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Installation Restoration Program

PHASE I - RECORDS SEARCH

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

WESTON
DESIGNERS CONSULTANTS

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WESTON

INSTALLATION RESTORATION PROGRAM

PHASE I: RECORDS SEARCH

U. S. AIR FORCE RESERVE AND
PENNSYLVANIA AIR NATIONAL GUARD
FACILITIES AT
GREATER PITTSBURGH AIRPORT

PREPARED FOR:
UNITED STATES AIR FORCE RESERVE
ROBINS AFB, GEORGIA 31098

DECEMBER 1984

By:

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EXECUTIVE SUMMARY

The Department of Defense (DoD) has developed a program to identify and evaluated 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 Action 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 Reserve Facility and Pennsylvania Air National Guard Facility at Greater Pittsburgh International Airport, under Contract No. F08637-83-G0009.

INSTALLATION DESCRIPTION

The U.S. Air Force Reserve and Pennsylvania Air National Guard occupy separate facilities at Greater Pittsburgh International Airport, sixteen miles WNW of the City of Pittsburgh, Pennsylvania.

The airport occupies roughly 10,200 acres. Of this acreage, 190 acres are occupied by the Air Force Reserve and Pennsylvania Air National Guard. The Reserve holds an overhead easement on an additional 65 acres. The Air Force Reserve occupies an area in the northeastern corner of the airport, while the PA ANG occupies a site in the southeastern corner.

The area immediately surrounding the airport is a mixture of residential, commercial and industrial uses and open areas. The area was formerly used for lumber and farming, but has developed into suburbs surrounding the City of Pittsburgh. Land development originally tended to follow stream and river valleys, but more recently has occurred on hilltops and ridges. Portions of Allegheny County are developing but future development will be inhibited by a lack of road access, utilities, or suitable tracts of land (USAF, 1978).

ENVIRONMENTAL SETTING

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

1. The mean annual precipitation is 36 inches, the net precipitation is +10 inches, and the one-year 24-hour rainfall event is estimated to be 2.3 inches. These data indicate that there is moderate potential for infiltration into the surface soils on the Base, and that there is moderate potential for runoff and erosion.

2. Soil permeability ranges from 0.6 to 6.0 inches per hour, which corresponds to moderate permeability. Shallow depth to bedrock and a seasonal high water table pose limitations to development on the base soils.

3. Surface water on the base is controlled by the storm sewer system, which empties into a small stream known as McClaren's Run. Approximately one to two acres of Air Force property, underlain by Atkins soil, can be considered to be floodplain.

4. Bedrock beneath the Greater Pittsburgh International Airport consists predominantly of the Conemaugh Formation, which is comprised of cyclical sequences of sandstone, shale, red beds and thin layers of limestone and coal. Bedrock is generally 15 to 20 feet below the surface.

5. Groundwater is not an important resource in Allegheny County as a whole. However, unconsolidated alluvial deposits in the flood plain of the Ohio River are the source of water for Moon Township Municipal Authority, which provides the airport water supply. Bedrock aquifers consist primarily of limestone and sandstone beds, and generally provide adequate supplies for only domestic and farm uses.

6. Although there are no records of mining under either facility, it is possible that there are unrecorded mine workings. These could have the potential to act as conduits for contaminant transfer and could also have the potential to cause subsidence of the subsurface.

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 and helicopter reconnaissance inspections were conducted at past waste activity sites. Four sites at the U.S. Air Force Reserve Facility and two sites at the Pennsylvania Air National Guard Facility were identified as potentially containing hazardous contaminants resulting from past activities. These sites have been assessed using a Hazard Assessment Rating Methodology (HARM) which 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 Program. Sites which do not receive high HARM scores are not necessarily precluded from follow-on action. The purpose of follow-on investigation is to determine if the site does present a threat to human health or the environment.

FINDINGS AND CONCLUSIONS

All six sites identified were determined to have potential for contamination of soil or ground water. The locations of the sites are shown on Figures ES-1 and ES-2. Table ES-1 presents the results of the HARM rating analysis, and indicates the contaminant of concern at each site.

RECOMMENDATIONS

The recommendations shown in Tables ES-2 and ES-3 are made for work to be performed in Phase II (Confirmation and Quantification). The recommended actions are generally one-time sampling and analytical 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 from contamination should it be present at a site.

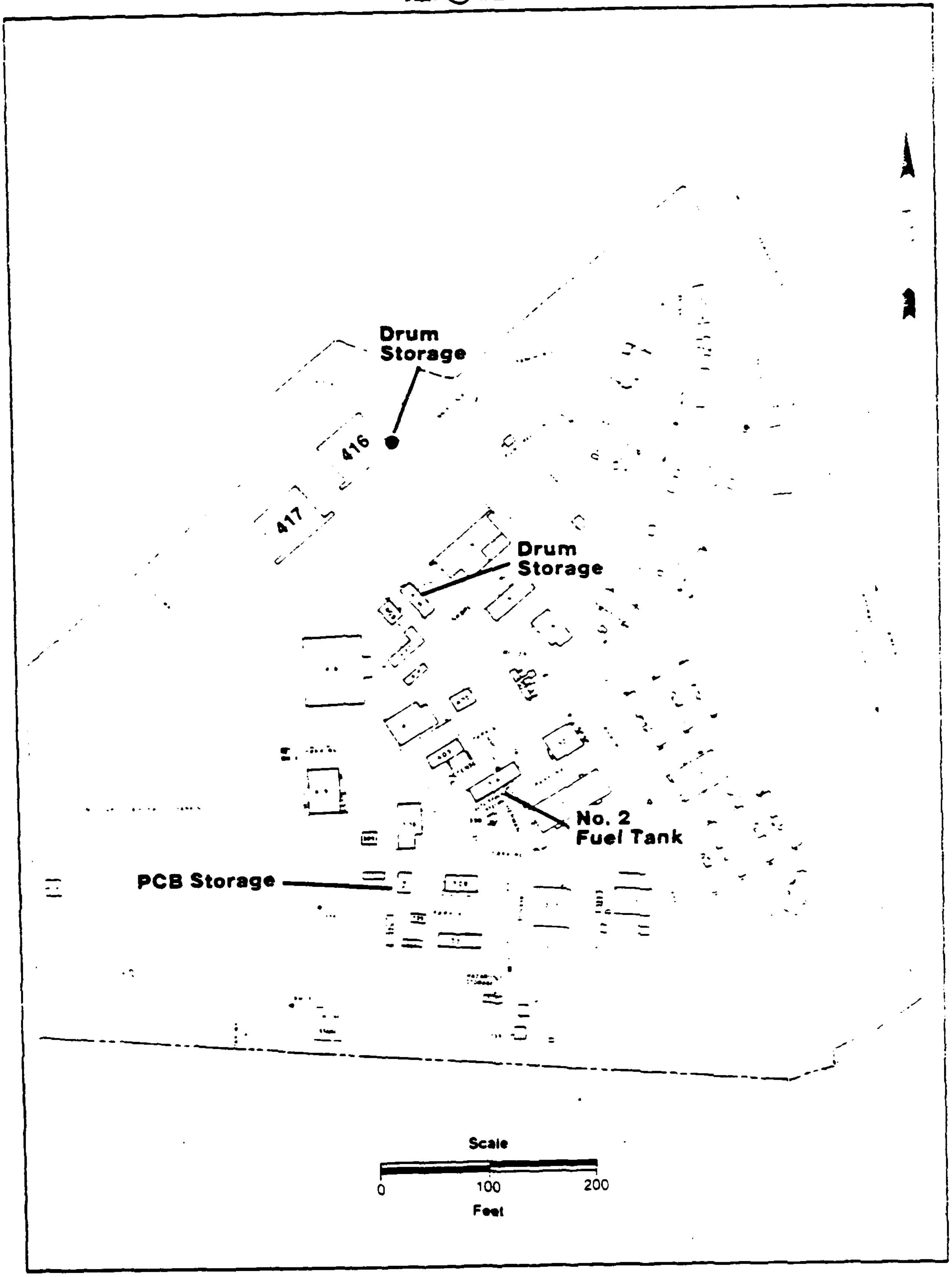

FIGURE ES-1: SITES RATED BY HARM - U.S. Air Force Reserve

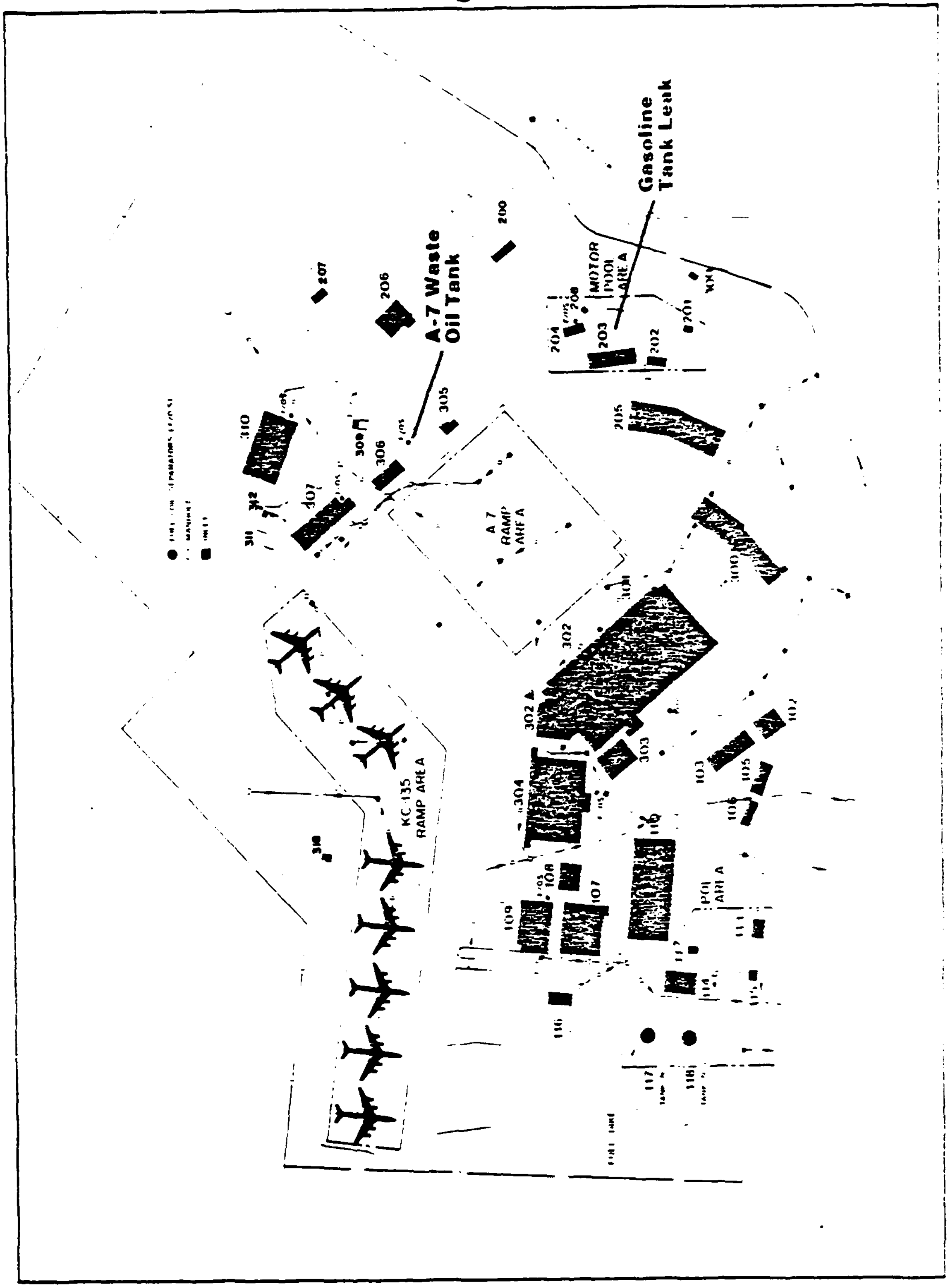

Figure ES-2: SITES RATED BY HARM, PA ANG

TABLES ES-1

SUMMARY OF HARM SCORES AND WASTE TYPES

Rank	Site	Waste Type	Score
Reserve Sites			
1	Fuel Line Break Building 316	Heating Oil	53
2	Drum Storage - Building 416	Solvents	46
3	Drum Storage - Building 408	Solvents	44
4	PCB Storage - Building 342	PCB	43
PA ANG Sites			
1	A-7 Waste Oil Tanks	Fuel Oil	56
2	Gasoline Tank Location	Gasoline	56

TABLE ES-1

SUMMARY OF RECOMMENDATIONS

AIR FORCE RESERVE

Rank	Site Name	Recommended Monitoring	Comments
1	Fuel Line Break Building 316	Soil sampling between fuel tank and storm sewer; installation of two downgradient wells	Expand monitoring if analyses indicates contamination
2	Drum Storage Building 416	Installation of two downgradient monitoring wells and one upgradient monitoring well	Soil sampling not included at this time because site is under a building and concrete pad
3	Drum Storage Building 408	Installation of two downgradient monitoring wells and one upgradient well	Soil sampling not included at this time because site is under a building and concrete pad
4	PCB-Storage Building 342	Installation of two downgradient wells and one upgradient well; well collection of soil samples on a grid basis	Soil sampling not included at this time because site is under a building and concrete pad

ES-3

SUMMARY OF RECOMMENDATIONS

PENNSYLVANIA AIR NATIONAL GUARD

Rank	Site Name	Recommended Monitoring
1	A7 Waste Oil Tank	Sample three soil borings and install one upgradient and two downgradient monitoring wells
2	Gasoline Tank Location	Sample three soil borings and install one upgradient and two downgradient monitoring wells

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 Recovery Act (RCRA), as amended. Under Section 6003 of the Act, Federal agencies are directed to assist U.S. 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 issued Defense Environmental Quality Program Policy Memoranda (DEQPPM), which mandated a comprehensive Installation Restoration Program (IRP).

The current DoD IRP policy is contained in DEQPPM No. 81-5, dated 11 December 1981, and implemented by the Air Force message, dated 21 January 1982. DEQPPM No. 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 material disposal sites, to control migration of 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, and directed by Executive Order No. 12316 and 40 CFR 300, Subpart F, National Contingency Plan (NCP). CERCLA is the primary legislation governing remedial action of past hazardous waste disposal sites.

1.2 PURPOSE AND SCOPE OF THE ASSESSMENT

The Installation and 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
- Phase IV - Operations/Remedial Actions

WESTON was retained by the U.S. Air Force to conduct the Phase I, Records Search at Greater Pittsburgh International Airport under Contract No. F08637-83-G0009. Two facilities were included in this records search: the Air Force Reserve Facility (911th TAG) and the Pennsylvania Air National Guard Facility. The two facilities are entirely separate operations and are housed at separate locations. This report contains a summary and an evaluation of the information collected during Phase I of the IRP.

The objective of the first phase of the program is to identify the potential for environmental contamination from past waste disposal practices at Air Force Reserve and Air National Guard facilities at Greater Pittsburgh Airport, 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 for both facilities was held at 911th TAG at Greater Pittsburgh Airport on 22 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 9-13 July 1984. Activities performed during the on-site visit included a detailed search of installation records, tour 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 the representatives of the U.S. Air Force Reserve and the Air National Guard to discuss preliminary findings.

The following individuals comprise WESTON's Records Search Team:

- Katherine A. Sheedy, Project Manager, (M.S., Geology, 1975).

- Michael Stapleton, Environmental Engineer (B.S., Earth and Environmental Sciences, 1981).
- Michael F. Coia, Chemical Engineer, (M.S., Environmental Engineering, 1981).

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

1.3 METHODOLOGY

The records search at the Reserve and Guard facilities began with a review of past and present 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 and Guard interviewees by area of knowledge 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 are listed in Appendix C.

The next step in the activity review process was to identify all hazardous material/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 and helicopter overflight of the identified sites was also made by the WESTON Records 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 flow chart 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.

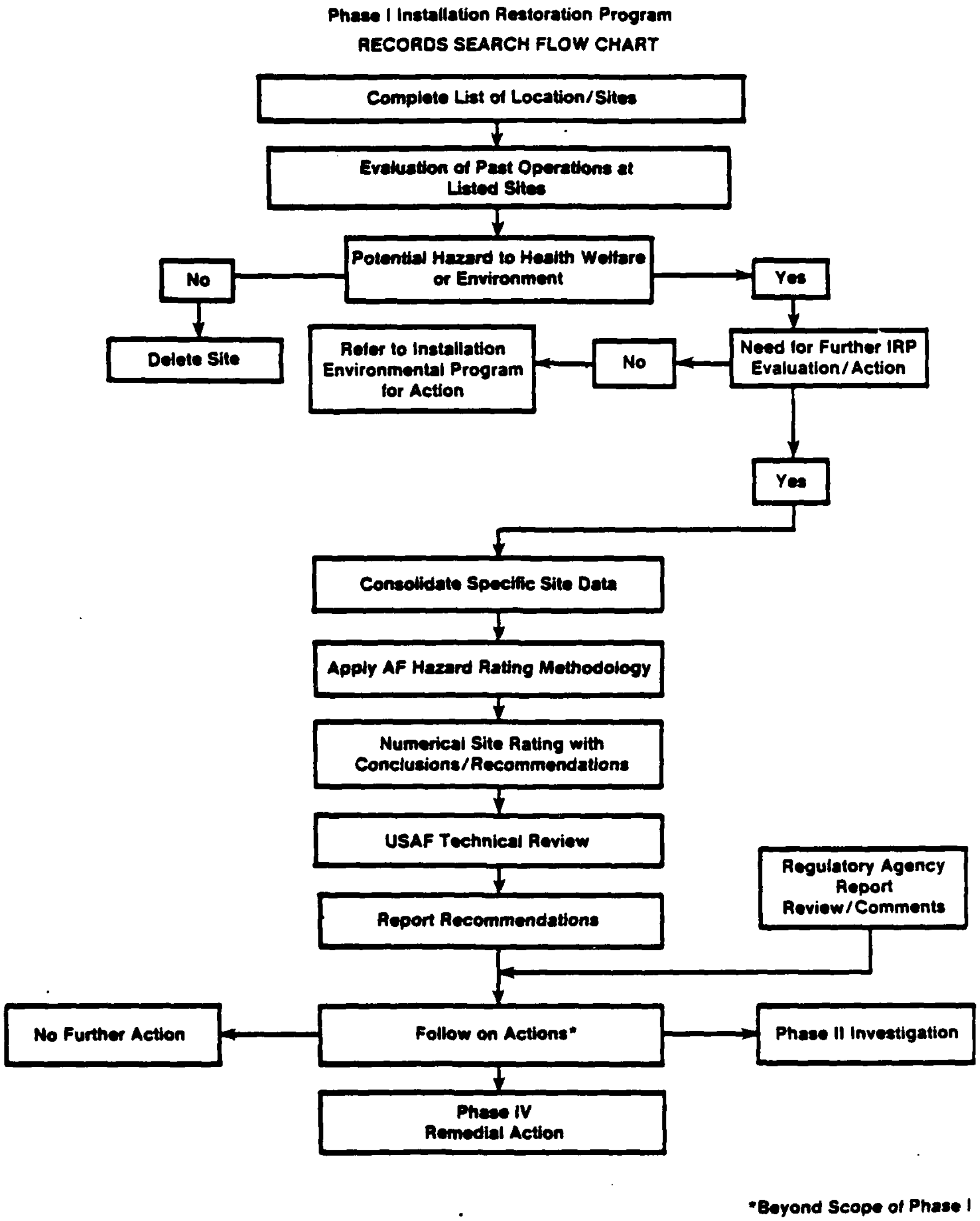

FIGURE 1-1 PHASE I INSTALLATION RESTORATION PROGRAM

SECTION 2

INSTALLATION DESCRIPTION

2.1 LOCATION, SIZE AND BOUNDARIES

The U.S. Air Force Reserve and Pennsylvania Air National Guard occupy separate facilities at Greater Pittsburgh International Airport, sixteen miles WNW of the City of Pittsburgh, Pennsylvania as shown on Figure 2-1.

The airport occupies roughly 10,200 acres. Of this acreage, 190 acres are occupied by the Air Force Reserve and Pennsylvania Air National Guard, as indicated in Table 2-1. The Reserve holds an overhead easement on an additional 65 acres. The Air Force Reserve occupies an area in the northeastern corner of the airport, while the PA ANG occupies a site in the southeastern corner. Facility locations are shown in Figure 2-1. Facility layouts are shown in Figures 2-2 and 2-3.

The area immediately surrounding the airport is a mixture of residential, commercial and industrial uses and open areas. The area was formerly used for lumber and farming but has developed in suburbs surrounding the City of Pittsburgh. Land development originally tended to follow stream and river valleys, but more recently has occurred on hilltops and ridges. Portions of Allegheny County are developing but future development will be inhibited by a lack of road access, utilities, or suitable tracts of land (USAF, 1978).

2.2 HISTORY

2.2.1 U.S. Air Force Reserves - 911 TAG

In 1942, Congress appropriated funding for a civil and national defense airport in Pittsburgh. Effective May 1944, a formal lease was negotiated between the Federal government and Allegheny County. The lease provided for an exclusive use parcel for the Air Transport Command facilities site, (now the Air Force Reserve site), and joint use of runways, taxiways, and all other sectors of the airport.

In June, 1944, two contracts were awarded for construction: Air Transport Command facilities, including temporary buildings, parking apron, access taxiways, hanger and associated utilities and appurtenances. By 1945, the Air Transport Command was using the facility as a refueling stop for ferrying of aircraft.

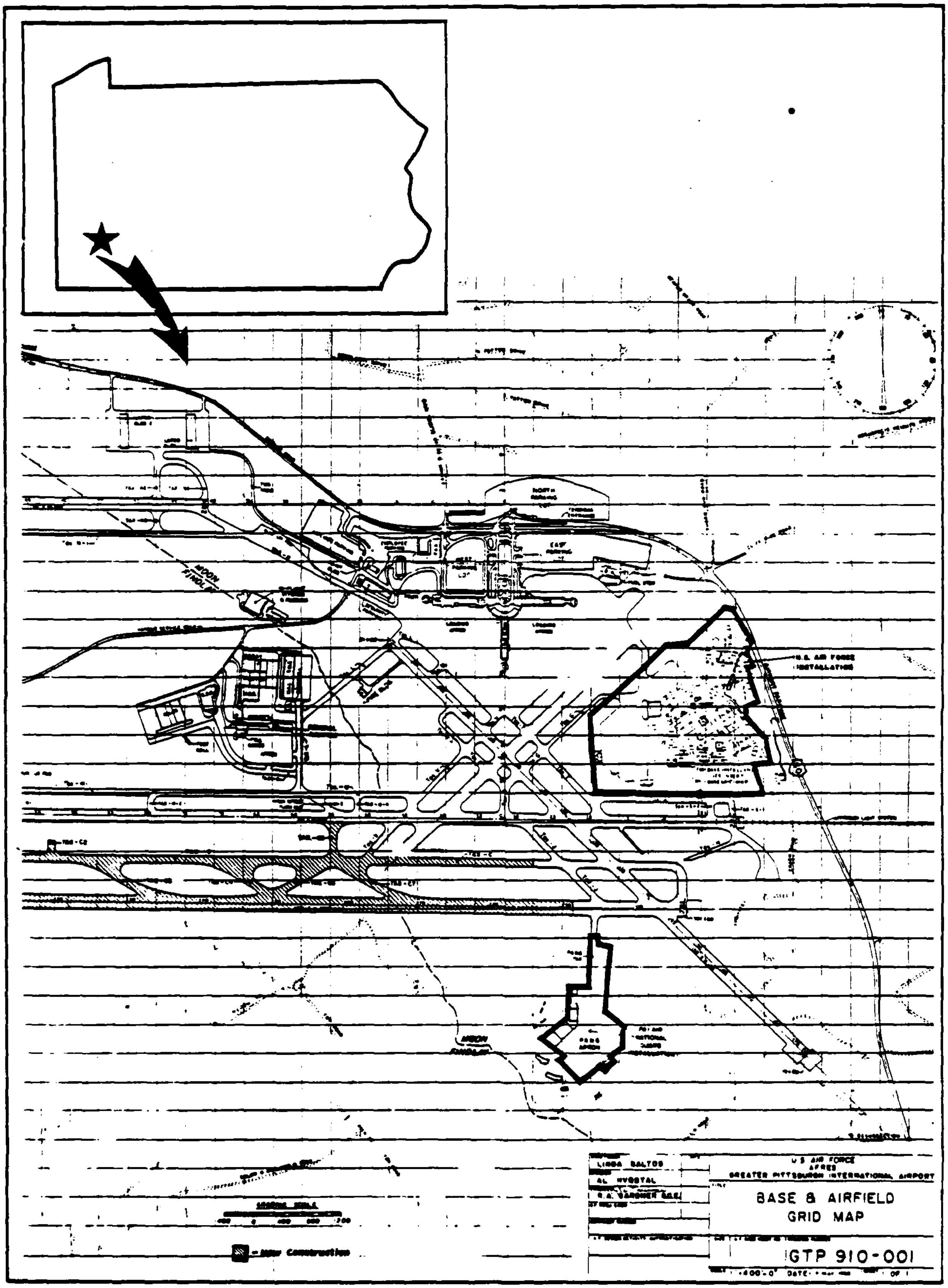

FIGURE 2-1 GREATER PITTSBURGH INTERNATIONAL AIRPORT

Table 2-1

Acreage of U.S. Air Force Reserve and Pennsylvania Air National Guard Facilities

	Acreage
Air Force Reserves	
Federally-owned, military controlled	11.67
In-Lease	87.97
Overhead Easement	64.89
Air Force Total	164.23
Pennsylvania Air National Guard	
Outgranted by U.S. Air Force	90.20
	254.43 acres

Source: U.S. Air Force, 1978.

