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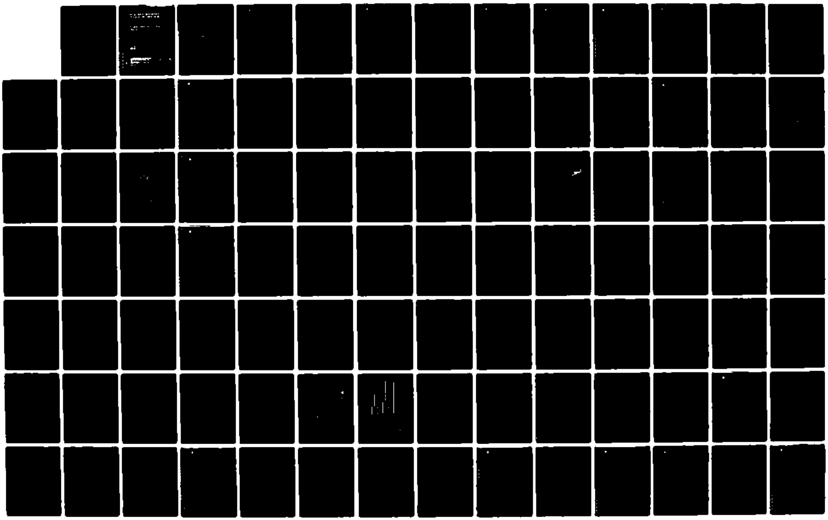

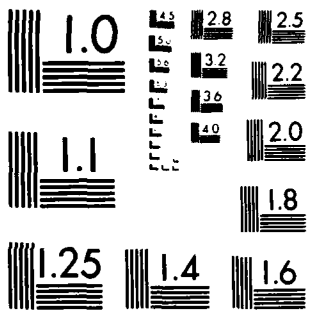

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INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

For
Richards-Gebaur Air Force Base,
Missouri

CH2M HILL

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NOTICE

This report has been prepared for the United States Air Force by CH2M HILL SOUTHEAST, INC., for the purpose of aiding in the implementation of the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, nor the Department of Defense.

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National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

FOR

RICHARDS-GEBAUR AIR FORCE BASE, MISSOURI

Prepared for

AIR FORCE ENGINEERING AND SERVICES CENTER
DIRECTORATE OF ENVIRONMENTAL PLANNING
TYNDALL AIR FORCE BASE, FLORIDA 32403

AND

AIR FORCE RESERVE
ROBINS AIR FORCE BASE, GEORGIA 31098

Prepared by

CH2M HILL
7201 N.W. 11th Place
Gainesville, Florida

March 1983

Contract No. F08637-80-G0010-6S01

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EXECUTIVE SUMMARY

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A. INTRODUCTION

1. CH2M HILL was retained on September 14, 1982, to conduct the Richards-Gebaur Air Force Base (AFB) records search under Contract No. F08637-80-G0010-6S01, with funds provided by the Air Force Reserve (AFRES).

2. DEQPPM 81-5 explains DoD policy which is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites on DoD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health and welfare that may have resulted from these past operations.

3. To implement the DoD policy, a four-phase Installation Restoration Program has been directed. Phase I, the records search, is the identification of potential problems. Phase II (not part of this contract) consists of follow-on field work as determined from Phase I. Phase II consists of a preliminary survey to confirm or rule out the presence and/or migration of contaminants and, if necessary, additional field work to determine the extent and magnitude of contaminant migration.

   Phase III (not part of this contract) consists of a technology base development study to support the development of project plans for controlling migration or restoring the installation. Phase IV (not part of this contract) includes those efforts which are required to control identified hazardous conditions.

4. The Richards-Gebaur AFB records search included a detailed review of pertinent installation records, contacts with 15 government organizations for documents relevant to the records search effort, and an onsite base visit conducted by CH2M HILL during the week of November 15 through 19, 1982. Activities conducted during the onsite base visit included interviews with 27 past and present base employees, ground tours of base facilities, and a detailed search of installation records. The installations addressed in the records search include Richards-Gebaur AFB and the Belton Training Annex.

B. MAJOR FINDINGS

1. The majority of industrial operations at Richards-Gebaur AFB have been in existence since the early 1950s. The major industrial operations have included aerospace ground equipment (AGE), pneudraulics and engine maintenance, and corrosion control. These operations have generated varying quantities of waste oils, fuels, solvents, and cleaners since the base was activated in 1953.

2. The standard procedures for the final disposition of the majority of the waste oils, fuels, and solvents have included off-base contract collection and removal; burning in fire department training exercises; discharge to storm drains with and without oil/water separation; and transferral to DPDO.

3. Interviews with past and present base employees resulted in the identification of 9 past disposal or spill sites at Richards-Gebaur AFB and the

approximate dates that these sites were used (see Figure 6, Section IV, for site locations).

C. CONCLUSIONS

1. No direct evidence was found to indicate that migration of hazardous contaminants exists within or beyond Richards-Gebaur AFB boundaries. Indirect evidence of contamination was found at Site No. 1, the South Landfill, (a small oil sheen on adjacent surface water).

2. Information obtained through interviews with 27 past and present base personnel, base records, shop folders, and field observations indicate that hazardous wastes have been disposed of on Richards-Gebaur AFB property in the past.

3. The potential for migration of hazardous contaminants exists because of the presence of a perched ground-water table with direct discharge to nearby creeks. The presence of low-permeability clays and shales below the ground surface reduces the potential for hazardous contaminant migration vertically into lower ground water aquifers.

4. Table 1 presents a priority listing of the rated sites and their overall scores. The sites designated as areas showing the most significant potential (relative to other Richards-Gebaur sites) for environmental impact were the South Landfill (Site No. 1) and the Northeast Landfill (Site No. 2).

5. The remaining rated sites (Sites No. 3, 4, 5, 6, 7, 8, and 9) are not considered to present significant

Table 1
PRIORITY LISTING OF DISPOSAL SITES

Site No.	Site Description	Overall Score
1	South Landfill	55
2	Northeast Landfill	54
8	Herbicide Burial Site	51
3	Contractor Rubble Burial Site	48
5	South Burn Pit	48
9	Oil-Saturated Area	48
6	North Burn Pit	45
4	West Burn Pit	42
7	Radioactive Disposal Well	4

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environmental concerns and, therefore, no Phase II work is recommended.

6. The records search did not reveal any significant environmental concerns for the Belton Training Annex; therefore, no Phase II work is recommended for this off-base installation.

D. RECOMMENDATIONS

1. A limited Phase II monitoring program is suggested to confirm or rule out the presence and/or migration of hazardous contaminants. This program includes the sampling and analysis of the surface water in Scope Creek upstream and downstream of the South Landfill, and the installation of a shallow monitoring well downgradient of the Northeast Landfill for sampling and analysis of the ground water in the surficial aquifer. Details of the limited Phase II monitoring program are provided in Section VI of this report. The priority for monitoring at Richards-Gebaur AFB is considered moderate, since no imminent hazard has been determined.

2. The final details of the monitoring program, including the exact locations of ground-water monitoring wells, should be finalized as part of the Phase II program.

3. In the event that contaminants are detected, a more extensive field survey program should be implemented to determine the extent of contaminant migration.

4. Other environmental recommendations were made in addition to the Phase II monitoring, and include a survey of abandoned POL storage tanks to determine their status, and an evaluation of various containers at the Northeast Landfill to determine their contents and appropriate disposition. The details of these additional recommendations are also provided in Section VI of this report.

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I. INTRODUCTION

I. INTRODUCTION

A. BACKGROUND

The United States Air Force (USAF), due to its primary mission, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. Federal, state, and local governments have developed strict regulations to require that disposers identify the locations and contents of disposal sites and take action to eliminate hazards in an environmentally responsible manner. The primary Federal legislation governing disposal of hazardous waste is the Resource Conservation and Recovery Act (RCRA) of 1976, as amended. Under Sections 3012 and 6003 of the Act, Federal agencies are directed to assist the Environmental Protection Agency (EPA) and state agencies to inventory past disposal sites and make the information available to the requesting agencies.

To assure compliance with these hazardous waste regulations, the Department of Defense (DoD) developed the Installation Restoration Program (IRP). The current DoD IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5 dated 11 December 1981 and implemented by Air Force message dated 21 January 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the Installation Restoration Program. DoD policy is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites and to control hazards to health and welfare that may have resulted from these past operations. The IRP will be the basis for remedial actions on USAF installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and clarified by Executive Order 12316.

To conduct the IRP Hazardous Materials Disposal Sites Records Search for Richards-Gebaur AFB, Missouri, CH2M HILL was retained on September 14, 1982 under Contract No. F08637-80-G0010-6S01.

The records search comprises Phase I of the DoD Installation Restoration Program and is intended to review installation records to identify possible hazardous waste-contaminated sites and to assess the potential for contaminant migration from the installation. Phase II (not part of this contract) consists of follow-on field work as determined from Phase I. Phase II consists of a preliminary survey to confirm or rule out the presence and/or migration of contaminants and if necessary, additional field work to determine the extent and magnitude of the contaminant migration. Phase III (not part of this contract) consists of a technology base development study to support the development of project plans for controlling migration or restoring the installation. Phase IV (not part of this contract) includes those efforts which are required to control identified hazardous conditions.

B. AUTHORITY

The identification of hazardous material disposal sites at Air Force installations was directed by Defense Environmental Quality Program Policy Memorandum 81-5 (DEQPPM 81-5) dated 11 December 1981, and implemented by Air Force message dated 21 January 1982, as a positive action to ensure compliance of Air Force installations with existing environmental regulations.

C. PURPOSE OF THE RECORDS SEARCH

The purpose of the Phase I Records Search is to identify and evaluate suspected problems associated with past hazardous material disposal sites and spill sites on DoD facilities. The existence and potential for migration of hazardous material contaminants were evaluated at Richards-Gebaur AFB by reviewing the existing information and conducting an analysis of installation records. Pertinent information includes the history of operations, the geological and hydrogeological conditions which may contribute to the migration of contaminants, and the ecological settings which indicate environmentally sensitive habitats or evidence of environmental stress.

D. SCOPE

The records search program included a pre-performance meeting, an onsite base visit, a review and analysis of the information obtained, and preparation of this report.

The pre-performance meeting was held at Richards-Gebaur AFB, Missouri, on October 7, 1982. Attendees at this meeting included representatives of the Air Force Engineering and Services Center (AFESC), Air Force Reserve (AFRES), Richards-Gebaur AFB, and CH2M HILL. The purpose of the pre-performance meeting was to provide detailed project instructions, to provide clarification and technical guidance by AFESC, and to define the responsibilities of all parties participating in the Richards-Gebaur AFB records search.

The onsite base visit was conducted by CH2M HILL from November 15 through 19, 1982. Activities performed during the onsite visit included a detailed search of installation records, ground tours of the installation, and interviews with past and present base personnel. At the conclusion of the onsite base visit, the base commander was briefed on the preliminary findings. The following individuals comprised the CH2M HILL records search team:

1. Mr. David Moccia, Project Manager (B.S. Chemical Engineering, 1971)

2. Mr. Bruce Haas, Assistant Project Manager (M.S. Civil Engineering, 1976)

3. Ms. Elizabeth Dodge, Ecologist (M.S. Environmental Health Engineering, 1978; M.S. Aquatic Biology, 1976)

Resumes of these team members are included in Appendix A. Government agencies were contacted for information and relevant documents. Appendix B lists the agencies contacted.

Individuals from the Air Force who assisted in the Richards-Gebaur AFB records search report include the following:

1. Mr. Myron Anderson, AFESC, Program Manager, Phase I

2. Capt. Gail Graban, AFESC, Phase I AFESC Program Representative

3. Mr. Larry Garrett, AFRES, Command Program Manager, Phase I

4. Major Kenneth Hundley, AFRES, Command Bioenvironmental Engineer

5. Major Gary Fishburn, USAF OEHL, Program Manager, Phase II

6. Mr. John Hurd, Richards-Gebaur AFB, Civil Engineer

7. Mr. Sam Mitchell, Richards-Gebaur AFB, Base Civil Engineer

8. Major Paul Garcia, AFRCE-CR/ROV Representative

E. METHODOLOGY

The methodology utilized in the Richards-Gebaur AFB records search is shown graphically on Figure 1. First, a review of past and present industrial operations is conducted at the base. Information is obtained from available records such as shop files and real property files, as well as interviews with past and present base employees from the various operating areas of the base. The information obtained from interviewees on past activities is based on their best recollection. A list of the 27 interviewees from Richards-Gebaur AFB, with areas of knowledge and years at the installation, is given in Appendix C.

The next step in the activity review process is to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from all the industrial operations on the base. Included in this part of the activity review is the identification of past landfill sites and burial sites; as well as other possible sources of contamination such as major PCB or solvent spills, or fuel-saturated areas resulting from significant fuel spills or leaks.

A general ground tour of identified sites is then made by the records search team to gather site-specific information including evidence of environmental stress and the presence of nearby drainage ditches or surface-water bodies. These water bodies are inspected for any evidence of contamination or leachate migration.

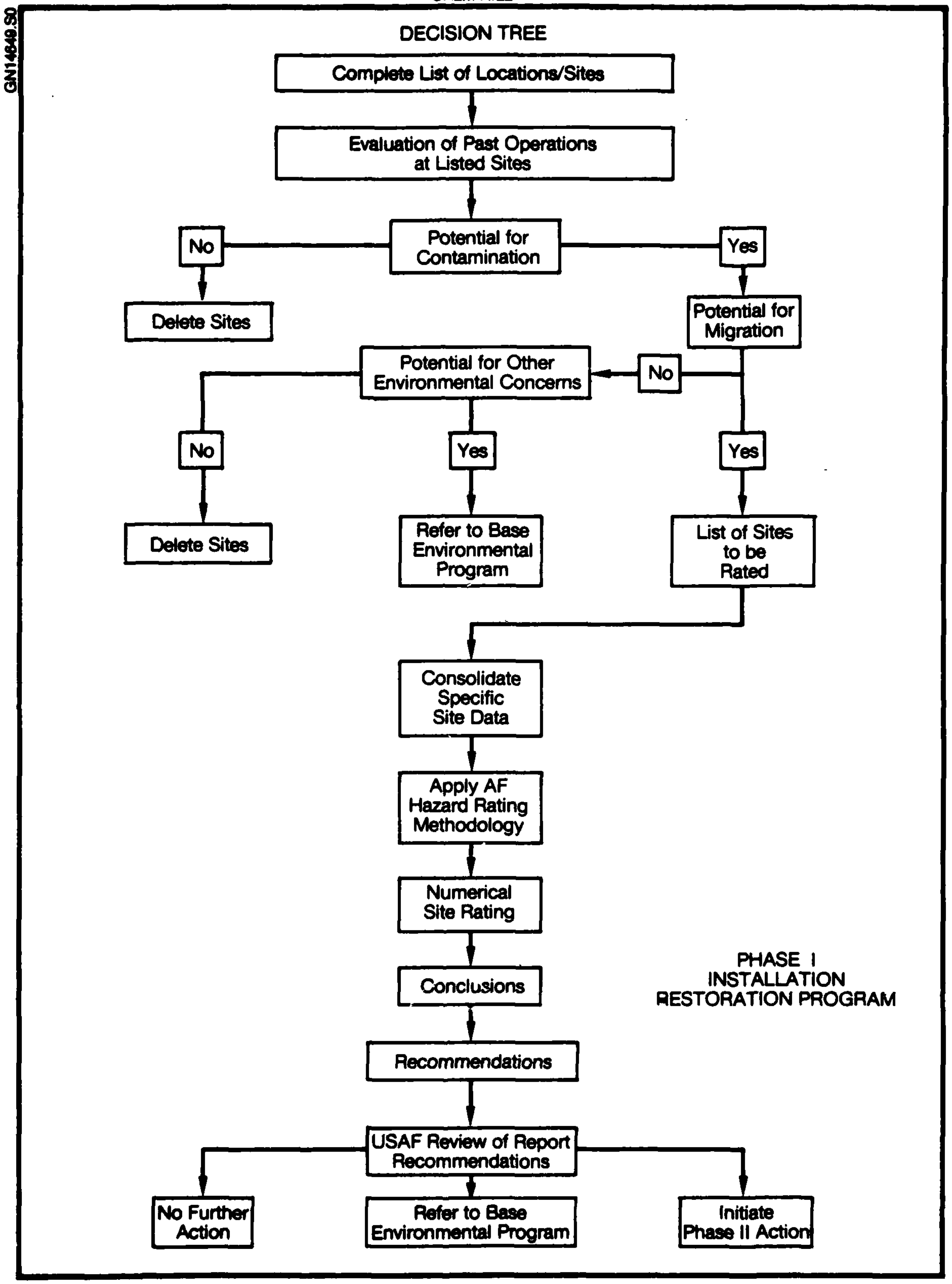

FIGURE 1. Records search methodology.

A decision is then made, based on all of the above information, as to whether a potential exists for hazardous material contamination from any of the identified sites. If not, the site is deleted from further consideration. If minor operations and maintenance deficiencies are noted during the investigations, the condition is reported to the Base Civil Engineer for further action.

For those sites at which a potential for contamination is identified, the potential for migration of this contamination is evaluated by considering site-specific soil and ground-water conditions. If there is no potential for contaminant migration, but other environmental concerns were identified, the site is referred to the base environmental monitoring program for further action. If no further environmental concerns are identified, the site is deleted from further consideration. If the potential for contaminant migration is identified, then the site is rated and prioritized using the site rating methodology described in Appendix D, "Hazard Assessment Rating Methodology."

The site rating indicates the relative potential for environmental impact at each site. For those sites showing a significant potential, recommendations are made to quantify the potential contaminant migration problem under Phase II of the Installation Restoration Program. For those sites showing a low potential, no Phase II work is recommended.

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II. INSTALLATION DESCRIPTION

II. INSTALLATION DESCRIPTION

A. LOCATION

Richards-Gebaur AFB is located in west-central Missouri, about 2.6 miles from the Kansas state line, as shown on Figure 2. The base is almost equally divided by the Jackson and Cass County line, which runs east-west through the middle of the base. In Cass County, the base is bounded by the City of Belton on the east and south, and in Jackson County, the base is wholly surrounded by Kansas City. Downtown Kansas City is about 18 miles to the north, Grandview is about 3 miles to the northeast, and Belton is about 3 miles to the southeast. The main access to the base is off of U.S. Highway 71.

B. ORGANIZATION AND HISTORY

The area of what is now Richards-Gebaur AFB was acquired by Kansas City in 1941 for use as an auxiliary airport, and was originally named Grandview Airport. In 1952, the Aerospace Defense Command leased the airport from Kansas City for use in air defense operations, and in 1953 the property was formally conveyed to the U.S. Government. The base was redesignated Richards-Gebaur AFB in 1957 in honor of two native Kansans, First Lieutenant John F. Richards and Lieutenant Colonel Arthur W. Gebaur, Jr.

Air Defense Command (ADC) had the primary mission on base until 1970, when the Air Force Communications Command (AFCC) assumed command and relocated its headquarters from Scott AFB, Illinois. In 1977, AFCC moved back to Scott AFB, and Richards-Gebaur AFB came under the Military Airlift Command.

