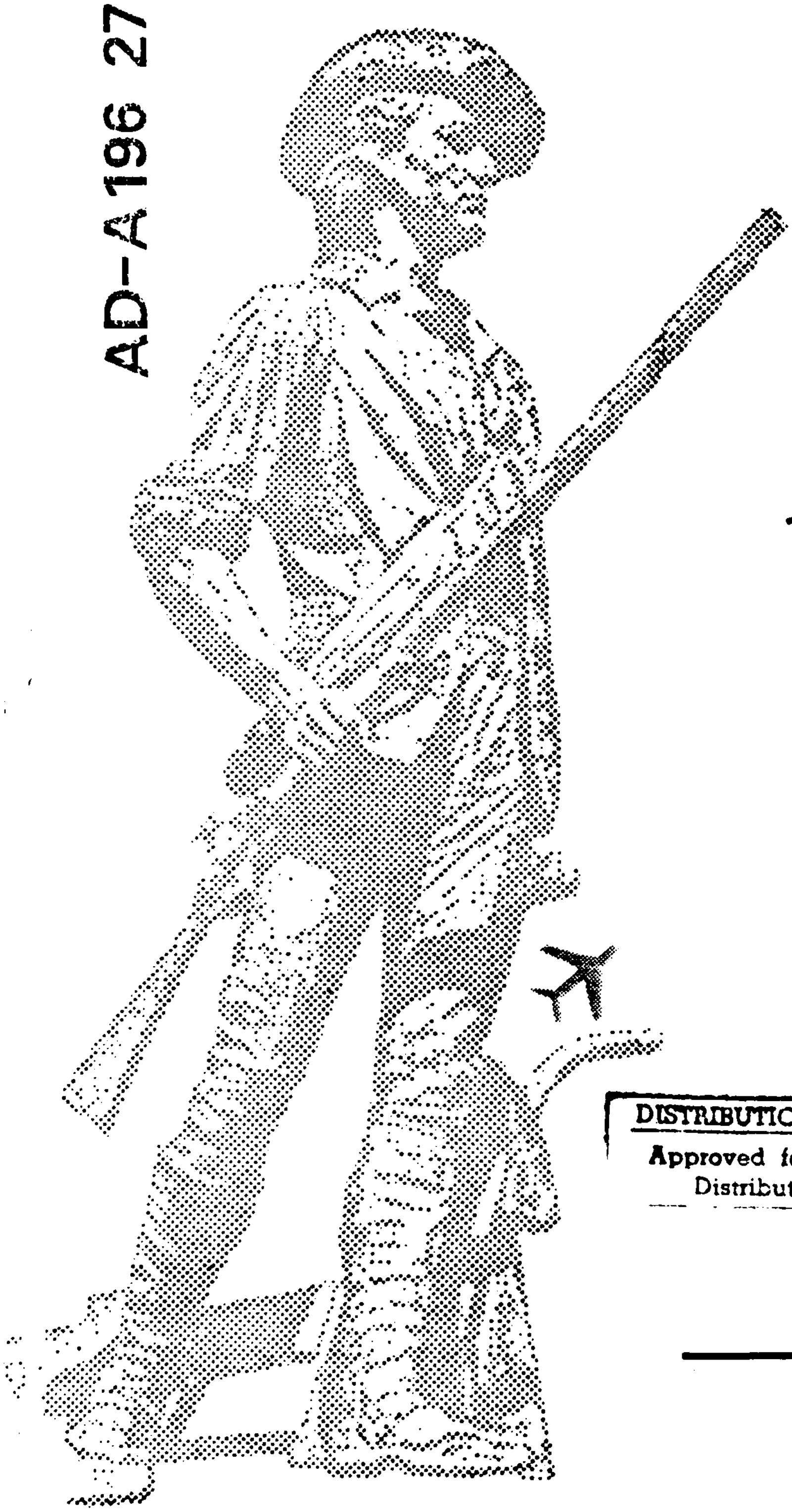
INSTALLATION RESTORATION PROGRAM



Records Search

132 Tactical Fighter Wing
Iowa Air National Guard
Des Moines Municipal Airport

The Air National Guard Support Center
Andrews AFB, Maryland 20331

CH2M HILL

September 1983

NOTICE

INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

FOR

DES MOINES AIR NATIONAL GUARD INSTALLATION, IOWA

Prepared for

AIR NATIONAL GUARD SUPPORT CENTER
ANDREWS AIR FORCE BASE, MARYLAND 20331

Prepared by

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CH2M HILL

September 1983

Contract No. F08637-80-G0010-5001

NOTICE

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National Technical Information Service
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INTRODUCTION

A. BACKGROUND

The Air National Guard (ANG), 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 the 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 6003 and 3012 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.

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

To conduct the IRP Hazardous Materials Disposal Sites Records Search for the Des Moines ANG Installation, CH2M HILL was retained on March 16, 1983 under Contract No. F08637-80-G0010-5001.

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. Phase II (not part of this contract) would consist of follow-on field work to determine the extent and magnitude of contaminant migration. Phase III (not part of this contract) would consist of a technology base development study of alternatives for remedial action to support the development of project plans for controlling migration or restoring the installation. Phase IV (not part of this contract) would include 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. The identification of hazardous material disposal sites at Air National Guard installations was directed by the Air Directorate NGB/DE in a letter dated 19 August 1981.

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 the Des Moines ANG Installation 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 installation visit, a review and analysis of the information obtained, and preparation of this report.

The pre-performance meeting was held at CH2M HILL's office in Reston, Virginia on March 22, 1983. Attendees at this meeting included representatives of the Air Force Engineering and Services Center (AFESC), United States Air Force (USAF), Air National Guard Support Center (ANGSC), Des Moines Air National Guard (ANG), 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 Des Moines ANG Installation records search.

The onsite installation visit was conducted by CH2M HILL from May 2 through 4, 1983. Activities performed during the onsite visit included a detailed search of installation records, ground tours of the installation, and interviews with past and present installation personnel. At the conclusion of the onsite installation visit, the installation commander was briefed on the preliminary findings. The following individuals comprised the CH2M HILL records search team:

1. Mr. Michael Thompson, Project Manager (M.S. Civil Engineering , 1972)

2. Mr. James Cable, Environmental Engineer/Ecologist (M.E. Civil Engineering, 1980)

3. Mr. Henry Harris, Hydrogeologist (Ph.D. Hydrogeology and Hydrogeochemistry, 1981)

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 and the Air National Guard who assisted in the Des Moines ANG Installation records search report include the following:

1. **Mr. Harry Lindenhofen, ANGSC, Air National Guard Program Coordinator for IRP**

2. **Captain William L. Levay**, Iowa ANG, Environmental and Engineering Officer

3. **Major Ferdinand J. Chabot**, Iowa ANG, Base Civil Engineer

4. **Mr. Bernard Lindenberg**, AFESC, Air Force Engineering Program Coordinator for IRP.

E. METHODOLOGY

The methodology utilized in the Des Moines ANG Installation records search is shown graphically on Figure 1. First, a review of past and present industrial operations was conducted at the installation. Information was obtained from available records such as shop files and real property files, as well as interviews with past and present installation employees from the various operating areas of the installation. The information obtained from interviewees on past activities was based on their best recollection. **A list of the 17 interviewees from the Des Moines ANG Installation, with areas of knowledge and years at the installation, is given in Appendix C.**

The next step in the activity review process was to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from all the industrial operations on the installation. Included in this part of the activity review was 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 was 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 were inspected for any evidence of contamination or leachate migration.

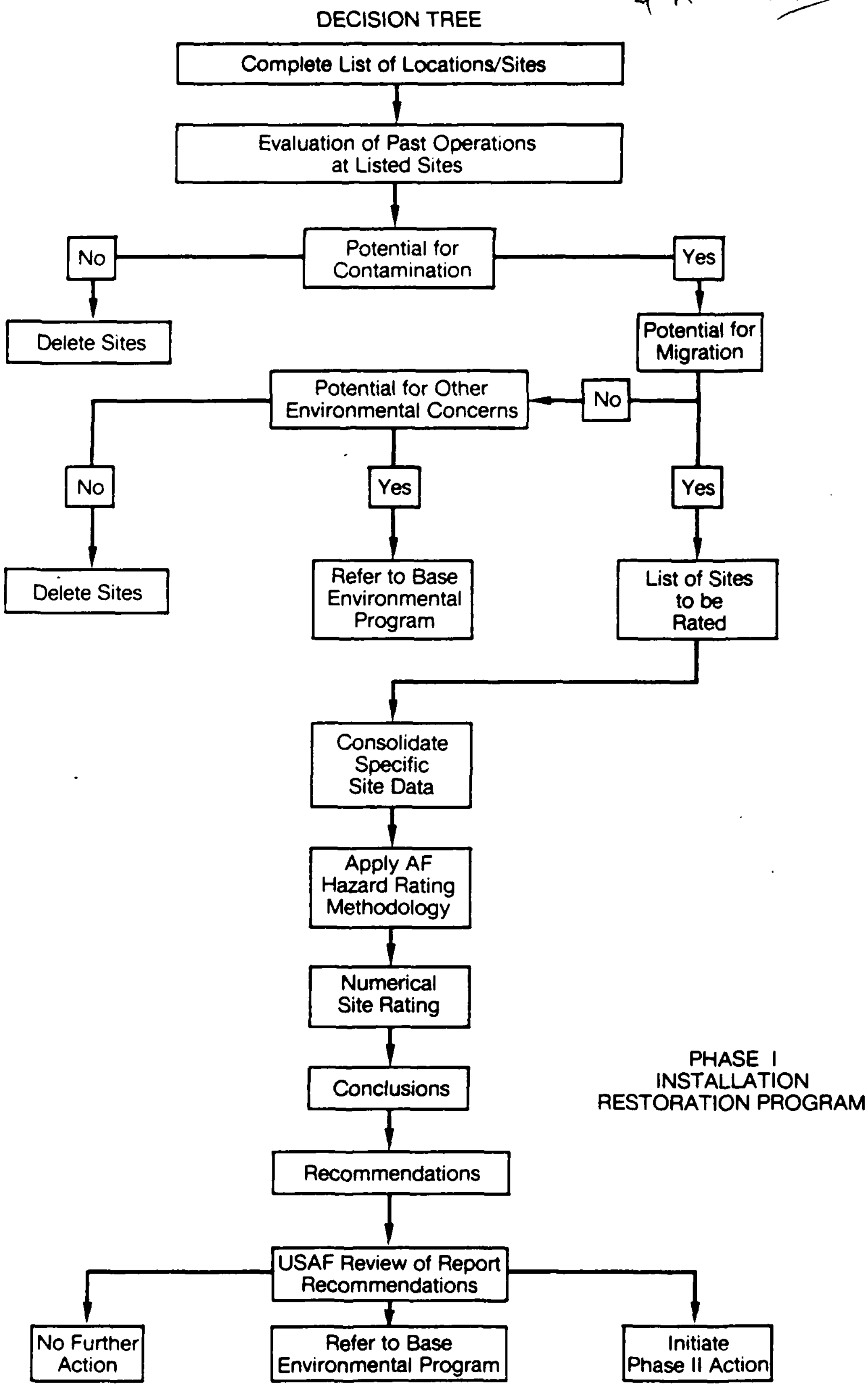

FIGURE 1.
Records Search Methodology.

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A decision was 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 was deleted from further consideration. Minor operations and maintenance deficiencies were noted during the investigations and made known during the outbriefing.

For those sites at which a potential for contamination was identified, the potential for migration of this contamination was evaluated by considering site-specific soil and ground-water conditions. If there was no potential for contaminant migration, but other environmental concerns were identified, the site was referred to the base environmental monitoring program for further action. If no further environmental concerns were identified, the site was deleted from further consideration. If the potential for contaminant migration was identified, then the site was 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 were 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 was recommended.

EXECUTIVE SUMMARY

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A. INTRODUCTION

1. CH2M HILL was retained on March 16, 1983, to conduct the Des Moines Air National Guard (ANG) Installation records search under Contract No. F08637-80-G0010-5001, with funds provided by the National Guard Bureau (NGB).

2. DEQPPM 81-5 explains DoD policy, which is to identify and fully evaluate suspected problems associated with past hazardous contamination on DoD facilities and to control the migration of hazardous contamination that could endanger health and welfare from such facilities.

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, if required, (not part of this contract) will consist of follow-on field work to determine the extent and magnitude of contaminant migration. Phase III (not part of this contract) would consist of a technology base development study of alternatives for remedial action to support the development of project plans for controlling migration or restoring the installation. Phase IV (not part of this contract) would include those efforts which are required to control identified hazardous conditions.