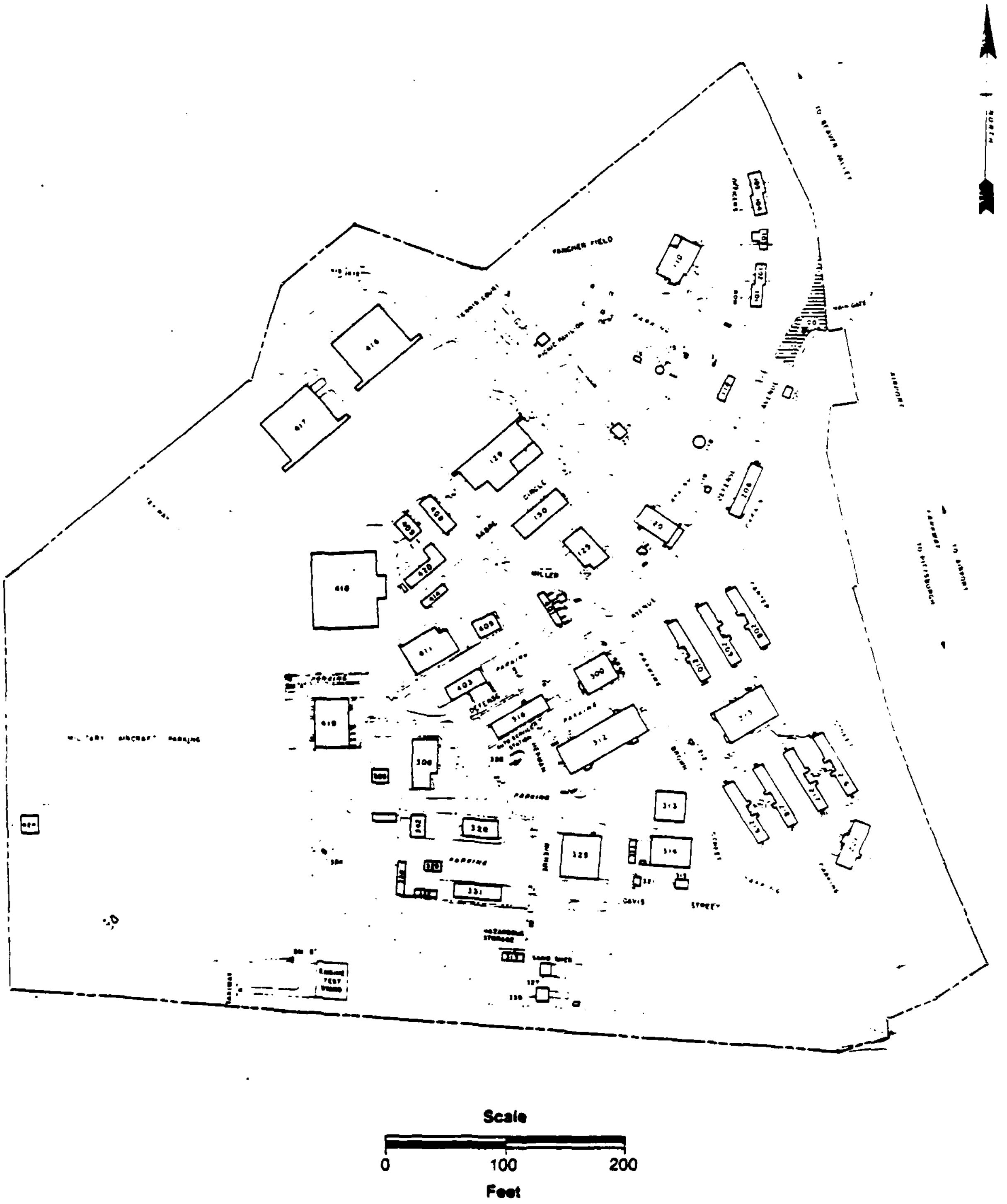

FIGURE 2-2 U.S. AIR FORCE RESERVES - 911TH TAG FACILITY LAYOUT

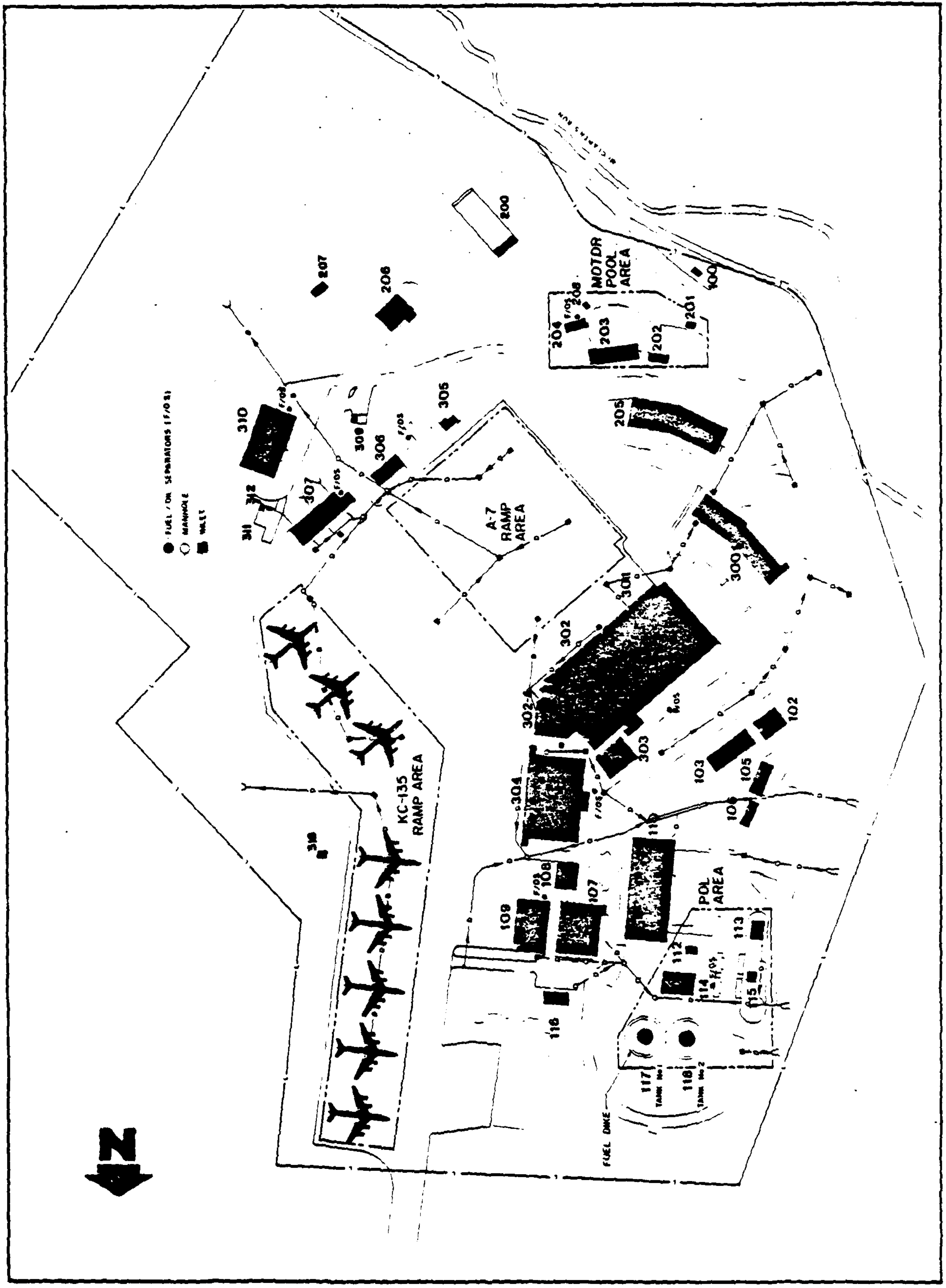

FIGURE 2-3 PENNSYLVANIA AIR NATION GUARD - FACILITY LAYOUT

In 1946, the installation was assigned to the Continental Air Command. In 1952, the installation was reassigned to the Aerospace Defense Command (ADC). From 1952 to 1958, the ADC conducted a major building program to support an active fighter interceptor mission.

The ADC mission was discontinued in 1958, and a reserve flying unit, the 758th Troop Carrier Squadron, was activated. In January 1963, the 758th was replaced by the 911th Troop Carrier Squadron.

In January 1967, the unit became a military airlift group. From March 1967 to April 1972, eight C-124's were flown by the group. In April 1972, the 911th Troop Carrier Squadron was redesignated as the 911th Tactical Airlift Group, and the C-124's were replaced by the sixteen C-123K aircraft.

2.2.2 Pennsylvania Air National Guard

The 171st Air Refueling Wing had its beginning in the Pennsylvania Air National Guard on 17 January 1947 at Harrisburg State Airport, New Cumberland, PA, when the 53rd Fighter Wing was organized at Greater Pittsburgh Airport, Coraopolis, PA, granted federal recognition on 22 April 1949, and subsequently assigned to the 53rd Fighter Wing. The 112th Fighter Group consisted of the 146th and 147th Fighter Squadrons.

The 53rd Fighter Wing was redesignated the 112th Fighter Wing on 1 November 1950 and further redesignated the 112th Fighter Bomber Wing on 30 November 1952. With a change in mission and aircraft, the wing was redesignated the 112th Fighter Interceptor Wing on 1 July 1955. Effective 1 October 1956, the Headquarters, 112th Fighter Interceptor Wing was transferred from Harrisburg State Airport to Greater Pittsburgh Airport.

Effective 1 May 1958, the Wing was once more redesignated the 112th Air Defense Wing. The 147th Fighter Interceptor Squadron was withdrawn from the organization structure of the Wing and was redesignated as the 147th Aeromedical Transport Squadron on 1 May 1961. The 171st Air Transport Group was organized and granted federal recognition on 16 February 1964, the Headquarters, 112th Air Defense Wing was inactivated after the 112th Air Defense Group was withdrawn. The officers and airmen were transferred to a newly constituted and federally recognized unit--the 171st Air Transport Wing. Concurrently, the 171st Air Transport Group was assigned to the Wing.

Redesignated the 171st Military Airlift Group on 1 January 1968, the Group was further redesignated the 171st Aeromedical Airlift Wing effective 1 July 1968.

With a change in aircraft and new mission, the 171st Aeromedical Airlift Wing was redesignated the 171st Air Refueling Wing effective 4 October 1972. With the inactivation of the 171st Air Refueling Group on 10 December 1974, the 147th Air Refueling Squadron was assigned directly to the Wing. On 1 July 1976, the Wing received notice of its reassignment from the Tactical Air Command (TAC) to Strategic Air Command (SAC) and one year later, July 1977, began transition training on a new aircraft. The 171st in supporting its SAC commitment maintains a continuous S.I.O.P. alert status. In September 1977, the 160th and the 170th Air Refueling Groups were assigned to the organizational structure of the Wing.

On 23 and 24 July 1983, the 171st Air Refueling Wing won first place in the Concours'D'Elegance Competition at England's "International Air Tattoo 83" Airshow with one of its KC-135E aircraft. The competition involved over 300 military aircraft from more than 30 countries.

2.3 ORGANIZATION AND MISSION

2.3.1 911th Tactical Airlift Group (AFRES)

The primary mission of the 911th Tactical Airlift Group (AFRES) is to provide command and staff supervision of tactical airlift squadron and assigned support units engaged in providing tactical airlift support for airborne forces and other personnel, equipment, supplies, and aeromedical evacuation of patients within the theater of operations. The secondary mission is to provide for the operation and maintenance of base facilities in support of assigned or attached units. In addition, the 911th provides:

1. Full support of Operation Location E, 2046th Communications Squadron (AFCS).
2. Reimbursible utilities, POL operation and maintenance, and supply support to the ANG for the use of Building 424 and billeting support.
3. Base recovery capability in the event of unforeseen contingencies or natural disasters.
4. Air Force collateral responsibilities rendering and to civil authorities in similar emergencies, (USAF, 1978).

Units assigned to the 911th Tactical Airlift Group include:

- 758th Tactical Airlift Squadron.
- 911th Aerial Port Flight.
- 911th Combat Support Squadron.
- 911th Consolidated Aircraft Maintenance Squadron.
- 911th Tactical Clinic.
- 911th Communications Flight.
- 911th Civil Engineer Flight Prime Beef "Charlie" Team.
- 911th Weapons Security Flight.
- 33rd Aeromedical Evacuation Squadron.

Tenant units include:

- Operating Location E 2046th Communications Group.
- 3511th Air Force Recruiting Squadron.
- Detachment AHOI/Civil Air Patrol-USAF.

According to U.S. Air Force data, as of March 1978, there were 3,183 persons affiliated with the Base (USAF, 1978). The population has been divided into the following categories:

Category	No. of Personnel
Active Duty	76
Reserve (ART)	452
Reserve (Non-ART)	2,022
Civilians and Their Families on Base	633
TOTAL	3,183

2.3.2 ANG UNITS (112TH TFG, 171AREF)

1. 112th TFG: The mission of the 112th Tactical Fighter Group is:

   a. To execute directed tactical fighter missions designed to destroy enemy forces, supplies, equipment, communications systems, and installation with conventional weapons within design limits of the weapons systems capabilities.

   b. To train, equip and prepare for combat, in accordance with directives, policies and schedules issued by higher headquarters, such unit and combat crews as may be assigned or attached.

   c. To perform staff supervision of maintenance activities.

2. 171st AREFW: The mission of the 171st AREFW is to train and provide operationally ready aircrew and personnel to support mobilization commitments, performing such peace time missions as essential to develop and maintain the operational capabilities to sustain the conducted strategic warfare in accordance with the Emergency War Order to the Strategic Air Command, and provide air refueling support to Lateral Commands as directed by the Tanker Single Manager (SAC). In addition, provide staff supervision over the 160th and 170th Air Refueling Groups in operational matters and staff advisory assistance in non-operational matters.

Units assigned to the 171st AREFW are:

1. 147 Air Refueling Squadron (GPIAP)
2. 160 Air Refueling Group (Rickenbacker ANGB, Ohio)
3. 170 Air Refueling Group (McGuire AFB, NJ)
4. 171 Combat Support Squadron
5. 171 Resource Management Squadron
6. 171 Consolidated Aircraft Maintenance Squadron

Tenant units include:

1. 112 Tactical Fighter Group
2. 146 Tactical Fighter Squadron
3. 112 Combat Support Squadron
4. 112 Consolidated Aircraft Maintenance Squadron
5. 112 Resource Maintenance Squadron
6. 146 Weather Flight

According to Pennsylvania Air Guard Data, as of 1 October 1984, there were 1589 persons affiliated with the ANG Base, with the population divided into the following categories:

Active Duty, (AGR + Reg AF)	101
Civilians	3
Technicians	359
State Employees	10
ANG Personnel ("Weekenders")	1116

SECTION 3

ENVIRONMENTAL CONDITIONS

3.1 METEOROLOGY

Pittsburgh is located 100 miles south of Lake Erie, in the foothills of Allegheny Mountains at the confluence of the Allegheny and Monongahela Rivers. Pittsburgh has a humid continental climate modified slightly by the Great Lakes and Atlantic Seaboard. January is the coldest month with an average temperature of 28.9°F, and July is the warmest month, with an average temperature of 72.1°F, (NOAA, 1974).

Precipitation is evenly distributed throughout the year. On the average, approximately 36 inches of precipitation fall annually. The annual average snowfall is 46.5 inches, (NOAA, 1974). Climatic data is summarized in Table 3-1.

Net precipitation is an indicator of the potential for leachate generation, and is equal to the difference between precipitation and evapotranspiration. The total annual loss by evapotranspiration in Allegheny County is 14 inches (Gallagher, 1973).

Net precipitation at Pittsburgh estimated to be +12 inches, which indicates the potential for leachate generation.

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. The one-year, 24-hour rainfall event is used to gauge rainfall intensity. The one-year, 24-hour rainfall in the vicinity of Pittsburgh is about 2.3 inches (NOAA, 1962).

3.2 GEOGRAPHY

3.2.1 Topography

Pittsburgh is located in the Appalachian Plateau Province, in an area dissected by narrow, nearly level stream valleys with steep sides. The ridgetops are mostly gently sloping to moderately steep.

The terrain surrounding the airport is mostly entirely sloping, with slopes of up to 25 percent in some areas. Surface drainage is good due to the slopes, but erosion can occur on unvegetated slopes and mowing and maintenance is difficult.

TABLE 3-1

CLIMATIC DATA
GREATER PITTSBURGH AIRPORT (1970)

	Temperature °F			Precipitation	Snow
Month	Daily Maximum	Daily Minimum	Monthly	Normal total Inches	Mean total Inches
J	36.5	21.2	28.9	2.97	11.0
F	37.6	20.7	29.2	2.19	10.0
M	46.1	27.4	36.8	3.32	10.0
A	60.0	37.9	49.0	3.08	1.7
M	71.4	48.1	59.8	3.91	0.3
J	79.9	56.9	68.4	3.78	0.0
J	83.3	60.9	72.1	3.88	0.0
A	81.9	59.6	70.8	3.31	0.0
S	75.5	52.8	64.2	2.54	0.0
O	63.7	42.4	53.1	2.52	0.2
N	49.5	32.0	40.8	2.24	3.9
D	38.1	23.2	30.7	2.40	9.4
YR	60.3	40.3	50.3	36.14	46.5

Source: U.S. Department of Commerce, NOAA, 1974.

Construction of runways and associated airport facilities has required leveling of slopes and the runways and associated facilities are at elevation of approximately 1,100 feet, MSL datum.

However, the surrounding area is steeply sloping, with elevations on ridgetops exceeding 1,200 feet MSL on Air Force property adjacent to the runways.

3.2.2 Soils

The principal soil groups on the Base are Urban Land, the Gilpin Series, and the Atkins Series, with the Urban Land - Culleoka complex comprising the major portion of the area (USDA, SCS, 1981). The distribution of soils is shown in Figure 3-1. Soil characteristics are summarized in Table 3-2.

The soil property of concern is assessing the potential for surface water infiltration is vertical permeability. As indicated in Table 3-2, vertical permeability values for soils on the AFRES and ANG properties range from 0.6 to 6.0 inches/hour (USDA, SCS, 1981). These values correspond to moderate permeability. Seasonal high water table and shallow depth to bedrock are development limitations for these soil groups.

None of the soils on the AFRES or PA ANG property are designated as "Prime Farmlands" by the U.S. Department of Agriculture, Soil Conservation Service. The Atkins silt loam has been designated as farmland of statewide importance. However, there is limited base property in this soil group, and the small size of the parcels and isolation from ongoing agricultural operations makes farming or grazing on base property impractical, (Smalley and Rosa, 1984).

3.3 SURFACE WATER RESOURCES

3.3.1 Drainage

Allegheny County is divided by the three principal rivers: the Ohio, Monongahela and Allegheny Rivers, and subdivided by many other smaller waterways. The Ohio River is located roughly two miles north of the Greater Pittsburgh International Airport.

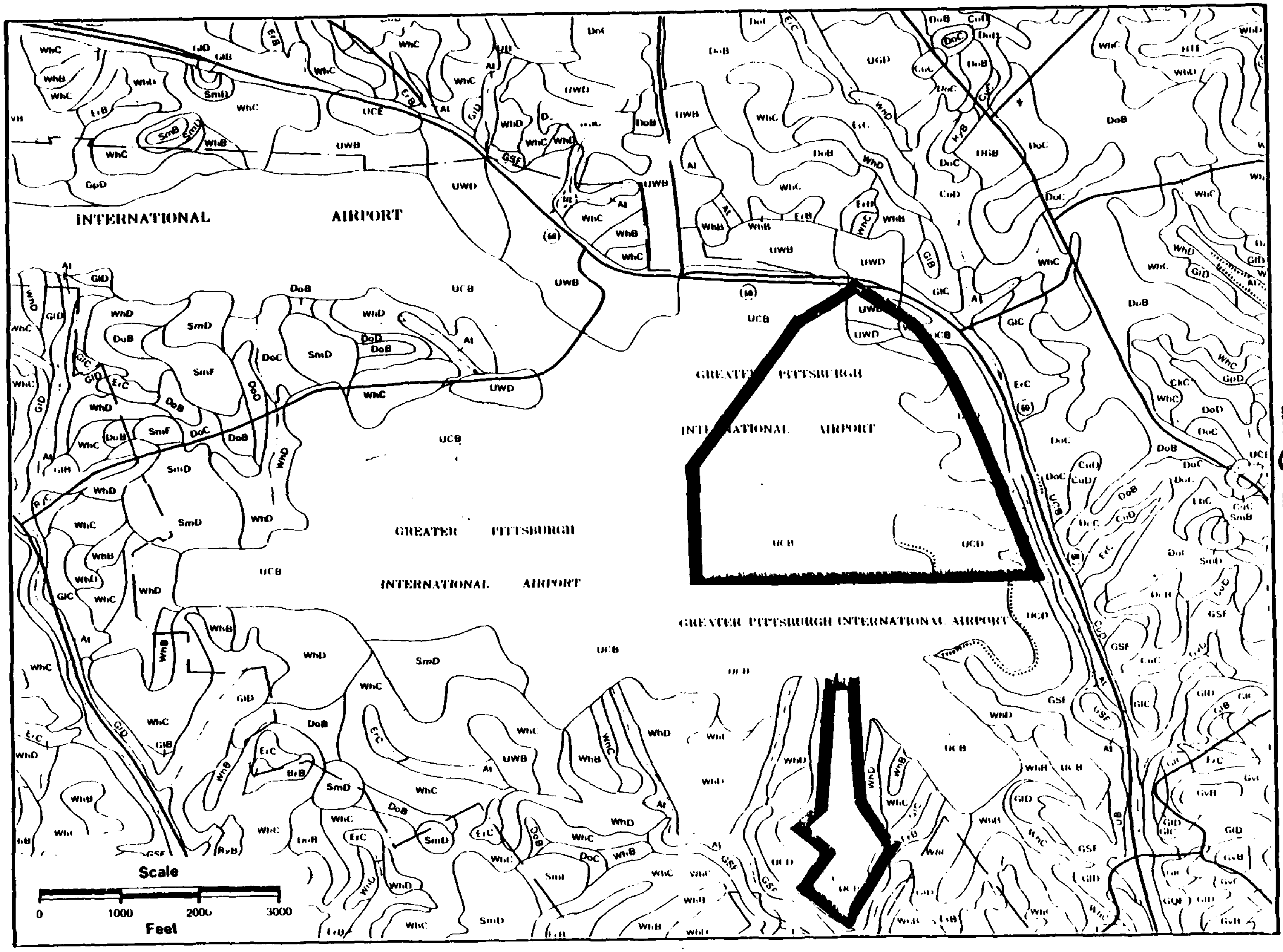

FIGURE 3-1 DISTRIBUTION OF SOIL

TABLE 3-2

CHARACTERISTICS OF SOILS AT GREATER PITTSBURGH INTERNATIONAL AIRPORT

Soil Name	Symbol	Brief Description	Slope (%)	Permeability (inches/hr)	Depth to Seasonal High Water Table (ft.)	Depth to Bedrock (ft.)
Urban Land - Culleoka Complex*	UCB	Land altered by man; original soils obscure	0 to 8%	0.6 to 6.0	> 6 ft.	1 1/2 to 3 1/2 feet
Urban Land - Culleoka Complex*	UCD	Land altered by man; original soils obscure	8 to 25%	0.6 to 6.0	> 6 ft.	1 1/2 to 3 1/2 feet
Gilpin Series - Gilpin, Weikert, and Culleoka Shaly Silt Loams	GSF	Moderately deep, steep, well drained soils on uplands	25 to 80%	0.6 to 6.0	> 6	1 1/2 to 3 1/2 feet
Atkins Series	AT	Deep, nearly level, poorly drained soils on floodplains	0 to 8%	0.6 to 6.0	0 to 1/2	> 5

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*Properties for this group are too highly variable to be estimated. Values indicated are representative of the Culleoka Series. Source: USDA, SCS, 1981.

