 72 hours. Neither of the other two samples resulted in any toxicity in OEHL's test organisms.

Site No. 3 - Waste Storage Area at New Fire Training Area (HARM Score - 55.5)

A waste storage area is located outside of the ANGB boundary, approximately 200 feet southeast of the edge of the aircraft parking ramp. The site is approximately 150 feet north of the new fire training pit (see Site No. 2) and within 30 feet of a 10,000-gallon railroad tanker which supplied fuel to the new fire training pit. The site has served as a waste accumulation point used primarily by the ANGB since about March 1987. At the time of the site visit, there were thirty-five 55-gallon drums containing various waste oils/materials. The drums were standing in an upright position resting on wooden pallets. Possible liquid contaminants were observed standing on top of several of the drums. Patches of dead grass and small areas of ground saturated with waste oils/fuels were evident within the general area of the site. Some of the drums appeared to have a moderate amount of rusting.

Site No. 4 - Waste Spillage at UST at Vehicle Maintenance (HARM Score - 56.8)

Spillage of waste oil is evident on the surface of the ground above a 500-gallon UST. The UST is located near the northwest corner of the Vehicle Maintenance Building and approximately 8 feet from the edge of asphalt pavement. An area approximately 8 feet in diameter appeared to be saturated with an unknown quantity of waste oil. The contaminated area surrounds a vertical pipe (approximately 2-inch diameter), which is connected to the UST and extends to approximately 3 feet aboveground. The spillage is from minor spills during filling and pumping of the UST through the vertical pipe. Patches of dead grass are also noticeable within the general area of the UST. Part of the rain runoff from this area would appear to be directed toward a low area of the pavement and then to a small field. The UST was used to store mostly used engine oil (approximately 95%) and some petroleum-based transmission fluid. Based on the years of operation of the UST and an approximated amount spilled for each time liquid was emptied into the filling port, roughly 700 gallons of liquid waste may have entered into the ground. The UST has been pumped about once a year and the waste disposed of through the DRMO. There are no reports or records of leakage from the UST.

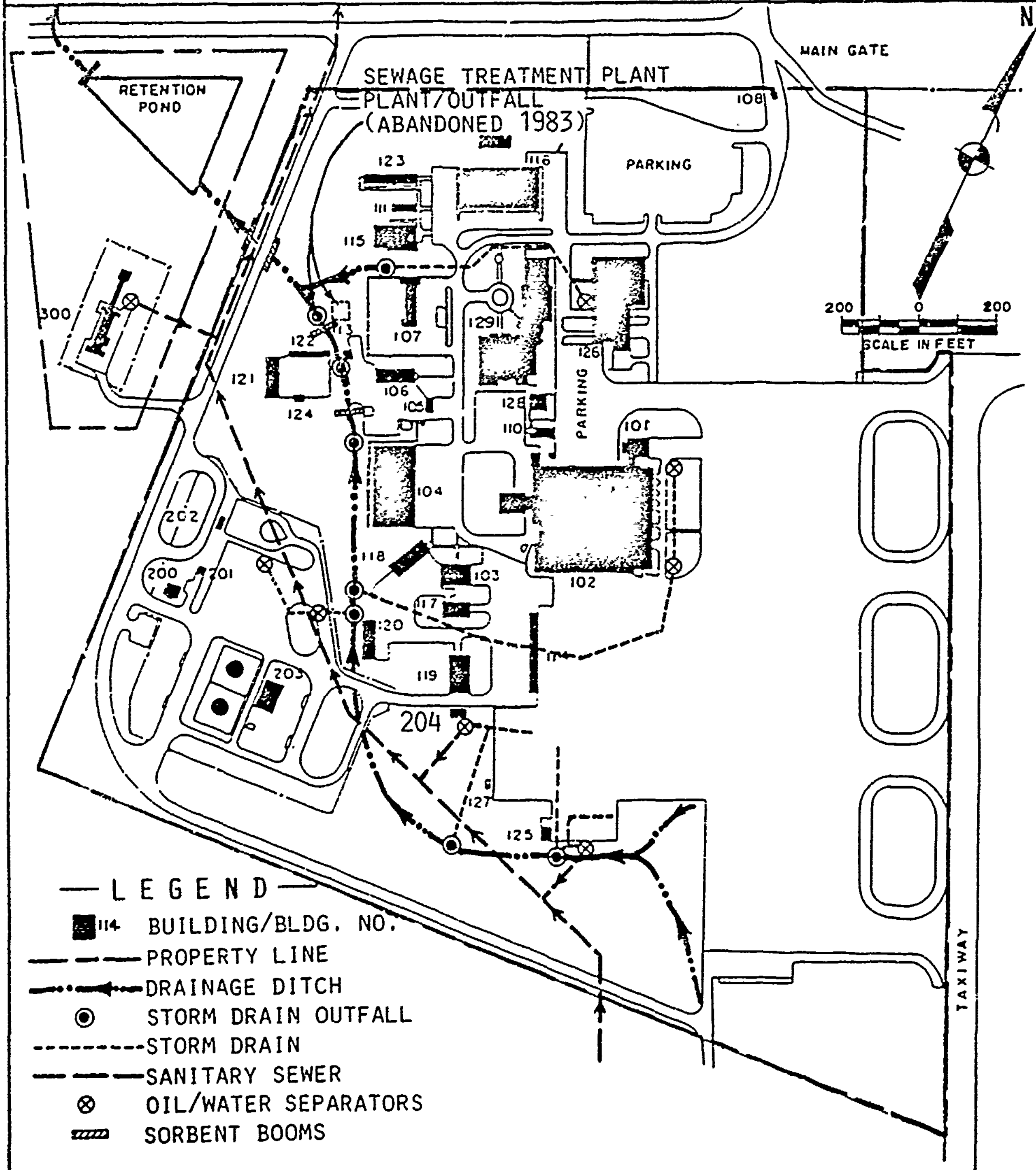
Site No. 5 - Drainage Ditch and Retention Pond (HARM Score - 60.3)

Surface runoff at the Base is collected in a series of interconnected shallow culverts, small ditches, and swales which feed a larger, solitary drainage ditch. The ditch lies near the perimeter of the Base at the south side, winds its way northward on the west side of the Base, then finally proceeds northwestward off the Base (Figure IV-B). Before leaving the Base at the northwest corner, the drainage ditch passes through a retention pond. The

DRAINAGE DITCH — FIGURE IV-B

172ND MAG, MISSISSIPPI AIR NATIONAL GUARD

A.C. THOMPSON FIELD, JACKSON, MISSISSIPPI



NOTE:

ONLY THE PORTIONS OF THE SANITARY SEWER AND STORM DRAIN SYSTEM CONNECTED WITH OIL/WATER SEPARATORS AND WASH RACK AREAS ARE SHOWN FOR CLARITY.

pond was constructed in 1986 as a flood control measure. The ditch is considered to be intermittent, as it flows only during periods of wet weather. The width and depth of the ditch vary within the confines of the Base, but is generally 5 to 10 feet wide and less than 3 feet deep.

