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Installation Restoration Program

PHASE I - RECORDS SEARCH

For U.S. Air Force Reserve Facilities Youngstown Municipal Airport

November 1984

Prepared for:
United States Air Force Reserve
Robins AFB, Georgia 31098

WESTON
DESIGNERS CONSULTANTS

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A Phase I initial assessment under the Installation Restoration Program was conducted for the Air Force Reserve (910 TAG) located at Youngstown MAP, Ohio. Past and current employees were interviewed, records were reviewed, regulatory agencies were contacted, and a ground and aerial reconnaissance were conducted. Past waste handling and practices were evaluated, and five past waste and spill sites were identified. One site was deleted from further evaluation because no hazardous materials were disposed of at that site. Four sites were assessed using the Hazard Assessment Rating Methodology (HARM); Phase II monitoring programs were recommended for the four sites.

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE RESERVE
ROBINS AIR FORCE BASE, GEORGIA 31098

11 JAN 1985

REPLY TO ATTN OF: DEPV (Mr Garrett/5755)

SUBJECT: Installation Restoration Program (IRP) Phase I Final Report for US Air Force Facilities at Youngstown Municipal Airport, OH

TO: See Distribution

The attached report is forwarded for your information/action. This report is the initial phase of an Air Force program to identify and fully evaluate problems associated with past hazardous material disposal and spill sites on Air Force facilities, to control the migration of hazardous contamination from such facilities, and to control hazards to the health and welfare that may have resulted from past operations.

FOR THE COMMANDER

JERROLD F. SMITH
Acting DCS/Engineering and Services

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Phase I IRP Report, Youngstown MAP, OH

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INSTALLATION RESTORATION PROGRAM

PHASE I: RECORDS SEARCH

U.S. AIR FORCE RESERVE FACILITIES

YOUNGSTOWN MUNICIPAL AIRPORT

Prepared for:

UNITED STATES AIR FORCE RESERVE

ROBINS AFB, GEORGIA 31098

NOVEMBER 1984

By:

Roy F. Weston, Inc.
Weston Way
West Chester, Pennsylvania 19380

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EXECUTIVE SUMMARY

ES.1 INTRODUCTION

The Department of Defense (DoD) has developed a program to identify and evaluate past hazardous material disposal sites on DoD property, to control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from these past disposal operations. This program is called the Installation Restoration Program (IRP). The IRP has four phases consisting of Phase I, Initial Assessment/Records Search; Phase II, Confirmation and Quantification; Phase III, Technology Base Development/Evaluation of Remedial Alternatives; and Phase IV, Operations/Remedial Actions. Roy F. Weston, Inc. was retained by the United States Air Force to conduct the Phase I, Initial Assessment/Records Search at the Air Force facilities at Youngstown Municipal Airport under Contract No. F08637-83-G0009.

ES.2 INSTALLATION DESCRIPTION

The Air Force facilities are located adjacent to Youngstown Municipal Airport in Vienna, Ohio. The base is located in Trumbull County approximately 12 miles north of the City of Youngstown.

The base consists of about 230 acres and is occupied by the 910th Tactical Airlift Group (TAG). At the present time, there are 1,265 personnel attached to the 910th TAG, most of which are part-time Air Reservists.

ES.3 ENVIRONMENTAL CONDITIONS

The area immediately surrounding the airport is primarily agricultural land, with limited residential and commercial development. The following environmental conditions are of particular importance in the evaluation of past hazardous waste management practices at the base:

1. The mean annual precipitation is 37 inches, the net precipitation is 6 inches, and the one-year, 24-hour rainfall event is estimated to be 2.6 inches. These data indicate there is moderate to high potential for infiltration into the surface soils on the base, and that there is moderate to high potential for runoff and erosion.

2. The natural soils on the base are silty loams. Soils data indicate that upper soils are moderately permeable, and are underlain by a clay layer and soils with slow to very slow permeability.

3. Surface water is controlled on base by open ditches, and storm sewers. The base drains into Spring Run, a tributary of the Mosquito Creek. There are no floodplains on the base.

4. The base is underlain by sedimentary rock known as the Pottsville Formation, comprised primarily of sandstone and shale. The bedrock is typically five to ten feet below the surface.

5. A seasonal perched water table occurs one to four feet below the surface, and is associated with slow permeability in the lower soil layers. Bedrock is the primary aquifer in the area. However, the five former base water supply wells were shut down when the base connected to a public water system. A sixth well provides water for non-potable uses at sewage treatment plant. Off-base the aquifer is used primarily for domestic supplies in homes not connected to the municipal water system.

6. There are no known endangered or threatened species in the area. There are also no known or suspected critical habitats or cultural areas.

ES.4 METHODOLOGY

During the course of this project, interviews were conducted with base personnel (past and present) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with local, state and Federal agencies; and field reconnaissance inspections were conducted at past hazardous waste activity sites.

Sites which were identified as potentially containing hazardous contaminants resulting from past activities have been rated using the Hazard Assessment Rating Methodology, (HARM). The HARM rating system takes into account factors such as site characteristics, waste characteristics, potential for contaminant migration, and waste management practices. The rating system is designed to indicate the relative need for follow-on action in Phase II of the IRP. The details of the rating procedure are presented in Appendix D.

ES.5 FINDINGS AND CONCLUSIONS

Five sites of potential environmental concern were identified during the course of this study. One site, the par course rubble dump, was eliminated from further consideration when it was determined that there is no evidence that hazardous materials were ever disposed of at the site.

The four remaining sites were determined to having a potential for environmental contamination, and were rated according to the HARM system. Table ES-1 presents the results of the HARM score rating analysis and indicates the types of contamination of concern at each site. All four sites are recommended for further study under Phase II of the IRP. Figure ES-1 shows the locations of the four sites recommended for confirmation.

ES.6 RECOMMENDATIONS

Table ES-2 summarizes recommendations for work to be performed in Phase II (Confirmation and Quantification). The recommended actions are generally one-time sampling and analy- tical programs. They are designed on a site-by-site basis to verify the presence or absence of contamination at a site, and to further assess the potential for adverse environmental impact should contamination be present.

TABLE ES-1

SUMMARY OF WASTE TYPES AND HARM SCORES FOR CONFIRMATION SITES AT THE 910TH TAG

Site Number	Site Name	Waste Type	HARM Score
1	Par Course Drum Storage Area	Waste Oils Waste Solvents De-icing Compound Paint Stripper Tri-cresyl Phosphate	56
2	Waste Oil/Solvent Corral	Waste Oils Waste Solvents Contaminated JP-4 Fuel	56 56
3	POL Lead Sludge Disposal Area	Tetraethyl Lead Sludge	52
4	Transformer Storage Area	PCB Contaminated Oils	46

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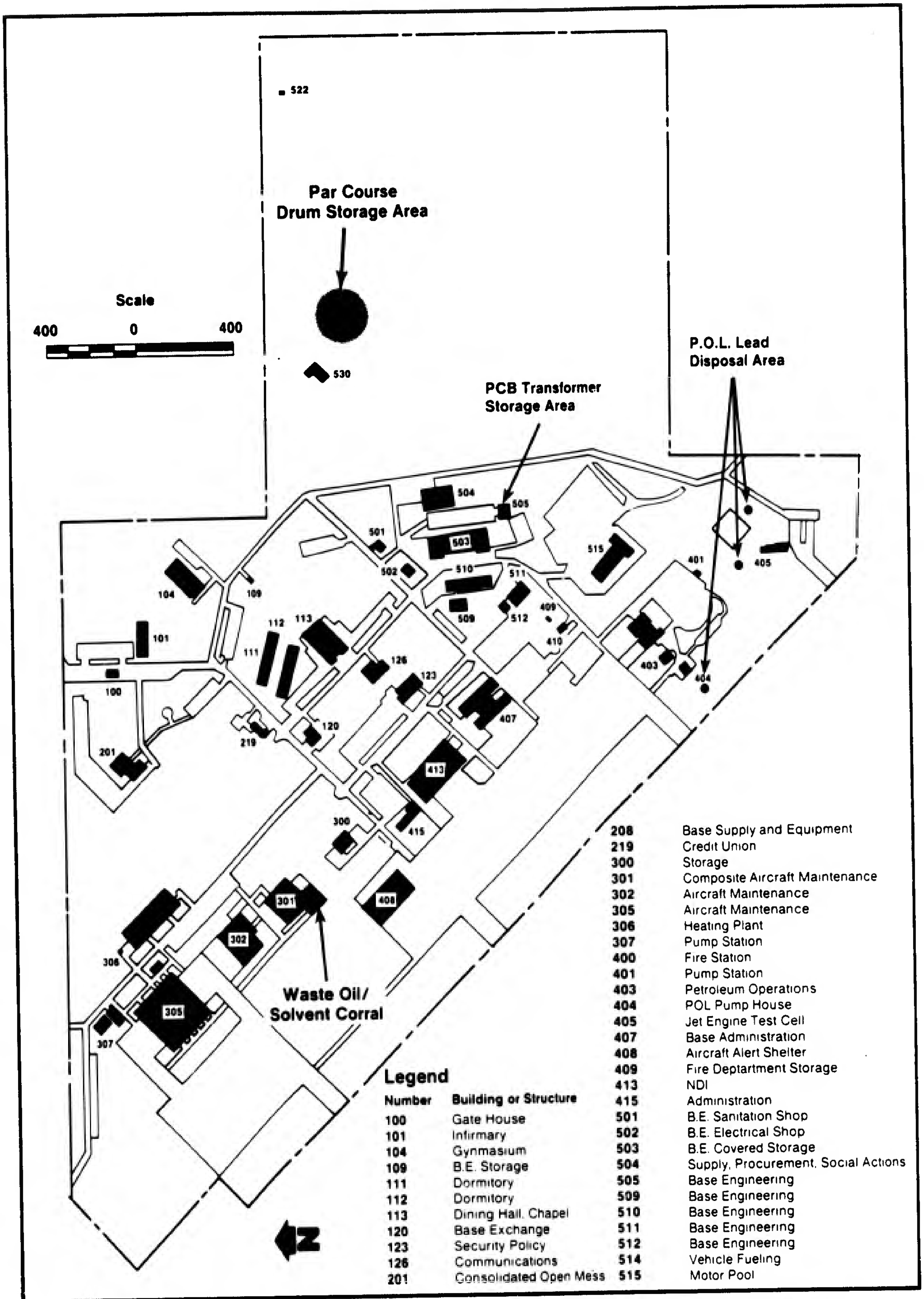

FIGURE ES-1 LOCATION OF SITES RECOMMENDED FOR CONFIRMATION

TABLE ES-2

RECOMMENDED PHASE II SAMPLING PROGRAM
910th TAG AT YOUNGSTOWN MUNICIPAL AIRPORT

Site No.	Site Name	HARM Score	Recommended Phase II Sampling Program
1	Par Course Drum Storage Area	56	- Five test pits to evaluate soils - Two surface water samples. - Four groundwater samples (existing wells).
2	Waste Oil/Solvent Corral	56	- Four hand augered soil samples.
3	POL Lead Sludge Disposal Area	52	- Test pits to locate three disposal trenches. - Four samples per trench: 2 sludge samples; 2 underlying soil samples.
4	Transformer Storage Area	46	- Six soil samples. - Five transformer oil samples.

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SECTION 1

INTRODUCTION

1.1 BACKGROUND AND AUTHORITY

The United States Air Force, due to the nature of its primary mission, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. This circumstance, coupled with the enactment of environmental legislation at the Federal, state, and local levels of government, has required action to be taken to identify and eliminate hazards related to past disposal sites in an environmentally responsible manner.

The primary federal legislation governing the disposal of hazardous waste is the Resource Conservation and Recover Act (RCRA), as amended. Under Section 6003 of the Act, Federal agencies are directed to assist EPA and make available information on past disposal practices. Section 3012 of RCRA requires each state to inventory disposal sites and make information available to requesting agencies. To assure compliance with these hazardous waste regulations, DoD issues Defense Environmental Quality Program Policy Memoranda (DEQPPM), which mandated a comprehensive Installation Restoration Program (IRP).

The current DoD IRP policy is contained in DEQPPM 81-5, dated 11 December 1982 and implemented by Air Force message dated 21 January 1982. DEQPPM 81-5 reissues, consolidates, and amplifies 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 from Air Force facilities, and to control hazards to health or welfare that resulted from past operations. The IRP will be the basis for U.S. Air Force response actions under the provisions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as directed by Executive Order 12316, 40 CFR 300, and Subpart F, National Contingency Plan. CERCLA is the primary legislation governing remedial action at past hazardous waste disposal sites.

1.2 PURPOSE AND SCOPE OF THE ASSESSMENT

The Installation Restoration Program has been developed as a four-phased program:

- Phase I - Initial Assessment (Records Search)
- Phase II - Confirmation/Quantification
- Phase III - Technology Base Development Evaluation of Remedial Alternatives
- Phase IV - Operations/Remedial Actions

WESTON was retained by the United States Air Force to conduct the Phase I Records Search at the Air Force facilities at Youngstown Municipal Airport under Contract No. F08637-83-G0009. The facility included in this records search is occupied by the 910th Tactical Airlift Group (AFRES), and is located at Youngstown Municipal Airport at Vienna, Ohio. This report contains a summary and an evaluation of the information collected during Phase I of the IRP.

Although only property currently owned or leased by the U.S. Air Force is included in the Installation Restoration Program, WESTON also investigated property previously owned by the U.S. Air Force which was transferred to the City of Youngstown in 1975. The findings for sites not located on Air Force property are presented in a supplemental report.

The objective of the first phase of the program is to identify the potential for environmental contamination from past waste management practices at the 910th TAG, and to assess the probability for contaminant migration. The Phase I program included a pre-performance meeting, an on-site base visit, a review and analysis of the information collected, and preparation of this report.

The pre-performance meeting was held at Youngstown on 24 May 1984. The purpose of this meeting was to define responsibilities of the project participants, establish a program schedule, transfer information to the project contractor, and to tour the base facilities.

WESTON's team conducted the on-site base visit 23 to 27 July 1984. Activities performed during the on-site visit included a detailed search of installation records, tours of the installation, and interviews with past and present base personnel. At the conclusion of the on-site base visit, an outbriefing was held with representatives of the Air Force to discuss preliminary findings.

The following individuals comprised WESTON's record search team:

- Raymond W. Kane, P.E., Team Leader, (M.S. Civil Engineering, 1976).
- Glenn R. Smart, Hydrogeologist, (B.S., Geology, 1977).
- Michael G. Stapleton, Chemical Engineer, (B.S., Earth and Environmental Science, 1981).
- Jennifer L. Kauffman, Environmental Planner, (M.R.P., Regional Planning, 1979).

Resumes of these key team members are provided in Appendix A.

1.3 METHODOLOGY

The Youngstown records search began with a review of past and present industrial operations and was conducted at the base. Information was obtained from available records, such as shop files and real property files, and from interviews with past and present base employees from the various operating areas. A list of Air Force interviewees by position and approximate years of service is presented in Appendix B.

Prior to the base interviews, the applicable federal, state and local agencies were contacted for pertinent base related environmental data. The agencies contacted are listed in Appendix C.

The next step in the activity review process was to identify all hazardous waste generators and to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various Air Force operations on the Base. Included in this part of the activities review was the identification of all known past disposal sites and other possible sources of contamination, such as spill areas.

A general ground tour of the identified sites was then made by the WESTON record search team to gather site-specific information, including general site conditions, visual evidence of environmental stress, and the presence of nearby drainage ditches or surface water bodies. These water bodies were inspected for any obvious signs of contamination or leachate migration.

A decision was then made, based on all of the above information, whether a potential exists for hazardous material contamination at any of the identified sites using the Decision Tree shown in Figure 1-1. If no potential existed, the site was deleted from further consideration. If minor operations and maintenance deficiencies were noted during the investigation, the conditions were reported to the Base Environmental Coordinator for remedial action.

For those sites where a potential for contamination was identified, the potential for migration of the contamination across installation boundaries was evaluated by considering site-specific groundwater and surface water conditions. If there was potential for on-base contamination or other environmental concerns, the site was referred to the Base Environmental Coordinator for further action. If the potential for contaminant migration was considered significant, the site was evaluated and prioritized using the Hazard Assessment Rating Methodology (HARM), described in Appendix D.

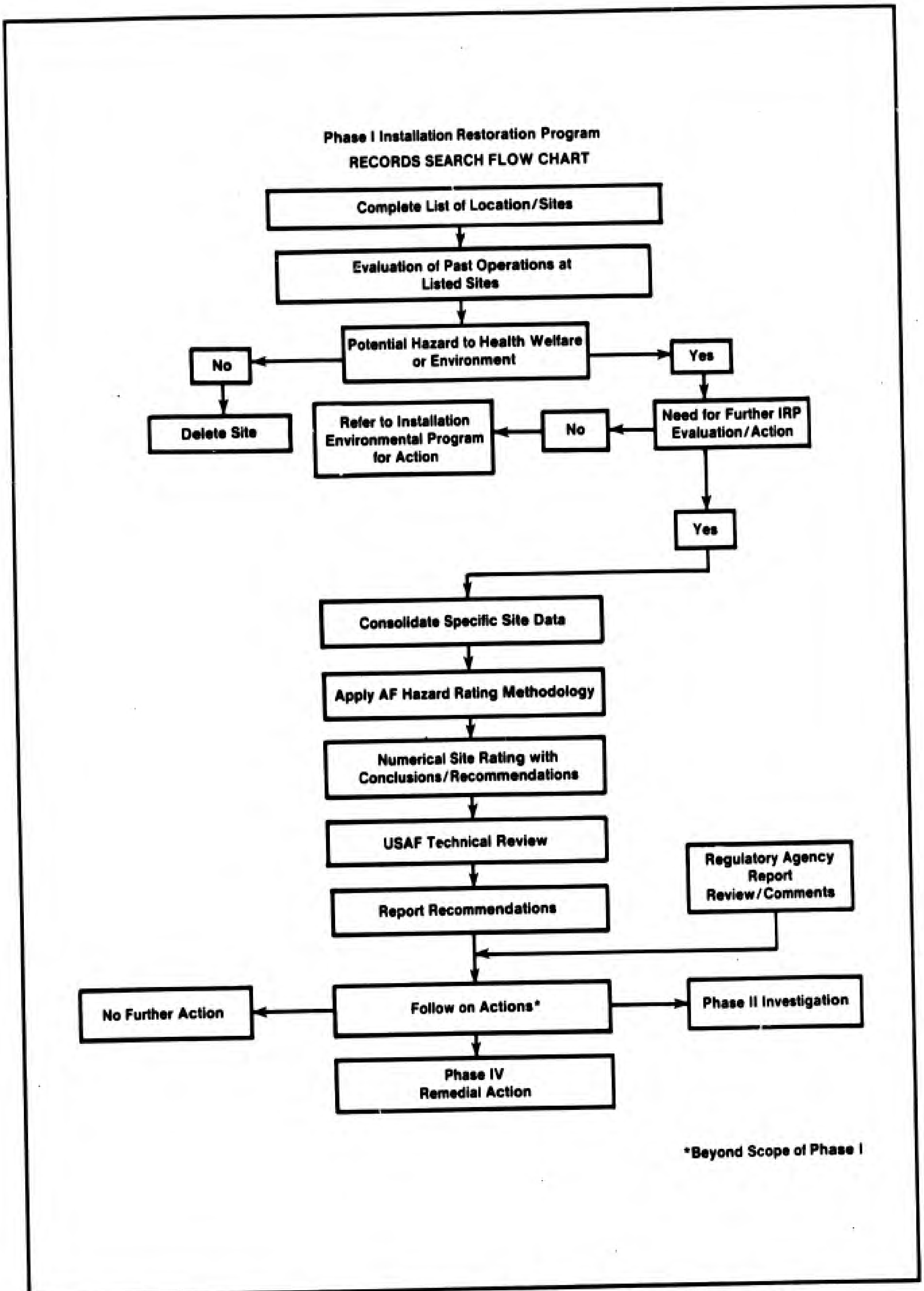

FIGURE 1-1 PHASE I INSTALLATION RESTORATION PROGRAM

The site rating indicates the relative potential for environmental impact at each site. Recommendations are then made for Phase II work at each site. Recommendations may vary from no action, to a complete monitoring and sampling program for those sites receiving a high HARM score. A limited Phase II program may be recommended for sites receiving a moderate HARM rating to confirm that hazardous materials are not migrating from the site. The site rating methodology is described in Appendix D.