4. The Des Moines ANG Installation records search included a detailed review of pertinent installation records, contacts with 9 government organizations for documents relevant to the records search effort, and an installation onsite visit conducted by CH2M HILL during May 2 through 4, 1983. Activities conducted during the base visit included interviews with 17 past and present installation employees, ground tours of installation facilities, and a detailed search of installation records. An additional visit was conducted on June 2, 1983, at which time the hydrogeology of the installation and vicinity was examined.

B. MAJOR FINDINGS

1. The major industrial shop operations at the Des Moines ANG Installation include corrosion control, engine maintenance, pneudraulics, aerospace ground equipment (AGE) maintenance, and vehicle maintenance. These operations generate varying quantities of waste oils, recovered fuels, and spent solvents and cleaners.

2. The industrial activities are conducted by the 132nd Tactical Fighter Wing to maintain and operate twenty-four A-7 aircraft and associated support equipment.

3. Several industrial shop operations have resulted in waste disposal at the Des Moines ANG Installation since it was constructed in 1941. From 1941 to 1970, commingled industrial wastes were placed in drums for disposal at both the Des Moines ANG Installation and Offutt AFB during fire department

training exercises. From 1970 to 1976, fire department training activities were conducted at the Des Moines ANG Installation only for disposal of commingled industrial wastes. Since 1976, industrial wastes have been segregated for disposal by contract through the DPDO at Offutt AFB. Recovered JP4 is still used at the Des Moines ANG Installation for fire training exercises.

4. Interviews with past and present installation employees resulted in the identification of three past disposal or spill sites at the Des Moines ANG Installation and the approximate dates that these sites were used.

C. CONCLUSIONS

1. Information obtained through interviews with 17 past and present installation personnel, installation records, shop folders, and field observations indicate that the Des Moines ANG Installation property has been used for disposal of small quantities of hazardous material in the past.

2. No evidence of environmental stress resulting from past disposal practices was observed at the Des Moines ANG Installation.

3. Table 1 presents the priority listing of the three rated sites and their overall scores. Site No. 3, the Facility 105 Vehicle Maintenance Fuel Tank, and Site No. 2, the Existing Fire Department Training Area, exhibit the most significant

potential (relative to the other Des Moines ANG Installation sites) for environmental concerns.

4. Site No. 1, the Old Fire Department Training Area located at Facility No. 228, is not considered to present significant concern for adverse effects on health or the environment.

Table 1
PRIORITY LISTING OF DISPOSAL SITES

Site No.	Site Description	Overall Score
2	Existing Fire Department Training Area	55
3	Facility No. 105 Vehicle Maintenance Fuel Tank	55
1	Old Fire Department Training Area	28

D. RECOMMENDATIONS

1. No imminent hazard has been determined to exist at the Des Moines ANG Installation; therefore, the priority for monitoring is considered low to moderate. A limited Phase II monitoring program is recommended to confirm or rule out the presence and migration of hazardous contaminants.

2. One soil boring at Site No. 3--Facility No. 105, Vehicle Maintenance Fuel Tank, is recommended to determine the extent of soil contamination in the area. The hand-augered soil boring should be drilled to a depth of 9 feet, and soil samples should be collected every 3 feet. These soil samples should then be analyzed for chemical

why lead?

oxygen demand (COD), oil and grease, lead, and benzene (a constituent of fuel oil) to determine the presence or absence of fuel oil.

3. One soil boring at Site No. 2, the Existing Fire Department Training Area, is recommended at the northwestern corner of the site near the drainage-way to determine the extent of soil contamination in the area. This hand-augered soil boring should also be 9 feet deep, with samples collected at 3-foot intervals. These samples should be analyzed for COD, oil and grease, lead, and volatile organic compounds (VOC's).

4. The specific details of the monitoring program, including the exact location of the soil borings, should be finalized as part of the Phase II program. In the event that contaminants are detected at significant levels, a more extensive field survey program should be implemented to determine the extent of contaminant migration.

II. INSTALLATION DESCRIPTION

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A. LOCATION

The Des Moines ANG installation is located at the Des Moines Municipal Airport in the southern portion of Polk County, Iowa. The installation is approximately 4 miles south of downtown Des Moines, the capital of Iowa and encompasses approximately 113 acres. The location map of the Des Moines ANG Installation is shown on Figure 2. Figure 3 shows the site plan of the installation.

B. ORGANIZATION AND HISTORY

The Des Moines ANG Installation was established at the Des Moines Municipal Airport in 1941 as the 124th Observation Squadron for the Field Artillery. After World War II, in 1946, the 132nd Fighter Group with the 124th Fighter Squadron of the Iowa National Guard was organized. From 1950 to the present, this unit has been under the control of the 132nd Tactical Fighter Wing.

Today, the 132nd Tactical Fighter Wing is equipped with twenty-four A-7 aircraft. The A-7 aircraft replaced the F-100 in 1974.

The installation facilities and associated property are leased from the City of Des Moines, Iowa.

The federal mission of the Des Moines ANG is to provide operational ready combat units, and qualified personnel for active duty in the Air Force to support augmentation requirements; to fulfill Air Force war and contingency commitments; and to perform such peace time missions as are compatible with training requirement and the maintenance of

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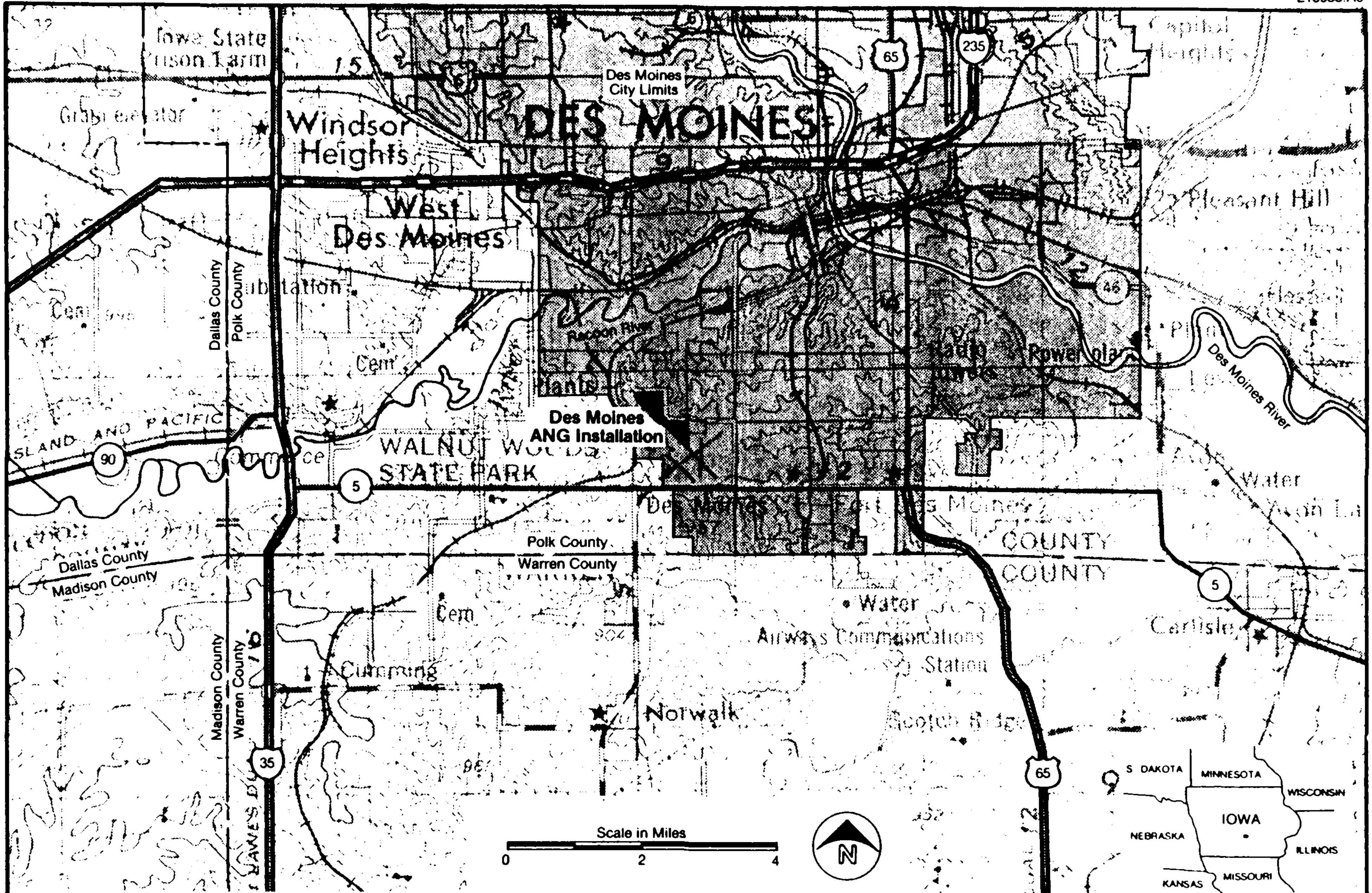

FIGURE 2.
Location Map of Des Moines ANG Installation.

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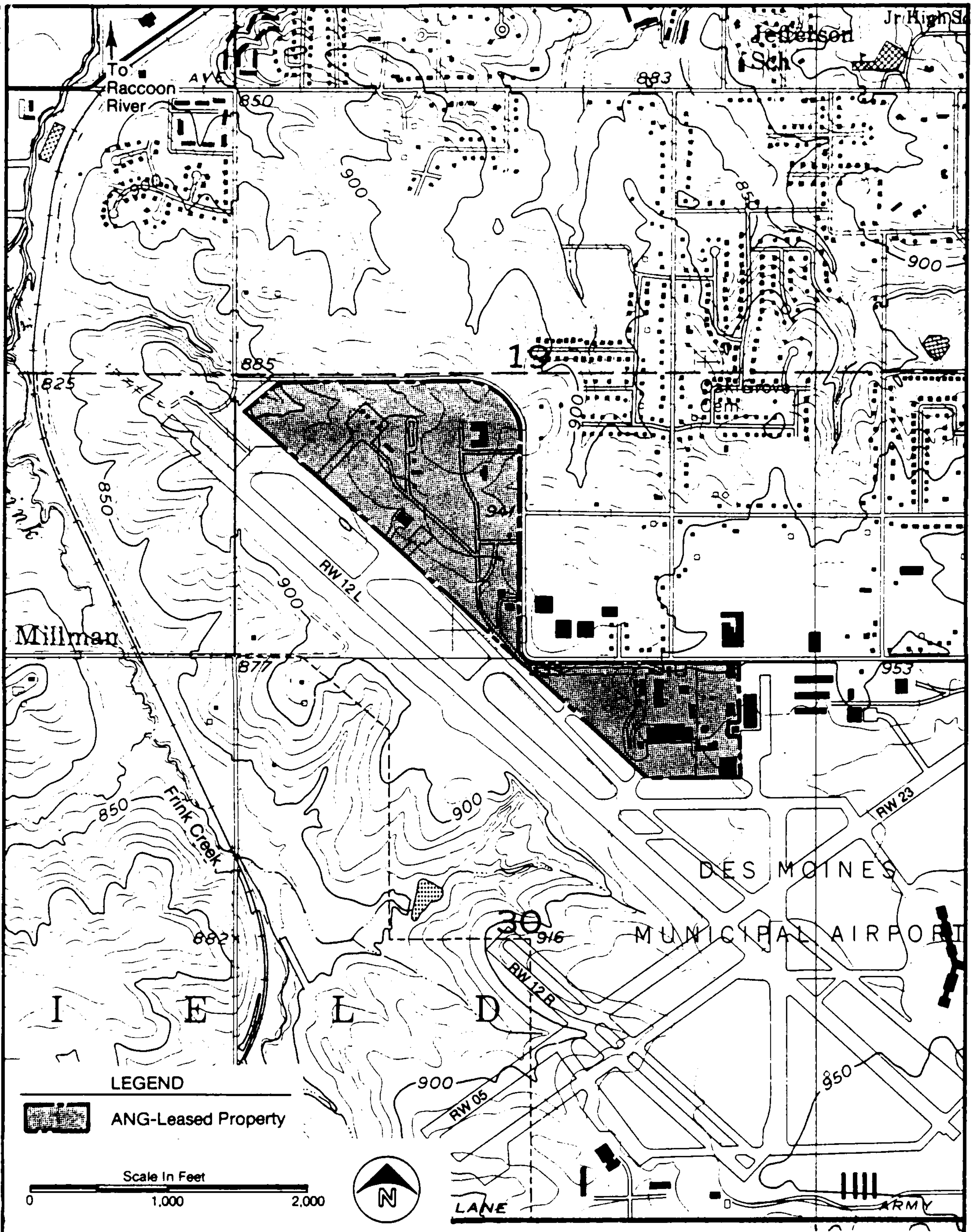

Source: USGS

FIGURE 3.
Site Map of the Des Moines ANG Installation.

mobilization readiness. In addition, when directed by the President, ANG units will protect life and property, and preserve peace, order, and public safety as part of its federal mission.

