AD-A195 270 INSTALLATION RESTORATION PROGRAM PRELIMINARY ASSESSMENT 1/1
FOR THE 188TH TAC..(U) HAZARDOUS MATERIALS TECHNICAL
CENTER ROCKVILLE MD FEB 88 DLA900-82-C-4426

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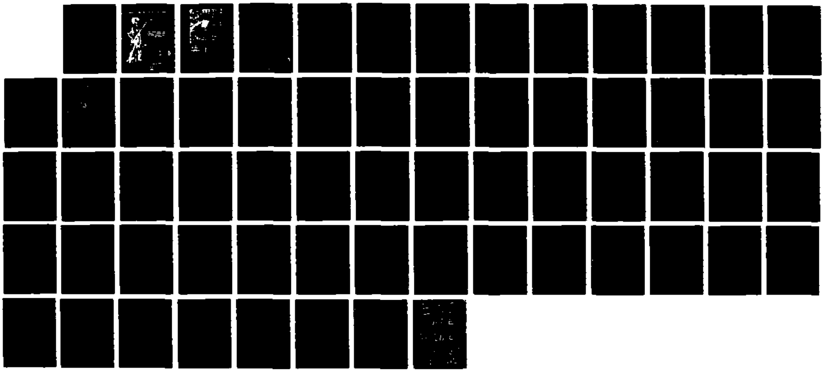
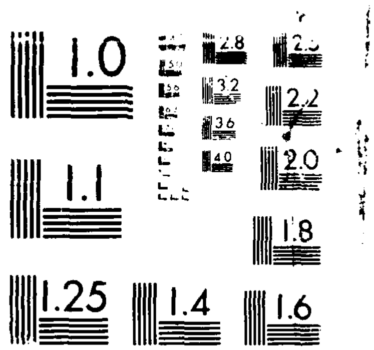




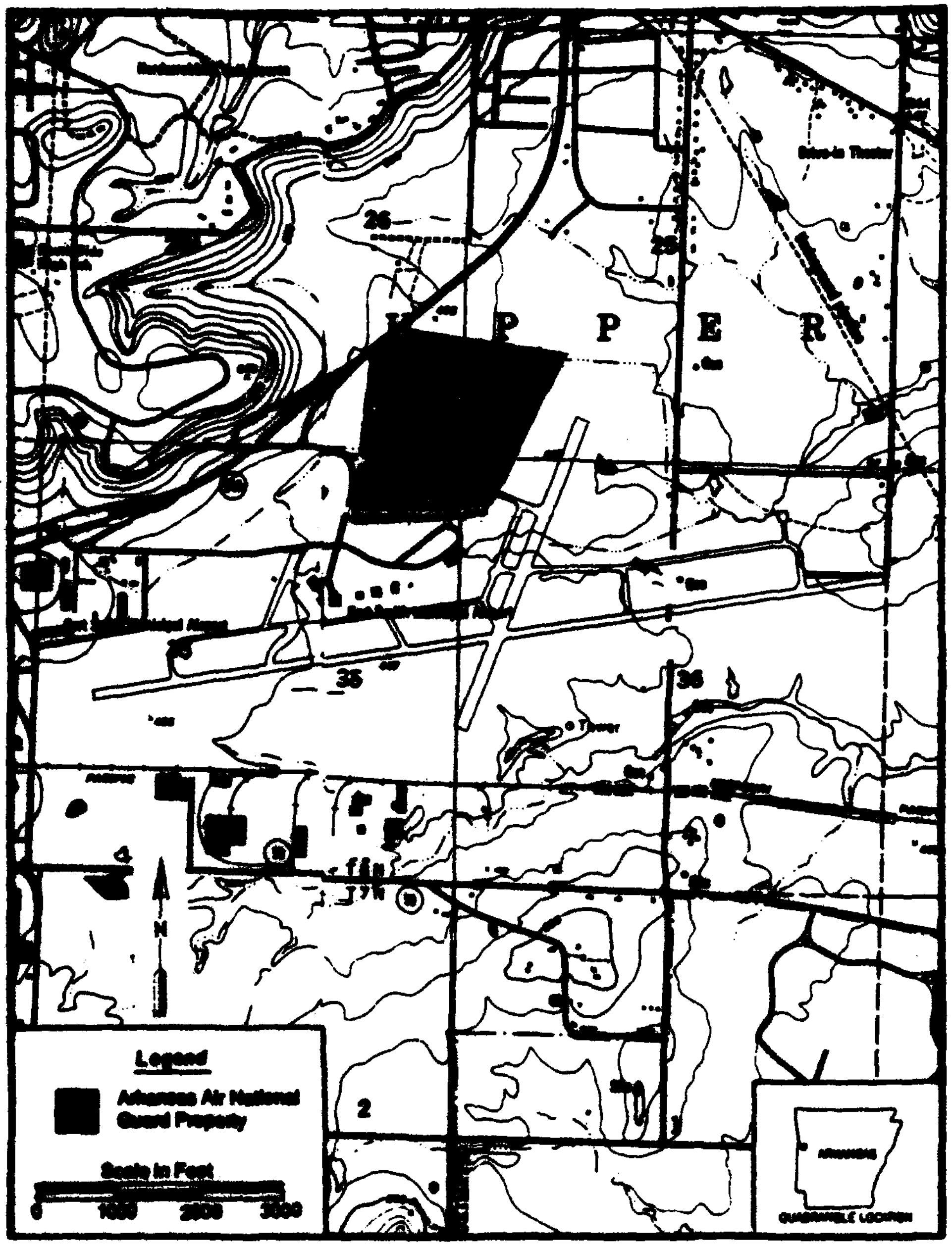
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963

INSTALLATION RESTORATION PROGRAM

Preliminary Assessment

188th Tactical Fighter Group
Arkansas Air National Guard
Fort Smith Municipal Airport
Fort Smith, Arkansas

Hazardous Materials Technical Center
February 1988



This report has been prepared for the National Guard Bureau, Andrews Air Force Base, Maryland by the Hazardous Materials Technical Center for the purpose of aiding in the implementation of the Air Force Installation Restoration Program.

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INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

FOR

188th TACTICAL FIGHTER GROUP
ARKANSAS AIR NATIONAL GUARD
FORT SMITH MUNICIPAL AIRPORT
FORT SMITH, ARKANSAS

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February 1988

Prepared for

National Guard Bureau
Andrews AFB, MD 20310

Prepared by

Hazardous Materials Technical Center
The Dynamac Building
11140 Rockville Pike
Rockville, Maryland 20852

Contract No. DLA 900-82-C-4426

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

A. Introduction

The Hazardous Materials Technical Center (HMTC) was retained in September 1987 to conduct the Installation Restoration Program (IRP) Preliminary Assessment of the 188th Tactical Fighter Group (TFG), Arkansas Air National Guard, Fort Smith Municipal Airport, Fort Smith, Arkansas (hereinafter referred to as the Base), under Contract No. DLA-900-82-C-4426. The Preliminary Assessment included:

- an onsite visit, including interviews with 14 present Base personnel conducted by HMTC personnel, during 7-10 December 1987;
- the acquisition and analysis of pertinent information and records on hazardous material use and hazardous waste generation and disposal at the Base;
- the acquisition and analysis of available geological, hydrological, meteorologic, and environmental data from pertinent Federal, State and local agencies; and
- the identification of sites on the Base that may be potentially contaminated with hazardous materials/hazardous wastes (HM/HW).

B. Major Findings

Past Base operations involved the use and disposal of materials and wastes that were subsequently categorized as hazardous. The major operations of the 188th TFG that have used and disposed of these materials and wastes are flightline, non-destructive investigation (NDI), transportation, aerospace ground equipment (AGE), photographic laboratory, jet engine, petroleum, oil and lubricants (POL) and refueling, wheel/tire and repair and reproduction, weapons, corrosion control, and vehicle maintenance. Waste oils, recovered fuels, spent cleaners, strippers, solvents, acids, photographic chemicals, and hydraulic fluid were generated by these activities.

Interviews with 14 present Base personnel and a field survey resulted in the identification of no disposal and/or spill sites at the Base which existed prior to January 1984, or in the case of leaking tanks, prior to February 1986;

and which are potentially contaminated with hazardous materials. The Base has always implemented a contractor to remove HM/HW from the Base. Oil water separators (OWSs) were installed as the Base was built to catch and separate oily waste before entry into the sanitary system. Drums located throughout the Base are used for collection of HM/HW. The fire training area (FTA) is constructed of concrete and has a clay berm to catch migrating contaminants.