Five sorbent booms, positioned to control small spills and help manage large spills, are shown in Figure IV-B. The past efficiency of the booms is not known; however, in June 1987 a 1,000 gallon JP-4 spill occurred at the new POL facility. As a result of the spill, the oil/water separator overflowed into the ditch where it was apparently contained by the sorbent booms. This is the only documented spill into the drainage system on the Base. Records indicate that the spilled fuel was confined to the drainage ditch on the Base. Peterson-Riedel and Rebel Vacuum Services were used to remove the fuel from the ditch to the fire training area burn pit for disposal. The Mississippi Department of Natural Resources, Bureau of Pollution Control, responded to the spill and was apparently satisfied with the cleanup operation. A letter of memorandum from Richard V. Ball to John Harper, both of the Mississippi Department of Natural Resources, Bureau of Pollution Control, dated June 17, 1987, describes the incident.

There are eight oil/water separators on the Base as shown in Figure IV-B. Two of the separators, one at the engine test facility (Building 300) and one at the Avionics Building (Building 126), discharge directly to the sanitary sewer. The separator at the engine test facility is no longer in service. The two separators at the wash rack area (Buildings 125 and 204) also discharge to the sanitary sewer. Flow from the associated storm drains is normally directed to the storm drain outfalls. Reportedly, a valve is positioned to direct the storm drain flow through separators during aircraft service operations. The remaining four separators discharge into the storm drainage system which flows into the drainage ditch. Reportedly, several facilities have disposed of waste oils and solvents into the drainage system via storm sewer inlets.

There are eight known and observed outfalls directed to the drainage ditch that serve the Base. One outfall is abandoned which served a sewage treatment plant up until 1983 (see Section C, Other Pertinent Facts). The remaining seven outfalls are connected to the storm drainage system (Figure IV-B).

Quarterly sampling of the water at the ditch as it enters the retention pond and at the pond outfall has been conducted since April 1986. The only parameters measured were oil and grease. The analyses that were available from Base files indicate that the highest level was 2.2 mg/L (outfall) and the lowest was <0.3 mg/L. The ditch and the pond have never been monitored nor permitted under state regulations.

Because the effluent from oil/water separators, a wash rack, and several facilities use the ditch to carry away contaminants, and the effectiveness of the sorbent booms is unknown, this site has been rated using the HARM method. Numerous samplings of the waters exiting the Base from the drainage ditch have shown evidence of oil, grease and, on one occasion, JP-4 jet fuel.

C. OTHER PERTINENT FACTS

- Sanitary sewage is connected to publicly owned treatment works.

- A sewage treatment plant which served the Base was operated from 1963 to 1983 (Figure IV-B). The plant consisted of an aeration and chlorination treatment system with an outfall at the drainage ditch permitted by the state of Mississippi. Reportedly, the plant had a capacity of less than one million gallons per day and the effluent complied with the state permit. Sewage sludge was delivered off-base. There is no evidence of environmental stress.

- A service station was located south of the Pavement and Grounds Building (Building 124) and west of the Base Supply Building (Building 104). Two 1000-gallon tanks were located at the station used to store gasoline for the pumps. The station and tanks were installed in the late 1960s, were used approximately one year, and then were removed. Reportedly, the tanks were partially buried in the ground. There were no reported leaks or spills. There is no evidence of environmental stress.

- Two septic drain fields are currently in service. One field serves the security gatehouse (Building 108), and another field serves the AGE Building (Building 114). The gatehouse drain field was installed around 1981 and the AGE drain field was installed in 1968. Another drain field served the Fuel Cell Repair Building (Building 125) from 1976 to 1986. Reportedly, there have been no hazardous wastes associated with any of the drain fields. There is no evidence of environmental stress.

- There are no (nor have there ever been) any landfills, radioactive burial sites, or sludge burial sites.

- There are no (nor have there ever been) any active water wells on the Base.

- There have never been any known leaks of PCB-contaminated oils.

- There has not been extensive use or storage of pesticides on the Base.

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V. CONCLUSIONS

The goal of the IRP Preliminary Assessment study is to identify sites where there may be potential for environmental contamination resulting from past waste disposal practices and the possible pathways and receptors. Information obtained through interviews with Base personnel, review of Base records, field observations, and visits or communication with outside agencies have resulted in the identification of five potentially contaminated sites on Base property or outside Base property but under the responsibility of the Base. These sites consist of the following:

<u>Site No. 1 - Old Fire Training Area</u> (HARM Score - 55.5)

The old fire training area has a moderate potential for environmental contamination. Although a small amount of environmental stress was noticeable, the site is suspected of being a potential source of contamination. Fire training exercises consisted of flooding the area with 200 to 1,000 gallons of flammable liquids several times per year for 14 years. Further investigation is recommended.

<u>Site No. 2 - New Fire Training Area</u> (HARM Score - 74.2)

The new fire training area has a strong potential for environmental contamination. Evidence for contaminant migration to the groundwater system exists as in Site No. 1, the old fire training area. Similar practices of dumping large quantities of flammable liquids onto the ground for burning purposes is documented. This site was in operation until November, 1987. Possible contaminants can be seen floating in a pool of water at the site. Further investigation is recommended.

<u>Site No. 3 - Waste Storage Area at the New Fire Training Area</u> (HARM Score 55.5)

The waste storage area adjacent to the new fire training area has a moderate potential for environmental contamination. Thirty-five unmarked 55-gallon drums were observed, some possibly leaking, at the site. Environmental stress on the ground surface was noticeable. There is a possibility for the visible contaminants on the ground to enter the groundwater system. Further investigation is recommended.

Site No. 4 - Waste Spillage Underground Storage Tank at Vehicle Maintenance (HARM Score - 56.8)

The waste spillage at the UST at Vehicle Maintenance has a moderate potential for environmental contamination. Environmental stress was observed near the filling and vent ports of the UST that holds waste oils generated at the motor pool. It is believed that the oil observed on the ground is the result of spillage while pouring waste oils into the UST fill pipe. It is uncertain how much oil was spilled over the years. A route of migration exists for the contaminants to the drainage ditch as part of surface runoff. Further investigation is recommended.

Site No. 5 - Drainage Ditch and Retention Pond (HARM Score - 60.3)

The drainage ditch and retention pond have a moderate potential for environmental contamination. The ditch receives runoff and effluent discharge from all areas of the Base. There is direct evidence that contaminants are entering the ditch; therefore, there is a potential for downstream contamination. Prior sampling has shown evidence of oil, grease, and JP-4. Further investigation is recommended.

VI. RECOMMENDATIONS

A total of five sites have been identified as having received hazardous wastes/hazardous materials at the 172nd MAG, Mississippi Air National Guard, A. C. Thompson Field. To aid in comparison of these five sites, the HARM was applied. The HARM rating scores indicate the relative need for followup work in the IRP.