SECTION 2

INSTALLATION DESCRIPTION

2.1 LOCATION, SIZE AND BOUNDARIES

The facilities of the 910th TAG are located adjacent to Youngstown Municipal Airport in Vienna, Ohio. The base is located in Trumbull County approximately twelve miles north of the City of Youngstown and ten miles east of the City of Warren. The location of the facility is shown in Figure 2-1.

The base occupies about 230 acres of land, including 110 acres of improved land, 70 acres of unimproved land, and 50 acres of facilities. In addition, the Air Force transferred about 393 acres of land to the City of Youngstown in 1975.

The area immediately surrounding the airport is primarily agricultural land, with limited residential and commercial development.

2.2 HISTORY

The Youngstown Municipal Airport was opened July 1, 1941, to serve the areas of eastern Ohio and western Pennsylvania. Air Force Reserve activities began at Youngstown in 1947, when a detachment, the 14th Night Fighter Squadron from Greater Pittsburgh International Airport, was stationed at Youngstown. The detachment was discontinued later that year.

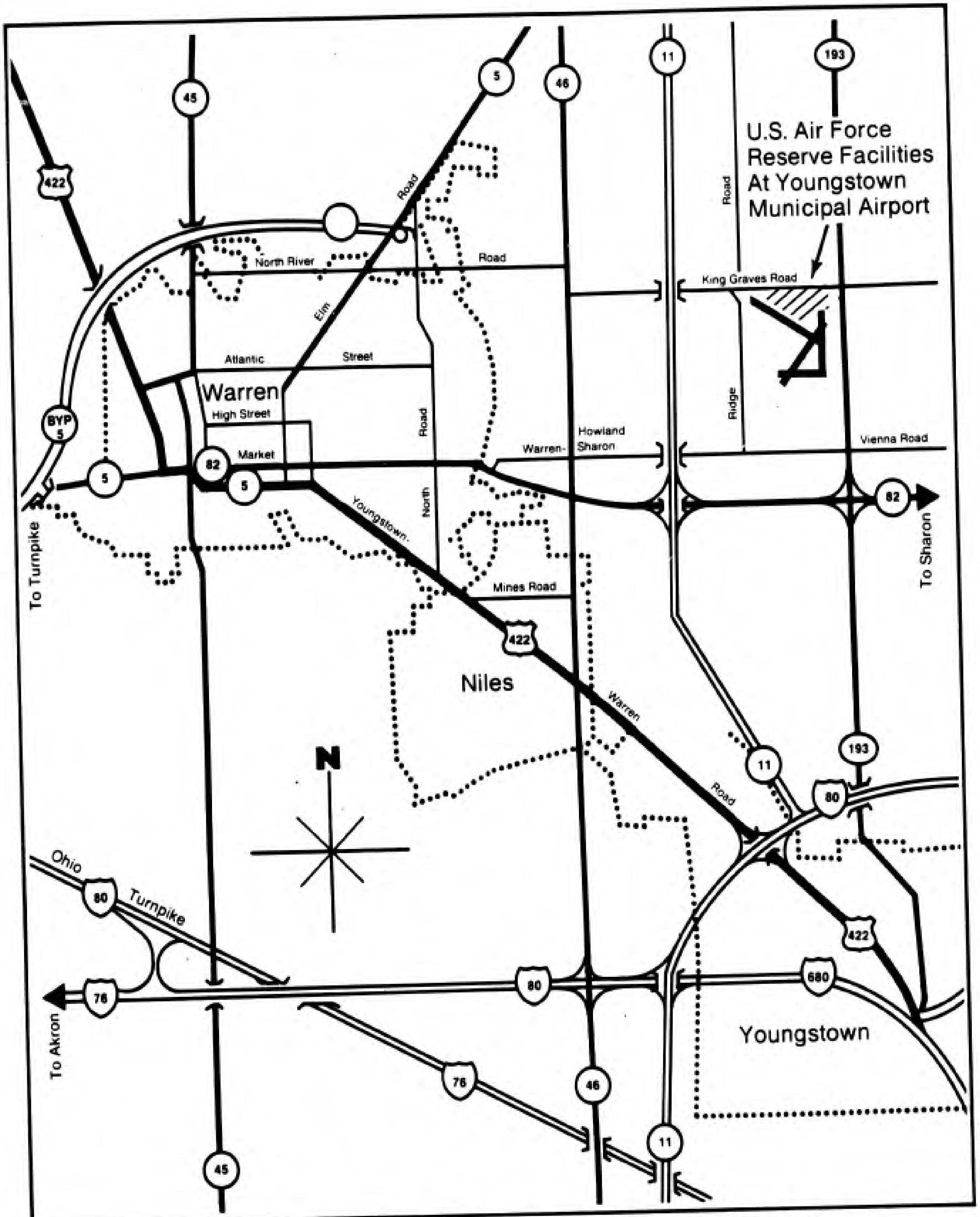

FIGURE 2-1 LOCATION OF THE 910TH TAG FACILITIES AT THE YOUNGSTOWN MUNICIPAL AIRPORT

The Air Defense Command of the regular Air Force constructed the base during 1951 to 1952. Construction of separate Reserve facilities was completed in 1957, and the 26th Fighter Bomber Squadron, flying T-33 and F-86H aircraft, was established at Youngstown. The 26th was inactivated in 1958, and was replaced by the 757th Troop Carrier Squadron, equipped with C-119 cargo aircraft. The Air Defense Command mission at Youngstown was terminated by the Air Force in 1960.

The 757th and Continental Air Command (now called the Air Force Reserve) took full control of the base in 1960. In 1969, the unit was redesignated the 910th Tactical Air Support Group, flying the U-3 aircraft and training forward air controllers. In 1971, the unit was redesignated the 910th Special Operations Group, flying A-37 fighter bombers in close air support mission. The unit was designated the 910th Tactical Fighter Group in 1973, and retained the same mission. Finally, in July 1981, the 910th Tactical Airlift Group (910th TAG), which flies C-130B Hercules aircraft, replaced the fighter unit. The 910th TAG currently has nine C-130 transport aircraft.

2.3 ORGANIZATION AND MISSION

The wartime mission of the 910th TAG is to employ the Lockheed C-130B Hercules aircraft in combat operations of tactical airlift. These operations include low level infiltration into a combat environment, where aircrews can deliver men and material by airdrop.

The peacetime mission of the unit is to direct the organizing, equipping, and training of Air Force Reserve aircrews in tactical airlift tactics and techniques, while maintaining a state of readiness which will enable performance of wartime mission upon mobilization. The unit is also available to assist in non-military humanitarian projects as required, (U.S. Air Force, 1983).

The 910th TAG is under the command of the 459th Tactical Airlift Wing, Andrews AFB, Maryland, which in turn functions under the direction of the 14th Air Force, Dobbins AFB, Georgia and Headquarters AFRES, Robins AFB, Georgia. In the event of mobilization, the unit would be assigned to the Military Airlift Command, headquartered at Scott AFB, Illinois.

The 910th Tactical Airlift Group is comprised of the following units:

- 757th Tactical Airlift Squadron
- Support Units, including:
  - 910th Consolidated Aircraft Maintenance Squadron
  - 910th Combat Support Squadron
  - 910th Communications Flight
  - 910th Mobility Support Flight
  - 910th Civil Engineering Squadron
  - 910th Tactical Clinic
  - 910th Weapons System Security Flight
  - 76th Mobile Aerial Port Squadron

At the present time, the following personnel are attached to the 910th TAG:

	No. of Personnel
Air Reservists (Part-Time)	901
Air Reserve Technicians	132
Civilian Element	232
TOTAL	1,265

SECTION 3

ENVIRONMENTAL SETTING

3.1 METEOROLOGY

The Youngstown Municipal Airport has a continental climate characterized by moderate extremes of heat and cold, wetness and dryness. July is the warmest month, with an average temperature of 72.3°F. January is the coldest month, with an average temperature of 27.5°F, (NOAA, 1974).

On the average, about 37 inches of precipitation fall annually. Rainfall varies considerably in amount and seasonal distribution, with spring being the wettest season. The average annual snowfall is about 58 inches, (USAF, 1983). Climatic data is summarized in Table 3-1.

Net precipitation is an indication of the potential for leachate generation, and is equal to the difference between precipitation and evapotranspiration. Net precipitation at Youngstown is estimated to be about 6 inches, which indicates a moderate potential for leachate generation, (Metcalf and Eddy, 1977).

Rainfall intensity is an indicator of the potential for excessive runoff and erosion, and is of interest in determining the potential for movement of contaminants.

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TABLE 3-1

CLIMATIC CONDITIONS AT
YOUNGSTOWN MUNICIPAL AIRPORT

Month	TEMPERATURE (°F)[1] Daily Maximum	Daily Minimum	Monthly Average	PRECIPITATION[2] Normal Total (inches)	Mean Total Snowfall (inches)
January	34.9	20.0	27.5	2.72	13.3
February	36.2	20.2	28.2	2.34	11.3
March	45.6	27.7	36.7	3.27	10.6
April	57.8	36.5	47.2	3.58	2.3
May	69.7	46.8	58.3	3.36	0.2
June	79.0	56.9	68.0	3.52	0.0
July	83.3	61.2	72.3	3.99	0.0
August	81.4	59.3	70.4	3.32	0.0
September	75.5	53.9	64.7	3.11	T
October	63.1	44.6	53.9	2.52	0.5
November	48.0	33.2	40.8	2.85	7.0
December	36.8	23.2	30.0	2.77	13.0
YEAR	59.3	40.3	49.8	37.35	58.2

Source: [1]NOAA, 1974
[2]USAF, 1983 (32 years of record)

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The one-year, 24-hour rainfall event is used to gauge rainfall intensity. The one-year, 24-hour rainfall in the vicinity of Youngstown is about 2.6 inches, (NOAA, 1962).

3.2 GEOGRAPHY

3.2.1 Topography

The Youngstown Municipal Airport has flat to gently rolling topography, and is situated on the Glaciated Allegheny Plateau section of the Appalachian Province. Elevations on the airport property range from 1100 to more than 1200 feet above mean sea level, with highest elevations encountered in the unimproved land at the eastern edge of the Air Force base, and lowest elevation (1102 feet m.s.l.) encountered at the U.S. Air Force sewage treatment plant on the western edge of the base, (Pardee, 1984).

3.2.2 Soils

The soils at the base have formed in glacial ground moraine deposits, known locally as the Hiram Till. The soils are silty loams, which are generally moderately permeable and poorly to moderately well drained. A published soil survey for Trumbull County is not available, but soils data have been obtained from the Ohio Department of Natural Resources, the Trumbull Soil and Water Conservation District, and from soil borings taken on airport property. Soil types and characteristics are summarized in Table 3-2. A soils map is provided in Figure 3-1.

TABLE 3-2

SOIL TYPES AND CHARACTERISTICS
YOUNGSTOWN MUNICIPAL AIRPORT

Soil Symbol	Soil Name	Description	Slope	Permeability	Depth to Water Table
HaA	Haskins Loam	Deep, somewhat poorly drained soils 20 to 40 inches thick over moderately or fine textured glacial till or lacustrine sediments.	0 to 2%	Moderate in upper layer; slow or very slow in underlying layer.	Perched water table 1 to 2-1/2 feet below surface in spring and winter
MtA	Mitiwanga Silt Loam	Moderately deep, somewhat poorly drained soils formed in 20 to 40 inches of glacial till over bedrock.	0 to 2%	Moderate	Perched water 1 to 2-1/2 feet below surface during wet periods
RdB	Rawson Loam	Deep, moderately well and well drained soils 20 to 40 inches thick, over moderately fine or finetextured glacial till or lacustrine sediments.	2 to 6%	Moderate in upper layer; slow or very slow in underlying layer	Perched water table 2-1/2 to 4 feet below surface seasonally
RsB	Rittman Silt Loam	Deep, moderately well drained soils formed in fine to medium textured glacial till; fragipan evident at depth of 20 to 40 inches.	2 to 6%	Moderate permeability above fragipan; slow in fragipan	Perched water table 2 to 3 feet below surface from late fall through late spring
WbA	Wadsworth Silt Loam	Deep, somewhat poorly drained soils formed in moderately fine to medium textured glacial till. Fragipan evident.	0 to 2%	Moderate or moderately above fragipan. Slow in fragipan.	Perched water table 1 to 2 feet below surface from late fall through late spring.

TABLE 3-2
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SOIL TYPES AND CHARACTERISTICS
YOUNGSTOWN MUNICIPAL AIRPORT

Soil Symbol	Soil Name	Description	Slope	Permeability	Depth to Water Table
WdB	Wadsworth Silt Loam	Deep, somewhat poorly drained soils formed in moderately fine to medium textured glacial till. Fragipan evident.	2 to 6%	Moderate or moderately above fragipan. Slow in fragipan.	Perched water table 1 to 2 feet below surface from late fall through late spring.
Ud	Udorthents	Man-made soil comprised of sands, clays, gravels, and other miscellaneous materials used to raise elevations of runways and facilities.	0 to 2%	Variable	Not available

Sources: ODNR, 1980; USDA, SCS, 1983; Blank, 1984

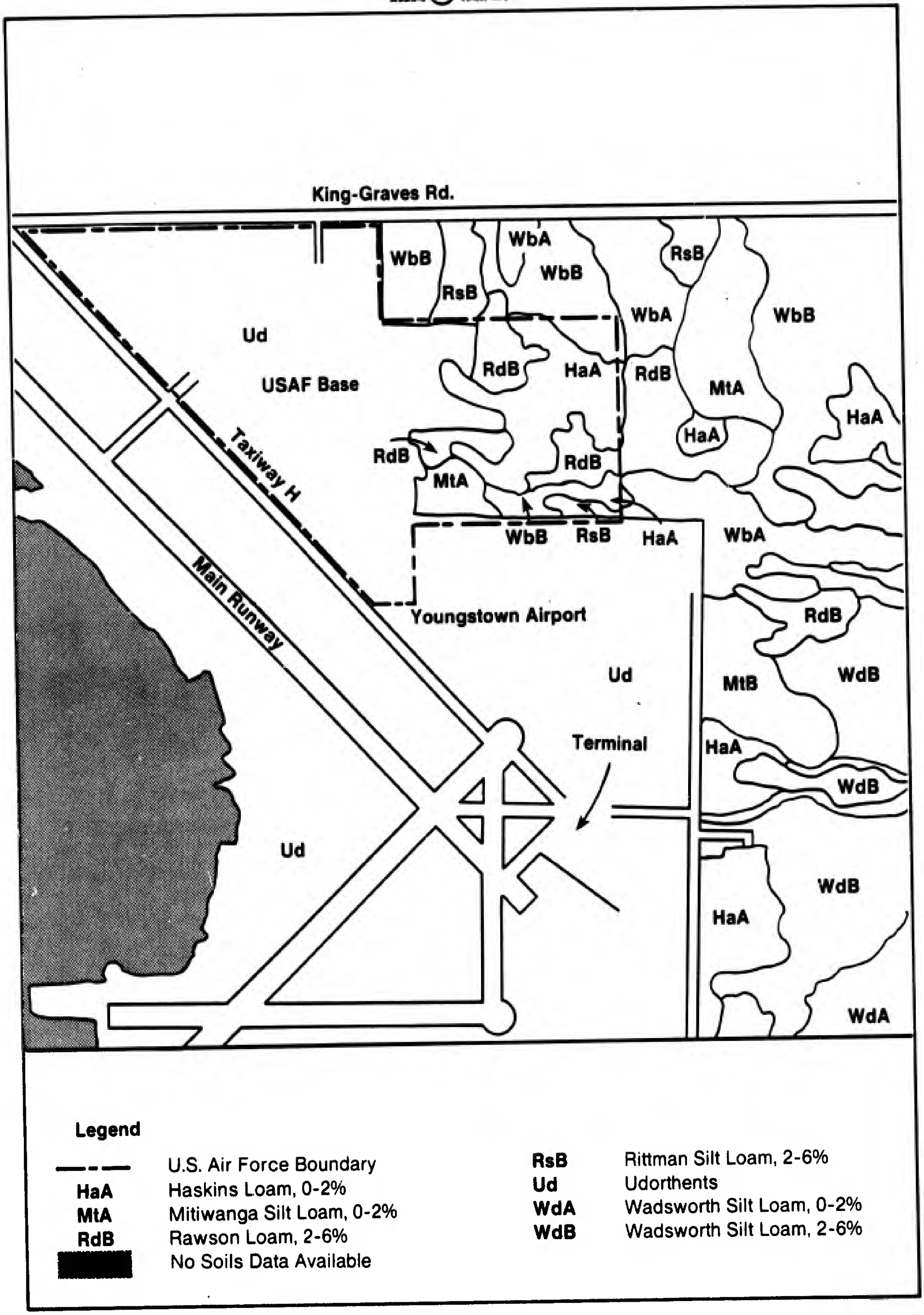

FIGURE 3-1 SOILS OF THE 910TH TAG, YOUNGSTOWN MUNICIPAL AIRPORT

The predominant soil type on the Youngstown Municipal Airport is Udorthents, a man-made soil used to raise elevations beneath the runways and other facilities. The characteristics of this soil type are highly variable and can be determined only after site-specific soil borings are taken. Soil borings were taken along a proposed shortfield takeoff and landing zone (parallel to and south of the main runway) in September 1983. Approximately 20 borings were taken, to a maximum depth of approximately 10 feet. The borings indicate the soils in this area are comprised of 0 to 12 inches of topsoil overlying silty clay material. In some areas, fill material comprised of asphalt, concrete, sand, gravel and other miscellaneous materials overlies the silty clay to a depth of six feet, (U.S. Air Force, file information, 1983).

Soils have been mapped on 70 acres of property owned by the Air Force at the eastern side of the base. This parcel consist of 85% woodland, and 15% in buildings, roads, trail, pond or idle areas. The investigation was conducted to determine the potential for using the site for crop and/or pasture land. It was concluded that the area could be used for these purposes, but that dense forest cover, low soil fertility, and poor soil drainage would limit such uses, (USAF, file information, 1983).

3.3 SURFACE WATER RESOURCES

3.3.1 Drainage Patterns

Drainage on the base is controlled by man-made open ditches and a storm sewer system. The storm sewer system is described in detail in Section 4.7. The drainage system of the 910th TAG flows west into Spring

Run, which flows into Mosquito Creek, a tributary of the Mahoning River. The Mahoning River flows southeast through the City of Youngstown, and ultimately into the Ohio River system. A map of the surface drainage patterns is provided in Figure 3-2.