A more detailed description of the base history and its mission are presented in Appendix E.

III. ENVIRONMENTAL SETTING

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A. METEOROLOGY

The Des Moines ANG Installation and surrounding area exhibit a continental climate, characterized by marked seasonal changes in temperature and precipitation. Average monthly temperatures range from 19.4°F in January to 75.1°F in July, with an average annual temperature of 49.0°F (see Table 2). Most precipitation falls in the late spring. Average monthly precipitation ranges from a low of 1.05 inches in February to a high of 4.90 inches in June. Average annual precipitation is 30.85 inches.

Prevailing winds in Des Moines, Iowa are typically from the northwest in the months of November through April, and from the south during the remainder of the year. The average annual wind speed is 11 miles per hour.

B. SOILS AND GEOLOGY

The Des Moines ANG Installation is located in the Dissected Till Plains section of the Central Lowland physiographic province. The landscape is rolling, with broad uplands generally lying 100 feet above the major river courses.

The installation is situated on a broad, gently rolling upland in an area of dissected topography about one mile south of the Raccoon River, just east and north of Frink Creek (Figures 2 and 3). Land surface elevations in the vicinity of the installation range from about 950 feet above mean sea level (msl) on the southeast to about 820 feet msl in the valley of Frink Creek.

Table 2
METEOROLOGICAL DATA SUMMARY FOR THE DES MOINES ANG INSTALLATION

	Temperatures °F							Precipitation in Inches				
	Normal			Extremes				Water Equivalent				
Month	Daily Maximum	Daily Minimum	Monthly	Record Highest	Year	Record Lowest	Year	Normal	Maximum Monthly	Year	Minimum Monthly	Year
January	27.5	11.3	19.4	62	1981	-24	1970	1.14	4.38	1960	0.07	1954
February	32.5	15.8	24.2	73	1972	-20	1958	1.05	2.99	1951	0.13	1968
March	42.5	25.2	33.9	84	1978	-22	1962	2.31	5.37	1961	0.39	1981
April	59.7	39.2	49.5	93	1980	9	1975	2.94	7.76	1976	0.86	1980
May	70.9	50.9	60.9	98	1967	30	1967	4.21	7.53	1960	1.23	1949
June	79.8	61.1	70.5	101	1977	38	1945	4.90	14.19	1947	1.13	1963
July	84.9	65.3	75.1	105	1955	47	1971	3.28	10.51	1958	0.04	1975
August	83.2	63.4	73.3	102	1954	40	1950	3.30	13.68	1977	0.71	1953
September	74.6	54.0	64.3	101	1939	26	1942	3.07	10.19	1961	0.41	1950
October	64.9	43.6	54.3	95	1963	14	1972	2.14	7.29	1941	0.03	1952
November	46.4	29.2	37.8	76	1980	-3	1964	1.42	4.60	1952	0.03	1969
December	32.8	17.2	25.0	69	1946	-16	1963	1.09	2.90	1941	0.12	1976
YEARLY AVERAGE	58.3	39.7	49.0									

Source: Local Climatological Data, Des Moines, Iowa 1981.

Surface soils at the Des Moines ANG Installation are formed primarily in loess of Wisconsinan age overlying glacial till of Kansan age. Dominant soils are those in the Tama-Downs-Fayette association, all of which are moderately well-drained silt loams. Soils of the Tama series are found on gentle slopes at higher elevations, whereas Downs and Fayette soils predominate on moderate side slopes at lower elevations. Soils of the Sharpsburg series, consisting of moderately well-drained silt loams, are also found on some moderate side slopes. Patches of Atterberg silt loam, a soil with moderately slow drainage, are also found on gently sloping parts of the installation. Low-lying drainageways on the site are underlain by soils of the Gravity series and of the Wabash-Gravity-Nodaway complex. These soils, primarily silty clay loams, are formed in fine-grained alluvium washed from surrounding slopes and are poorly drained.

The thickness of the Wisconsinan loess in which most of these soils are formed ranges from 3 to 4 feet beneath steeper side slopes to as much as 20 feet beneath level areas at higher elevations. The Kansan till beneath the loess is as much as 30 feet thick.

Permeabilities of the surficial soils are generally moderate, ranging from 10^{-3} to 10^{-4} centimeters per second (cm/sec). Soils in low-lying areas have lower permeabilities, on the order of 10^{-6} cm/sec or less. The permeability of the loess is probably also moderate, whereas the permeability of the Kansas till (which has a clay loam texture) is probably low, generally less than 10^{-6} cm/sec.

There are no known outcrops of bedrock anywhere within the boundaries of the Des Moines ANG Installation. The bedrock surface (Pennsylvanian shale) beneath the Kansan till lies 20 to 50 feet deep, at an elevation ranging between about 850 to 900 feet msl.

North of the Des Moines ANG Installation, a deep bedrock channel (with elevations between 750 and 800 feet msl) lies beneath the flood plain of the Raccoon River. This channel, which was carved in the Pennsylvanian shale by ancestors of the Raccoon River, is filled with coarse, permeable alluvium which was deposited by meltwaters as the last (Wisconsinan) glaciers withdrew from the area. The coarse alluvium filling the bedrock channel is currently a major source of potable water for Des Moines and vicinity.

A generalized geologic section for the Des Moines ANG Installation and vicinity is given in Table 3. Bedrock immediately beneath the installation is Pennsylvanian shale of the Des Moines Group, which underlies much of central Iowa. Deeper sedimentary rocks range in age from Mississippian to Cambrian and may be more than 3,000 feet thick in the vicinity of the site. All of the sedimentary rocks dip gently to the west and southwest. Basement rocks are Precambrian igneous and metamorphic complexes.

C. HYDROLOGY

1. Surface Water

There are no surface-water bodies on the Des Moines ANG Installation. Surface-water runoff is carried via storm-water collection systems toward Frink Creek or the Raccoon River, both tributaries of the Des Moines River. The Raccoon River enters the Des Moines River about 4 miles downstream of the installation. The City of Des Moines obtains its drinking water supplies from the shallow

Table 3
GENERAL GEOLOGIC SECTION FOR THE DES MOINES ANG INSTALLATION AND VICINITY

System (Age)	Group or Formation Name	Rock Type	Approx. Depth to Top of Unit (feet)	Aquifer	Quality of Water
Quaternary		Alluvium	--	Locally	Excellent
		Loess	--		
		Till	3-20	Locally	Excellent
Pennsylvanian	Des Moines Group	Shale	20-50	No	--
Mississippian	St. Genevieve	Shale and limestone	350-400	Yes	Poor
	St. Louis	Sandy limestone		Yes	Poor
	Warsaw	Shale and dolomite		Yes	Poor
	Keokuk	Dolomite and limestone		Yes	Poor
	Burlington	Dolomite and limestone		Yes	Poor
	Gilmore City	Limestone		Yes	Poor
	Hampton	Limestone and dolomite		Yes	Poor
	McCraney	Limestone	725-775	No	--
	English River	Siltstone		No	--
	Maple MIll	Shale		No	--
	Aplington	Dolomite		No	--
	Sheffield	Shale		No	--
Devonian	Lime Creek	Dolomite and shale	825-875	Yes	Poor
	Cedar Valley	Limestone and dolomite		Yes	Poor
	Wapsipinicon	Limestone, dolomite, and shale		Yes	Poor
Silurian	--	Dolomite and sandy dolomite	1,550-1,600	No	--
Ordovician	Maquoketa	Dolomite and shale		No	--
	Galena	Dolomite and chert		No	--
	Decorah	Limestone and shale		No	--
	Platteville	Limestone, shale, and sandstone		No	--
	St. Peter	Sandstone	2,025-2,075	Yes	Fair
	Prairie Du Chien	Dolomite and sandstone		Yes	Fair
Cambrian	Jordan	Sandstone	2,500-2,550	Yes	Fair
	St. Lawrence	Dolomite		Yes	Fair
	Franconia	Sandstone, siltstone, and shale	--	No	--
	Galesville	Sandstone		No	--
	Eau Claire	Sandstone, shale, and dolomite		No	--
	Mt. Simon	Sandstone		No	--
Precambrian	--	Igneous and metamorphic	3,000+	No	--

aquifer near the confluence of the two rivers. Figure 4 illustrates the stormwater drainage from the Des Moines ANG Installation.

2. <u>Groundwater</u>

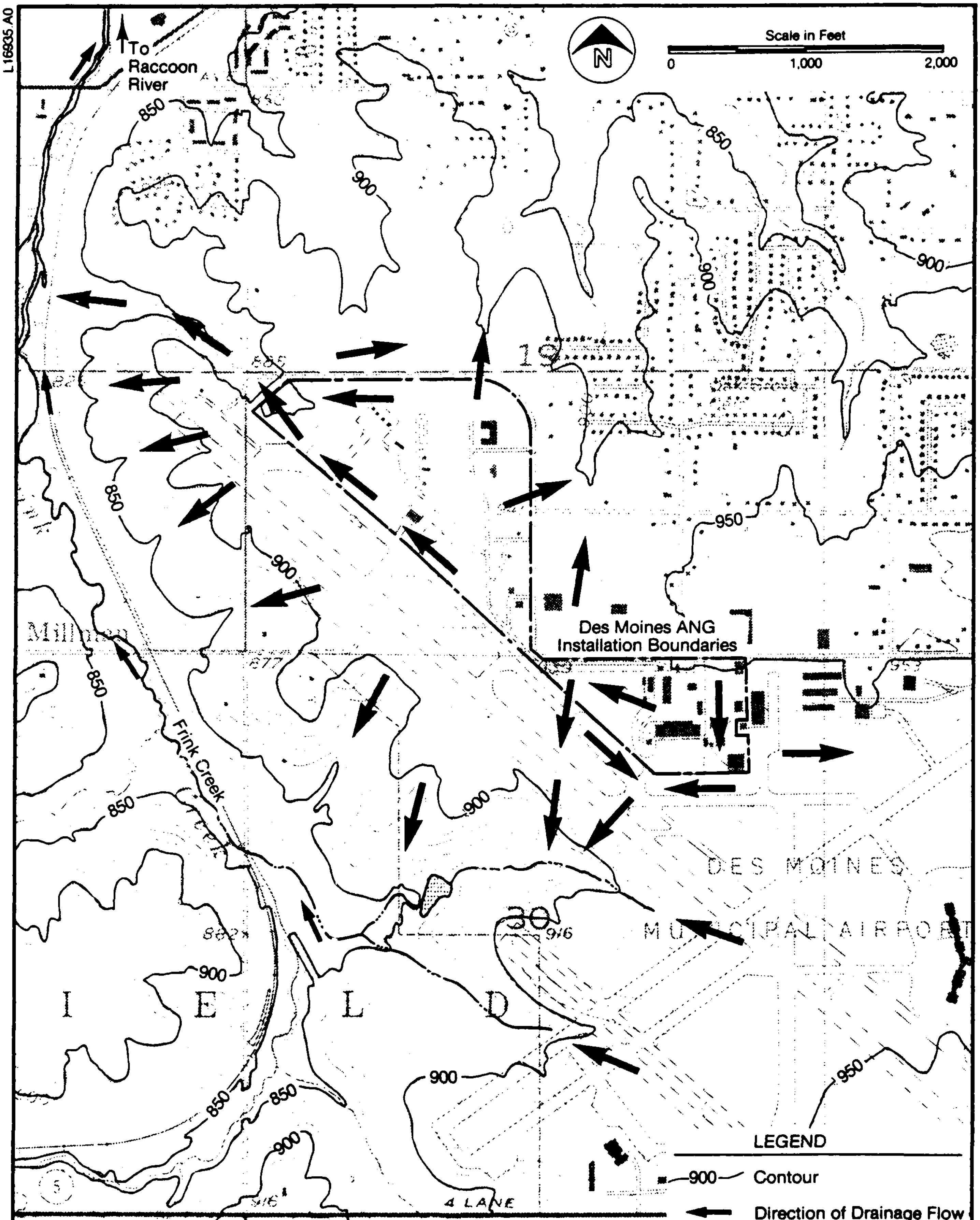
Table 3 summarizes groundwater conditions in the vicinity of the Des Moines ANG Installation. There are four major aquifers in the vicinity of the installation, one in the surficial (Quaternary) materials and three in the deeper, sedimentary bedrock units. However, the water in the bedrock aquifers is generally highly mineralized and/or at great depth, so that only the Quaternary alluvial aquifer is a major source of potable water.

Small volumes (a few gallons per minute) of groundwater adequate for individual domestic supplies may sometimes be obtained locally from sandy zones in the Kansan till.