Based on the investigation documented in this PA and the HARM scores the five identified sites received, it is recommended that further IRP action is necessary.

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GLOSSARY OF TERMS

AIRCRAFT CLEANING COMPOUND - A nonhazardous cleaning compound composed of nonionic detergent (monyl phenol ethylene oxide condensate), sodium dodecyl benzene sulphonate, and water. Not a priority pollutant.

ALLUVIUM - A general term for all detrital deposits resulting from the operations of modern rivers; thus including the sediments laid down in river beds, floodplains, lakes, fans at the foot of mountain slopes, and estuaries.

ANTICLINE - A fold in rock strata that is convex upward or had such an attitude at some stage of development.

AQUIFER - A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield economical quantities of water to wells and springs.

COLLUVIUM - A general term applied to loose and incoherent deposits, usually at the foot of a slope or cliff and brought there chiefly by gravity.

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

1. any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

2. any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

3. any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

4. any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

5. any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

6. any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

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

CRETACEOUS - A geological time period lasting from 136 to 65 million years ago.

CRITICAL HABITAT - The native environment of an animal or plant which, due either to the uniqueness of the organism or the sensitivity of the environment, is susceptible to adverse reactions in response to environmental changes such as may be induced by chemical contaminants.

CUESTA - A gently sloping plain which terminates in a steep slope on one side.

DENDRITIC DRAINAGE PATTERN - Characterized by irregular branching in all directions with the tributaries joining the main stream at all angles.

DETRITAL - Said of minerals occurring in sedimentary rocks which were derived from pre-existing rocks.

DIESEL FUEL - A hazardous fuel oil composed of aliphatic, ole... and aromatic hydr... arbons. Fuel oils are combustible or flammable ... are moderately per...stent and mobile in surface soils and even more ... deep soils and groundwater. Ingestion or inhalation of fuel oil is harmful. Diesel fuels are not priority pollutants. The DOT has designated fuel oil as a hazardous material.

DIP - In geology, the angle at which a stratum or any planer feature is inclined from the horizontal.

DOWNGRADIENT - A direction that is hydraulically downslope, i.e., the direction in which groundwater flows.

EMBAYMENT - A continental bor... area that has sagged concurrently with deposition so that an unusually thick section of sediment results.

ENDANGERED SPECIES - Wildlife species that are designated as endangered by the U.S. Fish and Wildlife Service.

EOCENE - A geological time epoch, lasting from 54 to 38 million years ago.

ESCARPMENT - A cliff or steep slope of some extent, generally separating two level or gently sloping areas, produced by erosion or faulting.

ETHYLENE GLYCOL - A colorless dihydroxy alcohol used as an antifreeze. It is highly mobile in the soil/groundwater system. It is not highly persistent. Ethylene glycol is not a priority pollutant. It does present a health hazard if ingested or inhaled. The European Economic Community (EEC) classifies ethylene glycol as a harmful substance.

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

FLORA - Plants or plant life, especially of a period or region.

GASOLINE - A fuel for internal combustion engines consisting essentially of volatile flammable liquid hydrocarbons derived from crude petroleum. Gasoline is relatively mobile and moderately persistent in most soil systems. Persistence in deep soils and groundwater may be higher. Downward migration of gasoline represents a potential threat to underlying groundwater. Inhalation and ingestion exposures are capable of causing death. Gasoline is not a priority pollutant. The DOT has designated gasoline as a hazardous material.

GEOMORPHOLOGY - That branch of both physiography and geology which deals with the form of the earth, the general configuration of its surface, and the changes that take place in the evolution of land forms.

GEOSYNCLINE - A large, generally linear trough that subsided deeply throughout a long period of time in which a thick succession of stratified sediments and possibly extrusive volcanic rocks commonly accumulated.

GROUNDWATER - refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

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

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

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

1. cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or

2. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HYDRAULIC CONDUCTIVITY - The rate of flow of water in gallons per day through a cross section of one square foot under a unit hydraulic gradient, at the prevailing temperature (gpd/ft^2). In the SI system, the units are m^3/day/m^2 or m/day.

HYDRAULIC FLUID - A low-viscosity fluid used in operating a hydraulic mechanism. Most hydraulic fluids consist primarily of a blend of various hydrocarbons. Most are highly immobile and persistent in the soil/groundwater system due to volatilization and aerobic biodegradation. Ingestion of hydraulic fluid presents a gastrointestinal health hazard. Hydraulic fluid is not a priority pollutant. Several federal agencies have classified hydraulic fluid as a hazardous material/hazardous waste.

HYDRAULIC GRADIENT - The rate of change in total head per unit of distance of flow in a given direction.

IGNEOUS - Formed by the solidification from a molten or partially molten state.

INTRUSIVE - Having, while fluid, penetrated into or between other rocks but solidifying before reaching the surface.

JP-4 (JET FUEL) - Jet engine test fuel made up of 35% light petroleum distillates and 65% gasoline distillates. JP-4 hydrocarbons are relatively mobile and nonpersistent in most soil systems. Persistence in deeper soils and groundwater may be higher. Aspiration of the liquid into the lungs is a severe short-term health hazard. Long-term effects on other organs is noted. JP-4 is not a priority pollutant. The DOT has designated all aviation fuel as a hazardous material.

LITHOLOGY - The physical character of a rock.

MEK (METHYL ETHYL KETONE) - A water-soluble, colorless liquid that is miscible in oil; used as a solvent in vinyl films and nitrocellulose coatings, also as a metal cleaner and degreaser. MEK migrates in the soil/groundwater system with very little retardation. Short-term exposure may include central nervous system disorders. MEK is not a priority pollutant; however, several federal programs list MEK as a toxic pollutant, toxic hazardous waste, hazardous substance or hazardous material.

METHYLENE CHLORIDE - A colorless liquid, practically nonflammable and nonexplosive; used as a refrigerant in centrifugal compressors, a solvent for organic materials, and a component in nonflammable paint remover mixtures. Methylene chloride is highly mobile in the soil/groundwater system. Little or no retardation is expected in deep or sandy soils. In the near surface volatilization is an important removal process. Migration to groundwater is common. Short-term exposure produces a narcotic effect. Death has been reported at high concentrations. There is evidence of mutagenicity in long-term exposure. Methylene chloride is not a priority pollutant.

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

MIOCENE - A geological time epoch lasting from 26 to 7 million years ago.

MOTOR OIL AND GREASE (LUBRICANTS) - A material used to diminish friction between the moving surfaces of machine parts. Highly immobile in the soil/groundwater system due to low water solubilities and high soil sorption. Volatilization and aerobic biodegradation rates are slow; therefore, oils and grease are persistent in the subsurface. Motor oil and grease are not priority pollutants. The EPA has classified used oil as a hazardous waste.

OLIGOCENE - A geological time epoch lasting from 38 to 26 million years ago.

