AD-A137493

(1)

INSTALLATION RESTORATION PROGRAM RECORDS SEARCH

For
Pease Air Force Base, New Hampshire

20030113071

CH2M HILL

Prepared for

AIR FORCE ENGINEERING AND SERVICES CENTER
DIRECTORATE OF ENVIRONMENTAL PLANNING
TYNDALL AIR FORCE BASE, FLORIDA 32403
AND
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DIRECTORATE OF ENGINEERING AND ENVIRONMENTAL PLANNING
OFFUTT AIR FORCE BASE, NEBRASKA 68113

JANUARY 1984

Unclas

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

AD A137493

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A137493 / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Installation Restoration Program Final Report Phase I - Records Search Pease AFB, NH	5. TYPE OF REPORT & PERIOD COVERED Final Report - Jan 84
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) CH_2M Hill	8. CONTRACT OR GRANT NUMBER(s) F08637-80-G0010-5007
9. PERFORMING ORGANIZATION NAME AND ADDRESS CH_2M Hill, 7201 NW 11 Place, Gainsville, FL	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS HQ SAC/DEPV, Offutt AFB, NE 68113	12. REPORT DATE Jan 84
	13. NUMBER OF PAGES 230
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) Uncl
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Environmental Quality
Water Pollution
Installation Restoration Program

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The identification of hazardous waste disposal sites at military installations is directed by the Defense Environmental Quality Program Policy Memorandum 80-6. Phase I constitutes a records search to determine the potential for migration of any toxics and hazardous materials off the installation as a result of past operations and disposal activities. This record search included a detailed review of pertinent installation records, contact with

various government and private agencies, and on site visits.

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PROGRAM RECORDS SEARCH

FOR

PEASE AIR FORCE BASE, NEW HAMPSHIRE

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January 1984

Contract No. F08637-80-G0010-5007

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

A. INTRODUCTION

1. CH2M HILL was retained on August 12, 1983, to conduct the Pease Air Force Base (AFB) records search under Contract No. F08637-80-G0010-5007 with funds provided by Strategic Air Command (SAC).

2. Department of Defense (DoD) policy, directed by Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, is to identify and fully evaluate suspected problems associated with past hazardous material disposal sites on DoD facilities, control the migration of hazardous contamination from such facilities, and control hazards to health and welfare that may have resulted from these past operations.

3. To implement the DoD policy, a four-phase Installation Restoration Program has been directed. Phase I, the records search, is the identification of potential problems. Phase II (not part of this contract) consists of follow-on field work to determine the extent and magnitude of contaminant migration. Phase III (not part of this contract) consists of technology base development to support the development of project plans for controlling migration or restoring the installation. Phase IV (not part of this contract) includes those efforts which are required to control identified hazardous conditions.

4. The Pease AFB records search included a detailed review of pertinent installation records, 16 outside agency contacts for documents relevant to the records search effort, and an onsite base visit conducted by CH2M HILL during the week of October 3 through October 7, 1983. Activities

conducted during the onsite base visit included interviews with 35 past and present base employees, a detailed search of installation records, and a ground tour of past disposal areas. Prior to the base visit, the Public Affairs Office provided a press release announcing the study and requesting persons knowledgeable of past disposal practices at the installation to contact Pease AFB.

B. MAJOR FINDINGS

1. Aircraft maintenance operations result in the generation of small quantities of hazardous wastes, including spent degreasers, solvents, paint strippers, and contaminated jet fuels. The total quantity of the above hazardous wastes is estimated to be approximately 1,500 to 2,000 gallons per year. In addition, approximately 14,000 gallons per year of waste oils (mostly engine oils but also includes some commingled petroleum wastes such as hydraulic fluid, PD-680, MOGAS, diesel fuel, and JP-4) and 10,000 gallons per year of reclaimed JP-4 fuel are generated. Contaminated JP-4 (15,000 gallons per year) is used in fire department training exercises.

2. Standard procedures for past and present industrial waste disposal practices have been as follows: (1) fire department training exercises (1956 to 1971); contractor removal (1971-1982); and contractor removal through the DPDO (1982 to present). Since 1971, most contaminated JP-4 fuel has been used in fire department training exercises. Reclaimed JP-4 is returned to bulk storage.

3. Interviews with past and present base employees resulted in the identification of 18 past disposal or spill sites at Pease AFB and the approximate dates that there sites were active. The location map of the identified disposal and spill sites is shown in Figure 1.

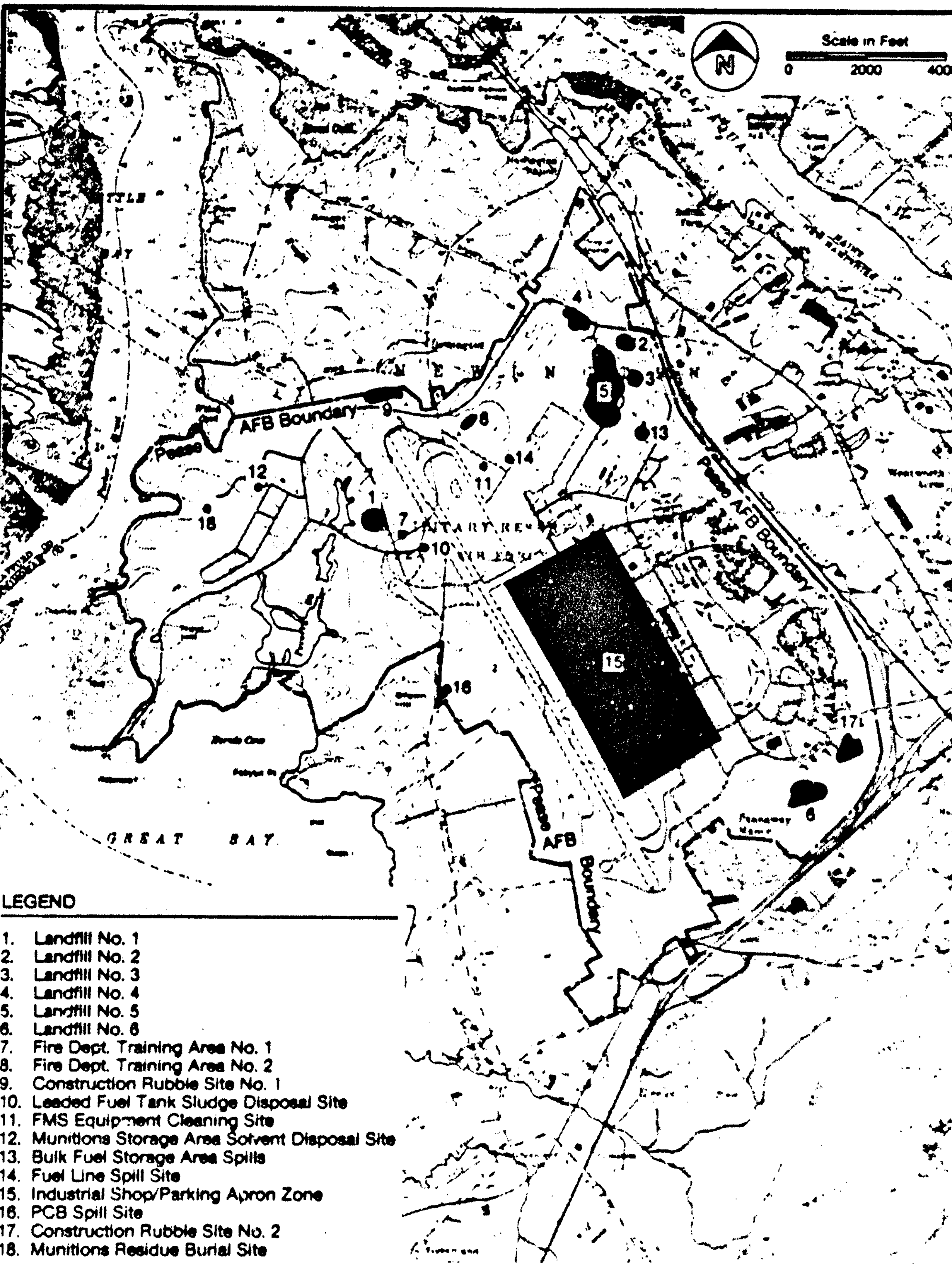

FIGURE 1.
Location Map of Identified Disposal and Spill Sites at Pease AFB.

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4. Evidence of environmental stress was found at Site No. 8 (Fire Department Training Area No. 2 [Active]). The ground in a nearby wooded area which receives drainage from the site was saturated with fuel and numerous pine trees in this area were dead or dying.

C. CONCLUSIONS

1. Information obtained through interviews with 35 past and present base personnel (one-third with 20 or more years at the installation), base records, shop folders, and field observations indicates that hazardous wastes have been disposed of on Pease AFB property in the past.

2. Direct evidence was found of hazardous waste contaminant migration within Pease AFB boundaries as follows:

- Trichloroethylene (TCE) ground-water contamination which was discovered at the Haven well in 1977.

- Fuel saturated ground in the wooded area receiving drainage from Site No. 8.

3. The exact source(s) of TCE ground-water contamination is not known but is suspected to have originated from past TCE usage (spills, leaking tanks, discharge to storm drains) in the industrial shop area near the Haven well--referred to in this report as Site No. 15 (Industrial Shop/Parking Apron Zone). Another suspected source is the existing fire department training area (Site No. 8) which has used mixed waste oils, fuels, and solvents including TCE in past fire training exercises prior to 1971. Both Sites No. 15 and 8 are located within the base water supply aquifer recharge area and are upgradient from the Haven well.

4. The potential for ground-water contamination at Pease AFB is high due to the high ground-water table (10 to 20 feet below land surface), the high rainfall, and the high net precipitation in the area. The base water supply aquifer is especially vulnerable to contamination because of the high permeability of this sand and gravel aquifer and the location of aircraft maintenance shops, the aircraft parking apron, and the main runway which are directly above the aquifer.

5. Table 1 presents a priority listing of the rated sites and their overall scores. Site No. 8, Fire Department Training Area No. 2 (overall score of 82), was designated as showing the most significant potential for environmental concerns due to the potential for contamination of the ground water with fuel and possibly TCE from past practices.

6. Other sites showing the most significant potential (relative to other Pease AFB sites) for environmental concerns are as follows:

- Site No. 1--Landfill No. 1
- Site No. 5--Landfill No. 5
- Site No. 7--Fire Department Training Area No. 1
- Site No. 13--Bulk Fuel Storage Area Spills
- Site No. 12--Munitions Storage Area Solvent Disposal Site

Sites No. 1, 5, 7, and 13 are located over glacial till outside the boundary of the base water supply aquifer. Contaminant migration, if it occurred, would tend to be

Table 1
PRIORITY LISTING OF DISPOSAL AND SPILL SITES

Ranking No.	Site No.	Site Description	Overall Score
1	8	Fire Dept. Training Area No. 2	82
2	13	Bulk Fuel Storage Area Spills	65
3	5	Landfill No. 5	60
3	1	Landfill No. 1	60
5	7	Fire Dept. Training Area No. 1	59
6	12	Munitions Storage Area Solvent Disposal Site	58
7	9	Construction Rubble Site No. 1	55
8	6	Landfill No. 6	54
9	11	FMS Equipment Cleaning Site	53
9	10	Leaded Fuel Tank Sludge Disposal Site	53
9	14	Fuel Line Spill Site	53
12	4	Landfill No. 4	52
13	2	Landfill No. 2	48
13	3	Landfill No. 3	48
15	15	Industrial Shop/Parking Apron Zone	8
16	16	PCB Spill Site	6

dispersed and eventually drawn toward the main water supply wells and then treated to remove organic contaminants. The concerns for these sites are, therefore, lower than their overall scores indicate. There is a concern for Site No. 12 because of a potential for contamination of the two small water supply wells which serve this area.

7. Site No. 15 (Industrial Shop/Parking Apron Zone) would have received an initial overall score of 84; however, the construction of the new water treatment plant for removal of TCE ground-water contamination constitutes a remedial action to mitigate adverse environmental impacts caused by Site No. 15, and resulted in the reduction of the overall score to 8 (waste management practices multiplier of 0.1). The ice-contact deposits underlying Site No. 15 constitute the main aquifer for the base, are of limited extent, and are essentially contained within the boundaries of the base. The base water supply wells, which are installed in the ice-contact deposits, tend to draw contaminants toward the cone of depression of the wells, thereby containing the ground-water contamination within the base boundaries. The new water treatment plant is designed to remove the contaminants from the well water supply.

Although the TCE ground-water contamination has decreased significantly since 1977, the continued monitoring of the base water supply wells for organic contaminants and the continued operation of the new water treatment plant are necessary because of the vulnerability of the base water supply aquifer to contamination from fuels and solvents. Contaminant levels may possibly increase in the future from past spills and leaks which could be migrating toward the base wells. Also, since the major shops and the aircraft parking apron are located directly above the sand and gravel aquifer recharge area, any fuel and solvent spills or leaks which occur in this area in the future can readily enter the ground-water supply and migrate toward the nearby base wells. The necessity for continued water supply monitoring and treatment cannot be overemphasized.

8. The remaining rated sites (Sites No. 2, 3, 4, 6, 9, 10, 11, 14, and 16) as well as the sites that were not rated (Sites No. 17 and 18) are not considered to present significant concern for adverse effects on health or the environment.

D. RECOMMENDATIONS

1. A Phase II monitoring program is recommended to confirm or rule out the presence and/or migration of hazardous contaminants. Site-specific monitoring recommendations include the installation of upgradient and downgradient monitoring wells for sampling ground water at (1) Fire Department Training Area No. 2 (Site No. 8), (2) a zone consisting of Landfill No. 5 (Site No. 5) and the Bulk Fuel Storage Area (Site No. 13), (3) a zone consisting of Landfill No. 1 (Site No. 1) and Fire Department Training Area No. 1 (Site No. 7). Details of the Phase II program are provided in Section VI of this report.

2. The specific details of the monitoring program, including the exact locations of sampling points, should be finalized as part of the Phase II program. If contaminants are detected at significant levels, a more extensive field survey program should be implemented to determine the extent of the contaminant migration.

3. Other IRP recommendations include:

- Correcting the drainage problem at Site No. 8, installing an oil/water separator, and initiating cleanup of gross fuel accumulations on the ground surface in the nearby wooded area.

- Sampling the two water supply wells at the munitions storage area (Site No. 12) for volatile organic compounds (VOCs).

- Sampling the five drainage ditches which convey stormwater away from the base and the wastewater treatment plant final effluent for VOCs.

- Initiating periodic sampling of the main water supply wells for VOCs (Haven, Harrison, and Smith wells). This sampling is recommended because of the potential for contamination as a result of past and future spills and leaks originating from Site No. 15.

- Emphasizing good housekeeping practices and the necessity to eliminate spillage of solvents and fuels on the ground in the flightline industrial shop areas (Site No. 15).

- Using an oil skimming device in the flightline drainage (McIntyre Ditch) oil/water separator.

I. INTRODUCTION

I. INTRODUCTION

A. BACKGROUND

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

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

To conduct the IRP Hazardous Materials Disposal Sites Records Search for Pease AFB, New Hampshire, CH2M HILL was retained on August 12, 1983 under Contract No. F08637-80-G0010-5007 with funds provided by Strategic Air Command (SAC). A location map of Pease AFB is shown in Figure 2.

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

B. AUTHORITY

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

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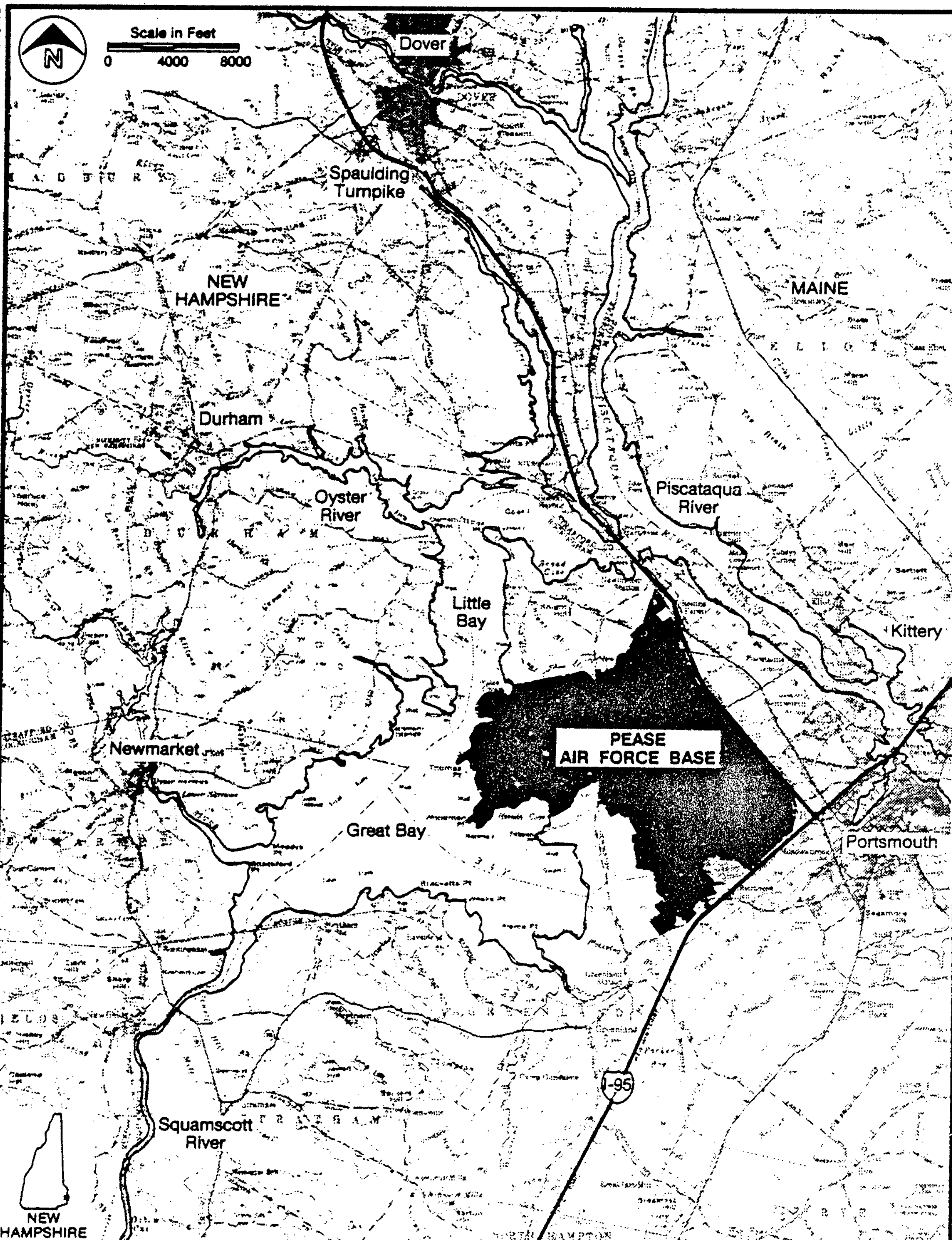

FIGURE 2.
Location Map of Pease AFB.

C. PURPOSE OF THE RECORDS SEARCH

The purpose of the Phase I records search is to identify and evaluate suspected problems associated with past hazardous material disposal sites and spill sites on DoD facilities. The existence of and potential for migration of hazardous material contaminants were evaluated at Pease AFB by reviewing the existing information and conducting an analysis of installation records. Pertinent information included the history of operations, the geological and hydrogeological conditions which may have contributed to the migration of contaminants, and the ecological features which indicated environmentally sensitive habitats or evidence of environmental stress. The evaluation is to determine which identified sites, if any, exhibit a significant potential for environmental impact and warrant further investigation. No sampling or field work is conducted during Phase I.

D. SCOPE

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

The pre-performance meeting was held at Pease AFB, New Hampshire, on September 1, 1983. Attendees at this meeting included representatives of the Air Force Engineering and Services Center (AFESC), the Strategic Air Command Headquarters (SAC), Pease AFB, and CH2M HILL. The purpose of the pre-performance meeting was to provide detailed project instructions, to provide clarification and technical guidance by AFESC, and to define the responsibilities of all parties participating in the Pease AFB records search.

The onsite installation visit was conducted by CH2M HILL from October 3 through 7, 1983. Activities performed during the onsite visit included a detailed search of installation records, ground tours, and interviews with installation personnel. At the conclusion of the onsite visit, the Base Commander, the Deputy Base Commander, and the Base Civil Engineer and his staff were briefed on the preliminary findings. The following individuals constitute the CH2M HILL records search team:

1. Mr. Norman Hatch, Project Manager (M.S., Chemistry, 1972; M.S., Environmental Engineering, 1973).

2. Mr. Gary Eichler, Hydrogeologist (M.S., Engineering Geology, 1974).

3. Mr. Brian Winchester, Ecologist (B.S., Wildlife Ecology, 1973).

Resumes of these team members are included in Appendix A.

Government organizations were contacted for information and relevant documents. Appendix B lists the organizations contacted.

Individuals from the Air Force who assisted in the Pease AFB records search include:

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

2. Lt. James R. Krier, Command Representative.

3. Ms. Janice LeClair, Pease AFB, Environmental Coordinator.

4. Mr. George Kraus, Pease AFB, Chief of Environmental and Contract Planning.

E. METHODOLOGY

The methodology used in the Pease AFB records search is shown in Figure 3. First, a review of past and present industrial operations was conducted at the installation. Information was obtained from available records such as contractor files and real property files, as well as interviews with employees from the various operating areas of the installation. The information obtained from interviewees on past activities was based on their best recollection. A list of interviewees from Pease AFB, with areas of knowledge and years at the installation, is given in Appendix C.

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

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

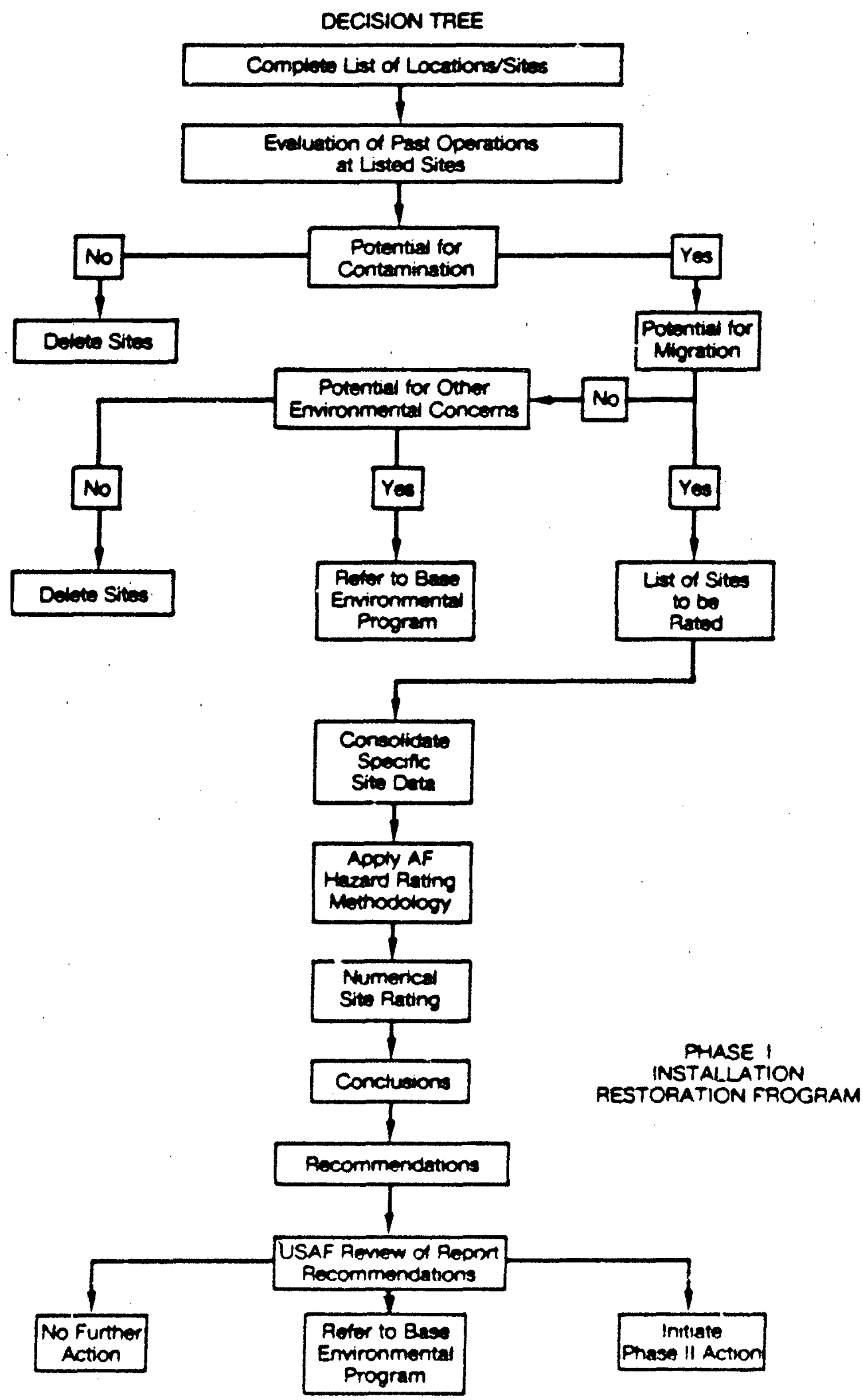

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FIGURE 3.
Records Search Methodology

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A decision was then made, based on all of the above information, as to whether a potential existed for hazardous material contamination from any of the identified sites. If not, the site was deleted from further consideration.

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

The site rating indicates the relative potential for adverse environmental impact at each site. For those sites showing a significant potential, recommendations were made to conduct a more detailed investigation of the potential contaminant migration problem under Phase II of the Installation Restoration Program. For those sites showing a low potential, no Phase II work was recommended.

II. INSTALLATION DESCRIPTION

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A. LOCATION

Pease AFB is located on 4,365 acres of land between the communities of Portsmouth and Newington in Rockingham County, New Hampshire. Other nearby communities (within 10 miles) include Dover, Greenland, New Castle, Rye, and Rye Beach in New Hampshire and Kittery and York in Maine. The nearest major commercial jet airport is located in Boston, 55 miles to the south. Access to the main entrance to Pease AFB (Newington Road) is provided via the Spaulding Turnpike (U.S. Route 4). The current base boundaries are shown in Figure 4.

B. ORGANIZATION AND MISSION

Pease AFB saw its first military use during World War II when it was leased by the U.S. Navy. In 1946, the Navy waived exclusive rights to the field except for 450 acres, which was transferred to the USAF in 1951. Following a series of USAF inspections, the present site was chosen for development of an air base because of its proximity to existing utilities and availability of good transportation facilities. Inspection reports also cited the feasibility of the site from the standpoint of infrastructure, public relations, and availability of land for expansion. Additional land was acquired in 1952 and 1953, with construction beginning about 1954.

In 1956, the 100th Bomb Wing began operation at the base, then known as Portsmouth Air Force Base. In February 1956, the 817th Air Division was activated here and was redesignated the 45th Air Division in 1971 with two more wings. The first B-47 aircraft arrived in April 1956 and by

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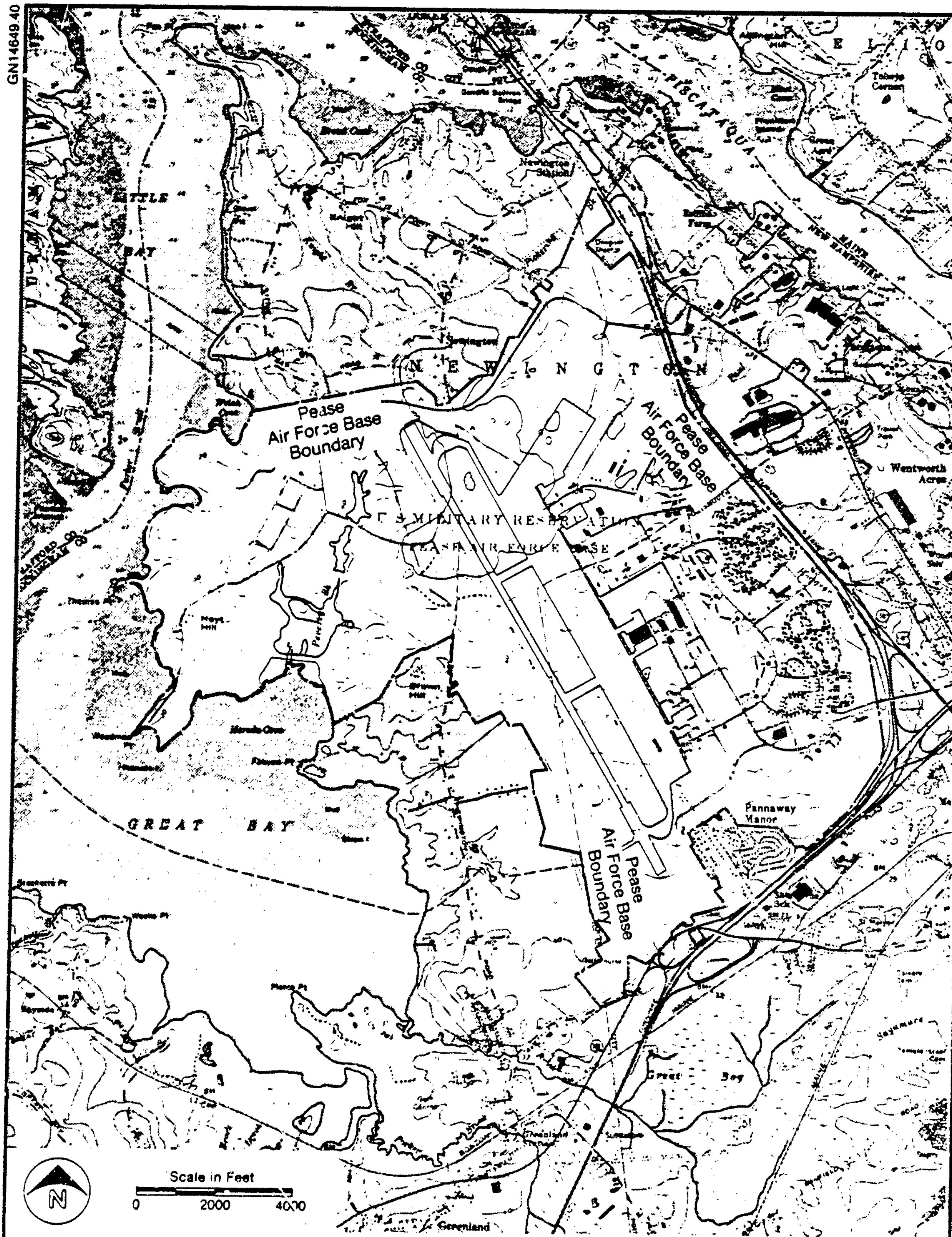

FIGURE 4.
Site Map of Pease AFB.

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the end of the year, all B-47s and KC-97 tankers assigned to the wing had arrived. In September 1957, Portsmouth AFB officially became Pease AFB, in honor of Captain Harl Pease, Jr.

In August 1958, the 100th Bomb Wing was joined by the 509th Bomb Wing. In February 1966, the last B-47 and KC-97 departed the base. The base also lost the 100th Bomb Wing to Davis-Monthan AFB, Arizona; however, the New Hampshire Air National Guard Unit from Grenier Field in Manchester came to Pease. The 509th Bomb Wing remained and was re-equipped with B-52 and KC-135 aircraft from Sheppard AFB, Texas.

In June 1966, the 34th Air Refueling Squadron arrived from Offutt AFB, Nebraska and in August 1967, the 54th Aerospace Rescue and Recovery Squadron arrived from Goose AB, Labrador. Later in 1967, the 817th Combat Support Group was redesignated the 509th Combat Support Group. In May 1969, it was announced that the 509th Bomb Wing would receive the first two operational squadrons of FB-111A aircraft. December 1969 marked the redesignation of the 509th as a medium Bombardment wing. On New Year's Day, 1970, the 715th Bombardment Squadron was reactivated. The Wing received their first FB-111A on 16 December 1970 and became fully operational in 1971.

The land and associated facilities of Pease AFB are presently used to support the Strategic mission and 15 tenants including the 45th Air Division of the base. The four organizations that have primary flying missions are the 393rd and 715th Bomb Squadrons which are authorized FB-111A Aircraft, and the 34th (scheduled for inactivation), and the 509th Air Refueling Squadrons which are authorized KC-135 aircraft. The 157th Air Refueling Group, which is a New Hampshire Air National Guard Unit and a tenant on the base, also flies the KC-135 aircraft. The primary mission of the 509th Bomb Wing is to maintain a combat-ready force capable of conducting long-range bombardment operations. The primary mission of the 157th Air Refueling Group is to provide tactical airlift support for airborne forces and other personnel, equipment, and supplies. The 157th Air Refueling Group is an operational and training unit. A more detailed description of the history and present organization of Pease AFB is provided in Appendix D.

III. ENVIRONMENTAL SETTING

III. ENVIRONMENTAL SETTING

A. METEOROLOGY

The weather at Pease AFB is typical of the northern coast of New England (see Table 2). Summers are mild with daytime highs in the upper 70s and nighttime lows in the upper 50s and low 60s. Daily highs in the winter average in the low to mid 30s, with nighttime low temperatures averaging between 15 and 20°F. The highest temperature recorded at Pease AFB is 101°, the lowest is -13°.

Precipitation is fairly evenly distributed throughout the year, with an annual mean of 43.9 inches. Snowfall averages 17 inches per month during the December-March period. Mean annual lake evaporation (commonly used to estimate the mean annual evapotranspiration rate) in the vicinity of Pease AFB is estimated to be 25 inches per year. Therefore, the annual net precipitation (mean annual precipitation minus mean annual evapotranspiration) for the Pease AFB area is approximately 19 inches per year.

Winds in the vicinity of Pease AFB are generally westerly, with mean monthly speeds varying from 5 to 7 knots.

B. PHYSICAL GEOGRAPHY

Pease AFB is located on a peninsula within the seaboard lowland section of the New England physiographic province. This section is bounded on the east by the Atlantic Ocean and on the west by the New England upland section, and is characterized by a low, undulating surface. The upland section, a peneplain with occasional monadnocks (erosional remnants), rises gently to the northwest and is dissected by narrow valleys. The seaboard lowland is merely the sloping

Table 2
METEOROLOGICAL DATA SUMMARY FOR PEASE AFB (1957-1979)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Temperature (°F)													
Mean Daily Maximum	32	33	42	54	65	75	80	78	70	60	48	35	56
Mean Daily Minimum	16	17	27	36	46	56	61	60	52	42	34	21	39
Mean Monthly	24	25	35	45	56	66	71	69	62	51	41	28	48
Extreme Maximum	61	60	78	91	99	95	101	100	94	87	75	64	101
Extreme Minimum	-13	-9	0	18	29	40	47	40	32	23	11	-9	-13
Precipitation (in)													
Mean Monthly	4.2	3.6	3.5	3.5	3.5	3.0	3.0	2.7	3.6	3.8	4.9	4.6	43.9
Monthly Maximum	12.3	6.3	6.2	11.1	6.7	6.2	5.1	7.2	8.1	12.1	12.4	10.1	12.4
Monthly Minimum	0.8	0.9	1.7	1.1	1.0	0.8	0.6	1.1	0.2	1.0	0.8	1.5	0.2
Mean Monthly Snowfall	18	19	14	2	T	0	0	0	0	T	3	18	74
Maximum Monthly Snowfall	44	61	30	9	T	0	0	0	0	2	13	38	61
Wind (kt)													
Mean	7	8	8	8	7	6	5	5	5	6	6	8	7
Prevailing Direction	W	W	W	W	W	W	W	W	W	W	W	W	W

Source: AWS Climatic Brief, Pease AFB.

margin of the upland section. The peninsula itself is bounded on the west and southwest by Great Bay, and on the northwest by Little Bay, and on the north and northeast by the Piscataqua River. The base is situated in the approximate center of the peninsula on a relatively flat kame plain, dissected by a number of surface drainage features.

Elevations at Pease AFB range from +100 feet mean sea level (msl) at the northwest end of the runway to sea level at the western base boundary with Great Bay. Land surface slopes radially downward in all directions on the peninsula from this high point (see Figure 5).