C. Conclusions

Information obtained through interviews with present Base personnel resulted in the identification of no areas on the Base that are potentially contaminated with HM/HW.

D. Recommendations

Because no potential exists for contamination of soils, groundwater, and surface water at the Base and migration of contaminants to off-Base receptors, further investigative stages of the IRP Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) are not recommended.

I. INTRODUCTION

A. Background

The 188th Tactical Fighter Group (TFG) is located at the Arkansas Air National Guard Base, Fort Smith Municipal Airport, Fort Smith, Arkansas (hereinafter referred to as the Base). The TFG was established in 1955. Past Base operations involved the use and disposal of materials and wastes that subsequently were categorized as hazardous. Consequently, the National Guard Bureau has implemented an Installation Restoration Program (IRP) consisting of the following:

- Preliminary Assessment (PA) - to identify past spill or disposal sites posing a potential and/or actual hazard to public health or the environment.
- Site Investigation/Remedial Investigation/Feasibility Study (SI/RI/FS) - to acquire data via field studies, for the confirmation and quantification of environmental contamination that may have an adverse impact on public health or the environment and to select a Remedial Action Plan (RAP).
- Research, Development and Demonstration (RD & D) - if needed, to develop new technology for accomplishment of remediation.
- Remedial Design/Remedial Action (RD/RA) - to prepare designs and specifications and implementation of remedial action.

B. Purpose

The purpose of this IRP Preliminary Assessment is to identify and evaluate suspected problems associated with past hazardous waste handling procedures, disposal sites, and spill sites on the Base. Personnel from the Hazardous Materials Technical Center (HMTC) visited the Base, reviewed environmental information, analyzed the Base records concerning the use and generation of hazardous materials/hazardous wastes (HM/HW), and conducted interviews with present Base personnel who are familiar with past and present HM/HW management activities. A physical inspection was made of the Base. Relevant information collected and analyzed as a part of the Preliminary Assessment included the history of the Base, with special emphasis on the history of the shop operations and their past HM/HW management procedures; the local geological, hydrological, and meteorological conditions that may affect migration of contaminants; the local land use, public utilities, and zoning requirements that affect the potential for exposure to contaminants; and the ecological settings that indicate environmentally sensitive habitats or evidence of environmental stress.

C. Scope

The scope of this Preliminary Assessment is limited to the Base and to spills, leaks, or disposal problems that occurred prior to January 1984, or in the case of leaking tanks, prior to February 1986, and includes:

- An onsite visit;
- The acquisition of pertinent information, records regarding hazardous materials use, hazardous waste generation and disposal practices at the Base;
- The acquisition of available geological, hydrological, meteorological, land use and zoning, critical habitat and species, and utility data from various Federal, State, and local agencies;
- A review and analysis of all information obtained; and
- The preparation of a report to include recommendations for further actions.

The onsite visit and interviews with present Base personnel were conducted during the period 7-10 December 1987. The HMTC Preliminary Assessment was conducted by Ms. Natasha M. Brock, Environmental Scientist, Mr. Vladmir Etlin, Environmental Engineer, Mr. Lawrence Gladstone, Geophysicist, and Mr. Raymond Clark, Department Manager/P.E. (Resumes are included as Appendix A). Individuals from the Air National Guard (ANG) who assisted in the Preliminary Assessment were Mr. Henry Lowman, Alternate Project Officer (ANGSC) and selected members of the 188th TFG. The Point of Contact (POC) at the Base was Lt. Col. Phillip Steven Core, Base Civil Engineer (188th CES).

D. Methodology

A flow chart of the Preliminary Assessment Methodology is presented in Figure 1. This Preliminary Assessment methodology ensures a comprehensive collection and review of pertinent site specific information and is used in the identification and assessment of potentially contaminated hazardous wastes spill/disposal sites.

The Preliminary Assessment begins with a site visit to the Base to identify all shop operations or activities on the Base that may have used hazardous materials or generated hazardous wastes. Next, an evaluation of past and present HM/HW handling procedures at the identified locations is made to determine whether environmental contamination may have occurred. The evaluation of past HM/HW handling practices is facilitated by extensive interviews with past and present employees familiar with the various operating procedures at the Base. These interviews also 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.

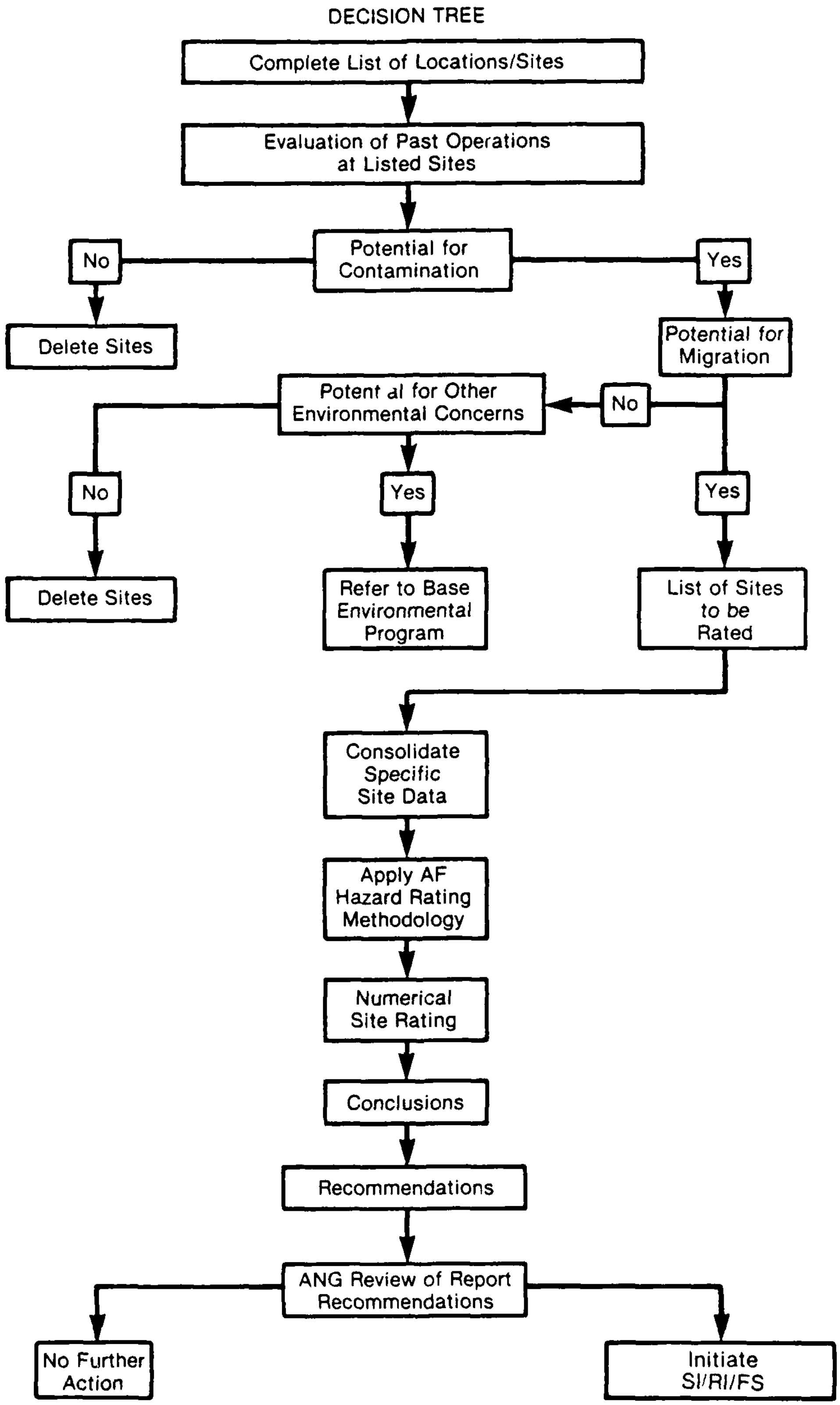
Appendix B lists the interviewees' principle areas of knowledge and their years of experience with the Base. Historic records contained in the Base files are collected and reviewed to supplement the information obtained from interviews. Using the information outlined above, a list of past waste spill/disposal sites on the Base is identified for f rther evaluation. A general survey tour of the identified spill/disposal sites, the Base, and the surrounding area is conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention is given to locating nearby drainage ditches, surface water bodies, residences, and wells.

Detailed geological, hydrological, meteorological, developmental (land use and zoning), and environmental data for the area of study is also obtained from the POC, and from appropriate Federal, State, and local agencies. A list of outside agencies contacted is in Appendix C. Following a detailed analysis of all the information obtained, areas are identified as suspect areas where HM/HW disposal may have occurred. Evidence at these sites suggest that the potential

HMTC PRELIMINARY ASSESSMENT
INSTALLATION
RESTORATION PROGRAM

Figure 1.