Drainage on the AFRES and ANG properties is controlled by man-made ditches, culverts and storm sewers which discharge into McClaren's Run. McClaren's Run flows in a southeasterly direction across Base property, and joins Montour Run approximately 1 1/2 miles south of the airport boundary. Montour Run flows east then north, and joins the Ohio River about five miles north of its confluence with McClaren's Run Surface drainage for the Air Force Reserve Installation is shown in Figure 3-2; surface drainage for the ANG Facility in shown on Figure 3-3.

As indicated in subsection 3.2.2, the Atkins soil series is an alluvial soil on floodplains adjacent to streams. Approximately one to two acres of Base property can be considered to be floodplain (Smalley and Rosa, 1984)

3.3.2 Surface Water Quality

There are no continuous recording discharge or water quality monitoring stations on McClaren's Run or Montour Run downstream from the Greater Pittsburgh International Airport, (Subitzky, 1976).

The Pennsylvania Air National Guard has conduced two sampling events on McLaren's Run and tributaries to McLaren's Run. Locations of the samples are shown on Figure 3-3. These samples, analyzed for oils and greases and phenols, indicate, that at the time of sampling, the major contribution of these constituents to surface water was from the commercial airport not from the Air National Guard facility. Results of the samples analyses are shown on Table 3-3.

Water quality criteria for McClaren's Run have been established by the State of Pennsylvania, and are imposed on the Allegheny County Department of Aviation by EPA Permit # PA0008. State water quality criteria for McClaren's Run is summarized in Table 3-4 (U.S. Air Force, 1978).

3.3.3 Surface Water Use

McClaren's Run's primary use is assimilation of stormwater discharges. The small discharge of the stream precludes navigation or recreational use. The Air Force's contribution to the total flow of the stream is estimated to be 0.5 percent (U.S. Air Force, 1978).

The stream ultimately discharges into the Ohio River, which is used for river transportation, community and industrial water supplies and water recreation.

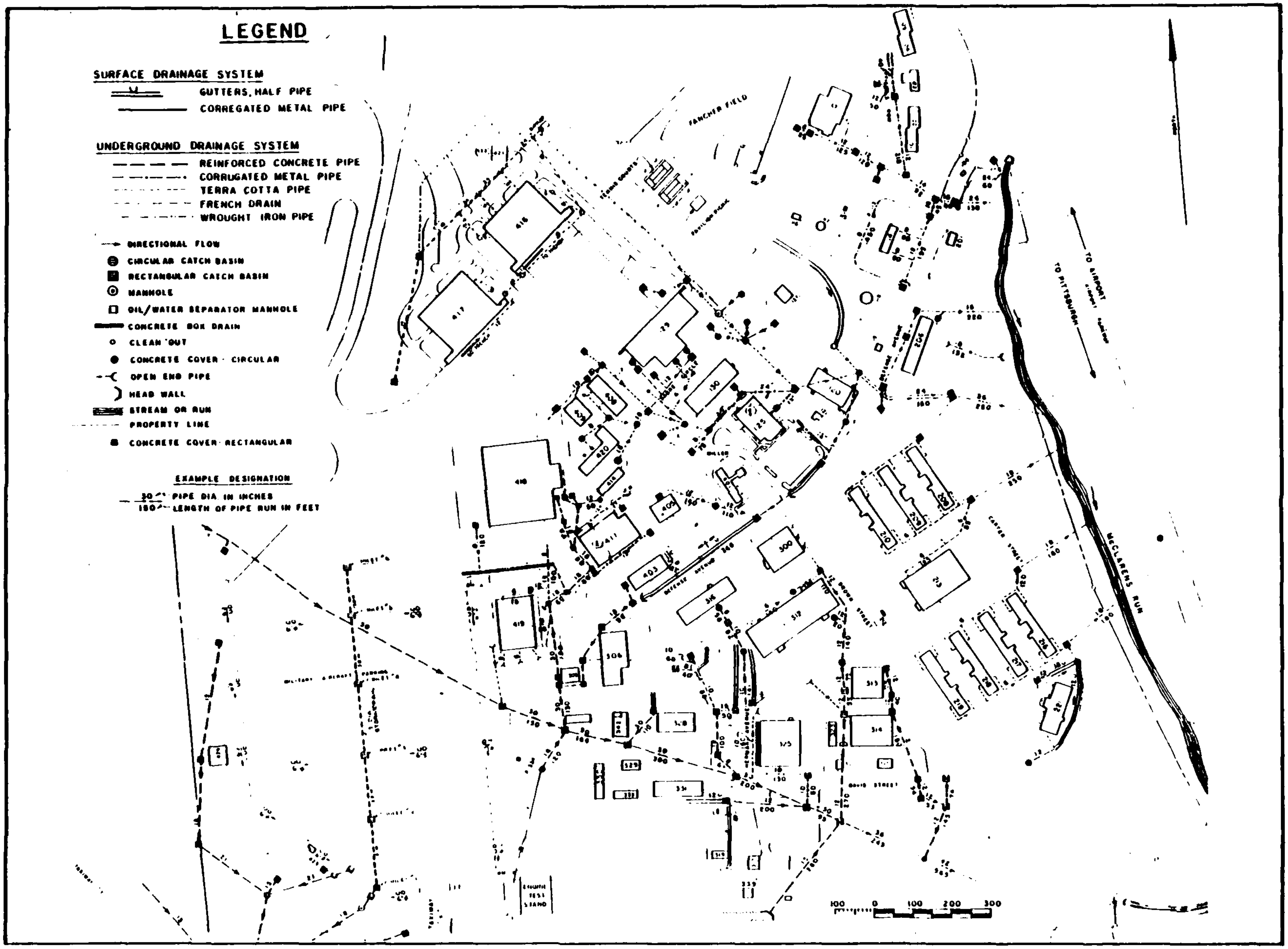

FIGURE 3-2 SURFACE DRAINAGE AT 911TH TAG

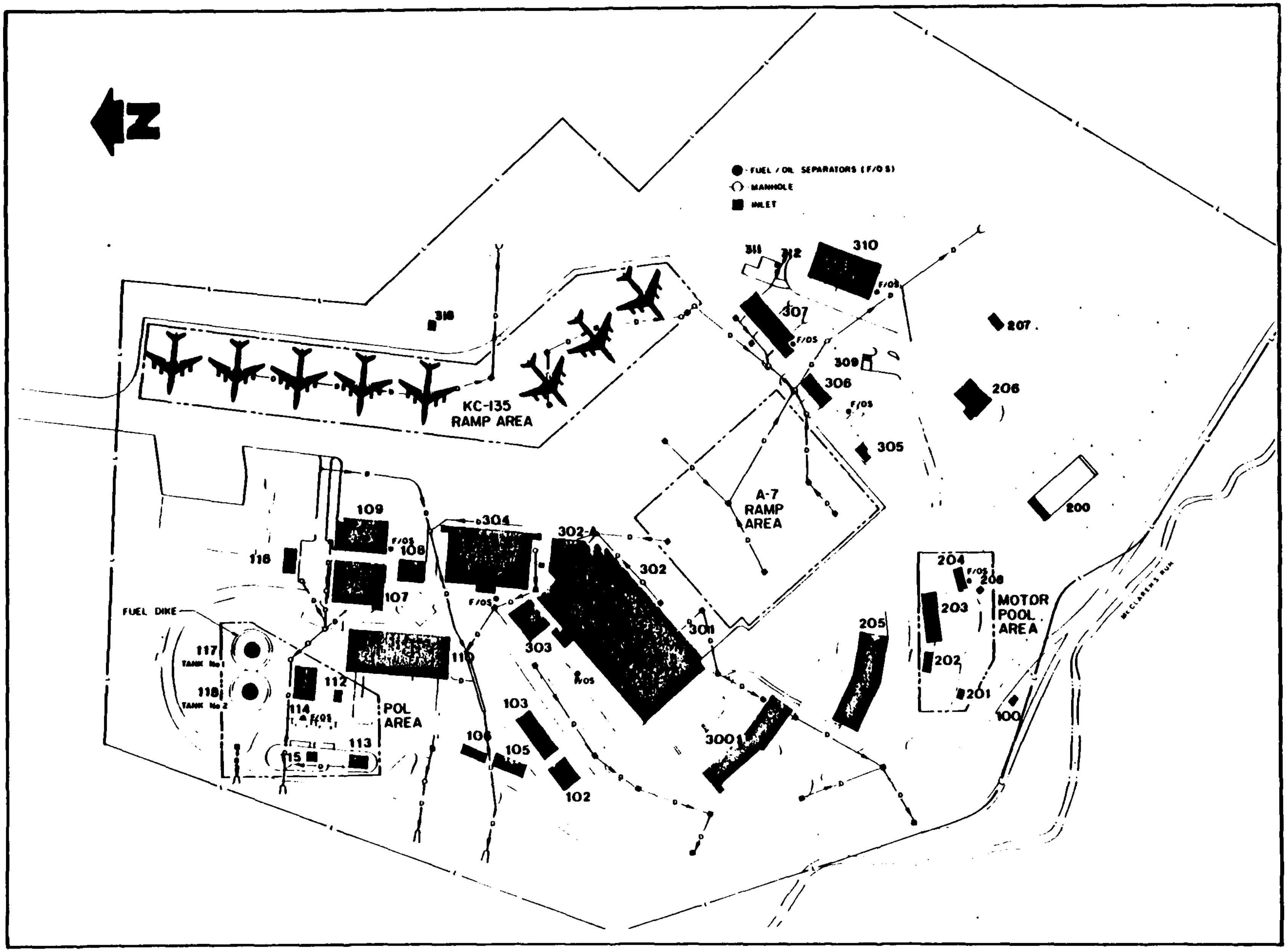

FIGURE 3-3 SURFACE DRAINAGE ANG FACILITY

TABLE 3-3

SURFACE WATER QUALITY

Sampling Point Approximate Locations Shown on Figure 3.4	Phenols (mg/l)			Oil and Grease (mg/l)		
	2/25/84	2/26/84	4/15/84	2/25/84	2/26/84	4/15/84
1	.05	1.55	.036	1.8	1.5	0.6
2	.04	.06	.02	1.6	0.6	0.8
3	.03	.03	.02	1.5	< .3	0.6
4	--	--	.064	--	--	<0.3

Source: Pennsylvania Air National Guard

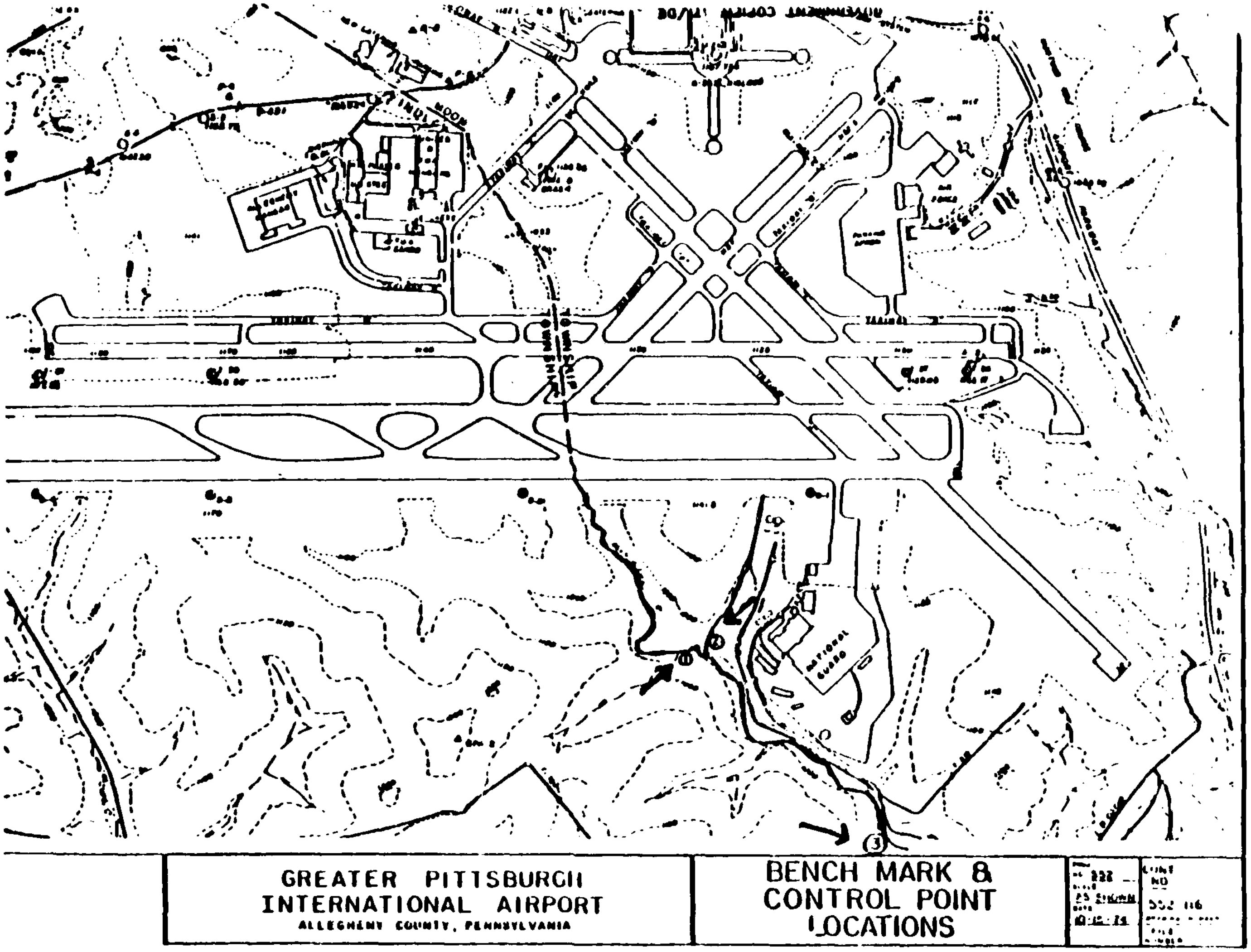

FIGURE 3-4 SAMPLING POINT LOCATIONS - MACCLAREN'S RUN

Table 3-4

State Water Quality Criteria for McClaren's Run - Pittsburgh, Pennsylvania

Parameter		Criteria
pH		6.0 to 8.5
Dissolved Oxygen (D.O.)		
2/15 - 7/31	Minimum daily average	6.0 mg/l
	No Value less than	5.0 mg/l
Remainder of Year	Minimum daily average	5.0 mg/l
	No Value less than	4.09 mg/l
Total Iron	Not to Exceed	1.5 mg/l
Temperature	Not more than 5°F rise above ambient temperature or a maximum of 87°F, whichever is less; not to be changed by more than 2°F during any 1-hour period.	
Dissolved Solids	Not more than 500 mg/l as a monthly average; not to exceed 750 mg/l at any time.	
Bacteria	Fecal coliform density in 5 consecutive samples shall not exceed a geometric mean of 200 coliforms/100 ml.	

Source: U.S. Air Force, 1978.

3.4 GROUNDWATER RESOURCES

3.4.1 Background Geology

Unconsolidated deposits of alluvium overlie the bedrock of major stream valleys in the County. The deposits consist of clay, silt, sand, gravel and some boulders transported and deposited by moving water. The unconsolidated deposits consist of two units: the basal part, immediately overlying the bedrock, which was deposited during the ice age; and an upper layer of recent age.

Allegheny County is underlain by bedrock that is flat lying sedimentary rock consisting of shale, claystone, limestone, sandstone, siltstone, and coal in interlayered beds of varying thicknesses. The strata, in order of increasing age and depth, include the Washington, Monongahela, Conemaugh, Allegheny and Pottsville Groups. The strata dip to the southwest, and younger deposits overlie the older deposits throughout the entire county. The aggregate thickness of the consolidated rocks is about 1300 feet (Gallagher, 1973).

Erosion has exposed all the Groups in some part of the County, and removed younger bedrock in some areas. In fact, the Washington Group is not found beneath the airport, and the Monongahela Group is found in only a few localized areas on the airport property. Characteristics of geologic units in Allegheny County are summarized in Table 3-5.

The Conemaugh Group, the shallowest bedrock beneath the airport, has been divided into the Casselman Formation (upper) and Glenshaw Formation (lower). The predominant bedrock formation beneath Greater Pittsburgh International Airport is the Casselman Formation of the Conemaugh Group, which is comprised of a cyclical sequence of sandstone, shale, red beds and thin layers of limestone and coal. Claystones and silty shales, or sequences of both are the predominant rock types. The silty shales are erratic and often grade laterally into sandy shales and sandstones, while limestones and coal seams in the Conemaugh Group are normally erratic and thin. The Casselman formation ranges from 200 to 400 feet in thickness. According to soil borings taken on base property prior to construction, bedrock is generally hard clay shale overlying a thin sandstone layer, with little or no water encountered. Depth to bedrock is generally 15 to 20 feet. (U.S. Air Force, 1978).

Underlying the Casselman formation is the Glenshaw formation of the Conemaugh Group. The Glenshaw formation is separated from the Casselman formation by the Ames limestone bed and ranges from 300 to 350 feet in thickness. It is composed of cyclical sequences of sandstone, shale, red beds, thin limestone and coal, and contains several sequences of fossiliferous limestone.

TABLE 3-5 GEOLOGIC UNITS IN ALLEGHENY COUNTY

Age	Name	Thickness and areal extent	Lithologic character	Hydrologic character
QUATERNARY	Alluvium	0-65 feet; thins out at edges of valleys. Relatively small areal extent, confined to valleys of larger streams.	Well to poorly-sorted deposits of clay, sand, gravel and cobbles.	Yields 5-3000 gpm, depending upon degree of sorting by grain size.
PERMIAN/PENNSYLVANIAN Dunkard Group		(not found beneath Air Force Facilities)		
PENNSYLVANIAN Monongahela Group		(not found beneath Pittsburgh ARF)		
Conemaugh Group	Upper and Lower Pittsburgh Limestone	50 feet combined thickness.	Limestones with interbedded or sandy shales and a thin coal bed.	Yields to 15 gpm. Generally lower.
	Connellsville Sandstone	20-75 feet.	Coarse-grained, micaceous sandstone.	Yields to 25 gpm; maximum yields are in southern part of county.
	Little Clarksburg coal	Thin and discontinuous.	Coal and shaly equivalent.	Yields 1-5 gpm.
	Clarksburg Limestone	0-3 feet.	Limestone, or shaly equivalent.	Yields 1-5 gpm.
	Morgantown Sandstone	90-120 feet, thinning toward northeast.	Compact, fine-grained, thick-bedded sandstone; persistent and locally massive.	Yields to 120 gpm; average 30 gpm.
	Birmingham Shale	50-60 feet.	Grades from shale to sandy shale; contains some sandstone lenses.	Yields 1-2 gpm.
	Duquesne coal	0-4 feet.	May be sandy shale locally; discontinuous.	Not known.
	Ames Limestone	3-8 feet.	Locally contains solution channels along bedding and joint planes.	Minimal supplies from bedding plane passages.

TABLE 3-5 GEOLOGIC UNITS IN ALLEGHENY COUNTY (Cont.)

Age	Name	Thickness and areal extent	Lithologic character	Hydrologic character
PENNSYLVANIAN Conemaugh Group (Cont.)	Pittsburgh Red Beds	5-15 feet.	Greenish-gray, red and variegated shales.	Minimal supplies from bedding plane passages.
	Saltsburg Sandstone	30-80 feet.	White or gray massive sandstone, locally grading into sandy shale.	Yields 2-400 gpm; averages 55 gpm.
	Bakerstown coal and associated rocks	10-20 feet.	Coal, shale and limestone; locally replaced by Saltsburg Sandstone.	Yields 3 gpm.
	Buffalo Sandstone	20-60 feet.	Coarse-grained and conglomeratic sandstone, grading laterally into fine-grained sandstone or sandy shales in western part of county.	Yields to 20 gpm.
	Brush Creek coal and associated rocks	30-40 feet.	Coal, shale, clay, and limestone.	Yields 4-20 gpm.
	Mahoning Sandstone	20-100 feet.	Medium- to coarse-grained, commonly two beds separated by a shale layer.	Yields 4-60 gpm, varying with depth and degree of fracturing.
Allegheny Group	Upper Freeport coal and associated rocks		Coal, clay, and shale.	Not known.
	Butler Sandstone	10-40 feet.	Coarse-grained or massive sandstone in north; grading to thin-bedded, sandy shale with sandstone lenses in the southern part of county.	Yields 2-10 gpm.
	Freeport Sandstone	30-70 feet usually, but 120 feet along Ohio River to the west.	Massive, locally conglomeratic sandstone grading laterally to fine-grained sandstone or sandy shale.	Yields 5-75 gpm.

TABLE 3-5 GEOLOGIC UNITS IN ALLEGHENY COUNTY (Cont.)

Age	Name	Thickness and areal extent	Lithologic character	Hydrologic character
PENNSYLVANIAN Allegheny Group (Cont.)	Upper Kittanning coal and associated rocks		Coal, clay, and shale, with some sandstone lenses.	Not an aquifer.
	Worthington Sandstone	15-100 feet.	Lenticular sandstone of variable texture, grading laterally to shale.	Yields to 50 gpm.

The Allegheny Group lies beneath the Conemaugh Group. it is comprised of cyclic sequences of shale, sandstone, limestone and coal, and ranges from 280 to 320 feet in thickness. Upper Freeport Coal comprises the upper boundary, and Brooksville Coal comprises the bottom boundary. Commercial mineral deposits within the Allegheny Group include the Vanport limestone, and Kittanmig and Clarion coals.

The Pottsville Group lies beneath the Allegheny Group. The Pottsville Group ranges from 120 to 230 feet in thickness, and is comprised of sandstone and shale. It contains some conglomerate and locally minerable coal. (Wagner and Others, 1975).

Landslides and subsidence are common geologic problems in Allegheny County. Landsliding is defined as the downslope movement of soils and rock due to the force of gravity. In Allegheny County, landsliding usually is related to the activities of man. Landsliding has not been reported to be a problem on the Base (U.S. Air Force, 1978).

Subsidence results from underground mining activities refers to downward bowing or ground collapse over areas undermined for the removal of coal. Subsidence creates frequent but localized problems in Allegheny County. According to geologic information on coal mining activities, subsidence is not likely to be a problem on the grounds of the Greater Pittsburgh International Airport (Briggs and Kohl, 1975).

3.4.2 Hydrogeologic Units

Groundwater in Allegheny County occurs in both unconsolidated alluvial deposits and bedrock formations. Hydrologic characteristics of the various geologic units are summarized in Table 3-5. Figure 3-5 is a geologic map which shows locations of selected wells.

A unconsolidated alluvial deposits overlie the bedrock in major stream valleys, including the Ohio River in the vicinity of the base. Alluvium generally is permeable and yields moderate to large supplies of water to wells when saturated. Deposits along the Ohio River range from several hundred feet to a mile in width, and reach an average maximum thickness of 65 to 70 feet. Yields range from a few gallons per minute to more than 3,000 gpm, with an average yield of 350 gpm (Gallagher, 1973). Well yields depend primarily upon the permeability and thickness of the saturated deposits penetrated by the well (Newport, 1975).