Large volumes of groundwater of excellent quality are obtained from coarse, alluvial sediments in the bedrock channel beneath the floodplain of the Raccoon River. This surficial aquifer is a major and highly important source of water for Des Moines and vicinity.

The Pennsylvanian shales underlying the surficial materials are low in permeability. They impede groundwater movement both laterally and vertically, and provide little opportunity for groundwater recharge and discharge.

The uppermost bedrock aquifer lies beneath about 350 feet of Pennsylvanian shale. This aquifer, approximately 300 feet thick, is composed of Mississippian rocks between the St. Genevieve and Hampton formations. The quality of



Source: USGS

FIGURE 4.
Stormwater Drainage and Topographic Map, Des Moines ANG Installation

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water from the aquifer is naturally poor, with dissolved solids content generally in excess of 3,000 parts per million (ppm). Dissolved constituents are primarily sulfate, sodium, bicarbonate, and calcium. The poor quality of the water severely restricts usage of the aquifer.

The uppermost aquifer is underlain by about 100 feet of relatively impermeable Mississippian shales, siltstones, and dolomites. Beneath this impermeable zone lies the middle bedrock aquifer, which is composed of about 700 feet of limestone and dolomite between the Lime Creek and Wapsipinicon Formations. The quality of water from the middle aquifer is naturally poor, with dissolved solids content generally in excess of 2,500 ppm. As in the uppermost aquifer, dissolved constituents are primarily sulfate, sodium, bicarbonate, and calcium. The middle aquifer is also not used for potable supplies.

Beneath the middle aquifer are about 500 feet of relatively impermeable Silurian and Ordovician rocks, underlain by the lower bedrock aquifer. The lower aquifer comprises about 500 feet of rock units between the Ordovician St. Peter sandstone and the Cambrian St. Lawrence dolomite; the Cambrian Jordan sandstone is the most important water-bearing unit in the sequence. The quality of water from the lower aquifer is fair, with dissolved solids content ranging between about 720 and 750 ppm. The water is hard, but could be used for potable supply. The temperature of water from the lower aquifer tends to be high, ranging between 75 and 80°F. The directions and rates of migration of any groundwater contamination associated with the Des Moines ANG Installation would be controlled by shallow groundwater flow systems in the loess and till deposits immediately beneath the installation. Review of available literature and discussions with representatives of the Iowa Geological Survey and the Iowa Department of Environmental Quality indicate that there is little direct information (such as water level measurements in nearby wells) regarding directions of groundwater flow in the loess and till. The available information is not sufficient to construct meaningful groundwater contour maps. However, basic hydrogeologic principles suggest that the direction of groundwater flow within the loess and till is controlled by topography and by the boundaries between (1) the loess and till and (2) the till and shale.

Precipitation infiltrates downward through the loess and then moves laterally, following surface topography, or percolates deeper into the underlying Kansan till. Some shallow groundwater may also be diverted laterally by the surface of the relatively impermeable till. Any groundwater passing deeper into the till is diverted laterally by the impermeable Pennsylvanian shale and is not likely to pass into deeper bedrock formations. Discharge of groundwater occurs in springs or seeps on hill slopes along drainageways or in the bottoms of drainageways. Some groundwater may discharge to the southeast and east, along the slopes above Frink Creek. The smaller, unnamed drainageways north and south of the installation are also likely discharge zones for groundwaters originating within the installation. The vast majority of groundwater originating within the installation probably discharges to the ground surface above an elevation of about 850 feet, which is the approximate elevation of the bedrock surface. The rate of groundwater movement within the loess and till is likely to be slow.

D. ECOLOGY

1. Vegetation and Wildlife

About 60 percent of the 115 acres comprising the Des Moines ANG Installation are developed areas. The unimproved areas consist of annual grassland communities composed of fescue, clover, and other annual grasses. The base is relatively well drained, so no significant wetland areas exist.

Because the installation does not contain diverse habitat, wildlife is limited, although some small mammals and birds may be present.

2. Threatened and Endangered Species

No threatened or endangered species are known to inhabit the Des Moines ANG Installation or the immediate vicinity. However, transient species, such as the Southern Bald Eagle or Indiana Bat may occasionally enter the area. Some environmentally unique prairie habitats within a 50-mile radius of the City of Des Moines support a number of state threatened and endangered species.

IV. FINDINGS

IV. FINDINGS

A. ACTIVITY REVIEW

1. Summary of Industrial Waste Disposal Practices

The major industrial shop operations at the Des Moines ANG Installation include corrosion control, engine maintenance, pneudraulics, aerospace ground equipment (AGE) maintenance, and vehicle maintenance. These operations generate varying quantities of waste oils, recovered fuels, and spent solvents and cleaners.

The total quantity of waste oils, recovered fuels, and spent solvents and cleaners generated at the Des Moines ANG Installation is approximately 7,000 gallons per year based on information obtained during the site visit.

Standard procedures for past and present industrial waste disposal practices at the Des Moines ANG Installation, based on reports and interviewee information, are as follows:

- 1941 to 1970--Industrial wastes from most installation operations were placed in drums or bowsers (portable tanks on wheels) for use in fire department training exercises at both the Des Moines ANG Installation and Offutt Air Force Base (AFB) in Omaha, Nebraska. Storm drains, which eventually led out to the stormwater retention ponds, or the sewer, which led to a septic tank and sand filters located on airport land constructed exclusively for the ANG, were used for disposal of small quantities of wastes and all washwaters.

- 1970 to 1976--The septic tank and sand filters were abandoned and replaced by a lift station and associated sewer lines connected to the City of Des Moines' Wastewater Treatment Plant (WWTP). Stormwater still flows to the stormwater retention ponds. Fire department training exercises were conducted at Des Moines ANG Installation only for disposal of commingled industrial wastes. Excess wastes were collected in drums and stored at Facility 237 in an open storage area. An oil/water separator was constructed at Facility 160, Engine Inspection and Repair, in 1975. Beginning in 1973, synthetic oil was segregated and recycled.

- 1976 to present--Instead of combining wastes prior to disposal, as was the procedure in the past, segregation of wastes became the standard operating procedure in 1976. Recovered POL, fuels, halogenated solvents, and cleaners were stored in several areas during this period; however, final disposal was accomplished either through fire department training exercises (waste fuels only) or by contract disposal through the Defense Property Disposal Office (DPDO) at Offutt AFB in Omaha, Nebraska. Approximately 120 drums of excess wastes, which had collected at the installation from 1970 to 1976, were hauled to Offutt AFB for contract disposal in 1976 and 1977.

From 1976 to 1979, drummed wastes were stored in an open storage area near Facility 237 prior to contract disposal through the DPDO at Offutt AFB. From 1979 to 1981, all drummed wastes were stored in the Open Alert Hangar, Facility 238 prior to disposal. Since 1981, all wastes have been collected and segregated at the Washrack, Facility 122 and, when full, moved to the Supply Warehouse, Facility 102, where they are transported on a monthly basis to the DPDO at Offutt AFB for contract disposal.

2. Industrial Operations

Industrial operations at the Des Moines ANG Installation have been primarily involved with routine maintenance of assigned aircraft and associated ground support equipment. A review of installation records and interviews with past and present installation 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, provides estimates of the quantities of wastes currently being generated, and describes the past and present disposition of these wastes; i.e., treatment, storage, and disposal. Appendix F contains a master list of industrial operations and provides information on the past and present locations and corresponding dates for each industrial operation. Descriptions of the major industrial activities are included in the following paragraphs.

Table 4
MAJOR INDUSTRIAL OPERATIONS SUMMARY

Organization/Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Quantity	Treatment/Storage/Disposal Methods (1940 – 1950 – 1960 – 1970 – 1980)
Flightline		Synthetic Oil	120 gal/yr	Recycled
		Hydraulic Fluid	60 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises at Installation; Contract Disposal Through DPDO at Offutt AFB
AGE	120	Synthetic Oil	50 gal/yr	Recycled
		Hydraulic Fluid Engine Oil PD-680	50 gal/yr 100 gal/yr 120 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises at Installation; Contract Disposal Through DPDO at Offutt AFB
Vehicle Maintenance	105	PD-680 Engine Oil Paint Thinners & Pigments Waste Fuels	60 gal/yr 1,000 gal/yr 50 gal/yr 60 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises at Installation; Contract Disposal Through DPDO at Offutt AFB
		Sulfuric Acid	50 gal/yr	Neutralized and Flushed Down the Sanitary Drain
Fuel Cell Replacement Shop	315	Waste Fuels	600 gal/yr	Recycled at AGE Shop
C.E. Paint Shop	100	Paint Thinners & Pigments	120 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises a Installation; Contract Disposal Through DPDO at Offutt AFB
POL Operations	215	Waste Fuels Ether	24 gal/yr 24 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises at Installation; Contract Disposal Through DPDO at Offutt AFB

Table 4--Continued

Organization/Shop Name	Present Location (Bldg. No.)	Waste Material	Estimated Quantity	Treatment/Storage/Disposal Methods (1940–1980)
Avionics	180	Trichloroethylene	25 gal/yr	Fire Training Exercises at Installation and Offutt AFB (1940–1970)
Flight Simulator	190	Hydraulic Oil	40 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises at Installation; Contract Disposal Through DPDO at Offutt AFB (1940 → present)
Missile Maintenance		Paint Remover Carbon Remover Fluid	24 gal/yr 120 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises at Installation; Contract Disposal Through DPDO at Offutt AFB (1940 → present)
Corrosion Control	315	MEK Toluene MIBK Laquer Thinner & Pigments Paint Remover	84 gal/yr 84 gal/yr 36 gal/yr 36 gal/yr 120 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises at Installation; Contract Disposal Through DPDO at Offutt AFB (1940 → present) Sanitary Sewer (1940 → present)
Electric Shop	100	Nickel-Cadmium Batteries	24/yr	To Landfill (1940 → present)
		Sulfuric Acid	48 gal/yr	Neutralized and Flushed Down the Sanitary Drain (1940 → present)
Wheel and Tire Repair and Reclamation	100	Paint Remover Cleaning Compound PD-680	220 gal/yr 40 gal/yr 120 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises at Installation; Contract Disposal Through DPDO at Offutt AFB (1940 → present)
Munitions Maintenance	301	PD-680	660 gal/yr	Fire Training Exercises at Installation and Offutt AFB; Fire Training Exercises at Instlalation; Contract Disposal Through DPDO at Offutt AFB (1940 → present)

Table 4--Continued

Organization/Shop Name	Present Location (Bldg. No.)	Waste Material	Estimated Quantity	Treatment/Storage/Disposal Methods (1940–1980)
Engine Maintenance	160	PD-680 Waste Fuels Aircraft Oil Synthetic Oil	100 gal/yr 180 gal/yr 180 gal/yr 1,000 gal/yr	Fire Training Exercises at Installation and Offutt AFB (1940–1950); Fire Training Exercises at Installation (1960–1970); Contract Disposal Through DPDO at Offutt AFB (1970–1980)
NDI	115	Penetrant Emulsifier	30 gal/yr 30 gal/yr	To Oil/Water Separator and Stormwater Drains
		Developer	30 gal/yr	To Offutt AFB for Silver Recovery
		PD-680 Trichloroethane	25 gal/yr 40 gal/yr	Fire Training Exercises at Installation and Offutt AFB (1940–1950); Fire Training Exercises at Installation (1960–1970); Contract Disposal Through DPDO at Offutt AFB (1970–1980)
Phase Maintenance, Pneudraulics, and Support Aircraft	100	Synthetic Oil Hydraulic Fluid Engine Oil PD-680	300 gal/yr 300 gal/yr 300 gal/yr 300 gal/yr	Fire Training Exercises at Installation and Offutt AFB (1940–1950); Fire Training Exercises at Installation (1960–1970); Contract Disposal Through DPDO at Offutt AFB (1970–1980)

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Note: Assumed dates are noted by ----

a. Flightline

General aircraft maintenance is conducted on the flightline. Wastes generated from this area include synthetic oil (120 gal/yr) and hydraulic fluid (60 gal/yr).

b. Aerospace Ground Equipment (AGE) Maintenance Shop

The AGE Maintenance Shop is located in Facility 120. This shop is responsible for repair, maintenance, and periodic inspection of all aerospace ground equipment. Wastes generated include synthetic oil (50 gal/yr), hydraulic fluid (50 gal/yr), engine oil (100 gal/yr), and PD-680 (120 gal/yr).

c. Vehicle Maintenance

The Vehicle Maintenance Shop is located in Facility 105. Wastes generated during the repair and maintenance of motor vehicles include PD-680 (60 gal/yr), engine oil (1,000 gal/yr), paint thinners and pigments (50 gal/yr), waste fuels (60 gal/yr), and sulfuric acid (50 gal/yr).