Spring Run is 4.5 miles long, and drains 7.3 square miles (ODNR, 1961). It joins Mosquito Creek approximately two miles south of a dam on Mosquito Creek which forms Mosquito Creek Reservoir. Seven miles south of the confluence of Spring Run and Mosquito Creek, Mosquito Creek enters the Mahoning River.

There are no floodplains on the airport property.

3.3.2 Surface Water Quality

The records search produced little data on local surface water quality. Records of U.S. Geological Survey list ranges of water quality in the Mahoning River for the year October 1982 to September 1983 as follows: specific conductance from 342 to 954 umhos/cubic centimeter; pH from 6.6 to 8.3; temperature 2.5 to 31.0 degrees celsius; and dissolved oxygen from 2.4 to 13.2 milligrams/liter. There were no available records of any analyses for other parameters (Shindel and Others, 1984).

3.3.3 Surface Water Use

Spring Run is too small to receive significant use. The flow of Mosquito Creek is regulated by the dam at Mosquito Creek Reservoir, and the creek does not receive significant use. The Mahoning River is used extensively

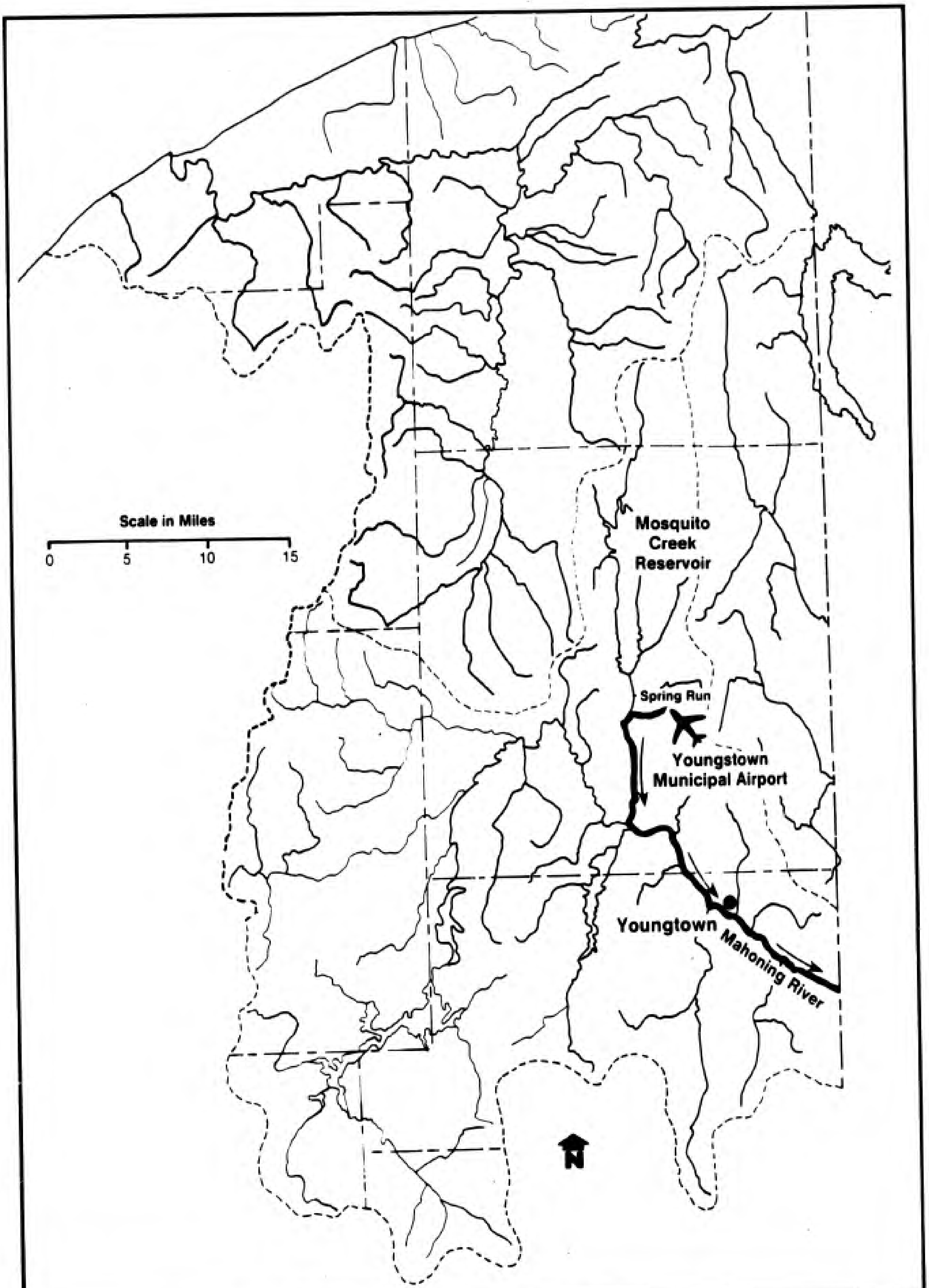

FIGURE 3-2 SURFACE DRAINAGE PATTERNS

as a source of industrial process and cooling waters, and receives wastewater treatment plant discharges. Recreational use of the Mahoning is limited. Water supply and recreational uses in the area are related to numerous reservoirs in the area, including Mosquito Creek Reservoir. These reservoirs are all located upstream from Spring Run or in different drainage areas.

3.4 SUBSURFACE GEOLOGY AND GROUNDWATER RESOURCES

3.4.1 Subsurface Geology

The Youngstown Municipal Airport is underlain by sedimentary rock known as the Pottsville Formation of the Pennsylvanian and Mississippian periods. Boring logs prepared as part of the base master plan describe the bedrock as brown to gray, medium grained sandstone with argillaceous inclusions, shale layers, coal seams and occasional hairline stylolites. Depth to bedrock ranges from approximately five to greater than twenty feet below ground surface, but is generally from five to ten feet. The formation dips gently at five to ten feet per mile toward the south, and contains areas of disintegrated rock and weathered fractures (Blank, 1984).

Logs of the six deep wells on the base describe the underlying formation as sandstones and shales down to a depth of at least 536 feet below ground surface. Depths to bedrock generally range from five to ten feet and the well drillers' logs frequently note zones of broken and fractured rock just above the competent bedrock.

3.4.2 Groundwater Resources

Groundwater in northwestern Ohio is derived from both unconsolidated glacial deposits and bedrock aquifers. The bedrock aquifers are the principal source of groundwater in the vicinity of the Youngstown Municipal Airport. A map of groundwater resources in the vicinity of the 910th TAG is provided in Figure 3-3.

Soils in the area exhibit moderate permeability in the upper horizons, but slow to very slow permeability in the underlying, finer material. As a result, seasonally perched water table conditions occur at depths of one to four feet (U.S.A.F., file information, 1980). From information contained in various borings, it appears that shallow groundwater exists under unconfined conditions. The configuration of the water table generally follows the topography, and the direction of groundwater flow is toward the northwest.

The bedrock aquifers in the vicinity of the 910th TAG are the Mississippian and Pennsylvanian sand- stones. The map of groundwater resources of Trumbull County (Figure 3-3) indicates that these aquifers generally yield 25 to 100 gallons per minute, and have a sustained yield of 50 gallons per minute. These yields are suitable for small industrial and municipal uses, (Crowell, 1979).

Data contained in well logs from the former water supply wells indicate that the static water table in the deep wells, which are cased to a depth of from 375 to 400 feet, was from 345 to 353 below the ground surface, except in Well #3, where it was 29 feet. Wells #2 and 4

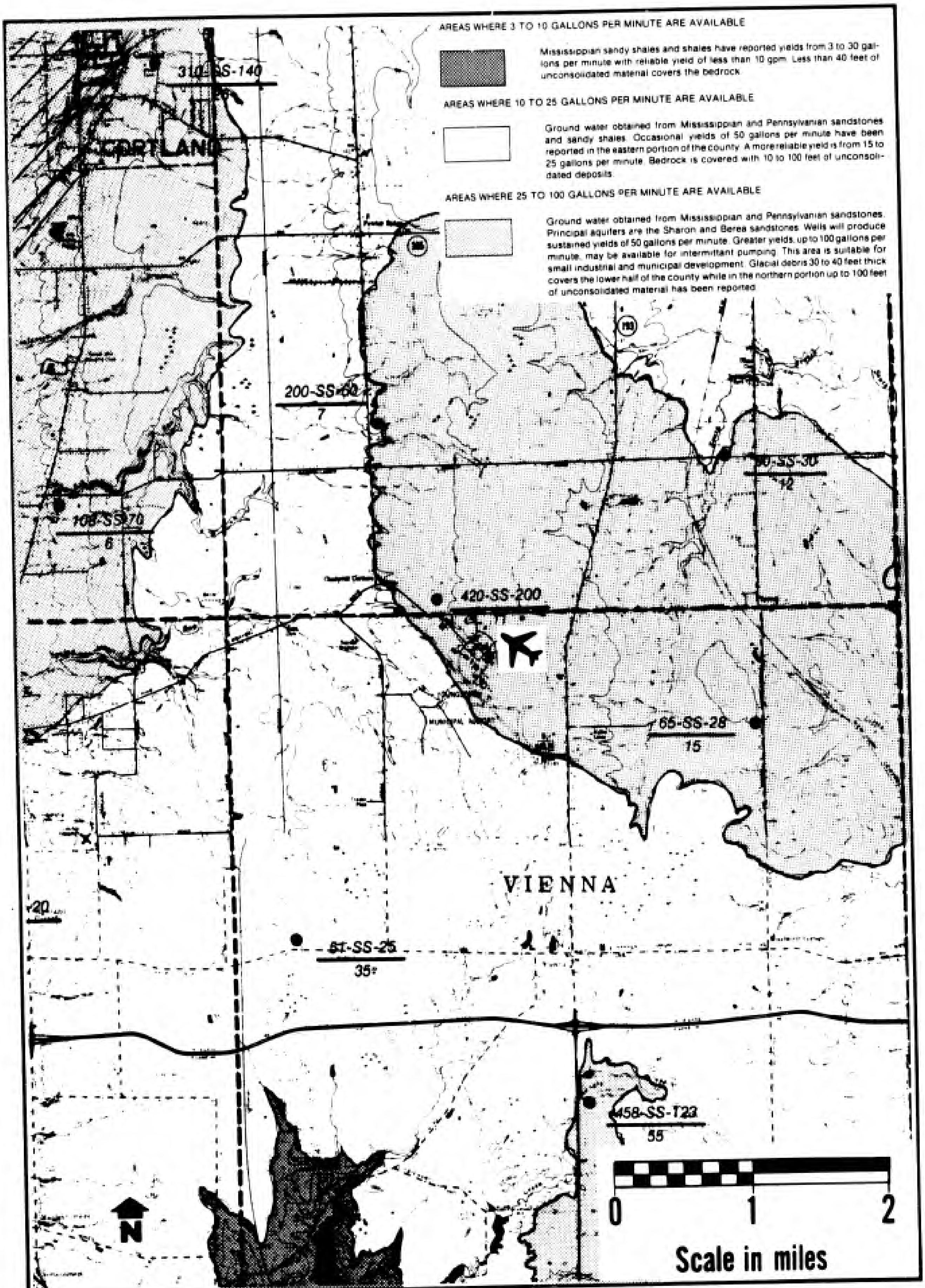

FIGURE 3-3 GROUNDWATER RESOURCES IN THE VICINITY OF THE 910TH TAG

were pumped at rates of 148 and 149 gallons per minute (gpm), respectively, which produced drawdown of 87 and 93 feet for specific capacities of 1.7 and 1.6 gpm per foot of drawdown. This can be roughly translated to a transmissivity of 10^3 to 10^4 gallons per foot per day for the uncased portion of the wells.

3.4.3 Groundwater Quality

The records search produced little data on local groundwater quality. Analyses of samples from the former drinking water supply wells show levels of sodium ranging from 6.3 to 210 parts per million (ppm), and sulfates from 2.1 to 50 ppm. There were no available records of any analyses for hazardous materials (USAF, file information, 1984).

3.4.4 Groundwater Use

Prior to November 1977, the base obtained water from a well field consisting of five wells located in the northern part of the property. Logs of four of the five wells indicate that depths range from 416 to 536 feet. In November 1977, an agreement was signed with the Four Townships Water District to supply the base with county water. The wells were capped at that time. However, base personnel indicated that it is still possible to access the wells for sampling purposes.

A sixth well is located south of the base at the sewage treatment plant. This well is 416 feet deep and is still operational, providing non-potable water for washdown procedures.

Homes in the area, which are not served by the public water supply system, obtain their water from wells drilled in the bedrock aquifer. No maps of domestic wells in the vicinity of the facility were uncovered during the record search. However, air photo analysis has indicated that there are a few homes within three thousand feet of the base boundary. No estimate has been made of the population served by aquifers within three miles of the base. However, to be conservative in the evaluation of potential environmental contamination using the HARM methodology, it has been assumed that more than 1,000 persons are served by aquifers within three miles of the installation boundary, even though the area is rural and has scattered development.

3.5 BIOTIC ENVIRONMENT

The native vegetation of Vienna Township included: the Beech-Maple Forest Association, which occupied upland areas and was the predominant vegetation; and mixed Mesophytic forests, including the Oak-Hickory and Elm-Ash Forest Associations, which occupied floodplains and poorly drained areas.

Prior to development of the Airport and the base, most of Vienna Township had been cleared and was used for active cultivation or pasture. Thus, existing vegetation is primarily second growth succession.

Existing vegetation on the base can be broken into two broad categories: improved grounds and the unimproved grounds. The improved grounds, consisting of the built up area of the base, were subjected to an extensive program of planting trees and shrubs from 1980 to 1983.

Species planted include maple, white birch, honey locust, sweet gum, and crabapple, as well as a variety of shrubs, (Pardee, 1984). The unimproved grounds include a mixture of open areas covered with field grasses and light brush, and mixed forested areas covered with hardwoods. A small wetland is also located in the unimproved area, (Blank, 1984). Native tree species are characteristic mainly of a mixed mesophytic forest, and include twenty species, with maple dominant (Pardee, 1984).

Terrestrial wildlife species which occur in the area include opossum, cottontail rabbit, woodchuck, mink, otter, striped skunk, and white tailed deer. Birds include the Canada goose, black duck, pintail duck, ruffed grouse, prairie chicken, wild turkey, several species of hawks and owls, and a variety of songbirds, (Blank, 1984). The type and number of species commonly found on the base is limited by lack of suitable habitat.

3.6 SENSITIVE ENVIRONMENTAL FEATURES

There are no known threatened or endangered plant species on the base, (USAF, 1984). There are also no known threatened or endangered wildlife species or critical habitats in the area. Finally, intensive field investigations combined with a thorough background analysis revealed no known or suspected cultural resources in the area, (Blank, 1984).

3.7 SUMMARY OF ENVIRONMENTAL CONDITIONS

The following environmental conditions are of particular importance in the evaluation of past hazardous waste management practices at the base:

1. The mean annual precipitation is 37 inches, the net annual precipitation is 6 inches, and the one-year, 24-hour rainfall event is estimated to be 2.6 inches. These data indicate there is moderate potential for infiltration into the surface soils on the base, and that there is moderate potential for runoff and erosion.

2. The natural soils on the base are silty loams. Soils data indicate that upper soils are moderately permeable, and are underlain by a clay layer and soils with slow to very slow permeability.

3. Surface water is controlled on base by open ditches and storm sewers. The base drains into Spring Run, a tributary of Mosquito Creek. There are no floodplains on the base.

4. The base is underlain by sedimentary rock known as the Pottsville Formation, comprised primarily of sandstone and shale. Depth to bedrock is typically five to ten feet below the surface.

5. A seasonal perched water table occurs at a depth of one to four feet below the surface, and is associated with slow permeability in the lower soil layers. Bedrock is the primary aquifer in the area. However, the five former base drinking water supply wells have been shut down. A single well provides water for non-potable uses at the sewage treatment plant. Groundwater is used primarily for domestic supplies in homes located off main highways.

6. There are no known endangered or threatened species which inhabit the area. There are also no known or suspected critical habitats or cultural areas.

SECTION 4

FINDINGS

4.1 INTRODUCTION

This section presents information on the activities conducted by the 910th TAG at the Youngstown Municipal Airport. Descriptions of past and present industrial operations, summaries of the types and quantities of waste generated, and a description of the waste management practices are provided. The information contained in this section was obtained primarily from interviews with current and former base employees, a review of files and records, and site inspections.

4.2 OVERVIEW OF INDUSTRIAL OPERATIONS

Industrial activities conducted by the 910th TAG can be grouped into four broad categories: 1) Motor Pool; 2) Aircraft Maintenance; 3) Base Engineer Maintenance Shops; and 4) POL Operations. These operations occur in several different shops and locations. Figure 4-1 shows all major buildings and facilities at the base. Table 4-1 is a shop-by-shop summary of hazardous materials management practices through time at the 910th TAG. A master shop list is included in Appendix F.