PD-680 (STODDARD SOLVENT) - A petroleum naphtha product with a comparatively narrow boiling range; used mostly for degreasing and as a general cleaning solvent. Stoddard solvent hydrocarbons are relatively mobile and moderately persistent in most soil systems. Persistence in deep soils and groundwater may be higher. Short-term exposure causes irritation of eyes, nose, and throat. Kidney damage results from long-term exposure. Stoddard solvent is not a priority pollutant. The DOT has designated petroleum naphtha as a hazardous material.

PERCHED WATER TABLE - Water table above an impermeable bed underlain by unsaturated rocks of sufficient permeability to allow movement of groundwater.

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

PLEISTOCENE - A geological time epoch lasting from 2.5 to .005 million years ago.

POROSITY - The percentage of the bulk volume of a rock or soil that is occupied by interstices, whether isolated or connected.

POTENTIOMETRIC SURFACE - Surface to which water in an aquifer would rise by hydrostatic pressure.

QUATERNARY - A geological time period lasting from 2.5 million years ago to the present.

RECENT - A geological time epoch lasting from 0.005 million years ago to the present.

STRATIGRAPHY - A branch of geology concerned with the form, arrangement, geographic distribution, classification, and mutual relationships of rock strata, especially sedimentary.

STRIKE - The course or bearing of the outcrop of an inclined bed or structure on a level surface. It is perpendicular to the direction of the dip.

SUBCROP - Area within which a formation occurs directly beneath an unconformity.

SULFURIC ACID - A toxic, corrosive, strongly acid, colorless, odorless liquid that is miscible with water and dissolves most metals. Widely used as a battery acid and as a laboratory reagent. Sulfuric acid is not a priority pollutant.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

SYNCLINE - A fold in rocks in which the strata dip inward from both sides toward the axis.

TERRACE - Relatively flat, horizontal, or gently inclined surface, sometimes long and narrow, which is bounded by a steeper descending slope on the opposite side. When typically developed, a terrace is steplike in character.

TERTIARY - A geological period lasting from 65 to 2.5 million years ago.

THREATENED SPECIES - Wildlife species who are designated as "threatened" by the U.S. Fish and Wildlife Service.

TOLUENE - A colorless, aromatic liquid derived from coal tar or from the catalytic reforming of petroleum naphthas. It is insoluble in water. Toluene is used as a paint thinner, metal cleaner, and paint equipment cleaner. It is relatively mobile in soil-water systems, including transport of vapor through air-filled pores as well as transport in solution. It may persist in the subsurface for months or years if biodegradation is not possible. Short-term exposure results in central nervous system depression. No adverse effects are noted in long-term exposure. Toluene is not a priority pollutant. Numerous federal regulations designate toluene as a hazardous substance or material.

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

TRANSMISSIBILITY - The rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient.

UNCONFORMITY - A surface of erosion or nondeposition that separates younger strata from older rocks.

WATER TABLE - The upper surface of a zone of saturation.

WETLANDS - An area subject to permanent or prolonged inundation or saturation that exhibits plant communities adapted to this environment.

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

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BIBLIOGRAPHY

1. "Air National Guard Installation Restoration Program," from ANG files.

2. "Aircraft Parking Ramp, Jet Fuel Storage and Distribution System," design drawings, Reynolds, Smith, and Hills, Inc., Architects-Engineers-Planners, Jackson, Mississippi, June 17, 1985.

3. American Geological Institute, 1974, Dictionary of Geological Terms, Doubleday Anchor.

4. Ball, Richard V., MS DNR. Correspondence/memorandum to John Harper dated June 17, 1987.

5. Baughman, Wilbur T., 1971, Rankin County Geology and Mineral Resources, Bull. 115, Mississippi Geological, Economic, and Topographical Survey, Jackson, Mississippi.

6. Brady, Nyle C., 1974, The Nature and Property of Soils, 8th ed., Macmillan Publishing Co.

7. Darden, Daphne, 1986, Potentiometric Map of the Cockfield Aquifer in Mississippi, Fall 1984, U.S. Geological Survey Water Resources Investigations Report 86-4042, in cooperation with the Mississippi Department of Natural Resources Bureau of Land and Water Resources.

8. Darden, Daphne, 1987, Potentiometric Map of the Sparta Aquifer System in Mississippi, Fall 1984, U.S. Geological Survey Water Resources Report 86-4206, in cooperation with the Mississippi Department of Natural Resources Bureau of Land and Water Resources.

9. Department of the Air Force, USAF Occupational and Environmental Health Laboratory (AFSC), Brooks Air Force Base, Texas, 1986, memorandum on the Groundwater Assessment Program to: 172 TAC Clinic/SGPM, Allen C. Thompson Field, Jackson, Mississippi.

10. Department of the Air Force, USAF Occupational and Environmental Health Laboratory (AFSC), Brooks Air Force Base, Texas, 1987, memorandum on the Results of Groundwater Assessment Program Analyses to: 172 TAC Clinic/SGPM, Allen C. Thompson Field, Jackson, Mississippi.

11. Department of the Interior, USGS, 1982, Water Resources Investigations of the U.S. Geological Survey in Mississippi.

12. Federal Register (47 FR 31224), 16 July 1982.

13. Federal Register (47 FR 31235), 16 July 1982.

14 Inman, Willard, April 11, 1988, personal communication, Mississippi State Research and Development Center.

15. Markland, Darryl T., Col., USAF, BSC, consultative letter 87-021DQ0339BAD, Aquatic Toxicity Test, Thompson Field, Mississippi, to 172 USAF Clinic/SGPB dated March 6, 1987 (New Fire Training Area).

16. OEHL Laboratory sampling analyses (retention pond), 1986-1987, ANGB files.

17. Spiers, C. A., and Dalsin, G. J., 1979, Water for Municipal and Industrial Development in Hinds, Madison, and Rankin Counties, Mississippi, U.S. Geological Survey and Mississippi Research and Development Center.

18. Thornbury, William D., 1965, Regional Geomorphology of the United States, John Wiley and Sons.

19. "Three Decades of Professionalism, History of the 172nd Tactical Airlift Group," from ANGB files.

20. United States Department of Agriculture, Soil Conservation Service, 1987, Soil Survey of Rankin County, Mississippi, in cooperation with Mississippi Agricultural and Forestry Experiment Station.

21. Wasson, B. E., 1986, Sources for Water Supplies in Mississippi. U.S. Geological Survey and Mississippi Research and Development Center, Jackson, Mississippi.

22. "Welcome to the 172nd Military Airlift Group, Thompson Field/Jackson, Mississippi, Guests' Information," ANGB files.