Soil associations occurring on base are, for the most part, undefined or classified as "urban land" (see Figure 6). This designation is used for those areas mostly covered by streets, parking lots, buildings, and other structures. In general, soils on base are glacial deposits consisting of unsorted clay, silt, sand, gravel, cobbles, and boulders. On the eastern part of the base, glacially derived soils grade into marine clays and glacial till, with bedrock becoming shallower and frequently exposed. Figure 6 illustrates recent, unpublished soil series mapping completed by USDA Soil Conservation Service. Since the primary objective of a soil survey is to map soils for agricultural and related construction activities, much of Pease AFB is designated as undefined or urban land. For these designations, (shaded in Figure 6), no soil characteristics have been determined. The shaded portion of Figure 6 also represents the most developed (flightline area, maintenance hangars, etc.) portion of the base. As discussed below, this portion of the base is underlain by a permeable ice-contact deposit which provides potable water for Pease AFB. This permeable deposit consists primarily of

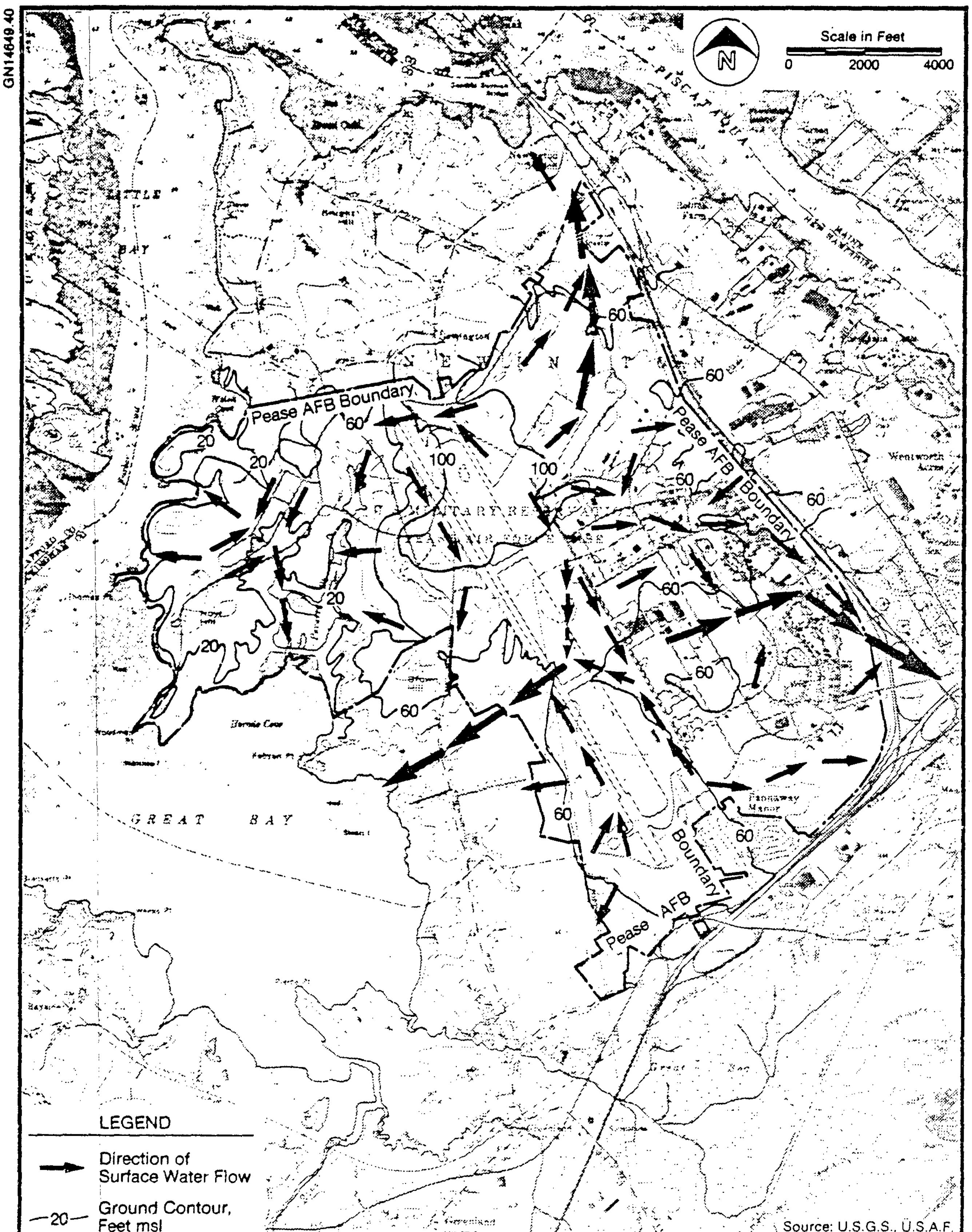

FIGURE 5.
Topography and Surface Drainage.

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Table 3
SOIL ENGINEERING PROPERTIES

Soil Map[a] Numeric Classification	Soil Series	Permeability (cm/sec)	Shrink-Swell Potential	Depth to Flooding Frequency	Water Table (ft)
12	Hinckly	4×10^{-3} to 1×10^{-2}	Low	None	>6
26	Windsor	$>4 \times 10^{-3}$	Low	None	>6
32	Boxford	4×10^{-5} to 1×10^{-4}	Low to Medium	None	1-3
33	Scitico	1×10^{-4} to 1×10^{-3}	Low to Medium	None	0-1
38	Elmridge	1×10^{-3} to 4×10^{-3}	Low	None	1.5-3
39	Whatley	1×10^{-4} to 4×10^{-3}	Low to Medium	None	--
40	Chatfield--Hollis	4×10^{-4} to 4×10^{-3}	Low	None	>6
95	Greenwood	4×10^{-4} to 4×10^{-3}	--	None	1
134	Maybid	1×10^{-4} to 4×10^{-4}	Low to Medium	None	1-0.5
214	Pipestone	4×10^{-4} to 1×10^{-2}	Low	None	0.5-1.5
298	Borrow Pits	$>4 \times 10^{-3}$	Low	None	>6
299	Udorthents	- - - - - - -	No data Available	- - - -	- - - -
313	Deerfield	4×10^{-3} to 1×10^{-2}	Low	None	1.5-3
460	Pennichuck	4×10^{-4} to 1×10^{-3}	Low	None	>6
510	Hoosic	1×10^{-3} to 1×10^{-2}	Low	None	76
538	Shaker	1×10^{-3} to 4×10^{-3}	Low	None	0-1.5
597	Westbrook	4×10^{-4} to 1×10^{-3}	Low	Frequent	0-1
647	Ridgebury	4×10^{-4} to 4×10^{-3}	Low	None	0-1.5
699	Urban Land	- - - - - - -	No data Available	- - - -	- - - -
799	Urban Land--Canton Complex	1×10^{-3} to 1×10^{-2}	Low	None	>6
997	Ipswich	4×10^{-4} to 1×10^{-2}	--	Frequent	0-1

[a] See Figure 6.

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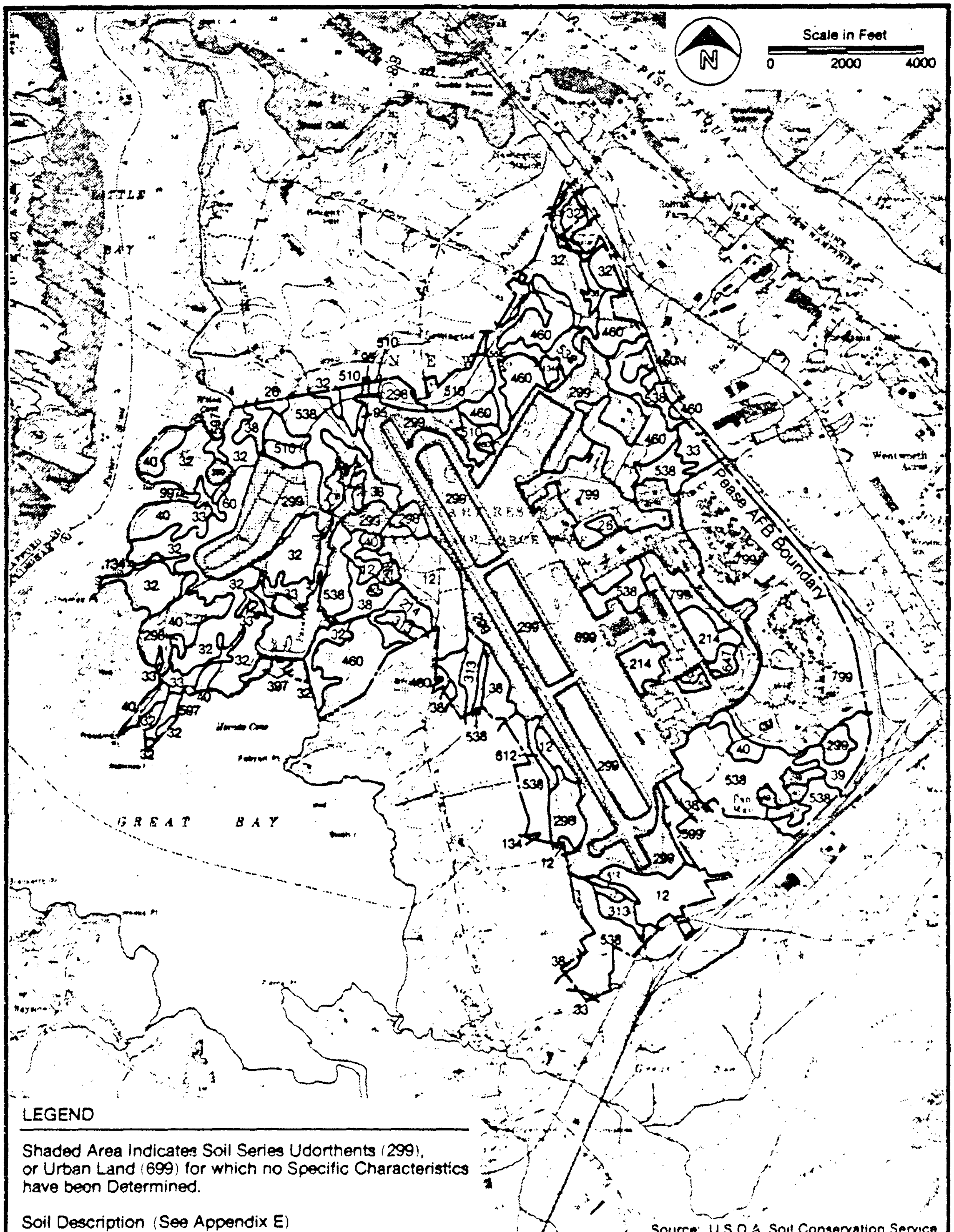

LEGEND

Shaded Area Indicates Soil Series Udorthents (299), or Urban Land (699) for which no Specific Characteristics have been Determined.

Soil Description (See Appendix E)

Source: U.S.D.A. Soil Conservation Service

FIGURE 6.
Soils Map.

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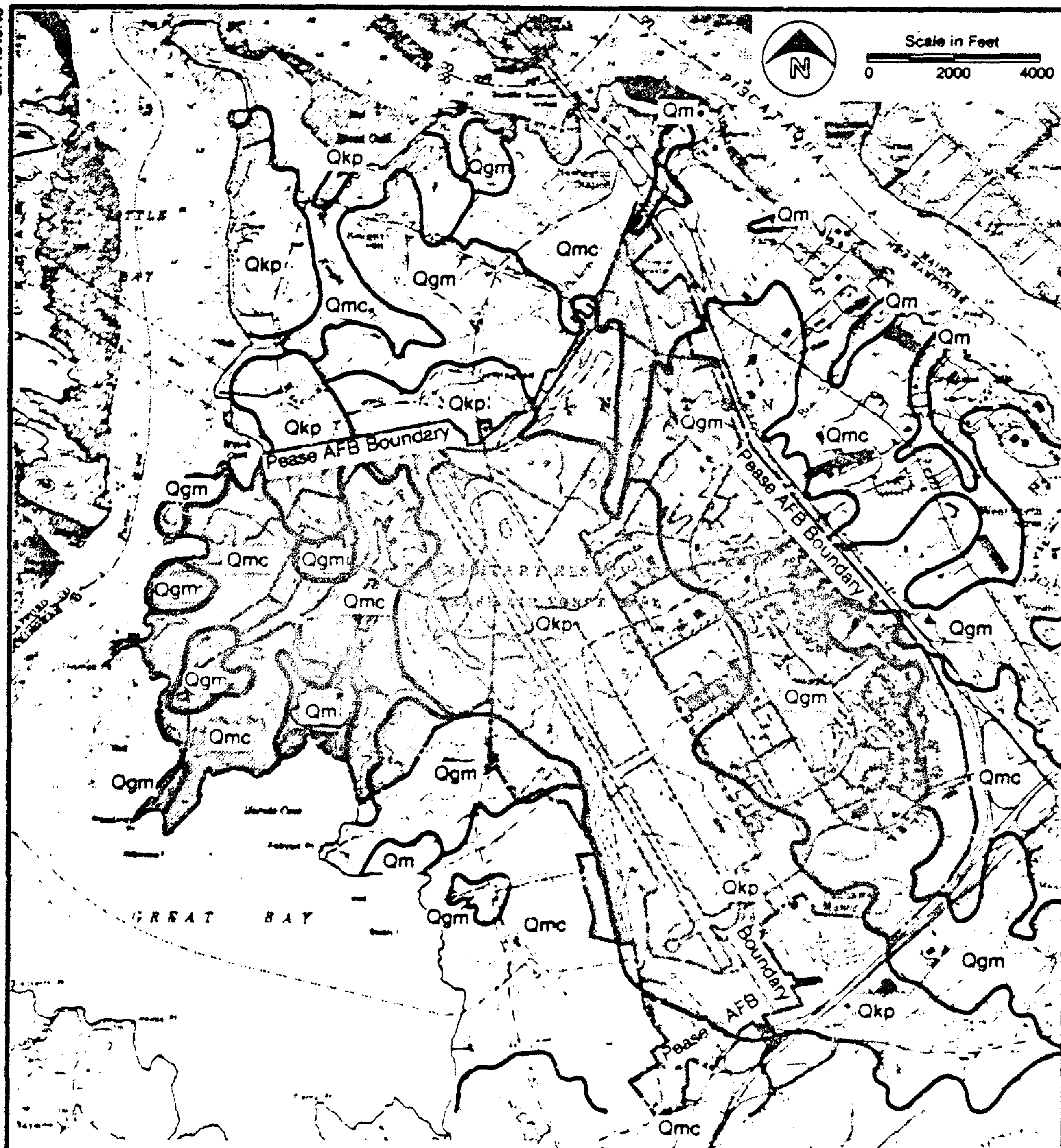
coarse grained glacial material (sand, gravel, cobbles, and boulders). Appendix E presents the descriptions of soils occurring at Pease AFB and Table 3 lists the associated engineering properties of these soils.

Geologically, Pease AFB is situated on a kame, or ice-contact plain, which is an isolated, flat-topped glacial outwash deposit, bounded by ice-contact slopes. This glacial feature is known as the Newington-Portsmouth Kame Plain and occurs as a linear feature which trends northwest and slopes at approximately 30 feet per mile to the southeast. Figure 7 illustrates the areal extent of the plain and its relationship to Pease AFB. This deposit is characterized by stratified coarse grained sediments including sand, gravel, cobbles, and boulders.

Surficial deposits of glacial till (ground moraine) and bedrock outcrops are also shown in Figure 7. Glacial till generally consists of unsorted clay, silt, sand, gravel, cobbles, and boulders. Till consists of unstratified, unsorted debris carried and deposited directly by the glacier. Kame or ice-contact deposits are stratified and the fine grained sediments (clay, silt, and rock flower) winnowed out and removed by glacial meltwater. Both glacial till and the ice-contact deposits at Pease AFB are unconsolidated and overlie bedrock.

Bedrock underlying Pease AFB consists of metasedimentary rocks. Recent data (personal communication, John Cotton, USGS) suggest that the age of these rocks is pre-Silurian (greater than 410 million years old). Figure 8 illustrates the bedrock geology at Pease AFB. Figure 9 illustrates a general northwest-southeast geologic profile taken through Pease AFB depicting bedrock geology. Bedrock formations



LEGEND

Qmc - Moraine Clay-Clay, Silt and Sand, Poorly Stratified.

Qkp - Kame Plain Deposits—Stratified Sand and Gravel Occuring in Larae, Flat-topped Ridges with some Distinct Ice-Contact Slopes.

Qgm - Ground Moraine-Stoney Till in a Thin Irregular Cover.

Qm - Marsh Deposits Sand, Silt and Organic Matter, Scarcely above Water at High Tide.

FIGURE 7.
Surfacial Geologic Map.

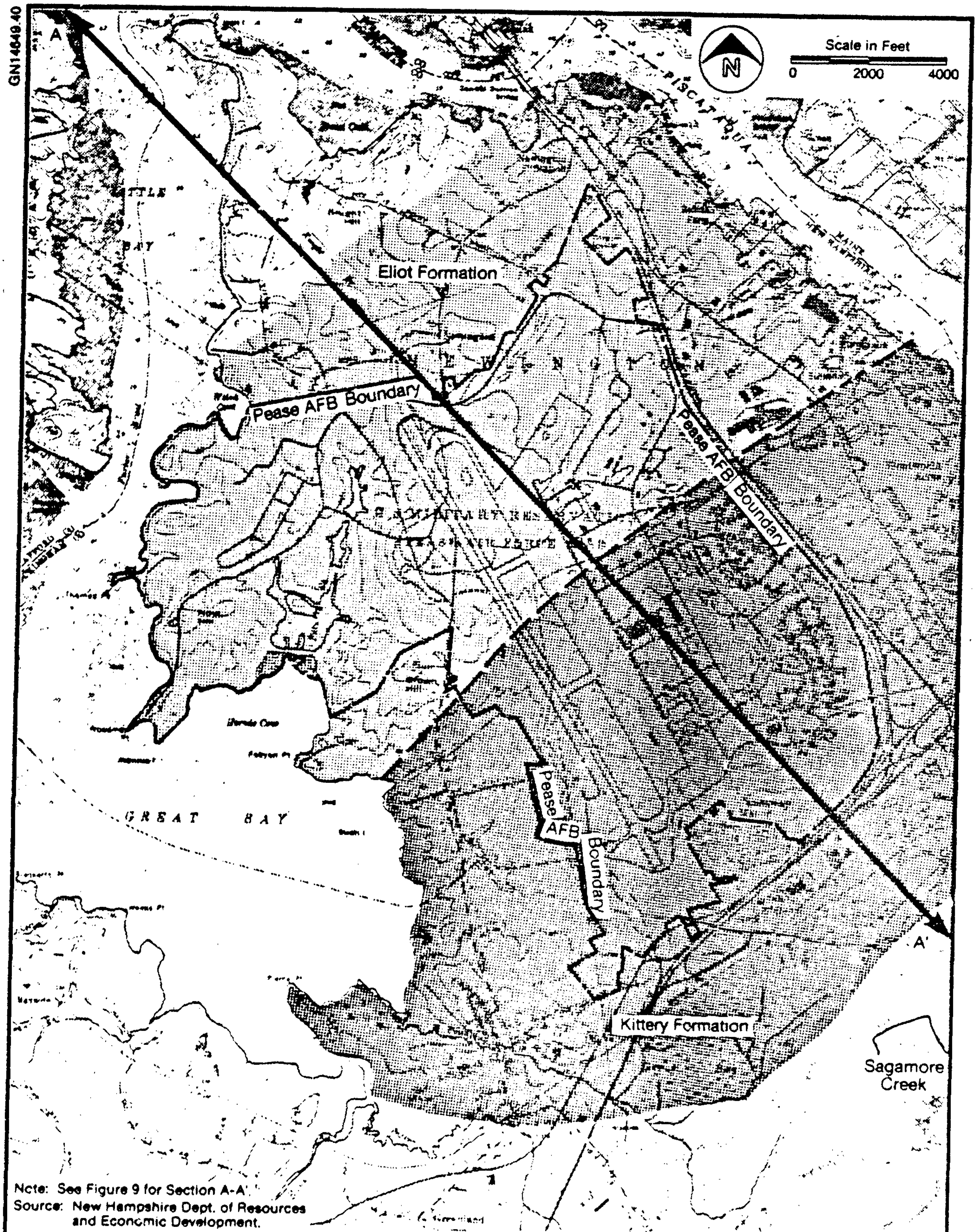


FIGURE 8.
Bedrock Geologic Map.

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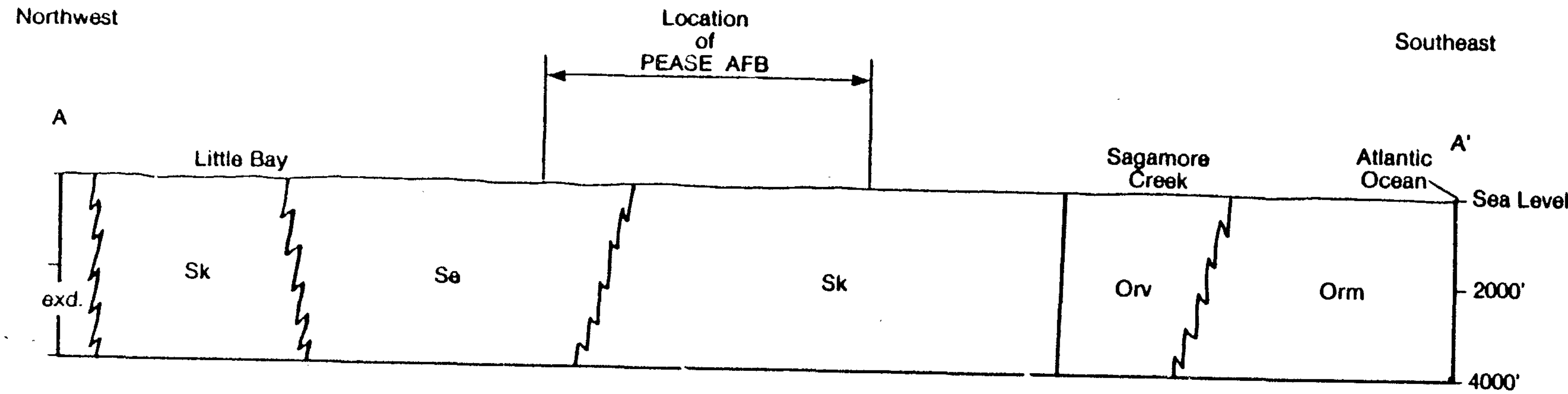

LEGEND

exd. - Exeter Diorite

Se - Eliot Formation

Sk - Kittery Formation

Orv - Rye Formation-Upper Metavolcanic

Orm - Rye Formation-Lower Metasedimentary

Source: New Hampshire Dept. of Resources and Economic Development.

Note: See Figure 8 for Section Location.

FIGURE 9.
Bedrock Geologic Cross Section AA'.

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immediately underlying glacial deposits at Pease AFB are identified as the Eliot formation (light gray in Figure 8) and the Kittery formation (dark gray in Figure 8). The Eliot formation is described by Novotny (1969) as follows:

> Dark gray slate; dark gray to dark green phyllite, commonly dolomitic; light to dark gray to black biotite schist, quartz biotite schist, and feldspathic quartz-biotite schist; massive, light gray to light gray-green, fine grained quartzite, in part feldspathic, in part dolomitic; light gray-green to brown, fine- to medium-grained, lime-silicate rock, containing actinolite.

The Kittery formation is described by Novotny (1969) as follows:

> Dark gray slate; dark gray-green to silvery gray phyllite; fine- to medium-grained, finely laminated to massive, poorly- to well-foliated quartz-biotite schist, biotite-sericite schist, and felspathic quartz-biotite schist, commonly calcareous and actinolitic; light gray-green to dark gray, well bedded to massive, fine-grained quartzite and feldspathic quartzite; thin-bedded to massive, medium-grained, light gray to light gray-green lime-silicate rock.

Table 4 lists geologic units which occur in southeastern New Hampshire. Those units occurring at Pease AFB notably include ice-contact deposits, till, and bedrock.

Although Pliestocene glaciation is the most visible geologic process which has shaped the Newington-Portsmouth Peninsula, underlying structure has also played an important role. Figure 10 illustrates the major structural features in the vicinity of Pease AFB. This figure, together with the bedrock geologic cross section illustrated in Figure 9 can be used to identify and understand the structural geology in the vicinity of Pease AFB. In general, most

Table 4
GEOLOGIC UNITS IN SOUTHEASTERN NEW HAMPSHIRE

Era	Series	Unit	Thickness	Character of Material	Topographic Situation	Water-Bearing Properties
Quaternary	Recent	Beach Deposits	0-25±	Fine to medium sand; waterworn cobbles and stones.	Modern beaches along coastline.	Permeable but generally contain only a few feet of freshwater over salt or brackish water. May yield a few gallons per minute at places, but heavy pumping produces saltwater.
Quaternary	Recent	Alluvium	Unknown	Stratified sand and silt; contains a few cobbles and small boulders.	Stream channels and flood plain.	Probably moderately permeable and saturated with water at many places, but generally not tapped by wells.
Quaternary	-- ? --	Swamp Deposits	0-20±	Silt, sand, some gravel and organic matter.	Poorly drained areas, depressions, and lowlands.	Not tapped by wells.
Quaternary	Pleistocene	Outwash and Shore Deposits	0-50±	Stratified fine to coarse sand and fine gravel; contain pebbles and cobbles at places.	Extensive outwash plains plains to inland parts of the area; thin terrace and old shoreline deposits near coast.	Moderately permeable. Where saturated thickness is sufficient, supply water for domestic and farm wells and may yield as much as 100 gpm at places.
Quaternary	Pleistocene	Marine Deposits	0-75±	Clay, silt, and some sand; commonly laminated, but massive in places.	Stream valleys and lowland areas.	Impermeable. Rarely yield water to wells, but overlie water-bearing deposits at places, and create artesian conditions.
Quarternary	Pleistocene	Ice-Contact Deposits	0-190±	Stratified sand, gravel, cobbles, and some boulders; contain silt and clay lenses in places; cross bedding and deltaic bedding common.	Generally flat, elongate plains, terraces along hillsides, and irregular hills and mounds.	Generally have high permeability but locally may have relatively low permeability. Furnish water for most of large public-supply system in the area. Yields of about 200 gpm are available at many places where the thickness is greater than 50 ft.

Table 4--Continued

Era	Series	Unit	Thickness	Character of Material	Topographic Situation	Water-bearing Properties
Quarternary	Pleistocene	Till	0-225±	Unsorted clay, silt, sand, gravel, cobbles, and boulders, moderately to highly compact; largely silt and sand at most places.	Irregular rolling surface in ground moraine; rounded hills in drumlins.	Generally has low permeability. At some places, where thicker than 10 to 15 ft, yields sufficient water to dug wells for domestic use, but many wells go dry during long droughts.
Palezoic	-- ? --	Bedrock[a]	Unknown	Fractured igneous and metamorphic rocks; dense.	Irregular surface underlying unconsolidated deposits; outcrops on hills and ridges.	Contains water in cracks. Yields small to moderate quantities of water from drilled wells.

[a]Bedrock at Pease AFB consists of pre-Silurian metasedimentary rocks of the Eliot and Kittery formations.

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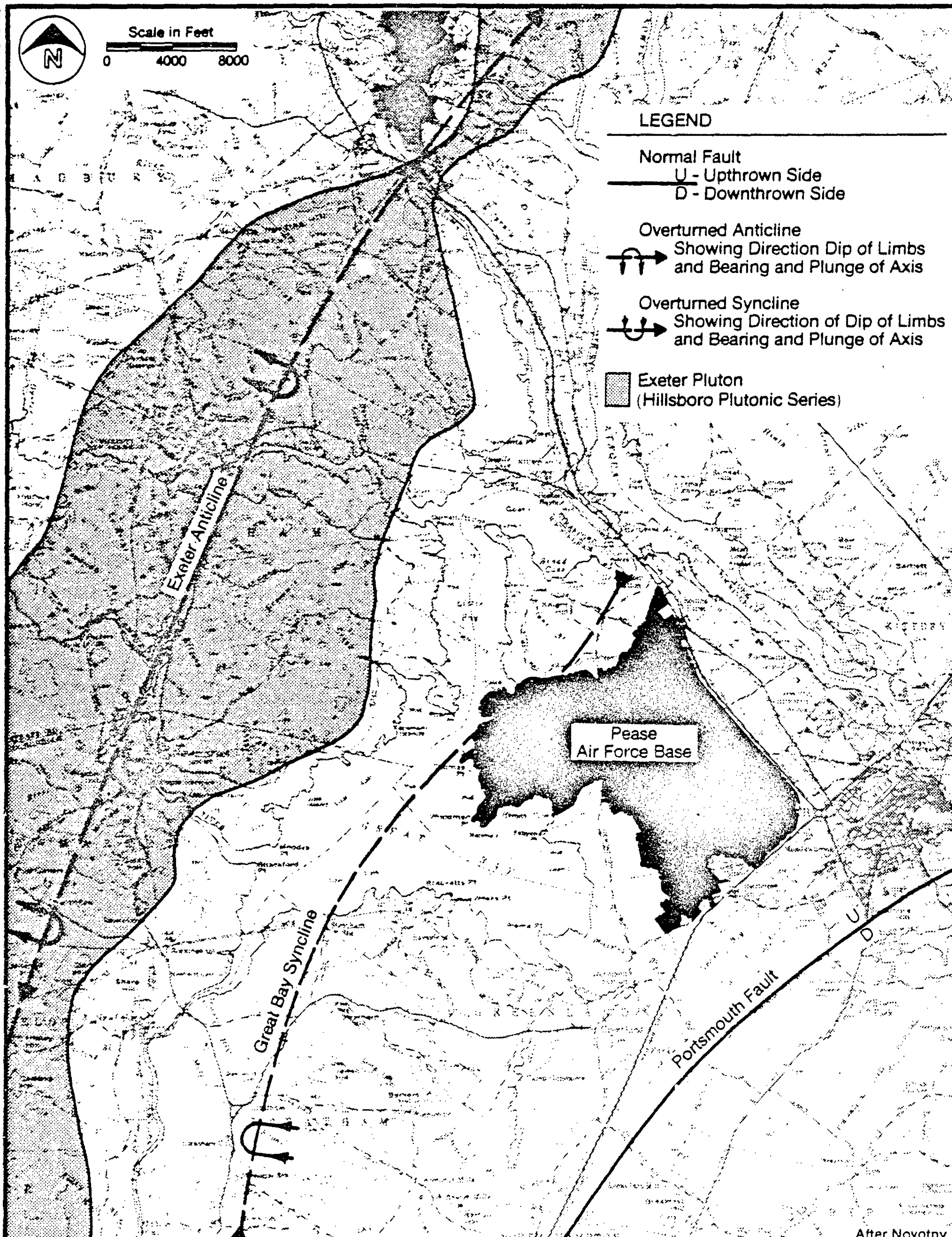

FIGURE 10.
Structural Geologic Map.

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rocks and geologic structures trend in a northeasterly direction. This fact can be readily observed from both the bedrock geologic map (Figure 8) and the structure geologic map (Figure 10). Bedrock structure consists primarily of overturned anticlines and synclines and normal faults. An anticline is a configuration of folded, stratified rocks in which the rocks dip in two directions away from a crest. A syncline is the reverse of an anticline in which rocks dip downward from opposite directions to come together in a trough. An overturned anticline or syncline is one in which at least one limb (both limbs in the vicinity of Pease AFB) is overturned or rotated through more than 90°.

Figure 10 shows that Great and Little Bays align with an overturned syncline referred to as the Great Bay Syncline. An igneous pluton (large mass of igneous rock formed beneath the earth by cooling, molten rock) consisting of massive diorite, known as the Exeter Anticline, is located adjacent and northeast of the Great Bay Sycline

Pease AFB is generally underlain by the Great Bay Syncline. The only major fault in the vicinity of Pease AFB, known as the Portsmouth Fault, is southeast of this syncline. This is a normal fault, meaning the head or hanging wall appears to have moved downward relative to the foot wall (also known as a gravity fault).

Bedrock geology and the accompanying geologic structure control the movement of ground water in these consolidated formations. Faults and folds alter the normal flow of ground water such that flow pathways follow structural trends. Fault planes tend to be more permeable than the surrounding rock mass and thus act as a conduit for ground water. Furthermore, the configuration of the bedrock plays an important role in the deposition and thickness of overlying unconsolidated deposits. That is, in those areas where the bedrock is close to land surface, the overlying unconsolidated deposits tend to be thinner.

C. HYDROLOGY

As discussed above, the base is situated on the Newington-Portsmouth Peninsula surrounded in part by Great and Little Bays and the Piscataqua River. The peninsula is located entirely within the Piscataqua River basin which drains approximately 1,020 square miles of Maine and New Hampshire. Other major rivers which occur in the Piscataqua basin include the Exeter, Lamprey, Oyster, Bellamy, Cocheco, and Salmon Falls Rivers. The Piscataqua River is formed by the confluence of the Salmon Falls and Cocheco Rivers. The 13-mile stretch downstream of the confluence is entirely tidewater.

Great and Little Bays receive flow from the Bellamy, Lamprey, Oyster, and Exeter Rivers before discharging into the Piscataqua River just north of Pease AFB. Great and Little Bays are also tidal.

The legal classification of rivers entering Great and Little Bays as well as the tidal reaches of the Piscataqua are Class B, or acceptable for bathing, recreation, fish habitat, and public water supply after adequate treatment. Actual water quality within most of these rivers is lower than Class B due to industrial or municipal waste disposal from numerous towns and industries located along these rivers.

Surface runoff from Pease AFB discharges ultimately to the Piscataqua River either directly or by way of Great and Little Bays. Figure 5 illustrates surface drainage at the base. Most of the runway, flightline shop area, and parking apron runoff is collected in storm drains, conveyed underneath the runway in a culvert measuring 108 inches in diameter. A bypass line connected to an oil/water separator was constructed in 1974 to pretreat the storm drainage prior to discharge to Great Bay. Surface drainage from the remaining portions of the base are collected in storm sewers and ditches and conveyed off base by four ditches or brooks which discharge to Great Bay and the Piscataqua River.

At Pease AFB, ground water occurs in both the bedrock formations and the surficial deposits. The bedrock consists of consolidated, metasedimentary rocks whereas the surficial materials consist of unconsolidated, glacial deposits. Bedrock underlies all of Pease AFB, occurring at various depths ranging from 0 to greater than 100 feet. The bedrock over most of the base is overlain by unconsolidated, glacial deposits.

In bedrock formations, ground water occurs primarily in joints or fractures which formed after the rocks were consolidated. The bedrock itself is very low in permeability. However, because of the occurrence of faults and joints, the rock mass does transmit ground water, with movement occurring along the fault or joint plane. The permeability of the rock itself is referred to as primary permeability and is very low in the metasedimentary bedrock formations. Permeability developed along fault or joint planes is referred to as secondary permeability since it developed after the rock was consolidated. Secondary permeability, although fairly low, does control ground-water flow within the bedrock formations. In southeastern New Hampshire, the most common type of joints dip at a steep angle (greater than 45° from the surface) and are referred to as vertical joints. Where these joints are closely spaced and intersecting, secondary permeability (and therefore well yield) is highest. In this geologic setting, increased well depth, unlike many cases, does not result in increased yield. This is because the width and number of joints decrease with depth due to the increased weight or overburden which tends to close the joints. Therefore, successful bedrock wells are those which intersect the greatest number of joints and fractures and generally penetrate less than 100 to 150 feet of bedrock.

Joints and fractures, which control ground-water movement, occupy a small part of the bedrock mass. Also, distribution of these joints and fractures is irregular. The result is that permeability and storage capacity of the bedrock is small and differs greatly from place to place. Ground water in bedrock commonly occurs under artesian conditions. In most situations, the water is confined by either the walls of the joint or by overlying low permeability materials such as clay or till. Recharge is primarily by slow leakance from saturated, unconsolidated materials overlying the bedrock.

The unconsolidated deposits occurring in southeastern New Hampshire are, for the most part, of glacial origin. These deposits include glacial till, ice-contact deposits, glacial-marine deposits, outwash, and glacial-shore deposits. Ground water occurs under unconfined or water table conditions within the pore spaces at these unconsolidated deposits. In general, the permeability of these deposits is fairly high for well sorted coarse deposits such as ice-contact deposits and fairly low for poorly sorted deposits such as till.

At Pease AFB, glacial deposits occur over most of the base. Only where bedrock outcrops at land surface are glacial deposits absent. The glacial deposits which are most important to ground-water movement at Pease AFB are the glacial till and ice contact deposits. Figure 11 illustrates the areal distribution of till and ice-contact deposits and Figure 12 illustrates two geologic profiles, one parallel and one perpendicular to the runway.

