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National Priorities List Site

Hazardous waste site listed under the
Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)("Superfund")

GRIFFISS AIR FORCE BASE
Rome, New York

Conditions at listing (October 1984): Griffiss Air Force Base occupies approximately 3,900 acres in the Mohawk River Valley in Oneida County in central New York State, approximately 2 miles northeast of Rome. The Mohawk River borders the main base on the west and south. Besides the main base, there are 11 annexes used for base support and research and development. Activated in 1942, the base is currently active with the 416th Bombardment Wing as host unit.

Hazardous wastes generated on the base are from support of the base mission and research and development activities. The sources include industrial shops and laboratories. The various wastes produced, including solvents and lead (from battery acids), were disposed of primarily in five landfills and six dry wells covering about 110 acres.

The Air Force has detected phenols, ethylbenzene, and benzene in ground water and toluene in surface water on the base. To date, no off-base wells have been closed due to contamination.

The base is participating in the Installation Restoration Program (IRP), the specially funded program established in 1978 under which the Department of Defense has been identifying and evaluating its past hazardous waste sites and controlling the migration of hazardous contaminants from these sites. The Air Force has completed Phase I (records search) and is conducting Phase II (verification and quantification.)

Status (April 1987): The Air Force has completed Phase II of the IRP and has also taken some remedial measures in a number of on-base areas. EPA is reviewing all IRP recommendations and will meet with the Air Force after completing the review to discuss the next phase of the IRP and negotiate an interagency agreement.

Within the boundaries of this Federal facility, there are areas subject to the Subtitle C corrective action authorities of the Resource Conservation and Recovery Act (RCRA). However, no such areas were included in scoring this specific site. Therefore, this Federal facility site is being placed on the Federal section of the NPL under the NPL/RCRA policy announced on September 8, 1983 (48 FR 40662).

Facility name: Griffiss Air Force Base

Location: Rome, New York

EPA Region: II

Person(s) in charge of the facility: Bruce Mero

Environmental Coordinator

(315) 330-2098

Name of Reviewer: Robert Jubach (NUS Corporation) Date: May 31, 1984

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The site is an active Air Force Base at which wastes were generated from industrial shops and laboratories. Contaminants such as solvents and battery wastes were disposed of in landfills and/or drywells. On-base sampling showed contamination in ground and surface water.

Scores: S_M = 34.20 (S_{gw} = 58.16 S_{sw} = 10.91 S_a = 0)

S_{FE} =

S_{DC} =

FIGURE 1
HRS COVER SHEET

Stuart Haus (NUS) 7/13/84

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Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0	(45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.						
2 Route Characteristics						3.2
Depth to Aquifer of Concern	0 1 2 3		2		6	
Net Precipitation	0 1 2 3		1		3	
Permeability of the Unsaturated Zone	0 1 2 3		1		3	
Physical State	0 1 2 3		1		3	
Total Route Characteristics Score					15	
3 Containment	0 1 2 3		1		3	3.3
4 Waste Characteristics						3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)		1	18	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8		1	1	8	
Total Waste Characteristics Score				19	26	
5 Targets						3.5
Ground Water Use	0 1 2 (3)		3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 (30) 32 35 40		1	30	40	
Total Targets Score				39	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5				33,345	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} =	58 16		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

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Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
1-yr. 24-hr. Rainfall	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 (12) 15 18	1	12	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			13	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	0 1 2 (3)	2	6	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			12	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			7020	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{SW} =	10.91		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

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Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
[1] Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
[4] Multiply [1] x [2] x [3]			0	35,100	
[5] Divide line [4] by 35,100 and multiply by 100		S_a =	0.00		

FIGURE 9
AIR ROUTE WORK SHEET

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	S	S^2
Groundwater Route Score (S_{gw})	58.16	3382.59
Surface Water Route Score (S_{sw})	10.91	119.03
Air Route Score (S_a)	0.00	0.00
$S_{gw}^2 + S_{sw}^2 + S_a^2$		3501.62
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		59.17
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		34.20

FIGURE 10
WORKSHEET FOR COMPUTING S_M

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August 16, 1982

QUALITY ASSURANCE TEAM

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference. Include the location of the document.

FACILITY NAME: Griffas Air Force Base

LOCATION: Rome, NY

DATE SCORED: 7/13/84

PERSON SCORING: Stuart Haus

PRIMARY SOURCE(S) OF INFORMATION (e.g., EPA region, state, FIT, etc.):

NUS Corporation Files
Rosslyn, VA

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

COMMENTS OR QUALIFICATIONS:

Score would increase if hazardous waste quantity could be documented

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GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

Phenols, Benzene, Ethylbenzene.
Reference 2, Section 5, Tables 4 and 7, and Section 6.

Rationale for attributing the contaminants to the facility:

Detailed ground water sampling around Landfill 1 showed the listed contaminants in concentrations above those found in the background monitoring well. Levels of phenols above background were also discovered in sampling wells downgradient of Landfills 2, 5, 6, and 7 and Building 301 (entomology lab). January 11, 1982 sampling results were not considered due to quality assurance concerns.

Reference 2, Sections 5 and 6; ***

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern:

The three aquifers underlying the base area are a source of well water for drinking purposes. Sediments of the upper two quaternary aquifers occur surficially throughout the area and on-base sampling of ground water has shown contamination in both these sediments. These two aquifers may also serve as recharge and storage units for the underlying Utica Shale Bedrock aquifer, although the amount of recharge is unknown.
Reference 1 pp 3-5, 3-9, 3-10 to 3-12; References 2, p 3-7 and Sections 5 and 6; References 6 and 7.

Depth(s) from the ground surface to the highest seasonal level of the saturated zone (water table(s)) of the aquifer(s) of concern:

Not Applicable

Depth from the ground surface to the lowest point of waste disposal/storage:

Not Applicable

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Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

Not Applicable

Mean annual lake or seasonal evaporation (list months for seasonal):

Not Applicable

Net precipitation (subtract the above figures):

Not Applicable

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Not Applicable

Permeability associated with soil type:

Not Applicable

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Not Applicable

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3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Not Applicable

Method with highest score:

Not Applicable

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Disposal practices at the facility were such that the following compounds were known to be disposed of in landfills and drywells: Trichloroethylene, Methyl Ethyl Ketone, Toluene, and Lead (from lead storage cell battery wastes). In addition, Phenols, Benezene and Ethlybenzene were discovered in groundwater sampling and were also evaluated. Reference 1, Tables 4.2, 4.3, and 4.4, pp. 4-1 to 4-37; Reference 2, Sections 5 and 6; References 5, 15 and 16.

HRS score: Lead -18, Phenol-12, Trichloroethylene-12, Benzene-12, Toluene-9, Ethylbenzene-9, Methyl Ethyl Ketone-6

References 3 and 4

Compound with highest score:

Lead HRS Score = 18
References 3 and 4

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Unknown. Contaminants have been detected in groundwater sampling; therefore the hazardous waste quantity is greater than zero. An HRS value of 1 will be applied. Reference 3.

Basis of estimating and/or computing waste quantity:

Reference 1, Tables 4.2 - 4.4, provide a discussion of estimated waste quantities and types and past disposal practices (i.e., landfills and drywells) at the facility. The estimates provide the best available quantitative information at this time although they are only estimates since detailed records have not been maintained. Estimates of quantity are not very exact and are only provided in terms of 1980 production. These quantities at times refer not to liquid or sludge amounts but to the container size. Waste storage facilities (e.g. Lot 69 drum storage) were not considered because of containment practices, the absence of known spills, and the fact that the storage area has been decommissioned.

Because of the questionable waste quantities, the HRS quantity is unknown, however, since contaminants have been detected in groundwater sampling, it is known that the hazardous waste quantity is greater than zero. Reference 1, Tables 4.2 - 4.4, pp. 4-1 to 4-37; References 5 and 16.

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5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

The aquifers discussed on page 2 of this documentation package are used for drinking water although most drinking water sources in the area are from municipal water supplies which use surface water. Within the three miles of the facility, those residences which do not use the cites of Rome or Utica municipal water obtain water from wells. The average well depth is approximately 80 to 100 feet in the area as the two quaternary aquifers (shallow) are the most productive.
Reference 1, p 3-11 and References 6, 13, 14, and 17.

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Houses located on Floyd Avenue northeast of Landfill 7 which are not served by the city of Rome municipal water system.
(Griffiss AFB is served by the city of Rome.)
References 5, 8, 9, 10, 11, 13 and 14.

Distance to above well or building:

400 feet
References 5, 8, 9, 10, 11, 13 and 14.

Population Served by Ground Water Wells Within a 3-Mile Radius

Identify water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

A house count was conducted using topographic maps some of which were compiled in 1955. The count excluded the homes served by the Rome and Utica municipal water supplies, since municipal water supplies use surface water sources. Since the maps are based on 1955 data, a count with more up-to-date information may be larger although it is anticipated that the final score will not be significantly changed. All homes within 3-mile were counted since the potential exists for wells to be drawing from any of the three aquifers as well as the potential for interaction between the aquifers. Homes were considered on both sides of the Mohawk River and New York State Barge Canal because of the potential for contaminant migration between aquifers and because of the unlikelihood that the river and canal serve as barriers to the local ground water flow since the wells in the area are much deeper than the 14 foot deep barge canal.
Number of houses = 608, Number of people = 608 x 3.8 = 2310.
References 3, 8, 9, 10, 11, 13, 14, 17, and 18.

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

None noted
Reference 7

Total population served by ground water within a 3-mile radius:

2310 people (water supply wells) + 0 people (irrigation) = 2310 People Total

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SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Toluene
Surface water sampling has been accomplished by the Air Force in the perennial seep from Landfill 1 (see below) and in Six Mile Creek which flows near Landfills 1, 2, 3, and 7 and into which the seep from Landfill 1 drains. Toluene has been detected in the seep.

Reference 2, pp. 5-24 to 5-29.

Rationale for attributing the contaminants to the facility:

Leachate has been observed draining from Landfill 1 into Six Mile Creek. Observations of the leachate stream have shown this to be a perennial seep originating in the landfill area. The seep appears to be, at least in part, a spring recharged, in part, from the landfill. The seep thus constitutes perennial surface water. Toluene has been detected in the seep. Toluene is also known to have been disposed in the landfill.

Reference 1, p. 4-16 and Table 4-2.
Reference 2, p. 5-2, Figure 6, pp 5-24 to 5-29.

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

Not Applicable

Name/description of nearest downslope surface water:

Not Applicable

Average slope of terrain between facility and above-cited surface water body in percent:

Not Applicable

Is the facility located either totally or partially in surface water?

Not Applicable

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Is the facility completely surrounded by areas of higher elevation?

Not Applicable

1-Year 24-Hour Rainfall in Inches

Not Applicable

Distance to Nearest Downslope Surface Water

Not Applicable

Physical State of Waste

Not Applicable

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Not Applicable

Method with highest score:

Not Applicable

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4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Trichloroethylene, Methyl Ethyl Ketone, Toluene, Phenols, Benzene, and Ethylbenzene. (See Groundwater Toxicity and Persistence) Since the battery wastes were deposited in drywells only and there appears to be no surface water migration potential for contaminants deposited in the drywells, lead is not considered as a compound for evaluation for surface water.
Reference 1, Tables 4.2-4.4, pp 4-1 to 4-37; Reference 2, Sections 5 and 6; References 5, 15 and 16.

Compound with highest score:

trichloroethylene
Benezene and Phenols HRS score = 12
References 3 and 4.

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

See Groundwater Hazardous Waste Quantity

Basis of estimating and/or computing waste quantity:

See Groundwater Hazardous Waste Quantity

* * *

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

The leachate stream from Landfill 1 has measured contamination and flows into Six Mile Creek. Six Mile Creek is currently used for recreation (e.g., fishing and swimming).
Reference 1, p 4-16 and References 8, 9, 10, 11, and 15.

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Is there tidal influence?

No
References 8-11.

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Not Applicable

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Landfill 1 is extended due to the observed release in the leachate stream and therefore now contacts a designated wetland, zero feet.
Reference 1, p 3-18 and p 4-15; Reference 12.

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

Not Applicable

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

None
References 13 and 14.

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Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

None
Reference 7

Total population served:

Zero

Name/description of nearest of above-cited water bodies:

Not Applicable

Distance to above-cited intakes, measured in stream miles.

Not Applicable

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AIR ROUTE

1 OBSERVED RELEASE

Contaminants detected:

No information was found to indicate that any measurements of air contamination have been made. Therefore, the rating factor for observed release must be given an assigned value of zero and the value of S_a must be zero.
References 1 and 2

Date and location of detection of contaminants

Not Applicable

Methods used to detect the contaminants:

Not Applicable

Rationale for attributing the contaminants to the site:

Not Applicable

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Not Applicable

Most incompatible pair of compounds:

Not Applicable

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Toxicity

Most toxic compound:

Not Applicable

Hazardous Waste Quantity

Total quantity of hazardous waste:

Not Applicable

Basis of estimating and/or computing waste quantity:

Not Applicable

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi **0 to 1 mi** **0 to ½ mi** **0 to ¼ mi**

Not Applicable

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Not Applicable

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Not Applicable

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Distance to critical habitat of an endangered species, if 1 mile or less:

Not Applicable

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Not Applicable

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Not Applicable

Distance to residential area, if 2 miles or less:

Not Applicable

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Not Applicable

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Not Applicable

Is a historic or landmark site (National Register of Historic Places and National Natural Landmarks) within the view of the site?

Not Applicable

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REFERENCES
GRIFFISS AIR FORCE BASE

1. "Installation Restoration Program, Phase I Record Search, Hazardous Materials Disposal Sites, Griffiss AFB, New York.", July 1981.

2. "Installation Restoration Program, Final Report, Phase II-Problem Confirmation and Quantification Study, Griffiss Air Force Base, Rome, New York", December 1982.

3. Barrett, Kris W., S. Steven Chang, Stuart A. Haus, and Andrew M. Platt, Uncontrolled Hazardous Waste Site Ranking System, A User's Manual, MITRE Corporation, MTR-8ZW111, August 1982.

4. Sax, N.I., Dangerous Properties of Industrial Materials, Fifth ed., Van Nostrand Reinhold, New York, 1979.

5. Letter from R. Jubach, NUS Corporation, to Bruce Mero, Griffiss AFB, May 15, 1984, C-582-5-4-160.

6. Telephone conversation between R. Jubach, NUS Corporation and P. Lambert, Oneida County Health Department, May 9, 1984.

7. Telephone conversation between R. Jubach, NUS Corporation and J. Jackson, Oneida County Soils Conservation Service, May 11, 1984.

8. U.S. Department of the Interior, Geological Survey, Rome, NY Quadrangle, N-4307.5-W7522.5/7.5, 1955.

9. U.S. Department of the Interior, Geological Survey, Oriskany, NY Quadrangle, N4307.5-W7515/7.5, 1955.

10. U.S. Department of the Interior, Geological Survey, Westernville, NY Quandrangle, N4315-W7522.5/7.5, 1955 Photorevised in 1978.

11. U.S. Department of the Interior, Geological Survey, North Western N.Y. Quandrangle, N4315-W7515/7.5, 1955.

12. Telephone conversation between R. Jubach, NUS Corporation and P. Hamilton, U.S. Fish and Wildlife Service, Cortland NY, May 14, 1984.

13. Telephone conversation between R. Jubach, NUS Corporation and F. Clark, City of Rome Engineer, May 10, 1984 (includes maps of the City of Rome municipal water system)

14. Telephone conversation between R. Jubach, NUS Corporation and R. Logalbo, City of Utica Water Board, May 11, 1984.

15. Telephone conversation between R. Jubach, NUS Corporation and Bruce Mero, Griffiss AFB, June 21, 1984.

16. Letter from Lt Col Michael Howayeck, USAF, Griffiss AFB, to Paul Beam, U.S. EPA, June 13, 1984.

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17. Telephone conversation between R. Jubach, NUS Corporation, and Mrs. Lee Bates, Lee Bates Well, May 14, 1984.

18. Telephone conversation between R. Jubach, NUS Corporation, and Frank Jennings, New York Department of Transportation, June 22, 1984.

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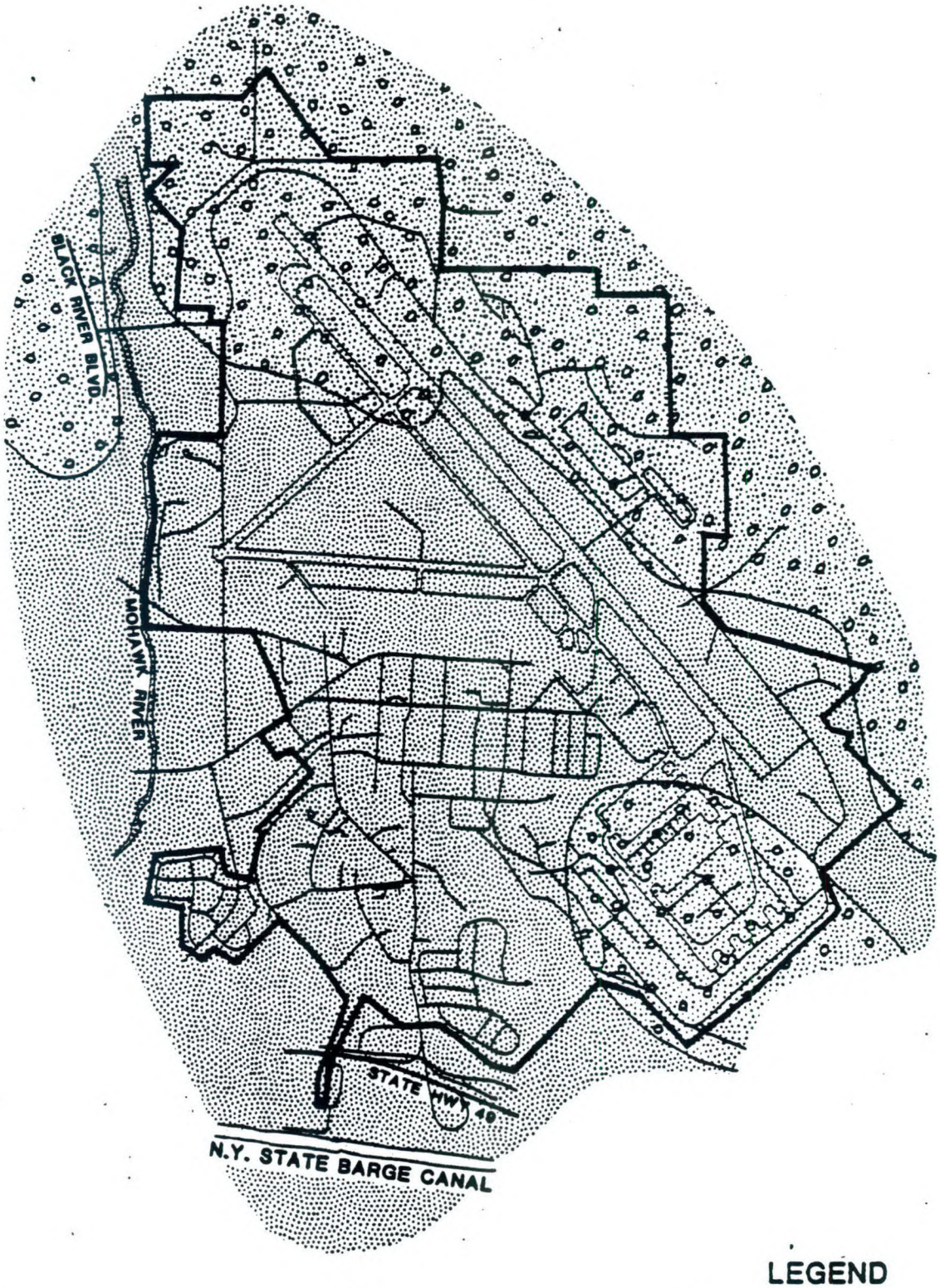
REFERENCE 1

FIGURE 3.2

EXCERPTS

GRIFFISS AFB

SURFICIAL GEOLOGY



LEGEND

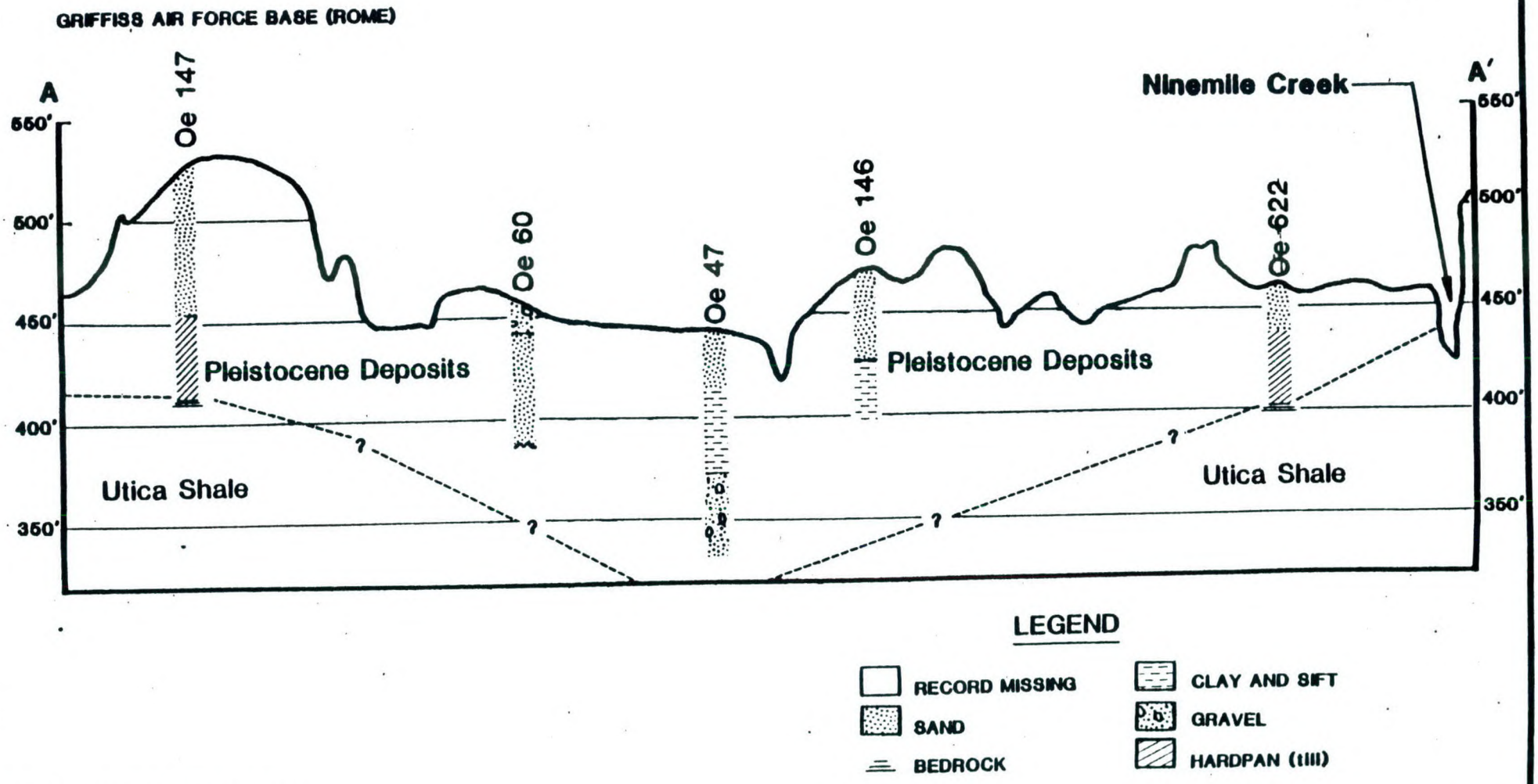
- QUATERNARY GLACIAL DEPOSITS
- QUATERNARY LACUSTRINE & ALLUVIAL DEPOSITS
- RESERVATION BOUNDARY

SOURCE: HALBERG, ET AL., 1962

GRIFFISS AFB

GEOLOGIC SECTION

FROM THREEMILE CREEK TO NINEMILE CREEK ALONG THE MOHAWK RIVER VALLEY



SOURCE: HALBERG, ETAL, 1962

ES ENGINEERING - SCIENCE

FIGURE 3.4

faults in the Griffiss area, including one approximately four miles east of the base near the town of Stittville. In addition, they have mapped a structural lineament extending north-south from the Lake Delta Reservoir along the approximate course of the Mohawk River, terminating at a point at or near the western installation boundary. The structural lineament is a linear feature detected by topographic survey, satellite or U-2 photography and may represent a buried fault or simply a change in bedrock conditions. The relationship between earthquake activity and locally mapped lineaments and faults is unknown, however, numerous small, non-damaging earthquakes have occurred in central New York. These are due to the activity of Holocene "pop-ups", a localized zone possibly depressed by glacial weight. The recovery of such a zone may cause a small tremor in isolated areas.