The Conemaugh Group, the uppermost bedrock formation beneath the base, contains some of the most important aquifers in the County. The best water-producing formations of the Conemaugh Group, in descending order, are the Connellsville, Morgantown, Saltsburg, Buffalo and Mahoning Sandstones.

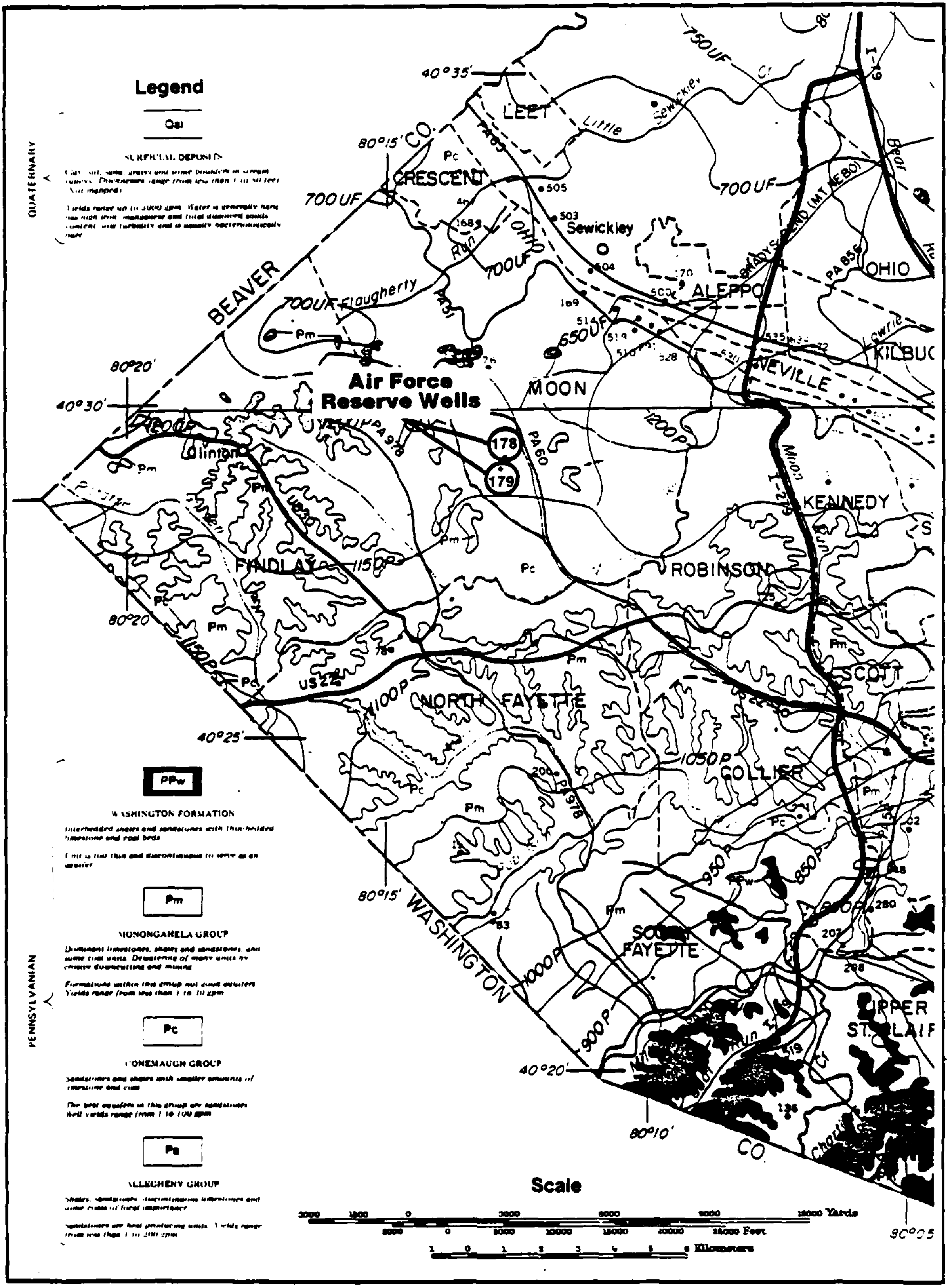

FIGURE 3-5 GENERALIZED GEOLOGIC MAP OF SOUTHWESTERN ALLEGHENY COUNTY AND LOCATIONS OF SELECTED WELLS (1974)

Yields generally range from 1 to 100 gallons per minute, depending on the local permeability and elevation of the aquifers.

The Conemaugh Group is a reliable source of small to moderate yields of water, the median yield for wells in this group is 20 gallons per minute (gpm) although some yields are more than 100 gpm. Wells drilled 100 to 150 feet below the water table will yield sufficient water for domestic purposes at most locations. Yields large enough for industrial or municipal uses are more difficult to obtain (Wagner and others, 1975).

The Allegheny Group, which underlies the Conemaugh Group, contains groundwater in fractures and pore spaces and is a reliable source for small to moderate supplies of water. In the southern part of the County, the group is at too great a depth to serve as an aquifer (Gallagher, 1973).

Within Allegheny County, the formations below the Allegheny Group are not likely to be suited as freshwater aquifers due to low permeability or high salt content (Gallagher, 1973).

3.4.3 Groundwater Quality

Groundwater from alluvium is generally hard and has high concentrations of iron, manganese and dissolved solids. It also has low turbidity and is generally bacteriologically pure. When pumpage induces flow from streams into wells, the well water quality is intermediate between surface and groundwater quality (Gallagher, 1973).

Groundwater quality in the Conemaugh Formation varies considerably. Dissolved solids concentrations range from 99 to 722 mg/l. Hardness ranges from 10 to 263 mg/l. Iron concentrations range from 0.08 to 23.2 mg/l, with 0.3 mg/l being the upper limit established for drinking water standards (Wagner and Others, 1975).

Chemical analyses from groundwater selected wells are summarized in Table 3-6. This table may be cross-referenced with Table 3-7 for more information on aquifer characteristics.

3.4.4 Groundwater Usage

In 1973, there were over 600 permitted wells in the county (Gallagher, 1973). The major source of groundwater is alluvial deposits in floodplains, particularly along the Allegheny and Ohio Rivers. Sandstone and limestone bedrock is a minor source of groundwater. Wells drilled in bedrock generally yield only enough for small domestic and farm needs, (USDA, SCS, 1981).

TABLE 3-6. CHEMICAL ANALYSES OF GROUND WATER IN ALLEGHENY COUNTY, PENNSYLVANIA
(Results in milligrams per liter except as indicated)

Well Number	Date of Collection	Temperature (°F)	Silica (SiO_2)	Total iron (Fe)	Total manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potasium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness as $CaCO_3$		Total Hardness	Specific Conductance (micromhos 25°C)	pH	Color
																Calcium magnesium	Non-carbonate				
5	9-11-26	56.5	8.8	0.16	-	81	7.9	14	3.8	171	91	20	-	0.82	333	-	-	235	-	-	-
169	10-9-45	-	-	1.2	-	-	-	-	-	261	71	137	-	-	-	-	-	228	-	7.7	-
500	3-24-66	59	15	3.0	2.6	79	27	33	1.7	271	85	52	-	-	459	222	86	308	-	7.1	4
502	6-28-38	58	-	0.1	-	-	-	11	-	359	-	-	-	-	567	294	194	488	294	7.0	-
507	12-17-51	51	-	-	-	-	-	-	-	255	110.8	29	-	-	506	209	89	298	-	7.3	5
511	11-3-39	59	-	17	-	-	-	-	-	-	106	31	-	-	-	-	-	266	-	7.4	10
514	12-10-45	58	10	4.5	8.0	79	8	-	-	-	77	22	-	-	-	-	-	231	-	7.1	-
516	11-9-41	58	8.8	0.6	3.4	66.9	15.6	-	-	190	90.3	26	-	-	366	156	77	233	-	7.5	-
517	11-9-41	58	8.4	0.2	2.4	62.5	14.7	-	-	149	115.4	23	-	-	356	122	98	220	-	7.4	-
523	6-22-38	54	12	-	-	-	-	-	-	-	-	-	-	-	413	174	99	273	-	7.8	-
524	8-00-46	55	-	0.8	-	-	39.9	-	-	122	-	25	-	-	-	-	-	202	-	7.0	-
530	5-11-44	54	-	4.5	0.5	130	11	-	-	265	92	91	-	-	-	213	153	366	-	7.2	10

Well locations shown on Figure 3.4
Source: Gallagher, 1973

TABLE 3-7

RECORD OF WELLS WITHIN A FIVE MILE RADIUS OF GREATER PITTSBURGH INTERNATIONAL AIRPORT

(1973)

Well Number	Well Location	Owner	Aquifer	Altitude (Above MSL)	Total Well Depth (feet)	Yield (gpm)	Use	Remarks
5	4032-8011	Edgeworth Water Co.	Alluvium	675	35	835	Public Supply	One of 9 wells.
50	4026-8014	Arcade	Morgantown Sandstone	960	68	---	Domestic; Stock	Saltwater at 30 feet, fresh below.
51	4027-8011	Briggs and Turivas	Saltsburg Sandstone	875	130	---	Industrial	Salty.
76	4030-8012	Oscar Goss	Connellsville Sandstone	1200	112	5	Domestic	
78	4026-8014	Martha Ross	Morgantown Sandstone	980	48	65	Domestic	
79	4027-8013	Albert Weir	*Birmingham Shale*	990	126	1	Domestic	
167	4033-8011	Pipeline Service Corp.	Freeport Sandstone	740	139	30	Industrial	
168	4032-8013	Reliance Welding Co.	Butler Sandstone	740	50	5	Industrial	
169	4031-8011	Dretzel Lead Burning Co.	Mahoning Sandstone	740	30	5.	Industrial	
170	4031-8009	Haysville Water Co.	Mahoning Sandstone	800	87	60	Unused	Soft, sulfurous.
178	4029-8012	Greater Pittsburgh Airport	*Morgantown Sandstone*	1100	170	28	Commercial; (unused)	
179	4029-8012	Greater Pittsburgh Airport	*Morgantown Sandstone*	1105	220	40	Commercial; (unused)	
290	4031-8009	Coraopolis Borough	Alluvium	715	60	230	Public Supply	Not on map.
291	4031-8009	Coraopolis Borough	Alluvium	715	61	650	Public Supply	
292	4031-8009	Coraopolis Borough	Alluvium	715	61	650	Public Supply	
500	4031-8009	Sterling Varnish Co.	Alluvium	715	52	65	Industrial	
501	4031-8009	Sterling Varnish Co.	Alluvium	710	60	65	Industrial	Not on map.
502	4032-8011	Sewickley Ice Co.	Alluvium	730	65	150	Industrial	Not on map.
503	4032-8011	Sewickley Ice Co.	Alluvium	730	65	50	Industrial	Not on map.
504	4032-8011	Sewickley Ice Co.	Alluvium	730	65	75	Industrial	
505	4033-8011	Edgeworth Co.	Alluvium	685	43	1100	Public Supply	One of 5 wells.
506	4033-8013	Bethlehem Steel Co.	Alluvium	700	59	550	Industrial	
507	4033-8013	Bethlehem Steel Co.	Alluvium	700	60	450	Industrial	
508	4031-8010	Russel-Burdsall & Ward	Alluvium	700	70	150	Destroyed	Not on map.

TABLE 3-7 (Cont.)

RECORD OF WELLS WITHIN A FIVE MILE RADIUS OF GREATER PITTSBURGH INTERNATIONAL AIRPORT

(1973)

Well Number	Well Location	Owner	Aquifer	Altitude (Above MSL)	Total Well Depth (feet)	Yield (gpm)	Use	Remarks
509	4031-8010	Russel-Burdsall & Ward	Alluvium	700	68	200	Industrial	Not on map.
510	4031-8010	Russel-Burdsall & Ward	Alluvium	700	52	200	Industrial	
511	4031-8010	Continental Foundry & Machine Co.	Alluvium	700	50	75	Industrial	Not on map.
512	4031-8010	Republic Oil Co.	Alluvium	715	60	150	Destroyed	Not on map.
513	4031-8010	Abrasive Machine Mfg. Co.	Alluvium	715	64	150	Unused	Not on map; high in sulfur.
514	4031-8010	Standard Steel Spring Co.	Alluvium	715	50	300	Industrial	
515	4031-8010	Standard Steel Spring Co.	Alluvium	715	50	400	Industrial	Not on map.
516	4031-8010	Pittsburgh Forging Co.	Alluvium	715	62	500	Industrial	Not on map.
517	4031-8010	Pittsburgh Forging Co.	Alluvium	717	65	500	Industrial	Not on map.
518	4031-8010	Pittsburgh Forging Co.	Alluvium	716	58	500	Industrial	Not on map.
519	4031-8010	Canfield Oil Co.	Alluvium	715	65	500	Industrial	Not on map.
520	4031-8010	Canfield Oil Co.	Alluvium	715	60	600	Unused	
521	4031-8010	Canfield Oil Co.	Alluvium	715	58	500	Unused	Not on map.
522	4031-8010	Standard Steel Spring Co.	Alluvium	718	60	500	Industrial	Not on map.
523	4031-8010	Coraopolis Ice Co.	Alluvium	718	72	20	Unused	Not on map.
524	4031-8009	Coraopolis Borough	Alluvium	685	38	175	Public Supply	Not on map.
525	4031-8009	Coraopolis Borough	A-luvium	715	67	600	Public Supply	Not on map.
526	4031-8009	Coraopolis Borough	Alluvium	715	67	575	Public Supply	Not on map.
527	4031-8009	Coraopolis Borough	Alluvium	715	67	500	Public Supply	Not on map.
528	4031-8009	Codo Manufacturing Corp.	Alluvium	817	65	15	Industrial	
529	4031-8009	Consolidated Lamp & Glass Co.	Alluvium	718	80	75	Industrial	Not on map.
530	4030-8008	Pittsburgh Screw & Bolt Corp.	Alluvium	719	75	500	Industrial	
531	4030-8008	Pittsburgh Screw & Bolt Corp.	Alluvium	719	75	500	Industrial	Not on map.

Source: Gallaher, 1973.

Data on selected wells within a five mile radius of Greater Pittsburgh International Airport are summarized in Table 3-7. As would be expected, the largest yielding wells are located in alluvial deposits along the Ohio River. Wells drilled in bedrock supply small commercial, industrial and domestic users.

The Moon Township Municipal Authority supplies the base potable water supply through a contract with the County Department of Aviation. The water is obtained from alluvial deposits of sand and gravel in the floodplain of the Ohio River near Coraopolis, Pennsylvania. The water is pumped through one radial and two vertical wells to a 3.5 million gallon per day treatment plant for softening and removal of small quantities of iron and manganese.

The base originally had two wells which produced poor quality water with high iron content. In the 1970's these wells were abandoned, because of poor water quality (U.S. Air Force, 1978). The wells remains but have been sealed with concrete. The base purchased water from the County even when their own wells were producing, as a source of back-up supply.

3.5 BIOTIC ENVIRONMENT

Natural vegetation on the base has been mostly removed by man's activities. Species of trees remaining on the base or which have been planted include oak, maple, cherry, scotch pine, Colorado blue spruce and arbor vitae. Shrubs on the base include wild sumac and flowering crab, while ground covers include myrtle and crown vetch. Blue grass, rye grass, red fescue and clover in varying combinations are the grasses on the base. There are no crops commercially cultivated on base (Smalley and Rosa, 1984).

Allegheny County has a wide variety of birds and wildlife, although urbanization has influenced the type and number of species. White tailed deer are known to inhabit the airport property. The population of the deer herd was estimated to be 12 in 1978 (USAF, 1978). The operational portion of the airport is fenced to control the herds movement. Small game on the base include rabbits, woodchucks and an occasional skunk or raccoon. There are few songbirds on base due to the lack of suitable habitat and feed.

The small stream, McClaren's Run, which borders the eastern edge of the airport for approximately 50 yards does not support any significant aquatic life or shellfish, or provide any habitat for waterfowl (USAF, 1978).

3.6 SENSITIVE ENVIRONMENTAL FEATURES

There are no known endangered species of birds or animals listed as native to Pennsylvania within 50 miles of the airport. There are also no known endangered plant species, or sensitive environmental areas on the base (US Air Force, 1978).

3.7 SUMMARY OF ENVIRONMENTAL CONDITIONS AT GREATER PITTSBURGH INTERNATIONAL AIRPORT

The following environmental conditions are of particular importance in the evaluation of hazardous waste management practices at Greater Pittsburgh International Airport.

1. The mean annual precipitation is 36 inches, the net precipitation is +10 inches, and the one-year, 24-hour rainfall event is estimated to be 2.3 inches. These data indicate that there is moderate potential for infiltration into the surface soils on the base, and that there is moderate potential for runoff and erosion.

2. Soil permeability ranges from 0.6 to 6.0 inches per hour, which corresponds to moderate permeability. Shallow depth to bedrock and a seasonal high water table pose limitations to development on the base soils.

3. Surface water on the base is controlled by the storm sewer system, which empties into a small stream known as McClaren's Run. Approximately one to two acres of Air Force property, underlain by Atkins soil, can be considered to be floodplain.

4. Bedrock beneath the Greater Pittsburgh International Airport consists predominantly of the Conemaugh Formation, which is comprised of cyclical sequences of sandstone, shale, red beds and thin layers of limestone and coal. Bedrock is generally 15 to 20 feet below the surface.

5. Groundwater is not an important resource in Allegheny County as a whole. However, unconsolidated alluvial deposits in the flood plain of the Ohio River are the source of water for Moon Township Municipal Authority, which provides the airport water supply. Bedrock aquifers consist primarily of limestone and sandstone beds, and are generally provide adequate supplies for only domestic and farm uses.

6. There are no known endangered species or critical habitats in the vicinity of the airport.

7. Although there are no records of mining under either facility, it is possible that there are unrecorded mine workings. These could have the potential to act as conduits for contaminant transfer and could also have the potential to cause subsidence of the subsurface.

SECTION 4

FINDINGS

4.1 INTRODUCTION

This section presents information on the 911th TAG of the U.S. Air Force Reserve, and the Pennsylvania Air National Guard at the Greater Pittsburgh International Airport.

The information summarizes the waste generated by past activity, describes waste disposal methods and identifies the disposal and spill sites located on the base, and evaluates the potential for environmental contamination.

To identify past base activities that resulted in generation and disposal of waste a review was conducted of current and past waste generation and disposal methods. The activity consisted of a review of files, records, and interviews with present and former base employees.

This section is organized to describe the practices and concerns separately at each base. In some cases, where both bases used the same waste disposal facility, the more detailed discussion of the facility is presented in the subsection on the Reserves.

4.2 U.S. AIR FORCE RESERVE - 911th TAG

4.2.1 Overview of Industrial Operations

Industrial type activities at the 911th at Pittsburgh IAP are grouped into three primary categories: Aircraft Maintenance, Base Civil Engineering, and POL operations. Each of these operations occur at several different shops and locations.

This subsection presents an overview of the operations. Table 4.1 is a shop specific summary of the waste handling practices through time at the 911th TAG.

4.2.1.1 Aircraft Maintenance (Shops)

Aircraft maintenance is a collection of shops which have the responsibility of repair, inspection and routine maintenance on all aircrafts located on their bases. The Bioenvironmental Engineering (BEE) Office provided current data on hazardous material usage. Based on these data, along with shop files and interviews, a history of past generation and disposal activities was constructed. All shops in Aircraft maintenance were personally visited by a team member in order to determine if the shop is or has been a generator of hazardous material.

TABLE 4.1

Waste Handling Summary - 911th TAG

Shop Name	Location Building#	Waste Material	Yearly Waste Quantity	Method(s) of TSD		
				1960	1970	1980
POL	113,114, 116,117,118	AV GAS JP-4	600g/yr	open burn		contract disposal
		Tank Sludge	10g/3-5 yrs	buried near tank		
Motor Pool	305,306	Waste Oil	600g/yr	open burn		contract disposal
		Solvents	3-600g/yr	open burn		contract disposal PD-680 Varsol
		Battery Electrolyte	100g/yr	neutralized then sanitary sewer		
		Degreaser	250g/yr	storm drain to oil/water sep.		
		Paint waste	5g/yr	open burn		contract disposal
Civil Engineering Electrical Shop	331	Battery Electrolyte	12g/yr	neutralized then sanitary sewer		
		Ethylene Glycol	15g/yr	contract disposal		
		TCE	15g/yr	possible burning		contract disposal
		Oil	45g/yr	open burn		contract disposal
Air Conditioning Refrigeration	325	Ethylene Glycol	30g/yr			sewer
Carpentry	331	Saw dust for pressure treated lumber	Unknown	trash		

——— Confirmed timeframe/disposal data by shop personnel

- - - Estimated timeframe/disposal data by shop personnel

TABLE 4.1

Waste Handling Summary - 911th TAG

Shop Name	Location Building#	Waste Material	Yearly Waste Quantity	Method(s) of TSD 1960	1970	1980
Plumbing/Heating	331	Oil	12g/yr			contract disposal
Aircraft Maintenance Battery/Avionics	125	Battery Electrolyte	240g/yr	neutralized solution to sewer		
Wheel & Tire	129	Alkaline Water Base Cleaner	300g/yr			contract disposal
		Varsol	150g/yr	possible burning		
		Naptha	15g/yr	possible burning		
		Hot Stripping Compound	250g/yr			contract disposal
		Cold Stripping Compound	350g/yr	possible burning		
Corrosion Control	416	Paint Thinner	20-50g	sewer	contract disposal	
		Toluene	20-40g			contract disposal
		Waste Point	100-150	possible burning	contract disposal	
Fuel Cell Maintenance	416 418(prior to 1984)	Waste JP-4	125-200g	possible burning	contract disposal	
Maintenance	129 (prior to 1971)	Petroleum Based Solvents	50-100g			sewer through oil/water separator
		Varsol	200-300g	sewer		
		Brulin	500g	sewer		
	Apron & 129	Skinbrighter	2,000g	sprayed on to planes waste to sewer		
	Apron & 129	Soil barrier	200g	sprayed on to planes-waste to sewer		

Confirmed timeframe/disposal data by shop personnel

Estimated timeframe/disposal data by shop personnel

TABLE 4.1

Waste Handling Summary - 911th TAG

Shop Name	Location Building#	Waste Material	Yearly Waste Quantity	Method(s) of TSD 1960	1970	1980
Engine	411	Waste Oil	400-600g	burning	contract disposal	
NDI	409	Penetrant	100-150g		contract disposal	
		Developer	100-125lbs		sewer	
		Magnetic (particle)	50g		contract dispcsal	
		X-ray developer	10-15g		sewer	
		X-ray fixer	10-15g		Silver Recovery	
		Emulsifier	100-150g		contract disposal	
Aircraft Environmental Systems	418	PD-680	10g		washed into sewer	
		Anti-icing fluid	5g		washed into sewer	
		Buturate thinner	2g	possible burning	contract disposal	
		Nitrate thinner	2g	possible burning	contract disposal	
		Paints and lacquers	7g	possible burning	contract disposal	
Instrument	418	Petroleum based solvent	2g/yr		contraot disposal	
Pneudraulics	418	Petroleum based solvent	300-400g/yr		contract disposal	
		Hydraulic fluid	10-15g/yr		contract disposal	
Survival Equipment	408	PD-680	10g/yr		contract disposal	
		Dichloromethone	3g/yr		contract disposal	
AGE	420	Lube oil	300-400g/yr	possible burning	contract disposal	
		Hydraulic fluid	50g/yr	possible burning	contract disposal	

Confirmed timeframe/disposal data by shop personnel

Estimated timeframe/disposal data by shop personnel

TABLE 4.1

Waste Handling Summary - 911th TAG

Shop Name	Location Building#	Waste Material	Yearly Waste Quantity	Method(s) of TSD 1960	1970	1980
Jet Engine	418	PD-680 Lube oil	300g/yr 20g/yr			
Prop	411	Petroleum based solvent	50g/yr	possible burning		contract disposal

Confirmed timeframe/disposal data by shop personnel

Estimated timeframe/disposal data by shop personnel

Shop interviews focused on hazardous material, material generated, waste quantities, and disposal methods. The majority of shops indicated that except for changes from Avgas to JP-4, only minor changes in materials have occurred. Volume of material generated appears to be relatively constant over time.

