AD-A197 430

INSTALLATION RESTORATION PROGRAM

Preliminary Assessment

153rd Tactical Airlift Group
Wyoming Air National Guard
Cheyenne Municipal Airport
Cheyenne, Wyoming

Hazardous Materials Technical Center
February 1988

88 6 30 090

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

DISTRIBUTION: Approved for public release; distribution is unlimited.

(1)

INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

FOR

153rd TACTICAL AIRLIFT GROUP
WYOMING AIR NATIONAL GUARD
CHEYENNE MUNICIPAL AIRPORT
CHEYENNE, WYOMING

March 1988

Prepared for

National Guard Bureau
Andrews AFB, Maryland 20310

Prepared by

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

Contract No. DLA 900-82-C-4426

CONTENTS

CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

A. INTRODUCTION

The Hazardous Materials Technical Center (HMTC) was retained in September 1987 to conduct the Installation Restoration Program (IRP) Preliminary Assessment of the 153rd Tactical Airlift Group (TAG), Wyoming Air National Guard, Cheyenne Municipal Airport, Cheyenne, Wyoming (hereinafter referred to as the Base), under Contract No. DLA 900-82-C-4426. The Preliminary Assessment included:

- an onsite visit, including interviews with 15 present and past Base personnel and 2 airport personnel conducted by HMTC personnel during 13-16 October 1987;
- the acquisition and analysis of pertinent information and records on hazardous materials use, and hazardous waste generation and disposal at the Base;
- the acquisition and analysis of available geological, hydrological, meteorological development, and environmental data from pertinent Federal, State, and local agencies; and
- the identification of sites on the Base which may be potentially contaminated with hazardous materials/hazardous wastes (HM/HW).

B. MAJOR FINDINGS

Past Base operations involved the use and disposal of materials and wastes that subsequently were categorized as hazardous. The major operations of the 153rd TAG that have used and disposed of these materials and wastes are flightline, NDI, avionics, AGE, airframe, electrical, engine and propulsion, nose dock and fuel cell, phase dock, pneudraulics, POL and refueling, repair and reclamation, photography lab, clinic, and vehicle maintenance. Waste oils, recovered fuels, spent cleaners, strippers, photographic chemicals, acids, and solvents were generated by these activities.

Interviews with 15 present and past Base personnel with an average of 17 1/2 years experience, 2 airport personnel and a field survey resulted in the identification of five disposal and/or spill sites at the Base that are potentially contaminated with HM/HW. Two sites were assigned a Hazard Assessment Score (HAS) according to the U.S. Air Force Hazard Assessment Rating Methodology (HARM):

Site No. 1 - Diesel Fuel Pump and Underground Storage Tank (HAS-71)

This site was active from 1974 to 1985. During the summer of 1984, the city used the diesel fuel to spray asphalt trucks. This fuel was drained onto the ground.

Site No. 2 - Old Nose Docks Waste Oil Underground Storage Tanks (USTs) (Unscored)

Several USTs exist on Base property which have been abandoned or have unknown contents. The USTs are located at Buildings 103, former 104, 105 and former 106. The sizes, exact locations and contents are unknown.

Site No. 3 - Underground Storage Tank (Building 4) (Unscored)

The underground storage tank near Building 4 was used for heating oil storage. The tank was reportedly emptied and abandoned due to water leaking into the tank.

Site No. 4 - Old Hazardous Waste Storage Area (HAS-52)

The old storage area south of Building 116, next to the former resevoir was an open, unpaved area, where drums were stored until removal by a contractor. This site was active from the late 1950s until 1984.

Site No. 5 - South Apron Drainage System (Unscored)

The south apron drainage system collects all run-off from the south apron and discharges directly into Dry Creek. While no major spills have occurred here, any residuals are transported by precipitation. The system is scheduled for connection to the north drainage system by October 1988. The north system drains into a fuel spill pond.

Groundwater and nearby surface water bodies are susceptible to contamination. The groundwater is approximately 100 feet below the ground surface. The aquifer is composed of sand and gravel lenses in silt, clay, and limestone layers. The surface water bodies within a 1-mile radius are Dry Creek, and Sloan, Kiwanis, and Absarraca Lakes. These waters are located as close as several hundred feet from the Base and provide water for fish and animal life. Contamination is possible from surface water run-off into Dry Creek and groundwater transport to Sloan Lake and Dry Creek.

C. CONCLUSIONS

Information obtained through interviews with Base personnel resulted in the identification of five disposal and/or spill sites on the Base that are potentially contaminated with HM/HW. At each of the identified sites, the potential exists for contamination of groundwater and subsequent contaminant migration. Two of the five sites were assigned a HAS according to HARM.

The most likely receptors of contaminated groundwater and surface water are the population and wildlife that use Dry Creek and Sloan Lake.

D. RECOMMENDATIONS

It is recommended that further investigations be done at all five sites.

I. INTRODUCTION

A. Background

The Wyoming Air National Guard (ANG) at the Cheyenne Municipal Airport, Cheyenne, Wyoming (hereinafter referred to as the Base), supports the 153rd Tactical Airlift Group (TAG). This unit was established in 1946 as the 187th Fighter Squadron. Past operations at the Base involved the use and disposal of materials and wastes that subsequently were categorized as hazardous. Consequently, the National Guard Bureau has implemented the Installation Restoration Program (IRP), which consists of the following:

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

B. Purpose

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

C. Scope

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

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

The onsite visit and interviews with past and present personnel were conducted during the period 13-16 October 1987. The Preliminary Assessment was prepared by Ms. Natasha Brock, Environmental Scientist; Mr. Mark Johnson, Geologist; and Mr. Raymond G. Clark, Department Manager (not present at site visit) (Resumes are included as Appendix A). Individuals from the ANG who assisted in the Preliminary Assessment were Mr. Daniel Waltz, Hydrogeologist (ANGSC/HMTC); and selected members of the 153rd TAG. The Point of Contact (POC) at the Base was Major Stewart Zuber, Base Civil Engineer (153rd CES/DE).