The runway follows almost exactly the trend of the ice-contact deposit. This ice-contact deposit is actually a kame plain and the flat, elevated topography of the plain surface made it ideally suited for runway construction.

Pease AFB obtains its water supply from three major on-base wells completed in the shallow, ice-contact deposits occurring above the bedrock. In addition, the base also uses three bedrock wells which are not connected to the main distribution system. A few of the old wells formerly used by the City of Portsmouth were bedrock wells, as are some private wells on the peninsula.

Glacial till deposits cover much of Pease AFB as can be seen from Figure 11. Till generally consists of an unsorted mixture of rock particles of all sizes from clay to boulders that were deposited directly by the ice. Till deposits at Pease AFB consist mostly of sand and silt, some gravel and larger rock fragments, and only a small proportion of clay. The glacial till at Pease AFB is known as a ground moraine, meaning the material was carried along and deposited by the glacier as it advanced and retreated, laying down a "pavement" or veneer of till. Ground moraines carry the full load of ice overburden and are therefore compacted and dense. This fact, together with the unsorted, angular, and fine-grained nature of the sediments, results in a low permeability. Nevertheless, glacial till is the source of water for numerous domestic wells on the Newington-Portsmouth peninsula. Wells are generally 10 to 30 feet deep and yield no more than 1 or 2 gallons per minute. The water table in

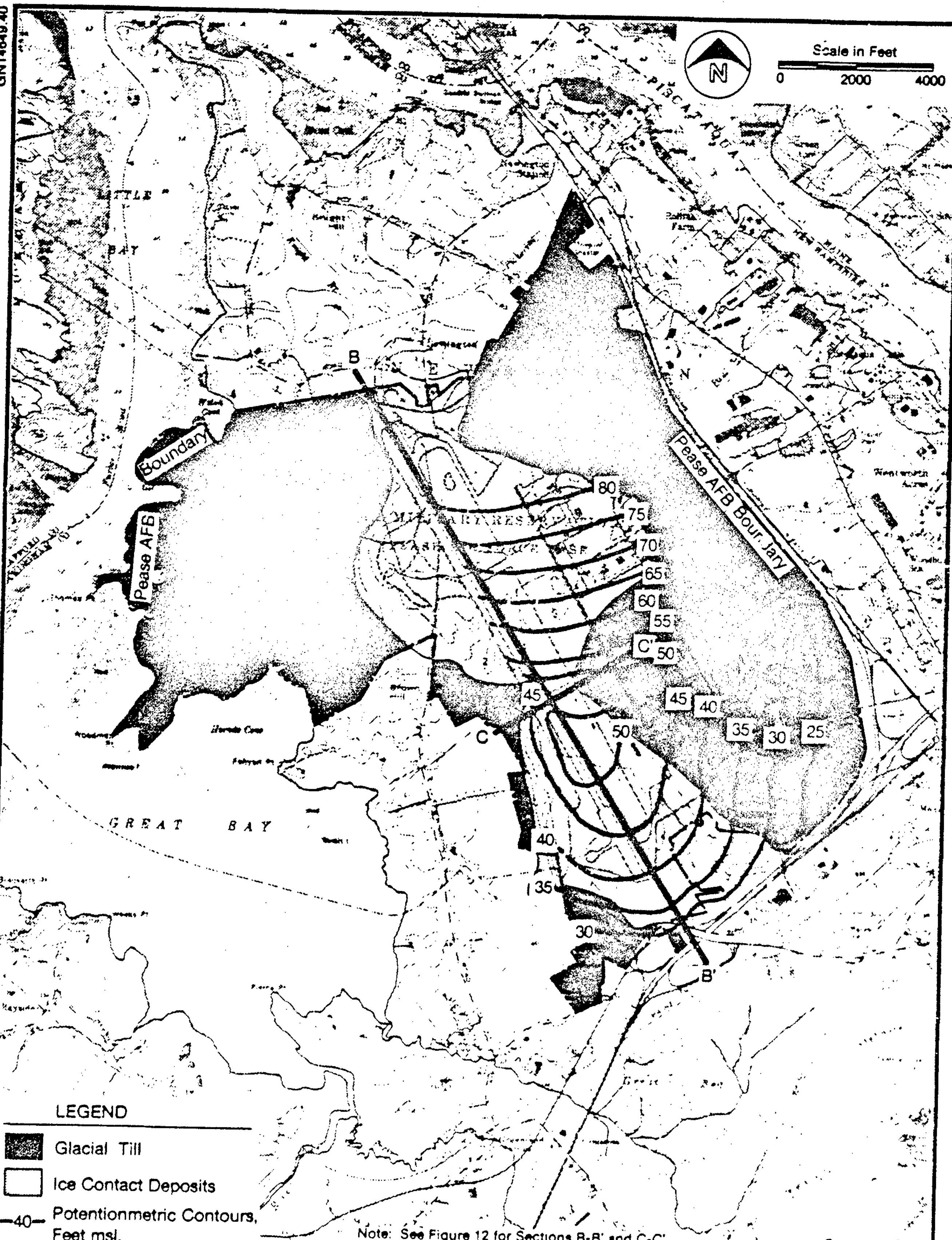

FIGURE 11.
Area Extent of Ice Contact Deposits and Potentiometric Surface, 1978.

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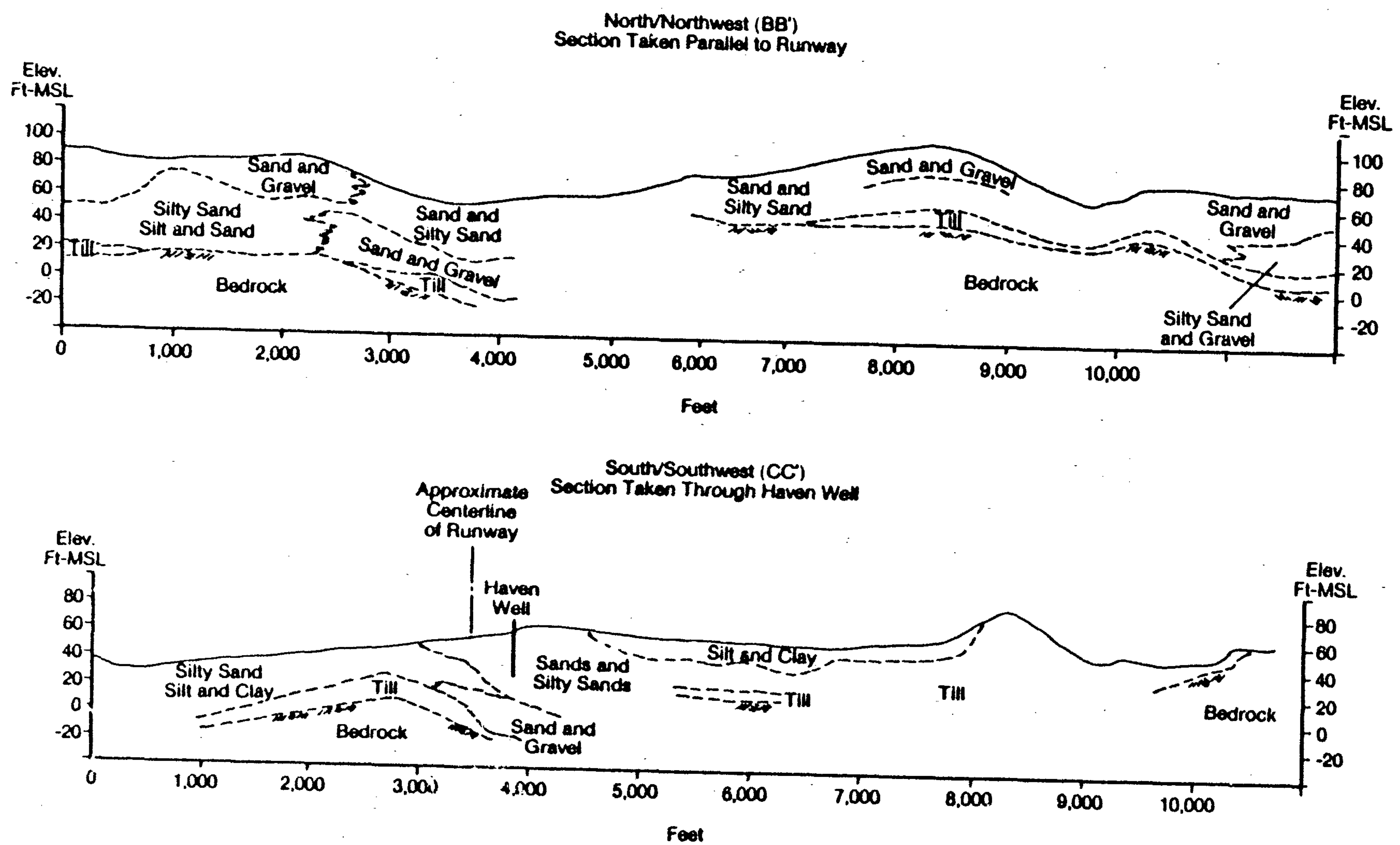

Source. U.S. Army Corps of Engineers.
Note. See Figure 11 for Section Locations

FIGURE 12.
North/Northwest and South/Southeast Geologic Cross Sections.

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till deposits on the peninsula is generally only a few feet below land surface. Deposits vary in thickness from a few feet to greater than 60 feet.

Ice-contact deposits generally consist of well sorted coarse-grained, unconsolidated sediments. As the name implies, ice-contact deposits are bodies of glacial debris built in contact with ice. Ice-contact deposits at Pease AFB are by far the most significant with regard to ground-water occurrence. The base currently obtains approximately 1 mgd from three wells (Haven, Harrison, and Smith wells) completed in the ice-contact deposits (see Figure 13), which Bradley referred to as the Main Aquifer in his investigation of TCE ground-water contamination at Pease AFB in 1978. Bradley, in a much earlier report completed in 1964, described the ice-contact kame plain as the Newington Ice Contact Deposit. His description of the deposit is as follows:

> Ice-contact deposits form a large kame plain that extends from the central part of Newington into the northwestern part of Portsmouth. This plain, which was called the Newington moraine by Keith and Katz (1917) and the Portsmouth kame plain by S. D. Tuttle in an unpublished Ph.D. thesis (The Quaternary geology of the coastal region of New Hampshire, Harvard University, 1952), is an irregular mass about 4 miles long and from about a quarter of a mile to a mile wide.

Bradley further states (Bradley and Peterson, 1962):

> At places the ice-contact deposits extend beneath adjacent outwash and shore deposits or beneath marine deposits, which may in turn be buried by outwash and shore deposits. Along the western edge of the kame plain, excavations show stratified sand, gravel, and cobbles in beds that dip gently westward. The ice-contact deposits are at least 70 feet thick at Portsmouth 25 (Haven Well), at least 65 feet thick at Portsmouth 14

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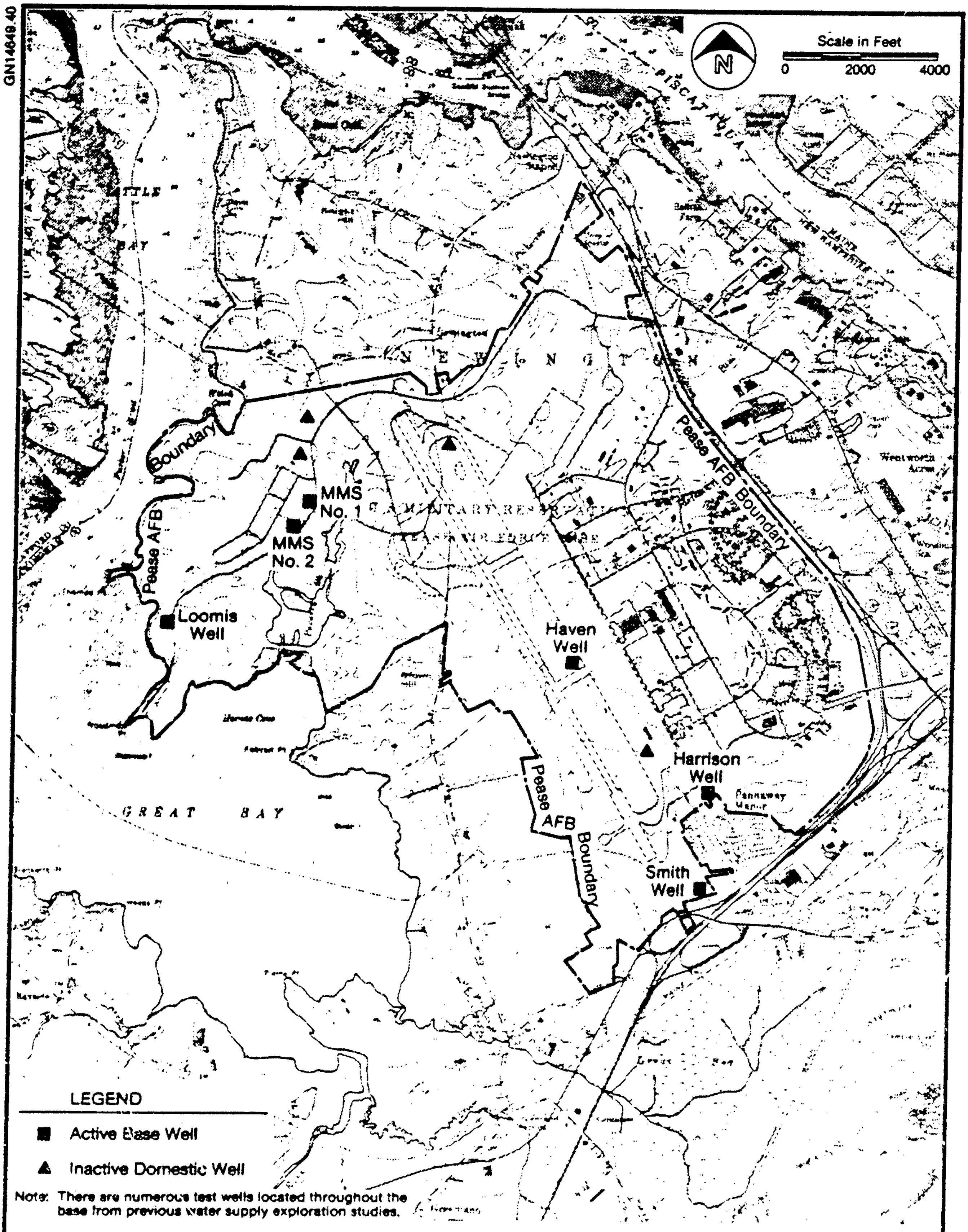

FIGURE 13.
Base Water Well Locations.

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(located at the intersection of Portsmouth, Newington, and Greenland boundary), and at least 66-1/2 feet thick at Newington 25 (located at north end of runway).

Before 1955, the saturated thickness of deposits near Portsmouth 2 (near Haven Well) was about 60 feet. Subsequently, construction of drainage facilities for Pease Air Force Base lowered the water table about 15 feet, and continuous or nearly continuous pumping of Portsmouth 25 lowered the saturated thickness of deposits there to about 30 feet by the end of 1957.

Connected to the northwestern corner of the kame plain is a small mass of ice-contact deposits extending westward to Great Bay and southward about 1/2 mile. Surface examination suggests that this body of deposits is thin, and it probably will not yield much ground water.

For many years, the water supply for the City of Portsmouth was derived from wells on the Newington-Portsmouth kame plain. The municipal supply wells included Portsmouth 1-5 (Goslin and Haven Wells). The yield of each well is not large, but the collective yield exceeded 2 mgd (million gallons per day) during part of the year. During construction of Pease Air Force Base, Portsmouth 1 and 2 were destroyed; subsequently, the Air Force undertook to provide Portsmouth with a comparable water supply.

The yield from the deposits of the Newington-Portsmouth kame plain remains high despite changes caused by the construction of Pease Air Force Base. The recharge area, which coincided with the exposed surface of the kame plain, was reduced somewhat by the construction of drained runways and parking aprons. However, the stripping of soil and trees has so reduced transpiration and soil moisture retention in the present recharge area that recharge rates there are probably larger than before the construction of the base. The net effect of these opposing changes is unknown.

Bradley also states that the quality of ground water produced from these wells is good and, with the exception of trichloroethylene (TCE) contamination introduced into the aquifer, is expected to remain good. The TCE ground-water contamination at Pease AFB is discussed in detail in Section IV.A.12.

The locations of the base water supply wells are shown in Figure 13, and pertinent well data are summarized in Table 5. Figure 14 illustrates geologic log and well construction details of the Smith Well. Bradley recently published (1982) his report of findings regarding the ground-water contamination at Pease AFB. Logs of test holes drilled during this investigation are included in Appendix N. As part of this effort, a potentiometric map was prepared which illustrates the hydraulic gradient and the direction of ground-water flow in the main aquifer (see Figure 11). This illustration shows that ground-water movement is from north to south, roughly parallel to the runway.

As can be seen from Figure 11, the most active (industrial) portion of the base overlies the ice contact deposit (main aquifer). Recharge to this aquifer is local and direct; therefore, any liquid placed on the surface could quickly infiltrate to the water table.

D. ECOLOGY

1. Flora and Fauna

Plant communities in the vicinity of Pease AFB may generally be divided into mixed deciduous pine forests, red maple bogs, fresh marshes, old fields and grasslands, and cultivated/ornamental communities. Upland forestlands occupy the greatest portion of the acreage on Pease AFB (2,600 acres)

Table 5
SUMMARY OF WELL DATA

Well Designation (see Figure 13)	Date of Construction	Diameter (in)	Depth (ft)	Screened Depth (ft)	Yield (gpm)	Drawdown (ft)	Aquifer
Haven	1955	24	66	51-66	800	13.7	Ice Contact Deposits
Smith	1958	18	67	45-67	495	6	Ice Contact Deposits
Harrison	1957	12	46	31-46	225	15.5	Ice Contact Deposits
MMS No. 1	1956	6	130	Not Screened	28	60	Bedrock
MMS No. 2	1956	6	170	Not Screened	29	44	Bedrock
Loomis	Pre-1956[a]	4	300	Not Screened	15	--	Bedrock

Note: With the exception of the Smith well (Figure 14), a search of installation records, USGS files, and contacts with Layne-New England Company failed to locate driller's logs for the above wells.

[a]This well was in existence prior to construction of the base.

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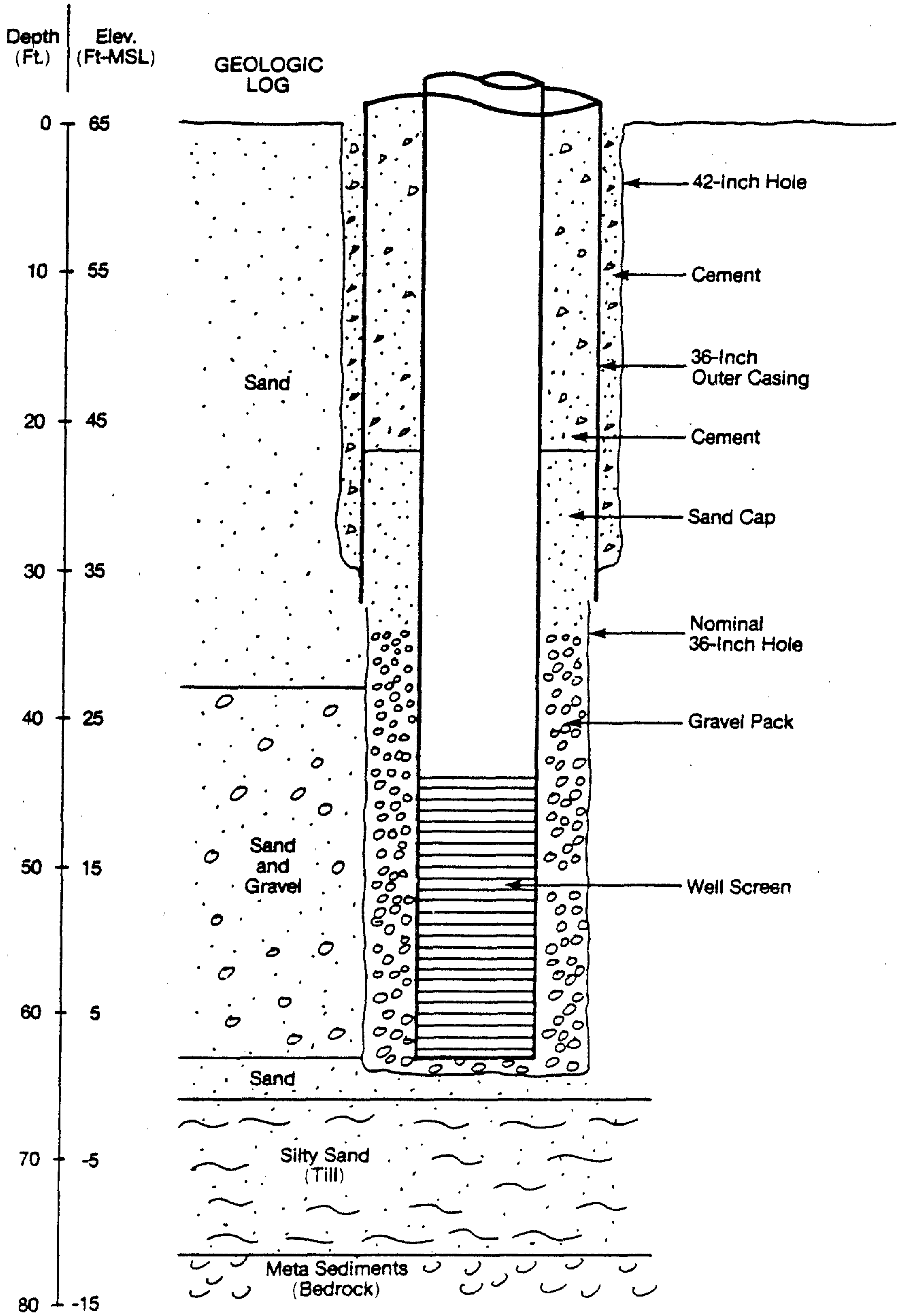

Source: Layne—New England Co.

FIGURE 14.
Geologic Log and Well Construction Detail for the Smith Well.

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and are composed of roughly 70 percent deciduous hardwoods and 30 percent pines and other conifers. Representative species include white pine, pitch pine, red pine, various birches, red oak, black oak, white oak, quaking aspen, and wild cherries. Red maple bogs are wetland areas with red maple as the dominant overstory species, and occur as small tracts on the base. Fresh marshes observed in proximity to the base were composed primarily of common reed. Typical ground cover species inhabiting old fields and grasslands on the base and surrounding lands include timothy grass, orchard grass, reed canarygrass, Kentucky bluegrass, red fescue, sweetfern, various alders, staghorn sumac, and various annual/biennial forbs.

A variety of fish and wildlife species occur on Pease AFB and surrounding lands. Important game species include deer, fox, gray squirrel, pheasant (stocked annually), eastern cottontail, woodcock, bobwhite quail, and a number of waterfowl species. Fishes inhabiting the ponds and brooks on base include brook and rainbow trout (both stocked), largemouth bass, yellow perch, chain pickerel, brown bullhead, alewife, golden shiner, American eel, and pumpkinseed. Important fish species in adjoining Great Bay include coho salmon, brown trout, blueback herring, alewife, and rainbow smelt. Approved shellfish areas in Great Bay (in proximity to Pease AFB) occur south of the Adams Point area (New Hampshire Public Health Services, 1983). Important shellfish species include lobsters and oysters.

2. Threatened and Endangered Species

No Federally endangered plants or animals reside on Pease AFB or nearby lands. Bald eagles and peregrine falcons (both endangered) may occasionally fly over Pease AFB, but all such occurrences are transient in nature

(Nickerson, 1983). State listed species which could possibly pass through or find suitable habitat on Pease AFB and adjoining lands include the common loon, Cooper's hawk, marsh hawk, red-shouldered hawk, osprey, upland sandpiper, common tern, roseate tern, arctic tern, whip-poor-will, purple marten, and eastern bluebird. None of these species are known to occur on Pease AFB.

IV. FINDINGS

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A. ACTIVITY REVIEW

1. Industrial Waste Disposal Practices

The majority of industrial operations at Pease AFB have been in existence since activation of the base in 1956. Aircraft maintenance operations generate small quantities of hazardous wastes, including spent degreasers, solvents, paint strippers, and contaminated jet fuel. The total quantity of hazardous wastes is currently estimated to be approximately 1,500 to 2,000 gallons per year. In addition, approximately 14,000 gallons per year of waste oils (which are mostly engine oils but also include some commingled petroleum wastes such as hydraulic fluid, PD-680, MOGAS, diesel fuel, and JP-4) and approximately 10,000 gallons per year of reclaimed JP-4 are generated. Contaminated JP-4 is stored in a 25,000-gallon underground storage tank located at Pumphouse No. 8 and used in fire department training exercises (approximately 15,000 gallons per year). The local Defense Property Disposal Office (DPDO), which is located at the Portsmouth Naval Shipyard, is responsible for monitoring contractor disposal of hazardous wastes. The selected contractor collects the waste at designated accumulation points at Pease AFB. Some recoverable JP-4 is also reused in powered AGE equipment. The waste oils, including lube oils, synthetic oils, and hydraulic fluid, are sold to contractors through the DPDO. Practices for past and present industrial waste disposal, based on information obtained from shop files and on the best recollection of interviewees, are summarized below:

- <u>1956-1961</u>: Most waste oils, fuels, and solvents were commingled and burned in Fire Department Training Area No. 1 (identified as

Site No. 7 in Section IV-B, Disposal Sites Identification and Evaluation). Some wastes were also discharged to storm drains, sanitary sewers, and disposed of on the ground outside of the generating facilities.

- 1961-1971: Most waste oils, fuels, and solvents were commingled and burned in Fire Department Training Area No. 2 (Site No. 8). Some wastes were also discharged to storm drains, sanitary sewers, and disposed of on the ground outside of generating facilities.

- 1971-1982: Most commingled waste oils, fuels, and solvents were sold to contractors who collected the waste from oil/water separators or from accumulated 55-gallon drums. Waste oils and solvents were no longer burned in fire department training exercises. Beginning in 1976, contaminated JP-4 was stored at Pumphouse No. 8 and subsequently used in fire department training exercises.

- 1982-Present: Waste paint strippers, thinners, solvents, and contaminated fuel are collected and stored in 55-gallon drums, 5-gallon cans and other various size containers at five satellite accumulation points throughout the base, awaiting proper contractor disposal through the DPDO. Plans are currently underway to construct a central hazardous waste storage facility for centralization and control of the accumulated waste prior to contractor pickup and disposal through the DPDO. Waste oils are collected throughout the base in bowsers, drums, and oil/water separators and sold to contractors through the DPDO. Most JP-4 is reclaimed and returned to bulk storage. Contaminated JP-4 is used in fire department training exercises.

2. Industrial Operations

The industrial operations at Pease AFB have been involved primarily with the maintenance and servicing of bomber and fuel tanker aircraft. The assigned aircraft and approximate dates that they were present at Pease AFB are shown in the table below:

1956-1965	B-47 (Bomber) KC-97 (Tanker)
1966-1970	B-52 (Bomber) KC-135 (Tanker)
1970-Present	FB-111 (Fighter Bomber) KC-135 (Tanker)

Waste quantities generated during the 1950s and 1960s when B-47 and later B-52 aircraft were assigned to the base could have been greater than current waste quantities because of larger-scale maintenance operations associated with larger aircraft size and greater number of aircraft. A list of industrial shops was obtained from the Bioenvironmental Engineering staff at the base. The master list of industrial shops, including building locations and preliminary screening of current waste handling, generation, and disposal practices, is included in Appendix F. A review of the shop folders and discussion with Civil Engineering Squadron personnel resulted in the identification of the major shops where most of the waste chemicals and petroleum products are generated. These shops were visited by a member of the records search team who was accompanied by the base Environmental Coordinator. The shop foremen were interviewed during the visits to obtain information on waste types, quantities, and past and present disposal practices. Additional information from long-term base employees was used to determine, as best possible, common past waste disposal practices. The information is presented in Table 6. The table includes the major shops at the 509th Bombardment Wing, which is the host organization at Pease AFB, and major shops at the New Hampshire Air National Guard, which has been the major tenant organization on base since 1966. Interviewees indicated that major shops, in general, have always been in their present locations.

Solvents are used at Pease AFB for degreasing and general cleaning of aircraft, aircraft systems, electronic components, and vehicles. Typical solvents include PD-680 (Type II) and various chlorinated organic compounds such as carbon tetrachloride, trichloroethylene (TCE), and 1,1,1-trichloroethane. Specific types of solvents used by Pease AFB have changed over the years. Carbon tetrachloride was in common use from 1956 until 1960. Trichloroethylene was in common use from 1956 until 1973. Only small quantities of TCE have been used since 1973; most TCE use has been replaced primarily by PD-680 (Type II) and, to a lesser extent, by 1,1,1-trichloroethane.

Paint strippers and thinners containing toluene, methyl ethyl ketone, and xylene are also commonly used at the base. Other chemicals include carbon remover (contains cresylic acid) and penetrant (contains isopropanol).

Table 6
MAJOR INDUSTRIAL OPERATIONS SUMMARY

Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Waste Quantity	Treatment/Storage/Disposal Methods (1950 — 1960 — 1970 — 1980)
509th BOMBARDMENT WING				
509th Field Maintenance Squadron				
Jet Engine Maintenance	119	JP-4 7808 Oil PD-680 (Type II)	750 gal/yr 250 gal/yr 180 gal/yr	FDT 1 → FDT 2 → CR → DPDO
Accessory Shop	119	Carbon Remover 7808 Oil Calibrating Fluid	60 gal/yr 250 gal/yr 12 gal/yr	FDT 1 → FDT 2 → CR → DPDO
FMS AGE Shop	213	Waste Engine Oil JP-4 PD-680 (Type II) Hydraulic Fluid	950 gal/yr 400 gal/yr 200 gal/yr 350 gal/yr	FDT 1 → FDT 2 → CR → DPDO
Wheel and Tire Shop	227	Paint Stripper	150 gal/yr	FDT 1 → FDT 2 → CR → DPDO
		PD-680 (Type II)	500 gal/yr	Pretreatment (FAC 226) to Sanitary Sewer
Corrosion Control	120	Waste Thinners Paint Strippers Waste Paints	1,000 gal/yr 25 gal/yr	FDT 1 → FDT 2 → CR → DPDO

LEGEND

FDT 1 = Fire Department Training Area No. 1
FDT 2 = Fire Department Training Area No. 2
CR = Contractor Removal.
DPDO = Defense Property Disposal Office, located at the Portsmouth Naval Shipyard, is responsible for monitoring contractor disposal. The selected contractor collects the waste at designated accumulation points at Pease AFB.

Notes:

1. Waste oils are not listed hazardous wastes in the State of New Hampshire.
2. The above waste fuel (JP-4) quantities do not include reclaimed fuels that are reused onbase.

Table 6--Continued

Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Waste Quantity	Treatment/Storage/Disposal Methods 1950–1960	1960–1970	1970–1980	1980–
NDI Shop	120	Penetrant	55 gal/yr	FDT 1	FDT 2	CR	DPDO
		Developer Emulsifier	55 gal/yr 55 gal/yr	Sanitary Sewer	Sanitary Sewer	Sanitary Sewer	DPDO
		Fixer	110 gal/yr	Sanitary Sewer	Sanitary Sewer	Sanitary Sewer	DPDO
Hydraulic Shop	120[3]	PD-680 (Type II) Hydraulic Fluid	150 gal/yr 100 gal/yr	FDT 1	FDT 2	CR	DPDO
Lead Acid Battery Shop	120	Battery Acid	20 gal/yr	Neutralization to Sanitary Sewer	Neutralization to Sanitary Sewer	Neutralization to Sanitary Sewer	Neutralization to Sanitary Sewer
<u>509th Transportation Squadron</u>							
		PD-680 (Type II)	200 gal/yr	FDT 1	FDT 2	CR	
Vehicle Maintenance Allied Trades	130	Thinners Waste Engine Oil	100 gal/yr 2,700 gal/yr	FDT 1	FDT 2	CR	DPDO

LEGEND

FDT 1 = Fire Department Training Area No. 1
FDT 2 = Fire Department Training Area No. 2
CR = Contractor Removal.
DPDO = Defense Property Disposal Office, located at the Portsmouth Naval Shipyard, is responsible for monitoring contractor disposal. The selected contractor collects the waste at designated accumulation points at Pease AFB.

Notes:

1. Waste oils are not listed hazardous wastes in the State of New Hampshire.
2. The above waste fuel (JP-4) quantities do not include reclaimed fuels that are reused onbase.
3. Wastes are generated in Building 227.

Table 6--Continued

Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Waste Quantity	Treatment/Storage/Disposal Methods 1950 – 1960 – 1970 – 1980
Vehicle Maintenance Allied Trades	130	Ethylene Glycol	200 gal/yr	Sanitary Sewer
		Battery Acid	150 gal/yr	Neutralized to Sanitary Sewer
Refueling Vehicle Maintenance	136	Waste Engine Oil	200 gal/yr	FDT 1 → FDT 2 → CR → DPDO
		Ethylene Glycol	50 gal/yr	Sanitary Sewer
<u>509th Civil Engineering Squadron</u>				
Power Production	152	Waste Engine Oil Diesel Fuel	700 gal/yr 180 gal/yr	FDT 1 → FDT 2 → CR → DPDO
		Battery Acid	90 gal/yr	Neutralization to Sanitary Sewer
<u>509th Organizational Maintenance Squadron</u>				
OMS AGE Shop	212	Waste Engine Oil JP-4 Hydraulic Fluid	1,710 gal/yr 2,000 gal/yr 200 gal/yr	FDT 1 → FDT 2 → CR → DPDO
<u>NEW HAMPSHIRE AIR NATIONAL GUARD</u>				
<u>157th Consolidated Aircraft Maintenance Squadron</u>				
Pneudraulics Shop	244	PD-680 (Type II) Hydraulic Fluid	80 gal/yr 30 gal/yr	FDT 2 → CR → DPDO

LEGEND

FDT 1 = Fire Department Training Area No. 1
FDT 2 = Fire Department Training Area No. 2
CR = Contractor Removal.
DPDO = Defense Property Disposal Office, located at the Portsmouth Naval Shipyard, is responsible for monitoring contractor disposal. The selected contractor collects the waste at designated accumulation points at Pease AFB.

Notes:

1. Waste oils are not listed hazardous wastes in the State of New Hampshire.
2. The above waste fuel (JP-4) quantities do not include reclaimed fuels that are reused onbase.

Table 6--Continued

Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Waste Quantity	Treatment/Storage/Disposal Methods 1950–1960	1960–1970	1970–1980	1980–
Repair and Reclamation	244	PD-680 (Type II)	90 gal/yr		FDT 2	CR	DPDO
Powered AGE	252	Waste Engine Oil Hydraulic Fluid PD-680 (Type II)	100 gal/yr 15 gal/yr 30 gal/yr		FDT 2	CR	DPDO
Jet Engine Maintenance	253	7808 Oil PD-680 (Type II)	20 gal/yr 45 gal/yr		FDT 2	CR	DPDO
Corrosion Control	253	Thinners Strippers Waste Paint	60 gal/yr		FDT 2	CR	DPDO
Periodic Phase	253	Waste Engine Oil JP-4 Hydraulic Fluid PD-680 (Type II)	300 gal/yr 300 gal/yr 100 gal/yr 150 gal/yr		FDT 2	CR	DPDO
Flightline Hangar	254	Hydraulic Fluid	60 gal/yr		FDT 2	CR	DPDO
157th Transportation Squadron							
Vehicle Maintenance	258	Waste Engine Oil PD-680 (Type II) Thinners	610 gal/yr 40 gal/yr 10 gal/yr		FDT 2	CR	DPDO

LEGEND

FDT 1 = Fire Department Training Area No. 1
FDT 2 = Fire Department Training Area No. 2
CR = Contractor Removal.
DPDO = Defense Property Disposal Office, located at the Portsmouth Naval Shipyard, is responsible for monitoring contractor disposal. The selected contractor collects the waste at designated accumulation points at Pease AFB.

Notes:

1. Waste oils are not listed hazardous wastes in the State of New Hampshire.
2. The above waste fuel (JP-4) quantities do not include reclaimed fuels that are reused onbase.