Disposal timelines were developed based on this information. Table 4.1 summarizes the information obtained from detailed shop review including information on present and past shop location, identification of hazardous wastes, waste quantities and disposal methods.

At the present time, the major aircraft maintenance operations are conducted Buildings 418, 416, 417 and 129. Building 418 is used for general maintenance and includes the machine shop, sheet metal shop and welding shop. The fuel cell maintenance shop and corrosion control are in Building 416. The aircraft maintenance hanger is Building 417. The scheduled maintenance shop is in Building 129. Building 418 was the original hanger at the base; it was built in 1945 for the U.S. Air Force and was used by the active duty Air Force and Reserves. In 1971 the building 129 hanger was completed. Building 129 was used for aircraft washing and also for aircraft maintenance. Building 418 has been converted from hanger space to shop space. Buildings 416 and 417 have only recently (1984) been completed and placed into use.

There have been few major changes in the aircraft maintenance operations. The changes that are of greatest significance to waste generation have been related to aircraft painting, engine oil use and solvent use.

Until the early 1970's, the aircraft were not painted; the only painting operations were touch up and interior painting. Prior to the early 1970's, the metal skins of the aircraft were cleaned with soap and water and periodically cleaned with skin brightener (Lama-Brite) which was a phosphoric acid based compound. The corrosion control shop has operated at its present scope then only for the last ten years.

Engine oil use has changed with each change in aircraft: the C-124 aircraft had eighty gallons of engine oil, the C-123 aircraft had forty gallons, and each C-130 engine holds eight quarts. These changes, however, did not significantly impact on the rate of generation of waste oil. The C-123 and C-124 aircraft apparently consumed more oil than the C-130's. In addition, the number of aircraft assigned has varied with the net result that the quantity of waste oil generated per year has not changed substantially.

The solvents that have been used have changed through the operations history. Chemsol, Varsol, and PD-680 have been used. All are petroleum based solvents.

Wastes generated by aircraft maintenance operations have been disposed of through various means as detailed on Table 4.1 and described in section 4.2.2. Briefly, waste disposal has been to landfills, the fire training area and to the sewer. Current practice is that materials/wastes are sold, recycled, or disposed of tthrough the DPDO. Waste from oil waters separators are disposed of through private contractor.

4.2.1.2 POL Operations

The POL operation has changed through the history of the site. The present POL facility was constructed in the late 50's; it contains two above ground storage tanks, one 187,000 gallon and a 122,377 gallon, and two underground 25,000 gallon tanks. Tank cleaning has occurred every 3-5 years. It has been common practice to bury the sludge, which has amounted to one or two 5-gallon buckets in the dike surrounding the tanks. Until 1978 the Reserve provided POL support to the Pa ANG.

Since the 1950s, fuel has been trucked to the aircraft and refueling has been taking place on the aircraft apron. Prior to that, a hydrant system was used. Fuel was piped up to the apron and refueling took place from six hydrants. The hydrant system was located under the present location of Building 416 and under the apron in front of 416. Most of the piping has been removed although some piping reportedly remains under Building 416. Interviews with personnel who were present during excavation of the system indicate that no evidence of oil in the ground was observed.

Early in the history of the base, the POL facility was located on the southern end of the base between Buildings 300 and 210. It is not known whether the storage tanks were above or below ground. Photographs from the early 1950's, however, do not show above ground tank(s) so it may be assumed that the tanks were below ground. Removal of the tanks has not been confirmed. Reports indicate that this was the site of numerous small spills; further documentation is unavailable.

4.2.2 Waste Management

4.2.2.1 Waste Disposal

In the past, the 911th has used four areas for most waste disposal. During the period the base was used by the active duty Air Force, wet garbage was removed from the site and reportedly sold to area farmers. Until 1969, the Air Force Reserve transported all refuse, other than that given/solid to farmers, off-base. Until approximately 1969, the Reserve provided their own trash hauling. Since 1969, removal and disposal has been by outside contractor.

Throughout the history of the base liquid wastes were taken offsite. Since 1974, liquid waste removal and disposal has been handled by contractor.

Coincident with off-site disposal an on-site landfill was also used for waste disposal (Landfill 2). The site is located under a portion of the Civil Engineering compound and was used until 1969. The site was used for open burning of trash. Reportedly, paint cans and other empty containers were burned. There was also a single report that radioactive tubes from the NDI shop were buried in this area.

Locations of waste storage and disposal sites on the base are shown on Figure 4-1 and listed on Table 4-2.

4.2.2.2 Waste Storage Areas

From the 50's to early 70's the major storage area was off-site.

Since 1982, wastes have been managed in accordance with the 911th TAG Hazardous Waste Management Plan (May 1982) which outlines six accumulation points and one central collection point for liquid wastes shipment to DPDO. Previous to 1982, two other areas were used. From early 1950 to 1974, the area where Building 408 stands was used for storage of oil, solvents, and fuel. The site had a gravel base and spillage was frequent. The storage area was moved to the area of Building 416 when 408 was constructed. From 1974 until 1982, this gravel based areas served as a collection point for oils, solvents, and fuels. The area was also heavily stained from spillage. When Buildings 408 and 416 were constructed, excavation was limited to surficial soil removal. The excavated material was used as fill in the surrounding area.

4.2.3 Fire Protection Training

The only location in which fire training occurred was off base.

4.2.4 Transformers and PCB Handling

Sixty-six transformers at the 911th have been analyzed for PCB content. Eight have PCB concentrations in the 50-499

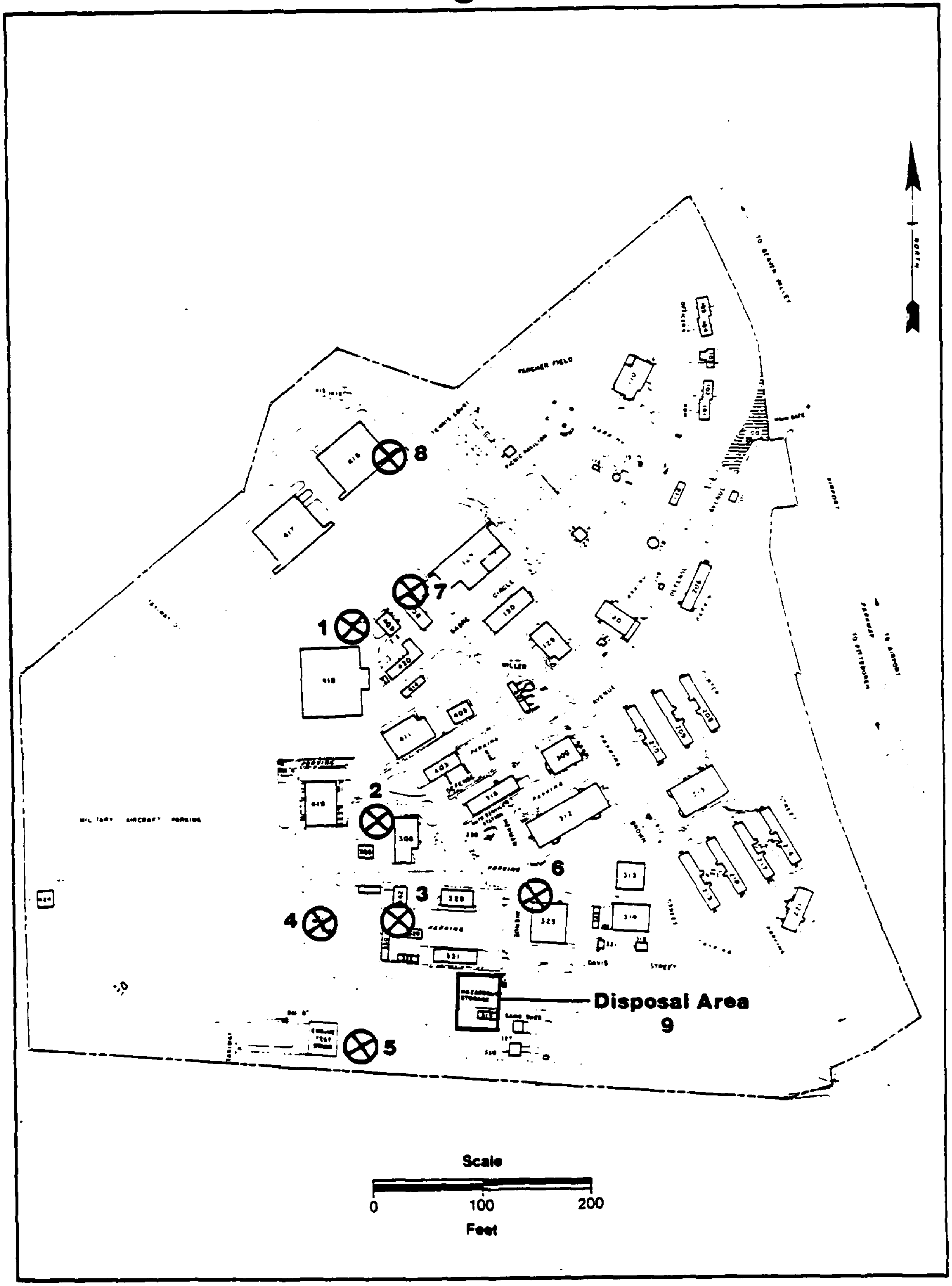

FIGURE 4-1 ON-BASE WASTE STORAGE AND DISPOSAL LOCATION - U.S. AIR FORCE RESERVE

TABLE 4-2

Waste Storage Areas

Air Force Reserve

Area	Location	Designation
1	N418	Accumulation point, 55 gallon drum storage for oils/solvents
2	W306	Accumulation point, 55 gallon drum storage for oils/solvents
3	S342	Accumulation point, 55 gallon drum storage for oils/solvents (past PCB storage area prior to construction of 342)
4	334	Exclusive storage of PCB and PCB contaminated material
5		Central Collection Area
6	N325	Drum Storage
7	Under 408	Past Storage Area
8	Under 416	Past Storage Area
9	CE	Past Disposal Area

range (Table 4-3) and eleven have concentrations greater than 500 ppm. PCB concentrations in the remaining transformers are below 50 ppm. Transformers taken out of use that contain PCBs are sent to DPDO at Letterkenny Army Depot. They are stored in Building 334 for the interim, presently and have been stored in the area of Building 342.

One incident took place that involved the leakage of a transformer that may have contained PCBs. In 1980, three transformers were transported to DPDO by the motor pool. It was apparent from the oil stained ground where they were stored that one (or more) of the transformers was leaking. When the shipment arrived at DPDO, it was rejected and sent back because; (1) transformer oil was leaking from the shipment and (2) no analytical data was provided on the oil. The transformers were returned to the AFR base and stored in Building 334 until chemical analysis was completed on the oil and they were sealed. Once this was completed, the transformers were shipped to DPDO and accepted. The PCB content of the leaked oil is unknown.

4.2.5 POL Spills and Leaks

At the Air Force Reserve, the majority of spills were less than 50 gallons and were contained with no adverse environmental impact. The largest recorded spill occurred October of 1980 when 460 gallons of fuel were spilled. The spill occurred in the POL pump area (Building #114); it was contained in the work area and collected in 55 gallon drums. There was no adverse environmental impact and the cause was human error.

In 1976 #2 fuel oil was discovered in a storm drain; the source was traced to a 5,000g No. 2 fuel oil tank at Building 316. Upon excavation, the source was found to be in the oil circulation system. The line leading from the pump in the furnace had a 1/4 x 3/8 hole in it. Necessary repairs were performed and the pipe was replaced, but not before fuel oil had travelled through the storm water system and reached the creek. Immediately, booms were put in place to recover any fuel oil. The amount of fuel recovered is unknown. It is assumed that the soil between the location of the leak and the storm sewer has been contaminated and no removal of soil has occurred. Figure 4-2 shows the location of the spill.

4.3 PENNSYLVANIA AIR NATIONAL GUARD

4.3.1 Overview of Industrial Operations

The industrial operations at the PaANG base are very similar in nature to the operations at the Reserve base. The major areas of industrial type activities and waste generation are

Table 4-3

PCB ANALYSIS - TRANSFORMERS IN USE AT 911TH TAG
(1983)

Transformer Location	PCB Content			PCB Concentrati
	500ppm +	499-50ppm	49-0ppm	
P300-Snack Bar	X			607ppm
P300-Credit Union			X	
P316 #1			X	
P316 #2			X	
P316#3			X	
B.C.E. #1			X	
B.C.E. #2			X	
B.C.E. #3			X	
Motor Pool #1			X	
Motor Pool #2			X	
Motor Pool #3			X	
P403			X	
P409 #1			X	
P409 #2			X	
P409 #3			X	
On Pad Near 409 #1			X	
P125 #3		Not Tested		
P125 #1			X	
P125 #2			X	
P125 #3			X	
P411 #1		X		297ppm
P411 #2		X		259ppm
P411 #3		X		284ppm
P206 #1			X	
P206 #2			X	
P206 #3			X	
Rocket Shed #1			X	
Rocket Shed #2			X	
Rocket Shed #3			X	
P114 #1	X			500,000ppm
P114 #2	X			500,000ppm
P114 #3	X			500,000ppm
206 Disconnected			X	
P120			X	
Dispensary #1		X		368ppm
Dispensary #2			X	
Dispensary #3			X	
Dispensary #4			X	

Table 4-3

PCB ANALYSIS - TRANSFORMERS IN USE AT 911TH TAG (1983)

Transformer Location	PCB Content			PCB Concentration
	500ppm +	499-50ppm	49-0ppm	
P312 #1		X		177ppm
P312 #2			X	
P312 #3			X	
Comm. Center #1			X	
Comm. Center #2			X	
Comm. Center #3			X	
Ballfield #1	X			340ppm
Ballfield #2		X		342ppm
Ballfield #3	X			752ppm
P125 #1			X	
P125 #2			X	
On Pad Near 409 #2			X	
On Pad Near 409 #3			X	
P408 #1		X		404ppm
P408 #2		X		281ppm
P408 #3	X			673ppm
P129 #1			X	
P129 #2		X		
P129 #3			X	
P127 #1	X			841ppm
P127 #2	X			838ppm
P127 #3	X			856ppm
Club #1			X	
Club #2			X	
Club #3			X	
Family Housing	X			839ppm

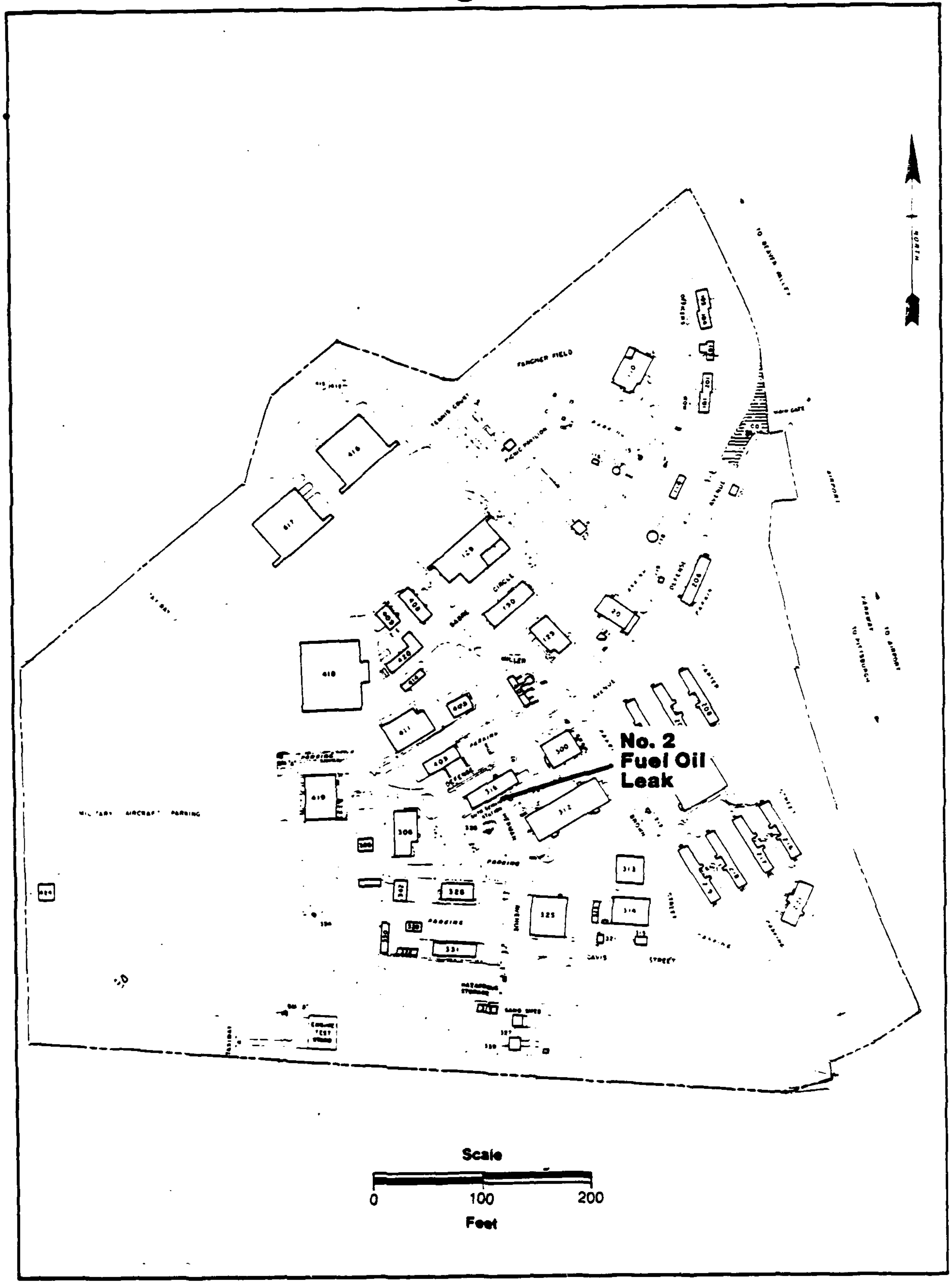

FIGURE 4-2 LOCATION OF TANK LEAKS - 911TH TAG

aircraft maintenance, and POL operations. Based on interviews with base personnel and review of base records, a detailed description of the waste handling practices has been developed and is shown on Table 4-4. Operations, waste handling and disposal are described in the following subsections.

4.3.1.1 Aircraft Maintenance

Maintenance operations on the KC-135 aircraft and the A-7 fighter aircraft are conducted primarily in shops located in Buildings 206, 301, 302, 303, 304, 305, and 310. The hangers (docks) are Buildings 301, 302 and 304. Buildings 301 and 302 are the original hangers built in 1950; Building 304 was added in 1974. The types of wastes generated by aircraft maintenance are similar to those generated at the Reserves. Table 4-4 shows that a petroleum based solvent (Chemsol) has been used through the history of the Guard at this site; as stated previously Chemsol is a PD-680 Type II solvent. Based on data collected at other bases, however, it is likely that Chemsol has actually been used only since the mid to late 1970's. Prior to that time, other bases generally used a kerosene based solvent (like Varsol) or trichloroethylene.

4.3.1.2 Base Civil Engineering

As at the Reserve base, Base Civil Engineering is responsible for maintenance of the base and provision of services. The major types of materials used by these activities are solvents, thinners, waste oil and vehicle fluids.

4.3.1.3 POL Operations

The POL facility at the ANG was constructed in 1978; it contains two above ground 210,000 gallon storage tanks.

Recent tank cleaning reportedly has not produced any sludges and no record of any gross spillage exists for the past. Prior to 1978, aircraft fuel was brought from the Air Force Reserve base.

The motor pool fuel storage system was changed in 1983 when a single 3,000 gallon tank was replaced by two 5000 gallon tanks and one 3,000 gallon tank. During this change, there was evidence of leakage from the old tank. This is discussed in greater detail in subsection 4.3.5.

4.3.2 Waste Management

4.3.2.1 Waste Disposal

The disposal of wastes has been handled in a variety of ways over the years at the PaANG. During the early period of the

TABLE 4.4

Summary of Waste Handling Practices - PaANG

Shop Name	Building	Waste Material	Amount gal/yr	Method(s) of Disposal 1960	1970	1980
POL	113	H_2SO_4	12	diluted & dumped in sewer ----------	----------	----------
		Isopropyl Alcohol	6	sewer----------	----------	----------
Motor Pool	202,203	Battery Electrolyte	200-250	Neutralized to Sanitary Sewer ----------	----------	----------
	204	Motor Oil	500-600	----------	sewer through O/W sep. waste oil tank	
		Chemsol	100-150	----------	sewer ----------	----------
		Kerosene	100-150	sewer ----------	----------	----------
		Hydraulic Fluid	200-250	----------	----------	sewer through O/W sep.
		Brake Fluid	30-50	----------	----------	sewer through O/W sep.
		Transmission Fluid	12-15	----------	----------	sewer through O/W sep.
		JP-4	100	----------	----------	sewer through O/W sep.
R&R Shop	301,302	Chemsol	350-500	Off-site ----------	----------	Burned off-site or contractor disposal
		Stripper Solvent (8010-01-040-1059)	350-400	Off-site ----------	----------	Burned off-site or contractor disposal
		Hydraulic Fluid	25-35	Off-site ----------	----------	Burned off-site or contractor disposal
		Toluene	12-15	Off-site ----------	----------	Burned off-site or contractor disposal
Age	307	Chemsol	250-350	Off-site - - - - - -	- - - - - -	Burned off-site or contractor disposal
		Hydraulic Fluid	125-150	Off-site - - - - - -	- - - - - -	Burned off-site or contractor disposal
		Paint Thinner	20-50	Off-site - - - - - -	- - - - - -	Burned off-site or contractor disposal
		H_2SO_4	10-15			

Confirmed timeframe/disposal data by shop personnel

- - Estimated timeframe/disposal data by shop personnel

TABLE 4.4

Summary of Waste Handling Practices - PaANG

Shop Name	Building	Waste Material	Amount gal/yr	Method(s) of Disposal 1960	1970	1980
Jet Engine	310	Chemsol	50-75	Off-site ----------	----------	Burned off-site or contractor disposal
		MEK	12-15	Off-site ----------	----------	Burned off-site or contractor disposal
Weapons	206	Chemsol	250-500	open burn at dump ----------	Off Site ----------	----------
		Enamel Thinner	40-50	open burn at dump ----------	Off Site ----------	----------
		Lacquer Thinner	40-50	open burn at dump ----------	Off Site ----------	----------
		Bore Cleaner (6850-00-753-4806)	250-500	open burn at dump ----------	Off Site ----------	----------
Electric	301	Toluene Diisocyanate Di-phenyl Methane	1	open burn at dump ----------	Off Site ----------	----------
		Toluene	12-15	open burn at dump ----------	Off Site ----------	----------
Flightline Maintenance	304	Cleaning Compound (6850-00-935-0995)	250-400	sewer through oil separator		
		Hydraulic Fluid	250-500	open burn at dump ----------	Off Site ----------	----------
		Oil	250-500	open burn at dump ----------	Off Site ----------	----------
Life Support	302A, 301	Isopropyl Alcohol	6-8	sewer ----------	----------	
		Toluene	1	open burn ----------	Off-site ----------	Burned off-site or Contractor disposal
		MEK	1	open burn at dump ----------	Off-site ----------	Burned off-site or contractor disposal

Confirmed timeframe/disposal data by shop personnel

- - - - - - Estimates timeframe/disposal data by shop personnel

TABLE 4.4

Summary of Waste Handling Practices - PaANG

Shop Name	Building	Waste Material	Amount gal/yr	Method(s) of Disposal 1960	1970	1980
Support Equipment	301	MEK	12-15	open burn	Off-Site	Burned off-site or Contrator Disposal
		Lacquer Thinner	12-15	open burn at dump	Off-Site	Burned off-site Contrator Disposal
		Petroleum Based Solvent	120-150	open burn at dump	Off-Site	Burned off-site Contractor Disposal
Phase Dock	301	Chemsol (P-D-680)	75-100	open burn	Off Site	
Hangar	302	Toluene	12-15	open burn at dump	Off Site	
		MEK	12-15	open burn at dump	Off Site	
		Cleaning Compound Class 1 (6850-01-0457931)	400-600	sewer drain		
		Cleaning Compound Class 1 (6850-01-935-0995)	400-600	sewer drain		
		Chemsol	250-400	sewer drain		
Pneudraulics	302	Hydraulic Fluid	200-300	open burn at dump	Off Site	
		Chemsol (P-D-680)	150-250	open burn at dump	Off Site	
		Toluene	12-15	open burn at dump	Off Site	
		Fuel	250-400	open burn at dump	Off Site	Recycled thru AGE
Fuel Cell		JP-4	600-800	open burn	Off Site	
		MEK	5-15	at dump	Off Site	
				at dump		
		Toluene	40-60	open burn at dump	Off Site	

Confirmed timeframe/disposal data by shop personnel

Estimated timeframe/disposal data by shop personnel

TABLE 4.4

Summary of Waste Handling Practices - PaANG

Shop Name	Building	Waste Material	Amount gal/yr	Method(s) of Disposal 1960	1970	1980
NDI		X-ray Film Processing		--		Sewer
Sheet Metal Welding	303	MEK	10-15	open burn--------- at dump	Off-Site------	Burned off-site or Contrator Disposal
		Paint Remover (8010-00-515-2259)	6-10	open burn--------- at dump	Off-Site------	Burned off-site or Contractor Disposal
Hydraulic	302	Chemsol	100	Off Site Burning------------		Contractor Disposal
		Hydraulic	40-50	----------------------------		Contractor Disposal
Corrosion Control	303	MEK	6	----------------------------		Contractor Disposal
		Lacquer Thinner	60	----------------------------		Contractor Disposal
		Acrylic Thinner Poly Acrylic	60	----------------------------		Contractor Disposal
		Paint and Lacquer Remover	60	----------------------------		Contractor Disposal
		Toluene	6	----------------------------		Contractor Disposal
Structural Repair		MEK	3	----------------------------		Contractor Disposal
		Paint Remover	3	----------------------------		Contractor Disposal
Environmental	302	Oil	12	----------------------------		Contractor Disposal
		Chemsol	6	----------------------------		Contractor Disposal

Confirmed timeframe/disposal data by shop personnel

Estimated timeframe/disposal data by shop personnel

base activities (50's to early 60'), all oils, solvents and fuel were burned offsite. From this time until the present, used solvents, oils and JP-4 have continued to be burned off site. This has continued until present with the exception of that around 1980 a recycling program was implemented for waste JP-4 and oils. Now all waste JP-4 is tested by POL to determine if it can be reused by AGE. Oils are tested and sent to DPDO if recyclable. If they are not, both go off site. This is in accordance with the Base Hazardous Waste Management regulation (85-12).