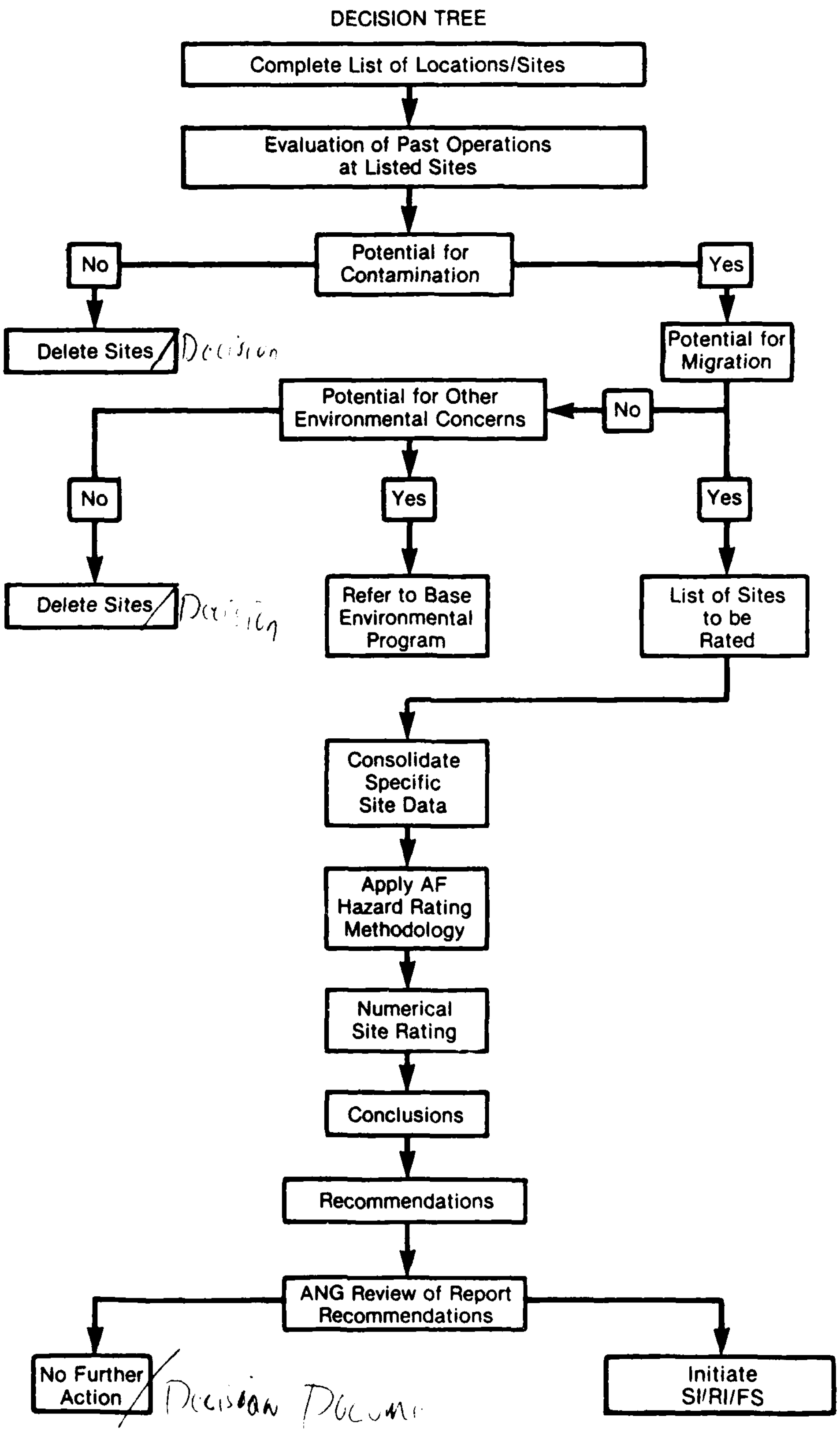
D. Methodology

A flow chart of the Preliminary Assessment Methodology is presented in Figure 1. This Preliminary Assessment methodology ensures a comprehensive collec-

PRELIMINARY ASSESSMENT
INSTALLATION
RESTORATION PROGRAM

Figure 1.

Preliminary Assessment Methodology Flow Chart.



tion and review of pertinent site specific information, and is used in the identification and assessment of potentially contaminated hazardous waste spill/disposal sites.

The Preliminary Assessment begins with a site visit to the Base to identify all shop operations or activities on the Base that may have utilized hazardous material or generated hazardous waste. Next, an evaluation of past and present HM/HW handling procedures at the identified locations is made to determine whether environmental contamination may have occurred. The evaluation of past HM/HW handling practices is facilitated by extensive interviews with past and present employees familiar with the various operating procedures at the Base. These interviews also define the areas on the Base where any waste materials, either intentionally or inadvertently, may have been used, spilled, stored, disposed of, or released into the environment.

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

Detailed geological, hydrological, meteorological, developmental (land use and zoning), and environmental data for the area of study is also obtained from the POC and from appropriate Federal, State and local agencies. A list of outside agencies contacted is in Appendix B. Following a detailed analysis of all the information obtained, sites are identified as suspect areas where HM/HW disposal may have occurred. Evidence at these sites suggests that they may be contaminated and that the potential for contaminant migration exists. These sites are assigned a Hazard Assessment Score (HAS) using the U.S. Air Force Hazard Assessment Rating Methodology (HARM)(Appendix C). The sites that are not scored is due to a lack of information on the exact amount of waste spilled and/or the type of material spilled cannot be determined. However, the absence of a score does not negate a recommendation for further IRP investigation. The computation of the score is from the Factor Rating Criteria included as Appendix D, along with the site Hazardous Assessment Rating Forms.

II. INSTALLATION DESCRIPTION

A. Location

The 153rd Tactical Airlift Group (TAG) is located on the northwest corner of the Cheyenne Municipal Airport, Cheyenne, Wyoming. The airport is located on the north side of Cheyenne, Wyoming which is located in the southeast corner of the State of Wyoming.

The Base occupies a total of 67 acres on two separate parcels of land leased from the Cheyenne Municipal Airport. Figure 2 shows the current boundaries of the Base covered by this Preliminary Assessment.

The Cheyenne Municipal Airport is located on the north side of Cheyenne, about 2 miles from downtown. The area surrounding the airport is dense residential to the south and sparse residential and businesses to the north. To the west are Kiwanis and Absarraca Lakes and to the southwest is Sloan Lake. Extending from the west to the east along the north boarder of the airport is Dry Creek.

B. Organization and History

The Wyoming Air National Guard was originally formed as the 187th Fighter Squadron in August 1946 occupying a small hangar on the southwest side of the airport.

In February 1950, the unit moved to its present location on the north side of the airport.

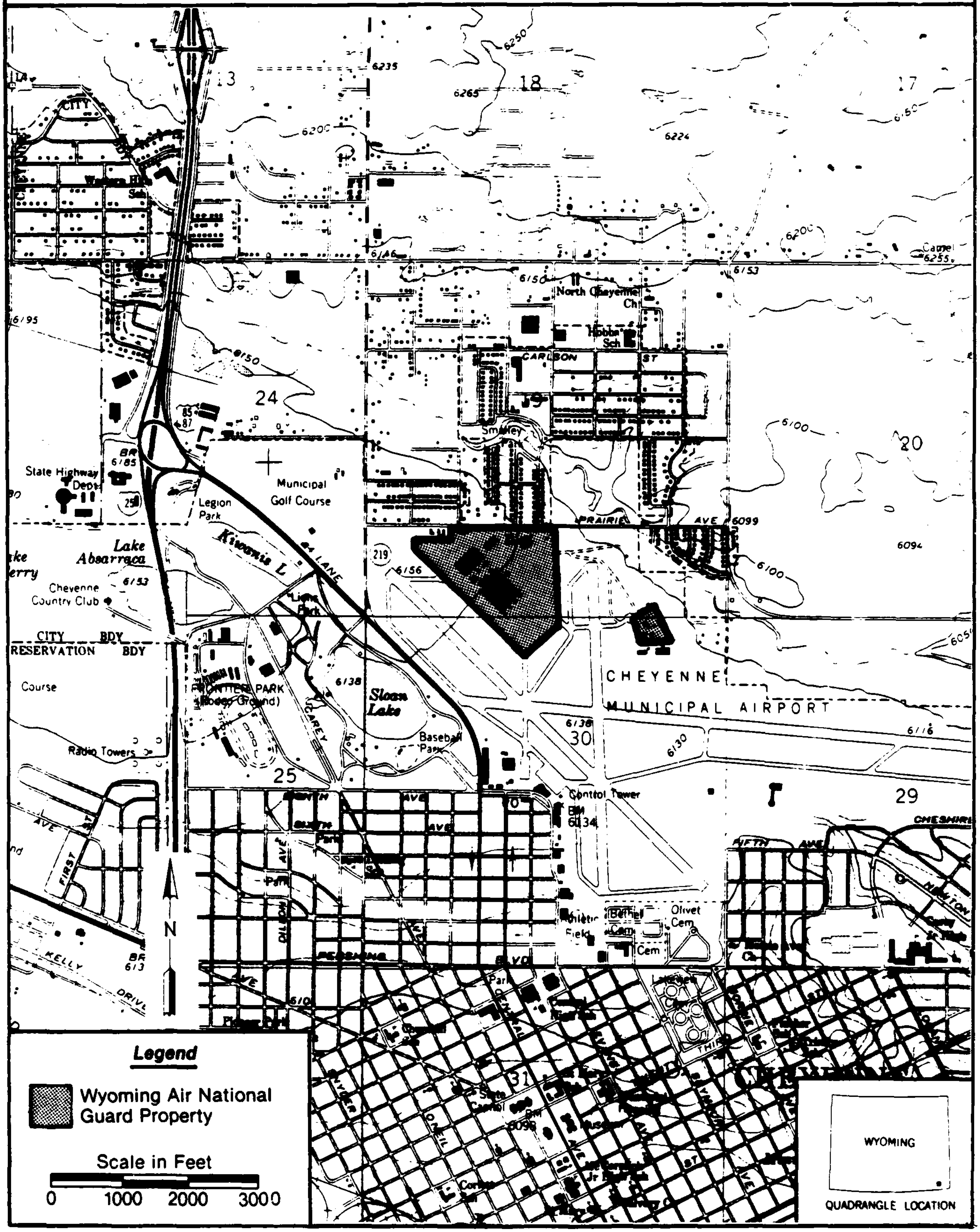
The Fighter Squadron was changed to the Fighter Bomber Squadron in May 1951 and was mobilized into Federal service to support in the Korean War.