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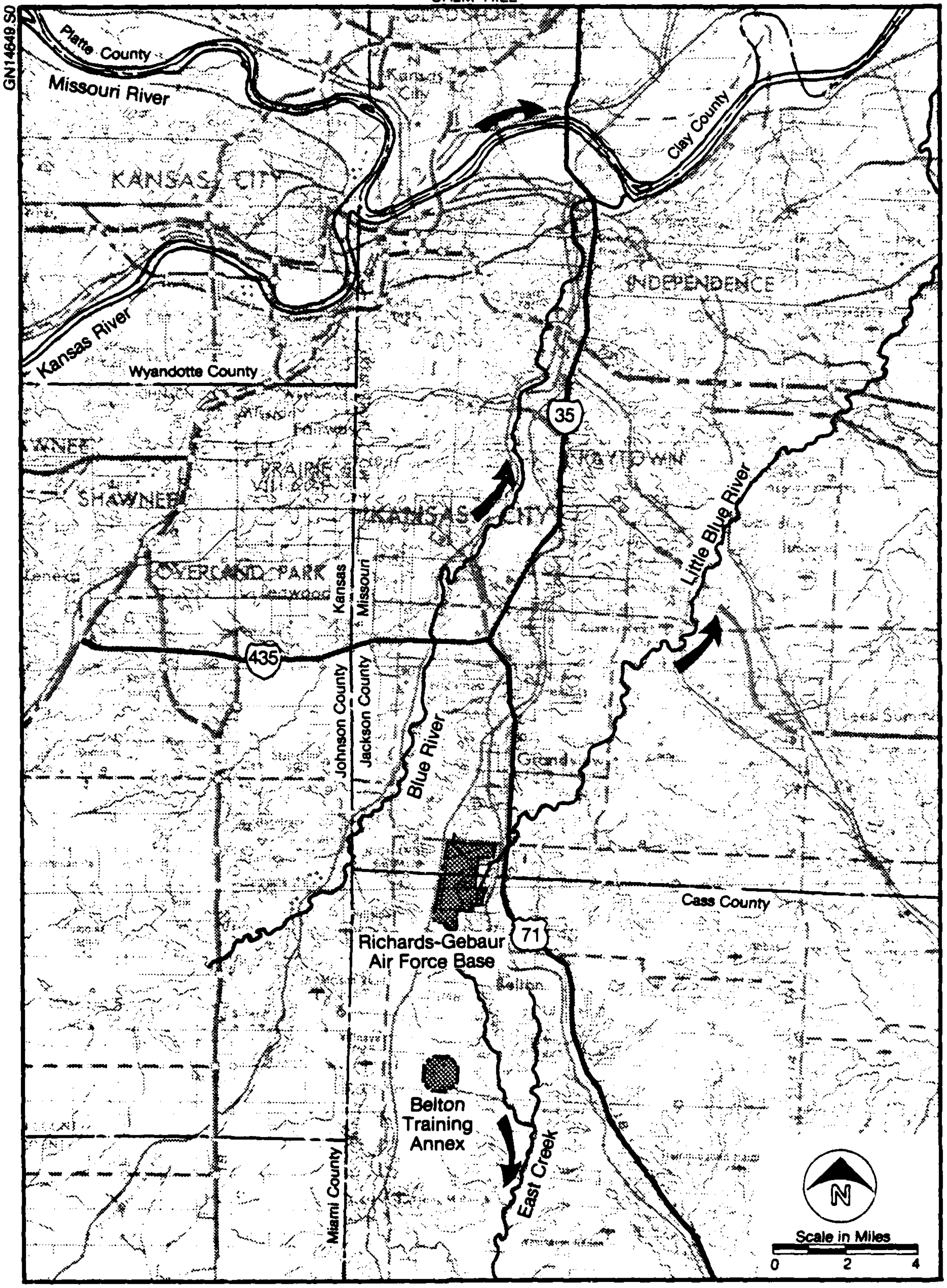

FIGURE 2. Location map of Richards-Gebaur AFB, Missouri.

Between 1977 and 1979 the number of active duty and civilian forces at Richards-Gebaur AFB was drastically reduced from a maximum of about 5,000 personnel during the active years of the base to less than 500 full-time personnel. In September, 1979, the majority of the operating support functions were transferred to a civilian contractor, Talley Services, Inc. AFRES assumed operational control in October, 1980.

The 442nd Tactical Fighter Group (AFRES) currently has the primary mission on-base. The AFRES unit was originally activated in 1949 at Fairfax Field in Kansas City, Kansas, and was relocated to Naval Air Station, Olathe, Kansas, (now Johnson County Industrial Airport) in 1950 before arriving at Richards-Gebaur AFB in April 1955.

Today the 442nd Tactical Fighter Group (TFG) is equipped with 24 A-10 Thunderbolt II aircraft, having previously been equipped with C-130 Hercules aircraft and C-124 reciprocating engine transport aircraft. The collocated AFRES units have an authorized strength of 197 full-time Air Reserve Technicians, 1,073 reservists, and 224 civilian employees.

Active duty support units remaining at Richards-Gebaur AFB include the 1879th Communications Squadron (AFCC) and Operating Location A, Detachment 19, 26th Weather Squadron (MAC). Other federal government agencies presently using base facilities include the U.S. Marine Corps' operation of the former base officer housing area, the U.S. Department of Agriculture's Standardization Division; U.S. Navy Seabee Reserve Mobile Construction Battalion No. 15, 308th Psychological Operations Company, and nine other U.S. Army reserve units, and the General Services Administration (GSA).

In October 1980, the majority of the base facilities and properties were excessed to the GSA and an interim lease and joint use of the airport with Kansas City became effective. Base support facilities are currently shared by AFRES, Kansas City, and Talley Services, Inc.

A more detailed description of the base history and its mission is included in Appendix E.

The Air Force-controlled property at Richards-Gebaur AFB involves a fairly complex arrangement of ownership, permit use, leases, and easements. Figure 3 illustrates the distribution of various land parcels within the base boundaries. Base property at the present time includes about 2,160 acres, of which 375 acres are retained by the Air Force, 1,673 acres are leased to the cities of Kansas City and Belton, 101 acres are being or have been transferred to the Department of the Navy, and 11 acres have been transferred to the Department of the Army. An off-base practice drop zone, the Belton Training Annex, represents another 472 acres of land under the control of Richards-Gebaur AFB.

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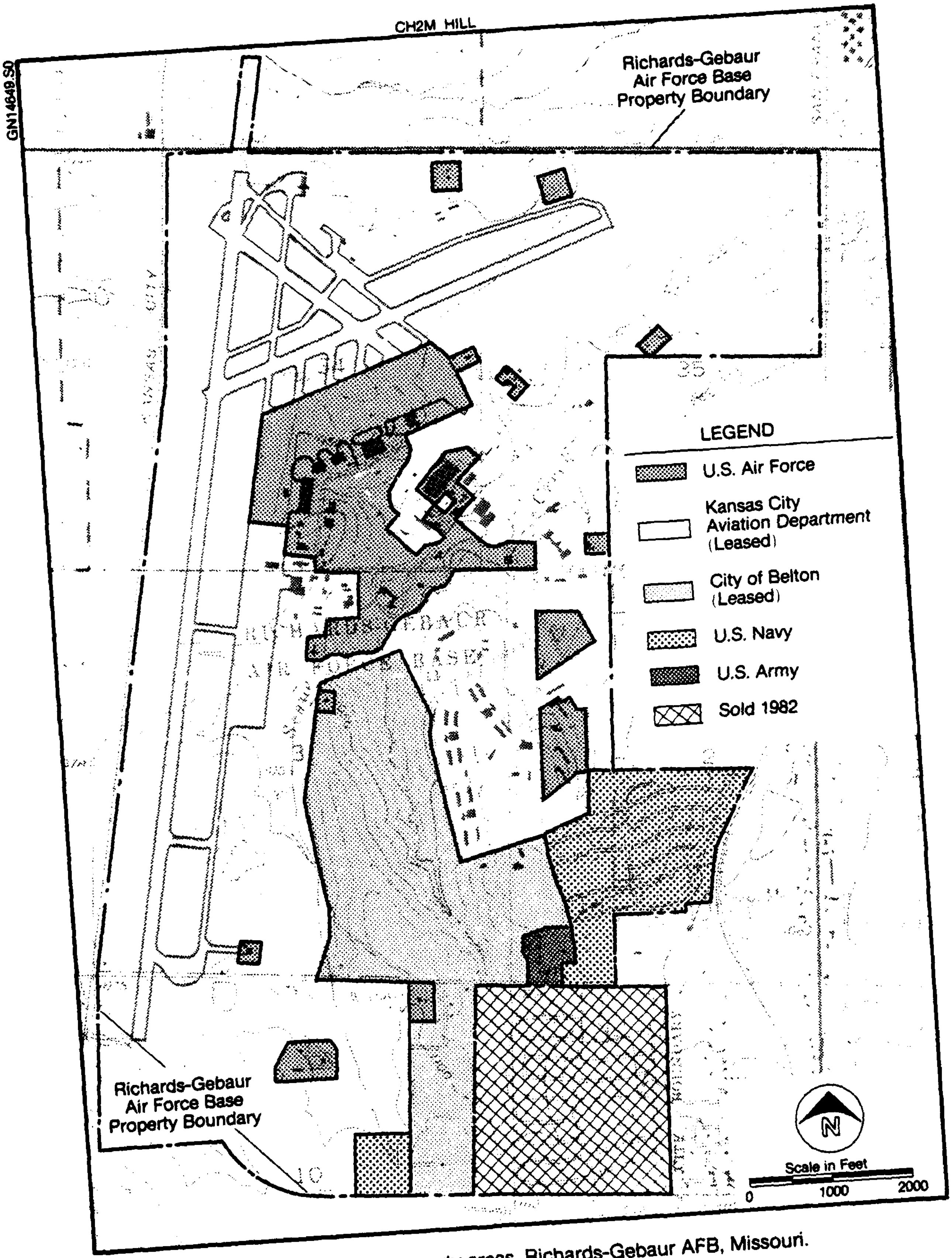

FIGURE 3. Real property areas, Richards-Gebaur AFB, Missouri.

III. ENVIRONMENTAL SETTING

III. Environmental Setting

A. Meteorology

Richards-Gebaur AFB and the surrounding area exhibit a modified continental climate, in which conditions normally expected to prevail at that latitude are often distorted by air currents freely entering from the southeast, the Gulf of Mexico, or other distant areas. Average monthly temperatures range from 26°F in January to 78°F in July, with an average annual temperature of 54°F (Table 2). Most precipitation falls in the late spring and early summer and again in the early fall. Average monthly precipitation ranges from 1.15 inches in February to 5.05 inches in June. Average annual precipitation is 36.8 inches. Maximum and minimum annual precipitation is 63.6 and 28.8 inches, respectively. Pan evaporation and evapotranspiration rates are approximately 60 inches and 42 inches per year, respectively.

Prevailing winds for the base are from the south all year and the mean annual wind speed is nine knots. Due to the base's location and the generally flat topography in surroundings areas, weather changes can be rapid. Tornados and severe thunderstorms are most likely to occur in spring and summer months.

B. GEOLOGY

Richards-Gebaur AFB is located in the Osage Plains region of the Central Lowland physiographic province. This region is characterized by low overall relief; broad, maturely dissected uplands yield to somewhat steeper valley slopes. Prominent escarpments are caused by thick, erosion-resistant limestone.

Table 2
METEOROLOGICAL DATA SUMMARY FOR RICHARDS-GEBAUR AIR FORCE BASE[a]

Parameter	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Temperature (°F)													
Highest	71	82	84	90	95	104	111	107	102	93	84	71	97.9[b]
Average Maxium	34.5	40.3	51.3	65.1	73.8	81.6	87.0	85.9	77.9	67.5	52.3	40.3	63.1
Average	26.2	31.9	42.1	55.3	64.7	72.8	77.9	76.3	68.5	57.6	43.6	32.6	54.1
Average Minimum	17.5	22.9	32.3	45.0	55.1	63.5	68.3	66.3	58.5	47.2	34.2	24.3	44.6
Lowest	-17	-12	-3	16	30	44	46	48	34	22	4	-8	-5.9[b]
Monthly Precipitation (inches)													
Maximum	3.51	3.15	11.48	8.74	7.65	12.57	12.40	7.76	13.54	9.24	5.68	2.79	63.64
Mean	1.50	1.15	2.58	3.40	4.25	5.05	3.78	3.19	4.65	3.62	1.78	1.57	36.83
Minimum	0.13	0.23	0.45	0.72	1.21	1.67	0.20	0.18	0.09	0.18	0.03	0.01	20.82

NOTES: [a]Period of Record: 1954 - 1982

[b]Average Annual Extremes

Source: Department of the Air Force, Richards-Gebaur AFB

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The base facilities are located on a broad plateau, called the Blue Ridge, between the Blue River on the west and the Little Blue River on the east (Figure 2). Land surface elevations range from about 960 feet above mean sea level (msl) on the east to over 1,100 feet (msl) on the south.

Surface soils at Richards-Gebaur AFB consist primarily of very thin loess over residual soils derived from the in-place weathering of the underlying limestone and shale rocks. Soil cover normally varies from 2 to 15 feet. The soils on the upland surfaces belong to the Sharpsburg and Macksburg series and consists of poorly drained silty clay loams. Greenton and Polo series soils are moderately well-drained silty clay and clay soils formed on the eroded convex side slopes. Where shale is exposed along creeks, soils consist of residual clays and silty clays belonging to the Snead and Sampsel series. Moderately well-drained alluvium has filled stream valleys up to a depth of about 50 feet. At Richards-Gebaur AFB, alluvial soils belonging to the Verdigris (Kennebec) series are present in the level bottomland area along Scope Creek. These alluvial soils have a high ground-water table and are subject to occasional flooding.

Permeabilities of the surficial soils are generally low, less than 10^{-6} centimeters per second (cm/sec). Permeability of the Verdigris (Kennebec) alluvial soils is moderate, between 10^{-4} and 10^{-6} cm/sec.

A generalized geologic section of the Osage Plains is given on Table 3. Sedimentary rocks of Pennsylvanian age comprise the uppermost geologic units within Jackson and Cass Counties and achieve a thickness of about 500 to 900 feet. In general, the rock strata dip very gradually toward the northwest at about 10 feet per mile; this general

Table 3
GENERALIZED GEOLOGIC SECTION
AT RICHARDS-GEBAUR AFB[a]

System	Group	Formation	Thickness (Approx.) in Feet	Depth to Top of Unit[b]	Physical Characteristics
Quaternary	Alluvium	--	50	--	
	Loess	--	2	--	
Pennsylvanian	Kansas City	Wyandotte	50	--	Limestone (Argentine)
		Lane	65	0	Shale
		Iola	10	65	Limestone (Raytown)
		Chanute	32	75	Shale
		Drum	2	107	Limestone
		Cherryville	17	109	Shale
		Dennis	15	126	Limestone (Winterset)
		Galesburg	3	141	Shale
		Swope	22	144	Limestone (Bethany Falls)
		Ladore	4	166	Shale
		Hertha	15	170	Limestone
	Pleasanton	--	150	185	Shale, Siltstone, and Sandstone; Gas-bearing, lower units
	Marmaton	--	125	335	Shale, sandstone, limestone, coal, and clay; Gas-bearing
	Cherokee	--	520	460	Sandstone, shale, limestone, siltstone, coal, and clay; Gas-bearing, upper units
Mississippian	Keokuk-Burlington	--	330	980	Limestone
	Chouteau (Kinderhook)	--	115	1,310	Siltstone, limestone, shale
Ordovician	--	Joachim	60	1,425	Dolomite (limestone)
	--	St. Peter	65	1,485	Sandstone
	--	Jefferson City	320	1,550	Dolomite (limestone)
	--	Roubidoux	20	1,870	Sandstone
	--	Gasconade	450	1,890	Dolomite (limestone), sandstone
Cambrian	Undifferentiated	--	150	2,340	Dolomite (limestone), shale
	--	Lamotte	100	2,490	Sandstone
Precambrian	Undifferentiated	--	--	2,590	Granite (igneous rocks)

[a]Composite section from following sources: Master Plan, Richards-Gebaur AFB, Tab C; Missouri Division of Geology, Volume 14; Missouri Division of Geology, Volume 43; Missouri Division of Geology, Vol. 6.

[b]Beneath top of Lane Shale

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regional dip is modified locally by low anticlines, synclines, and domes. Richards-Gebaur AFB is located on the King anticline, a structural rise favorable for oil and gas production and the oldest gas-producing area in Cass County. Gas production ended about 1938; numerous abandoned gas wells are located throughout the base.

Rock units that outcrop at Richards-Gebaur AFB are members of the Kansas City group and include the Chanute Formation, Iola Formation (Raytown member), Lane Formation, and Wyandotte Formation (Argentine member), as shown on Figure 4. These units are basically flat-lying in the area of the base.

The Wyandotte Formation (Argentine member) is the predominant rock unit and caps most of the upland areas. The unit consists of a highly weathered limestone that reaches a maximum thickness of about 50 feet. Weathering has produced enlarged clay-filled vertical joints and layers of soft clay along horizontal bedding planes. Extensive ground-water movement can occur in these joints and planes where conditions are favorable.

The Lane Formation shale underlies the Wyandotte limestone below an elevation of about 1,030 to 1,035 feet (msl). The Lane shale outcrops in the central portion of the base and is about 65 feet thick. The Lane shale is low in permeability and restricts the downward movement of ground water. The Raytown member of the Iola Formation is a thin limestone unit about 10 feet thick that outcrops along the banks of Scope Creek. A 10-foot difference in elevation of the Raytown limestone has been reported just north of the hospital and heating plant, which may indicate the presence of a minor fault or monocline. This fault could serve as a possible pathway for contaminant migration; however, the fault is located where no significant impact can be expected

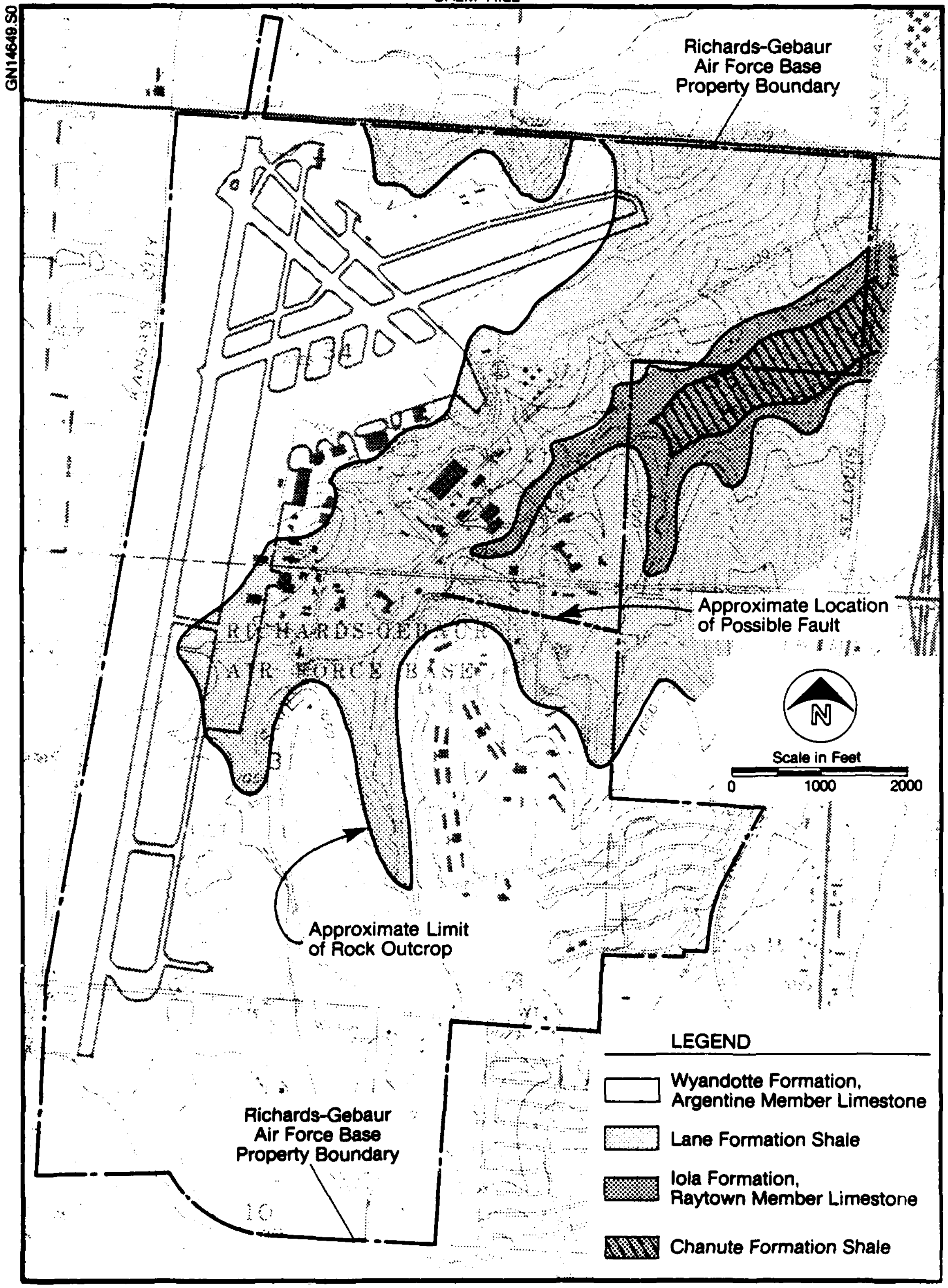

FIGURE 4. Geologic map of Richards-Gebaur AFB, Missouri.

from the identified disposal sites described in Section IV. The Chanute Formation, consisting primarily of shale with interbedded limestone stringers, is present beneath the Raytown limestone and is not exposed at the base, but is covered by alluvial soils along Scope Creek.