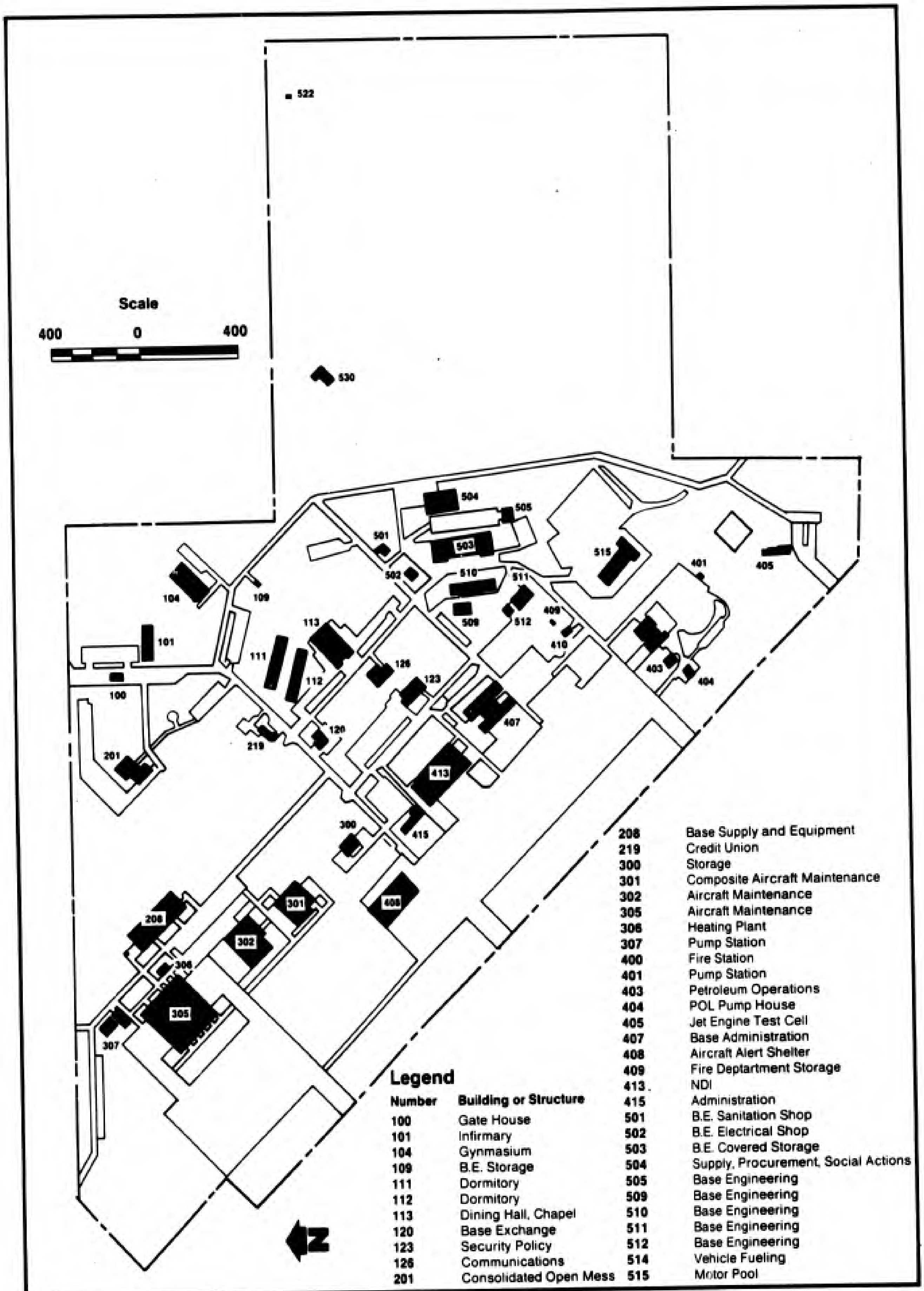

FIGURE 4-1 MAJOR BUILDINGS AND FACILITIES - 910TH TAG

TABLE 4-1

INDUSTRIAL OPERATIONS SHOP-BY-SHOP SUMMARY
HAZARDOUS MATERIALS MANAGEMENT –
910th TAG AT YOUNGSTOWN MUNICIPAL AIRPORT

Shop Name	Bldg. No.	Waste Materials	Current Waste Quantity (Gallons/Year) 1980	Method(s) of Treatment, Storage and Disposal (1960 – 1970 – 1980)
MOTOR POOL	515	PD-680	110	⊢ - - - - - - ┼——CD——→
		Motor Oil	880	⊢ - - - - - - ┼——CD——→
		H_2SO_4 (Sulfuric Acid)	20-30	⊢ - - Neutralized——Sewer——→
		Ethylene Glycol	150	⊢ - - - - - - ┼——CD——→
		Calgon S-49 (Detergent)	110	⊢ - - - - - - ┼——CD——→
AIRCRAFT MAINT.				
AGE Main. Shop	301	Used Solvents	200-300	⊢ - - BFD - - ⊢——CD——→
		JP-4	10-15	⊢ - - BFD - - ⊢——CD——→
Engine Shop	301	Engine Oil	500	⊢ - - - - - - ┼——CD——→
		Engine Cleaning Compound	55	⊢ - - - - - - ┼——CD——→
		PD-680	100	⊢ - - - - - - ┼——CD——→
		Lubricating Oil	200-300	⊢ - - - - - - ┼——CD——→
		JP-4	30-40	⊢ - - BFD - - ⊢——CD——→
Prop Shop	301	Hydraulic Fluid	500-600	⊢ - - CD - - ⊣ 1971 Jet A/C 1981 ⊢CD→
		PD-680	25	⊢ - - CD - - ⊣ Jet A/C ⊢CD→
		MEK	20-30	⊢ - - CD - - ⊣ Jet A/C ⊢CD→

Legend
- - - - Estimated Time Frame
- ——— Confirmed Time Frame
- CD = Contract Disposal
- BFD = Burned by Fire Dept.
- DPDO = Defense Property Disposal Office

TABLE 4-1
(Con't)

INDUSTRIAL OPERATIONS SHOP-BY-SHOP SUMMARY
HAZARDOUS MATERIALS MANAGEMENT -
910th TAG AT YOUNGSTOWN MUNICIPAL AIRPORT

Shop Name	Bldg. No.	Waste Materials	Current Waste Quantity (Gallons/Year) 1980	Method(s) of Treatment, Storage and Disposal (1960 – 1970 – 1980)
Repair & Reclam.	301	Soap Cleaner	55	- - - - - - CD →
		Paint Remover	30	- - - - - - CD →
		PD-680	90	- - - - - - CD →
Corrosion Control	302	Paint Stripper	60	- - BFD - - CD →
		MEK	90	- - BFD - - CD →
		Acetate Butarate Thinner	60	- - BFD - - CD →
		Acetone	60-120	- - BFD - - CD →
		Alkali Cleaning Compound	150-250	- - BFD - - CD →
		PD-680	55-100	- - Sewer - CD →
		Soil Barrier Remover PAHA	80-100	- - BFD - - CD →
		Toluene	40-60	- - BFD - - CD →
Fuels Systems Shop	302	PD-680	2	- - - - - - CD →
		JP-4	1000	- - BFD - - CD →
Battery/ Elec. Shop	305	H_2SO_4 (Sulfuric Acid)	30	- - Neutralized — Sewer →
		MEK	40-50	- - Sewer - CD →
		Toluene	40-50	- - Sewer - CD →
		Acetone	40-50	- - Sewer - CD →
		Engine Oil	10-15	- - BFD - - CD →

Legend
- - - Estimated Time Frame
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TABLE 4-1
(Con't)

INDUSTRIAL OPERATIONS SHOP-BY-SHOP SUMMARY
HAZARDOUS MATERIALS MANAGEMENT -
910th TAG AT YOUNGSTOWN MUNICIPAL AIRPORT

Shop Name	Bldg. No.	Waste Materials	Current Waste Quantity (Gallons/Year) 1980	Method(s) of Treatment, Storage and Disposal (1960 — 1970 — 1980)
Flight Line	305	PD-680	150-170	⊢ - - - - - - ⊢——CD——
Hyd./ Pneuhy. Shop	305	PD-680	200-400	⊢ - - - - - - ⊢——CD——→
		Hydraulic Fluid	100-150	⊢ - - - - - - ⊢——CD——→
		Toluene	2	⊢ - -Evaporation—CD——→
		MEK	10-15	⊢ - - - - - - ⊢——CD——→
Machine/ Welding Shop	305	Cutting Fluid	25	⊢ - - - - - - ⊢——CD——→
		OHT Hydraulic Fluid	5	⊢ - - - - - - ⊢——CD——→
		Lubricating Compound	5	⊢ - - - - - - ⊢——CD——→
		Thread-Cutting Oil	2	⊢ - - - - - - ⊢——CD——→
		Gear Lube SAE 80-90	3	⊢ - - - - - - ⊢——CD——→
		PD-680	5	⊢ - - - - - - ⊢——CD——→
Organiz. Maint.	305	Engine Oil	100	⊢ - - - - - - ⊢——CD——→
		Hydraulic Fluid	20-30	⊢ - - - - - - ⊢——CD——→
Sheet Metal Shop	305	MEK	2	⊢ - -BFD - -⊢——CD——→
		JP-4	50	⊢ - -Sewer -⊢——CD——→

Legend
- - - Estimated Time Frame
——— Confirmed Time Frame
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TABLE 4-1
(Con't)

INDUSTRIAL OPERATIONS SHOP-BY-SHOP SUMMARY
HAZARDOUS MATERIALS MANAGEMENT -
910th TAG AT YOUNGSTOWN MUNICIPAL AIRPORT

Shop Name	Bldg. No.	Waste Materials	Current Waste Quantity (Gallons/Year) 1980	Method(s) of Treatment, Storage and Disposal (1960 – 1970 – 1980)
NDI	413	PD-680	25	⊢ - - - - - - + —— CD ——→
BASE ENGRS. MAINT. SHOPS				
Elec. Shop	505	PCB Containing Transformers	1860 (total)	⊢ -Scrap - + — CD — 1979 DPDO —→
Paint Shop	512	Thinner/Cleaner	5	⊢ Poured on Ground ——→ 1983 CD→
		Paint, Oil Base	50	⊢ - - - - - - + —— CD ——→
POL OPER.	401,404	Lead Sludge From Tank Bottoms	500-1000 lbs. (Buried prior to 1970)	⊢ Buried ——→

Legend
- - - Estimated Time Frame
- - - Confirmed Time Frame
CD = Contract Disposal
BFD = Burned by Fire Dept.
DPDO = Defense Property Disposal Office

4.2.1 Motor Pool Operations

Motor Pool Operations consist primarily of activities associated with the repair and maintenance of vehicles and equipment owned by the 910th TAG. Motor Pool Operations occur primarily in Buildings #514 and #515.

Typical chemicals and hazardous materials handled in the motor pool are solvents, oils, and acids. Waste oils and solvents from Building #515 are temporarily stored in a 500-gallon liquid waste tank for eventual disposal by contractor through DPDO. Battery acid is neutralized and disposed of through an oil/water separator to the storm sewer system. No hazardous materials are generated in Building #514.

4.2.2 Aircraft Maintenance Shops

Aircraft Maintenance Shops are located in Buildings #301, #302, #305 and #413. These shops perform the full spectrum of repair and maintenance activities on the C-130 aircraft owned by the 910th TAG. Building #301 is the Composite Aircraft Maintenance Hangar for the 910th TAG. Several shops are located in Building #301, including the AGE Maintenance Shop, Engine Shop, Prop Shop and the Repair and Reclamation Shop. Building #302 contains the Fuel Systems Shop and the Corrosion Control Shops. Building #305 houses the Battery/Electrical Shop, the Flight Line, the Hydraulic/Pneuhydraulic Shop, the Instrument Shop, the Machine/Welding Shop, the Sheet Metal Shop and the Organizational Maintenance Shop. The NDI Shop is located in Building #413.

Typical chemicals and hazardous materials handled in the aircraft maintenance facilities are oils, solvents, and contaminated fuels. Most wastes generated are stored temporarily in the waste oil/solvent corral adjacent to Building #301 for eventual pickup by DPDO Columbus and disposal by contractor. Some liquid wastes, such as washdown solutions, are processed through oil/water separators and disposed of by service contract.

4.2.3 Base Engineer Maintenance Shops

The Base Engineer Maintenance Shops are located in Buildings #501, #505, #511 and #512. The shops are used to perform a full spectrum of activities related to the maintenance of real property on the base.

Behind Building #505 (lumber shed) is a temporary storage area for transformers, some of which may contain polychlorinated biphenyls (PCB's). These transformers are being stored until the percentage of PCB's present in the oil is determined and proper disposal through the DPDO is arranged. The transformers and PCB handling are discussed in Subsection 4.5.

No hazardous materials are handled in Building #511.

The Base Engineers Paint Shop is located in Building #512. This shop is used to perform interior and exterior painting on the base. Chemicals handled in the painting and cleaning process are paint thinner, toluene and gasoline. Wastes of these products are stored in drums and disposed of by contract along with unserviceable oil-based paints and oil-based paint cans.

The Entomology Shop is located in Building #501. The shop is responsible for pest and vegetation control on the base. Pesticides and herbicides are applied to various areas as required and are stored in Building #501 in small quantities. These substances are used until depleted and no wastes are generated. Substances, when no longer authorized for use, are removed through base supply by contract disposal.

4.2.4 POL Operations

The POL Operations Area is where JP-4 fuel for the C-130 aircraft is stored and distributed. Facilities located in the POL Area include JP-4 fuel tanks, a truck fill stand, tank trucks, and a defueling tank.

Two above-ground tanks (Tank A - 210,000 gallons, and Tank B - 420,000 gallons) receive, store and disburse JP-4 fuel. Tank A has been taken out of service, and there are no plans to use it in the near future. Each tank is contained in a separate dike with a containment volume greater than tank capacity, plus one foot of freeboard. Drains from the diked areas have manual valves which are locked when not in use. Rain water is routinely drained by POL personnel out of the diked area into an oil/water separator, which discharges into the storm sewer. Tank B is cleaned as required, and inspected annually by base personnel and every three years by an outside contractor.

Tank B supplies four, 25,000 gallon underground steel storage tanks, which dispense fuel to refueling trucks at the truck fill stand. These tanks are properly vented, grounded, and cleaned as required. The POL also includes a 10,000 gallon steel underground tank for defueling operations.

Presently, there are three, 5,000 gallon JP-4 refueling trucks and one, 1,500 gallon diesel fuel truck parked adjacent to Building #400. In 1981, a truck fill stand was constructed. This stand includes an oil/water separator, which collects all runoff and any spills from the parking area.

Additional information on fuels management at the 910th TAG is provided in Subsection 4.4.

4.3 WASTE MANAGEMENT PRACTICES

4.3.1 Waste Storage

Wastes generated at the base have been stored at several locations on and off base property during the last thirty years. On-base storage areas are discussed in this subsection.

Waste oils are presently accumulated in the Motor Pool in a 500-gallon liquid waste tank, which is pumped out periodically by a contractor. Twenty-two oil-containing transformers are stored adjacent to Building #505. The aircraft maintenance waste storage area, known as the Waste Oil/Solvent Corral, is located adjacent to Building #301. Waste oils, spent solvents, and contaminated JP-4 fuel are segregated into 55-gallon drums or holding tanks and periodically pumped out by a contractor. Wastes are also temporarily stored in seven oil/water separators at various locations on the base. Contractors pump out and dispose of materials collected in these separators.

Drums have been stored in the par course drum storage area since 1968 (according to air photos), and possibly even longer. At the time of WESTON's site visit in July 1984, the area had recently been cleaned up by base pavements and ground personnel, who identied the drums contents, put the drums in order, and graded the area. About 200 empty drums, and 60 drums containing materials stacked on wooden pallets, were located on the site. The Defense Property Disposal Office (DPDO) had instigated disposal actions. On 23 October 1984, all but 11 drums were removed by a DPDO chemical contractor.

From 1980 to 1982, drums containing waste oils, JP-4, and solvents from aircraft maintenance were stored along one side of Building #301. No more than eight drums were stored at this location at one time. This practice was discontinued when the Waste Oil/Solvent Corral was constructed.

4.3.2 Waste Disposal

The base does not currently own or operate any landfills. Waste disposal is handled primarily by contractor. Past disposal areas are described in this subsection.

The regular Air Force occupied the base from 1952 to 1957, prior to the takeover by the AFRES in 1960. The Air Force used several off-base properties to dispose of construction debris and rubble from 1952 to 1957. The Air Force has also conducted fire training operations on off-base property since 1952. Because these sites are not currently owned by the Air Force, and, therefore, not included in the DoD Installation Restoration

Program, they were not included in the Phase I records search.

From 1952 to 1970, 500 to 1,000 lbs. of tetraethyl lead sludge from the bottom of POL fuel tanks were buried in three small trenches in the POL Area. This disposal practice ended in 1970. Currently, POL tanks are inspected annually and cleaned as required by a contractor. Unleaded fuels are used, and no on-base disposal of tank sludges occurs. (Note: The ground in the general vicinity of the two eastern sludge disposal trenches was disturbed by recent Corps of Engineers projects. The construction inspector saw no evidence of the lead sludges).

From 1960 to 1965, wet trash from the mess hall was buried on-base. Building #530 is located on top of this former disposal site.

Construction debris was disposed of in the Par Course Rubble Dump for an undetermined period of time. This practice has been discontinued, and there is no evidence that hazardous materials have been disposed of in this area.

4.3.3 Hazardous Waste Management Plan

The Hazardous Waste Management Plan (1 October 1983) for the 910th TAG outlines the locations and operations of the generator accumulation points. Accumulation points are temporary waste storage areas, and include the Aircraft Maintenance and Motor Pool areas, as well as seven oil/water separators in various locations. The locations of the accumulation points are shown in Figure 4-2.

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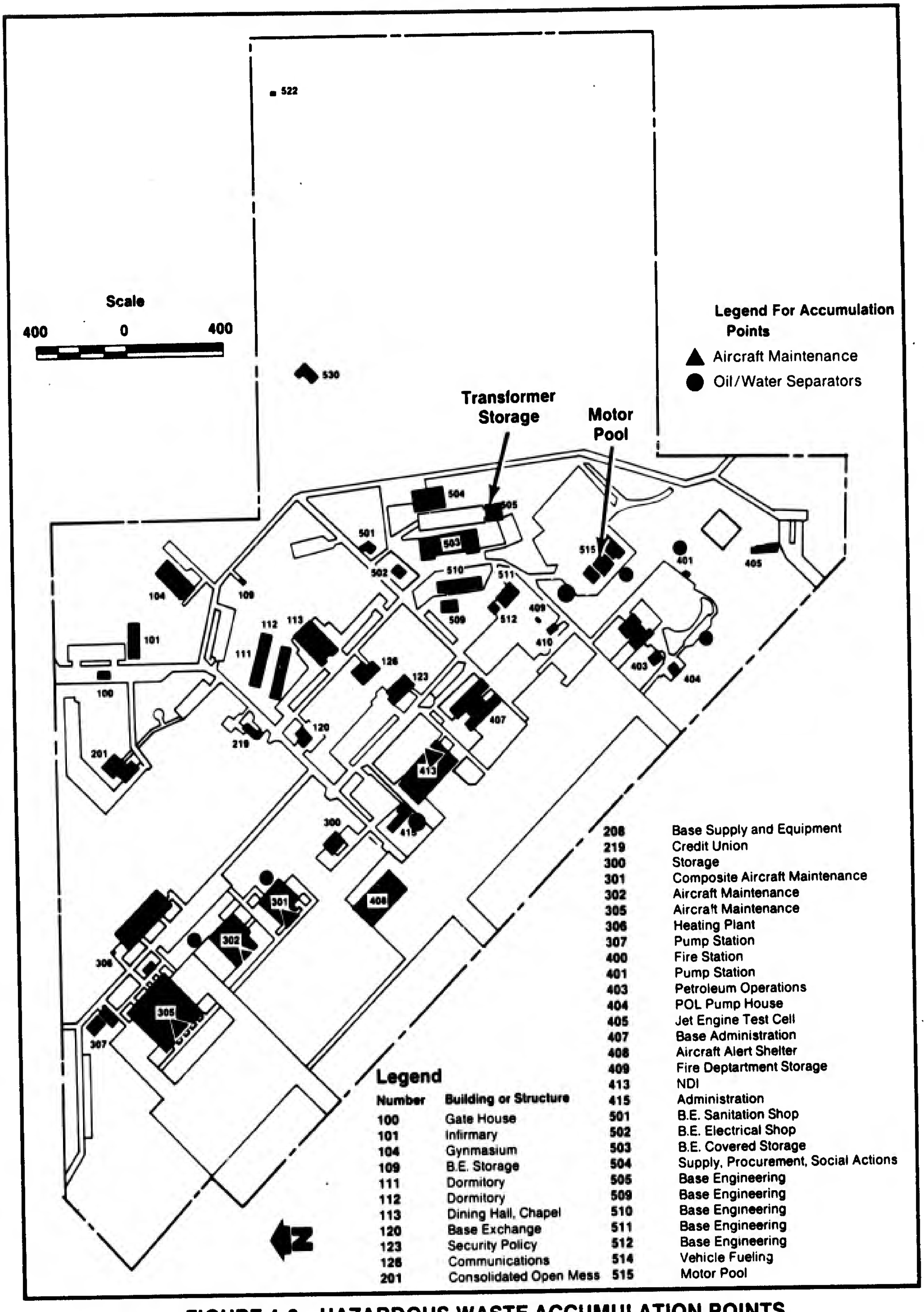

FIGURE 4-2 HAZARDOUS WASTE ACCUMULATION POINTS

Wastes from the various shops are collected at the accumulation points, which are managed by Accumulation Point Managers. The responsibilities of Accumulation Point Managers include:

- Assuring that wastes are placed in proper containers and accumulation start dates posted.
- Assuring hazard warnings are posted and containers are kept closed.
- Inspecting containers weekly, and implementing remedial action for leaks, spills, or improper storage.
- Notifying proper authorities in the event of spills.
- Reviewing activities for any possible reduction of program involvement to lessen waste amounts.