Table 6--Continued

Shop Name	Present Location (Bldg. No.)	Waste Material	Current Estimated Waste Quantity	Treatment/Storage/Disposal Methods 1950 – 1960 – 1970 – 1980
Vehicle Maintenance	258	Ethylene Glycol	100 gal/yr	Sanitary Sewer (1960 to 1980); DPDO (after 1980)
		Battery Acid	50 gal/yr	Neutralized to Sanitary Sewer (1960 to present)

LEGEND

FDT 1 = Fire Department Training Area No. 1
FDT 2 = Fire Department Training Area No. 2
CR = Contractor Removal.
DPDO = Defense Property Disposal Office, located at the Portsmouth Naval Shipyard, is responsible for monitoring contractor disposal. The selected contractor collects the waste at designated accumulation points at Pease AFB.

Notes:

1. Waste oils are not listed hazardous wastes in the State of New Hampshire.
2. The above waste fuel (JP-4) quantities do not include reclaimed fuels that are reused onbase.

a. 509th Bombardment Wing

i. Building 119

Building 119 is the location of the FMS Jet Engine Maintenance Shop and the Jet Engine Accessory Shop which provide maintenance to jet engines and related equipment. Wastes generated by these shops include JP-4 (750 gal/yr), 7,808 oil (500 gal/yr), carbon remover (60 gal/yr), PD-680 Type II (180 gal/yr), and calibrating fluid (12 gal/yr). Major methods of disposal have included fire department training exercises at Site No. 1 (1956-1961); fire department training exercises at Site No. 2 (1961-1971); contractor sale and removal (1971-1982); and contractor sale and removal through the DPDO (1982-present).

ii. Building 120

Building 120 is the location of the FMS Corrosion Control (Paint) Shop, Hydraulic Shop, NDI Shop, and Lead Acid Battery Shop. Wastes generated by these shops include thinners (1,000 gal/yr), paint strippers and waste paints (25 gal/yr); PD-680 Type II (150 gal/yr); hydraulic fluid (100 gal/yr); penetrant, developer, emulsifier, and fixer from the NDI Shop (275 gal/yr); and battery acid (20 gal/yr). Wastes from Hydraulic Shop operations, i.e., PD-680 Type II (150 gal/yr), and hydraulic fluid (100 gal/yr) are generated in Building 227. Disposal practices for waste thinners, paint strippers, PD-680, and hydraulic fluid have been similar to disposal of waste petroleum products from Building 119. Waste battery acid (sulfuric acid) is neutralized prior to discharge to the sanitary sewer. Waste developer, emulsifier, and fixer are removed by contract through the DPDO. In the past, these chemicals were discharged to the sanitary sewer.

iii. Building 130

Building 130 is the location of the 509th Transportation Squadron Vehicle Maintenance and Allied Trade Shops which are involved in the maintenance and repair of all base ground transportation vehicles. Wastes include engine oil (2,700 gal/yr), thinners (100 gal/yr), PD-680 Type II (200 gal/yr), ethylene glycol (200 gal/yr), and battery acid (150 gal/yr). Disposal methods for the waste oil, thinners, and PD-680 have been similar to those used at Building 119, with the exception that disposal of PD-680 is handled directly by a contractor and not through the DPDO. Waste battery acid (after neutralization) and ethylene glycol are discharged to the sanitary sewer.

iv. Building 136

Building 136 is the location of the 509th Transportation Squadron Refueling Vehicle Maintenance Shop. Wastes include engine oil (200 gal/yr) and ethylene glycol (50 gal/yr). Disposal methods have been similar to those used at Building 130.

v. Building 152

Building 152 is the location of the 509th Civil Engineering Squadron Power Production Shop. Wastes include engine oil (700 gal/yr), diesel fuel (180 gal/yr), and battery acid (90 gal/yr). The disposal methods for the engine oil and diesel fuel have been similar to those used at Building 119. The battery acid is neutralized prior to discharge to the sanitary sewer.

vi. Building 212

Building 212 is the location of the OMS AGE Shop. Wastes generated include waste engine oil (1,710 gal/yr), JP-4 (2,000 gal/yr), and hydraulic fluid (200 gal/yr). Disposal methods for the waste engine oil, JP-4, and hydraulic fluid have been similar to those used at Building 119.

vii. Building 213

Building 213 is the location of the FMS AGE Shop. Wastes generated include engine oil (950 gal/yr), JP-4 (400 gal/yr), PD-680 Type II (200 gal/yr) and hydraulic fluid (350 gal/yr). Disposal methods have been similar to those used at Building 119.

viii. Building 227 (DC Hangar)

Building 227 is the location of the FMS Wheel and Tire Shop and the OMS Aircraft Washrack. Wastes from the Wheel and Tire Shop include paint stripper (150 gal/yr) and PD-680 Type II (500 gal/yr). Disposal methods for the paint strippers have been similar to those used at Building 119. Waste PD-680 is discharged to the Facility 226 industrial wastewater treatment facility (effluent to sanitary sewer). Aircraft cleaning compound (1,100 gal/yr) and washwater from the washrack are discharged to the Facility 226 industrial wastewater treatment facility (effluent to sanitary sewer). The Hydraulic Shop, located in Building 120, generates waste PD-680 and hydraulic fluid in Building 227. Waste quantities and disposition have been discussed previously in the discussion of Building 120.

b. New Hampshire Air National Guard

i. Building 244

Building 244 is the location of the 157th Consolidated Aircraft Maintenance Squadron (CAMS), Repair and Reclamation Shop, and Pneudraulics Shop. Wastes genegenerated include PD-680 Type II (170 gal/yr) and hydraulic fluid (30 gal/yr). Wastes are accumulated in drums at a designated location behind Building 253, which is the main accumulation point for petroleum product wastes from all the New Hampshire Air National Guard flightline shop operations. Disposal is handled by the base and disposal methods have been identical to base disposal methods since 1966, i.e., fire department training exercises from 1966 to 1971, contractor removal from 1971 to 1982, and contractor removal through the DPDO from 1982 to present.

ii. Building 252

Building 252 is the location of the powered AGE shop. Wastes generated include waste engine oil (100 gal/yr), hydraulic fluid (15 gal/yr), and PD-680 Type II (30 gal/yr). Disposal methods have been similar to those used at Building 244.

iii. Building 253

Building 253 is the location of the 157th CAMS Jet Engine Maintenance Shop and the Corrosion Control and Periodic Phase shops. Wastes generated include thinners, paint strippers, and waste paints (60 gal/yr), 7808 oil (20 gal/yr), PD-680 Type II (195 gal/yr), waste engine oil (300 gal/yr), JP-4 (300 gal/yr), and hydraulic fluid (100 gal/yr). Waste disposal methods have been similar to those used at Building 244.

iv. Building 254

Building 254 is the location of the 157th CAMS Flightline Hangar Maintenance Shop. Waste hydraulic fluid is generated at the rate of 60 gal/yr. Disposal methods have been similar to those used at Building 244.

v. Building 258

Building 258 is the location of the 157th Transportation Squadron Vehicle Maintenance Shop. Wastes generated include engine oil (610 gal/yr), PD-680 Type II (40 gal/yr), thinners (10 gal/yr), ethylene glycol (100 gal/yr), and battery acid (50 gal/yr). Disposal methods for the waste engine oil, PD-680, and thinners have been similar to those used at Building 244. Ethylene glycol is currently turned into DPDO. In the past, ethylene glycol was discharged to the sanitary sewer. Waste battery (sulfuric) acid is neutralized and discharged to the sanitary sewer.

3. Major Past Industrial Activities

Major industrial shop activities, past and present, have historically occurred in the DC Hangar (Building 227), Building 120 and Building 119. The solvent trichloroethylene (TCE) was reported by interviewees to be commonly used in these areas during the late 1950s and 1960s. Building 244, currently the location of the New Hampshire Air National Guard FMS shops, was used as a B-47 weapons system maintenance facility prior to 1966. A waste TCE underground holding tank is suspected to have leaked in the past. Numerous fuel and solvent spills have occurred in this industrial area over the years. This industrial shop area, described in Section IV.B as Site No. 15, the Industrial

Shop/Parking Apron Zone, is a suspected source of TCE groundwater contamination as a result of past spills of TCE on the ground and in the storm drainage system. Other past major uses of TCE in this zone occurred in a liquid oxygen plant (no longer existing) which was located approximately 800 feet west of Building 244; at a former TCE holding tank located at Building 113, and during fuel cell repair operations in Building 229. Further discussion is included in Section IV.A.12, TCE Groundwater Contamination.

A small cadmium plating operation for tools and small parts was conducted in Building 120 during the late 1950s and early 1960s. Disposition of the plating solution when the operation was terminated is not known; however, solution may have been placed in drums and disposed of in the base landfills (Sites No. 1 and 2).

4. Fuels

Fuel and other petroleum products are received at Pease AFB and stored in the bulk storage area located off Portsmouth Avenue in the north main base area. JP-4 is supplied by pipeline to two aboveground storage tanks, each having a capacity of 2,500,000 gallons. Distribution of JP-4 to the flightline area is by transfer pump station at the bulk storage area to five operational pumphouses located on the flightline. Each pumphouse has refueling and defueling capabilities. The central heating plant has an aboveground 400,000-gallon storage tank for No. 6 fuel oil which is pumped to the tank. Numerous tanks are located at various areas throughout the base for storage of MOGAS, diesel fuel, No. 2 fuel oil, and JP-4. An inventory of major active POL storage tanks is presented in Appendix G. Interviewees were typically asked about the existence of any inactive major POL storage tanks. Information obtained from the interviews revealed the locations of inactive fuel storage tanks at pumphouses No. 1, 2, and 8. Each of these pumphouses has six 50,000-gallon underground storage tanks which have been drained of fuel and pickled with caustic soda. In addition, underground storage tanks which have been emptied but not pickled are located at Pumphouse No. 9 (two 50,000-gallon tanks and one 25,000-gallon tank) and at Pumphouses No. 2 and 3 (one 25,000-gallon tank each).

The main fuel storage tanks in the bulk storage area have routinely been inspected every 3 years and cleaned when necessary. The sludge from the cleaning operations was buried in an area across the runway (Site No. 10). The tank cleaning sludge consisted of rust, water, and some residual fuel. In the past, residue of leaded AVGAS would also have been included in the sludge. The sludge, about 50 gallons per tank cleaning, was buried in drums. In later years, the practice of burying this sludge was discontinued and replaced by allowing the sludge to weather on the ground surface. Current practice is to collect sludge from tank cleaning operations in 55-gallon drums which are removed by contract through the DPDO.

The records search indicated that several major fuel spill/leak incidents have occurred in the past at Pease AFB. In 1959, snow removal equipment ruptured a protruding vent line from the main underground JP-4 fuel line (Site No. 14). Resulting fuel loss was estimated to be at least 10,000 gallons. Most of the fuel either evaporated or was flushed with water into the storm drainage system. Major spills have also occurred at the bulk storage area (Site No. 13). In 1963, a ruptured drain line resulted in the loss of many thousands of gallons of fuel from bulk storage Tank No. 3 into the diked area surrounding the tank. One interviewee estimated that approximately 100,000 gallons had been spilled. Most of the spilled fuel was recovered. This same tank subsequently developed a small pinhole leak in 1980. Some minor fuel loss occurred (estimated at less than 1,000 gallons) before the leak was found and repaired. Also, at the bulk storage area, a corroded vent on the fuel transfer line at Building 160 resulted in the loss of an estimated several thousands of gallons of fuel in 1975.

Numerous smaller fuel spill incidents were reported in the flightline industrial shop area (Site No. 15). These include spillage from oil/water separators and visual observation of fuel in a recently excavated septic tank trench near Building 222

Major fuel storage tanks are checked for leaks regularly and inventories are checked carefully. Other than the above reported incidents, there were no reports of corroded or leaking tanks or fuel lines.

5. Fire Department Training Activities

Fire department training activities have been common at Pease AFB since the activation of the base in 1956. Two fire department training areas were identified by interviewees. The first, Site No. 7, was located near the original base landfill (Site No. 1). Limited information was available about this site but it was probably the main training site until 1961, when fire department training activities moved to the existing location (Site No. 8).

Current fire department training exercises are conducted about twice per month with about 1,000 to 1,500 gallons of recovered JP-4 used per activity. Exercises are curtailed during the winter due to adverse weather conditions. Only recovered JP-4 has been used in the exercises since about 1971. Prior to 1971, mixed POL wastes, including waste oils, solvents, and fuels were commonly used. According to numerous interviewees, fire department training was identified as the main method of disposal of waste oils, solvents, and fuels since the activation of the base in 1956 until 1971, when recovery and sale to contractors became the main method of disposal. The frequency of exercises and quantities of POL used in the exercises were probably greater during the 1960s when B-47 aircraft were assigned to the base. Currently, the burn area is pre-saturated with water and then JP-4 is poured onto a mock aircraft, allowed to burn for 1 to 2 minutes, and then extinguished using Aqueous Film-Forming Foam (AFFF). Procedures are believed to have been similar at Site No. 7, with the exception that protein foam would have been used to extinguish the fires.

The existing fire department training area was refurbished in 1975. A clay-lined burn area was constructed and a drainage system was installed. The drainage is piped to a clay-lined holding basin with discharge to a nearby wooded area. An oil/water separator was planned for the holding basin but, to date, has not been installed. Visual inspection of the wooded area receiving the fire department training area drainage showed a large circular area of dead pine trees. Fuel odors were noted and massive fuel saturation of soil was evident, with numerous ponded areas of fuel visible on the ground surface throughout this low-lying, wet area. The drainage line from the burn area is believed to be functioning improperly and fuel may periodically flow overland, over the dirt access road, and into the low-lying wooded drainage area.

Several interviewees also reported that a common practice in the past was to transport drums and bowsers of mixed POL wastes, including solvents to the fire department training areas (primarily Site No. 8) and to dump the wastes into the circular training area up to 1 week prior to a burn exercise, thereby affording a greater opportunity for wastes to percolate into the ground. The existing fire department training area is located at the edge of the aquifer recharge area for the base water supply. Because TCE was probably present in past POL wastes, this training area was identified as one of the suspect sources of TCE ground-water contamination at the base (Pontier and Christensen, 1977).

6. Polychlorinated Biphenyls (PCBs)

The main potential sources of PCBs at Pease AFB are electrical transformers and capacitors. Pease AFB has identified nine in-service transformers and seven in-service capacitors which contain PCB dielectric fluid. The above items are inspected monthly by Exterior Electric Shop personnel. Four transformers have developed small leaks (at the rate of a few drops per year) and are scheduled to be replaced.

The records search indicated only one major PCB spill incident which occurred in the summer of 1983 in Building 410, a receiver site. A blown transformer resulted in a spill of approximately 35 gallons of PCB transformer oil. Most of the spill was contained indoors on the concrete floor; however, some of the oil spilled onto the ground outside of the building (Site No. 16). The contaminated soil, as well as the transformer oil clean-up material, was collected in 18 55-gallon drums. The soil left in place was analyzed and found not to contain residual PCBs. The sealed drums and the blown transformer are being temporarily stored in a locked, fenced area in the Civil Engineering storage yard awaiting proper contractor disposal through the DPDO.

The transformers at Pease AFB are relatively new, the oldest being 1956 vintage at the time of base activation. No reports of past replacement of transformers or changing of transformer oil were made. No reports or indications that transformers or capacitors were disposed of in base landfills in the past were found.

7. Pesticides

Pesticides are commonly used at Pease AFB for weed and pest control. Pesticides have been stored in the Entomology Shop (Building 141) since 1973. Prior to 1973, pesticides were stored in the former Entomology Shop (Building 152). The major pesticides used for control of roaches, mosquitoes, ants, and rats (June 1982 to June 1983) include diazinon (454 lb), malathion (180 lb), and anti-coagulant (278 lb). Other pesticides used include bagon for ant and roach control, and dibrom for mosquito control. Pesticides used in the past include DDT, lindane, and ABATE, an organophosphorus larvicide. Overall pesticide usage at Pease AFB is small relative to other Air Force installations. Empty pesticide containers are triple rinsed, punctured with holes, and disposed of in dumpsters. Rinsewater is reused as dilution water for new pesticide. Pesticide application equipment is rinsed on a paved asphalt surface behind the Entomology Shop. In the past, the equipment was rinsed at the old CE washrack which no longer exists. The rinsewater from this operation was discharged to the storm sewer. Small amounts of pesticides would have been present in the rinsewater but this is not expected to have presented a problem. Small quantities of unused, banned, or restricted pesticides have been turned into the DPDO in the past for proper disposal. The records contained no verbal reports or indications of unused pesticides being buried in base landfills in the past. Base water supply wells are analyzed routinely for pesticides in accordance with the Safe Drinking Water Act and none have been detected. The records search did not indicate any contamination potential from the past and present use of pesticides at Pease AFB.

8. Wastewater Treatment

The original wastewater treatment plant at Pease AFB provided primary treatment for sanitary wastewater. The plant was modified in 1972 to provide secondary treatment (trickling filter) and expanded in 1976 to increase design treatment capacity to 1.2 mgd. Treated effluent is discharged via an outfall (approximately 3 miles long) to the Piscataqua River. The City of Newington jointly uses this same outfall to dispose of its treated wastewater effluent. According to the conditions of NPDES Permit No. NH 0090000 (currently due for renewal), the wastewater discharge is monitored routinely for BOD_5, TSS, total coliform, pH, settleable solids, and chlorine residual. A review of recent monitoring results shows that Pease AFB is in general compliance with the applicable NPDES discharge limits, with the possible exception of total suspended solids concentrations which sometimes fluctuate slightly above the monthly average limit of 15 mg/l. Waste sludge is digested for stabilization, dewatered on drying beds, and then used on the base golf course and other areas as a soil conditioner. Recent analyses of treated effluent and dried sludge (USAF OEHL, 1982) shows no toxicity problem from heavy metals.

Settled grit from the wastewater treatment plant grit removal chamber was buried in base landfills in the past (Sites No. 1, 2, 3, 4, 5, and 6). The grit is currently hauled off base by a contractor for disposal. Generally, the grit would contain biodegradable, putrescible materials, along with inert sand and grit.

A dissolved air flotation industrial treatment facility is located in Building 226 and has been operational from the late 1950s until 1977 and at present. This unit is used to separate oils and detergents from the aircraft washrack and maintenance operations located in the large DC Hangar (Building 227). The effluent from this unit is currently discharged to the sanitary sewer. One of the interviewees reported that, in the past, the effluent was discharged to the base storm drainage system which ultimately discharges to Great Bay. In the past, the sludge from the unit, which contained flocculent, oils, solvents, and detergents, was collected in a dumpster and periodically disposed of in the base landfills, primarily at Site No. 5. The estimated sludge quantity disposed of, according to the best recollection of the interviewee, was approximately 2,000 gallons per year. Since TCE was used in the main shop areas (and in Building 227) in the past, this sludge could have possibly contained some TCE. Currently, waste oils from this unit and from the five oil/water separators on base are sold to a private contractor through the DPDO.

9. Storm Drainage

Pease AFB has an extensive storm drainage system consisting of concrete culverts, catch basins, and drainage ditches. The collected storm drainage leaves the base via five ditches or brooks which discharge either to the Piscataqua River or to Great Bay. These discharge points include Flagstone Brook, Paul Brook, Hodgson Brook, Twin Brook, and the Receiver Site Brook (also known as McIntyre Ditch). The major discharge point is the Receiver Site Brook which drains the entire flightline area. The Receiver Site Brook has an oil/water separator and Flagstone Brook has a concrete weir for spill control. The above discharge points are regulated by NPDES Permit No. NH 0001643 which requires quarterly monitoring for oil and grease (10 mg/l limit) and surfactants (0.5 mg/l limit). Inspection of recent sampling results shows that the storm drainage discharges are generally in compliance with the above criteria. Interviewees have reported past fuel and oil spills into the storm drainage system and contaminants have undoubtedly discharged to Great Bay and the Piscataqua River in the past. The flightline area storm drainage system is a suspected source of ground-water contamination in the Haven well area due to probable discharge of waste TCE to this storm drainage system in the past (see Section IV.A.12 for further details). Current spill control procedures appear to be satisfactory.

10. Base Water Supply

Potable water for Pease AFB is supplied by three main wells on the base proper and several smaller wells serving outlying areas. The locations of the base wells, and several inactive domestic wells located on base, are shown in Figure 14. The main wells and the inactive domestic wells were in existence when the real estate was purchased for the base and the wells formerly served the City of Portsmouth. The City currently obtains most of its water from a surface-water supply, the Bellamy Reservoir, which is located approximately 12 miles northwest of the City. Chlorination and fluoridation are provided at each of the main well houses, i.e., Haven, Smith, and Harrison wells. Chlorination is also provided at the three small, outlying water supply wells: weapons storage area Well No. 1 (MMS1), weapons storage area Well No. 2 (MMS2), and the Sportsman's Club well (Loomis Well).

The base wells are analyzed routinely for primary drinking water standards and the results show that well water quality meets the standards for heavy metals, pesticides, and radioactivity. TCE was discovered as a contaminant in the three main wells in 1977. A new central water treatment plant has since been constructed to remove this contamination, and is due to begin operating in the near future. Further discussion of the TCE contamination problem is given in Section IV.A.12.

11. Refuse Disposal

Base refuse consisting mainly of garbage, rubbish, and trash generated at the family housing units and from the administration and shop buildings on base has been disposed of in the past (1956-1975) in a series of six base landfills. Some small quantities of waste petroleum products may have been buried in the landfills, but the majority of waste petroleum products have been disposed of by other methods, as discussed in Section IV.A.1. Further discussion of the base landfills is included in Section IV.B. From 1975 until 1982, base refuse has been disposed of by contract collection with off-base disposal. In 1982, a regional refuse-to-energy plant located at Pease AFB became operational and base refuse, along with refuse from the Portsmouth area, is incinerated in this plant.

At the request of the State of New Hampshire Division of Public Health Services, Pease AFB recently conducted a records search to identify, as best as possible, past base refuse disposal contracts and industrial waste disposal contracts. This information is presented in Appendix H.

12. TCE Groundwater Contamination

Pease AFB began receiving drinking water taste and odor complaints during the spring of 1977. Users complained that the drinking water had a fuel type odor. A detailed analysis of the water was conducted by EPA in April 1977, and TCE was found to be a major contaminant (391 ppb) in the main water supply well for the base (Haven well). Analysis of the two smaller base water supply wells showed that TCE was also present in the Harrison well at a concentration of 28.5 ppb. Initially, no TCE was detected in the Smith well; however, later analyses also showed the presence of TCE in this well. At the request of Pease AFB, a study was conducted by the USGS (Bradley, 1982) to determine the extent and potential source(s) of the contamination. A concurrent study was also conducted by the USAF OEHL (Pontier and Christensen, 1977) to determine the past usage and sources of TCE on base. Other contaminants found in the ground-water supply were Cis-1,2-dichloroethylene (3.0 to 9.8 ppb), tetrachloroethylene (<0.1 to 4.5 ppb), 1,1-dichloroethane (<0.1 to 0.2 ppb), and 1,1,1-trichloroethane (<0.1 to 2.4 ppb). The above contaminants were generally present at order-of-magnitude lower concentrations than TCE, which was determined to be the primary contaminant of concern. The USGS study (Bradley, 1982) concluded that the minimum zone of contamination included 250 acres in the vicinity of the Haven well. The aquifer is approximately 60 feet deep in this area. Sampling of test holes and the Haven well, during 1977 to 1978 showed that TCE concentrations were in the 150 ppb range throughout this area. The test hole monitoring also indicated that the contamination was originating from the north and upgradient from Haven well, which is the general location of major flightline industrial shops. TCE was also found in several base storm drains and drainage ditches, the source of which was believed to be contaminated ground water from the Haven well area.

The exact source or sources of the TCE contamination was not determined from the USGS or the USAF OEHL investigations. However, several highly suspect sources were identified including:

a. Exfiltration from the storm drainage system which serves the flightline industrial shop, parking apron, and runway areas. The flightline storm drains would undoubtedly have received some waste TCE and other solvents in the past. The main 108-inch storm drain passes through the Haven well area.

b. Waste TCE underground collection tanks located at Buildings 113 and 244. These tanks (1,200-gallon capacity each) were used from 1955 through 1965 to store waste TCE from vapor degreasers used in the maintenance of B-47 weapons systems. One tank (Building 113) was found to contain 1,000 gallons of waste TCE during the 1977 survey. The contents of the tank were removed and disposed of by contract. The other tank (Building 244) was found to be empty and may possibly have been leaking. Both tanks are now inactive and filled with sand. Building 244 is closer to the Haven well than Building 113 and is, therefore, more suspect.

c. The Fire Department Training Area (Site No. 8), which is located upgradient from the Haven well and burned mixed POL wastes in the past, was also listed as a suspect source of the ground-water contamination.

The investigation concluded that large amounts of TCE were used at Pease AFB prior to 1973, particularly during the time period of 1956 to 1966, which was when B-47 aircraft were stationed at the base. Only small quantities of TCE were used after 1973. Today, the only TCE user on base is the Munitions Maintenance Squadron which uses small amounts (quart cans) for weapons wipedown. Waste quantities generated are small (1 to 2 gallons per year).

The records search confirmed the suspect sources of TCE which were identified during the 1977 survey. One interviewee reported that TCE was commonly used in the past during aircraft cleaning and maintenance operations in the

DC Hangar (Building 227) and in Building 120. An interviewee indicated that a common practice was to dispose of waste TCE in the washrack drain in Building 227 which was connected to the storm drain which discharged to Great Bay. This confirms the industrial area storm drainage system as a suspect source of the ground-water contamination. This same interviewee reported that TCE was sometimes taken to construction rubble Site No. 1 (Site No. 9) for disposal. This occurred for a short time in 1958 to 1959. Another interviewee reported that mixed waste oil and solvents, possibly containing TCE, was sometimes used in the past for dust control on dirt roads in the industrial shop area. In general, past disposal of TCE solvent to the industrial area storm drains and general spillage of TCE on the ground surface outside the shops makes this area, referred to as the Industrial Shop/Parking Apron Zone (Site No. 15), a likely source of ground-water contamination. The flightline shop area, parking apron, and runway are also located directly over the recharge area for the base water supply aquifer, and the Haven well is located within 1,500 feet downgradient of the nearest industrial shops.

Due to the potential health hazard of TCE contaminated drinking water, Pease AFB is nearing completion of a new water treatment plant which will use activated carbon and diffused aeration to remove TCE from the ground-water supply. This decision was made after consideration of available water supply alternatives, and was determined to be the most feasible option for the base. The TCE concentrations in the main supply wells have decreased significantly since 1977 (Figure 15) and generally occur in the 10 ppb range in the Haven well and small to trace amounts in the Smith and Harrison wells. In spite of the decreasing TCE concentrations, the new water treatment plant is necessary because of (1) the extreme vulnerability of the

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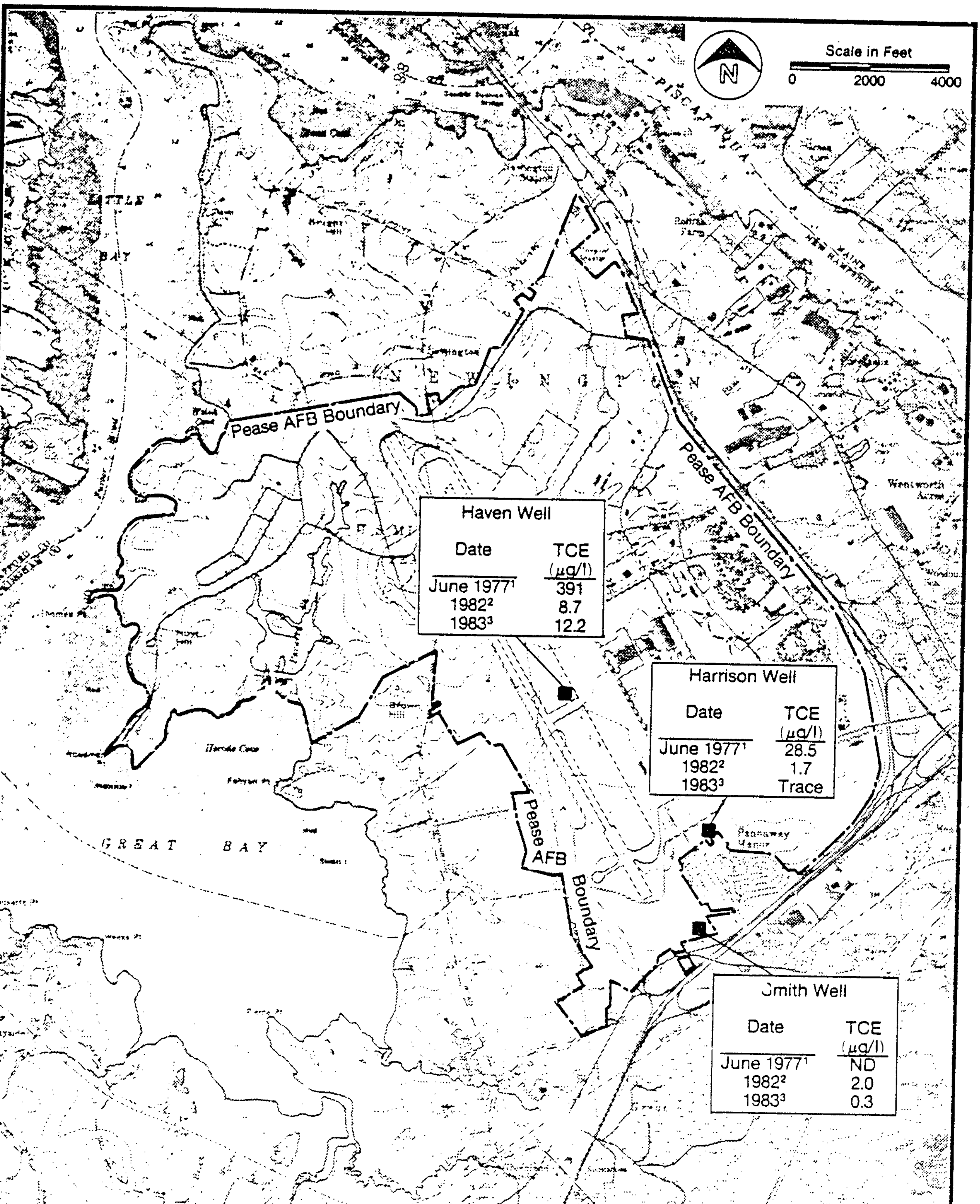

Notes: 1. Source: USEPA Env. Res. Center, Cincinnati
2. Source: USAF OEHL, Average for January through November
3. Source: USAF OEHL, Average for January through June
ND = None Detected

FIGURE 15.
TCE Contamination in Pease AFB Potable Water Supply Wells.

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base water supply aquifer to contamination and (2) the possibility that contaminant levels, including TCE, may increase in the future as a result of past spills and leaks which could be migrating toward the wells. Contaminant migration beyond the base boundary would probably not occur because of the limited extent of the sand and gravel main water supply aquifer which occurs only on base, and the continued pumping of the base water supply wells, especially the Haven well, which draws the contaminants toward the cone of depression of these pumping wells. TCE appears to be the only contamination problem, since routine monitoring shows that the base water supply wells meet primary drinking water standards for heavy metals, pesticides, and radioactivity.

13. Other Activities

The review of the records and information obtained during the interviews produced no evidence of the past or present storage, disposal, or handling of biological or chemical warfare agents at Pease AFB.

Some small-scale munitions disposal operations are conducted at Pease AFB. Small items such as outdated small arms ammunition, egress items, smoke grenades, and starter cartridges are deactivated in a burn pit located west of the munitions storage area. The inert residue is either salvaged through the DPDO, when appropriate, or buried onsite (Site No. 18). Burial locations are marked with signs.

A regional refuse-to-energy conversion plant is located on Pease AFB. Domestic refuse collected from the base and from several surrounding towns is incinerated at the plant and the byproduct steam is supplied to the base. The plant is owned by the City of Portsmouth and operated by a private contractor. Fly ash from the incinerator is hauled off base.

B. DISPOSAL SITES IDENTIFICATION AND EVALUATION

Interviews were conducted with base personnel (Appendix C) to identify disposal and spill sites at Pease AFB. A preliminary screening was performed on all the identified sites based on the information obtained from the interviews and available records from the base and outside agencies. Using the decision tree process described in Section I.E., a determination was made whether a potential exists for hazardous material contamination at any of the identified sites. For those sites with the potential for hazardous material contamination, a determination was then made as to whether significant potential exists for contaminant migration from these sites. These sites were then rated using the U.S. Air Force Hazard Assessment Rating Methodology (HARM), which was developed jointly by the Air Force, CH2M HILL, and Engineering-Science for specific application to the Air Force IRP. The HARM system considers four aspects of the hazard posed by a specific site: (1) the receptors of the contamination, (2) the waste and its characteristics, (3) potential pathways for waste contaminant migration, and (4) any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating. A more detailed description of the HARM system is included in Appendix I.

A total of 18 disposal and spill sites were identified at Pease AFB. Of these, 16 were rated using the HARM rating system. A complete listing of all of the sites, including potential hazards, is given in Table 7. Copies of the completed rating forms are included in Appendix J, and a summary of the hazard ratings for the sites is given in Table 8.

Table 7
DISPOSAL AND SPILL SITES SUMMARY

Site No.	Site Description	Hazard Potential: Contamination	Hazard Potential: Migration	Rating
1	Landfill No. 1	Yes	Yes	Yes
2	Landfill No. 2	Yes	Yes	Yes
3	Landfill No. 3	Yes	Yes	Yes
4	Landfill No. 4	Yes	Yes	Yes
5	Landfill No. 5	Yes	Yes	Yes
6	Landfill No. 6	Yes	Yes	Yes
7	Fire Dept. Training Area No. 1	Yes	Yes	Yes
8	Fire Dept. Training Area No. 2	Yes	Yes	Yes
9	Construction Rubble Site No. 1	Yes	Yes	Yes
10	Leaded Fuel Tank Sludge Disposal Site	Yes	Yes	Yes
11	FMS Equipment Cleaning Site	Yes	Yes	Yes
12	Munitions Storage Area Solvent Disposal Site	Yes	Yes	Yes
13	Bulk Fuel Storage Area Spills	Yes	Yes	Yes
14	Fuel Line Spill Site	Yes	Yes	Yes
15	Industrial Shop/Parking Apron Zone	Yes	Yes	Yes
16	PCB Spill Site	Yes	Yes	Yes
17	Construction Rubble Site No. 2	No	No	No
18	Munitions Residue Burial Site	No	No	No

Table 8
SUMMARY OF DISPOSAL AND SPILL SITE RATINGS

Site No.	Site Description	Subscore (% of Maximum Possible Score in Each Category)			Factor for Waste Management Practices	Overall Score	Page Reference of Site Rating Form
		Receptors	Waste Characteristics	Pathways			
1	Landfill No. 1	59	60	61	1.0	60	J-1
2	Landfill No. 2	56	40	49	1.0	48	J-3
3	Landfill No. 3	56	40	49	1.0	48	J-5
4	Landfill No. 4	61	40	54	1.0	52	J-7
5	Landfill No. 5	56	70	54	1.0	60	J-9
6	Landfill No. 6	74	27	61	1.0	54	J-11
7	Fire Dept. Training Area No. 1	59	64	54	1.0	59	J-13
8	Fire Dept. Training Area No. 2	67	80	100	1.0	82	J-15
9	Construction Rubble Site No. 1	65	40	61	1.0	55	J-17
10	Leaded Fuel Tank Sludge Disposal Site	61	45	54	1.0	53	J-19
11	FMS Equipment Cleaning Site	61	45	54	1.0	53	J-21
12	Munitions Storage Area Solvent Disposal Site	65	54	54	1.0	58	J-23
13	Bulk Fuel Storage Area Spills	63	80	61	0.95	65	J-25
14	Fuel Line Spill Site	63	48	49	1.0	53	J-27
15	Industrial Shop/Parking Apron Zone	71	80	100	0.10	8	J-29
16	PCB Spill Site	[illegible]2	60	49	0.10	6	J-31

A description of each site, including a brief discussion of the rating results, is presented below. Approximate locations of the sites are shown in Figure 16. Operating dates for the fire department training sites and approximate operating dates for the identified landfills are shown in Figure 17.

1. Landfills

Base solid waste has been disposed of in six base landfills from 1953 until 1975. All landfills have received domestic and industrial solid wastes generated on base. In addition, small quantities of flightline-generated liquid wastes (oils, solvents, paints, etc.) that were not burned in fire department training exercises or disposed of otherwise were received at the landfills. The six base landfills are discussed below:

a. Site No. 1--Landfill No. 1

Landfill No. 1, the original base landfill, was operated from 1953 to 1961. The landfill, estimated to be approximately 7 acres in size, is located in the vicinity of the northern terminus of the runway, lying directly east of the Peverly Ponds.