Sedimentary strata of the Rome area are known to be jointed. Joint planes of this area are oriented north, west and southwest, with the predominant direction being east or southeast along the Mohawk Valley. Joint plane dips tend to be vertical or nearly vertical (Isachsen and McKendree, 1977b).

A thorough understanding of local structural geology is often necessary in order to investigate ground-water flow amounts, rates, directions and possible channelization of flow in fractured consolidated aquifers. In many cases of fractured rock aquifers, a fracture trace analysis usually precedes field work in order to determine the appropriate number, depth and location of monitoring wells.

HYDROLOGY

Ground Water

Ground-water resources in the project area have been briefly summarized by Halbert et al (1962) and Sinnott and Cushing (1978). Additional data have been obtained from Kantrowitz (1970), primarily reconnaissance studies based upon the compilation of available information. An attempt to incorporate installation well data into this discusison was not successful as well logs have not been retained on file.

It has been stated that one reason for a lack of ground-water resources data has been the region's traditional dependence on surface water supplies and no current regulations requiring the permitting of

industrial or domestic supply water wells (P. Lambert, Oneida County Public Health Department, 1981). It is presently estimated that approximately 95 percent of the region's water supplies are derived from surface sources. Ground water sources are primarily utilized by individuals in areas not served by regional or community systems such as the sparsely populated town of Floyd, or by farmers for irrigation purposes.

Most of the Griffiss Air Force Base area appears to lie within a ground-water recharge area. Recharge occurs where unconsolidated deposits are exposed at ground surface, or during dry periods, along stream beds traversing these deposits. Regional recharge has been estimated by Kantrowitz (1970) to be equivalent to 25 percent of total precipitation.

Hydrogeologic Units: Hydrogeologic units of the Griffiss Air Force Base area correspond directly to the geologic units previously reported (Halberg, et al 1962) and shown in Figure 3.2. A brief summary of each unit follows:

- Quatenary lacustrine and alluvial deposits comprise an unconsolidated, unconfined aquifer made up of primarily fine-grained sediments. It varies in thickness from 70 to 150 feet. Wells screened into this unit average 68 feet in depth. The well yield ranges from 2 to 40 gallons per minute, averaging 11 gpm. Water derived from this unit is of variable quality, and is usually hard.

- Quaternary glacial deposits make up an unconsolidated unconfined aquifer comprised of primarily coarse-grained sediments. It varies in thickness from 10 to 140 feet. Wells screened into this unit average 67 feet in depth. This is the most productive aquifer of the region, with typical yields varying from 10 to 290 gallons per minute, averaging 80 gpm. The water is reported to be of good quality.

- Utica shale comprises a consolidated, usually unconfined aquifer containing water in weathered upper zones, in joints, bedding planes and in secondary fissures. This unit may function under confined (artisian) conditions locally. The unit ranges in thickness from 300 to 400 feet and typical yields from 0.5 to 48 gallons per minute, averaging 7.5 gpm. Water supplies are normally drawn from upper reaches of this unit as unit reliability declines with depth, and lower elevations may be naturally contaminated by salts, hydrogen sulfide or methane.

The unconsolidated hydrogeologic units receive recharge from precipitation and from streamflow in dry periods. The unconsolidated aquifers serve as both recharge and storage units for the underlying rock aquifer.

Ground-water levels in the Rome-Utica area are reported to fluctuate seasonally from 3 to 15 feet per year. Kantrowitz (1970) reports that the ground-water levels in similar hydrogeologic units may vary from 5 to 25 feet in the adjacent Eastern Oswego Basin.

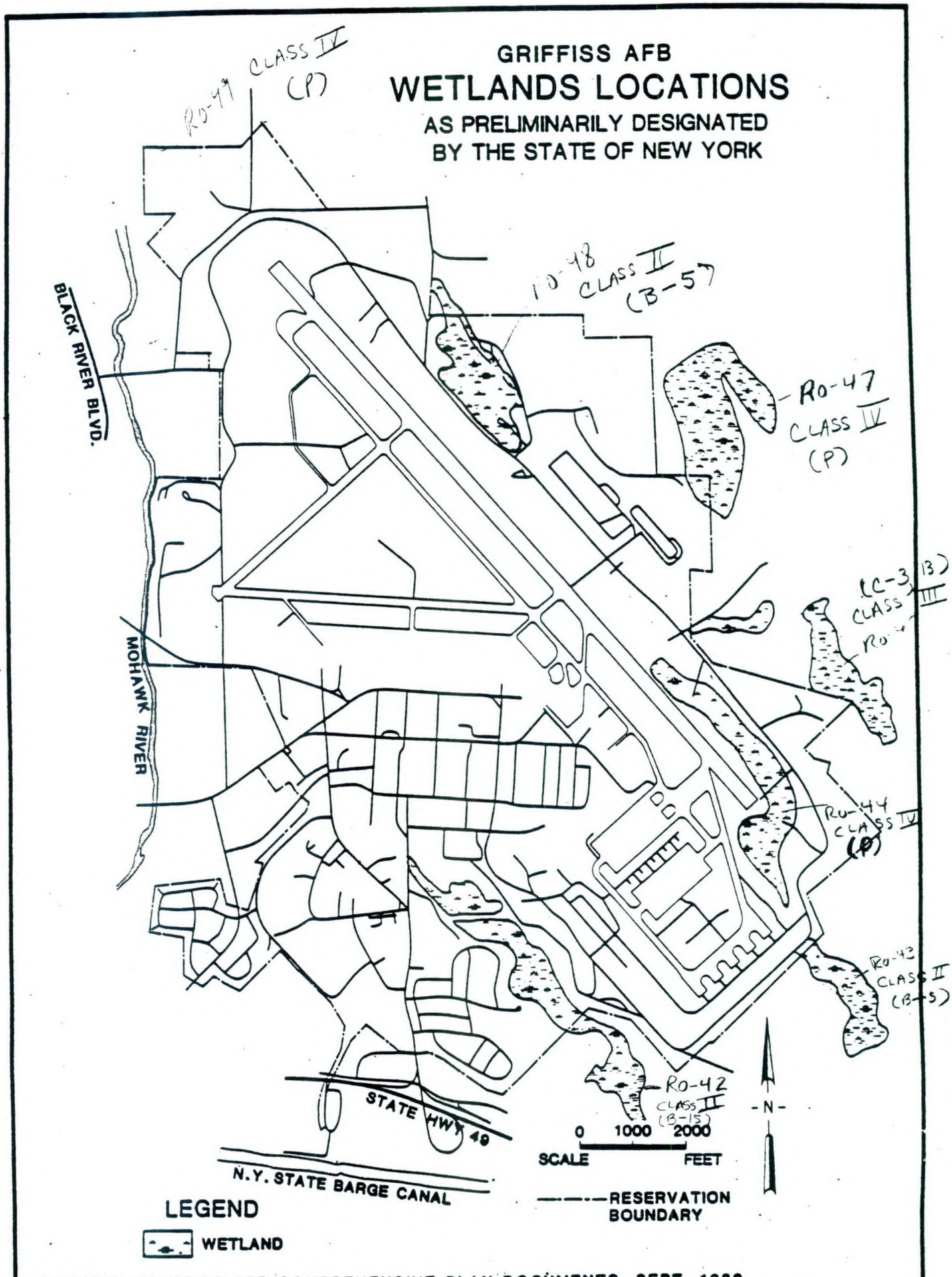
The water table of this region is reported to be a subdued replica of the topographic surface (Kantrowitz, 1970). Ground-water flow directions under unconfined conditions are typically down-gradient from a high potentiometric level to a lower potentiometric level. Ground-water discharge zones are typically springs, streams or surface water bodies.

The actual ground-water flow directions for the Griffiss Air Force Base area are undefined. Similarly, ground-water flow velocities and other physical characteristics of local aquifers have not been reported.

Surface Water

The New York State Department of Environmental Conservation has primary regulatory responsibility for the maintenance of water quality in the Griffiss Air Force Base area. Section 17-0301 of the State Environmental Conservation Law (Classificaton of Waters and Adoption of Standards) sets forth the legislative authority for both the assignment of stream classifications for all the waters of the state and the adoption of standards applicable to those classifications. The existing standards applicable to all classes of waters are set forth in Parts 700-703, Title 6, Official Compilation of Codes, Rules and Regulations. Waters of the Mohawk-West Canada Creek Planning Area are classified according to the following schedule, based upon utilization:

Classification	Utilization
AA	Water Supply - no discharges permitted
A	Water Supply
B	Bathing
C (T)	Fishing - trout stream
C	Fishing
D	Secondary contact recreation



SOURCE: GRIFFISS AFB COMPREHENSIVE PLAN DOCUMENTS, SEPT. 1980

CHAPTER 4

FINDINGS

To assess hazardous waste management at Griffiss AFB, past activities of waste generation and disposal were reviewed. This chapter contains a summary of the wastes generated by activity, a description of disposal methods used at Griffiss AFB, and an identification and evaluation of disposal sites located on the base. Figure 4.1 presents the decision tree utilized in the review of waste practices. This tree provided a logical algorithm for the consistent evaluation of all base practices.

PAST ACTIVITY REVIEW

To determine past activities on the base that resulted in generation and disposal of hazardous waste materials a review was conducted of all current and past waste generation and disposal methods. This review consisted of interviews with base employees, a search of files and records, and site inspections.

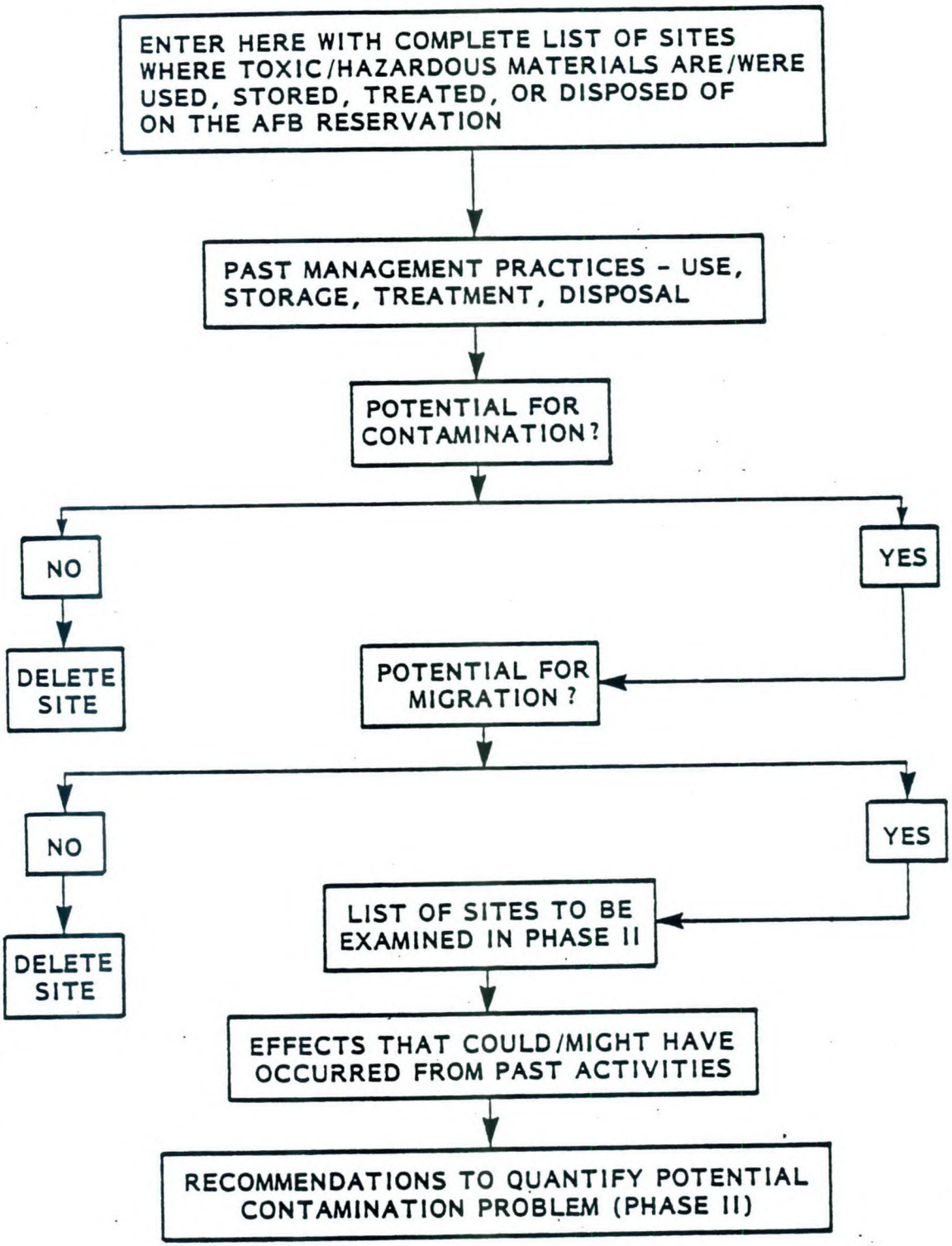
Waste Generated by Activity

All hazardous wastes generated on Griffiss can be associated with one of the following seven activities carried out on base:

- Industrial Operations (Shops)
- Research and Development Labs
- Pesticide and Herbicide Utilization
- Radioactive Waste
- Fire Control Training
- Hazardous Waste Storage
- POL (Fuels Management)

The following discussion addresses only those wastes generated on base which are either hazardous wastes or potentially hazardous wastes. In this discussion a hazardous waste is defined as hazardous by either the Resource Conservation and Recovery Act (RCRA), or the GAFB documents

WASTE PRACTICE REVIEW DECISION TREE



which have been reviewed. A potentially hazardous waste is one which was suspected of being RCRA hazardous although insufficient data was available to fully characterize the waste.

Industrial Operations (Shops)

Major mission support activity is conducted at Griffiss AFB by various groups and squadrons through the operation of industrial shops. These shops design, fabricate and repair components and parts for aircraft, missiles and aerospace ground equipment, as well as components, parts and items for special testing equipment, instrumentation and experimental equipment and devices. Most of the shops are located in Building 101, but some specialized fabrication and repair shops are located at different points around the base. A list of shops reviewed for this project and an indentification of hazardous materials present and potential problems is presented in Table 4.1. Table 4.2 identifies the hazardous wastes produced. A brief description of the industrial shops is given in Appendix A.

Research and Development Labs

The R&D Labs, along with other labs on base, provide primary and secondary mission support for GAFB. A brief description of each of the labs is appended. A list of the hazardous wastes each lab produces is given in Table 4.3.

Pesticide and Herbicide Utilization

Pesticides and herbicides have been used on GAFB to maintain the proper control of pest infestations and ground foiliage, respectively. At one time a 55 gallon spill of concentrated Lindane occurred. The pesticide and herbicide areas are discussed in the Appendix. Table 4.4 presents an overview of pesticide-and-herbicide-related wastes on GAFB and their sources.

Radioactive Wastes Sources: Buildings 510, 774, 123, 101, Depot 2, and Others

Several radioactive sources exist on base, ranging from a hospital night-vision tester and various research devices to storage shelves holding old electron tubes. Several of these sources hold government permits; others do not require them. Most of them are low-activity sources. The only potentially significant concentration is a radioactive material burial site located along Three Mile Creek. It is here that a number of old tubes were placed in a concrete vault and buried, collectively becoming a significant source. EPA testing has shown that

TABLE 4.1

INDUSTRIAL OPERATIONS REVIEWED

SHOP	HANDLE HAZARDOUS MATERIAL	POTENTIAL PROBLEM
416th AMS		
Auto Pilot/Instrument Shop	X	
Bomb/Nav Shop	X	
Comm/Nav Shop		
Doppler Shop		
ECM Shop		
Fire Control Shop	X	
PMEL	X	
416th CES		
Equipment Maintenance	X	
Carpenter Shop	X	X
Power Production	X	X
Demineralizer, Bldg. 778	X	X
Refrigeration/Heating Shops	X	X
Protective coating (Paint Shop)	X	
Welding Shop	X	
Steam Plant	X	X
416th CSG		
Auto Hobby Shop	X	
Reproduction	X	
Firing Range	X	
Wood Hobby Shop		
49th FIS		
AGE (Consolidated, Pwr & Non-Pwr)	X	
Egress Shop	X	
Jet Engine Shop (Consolidated)	X	X
Integrated Systems Shop		
Paint Shop	X	
Welding Shop	X	
416th FMS		
Powered AGE	X	X
Corrosion Control Shop	X	
Electric Shop		

SHOP	HANDLE HAZARDOUS MATERIAL	POTENTIAL PROBLEM
416th FMS (Cont'd)		
Jet Engine Test Cell	X	X
Environmental System	X	X
Fuel Cell Repair	X	
Hydrostatic Shop	X	X
Machine Shop	X	
Non-Destructive Inspection (NDI)	X	X
Pattern/Woodworking Shop	X	
Battery Shop	X	X
Pneudraulics Shop	X	X
Plastic/Fiber Glass Shop	X	X
Plating Shop	X	X
Propulsion Bearing Shop	X	X
Structural Repair Shop		
Survival Equipment Shop	X	X
Welding Shop	X	
Wheel & Tire Bearing Shop	X	X
416th MMS		
SRAM Maintenance Shop	X	X
Conventinal Munitions Maintenance	X	
Equipment Repair	X	
ALCM Maintenance	X	
416th Trans		
Allied Trades Shop	X	
Battery Shop/Dynamometer		
Vehicle Maintenance	X	X
Packing and Crating		
Paint Shop	X	
Welding Shop	X	
Tanker Repair/Refueling Maintenance	X	X

TABLE 4.2

INDUSTRIAL OPERATIONS (SHOPS) GENERATING HAZARDOUS WASTE

Name	Location (Bldg. #)	Waste Material	Quantity Utilized (1900)	Disposal Method* Past	Current
Machine Fabrication	3	-lacquer thinner	<1 gal/day	SAN/DRY	SAN/DRY
		-paint	<1 gal/day	SAN/DRY	SAN/DRY
Battery Shop	101	-KOH with metal ions from serviced batt.	<1 gal/day	SAN	SAN
		-Batteries	occasional	DPDO	DPDO
Engine Shop	101	-Oily Rags	varies	LAN	REF
		-Speedi-dry	varies	LAN	REF
		-Excess Oil, Fuel, fluids	10-20 gal/day	LAN	WOC
Environmental Systems	101	-Waste oils and fuel	varies	LAN/FIR	WOC/FIR
Hydrostatics	101	-Empty Cans of Bromochloro-methane	varies	EMP	EMP
Plastic Shop	101	-Plastic Dust	varies	LAN	REF
		-Waste Solvents	<2 gal/day)	LAN	DPDO
		-Hardened and waste resin	varies	LAN	REF
Plating Shop	101	-Plated-item washdown	<20 gal/day	STM	SAN
		-Plating bath solution	occasional	DPDO	DPDO
		-Plating bath settled solids	10 gal/yr	DPDO	DPDO
Foundrality Shop	101	-Trichloroethylene	<1 gal/day	SAN	DPDO
		-Methyl Ethyl Ketone (MEK)	<1 gal/day	SAN	DPDO
		-Toluene	<1 gal/day	SAN	DPDO
		-Contaminated Rags	varies	LAN	REF
Propulsion Shop	101	-degreasers, solvents, cleaners	1-3 gal/day	LAN	DPDO
		-Speedi-dry	varies	LAN	REF
Wheel and Tire	101	-degreasers, alcohol	<1 gal/day	LAN	DPDO
		-oily rags	varies	LAN	REF

*Key to Disposal Method:

DPDO = Consigned to DPDO for disposal
DRY = Dry well
EMP = Taken home by employees
FIR = Used for Fire Control Training
LAN = Landfill
REF = Picked up by non-hazardous refuse contractor
RPC = Consigned to RPC for disposal
SAN = Sanitary sewer system
SEP = Oil/water
STM = Storm sewer system
WOC = Waste oil contractor

TABLE 4.2 (CONTINUED)