Rock units underlying these formations consist of consecutively older sedimentary rocks over a Precambrian granite base rock at a depth of over 2,500 feet.

The principal gas-bearing horizons are found near the base of the Pleasanton Group, the Marmaton Group, and the upper 100 to 300 feet of the Cherokee Group. There are, therefore, about 400 feet of strata in which gas may be encountered, all of which are located in rocks of Pennsylvanian age, primarily sandstone, but occasionally black slaty shale or coal seams.

C. HYDROLOGY

1. Surface Water

The entire drainage of Richards-Gebaur AFB is received indirectly by the Missouri River, which is located about 20 miles north of the base. Nearly all base drainage is located within the drainage basin of the Little Blue River, as shown on Figure 5. The main base creek, Scope Creek, receives discharges from all industrial shop areas along the flightline and from the existing wastewater treatment plant. Flow in Scope Creek above the treatment plant is approximately 900 gallons per minute (gpm) during normal flow and approximately 3,000 gpm following storm events. Scope Creek is an intermittent stream which may be dry during periods of low rainfall, particularly in its upper reaches. Discharges from the wastewater treatment plant

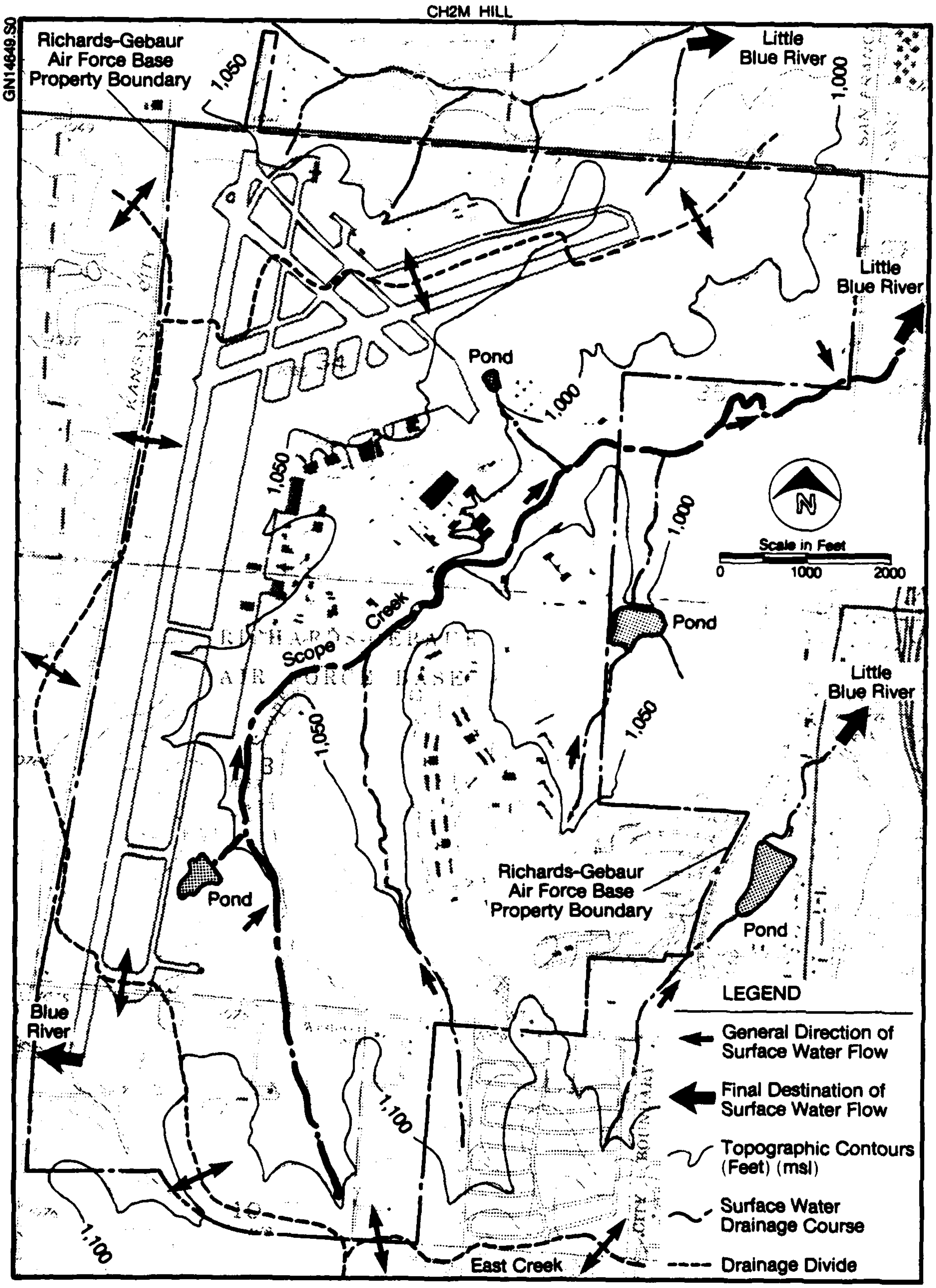

FIGURE 5. Storm water drainage and topographic map, Richards-Gebaur AFB, Missouri.

are currently about 122 gpm, and during times of low flow may contribute the majority of the flow to Scope Creek.

A small area in the southwest corner of the base is located within the Blue River drainage basin. In general, the drainage divide between the Blue River and Little Blue River basins follows the western boundary of the site; the drainage divide between the Little Blue River and East Creek (which flows south away from the base) follows the southern boundary.

There are two stormwater retention reservoirs on the base, as shown on Figure 5. One of these, a 4-acre pond located near the NDI Lab, Building 839, was constructed in the mid-1950s for flood control and fish propagation using rubble from runway demolition to dam an existing drainage swale. The other is a 0.3-acre pond (Facility 943) constructed in 1974 to intercept stormwater and washwater from the flightline for the collection of oils and fuels in an oil/water separator.

Water quality of the surface-water drainages on the base is discussed in Section IV.

Water from the Little Blue River downstream of the base has been used for irrigation only; irrigation use has declined considerably since the base was originally constructed due to extensive urbanization of the watershed. No public water supply intakes are located along the Blue or Little Blue Rivers. The Missouri River is used as a source of water supply for Kansas City. The intake is located upstream of the confluence of the Blue and the Missouri Rivers. Other public water supply intakes along the Missouri River are located more than 50 miles downstream of its confluence with the Little Blue River.

Richards-Gebaur AFB obtains its water from Kansas City, as discussed in Section IV.

2. Ground Water

Richards-Gebaur AFB is located in the saline ground-water province of western Missouri in which the total dissolved solids exceed 1,000 parts per million (ppm) in aquifers capable of yielding adequate water volumes to municipalities or industries. The saline water within the Pennsylvanian strata is probably modified seawater which has been trapped since ancient times. In southwest Jackson County and northwest Cass County, the total dissolved solids may exceed 40,000 ppm. There are therefore no major public ground-water supplies in the area of Richards-Gebaur AFB. Shallow aquifers containing sufficient volumes of fresh ground water to meet municipal, industrial, or domestic needs are present in the alluvium along major rivers and in the glacial drift deposits north of the Missouri River, but not in the area of Richards-Gebaur AFB.

Shallow ground-water aquifers are present in the uppermost limestone formations of Pennsylvanian age. Shallow wells in these aquifers have been used in some areas of Jackson and Cass Counties for domestic supplies, but yields are very low (1 to 3 gpm), quantities are not dependable seasonally, and water quality is often highly mineralized. No water supply wells are known to exist at Richards-Gebaur AFB. The shale rock strata of Pennsylvanian age are low in permeability, thereby impeding ground-water movement both laterally and vertically and providing little opportunity for ground-water recharge to the shallow limestone aquifers. Recharge may occur in some outcrop areas at higher elevations where conditions are favorable, or by percolation through overlying strata where joints, fractures, or faults are present. No significant recharge areas are known to exist in the area of Richards-Gebaur AFB. Discharge from the shallow limestone aquifers occurs in outcrop areas along the Missouri River and its tributaries, including Scope Creek at the base.

Perched ground water is present in some of the surficial materials on uplands and slopes. These perched water zones are recharged locally by precipitation and discharge to nearby streams in the form of springs or seeps. Water table elevations vary considerably over short distances and are seasonal.

The probable direction of ground-water flow within the perched ground water at the base is vertically downward through the loess, residual clays, and/or limestone caprock to the surface of the relatively impervious Lane Shale or Chanute Shale, then laterally to discharge via springs into Scope Creek. Locally, impervious residual clay layers, fragipan, and intact limestone strata may impede vertical ground-water flow; in these areas perched ground water may flow laterally along the surface of the impervious layer to discharge as springs or seeps.

Perched ground water is also present in the alluvium along Scope Creek. This perched ground water is recharged by direct rainfall infiltration, flow of perched ground water from higher elevations, or from the creek during times of flooding. Discharge is directly into the creek.

D. Environmentally Sensitive Conditions

1. Vegetation

Of the approximately 2,300 acres in the Richards-Gebaur AFB study area, about 700 acres are unimproved. Most of the unimproved areas consist of annual grassland communities composed of fescue, bluegrass, bromegrass, and clover. Small tracts of trees occur in the more isolated areas of the base. These primarily consist of honey locust, maple, oak and osage-orange. The base is relatively well drained, so no significant wetland areas exist.

2. Wildlife

Because habitat areas are not very diverse, wildlife on the base is correspondingly limited, consisting primarily of small mammals and song birds. Mammals reported include rabbits, squirrels, muskrats, coyotes, opossum, and groundhogs. Birds commonly found on the base are sparrows, cardinals, quail, shrikes, brown thrashers, red-tail hawks, and prarie horn larks. In the Richards-Gebaur Fish and Wildlife Management Plan developed in 1975, 500 acres were identified as suitable for habitat improvement through plantings of trees, crowned vetch, orchard grass, and ladino clover.

3. Aquatic Systems

Aquatic systems on the base consist of a 4-acre man-made pond and 4 miles of a small stream with tributaries which meander through the base. The pond is located southeast of the main runway, from which it receives stormwater runoff. Periodic stocking of the pond has been conducted to enhance recreational fishing. The small stream on the base is part of the headwaters of the Little Blue River. Presently it receives the base's stormwater runoff and effluent from the wastewater treatment plant on the base. A fishkill involving several hundred fish was reported on July 12, 1975 at the "golf course stream," a tributary of Scope Creek. The fishkill was investigated by the Air Force; however, no cause was identified. The fishkill is not considered the result of any past hazardous material disposal practices.

4. Threatened and Endangered Species

No species designated as endangered by the U.S. Fish and Wildlife Service of the Department of the Interior are known to inhabit the area within a 50-mile radius of Richards-Gebaur AFB. Some migratory endangered species which may rarely occur in the area as transients include the Southern Bald Eagle, American Peregrine Falcon, Indiana Bat, and Ozark Big-Eared Bat. Threatened species resident within a 50-mile radius include the Greater Prarie Chicken, Lake Sturgeon, and Niangua Darter.

The above species are also included on the Missouri Department of Conservation's list of rare and endangered fauna in the state. The Southern Bald Eagle and Ozark Big-Eared Bat are considered extirpated within the state of Missouri. State endangered species are the American Peregrine Falcon, Indiana Bat, Greater Prarie Chicken, and Lake Sturgeon. The Niangua Darter is classified as rare.

5. Environmental Stress

No evidence of significant environmental stress resulting from past disposal of hazardous wastes was observed during the ground tour of Richards-Gebaur AFB. Areas of potential concern are located alongside Scope Creek, where natural woodland environments and flood-prone lowlands are present. When the wastewater treatment plant on-base is taken out of operation (early 1983), effluent discharge to the stream will be eliminated. This will probably cause a noticeable reduction in the base flow of the stream as it leaves the study area.

GNR70A

IV. FINDINGS

IV. FINDINGS

A. ACTIVITY REVIEW

1. Summary of Industrial Waste Disposal Practices

The major industrial operations at Richards-Gebaur AFB have included aerospace ground equipment (AGE), pneudraulics and engine maintenance, and corrosion control. These operations have generated varying quantities of waste oils, fuels, solvents, and cleaners since the base was activated in 1953.

The total quantity of industrial wastes generated by AFRES is currently between 11,000 and 13,000 gallons per year. Quantities of waste oils, fuels, and solvents have decreased substantially since the A-10 aircraft replaced the C-130s at the base in 1982; approximately half as much industrial waste is currently generated. In addition, industrial waste quantities decreased substantially when the C-124 reciprocating engine aircraft were replaced by the C-130s in 1971; approximately half as much waste oil was generated with the C-130s. The total quantity of industrial wastes generated prior to 1971 was about 26,000 gallons per year more than current waste generation.

Standard procedures for past and present industrial waste disposal at Richards-Gebaur AFB, based on the reports or best recollection of interviewees, are as follows:

- 1953 to 1969: Industrial wastes from most base operations, from both regular Air Force and AFRES, including waste oils, solvents, and paint thinners were placed in drums or bowsers (portable tanks on wheels) for routine collection and disposal off-base by a private contractor. Waste oils and waste fuels were also accepted by the fire department for use in fire department training exercises. It was also common practice to dispose of small quantities of waste oils down the storm drain; two interviewees reported complaints by farmers, living downstream of the base of oil slicks on cattle in the late 1950s. Some industrial wastes may also have been disposed of at the two base landfills; burning of refuse at the landfills was common practice until 1969.

- 1969 to 1976: In 1969, the fire department no longer accepted waste oil products, although it continued to accept contaminated fuels for use in fire department training exercises. An industrial waste system consisting of oil/water separators and collector drains was installed at several facilities in about 1974. Underground tanks at Buildings 942 and 611 were converted from heating oil tanks to waste oil or waste fuel salvage tanks. In 1969, burning was no longer permitted at the base landfill and in 1971 or 1972, landfilling activity ceased altogether.

These changes, occurring about the time that operation of the base transferred from ADC to AFCC, resulted in greater control of the disposition of industrial wastes through off-base contract removal. Radium Petroleum was the primary contractor for disposal of industrial wastes during this period.

- 1976 to Present: Since 1976, procedures for disposal of waste fuels, lubricants, and solvents have undergone minor changes in response to functional and operational changes on the base. Waste POL has continued to be collected and disposed of off-base through contract removal, although the locations of tanks for temporary storage of the wastes have changed occasionally. In 1976, separation of synthetic and non-synthetic lubricants was implemented. Synthetic oils were originally placed in a 300-gallon underground tank at Building 927; in 1978 and 1979, synthetic oils were placed in 55-gallon drums for disposal through the Defense Property Disposal Office (DPDO), and recently have been collected in a 500-gallon bowser for disposal through DPDO. Waste non-synthetic POL were placed in each of three underground tanks at Buildings 611, 821, and 966 between 1976 and 1978; since 1978 only the tank at Building 966 has been used.

  Waste halogenated solvents (e.g., trichloroethylene) have been placed in drums and delivered to DPDO for disposal. Waste non-halogenated solvents (e.g., PD-680) have been placed in a 500-gallon bowser at the east end of the flightline for disposal through DPDO. Some PD-680 is also stored in the underground waste POL tank at Building 966 which is periodically emptied with its contents disposed of off-base through contract removal.

Waste oils generated at the Motor Pool, Building 704, were originally stored in 55-gallon drums that were either emptied into the underground waste POL tank at Building 966 or removed directly through off-base contract disposal. Since about 1980, a 500-gallon above-ground tank has been used for storage of waste POL.

Waste fuels generated along the flightline have been accumulated in two 500-gallon bowsers stored at the east end of the flightline. Waste fuels generated at the Motor Pool are accumulated in a 5,000-gallon underground tank at Building 711. Waste fuels are ultimately taken to the 5,000-gallon above-ground tank located at the fire department burn pit and used in fire department training exercises.

2. Industrial Operations

Industrial operations at Richards-Gebaur AFB have been conducted by several different tenant units or organizations under the regular Air Force, AFRES, and the Kansas City Aviation Department. These operations have been primarily involved in the routine maintenance of assigned aircraft and associated ground support equipment. Corrosion control activities have included only minor component and touch-up painting; no stripping or painting of entire aircraft has been conducted at the base, although in October, 1982, Talley Services, Inc., began stripping and overhauling of Army helicopters in Building 1010. Appendix F contains a master list of the industrial operations, and the approximate dates of operation.

A review of base records and interviews with past and present base employees resulted in the identification of the industrial operations in which the majority of industrial chemicals are handled and hazardous wastes are generated. Table 4 summarizes the major industrial operations and indicates the estimated quantities of wastes currently generated as well as the past and present disposition of these wastes, i.e., treatment, storage, and disposal. Appendix F, "Master List of Industrial Activities," provides data on the present location and the past or alternate location along with corresponding dates for the various industrial operations. This information has been obtained from shop files and interviews with shop personnel based on their best recollection. Descriptions of the major activities are included in the following paragraphs.

a. AFRES

i. General Aircraft Maintenance

Currently, most shops involved in general aircraft maintenance, including pneudraulics/environmental, wheel/tire, machine, electric/battery, phase/inspection, sheet metal/welding, and reclamation/repair are located in Building 918. Originally, all shops operated by AFRES were located in Building 940 and those operated by the regular Air Force were located in Building 821. Most Air Force shops moved into Building 918 in 1957, although the wheel/tire shop remained in Building 821 until about 1971. When command of the base was transferred from ADC to AFCC in 1970, the separate Air Force and AFRES shops were gradually combined into common facilities in Building 918.