In 1956, the Fighter Bomber Squadron was changed to the Fighter Interceptor Squadron to reflect its new mission and the arrival of new jet aircraft.

HMTC

Source: U.S.G.S. Topographic
Map 7.5 Minute Series
Cheyenne North Quad.
Wyoming, 1961
Photo Rev. 1970, 1978.

Figure 2.
Location Map of Wyoming Air National Guard



The Air National Guard became an all-weather fighter unit in 1958 and was designated the 153rd Fighter Interceptor Group.

A major change occurred in 1961 when the mission was changed to medical airlift and the jets were replaced with transport aircraft. The unit was designated the 187th Aeromedical Transport Squadron.

During the Vietnam War, the unit received a worldwide airlift mission. The squadron was expanded and designated the 153rd Air Transport Group. Several military designation changes occurred in the 1960s; it finally became the 153rd Aeromedical Airlift Group with its air evacuation mission expanded to include flight crews, nurses, medical technicians, and support personnel.

The unit became the 153rd Tactical Airlift Group in July 1972 and returned to turboprops in April of that year. The new mission was to execute aerial firefighting using the Modular Airborne Firefighting System (MAFFS) in 1975.

The latter half of the 1970s was committed to obtaining the highest level of combat readiness; firefighting missions; Jack Frost, a combat training exercise; and Volant Oak, a support mission in Central and South America.

The missions during the 1980s consist of Panama support and aerial firefighting.

III. ENVIRONMENTAL SETTING

A. Meteorology

The climate of the Cheyenne area is characterized by semi-arid conditions and large diurnal and annual temperature changes. The summers are generally warm with humidity averaging near 50 percent. The major precipitation occurs only during the summer as thunderstorms, occasionally accompanied by hail. The diurnal temperature ranges are 30 degrees in the summer and 23 degrees in winter. The summer temperatures range from 83 degrees during the day to 44 degrees at night. The winter temperatures range from 44 degrees during the day to 15 degrees at night, accompanied by strong winds.

The annual precipitation consists of 15 inches of rainfall, with 70 percent occurring during the growing season (NOAA, 1986). By calculating the net precipitation according to the method outlined in the Federal Register (47 FR 31224), dated 16 July 1982, a net precipitation value of minus 23 inches per year is obtained. Rainfall intensity, based on 1-year, 24-hour rainfall, is 1.25 inches (calculated according to 47 FR 31235, 16 July 1982, Figure 8).

B. Geology

The city of Cheyenne is located on a broad plateau between the North and South Platte Rivers at an elevation of 6,100 feet. The surrounding area is mostly flat to gently rolling prairie. Specifically, the Base sits on a plateau with a sharp 50 foot drop on the north side of the Base. Elevations drop more gently on the other sides. Thirty miles west of the city are the Laramie Mountains rising to an elevation of 9,000 feet.

Laramie County (in which Cheyenne is located) includes part of the Southern Rocky Mountains and Great Plains physiographic provinces. The Base lies within the High Plains section of the Great Plains. Rocks of Precambrian Age to Recent Age are present in Laramie County, consisting of shale and some sandstone, siltstone, and limestone.

The Base lies over the Ogallala Formation of the Miocene and Pliocene Ages. The Ogallala Formation is characteristic of lenticular beds of sand and gravel deposited by streams, and of silt, clay, and thin limestone beds deposited in temporary lakes. The gravel in the formation is from the mountains to the west and consist mainly of quartz, quartzite, feldspar, gneiss, and schist. The thickness of the Ogallala Formation ranges from 0 to 330 feet in thickness.

C. Soils

Soil borings were obtained during construction on Base property. The soils consist of a brown silty clayey fine sand, a few inches thick in some places. The most common top layer is a silty clayey sand or a sandy clay of several feet. These are underlain by a gravelly sand. Below this layer is a clay layer several feet thick. All borings were completed to a depth of 15 feet in soil disturbed by Base or airport construction. Analysis of the soil for surface erosion, surface permeability and soil permeability resulted in slight, 6.71×10^{-7} cm/sec, and 6.71×10^{-7} cm/sec rates, respectively (Soil Conservation Service, 1988 & Arix, 1986).

D. Hydrology

<u>Groundwater</u>

The Ogallala Formation is the most extensively developed aquifer in Laramie County. Most of the municipal water supply drawn is from Rob Roy, North Crowe, Granite and Crystal Resevoirs. A well field 6 miles west of Cheyenne is used for backup and peak useage periods (BCE, 1988). Some surface water is provided to Cheyenne from the alluvium of Crow Creek and Douglas Creek. A study done north of the Base reported groundwater starting at depths of 126 feet (Wyoming, 1985). The Base is supplied by the municipal water supply. Pumping tests on the Ogallala Formation show the aquifer to consist of lenses, stringers, and irregular masses of sand and gravel interbedded with silt and clay (Lowry, 1967). Groundwater flow is generally influenced by the local drainage system and therefore, groundwater flows toward the upper part of Crow Creek (Lowry, 1967). Crow Creek is located approximately 2 miles southwest of the Base. The groundwater flow at the Base is split into two directions. The north half of the Base's groundwater flows toward Dry Creek. The southern half flows toward Sloan Lake.

Surface Waters

The surface water bodies within a 1-mile radius of the Base consist of Dry Creek to the north, Sloan Lake to the southwest and Kiwanis and Absarraca Lakes to the west. Sloan Lake is located downgradient from the Base; the two other lakes are upgradient. Dry Creek is present mostly during rainy periods; however, fish life is present. It is also downgradient from the Base. Sloan, Kiwanis and Absarraca Lakes are used for recreational and fishing purposes. The Base is located outside the 100-year floodplain of Dry Creek.