Shop Name	Location (Bldg. #)	Waste Material	Quantity Utilized (1980)	Disposal Method* Past	Current
Steam Plant	117	-Soot from firebox	1 truckload/yr	LAN	REF
		-Boiler Blowdown and Ion exchange rinse	<50,000 gal/yr	DRY/SAN	DRY/SAN
		-Floor Hosedown	occasion	STM	STM
		-Asbestos Insulation	10 bags/yr	LAN	LAN
		-Oil from separator	varies	LAN	WOC
		-Water from separator	varies	STM	STM
Survival Equipment	212	-MEK and Toluene contaminated rags	varies	LAN	REF
Tanker Repair	214-6	-Waste fuel	varies	LAN	WOC
		-Vehicle washdown	varies	SEP	SEP
Electric Power Prod.	219	-Greases, alcohols, solvents	<1 gal/day	LAN	DPDO
		-Battery acid (neutralized)	<1 gal/day	DRY	DRY
		-Antifreeze	<1 gal/day	DRY	DRY
Vehicle Maintenance	255	-Oil, cleaners, solvents	<5 gal/day	DRY	DRY
		-Floor washdown	occasional	SAN	SAN
Heating Shop	301	-Asbestos pipe insulation	uncertain	LAN	REF
Carpenter Shop	334	-Asphalt Coatings, cements	<1 gal/day	LAN	REF
Demineralizer	770	-Ion exchange Recharge effluent	1000 gal/mo.	SAN	SAN
Aerospace Ground Equipment Shop	786	-Oil, solvents, fuel	<5 gal/day	LAN	DPDO
		-Equipment washdown	varies	SEP/STM	SEP/STM
Engine Test Cell	796	-Speedi-dry	varies	LAN	REF
		-hosedown effluent	varies	STM	STM
SRAM (Short Range Attack Missile)	829	-contaminated rags	varies	LAN	REF

*Key to Disposal Method:

DPDO = Consigned to DPDO for disposal
DRY = Dry well
EMP = Taken home by employees
FIR = Used for Fire Control Training
LAN = Landfill
REF = Picked up by non-hazardous refuse contractor
RPC = Consigned to RPC for disposal
SAN = Sanitary sewer system
SEP = Oil/water separator
STM = Storm sewer system
WOC = Waste oil contractor

TABLE 4.3

RESEARCH AND DEVELOPMENT LABS

Lab Name	Location (Bldg. #)	Waste Material	Quantity Utilized (1980)	Disposal Method* Past	Current
Etching, Rm 90	3	-Acids with metal ions	<1 gal/day	DRY	DRY
		-solidified sludge residue	<1 lb/day	LAN	REF
Lab, Rm 91	3	-Acid and bases with metal ions	1 gal/day	DRY	DRY
Lab, Rm 64	3	-Solvent, acids, bases	1-5 gal/day	DRY	DRY
		-Methanol, acetone, -Trichloroethylene	<1 gal/day	DRY	DPDO
Photo	various	-Developers, Fixers	3 gal/day	SAN	SAN
NDI Lab	101	-Photo lab solutions	<2 gal/day	SAN	SAN
		-Solvents	<1 gal/day	SAN	SAN
		-Toxic Dye Penetrants and Soaps	<1 gal/day	SAN	DPDO
RADC	106	-Etching and photo lab solutions	2-4 gal/day	SAN	SAN
High Power Lab	112	-Polychlorinated Biphenyl (PCB)-contaminated oil	varies	SUR	SUR
Supply fuels	223	-Excess contaminated fuel	<1 gal/day	LAN	WOC
Hospital & Dental X-Ray	510	-Spent developer and fixer	<2 gal/day	SAN	SAN
Hospital Clinical Lab	510	-Hexachlorophene	<1 gal/day	SAN	SAN
		-Formaldehyde	<1 gal/day	SAN	SAN

*Key to Disposal Method:
DPDO = Consigned to DPDO for disposal
DRY = Dry well
LAN = Landfill
REF = Picked up by non-hazardous refuse contractor
SAN = Sanitary sewer system
SUR = Surface Runoff
WOC = Waste oil contractor

TABLE 4.4

PESTICIDES AND HERBICIDES WASTE GENERATION

Shop Name	Location (Bldg. #)	Waste Material	Quantity Of Waste (1980)	Disposal Method* Past	Current
Pesticides					
Entomology Shop	301	-Rinsed Raw-Material Pesticide Containers	varies	LAN	REF
		-Rinse water from containers	varies	DRY	DRY
		-Shower and washer effluent	varies	SAN	SAN
		-Excess Pesticide	2 gal/yr	DRY	DRY
Entomology Storage Shed (now torn down)	near 321	Lindane spill in 1955	<55 gal.	seeped into ground	
(Most buildings have been sprayed with Chlordane pesticide around their ground perimeter. It may still remain in the soil.)					
Herbicides					
Grounds Maintenance	T-9	-Rinsed Raw-Material Herbicide containers	varies	LAN	REF
		-Rinsewater from containers	varies	SAN	SAN
		-Excess herbicide	very small amount	SUR	SAN
Ground Maintenance	Golf Course	-Excess herbicide	very small amount	STM	STM
Forrestport	Annex Site	-92 acre defoliant application area runoff	uncertain	SUR	SUR

*Key to Disposal Method:

DRY = Dry well
LAN = Landfill
REF = Picked up by non-hazardous refuse contractor
SAN = Sanitary sewer system
STM = Storm sewer system
SUR = Surface runoff

even this site, however, is not a problem. Overall, radioactive sources do not pose an environmental problem and are well regulated.

Fire Control Training

The Fire Control Department has been operating a fire training area just east of the north end of the runway. This area serves as a practice burning/extinguishing area, where petroleum product fires are set. The product most utilized is JP-4 jet fuel. When available, waste JP-4 is used. There are no records available regarding the effects of these practices on the site environment. As the area is an open, undeveloped field, some infiltration of the fuel into the ground is certain. Also, infiltration of the extinguishing chemicals into the ground is certain.

Hazardous Waste Storage

Lot 69. This lot has been the interim storage area for some hazardous wastes generated on base. DPDO has authority over these materials, but Civil Engineering has responsibility for maintenance of the area. There are no current arrangements to remove or dispose of the material. The major hazard in this area is that of a spill. In the past, some small quantities have spilled onto the ground. The drums are unprotected from rain and sun so that some rusting has ensued. Although the drums are raised above ground on pallets and the area is fairly well diked, the potential exists for spillage infiltrating into the ground. The lot is not fenced and surveillance and/or warning signs are not present.

Drummed Hazardous Waste Holding Area, Building 101. Drums of hazardous material (including waste oil) which are to be picked up, relocated or emptied (as with waste oil) by an off-site contractor are stored in this outside, caged area behind Building 101. Drums are grounded and supported a few inches above ground. An overhead covering minimizes direct contact with rainfall. No spill provisions (curbs or dikes) were apparent around the cage. The surrounding open area is level concrete for at least 200 feet in any direction. No spills have occurred from this area in the past.

Fuels Management

Several types of liquid fuel are currently in use at Griffiss AFB. The largest of these, by volume used, is jet aircraft fuel (JP-4) at about one million gallons per month. Others include No.2 heating oil

(FS-2), No.6 fuel oil (FS-6), diesel fuel (DF-1) automotive gasoline, leaded and unleaded (MOGAS), and aviation gasoline (AVGAS). Information on Fuels Management above and beyond that given below is provided in Appendix D.

Waste and Recoverable Petroleum Products. Used or contaminated petroleum products are either filtered for reuse or disposed of by private contractors. The only exception is the occasional use of contaminated JP-4 in fire training (only JP-4 is used in fire training - no oils or heavy petroleum products are used). Contaminated or suspect JP-4 recovered from spills, defueling, or other operations is collected in one of the 25,000 gallon tanks in Tank Farm No. 2 where it is held for testing. If the POL laboratory has determined that the JP-4 can re-enter the system, the tank is emptied into tank trucks which take the fuel to the bulk storage area near the barge canal. Cleanup of reusable JP-4 consists of filtering it through bowsers as it proceeds through the system. The waste filter material is dried, bagged and disposed of with non-hazardous trash.

Waste oil, lubricants and hydraulic fluids are collected near their generation points in small (1000 gallons or less) tanks. Waste oils are also collected in one of the 25,000 gallon tanks in Farm No. 2, presumably from trucks. A private contractor comes on base about every other month and pumps out the storage tanks if they are sufficiently full. Records indicate the following amounts of waste oil/fuel removed:

April 1980 -	2350 gal
June 1980 -	2545 gal
August 1980 -	2800 gal
September 1980 -	2020 gal
December 1980 -	2000 gal
February 1981 -	2530 gal
March 1981 -	1350 gal

Generally these materials are collected from oil separators and 55 gallon drums.

The present contractor for waste oils disposal is Williamtown Irrigation, Williamstown, New York. This contract was initated in July, 1979 and will expire in August, 1981. Previous contracts for waste oil disposal are as follows:

Oldover Corp. P. O. Box 2 Saugerties, NY 12477	July 78 - June 79
Berks Associates, Inc. P. O. Box 305 Douglasville, PA 19518	July 77 - June 78
Norco P. O. Box 338 Bayonne, NY 07002	July 76 - June 77
Berks Associates	August 75 - June 76

The waste oil contractor does not accept solvents (TCE, degreasers, paint thinners, etc.); however, there is inadequate control over what is placed into the waste oil drums.

Fuel and Oil Spills. Spills occurring on base are categorized as class I, class II, or class III spills, depending on the volume spilled and area covered. Class I spills are those which cover less than two feet in any planar direction; these are generally controlled by the agency responsible for the spill. Cleanup generally consists of applying sorbent material which is to be kept on hand by all potential spillers.

A class II spill is anything larger than a class I spill but not exceeding 10 feet in any planar direction, less than 50 square feet total coverage, and of a non-continuing nature. Immediate response by the local agency is to be followed by notification of the fire department who assists, if required, in any cleanup. Class III spills are any which exceed the definitions of a class II spill. These require full report to command authority off base and are therefore considered severe. Based upon records from the last year and discussions with fire department personnel, the average frequency of a class III spill is about once every month.

The sorbent material which is used to clean up the majority of spills is called "oil sorbent" type 100, roll type, and is manufactured by 3M Company. It can be rolled out to cover small spills or it can be applied as a dike to prevent the spreading of spilled liquids. For hydraulic fluids and perhaps fuel oil spills (based upon cleanup method documented for one such spill), a material "speedi dry" is used. For class II and III spills civil engineering has the responsibility for collecting the used sorbent material which is treated as a hazardous

waste. It is drummed and moved to the hazardous waste storage area (Lot 69). The fire department has experimented with the possibility of burning the waste sorbent in the past.

The spills logged during 1980 and the first three months of 1981 total approximately 100 (60 class I, 30 class II and 10 class III). The spills are not isolated to flightline/fueling operations, although most significant spills occur there.

DESCRIPTION OF DISPOSAL METHODS

On-Site Disposal Facilities

The on-site facilities which have been used for management and disposal of hazardous wastes can be categorized as follows:

- -Landfills
- -Gravity Separators
- -Storm Sewer Systems
- -Dry Wells
- -Septic Tanks

These types of hazardous waste management facilities (HWMF) are discussed individually in the following sub-sections.

Landfills. On-site landfills have been used for disposal of solid hazardous and non-hazardous wastes at GAFB. Flyash from the base steam plant has been a major component of the fill material. Landfilling has been done at a total of seven separate locations on the base. A summary of pertinent information concerning each landfill is given in Table 4.5. The landfills are discussed individually below.

Landfill No. 1 is situated in the northeastern portion of Griffiss GAFB, encompassing approximately 22 acres (Figure 4.2). Figure 4.3 shows the approximate site boundaries of the landfill and the approximate configuration of the cells. Prior to its use as a landfill, a gravel quarry was located on the site. The landfill began operations in 1960 and closed in 1973. In 1973, debris from a fire in the base commissary was buried near the intersection of the entrance road and Six Mile Creek.

All landfilling was accomplished by trench and cover, with the exception of some hardfill and steam plant boiler ash which was dumped and

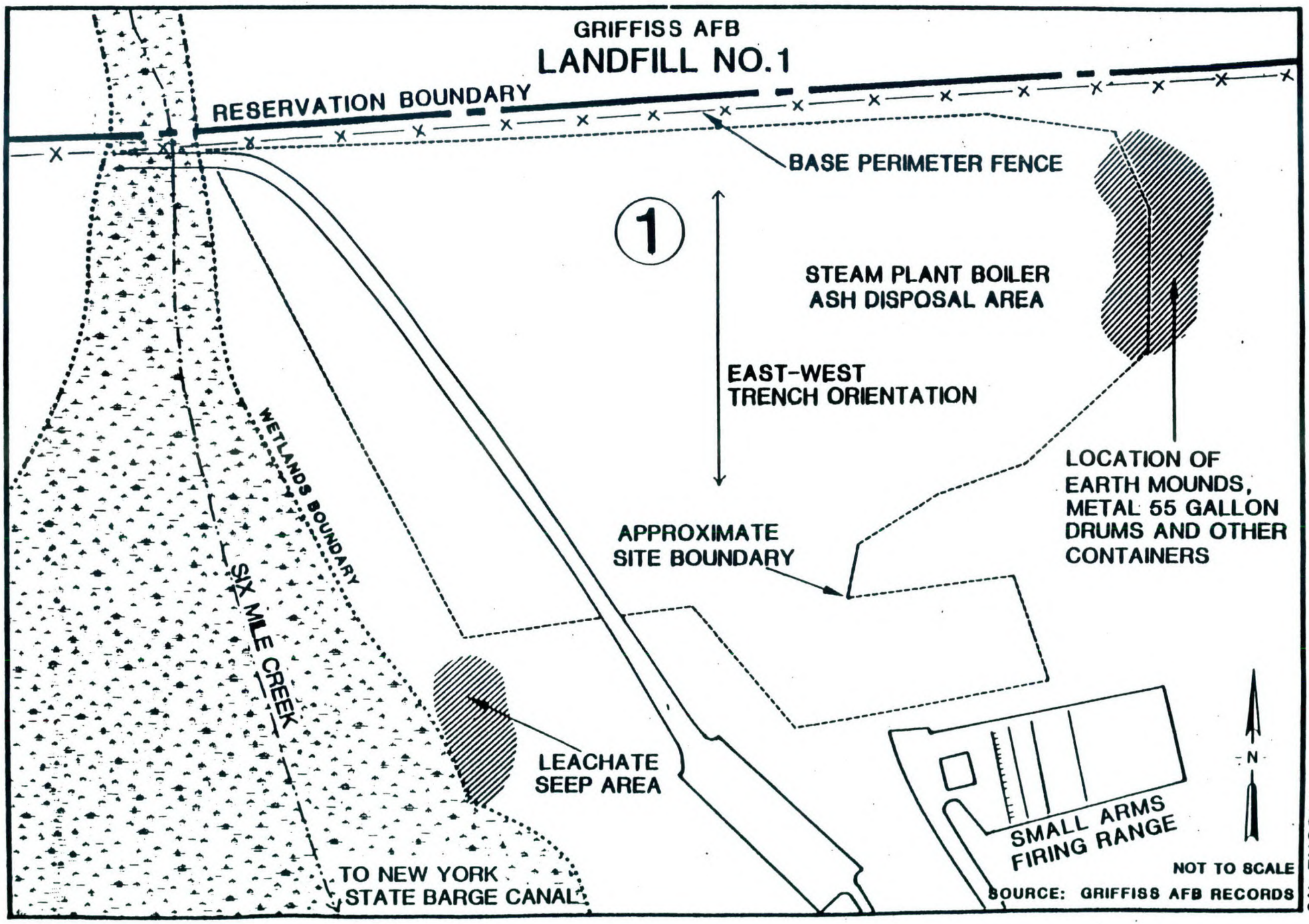

GRIFFISS AFB
LANDFILL NO.1
RESERVATION BOUNDARY
BASE PERIMETER FENCE
1
STEAM PLANT BOILER
ASH DISPOSAL AREA
EAST-WEST
TRENCH ORIENTATION
LOCATION OF
EARTH MOUNDS,
METAL 55 GALLON
DRUMS AND OTHER
CONTAINERS
APPROXIMATE
SITE BOUNDARY
WETLANDS BOUNDARY
SIX MILE CREEK
LEACHATE
SEEP AREA
SMALL ARMS
FIRING RANGE
N
TO NEW YORK
STATE BARGE CANAL
NOT TO SCALE
SOURCE: GRIFFISS AFB RECORDS

FIGURE 4.3

spread on the eastern edge of the trenches. Early cells were constructed in an east-west orientation 40 to 50 feet wide by 300 to 500 feet long. Depth of waste was 15 to 18 feet. During construction of the 2nd and 3rd trenches from the north, ground water was encountered and pumped to Six Mile Creek. A later trench was started in a north-south orientation through the east end of the earlier trenches, but was abandonned. Waste ash from the steam plant was used during one period as a cover material for the solid wastes.

Most of Landfill No. 1 appears to be graded to drain to a low area to the east, and then on to Six Mile Creek. The western portion of the site drains directly to Six Mile Creek about three miles upstream from its confluence with the New York State Barge Canal and Mohawk River. The site is at an elevation of about 540 ft. MSL. An inspection of the site indicates that it has been constructed in the relatively coarse-grained Pleistocene glacial deposits.

Leachate seeps are evident along the northeast bank of Six Mile Creek. These seeps appear to be coming from Landfill No. 1. An experimental treatment scheme consisting of two rock dikes (about two feet high) was constructed in an attempt to aerate and impound a small segment of Six Mile Creek, and potentially reduce some of the organic loading induced by the leachate flows. The leachate flow has become channelized near its interception by Six Mile Creek. At the time of observation the leachate contaminated flow to the creek was estimated to be 3 to 5 gpm. The EPA estimated this flow to be about 7 gpm.

Solid waste from Landfill No. 1 is visible in the drainage ditches of the road leading to the firing range. These wastes have been uncovered by road construction over the last solid waste cell and subsequent soil erosion due to runoff. There is also evidence of mounds of soil and waste on the eastern edge of the landfill. From many of these mounds unlabeled metal 55 gallon drums are exposed. The remains of decomposed cardboard drums are also visible. Other areas of the landfill are well vegetated in grass and much of the area has been reforested with red pine, white spruce, scotch pine, American cedar, larch, black walnut and evergreen vegetation.

Landfill No. 2 is situated in the eastern-most region of the base as shown in Figure 4.2. The boundaries of this 60-acre site are shown

on Figure 4.4. The lower or southern portion was operated as a location for hardfill disposal by an area method and other solid waste disposal by trench and cover method. The upper or northern portion of the landfill was operated in a trench and cover mode and was the last active disposal site on base. While major filling operations ceased in October 1980, one trench located in the southeastern-most extremity of the northern portion of the site has remained open to receive on board waste from overseas aircraft.

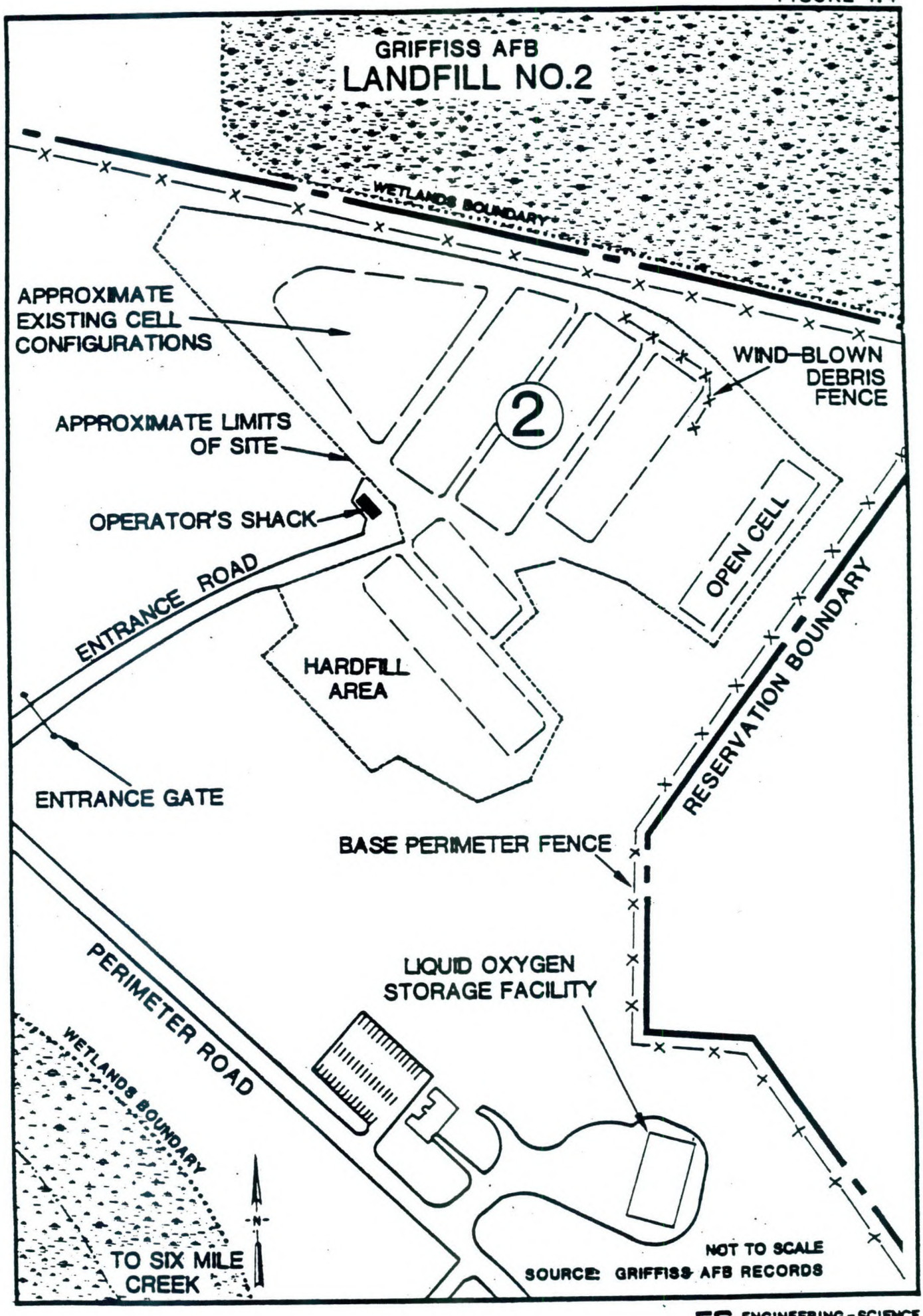
Part of the upper site is graded to drain to the northeast toward a tributary of Slate Creek which in turn drains to Six Mile Creek. The remainder of the upper site and the lower site drain to Six Mile Creek about one mile from its confluence with the New York State Barge Canal and Mohawk River.