d. Fuel Cell Replacement Shop

The Fuel Cell Replacement Shop is located in Facility 315. This shop is responsible for repairing and maintaining all aircraft fuel cells. Wastes generated from this area include waste fuels (600 gal/yr) and foam. The foam is disposed of in the City of Des Moines' landfill.

e. Civil Engineering (CE) Paint Shop

The CE Paint Shop is located in Facility 100. This shop generates a mixture of paint thinners and pigments (120 gal/yr).

f. PCL Operations

The POL Operations are located in Facility No. 215. This operation generates waste fuels (24 gal/yr) and ether (24 gal/yr).

g. Avionics

The Avionics Shop is located in Facility 180. Prior to 1972, this shop generated waste trichloroethylene (25 gal/yr).

h. Flight Simulator

The flight simulator is located in Facility No. 190. Flight simulations are used to train pilots to operate the A-7 aircraft. Wastes generated from this shop include hydraulic oil (40 gal/yr) and PD-680 (2 gal/yr).

i. Missile Maintenance

During missile maintenance, wastes are generated which include paint remover (24 gal/yr) and carbon remover fluid (120 gal/yr).

j. Corrosion Control

The Corrosion Control Shop is located in Facility No. 315. Corrosion control activities include cleaning, sanding, wiping, priming, repainting, and stenciling aircraft and ground support equipment. Wastes generated in this shop include a commingled mixture of methyl ethyl ketone (MEK) (84 gal/yr), toluene (84 gal/yr), methyl isobutyl ketone (MIBK) (36 gal/yr) and lacquer thinner (36 gal/yr). The shop also generates a water washable paint remover (120 gal/yr) which is disposed of down the sanitary sewer. All aircraft washing is conducted at the Washrack, Facility 122.

k. Electric Shop

The electric shop is located in Facility No. 100. Wastes generated from this area include nickel-cadmium batteries (24/year) and sulfuric acid (48 gal/yr).

l. Wheel and Tire Repair and Reclamation

The Wheel and Tire R&R Shop is located in Facility No. 100. Waste materials generated from this shop include spent paint remover (220 gal/yr), cleaning compound (40 gal/yr), and PD-680 (120 gal/yr). The PD-680 dip tank is cleaned approximately twice per year.

m. Munitions Maintenance

The Munitions Maintenance Shop is located in Facility No. 301. This shop generates waste PD-680 (660 gal/yr) while maintaining training missiles.

n. Engine Maintenance

The Engine Maintenance Shop is located in Facility No. 160. This shop generates waste PD-680 (100 gal/yr), fuels (180 gal/yr), aircraft oil (180 gal/yr), and synthetic oil (1,000 gal/yr).

o. Non-Destructive Inspection (NDI) Laboratory

The NDI Laboratory is located in Facility No. 115. Non-destructive testing methods, including x-ray, magnaflux, and ultrasound, are performed to determine material defects of aircraft structures, component parts, and related ground equipment. Wastes generated include penetrant (30 gal/yr), emulsifier (30 gal/yr), developer (30 gal/yr), PD-680 (25 gal/yr), and trichloroethane (40 gal/yr).

p. Phase Maintenance, Pneudraulics, and Support Aircraft

The Phase Maintenance, Pneudraulics, and Support Aircraft Shops are located in Facility 100. The Pneudraulics Shop services and repairs all aircraft pneumatic and hydraulic equipment. The Phase Maintenance and Support Aircraft Shops provide maintenance to all ANG aircraft. Wastes generated from these areas include synthetic oil (300 gal/yr), hydraulic fluid (300 gal/yr), engine oil (300 gal/yr), and PD-680 (300 gal/yr).

3. Fuels

The major fuel storage area of the Des Moines ANG Installation is the POL area located at Facility 215. In this area, JP-4 is stored in five below-ground, 25,046-gallon tanks. There are also four 5,000-gallon mobile JP-4 storage tanks located on the flightline. Fuel oil, MOGAS, and diesel fuel are stored at various locations on the installation in both above- and below-ground tanks. A complete listing of major POL storage tanks, including facility number, type of POL stored, capacity, and type of tank, is included in Appendix G.

Several fuel spills were noted during the interviewing process. In 1968, approximately 800 gallons of JP-4 was spilled and drained into the stormwater retention ponds. In 1981, the lines to the fuel oil tank located at Facility 180 were leaking, so all of the valves and fittings were replaced. The small quantity of spilled fuel oil was cleaned up. The fuel oil tank at Facility 105 was leaking and, in 1982, the existing tank was replaced with a fiberglass tank. This site will be discussed further in Section IV-B, "Disposal Site Identification and Evaluation," page IV-18.

The major POL storage tanks are cleaned approximately every 3 years. The sludge which is removed consists mainly of water, rust, dirt, and fuel. Final disposal of the sludge offsite was the responsibility of the contractor. Appendix H contains a list of deactivated POL storage tanks.

4. <u>Fire Department Training Activities</u>

Fire department training activities are routinely conducted at the Des Moines ANG Installation to provide actual fire-fighting experience to installation personnel. In order to simulate an accidental fire, fuels are poured into the fire department training area and ignited. Installation personnel then extinguish the fire.

Fire department training activities have been conducted at three different locations since activation of the installation in 1941. The first fire department training area was located south of the main runway across from the ANG Installation on land owned by the Des Moines Municipal Airport. Fire department training activities were conducted in this area from 1941 to 1966. In 1966, the fire department training area was moved to the present location of Facility 228; and fire department training activities were conducted here until 1971. Since 1971, all fire department training activities have been conducted near the northwest corner of the main runway.

5. Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are among the most chemically and thermally stable organic compounds known to man. Because of their stability, PCBs, once introduced into the environment, persist for long periods of time and are not readily biodegradable. The current established PCB criteria are as follows:

PCB Contamination (ppm)	Classification	Disposal Requirement
Less than 50	Non-regulated	Sanitary Landfill
Between 50 and 500	PCB-contaminated	Permitted Hazardous Waste Landfill or Incineration
Greater than 500	PCB	Incineration

Typical sources of PCB are electrical transformers and capacitors. No PCB transformers or capacitors are known to be present at the installation. In 1981 and 1982, all existing transformers were replaced with new non-PCB transformers. Proper offsite disposal of the old transformers and capacitors was the responsibility of the electrical contractor.

6. Pesticides

Pesticides are commonly used at the Des Moines ANG Installation to control insects, rodents, and undesirable weeds. The major pesticides used at the installation include Round Up and Assault. When empty, the containers are collected in the installation's trash containers for final disposal at the City of Des Moines' Landfill.

7. Wastewater Treatment

The Des Moines ANG Installation's sanitary sewer system is connected to the Des Moines municipal system. No analysis of the raw wastewater leaving the installation was available.

Prior to 1970, all sanitary wastewater was treated in a septic tank, followed by sand filters. The effluent was discharged to the retention pond, which eventually led to the Raccoon River. The septic tank and filters were constructed exclusively for ANG use on land owned by the Des Moines Municipal Airport. The system was abandoned when the connection to the Des Moines municipal system was completed.

There are nine oil/water separators on the installation which provide pretreatment of the industrial wastewater discharged from the shops. These oil/water separators are located at Facilities No. 100, 215, 228, 105, 230, 160, 122, and 315. The effluents from the oil/water separators at Facilities No. 100, 105, 215, and 315 are discharged to the stormwater retention ponds, which eventually flow to the Raccoon River. The effluents from the oil/water separators at Facilities No. 122, 160, 228, and 230 are discharged to the sanitary sewer. Appendix I lists the facility number and location, date of installation, and point of discharge for each of the oil/water separators. The oil phase is collected for subsequent service contract action for offsite disposal or recycling.

8. Available Water Quality Data

All potable water for the Des Moines ANG Installation is obtained from the City of Des Moines. No data was available on water quality at the installation.

The stormwater drainage system at the Des Moines ANG Installation is composed of ditches and storm sewers. There are two stormwater retention basins located on Des Moines Municipal Airport land which collect stormwater exiting the installation. One retention pond is on the northwestern corner of the installation boundary. The second stormwater retention pond is adjacent to the main runway across from Facility 100. These retention ponds discharge to Frink Creek, which ultimately leads to the Raccoon River.

9. Other Activities

The review of records and interview information produced no evidence of past or present storage, disposal, or handling of biological or chemical warfare agents at the Des Moines ANG Installation. Also, no explosive ordnance disposal (EOD) activities have been conducted at the Des Moines ANG Installation.

The records search indicated that, in the past, TCE has been used in moderate quantities and continues to be used today in smaller quantities. However, there were no indications of any large-scale use of TCE or problems associated with its handling or disposal.

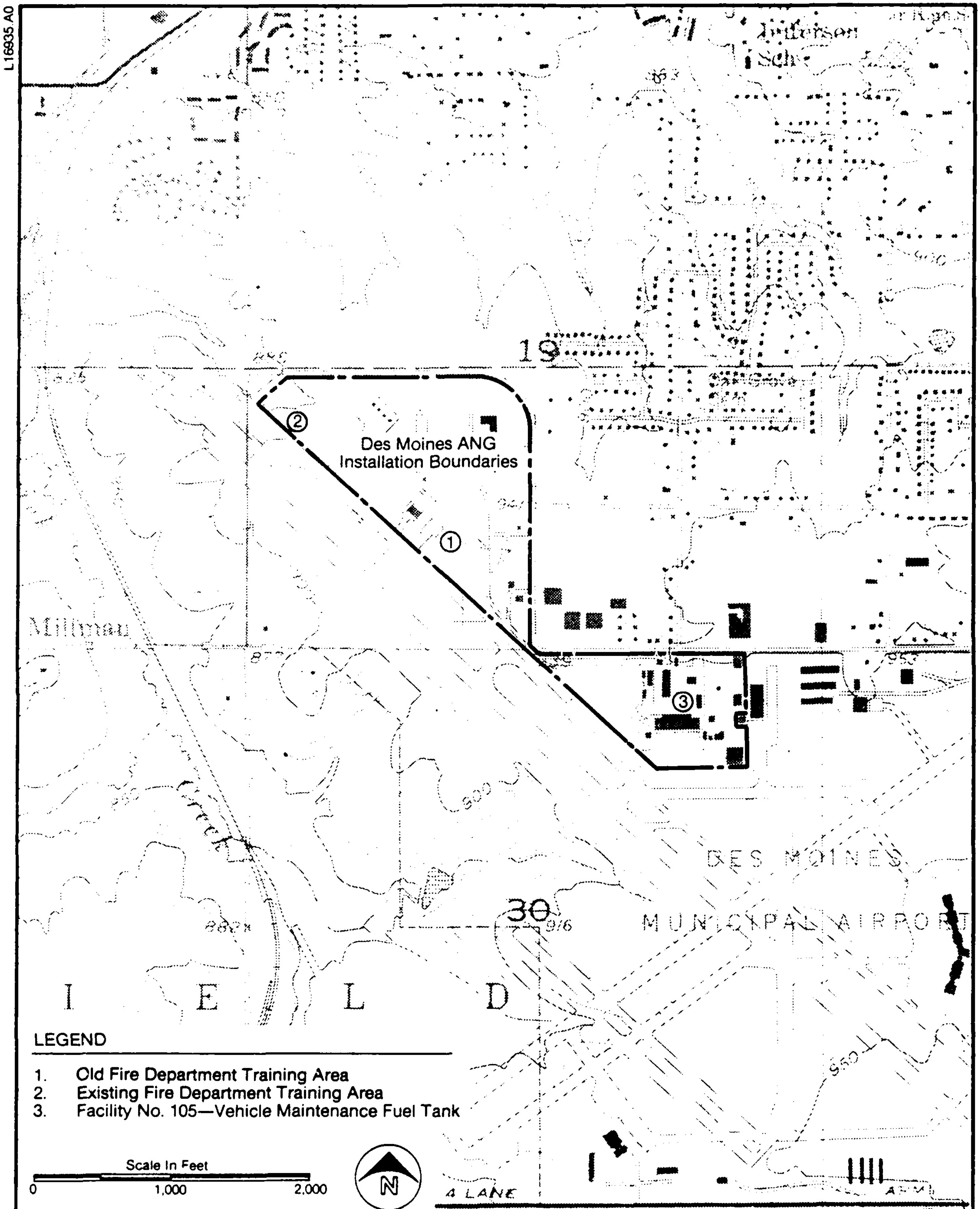
B. DISPOSAL SITE IDENTIFICATION AND EVALUATION

Interviews with 17 installation personnel (Appendix C) resulted in the identification of 3 disposal/spill sites at the Des Moines ANG Installation. The approximate locations of these sites are shown on Figure 5.