Storage at the accumulation points cannot exceed 90 days. Any storage exceeding 90 days requires an EPA permit.

Waste oils and solvents are temporarily stored at the Motor Pool and Aircraft Maintenance Shop, and are picked up by DPDO Columbus when requested by Base Supply. Battery acid at the Motor Pool is neutralized and disposed of through an oil/water separator. Washdown solutions from the Aircraft Maintenance Shop and contaminated wastewater at various locations are disposed of through oil/water separators and picked up by commercial disposal contractors. Oil-containing transformers which may contain PCB's are stored in an area adjacent to Building #505.

The base also owns a wastewater treatment plant, which is leased to the City of Youngstown. The base does not currently operate any open dumps or landfills on the base.

4.4 FUELS MANAGEMENT

Fuels management facilities at the base include the POL Area, which was described in subsection 4.2.4, and other fuel storage tanks located throughout the base. Table 4-2 lists these fuel storage tanks, and Figure 4-3 shows the locations of the tanks.

The Spill Prevention Control and Countermeasures Plan (5 May 1983) outlines the following procedures for the inspection and maintenance of records on all fuel and waste storage tanks:

- Daily visual inspection by the tank custodian (Note: Fire Department personnel inspect the fire training area tanks).

- Daily or weekly fuel inventory by the tank custodian.

- Monthly inspection to be completed by the tank custodian, with an inspection report sent to Base Civil Engineering.

There have been no significant spill incidents at the base (USAF, 1983). The Spill Prevention Control and Countermeasures Plan (SPCC) establishes procedures to be followed in the event of any oil and hazardous material spillage on base. Persons to be notified, spill containment procedures, and reporting requirements are outlined in the SPCC.

WESTON

TABLE 4-2

FUEL STORAGE TANKS
910th TAG

Location	Fuel Type	Number of Tanks	Capacity (gal.)	Above or Below Ground	Tank Type
POL Storage Tank Farm[1]	JP-4	1	210,000	Above	Steel
POL Storage Tank Farm	JP-4	1	420,000	Above	Steel
POL Operating Tank Farm	JP-4	4	25,000	Below	Steel
POL Operating Tank Farm	JP-4	1	10,000	Below	Steel
Filling Station, Bldg.#514	MOGAS, Unleaded	1	4,000	Below	F'glas
Filling Station, Bldg.#514	MOGAS, Leaded	1	6,000	Below	F'glas
Filling Station, Bldg.#514	Diesel Fuel	1	6,000	Below	F'glas
Fire Dept.	MOGAS	1	275	Above	Steel
Base Communications	Diesel Fuel	1	550	Below	Steel
AGE, Building #301	MOGAS	1	1,000	Above	Steel
AGE, Building #301	JP-4	1	500	Above	Steel
Pavement & Grounds Building #503	MOGAS	2	275	Above	Steel
Building #306	No. 2 Fuel Oil	2	10,000	Below	F'glas
Building #101	No. 2 Fuel Oil	1	2,000	Below	Steel
Building #104	No. 2 Fuel Oil	1	4,000	Below	F'glas
Building #307	Diesel Fuel	4	150	Above (Inside Bldg.)	Steel

WESTON

TABLE 4-2
(Con't)

FUEL STORAGE TANKS
910th TAG

Location	Fuel Type	Number of Tanks	Capacity (gal.)	Above or Below Ground	Tank Type
Building #113	No. 2 Fuel Oil	3	10,000	Below	F'glas
Building #530	No. 2 Fuel Oil	1	1,000	Below	F'glas
Building #300	No. 2 Fuel Oil	1	550	Below	Steel
Building #415	No. 2 Fuel Oil	1	2,000	Below	Steel
Building #501	No. 2 Fuel Oil	1	1,000	Below	Steel
Building #313[2]	No. 2 Fuel Oil	1	1,000	Below	Steel
Fire Training Facility[3]	JP-4	1	1,000	Above	Steel

[1]This tank is not in use and there are no plans to use it in the near future.

[2]Leased to Trumbull County. Not shown on map.

[3]Located off-base. Not shown on map.

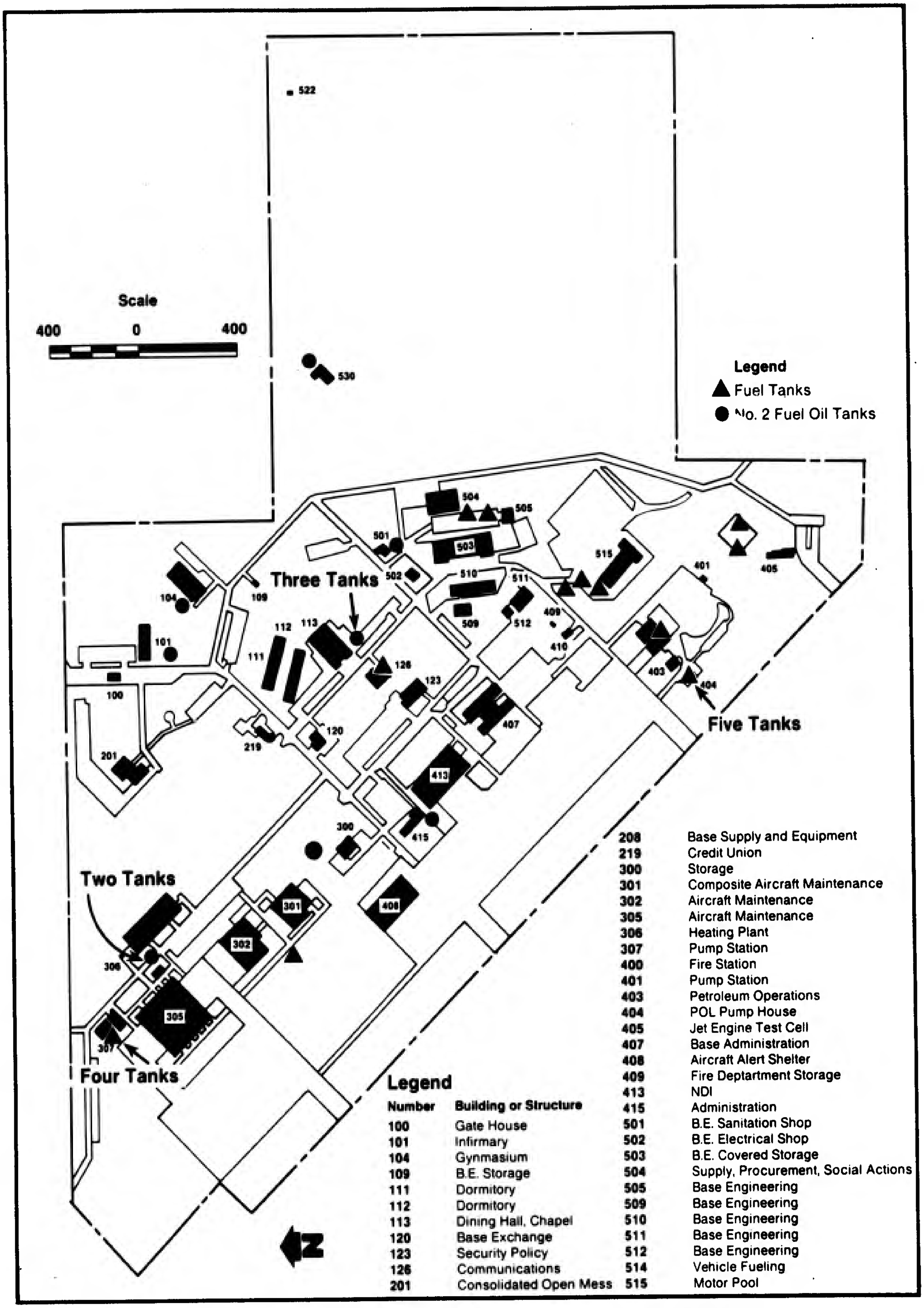

FIGURE 4-3 LOCATION OF FUEL STORAGE TANKS

4.5 TRANSFORMER STORAGE AND PCB HANDLING

The transformer storage area is located behind Building #505. The storage area is a 25-foot square concrete pad with 8-inch walls, surrounded on three sides by an 8-foot chain link fence. A two-inch valved drainage pipe to the outside is located on one side. At the time of WESTON's visit in July 1984, there were 18 transformers located on the concrete pad, and four located on the ground outside of the pad. None of the 22 transformers appeared to be leaking, and no oil stains were found in the area. At the present time, all 22 transformers are located on the concrete pad.

All transformers carry PCB warning labels, but it has been indicated that it was common practice to place such warning labels on all transformers, regardless of PCB content.

The record search provided a recent inventory list, which indicates the status (storage, service or sent to DPDO) of transformers. The inventory listed only 12 of the 22 transformers as currently being in storage.

Three sets of PCB analytical test results from two laboratories are available. The analytical data is for 49 samples, with six of the samples duplicated by one lab. The initial analysis of the duplicated samples indicated non-detectable reading, while analyses conducted ten months later indicated PCB concentrations ranging from 1.1 to 8.0 ppm.

Four samples contained PCB concentrations in the 50 to 500 ppm range. Three of these four transformers were removed by DPDO in 1982. The fourth is currently in storage. Analytical data is available on 17 of the 22 transformers in storage. All 22 have been turned in to DPDO and are awaiting disposal by a DPDO contractor. Sixteen contain PCB concentrations of less than 50 ppm, one contains 50 to 500 ppm of PCB's, and five transformers are untested.

4.6 FIRE PROTECTION TRAINING

Fire protection training has been conducted by the Air Force since 1952 at two sites located off-base. From 1952 to 1957, the Air Force trained base fire department personnel in fire fighting techniques at a site located just east of the old alert apron on the off-base property. Unknown quantities of JP-4 fuel, AVGAS, and possibly waste oils were burned in a fifty foot diameter burn pit. In 1958 to 1959, the top two to three feet of material in the pit was excavated and taken off-site for disposal. The excavated material was described as being oily in appearance.

The 910th TAG currently provides fire protection for the airport. Since 1960, AFRES has conducted fire training activities at a site located just off Ridge Road, southeast of the sewage treatment plant. Up to 4,000 gallons of waste JP-4 fuel per year have been poured into an unlined, circular gravel area and ignited. No measures have been taken to contain the wastes within the burn pit area. In 1980, approximately 1,500 gallons of waste oil and sludge was placed in a storage tank on-site for possible use in future exercises. The tank and its contents were removed from the site in October 1984.

4.7 WASTE TREATMENT AND DISPOSAL SYSTEMS

Liquid industrial wastes are controlled at the base through established sanitary and storm sewer systems which include oil/water separators, and through a waste management plan of waste segregation and contract disposal. There are no operating disposal sites on the base.

4.7.1 Oil/Water Separators

There are seven oil/water separators on the base, which are connected to the sanitary or storm sewers as indicated in Table 4-3. Buildings #413, #301 and #302 contain oil/water separators which are connected into the sanitary sewer system. These buildings contain a number of aircraft maintenance shops. Solvent and detergent mixes have been used for washing activities in these areas. The other four oil/water separators on the base are connected into the storm sewer system, and are located at the truck fill-stand, the POL tank area, the vehicle maintenance building, and vehicle fueling station.

The oil/water separator tanks are drained on a regular basis, and the contents are disposed of by a civilian contractor. There is no record of any past operational problems.

4.7.2 Sanitary Sewer Systems

Figure 4-4 depicts the sanitary sewer system and the locations of the three oil/water separators which drain into the sanitary sewer. The sanitary sewage treatment system was completed in 1952, is owned by the USAF, and

WESTON

TABLE 4-3

OIL/WATER SEPARATORS

Location	Activities	Discharges to
Building #413	NDI Shop	Sanitary Sewer
Building #301	Aircraft Maintenance	Sanitary Sewer
Building #302	Aircraft Maintenance	Sanitary Sewer
POL Area	Truck Fill Stand	Storm Sewer
POL Area	JP-4 Fuel Storage	Storm Sewer
Building #514	Vehicle Fueling Station	Storm Sewer
Building #515	Vehicle Maintenance Shop	Storm Sewer

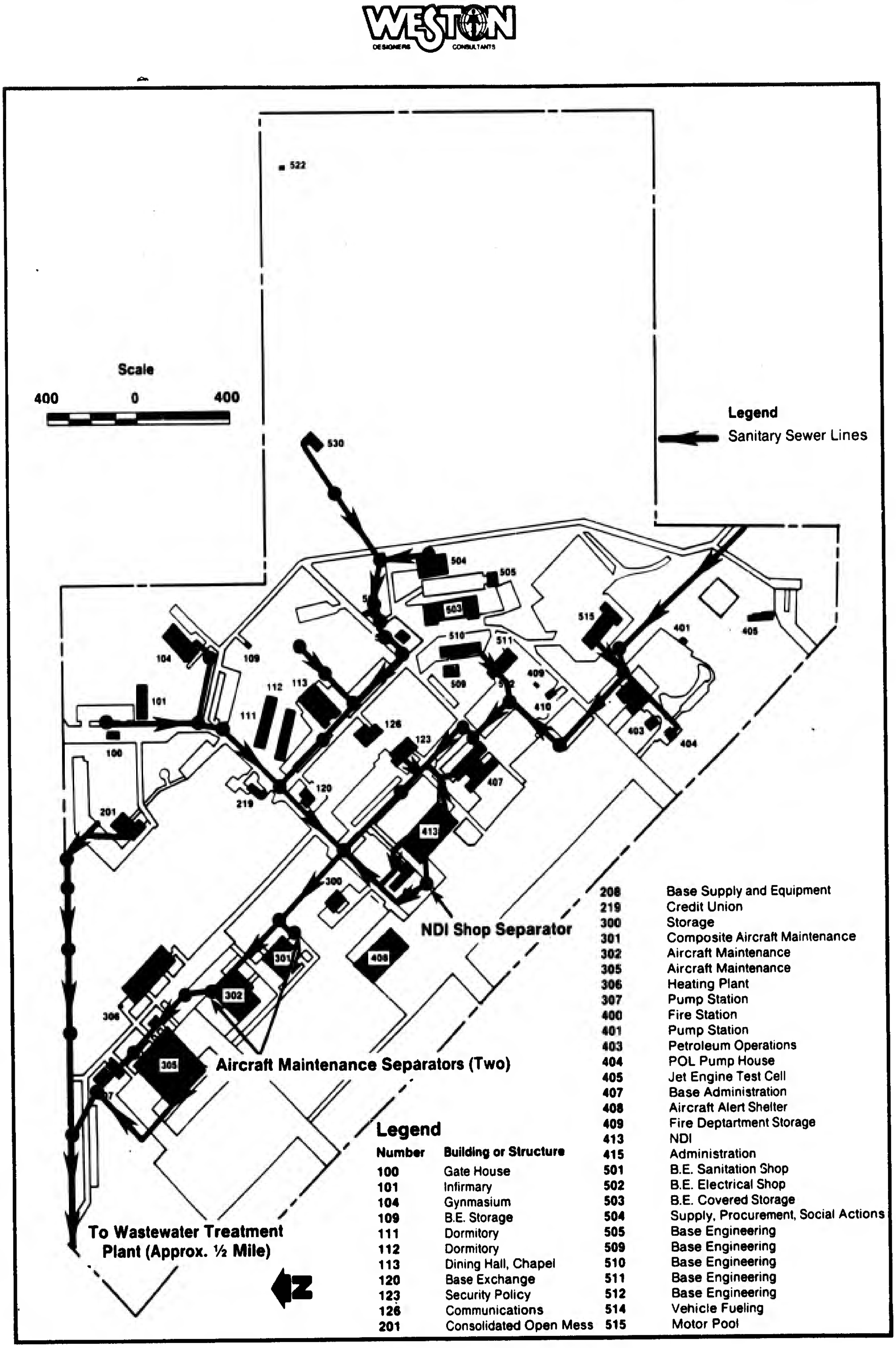

FIGURE 4-4 SANITARY SEWER SYSTEM

has a design capacity of 150 million gallons per day (mgd). The collection system consists of one sewage lift station from Hangar #413, with a 150-foot force main to the main sewer and 21,295 feet of 6", 8", 10" and 12" sewer. During 1978 to 1979, new plastic liners were installed inside existing sewer pipes. In 1980, a new 24" effluent sewer, approximately 382 feet in length, was installed to Spring Run Creek. As of 1 January 1983, the base sanitary sewage treatment plant was leased to the Board of County Commissioners of Trumbull County, Warren, Ohio for a period of 15 years.

A review of operation logs kept by personnel during control of the plant by the base indicated a number of occasions when free solvent or oil came into the treatment plant. There were also a number of incidents of biological stress due to industrial effluent discharge into the sanitary sewage system by base shops. Although no complete die-off of the biological system occurred, a temporary decrease in treatment efficiency was reported.

4.7.3 Storm Drainage System

The storm water drainage system, illustrated in Figure 4-5, removes all runoff and surface drainage from the base along established drainage ditches and storm sewer lines. Four oil/water separators are connected to the storm drainage system. Two open ditches (north and south) receive all flow from the system and then discharge into Spring Run on the west side of the air field.