At the time of the site visit, closure of the landfill was not complete. Some surface grading had been done; however, a number of stagnant ponded areas of discolored water were in evidence. During rainfall events this water would likely overflow to surrounding waterways, and during dry periods, these ponded waters would both percolate into the waste deposits or evaporate. No vegetative stabilization of the landfill has occurred.

A permanent wire mesh fence about 25 feet high by 150 feet long has been installed in the northeast area of the landfill as a wind blown refuse stop. While the fence may have been partially effective, some wind blown refuse paper and plastic could be seen on the edge of the surrounding woods. It is understood that during operation of this landfill, portable fences about six feet high surrounded the disposal areas. Security at the landfill consists of a gate across the entrance road and a three foot high perimeter security fence that borders the site on the southeast and north sides.

Landfill No. 3 is located within the limits of Landfill No. 2 as shown on Figure 4.5. Landfill No. 3 operated as a disposal area for asbestos wastes beginning operations in 1980 and received these wastes on an intermittent basis. Asbestos waste has been generated primarily from demolition and repair of asbestos insulated piping. The asbestos has been wetted, double bagged and hauled to the disposal area where pits were dug to about 8 feet deep in the approximate location shown on

FIGURE 4.4



ES ENGINEERING-SCIENCE

FIGURE 4.5

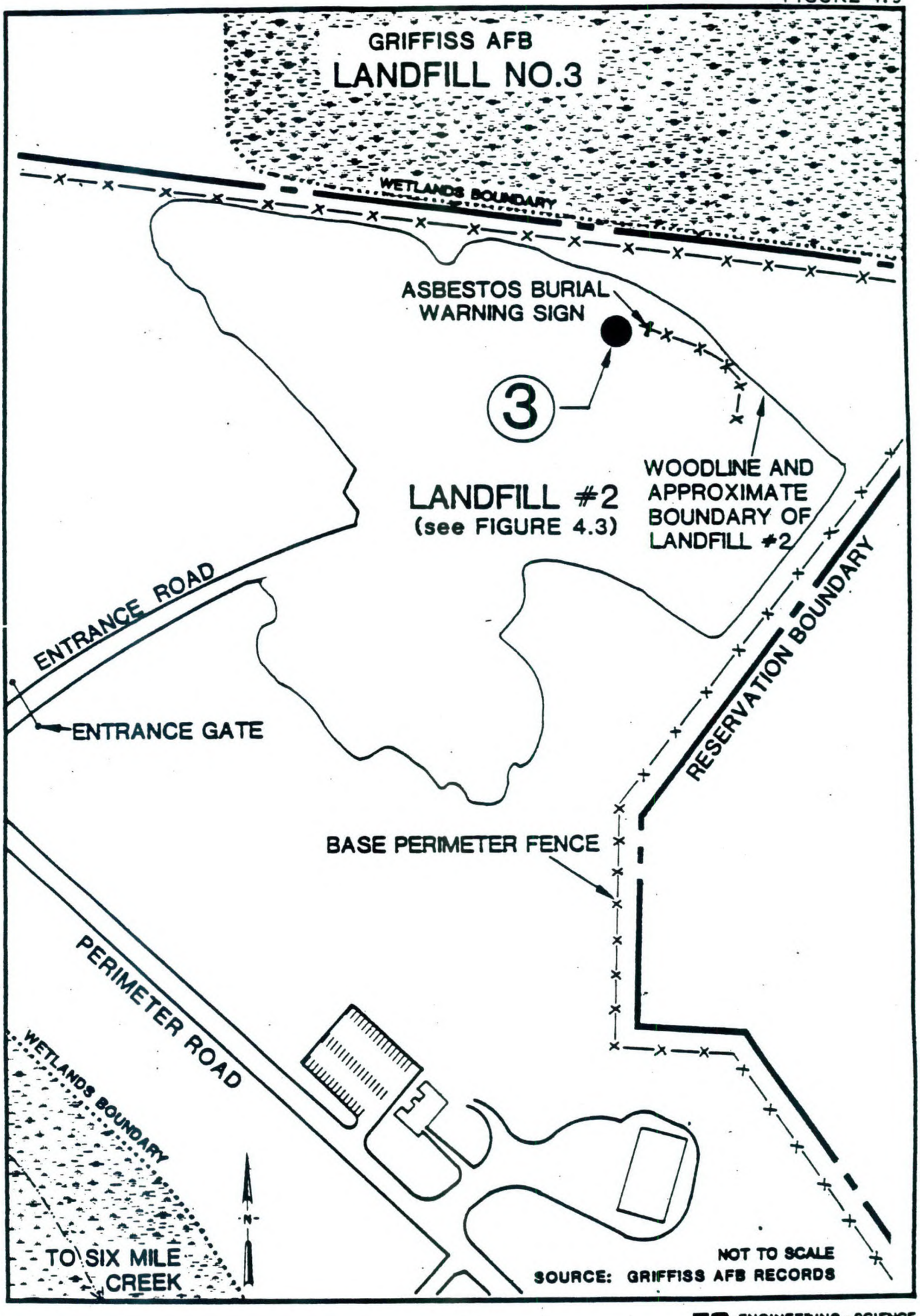

GRIFFISS AFB
LANDFILL NO.3
WETLANDS BOUNDARY
ASBESTOS BURIAL WARNING SIGN
3
LANDFILL #2
(see FIGURE 4.3)
WOODLINE AND APPROXIMATE BOUNDARY OF LANDFILL #2
ENTRANCE ROAD
ENTRANCE GATE
RESERVATION BOUNDARY
BASE PERIMETER FENCE
PERIMETER ROAD
WETLANDS BOUNDARY
TO SIX MILE CREEK
N
NOT TO SCALE
SOURCE: GRIFFISS AFB RECORDS

Figure 4.5. Security for the site is the same as that for Landfill No. 2. A warning sign in the vicinity of the disposal area physically identifies the location. All asbestos wastes were said to be buried within 25 feet of the sign. It has been estimated that one ton of asbestos is located in Landfill No. 3. There are no visible surface features other than the sign to indicate the location or extent of the asbestos burial area. This method of asbestos disposal has been approved by the State of New York, the EPA and Air Force regulations.

The location of Landfill No. 4 is shown in Figure 4.6. This landfill was used in the mid 1950's for disposal of low level radioactivity vacuum tubes. One person indicated that acid waste had been disposed of near this site. The site was initially an open vertical pipe four feet in diameter which was filled with concrete in 1977. The site drains 600 feet to Three Mile Creek which in turn flows another 4000 feet to the New York State Barge Canal. Tests of the air above the site indicate no radioactivity escape. There has been no ground water sampling for radioactivity in the area. A posted sign indicates a radioactive waste disposal site.

Landfill No. 5 is situated on about four acres near the intersection of Patrick Square Road and Perimeter Road (Figure 4.7). Patrick Square Road and an unnamed dirt access road border the site to the north and east, respectively. The landfill operated for about a year following the abandonment of Landfill No. 6 in 1959. The southern part of the site was constructed in the Three Mile Creek designated wetland area, and the site drains south to Three Mile Creek near its confluence with the New York State Barge Canal.

The landfill was constructed using an area type method to a total depth of about six feet. Wastes hauled to the site were burned at the landfill and then covered. A number of persons interviewed recalled underground fires that were difficult to extinguish. The site is now well vegetated in grass and small hardwoods, and to the southwest, the area is heavily wooded in medium to large hardwoods.

Landfill No. 6 is located on about eight acres between Perimeter Road and Three Mile Creek as shown on Figure 4.7. The landfill operated from 1955 until 1959, receiving hardfill (construction/demolition debris, wooden pallets, etc.) as well as municipal solid wastes (MSW)

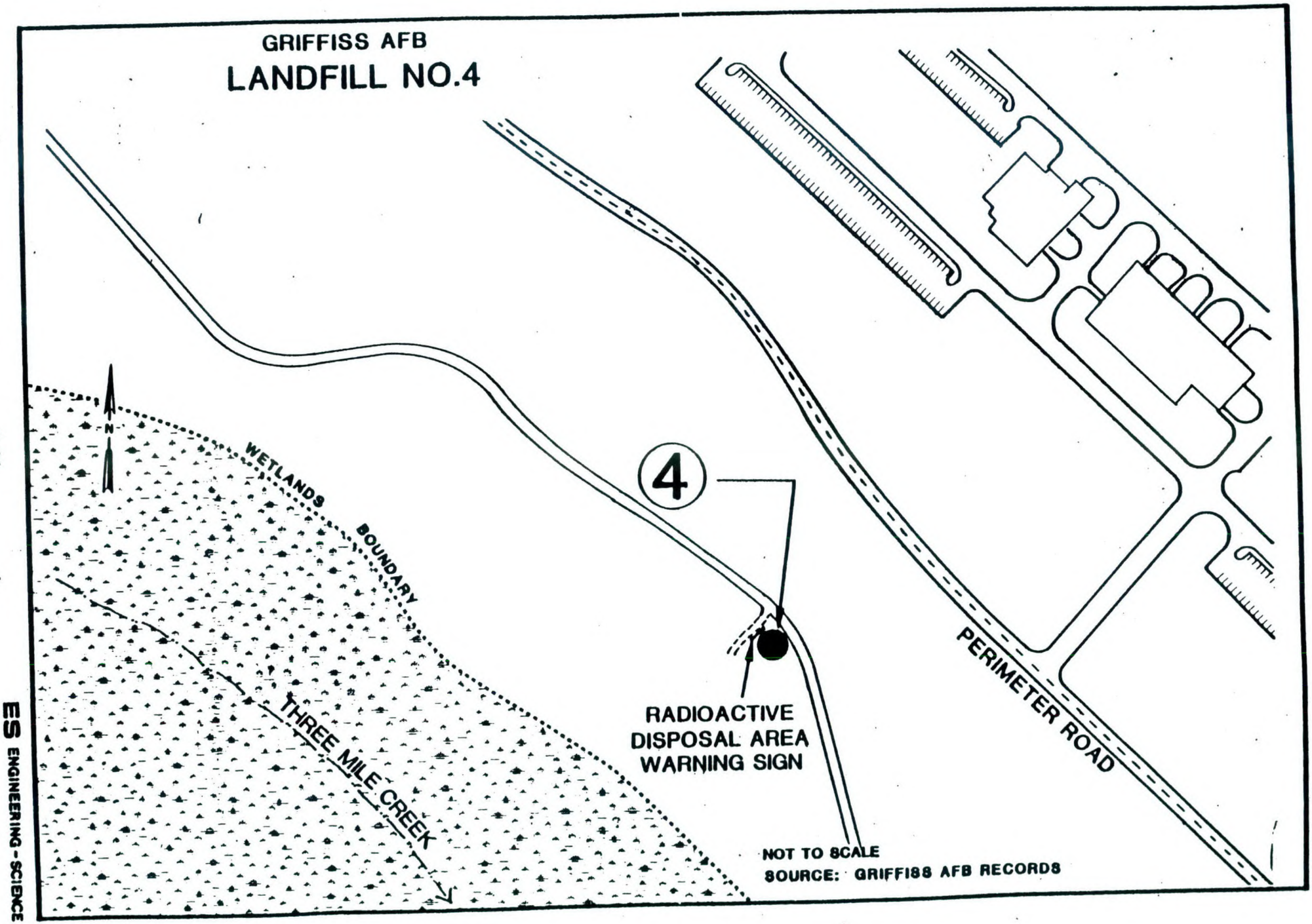
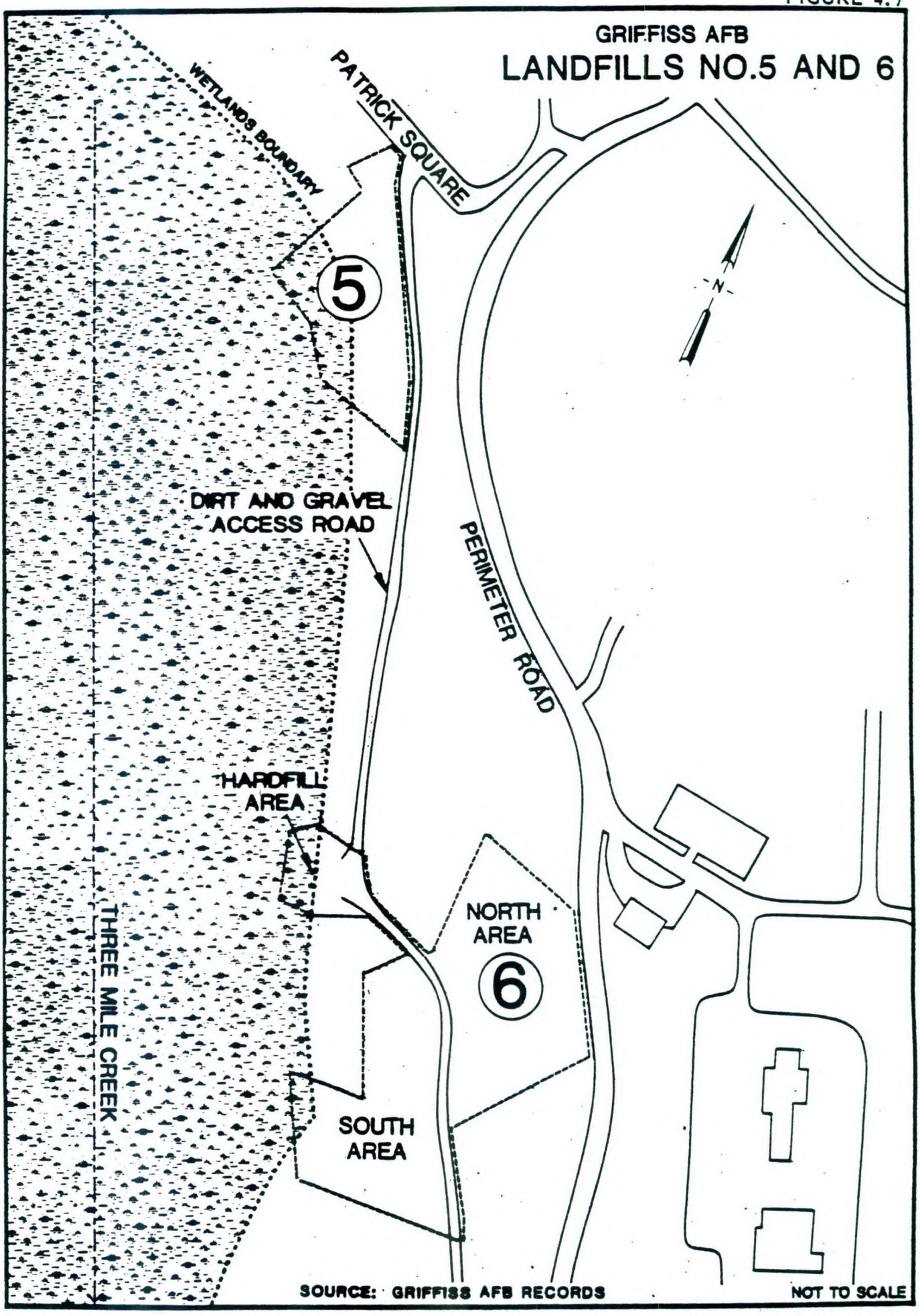

GRIFFISS AFB
LANDFILL NO.4
N
WETLANDS BOUNDARY
THREE MILE CREEK
4
RADIOACTIVE
DISPOSAL AREA
WARNING SIGN
PERIMETER ROAD
NOT TO SCALE
SOURCE: GRIFFISS AFB RECORDS

FIGURE 4.6

FIGURE 4.7



ES ENGINEERING-SCIENCE

and other base wastes. Hardfill was placed in a designated hardfill area on the western extremity of the site. The remaining area is physically divided by a dirt and gravel access road into a north area and a south area. The north area was constructed on a hillside with a ten percent slope, and wastes were dumped at the top of the hill and burned on the hillside. The thickeness of waste and burned residue on the hillside was estimated by one person to be five to ten feet. This area is now well vegetated with grass and small conifers and there is no visible evidence of leachate.

The south area lies on the opposite side of the dirt access road from the north area. Disposal in this area was accomplished by spreading wastes to an average depth of four feet and then covering. This area is flat and now stabilized in grass although the surface of the fill area has some small local depressions. The edge of the fill on the south side slopes down to the Three Mile Creek wetland area as designated on the "Base Comprehensive Plan."

Landfill No. 7 is located on about 4.5 acres to the east of the public runway observation point (Figure 4.8). This landfill was the first operated at Griffiss, opening in 1950 and closing in 1954. The landfill was operated using a trenching method with approximately four 20-foot deep trenches cut 50 to 60 feet wide and about 400 feet long, running parallel to the main runway. Waste collection vehicles entered the trenches alternately from one end and then the other from one day to the next. On any given day, one end of the trench would be in a waste burning phase while the other would be in a receiving phase. Persons interviewed recall liquid wastes being occasionally disposed of in the trenches. Liquids were buried in small pits dug in the bottom of the trenches.

When the landfill was closed, the area was vegetated with a thick grass cover. The surface now has numerous depressions and burrowing animal holes. Around the entrances to the burrows is evidence of charred wood and ashes apparently displaced from the waste material below. The site drains to a low area to the southeast which drains to Six Mile Creek. There was no evidence of leachate along the toe of fill, or surface ponding on the landfill cover. No fence, gates, signs or markers exist to indicate the location or extent of the landfill.

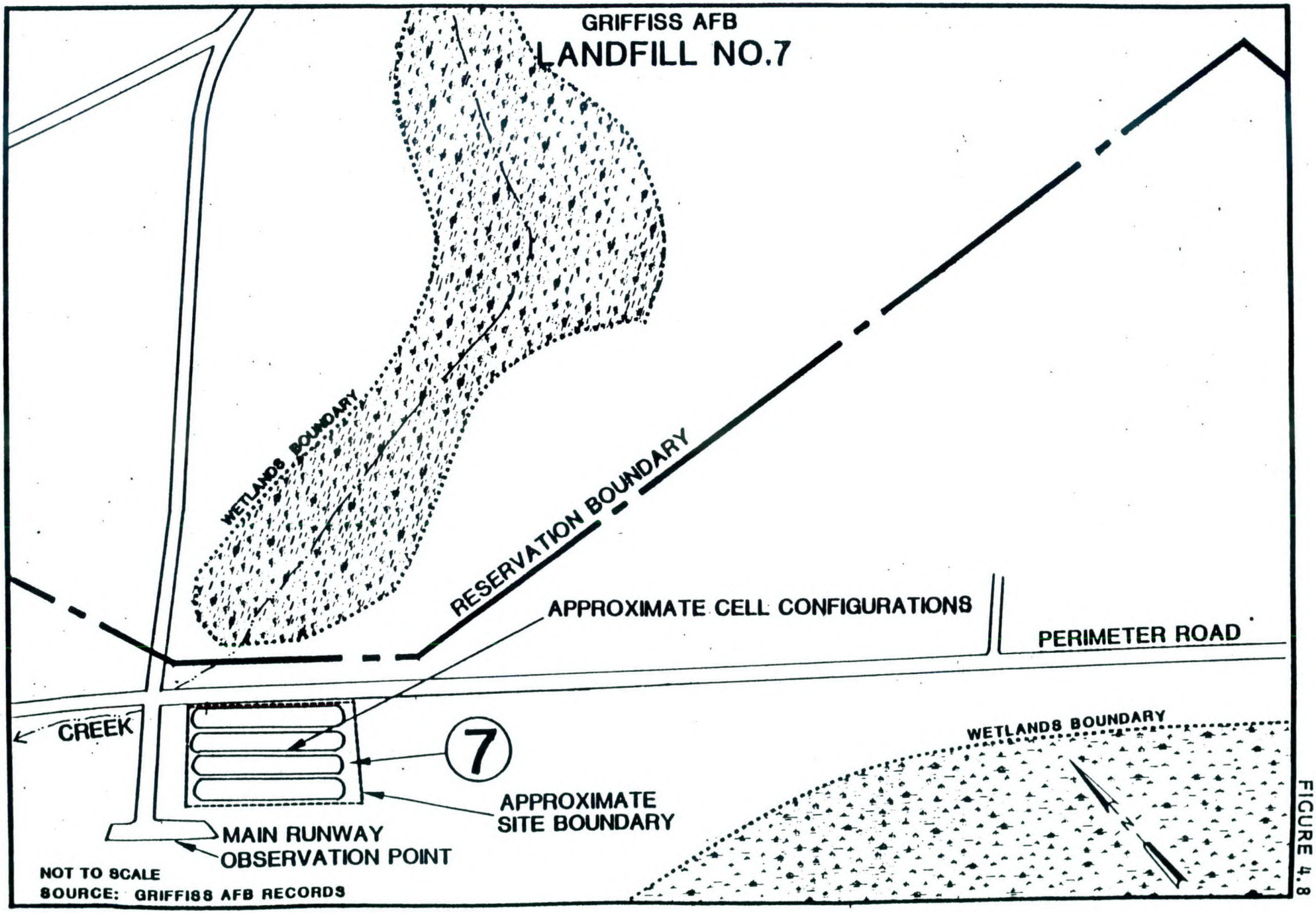

GRIFFISS AFB
LANDFILL NO.7
WETLANDS BOUNDARY
RESERVATION BOUNDARY
APPROXIMATE CELL CONFIGURATIONS
PERIMETER ROAD
CREEK
7
APPROXIMATE
SITE BOUNDARY
MAIN RUNWAY
OBSERVATION POINT
WETLANDS BOUNDARY
NOT TO SCALE
SOURCE: GRIFFISS AFB RECORDS

FIGURE 4.8

Industrial Waste Treatment Facilities. Holding tanks are utilized at various locations on the base for gravity separation of oil/water and fuel/water mixtures. The locations of the gravity separators are identified on Figure 4.9 and information related to these units is summarized in Table 4.6. The liquid wastes collected in these gravity separators are disposed of off site by a waste oil disposal contractor.

Storm Sewer System. Figure 4.10 indicates the general drainage areas and approximate discharge points of the Griffiss storm sewer system. Most of the runoff from GAFB ultimately discharges to the New York State Barge Canal (the Erie Canal) either directly or through the Mohawk River, Six-Mile Creek, Three-Mile Creek or the City of Rome storm sewer. Runoff from the Wood Haven housing area, however, is directed to dry wells where it infiltrates to the subsurface water system. The storm sewer system has received effluent from some of the Base's gravity separation units and runoff from areas where hazardous material spills have occurred in the past.