A preliminary screening was performed on the three identified past disposal/spill sites based on the information obtained from the interviews and available records from the installation and outside agencies. These sites were evaluated using the decision tree process described in the "Methodology" section, page I-5. A more detailed description of the HARM system is included in Appendix D, and copies of the completed rating forms are included in Appendix J. A summary of the overall hazard ratings is given in Table 5.

The following is a description of each site, including a brief description of the rating results.

- Site No. 1, the Old Fire Training Department Area (overall score 28) located at Facility No. 228, was used for fire department training exercises from 1966 to 1971. Approximately 12 times per year, 200 gallons of recovered JP-4, engine oil, and spent solvents were dumped on a pre-wetted area and burned. Facility 228 has since been expanded and now covers the past location of the fire department training area.



Source: USGS

FIGURE 5.
Location of Identified Disposal/Spill Sites at the Des Moines ANG Installation.

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Table 5
SUMMARY OF RESULTS OF SITE RATINGS

Site No.	Site Description	Subscore (% of Maximum Score of Each Category) Receptors	Pathways	Characteristics	Management Practices Factor	Overall Score	Page Reference for Form
1	Old Fire Department Training Area	43	63	60	0.5	28	H-1
2	Existing Fire Department Training Area	41	63	60	1.0	55	H-3
3	Facility No. 105 Vehicle Maintenance Fuel Tank	45	80	40	1.0	55	H-5

The receptors score of 43 is due to four factors: residential areas are located within a 1-mile radius of the site; the site is within 1,000 feet of the reservation boundary; the Des Moines Water Treatment Plant (WTP) is located less than 3 miles from the site; and this WTP provides treated surface water to a population greater than 1,000 people.

The pathways subscore of 63 is due to the facts that the distance to the nearest surface water is less than 500 feet and the rainfall intensity is greater than 50 thunderstorms per year.

The waste characteristics subscore of 60 results from this site's being used in the past for disposal of a confirmed small quantity of hazardous material.

The waste management practices factor is 0.5 because the area is now covered by a concrete checkpad. A waste management practices factor of 0.95 was considered to be too high and 0.10 too low; therefore, 0.5 was selected.

- Site No. 2, Existing Fire Department Training Area (overall score 55), has been used for fire department training exercises since 1971. Approximately 16 times per year, 420 gallons of waste POL are dumped into a prewetted bermed area and burned. This area is directly adjacent to land owned by the Des Moines Municipal Airport and is close to the northwestern stormwater retention pond.

The receptors subscore of 41 is due to four factors: residential areas are present within a 1-mile radius; the distance to the reservation boundary is less than 1,000 feet; the nearest surface water is a source of potable water; and the population served by surface water within 3 miles of the site is greater than 1,000.

The pathways subscore of 63 is due to the facts that the distance to the nearest surface water is less than 500 feet and the rainfall intensity in the area is greater than 50 storms per year.

The waste characteristics subscore of 60 results from this site's being used in the past for disposal of a confirmed small quantity of hazardous material.

- Site No. 3, Facility No. 105, Vehicle Maintenance Fuel Tank (overall score 55), was installed below ground in 1954 and had a 2,000-gallon capacity. When leak-tested with water in 1982, the tank emptied itself as quickly as it was filled. Based on the results of this test, the existing tank was replaced with a fiberglass tank. Approximately 12 to 15 cubic yards (cy) of oil-laden soil was excavated to allow placement and construction of the new fiberglass tank. The ball field located on ANG property was used for disposal of this contaminated soil. Information on the quantity of oil lost from the leaking tank and the extent of the remaining soil contamination was not available.

The receptors subscore of 45 is due to high scores in four areas: the population within 1,000 feet of the site is greater than 26 and less than 100; residential areas are within a 1-mile radius of the site; the nearest surface water is a source of potable water; and the population served by surface water within 3 miles of the site is greater than 1,000 people.

The pathways subscore of 80 results from the fact that the earth excavated from the area to install the new tank indicated fuel oil contamination.

The waste characteristics subscore of 40 results from this site's being used in the past for disposal of a confirmed small quantity of hazardous material, with a persistence factor of 0.8.

A total of three disposal sites were identified at the Des Moines ANG Installation and were rated using the HARM rating system.

C. ENVIRONMENTAL STRESS

No evidence of environmental stress resulting from the handling or disposal of hazardous substances was observed during the ground tour of the installation. Because there have been very few hazardous materials spills, it appears unlikely that operations at the installation have had significant environmental impact.

V. CONCLUSIONS

V. CONCLUSIONS

A. Information obtained through interviews with 17 present installation personnel, installation records, and field observations indicate that small quantities of hazardous wastes have been disposed of on Des Moines ANG Installation property.

B. No evidence of environmental stress resulting from past disposal of hazardous wastes was observed at the Des Moines ANG Installation.

C. Table 6 presents the priority listing of the three rated sites and their overall scores. Site No. 2, the Existing Fire Training Area, and Site No. 3, the Facility No. 105, Vehicle Maintenance Fuel Tank, exhibit the greatest potential (relative to the other Des Moines ANG Installation sites) for environmental concerns.

Table 6
PRIORITY LISTING OF DISPOSAL SITES

Site No.	Site Description	Overall Score
3	Facility No. 105--Vehicle Maintenance Fuel Tank	55
2	Existing Fire Department Training Area	55
1	Old Fire Department Training Area	28

D. Site No. 1, the Existing Fire Department Training Area, is not considered to present significant concerns for adverse effects on health and the environment.

VI. RECOMMENDATIONS

VI. RECOMMENDATIONS

A. PHASE II PROGRAM

No imminent hazard has been determined to exist at the Des Moines ANG Installation; therefore, the priority for monitoring is considered low to moderate. A limited Phase II monitoring program is recommended to confirm or rule out the presence and migration of hazardous contaminants. The following recommendations are made for the Des Moines ANG Installation:

1. One soil boring at Site No. 3--Facility No. 105, Vehicle Maintenance Fuel Tank, is recommended to determine the extent of soil contamination in the area. This hand-augured soil boring should be drilled to a depth of 9 feet, and soil samples should be collected every 3 feet. The soil samples should be analyzed for COD, oil and grease, lead, and benzene to indicate the presence or absence of fuel oil.

2. One soil boring at Site No. 2, the Existing Fire Department Training Area, is recommended at the northwestern edge of the site near the drainageway to determine the extent of soil contamination in this area. This hand-augured soil boring should also be 9 feet deep, with samples collected at 3-foot intervals. These samples should be analyzed for COD, oil and grease, lead, and volatile organic compounds (VOC's).

3. The specific details of the monitoring program, including the exact location of the soil borings, should be finalized as part of the Phase II

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

B. OTHER RECOMMENDATIONS

In addition to the limited Phase II monitoring program, the following recommendations are made:

1. All active below-ground POL storage tanks which contain hazardous materials should be leak-tested (e.g., pressure-checked) on a periodic basis.

2. A drain line and oil/water separator should be installed at the existing fire training area. This will prevent hazardous contaminant migration from the fire department training area into the stormwater retention pond, which ultimately discharges to the Raccoon River.

3. The abandoned below-ground POL tank at Facility No. 109 should be investigated to determine its contents.

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
AG	Above ground
AGE	Aerospace Ground Equipment
ANG	Air National Guard
ANGSC	Air National Guard Support Center
AVGAS	Aviation Gasoline
BG	Below ground
bls	Below Land Surface
CAMS	Consolidated Aircraft Maintenance Squadron
CE	Civil Engineering
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	Centimeter
cm/sec	Centimeters per second
COD	Chemical Oxygen Demand
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DoD	Department of Defense
DPDO	Defense Property Disposal Office
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
°F	Degrees Fahrenheit
gal/yr	Gallons per Year
HARM	Hazard Assessment Rating Methodology
IRP	Installation Restoration Program
JP	Jet Petroleum
MEK	Methyl Ethyl Ketone
MIBK	Methyl Isobutyl Ketone
MOGAS	Motor Gasoline
msl	Mean Sea Level
NDI	Non-Destructive Inspection

NGB	National Guard Bureau
No.	Number
PCBs	Polychlorinated Biphenyls
POL	Petroleum, Oil, and Lubricants
ppm	Parts per million
RCRA	Resource Conservation and Recovery Act
R&R	Repair and Reclamation
TCE	Trichloroethylene
TFW	Tactical Fighter Wing
USAF	United States Air Force
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

GLOSSARY OF TERMS

GLOSSARY OF TERMS

1. 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.

2. 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.

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

4. 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.

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

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

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

8. 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.

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

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

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

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

13. 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.

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

15. Methyl Ethyl Ketone - An organic chemical used as a solvent in cements and adhesives.

16. Methyl Isobutyl Ketone - An organic chemical used as a solvent in paints, varnishes, and lacquers.

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

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

19. 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.

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

21. 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.

22. 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.

23. PENETRANT - A petroleum-based fluorescent dye.

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

25. 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.

26. 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.

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

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

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

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

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

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

33. 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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7. "132nd Tactical Fighter Wing Spill Prevention, Control, and Countermeasures Plan," Des Moines ANG Base, Iowa, May 1979.

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Appendix A
RESUMES OF TEAM MEMBERS

MICHAEL S. THOMPSON

Education

M.S., Civil (Sanitary) Engineering, South Dakota State University, 1972
B.S., Civil Engineering, South Dakota State University, 1971

Experience

Mr. Thompson has extensive solid and hazardous waste technical experience in both the private and public sectors. Mr. Thompson has served as project technical consultant on various aspects of municipal and hazardous waste collection and disposal including waste characterization, landfill site selection and design, and RCRA permit application assistance. He has been involved in both short- and long-term investigations and studies as related to the requirements of the RCRA, TSCA, and CERCLA.

Mr. Thompson was assistant project manager for a Resource Conservation and Recovery Act (RCRA) Hazardous Waste Part B Permit application for a storage facility at the U.S. Army Umatilla Depot Activity, Oregon. He also served as assistant project manager for RCRA Hazardous Waste Part B Permit applications for treatment, storage and disposal facilities at three U.S. Army installations in Texas: Red River Army Depot, Lone Star Army Ammunition Plant, and Longhorn Army Ammunition Plant.

Mr. Thompson served as project consultant and task manager for remedial response actions for an uncontrolled hazardous waste site at Winthrop, Maine, under the U.S. Environmental Protection Agency's Superfund I program.

Mr. Thompson was senior project consultant and field engineer for engineering assistance to the New York City Department of Environmental Protection for the contracting and cleanup of an abandoned hazardous waste site within the city.

As District Engineer in Waste Management, Inc.'s Midwest Region for 1-1/2 years, Mr. Thompson provided engineering field support to landfill operations and management personnel at waste disposal sites within the region. Support activities involved design and supervision of construction of monitoring well systems and leachate collection facilities, monitoring of site operations to ensure compliance with plans, investigations and analysis of prospective landfill sites, coordination with outside engineering consultants tasked for company projects, supervision of construction projects ongoing at the landfills, and coordination of landfill programs with Federal, state, and local regulatory agencies with regard to active and prospective sites.

Mr. Thompson was a project officer for 3 years at the U.S. Army Environmental Hygiene Agency in the Waste Disposal Engineering Division and the Army Pollution Abatement Program Support Division. During these periods he consulted with Army installation commanders on all aspects of hazardous waste management including identification, sampling, handling, treatment, storage, and disposal. He interacted constantly with Federal, state, and local regulatory personnel and interagency technical committees regarding environmental permit applications/requirements and project impacts on Army installations. Existing Army landfill sites and prospective sanitary landfill areas were evaluated under his supervision.

Mr. Thompson has served as a hazardous or solid waste consultant to the following: Defense Logistics Agency (DLA), U.S. Army Development and Readiness Command (DARCOM), the U.S. Army Forces Command (FORSCOM), the Army National Guard, the Okinawa (Japan) Prefecture Environmental Pollution Investigative Committee, and the Michigan Advisory Committee for the Development of the State Department of Natural Resources Landfill Design Guidelines.

Professional Registration

Professional Engineer: Illinois, Maryland

Membership in Professional Organizations

American Society for Testing and Materials (ASTM)
Chi Epsilon
National Society of Professional Engineers
Water Pollution Control Federation

Publications

Mr. Thompson has authored or coauthored 15 Federal Government publications.

J. KENDALL CABLE
Environmental Engineer

Education

M.E., Civil Engineering, University of Tennessee
B.S., Civil Engineering, University of Tennessee

Experience

Mr. Cable's responsibilities at CH2M HILL involve projects dealing with hazardous and solid waste management and industrial waste treatment processes. He is also involved in municipal water and wastewater treatment projects.

Mr. Cable's hazardous waste experience includes hazardous materials records search for the United States Air Force, in which past hazardous material disposal sites were identified and suspected problems associated with the sites were evaluated. He also worked on a conceptual design and conducted pilot testing on a prototype packed tower aeration unit for removal of volatile organic compounds (VOC's) from groundwater in Port Malabar, Florida.