Appendix A

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THOMAS S. WEBB

EDUCATION B.S. Civil Engineering, University of Wyoming, 1966
B.A. History, Biology, University of Wyoming, 1964

CERTIFICATIONS Certified Safety Executive - 1987
Certified Safety Manager - 1987
Certified Safety Specialist (Industrial Hygiene) - 1987
Certified Industrial Hygiene, Comprehensive Practice (Not Current) - 1975

PROFESSIONAL EXPERIENCE

1/1988-Present PEER CONSULTANTS, P. C.
Oak Ridge, TN
Oak Ridge Regional Manager

Oak Ridge Regional Manager for all PEER activities and program manager of all PEER tasks performed under contracts with DOE and Bechtel National, Inc. Currently providing technical assistance and support to Hazardous Waste Remedial Action programs at both DOE and DoD facilities, DOE Nuclear and Chemical Waste Programs, and Permanent Waste Storage Programs. The above work includes:

Support of regulatory and policy analysis;
Program research and scientific analysis;
Legislative and regulatory tracking;
Quality assurance and control (QA/QC);
Hydrogeological monitoring support;
Review of recently proposed federal regulations regarding hazardous waste management and groundwater protection;
Environmental analyses, health and safety analyses, community relations planning and other tasks related to remedial action planning.

1987-1/1988 Project Manager

Senior Project Manager for the following tasks: the New Boston AFS RI/FS and Robins AFB and Newark AFB Spill Prevention and Response Plans. Technical review and engineering support to DOE on Tinker AFB storm drainage system evaluation and Dover AFB, cadmium reduction in the industrial waste stream. Preliminary assessments for 13 Air National Guard Bases.

1966-1987 U. S. AIR FORCE

Directed the activities of the Occupational & Environmental Health Laboratory in providing consultation, technical guidance, and on-site assistance in industrial hygiene, air and water pollution, entomology, health physics, and bioenvironmental engineering at all Air Force bases in the Pacific area including Hawaii, Japan, Korea, Guam, and the Philippines. As director, developed the plans for establishing an asbestos identification and counting capability to support Air Force bases in the Pacific. Had responsibility for managing the administration and budgeting of operating funds for the organization, procurement of equipment and supplies, day-to-day supervision of laboratory personnel, and conducting selected field studies. Personnel directly supervised included chemists, engineers, medical entomologist, and specialized technicians in each functional area.

As Chief, Bioenvironmental Engineer, Headquarters US Air Force, directed the Bioenvironmental Engineering/Occupational Health programs for all Air National Guard facilities in the United States and its territories. Established policy and guidance by writing and revising Air National Guard regulations and by supplementing Air Force publications. Was the only full time certified industrial hygienist in the command and personally conducted IH surveys including asbestos identification and evaluation; also assisted in developing plans and specifications for managing or removing asbestos in Air National Guard facilities. Budgeted for and technically directed the Phase IIA Installation Restoration Program at five ANG bases. Represented the National Guard Bureau (NGB) Surgeon on the Agency Environmental Protection Committee and the NGBs on the DoD Safety and Occupational Health Policy Council. Served on DoD subcommittees and provided testimony to Congressional committees in area of expertise.

Directed the Bioenvironmental Engineering/Environmental Health program for Clark AB, John Hay AB, and Wallace AS. Evaluated community and work environments and recommended controls to keep occupational and environmental stresses within acceptable limits. Established and conducted the environmental monitoring program for Clark AB.

As the Command Bioenvironmental Engineer, Headquarters AF Reserve, developed occupational health and environmental protection plans, policy, and programs for all AF reserve bases. Also developed and taught a two week training course for all AF Reserve bioenvironmental engineering technicians.

As Chief, Bioenvironmental Engineering, Robins AFB, Georgia, conducted an industrial hygiene program for 18,000 civilian and 5,000 military workers. Performed industrial hygiene evaluations of aircraft operations, paint stripping, industrial radiography, microwave radiation, laser and other industrial facilities.

Has also served as Chief, Bioenvironmental Engineering, Hill AFB, Utah; DaNang AB, Vietnam; and Wright-Patterson AFB, Ohio.

As the bioenvironmental engineer at the above bases, conducted numerous noise surveys for determining noise levels to which base personnel were exposed. Is also thoroughly familiar with land use planning with respect to aircraft noise having conducted such evaluations for both Hill and Robins AFB. These latter evaluations generated Ldn contours for then current aircraft operations, as well as projected contours for future aircraft conversions and modifications.

As the Bioenvironmental Engineer at five Air Force bases over a period of twelve years, collected, prepared, and interpreted results from base water samples submitted for bacteriological and chemical content analysis. As Commander of Operating Location AD USAF Occupational and Environmental Health Laboratory, directly supervised analytical personnel who performed analysis of lead and other metals in water and was directly responsible for appropriate analytical procedures and accuracy of data. In addition, provided consultative services concerning health and environmental effects to bases experiencing abnormally high levels of metals in drinking water. At Wright-Patterson AFB, assisted in all environmental protection evaluations and conducted stack gas monitoring of all coal-fired heating plants on base. At Hill AFB, was one of the principal authors of the Air Force's first Environmental Impact Statements (1970-71).

PUBLICATIONS:

"Exposure to Radio Frequency Radiation from an Aircraft Radar Unit," Aviation, Space, and Environmental Medicine, November 1980

"For a Breath of Clean Air", AF Aerospace Safety Magazine, March 1975

"Baseline Industrial Shop Surveys," AF Medical Service Digest, April 1973

"Knee Problems Observed in Weapons Loading Personnel," AF Medical Service Digest, March 1970

"Lasers - A New Problem for Bioenvironmental Engineers," AF Medical Service Digest, March 1969

"Use of Iodine as a Swimming Pool Disinfectant," AF Medical Service Digest, July 1967

ANTHONY R. WAGNER

EDUCATION B.A. Geology, University of Colorado, 1977

PROFESSIONAL EXPERIENCE

1987-Present PEER CONSULTANTS, P.C.
Oak Ridge, TN
Geologist

Task Manager on Preliminary Assessment (PA) assignments for Air National Guard Bases under the Installation Restoration Program (IRP). Tasks involved leading a team of geologists, civil engineers, and technicians in researching sites, site evaluations, conducting interviews, rating potentially contaminated sites under the Air Force HARM system and EPA's HRS system, and making recommendations for further action. Have provided technical and research assistance on U. S. Air Force hazardous waste sites programs. Knowledgeable in the location and removal of underground storage tanks, and contributed to a Remedial Investigation Report/Plan for East Fork Poplar Creek at the Y-12 Plant in Oak Ridge, Tennessee.

1987 ARDAMAN AND ASSOCIATES
Sarasota, FL
Engineering Technician

Responsibilities included geologic investigations such as soil borings and analysis, auger and rotary rig drilling for subsurface investigations, hydrogeologic investigations and foundation studies.

1980-1987 EMERALD EXPLORATION CONSULTANTS, INC.
Austin, TX
Senior Geologist

Project management including seismic and magnetotelluric crew supervision, seismic data processing supervision, data interpretation, technical report writing, and project proposal and budget management for government and private sector projects. Traveled extensively throughout the U.S. and China.