During the site inspection, it was noted that during warm weather it is common practice for aircraft

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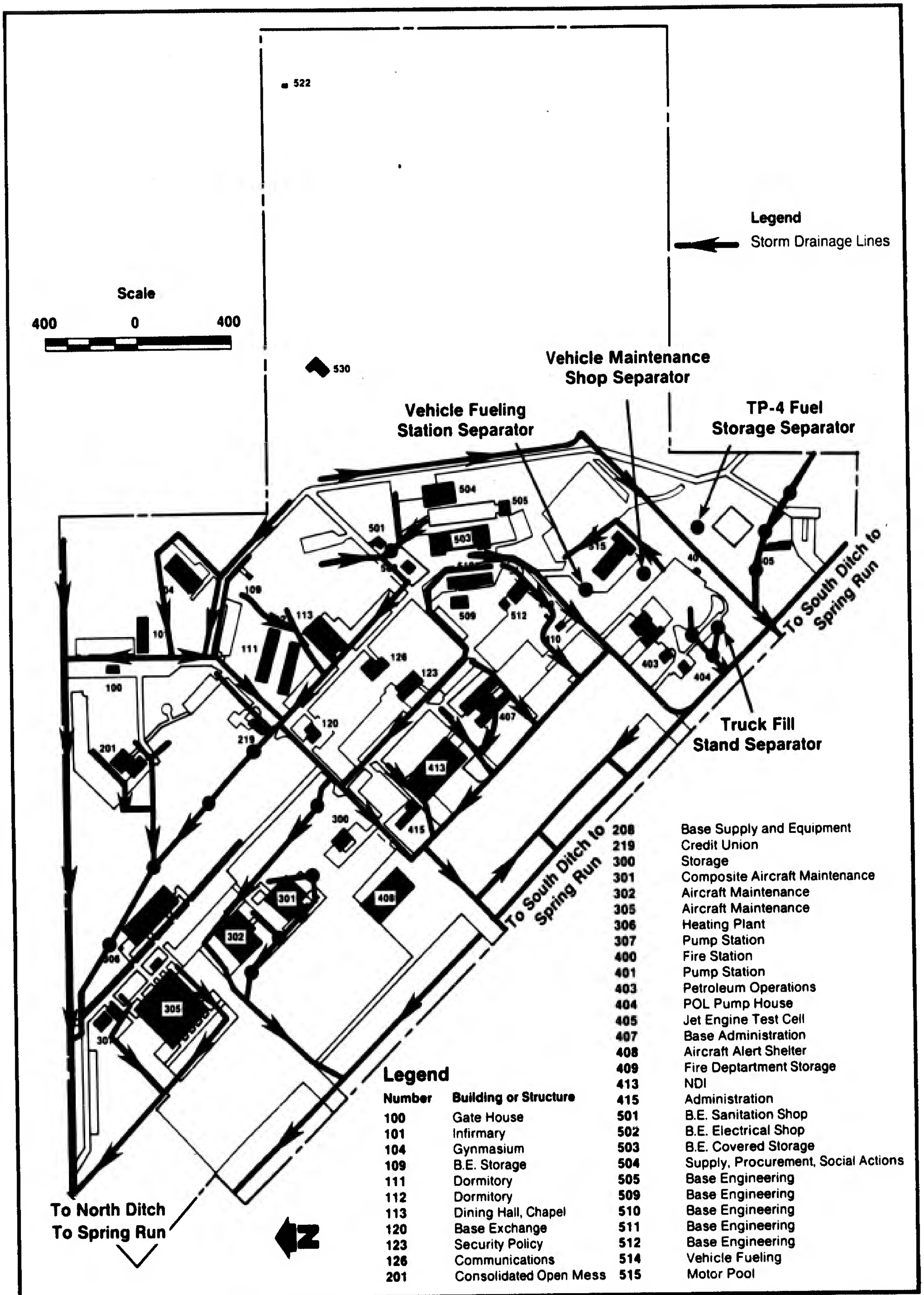


FIGURE 4-5 STORM DRAIN SYSTEM

maintenance personnel to work outside while cleaning aircraft parts with detergent and solvent mixtures. The wash water from these operations drains into the storm sewer system, not into the sanitary sewer equipped with oil/water separators inside the building. The open drainage ditch adjacent to Building #302 contained contaminated water from such operations. An inspection of the outfall for a section of the storm water system into the south drainage ditch, revealed that the water appeared slightly cloudy, indicating possible contamination from aircraft maintenance shops.

4.8 SITE FINDINGS

This section describes the five sites at the 910th TAG which were identified as potential sources of contamination due to past storage or disposal practices. The sites were identified through a number of sources, including AFRES files, interviews with base personnel, and field inspections. Figure 4-5 shows the locations of the five sites. The sites are described in this section.

Four of the five sites are recommended for a confirmation study under Phase II of the Installation Restoration Program. The confirmation study is described in Section 5 - Conclusions, and Section 6 - Recommendations.

4.8.1 Par Course Rubble Dump

The par course rubble dump is located near the small arms firing range. This site is approximately one acre in size, and was used for the disposal of construction

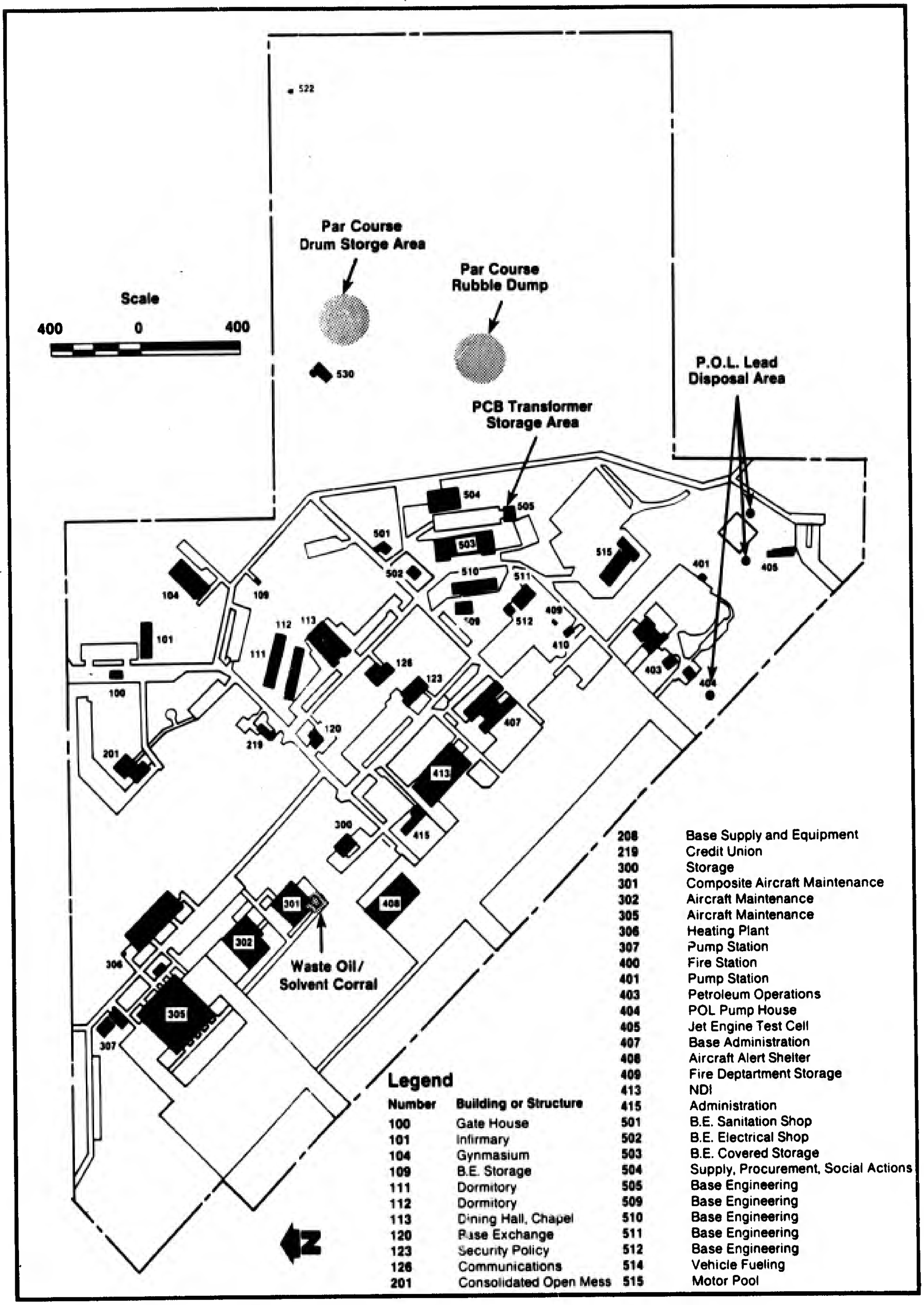


FIGURE 4-6 LOCATION OF SITES OF POTENTIAL ENVIRONMENTAL CONCERN

debris for an undetermined period of time. This practice has been discontinued, and there is no evidence that hazardous materials were ever disposed of in this area. There was no evidence of contamination or contaminant migration. Therefore, this site has not been given further consideration in this report.

4.8.2 Par Course Drum Storage Area

Aerial photographs indicate that drums have been stored in the par course drum storage area since 1968, and possibly even longer. At the time of WESTON's site visit in July 1984, about 200 empty drums, and 60 full drums, were on the site. The area had recently been cleaned up by base pavement and grounds personnel, who identified the drums, put the drums in order, and graded the area. Most of the empty drums were neatly stacked, the full drums were stacked on wooden pallets, and there was no indication of any past burial of drums. There were some crushed drums and assorted debris in the northwestern corner of the site.

The primary types of waste present included waste oils and spent solvents. However, some of the drums originally contained de-icing compound, paint stripper, and tri-cresyl phosphate.

Dark colored soils were found on the site, which may indicate past spillage. There was also an oily sheen on the the surface water in an adjacent area, which indicates possible surface water contamination. This site is recommended for a confirmation study, and is discussed further in Sections 5 and 6.

4.8.3 Waste Oil/Solvent Corral

The waste oil/solvent corral, adjacent to Building #301 has been used since 1980 to store waste oils, spent solvents, and contaminated JP-4 jet fuel. Wastes are segregated into 55-gallon drums or holding tanks and periodically pumped out by a licensed waste hauler. The site is currently underlain by a bed of slag, but in the past drums were stored on a grassy area. There is evidence of some leakage, and the slag material in some areas has a pronounced organic odor. Adjacent to the current storage area is an area of dead grass approximately 10 feet by 100 feet in size. This site is recommended for a confirmation study, and is discussed further in Sections 5 and 6.

4.8.4 POL Lead Sludge Disposal Area

Between 1952 and 1970, 500 to 1,000 pounds of sludge containing tetraethyl lead was buried in three small trenches in the POL area. The sludge came from the bottoms of tanks used to store leaded fuel. The exact locations of the trenches are not known. In fact, the ground in the vicinity of the two eastern sludge disposal trenches was distributed during recent Corps of Engineers construction projects, and the construction inspector saw no evidence of the lead sludges. Because lead is highly toxic and percutaneous, the site is recommended for a confirmation study, and is discussed in Sections 5 and 6.

4.8.5 Transformer Storage Area

The transformer storage area is located behind Building #505. The storage area is a 25-foot square concrete pad with 8-inch walls, surrounded by an 8-footchain-link fence. At the time of WESTON's site visit in July 1984, 18 transformers were located on the pad, and four were located on the ground outside of the pad. There were no signs of spills or leakage. Presently, all 22 transformers are located on the pad.

Available analytical data indicates that sixteen of the transformers contain PCB concentrations of less than 50 ppm, and one contains PCB concentrations in the 50 to 500 ppm range. Five transformers are untested. All 22 transformers have been turned into DPDO, and are awaiting disposal by a DPDO contractor. This site is recommended for a confirmation study, and is discused in Sections 5 and 6.

SECTION 5

CONCLUSIONS

5.1 INTRODUCTION

This section summarizes the conclusions reached relative to the need for further confirmation studies at each of the five sites discussed in the previous section. As mentioned previously, the par course rubble dump showed no evidence of hazardous material disposal or any sign of contamination. This site was not recommended for a confirmation study and was not rated according to the HARM methodology.

The four remaining sites are listed in Table 5-1 in order of descending priority, based on the Hazard Assessment Rating Methodology (HARM) scores. The HARM Methodology is described in Appendix D. HARM score sheets for the four sites are presented in Appendix E. The locations of the four sites are shown in Figure 5-1.

The objective of the Phase I Study is to develop sufficient evidence to justify further confirmation studies in Phase II. All four sites were rated as having sufficient reason to justify further confirmation studies. The conclusions for each site are summarized in the subsections below.

TABLE 5-1

SUMMARY OF WASTE TYPES AND HARM SCORES FOR CONFIRMATION SITES AT THE 910TH TAG

Site Number	Site Name	Waste Type	HARM Score
1	Par Course Drum Storage Area	Waste Oils Waste Solvents De-icing Compound Paint Stripper Tri-cresyl Phosphate	56
2	Waste Oil/Solvent Corral	Waste Oils Waste Solvents Contaminated JP-4 Fuel	56
3	POL Lead Sludge Disposal Area	Tetraethyl Lead Sludge	52
4	Transformer Storage Area	PCB Contaminated Oils	46

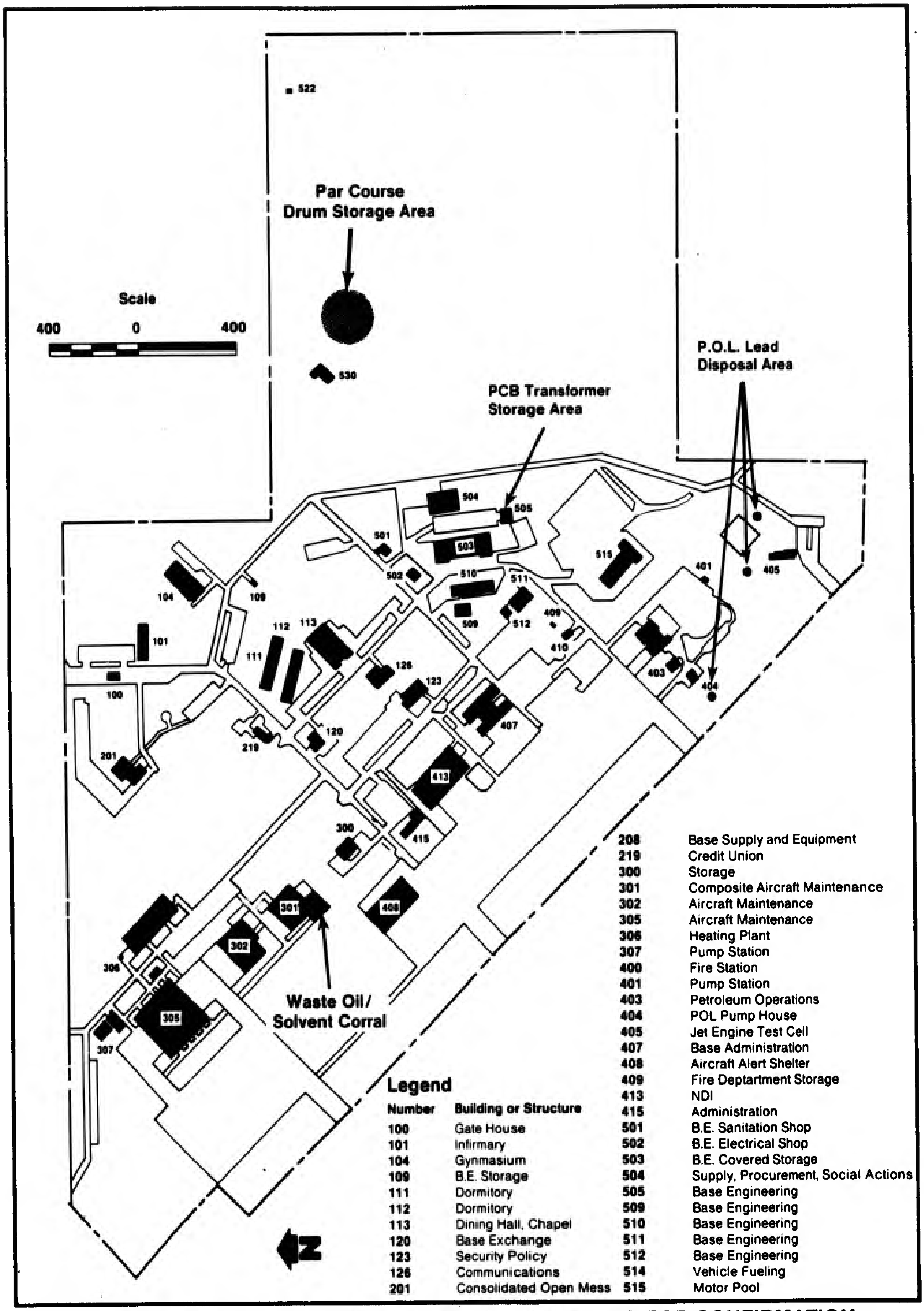


FIGURE 5-1 LOCATION OF SITES RECOMMENDED FOR CONFIRMATION

5.2 SITE NO. 1 - PAR COURSE DRUM STORAGE AREA

The par course drum storage area showed evidence of possible soil and surface water contamination. There were areas of dark colored soil, which may indicate some past spillage. There was also an oily sheen on surface water in an adjacent wet area, as well as some rusted drums. Possible contaminants include primarily waste oils and spent solvents, although some of the drums originally contained de-icing compound, paint stripper, and tri-cresyl phosphate.

The most probable pathway of contaminant migration is overland flow of spillage associated with rainfall and runoff. Slow vertical soil permeabilities caused by a hard pan in regional soils would preclude a serious groundwater contamination problem. However, the close proximity of the site to the abandoned well field might be a source of future problems if the wells were reopened. Since the extent of contamination is not known, the par course drum storage area is recommended for further confirmation study. Specific recommendations for a confirmation study at the site are presented in Section 6.

5.3 SITE NO. 2 - WASTE OIL/SOLVENT CORRAL

The waste oil/solvent corral, adjacent to Building #301 has been used since 1980 to store waste oils, spent solvents, and contaminated JP-4 jet fuel. The site is currently underlain by a bed of slag, but in the past drums were stored on a grassy area.

There is evidence of some leakage in this area, and the slag material in some areas has a pronounced organic odor. Adjacent to the current storage area is an area of dead grass approximately 10 feet by 100 feet in size.

Overland flow is the most likely pathway of off-site migration of wastes, particularly water soluble solvents. Nearby storm sewer manholes provide a conduit for off-base transport of wastes into local streams which flow through agricultural properties. A confirmation study is recommended to define the extent and type of contamination at the site.

5.4 SITE NO. 3 - POL LEAD DISPOSAL AREA

The exact locations of the three small trenches in the POL area used for disposal of tetraethyl lead sludge are unknown. The POL area is underlain by low permeability, hard pan soils which would limit the migration of contaminants. However, lead is highly toxic and percutaneous, and disturbance of the sludges during future construction activities could expose workers to adverse impacts. This area is, therefore, recommended for a confirmation study to define the exact locations of the trenches, and ensure access is controlled.

5.5 SITE NO. 4 - TRANSFORMER STORAGE AREA

The twenty-two transformers in the transformer storage area behind Building #505 are all stored on a concrete pad, and there is no evidence of spillage or leakage. However, past handling and storage practices, such as the temporary storage of transformers off the concrete pad, may have resulted in some spillage. In addition, there is a two-inch diameter drain pipe on the southwest side of the concrete storage area, which contains a valve that was in the "open" position during the site visit. If a spill had occurred in the past, precipitation could have washed the spilled material into the adjoining grassy area. Extensive migration of PCB's is unlikely, since PCB's are only slightly soluable and tend to attenuate on soil particles. However, PCB's are highly toxic. Sixteen of the 22 transformers contain less than 50 ppm of PCB's. The PCB concentration in the oil of one transformer is in the 50 to 500 ppm range, and is unknown for five transformers. Therefore, a confirmation study is recommended for the PCB transformer storage area, to determine if a contamination problem does exist and to facilitate rapid, proper disposal of the transformers.

SECTION 6

RECOMMENDATIONS

6.1 INTRODUCTION

The following recommendations are made for work to be performed under Phase II (Problem Confirmation) of the IR Program.

The recommendations are provided on a site-by-site basis to verify the presence or absence of contamination, and to further assess the potential for adverse environmental impacts from contaminant migration at each identified site. Recommendations are summarized in Table 6-1.

6.2 SITE NO. 1 - PAR COURSE DRUM STORAGE AREA

Improperly stored and handled waste at the drum storage area may have resulted in contamination of soils, surface water, and to a lesser extent, groundwater. Accordingly, it is recommended that test pits be excavated in up to five locations to evaluate the soil conditions and depth of soil contamination in the area, and to allow the collection of soil samples. It is further recommended that two surface water samples be collected: one from the stream adjacent to the site and one from the standing water adjacent to the drum staging area. Wells #1 through 4 in the former base water supply well field should also be sampled. The analytical protocol should include analysis for volatile organic compounds (VOC), as well as acid and base neutral extractable organic compounds.