The active duty and reserve pneudraulics/environmental shops were combined in about

Table 4
MAJOR INDUSTRIAL OPERATIONS SUMMARY

Organization/Shop Name	Present Location (Bldg. No.)	Waste Material	Estimated Waste Quantity	Treatment/Storage/Disposal Methods (1950, 1960, 1970, 1980)
AFRES				
Pneudraulics/Environmental	918	PD-680 solvent	40 gal/yr	Aircraft washrack[a] to storm drain; Off-base contract removal
		Hydraulic fluid	240 gal/yr	Fire dept.[b] training; Off-base contract removal
Wheel/Tire	918	PD 680 solvent	100-140 gal/yr	Aircraft washrack to storm drain; Off-base contract removal
		Paint stripper	100-200 gal/yr	Off-base contract removal
Electric/Battery	918	Sulfuric acid	80-100 gal/yr	Neutralized to sanitary sewer
NDI Laboratory	839	Penetrant	50-110 gal/yr	Off-base contract removal
		Emulsifier	25-100 gal/yr	Off-base contract removal; Drainfield
		Developer	50-150 gal/yr	Drainfield
		Fixer	10-40 gal/yr	Base photo for silver recovery; DPDO for silver recovery[c]
		Kerosene	25 gal/yr	Ground surface
Engine/Prop	927	Engine oil	200 gal/yr (1,200 gal/yr prior to 1972)	Fire dept.[b] training; Off-base contract removal

Table 4--Continued

Organization/Shop Name	Present Location (Bldg. No.)	Waste Material	Estimated Waste Quantity	Treatment/Storage/Disposal Methods (1950–1980)
		Synthetic oil	60-200 gal/yr	Off-base contract removal; DPDO[c]; Off-base contract removal
		PD 680 solvent	60-120 gal/yr	Aircraft washrack to storm drain[a]
Aerospace Ground Equipment	958	PD 680 solvent	40-160 gal/yr	Aircraft washrack to storm drain[a]; Off-base contract removal
		Engine oils, Hydraulic fluid	600 gal/yr (2,800 gal/yr prior to 1976)	Fire dept. training[b]; Off-base contract removal
		Waste fuels	100 gal/yr	Fire dept. training[b]
Active Air Force AGE	822	Engine oil, Hydraulic fluid, Paint stripper	240-1,200 gal/yr	Fire dept. training[b]; Off-base contract removal
Corrosion Control	948	Paint strippers, Paint thinners	55 gal/yr	Off-base contract removal
Operational Maintenance	Flightline	Synthetic oil	800 gal/yr	Off-base contract removal; DPDO[c]; Off-base contract removal
		JP-4 fuel	2,400 gal/yr (12,000 gal/yr prior to 1982)	Fire dept. training[b]

Table 4--Continued

Organization/Shop Name	Present Location (Bldg. No.)	Waste Material	Estimated Waste Quantity	Treatment/Storage/Disposal Methods 1950 1960 1970 1980
		PD-680 solvent	60 gal/yr (2,000 gal/yr prior to 1982)	Aircraft washrack to storm drain[a] (c. 1957 to 1980); Storm drain[d] (1980 on)
		Alkaline soap	15,000-25,000 gal/yr	
Fuel Cell (Lear Siegler, Inc. since 1977)	966 & 965	JP-4 fuel	2,400 gal/yr (12,000 gal/yr prior to 1982)	Fire dept. training[b] (c. 1966 on)
		Paint sludge	60 gal/yr	Off-base contract removal (c. 1966 on)
Kansas City Aviation Dept.				
Vehicle Maintenance	704 & 711	Engine oil, Hydraulic fluid, Paints and thinners	2,100-2,700 gal/yr	Fire dept. training[b] (c. 1957 to 1969); Off-base contract removal (1969 on)
		PD-680 Solvent	600 gal/yr	Off-base contract removal (c. 1957 on)
		JP-4 Fuel	600 gal/yr	Fire dept. training[b] (c. 1957 on)
Fixed-Base Operation	821	PD-680 Solvent	180-240 gal/yr	Off-base contract removal (1980 on)
Belton Tool Manufacturing	611 & 612	Waste oils	1,200 gal/yr	Off-base contract removal (1980 on)
Air Defense Command	611 & 612	Waste oils	1,200 gal/yr	Off-base contract removal (c. 1957 to 1970)

[a]Aircraft washrack (Facility No. 945) located at far east end of flightline; wastes washed down storm drain up to 1969, through oil/water separator into storm drain after 1969.

[b]Wastes placed in 55-gallon drums and taken to the fire department training areas for use in training exercises. Some wastes also disposed of off-base through contract removal when not used in training exercises.

[c]Defense Property Disposal Office, Whiteman AFB, Missouri.

[d]Floor drain at Building No. 918; discharges to storm drain without oil/water separator.

1971. The shop includes a 20-gallon cleaning vat containing PD-680 which is emptied every 6 to 12 months. The waste PD-680 is currently stored in a 12,000-gallon underground waste oil tank at Building 966 which is emptied and its contents removed off-base through contract. Prior to about 1980, the waste PD-680 was washed down the former aircraft washrack, Facility 945, which discharged to the storm drain following pretreatment in an oil/water separator installed in 1969. Waste hydraulic fluid generated in the pneudraulics/environmental shop (about 240 gallons per year) has been placed in the waste oil tank at Building 966 since about 1976 for disposal off-base through contract removal. Prior to 1976, the waste hydraulic fluid was typically placed in 55-gallon drums stored at the east end of the flightline near the aircraft washrack for disposal off-base through contract removal. Prior to 1969, these wastes were disposed of by the fire department in training exercises.

The wheel/tire shops were combined in about 1975, although a 100-gallon cleaning vat containing PD-680 remains in Building 940. The vat is seldom used, resulting in about 100 to 140 gallons of waste solvent per year which is stored in a 1,000-gallon aboveground waste solvent tank located at the former aircraft washrack, Facility 945. The waste solvent tank is emptied and its contents removed off-base through contract removal. Prior to about 1976, waste solvents were washed down the washrack drain which discharged to the storm drain following pretreatment in an oil/water separator installed in 1969. Waste paint strippers, between about 100 and 200 gallons per year, are stored in 55-gallon drums prior to removal off-base through contract.

The electric-battery shop disposes of approximately 3 or 4 nickel-cadmium batteries each month which are sent to DPDO at Whiteman AFB for ultimate disposition. Approximately 7 or 8 lead acid batteries are disposed of each month; the battery acid is neutralized with potassium hydroxide prior to washing down the sanitary sewer.

Other shops within Building 918 do not generate significant quantities of industrial wastes.

ii. Non-Destructive Inspection

The NDI Lab has been located in Building 839 at the south end of the runway since it was built in 1961. Principal wastes generated by the lab are held in a series of 50- to 100-gallon vats that are drained yearly for cleaning. Waste penetrant, approximately 50 to 110 gallons per year, was originally stored in drums for disposal off-base through contract; since about 1980, waste penetrant is placed in the waste oil tank near Building 966 which is then emptied and removed off-base through contract disposal. Waste emulsifier, approximately 25 to 100 gallons per year, was likewise placed in drums and disposed of off-base through contract prior to 1980; since 1980, waste emulsifier has been deposited down the sanitary drain which leads to a drainfield outside Building 839. Waste developer, approximately 50 to 150 gallons per year, has been deposited down the sanitary drain since 1961. Small quantities of waste fixer, approximately 10 to 40 gallons per year, were originally taken to the base photo lab for silver recovery; since 1980, waste fixer has been transferred to the Defense Property Disposal Office (DPDO) at Whiteman AFB, Missouri, for silver recovery. Small quantities of waste kerosene generated at the NDI lab, about 25 gallons per year, have been used as a herbicide to control weed growth around Building 839 since 1961.

iii. Engine/Prop

The regular Air Force moved its Engine/Prop Shop from Building 821 to Building 927 in 1959; AFRES moved its shop from Building 940 to be combined with the Air Force shop in about 1975. Waste synthetic oils (about 60 to 200 gal/yr) have been separated from non-synthetic oils since about 1976. Between 1976 and 1978 the waste synthetic oils were stored in a 300-gallon underground tank at Building 927, which was routinely emptied for disposal off-base through contract removal; between 1978 and 1980 they were placed in 55-gallon drums for disposal through DPDO; and since 1980 have been collected in a 500-gallon portable bowser which is stored at the former aircraft washrack (Facility 945) and disposed of off-base through contract removal.

Prior to about 1972 the Engine/Prop Shop generated approximately 1,200 gallons per year of waste non-synthetic oils. Between 1972 and 1980 the shop generated about 200 gallons per year and since 1980 only minor quantities of waste non-synthetic oils have been generated. Originally, these waste oils were collected in bowsers or drums that were stored at the former aircraft washrack and either used in fire department training exercises or removed off-base through contract disposal when not needed in fire department training exercises. After 1969, the fire department no longer accepted waste oils; all waste oils have since been disposed of off-base through contract removal. Between about 1976 and 1980, the waste oils were collected in the 500-gallon waste oil bowser for disposal off-base through contract removal. Since 1980, minor quantities (less than 10 gallons per year) of waste non-synthetic oil have been stored in the waste oil tank at Building 966 for disposal off-base through contract removal.

About 60 to 120 gallons per year of waste PD-680 solvent were disposed of by the Engine/Prop Shop prior to about 1980; these were washed down the aircraft washrack drain (Facility 945). Minor quantities (less than 10 gallons per year) of waste solvents generated since 1980 are stored in the waste oil tank at Building 966 for disposal off-base through contract removal.

iv. Aerospace Ground Equipment (AGE)

The AFRES AGE Shop has been located in Building 958 since 1963, having been located previously in Building 940. Wastes include about 40 to 160 gallons/year of PD-680 solvent and about 600 gallons/year of waste engine oils and hydraulic fluid, which are both stored in the waste oil tank at Building 966 and disposed of off-base through contract. Prior to 1976 waste solvents were washed down the storm drain at the aircraft washrack and waste oils (which amounted to about 2,800 gallons per year) were collected in 55-gallon drums and either used in fire department training exercises or removed off-base through contract disposal when not needed in fire department training exercises. Waste fuels (less than 100 gal/yr) have been taken to the fire department training area and used in training exercises.

The Air Force AGE Shop was located in Building 822 until the regular Air Force left in 1978. Wastes included about 240 to 1,200 gallons/year of mixed engine oil, hydraulic fluid, and miscellaneous paint thinners and strippers. Between about 1976 and 1978 these wastes were collected in a 15,000-gallon underground storage tank at Building 821 for disposal off-base through contract removal. Between 1969 and 1976 the wastes were placed in 55-gallon drums stored at the former aircraft washrack for disposal off-base through contract removal. Prior to 1969, the drummed wastes were either used in fire department training exercises or disposed of off-base through contract removal when not needed in fire department training exercises.

v. Corrosion Control

No major corrosion control activities have been conducted at Richards-Gebaur AFB. Between 1957 and 1978, a small paint shop was also located in Building 918; operations were discontinued when the Air Force left in 1978. Minor wastes that were generated were disposed of in conjunction with other paint stripper wastes generated in Building 918. These wastes were included in the estimates given in Table 4 for the Wheel/Tire shop. Minor painting of small parts has been done in Building 948 since 1973. About one 55-gallon drum of waste paint strippers, thinners, and residues is generated each year and is disposed of off-base by contract removal.

vi. Operational Maintenance

Operational maintenance along the flightline includes minor aircraft cleaning and servicing. Since 1976, about 800 gallons of waste synthetic oil has been disposed of each year through off-base contract removal along with waste synthetic oil generated at the Engine/Prop Shop. Waste JP-4 fuel is collected in a 500-gallon portable bowser, and is used in fire department training exercises. Currently, about 200 gallons per month of waste fuel is generated; prior to 1982 the servicing of C-124 and C-130 aircraft resulted in about 1,000 gallons per month of waste fuel being generated.

Aircraft washing activities were located primarily in the same general area at the east end of the flightline (Facility 945) from the early 1950s until 1982.

Air Force and AFRES units used the same washrack. The washrack drains to the storm sewer; an oil/water separator has been in use at the washrack since about 1969. During winter months, infrequent aircraft washing was also performed inside Buildings 940 and 821 from the 1950s to the early 1970s. Since the early 1970s, the north bay of Building 918 has also been used for aircraft washing, and since 1982 has been the only area used for aircraft washing. Floor drains in each of these buildings empty directly to the storm drain. About 2 aircraft per month were serviced at the former washrack (Facility 945); currently about 8 aircraft per week are being serviced in Building 918.

Only small quantities of solvents were used during washing activities. About 5 gallons per aircraft were used on the C-124s; 2 to 3 gallons per aircraft were used on the C-130s; and currently less than 60 gallons per year of solvent is being used on the A-10s. The total quantity of PD-680 solvent used prior to 1982 was generally about 2,000 gallons per year. Although it was common Air Force practice in the past to use trichloroethylene (TCE) in the washing of C-124 aircraft, no direct usage of TCE at Richards-Gebaur AFB was found. Alkaline soap usage has amounted to about 15,000 to 25,000 gallons per year.

b. Lear Siegler, Inc.

Lear Siegler, Inc. (LSI) is a private contractor hired by AFRES primarily to perform fuel cell maintenance. LSI has been operating out of Buildings 965 and 966 since 1977; previously, fuel cell maintenance was performed by the active Air Force. Wastes currently consist of about 200 gallons per month of JP-4 fuel which is drained from the fuel cells into a 500-gallon portable bowser. Before 1982, when C-130s and C-124s were being serviced by

AFRES, up to 1,000 gallons per month of waste fuel was typically generated. The fuel has been disposed of by the fire department in training exercises.

Approximately 60 gallons per year of waste paint sludges are placed in 5-gallon jugs which are tarnsferred to base supply (Talley Services, Inc.) for disposal off-base through contract.

c. Kansas City Aviation Department (KCAD)

i. Vehicle Maintenance

KCAD maintains all motor pool vehicles in Building 704 and refueling vehicles in Building 711. Vehicle maintenance under the Air Force prior to 1980 was also conducted in these buildings since the 1950s. Mixed wastes, including about 2,100 to 2,700 gallons per year of engine oils, hydraulic fluid, paints, and thinners, are currently emptied into either a 500-gallon portable tank or a 300-gallon waste oil tank at Building 704. These tanks are cleaned periodically and the contents are disposed of off-base through contract removal. Between 1969 and 1980, waste oils were typically collected in 55-gallon drums for disposal off-base through contract removal. Prior to 1969, the drummed waste oils were either used in fire department training exercises or disposed of off-base through contract removal when not needed in fire department training exercises.

PD-680 solvent is used at the Motor Pool as a degreaser. The solvent is stored in a 50-gallon vat which is drained about once a month and disposed of off-base through contract.

Waste JP-4 fuel (about 600 gal/yr) is stored in a 5,000-gallon underground waste fuel tank located at Building 711, and disposed of by the fire department in training exercises. Prior to about 1975, waste fuels were stored in 55-gallon drums and disposed of in fire department training exercises.

ii. Fixed-Base Operation (FBO)

Talley Services operates the FBO for light aircraft out of Building 821. Small quantities (less than 60 gallons a year) of waste engine oils and hydraulic fluids are generated; these have been stored in a few 55-gallon drums at Building 821 since Talley began the FBO in 1980 and have not yet been disposed. PD-680 solvent is used in a 15- to 20-gallon vat which is drained once a month for disposal off-base through contract removal.

iii. Other Operations

Kansas City used Building 819 for a few months in 1981 to make structural repairs to a fleet of buses. The operation generated few wastes, although several interviewees reported that when the activity was finished, the floor was covered with oil that was draining out of the building to the ground surface southeast of the building.

Talley Services, Inc. began operating in Building 1010 in October 1982. Talley will be overhauling about 115 Army helicopters. A biodegradable stripper, Custom Chemical Co. AK-2, will be used to strip the helicopters; drainage will flow to the storm drain. No wastes had been generated at the shop at the time of the records search base visit.

Belton Tool Manufacturing (BTM) Company has been operating out of Buildings 611 and 612 since 1980. BTM manufactures special fasteners such as U-bolts and I-bolts. Waste oils (about 100 gal/mo) are stored in a 2,000-gallon underground waste oil tank near Building 611 and are disposed of off-base once a year through contract removal.

Between 1957 and 1970 Buildings 611 and 612 were used by the Air Defense Command. Waste oils were stored in the same underground tank at Building 611, and amounted to about 100 gallons per month. No other wastes were reportedly generated.

3. Fuels

Bulk fuel storage facilities are located at the northern end of the base adjacent to the industrial waste retention reservoir. The facility is diked and consists of six aboveground tanks, two of which have been pickled by filling them with a caustic solution. Two of the remaining four contain JP-4 and have a combined capacity of 397,000 gallons. The other two tanks are 10,000 gallon-capacity each and contain motor gasoline (MOGAS) and diesel fuel. Prior to about 1971 when C-124s were the assigned aircraft, leaded aviation gasoline (AVGAS) was stored in a 304,500-gallon aboveground tank at the bulk fuels storage area.

In the past, tank cleaning was handled by civil engineering personnel using either active Air Force personnel or an independent contractor. The tanks have not been cleaned since Talley Services, Inc., obtained the contract to handle bulk storage (1979). Information was not available on cleaning procedures, dates of last cleaning, or disposition of tank residues (sludges). No evidence was found and no interviewee reported burial of tank sludges on Richards-Gebaur AFB.

Residual JP-4 drained from aircraft is collected and transported to the AGE shop for reuse. Excess is then taken to the fire department training area to be used in fire department training exercises. JP-4 is also stored in the underground tank at facility 711 (Refueling Vehicle Shop) for eventual use in fire department training exercises.

Other fuel storage tanks containing MOGAS, diesel, and Fuel Oil are located at several areas on the base. An inventory of existing active POL storage tanks is included in Appendix G.

Numerous POL storage tanks are reported to be inactive. However, whether or not these tanks have been deactivated according to standard Air Force procedures is unknown. It is suspected that some have been drained of POLs and filled with water or sand, while others are assumed to contain some residual POLs. An inventory of deactivated POL storage tanks is included in Appendix H.

Two fuel-related accidents were reported at Richards-Gebaur AFB in 1978. One involved a fuel truck at the bulk fuels storage area. Less than 5,000 gallons of aircraft fuel was spilled, ignited, and flowed into a nearby ditch. The burning fuel was contained in the ditch and was apparently consumed. No significant quantities of fuel seeped into the ground.

In another accident the same year, an aircraft fuel cell exploded during refueling of a Navy aircraft. No spill of fuel from the runway area occurred as a result of the incident.

Miscellaneous small spills have occurred on the flightlines due to overtopping of fuel tanks or rupturing of tanks. No other evidence of fuel spills was reported or observed at Richards-Gebaur AFB.

4. Fire Department Training Activities

Fire department training exercises have been conducted at three different locations. From 1954 through about 1969, waste fuels, waste oils, and spent solvents were burned at the training sites. Thereafter, waste fuels collected from fuel cells, and some clean fuels purchased directly from the Fuels Management Branch, were the only combustible liquids consumed in fire training exercises.

Most of the POL wastes would have been consumed in the fires; however, small quantities may have percolated into the ground. Prior to the 1960s protein foam and water were used to extinguish fires. Since then, AFFF (Aqueous Film Forming Foam) has been used for this purpose. AFFF is a non-corrosive, biodegradable fluorocarbon surfactant with foam stabilizers and is not considered to pose a potential for hazardous materials contamination. A description of past and present fire training activities at Richards-Gebaur AFB follows:

- 1954-1955: Initial fire training activities were carried out at a site west of the north-south runway and just north of County Line Road (West Burn Pit). This site was used until 1955 when it was discovered that the site was outside of the base property line. An estimated 550 to 2,300 gal/month of POl waste, consisting of waste oils, spent solvents, and contaminated fuels were sent to the fire department training areas during the period of 1954 through 1969. Data showing the specific quantities burned at the West Burn Pit were not available. The waste POL was collected in 55-gallon drums at the major shop areas and periodically delivered to the training site for surface burning.

- 1955-1965: The second fire training area (South Burn Pit) was set up at the South Landfill. This site was used until 1965 when a new site was designated at the north end of the base. Sources and quantities of POL wastes burned at the site were about the same as for earlier fire training activities at the West Burn Pit.