Dry Wells. Figure 4.11 shows the location of a number of direct-disposal dry wells located in the industrial shop area. These wells are stone and gravel filled pits, roughly three or four feet square and ten feet deep.

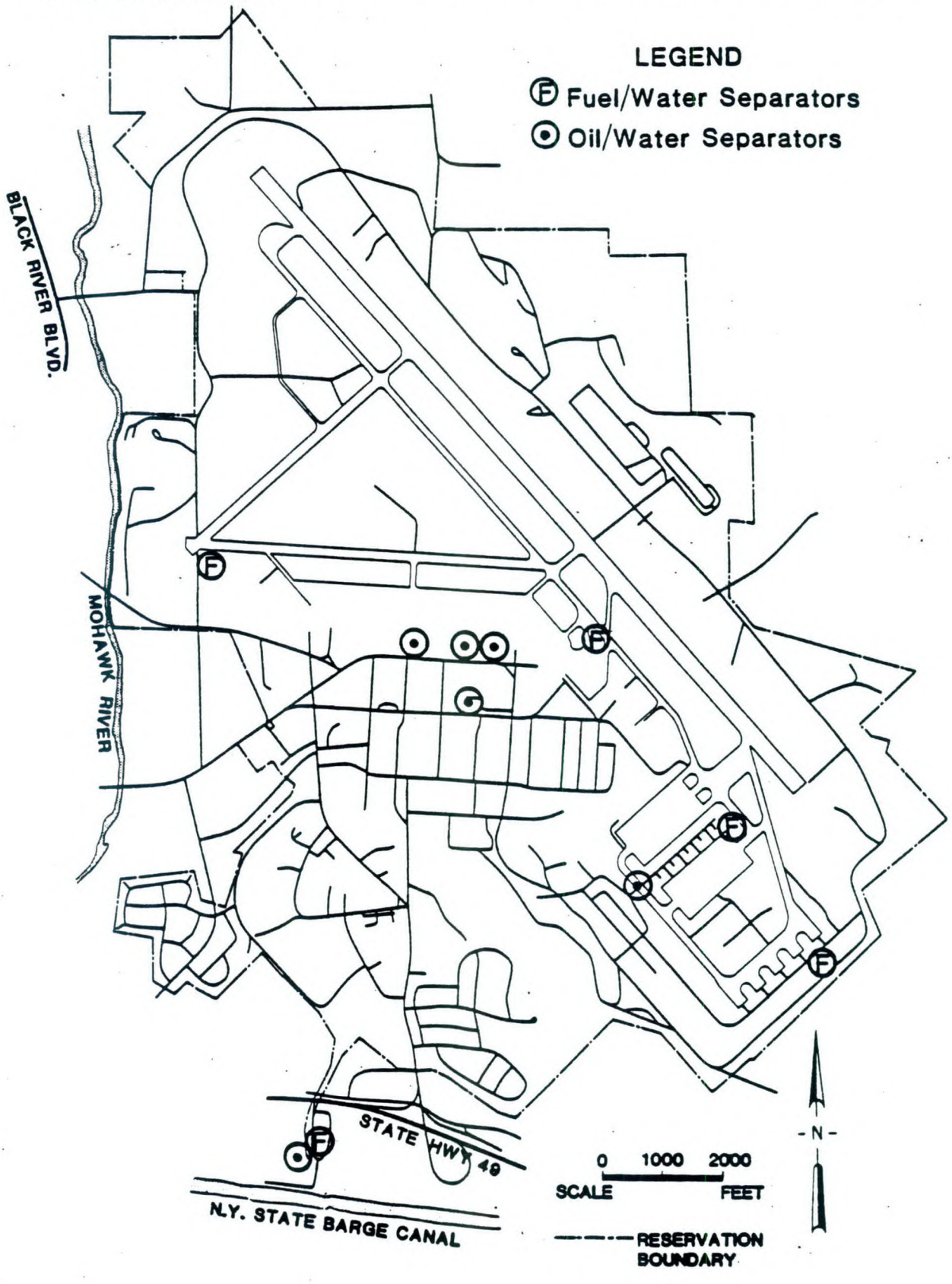
Liquid wastes, some of which are hazardous, have been placed in these dry wells and allowed to infiltrate directly to the ground-water system. Table 4.7 lists the active dry wells and summarizes information concerning the types and amounts of wastes disposed of through them.

Septic Tanks. There are over twenty septic tanks on base, serving facilities which are located too far from sanitary sewer lines to economically justify sewer-service connection. These units, however, are used primarily for disposal of sanitary sewerage.

"Yellow Submarine" Holding Tank. Plating and stripping rinses and wastes flow into floor drains at the plating shop (Bldg. 101). These drains lead to a half-buried holding tank (labeled the "yellow submarine") located just outside this building, near the shop. This tank is internally recirculated and is also fed by six sink drains in the area, thereby providing a dilution effect for the plating shop wastes. The tank effluent flows to the sanitary sewer.

GRIFFISS AFB

FUEL/WATER AND OIL/WATER SEPARATORS



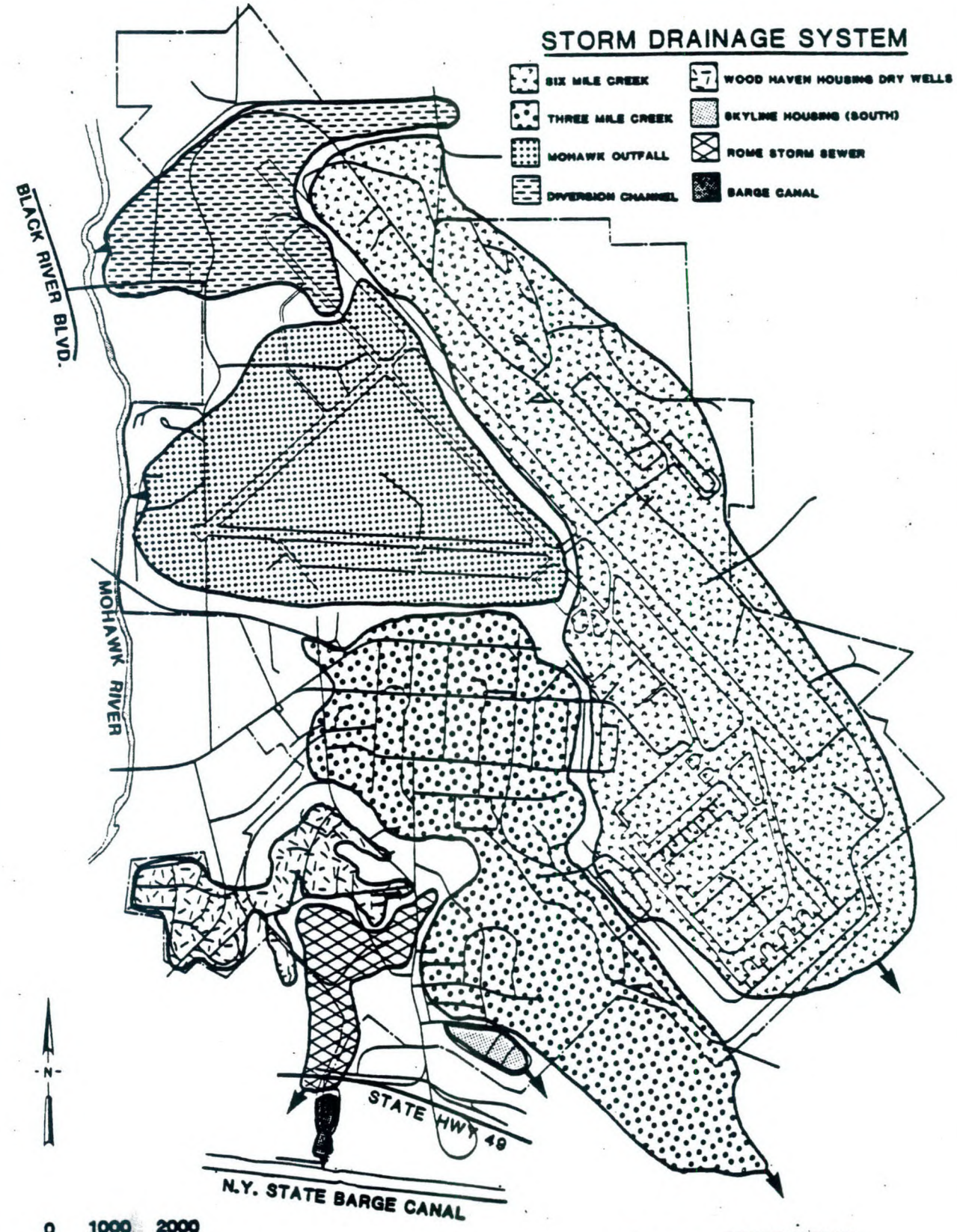
SOURCE: GRIFFISS AFB STORM DRAINAGE AND SANTARY SEWERAGE SYSTEMS, SEPT., 1980

Table 4.6
GAFB GRAVITY SEPARATION TREATMENT UNITS

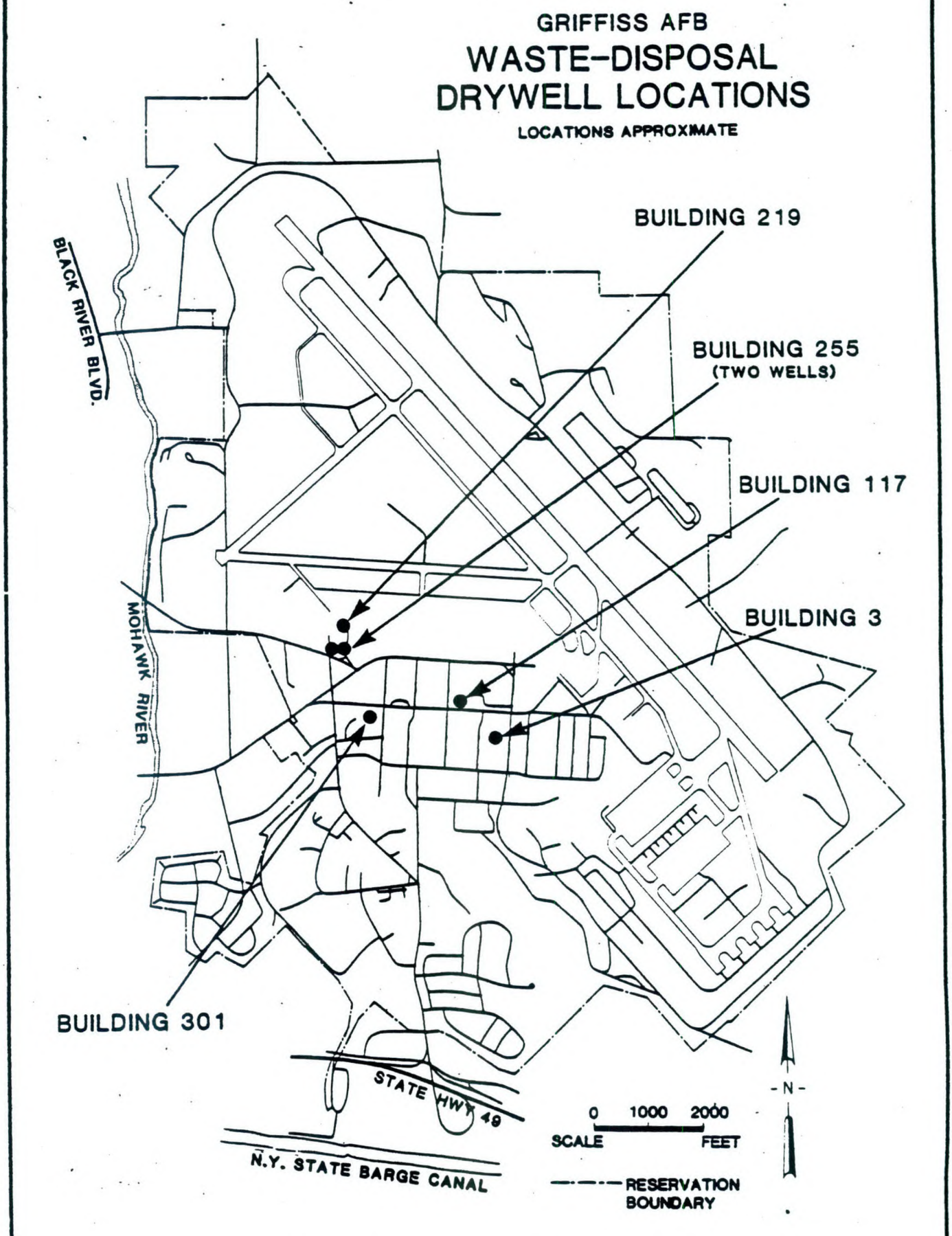
Location	Separator Type	Number of Separators	Influent Source	Discharge Point
Building 101	oil/water	2	Floor washdown from propulsion and engine repair shops.	Sanitary sewer
POL area at Barge Canal	fuel/water	1	Runoff and washdown from diked fuel storage area.	Sanitary sewer
	oil/water	1	Runoff and washdown from truck loading/unloading area.	Storm sewer to Barge Canal
SAC area	oil/water	1	Runoff and washdown from SAC area. Waste fuel from Fuels Laboratory.	Sanitary sewer
Building 100	oil/water	1	Runoff from surrounding area and Building 100 floor washdown.	Sanitary sewer
Steam plant	oil/water	1	Runoff and washdown from fuel oil unloading area. Floor washdown from motor pool, auto hobby shop and BX service station.	Storm sewer
Runway area	fuel/water	4	Runoff from runways.	Storm sewer

GRIFFISS AFB

STORM DRAINAGE PATTERNS



SOURCE: GRIFFISS AFB STORM SEWERAGE SYSTEM, SEPT., 1980



SOURCE: BIO-ENVIRONMENTAL ENGINEER INDUSTRIAL SHOP FILES

TABLE 4.7

GAFB DRY WELL DISPOSAL UNITS

Well Location	Wastes Disposal	Waste Classification*	Estimated Quantity
Building 3	o cleaning solvents	H	1-5 gal/day
	o etching acids and solutions containing metal salts	H	<2 gal/day
	o paint thinner (small amount)	H	<1 gal/day
Building 117	o boiler blowdown	NH	<20 gal/day
	o zeolite ion exchange rinse	NH	<5000 gal/mo
Building 219	o battery acids (neutralized)	H	<1 gal/day
	o electrical power production shop floor wash	PH	<100 gal/mo
	o ethylene glycol (antifreeze)		
Building 255	o lube oil	H	
	o engine cleaning compounds	H	<5 gal/day
	o caustic and acids	H	
	o paint (small amount)	PH	
Building 301	o pesticide container wash	H	<1 gal/day
	o excess or off-spec pesticide	H	<2 gal/yr

*H - probably hazardous
NH - probably non-hazardous
PH - potentially hazardous depending on contaminants

Off-Site Disposal Methods

The methods used for disposal of GAFB hazardous and non-hazardous wastes include:

- City of Rome Wastewater treatment plant (WWTP)
- Off-site waste oil contract disposal
- Off-site refuse waste contract disposal

City of Rome WWTP. With the exception of drummed wastes sent to an off-site contractor, wastes disposed of in septic tanks and the wastes disposed of in the on-site dry wells, all sanitary and industrial aqueous wastes go to the City of Rome WWTP through a sanitary sewer system. This WWTP was designed for 9 MGD and serves approximately 45,000 people. There are, however, inflow and infiltration problems and the actual average flow is above 10 MGD (peak flow is 14 MGD). The plant has high oils and grease loadings.

Off-Site Waste Oil Contractor. Most waste oil and fuel generated on site is drummed and placed in specific holding areas. An off-site, private contractor pumps this waste liquid into a tank truck on a regular basis and hauls the waste for disposal in an incinerator. The contractor checks the fuel/water and oil/water separators and withdraws floating wastes as necessary. At present the off-site contractor hauling and disposing of the GAFB waste oil and fuel is Williamstown Irrigation, Inc. of Williamstown, New York. Table 4.8 summarizes information concerning the wastes disposed of through off-site contractors.

Off-site Refuse Waste Contractor. An off-site, private contractor makes periodic rounds on GAFB, collecting the non-hazardous, general refuse and garbage from the dumpsters located on the base. The current contract for general refuse waste disposal is held by Onondaga Environmental Systems, Inc, East Syracruse, New York. The method of disposal is sanitary landfilling. Table 4.9 summarizes information concerning the wastes disposed of as non-hazardous in the off-site landfill.

Liquid Hazardous Wastes. As previously described, all hazardous liquid wastes are consigned to DPDO and stored at Lot 69. No disposal method has been arranged for for these wastes. Table 4.10 provides a partial listing of the liquids in storage.

TABLE 4.8

WASTE OIL INFORMATION

Wastes Removed by Contractor Include:

- Waste Fuels (Mogas, JP-4)
- Waste oil

Total Quantity of Waste

- 1000 - 1300 gal/month

Contractors

Williamstown Irrigation Williamstown, New York, 13493	July 79-current
Oldover Corp. P. O. Box 2 Saugerties, NY 12477	July 78 - June 79
Berks Associates, Inc. P. O. Box 305 Douglasville, PA 19518	July 77 - June 78
Norco P. O. Box 338 Bayonne, NY 07002	July 76 - June 77
Berks Associates	August 75 - June 76

TABLE 4.9

OFF-SITE NON-HAZARDOUS WASTE INFORMATION

Wastes Removed by Contractor include:

- Waste soot from Steam Plant Firebox (1 truckload/yr)
- Speedi-dry material (varies)
- Small amounts of asphalt coatings (<1 gal/day)
- Various cements and glues (<1 gal/day)
- Triple-rinsed pesticide containers (<1 container/day)
- Oily rags (varies)
- Solvent-contaminated rags (varies)
- Photocopy wastes (varies)
- Plastic dust (varies)
- Hardened or waste powdered resins (varies)
- Solidified chemicals from etching room sinktraps (<1 lb/day)
- Quick start cartridge (Ammonium Nitrate) (50/month)
- General refuse and domestic wastes (varies)

Current Contractor

Onondaga Environmental Systems, Inc.

East Syracuse, New York 13057

TABLE 4.10

PARTIAL LISTING OF HAZARDOUS WASTES IN STORAGE

- Methanol
- Acetone
- 1,1,1-trichloroethane
- Trichloroethylene
- Dye penetrants and soaps
- Greases
- Isopropyl alcohols
- Degreasers
- Solvents
- Cleaners
- Methyl ethyl ketone
- Toluene

EVALUATION OF PAST WASTE DISPOSAL FACILITIES

Landfills

Waste disposal by on-site landfilling has been practiced at seven locations on the base property. All of the locations, with the exception of Landfill No. 2, are presently inactive. Major activity at Landfill No. 2 ceased in 1980 but this site is still used to dispose of small amounts of waste from incoming overseas aircraft.

During the landfill site visits, a number of evident and potential problems were identified. These problems are noted on Table 4.4 and summarized in Table 4.11, and briefly discussed below.

Detailed geologic and hydrogeologic information was not available for the seven landfill sites. However, available soils information, indicates that several of the landfills are located in relatively permeable soil types. Permeable soils, in general, are not desirable for landfill siting since they allow rapid movement of liquid wastes and/or leachate and can provide an avenue for contamination of the ground-water system.

Visable leachate flows were observed in the vicinity of Landfill No. 1. The flow has been estimated to be about 3 to 7 gpm and enters Six Mile Creek. Water quality tests indicate the contamination of the creek by landfill leachate.

Wastes which have been uncovered due to excavation or exposed by erosion were observed at Landfill Nos. 1 and 2. Uncovered wastes can contribute to contamination of surface runoff.

Depressions in a landfill cover due to inadequate grading or subsidence can provide points for surface water ponding and increased infiltration. This is undesirable because it promotes rain water infiltrate through the waste and can increase leachate generation. Depressions were observed at Landfill Nos. 2, 6 and 7 during the site visits.

Landfill Nos. 2 and 3 were found to have incomplete plant cover during the site visits. Plant growth is beneficial because it tends to stabilize the soil surface and prevents erosion from exposing the buried wastes.

Two of the seven landfills are known to contain hazardous wastes. Landfill No. 3 was used to dispose of asbestos insulation and Landfill No. 4 was used to dispose of low level radioactive wastes. Although the

4.11

PROBLEMS IDENTIFIED AT GAFB LANDFILLS

	Landfill Located in permable soil types	Visable Leachate flows	Uncovered or exposed wastes	Insufficient grading for drainage (ponding)	Insufficient plant cover for soil stabilization	Past Disposal of hazardous wastes
Landfill 1	X	X	X			X
Landfill 2	X		X	X	X	INA
Landfill 3	X				X	S
Landfill 4	P					S
Landfill 5	P					INA
Landfill 6	P			X		INA
Landfill 7	X			X		INA

Notes: 1. "X" indicates confirmed and documented observation.
2. INA = information not available to confirm.
3. "S" indicates a suspected but undocumented problem.
4. "P" indicates that these sites are probably constructed in permeable soils.

other landfill areas may contain wastes with hazardous characteristics, recorded information is not available to confirm this. At any site where hazardous wastes have been landfilled there is the possibility that harmful contamination of the ground-water system has occurred or will occur at some future time.

Dry Wells

At a number of locations on the GAFB property dry wells are used for disposal of hazardous and non-hazardous liquid wastes. These dry wells consist of pits filled with gravel where liquid wastes are placed and allowed to infiltrate into the subsurface soils. Dry well disposal procedures used at GAFB may have contributed to contamination of the ground-water system. If this were the case, ground water monitoring would be necessary to define the extent of this contamination and to assess the impacts that have or will occur on local ground water users.

Rating of Waste Disposal Sites

Nineteen disposal sites associated with GAFB were identified as containing hazardous material resulting from past waste disposal activities. These sites have been assessed using a rating system which takes into account factors such as site characteristics, waste characteristics, potential for contamination and waste management practices. The details of the rating procedure are presented in Appendix B and the results of the assessment are summarized in Table 4.12. Rating scores were developed for the individual sites and the sites are listed in order of ranking. The rating system is designed to indicate the relative need for more detailed site assessment and/or remedial action. The information presented in Table 4.12 should be used as a guide for assigning priorities for dealing with the GAFB disposal sites. The rating forms for the individual waste disposal sites are presented in Tables 4.13 through 4.31.