E. Critical Habitats/Endangered or Threatened Species

According to the Game and Fish Department of Wyoming, there are no threatened species of flora of fauna within a 1-mile radius of the Base. Furthermore, there are no critical habitats, or wilderness areas within a 1-mile radius. There are some limited wetlands a short distance to the north and southwest of the Base.

IV. SITE EVALUATION

A. Activity Review

A review of Base records and interviews with past and present Base employees resulted in the identification of specific operations within each activity in which the majority of industrial chemicals are handled and hazardous wastes can be generated. A total of 15 past and present Base personnel with an average of 17 1/2 years experience were interviewed. Also 2 airport personnel were interviewed. The personnel interviewed were representative of Civil Engineering, Fire Department, Audio-visual, Storage and Distribution, Supply, POL, Aircraft Maintenance, Facilities Maintenance, Flightline, and Oil and Hazardous Response. Table 1 summarizes the major operations associated with each activity, provides estimates of the quantities of waste currently being generated by these operations, and describes the past and present disposal methods for the wastes. Based on information gathered, any operation that is not listed in Table 1 has been determined to produce negligible quantities of wastes ultimately requiring disposal.

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

The interviews with Base personnel and site inspections resulted in the identification of five waste release/spill sites. It was determined that all five sites are potentially contaminated with HM/HW with potential for migration, and it is recommended that these sites should be further evaluated. The Diesel Fuel Pump and UST (Site No. 1) and Old Hazardous Waste Storage Area (Site No. 4) were scored using HARM (Appendix C). Copies of completed Hazard Assessment Rating Forms along with the Factor Rating Criteria are included in Appendix D. Table 2 summarizes the Hazard Assessment Sccores (HAS) for the scored sites and Figure 3 illustrates the site locations.

Table 1. Hazardous Waste Disposal Summary: Wyoming Air National Guard

SHOP NAME	BUILDING NO.	HAZARDOUS WASTE/ USED HAZARDOUS MATERIAL	CURRENT QUANTITIES (GALLONS/YEAR)	METHOD OF TREATMENT, STORAGE, AND DISPOSAL 1950 1960 1970 1980 1990
Flightline	Trailer	A/C Soap (Butyl Cellosolve)	300	|---STORM---|---SURF IMP---|
		PD-680	72	|---CONTR---|---RECYC---|
		Deicing Fluid (Ethylene Glycol) (Propylene Glycol)	165	|---STORM---|---SURF IMP---|
Photographic Laboratory	116	Photographic Fixer (Aluminum Sulfate) (Sulfuric Acid)	3	|---SAN---|---SIL REC---|
		Photographic Developer (Potassium Hydroxide) (Hydroquinone) (Acetic Acid)	3	|---SAN---|---NEUTR SAN---|
NDI	116	Inspection Penetrant ZE-3 (Petroleum Sulfonate) (Paraffin) (Ethoxylated Octylenal) (Butoxylated Phosphate)	40	|---DRMO---|
		Magnetic Inspection Fluid (Paraffin)	60	|---DRMO---|
		X-ray Fixer (Sodium Hydroxide)	15	|---SIL REC---|
		Zyglo Penetrant	110	|---RECYC---|

DRMO - Disposed of through the Defense Reutilization and Marketing Office
NEUTR SAN - Neutralized and disposed of through sanitary sewer
SAN - Disposed of in drains leading to sanitary sewer
NEUTR SURF IMP - Neutralized and disposed of into a surface impoundment
STORM - Disposed through storm sewer to Dry Creek
LNDFL - Disposal to Cheyenne Municipal Landfill
CONTR - Disposed of by a contractor
DIL SAN - Disposal of by diluting with water and into the sanitary sewer system

SURF IMP - Surface Impoundment
SPLY - Sent to supply for recycle
SIL REC - Sent to silver recovery offbase
UNK - Disposal method unknown
OWS - Disposal through oil/water separator
* - Acid disposal in Battery Shop
** - Acid disposal in AGE

Table 1. Hazardous Waste Disposal Summary: Wyoming Air National Guard

SHOP NAME	BUILDING NO.	HAZARDOUS WASTE/ USED HAZARDOUS MATERIAL	CURRENT QUANTITIES (GALLONS/YEAR)	METHOD OF TREATMENT, STORAGE, AND DISPOSAL 1950 1960 1970 1980 1990
NDI (Continued)	116	X-ray Developer (Metal) (Phenodone) (Hydroquinone) (Benzenediol) (Sodium Hydroxide) (Potassium Hydroxide)	20	'------NEUTR SAN------'
Avionics	116	Dessicant (Cobalt Chlorine) (Silica Gel)	10	'--LNDFL--'
AGE (AGE located in Bldg 118 from 1950-1971)	124	Sulfuric Acid	12	'------DIL-SAN*------------------'---NEUT-SAN**---'
		Carbon Remover (Methylene Chloride) (Cresylic Acid)	1	'-----------CONTR-----------'----------DRMO---------'
		A/C Engine Oil	Unknown	'-----------CONTR-----------'----------DRMO---------'
		Ethylene Glycol	50	'-----------CONTR-----------'----------DRMO---------'
		Hydraulic Fluid	Unknown	'-----------CONTR-----------'----------DRMO---------'
		Turpentine	18	'----------SPLY---------'
Airframe	116	Thinner/Lacquer	120	'-----------CONTR-----------'----------DRMO---------'
		GSA Paint Remover	60	'------STORM---------'
		B&B 5151A Paint Remover	60	'-STORM-----------DRMO---------'
Carpenter Shop	118	None		

Table 1. Hazardous Waste Disposal Summary: Wyoming Air National Guard

SHOP NAME	BUILDING NO.	HAZARDOUS WASTE/ USED HAZARDOUS MATERIAL	CURRENT QUANTITIES (GALLONS/YEAR)	METHOD OF TREATMENT, STORAGE, AND DISPOSAL (1950 – 1960 – 1970 – 1980 – 1990)
Clinic	116	X-ray Fixer	3	|---NEUTR/SAN-|--SIL/REC---|
		X-Ray Developer	3	|---------NEUTR-SAN---------|
Electrical	118	None		
Electrical	116	Sulfuric Acid	12	|-------DIL-SAN*-----------------|-NEUTR-SAN**----|
Engine and Propulsion	116	A/C Soap	300	|--------------SAN-----------|-------SURF IMP-----|
		Detergent (Phosphoric Acid)	4	|----------------------SAN----------------------|
		Gas Path (Petroleum Dist.)	165	|--------------STORM----------|-------SURF IMP-----|
		PD-680	180	|-----------CONTR----------|----------DRMO-----------|
Nose Dock & Fuel Cell	122	A/C Soap	360	|-SAN-|----SURF IMP-----|
		PD-680	30	|----------OWS-----------|
		JP-4	600	|------------DRMO--------|
		Chem-Aqua 500c (Sodium bichromate)	2200	|-------SAN-|-------|
Phase Dock	116	Hydraulic Fluid	100	|-------------CONTR--------------|-------DRMO-------|
		PD-680	48	|-------------CONTR--------------|-------DRMO-------|
		Turbine Oil	Unknown	|-------------CONTR--------------|-------DRMO-------|
		Oil	330	|-------------CONTR--------------|-------DRMO-------|
Pneudraulics	116	Hydraulic Fluid	72	|-------------CONTR--------------|-----RECYC------|