- 1965-present: Since 1965, fire training activities have been conducted at a site just north of the closed runway (North Burn Pit). This site is identified by the Air Force as Facility No. 1033. Until about 1969, an estimated 1,800 gal/month of waste POL (oils, hydraulic fluid, some solvents, and contaminated fuels) were delivered to this site and stored there in 55-gallon drums for subsequent training exercises. After 1969, waste oils and solvents were no longer accepted for fire training and only contaminated JP-4 fuel has been accepted since 1969.

As much as 2,100 gal/month of contaminated JP-4 fuel was burned at the site between 1969 and 1982; higher quantities generally were burned when the regular Air Force was stationed at Richards-Gebaur AFB. Since 1982, after the regular Air Force left and the A-10 aircraft replaced the C-130s, training activities have consumed less than about 460 gal/month of contaminated JP-4 fuel or approximately 5,500 gallons/year.

This fire department training site originally consisted of an unlined clearing where ground surface burning was practiced. However, in 1969 the site was improved. A concrete lining and retaining curb was installed in the burn pit area, a separator was installed to skim the runoff prior to discharge into an underground drain field, and a 5,000-gallon aboveground tank was installed to receive and store waste fuels prior to burning.

5. Polychlorinated Biphenyls (PCB)

The locations, number, and status of PCB-contaminated transformers at Richards-Gebaur AFB are shown below:

Building Location	Number of Transformers	Current Status	
		Active	Inactive
100	3-6	--	X
221	1	X	--
1,010	3	X	--

There are no PCB storage areas on-base; however, out-of-service transformers are being stored at the north electrical substation (Facility No. 950) adjacent to the bulf fuels storage area. At the time of the records search base visit, approximately 10 to 15 transformers were noted on the ground outside the substation fence. It was not known whether these transformers held PCB-contaminated oil. There was no indication of leakage from these transformers.

One small spill of PCB-contaminated oil occurred in 1979 in the basement of Building 100. The spill was contained on the concrete floor and cleaned up and removed by an independent contractor. No other spill of PCB-contaminated oil was reported.

6. Pesticides

Pesticides are in use at Richards-Gebaur AFB. Herbicide storage (Building 614) and application is under control of the Kansas City Aviation Department's field maintenance section. Herbicide application at the golf course is by independent contractor through the City of Belton. Pesticide application for control of termites, roaches, ants, rodents, etc., is handled by an independent non-military contractor.

Herbicides in current use on the base include 2,4-D (70 gal/year), Krovar (150 lb/year), Dipel (40 lb/year), Weed-Be-Gone (5 gal/year), Torton 10K pellets (20 lb/year), Round-Up (3 gal/year) and Embark 2S (3 gal/year).

No records were found of past herbicide usage; however, data on types and quantities of pesticides used as late as 1976 were located. Common chemicals in use at that time included Diazinon (36 gal/year), Malathion (220 gal/year), Chlordane (220 gal/year), Dursban (20 gal/year), Pyrethrin (480 cans/year), Diazinon Dust (250 lb/year), Warfarin (50 lb/year), Sevin (400 lb/year), and Vapona (10 cans/year). These pesticides were stored in Building 151 and control of their use was by the 1840th CES Entomology Detachment.

Standard procedures for disposal of empty pesticide containers have been to triple-rinse, crush, and discard the containers in trash receptacles.

The records search did not reveal any evidence of contamination due to present or past usage of pesticides. However, a site was identified at which an unknown herbicide was buried in 1971. The herbicide was reportedly contained in plastic jars and was reported to contain mercury. The site is discussed further in Section IV, B.

7. <u>Wastewater Treatment</u>

Treatment of approximately 176,000 gpd of combined sanitary and industrial wastewaters prior to discharge into Scope Creek (and ultimately into Little Blue River) is provided by a 0.55-mgd trickling filter plant constructed in 1954. The facility consists of a primary clarifier, two trickling filters, a secondary clarifier, two anaerobic digesters, sludge drying beds, and a chlorine contact basin.

From 1954 through 1980, the treatment plant was operated by the Air Force and then the Air Force Reserve. Since 1980, the plant has been supervised, maintained, and operated by the Kansas City Pollution Control Department. Discharge from the plant is authorized and is in compliance with NPDES Permit No. MO-0004961. Table 5 shows the permit limitations on BOD_5 and SS and the average effluent BOD_5 and SS reported during 1982.

Industrial wastewaters are pretreated prior to release into the treatment plant. Oil/water separators installed at major shop areas remove oil prior to wastewater entering the sewer system. Locations of the oil/water separators and installation dates (when available) are included in Appendix I.

Table 5
RICHARDS-GEBAUR AFB TREATED WASTEWATER
CHARACTERISTICS SUMMARY
(January-November, 1982)

Parameter	NPDES Permit Limit	Average	Maximum	Minimum
Flow, gpd	--	176,000	250,000	130,000
BOD_5, mg/l	30	20	30	5
SS, mg/l	30	14	22	6

Source: Kansas City Pollution Control Department (Monthly Reports).

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From 1954 to 1980, anaerobically digested sludge was disposed of through local farmers and other agricultural interests and is not considered a problem. For about 8 to 10 years during the 1960's some sludge was used as a soil/fertilizer supplement in a base nursery operation located at the southeast end of the main runway. Since taking over the wastewater plant operations in 1980, the Kansas City Pollution Control Department has been disposing of the sludge off-base. The sludge is not considered to be hazardous.

At the present time, an interceptor line which will connect Richards-Gebaur AFB to the new Little Blue River regional treatment plant is under construction. When the project is completed (anticipated in early 1983) all sanitary and industrial wastewater from Richards-Gebaur AFB will flow to the new regional plant, and operation of the existing treatment plant will be discontinued.

No evidence was found during the records search to suggest that hazardous material contamination exists from either past or present wastewater treatment operations.

8. Available Water Quality Data

There are no potable water supply wells at Richards-Gebaur AFB, and no known analyses of the shallow ground-water aquifers have been performed. Potable water is supplied by Kansas City.

The base storm drainage system consists primarily of open drainages and creeks with underground pipes primarily in the runway and flightline areas. Almost all of this drainage eventually flows to Scope Creek and exits the base to the east into the Little Blue River. Verbal reports during the records search indicated that farmers living downstream of the base along the Little Blue River had complained of "oil-slickened" cattle in the 1950s. In 1970, a water and air pollution report prepared by the Air Force indicated that oil scum was visible at times on the open areas of the storm drainage system, and that the water was murky with heavy growth of green algae and water plants within 400 to 500 feet of closed storm drain outlets. That study recommended various operational changes and pollution control measures and eventually resulted in the construction of an industrial waste system, which was completed in 1974. This system consists of a series of collector pipes that discharge to the storm drain following pretreatment in an oil/water separator.

The records search did not reveal analytical data, either past or current, concerning the water quality within the base creeks. Analyses of the storm drainage ditch at the wastewater treatment plant have been completed; however, the sampling locations are not precisely known and it is probable that the water quality data represents wastewater discharge from the treatment plant. At the time of the records search, no oil scum or algae growth was observed in the base storm drainage ditches or Scope Creek.

9. Other Activities

No information was found in the base files or through personnel interviews to indicate past testing or use of chemical or biological warfare agents at Richards-Gebaur AFB.

During the period that ADC was in command (1955-1970), nuclear weapons were stored on the base at the 1200 munitions area. Nuclear weapons were also stored at an off-base munitions storage area currently known as the Belton Training Annex. Nuclear materials or weapons have not been buried and are no longer stored at the base or at the Belton Training Annex (see Section VII).

Conventional explosive ordnance is sent offsite to Fort Leonardwood, Missouri. No site at Richards-Gebaur AFB has been used for disposal of explosive ordnance or of nuclear materials.

B. DISPOSAL SITES IDENTIFICATION AND EVALUATION

Interviews with past and present base personnel (Appendix C) resulted in the identification of disposal and spill sites at Richards-Gebaur AFB. A preliminary screening was performed on all the identified sites based on the information obtained from the interviews and available records from the base and outside agencies. Using the decision tree process described in the Methodology section, page I-4, based on all of the above information, a determination was made whether a potential exists for hazardous material contamination in any of the identified sites. For those sites where hazardous material contamination was considered significant, a determination was made whether significant potential exists for contaminant migration from these sites. These sites were then rated using the U.S. Air Force Hazard Assessment Rating Methodology (HARM), which was developed jointly by the Air Force, CH2M HILL, and Engineering-Science for specific application to the Air Force Installation Restoration Program. The HARM system considers four aspects of the hazard posed by a specific site: the waste and its characteristics, potential pathways for waste contaminant migration, the receptors of the contamination, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating. A more detailed description of the HARM system is included in Appendix D. A total of 9 sites were rated. Copies of the completed rating forms are included in Appendix J, and a summary of the hazard ratings for the 9 sites is given in Table 6.

Shallow wells for domestic supplies are known to exist in Jackson and Cass Counties; however, the exact locations and depths of nearby wells could not be accurately determined. For the purpose of these ratings, it was assumed that the nearest well was between 3,000 feet and 1 mile from each site and that the total population served by all wells within a 3-mile radius is between 50 and 1,000. Due to the nearness of Scope Creek, the ground water in the uppermost limestone aquifers (Wyandotte and Iola Formations) flows laterally directly to the creek. It was therefore assumed in the ratings that the uppermost aquifer is not used as a source of water. No surface-water supplies are known to exist within 3 miles downstream of the base.

The following is a description of each site, including a brief discussion of the rating results. Figure 6 shows the approximate locations of these sites. Figure 7 presents a summary of the approximate dates that the major sites were in use.

1. <u>Landfills</u>

Sanitary landfill sites at Richards-Gebaur AFB were used intermittently since 1954, although off-base contract disposal of most solid waste has been the primary means of disposal since 1956. The three landfill sites are described below.

- Site No. 1, the South Landfill, is located in the southern part of the base near the NDI lab and adjacent to Scope Creek. Between 1954 and 1956 this site was the main sanitary landfill for Richards-Gebaur AFB. In 1956, off-base contract

Table 6
SUMMARY OF DISPOSAL SITE RATINGS

Site No.	Site Description	Subscore (% of Maximum Possible Score in Each Category) Receptors	Characteristics	Pathways	Factor for Waste Management Practices	Overall Score	Page Reference of Site Rating Form
1	South Landfill	38	48	80	1.0	55	J-1
2	Northeast Landfill	42	60	59	1.0	54	J-3
3	Contractor Rubble Burial Site	38	40	67	1.0	48	J-5
4	West Burn Pit	42	32	52	1.0	42	J-7
5	South Burn Pit	38	48	59	1.0	48	J-9
6	North Burn Pit	42	48	52	0.95	45	J-11
7	Radioactive Disposal Well	38	30	59	0.10	4	J-13
8	Herbicide Burial Site	41	60	52	1.0	51	J-15
9	Oil-Saturated Area	43	48	52	1.0	48	J-17

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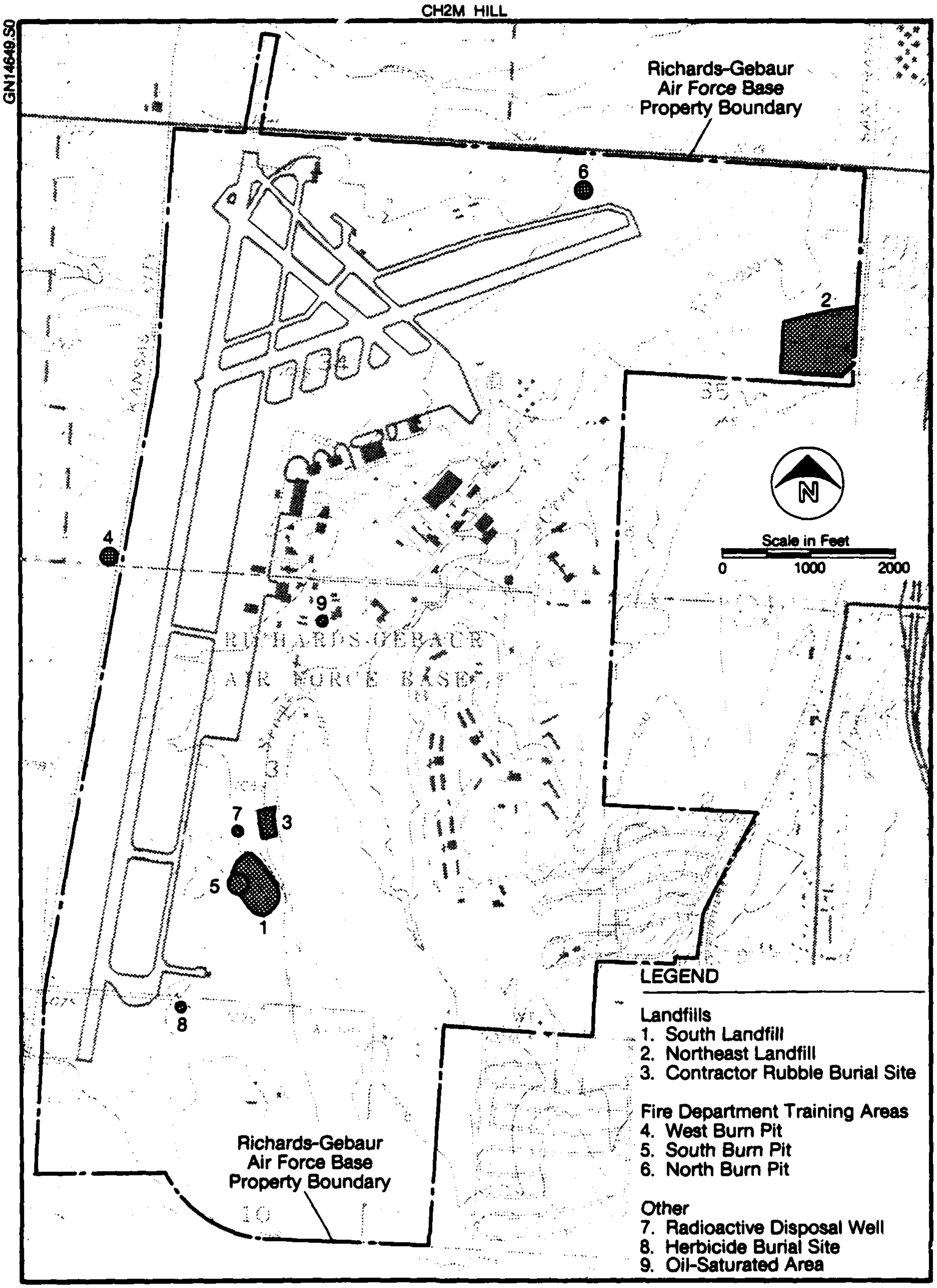

FIGURE 6. Identified disposal sites, Richards-Gebaur AFB, Missouri.

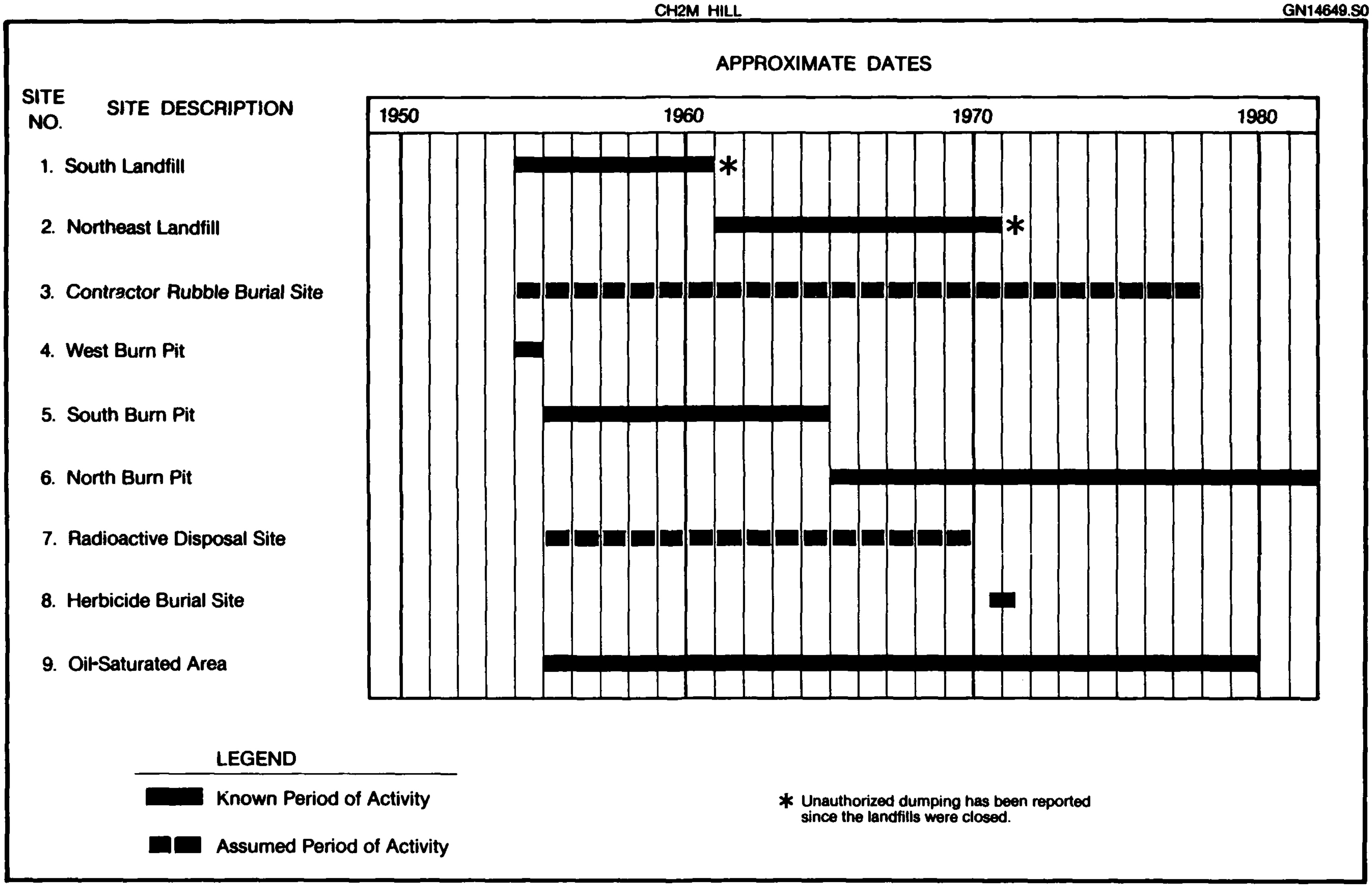

FIGURE 7. Historical summary of activities at major disposal sites.

disposal of most common refuse was begun, although some wastes, including building rubble, yard debris, and waste from some industrial shop areas were actively disposed of at the site until about 1961. Materials which may have been disposed of in the landfill include small quantities of waste paints, thinners, strippers, solvents, and oils, although this was not standard procedure. Operation of the landfill included burning of the wastes disposed. Since 1961, the area has been used only intermittently for unauthorized dumping. Due to recent incidents of unauthorized dumping, including cleaning of tar pots and some household waste dumping, an earthen barricade has been erected at the entrance to the site.

A small section of Scope Creek downstream of the site was observed to have a small oil sheen on the surface of the water, suggesting the presence of leachate; no oil sheen was observed upstream and no evidence of soil contamination was visible on the edges of the landfill. Small quantities of hazardous materials may have been placed in this landfill; however, no significant hazardous waste quantities were reported.

The overall rating score for Site No. 1 was 55. Although the receptors subscore was low due to the lack of critical environments or population near the site, the indirect evidence of migration of hazardous contaminants indicated by possible leachate resulted in a high pathway subscore (80) and raised the overall rating.