The landfill originally received construction rubble and debris during base construction. Types of materials received during base operation included domestic solid waste and shop wastes with some sporadic disposal being reported of waste oils and solvents, paint strippers, outdated paints, paint thinners, pesticide containers, and various empty cans and drums. Waste solution from the small on-base cadmium plating shop may have been placed in drums and disposed of in the landfill. Due to the prevalent use

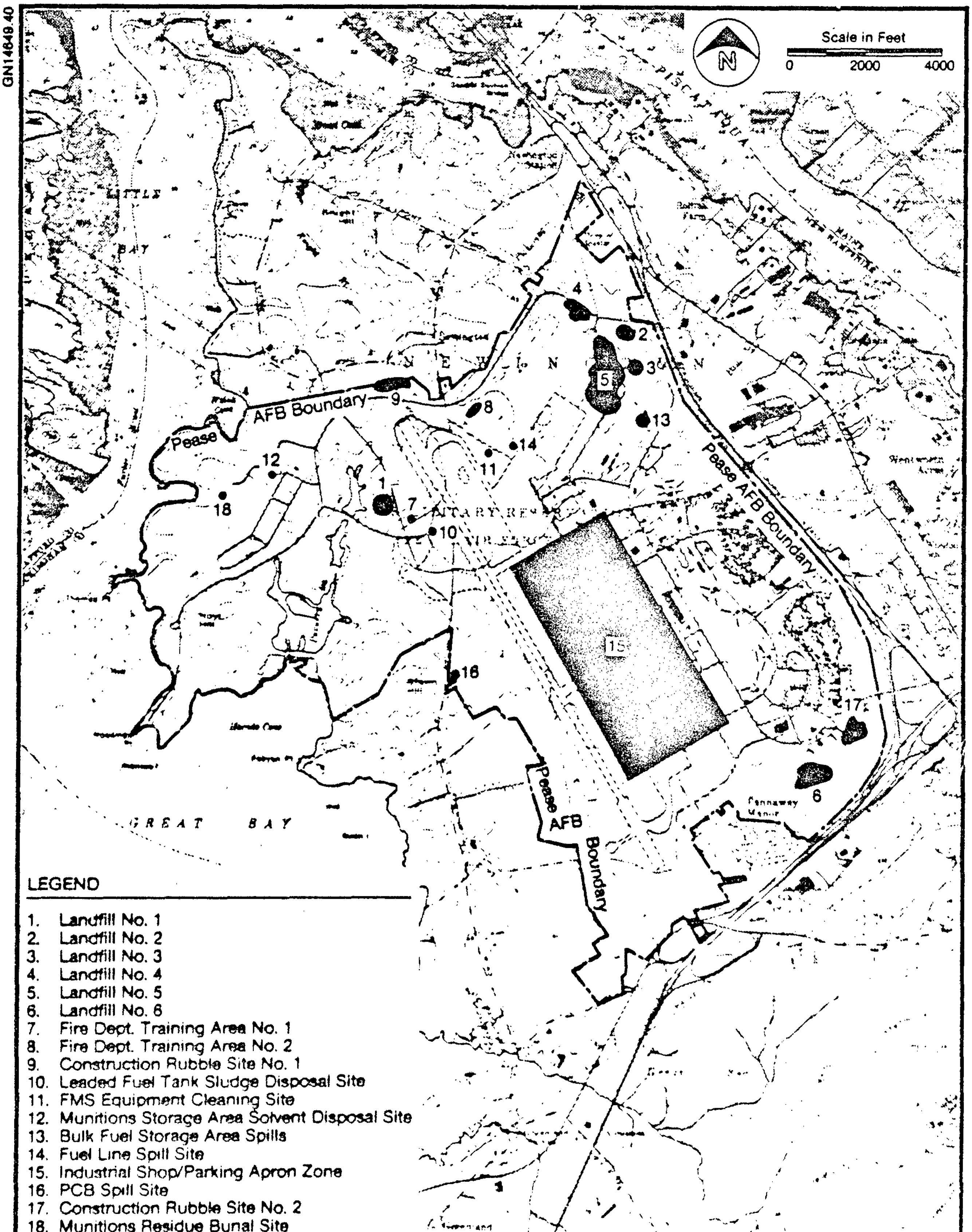

FIGURE 16.
Location Map of Identified Disposal and Spill Sites at Pease AFB.

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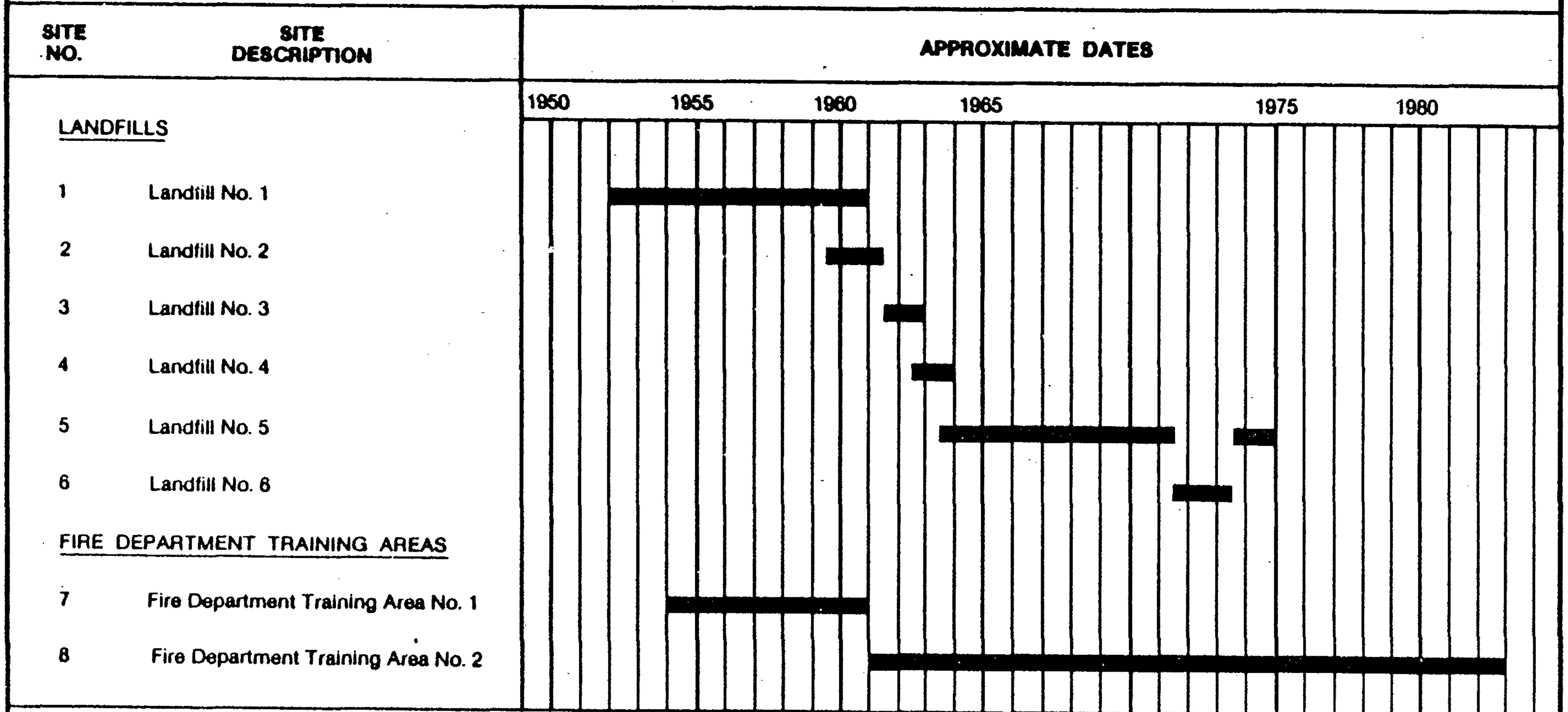

FIGURE 17.
Historical Summary of Activities at Landfills and Fire Department Training Areas.

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of TCE during the period when this landfill was active, Landfill No. 1 probably received some TCE waste in the past.

Until approximately 1960, Landfill No. 1 was the only landfill on base (excluding construction rubble areas) and consequently received the bulk of materials requiring disposal. Material to be disposed of was reportedly dumped over the edge of a steep embankment on the northerly side of the landfill and covered with fill pushed over from the top of the hill.

Landfill No. 1 received an overall HARM rating score of 60, due primarily to: (1) the known disposal of small quantities of hazardous wastes, (2) its proximity to an inactive on-base domestic well (approximately 1,900 feet), (3) its proximity to a critical environment (Great Bay), (4) the use and characteristics of the uppermost ground-water aquifer, and (5) its proximity to upper Peverly Pond (approximately 200 feet).

b. Site No. 2--Landfill No. 2

Landfill No. 2 was a minor landfill operated from 1960 to 1962. This site, approximately 3 acres in size, is located in the northeast sector of the base in the vicinity of the skeet range (Facility No. 10537). Typical use of the landfill involved cutting of long trenches to a depth of 6 to 8 feet (or to bedrock) and covering disposed material with fill.

Materials received at Landfill No. 2 were similar to those reported for Landfill No. 1, i.e., domestic solid waste. Some sporadic disposal of waste oils and solvents, paints, paint strippers, and thinners, pesticide containers, and various empty cans and drums also probably occurred at this site.

Landfill No. 2 received an overall HARM rating score of 48, due primarily to: (1) the suspected disposal of small quantities of hazardous wastes, (2) its proximity to the base boundary (approximately 600 feet), (3) the proximity of a critical environment (Piscataqua River), and (4) the use and characteristics of the uppermost ground-water aquifer.

c. Site No. 3: Landfill No. 3

Landfill No. 3 is another small landfill of approximately 2 acres. The site, located southeast of Landfill No. 2 and northwest of the bulk fuel storage area, was operated from 1962 to 1963 following the closing of Landfill No. 2. Mode of operation and materials received were essentially the same as for Landfill No. 2.

Landfill No. 3 received an overall HARM rating score of 48, due primarily to: (1) the suspected disposal of small quantities of hazardous wastes, (2) its proximity to the reservation boundary (approximately 700 feet), (3) the proximity of a critical environment (Piscataqua River), and (4) the use and characteristics of the uppermost ground-water aquifer.

d. Site No. 4--Landfill No. 4

Landfill No. 4 was operated subsequent to Landfill No. 3, from 1963 to 1964. The site, approximately 7 acres in size, is located in the northeast corner of the base, just southwest of Merrimac Drive. Mode of operation and materials received were essentially the same as for Landfills No. 2 and 3.

Landfill No. 4 received an overall HARM rating score of 52, due primarily to: (1) the suspected disposal of small quantities of hazardous wastes, (2) its proximity to an inactive on-base domestic well (approximately 5,000 feet), (3) its proximity to the reservation boundary (approximately 700 feet), (4) its proximity to a critical environment (Piscataqua River), and (5) its proximity (approximately 50 feet) to Flagstone Brook, and (6) the use and characteristics of the uppermost ground-water aquifer.

e. Site No. 5--Landfill No. 5

Landfill No. 5 was the major base landfill used from 1964 to 1972 and 1974 to 1975. It is approximately 23 acres in size and is located northeast of the northeast aircraft parking apron and northwest of the bulk fuels storage area. Its mode of operation was cut and fill, like the other small landfills located close to it.

Materials received during the earlier years were similar to Landfills No. 1 through 4. Typical materials included domestic solid waste, and some sporadic disposal of waste oils and solvents, paints, paint strippers and thinners, pesticide containers, and various empty cans and drums. In addition, the landfill received an estimated 20,000 gallons of sludge from the industrial waste treatment plant (Building No. 226). Since TCE was used in the main shop areas served by the industrial waste treatment plant, the sludge also possibly contained significant TCE residues.

Landfill No. 5 received an overall HARM rating score of 60, due primarily to (1) the suspected disposal of large quantities of hazardous wastes, (2) its proximity to an inactive on-base domestic well (approximately 4,000 feet), (3) its proximity to a critical environment

(Piscataqua River), (4) its proximity (within approximately 50 feet) to a surface-water body (e.g., Flagstone Brook), and (5) the use and characteristics of the uppermost ground-water aquifer.

f. Site No. 6--Landfill No. 6

Landfill No. 6 was operated from 1972 to 1974 in a cut and fill mode similar to most of the other landfills. It is located in the southeastern portion of the base, directly south of Facility No. 94. It is approximately 7 acres in size.

Materials received at this site were similar to those reported for the earlier landfills. Although some waste solvents, strippers, and thinners may also have been received at this site, the amounts were probably significantly less than those received at the older landfills. TCE was not commonly used at the base during the time of operation of this landfill and disposal of TCE or materials contaminated with TCE is not suspected at this site.

Landfill No. 6 received an overall HARM rating score of 54, due primarily to: (1) its proximity to the Harrison well (approximately 1,500 feet), (2) its proximity to a major critical environment (Great Bog wetland), (3) its proximity to surface water (within 50 feet), and (4) the use and characteristics of the uppermost ground-water aquifer.

2. Fire Department Training Areas

Two fire department training areas, covering a period of 1955 to present, were identified. Each identified site is discussed below:

a. <u>Site No. 7--Fire Department Training Area No. 1</u>

The original fire department training area was operated from 1955 to 1961 and is located on the western side of the northern runway terminus. Its present state includes a circular gravel area with some oil saturation of soils, surrounded by a large cleared area with sparse vegetation and no indication of oil residues. No evidence of recent use was found.

Waste oils, waste fuels, and spent solvents were burned at this site, with waste fuels accounting for the bulk of the material burned. The volume of material burned over the 6-year life of the training area is estimated to be between 120,000 and 200,000 gallons. On some occasions, the ground may have been presaturated with water prior to pouring the wastes onto the ground. Most of the materials would have been consumed in the fires; however, some minor percolation into the ground probably occurred, especially considering that burning did not always immediately follow dumping of waste flammable products.

Site No. 7 received an overall HARM rating score of 59, due primarily to (1) the known disposal of moderate quantities of hazardous wastes, (2) its proximity to the munitions maintenance well and an inactive on-base domestic well (approximately 3,200 and 2,000 feet, respectively), (3) its proximity to a critical environment used for shellfishing (Great Bay), and (4) the use and characteristics of the uppermost ground-water aquifer.

b. <u>Site No. 8--Fire Department Training Area No. 2</u>

Use of this fire department training area followed the discontinued use of the original training area in 1961 and has continued to the present. The site is located just northeast of the northern terminus of the runway. Prior to 1975, the site was similar to Fire Department Training Area No. 1, with no improvements except clearing of vegetation and installation of a gravel bed burn pit area. In 1975, the site was refurbished by construction of a clay-lined burn area and installation of a drainage system. The drainage system collects seepage/runoff in a clay-lined holding basin with discharge to an adjoining wooded area. An oil/water separator was planned for the holding basin but has not been installed to date.

From 1961 to 1971, burning exercises conducted at this fire training area were the main method of disposal for various POL wastes generated on base. Products burned included recovered fuels, waste oils, and spent solvents, some of which probably contained waste TCE. These wastes were reportedly transported to the site by drum or bowser and dumped onto the training area, sometimes up to 1 week prior to a burn exercise. Since about 1971, only recovered JP-4 has been used for fire training exercises at this site, with other waste POL products being disposed via contract. Training exercises are currently conducted about twice per month with 1,000 to 1,500 gallons of recovered JP-4 used per activity.

Visual inspection of the woodland area receiving the fire department training area drainage showed a large area of dead pine trees. Fuel odors were noted and massive fuel saturation of soil was evident, with numerous ponded areas of fuel visible on the ground surface. The drainage line from the burn area is believed to be functioning improperly and fuel may periodically flow overland into the low-lying wooded drainage area. The area of acute vegetation stress is approximately 7,000 ft^2 in size and is not connected (by natural surface drainage) to surrounding surface waters. The site is located upgradient of the active Haven Well.

Site No. 8 received an overall HARM rating score of 82, due primarily to: (1) the known disposal of large quantities of hazardous wastes, (2) the known surface migration and possible subsurface migration of hazardous contaminants off the site, (3) its proximity to an inactive on-base domestic well (approximately 800 feet), (4) its proximity to pristine natural environments (e.g., Peverly Ponds), (5) its proximity to the reservation boundary (approximately 600 feet), and (6) the use and characteristics of the uppermost ground-water aquifer.

3. Other Sites

a. Site No. 9--Construction Rubble Site No. 1

Construction Rubble Site No. 1 has been operated from the late 1950s until the present. It is located directly adjacent to the reservation boundary near the northern terminus of the runway. It also borders Pickering Brook, which flows into the Peverly Ponds.

This site has been used primarily for disposal of inert construction rubble such as concrete, bituminous pavement, tree stumps, brush, and similar materials. One interviewee stated that waste solvents containing TCE were disposed of at this site during 1958 and 1959. The waste solvent was reportedly disposed of in 5-gallon cans at a rate of approximately 20 gallons per month.

Site No. 9 received an overall HARM rating score of 55, due primarily to (1) the suspected disposal of small quantities of hazardous wastes, (2) its proximity to an inactive on-base domestic well (approximately 100 feet), (3) its proximity to the reservation boundary (adjoining), (4) its proximity to pristine natural environments, (5) its proximity to Pickering Brook (approximately 50 feet), and (6) the use and characteristics of the uppermost ground-water aquifer.

b. Site No. 10--Leaded Fuel Tank Sludge Disposal Site

The leaded fuel disposal site was used from the late 1950s to mid-1970s for disposal of sludges cleaned from the large AVGAS tanks located in the bulk fuels storage area. The site is located directly northwest of the TVOR facility (Building No. 10804). Except for a small area of reduced vegetative cover (approximately 50 square feet), no evidence of the site's former use was found.

The leaded AVGAS tanks were routinely inspected every 3 years and cleaned as necessary until the use of AVGAS was discontinued in 1978. Sludge cleaned from tanks consisted of rust, water, residual fuel and fuel sludge, and material from sandblasting tank interiors. Approximately 50 gallons of sludge was generated per tank cleaning. In early years, this sludge was drummed and buried at Site No. 10. In subsequent years it was spread on the ground surface and allowed to weather.

Site No. 10 received an overall HARM rating score of 53, due primarily to (1) the known disposal of small quantities of hazardous wastes, (2) its proximity to the Haven Well (approximately 4,800 feet), (3) its proximity to critical environments (Great Bay), and (4) the use and characteristics of the uppermost ground-water aquifer.

c. Site No. 11--FMS Equipment Cleaning Site

Site No. 11 was used intermittently prior to 1971 for disposal of waste solvent used to clean new equipment of their protective cosmolene coating. The site is located between the northern runway terminus and the northeastern aircraft parking apron. Except for a 100-square-foot area with sparse vegetative cover, there is no evidence of the site's former use.

Site No. 11 received an overall HARM rating score of 53, due primarily to (1) the suspected disposal of small quantities of moderately hazardous wastes, (2) its proximity to an inactive on-base domestic well (approximately 1,200 feet), (3) its proximity to pristine natural areas (Peverly Ponds), and (4) the use and characteristics of the uppermost ground-water aquifer.

d. Site No. 12--Munitions Storage Area Solvent Disposal Site

Site No. 12 was used as a dumping point for small quantities of waste thinners and solvents used in servicing and maintaining munitions at Building 466. The site, located west of the munitions storage area, was used for an undetermined number of years prior to 1980. Waste solvents which may have included TCE in earlier years were dumped at an estimated rate of 6 gallons/year onto the ground surface, resulting in the elimination of vegetative growth in a 10-foot-square area.

Site No. 12 received an overall HARM rating score of 60, due primarily to (1) the known disposal of small quantities of hazardous wastes, (2) its proximity to the munitions maintenance area water supply well (approximately 1,600 feet), (3) its proximity to Great Bay (approximately 1,500 feet), (4) its proximity to an unnamed brook emptying into Great Bay (approximately 700 feet), and (5) the use and characteristics of the uppermost ground-water aquifer.

e. <u>Site No. 13--Bulk Fuel Storage Area Spills</u>

The bulk fuel storage area is located in the northeastern sector of the base adjacent to Portsmouth Avenue and has been the site of a number of fuel spills. Although minor spills have probably occurred throughout the life of the facility, only a few major spills have been reported. In 1963, a ruptured drain line resulted in the loss of many thousands of gallons of fuel from bulk storage Tank No. 3 into the diked area surrounding the tank. (One interviewee estimated that up to 100,000 gallons may have been spilled.) Most of the spilled fuel was recovered. This same tank subsequently developed a small pinhole leak in 1980. Some minor fuel loss occurred (estimated at less than 1,000 gallons) before the leak was found and repaired. Also at the bulk storage area, a corroded vent on the fuel transfer line at Building 160 resulted in the loss of an estimated several thousand gallons of fuel in 1975.

Site No. 13 received an overall HARM rating score of 65, due primarily to (1) the known release of large quantities of hazardous waste, (2) its proximity to an inactive on-base domestic well (approximately 4,500 feet), (3) its proximity to pristine natural areas, (4) its proximity to the storm drainage system, (5) its distance from the reservation boundary (approximately 1,600 feet), and (6) the use and characteristics of the uppermost ground-water aquifer.

f. Site No. 14--Fuel Line Spill Site

In 1959, snow removal equipment ruptured a protruding vent line from the main underground fuel line, located northwest of Building 259 near the northern perimeter of the aircraft parking apron. Resulting fuel loss was estimated to be at least 10,000 gallons. Most of the fuel either evaporated or was flushed with water into the storm drainage system.

Site No. 14 was given an overall HARM rating score of 63, due primarily to (1) the known release of moderate amounts of hazardous wastes, (2) its proximity to an inactive on-base domestic well (approximately 1,700 feet), (3) its proximity to pristine natural areas and minor wetlands, (4) its proximity to a stormwater catch basin (approximately 500 feet), and (5) the use and characteristics of the uppermost ground-water aquifer.

g. Site No. 15--Industrial Shop/ Parking Apron Zone

Site No. 15 is an area containing most of the flightline shops, hangars, and aircraft parking apron-refueling areas (see Figure 18). Over the years, this area has been the site of numerous small flightline spills, spent solvent and waste oil spills, and disposal of shop generated wastes into storm sewers. For a detailed

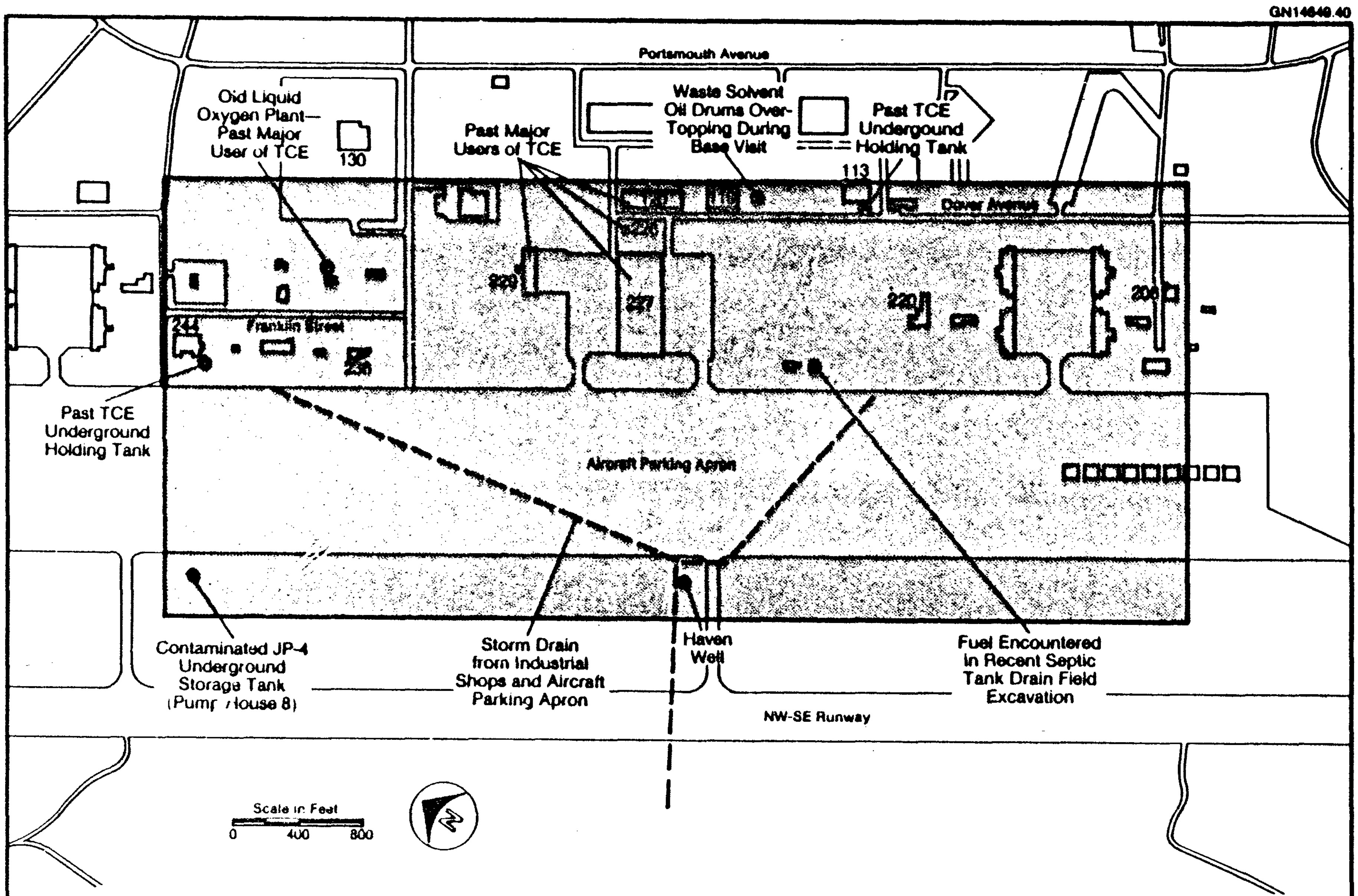

FIGURE 18.
Site No. 15—Industrial Shop/Parking Apron Zone.

description of the shops and activities located within Site No. 15, refer to Sections IV.A.2 and IV.A.3. Some specific spill or waste disposal incidents are listed below:

- The effluent from the industrial waste treatment facility (Building 226), operational since the late 1950s, was discharged in early years to the storm drainage system, which ultimately discharges to a shellfishing area of Great Bay. The oil/water separator system was installed on this drainage system in 1974.

- Various waste oils, hydraulic fluid, diesel fuel, JP-4, waste paints, spent solvents (including TCE), paint strippers, and paint thinners were directly discharged to storm drains, washrack drains, sanitary sewers, or disposed of on the ground outside of generating facilities. Spillage of oil/ water separators, and overfilling of bowsers and 55-gallon drums also resulted in waste fluids being deposited on the ground or in nearby surface waters (i.e., brooks, open drainage ditches).

- Waste TCE was collected in underground storage tanks located at Buildings 113 and 244. These tanks (1,200 gallons each) were used from 1955 through 1965 to store waste TCE from vapor degreasers used in the maintenance of B-47 weapons systems. One tank (Building 113) was found to contain 1,000 gallons of waste

TCE during the 1977 survey. The other tank (Building 244 was found to be empty and may possibly have been leaking. These tanks are located relatively close to the Haven well, which, in 1977, was found to be producing water with significant TCE contamination (see Section IV.A.12 for a detailed history and discussion of the groundwater contamination on Pease AFB). TCE usage on the flightline and associated shops was probably highest during 1956 to 1966 when B-47 aircraft were stationed there.

- Mixed oil and solvent wastes, possibly containing TCE, were reportedly used in past years as a dust palliative on dirt roads in the vicinity of the industrial shop area.

- The most significant fuel spill reported on the flightline was the release of an estimated 3,000 gallons of JP-4 in the early 1970s due to the rupture of a tanker wing. Smaller spills (<100 gallons) have occurred periodically on the flightline throughout its operational life. Recent excavation of soil for a septic tank leach field in the vicinity of Building 222 revealed fuel-saturated soils in that area.

The above incidents of hazardous waste disposal and release within Site No. 15, together with the confirmed contamination of the uppermost ground-water aquifer in the vicinity of the site, resulted in Site No. 15 having the highest gross total HARM rating (84) of all sites evaluated. However, remedial waste management actions in the form of a new water treatment plant using activated carbon and diffused aeration resulted in a waste management practices factor of 0.1, and reduced the overall HARM rating score for this site to 8. The base water supply wells, which are installed in the ice-contact deposits constituting the main water supply aquifer for the base, tend to draw contaminants toward the cone of depression of the wells, thereby containing the ground-water contamination within the base boundaries. The new water treatment plant is designed to remove the contaminants from the well water supply. TCE concentrations in all base wells have decreased markedly since 1977, with the most highly contaminated well (i.e., Haven Well) showing the greatest decrease (from 391 ppb to 10 ppb).

h. Site No. 16--PCB Spill Site

In 1983, a blown transformer at Building 410 resulted in the release of approximately 35 gallons of transformer oil containing 500,000 ppm PCB. Most of the spill was contained indoors on the concrete floor, although some oil did reach the ground outside of the building. The contaminated soil, as well as the transformer oil clean-up material, were collected in 18 55-gallon drums. The remaining soil was analyzed and found not to contain residual PCBs. The sealed drums and the blown transformer are being temporarily stored in a locked, fenced area in the Civil Engineering storage yard awaiting proper contractor disposal through the DPDO. Due to the effective and prompt cleanup of this spill, a waste management practices factor of 0.1 was applied, resulting in an overall HARM rating score of 6 for this site.

i. Site No. 17--Construction Rubble Site No. 2

This site, located to the northwest of Landfill No. 6, was used only for inert construction debris. There was no known or suspected disposal of domestic or industrial wastes at this site, and consequently, Site No. 17 did not justify a HARM evaluation.

j. Site No. 18--Munitions Residue Burial Site

Located northwest of the munitions/ordinance storage area, this site has received the inert residue from deactivated small arms ammunition, egress items, smoke grenades, and starter cartridges. Portions of the inert residue (such as brass) are salvaged through DPDO. Due to the lack of hazardous waste disposal or contamination at this site, it was not given a HARM rating.

C. ENVIRONMENTAL STRESS

The most significant environmental stress noted was the large area (approximately 7,000 ft^2) of dead pine trees in the vicinity of Fire Department Training Area No. 2 (Site No. 8). The heavy saturation of soils with fuel in the affected area suggests seepage and surface discharge from the fire training area as the main cause. A number of other hazardous waste disposal or spill sites had very small patches of vegetation stress or die-back, but the small areas involved rendered these impacts insignificant.

One other environmental stress noted was due to the overflow of 55-gallon drums containing waste oils outside of Building 119 (located within Site No. 15). The drum storage site is upslope and close to a drainage ditch connected to Hodgson Brook. Oil sheens, odor, and saturation of bank and streambed sediments were most noticeable directly downstream of Building 119 and still faintly detectable 3,000 feet downstream.

No other evidence of current environmental stress was found during agency contacts, base interviews, or the site reconnaissance.

V. CONCLUSIONS

V. CONCLUSIONS

A. Information obtained through interviews with 35 base personnel, base records, shop folders, and field observations indicates that hazardous wastes have been disposed of on Pease AFB property in the past.

B. Direct evidence was found of hazardous waste contaminant migration within Pease AFB boundaries. Specifically, trichloroethylene (TCE) ground-water contamination was discovered in 1977 in the main water supply wells for the base. The highest contamination was found in the Haven well, while much lower contaminant concentrations were found in the Harrison and Smith wells. Recent analyses show that TCE contamination is still present but at much smaller concentrations than detected in 1977.

C. Direct evidence of hazardous contaminant migration was also found at Site No. 8 (Fire Department Training Area No. 2). A low-lying wooded area which receives drainage from Site No. 8 is saturated with fuel. Pine trees in this area are dead or dying from the fuel saturated ground.

D. The exact source(s) of TCE ground-water contamination is not known. Contamination is suspected to have originated from the flightline industrial shop area near the Haven well (Site No. 15--Industrial Shop/Parking Apron Zone). Past spills of TCE on the ground and into the area storm drains and possible leakage from underground TCE holding tanks are probable causes of the TCE ground-water contamination problem. Another suspected source is Site No. 8 (Fire Department Training Area No. 2) which has used mixed waste oils, fuels, and solvents, including TCE, in past fire training exercises prior to 1971. Both Sites No. 15 and No. 8 are located within the base water supply aquifer recharge area, and are upgradient from the Haven well.

E. The potential for ground-water contamination at Pease AFB is high due to the high ground-water table (10 to 20 feet below land surface), the high rainfall, and the high net precipitation. The base water supply aquifer is especially vulnerable to contamination because of the high permeability of the sand and gravel aquifer and the location of aircraft maintenance shops, the aircraft parking apron, and the main runway which are directly above the aquifer.

F. Table 9 presents a priority listing of the rated sites and their overall scores. The following sites were designated as areas showing the most significant potential (relative to other Pease AFB sites) for environmental concerns.

1. Site No. 8--Fire Department Training Area No. 2 (Overall Score of 82)

Site No. 8, Fire Department Training area No. 2, was designated as showing the most significant potential for environmental concern. This site, which received an overall score of 82, has been used for fire department training exercises since 1961. A nearby low-lying wooded area which receives drainage from the site is saturated with fuel and pine trees in this area are dead or dying. The potential exists for fuel contamination to enter the ground water. Also, past fire training exercises (prior to 1971) used mixed waste oils, fuels, and solvents, including TCE. Interviewees reported that the wastes were sometimes

Table 9
PRIORITY LISTING OF DISPOSAL AND SPILL SITES

Ranking No.	Site No.	Site Description	Overall Score
1	8	Fire Dept. Training Area No. 2	82
2	13	Bulk Fuel Storage Area Spills	65
3	5	Landfill No. 5	60
3	1	Landfill No. 1	60
5	7	Fire Dept. Training Area No. 1	59
6	12	Munitions Storage Area Solvent Disposal Site	58
7	9	Construction Rubble Site No. 1	55
8	6	Landfill No. 6	54
9	11	FMS Equipment Cleaning Site	53
9	10	Leaded Fuel Tank Sludge Disposal Site	53
9	14	Fuel Line Spill Site	53
12	4	Landfill No. 4	52
13	2	Landfill No. 2	48
13	3	Landfill No. 3	48
15	15	Industrial Shop/Parking Apron Zone	8
16	16	PCB Spill Site	6

poured into the training area up to 1 week prior to a burn, thereby affording the opportunity for wastes to percolate into the ground. The burn area was unlined prior to 1975. Both the burn area and the fuel saturated wooded area are located within the boundary of the base water supply aquifer and are upgradient from base water supply wells.

2. <u>Site No. 13--Bulk Fuel Storage Area Spills (Overall Score of 65)</u>

This site was identified as the location of major fuel spill incidents in the past. Some fuel saturation of the ground and possibly ground-water contamination may have resulted from these past spill incidents.

3. <u>Site No. 1--Landfill No. 1 (Overall Score of 60)</u>

This site was the original base landfill which was used from 1956 to 1961. Some solvents were disposed of in this landfill in the past--quantities are believed to have been small. This site is located downgradient and outside of the base water supply aquifer and is not a suspect source of contamination of base wells. However, any contaminant migration from this site would travel south toward the base boundary. The primary concern is the potential for long-term contaminant migration beyond the base boundary.

4. <u>Site No. 5--Landfill No. 5 (Overall Score of 60)</u>

This site was the longest duration main base landfill (1964 to 1972; 1974 to 1975). Waste sludge from the industrial wastewater treatment facility (Building 226) was commonly disposed of in this landfill in the past. TCE was probably present in this sludge. Although this was not a major disposal site for waste petroleum products, the long-term use of this landfill makes it likely to have received more waste petroleum products from sporadic dumping than other base landfills.

5. Site No. 7--Fire Department Training Area No. 1 (Overall Score of 59)

This site was the original base fire department training area (1956 to 1961) and is located near Site No. 1, the original base landfill. Information about this site is limited; however, it is known that mixed petroleum product wastes, some of which contained TCE, were used in the fire training exercises. As with Site No. 1, the primary concern is the potential for long-term contaminant migration beyond the base boundary.

6. Site No. 12--Munitions Storage Area Solvent Disposal Site (Overall Score of 58)

Some small quantities of thinners and solvents, including TCE, have been disposed of on the ground behind Building 466. A small area of dead grass marks the site where the dumping occurred. The munition storage area is isolated and the primary concern is the potential for contamination of the two small water supply wells which serve the area.