REFERENCE 2
EXCERPTS

By some estimates this recharge may be as much as 25 percent of all available precipitation (about 46 inches per year). The unconsolidated sediments may act as recharge galleries for the Utica Shale, but the percentage of total recharge entering the bedrock hydrogeologic unit by this means is unknown. The amount of recharge to bedrock, however, is expected to be relatively small due to the expected large differences in hydraulic conductivities between the unconsolidated and bedrock units. The percentage of total recharge which discharges in sustaining spring and stream baseflows is also unknown.

3.5 HISTORY OF WASTE DISPOSAL

Figure 3 is an index map of Griffiss, upon which the locations of all of the waste disposal sites of concern to this study are plotted. Summaries of the history and practice of use of these sites were provided in the Phase I Report, and are reproduced here in the following paragraphs.

3.5.1 Landfill No. 1

Landfill No. 1 is situated in the northern portion of Griffiss and encompasses approximately 22 acres (see Figure 3). Prior to its use as a landfill, a gravel quarry was located on the site. The landfill began operations in 1960 and closed in 1973. In 1973, debris from a fire in the base comissary was buried near the intersection of the entrance road and Six Mile Creek.

All landfilling was accomplished by trench and cover methods, with the exception of some hardfill and steam plant boiler ash which was dumped and spread on the eastern edge of the trenches. Early cells were constructed in an east-west orientation and were from 40 to 50 feet wide by 300 to 500 feet long. Depths of waste were from 15 to 18 feet. During construction of the 2nd and 3rd trenches from the north, ground water was encountered and pumped to Six Mile Creek. A later trench was started in a north-south orientation through the east end of the earlier trenches, but was abandoned. Waste ash from the steam plant was used during one period as cover material for the solid wastes.

Most of Landfill No. 1 appears to be graded to drain to a low area to the east, and then on to Six Mile Creek. The extreme southwestern portion of the site drains directly to Six Mile Creek about three miles upstream from its confluence with the New York State Barge Canal. The site is at an elevation of about 540 ft. msl, and was constructed in the relatively coarse-grained Pleistocene glacial deposits.

REFERENCE 2

SECTION 5

GEOTECHNICAL AND CONCEPT ENGINEERING INVESTIGATION OF LANDFILL No. 1

5.1 GENERAL

The purpose of this investigation into Landfill No. 1 was to ascertain by geotechnical methods the field environmental conditions within which the landfill exists. The data collected during the geotechnical field investigation were to be sufficiently detailed to support a preliminary concept engineering assessment of alternative remedial actions. Several specific questions were to be answered during this investigation:

- Determine the extent and magnitude of environmental contamination which has resulted from previous waste disposal practices at Landfill No. 1.
- Determine whether or not contamination from Landfill No. 1 is presently migrating off-site and assess the potential for such occurrences in the future.
- Identify alternatives for mitigating any adverse environmental effects of existing contamination problems.
- Suggest potential ways of restoring the environment to as near a normal level as is practical.
- Suggest a future environmental monitoring program to document environmental conditions at Landfill No. 1.

Based on the findings of Phase I Records Search, Landfill No. 1 was identified as a first priority site and therefore a complete two-stage evaluation of Landfill No. 1 was performed.

5.2 CONFIRMATION STAGE INVESTIGATION

5.2.1 Site Reconnaissance

The first activity undertaken in the Confirmation Stage investigation was an in-depth inspection of Landfill No. 1. Landfill

No. 1 is located in the extreme northern portion of the base property, just north of the Small Arms Firing Range, as shown in Figure 5. Figure 6 is an expanded view of the configuration of Landfill No. 1. The disposal site occupies approximately 22 acres of an area of above average elevation northeast of Six Mile Creek. The site surface lies at elevations of between 530 and 540 feet above mean sea level (MSL) and drops abruptly at the toe near Six Mile Creek to an elevation of approximately 500 feet above MSL. The area to the southwest of Six Mile Creek is level marsh land, with some evidence of its use for dumping of hardfill wastes.

The landfill area was previously used as a sand and gravel quarry. The landfill was a "trench and cover" type of operation open from 1960 to 1973 and holds general refuse and boiler ash. The exact boundaries of the landfill could not be determined from field inspection data. The site was not lined or capped to control water infiltation. The landfill was subsequently covered with native sand and gravel and some areas were replanted with softwoods. The site surface drains generally to the southeast toward a small tributary of Six Mile Creek. However, the surface is uneven, probably caused by differential settlement, and ponding occurs after rainstorms.

Some debris is still visible on the surface of the site, particularly at the eastern end of the site where there appears to have been some burning of small cardboard and metal containers containing paint, fire fighting chemicals and other unknown substances.

At the base of the slope adjacent to Six Mile Creek, southwest of the landfill, there is a perennial seep. It emerges from several points along a short (approximately 150 feet) front of the slope, where it feeds a wet area adjacent to the creek. Eventually it enters the creek principally through two rivulets having a combined flow of about five gallons per minute. The discharge point of the seep into the creek was slightly foamy for a few yards downstream. The seep has a rust red tint and has stained the ground it has flowed over; small deposits of white crystalline material were also observed. The seep appears to be fed by water percolating through the landfill. There is a concrete structure near the seep outlet which apparently was a springhouse. The date "1934" is etched on the wall. It seems likely that the seep is, at least in part, a spring that existed before the landfill, and that it receives at least some of its recharge

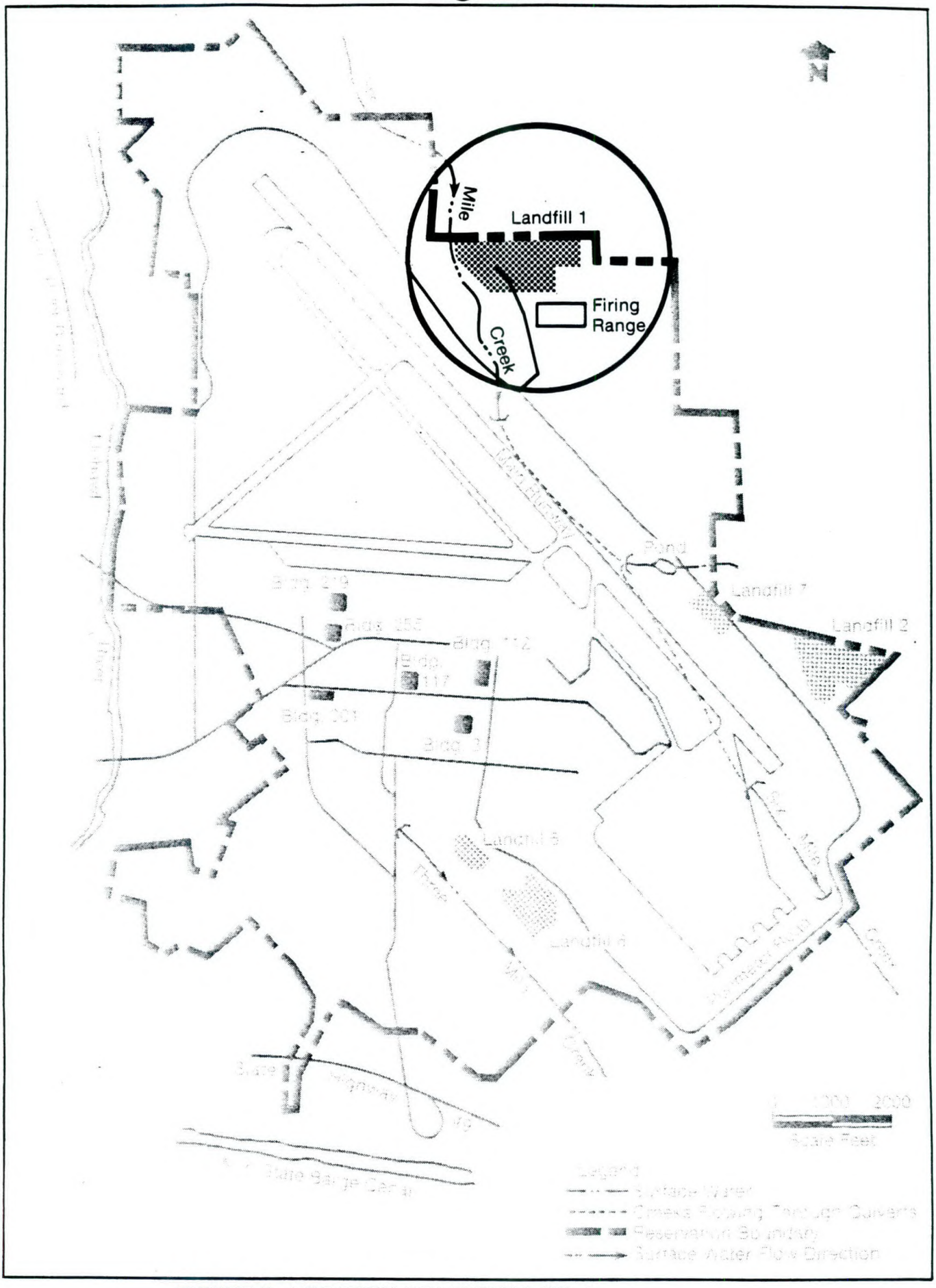


FIGURE 5 LOCATION OF LANDFILL NO. 1, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

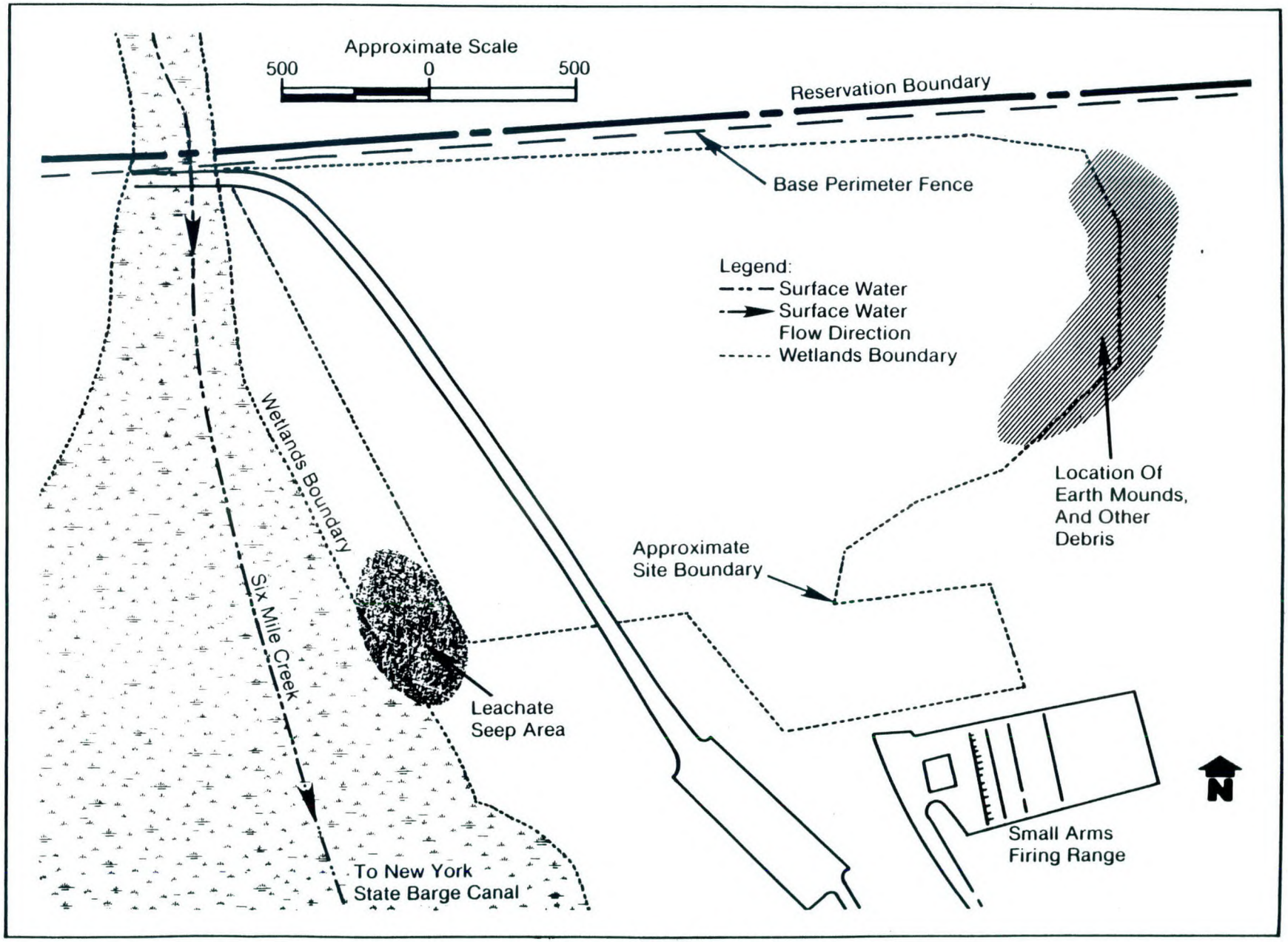


FIGURE 6 EXPANDED PLAN VIEW OF LANDFILL NO. 1, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

from the area now occupied by the landfill. Inspection of vegetation around the entire site revealed almost no stressed vegetation. Only in the immediate vicinity of the leachate seep was vegetative stress obvious, and at least some of that stress could be attributable to continuous inundation of plant root systems. Most of the vegetation growing within the seep area is, however, vigorous and luxuriant.

5.2.2 Remote Sensing Investigation

Aerial photos were obtained from the Intelligence Division, 416 Bomb Wing. These photos clearly depicted Landfill No. 1 during various years in the past, in both black and white and in thermal infrared prints. Inspection of these photos assisted in delineating a better set of boundaries for the landfill than was possible from visual reconnaissance. Meticulous examination of the prints, however, detected no evidence of stressed vegetation or thermal irregularities which could have provided the locations of any subsurface leachate plume other than the one at the seep.

5.2.3 Earth Resistivity Survey

WESTON conducted earth resistivity surveys around Landfill No. 1 using a Soiltest Model R-40 Resistivity Meter. The purpose of these surveys was to identify lateral variations in earth resistivity that may reflect subsurface leachate plumes and help to locate monitor wells required to define the problem. Approximately 12 earth resistivity stations were located and measurements made at each at a constant spacing of 10 feet. Most of the profiles concentrated along the toe of the landfill, but other transects were also run for contrast with the location of the known plume. Even adjacent to the plume, earth resistivity readings displayed only small variations. WESTON concluded that too many significant variables, such as material surveyed, depth to water, depth to bedrock and conductance of ground water, were varying too widely to establish control over the survey. Further efforts in earth resistivity were abandoned at Landfill No. 1.

5.2.4 Installation of Monitor Wells

Site topography and surface drainage patterns indicated that the general water table flow direction should be across the site from roughly northwest to southeast, toward a tributary of Six Mile Creek. Field reconnaissance data, coupled with field checked data from the analysis of aerial photos, allowed selection of Site W1 as being an upgradient, background location outside the boundary of the landfill. WESTON then used the "three

downgradient" principle from the Resource Conservation and Recovery Act of 1976 (RCRA), and selected sites W5, W6 and W7. These sites are along the southwest bank of Six Mile Creek, directly across the creek and only a few tens of yards from the leachate seep area. WESTON would have preferred to install the downgradient wells on the landfill site of Six Mile Creek. However, the very steep toe of the landfill, the heavily wooded vegetation and the position of the creek restricted drill rig access. The four well sites selected are shown in Figure 7.

All four wells were drilled during November and December 1981, using auger drill equipment, and were drilled and developed in the manner described in Section 4.2.5 of this report. Bedrock was encountered in the three downgradient wells at unexpectedly shallow depths. Well construction details and boring logs are contained in Appendix C, and well configuration data are summarized in Table 2. A preliminary round of water level data confirmed that the topographic analysis and the assumption of the water table mimicking topography had been correct. The direction of ground-water flow was toward Six Mile Creek.

5.2.5 Ground-Water Sampling and Analysis

On 11 January 1982, approximately two weeks after completion of development pumping, an initial round of water quality samples was taken from the four Landfill No. 1 monitor wells. Sampling was accomplished as described in Section 4.2.6.1 of this report. Samples were taken for complete analyses of the USEPA Priority Pollutant List, a listing of the compounds of which is in Appendix D of this report. Samples were transported to the WESTON laboratory on ice, and were extracted and analyzed in accordance with Standard USEPA protocols as noted in Section 4.2.6.3 of this report. Table 3 contains a summary of the data obtained by those analyses--compounds listed in Appendix D but not in Table 3 were below quantifiable detection limits.

Well W5 is directly across Six Mile Creek from the seep, and contained quantifiable benzene (11 ppb) and ethylbenzene (92 ppb). Well W1, the background well, contained zinc in what appeared to be an anomalously high concentation. Well W6 contained elevated soluble chromium and W7 contained elevated zinc. No other compounds were detected at quantifiable concentrations. Several other compounds were detected in trace amounts, most notably some of the phthalates. WESTON's Quality Assurance (QA) Officer was of the opinion that a possible QA problem existed, due to the relatively low concentrations of those contaminants detected and due to the relatively high degree of scatter in the

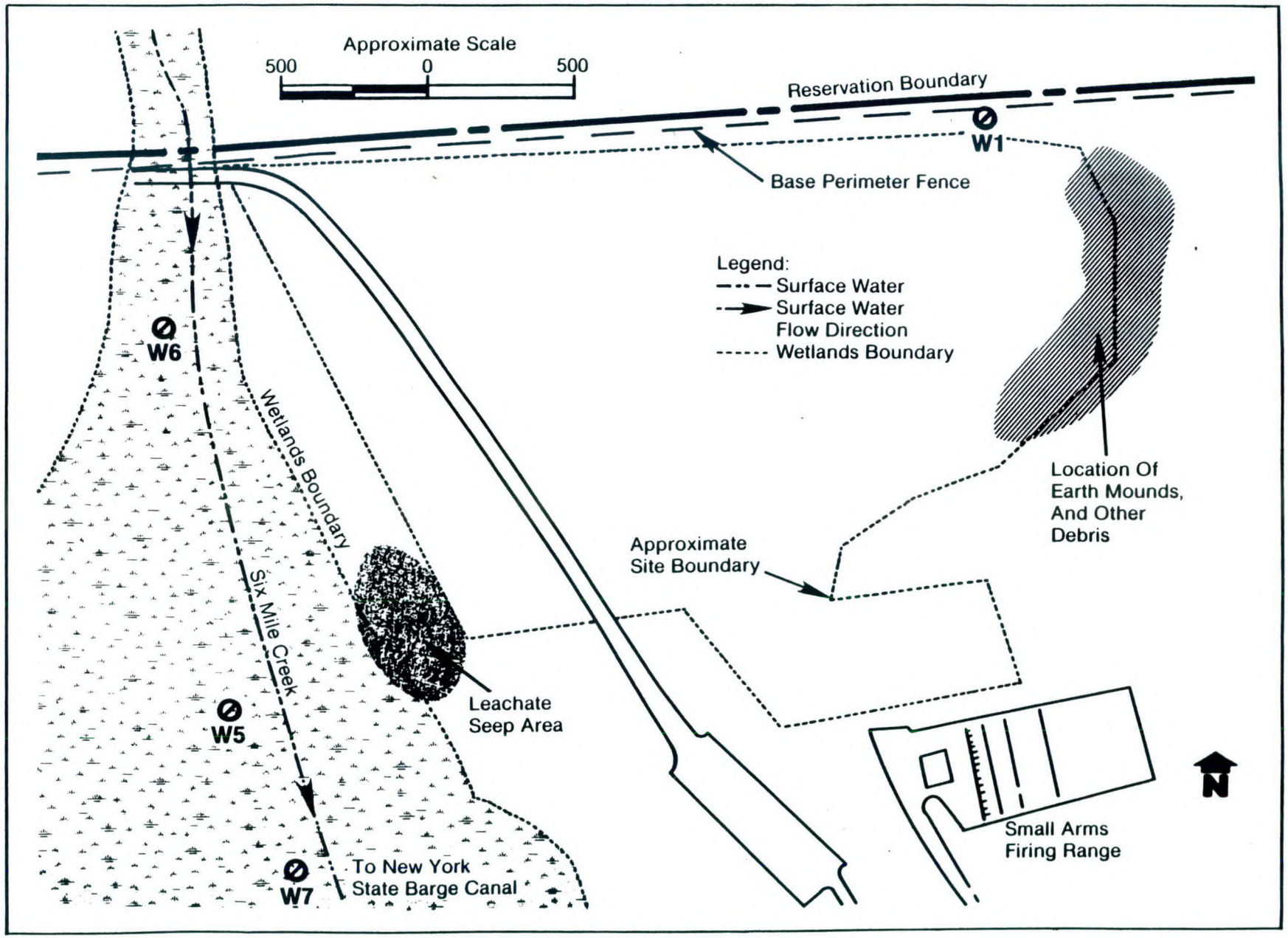


FIGURE 7 LOCATIONS OF FOUR CONFIRMATION STAGE MONITOR WELLS, LANDFILL NO. 1, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Table 2

Monitor Well Construction Data for
Four Confirmation Stage Monitor Wells, Landfill No. 1

Well	Location	Well Depth (in feet)	Screen Depth Interval (in feet)	*Elevation of Top of Casting (TOC)	Depth to Water (in feet from TOC)	Ground Water Elevation (4-18-82)
W1	NE Corner-Base Boundary	14.5	4.5 - 14.5	540.8	9.0	531.8
W5	SW Side - Six Mile Creek Wetlands	20.0	10.0 - 20.0	497.7	5.4	492.3
W6	SW Side - Six Mile Creek Wetlands	15.0	5.0 - 15.0	499.6	3.2	496.4
W7	SW Side - Six Mile Creek Wetlands	17.0	7.0 - 17.0	495.9	3.3	492.6

*Relative elevations of wells were determined by ground survey using W5 as arbitary datum. Elevation of W5 in reference to mean sea level is approximate, based on existing contours on base plan.

Table 3

Analyses of Ground Water Samples, Landfill No. 1, 11 January 1982

Well	Location	Cr (Sol)[1] (mg/l)	Cu (Sol) (mg/l)	Zn (Sol) (mg/l)	Phenols (mg/l)	VOA[2] (ug/l)
W1	Upgradient	<0.05	0.04	1.05	<0.005	<10
W5	Downgradient	0.06	0.05	0.14	<0.005	11 (Benzene) 92 (Ethyl benzene)
W6	Downgradient	1.24	0.05	0.11	<0.005	<10
W7	Downgradient	0.20	0.06	2.31	<0.005	<10
Detection Limits		0.05	0.02	0.02	0.005	10 (each parameter)

Notes: [1]Sol indicates dissolved metals.
[2]VOA indicates USEPA Priority Pollutant List Volatile Organic Compounds (see Appendix D).