- Site No. 2, the Northeast Landfill, is located in the northeast portion of the base alongside Scope

Creek. The site was used between about 1961 and 1971 for the disposal of miscellaneous wastes including building rubble, yard debris, and waste from some industrial shop areas. The wastes were typically burned and buried in trenches. Most of the sanitary wastes at Richards-Gebaur AFB were disposed of off-base through contract removal during this time. One interviewee reported that disposal of waste paints and paint thinners at the site by spreading the wastes on the ground surface had been practiced in the past as late as 1978. The eastern portion of the site has been used for open storage of materials including construction materials, pipes, empty tanks, waste paint and thinners in drums and buckets, and empty 55-gallon drums. Over 400 55-gallon drums are currently stored at the site, most of which are empty, and some of which contain unknown contents.

The site received an overall rating score of 54 due primarily to the known disposal of hazardous wastes and a moderate potential for surface-water migration of contaminants off-base.

- Site No. 3, the Contractor Rubble Burial Site, is also located adjacent to Scope Creek, just west of the golf course alongside Walker Road. The site was used intermittently during the time the regular Air Force was active on the base, between 1954 and 1978. The site was used primarily for disposal of contractor rubble and debris, although household debris was visible in the exposed portions of the landfill. One interviewee indicated that the site was also used as a sanitary landfill in lieu of Site No. 1 prior to 1961. The site has an overall rating score of 48; low subscores in the receptors and waste characteristics categories were due to the lack of critical environments or population near the site, and the suspected disposal of small quantities of hazardous wastes. A moderate to high pathways subscore (67) was due to the proximity of Scope Creek and the steep banks of the landfill.

2. <u>Fire Department Training Areas</u>

- Site No. 4, the West Burn Pit, is located just north of the Cass County-Jackson County line and just west of the base property. The site was originally used for fire department training between 1954 and 1955, but was abandoned in 1955 when it was discovered that the site was located off-base. No significant quantities of residual hazardous waste materials are suspected at the site, resulting in a low overall score of 42.

- Site No. 5, the South Burn Pit, is located just west of the South Landfill near the NDI Lab and was used for fire department training between 1955 and 1965. Wastes used in training exercises included waste oils, solvents, and fuels. The wastes were stored in drums at the facility until training exercises were begun. The burn pit was unlined and had no oil/water separator. Small quantities of hazardous materials are known to have been disposed of at the site, resulting in a moderate overall score of 48.

- Site No. 6, the North Burn Pit, is located north of the flightline and has been used for fire department training since 1965. The burn pit was unlined and accepted waste oils, solvents, and fuels until about 1969. In 1969, the area was lined with a concrete slab and an oil/water separator was installed; only contaminated JP-4 fuel has been used in training exercises since 1969. The site received an overall rating score of 45 due to the known disposal of hazardous materials and the partial containment provided by the lined facility.

- Site No. 7, the Radioactive Disposal Well located west of Scope Creek in the southern portion of the base, was used intermittently between 1955 and about 1970 for disposal of low-level radioactive materials, primarily dosimeters. Levels of radioactivity in the vicinity of the well have been measured and found to be at or near background levels. The well has been tested and capped. An overall rating score of 4 is due to the low levels of radioactivity and full containment of small waste quantities.

3. <u>Other Sites</u>

- Site No. 8, the Herbicide Burial Site located at the south end of the runway, is an area where about 4 cases of a mercury-containing herbicide in plastic pint-sized bottles were buried in 1971. An overall score of 51 reflects the known disposal of hazardous materials at the site and a moderate potential for surface water migration; however, the small quantity of herbicide (estimated to be less than 50 pounds) and the low-permeability clay soils indicate a low potential for ground-water contamination or migration.

- Site No. 9, an Oil-saturated Area, is located west of Building 704. The area was previously used for storage of waste POL products by the Motor Pool. When Kansas City took over operations in 1980, the ground was reportedly so soft as a result of the oil saturation that they spread gravel over the ground surface to stabilize it. A small patch of oil-contaminated ground was noted at the ground surface at the edge of the gravel during the records search base visit. The site received a rating of 48 due to the known disposal of small quantities of POL products, and a moderate potential for surface-water migration.

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V. CONCLUSIONS

V. CONCLUSIONS

A. No direct evidence was found to indicate that migration of hazardous contaminants exists within or beyond Richards-Gebaur AFB boundaries. Indirect evidence of contamination was found at Site No. 1, the South Landfill, (a small oil sheen on the adjacent surface water).

B. Information obtained through interviews with 27 past and present base personnel, base records, shop folders, and field observations indicate that hazardous wastes have been disposed of on Richards-Gebaur AFB property in the past.

C. The potential for migration of hazardous contaminants exists because of the presence of a perched ground-water table with direct discharge to nearby creeks. The presence of low-permeability clays and shales below the ground surface reduces the potential for hazardous contaminant migration vertically into the ground water but increases the potential for migration into nearby surface waters.

D. Table 7 presents a priority listing of the rated sites and their overall scores. The following sites were designated as areas showing the most significant potential (relative to other Richards-Gebaur sites) for environmental impact.

1. <u>Site No. 1 (South Landfill)</u>

   This site was the main base sanitary landfill--used continuously from 1954 until 1956 and intermittently through 1982. From 1954 until about 1961 wastes, including building rubble, yard

Table 7
PRIORITY LISTING OF DISPOSAL SITES

Site No.	Site Description	Overall Score
1	South Landfill	55
2	Northeast Landfill	54
8	Herbicide Burial Site	51
3	Contractor Rubble Burial Site	48
5	South Burn Pit	48
9	Oil-Saturated Area	48
6	North Burn Pit	45
4	West Burn Pit	42
7	Radioactive Disposal Well	4

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debris, and waste from some industrial shop areas, were actively disposed of at this site. The probable path of migration of contaminants, if present at Site No. 1, is vertically downward to the perched ground-water table, then laterally eastward to discharge into Scope Creek. The relatively thick, impervious Lane Shale underlies the site and effectively restricts vertical movement of ground water. During the site visit a small oil sheen, suggesting the presence of leachate, was observed on the surface of a small area of Scope Creek just downstream of the landfill site; no oil sheen was observed upstream. No visible evidence of soil contamination was observed on the banks of Scope Creek at the edge of the landfill. Scope Creek flows through the base and eventually discharges into the Little Blue River, thereby providing a pathway for any hazardous contaminants in the leachate, if present, to enter surface-water bodies and migrate beyond base property.

2. Site No. 2 (Northeast Landfill)

This site was reportedly used between 1961 and 1971 for disposal of miscellaneous waste, including building rubble, yard debris, and wastes from some industrial shop areas. Reportedly, disposal of some waste paint and thinners by spreading of the liquid wastes onto the ground surface has been practiced at this site. Materials in open storage at the site currently include construction rubble, pipes, empty tanks, waste paints and thinners in drums and buckets, and empty 55-gallon drums. Of over 400 drums currently at the site, some contain unknown contents. The probable path of migration of contaminants is vertically downward to the perched water table present in the alluvial soils alongside Scope Creek, then laterally southeastward to discharge into Scope Creek. The relatively thick, impervious Chanute Shale underlies the site and effectively restricts vertical movement of ground water. Because of the known disposal of hazardous wastes at the site and the proximity of the site to Scope Creek, there is a moderate potential for migration of hazardous contaminants off-base.

E. The remaining rated sites (Sites No. 3, 4, 5, 6, 7, 8, and 9) are not considered to present significant environmental concerns.

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VI. RECOMMENDATIONS

VI. RECOMMENDATIONS

A. PHASE II PROGRAM

A limited Phase II monitoring program is suggested to confirm or rule out the presence and/or migration of hazardous contaminants. The priority for monitoring at Richards-Gebaur is considered moderate since no imminent hazard has been determined.

Tables 8 and 9 present a summary of recommended monitoring sites, parameters to be measured, and the rationale for the analyses. Specifically, monitoring is recommended for the South Landfill (Site No. 1) and the Northeast Landfill (Site No. 2).

1. South Landfill (Site No. 1)

It is recommended that the adjacent creek (Scope Creek) be monitored upstream and downstream of the site to determine if hazardous contaminants are leaching into the creek. The water samples should be analyzed for the parameters indicated in Table 8. The stream should be sampled on two occasions at least 30 days apart to determine the presence of contaminants.

2. Northeast Landfill (Site No. 2)

It is recommended that one shallow monitoring well be installed downgradient of the site to determine if hazardous contamination is present in the area ground water. The well should be drilled to the depth of the top of the underlying Chanute shale (approximately 30 feet deep at this site) and screened from the top of the shale to within

Table 8
RECOMMENDED ANALYSES

Sample Type	Volatile Organic Compounds (VOC)	Heavy Metals	Pesticides	Phenols	pH, Specific Conductance COD, TOC, and Oil and Grease
Surface Water					
South Landfill (Site No. 1)	X	X	X	X	X
Monitoring Well					
Northeast Landfill (Site No. 2)	X	X	X	X	X

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Table 9
RATIONALE FOR RECOMMENDED ANALYSES

Parameter	Rationale
Volatile Organic Compounds (VOC)	Organic solvents used on-base
Heavy Metals (lead, nickel, chromium, cadmium, and silver)	Potential sources identified (leaded fuel, battery acid, and electrolyte, paint, photographic chemicals)
Pesticides	Commonly used at Richards-Gebaur AFB in the past and empty containers disposed of in landfills
Phenols	Phenolic cleaner and paint stripper used on base
pH, Specific Conductance COD, TOC, and Oil and Grease	Indicators of non-specific contamination

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5 feet of the ground surface. The well should be analyzed for the parameters indicated in Table 8. The well should be sampled on two occasions at least 30 days apart to determine the presence of contaminants.

B. OTHER ENVIRONMENTAL RECOMMENDATIONS

Other recommendations developed as a result of the records search include the following:

1. The status of abandoned POL storage tanks is not clear. Various tanks were reported as abandoned, but information was unclear as to whether the tanks had been deactivated according to procedure or simply abandoned. It is recommended that a survey be made to determine the current status of these tanks, e.g., whether they are empty, filled with water, contain residual POL, or are properly deactivated. Tanks should be locked to prevent unauthorized use.

2. The various containers stored aboveground at the Northeast Landfill should be inspected to determine the nature of their contents (old paints, thinners, POLs, etc.). If verified to contain potentially hazardous contaminants, the contents should be disposed of at an authorized hazardous waste facility.

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VII. OFF-BASE INSTALLATION

VII. OFF-BASE INSTALLATION

The Belton Training Annex is located approximately 5 to 6 miles south of Richards-Gebaur AFB and 1 mile east of Route D. This is a 472-acre land area, octagonal in shape, that covers nearly all of Section 34 in Township 46 North and Range 33 West.

The area was acquired by the Air Defense Command in 1955 for use as an ammunitions storage area from 1955 to 1970. Four ammo bunkers still exist at the site. It was during this time that nuclear armed rockets were stored at the site. There is no ordnance of any type stored or buried at the annex, and the site has not been used for explosive ordnance disposal.

The Annex was inactive after ADC left (1970) and was not in use again until the Air Force Reserve activated it in 1977 as a drop zone for practice drop of equipment and personnel.

The records search did not reveal evidence of any past disposal sites or spills at the Belton Training Annex and, therefore, no Phase II activities are recommended.

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LIST OF ACRONYMS, ABBREVIATIONS,
AND SYMBOLS USED IN THE TEXT

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS USED IN THE TEXT

ADC	Air Defense Command
AFB	Air Force Base
AFCC	Air Force Communications Command
AFESC	Air Force Engineering and Services Center
AFFF	Aqueous Film-Forming Foam
AFRCE	Air Force Regional Civil Engineering
AFRES	Air Force Reserve
AG	Aboveground
AGE	Aerospace Ground Equipment
AVGAS	Aviation Gasoline
BG	Belowground
Bldg.	Building
bls	Below Land Surface
BOD_5	Biochemical Oxygen Demand (5-day)
BTM	Belton Tool Manufacturing (Company)
CAMS	Consolidated Aircraft Maintenance Squadron
CE	Civil Engineering
CES	Civil Engineering Squadron
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	Centimeter
COD	Chemical Oxygen Demand
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DO	Dissolved Oxygen
DoD	Department of Defense
DPDO	Defense Property Disposal Office
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
°F	Degrees Fahrenheit
FBO	Fixed-Base Operator
ft/day	Feet per Day
ft/ft	Feet per Foot
ft/min	Feet per Minute
gal/mo	Gallons per Month

gal/yr	Gallons per Year
gpd	Gallons per Day
gpm	Gallons per Minute
HARM	Hazard Assessment Rating Methodology
IRP	Installation Restoration Program
JP	Jet Petroleum
KCAD	Kansas City Aviation Department
lb/yr	Pounds per Year
LSI	Lear Siegler, Inc.
Max.	Maximum
mg/l	Milligrams per Liter
mgd	Million Gallons per Day
Min.	Minimum
mo.	Month
MOGAS	Motor Gasoline
mph	Miles per Hour
msl	Mean Sea Level
NDI	Non-Destructive Inspection
No.	Number
NPDES	National Pollutant Discharge Elimination System
OEHL	Occupational and Environmental Health Laboratory
PCB	Polychlorinated Biphenyl
POL	Petroleum, Oil, and Lubricants
ppb	Parts per Billion
RCRA	Resource Conservation and Recovery Act
sec	Second
TAC	Tactical Air Command
TCE	Trichloroethylene
TFG	Tactical Fighter Group
TOC	Total Organic Carbon
TOX	Total Organic Halogen
USAF	United States Air Force
USDA	United States Department of Agriculture
μg/l	Microgram per Liter
VOC	Volatile Organic Compound

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GLOSSARY OF TERMS

AD-A126 605 INSTALLATION RESTORATION PROGRAM RECORDS SEARCH FOR RICHARDS-GEBAUR AIR FORCE BASE MISSOURI(U) CH2M HILL GAINESVILLE FL MAR 83 F08637-80-G-0010

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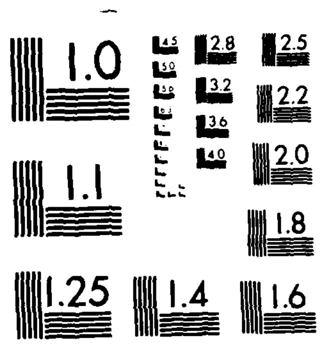

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

GLOSSARY OF TERMS

1. AFFF (Aqueous Film Forming Foam) - A non-corrosive, biodegradable fluorocarbon surfactant with foam stabilizers used to smother flames.

2. ALLUVIUM - A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material deposited during comparatively recent geologic time by a stream or other body of running water as a sorted or semisorted sediment in the bed of the stream or on its flood plain or delta.

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

4. CONFINING STRATA - A strata of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

5. CONTAMINANT - As defined by section 104(a)(2) of CERCLA, 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.

6. DEVELOPER - A chemical used to make images visible on exposed film; typically sodium hydroxide or sodium sulfite.

7. DISCHARGE - The process involved in the draining or seepage of water out of a ground-water aquifer.

8. DOSIMETER - A device for measuring very small quantities of radiation a person has absorbed.

9. DOWNGRADIENT - A direction that is hydraulically down slope; the direction in which ground water flows.

10. EMULSIFIER - A substance used to hold very fine oily or resinous liquid suspended in another liquid; in photography, a suspension of silver salt in gelatin used to coat plates and film.

11. EVAPOTRANSPIRATION - Evaporation from the ground surface and transpiration through vegetation.

12. FIXER - A solution containing silver used in photography to stabilize images on film.

13. FLOOD PLAIN - The relatively smooth valley floors adjacent to and formed by alluviating rivers which are subject to overflow.

14. GROUND WATER - All subsurface water, especially that part that is in the zone of saturation.

15. HAZARDOUS WASTE - A solid waste which 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 irreversible or incapacitating reversible, illness; or

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

16. INTERMITTENT STREAM - A stream or reach of stream that flows only at certain times of the year and is therefore temporarily or seasonally dry.

17. LEACHATE - A solution resulting from the separation or dissolving of solid or hazardous material by percolation of water through the material.

18. LOESS - An unconsolidated deposit of windblown dust of glacial age, usually calcareous and unstratified and consisting primarily of silt-sized particles.

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

20. NET PRECIPITATION - Mean annual precipitation minus mean annual evapotranspiration.

21. OIL/WATER SEPARATOR - A man-made facility designed to separate by gravity liquids of differing densities; typically to skim oil or grease from a water surface.

22. ORDNANCE - Any form of artillery, weapons, or ammunition used in warfare.

23. OUTCROP - That part of a geologic formation that appears at the surface of the Earth or bedrock that is covered only by surficial deposits such as residual soils, alluvium, or loess.

24. PCB (Polychlorinated Biphenyl) - A chemically and thermally stable toxic organic compound that, when introduced into the environment, persists for long periods of time, is not readily biodegradable, and is biologically accumulative.

25. PD 680 - A petroleum distillate used as a safety cleaning solvent. Two types of PD-680 solvent have been used; Type I, having a flashpoint of 100°F, and Type II, having a flashpoint of 140°F.

26. PENETRANT - A petroleum-based fluorescent dye.

27. PERCHED GROUND WATER - Unconfined ground water separated from an underlying regional ground-water table.

28. 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.

29. POTENTIOMETRIC SURFACE - An imaginary surface that represents the static head of ground water and is defined by the level to which water will rise in a cased well.

30. RECHARGE - The process involved in the addition or replenishment of water to a ground-water aquifer.

31. SEDIMENTARY ROCK - A rock resulting from the consolidation of loose sediment that has accumulated in layers; typical examples include sandstone, siltstone, limestone, and shale.

32. STRATA - Distinguishable horizontal layers separated vertically from other layers.

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

34. UPGRADIENT - A direction that is hydraulically up slope.

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

36. WETLAND - An area subject to permanent or prolonged inundation or saturation which exhibits plant communities adapted to this environment.

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REFERENCES

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APPENDIXES

Appendix A
RESUMES OF TEAM MEMBERS

DAVID M. MOCCIA

Education

B.S., Chemical Engineering, University of Florida, 1971

Experience

Mr. Moccia joined CH2M HILL in 1971 and is currently the Manager of the Chemical Processes Department. He is responsible for projects involving water treatment in the power industry, energy production, and industrial in-plant reuse/recycle processes. Since joining the firm, Mr. Moccia has participated in a wide variety of projects, including facility evaluations, pilot studies, and conceptual and engineering design for municipal and industrial wastewater treatment facilities.

Examples of Mr. Moccia's project-related experience include the following:

- Project management for design of three poultry process wastewater treatment facilities for Perdue, Inc.
- Project management for design of a biological-chemical wastewater treatment system for a tank car cleaning and maintenance facility for General American Transportation Corporation in Waycross, Georgia.
- Preliminary engineering for a 3.0-mgd reverse-osmosis water treatment plant for the Englewood Water District, Englewood, Florida.
- Process responsibilities for design of a 9.5-mgd activated sludge treatment plant, including sludge thickening and dewatering, for the City of Alexander City, Alabama.
- Preliminary design for a sludge drying and pelletizing facility for the City of Naples, Florida.