4.3.2.2 Waste Storage

Past waste storage at the ANG included: an area south of the present POL which held a maximum of 15 drums at a time during use. This area had no visible signs of contamination. Used from mid-1970's until early 1980's; at present the area has been covered by fill. Aircraft maintenance was the main user.

As of July 1984, two areas are used for storage of an area behind Building 110 for storage of used and unused product and a gravel parking lot across from the POL area is used to store materials and wastes which are to be shipped to DPDO.

4.3.3 Fire Protection Training

The PaANG used the same off-site area that was used by the Reserves.

4.3.4 Transformer Handling

There were no analytical results found at the ANGB in the record search for PCB concentrations of transformer oil. Six transformers are stored behind Building 205; three on pallets, three on the ground. As of July 1984 three other transformers were stored behind Building 206 on the ground. The PCB content of the oil is unknown. There were no reports of any leaking transformers or any of contaminated transformer oil. Neither area has been used for transformer storage as a continuing practice.

4.3.5 POL Spills and Leaks

At the ANG base, WESTON's investigation identified no major spill; a number of small spills (15-20g) were reported but all appear to have contained and recovered without any adverse impact. There have been, however, two underground tanks in which leaks have occurred. The first during installation of new tanks in the motor pool. The old 3,000 gal leaded gas tank was removed and many small holes were noted in the tank. Extensive anaerobic odors were noted with contaminated soil and free fuel and water present in the location of the removed tank. It is not known for how long or the quantity of fuel that had escaped from the tank. No excavation of soil occurred and the area was backfilled and covered by asphalt in the center of the motor pool lot.

The second location is the underground waste oil (300 or 550 gallons) for the A-7 test stand, where two years ago it was noticed that the influent pipe was broken below grade. The tank is still in use. The area over the tank lacks vegetation, is oil soaked and has subsided a few inches. The amount of oil lost has been estimated by personnel to be 300 gallons. It was reported that the bottom of the tank may have been broken when an attempt was made to clear an obstruction in the influent pipe by hammering a smaller pipe to remove the obstruction.

The potential exists in both locations for extensive soil contamination and possible groundwater contamination, especially if use of the waste oil tank is continued. Figure 4-3 shows the locations of these sites.

4.4 SUMMARY OF PAST WASTE MANAGEMENT METHODS

The facilities on Pittsburgh ANG and Air Force Reserve Bases which have been used for the management of waste can be categorized as follows:

- landfills
- sanitary wastewater treatment plants
- oil water separators

These facilities are discussed in the following subsections.

4.4.1 Landfills

Landfills have been used by the Air Force Reserve and ANG bases for disposal of wastes. The only onsite landfill is described below.

The landfill was located at the AFR base across from the present sand storage area (See Figure 4-1). This was used from early 1950 until early 1960's for normal refuse and used paint cans. In the 60's, it was common practice to burn trash, but there is no indication that any burning of hazardous material occurred. There was one report that radioactive tubes were placed in the fill; this area has been filled in over the years and is now buried by up to 30 feet of cover.

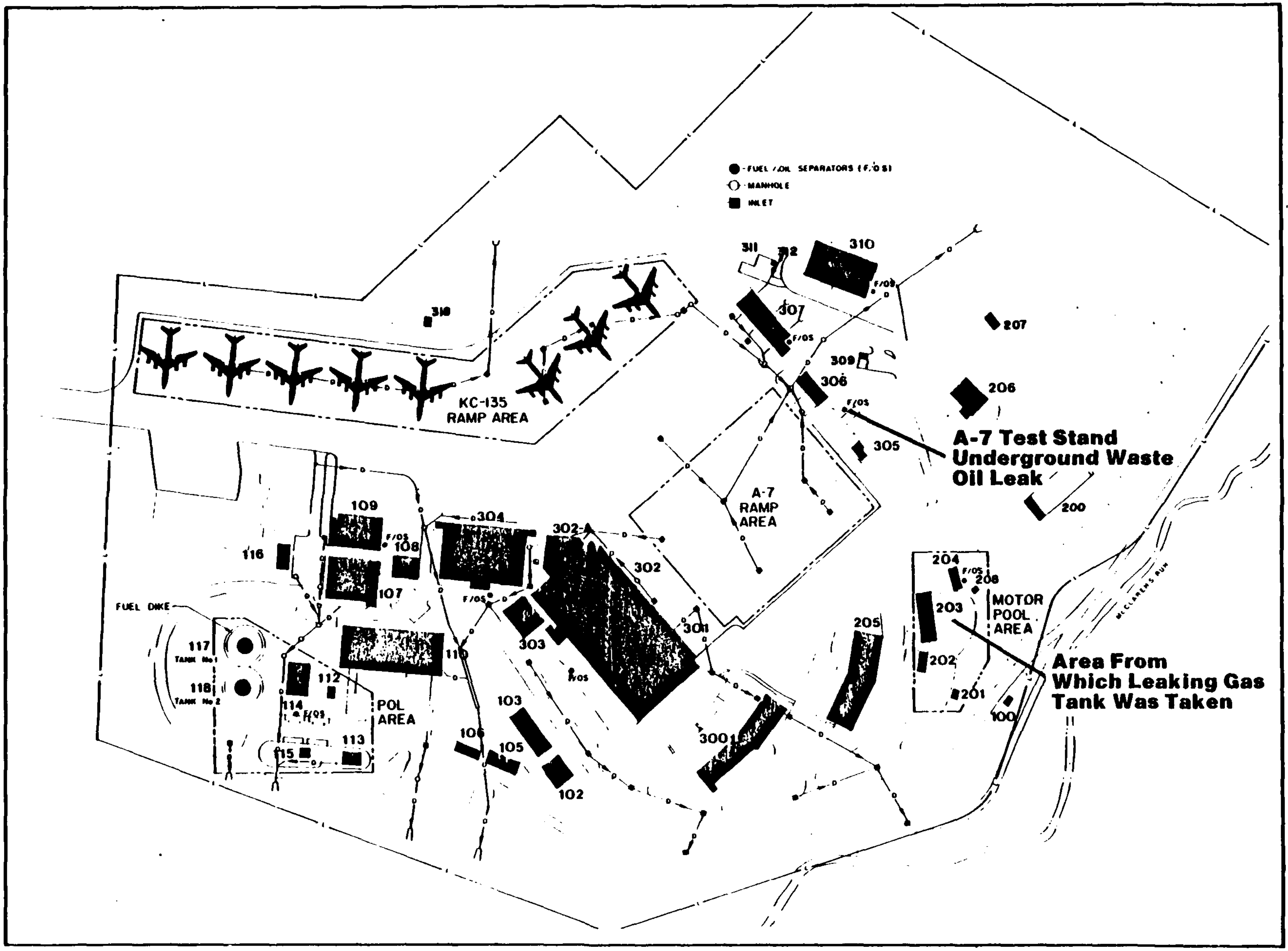

FIGURE 4-3 LOCATION OF TANK LEAKS - PA ANG

4.4.2 Sanitary Wastewater Treatment Plants

Both bases currently use the municipal treatment plant. An older treatment plant at the ANG was leveled, covered over and now has a Building 200 over a portion of it. An older plant at the Air Force Reserve is located south of the base and is now in the process of being buried.

4.4.3 Oil-Water Separators

During the mid 70's, fuel/oil separators were installed at both bases. Recovered oil is disposed of by an off-base contractor and the wastewater enters the sanitary sewer system.

The ANG base has eight separators around the base (Table 4-5): Their functional ability is in some doubt for two reasons. First, within the past year it has been noted that two of the separators are clogged and do not work. Another problem which was recently discovered is that the contractor who removes the collected oil has been pumping the separator and not the waste collection tank. Therefore, with the waste collection tank full, the system is by-passed. There is no indication of how long this situation has existed, but it appears to have been for a number of years. This problem has been rectified and the waste tanks are being pumped.

The AFR has 10 oil/water separators at different locations (Table 4-6). Recovered oil is disposed of by an off-base contractor.

4.4.4 Low Level Radio-Active Material

There have been a number of reports on different methods past and present for the disposal of Radon and Kriton 85 detection/source tube.

At the ANG, a shipment is noted to Wright Patterson of 1 Kryton 85 source tube; this was the only record of radioactive material at ANG. The Air Force Reserve base had two written records.

- 2 June 1981, one Kryton 85 source tube 6680-00-179-216045, shipped from the instrument shop (Building 107) to supply for disposal, 300 millicures.
- 16 May 1981, on a materials survey checklist from the Avionics shop listed six radio-active electron tubes per month generated, and the disposal method "put in carton then into trash".

TABLE 4-5

Oil/Water Separators

PA ANG

Building	Tank Volume/Gallons	Underground/Aboveground
109	200	Underground
204	100	Underground
301/302	15,000	Underground
304	222	Underground
305	300	Underground
307	120	Underground
310	120	Underground
114	500	Aboveground

TABLE 4-6

Oil Water Separators

Air Force Reserve

Area	Building Location	# of Tanks	Volume	Underground/Aboveground
10	118	1	250	Underground
11	127	1	570	Underground
12	129	1	280	Underground
13	420	1	250	Underground
14	418	1	280	Underground
15	411	1	250	Underground
16	411	1	280	Underground
17	306	1	280	Underground
18	306	1	280	Underground
19	325	1	500	Underground
	416	1		Underground
	417	1		Underground

There were also two reports of burial of Krypton and Radon tubes. One report stated that it was common practice to bury these tubes in the landfill at the AFR base. The report could be verified through any file sources or by other interviewees. During the 1960's many personnel at Air Force bases routinely wore dosimeters even though there were no radionuclide sources. The assumption of radioactive waste may have been made based on seeing the monitoring devices.

4.5 EVALUATION OF PAST ACTIVITIES

Review of past operations and waste management practices at the U.S. Air Force Reserve and Pennsylvania Air National Guard at the Greater Pittsburgh International Airport has resulted in identification of fifteen sites of environmental concern. Nine sites are located on the Reserve base (Figure 4-4) and six are located at the PaANG base (Figure 4-5). All sites were evaluated according to the Flow Chart Method shown previously on Figure 1-1. The results of this evaluation are shown on Table 4-7.

4.5.1 Air Force Reserve Sites of Initial Environmental Concern

There is not sufficient evidence that the Landfill No. 2 site has a potential for creating environmental contamination. Landfill No. 2 was used only for disposal of normal base refuse. No information was obtained from base records or interviews to indicate that any significant amount of hazardous waste were disposed of at the site. However, reports indicate that some burial of low-level radioactive Radon detector tubor did occur. This is not considered to be significant because the number of tubes appears small and the area is covered by 20-40 ft of fill. Past measurements by reserve personnel have failed to produce readings above normal background.

There is not sufficient evidence that the drum storage areas in CE have potential for creating environmental contamination.

It is recommended that the storage activities be moved to a contained area or that containment be provided at the present locations.

There is not sufficient evidence that the drum storage area (motor pool) has potential for creating environmental contamination. The area contains the unused products for routine use in operations. There are no data to suggest that spills or leaks have occurred. It is, however, recommended that containment be provided for the stored materials.

TABLE 4-7

SUMMARY OF FLOW CHART METHODOLOGY

Site	Contamination	Contaminant Migration	Environmental Concern	HARM Rating
U.S. Air Force Reserve				
Landfill	N	N	N	N
Drum Storage CE	N	N	Y	N
Drum Storage Building 408	Y	Y	N	Y
Drum Storage Building 416	Y	Y	N	Y
Drum Storage Motor Pool	N	N	Y	N
PCB Storage Building 334	N	N	Y	N
PCB Storage Building 342 (outside)	Y	Y	N	Y
Drum Storage CE	N	N	Y	N
Fuel Line Break Building 316	Y	Y	N	Y
PA Air National Guard				
Gasoline Tank Leak Motor Pool	Y	Y	N	Y
A-7 Test Stand Waste Oil Tank	Y	Y	Y	Y
Transformer Storage Area Building 206 (outside)	N	N	Y	N
Oil/Water Separators	N	N	Y	N
Drum Storage Area (POL)	N	N	N	N
Drum Storage Current	N	N	Y	N

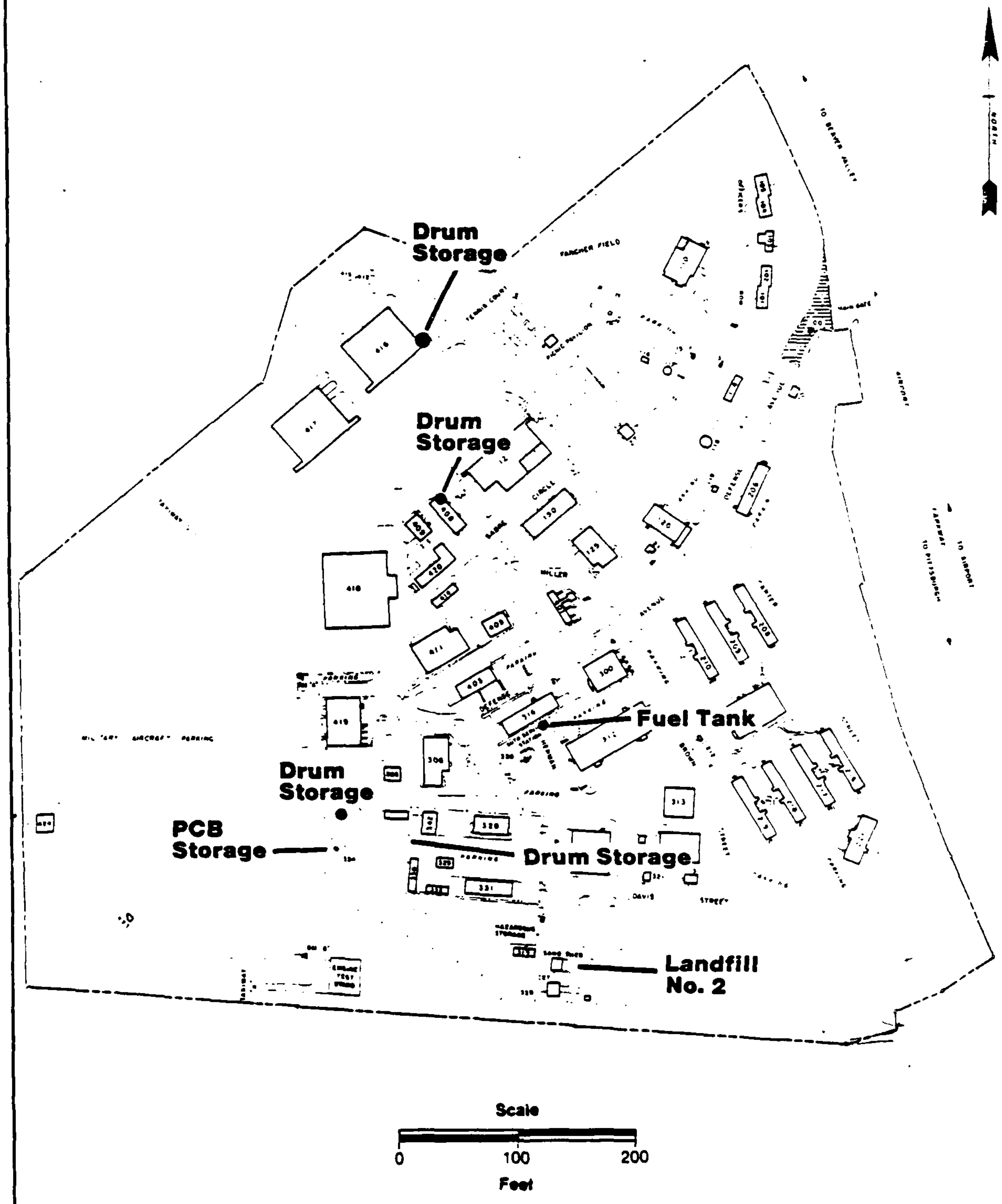

FIGURE 4-4 SITES OF ENVIRONMENTAL CONCERN-
911TH TAG

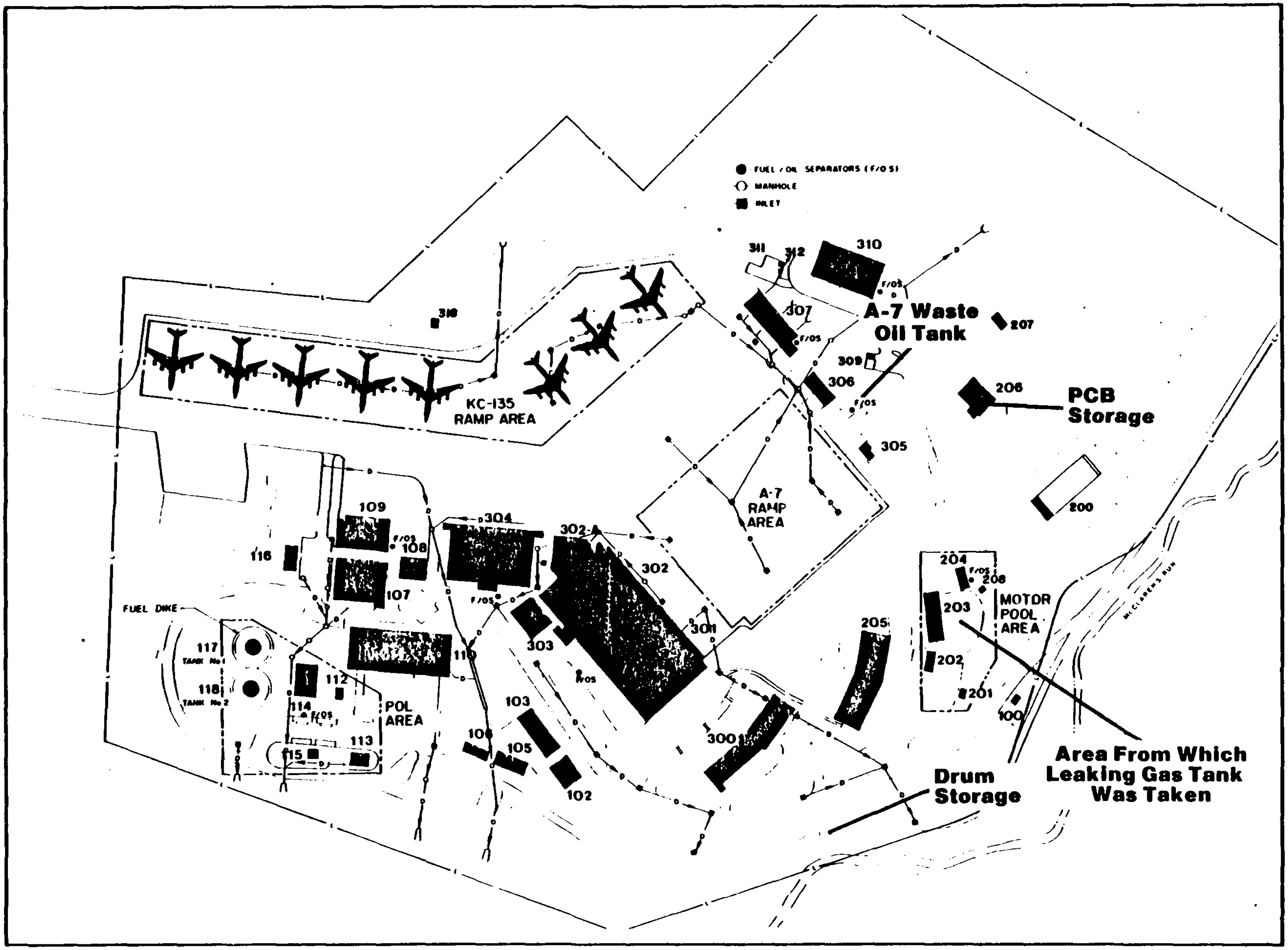

FIGURE 4-5 SITES OF ENVIRONMENTAL CONCERN - PA ANG

There is not sufficient evidence that the transformer storage area has potential for environmental contamination and a follow-on investigation is not warranted. No reported leachate of transformer oil has been reported at the site.

There is not sufficient evidence that the oil/water separator system has potential for environmental contamination. There has been a problem in the past with correct usage and maintenance, which lead to a by-pass of the system. The problem has been rectified but two units still remain inoperable. The aqueous effluent is discharged into the sanitary sewer system for all separators.

There is not sufficient evidence that the current drum storage site has potential for environmental contamination. The area is on the outer edge of the base on fill material with a gravel base. No cover or containment exist at the site. The storage site appears to be temporary location until a permanent site is found.

There is no evidence to indicate that the storage of PCB's in building 334 is a potential source of contamination. Storage is inside the building. Although the building is the old well house for one of the two abandoned water supply wells, the well has been sealed and there is no visible means of communication between the stored transformers and groundwater.

The remaining sites identified were determined to have a potential for environmental contamination and migration and were, therefore, evaluated using the Hazard Assessment Rating Methodology (HARM). The HARM process considered the potential contamination receptors, waste characteristics, migration pathways, and waste management practices in use at the site. The details of the system and rating sheets for the individual are presented in Appendix D. The HARM system is designed to indicate the relative need for follow-on action and the resulting ratings are intended for assigning priorities for further investigation in order to more fully evaluate the sites identified. Table 4-8 is a summary of the HARM scores for the sites.

4.5.2 Pennsylvania Air National Guard Sites of Initial Environmental Concern

There is not significant evidence that the Drum Storage Site (POL) has potential for environmental contamination. This area was used for only one year between 1977-1978. This area has been buried during base expansion and there was no data indicating spills during site use.

There is not sufficient evidence that the transformer storage area has potential for environmental contamination and a follow-on investigation is not warranted. No reported leachate of transformer oil has been reported at the site.

There is not sufficient evidence that the oil/water separator system has potential for environmental contamination. There has been a problem in the past with correct usage and maiantenance, which lead to a by-pass of the system. The problem has been rectified but two units still remain inoperable. The aqueous effluent is discharged into the sanitary sewer system for all separators

.

The remaining sites at the PaANG do have the potential for causing environmental contamination and migration and therefore have been rated by the HARM. The results of applying the methodology are summarized on Table 4-8.