7. Summary

In general, Sites No. 1, 5, 7, and 13 are located over glacial till outside the boundary of the base water supply aquifer. Contaminant migration from these sites would be relatively slow and dispersed. The concern for these sites is less than Site No. 8, which is located within the boundary of the base water supply aquifer. Site No. 12 is of concern because of the potential for contamination of the two small water supply wells which serve this isolated area.

G. TCE contamination of the base water supply is known to have originated from Site No. 15 (Industrial Shop/Parking Apron Zone), which is located directly above the water supply aquifer. The exact source(s) of the contamination is not known. Suspect sources include past spills, possibly leaking tanks, and discharges from the storm sewer within Site No. 15. This site would have received an overall score of 84; however, the construction of the new water treatment plant for removal of TCE ground-water contamination resulted in a reduction of the overall score from 84 to 8, since this constitutes an offsite remedial action (waste management practice multiplier of 0.1). The pumping action (cone of depression) of the nearby downgradient water supply wells tends to draw contaminants toward the wells and to prevent migration of contaminants beyond the base boundaries. The water from the base wells is treated to remove the contaminants.

Although the TCE ground-water contamination has decreased significantly since 1977, the continued monitoring of the base water supply wells for organic contaminants and the continued operation of the new water treatment plant are necessary because of the vulnerability of the base water supply aquifer to contamination from fuels and solvents. It is possible that contaminant levels may increase in the future from past spills and leaks which could be migrating toward the base wells. Also, since the major shops and the aircraft parking apron are located directly above the sand and gravel aquifer recharge area, any fuel and solvent spills or leaks which occur in this area in the future can readily enter the ground-water supply and migrate toward the nearby base wells. The necessity for continued water supply monitoring and treatment cannot be overemphasized.

H. The remaining rated sites (Sites No. 2, 3, 4, 6, 9, 10, 11, 14, and 16) as well as the sites that were not rated) (Sites No. 17 and 18) are not considered to present significant concern for adverse effects on health or the environment.

VI. RECOMMENDATIONS

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A. PHASE II PROGRAM

A Phase II monitoring program is recommended at Pease AFB to confirm or rule out the presence of hazardous contaminant migration. Specifically, monitoring wells are recommended for Fire Department Training Area No. 2 (Site No. 8); a zone consisting of the Bulk Fuel Storage Area (Site No. 13) and Landfill No. 5 (Site No. 5); and a zone consisting of Landfill No. 1 (Site No. 1) and Fire Department Training Area No. 1 (Site No. 7). Tables 10 and 11 present a summary of recommended monitoring sites, parameters to be measured, and the rationale for the analyses. Approximate monitoring well locations are shown in Figures 19, 20, and 21, and a typical monitoring well installation is shown in Figure 22. Recommendations for the Industrial Shop/Parking Apron Zone (Site No. 15), the Munitions Storage Area Solvent Disposal Site (Site No. 12), and additional recommendations for Fire Department Training Area No. 2 (Site No. 8) are presented in Section VI.B which includes other IRP environmental recommendations.

1. Fire Department Training Area No. 2 (Site No. 8)

Installation of monitoring wells is recommended to determine if a concentrated contaminant plume is migrating toward the base wells from this suspect source. The information obtained from the Phase II monitoring can be used for planning purposes to determine if source control remedial actions are warranted at this site in addition to treatment at the wellhead (new water treatment plant). Five monitoring wells, four downgradient and one upgradient, should be installed to determine if ground-water contamination from fuel, TCE, or other organic contaminants is present and

Table 10
RECOMMENDED PHASE II ANALYSES

Sample Location	Number of Monitoring Wells	Number of Samples	Analyses					
			VOC[a]	Heavy Metals	Phenols	Pesticides	Cyanide	Oil and Grease
Fire Department Training Area No. 2 (Site No. 8)	5	10	X	X	X	--	--	X
Monitoring Zone for Bulk Fuel Storage Area (Site No. 13) and Landfill No. 5 (Site No. 5)	5	10	X	X	X	X	X	X
Monitoring Zone for Landfill No. 1 (Site No. 1) and Fire Department Training Area No. 1 (Site No. 7)	3	6	X	X	X	X	X	X

[a]VOC = Volatile Organic Compounds.

Table 11
RATIONALE FOR RECOMMENDED ANALYSES

Parameter	Rationale
Volatile Organic Compounds (VOC)	Known TCE contamination in the main water supply aquifer for the base; organic solvents used on base (past and present); persistent components of fuels and other POL products, e.g., benzene and toluene
Heavy Metals (lead, nickel, chromium, cadmium, and silver)	Potential sources identified (leaded fuel, battery acid and other electrolytes, paint wastes, photographic chemicals)
Phenols	Phenolic cleaners and paint strippers used in the past
Pesticides	Known or suspected use at Pease AFB.[a]
Cyanide	Past plating operations using cyanide process
Oil and Grease	Fuel spill indicator and indicator of non-specific contamination

[a]Pesticide analysis should include Chlordane, 2,4-D, DDT, Dibrom, Diazinon, Dursban, Endrin, Lindane, Malathion, Methoxychlor, Sevin, Toxaphene, and Warfarin.

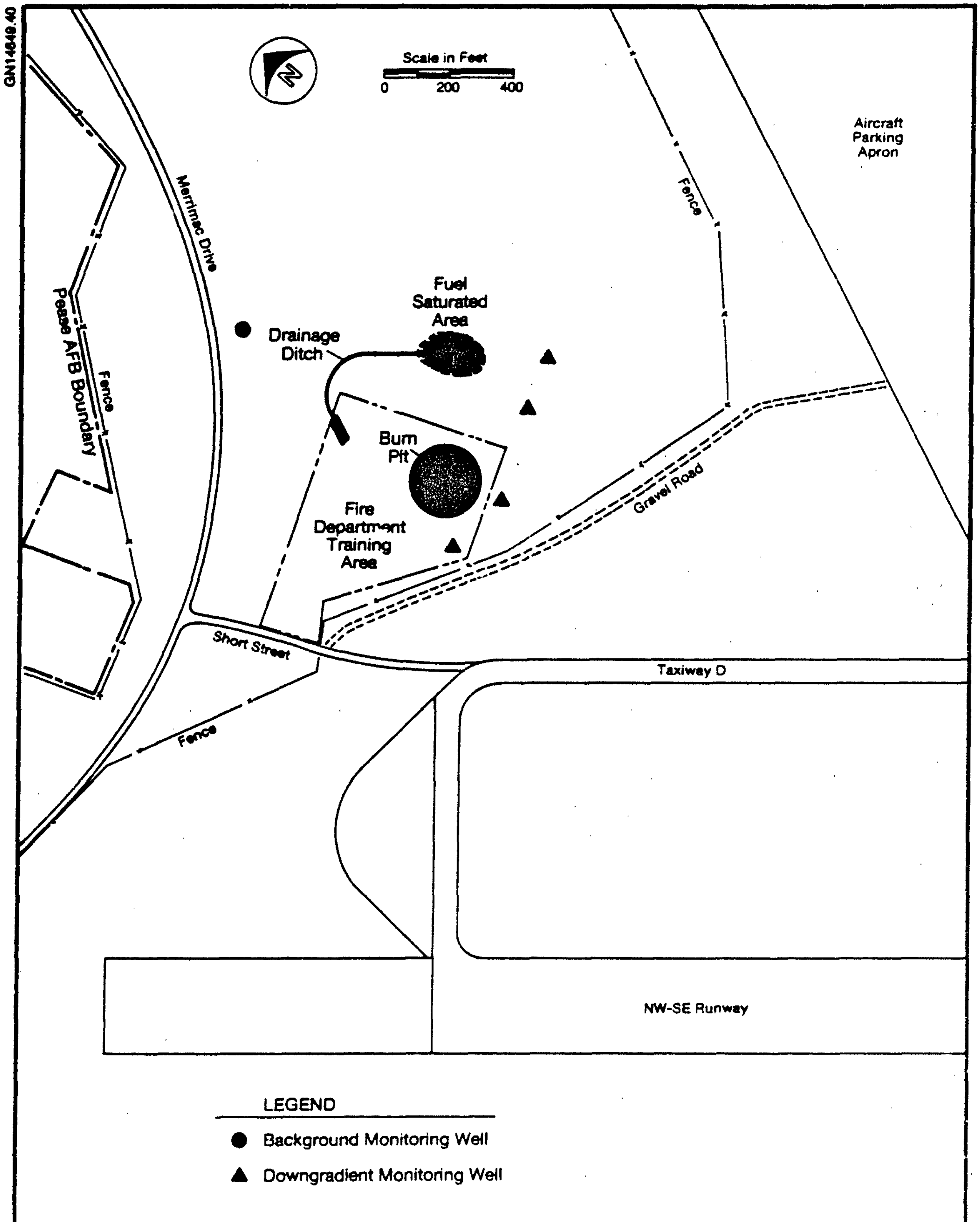

FIGURE 19.
Recommended Preliminary Sampling Locations for Site No. 8—
Fire Department Training Area No. 2.

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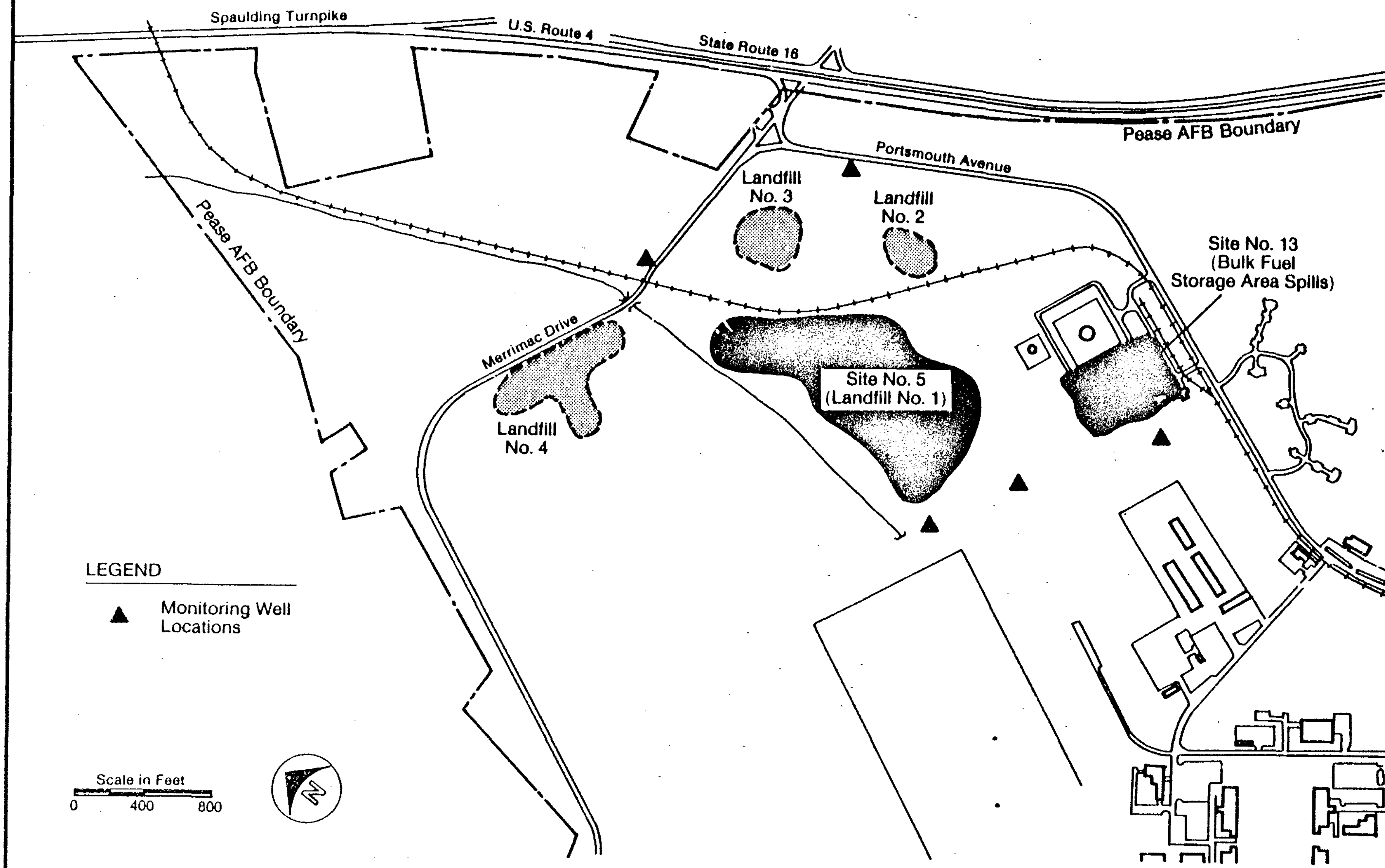

FIGURE 20.
Recommended Preliminary Sampling Locations for Zone Monitoring of Site No. 13—Bulk Fuel Storage Area and Site No. 5—Landfill No. 5.

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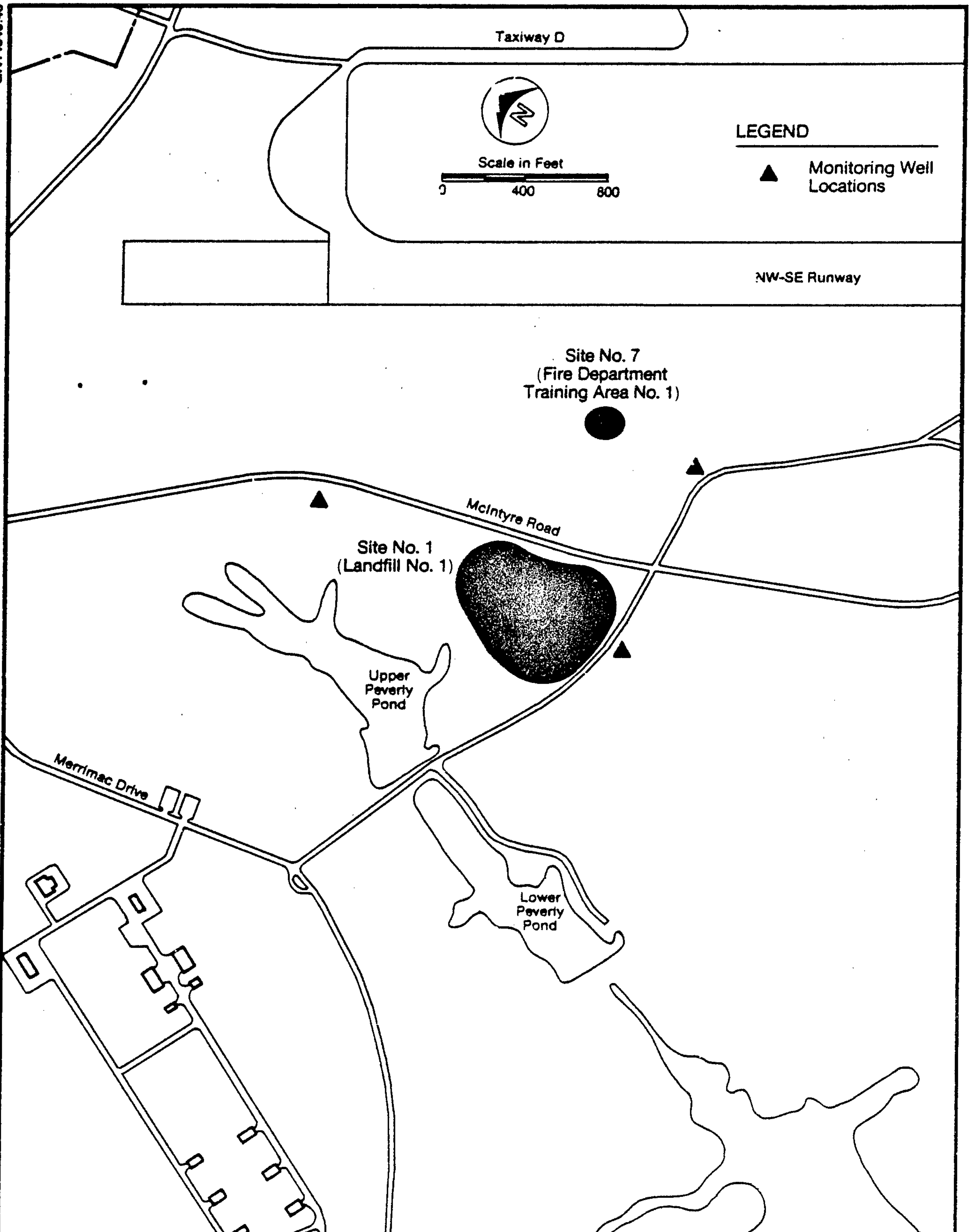

FIGURE 21.
Recommended Preliminary Sampling Locations for Zone Monitoring of Site No. 1—Landfill No. 1 and Site No. 7—Fire Department Training Area No. 1.
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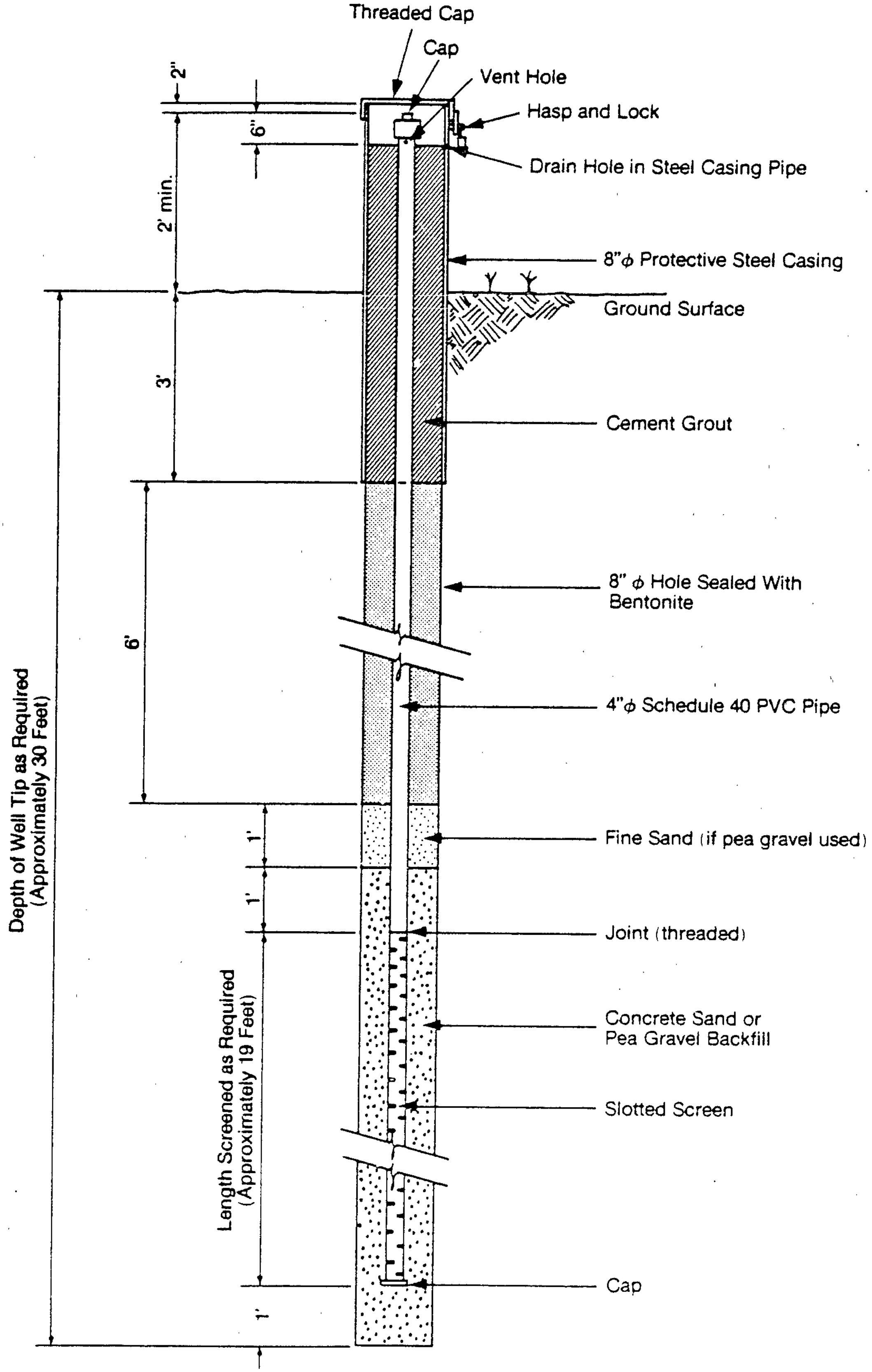

FIGURE 22.
Typical Monitoring Well Installation.

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migrating from Site No. 8. The well should be drilled to bedrock (approximately 30 feet) and screened throughout the saturated ground-water zone (approximately 10 to 30 feet). Each well should be sampled on two occasions, at least 30 days apart and analyzed for volatile organic compounds (VOCs), oil and grease, and the other parameters listed in Table 10. The VOC scan includes specific organic compounds, such as TCE, benzene, toluene, and xylene, which are not readily biodegradable components of solvents and fuels. The oil and grease analysis is an indirect indication of gross fuel contamination. In addition, the wells should be sampled in the field by color sensitive tape or liquid column sampler to determine the possible presence and estimated thickness of a floating fuel lens in the ground water in this area.

2. Monitoring Zone for Sites No. 13 and 5

Monitoring wells should be installed to determine if hazardous contaminant migration is occurring in the ground water in the vicinity of the Bulk Fuel Storage Area (Site No. 13) and Landfill No. 5 (Site No. 5). The possibility also exists that a ground-water flow divide may exist in this area. If this is the case, then some contaminant migration, if it occurred, could travel toward nearby base boundaries. Five monitoring wells should be installed, sampled on two occasions at least 30 days apart, and analyzed for the parameters shown in Table 10. Each well should be drilled to bedrock (approximately 30 feet) and screened throughout the saturated ground-water zone (approximately 10 to 30 feet). Although the zone monitoring is recommended primarily for Sites No. 13 and 5, Sites No. 2, 3, and 4 are also included in this zone.

3. Monitoring Zone for Sites No. 1 and 7

Monitoring wells should be installed to determine if hazardous contaminant migration is occurring in the ground water in the vicinity of Landfill No. 1 (Site No. 1) and Fire Department Training Area No. 1 (Site No. 7). Three monitoring wells, one upgradient and two downgradient, should be installed, sampled on two occasions at least 30 days apart, and analyzed for the parameters given in Table 10. Each well should be drilled to bedrock (approximately 30 feet) and screened throughout the saturated ground-water zone (approximately 10 to 30 feet).

B. OTHER ENVIRONMENTAL RECOMMENDATIONS

Other IRP recommendations that have resulted from the base visit and records search include the following:

1. The drainage problem at Site No. 8, Fire Department Training Area No. 2, should be corrected. Completely refurbishing the site may be necessary to correct this problem. An oil/water separator should also be installed to pretreat the drainage from the site. Ponded and puddled fuel in the fuel saturated wooded area should be removed since the present condition constitutes a fire hazard as well as a potential source of ground-water contamination.

2. The two water supply wells at the munitions storage area (MMS No. 1 and MMS No. 2) should be sampled and analyzed for VOCs to determine if TCE or other organic contaminants are present. Site No. 12 is located within the munitions storage area complex.

3. The five drainage ditches which convey stormwater away from the base, which are currently sampled on a quarterly basis for oil and grease and surfactants, and the wastewater

treatment plant final effluent should be sampled and analyzed for VOCs to determine if TCE or other organic contaminants are leaving the base via these surface-water pathways and discharging into the Piscataqua River and Great Bay.

4. The main water supply wells for the base (Haven, Harrison, and Smith wells) which are periodically analyzed for TCE should also be periodically analyzed for VOCs. A VOC scan would identify water soluble components of spilled fuels, if present, and any chlorinated byproducts which could have formed from the partial biodegradation of TCE in the aquifer (such as 1,2-dichloroethylene, vinyl chloride, and 1,1-dichloroethylene). The observed decrease in TCE concentrations could possibly be accompanied by an increase in the above partial degradation products which are more persistent than TCE. Periodic monitoring of the base wells for VOCs is recommended because of the proximity of Site No. 15 (Industrial Shop/Parking Apron Zone) and the potential for ground-water contamination from past and future spills or leaks originating from this area.

5. Good housekeeping practices should be emphasized in the flightline industrial shops (Site No. 15) because of their sensitive locations (above the base water supply aquifer) and the vulnerability of this aquifer to contamination. Special emphasis should be placed on waste petroleum product and solvent accumulation points to avoid overtopping drums and spilling these products on the ground.

6. An oil skimming device should be used in the flightline drainage oil/water separator located near the Receiver Site (McIntyre Ditch).

C. LAND USE RESTRICTIONS FOR IDENTIFIED SITES

Land use restrictions at the identified disposal and spill sites at Pease AFB are recommended for consideration. The rationale for imposing land use restrictions include: (1) providing the continued protection of human health, welfare, and environment; (2) ensuring that the migration of potential contaminants is not promoted through improper land uses; (3) facilitating the compatible development of future USAF facilities; and (4) allowing for identification of property which may be proposed for excess or outlease.

Before any land use activity is planned at suspected contamination sites, potential hazards and environmental impacts must be considered. As more site information becomes available (Phase II) and/or cleanup actions occur (Phase IV), land use restrictions should be re-evaluated.

APPENDIX CONTENTS

Appendix A

RESUMES OF TEAM MEMBERS

NORMAN N. HATCH, JR.
Manager, Industrial Processes

Education

M.S., Environmental Engineering, University of Florida
M.S., Analytical Chemistry, University of Florida
B.S., Chemistry, University of New Hampshire

Experience

Mr. Hatch's range of engineering experience includes hazardous waste projects, laboratory and pilot treatability studies, process design of industrial wastewater treatment facilities, and process design of municipal water and wastewater treatment facilities.

Mr. Hatch has extensive experience in the hazardous waste field, including overall responsibility for hazardous materials disposal site evaluations for over 20 U.S. Air Force installations throughout the United States. The purpose of the site assessments is to determine the potential for hazardous contaminant migration from past disposal practices and to recommend follow-up actions. Mr. Hatch is also a principal investigator in the Biscayne Aquifer-Dade County Superfund project, which includes the evaluation of the magnitude and extent of major well field contamination from numerous potential sources in the study area. Mr. Hatch also participated in a comprehensive RCRA compliance program for Gulf Oil Company's Port Arthur Refinery in Texas.

Mr. Hatch has extensive experience in industrial wastewater treatment projects. He served as project manager of a feasibility study for treatment of high nitrogen industrial wastewater from the Air Products and Chemicals, Inc., manufacturing complex in Pensacola, Florida. Treatment technologies investigated included aerated lagoons, oxidation ponds, anaerobic treatment ponds, spray irrigation, activated carbon, and air stripping. Mr. Hatch also served as project manager of a comprehensive treatability and process selection study for the American Cyanamid Fibers Division plant in Milton, Florida. Wastewater treatment processes investigated included spray irrigation, deep well injection, activated sludge, rotating biological contactors, anaerobic contact treatment, activated carbon, ion exchange, and chemical coagulation. In addition, Mr. Hatch has served as project manager for several other treatability and process selection studies for industrial clients, including Arizona Chemical Company, Kaiser Agricultural Chemicals, and Engelhard Minerals and Chemicals. He has also provided assistance in the investigation of state and NPDES discharge permits for Air Products and Chemicals, Inc., American Cyanamid, and Kaiser Agricultural Chemicals.

Mr. Hatch has extensive experience in municipal water and wastewater treatment. He served as lead engineer for an ozone disinfection pilot plant and feasibility study for the City of Philadelphia's Queen Lane Water Treatment Plant. Mr. Hatch was also the lead engineer in charge of process design of chemical feed systems for the Queen Lane Plant, process design and design of chemical feed and sludge handling facilities for the Alexander City, Alabama, Water Treatment Plant, and process design and design of chemical feed system modifications for the St. Augustine, Florida, Water Treatment Plant. Mr. Hatch also served as project manager for a water system master plan for the City of Ft. Pierce, Florida; design of water treatment facilities for a sugar mill in south Florida; a feasibility study of direct wastewater reuse for potable water for the City of St. Petersburg, Florida; and pilot plant investigations leading to a unique system for removal of hydrogen sulfide from potable water for the Orlando Utilities Commission, Orlando, Florida.

Mr. Hatch also has experience in municipal wastewater treatment alternative analyses and process design and in the preparation of numerous 201 facilities plans.

Professional Registration

Professional Engineer, Florida, Georgia

Membership in Professional Organizations

Phi Beta Kappa
Phi Kappa Phi
Society of Sigma Xi
Water Pollution Control Federation

Publications

"The Sarasota Phosphate Removal Project," co-authored with M. Sturm. Water and Sewage Works, March 1974.

"Laser Excited Atomic and Ionic Fluorescence of the Rare Earths in the Nitrous Oxide-Acetylene Flame," co-authored with H. Omenetto, L. M. Fraser, and J. D. Winefordner. Analytical Chemistry, Vol. 45, No. 1, January 1973.

BRIAN H. WINCHESTER
Department Manager, Environmental Sciences

Education

B.S. Wildlife Ecology, University of Florida

Experience

Mr. Winchester is currently responsible for environmental sciences marketing and technical quality in CH2M HILL's five Florida offices. He has a broad range of experience in the management of multidiscipline projects, design and implementation of field sampling programs, data interpretation, impact assessment and prediction, impact mitigation and remedial method development, report preparation and review, and expert consultation at client/agency hearings. He has successfully prepared numerous Environmental Impact Statements (EIS's), Developments of Regional Impact reports (DRI's), and environmental assessments for a variety of industries, utilities, and public agencies.

Mr. Winchester has directed or participated in a number of aquatic ecology projects in the southeastern U.S. He provided program management and technical input for two separate 2-year NPDES-related monitoring studies in upper Escambia Bay. Study components included water chemistry, phytoplankton, benthic macroinvertebrates, and interaction with the Florida Department of Environmentl Regulation (FDER). He also served as technical manager for the preparation of 301(h) waiver applications and associated Phase I studies for five ocean outfalls in southeastern Florida. Program components included definition of current and vertical density gradient patterns, water chemistry, sediment characteristics, plankton communities, benthic macroinvertebrate communities (including hardground/coral reef communities), demersal fish populations, and assessment of impacts associated with reduced treatment levels of ocean discharge.

Mr. Winchester is currently directing a multidiscipline environmental program for the Key West Utility Board, which includes preparation of NPDES permits and NPDES-related monitoring studies of cooling water impacts on water chemistry, seagrass beds, macrobenthos, and demersal fish.

Other relevant projects for which Mr. Winchester has had management or technical responsibility include a study of seagrass and oyster bed communities in the Withlacoochee estuary; an ichthyoplankton entrainment study in southeastern Florida; fish population studies in seagrass beds off south and west-central Florida; a CEIP assessment of potential impacts associated with oil and gas industry development in the Tampa Bay area; long-term biological monitoring of tidal creek systems in northeastern Florida; an EIS assessment of maintenance dredging impacts along the 300-mile Gulf Intracoastal Waterway in Louisiana; and a synthesis of published and unpublished information on benthic macroinvertebrate community structure in northern Gulf of Mexico estuaries.

In addition to the above projects, Mr. Winchester has managed or participated in over 40 other environmental studies associated with channelization impacts, phosphate mining, treatment of secondary effluent with wetland systems, wetland valuation, biological impacts of air emissions, water table drawdown impacts, dredged material disposal, corridor studies, power plant blowdown impacts, rare and endangered species, and hazardous waste studies.

Membership in Professional Organizations

Society of Wetland Scientists
Ecological Society of America
City of Gainesville Hazardous Materials Committee
City of Gainesville Water Quality Committee

Publications

Mr. Winchester has authored several technical papers on wetland ecology, rare and endangered species management, and other topics. Representative papers include the following:

"Dry Season Wastewater Renovation by a North Florida Hardwood Swamp." Wetlands (in press). 1983.

"Assessing Ecological Value of Central Florida Wetlands." A Case Study." Proceedings of the Eighth Annual Conference on the Restoration and Creation of Wetlands, 8:25-38. 1981.

"Valuation of Coastal Plain Wetlands in the Southeastern United States." Symposium on Progress in Wetlands Utilization and Management, Orlando, Florida. pp 285-298. 1981.

With L. D. Harris. "An Approach to Valuation of Florida Freshwater Wetlands." Proceedings of the Sixth Annual Conference on the Restoration and Creation of Wetlands, 6:1-26. 1979.

BRIAN H. WINCHESTER

With R. S. DeLotelle, J. R. Newman, and J. T. McClave. "Ecology and Management of the Colonial Pocket Gopher: A Progress Report." Proceedings of the Rare and Endangered Wildlife Symposium, Athens, Georgia. pp 173-184. 1978.

With R.S. DeLotelle. "The Current Status of the Colonial Pocket Gopher." Oriole 43:33-35. 1978.

With F.E. Benenati and T.P. King. "The Ecological Effects of Arsenic Emitted From Non-Ferrous Smelters." U.S. EPA, EPA 560/6-77-011. 1976.

GNRE3

GARY E. EICHLER
Hydrogeologist

Education

M.S., Geology with Minor in Civil Engineering, University of Florida
B.S., Cum Laude, Construction and Geology, Utica College of Syracuse University

Experience

Mr. Eichler has been responsible for groundwater projects for both water supply and effluent disposal. Studies have included site selection, well design, construction services, monitoring and testing programs, determination of aquifer characteristics, and well field design. In addition, he has conducted numerous studies to determine pollution potential of toxic and hazardous wastes. Prior to joining CH2M HILL, Mr. Eichler was an engineering geologist with an environmental consulting firm. His responsibilities included project management, soils investigations, siting studies, groundwater and surface-water reports, and federal and state environmental impact studies.

Mr. Eichler has been responsible for exploration drilling, testing and design of well fields having a combined total installed capacity of over 75 mgd. Many of these well fields for potable water supply are located in the coastal aquifer in close proximity to saltwater.

His experience includes responsibility for the design and installation of shallow aquifer well fields in unconsolidated formations. Mr. Eichler has designed and installed screened wells, both natural and gravel packed, as well as open hole wells using both cable tool and rotary drilling methods.

Project responsibilities have included management and team participation on more than 20 hazardous waste disposal projects. The studies included initial site investigations, determination of pollutant travel time and direction, and evaluation of the potential for contaminant migration.

Mr. Eichler has been involved in geophysical logging and performance testing of deep disposal wells for both municipal effluent and hazardous waste.

He has conducted projects to determine saltwater intrusion potential and has been responsible for the design of monitoring programs to warn against intrusion.

GARY E. EICHLER

Mr. Eichler has conducted hydrogeological projects using aquifer computer modeling techniques to predict the effects of future large scale groundwater withdrawals.

Professional Registration

Certified Professional Geologist, Certificate No. 4544

Membership in Professional Organizations

American Institute of Professional Geologists
American Water Resources Association
Association of Engineering Geologists
Geological Society of America
Southeastern Geological Society
National Water Well Association
Florida Well Drillers Association

Publications

With U. P. Singh, C. R. Sproul, and J. I. Garcia-Bengochea. "Aquifer Testing of the Boulder Zone of South Florida." ASCE Publication Preprint 82-030. 1982.

Engineering Properties and Lime Stabilization of Tropically Weathered Soils. Master's Thesis. Department of Geology, University of Florida. August 1974.