Preliminary Assessment Methodology Flow Chart.



for contaminant migration exists. These sites are assigned a Hazard Assessment Score (HAS) using the Hazard Assessment Rating Methodology (HARM). The other sites that are not scored is because information on the exact amount of waste spilled and/or the type of waste spilled cannot be determined. However, the absence of a score does not negate a recommendation for further IRP investigation.

II. INSTALLATION DESCRIPTION

A. Location

The 188th TFG is located on the north side of the Fort Smith Municipal Airport, Fort Smith, Arkansas. The airport is located in southern Fort Smith on Route 22. Fort Smith is located on the mid western boarder of Arkansas on the Arkansas River.

The Base occupies 97 acres on one parcel of land leased from the Fort Smith Municipal Airport. Figure 2 shows the current boundaries of the Base covered by this Preliminary Assessment.

The Fort Smith Municipal Airport is located on the southeastern side of Fort Smith. The area surrounding the airport is light industry, housing, and prairie. To the north is the Arkansas River. The population within 1,000 feet of the Base is over 100 persons, including on base facilities. A now closed smelting operation to the west of the Base eliminated vegetation due to operations there. That area is also undesirable for residential use.

B. Organization and History

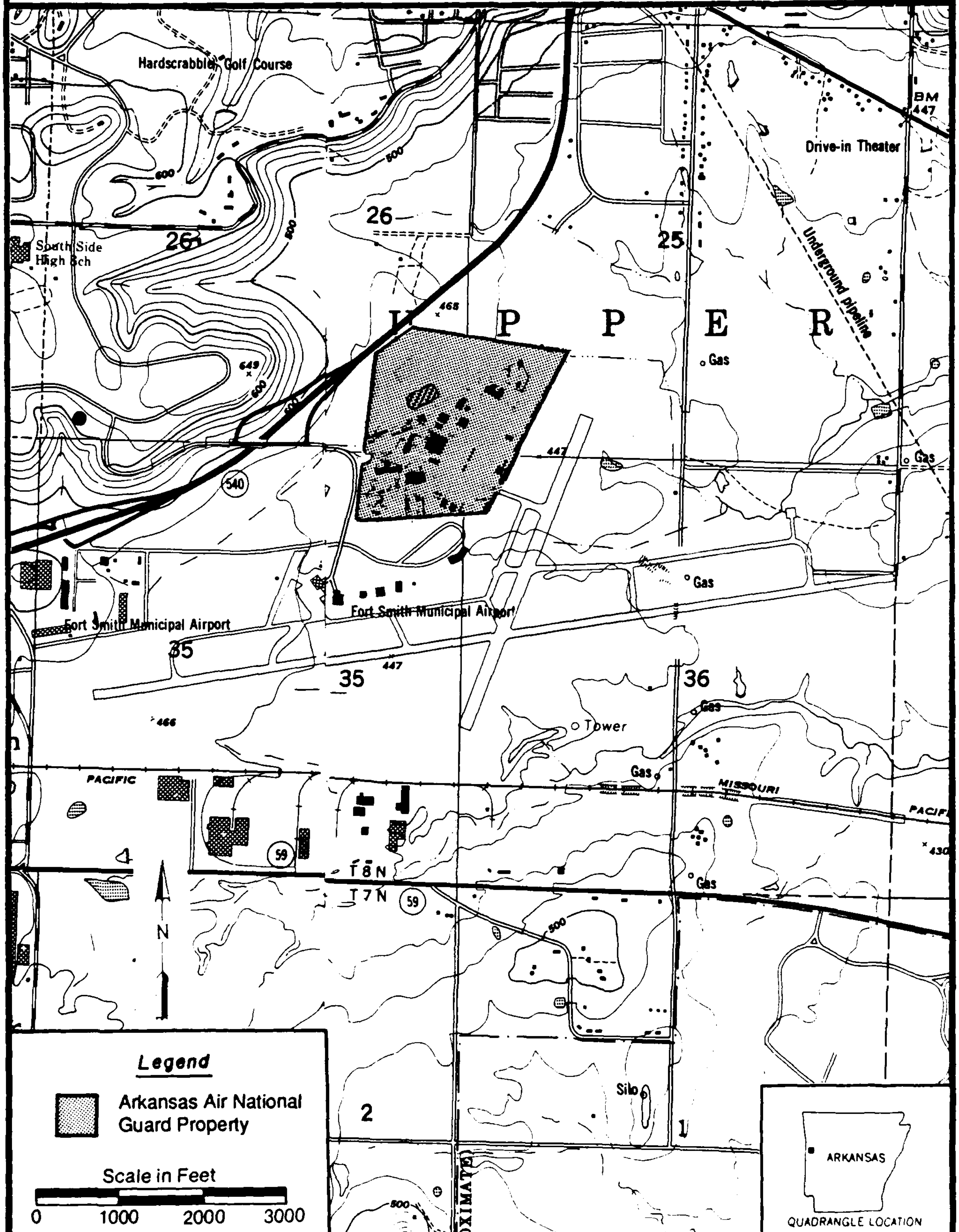
The Arkansas Air National Guard Base was built in 1953-55, originally occupying a small hanger which is now the air carrier ramp.

The Air National Guard was organized as the 188th Tactical Reconnaissance Group. In 1972, the guard was designated as the 188th Tactical Fighter Group. The Base changed aircraft in 1979 and will be changing aircraft again in 1988. The change of aircraft is to ensure the capability of the unit in combat demands.

HMTC

Source: U.S.G.S. 7.5 minute Series, S. Fort Smith and Barling Quadrangles, 1948, 1947.

Figure 2.
Location Map of Arkansas Air National Guard, Fort Smith Municipal Airport, Fort Smith, Arkansas.



III. ENVIRONMENTAL SETTING

A. Meteorology

The meteorological data presented below is from local climatological data for the Fort Smith area compiled by the National Oceanic and Atmospheric Administration (NOAA).

The climate of the Fort Smith area is characterized by hot humid summers and cold winters. A prevailing wind from northeast is common throughout the year. The average temperature in the summer is 80° F and the average winter temperature is 45° F.

Precipitation is evenly distributed throughout the year; January being the driest month and May the wettest month. The summer rains usually occur as convective showers. Winter precipitation amounts to about six inches and occurs mostly as ice storms.

The annual precipitation consists of 40 inches (NOAA, 1986). By calculating the net precipitation according to method outlined in the Federal Register (47 FR 31224), dated 16 July 1982, a net precipitation value of minus 6 inches per year is obtained. Rainfall intensity, based on a 1-year, 24-hour rainfall is 3.0 inches (calculated according to 47 FR 31235, 16 July 1982).

B. Geology

The geology of western Arkansas, the Fort Smith District, consists of shale interbedded with sandstone. Some shale beds contain coals and underclays. The stratified rocks consist of the Atoka Formation, Hartshorne Sandstone, McAlester Shale, Savanna Sandstone, and Boggy Shale, in order from oldest to youngest (Hendricks and Parks, 1950). These formations are of the Paleozoic Era, Carboniferous System, Pennsylvanian Period.

The Atoka Formation consists of alternating beds of shale and sandstone, the shale being more abundant. The sandstone varies in thickness and character, ranging from coarse-grained and almost white to fine-grained, brownish; all is very micaceous. The sandstone beds can range from 10 feet to 150 feet thick in a belt 1/2 mile wide. The more abundant shale is black, slightly gritty, splintery, and contains some coarse mica and abundant macerated plant material. The formation ranges in thickness from 9,000 to 500 feet, with 4,500 feet of formation found at Fort Smith.

The Hartshorne Sandstone lies above the Atoka Formation and ranges in thickness from 10 to 300 feet. It is generally coarse-grained, clean and thick-bedded in thick areas and fine-grained, thin-bedded and shaly in thin areas. Plant fossils are abundant in this formation.

The McAlester Shale, which overlies the Hartshorne Sandstone, consists of dark, gritty shale with beds of sandstone and coal. It ranges in thickness from 1,820 feet to 500 feet near Fort Smith. The Sandstone beds are discontinuous, although they may extend 30-40 miles. The Sandstone is fine-grained, thin-bedded, ripple-marked, micaceous and of a pale buff color. The McAlester Shale contains eight coal beds, with abundant plant fossils.