Professional Engineer Registration

Florida, Georgia, North Carolina

Membership in Organizations

Florida Engineering Society
Florida Pollution Control Association
National Society of Professional Engineers
Water Pollution Control Federation
Tau Beta Pi

BRUCE JAMES HAAS
Manager, Geotechnical Engineering

Education

M.S., Civil Engineering, University of Wisconsin, 1976
B.S., Civil Engineering, University of Wisconsin, 1975
Studies as exchange student, Technische Universitat, Munich, West Germany, 1974-1975

Experience

Mr. Haas is responsible for field explorations and geotechnical investigations and for general earthwork design projects. His special knowledge of soils, sitework, and construction procedures has been instrumental in developing numerous efficient and economical civil engineering designs. Project experience includes site development, grading and drainage, streets and roadways, marinas, and hazardous waste disposal. Examples of project-related assignments include:

- Lead civil engineer in charge of stormwater management, site development, and geotechnical review for the new 130-mgd West County Wastewater Treatment Plant for the Louisville and Jefferson County Metropolitan Sewage District, Louisville, Kentucky.
- Geotechnical engineer responsible for geohydrologic reviews of various hazardous waste disposal facilities for the Agrico Chemical Company. The project involved assessment of ground-water pollution potential, design of monitoring systems, and preparation of closure and post-closure plans for agricultural chemical plants in Oklahoma, Louisiana, and Florida.
- Design geotechnical engineer and resident inspector for a 6-mgd wastewater treatment plant for the Grand Strand Water and Sewer Authority, Conway, South Carolina. Plant facilities and the 3,000-foot-long effluent pipeline were supported by timber piles.
- Civil and geotechnical engineer for marina improvements at the Oyster Water-Based Recreation Facility located in the tidal marshes of Northampton County, Virginia.
- Resident inspector for stabilization and reconstruction of existing sludge lagoon dikes for the Madison, Wisconsin, Metropolitan Sewerage District. This project involved the use of fabric reinforcement and light-weight wood chip fill for dikes located on highly compressible, low-strength marsh deposits.

Mr. Haas has performed foundation investigations and geotechnical designs for numerous major water and wastewater treatment plants at the following locations:

- Walt Disney World, Florida
- St. Petersburg, Florida

BRUCE JAMES HAAS

- Suffolk, Virginia
- Howard County, Maryland
- Harriman, Tennessee

These investigations have resulted in safe, economical design of foundation systems involving spread footings, piles, and construction preloads.

Professional Engineer Registration

Florida, Wisconsin

Membership in Organizations

American Society of Civil Engineers

Publications

"Proposed Criteria for Interpreting Stability of Lakeshore Bluffs," Engineering Geology, 1980, with T. B. Edil.

■ ELIZABETH E. DODGE
Environmental Scientist

Education

M.S., Environmental Health Engineering, Notre Dame University, 1978
M.S., Aquatic Biology, Notre Dame University, 1976
B.S., Biology, Mary Washington College, 1974

Experience

Ms. Dodge's responsibilities as an environmental scientist specializing in the areas of water chemistry and aquatic biology include technical and managerial contributions to a variety of projects including:

- Water quality management studies of the Anacostia River watershed, Maryland.
- Dynamic modeling of waste load nitrification effects in the Bush River (Maryland), a subestuary of the Chesapeake Bay.
- Survey and analysis of oxygen demand of macrobenthic invertebrates in the Alabama River, Alabama.
- Environmental assessment of water quality, aquatic biology, and public health impacts of a large project to upgrade the wastewater conveyance and treatment system of Milwaukee, Wisconsin.
- Water quality and biological field sampling and environmental assessment for expansion of an 80 mgd wastewater treatment facility discharging to Lake Michigan.
- Identification and evaluation of hazardous waste disposal sites at MacDill and Avon Park Air Force Bases, Florida.
- Stormwater management surveys of St. Louis, Missouri, streams.
- Statistical analysis of effects of backflows from three Chicago rivers on Lake Michigan water quality.

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Prior to joining CH2M HILL, Ms. Dodge contributed to studies on innovative lake reclamation methods. Her graduate research centered on the environmental chemistry and biological effects of toxic substances, particularly heavy metals.

Membership in Organizations

American Association for the Advancement of Science
American Water Resources Association
International Association for Great Lakes Research
Society of Women Engineers

ELIZABETH E. DODGE

Publications

"The Effect of Chemical Speciation on Copper Uptake by *Chironomus tentans*," with T.L. Theis. Environmental Science and Technology. Vol. 13. October 1979. pp. 1287-88.

"A Study of the Relationship Between Phytoplankton Abundance and Trace Metal Concentration in Eutrophic Lake Charles East, Indiana, Using Correlation Techniques," with D.F. Spencer and others. Proceedings of the Indiana Academy of Science. 1977.

Appendix B
OUTSIDE AGENCY CONTACT LIST

Appendix B
OUTSIDE AGENCY CONTACT LIST

1. U. S. Army Corps of Engineers
   Kansas City, Missouri
   John Moylan (Chief of Geology)
   816/374-3554

2. U. S. Environmental Protection Agency
   Kansas City, Missouri
   Glen Yager
   816/374-5593

3. U. S. Fish and Wildlife Service
   Kansas City, Missouri
   Lyle Stimmerman 816/374-6166
   Fay Grogan 816/356-2280

4. U. S. Geological Survey
   Kansas City, Missouri
   816/254-5824

5. U. S. Soil Conservation Service
   Cass County, Missouri
   816/884-3391

6. U. S. Soil Conservation Service
   Jackson County, Missouri
   816/254-2040

7. U. S. Weather Bureau
   Kansas City, Missouri
   816/374-3427

8. Missouri Department of Conservation
   Kansas City, Missouri
   David Young
   816/885-5633

9. Missouri Department of Natural Resources
   Division of Geology and Land Survey
   Rolla, Missouri
   Carl Roberts, Oil and Gas Section Chief
   Don Miller, Ground Water Section Chief
   314/364-1752

10. Missouri Department of Natural Resources
    Kansas City, Missouri
    Jim McConathy
    816/274-6675

11. Pollution Control Department
    City of Kansas City, Missouri
    Bob Brown, Chief of Treatment
    816/274-1652

12. Missouri Department of Environmental Quality
    Water Supply Program
    Jefferson City, Missouri
    Jerry Lane
    314/751-3241

13. Jackson County Health Department
    Kansas City, Missouri
    816/881-4424

14. Cass County Health Department
    Cass County, Missouri
    816/884-5100

15. Missouri Division of Health
Kansas City, Missouri
Robert Fields
816/274-6385

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Appendix C
RICHARDS-GEBAUR AFB RECORDS SEARCH
INTERVIEW LIST

Appendix C

RICHARDS-GEBAUR AFB RECORDS SEARCH INTERVIEW LIST

No.	Organization	Area of Knowledge	Years at Installation
1	AFRES	Electrical Shop	29
2	AFRES	Electrical Shop	11
3	AFRES	Avionics	27
4	AFRES	Flightline	23
5	AFRES	AF Aircraft Maintenance	28
6	AFRES	Real Property	22
7	AFRES	Public Affairs	14
8	AFRES	Civil Engineering/Aircraft Maintenance (AF)	23
9	KCAD	Vehicle Maintenance	2
10	KCAD	Field Maintenance	2
11	KCAD	Field Maintenance	2
12	KCAD	Building Maintenance	1½
13	KCAD	Steam Plant	1
14	KCAD	Exterior Electric	2
15	KCAD	Pollution Control	2
16	Air Force	Bioenvironmental Engineering	1½
17	Air Force	Bioenvironmental Engineering	1
18	Air Force	Logistics Planning	4
19	Talley Services, Inc.	Fire Department	7
20	Talley Services, Inc.	Fire Department	31
21	Talley Services, Inc.	Supply	14
22	Talley Services, Inc.	Fuels Management	3
23	Retired	Fuels Management	4
24	Talley Services, Inc.	AF Civil Engineering	23

Appendix C--Continued

No.	Organization	Area of Knowledge	Years at Installation
25	BTM	Tool Manufacturing	2
26	Retired	AF Civil Engieneering	26
27	Transferred	AF Civil Engineering	6

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Appendix D
HAZARD ASSESSMENT RATING METHODOLOGY

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

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

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

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

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

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of

USAF OEHL, AFESC, various major commands, Engineering Science, and CH2M HILL met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

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

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

DESCRIPTION OF MODEL

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

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

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1). The site rating form is provided on Figure 2 and the rating factor guidelines are provided in Table 1.

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

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

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

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

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites at which there is 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 factor to the sum of the scores for the other three categories.

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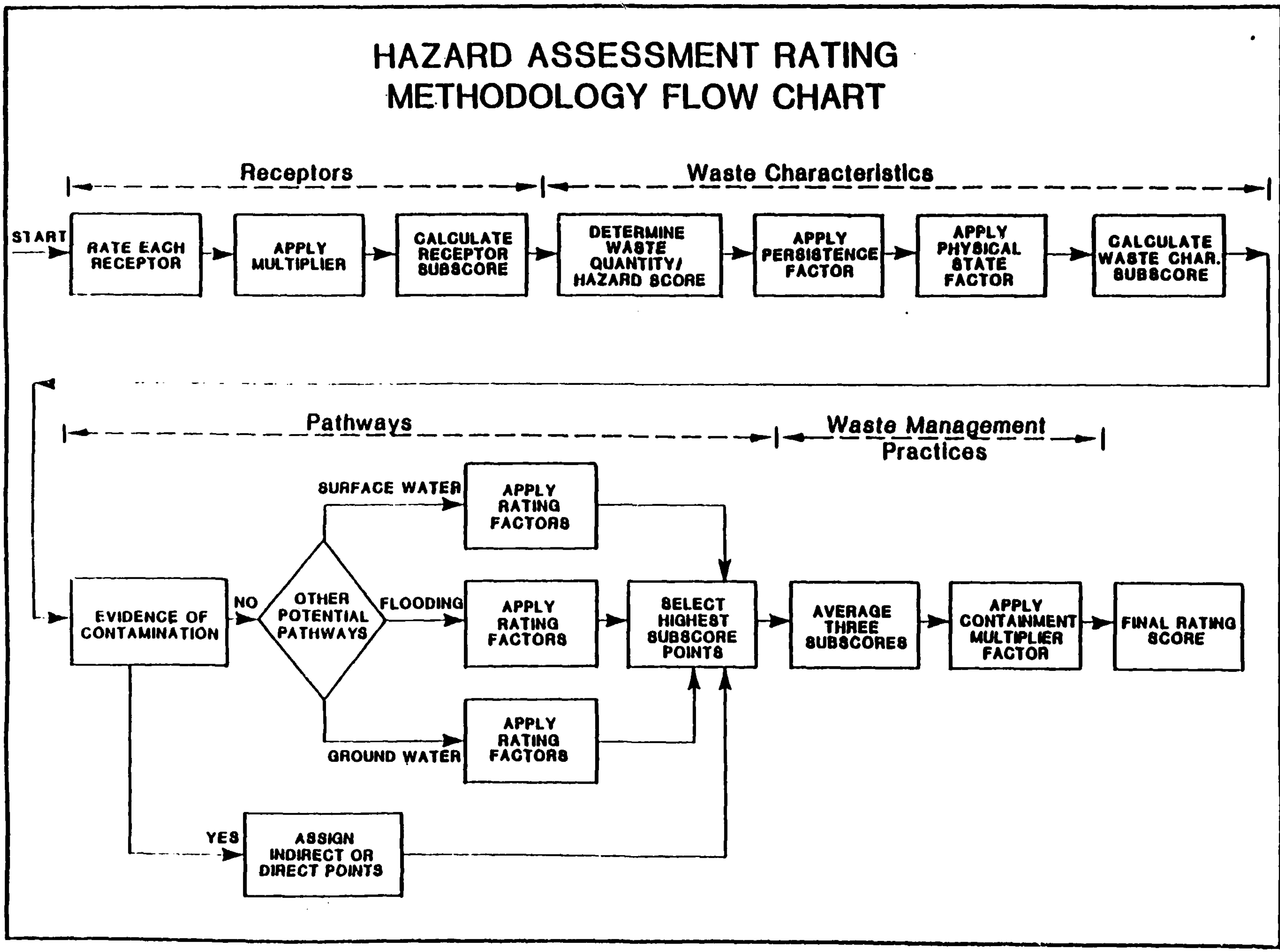
HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART
Receptors
Waste Characteristics
START
RATE EACH RECEPTOR
APPLY MULTIPLIER
CALCULATE RECEPTOR SUBSCORE
DETERMINE WASTE QUANTITY/ HAZARD SCORE
APPLY PERSISTENCE FACTOR
APPLY PHYSICAL STATE FACTOR
CALCULATE WASTE CHAR. SUBSCORE
Pathways
Waste Management Practices
SURFACE WATER
APPLY RATING FACTORS
EVIDENCE OF CONTAMINATION
NO
OTHER POTENTIAL PATHWAYS
FLOODING
APPLY RATING FACTORS
SELECT HIGHEST SUBSCORE POINTS
AVERAGE THREE SUBSCORES
APPLY CONTAINMENT MULTIPLIER FACTOR
FINAL RATING SCORE
GROUND WATER
APPLY RATING FACTORS
YES
ASSIGN INDIRECT OR DIRECT POINTS

FIGURE 1

FIGURE 2

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 reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
		Subtotals	______	______

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

II. WASTE CHARACTERISTICS

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

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

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

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

______ X ______ = ______

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

______ X ______ = ______

III. PATHWAYS

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

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

Subscore ______

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

1. Surface water migration

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

Subtotals ______ ______

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

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 ______ = ______

Table 1
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 of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-15	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

Table 1--Continued

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 of 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

Table 1--Continued

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

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

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

C. Physical State Multiplier

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

Table 1--Continued

III. PATHWAYS CATEGORY

A. Evidence of Contamination

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

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

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 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 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	<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 25-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 ground water	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

Table 1--Continued

B-3 Potential for Ground-Water Contamination--Continued

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
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 located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

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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Appendix E
INSTALLATION HISTORY AND MISSION

Appendix E
INSTALLATION HISTORY AND MISSION

I. HISTORY

Richards-Gebaur Air Force Base, Missouri, an Air Force Reserve (AFRES) installation, is located 25 miles south of downtown Kansas City, Missouri, with access off U.S. Highway 71 (South).

The history of Richards-Gebaur AFB dates back to 1941 when a group of farms was acquired by Kansas City, Missouri, for use as an auxiliary airport. The acquisition of land totaling 2,400 acres continued until 1952.

During World War II, President Harry S. Truman utilized what was then called Grandview Airport for trips to his native home of Independence, Missouri, and other locations in the greater Kansas City area. During the "Kaw River flood" of 1951 Grandview Airport was used by commercial airlines unable to operate from the Downtown Kansas City Municipal Airport.

In 1952, the Aerospace Defense Command leased the airport from Kansas City for use of air defense operations. In November 1952 the voters of Kansas City approved a charter amendment which authorized the city government to convey Grandview Airport to the United States government.

In January 1953, Kansas City formally conveyed the property deed and title to the United States government; and on November 4, 1955, Headquarters U.S. Air Force issued General Order No. 91, Section V, which proclaimed Grandview Air Force Base a permanent U.S. Air Force installation.

Ceremonies redesignating the base as Richards-Gebaur AFB were held April 27, 1957 for memorializing two native

Kansas Citians, 1st Lt. John F. Richards and Lt. Col. Arthur W. Gebaur, Jr.

Lieutenant Richards joined the Air Service in 1917 and was assigned as a reconnaissance pilot to France, where he was killed September 26, 1918 while on an artillery spotting mission the first day of the Argonne offensive. Colonel Gebaur enlisted in the U.S. Army Air Force five days after Pearl Harbor and served as an instructor pilot during World War II. Recalled to active duty during the Korean Conflict, he qualified for jet aircraft and was killed August 29, 1952 over North Korea on his 99th F-84 mission.

The Aerospace Defense Command had the primary mission on-base until inactivation of 10th Air Force and the Western Region, North American Air Defense Command.

On July 1, 1970 the Air Force Communications Command (AFCC) assumed command of Richards-Gebaur AFB and relocated its headquarters from Scott AFB, Illinois. With reestablishment of Headquarters AFCC at Scott AFB, and inactivation of the host 1840th Air Base Wing, Richards-Gebaur became a Military Airlift Command base on October 1, 1977 with the 1607th Air Base Group as the host active duty unit.

A drastic reduction in the active duty and civilian forces on-base resulted in the host unit being redesignated the 1607th Air Base Squadron (ABS), which provided base operating support until a majority of those functions were assumed September 1, 1979 by a civilian contractor, Talley Services, Inc.

AFRES assumed operational control October 1, 1980 of Richards-Gebaur with the commander, 442nd Combat Support Squadron, also functioning as base commander. The 442 Tactical Fighter Group currently has the primary mission on the base. The remaining active duty support units are the 1879th Communications Squadron (AFCC) and Operating Location A, Detachment 19, 26th Weather Squadron (MAC).

An interim lease for a majority of the excessed base facilities and properties, and joint-use of the airport facility, both with Kansas City, Missouri, also became effective October 1, 1980. Identified base support functions are shared by Talley Services, Inc., and the City of Kansas City.

The 13 collocated AFRES units on-base have an authorized strength of 197 full-time Department of Air Force (DAF) civilian employees/reservists (Air Reserve Technicians), and 1,073 reservists. Other authorized DAF civilians include 98 for support of the primary AFRES mission, and 126 for other Air Force functions on-base, including the Consolidated Open Mess and billeting.

Other federal government agencies presently using base facilities include the U.S. Marine Corps (operation of the 241-unit former base officer housing area as an all-services, active duty, enlisted and officer housing area); U.S. Department of Agriculture's standardization division (use of the former base hospital); U.S. Navy Seabee Reserve Mobile Construction Battalion No. 15; 308th Psychological Operations Company and nine other U.S. Army Reserve units, in the former base exchange building; and the General Services Administration.

II. MISSION

The primary mission of the active duty Air Force, Talley Services, and Kansas City personnel is to provide base operating support for the AFRES 442nd Tactical Fighter Group which, equipped with 24 A-10 Thunderbolt II aircraft, has the primary mission on-base. Detailed mission statements for the various active Air Force and Air Force Reserve organizations are given below:

<u>442 Tactical Fighter Group (TFG)</u>

The mission of the 442 TFG is to:

- o Sustain a combat-ready posture capable of worldwide deployment.
- o Conduct close air support at forward operation locations with minimum support facilities.
- o Engage in joint antiarmor operations, battlefield interdiction, search and rescue missions.
- o Employ conventional munitions, including AGM-65 Maverick, against surface targets.

<u>442 Consolidated Aircraft Maintenance Squadron (CAMS)</u>

The mission of the 442 CAMS is to accomplish organizational and field level maintenance for 24 unit-assigned A-10 aircraft. In addition, the 442 CAMS also accomplished C-130 fuel cell rework as a central repair facility for all AFRES-assigned C-130 aircraft and other C-130 aircraft modification as dictated by command priorities. At the present time, the 442 CAMS is also supporting a Depot Field Team which is performing aircraft modification on all AFRES-assigned A-10 aircraft.

442 Weapons Systems Security Flight (WSSF)

The mission of 442 WSSF is to train Air Force Reserve personnel in the proper procedures regarding Aircraft Security and Limited Air Base Ground Defense.

442 Combat Support Squadron (CSS)

The mission of the 442 CSS is to support and train personnel of the 442 Tactical Fighter Group, and other collocated Air Force Reserve units, enabling individuals and units to be fully mission-ready if mobilized and deployed in support of the nation's Total Force.

442 Communications Flight (CF)

The 442 CF has both a peacetime and a wartime mission.

The peacetime mission is to provide normal Communications Electronics staff support to the 442 TFG Commander and to provide the Group with required communications services. These services include:

a. Managing the Group's COMSEC Education Programs.

b. Providing customer education in communications services.

c. Maintaining intrabase radio equipment, air to ground radio systems, public address and intercom systems, and tactical telephone systems.

d. Operating tactical fixed-station and tactical record communications systems.

The wartime mission of the 442nd Communications Flight is to operate and maintain telecommunications equipment at collocated operating bases (COBs) in Europe. The equipment is prepositional and maintained in "ready" status by AFCC readiness teams.