TABLE 6-1

RECOMMENDED PHASE II SAMPLING PROGRAM
910th TAG AT YOUNGSTOWN MUNICIPAL AIRPORT

Site No.	Site Name	HARM Score	Recommended Phase II Sampling Program
1	Par Course Drum Storage Area	56	- Five test pits to evaluate soils - Two surface water samples. - Four groundwater samples (existing wells).
2	Waste Oil/Solvent Corral	56	- Four hand augered soil samples.
3	POL Lead Sludge Disposal Area	52	- Test pits to locate three disposal trenches. - Four samples per trench: 2 sludge samples; 2 underlying soil samples.
4	Transformer Storage Area	46	- Six soil samples. - Five transformer oil samples.

6.3 SITE NO. 2 - WASTE OIL/SOLVENT CORRAL

The primary contaminant migration pathway of concern from the "corral" area is overland flow associated with rainfall and runoff. To address this problem, four hand augered soil samples should be collected: two from the area of dead grass next to corral; one from the slag sub-grade beneath the corral; and one from an area of stressed vegetation west of Building #301, probably resulting from parts washing operations outside Building #301. Each sample should be analyzed for VOC, acid and base neutral extractables, and lead.

6.4 SITE NO. 3 - POL LEAD SLUDGE DISPOSAL AREA

In the POL lead sludge disposal area, tetraethyl lead sludge has been buried in three small trenches. The trenches are probably underlain by slow permeability, hardpan soils which would limit the potential migration of contaminants. This area is of concern, however, because the lead is highly toxic and percutaneous. Future construction or removal operations which disturb soils may expose workers to adverse impacts. It is, therefore, recommended that a sufficient number of test pits be excavated to delineate the size of the trenches. Four composite samples should be taken in each trench: two samples of the sludge, and two samples of the soil 0 to 12 inches below the sludge.

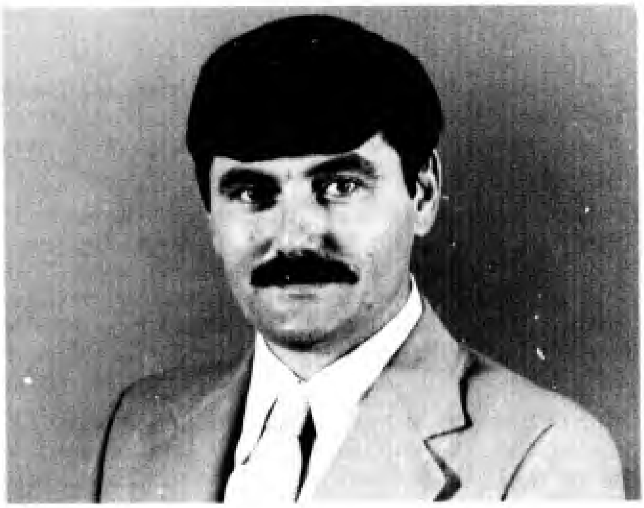
6.5 SITE NO. 4 - TRANSFORMER STORAGE AREA

The storage of PCB transformers adjacent to Building #505 is a potential source of environmental contamination. The 22 transformers in the PCB transformer storage area are stored on a concrete pad, and there is no evidence of spills or leaks. PCB's are only slightly soluble and tend to adhere to soil particles. It is unlikely that any significant migration of PCB's would occur. However, soil sampling is recommended to confirm the presence or absence of contamination. Soil samples should be taken in the area east of the concrete pad, where four transformers were located at the time of WESTON's site visit. Four composite soils samples should be taken in this area, to a depth of 12 inches. In addition, two composite soil samples should be taken on the west side of the concrete pad, where the 2-inch drain line exits the pad.

It is also recommended that sampling and analysis be conducted to determine the concentrations of PCB's in the five untested transformers. Proper disposal of transformers determined to have significant PCB concentrations through DPDO would follow.

APPENDIX A

RESUMES OF WESTON TEAM



Raymond W. Kane, P.E.

Registration

Registered Professional Engineer in Pennsylvania.

Fields of Competence

Environmental management and regulatory compliance; energy facility siting; oil, gas and shale technology; water resource planning; hazardous waste management; regional planning; environmental impact assessment; management consulting; strategic planning.

Experience Summary

Twelve years in a variety of energy/environmental projects for large industrial firms, and Federal and state government clients. Manager of large complex interdisciplinary studies for petroleum, and chemical industries. Program manager for statewide power plant siting study and oil, gas and shale technology research and development activities on the Federal level.

Conducted numerous environmental audits and regulatory compliance reviews at industrial facilities. Conducted several water resource planning and economic base studies. Conducted industrial hazardous waste planning and engineering evaluations.

Credentials

B.S., Civil Engineering—Villanova University (1967)

M.S., Civil Engineering (Water Resources)—Villanova University (1976)

Tau Beta Pi

Water Pollution Control Federation

Society of American Military Engineers

American Defense Preparedness Association

Commander—U.S. Naval Reserve, Civil Engineer Corps

Employment History

1981-Present	WESTON
1978-1981	Booz-Allen & Hamilton Principal
1975-1978	WESTON
1973-1975	McCormick, Taylor & Associates
1972-1973	Kappa Systems, Inc.
1971-1972	Upper Darby (PA) Township
1967-1971	Submarine Force, U.S. Navy

Key Projects

Project manager for environmental audit and regulatory compliance review for Occidental Petroleum Corporation. Conducted reviews of over 100 chemical, petroleum and coal preparation facilities. Determined true costs of environmental compliance activities and corporate liability for 3-year period. Study was in response to SEC consent agreement. As a follow-on also developed an Assessment Program Guidance Document (APGD) to help corporate staff set up programs, policies and procedures to ensure environmental related liabilities and exposure are minimized.

Project Director for "Development of Environmental Audit Program" for the National Institutes of Health. Responsible for establishment of audit protocols and procedures to ensure compliance with federal, state, and local environmental requirements for the main campus of NIH and field facilities around the country.

Project Manager for coal-fired power plant siting study in Western Maryland. Served as progam integrator, managing the technical work of several subcontractors. Identified exclusionary and discretionary screening criteria and determined best sites for siting of power plant using state MAGI (environmental data base) system. Participated in Public Involvement Program through public workshops and meetings. Reservoir siting and coal cleaning facility siting studies were also a part of this large complex project.

Professional Profile

Project Manager for large oil, gas, and shale technology R&D project for Department of Energy. Conducted a variety of technical resource characterization studies, market studies, strategic planning and environmental assessment evaluations for DOE's program offices. Technologies evaluated included above-ground and modified in-situ oil shale retorting, enhanced oil recovery and enhanced gas recovery. Coordination with Bartelsville Energy Technology Center (BETC) staff was a major part of this project.

Project Manager—New York City, Department of Environmental Protection. Responsible for environmental assessment of city-wide sludge management facility plan. Work includes site selection criteria and screening and development of baseline information and impact assessments for a range of land-based alternatives including composting, land application, co-incineration, co-disposal and landfilling.

Project Manager—Pennsylvania Department of Transportation. Responsibilities included regional planning and development of an EIS for 17 miles of a 4-lane interstate highway project and coordination of all study elements. Public participation and client relations were prime management responsibilities, in addition to the technical responsibility for water resources assessment.

Project Manager—Confidential Industrial Client. Determination of potential development constraints for expansion of facilities for a major industrial client, involving investigations of: 1) zoning regulations; 2) municipal services; 3) environmental constraints; 4) traffic transportation constraints.

Project Manager—Jacksonville District Corps of Engineers. Responsibility included: coordination and management of $150,000 multi-disciplinary study of geologic and biologic resources, land use, soils and other existing natural resources; projection of population and other economic parameters to the year 2030 and forecasts of water demand and wastewater generation; LANDSAT and other multi-spectral imagery to develop certain types of graphic overlays showing wetlands and other transitional zones.

Project Director of Navy Phase 1 Initial Assessment Study for Portsmouth Naval Shipyard and Brunswick Naval Air Station. Conducted record searches and field investigations to determine existence of any past hazardous waste disposal sites. Developed recommendations for Phase 2 Confirmation and Quantification Study.

Project Director for hydrogelogic investigation of TCE contamination for industrial client in New Jersey. Conducted wastewater sampling and analysis, pump tests and groundwater modeling to determine cause and effect relationship of contamination.

Project Manager—Vicksburg Distict Corps of Engineers. Responsible for the coordination and management of study geared to the projection of population, employment earnings, value added, income, industrial growth, and agricultural production for a 26-county region in northwest Mississippi.

Publications

Kane, R.W., "Water Resources Impacts of Synthetic Fuels Development in the West", 1981.

Kane, R.W., Cahill, L.W., Burns, H.B., "Energy Choices and Environmental Constraints", 1979.

Kane, R.W., "What Constitutes a Good Corporate Environmental Management and Regulatory Compliance Program? 1981.

Kane, R.W., Emig, D., "DoD's Superfund Program", 1983.

Kane, R.W., Gertz, S.G., "Hazardous Waste—Corporate Risk or Corporate Profit?", 1982.

Glenn R. Smart

Fields of Competence

Hydrogeologic investigations of potential hazardous waste sites and landfills; design and supervision of installation of groundwater monitoring programs; collection of field data and evaluation of potential environmental impact; management of hydrogeologic projects at hazardous waste sites.

Experience Summary

Seven years of experience in various aspects of the water resource industry. Involvement in over 100 hazardous waste projects in sixteen states. Development of hazardous waste site preliminary assessments and full field investigations. Development of site safety plans for use during hazardous waste site evaluations. Fully trained in the use of respiratory protective equipment, emergency first aid procedures, site sampling protocols and chain-of-custody procedures, and general site safety programs. Frequent interaction with government and industrial clients. Provided expert testimony for superfund litigation.

Employed remote sensing techniques and on-site investigations to locate favorable sites for the development of groundwater supplies. Collected field data, compiled hydrologic and hydraulic input, prepared reports for flood insurance studies. Presented study results to federal, state and local authorities.

Credentials

B.S., Hydrology—University of New Hampshire (1977)

National Water Well Association, Technical Division

American Water Resource Association

Employment History

1984-Present	WESTON
1979-1984	Ecology and Environment, Inc.
1977-1979	Sverdrup & Parcel and Associates, Inc.

Key Projects

Project Manager for Superfund site hydrogeologic investigation to determine potential impact on local well water supplies.

Project Manager for complete hydrogeologic investigation of Superfund site involving alleged contamination of municipal field.

Project Manager for confidential industrial client. Project included hydrogeologic study to determine the groundwater quality beneath site slated for industrial development.

Supervised a team of six field geologists and participated in collection of geologic data for nationwide mineral survey. Responsible for all planning, logistics, quality assurance and financial control of the team.

Designed shallow water table study to assess impact of past waste disposal practices of confidential client.

Designed and supervised installation of numerous groundwater monitoring programs at hazardous waste sites.

Publications

Hagger, C.L.D., and G.R. Smart, "Drilling and Installation of Groundwater Monitoring Wells on Hazardous Waste Sites: Construction Specifications and Preparations for Non-ideal Field Conditions." Paper presented to Northeast Conference on the Impact of Waste Storage and Disposal on Groundwater Resources, Ithaca, New York, July, 1982.

Smart, G.R., "A Cost-Effective Approach to Monitoring Well Installation." Paper presented to Triangle Conference on Environmental Technology, University of North Carolina at Chapel Hill, North Carolina, April, 1983.

Smart, G.R., "Installation of Monitoring Wells at Hazardous Waste Sites." Paper presented to 1983 Spill Control and Hazardous Materials Conference, New Haven, Connecticut, 1983.

Smart, G.R., "Design of Monitoring Well Systems to Meet RCRA Requirements." Presented at the HMCRI Waste Site Conference, Houston, Texas, March, 1984.

Professional Profile

Michael G. Stapleton

Fields of Competence

Industrial waste treatability studies; chemical treatment of hazardous and industrial wastes; groundwater monitoring; soil sampling; and wet chemical environmental sample analyses.

Experience Summary

Bench-scale modeling of industrial waste treatment methods; RCRA testing for EP toxicity, groundwater quality monitoring; and wet chemical analyses of environmental samples.

Instrumentation experience: atomic absorption, infrared, UV-VIS spectrophotometers.

Credentials

B.S., Earth and Environmental Sciences—Wilkes College (1981)

Employment History

1984-Present	WESTON
1981-1984	Chem-Clear, Inc.

Key Projects

Assistant Project Scientist for execution of static bioassays for a pharmaceutical firm as part of NPDES compliance testing.

Participant in large-scale water quality and biological sampling project along 40 miles of a North Carolina river for a major paper company.

Industrial source emission testing projects involving glass manufacturing, asphalt production, steel manufacturing, and chlorinated organic producing facilities.

Attendance at a training session for initial site investigation of hazardous waste dump sites.

Participation in two on-site information gathering sessions, looking into past and present chemical use and disposal at present air force facilities.

Investigation and development of testing methods of anaerobic digestion inhibition for a major chemical firm.

Participant in bathymetric study for PSE&G.

Professional Profile

Jennifer L. Kauffman

Fields of Competence

Environmental impact assessment; analysis of environmental policies and regulations; technical writing and editing; solid waste management and resource recovery planning; small scale hydroelectric project evaluation and development; energy workshop development and promotion; water resource management; coastal zone management and land use planning.

Experience Summary

Five years experience in consulting planning and engineering fields as project planner, project coordinator and technical writer and editor. Project planner for preparation of two comprehensive solid waste management plans. Over four years experience in small scale hydroelectric project evaluation and development, including preparation of feasibility studies, environmental reports and FERC permit, exemption and license applications. Prepared impact assessments for wastewater projects and "201" facilities plans. Edited workbooks, and developed and implemented promotional programs for energy conservation workshops. Assisted in preparation of coastal zone management and community recreation and master plans.

Credentials

B.S., Land Use and Regional Planning—Bowling Green State University (1977)

Master's of Regional Planning—University of Michigan (1979)

American Planning Association

American Planning Association, Energy Planning Division.

National Association of Environmental Professionals

Employment History

1983-Present	WESTON
1979-1983	Ayres, Lewis, Norris and May, Inc.
1978-1979	University of Michigan Coastal Zone Laboratory

Key Projects

Project Planner for preparation of comprehensive solid waste management plans for Bay and Midland Counties in Michigan. Analyzed quantity and composition of waste stream. Evaluated feasibility and assessed impacts of management alternatives, including landfilling, energy recovery, recycling and composting. Developed landfill capability maps and management/implementation strategies.

Organized, administered and promoted a series of workshops on energy conservation in municipal water and wastewater systems in Pennsylvania.

Co-author and technical editor of more than a dozen small-scale hydroelectric feasibility studies. Prepared environmental impact assessments, analyzed hydraulic and hydrologic data and researched legal and institutional constraints to development. Prepared FERC preliminary permit, exemption and license applications.

Inventoried data sources and conducted preliminary assessment of State hydroelectric development potential for Ohio Dept. of Energy.

Prepared environmental assessment for proposed modifications and expansion of the wastewater treatment facility at K.I. Sawyer Air Force Base, Michigan.

Edited workbooks and prepared promotional materials for one day seminars on energy conservation in municipal water and wastewater systems, and energy conservation in commercial lodging facilities.

Assistant planner for preparation of a coastal zone management plan for the St. Clair Flats, a sensitive freshwater delta in Lake St. Clair near Detroit. Collected, analyzed and mapped natural resource and cultural data. Assisted in development and analysis of alternate management scenarios and preparation of land management and acquisition priorities plans.

Evaluated State policies and procedures governing the issuance of dredge, fill and construction permits in inland lakes and streams and Great Lakes bottomlands in Michigan.

Professional Profile

Researched and participated in preparation of a number of coastal zone management, recreation and commuity master plans. Conducted facility inventories, natural resource capability analyses and impact assessments. Collected and analyzed data, developed and implemented surveys, researched regulatory, financial and technical programs, and prepared reports.

Publications

"Multiple Use Issues and the Reactivation of Former Hydro Plants." Presented at WATERPOWER '83, September 1983, Knoxville, Tennessee.

'Integrating Solid Waste Management and Energy Planning," January 1983. Forthcoming publication in an American Planning Association compendium entitled, *The Role of Planning in Our Nation's Energy Future.*

"Multipurpose Planning of Hydroelectric Projects," *Energy Planning Network*, APA Energy Planning Division, December 1981.

"Multipurpose Planning of Small Hydro Projects: An Opportunity Assessment Approach." Presented at WATERPOWER '81, June 1981, Washington, D.C.

"The Water Power Revival in Michigan," *The Michigan Riparian*, February 1981.

APPENDIX B

LIST OF INTERVIEWEES

Table B-1

List of Interviewees
Youngstown ARF

Position	Area of Knowledge	Years of Service
Civilian	Nursing	7
Military	Base Operations	5
Military	Field Maintenance	25
Civilian	Field Maintenance	27
Civilian	Pavements and Grounds	10
Civilian	Wastewater Treatment	27
Civilian	Structural Engineering	25
Civilian	Base Supply	32
Civilian	Fire Department	17
Civilian	Motor Pool	1
Civilian	Transportation	29
Civilian	POL Area	14
Civilian	AGE Shop	26
Civilian	Prop Shop	4
Civilian	Water Supply	1
Civilian	Civil Engineering	8
Civilian	Repair and Reclamation	4
Civilian	AGE Shop	20
Civilian	Hydraulic/Environmental Shop	14
Civilian	Vehicle Maintenance	10

APPENDIX C

LIST OF OUTSIDE AGENCIES

TABLE C-1

LIST OF OUTSIDE AGENCIES CONTACTED

Jim Beyers
National Archives and National Records Center
Research Assistance and Information
Washington, DC
202-523-3218

Steve Bern
Records Officer
Washington National Records Center
Suitland, Maryland
301-763-1710

Bill Lewis
Washington National Records Center
Suitland, Maryland
301-763-1710

Mr. Eldridge
Army Records Office
703-325-6179

Ed Reese
Records Office
Military Archives Division
Modern Military Headquarters Branch
Washington, DC
202-523-3340

Grace Rowe
Air Force Records Management
Air Force Records
Washington, DC
202-692-3527

Dan Ross
Trumbull Soil and Water Conservation District
188 North Mecca Street
Cortland, Ohio
216-637-2056

Ohio Department of Natural Resources
Division of Water
Fountain Square
Columbus, Ohio
614-265-6717

APPENDIX D

HAZARD ASSESSMENT RATING METHODOLOGY

USAF INSTALLATION RESTORATION PROGRAM

HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

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

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

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

The first site rating model was developed in June 1981 at a meeting with representatives from USAF Occupational Environmental Health Laboratory (OEHL), Air Force Engineering Services Center (AFESC), Engineering-Science (ES) and CH_2M 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 CH_2M 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.

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, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

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. Sites at which there is no containment are not reduced in score. 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 managment practices category factor to the sum of the scores for the other three categories.