The Savannah Sandstone overlies on the McAlester Shale and ranges in thickness from 1,140 to 1,610 feet at three locations near Fort Smith. The formation consists of shale and sandstone, and contains six coal beds and one lenticular bed of limestone. The shale is buff to brown in color and sandy with some grey clay shale and thin beds of black carbonaceous shale. The coal beds range in thickness from 3 to 18 inches. The limestone bed is 6 inches thick.

The Boggy Shale consists of dark clayey shale and gritty shale with three sandstone beds from 760 to 900 feet above the base of the formation. The shale ranges in thickness from 100 to 900 feet. The sandstone is coarse-grained, medium-bedded, and buff to brown in color.

Overlying the rocks of the Carboniferous System is the Quaternary System, which consists of stream terraces and alluvium. The stream terraces consist of gravel, sand, silt, and clay deposits 50 feet in elevation above the Arkansas River bed. The deposits are made up of quartz, chert, quartzite, sandstone and other siliceous materials.

The alluvium covers the bottom of the Arkansas River and its tributaries. The alluvium is mostly silt, ranging in thickness from 0 to 20 feet.

The Massard Prairie Anticline's axis is located south of the Base. Weathering of the anticline has worn away the Savannah Sandstone and Boggy Shale thus exposing the McAlester Shale on Base property.

C. Soils

The soils beneath the Base consist of the Wrightsville soils. These soils are classified as poorly drained, dominantly level, deep loamy soils found in old stream terraces in broad valleys. The Base soil is classified as the *Wrightsville complex, 0 to 2 percent* slopes (WsA) (USSCS, 1975). The surface layer of this soil is a grayish-brown silt loam, about 3 inches thick. The subsurface layer is light brownish-grey, mottled silty loam about 13 inches thick. The subsoil can extend to a depth of 72 inches. The upper 7 inches of the subsoil is grey, mottled silty clay with lenses of light-grey silty loam; the next 37 inches is light brownish-grey, mottled silty clay and clay; the last 12 inches is reddish-brown, mottled clay.

The permeability of the Wrightsville complex, 0 to 2 percent is very slow (less than 4.2×10^{-5} cm/sec) and water capacity is high. The erosion hazard for this soil is slight.

The Wrightsville soil has poor engineering properties, with severe limitations due to high shrink-swell potential, poor drainage, slight slopage, poor stability and compaction, poor workability, and side wall instability.

D. Hydrology

Surface Water

The Arkansas River is located 2-1/2 miles northeast of the Base. Little Massard Creek, a tributary of Massard Creek, splits and flows both just north and south of the Base. The Base is not in the 100-year floodplain of the Massard Creek (Argonne, 1987). The river is used as a source of sand and gravel, and provides recreational facilities for fishing, boating, and water fowl hunting.

To the west, the Poteau River joins the Arkansas River north of Fort Smith. The Poteau River is about 4 miles to the west, on the other side of South Fort Smith. Storm run-off from the Base flows into the Massard Creek Tributaries.

The water source for Fort Smith and the Base are two impoundments referred to as Lake Fort Smith and Lake Shepherd Springs. They are located about 23 miles northeast of Fort Smith. The water is piped to a municipal treatment facility in Mountainburg before distribution to the city and the Base. The Base has a 250,000-gallon elevated water tower for an alternate water source. A 13 acre-ft reservoir is located on the north side of the Base for emergency use.

Groundwater

The groundwater in the Fort Smith area occurs in two aquifers, the alluvial deposits of the Arkansas River and its tributaries, and the consolidated rocks that underlie the entire area (Argonne, 1987). The water in the underburden (bedrock) is derived from the downward flow of water from the overburden (alluvium) and fractures. The bedrock generally yields 50 gallons per minute (gpm) while the alluvium yields 300 to 700 gpm.

The groundwater table can be found from 0 to 15 feet. During the rainy season, the water table is at the surface. Groundwater flow is suspected to flow toward Little Massard Creek, which is toward the north. The possibility of contamination of the aquifers and the creek is very little since the permeability is very slow and the Base has not had any spills or releases.

E. Critical Habitats/Endangered or Threatened Species

According to the Arkansas Fish and Game Commission, there are no endangered or threatened species of flora or fauna within a 1-mile radius of the Base. Furthermore, there are no critical habitats, wetlands, or wilderness areas within a 1-mile radius of the Base (Argonne, 1987).

IV. SITE EVALUATION

A. Activity Review

A review of Base records and interviews with 14 present Base personnel resulted in the identification of specific operations at the Base in which the majority of industrial chemicals are handled and hazardous wastes are generated. Table 1 summarizes these major operations, provides estimates of the quantities of waste currently being generated, and describes the past and present disposal methods for the wastes. Based on information gathered, any operation that is not listed in Table 1 has been determined to produce negligible quantities of wastes requiring disposal.

B. Disposal/Spill Site Identification, Evaluation, and Hazard Assessment

Interviews with 14 present Base personnel (Appendix B) and subsequent site inspections did not result in the identification of sites potentially contaminated with HM/HW. Potential sites are scored using HARM (Appendix D). The objective of this assessment is to provide a relative ranking of sites suspected of contamination from hazardous substances. The final rating score reflects specific components of the hazard posed by a specific site: possible receptors of the contamination (e.g., population within a specified distance of the site and/or critical environments within a 1-mile radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding). If the evaluation indicates the site presents little or no apparent environmental or health hazard, no further IRP action will be scheduled.

The absence of sites at the Base is attributed to nonoccurrence of spills or releases of hazardous materials and the proper disposal of hazardous waste.

The Base shops use primers, paints, solvents, strippers, sealers, patches, lubricating oil, cleaners, hydraulic fluid, brake fluid, acids, alcohols, contact cement, ink, jet fuel (JP-4), ether, photographic chemicals, and thinners.

Table 1. Hazardous Material/Hazardous Waste Disposal Summary: Arkansas Air National Guard, Fort Smith Municipal Airport, Fort Smith, Arkansas

Shop Name	Building No.	Hazardous Waste/ Used Hazardous Material	Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 – 1960 – 1970 – 1980 – 1990
Flightline	218	PD-680	240	1950–1970 SAN; 1970–1990 RECYLE
Docks A & B	200	JP-4	80	1960–1990 FTA
		A.C. Grease	1/4 lb/mo.	1950–1990 SAN
		Paint Remover	12	1950–1990 SAN
		A.S. Soup	240	1950–1990 SAN
AGE (unpowered)	200	Hydraulic Oil	12	1950–1990 DRMO
AGE (powered)	204	PD-680	260	1950–1970 SAN; 1970–1990 RECYC
		A.C. Oil	24	1950–1990 DRMO
POL	117	No Chromix	10 pkg	1950–1990 SAN
		Vacuum Pump Oil	1	1950–1990 DRMO
NDI	200	Fixer	40	1950–1990 DRMO
		TCE	65	1950–1990 DRMO
		Hydrochloric Acid	1	1950–1990 NEUTR SAN
Weapons	115	Cleaning Solvent	260	1950–1970 SAN; 1970–1990 RECYC
Corrosion Control	203	Paint Stripper	4	1950–1990 DRMO
Jet Engine	214	Lube Oil	210	1950–1990 RECYC
Pneudraulics	200	Hydraulic Fluid	15	1950–1990 DRMO
Wheel/Tire and RR	203	Paint Remover	220	1950–1990 DRMO
		Solvent	60	1950–1970 SAN; 1970–1990 RECYC

SAN - Disposed of through sanitary sewer system
RECYC - Disposed of through removal by contractor
FTA - Disposed of through burning at the FTA
DRMO - Disposed of through the Defense Reutilization and Marketing Office
NEUT SAN - Disposed of through neutralization and sanitary sewer system

Table 1. Hazardous Material/Hazardous Waste Disposal Summary: Arkansas Air National Guard, Fort Smith Municipal Airport, Fort Smith, Arkansas (Continued)

Shop Name	Building No.	Hazardous Waste/ Used Hazardous Material	Estimated Quantities (Gallons/Year)	Method of Treatment/Storage/Disposal 1950 – 1960 – 1970 – 1980 – 1990
Transportation	110	Hydraulic Fluid	110	DRMO (1950–1990)
	118	Battery Acid	10	NEUTR SAN (1950–1990)
Photographic Laboratory	200	Developer	1	SAN (1950–1990)
		Fixer	36	SAN (1950–1970); RECYC (1970–1990)
		Stabilizer	6	SAN (1950–1990)
		Activator	6	SAN (1950–1990)
Civil Engineering	107	Cleaner	3	SAN (1950–1990)
		PD-680	110	FTA (1950–1990)

The photographic chemicals are disposed of through the sanitary sewer system after neutralization, except for the fixer which is recycled for silver recovery. The acids are also neutralized and disposed of through the sanitary sewer system.