QA duplicates analyzed. Prudence indicated that additional analyses were needed, and the QA Officer requested an additional round of samples for a repeat analysis.

On 16 February a second round of water samples was taken from the landfill No. 1 wells, in exactly the same manner as previously described, including a higher percentage of additional QA samples.

Table 4 is a summary of the results obtained from this second round of sampling. For ease of comparison, Table 3 data are also contained in Table 4. The presence of benzene and ethyl benezene in Well W5 was confirmed. However, the elevated metals levels from the first sampling round were not confirmed. Slightly elevated phenol levels were detected, with Well W5 showing the highest level at 58 ppb. No other compounds listed in Appendix D were detected.

5.2.6 Conclusions From The Confirmation Stage

The following conclusions were drawn from the results of the Confirmation Stage efforts. These conclusions also assisted in making work scope adjustments to the Quantification Stage effort.

- Bedrock downgradient from Landfill No. 1 was encountered at 8-12 feet rather than the 70-100 feet anticipated from the Records Search Report.
- The line described by Wells W5, W6 and W7 probably represented the approximate position of farthest downgradient migration position of detectable contaminants from the Landfill No. 1 other than downstream on Six Mile Creek.
- Preliminary ground-water and chemistry data indicated that the known leachate seep was the surface expression of the only "plume" leaving the landfill.
- The extent of the "plume" was yet to be ascertained.
- The impact of the leachate seep was yet to be quantified.
- Field reconnaissance indicated a possible lobe of the leachate seep farther to the southeast and east than was indicated in the Records Search Report.

Table 4

Summary of All Confirmation Stage Analyses
of Ground Water Samples, Landfill No. 1

Well	Location	Date	Cr (Sol)[1] mg/l	Cu (Sol) mg/l	Zn (Sol) mg/l	Phenols mg/l	VOA[2] ug/l
W1	Upgradient	2/16	< 0.05	< 0.02	< 0.02	0.005	< 10
		1/11	< 0.05	0.04	1.05	< 0.005	< 10
W5	Downgradient	2/16	< 0.05	< 0.02	< 0.02	0.058	58 (Benzene)
							116 (Ethyl benzene)
		1/11	0.06	0.05	0.14	< 0.005	11 (Benzene)
							92 (Ethyl benzene)
W6	Downgradient	2/16	< 0.05	< 0.02	0.04	0.010	< 10
		1/11	1.24	0.05	0.11	< 0.005	< 10
W7	Downgradient	2/16	< 0.05	< 0.02	< 0.02	0.010	< 10
		1/11	0.20	0.06	2.31	< 0.005	< 10
Detection Limits			0.05	0.02	0.02	0.005	10 (each parameter)

Notes: [1]Sol indicates dissolved metals.
[2]VOA indicates USEPA Priority Pollutant List Volatile Organic Compounds (see Appendix D).

- The limited number of compounds detected in groundwater samples suggested that a very limited number of compounds should replace the Priority Pollutants List for any additional sampling analysis.

5.3 QUANTIFICATION STAGE INVESTIGATION

5.3.1 Additional Monitor Wells

A total of five additional monitor wells were installed around Landfill No. 1. The locations of these wells are shown on Figure 8. Each of these locations was selected, as follows:

- P1 was located adjacent to the base boundary to verify background chemistry data and to verify that groundwater flow gradients are not in an off-base direction.

- P2 was located to bracket the northwestern extremity of the leachate seep and plume area.

- P3 was located to bracket the southeastern extremity of the leachate seep and plume area.

- P4 was located to confirm or deny the field observation of an additional plume lobe.

- P5 was located to bracket the downgradient--most extreme of flow of the leachate plume.

Each of these five wells was installed using auger drilling equipment in the manner described in Section 4.2.5. Boring logs and well construction details are contained in Appendix C, and a summary of the construction details is contained in Table 5.

5.3.2 Subsurface Conditions

During the drilling of each well, subsurface conditions were described and split spoon samples were recovered at regular intervals. Subsurface conditions for each boring are presented in the stratigraphic logs in Appendix C.

The landfill area northeast of Six Mile Creek (Wells W1, P1, P2, P3 and P4) is directly underlain by glacial outwash sediments consisting of silty sands and sands, ranging from 9.5 to 34 feet in thickness. The sands, in turn, are underlain by glacial till

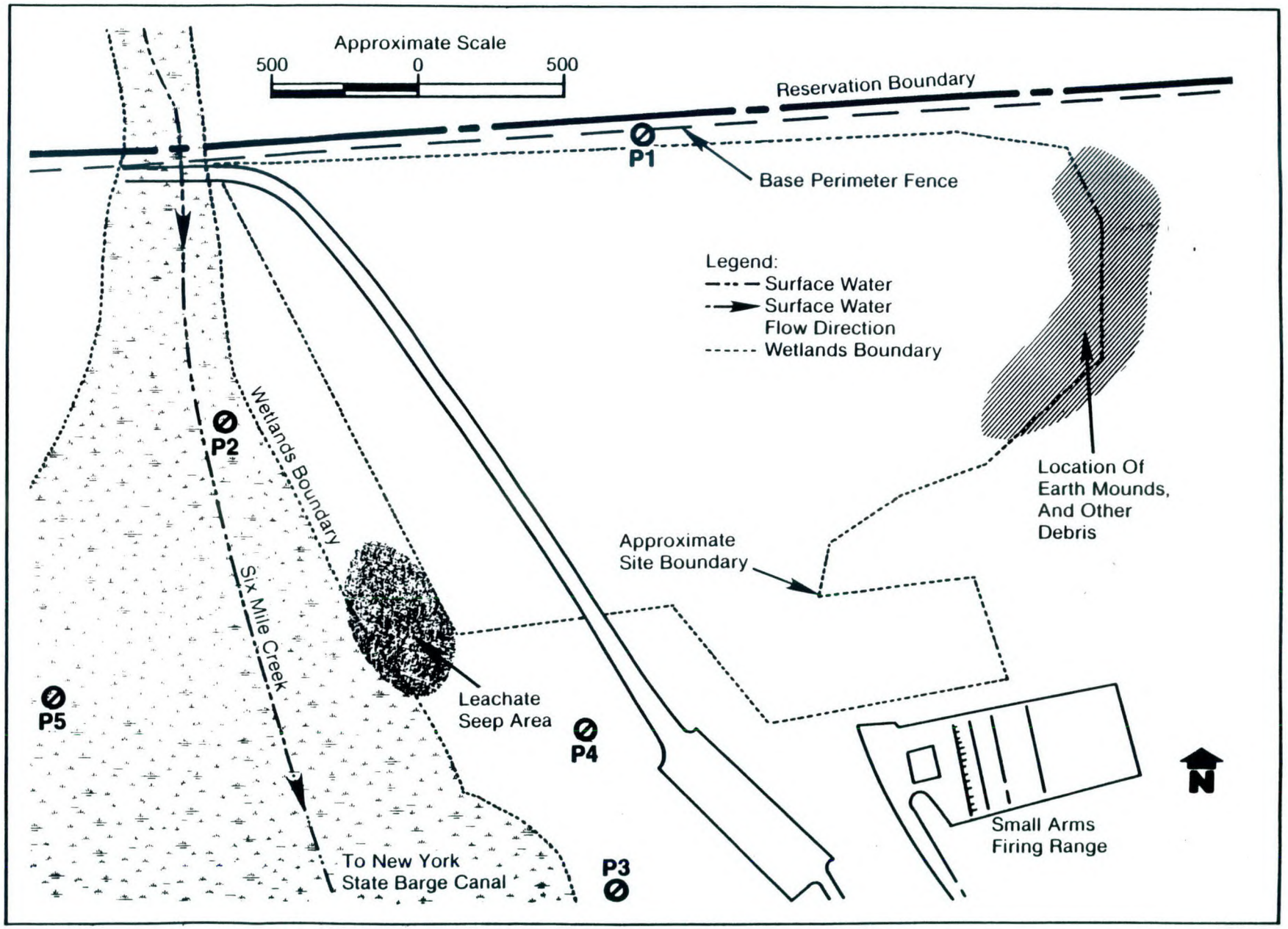


FIGURE 8 LOCATIONS OF FIVE QUANTIFICATION STAGE MONITOR WELLS, LANDFILL NO. 1, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Table 5

Monitor Well Construction Data for
Four Quantification Stage Monitor Wells, Landfill No. 1

Well	Location	Well Depth (in feet)	Screen Depth Interval (in feet)	*Elevation of Top of Casting (TOC)	Depth to Water (in feet from TOC)	Ground Water Elevation (4-18-82)
P1	North Base Boundary Line	22.0	12.0 - 22.0	527.4	7.9	519.5
P2	SW Slope Toe	13.0	8.0 - 13.0	505.5	6.2	499.3
P3	SE Slope Toe	17.0	12.0 - 17.0	508.6	2.0	506.6
P4	South Slope	32.0	22.0 - 32.0	533.5	25.3	508.2
P5	SW Side-Six Mile Creek Wetlands	20.0	15.0 - 20.0	497.2	3.8	493.4

*Relative elevations of wells were determined by ground survey using W5 as arbitary datum. Elevation of W5 in reference to mean sea level is approximate, based on existing contours on base plan.

--a compact mixture of silty sand and gravel. The till ranged in thickness from one to three feet, and was in direct contact with the dark grey Utica Shale bedrock.

The wetland southwest of Six Mile Creek (Wells W5, W6, W7 and P5) is underlain by lacustrine sediments consisting of fine silts and sands, organic silts, and in P5, five feet of dense clay. From one to five feet of till was encountered under the lacustrine sediments. Shale bedrock was encountered from eight to 20 feet below ground surface, the deepest location being at Well P5.

Figure 9 presents a topographic map of the top of the Utica Shale under the site. The contours were constructed from boring log information contained in Appendix C. From Figure 9 it can be seen that the bedrock surface dips gently to the southwest, in the same direction as the flow of ground water determined from preliminary Confirmation Stage water level data. Water Table flow gradients most often mimic Ground Surface Topography, but at Landfill No. 1 this is not the case. This suggests that some other phenomenon is exerting a control over ground water flow directions in the vicinity of Landfill No. 1. The bedrock may represent a permeability boundary to vertical infiltation of ground water which defines ground-water gradients, and that ground water will flow literally "down hill" over the bedrock surface, as opposed to downgradient under more normal ground-water flow conditions.

5.3.3 Ground Water Flow Evaluation

Tables 2 and 5 contain ground water elevation data, as measured on 18 April 1982. Surveyed elevations were keyed to Well W-5, an arbitrary benchmark for relative elevations. The elevation of Well W5 was based upon a nearby spot elevation from the base facilities plan map. Water level elevations from all nine Landfill No. 1 wells were used to construct the water table contour map shown in Figure 10. Contouring of this map took into consideration that the water table should also intersect the elevations of both the seep and Six Mile Creek. From Figure 10 it can be seen that the ground-water flow direction is to the southwest toward the creek from the landfill. Several other observations may be made based upon Figure 10.

- The average gradient across the site (head drop versus distance of flow) is approximately 0.02 feet per foot.

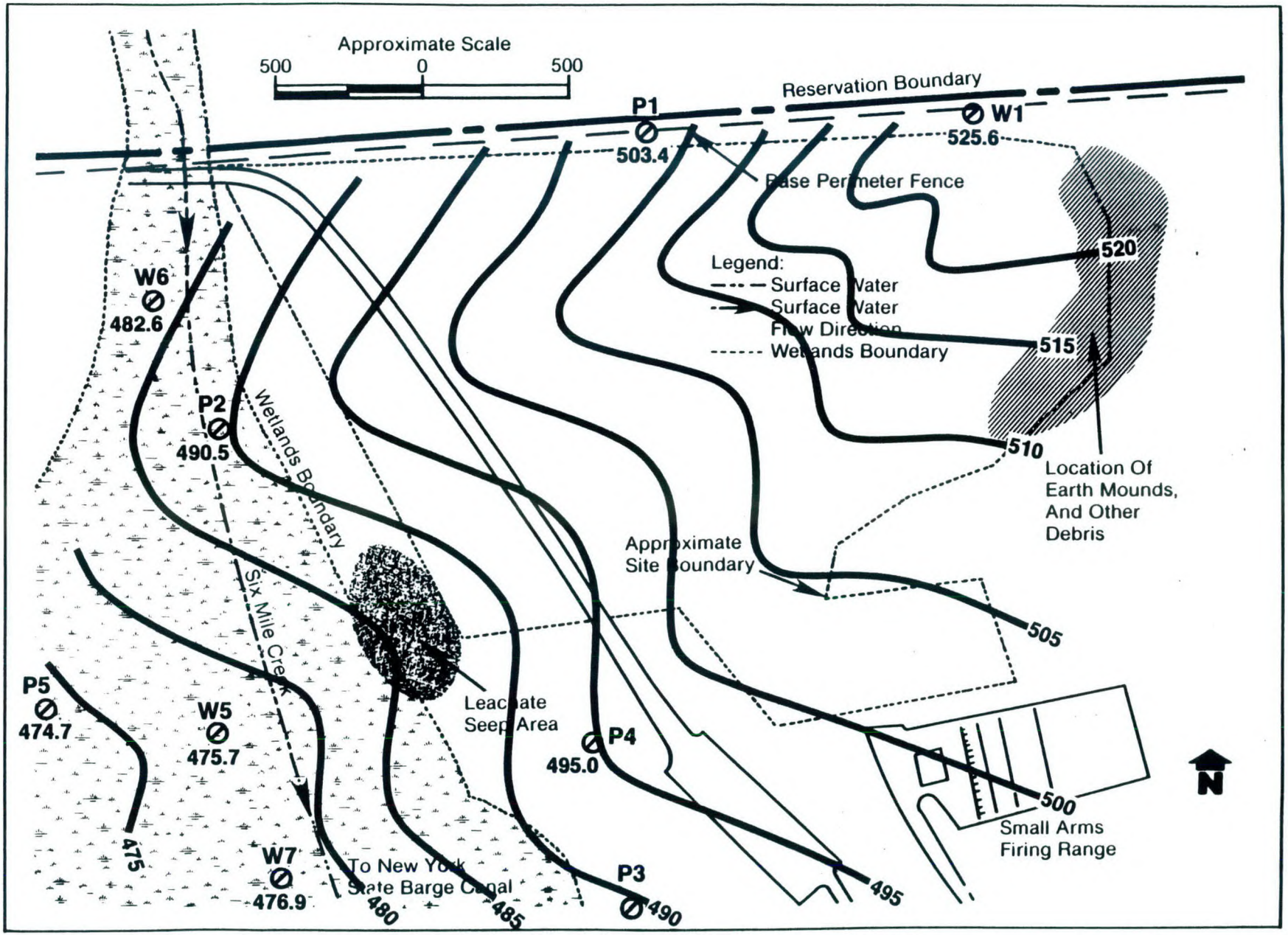


FIGURE 9 TOPOGRAPHIC MAP OF THE TOP OF THE UTICA SHALE, LANDFILL NO. 1, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

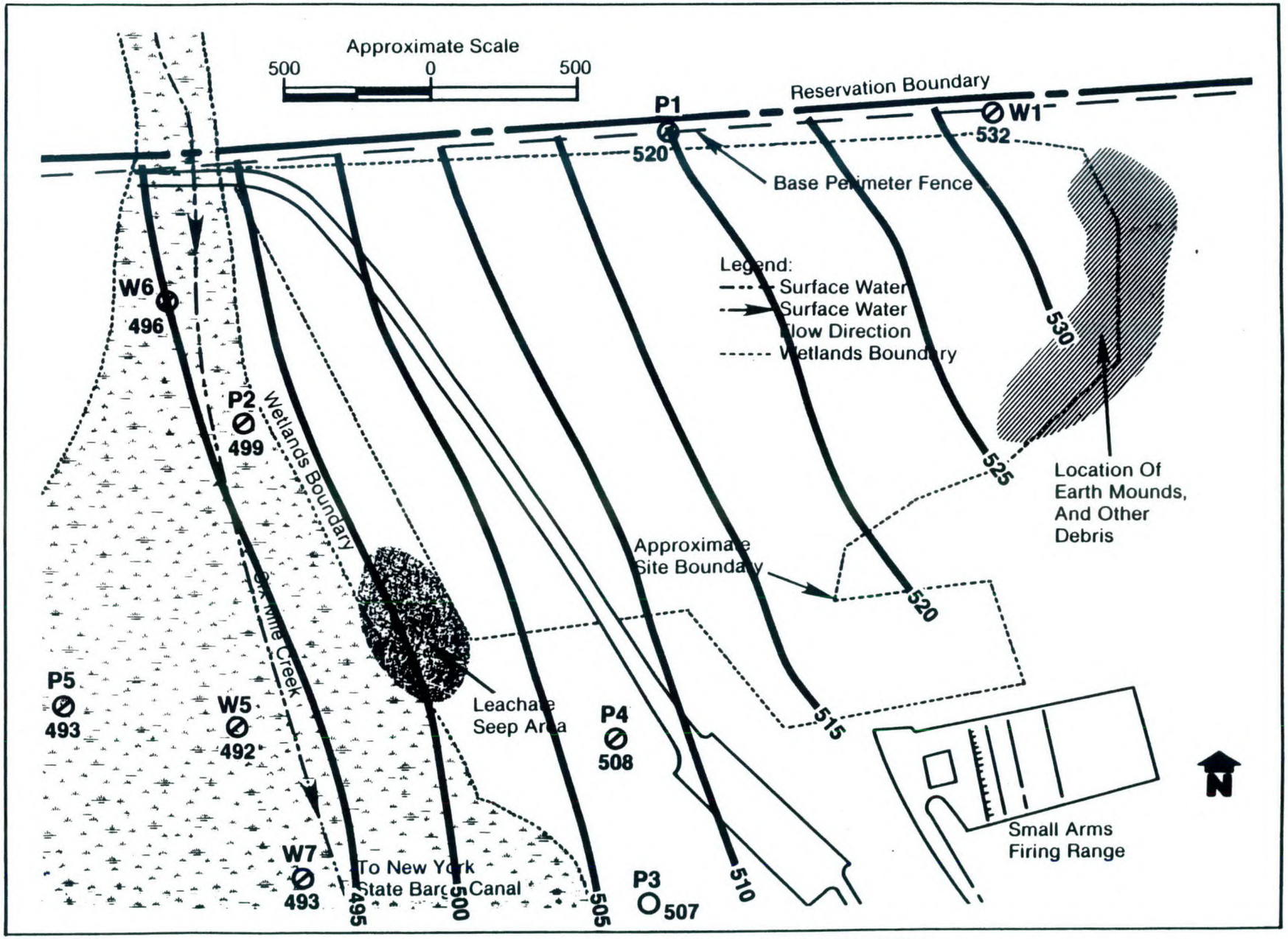


FIGURE 10 MAP OF WATER TABLE CONFIGURATION, LANDFILL NO. 1, 18 APRIL 1982, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

- Ground-water levels in the wetland wells (W5, W6, W7 and P5) were lower than the creek surface indicating a discharge gradient from the creek to the water table to the southwest. This is an expected condition at the onset spring-thaw conditions, but it is probably not typical for other seasons of the year. With the Creek and Aquifer under the hydraulic conditions as measured in April, 1982, flow lines do not converge upon the Creek, with the Creek acting as a hydrodynamic barrier to further migration, but will pass beneath the Creek allowing migration to occur. During periods of higher water Table elevations in these wells, the Creek will act as an effective hydrodynamic barrier to further contaminant migration in the water table.

- There is a bend in ground-water surface contours and a compression of gradients near Well P2. Ground-water elevations in Wells P3 and P4 are similar to the outflow elevation of the seep, while the water level in Well P2, approximately 50 feet from the seep, is approximately seven feet lower. This indicates a permeability barrier to the west of the seepage outflow, and this is consistent with the transition between disturbed conditions near the landfill and undisturbed conditions to the creek side of the landfill. Since ground water flows preferentially in zones of least resistance (higher permeability) more water will flow through disturbed zones, as represented by Landfill No. 1. When ground water flowing in relatively higher permeability encounters a zone of relatively lower permeability, as represented by the undisturbed area near well P2, water levels in the higher permeability zone will mound, as shown at the seep. The relatively low permeability, undisturbed zone near Well P2 is an effective barrier to retard leachate migration laterally in the direction of Well P2.

- There is no flow gradient indicating off-base migration of any contaminants which may be in the ground water at Landfill No. 1.

5.3.4 Aquifer Characteristics Testing

During development pumping of the monitor wells shortly after construction it became clear that only Well P4 could be pumped for a sufficiently long time to conduct a pump test, as described in Section 4.2.7. A short duration (90 minutes) pump test was conducted on Well P4. Normally this is not a long enough test duration for water table conditions--however, no other monitor wells were near enough to monitor for a longer duration test, considering the very thin nature of the water table aquifer. Therefore, Well P4 was pumped only long enough to establish a relatively constant drawdown head, and then pumping was terminated and head recovery was monitored. Three other wells, P2, P3 and W5, were selected for slug testing as described in Section 4.2.7. Transmissivity of the aquifer was calculated from the Well P4 pump test data, using the relationship:

$$T = \frac{2.30Q}{4\pi S_1}$$

Where T = Transmissivity (Ft^2/Minute)
Q = Pumping Rate (Gallons/Minute)
S_1 = Residual Drawdown over One Log Cycle of Time (Feet)

Hydraulic conductivity of the aquifer was determined from slug test data on Wells P2, P3 and W5, using the method of Bouwer and Rice. Transmissivity and hydraulic conductivity are directly comparable, since transmissivity is equal to the product of hydraulic conductivity and aquifer saturated thickness. Saturated thickness is known from comparing well construction data with water level data. The analysis of the pump and slug test data is contained in Appendix E, and the results are summarized in Table 6.

From Table 6 the following conclusions may be drawn:

- Hydraulic conductivities determined for Wells P3 and W5 are the same at 0.002 feet per minute, a result which would be consistent with results expected for fine to medium grained aquifer materials containing a very small silt and clay fraction.

- The hydraulic conductivity value obtained for Well P2 was an order of magnitude lower (0.0003 ft/min) than for Wells P3 and W5. This result would be consistent results expected for silty fine sand aquifer materials.