Table 1. Hazardous Waste Disposal Summary: Wyoming Air National Guard

SHOP NAME	BUILDING NO.	HAZARDOUS WASTE/ USED HAZARDOUS MATERIAL	CURRENT QUANTITIES (GALLONS/YEAR)	METHOD OF TREATMENT, STORAGE, AND DISPOSAL (1950 – 1960 – 1970 – 1980 – 1990)
POL & Refueling	5	Petroleum Ether	18	CONTR → DRMO
		Isopropyl Alcohol	18	CONTR → DRMO
		JP-4	30	CONTR → DRMO
		Automotive Fuel	12	CONTR → DRMO
		Diesel Fuel	12	CONTR → DRMO
		Sulfuric Acid	1	DIL—SAN* → NEUTR-SAN*
		Potassium Dichromate	1/4	SAN
Plumbing	118	None		
Repair and Reclamation	116	PD-680	144	SAN → DRMO
		B & B 9201	110	DRMO
Reproduction	116	Toner Solution (Petroleum Dist.)	4	SAN → DRMO
		Copier Dispersient (Petroleum Dist.)	4	SAN → DRMO
		Conversion Solution	50	SAN
Vehicle Maintenance (Located in Bldg 118 from 1950-1971)	123	Sulfuric Acid	8	DIL-SAN* → NEUTR-SAN**
		Paint Remover (Methylene Chloride)	5	CONTR → DRMO
		PD-680	20	CONTR → DRMO
		Carbon Remover (Methylene Chloride) (Cresylic Acid)	5	CONTR → DRMO
		Lube Oil	5	CONTR → DRMO
		Hydraulic Fluid	2	CONTR → DRMO
Welding	116	None		

Table 1. Hazardous Waste Disposal Summary: Wyoming Air National Guard

SHOP NAME	BUILDING NO.	HAZARDOUS WASTE/ USED HAZARDOUS MATERIAL	CURRENT QUANTITIES (GALLONS/YEAR)	METHOD OF TREATMENT, STORAGE, AND DISPOSAL 1950 1960 1970 1980 1990
Power Production	118	Sulfuric Acid	4	(1970–1990) |-DIL-SAN**-|-NEUTR-SAN**-|
Boiler Plant	117	Chem-Aqua 500c	4400	(1980–1985) |-STORM-|
Battery Shop (1950-1971)	116	Sulfuric Acid	12	(1950–1971) |----DIL-SAN-------------|

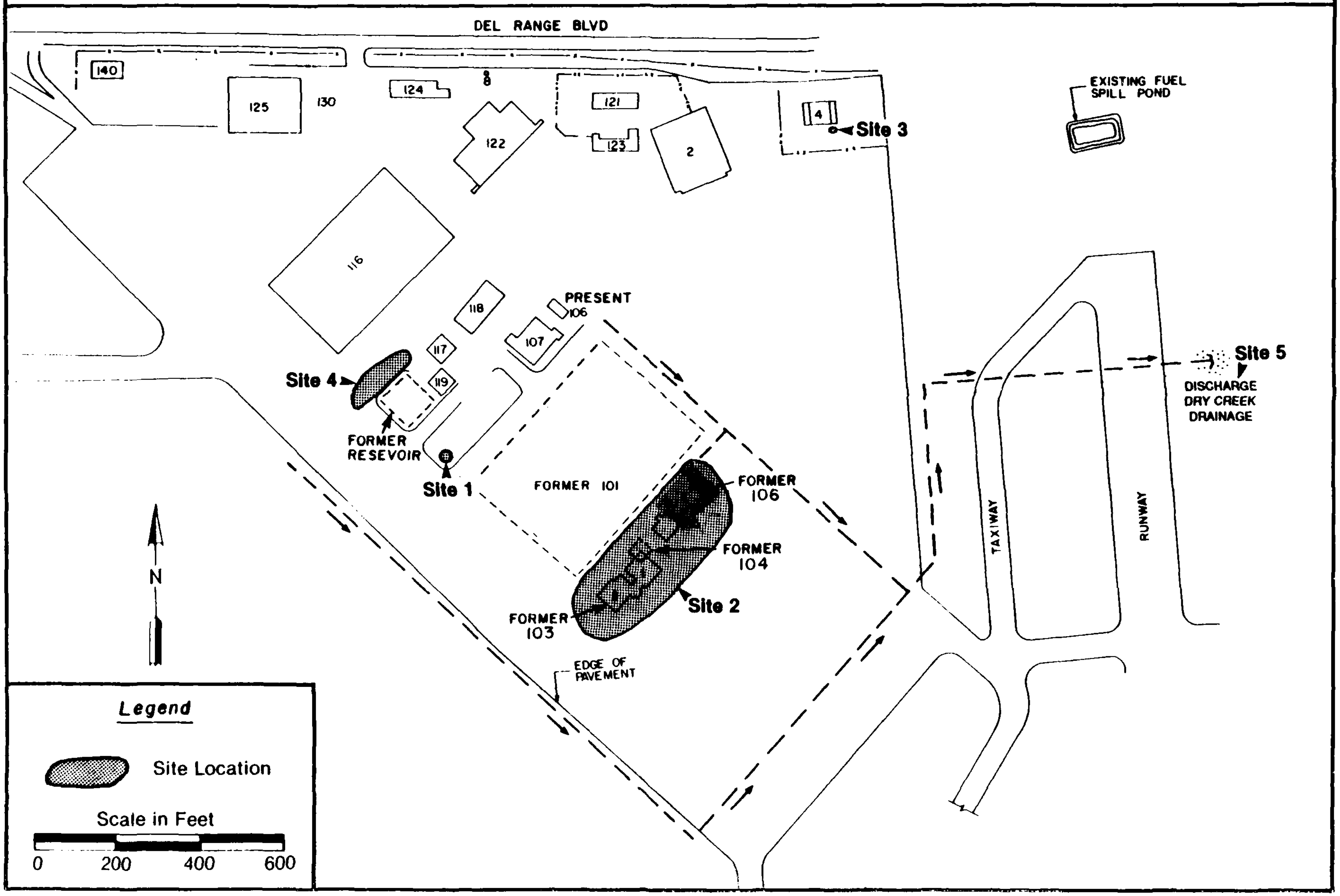
Table 2. Site Hazard Assessment Scores (as Derived from HARM): Wyoming Air National Guard

Site Priority	Site No.	Site Description	Receptors	Waste Characteristics	Pathway	Waste Mgmt. Practices	Overall Score
1	1	Diesel Fuel Pump	65	48	100	71	71
2	4	Hazardous Waste Storage Area	65	12	80	52	52

Adapted From:
Source: Fuel Spill Pond Map
Wyoming ANG, 1986

Figure 3.

Location of Sites at Wyoming Air National Guard



The objective of this assessment is to provide a relative ranking of sites suspected of contamination from hazardous substances. The final score reflects specific components of the hazard posed by a specific site: possible receptors of the contamination (e.g., population within a specified distance of the site and/or critical environments within a 1-mile radius of the site); the waste and its characteristics; and the potential pathways for contaminant migration (e.g., surface water, groundwater, flooding. Descriptions of all the sites follow.