The cleaners and strippers are wiped from the object being cleaned with paper towels and disposed of in the regular trash.

All the solvents are supplied and recycled by a contractor.

The oils, brake fluid, and hydraulic fluid are drummed and sent to DRMO every 90 days. The drums are stored at seven locations on Base: Auto Maintenance Shop, north of the Petroleum Operations Building, Hangar and Maintenance, Hush House, Jet Engine Shop, Organization Maintenance Facility, and south of the Fuel Systems Maintenance Dock and Corrosion Control (Figure 3). These locations are concreted and bermed to prevent any release to the environment. In addition, most of the drum intakes are locked and hooded to prevent contamination.

Paint thinner, primer, cement, sealers, and ink are used up in the process.

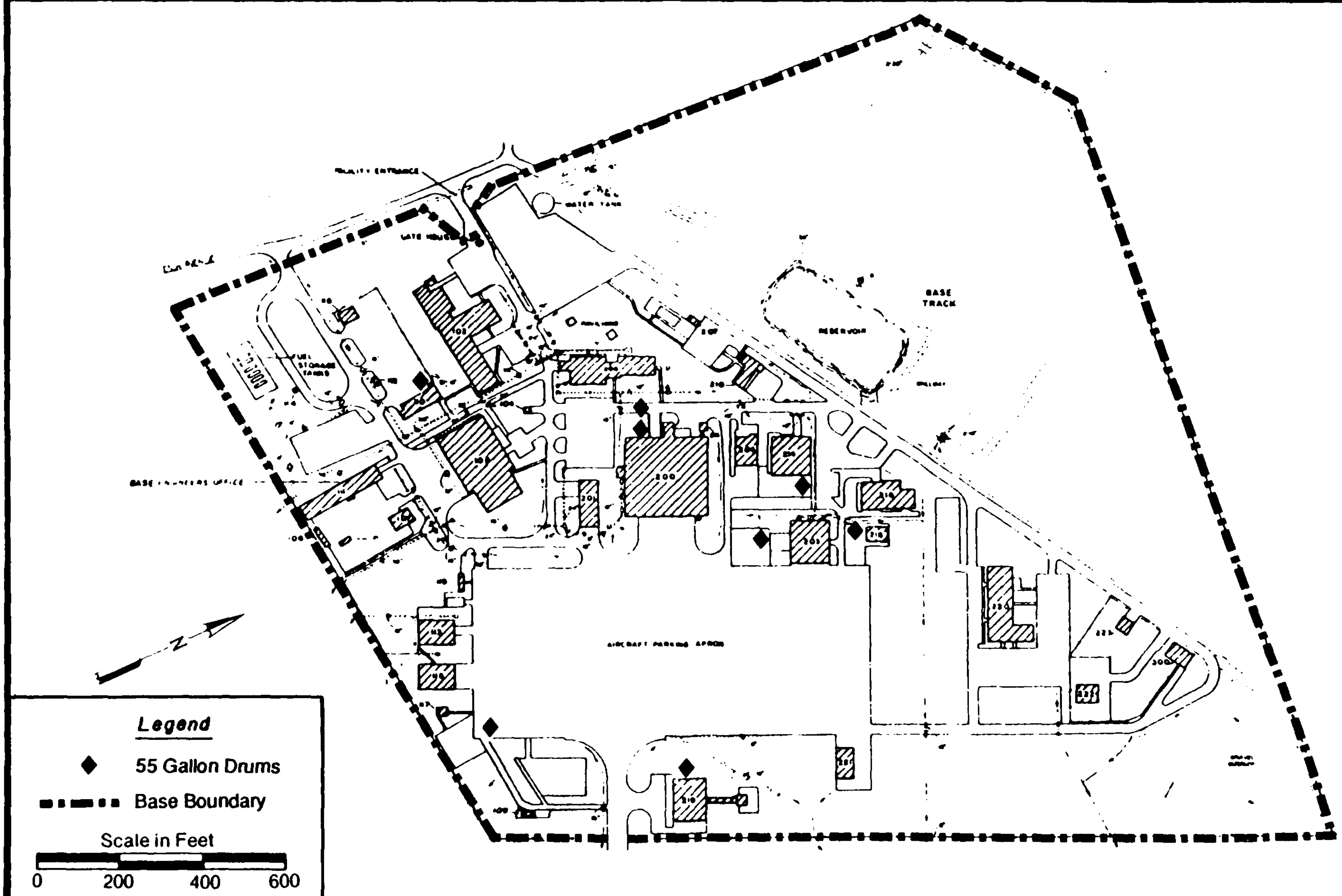
Ether and alcohols volatilize or are used up in the process.

The JP-4 is disposed of at the fire training area (FTA) during fire training activities. Approximately 200 gallons is burned twice per month. The FTA is constructed of concrete, thus preventing any soil contamination. The JP-4 is taken to the FTA in 55-gallon drums where it is pumped into a 1,000 gallon aboveground tank. The JP-4 is pumped from the tank to the area during training exercises. The concrete FTA was installed in 1970. A clay and gravel FTA was used from 1960 to 1970 in the same location. The old FTA is still under the concrete FTA. During construction, no residues were found since State regulations required that the fuel be burned 100%. Only fuel has been burned at the pit except for one occasion where the only residue was ashes. Standard

Source: Adapted From
ANG Training Facility,
Storm Drainage System, 1986.

Figure 3.

Location of Drum Storage Arkansas Air National Guard.



procedure has always been to float the fuel on a layer of water to stop soil saturation, perform exercise and relight the fuel for 100% burn after exercises. Due to the impermeable clay soil and limited use, contamination of soil, groundwater, and surface waters is not likely. The area had an underground concrete tank to catch excess fuel. The tank has now been backfilled and is no longer in use. The FTA has a clay barrier on the downgradient side to prevent any fuel migration.

The tanks at POL are all aboveground, thus contributing to no undetected leaks or spills. The eight 25,000 gallon tanks were constructed in 1955 (4), 1979 (2) and 1987 (2). To minimize the possibility of rust, the water that accumulates in the tanks is drawn off daily into drums, which are taken to the FTA.

The Motor Pool has three underground steel tanks for diesel and regular fuels (leaded and unleaded). The tanks were installed in 1955, 1956, and 1980 and hold 4,000, 5,000 and 10,000 gallons, respectively. No leaks have been detected in the tanks.