1978-1980 KENWILL, INC.
Maryville, TN
Geologist

Responsibilities evolved around the Central Tennessee oil and gas prospect evaluation from initial planning stages through well completion, coal and mineral exploration and reserve estimation studies including surface and underground geologic mapping, and laboratory duties for quality control at a limestone mine.

PROFESSIONAL REGISTRATION Licensed Professional Geologist, State of North Carolina - License Number 526

CERTIFICATION OSHA 29 CFR1910.120(e) as provided by SARA, Health and Safety Training for Hazardous Waste Activities

PROFESSIONAL MEMBERSHIPS National Water Well Association/Association of Ground Water Scientists and Engineers

American Association of Petroleum Geologists

Society of Exploration Geophysicists

PUBLICATIONS High Resolution Seismic Surveys and Their Applications to Coal Exploration and Mine Development: Case Histories, 1984, (abstract), AAPG Bull., V. 68, No. 7.

The Application of High Resolution Seismology to the Delineation of Faulting and Coal Seam Thickness: A Continuing Case History, 1984. In Proceedings of the 1984 Rocky Mountain Coal Symposium, Bismarck, North Dakota.

KEVIN WAYNE PACK

EDUCATION	B.S. Civil Engineering, West Virginia University, 1981 Currently enrolled in the graduate Environmental Engineering Program at the University of Tennessee, Knoxville
CERTIFICATIONS	Engineer-In-Training, 1987
PROFESSIONAL EXPERIENCE	
1987-Present	PEER CONSULTANTS, P.C. Oak Ridge, TN Civil Engineer Prepared Preliminary Assessments for three Air National Guard Bases under the U.S. Air Force Installation Restoration Program, which included identifying past spills/disposal practices posing a potential hazard to public health and environment. Prepared Decision Documents and assisted in a Remedial Investigation/Feasibility Study for New Boston Air Force Station, Amherst, New Hampshire. Provided technical assistance on a RCRA Feasibility Investigation for East Fork Poplar Creek in Oak Ridge, Tennessee.
1984-1987	BARGE WAGGONER SUMNER AND CANNON Knoxville, TN Civil Engineer Involved in planning, design, and construction phases of water distribution systems, sanitary and storm sewers, and site development. Responsible for developing the conceptual design and cost estimates for one, four, and ten MGD wastewater treatment facilities. Wrote the operation and control manuals for the one and four MGD facilities which included descriptions, flow diagrams, major components, control procedures for common operating problems, and laboratory tests of each unit process. Reviewed manufacturer's equipment drawings and literature for compliance with design drawings.
1982-1984	TOMPKINS BECKWITH, INC. Waterford III Steam Electric Station Taft, LA Engineer Responsibilities included resolving construction restraints for installation of structural steel pipe support systems, implementing design modifications, and acting as liaison between construction contractors, design engineers, and quality control personnel on a fast-paced production schedule.
1982	DANIEL CONSTRUCTION COMPANY Calloway Nuclear Power Plant Fulton, MO Engineer Responsibilities included inspecting pipe support systems, maintaining production schedules, and acting as liaison between construction contractors and design engineers.
1974-1982 Summers	Technician, H. C. Nutting Geotechnical Engineers, Charleston, WV; Engineering Aide, WV Department of Natural Resources, Charleston, WV; Laborer, E. E. Moore Construction Company, South Charleston, WV.

HARLAN T. FAULK

EDUCATION: Associate Degree, Business Management, Lansing Community College, Lansing, MI, 1982
Bioenvironmental Engineering Technician, USAF School of Aerospace Medicine, 1955, Advanced Principles 1965.

CERTIFICATION Certified Asbestos Practices and Procedures for Contractor, Supervisor and Project Designers by EPA approved course

Certified for Field Monitoring, Sampling, and Safety Aspects of Hazardous Materials at Hazardous Waste Sites by EPA approved course

PROFESSIONAL EXPERIENCE

1987-Present PEER CONSULTANTS, P. C.
Oak Ridge, TN
Environmental Engineering Technician/Industrial Hygienist

Provides technical and research assistance for preliminary assessments (PA), for Air National Guard Bases under the Air Force's Installation Restoration Program (IRP). Collects data during PA's at IRP sites. Reviews Health and Safety Plans for completeness and makes appropriate recommendations for changes when required for U. S. Air Force's RI/FS. For the Department of Energy, reviews Notices of Intent (NOI) to remove asbestos for regulatory compliance, writes letters to the regulators as needed to forward the NOI to the appropriate state regulator. Provides technical assistance concerning hazardous waste management practice at Travis AFB, California under the DOE HAZWRAP program. Develops environmental sampling and monitoring plans, project QA/QC plans, and environmental equipment requirements. Conducts field surveys for environmental contamination, (chemical and radiological) noise, and physical hazards. Writes detailed reports of findings for inclusion in total project report.

1982-1987 DEPARTMENT OF THE AIR FORCE (CIVILIAN)
Selfridge Air National Guard Base
Mt. Clemens, MI
Industrial Hygiene/Environmental Manager

Implemented, managed and administered a bioenvironmental engineering (industrial hygiene/environmental monitoring) program. Assessed water, air, and ground pollution monitoring requirements. Identified and evaluated potential pollution sources, developed sampling strategies, and maintained or revised base supplements to Air Force regulations concerning pollution monitoring. Provided pollution data requested by federal, state, or local agencies. Assisted in the implementation of the Installation Restoration Program (IRP); provided technical and analytical assistance for the IRP. Provided technical assistance in support of the Resource Conservation and Recovery Act (RCRA). Provided guidance for implementation of the base RCRA programs; reviewed plans for location and construction of hazardous waste accumulation points and storage facilities; arranged for analysis of hazardous waste; and provided technical assistance in the training of hazardous waste facility managers and employees. Under the general guidance of Air Force Standards, OSHA, and EPA requirements, formulated environmental health policies, bioenvironmental engineering management plans, wrote base environmental monitoring regulations, and planned and directed the programs. Researched and developed programs for a new method of detection and control of hazards and environmental stresses. Supervised and conducted sampling programs; evaluated plans and specifications of proposed construction projects for environmental impact and appropriate workplace environmental conditions. Member of the Base Environmental Protection Committee. Designed and implemented a computerized bioenvironmental engineering program.

1955-1974 UNITED STATES AIR FORCE (ACTIVE DUTY)
Various Worldwide Assignments
Bioenvironmental Engineering Technologist

Implementation of Air Force environmental/industrial hygiene programs, including industrial hygiene/environmental surveillance: sampling, ventilation, lighting, radiation and asbestos monitoring; community health programs such as waste/hazardous waste disposal, potable water and waste water analysis, and collection of laboratory specimens. Special Accomplishment: January 1967-June 1970, assigned to the USAF Occupational and Environmental Health Lab, McClellan AFB, CA: Assisted in the development of specialized pollution survey equipment; conducted chemical analysis of potable water, for RCRA compliance: waste water, soil, industrial waste, industrial products, air and other industrial hygiene samples using special analytical procedures and equipment.