Site No. 1 - Diesel Fuel Pump and Underground Storage Tank (UST) (HAS-71)

The diesel fuel pump was in service from 1974 until 1985; however, the period in focus is when the city used the pump for cleaning purposes. The city occupied the former double hangar and used the pump located northwest of the hanger from 1974 until 1985. During the summer of 1984, two asphalt trucks were rinsed out approximately three times per week with diesel fuel which was allowed to drain onto the ground. The site was scored assuming a small quantity spill/release.

The pump, tank, and 50 cubic yards surrounding the tank are scheduled for removal due to the construction of a fire protection system water supply line. Construction is scheduled by the end of 1989. No evidence of spillage was observed during the site visit.

Site No. 2 - Old Nose Docks Waste Oil USTs (Unscored)

Buildings former 103, 104, 105, and former 106 each have underground storage tanks (USTs), possibly used for heating oil. The exact locations, sizes, contents, and inspection records are unknown. Building 104 has been demolished. Building 103 had an extension built and has been renamed Building 1. Buildings 105 and 106 have been combined and named Building 105. (The designation Building 106 has been given to the building next to Building 107.)

Site No. 3 - Underground Storage Tank (Building 4) (Unscored)

The UST located at Building 4 was used for heating oil. Water entered the tank at the joint of the vent pipe, thus, the tank was subsequently emptied and abandoned.

Site No. 4 - Old Hazardous Waste Storage Area (HAS-52)

The hazardous waste storage area was active from 1950 to 1983. Prior to demolition, it was located behind Building 116. The drums were stored here until removal by a contractor. No information exists on the amount and type of waste stored. There was no ground protection provided underneath the drums, however, no evidence of releases was seen since the soil was graded over during the demolition of the resevoir. During the site visit, no evidence of spills or releases was noted. The site was scored assuming a small quantity spill/release, low hazard rating, and easily biodegradable compounds.

Site No. 5 - South Apron Drainage - (Unscored)

The south apron drainage system currently drains into Dry Creek. No major spills or releases have been reported on this part of the apron; however, residuals are transported by precipitation. The north apron currently drains into a fuel spill pond and the south apron is scheduled for connection to the fuel spill pond by October 1988 by installing a sewer system and plugging the existing manhole to prevent further discharge into Dry Creek. This action will eliminate the potential of contamination to Dry Creek in the event of a spill.

V. CONCLUSIONS

Information obtained through interviews with 15 present and past Base personnel, review of Base records, and field observations has resulted in the identification of five potentially contaminated disposal and/or spill sites on Base property. These sites consist of the following:

Site No. 1 - Diesel Fuel Pump and UST (Unscored)(HAS-71)
Site No. 2 - Old Nose Docks Waste USTs (Unscored)
Site No. 3 - Underground Storage Tank (Building 4) (Unscored)
Site No. 4 - Old Hazardous Waste Storage Area (HAS-52)
Site No. 5 - South Apron Drainage (Unscored)

The soil, surface water, and groundwater at the Base is susceptible to contamination. The upper aquifer consists of sandy clays, sandy gravel, and some clay.

No measures were made to contain the spills from the Diesel Fuel Pump and UST (Site No. 1) and the Hazardous Waste Storage Area (Site No. 4) and South Apron Drainage (Site No. 5). Due to the time period of the spills or possible releases, the groundwater and Dry Creek may already be contaminated.

VI. RECOMMENDATIONS

Because of the potential for contaminant migration, further investigation is recommended for all five sites in accordance with applicable regulations.

GLOSSARY OF TERMS

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

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

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

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

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

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

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

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

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

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

DISCHARGE - The release of any waste stream or any constituent thereof to the environment which is not recovered.

DOWNGRADIENT - A direction that is topographically or hydraulically downslope; the direction in which groundwater flows.

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

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

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

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

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

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

a. cause, or significantly contribute to, an increase in mortality or an increase in serious 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, disposed of, or otherwise managed.

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

MIOCENE - An epoch of the upper Tertiary period, after the Oligocene and before the Pliocene, occurred between 23.5 and 5 million years ago.

PLIOCENE - An epoch of the Tertiary period, after the Miocene and before the Pleistocene, occurred bewteen 5 and 2 million years ago.

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

PRECAMBRIAN - All geologic time, and its corresponding rocks, before the beginning of the Paleozoic, about 500 million years ago and older.

RECENT(HOLOCENE) - An epoch of the Quarternary period, from the end of the Pleistocene, approximately 8 million years ago to the present time.

UPGRADIENT - A direction that is topographically or hydraulically upslope.

WETLANDS - Those areas that are inundated or saturated by surface or ground-water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

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

WETLANDS - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

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

BIBLIOGRAPHY

1. Lowry, Marlin E., and Marvin A. Crist. Geology and Groundwater Resources of Laramie County. Geological Survey Water-Supply Paper, 1934. U.S. Government Printing Office. Washington, D.C., 1967.

2. National Oceanic and Atmospheric Administration. Local Climatological Data - Annual Summary with Comparative Data, Cheyenne, Wyoming. Department of Commerce. National Climatic Data Center. Ashville, North Carolina, 1987.

3. Wyoming Air National Guard. Wyoming Air National Guard 40th Anniversary Reunion; 1946-1986. Wyoming Air National Guard. Cheyenne, Wyoming, 1987.

4. Office of the Federal Register. Part 300 National Oil and Hazardous Waste Contingency Plan Subpart H. National Archives. Washington, D.C., July 1982.

5. State Engineer's Office. Summary of the North Cheyenne Study Area Meeting. State of Wyoming. Cheyenne, Wyoming, June 1985.

6. Arix. Report of a Geotechnical Investigation for Fuel Spill Area Wyoming Air National Guard Cheyenne Municipal Airport Cheyenne, Wyoming. Empir Laboratories, Inc. Cheyenne, Wyoming, 1986.

7. Wyoming Soil Conservation Service. Telephone Inquiry-Soil Erosion, 1988.

APPENDIX A

RESUMES OF HMTC SURVEY TEAM MEMBERS

NATASHA M. BROCK

EDUCATION

Graduate work, civil/environmental engineering, University of Maryland, 1987-present
Graduate work, civil/environmental engineering, University of Delaware, 1985-1986
B.S. (cum laude), environmental science, University of the District of Columbia, 1984
Undergraduate work, biology, The American University, 1978-1980

CERTIFICATION

Health & Safety Training Level C

EXPERIENCE

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

EMPLOYMENT

Dynamac Corporation (1987-present): Environmental Scientist

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

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

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

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

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

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

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

MARK D. JOHNSON

EDUCATION

B.S., geology, James Madison University, 1980

EXPERIENCE

Seven years' technical experience including geologic mapping, subsurface investigations, foundation inspections, groundwater monitoring, pumping and observation well installation, geotechnical instrumentation, groundwater assessment, preparation of Air Force Installation Restoration Program Guidance and preparation of statements of work for the Air Force and the Air National Guard.

EMPLOYMENT

Dynamac Corporation (1984-present): Staff Scientist/Geologist

Primarily responsible for preparing statements of work for Phase IV-A of the Air Force's Installation Restoration Program, statements of work for Phase II and Phase IV-A of the Air National Guard's Installation Restoration Program, and assessing groundwater of hazardous waste disposal/spill sites on military installations for the purpose of determining rates and extents of contaminant migration and for developing site investigations, remedial investigations and identifying remedial actions. Prepared management guidance document for the Air Force's Installation Restoration Program.