442 Tactical Hospital (TAC HOSP)

The mission of the 442 TAC HOSP is to provide immediate first aid and triage treatment, transportation of casualties, and coordination of private ambulance service.

935 Civil Engineering Squadron (CES)

The mission of the 935 CES is to:

- o Develop and maintain a highly skilled, mobile military combat engineering force capable of rapid response for contingency operations worldwide.

- o Develop and maintain a highly skilled, in-place military engineering force for direct combat support of CONUS and theater forces directly tasked in operations plans.

- o Provide supplementary training to ensure that military personnel are capable of performing direct combat tasks.

- o Develop and maintain USAFR Civil Engineering forces to complement active duty forces for direct combat support.

36 Aeromedical Evacuation Flight (AEF)

The mission of the 36th AEF is to provide aeromedical evacuation crew members that are trained and equipped to provide inflight medical care around the clock in intra-theater tactical airlift aircraft which have been reconfigured for patient movement. The 36th AEF also provides a direct communication link and immediate coordination between the user service originating patients for aeromedical evacuation and the tactical aeromedical evacuation system. The flight is Military Airlift Command gained.

77/78 Mobile Aerial Port Squadrons (MAPS)

The mission of the 77/78 MAPS(s) is to provide mobile terminal facilities in support of airlift forces. Mobile terminal operations include functions necessary to prepare cargo for aerial delivery and terminal services associated with airland operations at an airhead.

41 Aerial Port Squadron (APS)

The mission of the 41 APS is to operate fixed air terminal facilities at MAC aerial ports, to operate mobile terminal facilities as required to support MAC airlift operations, and to manage commercial transportation facilities. Fixed terminal facilities operations include all services required for effective movement of passengers, mail, and cargo by military or military contract aircraft. Mobile terminal operations include functions required to prepare cargo for aerial delivery modes and the terminal services associated with airlanded operations in an airhead.

1879 Communications Squadron (CS)

The mission of the 1879 CS is to manage, operate, and maintain the ground Communications-Electronics and Air Traffic Control services/facilities in support of the 442 Tactical Fighter Group at Richards-Gebaur AFB.

Operating Location A, Detachment 19, 26th Weather Squadron (WS)

The mission of OL-A, DET 19, 26 WS is to perform a basic weather watch in a limited-duty weather station; make visual and instrumental observations of weather conditions; evaluate, record, and transmit observations over teletype and electrowriter; issue observed met watches; disseminate centrally prepared weather warnings and terminal forecasts to on-base agencies; and assist assigned and transit aircrews with current and forecast conditions.

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Appendix F
MASTER LIST OF INDUSTRIAL ACTIVITIES

Appendix F
MASTER LIST OF INDUSTRIAL ACTIVITIES

Organization/Shop Name	Present Location and Dates (Bldg. No.)	Past or Alternate Location and Dates (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Current Treatment/Storage/Disposal Method
AFRES					
Pneudraulics/Environmental	918 1957-Pres.	940 1955-1971 821 1954-1957	X	X	Holding tank/contract disposal
Wheel/Tire	918 1971-Pres.	940 1955-Pres. 821 1954-1971	X	X	Drums to holding tank/contract disposal
Machine	918 1957-Pres.	940 1955-1971 821 1954-1957			
Electric/Battery	918 1957-Pres.	940 1955-1971 821 1954-1957	X		Neutralized; to sanitary sewer
Docks & Inspection	918 1957-Pres.	940 1955-1971 821 1954-1957			
Sheet Metal/Welding	918 1957-Pres.	940 1955-1971 821 1954-1957			
Reclamation and Repair	918 1957-Pres.	940 1955-1975 821 1954-1957			
NDI Lab	839 1961-Pres.		X	X	Drums to DPDO
Parachute and Fabric	801 1954-Pres.				
Engine/Prop	927 1959-Pres.	940 1955-1975 821 1954-1959	X	X	Bowser/contract disposal
Avionics	930 1961-Pres.	940 1955-1974 821 1954-1961			
Instrument/Auto Pilot	930 1961-Pres.	940 1955-1971 821 1954-1961			
Aerospace Ground Equipment	958 1963-Pres.	940 1955-1963 822 1960-1978	X	X	Holding tank/contract disposal
Corrosion Control	948 1973-Pres.	918 1957-1978	X	X	Drums/contract disposal
Fuel Systems	948 1963-Pres.	940 1955-1963			
Munitions	1202 1982-Pres.	1202 1961-1971			
Gun Shop	828 1982-Pres.	828 1958-1971			
Loading	940 1982-Pres.				
Photo Lab	106 1954-1980				
Lear Siegler, Inc.					
Fuel Cell	940 1982-Pres.				
Fuel Cell	965 1966-Pres.		X	X	Bowser/fire department training
Fuel Cell	966 1966-Pres.		X	X	Bowser/fire department training
Talley Services, Inc.					
PME Lab	925 1962-Pres.				
Hobby Shop	426 1965-Pres.				
Golf Course	354 1966-Pres.				
Liquid Fuels	1015 1952-Pres.				
Fuels Lab	1015 1952-Pres.				
Fire Department	900 1954-Pres.	1021 1951-1954			
Supply	610 1953-Pres.				

Appendix F--Continued

Organization/Shop Name	Present Location and Dates (Bldg. No.)	Past or Alternate Location and Dates (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Current Treatment/Storage/Disposal Method
Kansas City Aviation Dept.					
Carpenter Shop	605 1953-Pres.				
Interior and Exterior Heat	605 1953-Pres.				
Paint	605 1953-Pres.				
Pest Control	614 1980-Pres.	151 1954-1980			
Plumbing	605 1953-Pres.				
Refrigeration	605 1953-Pres.				
Roads and Grounds	605 1953-Pres.				
Sanitation	605 1953-Pres.				
Sheet Metal	605 1953-Pres.				
Steam	514 1954-Pres.	942 1955-1975 948 1963-1975 821 1954-1975 965 1966-1975			
Vehicle Maintenance	704 1954-Pres.		X	X	Holding tank/contract disposal
Refueling Vehicle Maintenance	711 1968-Pres.		X	X	Holding tank/contract disposal
Belton Tool Manufacturing Co.	612 1980-Pres.				
Former (ADC, AFCC)		612 1957-1970			
442 MAPS					
Mobile Aerial Port Squadron	940 1978-Pres.				
303 TFS					
Life Support	710 1954-Pres.				
1879 Communications Squadron	105 1954-Pres. 901 1954-Pres. 925 1962-Pres.				
U.S. Navy Seabees	1980-Pres.				
U.S. Army	330 1980-Pres.				
U.S. Dept. of Agriculture	221 1980-Pres.				

Appendix G
INVENTORY OF EXISTING
POL STORAGE TANKS

Appendix G
INVENTORY OF EXISTING POL STORAGE TANKS AT
RICHARDS-GEBAUR AFB, MISSOURI

Facility/ Location	Type POL	Capacity (gal)	Aboveground (AG) Belowground (BG)
151	Diesel	1,500	AG
330	Diesel	5,000	Unknown
514	Fuel Oil	50,000 (4 each)	BG
	Fuel Oil	50,450 (2 each)	BG
611	Waste Oil	2,000	BG
702	MOGAS	10,000 (2 each)	BG
711	Waste JP-4	5,000	BG
	Waste Oil	1,000	BG
821	Waste Oil	15,000	BG
828	Fuel Oil	1,500	Unknown
831	MOGAS	1,000 (2 each)	Unknown
839	Diesel	4,000	BG
921	Diesel	1,000	AG
945	JP-4	500 (2 each)	AG
	Waste PD 680,	1,000 (2 each)	AG
	paint thinner, misc. POLs		AG
955	JP-4	187,000	AG
957	JP-4	210,000	AG
958	Waste PD 680, paint thinner, misc. POLs	500	AG
963	MOGAS	500	Unknown
964	MOGAS	500	Unknown
966	Waste Oil	1,000	BG
	Waste Oil	12,000	BG
1010	Fuel Oil	2,500	BG
	MOGAS	500	BG
1014	MOGAS	500	BG
1016	Fuel Oil	1,000	Unknown
1020	Fuel Oil	2,000	Unknown
1025	Fuel Oil	1,000	BG
	MOGAS	275	BG
1030	Diesel	500	BG
1033	Waste JP-4	5,000	AG
1100	Fuel Oil	500	Unknown
1106	Fuel Oil	1,000	Unknown
1201	Fuel Oil	3,000	BG
1202	Fuel Oil	1,500	BG
1301	Fuel Oil	4,000	BG
9610	MOGAS	10,000	AG
	Diesel	10,000	AG

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Appendix H
INVENTORY OF DEACTIVATED
POL STORAGE TANKS

Appendix H
INVENTORY OF DEACTIVATED POL STORAGE TANKS
AT RICHARDS-GEBAUR AFB, MISSOURI

Facility/ Location	Type POL Previously Stored in Tank	Capacity (gal)	Aboveground (AG) Belowground (BG)	Comments
125	MOGAS	4,000	BG	Deactivation procedures not verified.
	MOGAS	3,000 (4 each)	BG	
611	Diesel	30,000 (5 each)	BG	Tanks reported as abandoned; however, deactivation procedures not verified.
	Fuel Oil	30,000	BG	
901	Jet Fuel	25,000 (4 each)	BG	Reportedly abandoned in mid-1970s; however, deactivation procedures not verified.
927	Waste Oil	300	BG	Deactivation procedures not verified.
942	Fuel Oil	15,000 (2 each)	BG	Reported abandoned in 1976; however, deactivation procedures not verified.
948	Fuel Oil	6,000	BG	Reportedly abandoned and locked (1976).
954	Fuel Oil	260,000	AG	Reportedly has been "pickled."
956	AVGAS	304,500	AG	Reportedly has been "pickled."
1015	AVGAS	1,000	BG	Reportedly has been deactivated and filled with water.

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Appendix I
INVENTORY OF OIL/WATER SEPARATORS

Appendix I
INVENTORY OF OIL/WATER SEPARATORS

Facility No.	Facility Identification	Date Facility Constructed	Date of Separator Installation	Discharge
704	Motor Pool	1954	1973	Sanitary Sewer
711	Refueling Vehicle Maintenance	1968	1968	Sanitary Sewer
821	Fixed Base Operation	1954	1973	Sanitary Sewer
822	Former USAF AGE Shop (Vacant)	1960	1973	Sanitary Sewer
920	Vehicle Wash Rack	1955	1955	Sanitary Sewer
9470	Industrial Oil/Water Separator and Oil Storage Tank	1974	1974	Industrial Sewer
1033	Industrial Oil/Water Separator and Storage Tank at Fire Training Facility	1965	1969	Drainfield

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Appendix J
SITE RATING FORMS

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: 1. South Landfill

LOCATION: Richards-Gebaur AFB

DATE OF OPERATION OR OCCURRENCE: Continuous 1954-1961; Intermittent 1961-1982

OWNER/OPERATOR: Richards-Gebaur AFB

COMMENTS/DESCRIPTION: Primarily rubble; possible domestic refuse; oil/tar dumps

SITE RATED BY: Dave Moccia, Bruce Haas, Liz Dodge

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	1	10	10	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	2	6	12	18
			Subtotals	69	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 38

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) H

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

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

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

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 three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	16	24
		Subtotals	64	108
Subscore (100 x factor score subtotal/maximum score subtotal)				59
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	N/A	8	--	--
		Subtotals	30	90
Subscore (100 x factor score subtotal/maximum score subtotal)				33

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	38
Waste Characteristics	48
Pathways	80
Total 166 divided by 3 =	55
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

55 x 1.0 = **55**

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: 2. Northeast Landfill

LOCATION: Richards-Gebaur AFB

DATE OF OPERATION OR OCCURRENCE: Continuous 1961-1971; intermittent 1971-1982

OWNER/OPERATOR: Richards-Gebaur AFB

COMMENTS/DESCRIPTION: Reported rubble burial, land applied paint thinners; trash; visible drums with unknown contents

SITE RATED BY: Dave Moccia, Bruce Haas, Liz Dodge

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	1	10	10	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	2	6	12	18
			Subtotals	75	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 42

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) H

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

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

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

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	0
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	16	24
		Subtotals	64	108
Subscore (100 x factor score subtotal/maximum score subtotal)				59
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	N/A	8	N/A	--
		Subtotals	30	90
Subscore (100 x factor score subtotal/maximum score subtotal)				33

C. Highest pathway subscore

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

Pathways Subscore 59

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	42
Waste Characteristics	60
Pathways	59
Total 161 divided by 3 =	54
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

54 x 1.0 = 54

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: 3. Contractor Rubble Burial Site

LOCATION: Richards-Gebaur AFB

DATE OF OPERATION OR OCCURRENCE: Interim 1954-1978

OWNER/OPERATOR: Richards-Gebaur AFB

COMMENTS/DESCRIPTION: Contractor's rubble; household debris

SITE RATED BY: Dave Moccia, Bruce Haas, Liz Dodge

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	1	10	10	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	2	6	12	18
			Subtotals	69	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 38

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) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

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

40 x 1.0 = 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	
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	16	24
		Subtotals	72	108
Subscore (100 x factor score subtotal/maximum score subtotal)				67
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	1	8	8	24
Direct access to ground water	N/A	8	N/A	--
		Subtotals	30	90
Subscore (100 x factor score subtotal/maximum score subtotal)				33

C. Highest pathway subscore

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

Pathways Subscore 67

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	38
Waste Characteristics	40
Pathways	67
Total 145 divided by 3 =	48
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

48 x 1.0 = 48

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: 4. West Burn Pit

LOCATION: Richards-Gebaur AFB

DATE OF OPERATION OR OCCURRENCE: 1954-1955

OWNER/OPERATOR: Richards-Gebaur AFB

COMMENTS/DESCRIPTION: Fire Training Area 1954-1955

SITE RATED BY: Dave Moccia, Bruce Haas, Liz Dodge

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	1	10	10	30
F. Water quality of nearest surface-water body	1	6	6	18
G. Ground-water use of uppermost aquifer	0	9	0	27
H. Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	2	6	12	18
		Subtotals	76	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 42

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) S

3. Hazard rating (H = high, M = medium, L = low) H

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 0.8 = 32

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

32 x 1.0 = 32

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 three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	16	24
		Subtotals	56	108
Subscore (100 x factor score subtotal/maximum score subtotal)				52
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	N/A	--
		Subtotals	22	90
Subscore (100 x factor score subtotal/maximum score subtotal)				24

C. Highest pathway subscore

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

Pathways Subscore 52

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	42
Waste Characteristics	32
Pathways	52
Total 126 divided by 3 =	42
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

42 x 1.0 = 42

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: 5. South Burn Pit

LOCATION: Richards-Gebaur AFB

DATE OF OPERATION OR OCCURRENCE: 1955-1965

OWNER/OPERATOR: Richards-Gebaur AFB

COMMENTS/DESCRIPTION: Fire Training Area, 1955-1965

SITE RATED BY: Dave Moccia, Bruce Haas, Liz Dodge

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	1	10	10	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	2	6	12	18
			Subtotals	69	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 38

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) H

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

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

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

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	0
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	16	24
		Subtotals	64	108
Subscore (100 x factor score subtotal/maximum score subtotal)				59
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	N/A	N/A
		Subtotals	22	90
Subscore (100 x factor score subtotal/maximum score subtotal)				24

C. Highest pathway subscore

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

Pathways Subscore 59

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	38
Waste Characteristics	48
Pathways	59
Total 145 divided by 3 =	48
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

48 x 1.0 = 48

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: 6. North Burn Pit

LOCATION: Richards-Gebaur AFB

DATE OF OPERATION OR OCCURRENCE: 1965 - present

OWNER/OPERATOR: Richards-Gebaur AFB

COMMENTS/DESCRIPTION: Fire Training Area 1965 - present (modified in 1970)

SITE RATED BY: Dave Moccia, Bruce Haas, Liz Dodge

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	1	10	10	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	2	6	12	18
			Subtotals	75	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 42

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) H

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

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

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

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	0
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	16	24
		Subtotals	56	108
Subscore (100 x factor score subtotal/maximum score subtotal)				52
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	N/A	--
		Subtotals	22	90
Subscore (100 x factor score subtotal/maximum score subtotal)				24

C. Highest pathway subscore

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

Pathways Subscore 52

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	42
Waste Characteristics	48
Pathways	52
Total 142 divided by 3 =	47
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

47 x 0.95 = 45

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: 7. Radioactive Disposal Well

LOCATION: Richards-Gebaur AFB

DATE OF OPERATION OR OCCURRENCE: Constructed 1955; intermittent to present

OWNER/OPERATOR: Richards-Gebaur AFB

COMMENTS/DESCRIPTION: Disposal well for solid radioactive materials

SITE RATED BY: Dave Moccia, Bruce Haas, Liz Dodge

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	1	10	10	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	2	6	12	18
			Subtotals	69	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 38

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) L

Factor Subscore A (from 20 to 100 based on factor score matrix) 30

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

30 x 1.0 = 30

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

30 x 0.5 = 15

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 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	16	24
		Subtotals	64	108
Subscore (100 x factor score subtotal/maximum score subtotal)				59
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	3	8	24	24
Direct access to ground water	N/A	8	N/A	N/A
		Subtotals	46	90
Subscore (100 x factor score subtotal/maximum score subtotal)				51

C. Highest pathway subscore

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

Pathways Subscore 59

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	38
Waste Characteristics	15
Pathways	59
Total 112 divided by 3 =	37
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

37 x 0.10 = 4

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: 8. Herbicide Burial Site

LOCATION: Richards-Gebaur AFB

DATE OF OPERATION OR OCCURRENCE: August, 1971

OWNER/OPERATOR: Richards-Gebaur AFB

COMMENTS/DESCRIPTION: Unused herbicide (reportedly contained mercury) buried

SITE RATED BY: Dave Moccia, Bruce Haas, Liz Dodge

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	1	10	10	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	2	6	12	18
			Subtotals	73	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 41

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) H

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

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

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

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	0
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	16	24
		Subtotals	56	108
Subscore (100 x factor score subtotal/maximum score subtotal)				52
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	N/A	--
		Subtotals	22	90
Subscore (100 x factor score subtotal/maximum score subtotal)				24

C. Highest pathway subscore

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

Pathways Subscore 52

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	41
Waste Characteristics	60
Pathways	52
Total 153 divided by 3 =	51
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

51 x 1.0 = 51

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: 9. Oil Saturated Area

LOCATION: Richards-Gebaur AFB

DATE OF OPERATION OR OCCURRENCE: 1954-1980

OWNER/OPERATOR: Richards-Gebaur AFB

COMMENTS/DESCRIPTION: Storage of open drums containing waste oils; ground reportedly saturated with oil.

SITE RATED BY: Dave Moccia, Bruce Haas, Liz Dodge

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	2	4	8	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	1	10	10	30
F.	Water quality of nearest surface-water body	1	6	6	18
G.	Ground-water use of uppermost aquifer	0	9	0	27
H.	Population served by surface-water supply within 3 miles downstream of site	0	6	0	18
I.	Population served by ground-water supply within 3 miles of site	2	6	12	18
			Subtotals	77	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 43

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) H

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

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

60 x 0.8 = 48

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

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 0

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	1	6	6	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	2	8	16	24
		Subtotals	56	108
Subscore (100 x factor score subtotal/maximum score subtotal)				52
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	1	6	6	18
Soil permeability	0	8	0	24
Subsurface flows	0	8	0	24
Direct access to ground water	N/A	8	N/A	--
		Subtotals	22	90
Subscore (100 x factor score subtotal/maximum score subtotal)				24

C. Highest pathway subscore

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

Pathways Subscore 52

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	43
Waste Characteristics	48
Pathways	52
Total 143 divided by 3 =	48
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

48 x 1.0 = 48

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