TABLE 4-8

SUMMARY OF HARM SCORES

Rank	Site	Receptors Subscore	Waste Characteristics Subscore	Pathways Subscore	Waste Management Factor	Score
Reserve Sites						
1	Fuel Line Break Building 316	40	40	80	1	53
2	Drum Storage - Building 416	43	54	41	1	46
3	Drum Storage - Building 408	37	54	41	1	44
4	PCB Storage - Building 342	43	40	46	1	43
PA ANG Sites						
1	A-7 Waste Oil Tanks	41	48	80	1	56
2	Gasoline Tank Location	41	48	80	1	56

SECTION 5

CONCLUSIONS

5.1 INTRODUCTION

The goal of the IRP Phase I study is to identify sites having the potential for environmental contamination resulting from past waste disposal practices and to assess the possibility of contaminant migration from these sites. The conclusions given below are based on field inspections, review of records and files, review of the environmental setting, and interviews with base personnel, past employees, and Federal, state and local government employees and consideration of the environmental setting of each site. Table 5-1 contains a list of potential contamination sources identified at Pittsburgh Air Force Reserve and ANG sites, and a summary of the HARM scores for those sites locations are shown on Figures 5-1 and 5-2 . Descriptions of the sites are presented in the following subsections. The follow-on recommendations are presented in Section 6.

5.2 SITES AT THE U.S. AIR FORCE RESERVE

5.2.1 *Fuel Line Break (316)*

There is sufficient evidence that the area of building 316's fuel oil storage tank has potential for creating environmental contamination and a follow-on investigation is warranted. It has been estimated that 460 gallons of oil escaped from the tank through a broken pipe before the leak was detected and the pipe replaced. There has been no excavation of contaminated soil or any indication of extent of contamination.

The leak was detected when oil was found to be entering the storm sewer approximately twenty feet from the tank. Based on this condition it can be assumed that some migration of product has taken place. Soil between the tank and the sewer has not been removed and there have been no analysis of soil or groundwater to determine the extent of migration. It is estimated that most of the 460 gallons of fuel that were reportedly discharged from the tank remains in the ground.

The site received a HARM score of 53.

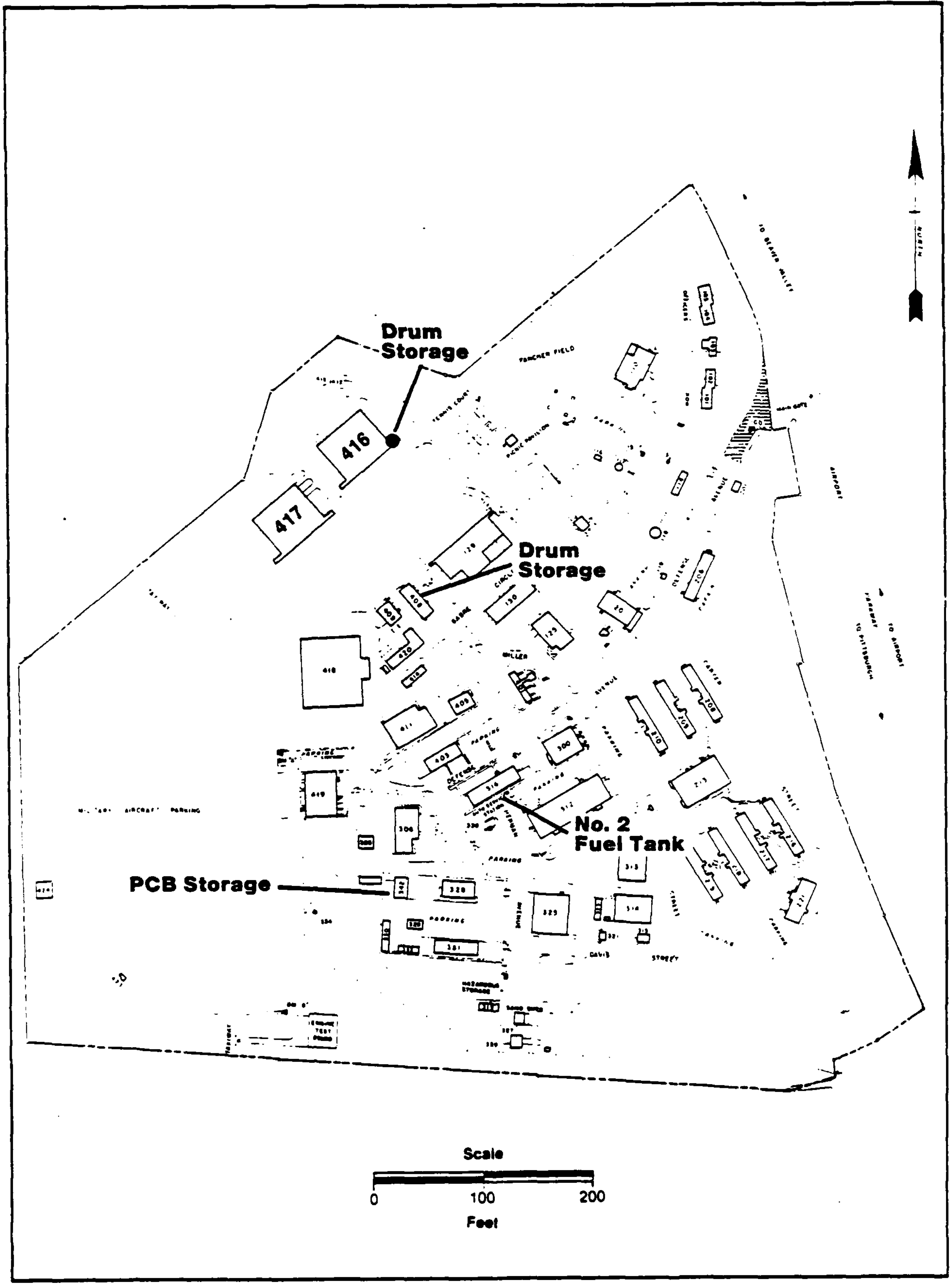

FIGURE 5-1 SITES RATED BY HARM

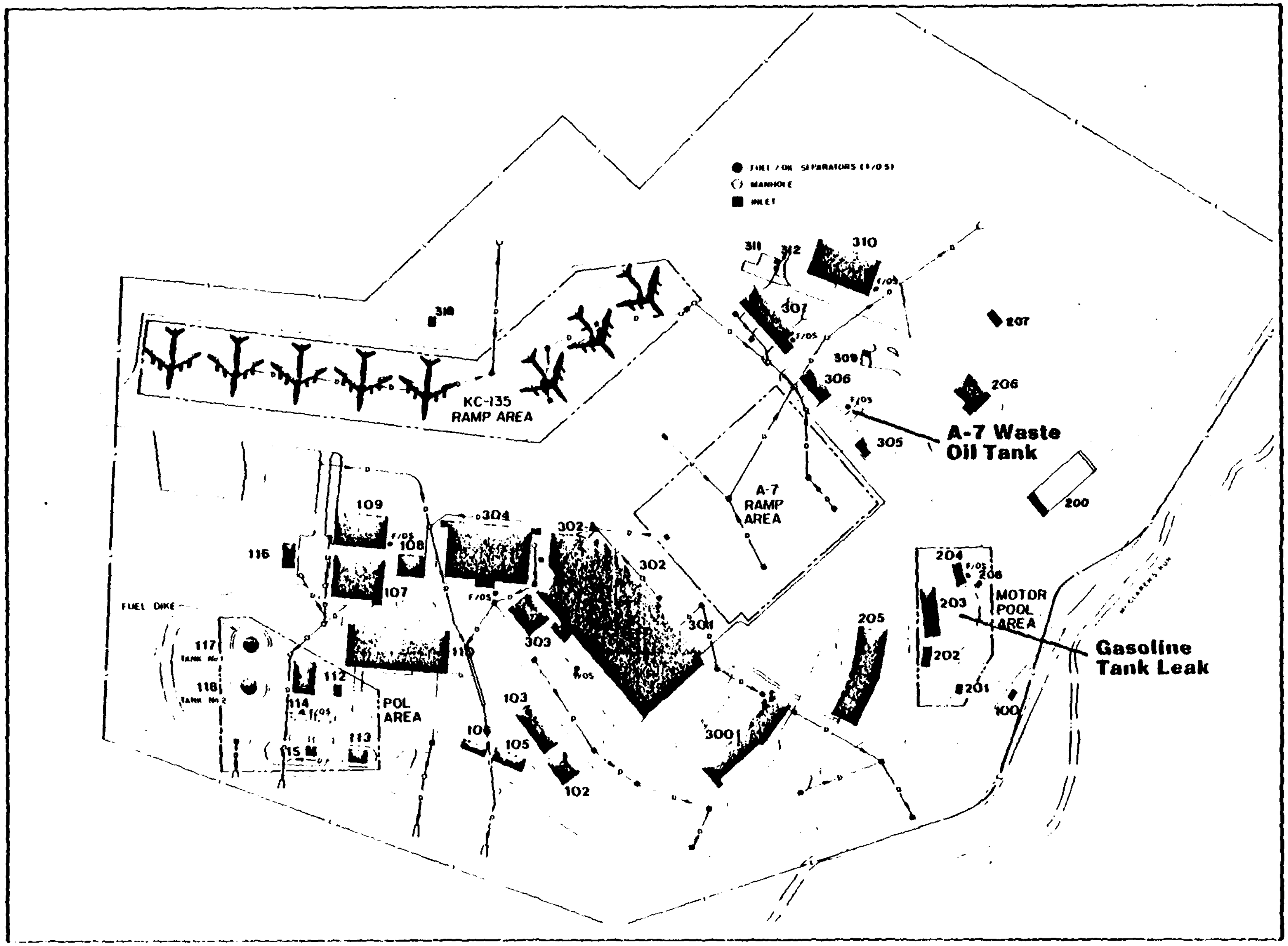

FIGURE 5-2 SITES RATED BY HARM - PA ANG

TABLE 5-1

SITES EVALUATED USING THE HAZARD ASSESSMENT RATING METHODOLOGY

Rank	Site	Operating Period	HARM Score
Reserve Sites			
1	Fuel Line Break-Building 316	1976	53
2	Drum Storage-Building 416	1974-1982	46
3	Drum Storage-Building 408	1950-1974	44
4	PCB Storage-Building 342	1970's-1982	43
Pa ANG Sites			
1	A-7 Waste Oil Tank	1982-Present	56
2	Gasoline Tank Location	Prior to 1983	56

5.2.2 Drum Storage Area- Building 416

There is sufficient evidence that the Drum Storage Area (Building 416) has potential for creating environmental contamination and a follow-on investigation is warranted. The area was used from 1974 until 1982 for storage of waste oil and fuel; approximately twenty drums were in the area at any one time. This area replaced the previous Drum Storage Area that was closed when Building 408 was constructed. It has also been reported that a large amount of spillage occurred with no containment mechanism; the area had a gravel base floor. Most spillage occurred when drums were overfilled. In 1984 Building 416 was constructed at this site, some excavation occurred with the material dumped over the bank by the tennis courts. Excavation was, however, minimal with only surficial soil removed to prepare the building site for the slab foundation of Building 46.

A potential concern at this site exists because of the mix of oils and solvents stored in the area. It is possible that PCB oil was mixed with other waste oils. Although PCBs are not normally soluble in water the presence of solvents spilled in the area would tend to mobilize PCBs and could promote migration of PCBs to groundwater.

This site received a HARM score of 46.

5.2.3 Drum Storage - Building 408

There is sufficient evidence that the Drum Storage Area (Building 408) has potential for creating environmental contamination and a follow-on investigation is warranted. The area was used from early 1950 until 1974 for storage of waste oil, solvents and fuels. Heavy spillage was reported during its use, the floor was a gravel base with no provisions for containment. The area was chosen for construction of a new building (408) and some excavation occurred. The excavated material was spread as fill around the base.

The same concern for the potential for PCB contamination described for the storage area at Building 416 exists for this site. As described in Section 4, this site was the on-base collection/storage area for liquid wastes generated by the Reserve and so any type of liquid, including PCB oils, could have been stored and spilled at this location.

This site received a HARM score of 44.

5.2.4 PCB Storage Area - Building 342

There is sufficient evidence that the PCB storage area at the location now occupied by Building 342 has the potential for causing environmental contamination. The site was used to store PCB transformers; interviewees have indicated that this area was used to store the leaking transformers described in Section 4.2.4 prior to the rejection of the transformers by Letterkenny and that the soil at the site was stained with oil from the transformers. There has been no estimate made of the quantity of PCBs that may have leaked at this location.

The site is now covered by Building 342. Some excavation took place in conjunction with building construction and the excavated material was deposited in the surrounding area creating the possibility that PCB contaminated soil has been spread around the area.

This site has received a HARM score of 43.

5.3 SITES AT THE PENNSYLVANIA AIR NATIONAL GUARD BASE

5.3.1 A-7 Waste Oil Tank

There is sufficient evidence that the waste oil tank at the A-7 test site has potential for environmental contamination and a follow-on investigation is warranted. Two years ago, the influent pipe had been broken below grade. However, the tank has remained in use. The area above the tank has subsided and is oil soaked. The amount of oil lost has been estimated to be 300 gallons but WESTON received some information that the bottom of the tank may have been punctured during a cleaning procedure. The estimate of 300 gallons does not include loss from the bottom of the tank. The possibility of loss from the bottom of the tank increases the probability that oil has migrated to groundwater.

This site has received a HARM score of 56.

5.3.2 Gasoline Tank - Motor Pool

There is sufficient evidence that the old gasoline tank location has potential for creating environmental contamination and a follow-on investigation is warranted. Upon replacement when a new fuel system was installed, the old 3,000 gallon tank was found to have numerous holes in it, extensive anaerobic odor were present and free gasoline could be seen in the hole the tank was pulled from. The amount of gas lost is unknown. However, the amount of gasoline lost may have been significant because the leaks were apparently of long standing duration. No excavation of contaminated soil occurred, and the area was backfilled and covered with asphalt.

The site has received a HARM score of 56.

SECTION 6

RECOMMENDATIONS

6.1 INTRODUCTION

Four sites have been identified at the U.S. Air Force Reserve base as having the potential for environmental contamination and warranting follow-on investigation. Two such sites have been identified at the Pennsylvania Air National Guard base.

The investigations have been designed to determine if contamination does exist and to further assess the potential for contaminant migration at each identified site. The recommended action is generally a one time sampling program using indicator parameters for the detection of suspected contaminants. Should contamination be identified at a site, the sampling program may need to be expanded to further define the extent of contamination. Table 6-1 summarizes the actions recommended for sites on the Reserve Base, and Table 6-2 summarizes actions at the PaANG base.

It is recommended that prior to installation of groundwater monitoring wells, geophysical surveys be conducted at certain sites in order to delineate leachate plumes migrating from the site. The recommended geophysical techniques are electrical resistivity and/or electromagnetic conductivity. The results of these surveys should be used to finalize the selection of monitoring well locations. During well drilling, it is recommended that the cuttings/samples should be examined with an organic vapor analyzer or similar instrument to provide further data on presence or absence of contamination. In addition, appropriate safety precautions should be taken during drilling and sampling. The minimum well requirements are presented in Table 6-3. The analysis parameters for soil sampling are shown in Table 6-4 and analysis parameters for groundwater samples are shown in Table 6-5.

TABLE 6.1

SUMMARY OF RECOMMENDATIONS

AIR FORCE RESERVE

Rank	Site Name	Harm Score	Recommended Monitoring	Analysis List	Comments
1	Fuel Line Break Building 316	53	Soil sampling between fuel tank and storm sewer; installation of two downgradient wells	Table 6.4 Table 6.5	Expand monitoring if analyses indicates contamination
2	Drum Storage Building 416	46	Installation of two downgradient monitoring wells and one upgradient monitoring well	Table 6.5	Soil sampling not included at this time because site is under a building and concrete pad
3	Drum Storage Building 408	44	Installation of two downgradient monitoring wells and one upgradient well	Table 6.5	Soil sampling not included at this time because site is under a building and concrete pad
4	PCB-Storage Building 342	43	Collection of Soil Samples on a grid basis	PCB's	

TABLE 6-2

SUMMARY OF RECOMMENDATIONS

PENNSYLVANIA AIR NATIONAL GUARD

Rank	Site Name	Harm. Score	Recommended Monitoring	Analysis List	Comments
1	A-7 Waste Oil Tank	56	Sample three soil borings and install one upgradient and two downgradient monitoring wells.	Table 6.4 Table 6.5	Should contamination be identified additional wells as recommended.
2	Gasoline Tank Location	56	Sample three soil borings and install one upgradient and two downgradient monitoring wells	Table 6.4 Table 6.5	

TABLE 6-3

Recommended Minimum Well Construction Requirements

Item	Description
Casing	PVC with nonglue fittings.
Minimum Casing Diameter	Four inches.
Screen	PVC wound with nonglue connectors and bottom cap.
Top of Screen	5 feet above the water table.
Gravel Pack	2 feet above top of the screen.
Bentonite Seal	A 2-foot bentonite seal should be placed above the gravel pack.
Grout	Six to one bentonite/cement mix to 2 feet below surface. Grout emplaced with a grout pipe. Grout pumped through pipe to the bottom of the open annulus (above the seal).
Protective Cover	5-foot length of black iron pipe extending 3 feet above the ground surface and set in cement grout. Pipe diameter must be at least 2 inches greater than casing diameter.
Cap	A secure locking cap should be provided.
Survey	Location and elevations of all wells should be surveyed.
	Wells shall be constructed so as to minimize interference with base operations.

TABLE 6-4

RECOMMENDED ANALYSIS FOR SOIL AND SEDIMENT SAMPLES

Oil and Grease
Volatile Organic Constituents (VOC)
Benzene
Total Organic Halogens (TOH)
PCBs

TABLE 6-5

RECOMMENDED ANALYSIS FOR GROUNDWATER SAMPLES

pH
Total Dissolved Solids
Oil and Grease
Volatile Organic Constituents (VOC)
Total Organic Halogens (TOH)
PCBs

6.2 U.S. Air Force Reserve Sites

6.2.1 Fuel Line Break-Building 316

This site has the potential for causing environmental contamination and monitoring is recommended. The media of concern as contaminant receptors are soil and ground water. Soil in the area of the leak has most certainly been affected since the leaking product migrated through the soil to the storm sewer. It is not known whether product also migrated beyond the storm sewer or if all product was collected by the sewer. It is also not known if product has migrated to ground water. It is, therefore, recommended that three soil borings be constructed between the fuel line and the storm sewer. Borings should be accomplished using continuous split spoon sample collection. Each sample should be examined to determine if there is visible evidence of contamination; it is assumed that each boring, completed to the water table will be fifteen feet deep and result in collection of samples that can be composited for the five to ten foot interval and the ten to fifteen foot interval. Therefore, six samples will be analyzed for the parameters shown on Table 6-4. One soil boring shall be extended to ten feet below the water table and completed as a ground water monitoring well.

In order to determine if product has migrated beyond the storm sewer, one additional soil boring shall be completed on the downgradient side of the storm sewer. This boring shall be sampled and analyzed as discussed above. This boring shall also be extended and completed as a ground water monitoring well as also described above. Both monitor wells shall be sampled and analyzed as shown on Table 6-5.

6.2.2 Drum Storage - Building 416

This site has the potential to be a source of contamination and additional investigation is warranted. Soil sampling at this location is not feasible since the actual storage area has been covered by construction of Building 416 and the concrete pad in front of the building. The recommended investigation, therefore, is installation and sampling of two downgradient and one upgradient ground water monitoring wells. Because the site is in a built-up area of the base, it will be necessary to install the wells through the apron in front of the building. It is recommended that the downgradient wells be located within fifty feet of the building.

Each well shall be sampled and analyzed for the parameters shown on Table 6-5.

6.2.3 Drum Storage - Building 408

This storage site has been determined to have the potential for causing environmental contamination. This site has also been covered by construction and soil sampling is not feasible. The recommended investigation, therefore, is the installation and sampling of two downgradient wells and one upgradient well. Because of the developed nature of the site area, it will probably be necessary to drill through paved areas in order to construct the wells.

All wells shall be sampled and analyzed as shown on Table 6-5.

6.2.4 PCB Storage - Building 342

This site has the potential for being a source of contamination to both soil and ground water. The site itself has been covered by construction and some soil from the site area has been spread in the vicinity and some contamination may have been associated with these soils. It is, therefore, recommended that a sampling grid be laid out around Building 342. Include approximately 20 sampling points or grid modes around the perimeter of the building. Samples of the upper six inches of soil shall be collected. These samples shall be analyzed for PCB's.

6.3 Pennsylvania Air National Guard

6.3.1 A-7 Waste Oil Tank

This site has been determined to have the potential for causing contamination of soil and ground water. The recommended investigation includes completion and sampling of three soil borings. These borings shall be accomplished as previously described in Section 6.2.1. Two of the soil borings shall be extended and completed as downgradient ground water monitoring wells. An additional monitoring well shall be installed upgradient of the site to serve as a background sampling location. The two downgradient wells shall be located as close as possible to the location of the leak.

Soil samples shall be analyzed for the parameters shown on Table 6-4. Ground water samples shall be analyzed for parameters shown on Table 6-5.

6.3.2 Gasoline Tank Location

The site that was the location of the old gasoline storage tank at the motor pool has the potential to be a source of soil and ground water contamination. The recommended investigation, therefore, includes sampling of both soil and ground water. Three soil borings are recommended in the area from which the tank was removed. Care should be taken in selection of exact locations because of the presence of the new tanks in the immediate vicinity. The borings shall be accomplished and sampled as described in Section 6.2.1 with the exception that these borings would be expected to be twenty feet deep resulting in collection of an additional composited sample, in each boring, for the interval from fifteen to twenty feet. These samples shall be analyzed for the parameters shown on Table 6-4.

One of the soil borings shall be extended and completed as a ground water monitoring well. An additional well shall be installed approximately 30 to 50 feet downgradient of the past tank location. An upgradient monitoring well shall also be installed. Each of the three wells shall be sampled and analyzed for the parameters shown on Table 6-5.

APPENDIX A

RESUMES OF THE WESTON TEAM

KATHERINE A. SHEEDY
PROJECT MANAGER

Fields of Competence

Geologic investigation and site evaluation; environmental impact assessment, quantitative and qualitative groundwater analysis; design of groundwater monitoring systems.

Experience Summary

Nine years experience in geological investigations including environmental impact analysis in geology, groundwater, and soils; hydrogeologic investigations of hazardous waste sites, preparation and delivery of expert testimony; assessment and mitigation of low-level radioactive contamination of groundwater and soils; migration of radionuclides in groundwater; site stability in limestone terrains; development of evaluation criteria for site search and selection projects; pre-mine opening hydrologic investigations for surface and underground coal mines; development of clean-up strategies for hazardous and radioactive waste disposal sites; Environmental Impact Statement preparation and review; site suitability investigations of waste disposal facilities for industrial and residential developments.

Credentials

B.A., — Queens College, CUNY (1969)

M.S., Geology — University of Delaware (1975)

American Geophysical Union

Geological Society of America

National Water Well Association - Technical Division

Employment History

1974-Present	WESTON
1972-1974	University of Delaware

Key Projects

Preparation of RCRA Part B permit application for facilities in the Midwest and on the West coast.

Project Manager for NACIP Confirmation Study at Alleghany Ballistics Laboratory.

Principal Investigator and team leader for initial assessment studies at NAS Brunswick and the Portsmouth Naval Shipyard, Maine.

Project Manager for Phase I, IRP studies at four Air Force Reserve facilities and the Air Force Academy.

Groundwater consultant for a state-of-the-art assessment of TCE removal from groundwater for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA).

Principal Geologist on an R&D project for USATHAMA to develop lagoon closure guidelines for lagoons contaminated with explosives residue.

Project Manager and Principal Investigator for: locating, investigating, assessing, and cleanup of a site contaminated by pharmaceutical wastes; supervisory of a leachate collection system and groundwater monitoring program for an industrial landfill.

Assessment of groundwater contamination from a municipal landfill in the Atlantic Coastal Plain including aquifer simulation to determine migration 10, 20, and 30 years in the future.

Hydrogeologic assessment of a multi-source military installation. the project includes groundwater modeling for the installation and for areas outside the installation in conjunction with State and Federal agencies.

Design of monitoring systems for a large industrial complex in Montana.