Bechtel Associates Professional Corporation (1981-1984): Geologist

Performed the following duties in conjunction with major civil engineering projects including subways, nuclear power plants and buildings: prepared geologic maps of surface and subsurface facilities in rock and soil including tunnels, foundations and vaults; assessed groundwater conditions in connection with construction activities and groundwater control systems; monitored the installation of permanent and temporary dewatering systems and observation wells; monitored surface and subsurface settlement of tunnels; and participated in subsurface investigations.

Schnabel Engineering Associates (1981): Geologist

Inspected foundations and backfill placement.

PROFESSIONAL AFFILIATIONS

Association of Engineering Geologists
National Water Well Association/Association of Ground Water Scientists and Engineers
British Tunneling Society

RAYMOND G. CLARK, JR.

EDUCATION

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

SPECIALIZED TRAINING

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

CERTIFICATIONS

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

EXPERIENCE

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

EMPLOYMENT

Dynamac Corporation (1986-present): Program Manager

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

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

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

HNTB (1979-1981): Airport Engineer

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

HNTB (1974-1979): Design Engineer

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

HNTB (1972-1974): Airport Engineer

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

Self-employed (1971-1972): Private Consultant

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

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

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

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

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

Corps of Engineers (1967-1968): Division Engineer

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

Corps of Engineers (1963-1967): Engineer Advisor

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

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

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

Corps of Engineers (1959-1960): Area Engineer

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

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

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

Corps of Engineers (1957-1958): Student

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

Corps of Engineers (1954-1957): Engineer Manager

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

Corps of Engineers (1949-1954): Engineer Commander

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

PROFESSIONAL AFFILIATIONS

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

HARDWARE

IBM PC

SOFTWARE

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

APPENDIX B

OUTSIDE AGENCY CONTACT LIST

OUTSIDE AGENCY CONTACT LIST

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

2. Game and Fish Department of Wyoming
   5400 Bishop Boulevard
   Cheyenne, Wyoming
   Rex Corsi
   (307) 777-7735

3. Department of Highways
   5300 Bishop Boulevard
   Cheyenne, Wyoming
   George Johnson
   (307) 777-7475

4. State of Wyoming
   Department of Environmental Quality
   Water Quality Division
   Herschler Building
   Cheyenne, Wyoming
   Leroy Feusner
   (307) 777-7781

5. State of Wyoming
   State Engineer's Office
   Herschler Building
   Cheyenne, Wyoming
   Richard Stockdale
   (307) 777-7354

6. Wyoming Soil Conservation Service
   1750 Westland Road
   Cheyenne, Wyoming
   Abe Stevenson
   (307) 772-2316

APPENDIX C

USAF HAZARD ASSESSMENT RATING METHODOLOGY

USAF HAZARD ASSESSMENT RATING METHODOLOGY

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

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

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

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air National Guard in setting priorities for follow-on site investigations.

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

DESCRIPTION OF MODEL

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

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

Site scores are developed using the appropriate ranking factors according to the method presented in the flow chart (Figure 1 of this report). The site rating form and the rating factor guideline are provided at the end of this appendix.

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

The receptors category rating is based on four rating factors: the potential for human exposure to the site, the potential for human ingestion of contaminants should underlying aquifers be polluted, the current and anticipated uses of the surrounding area, and the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1,000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 x factor score subtotal/ maximum score subtotal).

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

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

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

APPENDIX D

SITE HAZARDOUS ASSESSMENT RATING GUIDELINES, FORMS, AND FACTOR RATING CRITERIA

HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence or economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

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

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

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

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records

Logic based on the knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

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

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

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

II. WASTE CHARACTERISTICS -Continued

Waste Characteristics Matrix

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

Notes:

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

Confidence Level

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

Waste Hazard Rating

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

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

B. Persistence Multiplier for Point Rating

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

C. Physical State Multiplier

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

III. PATHWAYS CATEGORY

A. Evidence of Contamination

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

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

B-1 Potential for Surface Water Contamination

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (including drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall (Number of thunderstorms)	<1.0 inch (0-5)	1.0 to 2.0 inches (6-35)	2.1 to 3.0 inches (36-49)	>3.0 inches (>50)	8

B-2 Potential for Flooding

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

B-3 Potential for Ground-Water Contamination

Rating Factors	0	1	2	3	Multiplier
Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	8
Soil permeability	Greater than 50% clay ($<10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($>10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground water level	8

B-3 Potential for Ground-Water Contamination -Continued

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

IV. WASTE MANAGEMENT PRACTICES CATEGORY

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

B. Waste Management Practices Factor

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

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Spills:

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

Surface Impoundments:

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

Fire Protection Training Areas:

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

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

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE DIESEL FUEL PUMP AND UST (SITE 1)
LOCATION WYOMING AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE SUMMER 1978
OWNER/OPERATOR 153RD TAG
COMMENTS/DESCRIPTION OPERATED BY CITY AT THAT TIME
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	3	10	30	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	3	3	9	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	3	6	18	18
GROUND WATER	:	1	6	6	18
		SUBTOTALS		117	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 65

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (H)

FACTOR SUBSCORE A (60)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR = SUBSCORE B
(60)(0.8) = (48)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(48)(1) = (48)

III. PATHWAY

RATING FACTOR	FACTOR RATING	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 (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (LESS THEN 80) EXISTS, PROCEED TO B.

(100)

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

DISTANCE TO NEAREST SURFACE WATER :
NET PRECIPITATION :
SURFACE EROSION :
SURFACE PERMEABILITY :
RAINFALL INTENSITY :

SUBTOTALS

SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)

2. FLOODING

SUBSCORE (100 x FACTOR SCORE /3) :

3. GROUND WATER MIGRATION

DEPTH TO GROUND WATER :
NET PRECIPITATION :
SOIL PERMEABILITY :
SUBSURFACE FLOWS :
DIRECT ACCESS TO GROUND WATER :

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.

(100)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(65)
WASTE CHARACTERISTICS	(48)
PATHWAYS	(100)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(71)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(71)	(1)	=	71

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE OLD HAZARDOUS WASTE STORAGE AREA (SITE 4)
LOCATION WYOMING AIR NATIONAL GUARD
DATE OF OPERATION/OCCURRENCE LATE 1950 S-1984
OWNER/OPERATOR 153RD TAG
COMMENTS/DESCRIPTION
RATED BY HMTC

I. RECEPTORS

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
A. POPULATION WITHIN 1000 FEET OF SITE	:	3	4	12	12
B. DISTANCE TO NEAREST WELL	:	3	10	30	30
C. LAND USE/ZONING WITHIN 1 MILE RADIUS	:	3	3	9	9
D. DISTANCE TO INSTALLATION BOUNDARY	:	3	6	18	18
E. CRITICAL ENVIRONMENTS WITHIN 1 MILE RADIUS OF SITE	:	0	10	0	30
F. WATER QUALITY OF NEAREST SURFACE WATER	:	1	6	6	18
G. GROUND WATER USE OF UPPERMOST AQUIFER	:	2	9	18	27
H. POPULATION (WITHIN 3 MILES) SERVED BY					
DOWN STREAM SURFACE WATER	:	3	6	18	18
GROUND WATER	:	1	6	6	18
		SUBTOTALS		117	180

RECEPTORS SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL) 65

II. WASTE CHARACTERISTICS

A. SELECT THE FACTOR SCORE BASED ON THE ESTIMATED QUANTITY, THE DEGREE OF HAZARD, AND THE CONFIDENCE LEVEL OF THE INFORMATION.