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Appendix B

Appendix B

OUTSIDE AGENCY CONTACT LIST

1. Mississippi Department of Natural Resources
   Bureau of Geology
   2525 N. West Street
   P.O. Box 5348
   Jackson, Mississippi 39216

2. Mississippi Department of Natural Resources
   Bureau of Pollution Control
   2380 Highway 80 West
   South Port Center
   Jackson, Mississippi 39209

3. U.S. Fish and Wildlife Service
   Jackson, Mississippi

4. Mississippi Department of Wildlife and Conservation
   Jackson, Mississippi

5. U.S. Department of Agriculture
   Soil Conservation Service
   Federal Building, Suite 401
   Jackson, Mississippi 39269

6. U.S. Department of the Interior
   Geological Survey
   Federal Building, Suite 710
   Jackson, Mississippi 39269

7. United Gas Pipeline Company
   1020 North Foxhall
   P.O. Box 5417
   Pearl, Mississippi 39208-0417

8. Jackson Municipal Airport Authority
   P. O. Box 98109
   Jackson, Mississippi 39298

Appendix C

Appendix C

USAF HAZARD ASSESSMENT RATING METHODOLOGY

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 8 -5, 11 December 1981).

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

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 National Guard in setting priorities for follow-on site investigations.

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 Preliminary Assessment portion (Phase I) of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors according to the method presented in the flowchart (Figure I-A of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

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

The receptors category rating is based on four rating factors: (1) the potential for human exposure to the site, (2) the potential for human ingestion of contaminants should underlying aquifers be polluted, (3) the current and anticipated uses of the surrounding area, and (4) the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed.

The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/maximum score subtotal).

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

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: surface-water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

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

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.	Groundwater use of uppermost aquifer	Not used, other sources readily available	Commercial industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available, commercial, industrial, or irrigation; no other water source available	9
H.	Population served by surface water supplies within 3 miles downstream of site	0	1-15	51-1,000	Greater than 1,000	6
I.	Population served by	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

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

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- 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

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

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

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

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

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

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

III. PATHWAYS CATEGORY

A. Evidence of Contamination

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

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

B-1 Potential for Surface Water Contamination

Rating Factors	0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to a mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	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 hour rainfall (thunderstorms)	<1.0 inch	1.0 to 2.0 inches	2.1 to 3.0 inches	>3.0 inches	8

B-2 Potential for Flooding

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

B-3 Potential for Groundwater Contamination

Rating Factors	0	1	2	3	Multiplier
Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay 10^{-2} to 10^{-4} cm/sec	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high groundwater level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean groundwater level	8
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

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

B. Waste Management Practices Factor

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

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

Spills:

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

Surface Impoundments:

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

Fire Protection Training Areas:

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

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-6-3, then leave blank for calculation of factor score and maximum possible score.

Appendix D

HAZARD ASSESSMENT RATING FORM

NAME OF SITE ____________

LOCATION ____________

DATE OF OPERATION OR OCCURRENCE ____________

OWNER/OPERATOR ____________

COMMENTS/DESCRIPTION ____________

SITE RATED BY ____________

I. RECEPTORS

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

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 groundwater 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) ______

2. Flooding

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

Subscore (100 x factor score/3) ______

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to groundwater		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 ______ = [   ]

HAZARD ASSESSMENT RATING FORM

NAME OF SITE Site No. 1 - Old Fire Training Area

LOCATION A. C. Thompson Field

DATE OF OPERATION OR OCCURRENCE

OWNER/OPERATOR

COMMENTS/DESCRIPTION

SITE RATED BY C Wieland

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
Subtotals			91	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 50.5

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

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 0.9 = 36

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

36 x 1.0 = 36

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 80

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

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
Subtotals			74	108

Subscore (100 x factor score subtotal/maximum score subtotal) 68.5

2. Flooding

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

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
Subtotals			68	114

Subscore (100 x factor score subtotal/maximum score subtotal) 59.6

C. Highest pathway subscore

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

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	50.5
Waste Characteristics	36
Pathways	80

Total 166.5 divided by 3 = 55.5 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

55.5 x 1.0 = 55.5

HAZARD ASSESSMENT RATING FORM

NAME OF SITE Site No. 2 - New Fire Training Area

LOCATION A. C. Thompson Field

DATE OF OPERATION OR OCCURRENCE

OWNER/OPERATOR

COMMENTS/DESCRIPTION

SITE RATED BY C. Wieland

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
		Subtotals	91	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 50.5

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

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 0.9 = 72

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

72 x 1.0 = 72

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 100

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

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
Subtotals			74	108

Subscore (100 x factor score subtotal/maximum score subtotal) 68.5

2. Flooding

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

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
Subtotals			68	114

Subscore (100 x factor score subtotal/maximum score subtotal) 59.6

C. Highest pathway subscore

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

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	50.5
Waste Characteristics	72
Pathways	100

Total 222.5 divided by 3 = 74.2
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

74.2 x 1.0 = 74.2

HAZARD ASSESSMENT RATING FORM

NAME OF SITE Site No. 3 - Waste Storage Area at New Fire Training Area

LOCATION A. C. Thompson Field

DATE OF OPERATION OR OCCURRENCE

OWNER/OPERATOR

COMMENTS/DESCRIPTION

SITE RATED BY C. Wieland

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
Subtotals			91	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 50.5

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

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 0.9 = 36

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

36 x 1.0 = 36

III. PATHWAYS

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

A. If there is evidence of migration of nazardous 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 80

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

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
Subtotals			74	108

Subscore (100 x factor score subtotal/maximum score subtotal) 68.5

2. Flooding

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

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
Subtotals			68	114

Subscore (100 x factor score subtotal/maximum score subtotal) 59.6

C. Highest pathway subscore

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

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	50.5
Waste Characteristics	36
Pathways	80

Total 166.5 divided by 3 = 55.5 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

55.5 x 1.0 = 55.5

HAZARD ASSESSMENT RATING FORM

NAME OF SITE Site No. 4 - Waste Spillage at Underground Storage Tank at Vehicle Maintenance

LOCATION A. C. Thompson Field

DATE OF OPERATION OR OCCURRENCE

OWNER/OPERATOR

COMMENTS/DESCRIPTION

SITE RATED BY J. Oliver

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
Subtotals			91	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 50.5

II. WASTE CHARACTERISTICS

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

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

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

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

50 x 0.8 = 40

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

40 x 1.0 = 40

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 80

B. Rate the migration potential for 3 potential pathways: Surface wates migration, flooding, and groundwater 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	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

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

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to groundwater	1	8	8	24
Subtotals			68	114

Subscore (100 x factor score subtotal/maximum score subtotal) 60

C. Highest pathway subscore

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

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	50.5
Waste Characteristics	40
Pathways	80

Total 170.5 divided by 3 = 56.8 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