GNRE3

Appendix B

OUTSIDE AGENCY CONTACT LIST

Appendix B
OUTSIDE AGENCY CONTACT LIST

1. Department of Health and Welfare
   Division of Public Health Services
   Office of Waste Management
   Hazardous Waste Cleanup Fund
   Concord, New Hampshire
   Brook Dupee, Program Manager, 603/271-4664
   Dawn Channing, Environmentalist, 603/271-4664

2. Department of Health and Welfare
   Division of Public Health Services
   Office of Waste Management
   Bureau of Solid Waste Management
   Concord, New Hampshire
   Scott Eaton, Waste Management Engineer, 603/271-4586

3. Department of Health and Welfare
   Division of Public Health Services
   Office of Waste Management
   Bureau of Hazardous Waste Management
   Concord, New Hampshire
   Janice Paterson, RCRA Inspector, 603/271-4656
   Kevin Hopkins, RCRA Permits, 603/271-4622

4. New Hampshire Water Supply and Pollution Control Commission
   Industrial Waste Division
   Concord, New Hampshire
   Lynn A. Woodard, Director, 603/271-3503

5. New Hampshire Water Supply and Pollution Control Commission
   Ground-Water Permits Division
   Concord, New Hampshire
   Dan H. Allen, Director, 603/271-3503

6. New Hampshire Water Supply and Pollution Control Commission
   Water Supply Division
   Concord, New Hampshire
   Bernard Lucey, Chief of Public Water Supply Program, 603/271-3139

7. New Hampshire Water Supply and Pollution Control Commission
   Wastewater Division
   Concord, New Hampshire
   Steve Roberts, NPDES Permits, 603/271-2458

8. New Hampshire Department of Agriculture
Pesticide Control Division
Concord, New Hampshire
Mr. McKay, Pesticide Inspector, 603/271-3550

9. U.S. Environmental Protection Agency, Region I
John F. Kennedy, Federal Building
Boston, Massachusetts
Susan Hanamoto, N.H. Coordinator, 617/223-3468

10. U.S. Geological Survey
Water Resources Division
Bow, New Hampshire
John E. Cotton, Geologist, 603/225-4681

11. USDA Soil Conservation Service
Exeter, New Hampshire
Russell J. Kelsea, Conservationist, 603/772-4385

12. New Hampshire Fish and Game Department
Inland and Marine Fisheries Division
Concord, New Hampshire
Ted Spurr, Biologist, 603/271-2501
Charles Thoits, Division Chief, 603/271-2501

13. U.S. Fish and Wildlife Service
Ecological Services
Concord, New Hampshire
Gordon Russel, Biologist, 603/224-2585
Ken Carr, Environmental Contamination Specialist, 603/224-2585

14. U.S. Fish and Wildlife Service
Endangered Species
Newton, Massachusetts
Paul Nickerson, Biologist, 617/965-5100

15. Seacoast Anti-Pollution League
Portsmouth, New Hampshire
Jane Doughty, Field Director, 603/431-5089

16. New Hampshire Water Supply and Pollution Control Commission
Concord, New Hampshire
Ken Warren, Biologist, 603/271-3357

Appendix C

PEASE AFB RECORDS SEARCH INTERVIEW LIST

Appendix C
PEASE AFB RECORDS SEARCH INTERVIEW LIST

Interviewee	Area of Knowledge	Years at Installation
1	Civil Engineering	27
2	Civil Engineering	26
3	Civil Engineering	27
4	Refuse Collection/Heavy Equipment Operation	29
5	Refuse Collection/Heavy Equipment Operation	22
6	Aircraft Maintenance/Heavy Equipment Operation	17
7	Disaster Preparedness	12
8	Fire Department	17
9	Fire Department	10
10	Civil Engineering	22
11	Exterior Electric/Electric Shop	28
12	Plumbing Shop	17
13	Plumbing Shop/Heat Shop	17
14	Aircraft Maintenance	17
15	Aircraft Maintenance--NHANG	17
16	Aircraft Maintenance--NHANG	17
17	Aircraft Maintenance	17
18	Aircraft Maintenance	25
19	Aircraft Maintenance	10
20	Aircraft Maintenance--NHANG	2
21	Aircraft Maintenance/Electric Shop	27
22	Vehicle Maintenance	6
23	CE Environmental	7
24	CE Environmental	1
25	Bioenvironmental Engineering	1
26	Bioenvironmental Engineering--NHANG	5
27	Munitions Maintenance	3
28	Munitions Maintenance	1
29	Munitions Disposal	2
30	Liquid Fuels Maintenance	24
31	Fuels Management	7
32	Base Supply	28
33	Defense Property Disposal Office	13
34	Entomology	15
35	Water and Wastewater	16

Appendix D

INSTALLATION HISTORY

Appendix D
INSTALLATION HISTORY

A. INSTALLATION HISTORY

The history of Pease AFB, described in the following narrative, was obtained from TAB A-1, Environmental Narrative, Pease AFB.

Pease AFB, home of the Strategic Air Command's 45th Air Division and the 509th Bombardment Wing (Medium), is a permanent military installation representing an investment of millions of dollars. Its continued effectiveness depends mainly on its protection from encroachment. It is located in southeastern New Hampshire, approximately 3 miles west northwest of the City of Portsmouth in Rockingham County.

The site was first developed as a municipal airport for the City of Portsmouth. The original development consisted of a three-runway system with a small aircraft parking apron and two hangars. The two hangars were built and owned by the users: Skyhaven, Inc., and Yankee Flying School. These companies leased the field for $500.00 per annum with renewal upon request and a 14-day cancellation.

Northeast Airlines used the field by paying a sliding fee graduated according to aircraft movement. The City of Portsmouth was responsible for snow removal on the field and kept it open when possible. During this time, the field operated without benefit of control tower or lighting facilities.

At the beginning of World War II, the U.S. Navy leased the field for its exclusive use for the duration of the war and 6 months thereafter for a fee of $1.00 per annum. On June 25, 1946, the Navy waived exclusive rights to the field and retained right of use on 450 acres of the original system. In 1951, the Navy transferred to USAF the above 450 acres for 25 years with renewal rights.

During 1951, an Air Force Evaluations Group led by Colonel Washburn of the Strategic Air Command visited the site. Following this evaluation, the site was inspected by the Assistant Secretary of the Air Force (Installation). Based on the reports made by these two inspections, the present site was chosen for development because of its proximity to existing utilities and availability of good transportation facilities. The report also cited the feasibility of the site from the standpoint of availability of land for expansion, engineering, and public relations.

Additional land was acquired in 1952 and 1953, with construction beginning about 1954. In 1956, the 100th Bomb Wing began operation at the base, then known as Portsmouth Air Force Base. In February 1956, the 817th Air Division was activated here and was redesignated the 45th Air Division in 1971 with two more wings.

The first B-47 aircraft arrived in April 1956 and by the end of the year, all B-47s and KC-97 tankers assigned to the wing had arrived. In September 1957, Portsmouth AFB officially became Pease AFB, in honor of Captain Harl Pease, Jr., who was lost in a bombing raid over Rabual, New Britain, August 2, 1942. In a ceremony attended by more than 28,000 people, a monument was unveiled which stands in front of Base Headquarters as a lasting memory of the New Hampshire Medal of Honor recipient who gave his life for his country.

In August 1958, the 100th Bomb Wing was joined by the 509th Bomb Wing. In February 1966, the last B-47 and KC-97 departed the base. The base also lost the 100th Bomb Wing to Davis-Monthan AFB, Arizona; however, the New Hampshire Air National Guard Unit from Grenier Field in Manchester came to Pease. The 509th Bomb Wing remained and was re-equipped with B-52 and KC-135 aircraft from Sheppard AFB, Texas.

In June 1966, the 34th Air Refueling Squadron arrived from Offutt AFB, Nebraska, and, in August 1967, the 54th Aerospace Rescue and Recovery Squadron arrived from Goose AB, Labrador. Later in 1967, the 817th Combat Support Group was redesignated the 509th Combat Support Group.

In May 1969, it was announced that the 509th Bomb Wing would receive the first two operational squadrons of FB-111A aircraft. December 1969 marked the redesignation of the 509th as a medium bombardment wing. On New Year's Day, 1970, the 175th Bombardment Squadron was reactivated. The Wing received their first FB-111A on December 16, 1970, and became fully operational in 1971.

From the time the base was fully operational in 1956, one operational wing was assigned, the 100th Bomb Wing, with 70 B47s and 25 KC97s. In December 1957, a second squadron of 25 KC97s arrived. In July and September 1958, the 509th Bomb Wing moved to Pease and joined its tanker squadron. From September 1958 to March 1966, two operational wings were assigned at Pease, the 100th and the 509th, the 100th Bomb Wing phasing out in March 1966. In 1965, the KC-97s and B-47s started phasing out. The last B-47 departed in November 1965. The first KC-135s arrived in April 1966 and were joined by 15 B-52s to replace the B-47s. In October 1966, an additional 10 KC-135s arrived. By late fall, another 10 KC-135s arrived for a total of two refueling squadrons, of 15 aircraft each. During the Southeast Asia conflict, the B-52s were TDY to SEA, never to return to Pease. Instead, the newer FB-111s arrived in December 1970. The total high strength of FB-111s was up to 34 aircraft and KC-135s a high of approximately 35 aircraft, the total number varying from time to time.

B. PRIMARY MISSION

1. General

Pease AFB consists of approximately 4,310 acres of land owned in fee and 54 acres of easements. The land and associated facilities are used to support the Strategic mission and 15 tenants including the 45th Air Division of the base. The four organizations that have primary flying missions are the 393rd and 715th Bomb Squadrons which are authorized FB-111A Aircraft, and the 34th (scheduled for inactivation), and the 509th Air Refueling Squadrons which are authorized KC-135 aircraft. The 157th Air Refueling Group which is a New Hampshire Air National Guard Unit and a tenant on the base, also fly the KC-135 aircraft. The primary mission of the 509th Bomb Wing is to maintain a combat-ready force capable of conducting long-range bombardment operations. The primary mission of the 157th Air Refueling Group is to provide tactical airlift support for airborne forces and other personnel, equipment, and supplies. The 157th Air Refueling Group is an operational and training unit.

2. Major Assigned Units

The 45th Air Division makes certain, through frequent staff visits, that each unit assigned is in a combat readiness status.

Detachment 6, 26th Weather Squadron, provides meteorological data for the base flight personnel and severe weather warning support.

The 509th Bombardment Wing (Medium) is capable of immediate and sustained long-range bombing and air-refueling operations as may be directed by the Strategic Air Command.

The 509th Combat Support Group is the support function for the 509th Bomb Wing and tenant units. Base administration, civil engineering, security, recreations, food services, legal, and religious are some of the varied services provided by their organization.

C. <u>TENANT MISSION</u>

The USAF Hospital at Pease provides medical services to Pease personnel and their dependents and Navy personnel and their dependents, as well as retired military personnel in the area. This is the only military hospital in the area.

The 157th Air Refueling Group of the New Hampshire Air National Guard, another major tenant unit assigned to Pease, gives active duty Air Force personnel total global support, including numerous mercy missions as a result of natural disasters. Their primary mission is to perform airlift activities, cargo, and personnel drops. Their new addition of KC-135 aircraft will provide them with an additional air refueling mission.

Detachment 27, SAC Management Engineering Team, provides manpower support to base units, conducts management engineering studies, and provides management advisory studies.

1916th AF Communications Squadron in accordance with the policies established by the Commander, North COM Area, provides reliable ATC services as required to support the base mission.

The 71 FTW/OLC is an Air Training Command (ATC) detachment assigned to Pease AFB to conduct the training of pilots in the Accelerated Co-Pilot Enrichment Program (ACE). The organization, which has been active at Pease since October 1, 1977, consists of three instructor pilots, four T-37 aircraft, and various maintenance personnel.

Other tenant units assigned include Air Force Office of Special Investigation, District I; 2020 Field Training Detachment; Detachment 1358, 1030th USAF Auditor General; OL21A1, Postal Courier Service; a local AFROTC Detachment; AFROTC Northeast; American Red Cross; Defense Investigative Services; and the USAF Judiciary Area Defense Council.

Appendix E

SOIL SERIES DESCRIPTIONS

Appendix E
SOIL SERIES DESCRIPTIONS

HINCKLEY SERIES (12)

The Hinckley Series consists of deep, excessively drained soils on terraces, outwash plains, deltas, kames, and eskers. They formed in water-sorted material. Typically, these soils have a very dark grayish brown, loamy sand surface layer 7 inches thick. The subsoil layers from 7 to 15 inches are strong brown and yellowish brown gravelly, loamy sand. From 15 to 18 inches, the subsoil is yellowish brown gravelly sand. The substratum from 18 to 60 inches is light olive brown stratified sand, gravel, and cornerstones. Slopes range from 0 to 60 percent.

WINDSOR SERIES (26)

The Windsor Series consists of deep, excessively-drained soils on terraces. They formed in deposits of sand and loamy sand. Typically, these soils in a wooded area have a very dark grayish brown, loamy sand surface layer 2 inches thick. The subsoil from 2 to 20 inches is strong brown and yellowish brown loamy sand and from 20 to 24 inches is light yellowish brown sand. The substratum from 24 to 60 inches is pale brown and light brownish gray sand. Slopes range from 0 to 60 percent.

BOXFORD SERIES (32)

The Boxford Series consists of deep, moderately well to somewhat poorly drained soils on terraces. They formed in

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Source: U.S.D.A. Soil Conservation Service.

( ) corresponds to soil map numeric designation. See Figure 7.

lacustrine or marine sediments. Typically, these soils have a dark grayish brown silt loam surface layer 9 inches thick. The subsoil from 9 to 17 inches is dark yellowish brown and yellowish brown silt loam. From 17 to 44 inches, the mottled subsoil is yellowish brown and light olive brown silty clay loam. The mottled substratum from 44 to 60 inches is light olive brown silty clay loam. Slopes range from 0 to 25 percent.

SCITICO SERIES (33)

The Scitico Series consists of deep poorly drained soils on lowlands. They formed in marine or lacustrine sediments. Typically, these soils have a very dark grayish brown silt loam surface layer 4 inches thick and an olive gray mottled silt loam subsurface layer 5 inches thick. The subsoil is dark gray mottled silty clay loam 15 inches thick. The substratum is dark grayish brown mottled silty clay loam from a depth of 24 to 60 inches. Slopes range from 0 to 5 percent.

ELMRIDGE SERIES (38)

The Elmridge Series consists of deep, moderately well drained soils on terraces. They formed in a loamy mantle over clayey sediments. These soils have a very dark grayish brown fine sandy loam surface layer 6 inches thick. The subsoil from 6 to 18 inches is dark yellowish brown and dark brown fine sandy loam and from 18 to 25 inches is yellowish brown mottled sandy loam. The substratum from 25 to 60 inches is olive brown mottled silty clay. Slopes range from 0 to 25 percent.

WHATELY SERIES (39)

The Whately Series consists of deep, very poorly drained soils in depressions. They formed in loamy deposits and the underlying lacustrine or marine deposits. Typically, these soils have a mucky surface layer 5 inches thick over a very dark gray fine sandy loam layer 7 inches thick. A mottled subsurface layer from 7 to 20 inches is gray fine sandy loam. The mottled subsoil from 20 to 33 inches is a greenish gray silty clay loam. The mottled substratum from 33 to 60 inches is also greenish gray silty clay loam. Slopes range from 0 to 3 percent.

CHATFIELD SERIES (40)

The Chatfield Series consists of moderately deep, well drained to somewhat excessively drained soils on uplands. They formed in glacial till. Typically, these soils have a dark brown fine sandy loam surface layer, 8 inches thick. The subsoil layers from 8 to 24 inches are yellowish brown and light olive brown loam. The substratum from 24 to 26 inches is dark grayish brown loam. Bedrock is at 26 inches. Slopes range from 0 to 60 percent.

HOLLIS SERIES (40)

The Hollis Series consists of shallow, well drained, and somewhat excessively drained soils on uplands. They formed in acid glacial till derived mainly from schist and gneiss. Typically, these soils have a very dark grayish brown fine sandy loam surface layer 2 inches thick. The subsoil between 2 inches and 15 inches is dark yellowish brown and yellowish brown friable fine sandy loam and gravelly fine sandy loam which overlies schist bedrock. Slopes range from 0 to 45 percent.

GREENWOOD SERIES (95)

The Greenwood Series consists of very poorly drained soils formed in organic deposits on uplands. The surface layer is brown fabric material 6 inches thick. The substratum is very dark brown and dark brown sapric and hemic material. Slopes are 0 to 2 percent. Most areas are in natural vegetation.

MAYBID SERIES (134)

The Maybid Series consists of deep, very poorly drained soils on lowlands. They formed in lacustrine or marine sediments. Typically, these soils have a very dark gray surface layer 7 inches thick. The silty clay and silty clay loam subsoil is gray from 7 to 11 inches and is greenish gray from 11 to 19 inches. The substratum, from 19 to 60 inches is greenish gray silty clay. Slopes range from 0 to 3 percent.

PIPESTONE SERIES (214)

The Pipestone Series consists of somewhat poorly drained soils formed in acid sandy glaciofluvial deposits on lake outwash and till plains. The surface layer is very dark brown loamy sand 8 inches thick. The subsurface layer is grayish brown loamy sand 3 inches thick. The subsoil is dark reddish brown and yellowish brown loamy sand and sand 20 inches thick. The substratum is light brownish gray sand. Slopes range from 0 to 6 percent. Areas are used for cropland, pastureland, woodland, and specialty crops.

BORROW PITS (298)

Gravel pits are open excavations from which soil and gravel have been removed, exposing the gravelly material. Slopes are 0 to 3 percent.

UDORTHENTS (299)

No interpretation at this time.

DEERFIELD SERIES (313)

The Deerfield Series consists of deep, moderately well drained soils on terraces, deltas, and outwash plains. They formed in thick deposits of sand derived mainly from granite, gneiss, and quartzite. Typically, these soils have a very dark grayish brown loamy sand surface layer 9 inches thick. The subsoil from 9 to 19 inches is yellowish brown loam sand that is mottled. The subsoil from 19 to 27 inches is mottled sand. The substratum from 27 to 46 inches is olive gray sand. Slopes range from 0 to 15 percent.

PENNICHUCK SERIES (460)

The Pennichuck Series consists of moderately deep, well drained soils formed in loamy glacial till. They are on rolling uplands. Typically, Pennichuck soils have a dark brown channery fine sandy loam surface layer 9 inches thick. The subsoil from 9 to 24 inches is yellowish brown channery fine sandy loam. The substratum from 24 to 36 inches is yellowish brown very channery fine sandy loam. Bedrock is at 36 inches. Slopes range from 3 to 25 percent.

HOOSIC SERIES (510)

The Hoosic Series consists of deep, somewhat excessively drained soils on outwash plains, kames, eskers, and moraines. They formed in water-sorted material. Typically, these soils have a dark grayish brown gravelly sandy loam surface layer 6 inches thick. The yellowish brown subsoil from 6 to 11 inches is gravelly sandy loam, from 11 to 22 inches is very gravelly sandy loam and from 22 to 28 inches is very gravelly loamy sand. The substratum from 28 to 60 inches is very gravelly sand. Slopes range from 0 to 45 percent.

SHAKER SERIES (538)

The Shaker Series consists of deep, poorly drained soils on terraces. They formed in a loamy mantle over clayey sediments. These soils have a very dark brown fine sandy loam surface layer 6 inches thick. The subsoil is light brownish gray and dark brown mottled sandy loam 24 inches thick. The substratum, from 28 to 60 inches, is dark yellowish brown, mottled silty clay. Slopes range from 0 to 8 percent.

WESTBROOK SERIES (597)

The Westbrook Series consists of deep, very poorly drained soils on tidal flats, subject to inundation by saltwater twice daily. They formed in humic organic material. Salt content in the soil layers ranges from 1,000 to 35,000 parts per million. Typically, the layers from 0 to 48 inches are very dark gray and dark olive gray organic materials. The substratum from 48 to 99 inches is very dark gray silt loam. Slopes range from 0 to 1 percent.

RIDGEBURY SERIES (647)

The Ridgebury Series consists of deep, poorly and somewhat poorly drained soils on uplands. They formed in glacial till. Typically, these soils have a black, very stony or extremely stony sandy loam surface layer 6 inches thick. The mottled subsoil from 6 to 16 inches is olive gray sandy loam. The mottled substratum from 16 to 60 inches is a very firm fragipan that is light olive brown and olive sandy loam. Slopes range from 0 to 15 percent.

URBAN LAND (699)

Urban land is land mostly covered by streets, parking lots, buildings, and other structures of urban areas.

URBAN LAND--CANTON SERIES (799)

Urban land is land mostly covered by streets, parking lots, buildings, and other structures or urban areas. Canton Series consists of deep, well-drained soils on uplands. They formed in a fine sandy loam mantle underlain by gravelly sandy glacial till derived mainly from granite and gneiss. Typically, these soils have a dark brown fine sandy loam surface layer, 2 inches thick. The subsoil between 2 and 22 inches is very friable yellowish brown and light yellowish brown fine sandy loam. The substratum, from 22 to 60 inches is friable light olive gray and olive gray gravelly loamy sand. Slopes range from 0 to more than 35 percent.

IPSWICH SERIES (997)

The Ipswich Series consists of deep, very poorly drained soils on tidal flats subject to tidal flooding. They formed in organic material. Salt content in the soil layers ranges from 10,000 to 35,000 parts per million. Typically, the layers from 0 to 18 inches are dark grayish-brown fibric materials; from 10 to 42 inches, are very dark grayish-brown hemic materials; and from 42 to 62 inches, are very dark grayish-brown sapric materials. Slopes range from 0 to 1 percent.

Appendix F

MASTER LIST OF INDUSTRIAL OPERATIONS

Appendix F
MASTER LIST OF INDUSTRIAL OPERATIONS

Shop Name	Present Location[a] (Building No.)	Handles Chemical and/or Petroleum Product Materials	Generates Chemical and/or Petroleum Product Waste	Current Treatment/Storage Disposal Methods
50th Bombardment Wing				
509th Civil Engineering Squadron				
Entomology	141	X	--	Consumed in Use
Liquid Fuels	152	X	X	DPDO[b]
Metal Shop	152	--	--	
Plumbing Shop	152	X	--	Consumed in Use
Pavements and Grounds	214	X	X	DPDO
Carpenter Shop	151	X	--	Consumed in Use
Power Production	152	X	X	DPDO
Paint Shop	152	X	X	DPDO
Fire Extinguisher Maintenance	241	--	--	
Heat Plant	124	--	--	
Refrigeration, A/C	152	X	X	DPDO
Golf Course Maintenance	401	X	--	Consumed in Use
509th Transportation Squadron				
Allied Trades	130	X	X	DPDO
Vehicle Maintenance	130	X	X	DPDO
Refueling Maintenance	136	X	X	DPDO
Packing and Crating	122	--	--	
509th Organizational Maintenance Squadron				
Tanker Phase	227	X	X	Oil/Water Separator to Sanitary Sewer; DPDO
AGE Shop	212	X	X	DPDO
509th Munitions Maintenance Squadron				
Maintenance and Inspection	466	X	X	DPDO
Integrated Maintenance	468	X	X	DPDO
Equipment Maintenance	437	X	X	DPDO
Weapons Release	251	X	X	DPDO

[a]Major industrial shops have always been in their present locations.

[b]The Defense Property Disposal Office (DPDO), which is located at the Portsmouth Naval Shipyard, is responsible for monitoring contractor removal. The selected contractor collects the waste at designated accumulation points at Pease AFB. Petroleum product wastes collected by the contractor are recycled and reused.

Appendix F--Continued

Shop Name	Present Location[a] (Building No.)	Handles Chemical and/or Petroleum Product Materials	Generates Chemical and/or Petroleum Product Waste	Current Treatment/Storage Disposal Methods
509th Field Maintenance Squadron				
Electrical Repair	227	X	X	Neutralization to Sanitary Sewer
Wheel and Tire	227	X	X	DPDO[b]
Paint Shop	120	X	X	DPDO
Machine Shop	120	X	--	Consumed in Use
Structural Repair	120	X	--	Consumed in Use
Welding Shop	120	--	--	
Fuel Systems Repair	229	X	X	DPDO
Jet Engine Maintenance	119	X	X	DPDO
Jet Engine Accessory Shop	119	X	X	DPDO
Test Cell	222	X	X	Oil/Water Separator to Storm Drain; DPDO
AGE Shop	21[illegible]	X	X	Oil/Water Separator to Sanitary Sewer; DPDO
NDI Shop	120	X	X	Silver Recovery to Sanitary Sewer; DPDO
Hydraulic Shop	120	X	X	DPDO
Environmental Systems	120	X	--	Consumed in Use
509th Combat Support Group				
Auto Hobby	103	X	X	DPDO
Wood Hobby	48	--	--	
Firing Range	146	X	X	DPDO
Photo Lab	34	X	X	Silver Recovery to Sanitary Sewer
USAF Hospital				
Medical Lab	93	X	X	Silver Recovery to Sanitary Sewer; DPDO
Dental Lab	93	X	--	Consumed in Use

[a]Major industrial shops have always been in their present locations.

[b]The Defense Property Disposal Office (DPDO), which is located at the Portsmouth Naval Shipyard, is responsible for monitoring contractor removal. The selected contractor collects the waste at designated accumulation points at Pease AFB. Petroleum product wastes collected by the contractor are recycled and reused.

Appendix F--Continued

Shop Name	Present Location[a] (Building No.)	Handles Chemical and/or Petroleum Product Materials	Generates Chemical and/or Petroleum Product Waste	Current Treatment/Storage Disposal Methods
New Hampshire Air National Guard 157th Consolidated Aircraft Maintenance Squadron				
Pneudraulics Shop	244	X	X	DPDO[b]
Repair and Reclamation	244	X	X	DPDO
Powered AGE	252	X	X	DPDO
Jet Engine Maintenance	253	X	X	DPDO
Survival Equipment Shop	244	--	--	
NDI Shop	244	--	--	
Welding Shop	244	X	--	Consumed in Use
Machine Shop	244	--	--	
Electrical Repair	244	X	--	Consumed in Use
Fuel Systems	244	X	--	Consumed in Use
Environmental Systems	244	X	--	Consumed in Use
Avionics	244	X	--	Consumed in Use
Corrosion Control	253	X	X	Oil/Water Separator to Storm Drain; DPDO
Periodic Phase	253	X	X	DPDO
Flightline Hangar	254	X	X	DPDO
157th Civil Engineering Squadron				
Power Production	252	--	--	
Carpenter Shop	250	X	--	Consumed in Use
157th Transportation Squadron				
Vehicle Maintenance	258	X	X	Neutralized to Sanitary Sewer; Oil/Water Separator to Storm Drain; DPDO

[a]Major industrial shops have always been in their present locations.

[b]The Defense Property Disposal Office (DPDO), which is located at the Portsmouth Naval Shipyard, is responsible for monitoring contractor removal. The selected contractor collects the waste at designated accumulation points at Pease AFB. Petroleum product wastes collected by the contractor are recycled and reused.

Appendix G

INVENTORY OF EXISTING POL STORAGE TANKS

Appendix G
INVENTORY OF MAJOR[a] ACTIVE POL
STORAGE TANKS AT PEASE AFB

Facility/Location	Tank Contents	Number of Tanks	Capacity, Gallons (each)	Aboveground (AB) Belowground (BG)
321	JP-4	6	50,000	BG
325	JP-4	4	50,000	BG
330	JP-4	4	50,000	BG
334	JP-4	4	50,000	BG
339	JP-4	4	50,000	BG
343	Recovered JP-4	1	25,000	BG
347	MOGAS	1	50,000	BG
	Diesel	1	50,000	BG
351	JP-4	6	50,000	BG
Bulk Storage Area	JP-4	2	2,500,000	AG
	JP-7	1	500,000	AG
	JPTS	1	25,000	BG
	De-icing Fluid	1	25,000	BG
	MOGAS	1	15,000	BG
	Diesel	1	15,000	BG
Base Service Station	MOGAS	4	10,000	BG
	Diesel	1	15,000	BG
149	No. 2 Oil	1	1,000	AG
205	Diesel	1	3,000	BG
213	JP-4	1	2,000	UG
	MOGAS	1	2,000	UG
	Diesel	1	2,000	UG
222	No. 2 Oil	1	1,000	BG
	JP-4	1	5,000	BG
	Waste Fuel	1	500	BG
227	PD-680	1	6,000	BG
232	Diesel	1	1,000	BG
234	No. 2 Oil	1	1,000	BG
239	Diesel	1	1,500	BG
258	MOGAS	1	10,000	BG
	Diesel	1	8,000	BG
307	No. 2 Oil	1	3,000	BG
354	Diesel	1	1,000	BG
359	Diesel	1	1,000	BG
400	No. 2 Oil	1	550	BG
410	Diesel	1	1,000	AG
	No. 2 Oil	1	1,000	BG
Fire Dept.	Recovered JP-4	1	5,000	AG
Training Area	No. 2 Oil	1	500	BG
33	No. 2 Oil	1	1,000	BG

[a]Includes storage tanks with capacities of 500 gallons or greater.

Appendix G--Continued

Facility/Location	Tank Contents	Number of Tanks	Capacity, Gallons (each)	Aboveground (AB) Belowground (BG)
	MOGAS	4	5,000	BG
	MOGAS	1	10,000	BG
	Waste Oil	1	550	BG
68	No. 2 Oil	1	1,000	BG
86	No. 2 Oil	1	750	BG
87	No. 2 Oil	1	25,000	BG
	No. 2 Oil	1	8,000	BG
	Diesel	2	4,000	BG
90	Diesel	1	500	BG
95	No. 2 Oil	1	12,560	BG
99	No. 2 Oil	1	6,280	BG
124	No. 6 Oil	1	400,000	AG
	No. 6 Oil	1	30,000	BG
136	Waste JP-4	1	1,200	BG
141	No. 2 Oil	1	500	BG
142	No. 2 Oil	1	750	BG
143	No. 2 Oil	1	750	BG
144	No. 2 Oil	1	1,000	BG
420	Diesel	1	1,000	BG
	No. 2 Oil	1	1,000	BG
430	No. 2 Oil	1	500	BG
431	MOGAS	1	500	AG
432	Diesel	1	3,000	BG
435	No. 2 Oil	1	500	BG
437	No. 2 Oil	1	1,000	BG
457	No. 2 Oil	1	3,000	BG
466	No. 2 Oil	1	2,000	BG
468	No. 2 Oil	1	1,000	BG

Appendix H

PAST BASE REFUSE AND INDUSTRIAL WASTE DISPOSAL CONTRACTORS

STATE OF NEW HAMPSHIRE
DEPARTMENT OF HEALTH AND WELFARE
DIVISION OF PUBLIC HEALTH SERVICES

Edgar J. Helms. Jr.
Commissioner
Department of Health and Welfare

William T. Wallace. Jr.. M.D.. M.P.H.
Director
Division of Public Health Services

Health & Welfare Bldg.
Hazen Drive
Concord. NH 03301
Tel. (603) 271- 4664

August 2, 1983

Col. Gindlesperger, Base Commander
509 CSG/CC
Pease Air Force Base
Newington, NH 03801

Dear Sir:

The New Hampshire Division of Public Health Services is currently evaluating the risks to human health posed by the Coakley landfill which is located in Greenland/North Hampton. We seek to enlist your assistance in this project.

Specifically, any information pertaining to the disposal of waste by Pease Air Force Base in the aforementioned landfill would be appreciated. We understand that documents exist which identify parties who were awarded disposal contracts for the base; furthermore, we understand that some identification of such wastes so disposed is also available.

We would welcome the opportunity to meet with you, or members of your staff, for the purposes of reviewing such information. Please notify me if such a meeting can be arranged.

Thank you for your assistance in this matter.

Very truly yours,

Brook S. Dupee, Program Manager
Hazardous Waste Cleanup Fund
Office of Waste Management
Division of Public Health Services

BSD/jep

NJC
8/5

17 AUG 1983

Mr Brook S. Dupee, Program Manager
Hazardous Waste Cleanup Fund
Office of Waste Management
Health and Welfare Building
Hazen Drive
Concord NH 03301

Dear Mr Dupee

I have tasked our Civil Engineering office to prepare a formal reply to your letter of 2 August 1983.

We are in the process of researching our archives to gather the information you requested. There are approximately 800 boxes of records on Pease that must be individually searched to obtain information prior to FY81. Additional records that may address disposal contracts over the last 10 year period were either routinely destroyed or sent to the permanent records depository.

It will be impossible to completely reconstruct these records for the entire period that the Base used the Coakley landfill. I expect to provide you a reply on the first search by 26 August 1983.

If you have any questions, please contact George T. Kraus of our Engineering Staff at 430-2154.

Sincerely

Signed

LARRY P. GINDLESPERGER, Colonel, USAF
Commander

FUNC ADDRESS SYMBOL	LAST NAME AND DATE
CINC/C	
VCINC/C	
CS	
CSA	
AC	
AD	
DA	
DC	
DE	
for DEA	
DEE	
DEEV	
DO	
DP	
HC	
HO	
IG	
IN	
JA	
LG	
NR	
PA	
SG	
SP	
SX	
XO	
XP	

RETURN TO:	FUNC ADDRESS SYM	ORIGINATOR'S NAME AND GRADE	PHONE NO	TYPIST'S INITIALS	DATE TYPED
	DEEV	MR. KRAUS	2154	mp	10 AUG 83

DEPARTMENT OF THE AIR FORCE
509TH COMBAT SUPPORT GROUP (SAC)
PEASE AIR FORCE BASE, NEW HAMPSHIRE 03801

Mr Brook S. Dupee, Program Manager
Hazardous Waste Cleanup Fund
Office of Waste Management
Health and Welfare Building
Hazen Drive
Concord NH 03301

26 August 1983

At our Base Commander's request we conducted a records search to discover waste disposal contracts covering the period we used Coakley's Landfill (1975-1982) for domestic refuse.

Our use of the landfill was strictly limited to refuse permitted by our contract with the City of Portsmouth. Pickups and disposal were made by contract. The list of these contracts is shown on Atch 1. Disposal of industrial waste and recyclable petroleum products were not permitted in the landfill. Regulations concerning the proper handling of these wastes were published in February 1973. These wastes were normally collected in 55 gallon drums and disposed of via separate service contract. None of our records show that any of these wastes went to Coakley's Landfill.

Attachment 2 lists the individual disposal contracts. Unfortunately, the list may not be complete. Air Force Manual 12-50, Table 70-1, Rules 1-7 (Atch 3) provides disposition instructions for contract documentation. We are instructed to dispose of all project documents for contracts less than $10,000 one year after project completion. The vast majority of our contracts fall into this category. The data that we did include was pieced together from unofficial logs kept by the Base Environmental Coordinator, a position established in 1976. The period before that is extremely sketchy with only some contractors' names but no actual record of usage.

The Base also disposed of various wastes at the Portsmouth Naval Shipyard (PNSYD) and through the Defense Disposal Office (DPDO), also at PNSYD. Most of these wastes were recyclable petroleum products. They, in turn, contracted for final disposal.

We have requested that the DPDO research their records for the same time period (Atch 4).

We feel confident that the controls in place from 1973 would insure that only allowable wastes were collected by our contractors and subsequently disposed of in Coakley's Landfill.

If you should require any further information, please contact George I. Kraus at 603-430-2586.

We would be happy to meet with you to discuss this matter.

JOHN B. OLANSEN, Lt Col, USAF
Base Civil Engineer

4 Atch
1. Pease AFB Refuse Contracts
2. Pease AFB Industrial Waste Disposal Contracts
3. AFM 12-50, Pages 10-195 and 10-196
4. Ltr, Records Search for Waste Disposal, 26 Aug 83

cc: CSG/JA w/Atch

PEASE AFB REFUSE CONTRACTS

DATES	SCOPE	CONTRACTOR
1980-1983	BASE	H. E. BOUFFARD AND COMPANY
1977-1983	HOUSING	COASTAL ENVIRONMENTAL
1975-1980	BASE	SEACOAST TRUCKING
1976-1977	HOUSING	KEEFE ENVIRONMENTAL SERVICES
1975-1976	HOUSING	SEACOAST TRUCKING

ATCH 1

PEASE AFB INDUSTRIAL WASTE DISPOSAL CONTRACTS

1. KNOWN CONTRACTS:

DATE	AMOUNT	MATERIAL	CONTRACTOR
JUN 82	12-55 GAL DRUMS	WASTE PENETRATING OIL	COATING SYSTEMS, INC.
JUN 82	1210 GALS	PAINT THINNERS	RESOURCE CONSERVATION RECOVERY AGENCY
JUN 81	400 GALS	DETERGENT AND WATER	RESOURCE CONSERVATION RECOVERY AGENCY
APR 81	880 GALS	PAINT THINNERS	RESOURCE CONSERVATION RECOVERY AGENCY
AUG 80	3-55 GAL DRUMS	SOLVENT	KEEFE ENVIRONMENTAL SERVICES, INC.
AUG 80	3-55 GAL DRUMS	SOLVENT, THINNERS	KEEFE ENVIRONMENTAL SERVICES, INC.
JUN 80	11-55 GAL DRUMS	THINNERS, PAINT, SLUDGE	KEEFE ENVIRONMENTAL SERVICES, INC.
JUN 80	4-55 GAL DRUMS	OIL	KEEFE ENVIRONMENTAL SERVICES, INC.
OCT 79	UNKNOWN (FROM SEPARATOR)	SOLVENTS, FUEL	ATC PETROLEUM
AUG 79	25-55 GAL DRUMS	SOLVENTS	KEEFE ENVIRONMENTAL SERVICES, INC.
AUG 79	2-55 GAL DRUMS	OILS	KEEFE ENVIRONMENTAL SERVICES, INC.
APR 78	22-55 GAL DRUMS	THINNERS, SOLVENTS, SLUDGE	RECYCLING INDUSTRIES
NOV 77	300 GALS	SOLVENT AND OIL WASTE	KEEFE ENVIRONMENTAL SERVICES, INC.
OCT 77	1000 GALS	TCE, SILICONE FLUID	RECYCLING INDUSTRIES
SEP 77	22-55 GAL DRUMS	PAINT THINNERS	RECYCLING INDUSTRIES
AUG 77	UNKNOWN (FROM SUMP)	INDUSTRIAL WASTE SLUDGE	BEEDE

PEASE AFB INDUSTRIAL WASTE DISPOSAL CONTRACTS (CONT'D)

DATE	AMOUNT	MATERIAL	CONTRACTOR
SEP – OCT 75	UNKNOWN	JP-4 SLUDGE	CRAIGO COMPANY
JUL 73	UNKNOWN	JP-4 SLUDGE	MCKIN COMPANY
SEP – NOV 72	UNKNOWN	JP-4 SLUDGE	MCKIN COMPANY
APR – MAY 70	UNKNOWN	JP-4 SLUDGE	MCKIN COMPANY
OCT – NOV 68	UNKNOWN	JP-4 SLUDGE	MCKIN COMPANY
OCT 65	UNKNOWN	JP-4 SLUDGE	PETROLEUM TANK CLEANING CO.
APR – AUG 61	UNKNOWN	JP-4 SLUDGE	PETROLEUM TANK SERVICE CO.