Mr. Cable's industrial wastewater experience includes a bench-scale treatability study and conceptual design for the American Hoechst Corporation in Mt. Holly, North Carolina; wastewaters generated at the facilities were a complex mixture of synthetic organic compounds. He also participated in a pilot plant treatability study and conceptual design for Hercules, Inc., in Brunswick, Georgia; wastewaters generated at the facilities resulted from the production of organic gum and wood chemicals, cellulose-based water-soluble polymers, and specialty organic chemicals.

Mr. Cable's municipal wastewater studies have included a wastewater master plan for Manatee County, Florida, an addendum to the West Pasco County Wastewater Facilities Plan--New Port Richey Service Area, and a cost-effective analysis of two types of package wastewater treatment plants. He also contributed to a study for the U.S. Army Corps of Engineers to develop functions for estimating the capital and O&M costs associated with surface-water intake systems. The cost functions were verified using cost data from projects previously designed by CH2M HILL. He conducted a sampling program and developed design flow and loads for the Ocean Springs Regional Land Treatment System. He helped to develop conceptual documents and design instructions for the Ocean Springs Regional Land Treatment System in Ocean Springs, Mississippi. The system included a 75-acre multicellular facultative lagoon, a 15.75-mgd pump station, and 415 acres of sprinkler irrigation with subsurface drainage. He evaluated the flows, loads, and operating efficiency of an existing facultative lagoon in Ridge Spring, South Carolina. From this information, he developed a conceptual design for an aerated lagoon for the town. He conducted a sampling program and evaluated the existing and future capacity of a 1.0-mgd activated sludge WWTP in Silver Springs Shores near Ocala, Florida. He also participated in development of a municipal sludge disposal plan for the Pascagoula/Moss Point Regional Wastewater Treatment Plant in Pascagoula, Mississippi. In this project, various sludge disposal options were evaluated, and land application on privately owned farmland was selected. Based on this information, a disposal plan and feasibility study were developed. He also evaluated the method of municipal sludge land application used by a WWTP located in Silver Springs Shore near Ocala, Forida.

Professional Registration

Engineer-In-Training, Tennessee

Membership in Professional Organizations

American Society of Civil Engineers
Water Pollution Control Federation
Chi Epsilon
Toastmasters

Publications

"An Evaluation of the Adsorption and Flotation of Nonpolar Organic Compounds in Clay Colloid Suspensions." Masters Thesis, University of Tennessee. 1980.

"Developing Cost Estimating Methods for Surface Water Intake Structures." Presented at ASCE National Specialty Conference entitled Water Supply--The Management Challenge in Conjunction with the U.S. Army Engineer Waterways Experiment Station, Tampa, Florida. March 1983.

HENRY J. H. HARRIS
Hydrogeologist

Education

Ph.D., Hydrogeology and Hydrogeochemistry, University of Illinois
B.A., Geology and Philosophy, Haverford College

Experience

Dr. Harris specializes in the planning and management of hydrogeologic and geochemical investigations. He has studied waste disposal sites of various kinds, including landfills (for hazardous, low-level radioactive, and sanitary wastes) and coal mine spoils and gobs. He has performed groundwater resource evaluations and well-field design investigations, and is experienced in the planning, installation, and operation of groundwater monitoring facilities. Dr. Harris has implemented computer models for hydrogeologic studies, including resource evaluation, assessment of contaminant transport, and evaluation of the thermodynamic behavior of solutes. He is experienced in laboratory analysis of the hydraulic properties of earth materials. He has extensive theoretical and practical knowledge of the inorganic and isotope geochemistry of brines, and of the hydrogeochemistry of cold regions.

Dr. Harris planned and supervised all aspects of an intensive hydrogeologic investigation of a hazardous waste landfill in Maine. The investigation comprised geophysical surveys, installation of a system of 21 monitoring wells in 13 locations, and sampling and analysis of ground and surface waters for 129 priority pollutants and other dissolved constituents. Dr. Harris compiled and analyzed the data produced by the investigation and wrote an interpretive report assessing the impact of the landfill. Together with a team of CH2M HILL engineers and scientists, he is preparing a feasibility study which compares and evaluates alternative measures to alleviate the adverse impacts of the landfill.

As co-investigator in a study funded by the U.S. Nuclear Regulatory Commission, Dr. Harris reviewed cover designs for landfills containing low-level radioactive waste; his work comprised laboratory, field, and computer studies of groundwater flow and contaminant transport in the unsaturated zone. In this capacity, Dr. Harris also designed and supervised the construction of a computerized laboratory instrument used to monitor groundwater flow in variably saturated soils.

HENRY J. H. HARRIS

Dr. Harris serves as a senior technical reviewer in CH2M HILL's quality assurance program for hazardous waste (Superfund) projects under contract to the U.S. Environmental Protection Agency. In this capacity, Dr. Harris has reviewed and written portions of more than a dozen Remedial Action Master Plans, which are the initial planning documents describing the remedial investigation and closure procedures to be used at hazardous waste sites. In addition, Dr. Harris writes and reviews CH2M HILL protocols for geophysical investigations, monitoring well installation, and groundwater sampling.

Dr. Harris performed a well-field evaluation for a midwestern city which is entirely dependent upon groundwater for water supply. The evaluation included an assessment both of the performance of recharge facilities crucial to the successful operation of the well fields and of the potential for contamination of the existing supply. In addition, Dr. Harris offered recommendations for the placement and operation of new wells and well-fields. Dr. Harris has also participated in the design of wells and well-fields for communities in Florida.

Currently, Dr. Harris serves as a technical reviewer and consultant for a public interest group concerned about the potential environmental impacts of uranium mining in Virginia.

Dr. Harris participated in a study of the hydrogeochemistry of coal mine spoils and gobs in Illinois. The study included collection and chemical analysis of groundwater samples from the saturated and unsaturated zones, interpretation of the chemical behavior of the groundwaters, and assessment of the effects of current disposal practices upon the quality of native groundwater.

Prior to his employment with CH2M HILL, Dr. Harris was a geologist with the Hydrogeology and Geophsyics Section of the Illinois State Geological Survey.

Membership in Professional Organizations

American Geophysical Union
Geological Society of America

Publications

Dr. Harris has written or co-authored 19 journal articles and abstracts, some of which are cited below:

HENRY J. H. HARRIS

"A Gamma Ray Attenuation System for Studying the Movement of Moisture in Model Landfill Covers." American Geophysical Union, Annual Meeting, Philadelphia, Pennsylvania, 1982.

With K. Cartwright. "Pressure Fluctuations in an Antarctic Aquifer: The Freight-Train Response to a Moving Rock Glacier." Antarctic Geoscience, University of Wisconsin Press, Madison. 1982.

With K. Cartwright. "Hydrogeology of the Dry Valley Region, Antarctica." Antarctic Research Series, Vol. 33, American Geophysical Union, Washington, D.C. 1982.

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With K. Cartwright and T. Torii. "Dynamic Chemical Equilibrium in a Polar Desert Pond: A Sensitive Index of Meteorological Cycles, Science, Vol. 204 (4390) and Vol. 204 (4396). 1979.

Appendix B
OUTSIDE AGENCY CONTACT LIST

Appendix B
OUTSIDE AGENCY CONTACT LIST

1. U.S. Army Corps of Engineers
   Des Moines, Iowa
   Mark Scherer (Assistant Park Manager)
   515/276-4656

2. Iowa Environmental Quality Department
   Water Quality Division
   Des Moines, Iowa
   Murray Miller (Regional Inspector)
   515/281-8693

3. Iowa Health Department--Health Engineering
   Des Moines, Iowa
   Bud Rushenberg (Sanitarian)
   515/281-3931

4. U.S. Soil Conservation Service
   Des Moines, Iowa
   John Nixon (Assistant State Soil Scientist)
   515/284-4260

5. Polk County Health Department
   Des Moines, Iowa
   Mel Vignaroli (Polk County Sanitarian)
   515/286-3376

6. Des Moines Health Department
   City of Des Moines
   Steve Gatz (no title)
   515/283-4997

7. Central Iowa Regional Association of Local Governments
   Des Moines, Iowa
   Bill Molison (no title)
   515/244-3257

8. Iowa Environmental Quality Department
   Public Information
   Des Moines, Iowa
   Larry Kolczak (no title)
   515/281-8690

9. Iowa Conservation Commission
   Des Moines, Iowa
   Roger Laushman (no title)
   515/281-5145

Appendix C
DES MOINES ANG INSTALLATION RECORDS SEARCH INTERVIEW LIST

Appendix C
DES MOINES ANG INSTALLATION
RECORDS SEARCH INTERVIEW LIST

Interviewee No.	Organization	Area of Knowledge	Years at Installation
1	ANG	Base Facilities	11
2	ANG	Vehicle Maintenance	27
3	ANG	Base Facilities	29
4	ANG	Fire Training Activities	26
5	ANG	Base Supply	28
6	ANG	Bioenvironmental Engineering	5
7	ANG	Non-Destructive Inspection	30
8	ANG	Engine Shop	15
9	ANG	Vehicle Maintenance	29
10	ANG	Avionics	24
11	ANG	Flight Simulator	27
12	ANG	Corrosion Control	16
13	ANG	Fuels	15
14	ANG	Wheel and Tire	2
15	ANG	Pneudraulics	17
16	ANG	Phase Maintenance	12
17	ANG	Aerospace Ground Equipment	29

Appendix D
HAZARD ASSESSMENT RATING METHODOLOGY

Appendix D
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.

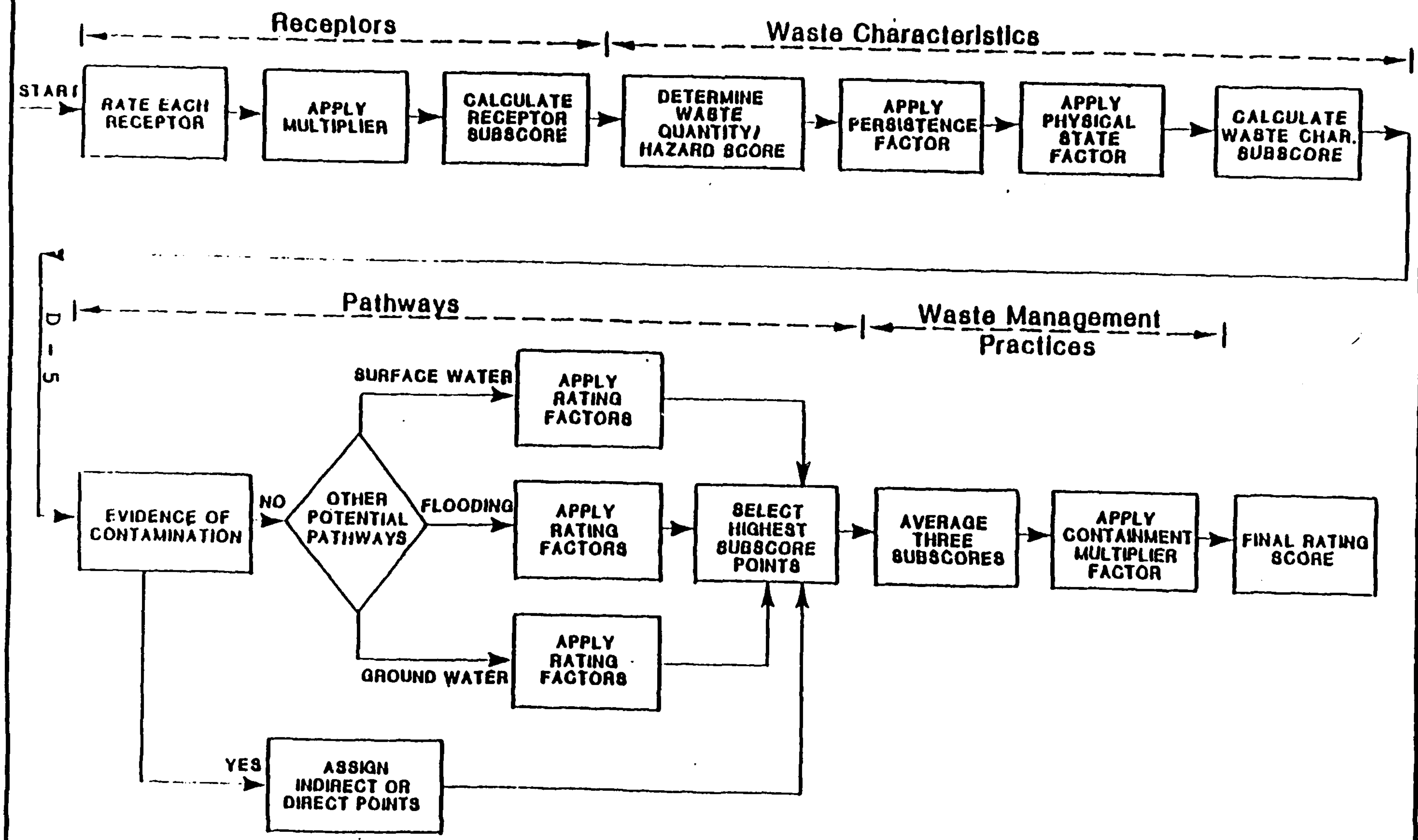
The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant, and adding the weighted scores to obtain a total category score.