Assessment of regulatory requirements for hazardous waste lagoon closure in over forty states.

Assessment and analysis of emerging trends in groundwater research as applied to the utility industry.

Preparation of EPA Remedial Action Master Plans for five uncontrolled hazardous waste sites.

Principal investigator for geology, soils and groundwater portion of an Environmental Impact Statement for the decontamination of a radioactive waste disposal site in Canonsburg, Pennsylvania.

Project manager and principal investigator on clean-up of a site contaminated by pharmaceutical wastes in New Jersey.

Project manager and principal investigator for assistance in EIS preparation for five synthetic fuel plants in east-central United States.

Evaluation of environmntal impact and operation of 23 municipal landfills in the Atlantic Coastal Plain.

Hydrogeologic investigations at mine sites prior to, during, and after mining operations in Illinois.

Hydrogeologic investigations to determine site suitability for landfills, sewage sludge disposal, spray irrigation and industrial waste disposal.

Principal investigator on a dredge material disposal site feasibility study for Interstate Division for Baltimore City. This project was conducted to evaluate the feasibility of specific sites for disposal of 5 million cu yds of material dredged from the Fort McHenry Tunnel in Baltimore. The evaluation included examination of costs, engineering feasibility, site stability, impact on biology and groundwater and ultimate use of the site as an inner-city park.

Supervision of an investigation to determine groundwater quality, delineate the extent of groundwater pollution and develop a groundwater-quality management program for a six-county area. Evaluated the adequacy of existing groundwater-quality standards and interacted with regulatory agencies.

Evaluation of groundwater quality, quantity and facilities; impact on groundwater for sites in semi-arctic environments and within the Columbia River Basin Project area.

Environmental assessment for a 200,000-BPCD refinery on a semi-arid island with extensive groundwater use in the West Indies.

Evaluation of structural stability problems in limestone solution area in Pennsylvania.

Supervision of a leachate collection system and groundwater monitoring program for an industrial landfill.

Investigation of potential sources of petroleum product found to be discharging through the subsurface, at the shore of Lake Erie.

Development of a state-of-the-art study and environmental analysis of the geothermal steam industry.

Publications

Sheedy, K.A., 1979, Three-Phase Approach to Determination of Site Stability in Limestone: presented at Association of Engineering Geologists 1979 Annual Meeting, Chicago, Illinois.

Sheedy, K.A., Schoenberger, R.J., Haderer, P., Dovey, R., 1979, Solid Waste Disposal in the Coastal Plain: A Case Study: presented at Association of Engineering Geologists 1979 Annual Meeting, Chicago, Illinois.

Sheedy, K.A., Leis, W., Thomas, A., 1980, Land Use in Limestone Terrain, Problems and Case Study Solutions. In Applied Geomorphology, (The "Binghamton" symposia; 11) George Allen and Unwin, 1982.

Sheedy, K.A., Leis, W., Bopp, F., Anderson, J., "Use of Ground Penetrating Radar in Limestone Terrain." American Geographers Association, 1981

Sheedy, K.A., "Methodology for the Selection of Low-Level Radioactive Waste Disposal Sites." American Nuclear Society, 1982.

MICHAEL F. COIA

Fields of Competence

Solid and hazardous waste management: hazardous waste site remedial actions; solid waste collection, storage and disposal, and resource recovery unit operations.

Experience Summary

Three years of civil and environmental engineering experience in the fields of hazardous and solid waste management including: industrial and hazardous waste treatment, storage and disposal technologies; hazardous waste site remedial action alternatives; the engineering responses of clay soils to the presence of hazardous waste chemicals; modelling and evaluation of complex cover systems for application at hazardous waste disposal facilities; radioactive waste disposal strategies; resource recovery and refuse to energy technologies.

Credentials

B.S., Civil Engineering — Duke University (1980), Cum Laude

M.S., Environmental Engineering — Duke University (1981)

Chi Epsilon

Employment History

1981-Present WESTON

1980-1981 Duke University

Key Projects

A Team Engineer on four Phase I studies including the U.S. Air Force Academy; Project Engineer on a project to determine hazardous waste storage needs at DPDO facilities on various Navy installations.

Served as Project Engineer for the following WESTON hazardous waste projects:

- Development of a remedial action clean-up program for Bruin Lagoon, Pennsylvania for EPA under "Superfund" for Bruin Lagoon, a 3-acre acidic oil sludge lagoon located in western Pennsylvania. Prepared the design of a complex cover system, groundwater controls, and sludge dewatering/stabilization methodology for an in situ stabilization of the oily sludge waste at Bruin Lagoon. Prepared contractor bid specifications.
- Evaluation of clean-up scenarios at an existing industrial complex of over 2,000 acres in California contaminating the soil and groundwater quality through storage, spillage, and deep-well injection of organic and halogenated compounds.

- Development of regulatory and technology guidelines for the closure of inactive explosive waste lagoons at over 40 U.S. Army installations. Analyzed the waste lagoon characteristics and installation area characteristics and installation area characteristics, as well as the Federal and state regulatory requirements for closure of inactive land disposal facilities. Evaluated in-place closure technologies for application with groundwater isolation and pumping, surface soil capping, and explosive waste desensitization.

- Assessment of available hazardous waste management technologies for implementation on a provincewide scale for Ontario, Canada. Analyzed appropriate chemical and physical treatment strategies, incineration technologies, fixation/stabilization approaches, and ultimate disposal alternatives for application to Ontario's industrial waste streams.

- Evaluation of potential remedial action clean-up strategies under Superfund for Matthews Electroplating, a site where soil and groundwater contamination resulted from chromium plating operations. Conducted the site characterization field work, environmental sampling, and geologic soils investigations. Prepared the engineering feasibility study for the selected remedial action alternative.

- Evaluation of a municipally-operated refuse-to-energy resource recovery system for Salem County, New Jersey. Prepared the system design based on Countywide waste stream characterization, identification of potential energy markets, evaluation of incineration technologies, and cost-effective analysis.

- Development of a remedial action cleanup program at a major industrial site on Lake Michigan where massive PCB spills and discharges have contaminated soil and surface water quality.

As a Research Assistant at Duke University, supervised the following projects in solid, hazardous, and radioactive waste management:

- Analysis of permeability rate and other structural alterations in clays and clay soils when exposed to industrial and hazardous waste leachates in completion of a Master's degree thesis in environmental engineering.

- Prepared the methodology for evaluation of a potential low-level radioactive waste disposal facility in Research Triangle Park, North Carolina.

- Evaluation of resource recovery applications in North Carolina, including the potential use of a shredding operation at the Durham sanitary landfill.

Publications

"The Effect of Electroplating Wastes Upon Clay As An Impermeable Boundary to Leaching," M.S. Thesis by M.F. Coia.

"The Leaching of Electroplating Wastes Through Clay Liners," by M.F. Coia, J.J. Peirce, and P.A. Vesilind. Presented at the 1981 AIChE 74th National Conference.

"Bruin Lagoon: Remedial Clean-up of Hazardous Waste Sites Under Superfund," by M.F. Coia and J.W. Thorsen. Presented at the 1982 Mid-Atlantic Industrial Waste Conference.

"Remedial Superfund Actions: Procedures and Results," by J.W. Thorsen and M.F. Coia. Presented at the 1982 National Conference of ASCE, Environmental Engineering Division.

"Remedial Actions at Industrial Waste Sites: A Case History, Bruin Lagoon," by M.F. Coia. Presented at the 1982 Engineering Foundation Conference: Industry Response to the Hazardous Waste Challenge.

"In-Place Stabilization and Closure of Oily Sludge Lagoons," by A.A. Metry, M.F. Coia, M.H. Corbin, and A.L. Lenthe. Presented at 1983 WPCAP Technical Conference.

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.

APPENDIX B

LIST OF INTERVIEWEES

Table B-1

LIST OF INTERVIEWEES
AIR FORCE RESERVES

	Area of Knowledge	Years of Service
1.	Aircraft Maintenance	30
2.	Civil Engineering	30
3.	Aircraft Maintenance	19
4.	Aircraft Maintenance	25
5.	Engine Mechanic	24
6.	Water and Waste	10
7.	Aircraft Maintenance	28
8.	Corps of Engineers	8
9.	Civil Engineering	19
10.	Civil Engineering	14
11.	Flight line	25
12.	POL	2
13.	POL	36
14.	POL	18
15.	Civil Engineering	2
16.	Motor Pool	28
17.	Fuel Maintenance	26
18.	Aircraft Maintenance	22
19.	Aircraft Maintenance	18
20.	Motor Pool	16
21.	Motor Pool	10
22.	Bio-Environmental Engineering	1

Table B-2

LIST OF INTERVIEWEES
PENNSYLVANIA AIR NATIONAL GUARD

	Area of Knowledge	Years of Service
1.	Fire Department	2
2.	Transportation	5
3.	Civil Engineering	31
4.	Fabrication	16
5.	Fuel Cell	20
6.	Civil Engineering	27
7.	POL	<5
8.	Inspection	10
9.	AGE	4
10.	Aircraft Maintenance	12
11.	Motor Pool	34
12.	Propulsion	32
13.	Civil Engineering	2
14.	Civil Engineering	
15.	Fuel Cell	<7

APPENDIX C

LIST OF OUTSIDE AGENCIES CONTACTED

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
202-694-3527

Alan Guyer
Pennsylvania Geological Survey
Harrisburg, Pennsylvania
717-787-2167

LIST OF OUTSIDE AGENCIES
(Con't)

Steve Hearsh
U.S. EPA - Region III
Philadelphia, Pennsylvania
212-597-1177

Joe Feola
Pennsylvania Dept. of Environmental Resources
Norristown, Pennsylvania
215-270-1975

Paul Warmo, Water Quality Sanitarian
Pennsylvania Dept. of Environmental Resources
Norristown, Pennsylvania
215-270-1900

Tom Majusick
U.S. Dept. of Housing and Urban Development
Federal Emergency Management Agency
Philadelphia, Pennsylvania
215-597-3630

Gary Rohn
U.S. Army Corps of Engineers
Philadelphia, Pennsylvania
215-597-4808

Donald J. Baker, Engineer
Delaware River Basin Commission
West Trenton, New Jersey
609-883-9500

APPENDIX D

HAZARD ASSESSMENT SCORE 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

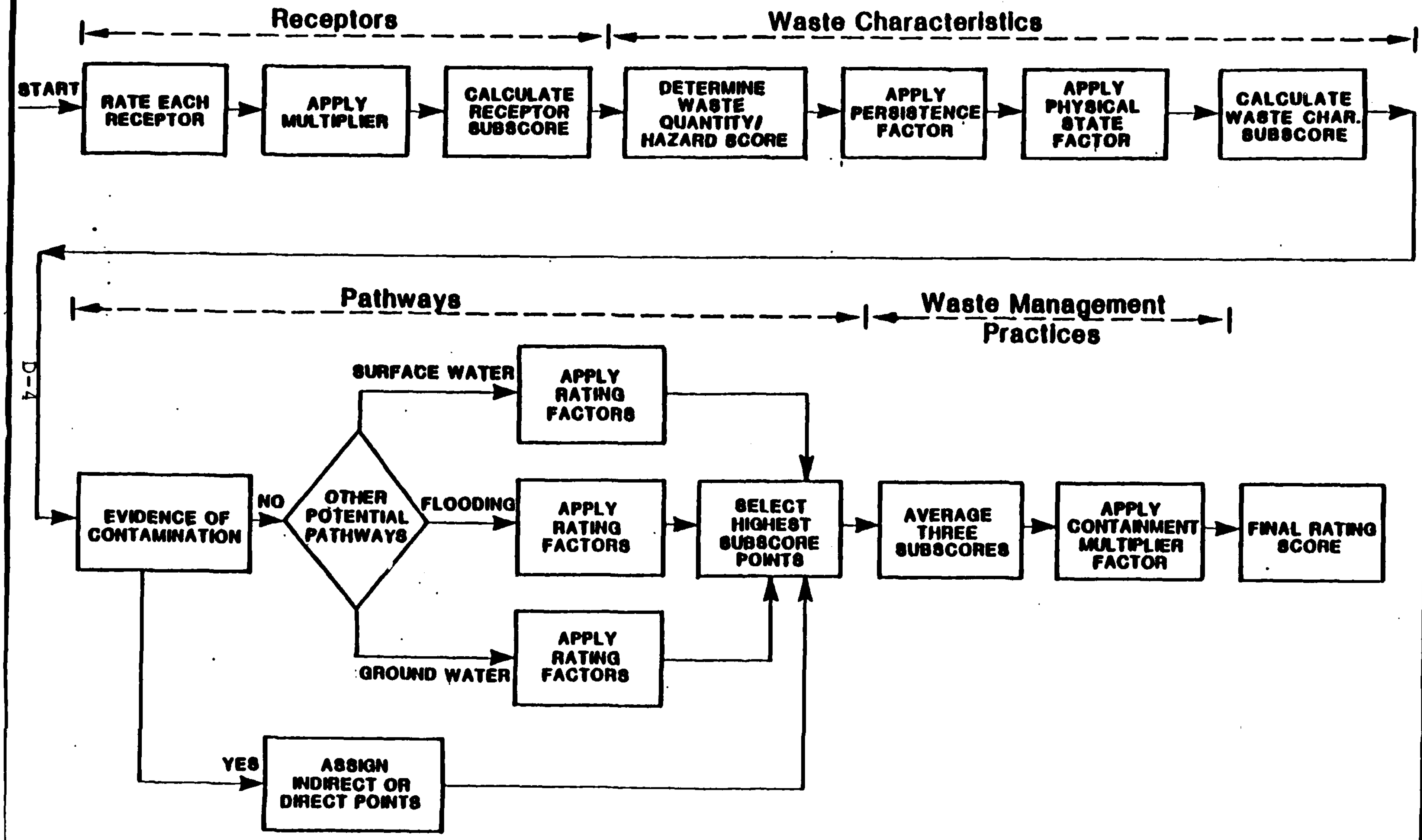

TABLE 1

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

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

TAB Con ed

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

Rating Factor	0	1	2	3	Multiplier
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1

B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION

Rating Factor	0	1	2	3	Multiplier
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	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:

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

Spills:

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

Surface Impoundments:

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

Fire Proection Training Areas:

- Concrete surface and berms
- Oil/water separator for pretreatment of runoff
- 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.

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Page 1 of 2

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)

Page 2 of 2

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 ______

V. 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 ______ = ☐

APPENDIX E

Site HARM Score Calculations

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE Fuel Line Break Building 316
LOCATION Outside Building 316 - Reserve Base
DATE OF OPERATION OR OCCURRENCE 1976
OWNER/OPERATOR U.S. Air Force Reserves
COMMENTS/DESCRIPTION
SITE RATED BY Sheedy

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to reservation boundary	2	6	12	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	2	9	18	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	72	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 40

II. WASTE CHARACTERISTICS

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

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

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

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

50 X .8 = 40

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 X 1 = 40

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

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	2	8	16	24
		Subtotals	50	108

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

2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	3	8	24	24
Subsurface flows	0	8	0	24
Direct access to ground water	2	8	16	24
		Subtotals	68	114

Subscore (100 x factor score subtotal/maximum score subtotal) 60

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	40
Waste Characteristics	40
Pathways	80
Total 160 divided by 3 =	53
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

____

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Page 1 of 2

NAME OF SITE Drum Storage - Building 416
LOCATION Under southeast corner of Building 416
DATE OF OPERATION OR OCCURRENCE 1974-1982
OWNER/OPERATOR Reserve
COMMENTS/DESCRIPTION Covered by corner of Building 416-minimal excavation prior to construction
SITE RATED BY Sheedy

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	2	4	8	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	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	78	180

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

II. WASTE CHARACTERISTICS

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

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

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

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

60 x .9 = 54

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

54 x 1 = 54

FIGURE 2 (Continued)

Page 2 of 2

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

Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
Subtotals			44	108

Subscore (100 X factor score subtotal/maximum score subtotal) 41

2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

Depth to ground water	2	8	16	24
Net precipitation	2	6	12	18
Soil permeability	2	8	16	24
Subsurface flows	0	8	0	24
Direct access to ground water	1	8	1	24
Subtotals			45	114

Subscore (100 x factor score subtotal/maximum score subtotal) 39

C. Highest pathway subscore.

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

Pathways Subscore 41

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	43
Waste Characteristics	54
Pathways	41

Total 138 divided by 3 = 46
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

46

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Page 1 of 2

NAME OF SITE Drum Storage - Building 408

LOCATION Under Building 408

DATE OF OPERATION OR OCCURRENCE 1950-1974

OWNER/OPERATOR Reserve

COMMENTS/DESCRIPTION Covered by Building 408-some excavation occurred

SITE RATED BY Sheedy

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to reservation boundary	2	6	12	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	2	9	18	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	68	180

Receptors subscore (100 X factor score subtotal/maximum score subtotal) 37

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 .9 = 54

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

54 x 1 = 54

FIGURE 2 (Continued)

Page 2 of 2

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	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	0	6	80	18
Rainfall intensity	2	8	16	24
		Subtotals	44	108

Subscore (100 X factor score subtotal/maximum score subtotal) 41

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

Subscore (100 x factor score/3) 0

Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water	2	8	16	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	1	24
		Subtotals	45	114

Subscore (100 x factor score subtotal/maximum score subtotal) 39

C. Highest pathway subscore.

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

Pathways Subscore 41

IV WASTE MANAGEMENT PRACTICES

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

Receptors	37
Waste Characteristics	54
Pathways	41

Total 132 divided by 3 = 44 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

44 x 1 = 44

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Page 1 of 2

OF SITE PCB Storage - Building 342

ATION Reserves - under Building 342

OF OPERATION OR OCCURRENCE 1970's-1982

R/OPERATOR Reserves

S/DESCRIPTION Now under building

RATED BY Sheedy

RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
lation within 1,000 feet of site	2	4	8	12
Distance to nearest well	1	10	10	30
Land use/zoning within 1 mile radius	2	3	6	9
Distance to reservation boundary	3	6	18	18
itical environments within 1 mile radius of site	0	10	0	30
ater quality of nearest surface water body	0	6	0	18
ound water use of uppermost aquifer	2	9	18	27
Population served by surface water supply within 3 miles downstream of site	0	6	0	18
Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			78	180

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

WASTE CHARACTERISTICS

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

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

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

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

40 x 1 = 40

Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

40 x 1 = 40

FIGURE 2 (Continued)

Page 2 of 2

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	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
Subtotals			44	108

Subscore (100 X factor score subtotal/maximum score subtotal) 41

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	2	8	16	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			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	43
Waste Characteristics	40
Pathways	46

Total 129 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

43 x

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Page 1 of 2

NAME OF SITE A-7 Waste Oil Tank
LOCATION PaANG Base
DATE OF OPERATION OR OCCURRENCE 1982-Present
OWNER/OPERATOR PaANG
COMMENTS/DESCRIPTION Tank still in use
SITE RATED BY Stapleton

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	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	74	180

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

II. WASTE CHARACTERISTICS

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

1. Waste quantity (S = small, M = medium, L = large) 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 = 48

FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Page 1 of 2

NAME OF SITE Gasoline tank (removed)
LOCATION Motor Pool
DATE OF OPERATION OR OCCURRENCE 1983
OWNER/OPERATOR PA ANG
COMMENTS/DESCRIPTION Tank was found to be leaking upon removal, with gasoline
pit
SITE RATED BY Stapleton

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	1	4	4	12
B. Distance to nearest well	1	10	10	30
C. Land use/zoning within 1 mile radius	2	3	6	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	0	10	0	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	2	9	18	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	74	180

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

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level 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 = 48

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

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	0	6	0	18
Rainfall intensity	2	8	16	24
Subtotals			52	108

Subscore (100 X factor score subtotal/maximum score subtotal) 48

2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Ground-water migration

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

Subscore (100 x factor score subtotal/maximum score subtotal) 53

C. Highest pathway subscore.

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

Pathways Subscore 53

WASTE MANAGEMENT PRACTICES

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

Receptors	41
Waste Characteristics	48
Pathways	80

Total 169 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 ______ = 56

APPENDIX F

MASTER SHOP LISTS

TABLE F.1

MASTER SHOP LIST
AIR FORCE RESERVE

Shop	Handles Haz. Material	Generates Haz. Mat.	Disposal of Hazardous Material Past	Disposal of Hazardous Material Present
POL	Yes	Yes	Off site burn	Contract dis.
Motor Pool	Yes	Yes	Off site burn	Contract dis.
Civil Engineering				
Carpentry	Yes	No		
Entomology	Yes	No		
Refrigeration/air conditioning	Yes	No		
Roads and grounds	No	No		
Welding/sheet metal/plumbing	Yes	No		
Electric	Yes	Yes	Open burn	Contract dis.
Heating	Yes	Yes	Contract disposal/sewer	
Protective Coating	Yes	No		
Air Craft Maintenance				
Battery/Avionics	Yes	Yes	Neutralized to sewer	
R & R	Yes	Yes	Offsite burn	Contract dis.
Instrument	Yes	Yes	Offsite burn	Contract dis.
Machine	Yes	No		
Fuel cell	Yes	Yes	Offsite burn	Contract dis.
Environmental	Yes	Yes	Offsite burn	Contract dis/sewer
Welding	Yes	No		
Pneudraulics	Yes	Yes	Offsite burn	Contract dis.
Corosion control	Yes	Yes	Offsite burn	Contract dis.
NDI	Yes	Yes	Contract dis/sewer/recovery	
Structural repair	Yes	No		
Survival equipment	Yes	Yes	Offsite burn	Contract dis.
AGE	Yes	Yes	Offsite burn	Contract dis.
Jet engine shop	Yes	Yes	Offsite burn	Contract dis.
Prop	Yes	Yes	Offsite burn	Contract dis.
Schedule maintenance	Yes	Yes	Offsite burn	Contract dis.
PDL Systems Maintenance	Yes			

TABLE F

MASTER SHOP LIST
PA ANG

Shop	Handles Haz. Material	Generates Haz. Mat.	Disposal of Hazardous Material Past	Disposal of Hazardous Material Present
POL	Yes	Yes		Sewer
Motor Pool	Yes	Yes	Burn	Contract dis.
Air Craft Maintenance				
Pneudraulics	Yes	Yes		Contract dis.
Flight management	Yes	No		
Life support	Yes	Yes		Offsite/DPDO
R & R	Yes	Yes		Offsite/DPDO
Electric	Yes	Yes		Offsite/DPDO
Environmental	Yes	Yes		Contract dis/fire academy
Fuel cell	Yes	Yes	Burn	Offsite/AGE
NDI	Yes	Yes		Sewer
Hydraulic	Yes	Yes		Contract disposal
Structural repair	Yes	Yes		DPDO
Machine	Yes	No		
Corrosion Control	Yes	Yes		DPDO
Flight line	Yes	Yes		Sewer/fire academy/DPDO
Metal processing	Yes	No		
Fuel system	Yes	No		
Support equipment	Yes	Yes		
Avionics	Yes	No		
Jet engine	Yes	Yes		Fire academy/DPDO
Phase dock	Yes	Yes		Fire academy/DPDO
Survival	Yes	Yes		
147th hanger	Yes	Yes		Fire academy/DPDO
AGE	Yes	Yes		Sewer/fire academy/DPDO
Civil Engineering				
Carpentry	No	No		
Welding	Yes	No		
Electric	Yes	No		
Plumbing	Yes	No		
Paint	Yes	No		
Machine	Yes	No		
Fire department	No	No		
Clinic	Yes	No		
Alert facility	Yes	No		
Weapons	Yes	Yes	Burn	Fire academy/DPDO
Life support	Yes	Yes	Burn	Fire academy/DPDO/sewer

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.
ANG	Air National Guard
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-dichlorophenoxyacetic 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 - responsible disposal or reuse/recycling of hazardous materials from DoD installations.
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.
FLOW 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.
FLOOD 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: o All substances regulated under Paragraphs 311 and 307 of the Clean Water Act (except oil). o All substances regulated under Paragraph 3001 of the Solid Waste Disposal Act. o All substances regulated under Paragraph 112 of the Clean Air Act. o All substances which the Administrator of EPA has acted against under Paragraph 7 of the Toxic Substance Control Act. o 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.

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
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

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	Petroleum-based, all purpose 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 unfit 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	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 Air Group
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 nonhazardous.
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
USAF OEHL	United States Air Force Occupational Health and Environmental Laboratory
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
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

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