FIGURE 1

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

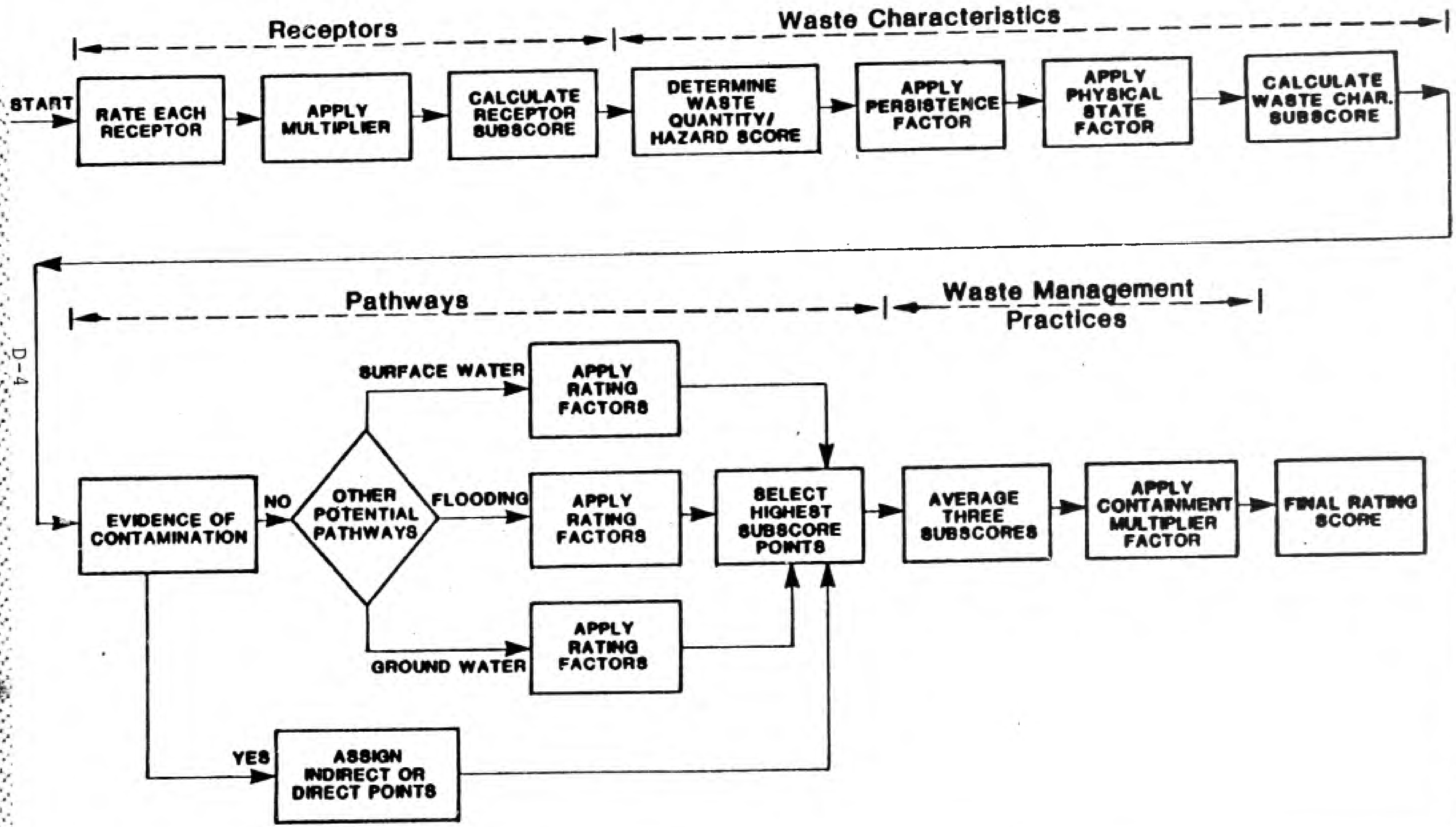


FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY 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 ______ = ______

FIGURE 2 (Continued)

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

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels: 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination.	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propagation and management of fish and wildlife.	Shellfish propagation and harvesting.	Potable water supplies	6
G. 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

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

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.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

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

Hazard Category	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)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

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)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

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 Factor	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 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	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-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8
B-2 POTENTIAL FOR FLOODING					
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1
B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION					
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site 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

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

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 Proection 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-B-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX E

HARM SCORE SHEETS

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE Site No. 1 - Par Course Drum Storage Area

LOCATION Off Herrman Road, North of Bldg. 515

DATE OF OPERATION OR OCCURRENCE Since 1968

OWNER/OPERATOR U.S. Air Force

COMMENTS/DESCRIPTION

SITE RATED BY Glenn Smart

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			71	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 39

II. WASTE CHARACTERISTICS

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

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

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 .8 = 48

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

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

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

Subscore 80

B. Rate the migration potential for 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	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	2	6	12	18
Rainfall intensity	1	8	8	24
Subtotals			72	108

Subscore (100 X factor score subtotal/maximum score subtotal) 66

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	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	1	8	8	24
Subtotals			60	114

Subscore (100 x factor score subtotal/maximum score subtotal) 52

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	39
Waste Characteristics	48
Pathways	80
Total 167 divided by 3 =	56 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

56 x 1.0 = 56

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE Site No. 2 - Waste Oil/Solvent Corral

LOCATION Adjacent to Building 301

DATE OF OPERATION OR OCCURRENCE 1980 Present

OWNER/OPERATOR U.S. Air Force

COMMENTS/DESCRIPTION

SITE RATED BY Glenn Smart

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
		Subtotals	71	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 39

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 .8 = 48

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

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

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

Subscore 80

B. Rate the migration potential for 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	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	2	6	12	18
Rainfall intensity	1	8	8	24
Subtotals			64	114

Subscore (100 X factor score subtotal/maximum score subtotal) 56

2. Flooding

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

Subscore (100 x factor score/3) 0

3. 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	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	1	8	8	24
Subtotals			60	114

Subscore (100 x factor score subtotal/maximum score subtotal) 52

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	39
Waste Characteristics	48
Pathways	80
Total 167 divided by 3 =	56 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

56 x 1.0 = 56

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE Site No. 3 - POL Lead Sludge Disposal Area

LOCATION Adjacent to POL Tank Farm

DATE OF OPERATION OR OCCURRENCE 1952 - 1972

OWNER/OPERATOR

COMMENTS/DESCRIPTION

SITE RATED BY Glenn Smart

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			71	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 39

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 0.75 = 45

III. PATHWAYS

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

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

Subscore 80

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and 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	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
Subtotals			42	105

Subscore (100 X factor score subtotal/maximum score subtotal) 40

2. Flooding

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

Subscore (100 x factor score/3) 0

3. 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	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	1	8	8	24
Subtotals			52	114

Subscore (100 x factor score subtotal/maximum score subtotal) 46

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	39
Waste Characteristics	45
Pathways	80

Total 164 divided by 3 = 55 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

55 x .95 = 52

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE Site No. 4 - PCB Transformer Storage Area

LOCATION Adjacent to Building #505

DATE OF OPERATION OR OCCURRENCE Current

OWNER/OPERATOR 22 Transformers Stored on a Concrete Pad

COMMENTS/DESCRIPTION

SITE RATED BY Glenn Smart

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	2	10	20	30
C. Land use/zoning within 1 mile radius	1	3	3	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	0	9	0	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			71	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 39

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 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	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	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 (0-3)	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 (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	1	8	8	24
Subtotals			52	114

Subscore (100 x factor score subtotal/maximum score subtotal) 46

C. Highest pathway subscore.

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

Pathways Subscore 46

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	39
Waste Characteristics	60
Pathways	46

Total 145 divided by 3 = 43 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

48 x .95 = 46

WESTON

APPENDIX F

MASTER SHOP LIST

WESTON

APPENDIX F

MASTER SHOP LIST

Shop Name	Building	Handles Hazardous Materials	Generates Hazardous Materials	Disposal of Hazardous Materials
Aircraft Maintenance				
Prop Shop	301	Yes	Yes	Contract Disposal
Repair and Reclamation	301	Yes	Yes	Contract Disposal
AGE Maintenance	301	Yes	Yes	Contract Disposal
Engine Shop	301	Yes	Yes	Contract Disposal
NDI	413	Yes	Yes	Contract Disposal
Fuel Sys-tems Shop	302	Yes	Yes	Contract Disposal
Machine/ Welding	305	Yes	Yes	Contract Disposal
Flight Line	305	Yes	Yes	Contract Disposal
Hydraulic/ Pneuhydraulic	305	Yes	Yes	Contract Disposal
Battery/ Electrical Shop	305	Yes	Yes	Dilution to Storm Sewer
Instrument Shop	305	No	No	None
Sheet Metal Shop	305	Yes	Yes	Storm Sewer/ Recycle through AGE

WESTON

APPENDIX F

MASTER SHOP LIST

Shop Name	Building	Handles Hazardous Materials	Generates Hazardous Materials	Disposal of Hazardous Materials
<u>Aircraft Maintenance</u> (continued)				
Corrosion Control	302	Yes	Yes	O/W Separator to Sewer
Organizational Maintenance	305	Yes	Yes	Contract Disposal
<u>Motor Pool</u>				
Vehicle Fueling	514	Yes	No	Contract Disposal/O/W Separator to Storm System/ Neutralization to Sewer
Auto Maintenance	515	Yes	Yes	Contract Disposal/O/W Separator to Storm System/ Neutralization to Sewer
Refueling Shop	515	Yes	Yes	Contract Disposal/O/W Separator to Storm Sewer
<u>Base Engineer Maintenance Shops</u>				
Transformer Storage Area	505	Yes	Yes	Contract Disposal through DPDO
Maintenance Shop	511	No	No	None

WESTON

APPENDIX F

MASTER SHOP LIST

Shop Name	Building	Handles Hazardous Materials	Generates Hazardous Materials	Disposal of Hazardous Materials
Base Engineer Maintenance Shop (continued)				
Base Engr. Paint Shop	512	Yes	Yes	Contract Disposal
Entomology	501	Yes	No	Contract Disposal
POL Area	403, 404	Yes	No	Contract Disposal/O/W Separator to Storm Sewer
Wastewater Treament Plant	313	Yes	No	None

WESTON

APPENDIX G

GLOSSARY OF TERMS AND ABBREVIATIONS

APPENDIX G

GLOSSARY OF TERMS AND ABBREVIATIONS

ACCUMULATION POINT	A designated location for the accumulation of wastes prior to removal from the installation.
ACFT MAINT	Aircraft Maintenance
AF	Air Force
AFB	Air Force Base
AFESC	Air Force Engineering and Services Center
AFFF	Aqueous Film Forming Foam (a fire extinquishing agent).
AFR	Air Force Regulation
AFRES	Air Force Reserve
Ag	Chemical symbol for silver.
AGE	Aerospace Ground Equipment
Al	Chemical symbol for aluminum.
ALLUVIUM	Materials eroded, transported, and deposited by surface water.
ARTESIAN	Groundwater contained under hydrostatic pressure.
AQUIFER	A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring.

AROMATIC	Organic chemial compounds in which the carbon atoms are arranged into a ring with special electron stability associated. Aromatic compounds are often more reactive than nonaromatics.
AVGAS	Aviation Gasoline (contains lead).
Ba	Chemical symbol for barium.
BIOACCUMULATE	Tendency of elements or compounds to accummulate or buildup in the tissues of living organisms when they are exposed to elements in their environments, e.g., heavy metals.
BIODEGRADABLE	The characteristic of a substance to be broken down from complex to simple compounds by microorganisms.
BOWSER	A mobile tank, usually 1,000 gallons or less in capacity.
BX	Base Exchange
$CaCO_3$	Chemical symbol for calcium carbonate.
Cd	Chemical symbol for cadmium.
CE	Civil Engineering
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIRCA	About, used to indicate an approximate date.
Cn	Chemical symbol for cyanide.
COD	Chemical Oxygen Demand, a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water.
COE	Corps of Engineers

CONFINED AQUIFER	An aquifer bounded above and below by geologic units of distinctly lower permeability than that of the aquifer itself.
CONFINING UNIT	A geologic unit with low permeability which restricts the vertical movement of groundwater.
Cr	Chemical symbol for chromium.
Cu	Chemical symbol for copper.
2,4-D	Abbreviation for 2,4-dichlorophenoxy-acetic acid, a common weed killer and defoliant.
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DIP	The angle at which a geologic structural surface is inclined from the horizontal.
DoD	Department of Defense
DOT	Department of Transportation
DOWNGRADIENT	In the direction of decreasing hydraulic static head; the direction in which groundwater flows.
DPDO	Defense Property Disposal Office. The agency responsible for disposal of hazardous materials within the DoD.
DUMP	An uncontrolled land disposal site where solid and/or liquid wastes are deposited.
EFFLUENT	A liquid waste, untreated or treated, that discharges into the environment.
EP	Extraction Procedure - the EPA standard laboratory procedure for simulation of leachate generation.
EPA	U.S. Environmental Protection Agency

EROSION	The wearing away of land surface by wind, water, or chemical processes.
FAA	Federal Aviation Administration
FAULT	A fracture in rock along the adjacent rock surfaces which are differentially displaced.
Fe	Chemical symbol for iron.
FLOOD PLAIN	The low land and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to 1 percent or greater chance of flooding in any given year.
FLOW PATH	The direction of movement of groundwater as governed principally by the hydraulic gradient.
FMS	Field Maintenance Squadron
FPTA	Fire Protection Training Area
FY	Fiscal Year
GC/MS	Gas chromatograph/mass spectrophotometer, an analytical instrument for qualitative and quantitative measurement of organic compounds having a maximum molecular weight of 800.
GROUNDWATER	Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure.
GROUNDWATER RESERVOIR	The earth materials and the intervening open spaces that contain groundwater.
HALON	A fluorocarbon fire extinguishing compound.
HALOGEN	The class of chemical elements including fluorine, chlorine, bromine, and iodine.

HARM — Hazard Assessment Rating Methodology

HAZARDOUS SUBSTANCE — Under CERCLA, the definition of hazardous substance includes:

- All substances regulated under Paragraphs 311 and 307 of the Clean Water Act (except oil).
- All substances regulated under Paragraph 3001 of the Solid Waste Disposal Act.
- All substances regulated under Paragraph 112 of the Clean Air Act.
- All substances which the Administrator of EPA has acted against under Paragraph 7 of the Toxic Substance Control Act.
- Additional substances designated under Paragraph 102 of the Superfund Bill.

HAZARDOUS WASTE — As defined in RCRA, a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical/chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

HAZARDOUS WASTE GENERATION — The act or process of producing a hazardous waste.

HEAVY METALS — Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but which become toxic at higher concentrations.

Hg	Chemical symbol for mercury
HQ	Headquarters
HYDROCARBONS	Organic chemical compounds composed of hydrogen and carbon atoms chemically bonded. Hydrocarbons may be straight chain, cylic, branched chain, aromatic, or polycyclic, depending upon arrangement of carbon atoms. Halogenated hydrocarbons are hydrocarbons in which one or more hydrogen atoms has been replaced by a halogen atom.
INFILTRATION	The movement of water across the atmosphere-soil interface.
IRP	Installation Restoration Program
ISOPACH	Graphic presentation of geologic data, including lines of equal unit thickness that may be based on confirmed (drill hole) data or indirect geophysical measurement.
JP-4	Jet Propulsion Fuel (unleaded) No. 4, military jet fuel.
LEACHATE	A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water.
LITHOLOGY	The description of the physical character of a rock.
LOESS	An essentially unconsolidated unstratified calcareous silt; commonly homogeneous, permeable, and buff to gray in color.
LYSIMETER	A vacuum operated sampling device used for extracting pore waters at various depths within the unsaturated zone.

WESTON

MEK	Methyl Ethyl Ketone
METALS	See "Heavy Metals".
MGD	Million gallons per day.
MOA	Military Operating Area
MIK	Methyl Isobutyl Ketone
MOGAS	Motor Gasoline
Mn	Chemical symbol for manganese.
MONITORING WELL	A well used to obtain groundwater samples and to measure groundwater elevation
MSL	Mean Sea Level
NDI	Nondestructive inspection.
NET PRECIPITATION	The amount of annual precipitation minus annual evaporation.
Ni	Chemical symbol for nickel.
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
ODNR	Ohio Department of Natural Resources
OEHL	Occupational and Environmental Health Laboratory
OIC	Officer-In-Charge
ORGANIC	Being, containing, or relating to carbon compounds, especially in which hydrocarbon is attached to carbon.
OSI	Office of Special Investigations

WESTON

O&G	Symbols for oil and grease.
Pb	Chemical symbol for lead.
PCB	Polychlorinated Biphenyl - liquids used as a dielectrics in electrical equipment.
PERCOLATION	Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.
PERMEABILITY	The capacity of a porous rock, soil, or sediment for transmitting a fluid.
PERSISTENCE	As applied to chemicals, those which are very stable and remain in the environment in their original form for an extended period of time.
PD-680	Kerosene-based cleaning solvent
pH	Negative logarithm of hydrogen ion concentration.
PL	Public Law
POL	Petroleum, Oils, and Lubricants
POLLUTANT	Any introduced gas, liquid, or solid that makes a resource unit for a specific purpose.
POLYCYCLIC COMPOUND	All compounds in which carbon atoms are arranged into two or more rings, usually in nature.
POTENTIOMETRIC SURFACE	The surface to which water in an aquifer would rise in tightly cased wells open to the aquifer.
PPB	Parts per billion by weight.
PPM	Parts per million by weight.

PRECIPITATION	Rainfall.
QUATERNARY MATERIALS	The second period of the Cenozoic geologic era, following the Tertiary, and including the last 2 to 3 million years.
RCRA	Resource Conservation and Recovery Act of 1976
RECEPTORS	The potential impact group or resource for a waste contamination source.
RECHARGE AREA	A surface area in which surface water or precipitation percolates through the unsaturated zone and eventually reaches the zone of saturation.
RECHARGE	The addition of water to the groundwater system by natural or artificial processes.
RIPARIAN	Living or located on a riverbank.
SANITARY LANDFILL	A site using an engineered method of disposing solid wastes on land.
SATURATED ZONE	Soil or geologic materials in which all voids are filled with water.
SAX's TOXICITY	A rating method for evaluating the toxicity of chemical materials.
SCS	U.S. Department of Agriculture Soil Conservation Service
SOLID WASTE	Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment, or air pollution control facility, and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic

sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

SPILL	Any unplanned release or discharge of a material onto or into the air, land, or water.
STORAGE OF HAZARDOUS WASTE	Containment, either on a temporary basis or for a longer period, in such manner as not to constitute permanent disposal of such hazardous waste.
STP	Sewage Treatment Plant
2,4,5-T	Abbreviation for 2,4,5-trichlorophenoxyacetic acid, a common herbicide.
TAG	Tactical Airlift Wing
TCE	Trichloroethylene
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TOXICITY	The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism.
TRANSMISSIVITY	The rate at which water is transmitted through a unit width of aquifer under a hydraulic gradient.

TREATMENT OF HAZARDOUS WASTE	Any method, technique, or process including neutralization designed to change the phsyical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste non-hazardous.
TSD	Treatment, storage, or disposal.
TSDF	Treatment, storage, or disposal facility.
UPGRADIENT	In the direction of increasing hydraulic static head; the direction from which groundwater flows.
USAF	United States Air Force
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WANG	Wisconsin Air National Guard
WATER TABLE	Surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere.
WWTP	Wastewater Treatment Plant
Zn	Chemical symbol for zinc

APPENDIX H

REFERENCES

APPENDIX H

REFERENCES

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