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.

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART



FIGURE

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. <u>WASTE CHARACTERISTICS</u>

A-1 Hazardous Waste Quantity

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

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

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

A-3 Hazard Rating

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

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

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

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	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

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

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

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

B. Persistence Multiplier for Point Rating

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

C. Physical State Multiplier

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

Table 1--Continued

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
(Thunderstorms)	0-5 0	6-35 30	36-49 60	>50 100	

B-2 Potential for Flooding

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

B-3 Potential for Ground-Water Contamination

Rating Factors	0	1	2	3	Multiplier
Depth to 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.

Appendix E
INSTALLATION HISTORY AND MISSION

Appendix E
INSTALLATION HISTORY AND MISSION

The history of the Des Moines ANGB dates back to May 1940 when the National Guard Bureau advised Governor George Wilson and Adjutant General Charles Grahl that the State was being considered for authorization of an air unit. Efforts were therefore started immediately to construct a hangar/armory at the Municipal Airport. A $350,000 hangar project was started in January 1941, financed with $50,000 from the National Guard Bureau, $50,000 from a group of Des Moines businessmen, and a $250,000 WPA grant. The 124th Observation Squadron was federally recognized 25 February 1941.

The hangar was completed in November 1943, and used by the Army Air Corps as a turnaround base for the remainder of WW II.

The facility, encompassing 37 acres, was leased to the National Guard in 1946 when the 124th Fighter Squadron was reformed as part of the 132nd Fighter Group. The only structures then present were the hangar building and a shelter for the main gate guard.

The 132nd FW/124th FS were equipped with the P-51D from 1946 to 1953. The unit was recalled for 21 months from April 1951 through December 1952 for the Korean Conflict. During the unit's absence, a motor vehicle repair shop and supply warehouse were built. An additional aircraft parking ramp was completed following the unit's return in the spring of 1953.

The 132nd FW began jet operations in the summer of 1953. Runway 12-30 was increased from 5,700 feet to 7,500 feet through an NGB-funded project in 1954 to better accommodate the ANG's F-80s.

In 1957, the Wing was notified of another aircraft conversion from the F-84E to the F-86L. This conversion required the construction of a flight simulator building and a rocket storage facility. After several sessions with the City Council, the ANG obtained a long-term lease required by NGB for approval of the additional facilities, which were completed in 1958.

An Operations and Training (O & T) building and an aircraft engine shop were constructed in 1960 and 1961. Also approved during this period was another extension to runway 12-30 to 9,000 feet.

The unit continued to receive additional tasking in the Air Defense Mission. Construction of a special weapon storage site was started in 1964 to enhance the F-98J/AIR-2A ADC mission.

A runway alert facility was completed in 1969, following the Wing's transfer to Tactical Air Command and conversion to the F-84F.

The sudden conversion to the F-100C forced a temporary installation of an expeditionary aircraft arresting system while permanent ones were installed later. Due to the lack of overruns on runway 12-30, permission was obtained to set the BAK 12's 500 feet down the runway. This installation was completed in August 1972.

A new aircraft engine shop was completed in 1974. The requirement to stand the engine vertically for overhaul made the old shop obsolete.

The conversion from the F-100 to the A-7D Corsair II in 1974 necessitated the construction of several new facilities. An Avionics Shop and an A-7 Flight Simulator were completed in 1975 and 1977, respectively; and the Fuel Cell/Corrosion Control Facility, Aircraft Arresting Barriers on Runway 05-23, and a Power Check Pad with noise suppressors were completed in 1979. During that same period, space shortages for Base Fuels, Accounting and Finance, and Civil Engineering were corrected by construction of a POL Operations Building, a Base Engineer Shops Building, and an addition to the old Flight Simulator. The latter was occupied by the Accounting and Finance Section in 1979. A flurry of construction activity started in the Fall of 1982. Additions to the Avionics and Motor Vehicle Shops were started, alteration of one-third of the Fabrication Shop for a new Non-destructive Inspection Lab began, and the construction of the new Multi-Purpose Operations/Maintenance Facility commenced.

The federal mission of the Des Moines ANG is to provide operational ready combat units, and qualified personnel for active duty in the Air Force to support augmentation requirements; to fulfill Air Force war and contingency commitments; and to perform such peace time missions as are compatible with training requirements and the maintenance of mobilization readiness. In addition, when directed by the President, ANG units will protect life and property, and preserve peace, order and public safety as part of its federal mission.

Appendix F
MASTER LIST OF INDUSTRIAL OPERATIONS

Appendix F
MASTER LIST OF INDUSTRIAL OPERATIONS

Organization/Shop Name	Present Location and Dates (Bldg. No.)	Past or Alternate[a] Location and Dates (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Current Treatment/Storage/Disposal Method
Vehicle Maintenance	105 1976-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Photography Laboratory	100 1941-Pres.				
Avionics/Munitions Inspection	100 1941-Pres.		X		
Avionics AGE (PMEL)	180 1977-Pres.				
Avionics AGE Shop	180 1977-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Fuel Shop	100 1941-Pres.		X	X	Recycled at AGE
Egress	100 1941-Pres.				
Electric Shop	100 1941-Pres.				
Pneudraulics	100 1941-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Environmental	100 1941-Pres.				
Wheel and Tire Repair and Reclamation	100 1941-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Fuel Cell Replacement Shop	315 1968-Pres.		X	X	Recycled at AGE Shop
AGE	120 1960-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
NDI	230 1961-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Corrosion Control	315 1968-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Engine Maintenance	160 1975-Pres.	315 1972-1975	X	X	Contract disposal through DPDO at Offutt AFB
Engine Test Cell	228 1959-Pres.				
Non-Powered AGE	100 1941-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Munitions Storage/Maintenance	301 1966-Pres.				
CE Paint Shop	100 1941-Pres.		X	X	Contract disposal through DPDO at Offutt AFB

[a] Information for past or alternative locations was not available for all shops.

Appendix F--Continued

Organization/Shop Name	Present Location and Dates (Bldg. No.)	Past or Alternate[a] Location and Dates (Bldg. No.)	Handles Hazardous Materials	Generates Hazardous Waste	Current Treatment/Storage/Disposal Method
Flight Simulator	190 1978-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Flightline			X	X	Contract disposal through DPDO at Offutt AFB
POL Operations	215 1963-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Missile Maintenance	301 1966-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Phase Maintenance	100 1941-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Support Aircraft	100 1941-Pres.		X	X	Contract disposal through DPDO at Offutt AFB
Fabrication	230 1961-Pres.				

[a]Information for past or alternate locations was not available for all shops.

Appendix G
INVENTORY OF EXISTING POL STORAGE TANKS

Appendix G
INVENTORY OF EXISTING POL STORAGE TANKS

Facility/Location	Type POL	Capacity (gal)	Above Ground (AG) Below Ground (BG)
100	Fuel Oil	10,000	BG
101	Fuel Oil	5,000	BG
105	Fuel Oil	2,000	BG
107	Fuel Oil	1,000	BG
109	Fuel Oil	560	BG
110	Fuel Oil	5,000	BG
	Fuel Oil	1,000	BG
120	MOGAS	3,000	BG
160	Fuel Oil	2,000	BG
180	Fuel Oil	1,500	BG
190	Fuel Oil	2,500	BG
215	JP-4	25,046 (6 each)	BG
215	JP-4	1,050 (line inventory)	AG
220	MOGAS	3,000 (2 each)	BG
105	Fuel Oil	5,000	AG
217	JP-4	5,000 (4 each)	AG
228	JP-4	1,000	AG
233	Diesel	600	AG
241	Diesel	500	BG
300	Diesel	250	AG
311	Diesel	500	BG

Appendix H
INVENTORY OF DEACTIVATED POL STORAGE TANKS

Appendix H
INVENTORY OF DEACTIVATED POL STORAGE TANKS

Facility/Location	Type of POL Previously Stored	Capacity (gal)	Above Ground (AG) Below Ground (BG)	Comments
110	Fuel Oil	5,000	BG	Filled with water
	Fuel Oil	1,000	BG	Filled with water
109	Fuel Oil	560	BG	Status unknown
100	JP-4	10,000	BG	Filled with sand
100	JP-4	5,000	BG	Filled with sand

Appendix I
INVENTORY OF OIL/WATER SEPARATORS

Appendix I
INVENTORY OF OIL/WATER SEPARATORS

Facility No.	Facility Identification	Date of Facility Construction	Date of Separator Installation	Discharge
100	Main Hangar Building	1941	1941	Stormwater drainage
		1941	1941	Stormwater drainage
215	POL Facility	1963	--[a]	Stormwater drainage
105	Motor Vehicle	1954	1957	Stormwater drainage
230	Fabrication/NDI	1961	1982	Sanitary sewer
160	Engine I and R	1975	--[a]	Sanitary sewer
122	Washrack Facility	1967	1957	Sanitary sewer
228	Engine Run-up Area	1959	1979	Sanitary sewer
315	Corrosion Control	1968	1979	Stormwater drainage

[a]Construction date not available.

Appendix J
SITE RATING FORMS

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 1, Facility No. 228 Fire Training Area

LOCATION: Des Moines ANG Base Fac. 228

DATE OF OPERATION OR OCCURRENCE: 1966 to 1971

OWNER/OPERATOR: Des Moines ANG Installation

COMMENTS/DESCRIPTION: Covered by Check Pad

SITE RATED BY: K. Cable

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	0	10	0	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	3	6	18	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	3	6	18	18
I.	Population served by ground-water supply within 3 miles of site	0	6	0	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 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	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
		Subtotals	68	108
Subscore (100 x factor score subtotal/maximum score subtotal)				63
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	8	24
		Subtotals	54	114
Subscore (100 x factor score subtotal/maximum score subtotal)				47

C. Highest pathway subscore

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

Pathways Subscore 63

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	43
Waste Characteristics	60
Pathways	63
Total 166 divided by 3 =	55
	Gross Total Scor

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

55.00 x 0.5 = 28

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 2 Existing Fire Training Area

LOCATION: Des Moines ANG Installation N.W. of Main Runway

DATE OF OPERATION OR OCCURRENCE: 1971 to Present

OWNER/OPERATOR: Des Moines ANG Installation

COMMENTS/DESCRIPTION: Fire training exercise area

SITE RATED BY: K. Cable

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	0	10	0	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	3	6	18	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	3	6	18	18
I.	Population served by ground-water supply within 3 miles of site	0	6	0	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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water	3	8	24	24
Net precipitation	1	6	6	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
		Subtotals	68	108

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

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

Subscore (100 x factor score/3) 0

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	8	24
		Subtotals	54	114

Subscore (100 x factor score subtotal/maximum score subtotal) 47

C. Highest pathway subscore

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

Pathways Subscore 63

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	41
Waste Characteristics	60
Pathways	63
Total 164 divided by 3 =	55

Gross Total Sco

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: Site No. 3, Facility No. 105 Vehicle Maintenance Fuel Tank

LOCATION: Des Moines ANG Installation Facility 105

DATE OF OPERATION OR OCCURRENCE: 1982

OWNER/OPERATOR: Des Moines ANG Installation

COMMENTS/DESCRIPTION: Leaky Fuel Oil Storage Tank

SITE RATED BY: K. Cable

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	0	10	0	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	3	6	18	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	3	6	18	18
I. Population served by ground-water supply within 3 miles of site	0	6	0	18
		Subtotals	81	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 45

II. WASTE CHARACTERISTICS

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

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

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

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

50 x 0.8 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

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

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

Subscore 80

B. Rate the migration potential for 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	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	3	8	24	24
		Subtotals	68	108
Subscore (100 x factor score subtotal/maximum score subtotal)				63
2. Flooding	0	1	0	3
	Subscore (100 x factor score/3)			0
3. Ground-water migration				
Depth to ground water	3	8	24	24
Net precipitation	1	6	6	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to ground water	0	8	8	24
		Subtotals	54	114
Subscore (100 x factor score subtotal/maximum score subtotal)				47

C. Highest pathway subscore

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

Pathways Subscore 80

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	45
Waste Characteristics	40
Pathways	80
Total 165 divided by 3 =	55
	Gross Total Scor

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

END
DATE
9-88
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