2. POSSIBLE CONTRACTS (NO OFFICIAL RECORDS):

MATERIAL	CONTRACTOR
SYNTHETIC OIL	A. B. CHEMICAL, WASH PA
MOTOR OIL	NORTHEAST OIL, L.I., NY
JET FUEL	EASTERN SURPLUS, CALAIS, ME

70. *Contracting and Acquisition. These tables cover disposition of documentation relating to contracting for and acquiring materiel and services from sources outside the Air Force.

TABLE 70-1

*ACQUISITION OF MATERIEL AND SERVICES

RULE	A	B	C	D
	If documents are or pertain to	consisting of	which are	then
1	individual procurement case files (paying office contract files are covered in table 177-18)	record sets of contracts, purchase orders, and other contractual instruments, all supporting data and information documenting the negotiation, administration, completion, and payment of individual procurement transactions (note 1)	transactions after 25 Jul 74 for $10,000 or less, transactions on or before 25 Jul 74 for $2,500 or less, and construction contracts under $2,000	destroy 1 year after contract is closed as provided in Part 5, ASPR Sup. 2. (Exception: Identify those containing determinations and findings other than 10 USC 2304a (3) and (6); retain for 6 years per ASPR 3-308.)
2			transactions after 25 Jul 74 for more than $10,000, transactions on or before 25 Jul 74 for more than $2,500, and construction contracts exceeding $2,000	destroy 6 years, 3 months after contract is closed as provided in Part 5, ASPR Sup. 2.
2.1			*GAO copies of contracts	*destroy 6 years and 3 months after close of contract.
3			utility contracts containing records of payment by the government for connection or termination charges associated with the service or records of payments to become due to the government by the supplier (e.g., electric cooperatives, etc.)	destroy 15 years after close of contract.
4			delivery order transactions for more than $10,000 written against utility requirements contracts to provide payment for services received	destroy 6 years after payment. (Also see rule 5.)
4.1			delivery order transactions for $10,000 or less written against utility requirements contracts to provide payment for services received	destroy 1 year after payment. (Also see rule 5.)

TABLE 70-1 (Continued)

R U L E	A	B	C	D
	If documents are or pertain to	consisting of	which are	then
5			outstanding exceptions, unsettled claims by or against the US, incomplete investigations, cases under litigation, or requests by the Comptroller General of the US	retain until clearance/ litigation is obtained/ settled; destroy if retention periods in rules 1 through 3 have expired.
6		information copies		destroy 3 months after final payment or after purpose has been served, whichever is sooner.
7		working papers, duplicate copies of official file documents and other material	not required or appropriate for filing in official files	destroy when purpose has been served, on completion or final payment under the contract, but not later than 1 year after final payment.
7.1	contractor general files (note 2)	documents pertaining generally to the contractor and not to a specific contract but to several contracts (e.g., concerning any general aspect of his capabilities, performance, procedures or operations covered in ASPR Sup. 2-101.2)	maintained by purchasing and contract administration offices	destroy when superseded or obsolete as provided in ASPR Sup. 2-502a, unless retention for a longer period is justified.
7.2		duplicate or working copies	not required or appropriate for filing in official files	destroy when they have served their purpose, when actions which the file facilitated have been taken or on physical completion or final payment under the contract, as appropriate, under ASPR Sup. 2-504, unless retention for a longer period is justified.
8	transactions that do not obligate funds	indefinite delivery-type contracts, call procurement arrangements, basic ordering agreements, and related records		destroy 6 years after expiration or termination.

DEPARTMENT OF THE AIR FORCE
509TH COMBAT SUPPORT GROUP (SAC)
PEASE AIR FORCE BASE, NEW HAMPSHIRE 03801

REPLY TO ATTN OF: DEEV (J. LeClair, 2586)

26 August 1983

SUBJECT: Records Search for Waste Disposal

TO: Portsmouth Naval Shipyard/DPDO

1. We are currently conducting a search for records of our past waste disposal activities. This is in response to a letter we received from the State of New Hampshire (See Atch 1).

2. Minutes of the Environmental Protection Committee from 1972 through 1979 state that we sold synthetic oils and jet fuel through the DPDO. Minutes from 1974 also indicate that we sold lube oil through your office.

3. Please provide us with any available information on these or other items you have handled for Pease AFB. We would appreciate your response by 15 September 1983.

FOR THE COMMANDER

JOHN E. OLANSEN, Lt Col, USAF
Base Civil Engineer

1 Atch
Ltr from NH Division
of Public Health Services,
2 Aug 83

AIR FORCE ANNIVERSARY
READY THEN READY NOW

Appendix I

HAZARD ASSESSMENT RATING METHODOLOGY

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

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

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

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

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

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

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

PURPOSE

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

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

DESCRIPTION OF MODEL

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

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

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

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

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

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

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

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

GNR126

FIGURE

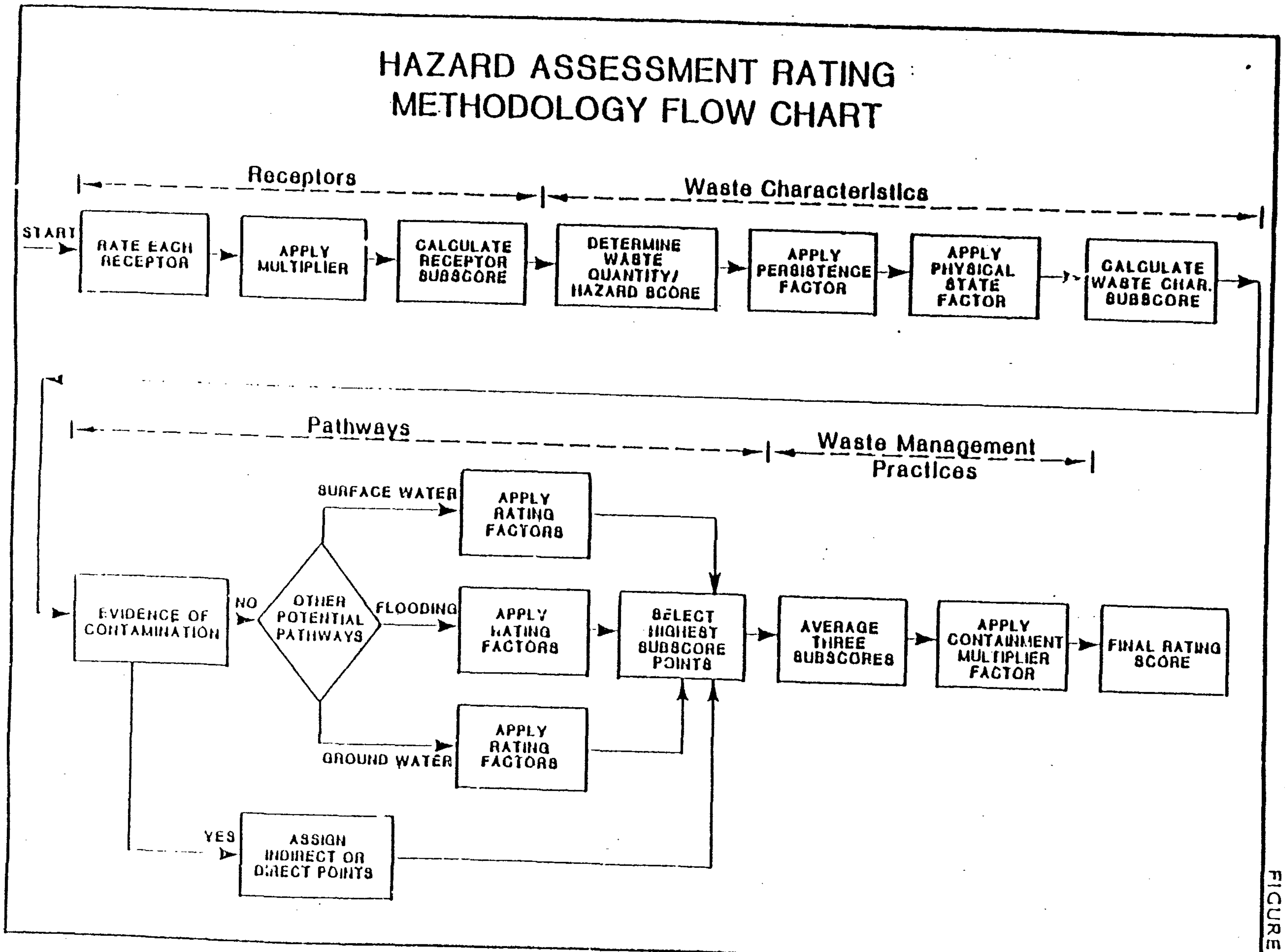
HAZARD ASSESSMENT RATING
METHODOLOGY FLOW CHART
Receptors
Waste Characteristics
START
RATE EACH RECEPTOR
APPLY MULTIPLIER
CALCULATE RECEPTOR SUBSCORE
DETERMINE WASTE QUANTITY/ HAZARD SCORE
APPLY PERSISTENCE FACTOR
APPLY PHYSICAL STATE FACTOR
CALCULATE WASTE CHAR. SUBSCORE
Pathways
Waste Management Practices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

FIGURE 2

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE ____________________

LOCATION ____________________

DATE OF OPERATION OR OCCURRENCE ____________________

OWNER/OPERATOR ____________________

COMMENTS/DESCRIPTION ____________________

SITE RATED BY ____________________

I. RECEPTORS

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

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

II. WASTE CHARACTERISTICS

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

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

2. Confidence level (C = confirmed, S = suspected) ______

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

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

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

______ X ______ = ______

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

______ X ______ = ______

III. PATHWAYS

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

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

Subscore ______

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

1. Surface water migration

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

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

2. Flooding

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

Subscore (100 x factor score/3) ______

3. Ground-water migration

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

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

C. Highest pathway subscore.

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

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

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

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

______ X ______ = ______

Table 1
HAZARDOUS ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or Industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Ground-water use of uppermost aquifer	Not used, other sources readily available	Commercial, industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available; commercial, industrial, or irrigation, no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-15	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

Table 1--Continued

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

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

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

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

S = Suspected confidence level

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

A-3 Hazard Rating

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

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

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

Table 1--Continued

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

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

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

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

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

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

B. Persistence Multiplier for Point Rating

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

C. Physical State Multiplier

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

Table 1--Continued

III. PATHWAYS CATEGORY

A. Evidence of Contamination

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

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

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
B-1 Potential for Surface Water Contamination					
Distance to nearest surface water (includes drainage ditches and storm sewers	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year 24-hour rainfall	<1.0 inch	1.0 to 2.0 inches	2.1 to 3.0 inches	>3.0 inches	8
B-2 Potential for Flooding					
Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1
B-3 Potential for Ground-Water Contamination					
Depth to ground water	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to + 20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8

Table 1--Continued

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

Rating Factors	Rating Scale Levels: 0	1	2	3	Multiplier
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

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

B. Waste Management Practices Factor

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

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

Guidelines for fully contained:

Landfills:

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

Spills:

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

Surface Impoundments:

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

Fire Protection Training Areas:

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

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

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Appendix J

SITE RATING FORMS

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 1--Landfill No. 1

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1953-1961

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Original Base Landfill

SITE RATED BY: N. Hatch, B. Winchester

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	1	3	3	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	107	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 59

II. WASTE CHARACTERISTICS

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

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

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

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

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	59
Waste Characteristics	60
Pathways	61
Total 180 divided by 3 =	60 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

60 x 1.0 = 60

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 2—Landfill No. 2

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1960-1962

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Main Base Landfill, Short Duration

SITE RATED BY: N. Hatch, B. Winchester

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	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	100	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 56

II. WASTE CHARACTERISTICS

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

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

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

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

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	50	108
Subscore (100 x factor score subtotal/maximum score subtotal)				46
2. Flooding	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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 49

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	56
Waste Characteristics	40
Pathways	49
Total 145 divided by 3 =	48
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

48 x 1.0 = 48

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 3--Landfill No. 3

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1962-1963

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Main Base Landfill, Short Duration

SITE RATED BY: N. Hatch, B. Winchester

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	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	100	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 56

II. WASTE CHARACTERISTICS

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

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

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

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

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

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

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

Subscore --

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	50	108
Subscore (100 x factor score subtotal/maximum score subtotal)				46
2. Flooding	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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 49

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	56
Waste Characteristics	40
Pathways	49
Total 145 divided by 3 =	48
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

48 x 1.0 = 48

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 4--Landfill No. 4

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1963-1964

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Main Base Landfill, Short Duration

SITE RATED BY: N. Hatch, B. Winchester

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	2	3	6	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	110	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 61

II. WASTE CHARACTERISTICS

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

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

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

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

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	61
Waste Characteristics	40
Pathways	54
Total 155 divided by 3 =	52
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

52 x 1.0 = 52

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 5--Landfill No. 5

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1964-1972, 1974-1975

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Main Base Landfill, Longest Duration

SITE RATED BY: N. Hatch, B. Winchester

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	2	3	6	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	100	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 56

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) L

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) 70

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

70 x 1.0 = 70

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

70 x 1.0 = 70

III. PATHWAYS

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

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

Subscore —

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	56
Waste Characteristics	70
Pathways	54
Total 180 divided by 3 =	60
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

60 x 1.0 = 60

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 6--Landfill No. 6

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1972-1974

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Main Base Landfill, Short Duration

SITE RATED BY: N. Hatch, B. Winchester

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	3	10	30	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	3	10	30	30
F.	Water quality of nearest surface-water body	1	6	6	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	133	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 74

II. WASTE CHARACTERISTICS

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

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

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

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

.9 x 30 = 27

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

1 x 27 = 27

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	—
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore **61**

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	74
Waste Characteristics	27
Pathways	61
Total 162 divided by 3 =	54
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

54 x 1.0 = **54**

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 7--Fire Department Training Area No. 1

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1955-1961

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Original Fire Department Training Area, Mixed POL Wastes

SITE RATED BY: N. Hatch, B. Winchester

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	3	10	30	30
C.	Land use/zoning within 1 mile radius	1	3	3	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	107	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 59

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) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

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

80 x .8 = 64

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

64 x 1.0 = 64

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	59
Waste Characteristics	64
Pathways	54
Total 177 divided by 3 =	59
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

59 x 1.0 = 59

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 8—Fire Department Training Area No. 2

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1961-Present

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Fire Training Area, Longest Duration
Massive Fuel Contamination of Adjacent Woodland Visible

SITE RATED BY: N. Hatch, B. Winchester

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	3	10	30	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	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	120	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 67

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) L
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) 100

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

100 x .8 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

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	100
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	--	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	--	1	--	--
	Subscore (100 x factor score/3)			--
3. Ground-water migration				
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 100

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	67
Waste Characteristics	80
Pathways	100
Total 247 divided by 3 =	82
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

82 x 1.0 = 82

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 9--Construction Rubble Site No. 1

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: Late 1950's-Present

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Used Mainly for Disposal of Inert Construction Rubble, Suspected Solvent Disposal

SITE RATED BY: N. Hatch, B. Winchester

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	3	10	30	30
C.	Land use/zoning within 1 mile radius	1	3	3	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	117	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 65

II. WASTE CHARACTERISTICS

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

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

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

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

40 x 1.0 = 40

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

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

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

Subscore --

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	65
Waste Characteristics	40
Pathways	61
Total 166 divided by 3 =	55 Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

55 x 1.0 = 55

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 10--Leaded Fuel Tank Sludge Disposal Site

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: Late 1950's-Mid 1970's

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Main AVGAS Tanks Inspected Every 3 Years, Cleaned as Necessary

SITE RATED BY: N. Hatch, B. Winchester

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	3	10	30	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	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	110	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 61

II. WASTE CHARACTERISTICS

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

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

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

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

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x .75 = 45

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	58	108
Subscore (100 x factor scor subtotal/maximum score subtotal)				54
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	61
Waste Characteristics	45
Pathways	54
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

53 x 1.0 = 53

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 11--FMS Equipment Cleaning Site

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: Pre-1970, Duration Unknown

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: --

SITE RATED BY: N. Hatch, B. Winchester

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	0	4	0	12
B.	Distance to nearest well	3	10	30	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	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	110	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 61

II. WASTE CHARACTERISTICS

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

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

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

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

50 x 0.9 = 45

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

45 x 1.0 = 45

III. PATHWAYS

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

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

Subscore --

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	61
Waste Characteristics	45
Pathways	54
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

53 x 1.0 = 53

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 12--Munitions Storage Area Solvent Disposal Site

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: Utilized Prior to 1980, Duration Unknown

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Surface Disposal on Ground Behind Building 466

SITE RATED BY: N. Hatch, B. Winchester

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	3	10	30	30
C.	Land use/zoning within 1 mile radius	1	3	3	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	2	6	12	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	117	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 65

II. WASTE CHARACTERISTICS

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

1. Waste quantity (S = small, M = medium, L = large) S
2. Confidence level (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 1.0 = 54

III. PATHWAYS

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

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

Subscore --

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface-water migration				
Distance to nearest surface water	2	8	16	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	58	108
Subscore (100 x factor score subtotal/maximum score subtotal)				54
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 54

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	65
Waste Characteristics	54
Pathways	54
Total 173 divided by 3 =	58
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

58 x 1.0 = 58

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 13--Bulk Fuel Storage Area Spills

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1963, 1975--Major Spills

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Two Major Spills, One Minor Spill

SITE RATED BY: N. Hatch, B. Winchester

I. RECEPTORS

	Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A.	Population within 1,000 feet of site	1	4	4	12
B.	Distance to nearest well	2	10	20	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	113	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 63

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) L
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) 100

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

100 x .8 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

III. PATHWAYS

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

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

Subscore --

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

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
1. Surface-water mi ;ation				
Distance to near st surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	66	108
Subscore (100 x factor score subtotal/maximum score subtotal)				61
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	63
Waste Characteristics	80
Pathways	61
Total 204 divided by 3 =	68
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

68 x .95 = 65

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 14--Fuel Line Spill Site

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1959

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: --

SITE RATED BY: N. Hatch, B. Winchester

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	3	10	30	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	2	10	20	30
F.	Water quality of nearest surface-water body	1	6	6	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	114	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 63

II. WASTE CHARACTERISTICS

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

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

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

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

60 x .8 = 48

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

48 x 1.0 = 48

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	0	8	0	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	50	108
Subscore (100 x factor score subtotal/maximum score subtotal)				46
2. Flooding	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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 61

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	63
Waste Characteristics	48
Pathways	49
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

53 x 1.0 = 53

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 15—Industrial Shop/Parking Apron Zone

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1956-Present

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Groundwater Contamination with TCE

SITE RATED BY: N. Hatch, B. Winchester

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	3	10	30	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	2	6	12	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	2	6	12	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	127	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 71

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) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

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

80 x 1.0 = 80

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.0 = 80

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	100
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	--	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	--	1	--	--
	Subscore (100 x factor score/3)			--
3. Ground-water migration				
Depth to ground water	--	8	--	--
Net precipitation	--	6	--	--
Soil permeability	--	8	--	--
Subsurface flows	--	8	--	--
Direct access to ground water	--	8	--	--
		Subtotals	--	--
Subscore (100 x factor score subtotal/maximum score subtotal)				--

C. Highest pathway subscore

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

Pathways Subscore --

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	71
Waste Characteristics	80
Pathways	100
Total 251 divided by 3 =	84
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

84 x 0.12 = 8

HAZARDOUS ASSESSMENT RATING FORM

NAME OF SITE: Site No. 16--PCB Spill Site

LOCATION: Pease AFB

DATE OF OPERATION OR OCCURRENCE: 1983

OWNER/OPERATOR: Pease AFB

COMMENTS/DESCRIPTION: Blown Transformer in Building 410, Some Spillage Onto Ground

SITE RATED BY: N. Hatch, B. Winchester

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	3	10	30	30
C.	Land use/zoning within 1 mile radius	3	3	9	9
D.	Distance to reservation boundary	3	6	18	18
E.	Critical environments within 1 mile radius of site	2	10	20	30
F.	Water quality of nearest surface-water body	2	6	12	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	129	180

Receptors subscore (100 x factor score subtotal/maximum subtotal) 72

II. WASTE CHARACTERISTICS

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

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

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

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

60 x 1.0 = 60

C. Apply physical state multiplier

Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.0 = 60

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.				
			Subscore	--
B. Rate the migration potential for three potential pathways: surface-water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.				
1. Surface-water migration				
Distance to nearest surface water	1	8	8	24
Net precipitation	2	6	12	18
Surface erosion	2	8	16	24
Surface permeability	1	6	6	18
Rainfall intensity	1	8	8	24
		Subtotals	50	108
Subscore (100 x factor score subtotal/maximum score subtotal)				46
2. Flooding	--	1	--	--
	Subscore (100 x factor score/3)			--
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	NA	8	NA	NA
		Subtotals	44	90
Subscore (100 x factor score subtotal/maximum score subtotal)				49

C. Highest pathway subscore

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

Pathways Subscore 49

IV. WASTE MANAGEMENT PRACTICES

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

Receptors	72
Waste Characteristics	60
Pathways	49
Total 181 divided by 3 =	60
	Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score x Waste Management Practices Factor = Final Score

60 x 0.10 = 6

Appendix K

GLOSSARY OF TERMS

Appendix K
GLOSSARY OF TERMS

ALLUVIUM - A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material deposited during comparatively recent geologic time by a stream or other body of running water as a sorted or semisorted sediment in the bed of the stream or on its flood plain or delta, or as a code or fan at the base of a mountain slope; especially such a deposit of fine-grained texture deposited during time of flood.

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

BOWSER - A small mobile tank used to recover and transport POL products.

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

CONTAMINANT - As defined by section 104(a)(2) of CERCLA, shall include, but not be limited to, any element, substance, compound, or mixture, including disease causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformation, in such organisms or their offspring.

DOWNGRADIENT - A direction that is hydraulically down slope. The downgradient direction can be determined through a potentiometric survey or through the evaluation of existing water level elevations referenced to a common datum (mean sea level).

EP TOXICITY - A laboratory test designed to identify if solid waste is hazardous. A liquid extract from the solid waste is analyzed for selected metals and pesticides. If one or more of the parameters tested for is present in concentration greater than a maximum value then the solid waste is considered a hazardous waste in accordance with RCRA definition.

ESKER - A widening ridge of stratified glacial drift, steep-sided, 3 to 15 m in height, and from · fraction of a mile to over 160 km in length.

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

FORB - A low-growing herbaceous plant other than grass.

FRACTURES - As a mineral characteristic, the way in which a mineral breaks when it does not have cleavage. May be conchoidal (shell-shaped), fibrous, hackly, or uneven.

GLACIAL TILL - Unsorted and unstratified drift, generally unconsolidated, deposited directly by and underneath a glacier without subsequent reworking by water from the glacier, and consisting of a heterogeneous mixture of clay, sand, gravel, and boulders varving widely in size and shape.

GROUND MORAINE - Till deposited from a glacier as a veneer over the landscape and forming a gently rolling surface.

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

HAZARDOUS WASTE (expanded version of the RCRA definition) - A solid waste which because of its quantity, concentration, or physical, chemical or infectious characteristics may -

(A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible, illness; or

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

ICE-CONTACT DEPOSITS - Stratified drift deposited in contact with melting glacier ice, such as an esker, kame, kame terrace, or a feature marked by numerous kettles.

JOINTS - A break in a rock mass where there has been no relative movement of rock on opposite sides of the break.

KAME PLAIN - A flat-topped outwash plain originally entirely bounded by ice-contact slopes.

LACUSTRINE - Pertaining to, produced by, or formed in a lake or lakes; e.g., "lacustrine sands" deposited on the bottom of a lake or formed along the margin of a lake.

LEACHING - The separation or dissolving out of soluble constituents from a rock or ore body by percolation of water.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal and moderate proportions of clay, silt, and sand particles, and usually containing organic matter (humus) with a minor amount of gravelly material.

METAMORPHOSED (METAMORPHIC) - Pertaining to the process of mineralogical and structural adjustment of solid rocks to physical and chemical conditions which have been imposed at depth below the surface zones of weathering and cementation, and which differ from the conditions under which the rocks in question originated.

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

NET PRECIPITATION - Mean annual precipitation minus mean annual evapotranspiration. Evapotranspiration is sometimes estimated by pan evaporation measurements.

PD-680 (Type I and Type II) - A military specification for aliphatic petroleum distillate used as a safety cleaning solvent. The primary difference between PD-680 Type I and Type II is the flash point of the material. The flash points are 100°F and 140°F for PD-680 Types I and II, respectively. Currently, only Type II is authorized for use at Air Force installations.

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

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

SOIL HORIZONS -

(A) A-Horizon - The uppermost mineral horizon of a soil; zone of leaching.

(B) B-Horizon - Occurs below the A-Horizon; the mineral horizon of a soil or the zone of accumulation.

(C) C-Horizon - Occurs below the B-Horizon; a mineral horizon of a soil consisting of unconsolidated rock material that is transitional in nature between the parent material below and the more developed horizons above.

SOLUM - Upper part of a soil profile, in which soil-forming processes occur; A and B horizons.

SPOTTING CHARGE - A small explosive charge, the size of a shotgun shell, which is contained in training ordnance to score the impact of training ordnance.

STRATA - Plural of stratum.

STRATUM - A single and distinct layer, of homogeneous or gradational sedimentary material (consolidated rock or unconsolidated earth) of any thickness, visually separable from other layers above and below by a discrete change in the character of the material deposited or by a sharp physical break in deposition, or by both.

UNSATURATED ZONE (Vadose Zone or Zone of Aeration) - A subsurface zone containing water under pressure less than that of the atmosphere, including water held by capillarity; and containing air or gases generally under atmospheric pressure. This zone is limited above by the land surface and below by the surface of the zone of saturation.

UPGRADIENT - A direction that is hydraulically up slope. The upgradient direction can be determined through a potentiometric survey or through the evaluation of existing water level elevations referenced to a common datum (mean sea level).

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

Appendix L

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

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

A/C	Aircraft
AFB	Air Force Base
AFESC	Air Force Engineering and Services Center
AFFF	Aqueous Film-Forming Foam
AG	Aboveground
AGE	Aerospace Ground Equipment
AVGAS	Aviation Gasoline
Bldg.	Building
bls	Below Land Surface
BOD_5	Biochemical Oxygen Demand (5-day)
BX	Base Exchange
°C	Degrees Celsius (Centigrade)
CE	Civil Engineering
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
cm/sec	Centimeters per Second
COD	Chemical Oxygen Demand
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DoD	Department of Defense
DPDO	Defense Property Disposal Office
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
°F	Degrees Fahrenheit
ft/min	Feet per Minute
gal/yr	Gallons per Year
gm/kg	Grams per Kilogram
gpd	Gallons per Day
gpm	Gallons per Minute
HARM	Hazard Assessment Rating Methodology
IRP	Installation Restoration Program
JP	Jet Petroleum
lb	Pounds

lb/yr	Pounds per Year
MAJCOM	Major Command
mg/L	Milligrams per Liter
mgd	Million Gallons per Day
mo.	Month
MOGAS	Motor Gasoline
mph	Miles per Hour
msl	Mean Sea Level
NDI	Non-Destructive Inspection
No.	Number
NPDES	National Pollutant Discharge Elimination System
OEHL	Occupational and Environmental Health Laboratory
PCB	Polychlorinated Biphenyls
POL	Petroleum, Oil, and Lubricants
ppm	Parts per Million
RBS	Radar Bomb Scoring
RCRA	Resource Conservation and Recovery Act
SAC	Strategic Air Command
SCS	Soil Conservation Service
TCE	Trichloroethylene
TOC	Total Organic Carbon
TSS	Total Suspended Solids
UG	Underground
USAF	United States Air Force
USDA	United Stated Department of Agriculture
VOC	Volatile Organic Compound
µg/l	Micrograms per Liter

Appendix M

REFERENCES

Appendix M
REFERENCES

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Appendix N

USGS TEST HOLE LOGS

Table 1.--Logs of test holes, December 1977

(Drilled by Layne-New England Company;
Logs by U.S. Geological Survey.)

Locations of test holes are shown in figure 3 except for test hole TH 9 which is shown in figure 1.

	Depth (feet)
TH 1. 2-1/2-inch observation well. Screen: stainless steel, 5 foot, 30 mesh, 65-70 feet below land-surface datum. Drillers pumped with pitcher pump, water cloudy. Drillers reported static water level 18.4 feet below land-surface datum.	
Topsoil	0 - 1
Sand, fine to very fine, uniform, tan, micaceous,	1 - 32
Sand, fine and some medium-grained, tan	32 - 48
Sand, medium to coarse, mostly tan and some gray; gravel up to 1/4-inch diameter much of it tan, some dark gray (local bedrock color)	48 - 71
Refusal	71
TH 1A. 2-1/2-inch observation well. Screen: stainless steel, 3 foot, 10 mesh, 26-29 feet below land-surface datum. Not pumped by drillers. Drillers reported static water level 15.41 feet below land-surface datum.	
Topsoil	0 - 1
Sand, fine to very fine, uniform, micaceous, tan	1 - 32
TH 2. 2-1/2-inch observation well. Screen: stainless steel, 5 foot, 40 mesh, 63-68 feet below land-surface datum. Drillers reported static water level 18.3 feet below land-surface datum.	
Topsoil	0 - 1
Sand, fine, some medium and little coarse, brown	1 - 24
Sand and gravel; many pebbles up to 1-inch diameter; many angular to subangular pebbles and coarse gravel mixed with subrounded particles; very little fine sand and silt, gray and brown	24 - 48
Same as 24-48 except pebbles up to 3/4-inch diameter and contains more silt and very fine sand	48 - 60
Same as 24-48 except slightly more angular, darker (more gray), largest particles are about 1/2 inch	60 - 70
Refusal	70
TH 2A. 2-1/2-inch observation well. Screen: stainless steel, 5 foot, 40 mesh, 24-29 feet below land-surface datum. Drillers reported static water level 18.0 feet below land-surface datum.	
Topsoil	0 - 1
Sand, mostly fine, some medium, a little coarse; brown	1 - 24
Sand and gravel; contains a little silt and fine sand; brown and gray	24 - 29

Table 1.--Logs of test holes, December 1977 (Continued)

	Depth (feet)
TH 3. 2-1/2-inch observation well. Screen: stainless steel, 3 foot, 10 mesh, 77-80 feet below land-surface datum. Drillers reported static water level 22.1 feet below land-surface datum.	
Topsoil (or fill)	0 - 2
Sand, mostly fine, a little silt; occasional gravel and pebble particles, mostly subangular. Sand is brown; gravel usually gray	2 - 20
Same as 2-20 but more silt and smaller subrounded particles; light tan	20 - 30
Sand, very fine to fine; some silt; micaceous; tan (gravel particles absent)	30 - 40
Sand, very fine to fine; a little silt; tan	40 - 53
Sand, medium and some coarse, relatively uniform; tan	53 - 60
Sand, mostly coarse, some fine and medium and a few gravel particles; brown	60 -70±
Sand and gravel, silty; a few subrounded particles up to 1/3-inch diameter; subrounded; light tan	±70 - 80
Refusal	80
TH 4. 2-1/2-inch observation well. Screen: stainless steel, 3 foot, 10 mesh, 54-57 feet below land-surface datum. Drillers reported static water level 14.25 feet below land-surface datum.	
Topsoil	0 - 1
Sand, medium, a little fine sand; slightly micaceous; uniform textured; tan	1 - 20
Sand, medium less fine than above; becomes coarse sand near 40 feet; tan to brown where coarser	20 - 40
Sand, medium to coarse; some angular, dark gray, slaty gravel-size particles; tan except dark brownish-gray where an abundance of gravelly particles occurs	40 - 48
Sand and gravel; poorly sorted with some silt and small pebbles; dark brownish-gray. (Probably ice-contact deposits, but close to or mixed with a little till at bottom.)	48 - 58
Refusal	58
TH 5. 2-1/2-inch observation well. Screen: stainless steel, 5 foot, 60 mesh, 51-56 feet below land-surface datum. Drillers reported static water level 15.83 feet below land-surface datum.	
Topsoil	0 - 1
Sand, gravel with some pebbles and silt; poorly sorted; subrounded to subangular; tan with a few light gray pebbles and coarse gravel particles	1 - 35
Gravel, some poorly sorted sand, and pebbles up to 3/4-inch diameter. Tan, with some light gray particles	35 - 45
Sand and gravel, poorly sorted with many pebbles up to 1-inch diameter; mostly subrounded, brown to tan with a few light gray particles	45 - 56
Refusal	56

Table 1.--Logs of test holes, December 1977 (Continued)

	Depth (feet)
TH 7. 2-1/2-inch observation well. Screen: stainless steel, 5 foot, 60 mesh, 65-75 feet below land-surface datum. Pumped by drillers. Drillers reported static water level 17.01 feet below land-surface datum.	
Topsoil	0 - 1
Sand, fine, a little very fine; uniform; tan	1 - 10
Sand, mostly fine, some medium and very fine; tan	10 - 35
Sand, mostly medium to coarse with scattered gravel particles, brown; gravel is subangular, brown and gray; a few particles up to 1/4-inch diameter	35 - 55
Sand and gravel, poorly sorted, brown and gray, a few particles up to 1/2-inch diameter; most larger particles are subangular, a few subrounded. (Two samples: 55-65 feet and 65-75 feet are approximately the same)	55 - 75
Refusal	75
TH 8. 2-1/2-inch observation well. Screen: stainless steel, 5 foot, 30 mesh, 51-56 feet below land-surface datum. Drillers reported static water level 9.01 below land-surface datum.	
Topsoil	0 - 1
Sand, mostly medium, poorly sorted and a little gravel; tan; scattered pebbles, subrounded; up to 1/2-inch diameter gray	1 - 25
Sand; mostly fine and very fine; some silt; micaceous; light tan	25 - 45
Sand; mostly fine to medium; a little silt; micaceous; brown	45 - 56
Refusal	56
TH 9. 2-1/2-inch observation well. Screen: stainless steel, 3 foot, 30 mesh, 40-43 feet below land-surface datum. Attempt was made to gravel-pack hole before setting screen because of fine-textured material and importance of trying to get water sample. Drillers reported static water level 7.1 feet below land-surface datum.	
Sand, mostly fine and very fine; tan	0 - 12
Silt and clay; a few gravel particles, subangular; gray. (Marine silt and clay overlying till?)	12 - 56
Refusal	56
TH 10. 2-1/2-inch observation well. Screen: stainless steel, 3 foot, 30 mesh, 32-35 feet below land-surface datum. Drillers reported static water level 23.8 feet below land-surface datum.	
Topsoil	0 - 1
Sand, fine and very fine; a little gravel including particles up to 1/4-inch diameter; brown	1 - 10
Sand, fine to medium; a little very fine sand; very few scattered pebbles up to 1/2-inch diameter; slightly micaceous; tan	10 - 20
Same as 10-20 except slightly less very fine sand and more dark-colored grains; brown	20 - 28
Sand and gravel; poorly sorted; some silt and many pebbles up to 1-1/4-inch diameter; pebbles are angular to subangular mostly dark gray; sample is dark brownish-gray. (May be till or very "dirty" ice-contact deposits.)	28 - 35
Refusal	35