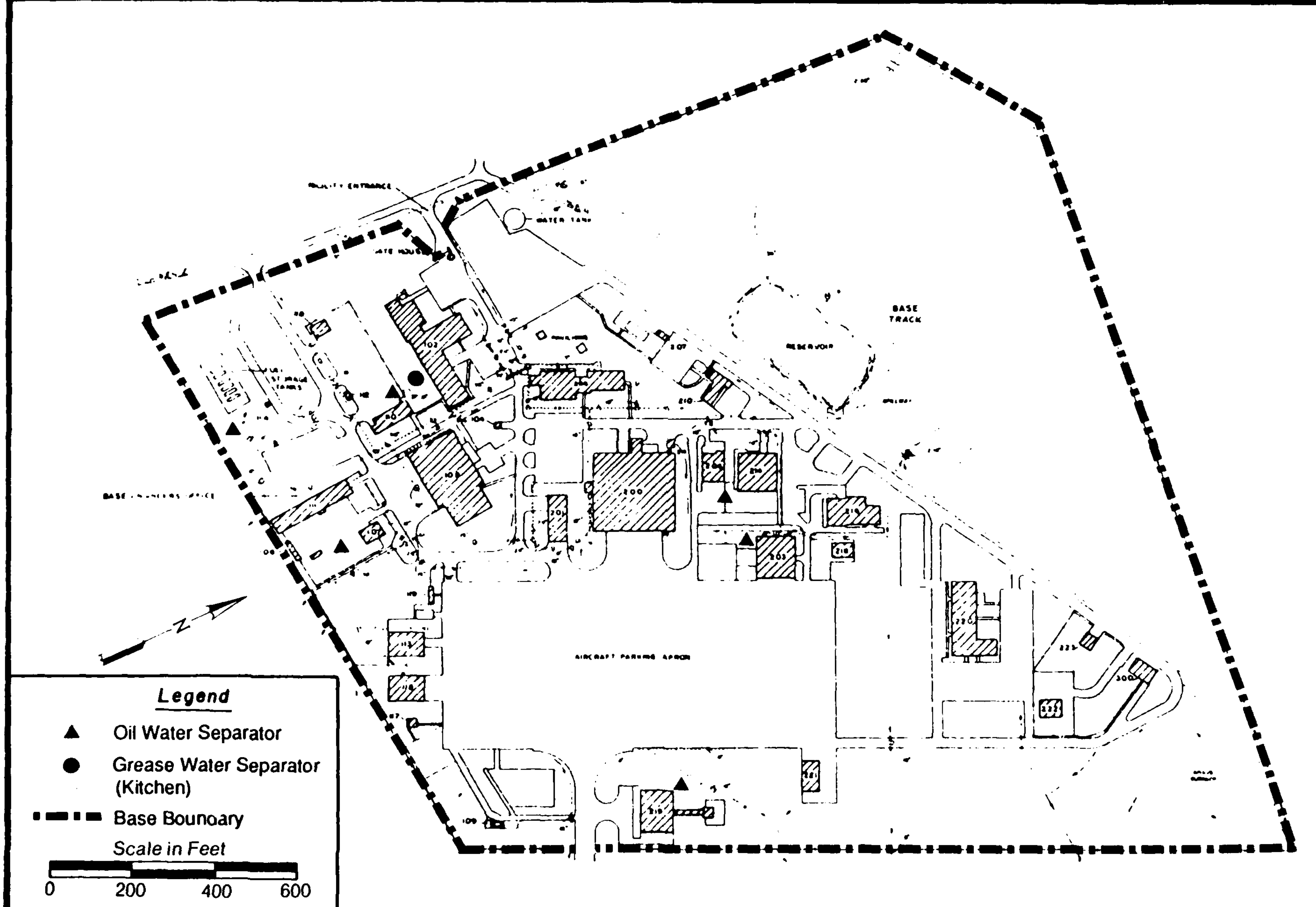
The Base has six 290-gallon and one 5,000 gallon oil/water separators (OWSs) located at POL, Fuel Systems Maintenance (Building 203), Auto Maintenance (Building 110), Civil Engineering (Building 107), AGE (Building 204), Hush House (Building 219), and Kitchen (Building 102) to catch runoff from aircraft and motor vehicle cleaning operations (Figure 4). The OWS at the Auto Maintenance was installed in 1977 when the refueling vehicle maintenance bay was built. The OWSs at the AGE is yoked and tied in with the Engine Shop. It was installed in 1972 and can process 50 gpm (gallons per minute). The OWS at the POL is in the process of being installed and will have a holding capacity of 5,000 gallons. The OWS at the Fuel Systems Maintenance was installed in 1978. It can process 50 gpm and has a grit chamber tank. The OWS at Civil Engineering was installed in 1982 and consists of a double chamber tank and grit chamber. The Hush House OWS was installed in 1982 and processes 50 gpm. The oil grease separator for the Kitchen was installed in 1975. The OWSs are emptied every 90 days by a contractor and the water outlet is connected to the sanitary sewer system which goes to Massard Wastewater Treatment Facility.

HMTC

Source: Adapted From
ANG Training Facility,
Storm Drainage System, 1986.

Figure 4.

Location of Oil Water Separators Arkansas Air National Guard.



V. CONCLUSIONS

Information obtained through interviews with 14 present Base personnel, review of Base records, and field observations has resulted in the identification of no potentially contaminated and/or spill sites on Base property.

The Base geology consists of firm and stiff clay and soft shale. Although the water table can be found as shallow as five feet, the permeability of the soil is very low. Therefore, any release or spill would be constricted to the immediate area of release.

Preventive release measures have been taken at the Base (i.e., OWS, concrete pads, and concrete FTA) to lessen the likelihood of a release to the environment.

The hazardous waste generated by the Base is disposed of through the DRMO, or burned at the FTA. Minute amounts (on towels) are disposed of in the regular trash.

VI. RECOMMENDATIONS

Due to the absence of spills or release sites on the Base, no further IRP action is recommended.

GLOSSARY OF TERMS

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

AQUIFER - A geologic formation, or group of formations, that contains sufficient saturated permeable material to conduct groundwater and to yield economically significant quantities of groundwater to wells and springs.

CARBONIFEROUS - The Mississippian and Pennsylvanian periods combined, ranging from about 345 to 280 millions years ago.

CLAY [soil] - A rock or mineral particle in the soil having a diameter less than 0.002 mm (2 microns).

CLAY [geol.] - A rock or mineral fragment or a detrital particle of any composition smaller than a fine silt grain, having a diameter less than 1/256 mm (4 microns).

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 designated as a hazardous substance under:

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

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) 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),

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

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) 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).

CRITICAL HABITAT - The specific areas within the geographical area occupied by the species, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range other than a species of the Class Insecta to constitute a pest whose protection would present an overwhelming and overriding risk to man.

FORMATION - A lithogically distinctive, mappable body of rock.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States 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.

HAS - Hazard Assessment Score - The score developed by utilizing the Hazardous Assessment Rating Methodology (HARM).

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 are 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:

a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or

b. 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 at which water can move through a permeable medium.

HYDRAULIC GRADIENT - The difference in head (elevation of water surface) at two points divided by the distance between these two points.

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

PALEOZOIC - An era of geologic time from the end of the Precambrian to the end of the Mesozoic, or from about 570 to 225 million years ago.

PD-680 - A cleaning solvent composed predominately of mineral spirits; Stoddard solvent.

PENNSYLVANIAN - A period of the Paleozoic era thought to have covered the time span between 320 and 280 million years ago.

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.

SANDSTONE - A medium-grained fragmented sedimentary rock composed of abundant round or angular fragments of sand, size set in a fine-grained matrix (silt or clay) and more or less firmly united by a cementing material (commonly silica, iron oxide, or calcium carbonate).

SHALE - A fine-grained loess and transported sedimentary rock, formed by the consolidation of clay, silt, or mud. It is characterized by a finely laminated structure, which imparts a fissility approximately parallel to the bedding, along which the rock breaks readily into thin layers and that is commonly most conspicuous on weathered surfaces, and by an appreciable content of clay minerals and detrital quartz.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as to the number of inches per hour that water moves downward through the saturated soil.

Terms describing permeability are:

Very Slow	- less than 0.06 inches per hour (less than 4.2×10^{-5} cm/sec)
Slow	- 0.06 to 0.20 inches per hour (4.2×10^{-5} to 1.4×10^{-4} cm/sec)
Moderately Slow	- 0.2 to 0.6 inches per hour (1.4×10^{-4} cm/sec)
Moderate	- 0.6 to 2.0 inches per hour ($4.2 \times 10^{-4} \times 10^{-3}$ cm/sec)
Moderately Rapid	- 2.0 to 6.0 inches per hour (1.4×10^{-3} to 4.2×10^{-3} cm/sec)
Rapid	- 6.0 to 20 inches per hour (4.2×10^{-3} to 1.4×10^{-2} cm/sec)
Very Rapid	- more than 20 inches per hour (more than 1.4×10^{-2} cm/sec)

(Reference: U.S.D.A. Soil Survey)

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

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or significant portion of its range.

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

UNDERCLAYS - A statrum of clay beneath a coal bed often containing roots of coal plants.

UPGRADIENT - A direction that is topographically or hydraulically upslope.

WATER TABLE - The upper limit of the portion of the ground that is wholly saturated with water.

WETLANDS - An area subject to permanent or prolonged inundation or saturation, and 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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2. U.S. Soil Conservation Service. March 1975. Soil Survey of Sebastain County, Arkansas. U.S. Department of Agriculture, Washington, D.C.

3. Hendricks, T.A. and Bryan Parks. 1950. "Geology of the Fort Smith District Arkansas Geological Survey Professional Paper 221-E." Shorter Contributions to General Geology, 1949. U.S. Government Printing Office, Washington, D.C.

4. National Oceanic and Atmospheric Administration. 1986. Local Climatological Data, Annual Summary with Comparative Data, Fort Smith, Arkansas. National Climatic Data Center. Asheville, NC.

5. Office of the Federal Register. 16 July 1982. Part 300. National Oil and Hazardous Substances Pollution Contingency Plan Subpart H. National Archives and Records Service, Washington, D.C.

APPENDIX A

Resumes of Preliminary Assessment Team Members

NATASHA M. BROCK

EDUCATION

Graduate work, civil/environmental engineering, University of Maryland, 1987-present

Graduate work, civil/environmental engineering, University of Delaware, 1985-1986

B.S. (cum laude), environmental science, University of the District of Columbia, 1984

Undergraduate work, biology, The American University, 1978-1980

CERTIFICATION

Health & Safety Training Level C

EXPERIENCE

Three years' experience in the environmental and hazardous waste field. Work performed includes remedial investigations/feasibility studies, RCRA facility assessments, comprehensive monitoring evaluations, and remedial facility investigations. Helped develop and test biological and chemical processes used in minimization of hazardous and sanitary waste generation. Researched multiple substrate degradation using aerobic and anaerobic organisms.