1. WASTE QUANTITY (S=SMALL, M=MEDIUM, L=LARGE) (S)
2. CONFIDENCE LEVEL (S=SUSPECT, C=CONFIRM) (C)
3. HAZARD RATING (L=LOW, M=MEDIUM, H=HIGH) (L)

FACTOR SUBSCORE A (30)
<FROM 20 TO 100 BASED ON FACTOR SCORE MATRIX>

B. APPLY PERSISTENCE FACTOR

FACTOR SUBSCORE A x PERSISTENCE FACTOR SUBSCORE B
(30)(0.4) = (12)

C. APPLY PHYSICAL STATE MULTIPLIER

SUBSCORE B x PHYSICAL STATE MULTIPLIER = WASTE CHARACTERISTICS SUBSCORE
(12)(1) = (12)

III. PATHWAY

RATING FACTOR		FACTOR RATING	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 (100) EXISTS THEN PROCEED TO C. IF NO EVIDENCE OR INDIRECT EVIDENCE (LESS THEN 80) EXISTS, PROCEED TO B.
(80)

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	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DISTANCE TO NEAREST SURFACE WATER	:	2	8	16	24
NET PRECIPITATION	:	0	6	0	18
SURFACE EROSION	:	1	8	8	24
SURFACE PERMEABILITY	:	3	6	18	18
RAINFALL INTENSITY	:	1	8	8	24
SUBTOTALS				50	108
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					46

2. FLOODING

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
FLOODING		0	1	0	3
SUBSCORE (100 x FACTOR SCORE /3)	:				0

3. GROUND WATER MIGRATION

RATING FACTOR		FACTOR RATING	MULTIPLIER	FACTOR SCORE	MAXIMUM POSSIBLE SCORE
DEPTH TO GROUND WATER	:	1	8	8	24
NET PRECIPITATION	:	0	6	0	18
SOIL PERMEABILITY	:	0	8	0	24
SUBSURFACE FLOWS	:	0	8	0	24
DIRECT ACCESS TO GROUND WATER	:	0	8	0	24
SUBTOTALS				8	114
SUBSCORE (100 x FACTOR SCORE SUBTOTAL/MAXIMUM SCORE SUBTOTAL)					7

C. HIGHEST PATHWAY SUBSCORE

ENTER THE HIGHEST SUBSCORE VALUE FROM A, B-1, B-2 OR B-3 ABOVE.
(80)

IV. WASTE MANAGEMENT PRACTICES

A. AVERAGE THE THREE SUBSCORES FOR RECEPTORS, WASTE CHARACTERISTICS, AND PATHWAYS.

RECEPTORS	(65)
WASTE CHARACTERISTICS	(12)
PATHWAYS	(80)
TOTAL DIVIDED BY 3 = GROSS TOTAL SCORE	(52)

B. APPLY FACTOR FOR WASTE CONTAINMENT FROM WASTE MANAGEMENT PRACTICES

GROSS TOTAL SCORE x	WASTE MANAGEMENT PRACTICES FACTOR x		FINAL SCORE
(52)	(1)	=	52

153rd Tactical Airlift Group
Wyoming Air National Guard

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

1. RECEPTORS CATEGORY	RATING SCALE LEVELS	NUMERICAL VALUE
Population within 1,000 feet of site:	Greater than 100	3
Distance to nearest well:	0 to 3,000 feet	3
Land use/zoning within 1 mile radius:	Residential	3
Distance to Base boundary:		
Site No. 1	0 to 1,000 feet	3
Site No. 2	0 to 1,000 feet	3
Site No. 3	0 to 1,000 feet	3
Site No. 4	0 to 1,000 feet	3
Site No. 5	0 to 1,000 feet	3
Critical environments within 1 mile:	Not a critical environment	0
Water quality of nearest surface water body:	Recreation propagation and management of fish and wild-life	1
Groundwater use of uppermost aquifer:	Drinking water, municipal water available	2
Population served by surface water supply within 3 miles downstream of site:	51 - 1,000	2
Population served by groundwater supply within 3 miles of site:	1 - 50	1

2. WASTE CHARACTERISTICS CATEGORY		
Quantity:		
Site No. 1	Small quantity	S
Site No. 2	Unknown	
Site No. 3	Unknown	
Site No. 4	Small quantity	S
Site No. 5	Unknown	

153rd Tactical Airlift Group
Wyoming Air National Guard

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

2. WASTE CHARACTERISTICS CATEGORY (Continued)	RATING SCALE LEVELS	NUMERICAL VALUE
Confidence Level:		
Site No. 1	Confirmed	C
Site No. 2	Suspected	S
Site No. 3	Suspected	S
Site No. 4	Confirmed	C
Site No. 5	Suspected	S
Hazard Rating:		
Toxicity		
Site No. 1	Sax Level 3	3
Site No. 2	Unknown	
Site No. 3	Sax Level 3	3
Site No. 4	Sax Level 1	1
Site No. 5	Sax Level 3	3
Ignitability		
Site No. 1	Flash point 80 °F to 140 °F	2
Site No. 2	Flash point unknown	
Site No. 3	Flash point 80 °F to 140 °F	2
Site No. 4	Flash point 140 °F to 200 °F	1
Site No. 5	Flash point 80 °F to 140 °F	2
Radioactivity		
Site No. 1	At or below background levels	0
Site No. 2	At or below background levels	0
Site No. 3	At or below background levels	0
Site No. 4	At or below background levels	0
Site No. 5	At or below background levels	0

153rd Tactical Airlift Group
Wyoming Air National Guard

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

2. WASTE CHARACTERISTICS CATEGORY (Continued)	RATING SCALE LEVELS	NUMERICAL VALUE
Hazard Rating: (Continued)		
Persistance Multiplier		
Site No. 1	Straight chain hydrocarbons	0.8
Site No. 2	Straight chain hydrocarbons	0.8
Site No. 3	Straight chain hydrocarbons	0.8
Site No. 4	Easily biodegradable compounds	0.4
Site No. 5	Straight chain hydrocarbons	0.8
Physical State Multiplier		
Site No. 1	Liquid	1.0
Site No. 2	Liquid	1.0
Site No. 3	Liquid	1.0
Site No. 4	Liquid	1.0
Site No. 5	Liquid	1.0

3. PATHWAYS CATEGORY

Surface Water Migration

Distance to nearest surface water:	501 feet to 2,000 feet	2
Net precipitation:	Less than -10 inches	0
Surface erosion:	Slight	1
Surface permeability:	Greater than 50% clay ($<10^{-6}$ cm/sec)	3
Rainfall intensity:	1.0 to 2.0 inches	1
Flooding:	Beyond 100-year flood-plain	0

153rd Tactical Airlift Group
Wyoming Air National Guard

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria (Continued)

3. PATHWAYS CATEGORY (Continued)	RATING SCALE LEVELS	NUMERICAL VALUE
Groundwater Migration		
Depth to groundwater:	50 to 500 feet	1
Net precipitation:	Less than -10 inches	0
Soil permeability:	Greater than 50% clay ($<10^{-6}$ cm/sec)	0
Subsurface flow:	Bottom of site greater than 5 feet above high groundwater level	0
Direct access to groundwater:	No evidence of risk	0

4. WASTE MANAGEMENT PRACTICES CATEGORY

Practice:

Site No. 1	No containment	1.0
Site No. 2	Limited containment	0.95
Site No. 3	Limited containment	0.95
Site No. 4	No containment	1.0
Site No. 5	No containment	1.0