56.8 x 1.0 = 56.8

HAZARD ASSESSMENT RATING FORM

NAME OF SITE Site No. 5 - Drainage Ditch and Retention Pond

LOCATION A. C. Thompson Field

DATE OF OPERATION OR OCCURRENCE

OWNER/OPERATOR

COMMENTS/DESCRIPTION

SITE RATED BY C Wieland

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A Population within 1,000 ft. of site	3	4	12	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Groundwater use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
Subtotals			91	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 50.5

II. WASTE CHARACTERISTICS

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

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

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

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

50 x 0.8 = 40

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

40 x 1.0 = 40

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 100

B. Rate the migration potential for 3 potential pathways: Surface wates migration, flooding, and groundwater 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	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	0	6	0	18
Rainfall intensity	3	8	24	24
Subtotals			68	108

Subscore (100 x factor score subtotal/maximum score subtotal) 63

2. Flooding

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

Subscore (100 x factor score/3) 0

3. Groundwater migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	3	8	24	24
Subsurface flows	1	8	8	24
Direct access to groundwater	1	8	8	24
Subtotals			76	114

Subscore (100 x factor score subtotal/maximum score subtotal) 66.7

C. Highest pathway subscore

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

Pathways Subscore 100

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	50.5
Waste Characteristics	40
Pathways	100

Total 190.5 divided by 3 = 63.5 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

63.5 x 0.95 = 60.3

Appendix E

172nd MAG
MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD
JACKSON, MISSISSIPPI

USAF HAZARD ASSESSMENT RATING METHODOLOGY
FACTOR RATING CRITERIA

1. RECEPTORS CATEGORY

Population within 1,000 feet of site:	
Site No. 1	Greater than 100
Site No. 2	Greater than 100
Site No. 3	Greater than 100
Site No. 4	Greater than 100
Site No. 5	Greater than 100
Distance to nearest well:	
Site No. 1	1 to 3 miles
Site No. 2	1 to 3 miles
Site No. 3	1 to 3 miles
Site No. 4	1 to 3 miles
Site No. 5	1 to 3 miles
Land use/zoning within 1 mile radius	Commercial/industrial
Distance to Base Boundary	
Site No. 1	0 to 1,000 feet
Site No. 2	0 to 1,000 feet
Site No. 3	0 to 1,000 feet
Site No. 4	0 to 1,000 feet
Site No. 5	0 to 1,000 feet
Critical Environments within 1 mile	None
Water quality of nearest surface water body	Agricultural/Industrial
Groundwater use of uppermost aquifer	Drinking water; no municipal water available; commercial, industrial, or irrigation; no other water source available.
Population served by surface water supply within 3 miles downstream of site	Zero
Population served by groundwater supply within 3 miles of site	Greater than 1,000

172nd MAG
MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD
JACKSON, MISSISSIPPI

USAF HAZARD ASSESSMENT RATING METHODOLOGY
FACTOR RATING CRITERIA

2. WASTE CHARACTERISTICS

Quantity:

Site No. 1	Medium - estimated 800 to 4,000 gallons per year
Site No. 2	Large - estimated 1,000 to 30,000 gallons per year
Site No. 3	Medium - estimated 2,000 gallons per year
Site No. 4	Small - estimated less than 500 gallons per year
Site No. 5	Small - estimated 1,000 gallons per year

Confidence Level:

Site No. 1	Suspected Confidence Level
Site No. 2	Confirmed Confidence Level
Site No. 3	Suspected Confidence Level
Site No. 4	Confirmed Confidence Level
Site No. 5	Confirmed Confidence Level

Toxicity:

Site No. 1	SAX Level 1
Site No. 2	SAX Level 1
Site No. 3	SAX Level 2
Site No. 4	SAX Level 1
Site No. 5	SAX Level 1

Ignitability:

Site No. 1	Flash Point at 80°F to 140°F
Site No. 2	Flash Point at 80°F to 140°F
Site No. 3	Flash Point at 80°F to 140°F
Site No. 4	Flash Point at 80°F to 140°F
Site No. 5	Flash Point at 80°F to 140°F

Radioactivity:

Site No. 1	At or Below Background Levels
Site No. 2	At or Below Background Levels
Site No. 3	At or Below Background Levels
Site No. 4	At or Below Background Levels
Site No. 5	At or Below Background Levels

172nd MAG
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A.C. THOMPSON FIELD
JACKSON, MISSISSIPPI

USAF HAZARD ASSESSMENT RATING METHODOLOGY
FACTOR RATING CRITERIA

Persistence Multiplier:

Site No. 1	0.9
Site No. 2	0.9
Site No. 3	0.9
Site No. 4	0.8
Site No. 5	0.8

Physical State Multiplier:

Site No. 1	1.0
Site No. 2	1.0
Site No. 3	1.0
Site No. 4	1.0
Site No. 5	1.0

3. PATHWAYS CATEGORY

Surface Water Migration:

Distance to Nearest Surface Water:

Site No. 1	0 to 500 feet
Site No. 2	0 to 500 feet
Site No. 3	0 to 500 feet
Site No. 4	0 to 500 feet
Site No. 5	0 to 500 feet

Net Precipitation: +5 to +20 inches

Soil Erosion: Slight

Surface Permeability:

Site No. 1	10^{-2} to 10^{-4} cm/sec
Site No. 2	10^{-2} to 10^{-4} cm/sec
Site No. 3	10^{-2} to 10^{-4} cm/sec
Site No. 4	$>10^{-2}$ cm/sec
Site No. 5	$>10^{-2}$ cm/sec

Rainfall Intensity: >3.0 inches

Flooding: Beyond 100-year floodplain

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MISSISSIPPI AIR NATIONAL GUARD
A.C. THOMPSON FIELD
JACKSON, MISSISSIPPI

USAF HAZARD ASSESSMENT RATING METHODOLOGY
FACTOR RATING CRITERIA

Groundwater Migration

Depth to Groundwater	0 to 10 feet
Net Pricipation	+5 to +20 inches

Soil Permeability:

Site No. 1	10^{-2} to 10^{-4} cm/sec
Site No. 2	10^{-2} to 10^{-4} cm/sec
Site No. 3	10^{-2} to 10^{-4} cm/sec
Site No. 4	$<10^{-2}$ cm/sec
Site No. 5	$<10^{-2}$ cm/sec

Subsurface Flow:

Site No. 1	Bottom of site occasionally submerged
Site No. 2	Bottom of site occasionally submerged
Site No. 3	Bottom of site occasionally submerged
Site No. 4	Bottom of site greater than 5 feet above high groundwater level
Site No. 5	Bottom of site occasionally submerged

Direct Access to Groundwater:

Site No. 1	Low Risk
Site No. 2	Low Risk
Site No. 3	Low Risk
Site No. 4	Low Risk
Site No. 5	Low Risk

4. WASTE MANAGEMENT PRACTICES CATEGORY

Practice:

Site No. 1	No containment
Site No. 2	No containment
Site No. 3	No containment
Site No. 4	No containment
Site No. 5	Limited containment