EMPLOYMENT

Dynamac Corporation (1987-present): Environmental Scientist

In working for Dynamac's Hazardous Materials Technical Center (HMTC), performs Preliminary Assessments, Remedial Investigations and Feasibility Studies (PA/RI/FS) under the Air National Guard Installation Restoration Program. Specifically involved in determining rates and extent of contamination, recommending groundwater monitoring procedures, and soil sampling and analysis procedures. In the process of preparing standard operating procedure manuals for quick remedial response to site spills and releases, and PA/RI/FS.

C.C. Johnson & Malhotra, P.C. (1986-1987): Environmental Scientist

Involved as part of a team in performing Remedial Investigations/Feasibility Studies (RI/FS) for EPA Regions I and IV under Resource Conservation and Recovery Act (RCRA) work assignments for REM II projects. Participated on a team involved in RCRA Facility Assessments (RFAs), Comprehensive Monitoring Evaluations (CMEs), and Remedial Facility Investigations (RFIs) for EPA work assignments under RCRA for REM III projects in Regions I and IV. Work included solo oversight observations of field sampling and facility inspections. Additional responsibilities included promotion work, graphic layout, data entry-quality check for various projects. Certified Health & Safety Training Level C.

Work Force Temporary Services (1985-1986): Research Scientist

In working for DuPont's Engineering Test Center, helped in the development and testing of laboratory-scale biological and chemical processes for a division whose main purpose was to reduce the amount of hazardous waste generated. Also worked for Hercules, Inc., with a group involved in polymer use for wastewater treatment for clients in various industrial fields. Specifically involved in product consultation, troubleshooting, and product development.

National Oceanic and Atmospheric Administration (1982-1984): Research Assistant

Involved with an information gathering and distribution center of weather impacts worldwide. Specifically involved in data collection, distribution of data to clients, assessment production and special reports.

LAWRENCE E. GLADSTONE

EDUCATION

B.S., geophysics, Virginia Polytechnic Institute & State University, 1985
Geology field methods, Texas Tech University, 1985

EXPERIENCE

One year of experience as research assistant for the Hazardous Materials Technical Center of Dynamac Corporation. Experience includes data base development, surveillance of hazardous waste contractors, and preparation of RCRA Part B permits for the Defense Reutilization and Marketing Service (DRMS).

EMPLOYMENT

Dynamac Corporation (1986-present): Research Assistant

Prepares Part B permits for various Defense Reutilization and Marketing Office (DRMO) installations. Conducts surveillance of hazardous waste contractors for the DRMS. Duties include auditing contract records, tracking fate of disposed items and observing contractor operations.

Assisted in development of data base listing hazardous materials turned over to DRMOs by various waste generators according to designated category waste codes.

U.S. Geological Survey (part-time, 1983-1985): Cartographic Aide

Assisted in quality control process of printing and distributing topographic maps.

VLADIMIR N. ETLIN

EDUCATION

Ph.D., environmental engineering, All Union Scientific Research Institute of Water Supply, Sewerage, Hydrotechnical Construction and Engineering Hydrogeology, Moscow, U.S.S.R., 1968

M.S., civil engineering, Polytechnic Institute, Novocherkask, U.S.S.R., 1959

B.S., environmental engineering, Polytechnic Institute, Novocherkask, U.S.S.R., 1957

CERTIFICATION

Wastewater Treatment Operator, Virginia's Class I Certificate, 1977

EXPERIENCE

Twenty-eight years of experience in hazardous waste and environmental science fields. Experience includes research, development, design, construction, and operation in water and wastewater treatment and supply; teaching graduate and undergraduate courses in environmental science; surveillance and evaluation of hazardous waste problems; and development of remedial action recommendations.

EMPLOYMENT

Dynamac Corporation (1985-present): Senior Environmental Engineer

Managed a project for bringing a DOD installation, which was on the Governmental National Priority List, into compliance with federal and local regulations. Major areas of the project included collecting information, evaluating the waste generation activities, and recommending ways to reduce or recycle waste; evaluating the methods used at the installation against best available technologies; investigating existing sewer lines for cross connections and unpermitted discharges; investigating operation/maintenance procedures, design and structural aspects of the industrial waste treatment plant operation, and the adequacy of the facility to handle present and future flow, as well as training personnel to operate the plant; and investigating storage, spill containment, disposal, and tracking practices for adherence to the Resource Conservation and Recovery Act (RCRA) requirements.

Prepared designs and specifications for recovery of underground gasoline on DOD installations. Prepared cost estimates for remedial actions in cleaning hazardous materials on DOD installations.

County of Arlington, Virginia, Water Pollution Control Division (1976-1985): Engineer

Supervised the construction, startup, and operation of the 30-mgd advanced water treatment plant, tertiary section of which had two stages of lime treatment, lime recovery, multimedia filtration, polishing effluent through activated carbon filters, reaeration, break point chlorination. Conducted a variety of troubleshooting activities which included reducing energy consumption, optimizing the efficiency of different sections of the treatment plant, and performing an engineering study of the plant's inflow/infiltration problem.

Ebasco Services, Inc., Water Treatment Department (1974-1976): Associate Engineer

Developed specifications and design of wastewater treatment plants, chlorination and dechlorination for cooling water systems, bulk gas storages, oil-water separator systems, and potable water systems for power plants.

Scientific Research Institute, U.S.S.R. (1968-1972): Senior Scientist, Department of Wastewater Treatment

Involved in research and development of methods for intensification of wastewater treatment at industrial treatment plants and design of new wastewater plants. Studied theoretical and experimental aspects of physical, chemical, and biological methods of wastewater treatment, and reuse of treated water as industrial water supply. Developed a theory of mixing and aeration of liquid in the aeration tank for the effective treatment of activated sludge systems.

Government of Ukrain (1971): Government Representative

Headed a delegation of scientists and engineers for inspection of the pollution of rivers in the industrial Don Basin. Gathered information, performed an in-depth analysis, and submitted a report on the environmental status of the region.

Government Consulting Engineers Firm (1968): Lead Engineer

Prepared water and wastewater treatment plant specifications for various kinds of food factories; designed water supply systems, sewerage and rain drainage systems for these factories.

Government Assembly Company (1967-1968): Senior Engineer

Headed a team in troubleshooting at industrial waste treatment plants.

Vladivostok Polytechnical Institute (1961-1963): Associate Professor

Taught graduate courses in environmental engineering.

Government Consulting Engineers No. 4 (1960-1961): Engineer

Responsible for writing specifications and designing water and sewerage systems and treatment plants for cities, industries and buildings.

Government Construction Company DTSC (1959-1960): Foreman

Involved in the construction of water and sewerage systems and treatment plants for towns. Supervised construction team.

PUBLICATIONS

Author of eight published articles, three inventions, and five patents.

RAYMOND G. CLARK, JR.

EDUCATION

Completed graduate engineering courses, George Washington University, 1957
B.S., mechanical engineering, University of Maryland, 1949

SPECIALIZED TRAINING

Grad. European Command Military Assistance School, Stuttgart, 1969
Grad. Army Psychological Warfare School, Fort Bragg, 1963
Grad. Sanz School of Languages, D.C., 1963
Grad. DOD Military Assistance Institute, Arlington, 1963
Grad. Defense Procurement Management Course, Fort Lee, 1960
Grad. Engineer Officer's Advanced Course, Fort Belvoir, 1958

CERTIFICATIONS

Registered Professional Engineer: Kentucky (#4341); Virginia (#8303); Florida (#36228)

EXPERIENCE

Twenty-nine years of experience in engineering design, planning and management including construction and construction management, environmental, operations and maintenance, repair and utilities, research and development, electrical, mechanical, master planning and city management. Over six years' logistical experience including planning and programming of military assistance materiel and training for foreign countries, serving as liaison with American private industry, and directing materiel storage activities in an overseas area. Over two years' experience as an engineering instructor. Extensive experience in personnel management, cost reduction programs, and systems improvement.

EMPLOYMENT

Dynamac Corporation (1986-present): Program Manager

Responsible for activities relating to Phases I, II and IV of the U.S. Air Force Installation Restoration Program including records search, review and evaluation of previous studies; preparation of statements of work, feasibility studies; preparation of remedial action plans, designs and specifications; review of said studies/plans to ensure that they are in conformance with requirements; review of environmental studies and reports; and preparation of Air Force Installation Restoration Program Management Guidance.

Howard Needles Tammen & Bergendoff (HNTB) (1981-1986): Manager

Responsible, as Project Manager, for: design of a new concourse complex at Miami International Airport to include terminal building, roadway system, aircraft apron, drainage channel relocation, satellite building with underground pedestrian tunnel, and associated underground utility corridors, to include subsurface aircraft fueling systems, with an estimated construction cost of $163 million; a cargo vehicle tunnel under the crosswind runway with an estimated construction cost of $15 million; design and construction of two large corporate jet aircraft hangars; and for the hydrocarbon recovery program to include investigation, analysis, design of recovery systems, monitoring of recovery systems, and planning and design of residual recovery systems utilizing biodegradation. Participated, as sub-consultant, in Air Force IRP seminar.

HNTB (1979-1981): Airport Engineer

Responsibilities included development of master plan for Iowa Air National Guard base; project initiation assistance for a new regional airport in Florida; engineering assistance for new facilities design and construction for Maryland Air National Guard; master plan for city maintenance facilities, Orlando, Florida; in-country master plan and preliminary engineering project management for Madrid, Spain, International Airport; and project management of master plan for Whiting Naval Air Station and outlying fields in Florida.

HNTB (1974-1979): Design Engineer

Responsibilities included development of feasibility and site selection studies for reliever airports in Cleveland and Atlanta; site selection and facilities requirements for the Office of Aeronautical Charting and Cartography, NOAA; and onsite mechanical and electrical engineering design for terminal improvements at Baltimore-Washington International Airport, Maryland.

HNTB (1972-1974): Airport Engineer

Responsible for development of portions of the master plan and preliminary engineering for a new international airport for Lisbon, Portugal, estimated to cost $250 million.

Self-employed (1971-1972): Private Consultant

Responsible for engineering planning and installation of a production line for multimillion-dollar contract in Madrid, Spain, to fabricate transmissions and differentials for U.S. Army vehicles.

U.S. Army, Corps of Engineers (1969-1971): Chief, Materiel & Programs

Directed materiel planning and military training programs of military assistance to the Spanish Army. Controlled arrival and acceptance of materiel by host government. Served as liaison/advisor to American industry interested in conducting business with Spanish government. Was Engineer Advisor to Spanish Army Construction, Armament and Combat Engineers, also the Engineer Academy and Engineer School of Application.

Corps of Engineers (1968-1969): Chief, R&D Branch, OCE

Directed office responsible to Chief of Engineers for research and development. Developed research studies in new concepts of bridging, new explosives, family of construction equipment, night vision equipment, expedient airfield surfacing, expedient aircraft fueling systems, water purification equipment and policies, prefabricated buildings, etc. Achieved Department of Army acceptance for development and testing of new floating bridge. Participated in high-level Department Committee charged with development of a Tactical Gap Crossing Capability Model.

Corps of Engineers (1967-1968): Division Engineer

Facilities engineer in Korea. Was fully responsible for management and maintenance of 96 compounds within 245 square miles including 6,000+ buildings, 1 million linear feet of electrical distribution lines, 18 water purification and distribution systems, sanitary sewage disposal systems, roads, bridges, and fire protection facilities with real property value of more than $256 million. Planned and developed the first five-year master plan for this area. Administered $12 million budget and $2 million engineer supply operation. Was in responsible charge of over 500 persons. Developed and obtained approval for additional projects worth $9 million for essential maintenance and repair. Directed cost reduction programs that produced more than $500,000 savings to the United States in the first year.

Corps of Engineers (1963-1967): Engineer Advisor

Engineer and aviation advisor to the Spanish Army. Developed major modernization program for Spanish Army Engineers, including programming of modern engineer and mobile maintenance equipment. Directed U.S. portion of construction, testing and acceptance of six powder plants, one shell loading facility, an Engineer School of Application, and depot rebuild facilities for engineer, artillery, and armor equipment. Planned and developed organization of a helicopter battalion for the Spanish Army. Responsible for sales, delivery, assembly and testing of 12 new helicopters in country. Provided U.S. assistance to unit until self-sufficiency was achieved. Was U.S. advisor to Engineer Academy, School of Application and Polytechnic Institute.

Corps of Engineers (1960-1963): Deputy District Engineer

Responsible for planning and development of extensive construction projects in the Ohio River Basin for flood control and canalization, including dam, lock, bridge, and building construction, highway relocation, watershed studies, real estate acquisitions and dispositions. Was contracting officer for more than $75 million of projects per year. Supervised approximately 1,300 personnel, including 300 engineers. Planned and directed cost reduction programs amounting to more than $200,000 per year. Programmed and controlled development of a modern radio and control net in a four-state area.

Corps of Engineers (1959-1960): Area Engineer

Directed construction of a large airfield in Ohio as Contracting Officer's representative. Assured that all construction (runway, steam power plant, fuel transfer and loading facilities, utilities, buildings, etc.) complied with terms of plans and specifications. Was onsite liaison between Air Force and contractors.

Corps of Engineers (1958-1959): Chief, Supply Branch

Managed engineer supply yard containing over $21 million construction supplies and engineer equipment. Directed in-storage maintenance, processing and deprocessing of equipment. Achieved complete survey of items on hand, a new locator system and complete rewarehousing, resulting in approximately $159,000 savings in the first year.

Corps of Engineers (1957-1958): Student

U.S. Army Engineer School, Engineer Officer's Advanced Course.

Corps of Engineers (1954-1957): Engineer Manager

Managed engineer construction projects and was assigned to staff and faculty of the Engineer School. Was in charge of instruction on engineer equipment utilization, management and maintenance. Directed Electronic Section of the school. Coordinated preparation of five-year master plan for the Department of Mechanical and Technical Equipment.

Corps of Engineers (1949-1954): Engineer Commander

Positions of minor but increasing importance and responsibility in engineering management, communications, demolitions, construction administration and logistics.

PROFESSIONAL AFFILIATIONS

Member, National Society of Professional Engineers
Fellow, Society of American Military Engineers
Member, American Society of Civil Engineers
Member, Virginia Engineering Society
Member, Project Management Institute

HARDWARE

IBM PC

SOFTWARE

Lotus 1-2-3, D Base III Plus, Framework, Project Scheduler 5000, Harvard Project Manager, Volkswriter, Microsoft Project

APPENDIX B

Interviewee Information

INTERVIEWEE INFORMATION

Interviewee Number	Primary Duty Assignment	Years Associated with Arkansas ANG
1	Fire Chief	20
2	Bioenvironmental Engineering	15
3	Civil Engineering	21
4	Spill Response	14
5	Motor Pool	30
6	Aircraft/Field Maintenance	34
7	Supply	32
8	Engine Shop and Hush House	14
9	Maintenance	30
10	Avionics	32
11	Supply TMO	31
12	Operations Support	8
13	Fuels Maintenance	22
14	Contracting	7

APPENDIX C

Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

1. U.S. Geological Survey
   12201 Sunrise Valley Drive
   Reston, Virginia 22092
   Library and Map Sales

2. National Oceanic and Atmospheric Administration
   National Climatic Data Center
   Asheville, North Carolina 28801

APPENDIX D

USAF Hazard Assessment Rating Methodology

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 81-5, 11 December 1981).

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

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 Records Search 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 flow chart (Figure 1 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: possible receptors of the contamination, the waste and its characteristics, the potential pathways for contamination migration, and any efforts that were made to contain the wastes resulting from a spill.

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and 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 containment 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 factory to the sum of the scores for the other three categories.

HAZARDOUS 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 feet 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. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	______	______

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

II. WASTE CHARACTERISTICS

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

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

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

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

______ X ______ = ______

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

______ X ______ = ______

III. PATHWAYS

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

Subscore ______

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

1. Surface water migration

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

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

2. Flooding

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

Subscore (100 X factor score/3) ______

3. Ground water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
Subtotals			______	______

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

C. Highest pathway subscore.

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

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

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

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

______ X ______ = [ ]

HAZARDOUS 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 or economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

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

  Logic based on the 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

Waste Characteristics Matrix

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

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added.
- o Suspected confidence levels (S) can be added.
- o Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

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

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

B. Persistence Multiplier for Point Rating

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

C. Physical State Multiplier

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

III. PATHWAYS CATEGORY

A. Evidence of Contamination

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

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be 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	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (including drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 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 (Number of thunderstorms)	<1.0 inch (0-5)	1.0 to 2.0 inches (6-35)	2.1 to 3.0 inches (36-49)	>3.0 inches (>50)	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 Ground-Water 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	8
Soil permeability	Greater than 50% clay ($<10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($>10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8

B-3 Potential for Ground Water Contamination -Continued

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
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

Surface Impoundments:

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

Spills:

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

Fire 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.

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