Table 6

Summary of Aquifer Characteristics Test Results
From Landfill No. 1 Wells

Well	Test Method	Parameter Measured	Aquifer Thickness In Feet	Hydraulic Conductivity Feet/Minute	Transmissivity $Feet^2$/Minute
P2	Slug/Recovery	Hydraulic Conductivity	7	0.0003	0.0021*
P3	Slug/Recovery	Hydraulic Conductivity	11	0.002	0.022*
W5	Slug/Recovery	Hydraulic Conductivity	5	0.002	0.010*
P4	Pumping	Transmissivity	12	0.1*	1.2

*Calculated

- The transmissivity (1.17 ft^2/min) and calculated hydraulic conductivity (0.1 ft/min) for Well P4 were several orders of magnitude higher than those of Wells P3 and W5. This result would be consistent with results expected for clean medium to coarse grained sands.

Sediment samples from screened intervals of selected wells were submitted to the laboratory for particle size analysis. The purpose of these analyses was to provide a cross-check, on the aquifer characteristics results obtained from well tests. The results of these analyses are presented in Appendix F, and are summarized below.

The results of these analyses indicate that the screened intervals of Wells P2, P3 and P4 contain sediments of roughly similar grain size distribution. Median grain sizes for the three screened intervals range from 300 microns (fine sand) in Well P2, to 800 microns (medium sand) in Well P3. All three wells have a D-90 grain size of about 140 microns in the fine sand range. This result would be consistent with a hydraulic conductivity on the order 0.002 feet per minute, such as was obtained on Wells P3 and W5. The results obtained for the particle size analyses on samples from Wells P2 and P4 appear to be in conflict with the results of the aquifer tests--the aquifer test result for Well P2 appears to be too low, and the result for Well P4 appears to be too high. The most likely explanation for this apparent conflict lies in the very heterogeneous nature of the aquifer materials. Well P2 may be screened in a sand lens surrounded by finer grained and less permeable materials, while Well P4 may be in direct hydraulic connection with coarser and more permeable materials adjacent to the well.

The distribution of measured permeabilities in the water table aquifer indicates that leachate from Landfill No. 1 would migrate preferentially in a south-southwesterly direction away from the Landfill. Based upon the hydraulic conductivities measured in Wells P3 and W5, and upon the measured average gradient across the site, leachate seepage velocities on the order of 0.25 feet per day can be expected during portions of the year when the water table and creek are configured as in April, 1982. During portions of the year when the creek acts as an hydrodynamic barrier, seepage velocities in a south-southwesterly direction away from the landfill could be expected to be lower than this value.

5.3.5 Ground Water Sampling and Analyses

On 28 April 1982 a complete round of water quality samples was taken from all nine monitoring wells at Landfill No. 1. Sampling was accomplished as described in Section 4.2.6.1 of this report. The list of analytes selected for Quantification Stage analysis was based upon the results of Confirmation Stage testing, was considerbly shorter than for the Confirmation Stage, and included the following analytes:

- EPA Priority Pollutant List Volatile Organics Fraction (VOA)
- Total Organic Carbon (TOC)
- Chromium (Total Soluble)
- Zinc
- Iron
- Calcium

Samples were transported to the WESTON Laboratory on ice, and were extracted and analyzed in accordance with Standard USEPA protocols as noted in Section 4.2.6.3 of this report. Table 7 contains the results of the Quantification Stage ground-water chemistry analyses. For comparison purposes, Appendix G contains a listing of USEPA Safe Drinking Water Standards.

From the data in Table 7 several conclusions may be drawn:

- The results of analyses on Wells W1 and P1, combined with the water table map contained in Figure 9, appear to confirm that no contaminants are migrating off-base in the groundwater. However, both wells are very close to the boundary of the landfill, and considerable scatter in the zinc data from Well W1 and the elevated TOC datum from Well P1 make a definitive conclusion impossible at this time.
- Slightly elevated zinc and calcium in Well P4 indicates the potential presence of a diluted lobe of leachate to the southeast of the present seep, and in the direction of the highest measured permeability at Landfill No. 1.

Table 7

Results of Quantification Stage Ground Water Quality Analyses, Landfill No. 1

Well	TOC (mg/l)	Cr (Sol)[1] (mg/l)	Fe (Sol) (mg/l)	Zn (Sol) (mg/l)	Phenols (mg/l)	VOA[2] (ug/l)	
W1	<1.0	<0.05	<0.05	4.30	31.9	<10	
W5	13.0	<0.05	4.00	<0.02	125.0	23	(ethyl benzene)
W6	3.5	<0.05	<0.05	<0.02	74.7	<10	
W7	25.0	<0.05	<0.05	<0.02	89.9	<10	
P1	12.0	<0.05	<0.05	<0.02	39.4	<10	
P2	31.2	<0.05	1.18	<0.02	123.0	<10	
P3	24.4	<0.05	<0.05	<0.02	46.4	<10	
P4	<1.0	<0.05	<0.05	0.04	54.1	<10	
P5	22.9	<0.05	2.40	<0.02	75.0	<10	
Detection Limits:	1.0	0.05	0.05	0.02	0.1	10	

Notes: [1]Sol indicates dissolved metals.
[2]VOA indicates USEPA Priority Pollutant List Volatile Organic Compounds (see Appendix D).

- Elevated TOC levels noted in most wells in the wetlands area may be due to infiltration of surface water from marshes, where TOC is naturally high from the decomposition of marsh vegetation.

- Elevated calcium and iron in wells W5, W6, W7, P2, P3, and P5 may indicate the presence of a diluted plume of leachate in the wetland area southwest of Six Mile Creek. The detection of ethylbenzene in Well W5 would appear to confirm this, although the lack of ethylbenzene in any of the other wells around it indicates that this occurrence is isolated. No definitive conclusion is possible at this time.

- Additional water quality monitoring for Quantification Stage analytes should be done on the nine landfill No. 1 wells. If the results of such additional monitoring fail to resolve the questions raised above, additional monitor wells may be needed for sampling and analysis. If these additional data verify the Quantification Stage results concerning the isolated nature and low concentration of ethylbenzene in Well W5, then based upon our experience with similar types of sites WESTON would conclude that the diluted plume southwest of Six Mile Creek represents a situation of no major environmental concern. This is especially true since there are no known potable water supply wells in either the water table or the Utica Shale Aquifers within at least one mile of the landfill.

5.3.6 Surface Water Flow and Water Quality

The purpose of measuring surface water flows in Six Mile Creek was to assess the potential direct impact of leachate seepage upon the creek. Direct instantaneous flow measurements were made of the two seepage streams entering Six Mile Creek (Sample LS) and of the creek itself at the three stream sampling locations (Samples S1, S2, S3) shown on Figure 11. The seepage streams were measured by timing flow through a small weir. The creek flow rates were determined by measuring flow velocities across measured cross-sectional areas at each sampling station.

The measurements were made during a period of moderately increased flow resulting from a rainstorm. The creek, however, was not above its banks. Calculations for stream flow measurements

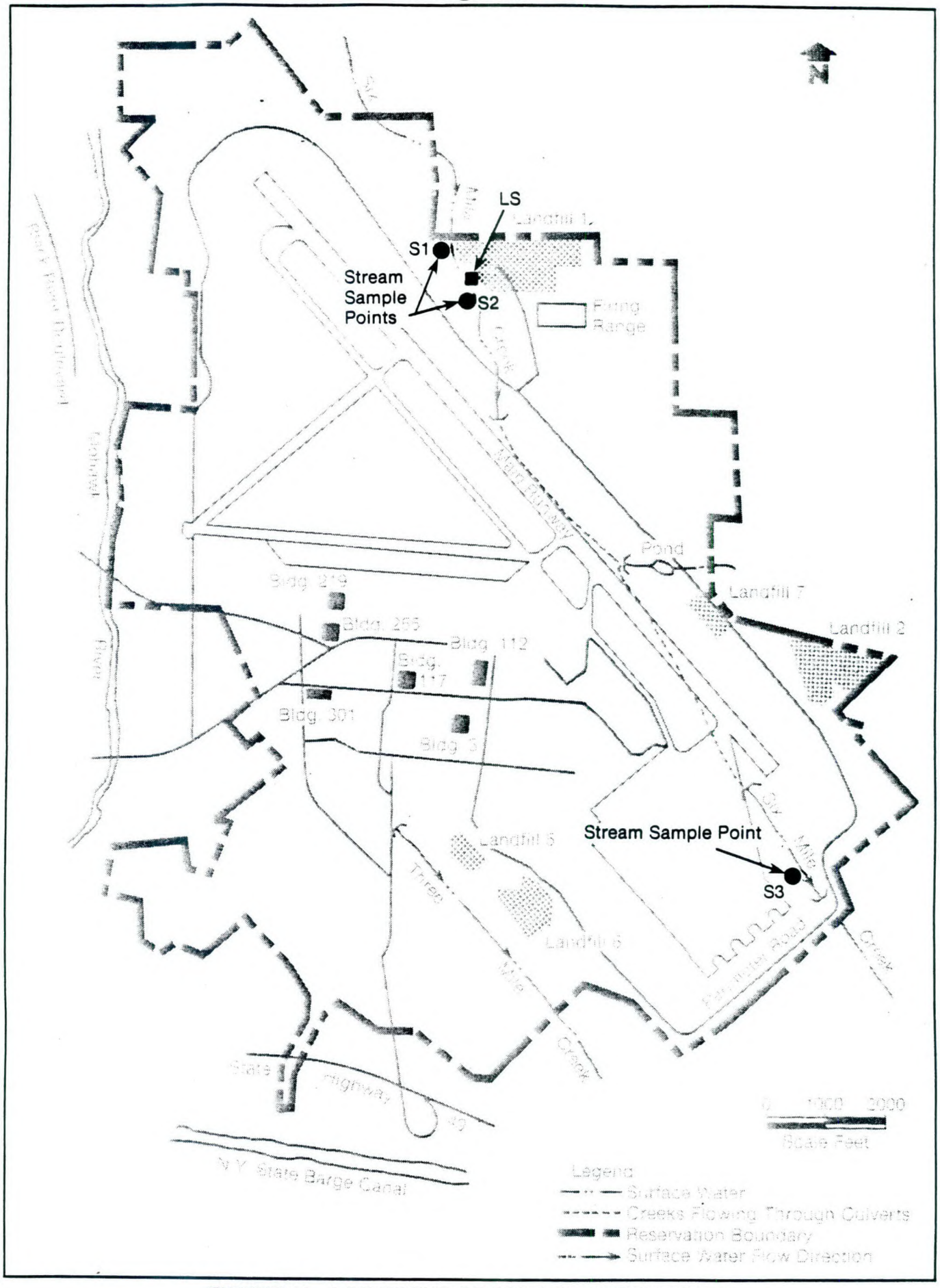


FIGURE 11 LOCATIONS OF FOUR QUANTIFICATION STAGE SURFACE WATER SAMPLING SITES, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

are presented in Appendix H and the results of all measurements are summarized in Table 8. Creek flow at the two locations measured at Landfill No. 1 averaged 4.2 cfs (2.72 mgd). The two readings were within 15% of each other, a precision which is well within the margin of error for such measurements. Flow measured at the culvert where Six Mile Creek exits the base, at the southeastern end of the runway, was measured at 5.8 cfs (3.76 mgd).By contrast, the combined flow of the two coalesced leachate rivulets at the toe of Landfill No. 1 was less than 0.1 cfs (0.06 mgd). This rate of leachate flow was relatively high, due to the recent rainstorm--others have estimated the leachate seepage rate at about five gallons per minute (7,200 gallons per day). If the higher, measured flow rate were typical of the leachate seep, this volume of leachate represents about 1.4 percent of the instantaneous flow rate of Six Mile Creek at the seep. At the Six Mile Creek point of discharge from the base the total discharge of leachate seepage is about one percent of the total instantaneous flow of the creek. In other words, for the time measured the leachate discharged to the Creek experiences approximately an instantaneous 75-fold dilution, and by the time the creek departs the base this dilution factor raises to about a total of a 100-fold dilution. The implication of this finding is: 1) if a compound to be detected at the exit point from the base has a detection limit of 10 parts per billion (ppb), and 2) if that compound is contributed to the creek solely by landfill leachate, then 3) the compound would have to be present in the leachate at a concentration of about 1,000 ppb in order to be detected at all downstream of the discharge. This assumes the same flow ratio of leachate seepage to stream flow throughout the year. No data are known to be available documenting 7-day, 10-year low flow of Six Mile Creek, and the value cannot be calculated on the basis of a single set of instantaneous measurements. If the ratio of spring seepage base flow to the stream base flow increased by a factor of three, the concentration of a contaminant would have to be at least 250 ppb to be detectable immediately downstream of the confluence of the seep with Six Mile Creek.

In order to test this scenario, surface water quality samples were taken at both leachate seeps, and at all three surface water gaging stations. Samples were taken in accordance with the procedure described in Section 4.2.6.2 of this report. The samples were transported to the WESTON Laboratory on ice, and were analyzed for the shortened list of Quantification Stage parameters enumerated in Section 5.3.5. Table 9 contains the results of those analyses. Of the Volatile Organics analyzed for in the leachate, only toluene was detected at 21 ppb--an insufficient concentration to have a local detectable trace in Six Mile Creek at the seep discharge point. The leachate TOC levels were elevated over background surface water levels (assuming

Table 8

Summary of Stream Flow Measurements,
Six Mile Creek, Griffiss Air Force Base

Location	Date	Instantaneous Flow (cfs)	Instantaneous Flow (mgd)
S-1, Six Mile Creek, Station 1, Bridge Upstream from Landfill No. 1	4-27-82	4.4	2.85
S-2, Six Mile Creek, Station 2, Downstream from Landfill No. 1 Seeps	4-27-82	3.9	2.53
S-3, Six Mile Creek, Station 3, Downstream Exit from Base Near Family Center	4-27-82	5.8	3.76
LS, Leachate Seeps (combined)	4-27-82	<0.1	<0.06

Table 9

Results of Quantification Stage Surface Water Quality Analyses - Landfill No. 1

Sample Site	TOC (mg/l)	Cr(sol)[1] (mg/l)	Fe(sol) (mg/l)	Zn (sol) (mg/l)	Ca(sol) (mg/l)	VOA[2] (mg/l)
Seep 1 (Site LS)	55.3	<0.05	<0.05	0.02	147.0	<10
Seep 2 (Site LS)	74.3	<0.05	1.60	<0.02	156.0	21 (Toluene)
Six Mile Creek (Site S1)	2.0	<0.05	<0.05	<0.02	10.1	<10
Six Mile Creek (Site S2)	2.3	<0.05	10.46	<0.02	35.5	<10
Six Mile Creek (Site S3)	3.3	<0.05	0.27	<0.02	14.7	<10
Detection Limits	1.0	0.05	0.05	0.02	0.1	10

[1](sol) indicates dissolved metals.

[2]VOA indicates U.S. EPA Priority Pollutant List Volatile Organic Compounds (see Appendix D).

that Station 1 at the bridge is representative of background conditions), but are consistent with or only slightly higher than the TOC levels expected to be associated with naturally decomposing vegetable matter in marshy terrain. The leachate seep traverses such a marshy terrain between its rising point and its discharge point to Six Mile Creek. At a dilution factor of about 75 the combined leachate TOC can only raise the TOC level in the creek by about 0.9 parts per million (ppm)--an increase of 0.3 ppm over background was actually detected at the discharge mixing point. In effect, such small variations in TOC data are within the error of quantification for TOC. At Sample Point S2 high dissolved iron was detected. Iron floccules were observed in the stream bed at Station S2, probably representing diffuse water table discharge to the creek. While dissolved iron in excess of 10 ppm is high, local pH conditions probably contribute to keeping this iron in solution locally. This iron value is not inconsistent with iron concentrations in marshy deposits in other areas of the northeastern United States. Toluene constitutes between 6 percent and 7 percent by volume of many commercial gasolines, and is a fairly common constituent of commercially available paint strippers and paint and laquer thinners. In a landfill used dominantly for municipal-type waste and refuse disposal it may not be too surprising to find traces of toluene present from municipal trash disposal. The failure to detect ethylbenzene in the leachate seep is supportive of the conclusion that the dilute leachate plume present in groundwater southwest of Six Mile Creek is an isolated occurrence, and that it is not currently sustained and recharged by leachate migrating away from Landfill No. 1.

From the foregoing analyses, several conclusions may be drawn:

- The leachate from Landfill No. 1 does not appear to be toxic to vegetation.
- High dilution factors render the leachate contaminants virtually undetectable at even short distances downstream on Six Mile Creek.
- Landfill No. 1 appears to have no significant impact upon water quality in Six Mile Creek at the point where the Creek leaves the base.

5.3.7 Ground Penetrating Radar Results

As discussed in section 4.2.3.2 the two primary objectives of the GPR tests were: 1) determine the usefulness of the data in the analysis and understanding of soil and bedrock conditions; and 2) determine whether or not the GPR could delineate the landfill boundaries.

The specific geologic data to be obtained by the GPR was a top of rock profile from the landfill to the creek. In order to accomplish this the GPR traverse must begin at, and periodically intercept, known subsurface conditions (wells) and be continuous. The traverse selected began at Well P5, continued to Wells W5 and P2, and then continued directly uphill to the top of the landfill. The profile produced generally conformed to log data, however, it was not continuous. The lack of continuity was due to wet areas adjacent to the creek, to the creek itself, and to heavy vegetation on the hill. Due to the lack of continuity the GPR data was of limited use. However it did demonstrate that top of rock can be located by an unobstructed continuous traverse. Figures 12 and 13 present examples of GPR profiles from Landfill No. 1 that show distinct soil and lithologic interfaces.

The second objective of the GPR test was to determine whether or not the boundaries of the landfill could be delineated. Based on past experience WESTON has observed that natural or undisturbed areas exhibited profiles with continuous interfaces in contrast to disturbed areas such as landfills which exhibit discontinuous or disjointed interfaces. Several GPR traverses, were run through the landfill all of which produced profiles similar to the one shown in Figure 13. Comparing the profiles shown in Figures 12 and 13 it can be seen that areas within the landfill produce profiles distinctly different from adjacent undisturbed areas. Therefore, it has been successfully demonstrated that the GPR can accurately delineate the boundaries of the landfill. Delineation of the landfill boundaries will be helpful in determining the area that will be involved in any necessary remedial action.

5.4 CONCEPT ENGINEERING EVALUATION OF LANDFILL NO. 1

5.4.1 General

The remedial action alternatives have been grouped into two categories according to level and degree of action as follows: The first category, Minimal Action, includes those basic activities which could be applied as a minimum level of environmental control. In general, implementation of the Minimal Actions should reduce potential future environmental contamination but will not significantly contribute to the cleanup of any contamination which may already have occurred. Continued monitoring

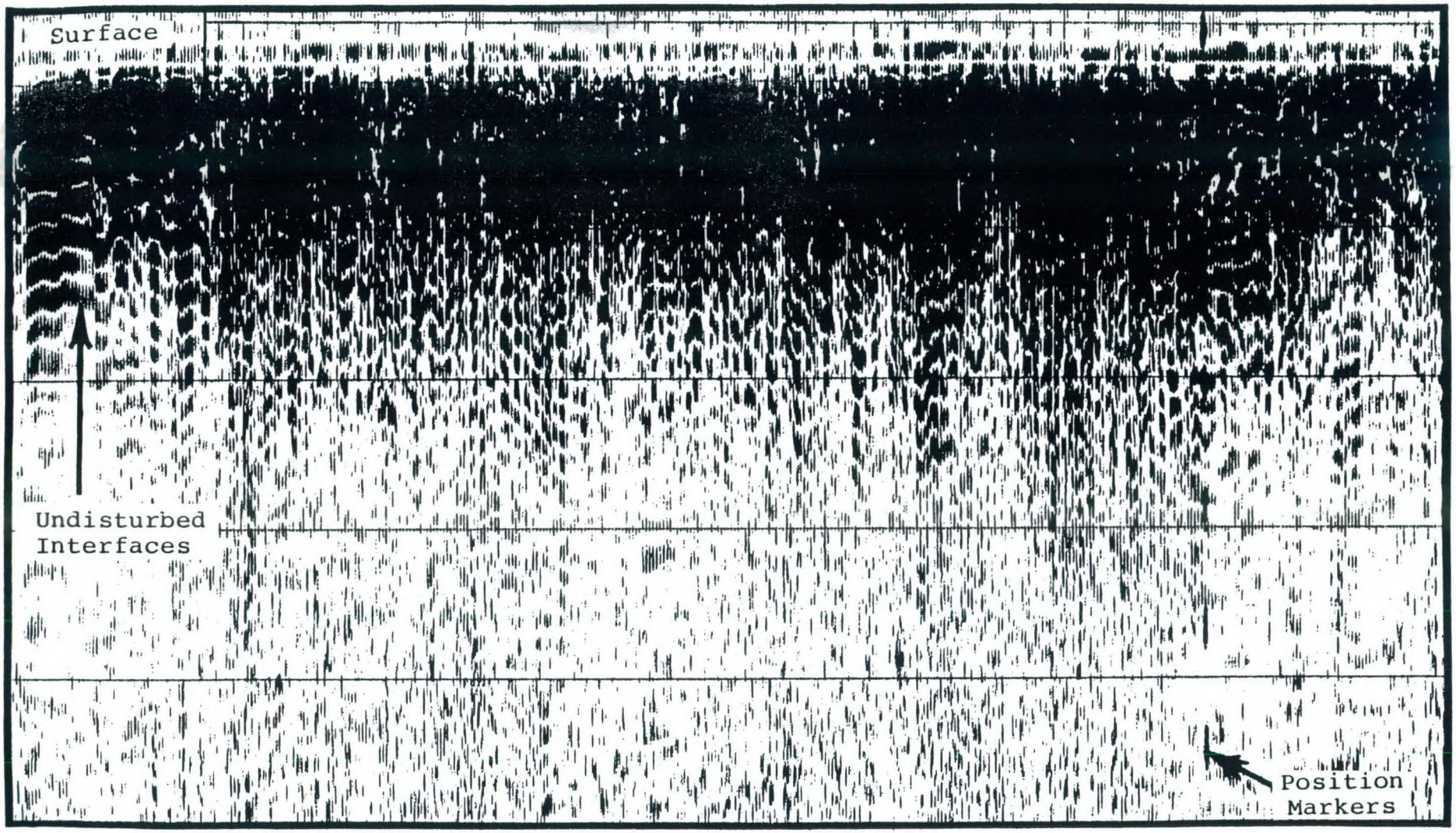


Figure 12: Ground Penetrating Radar Profile of A Disturbed Area, East Side of Landfill No. 1, Griffiss Air Force Base, Rome, New York

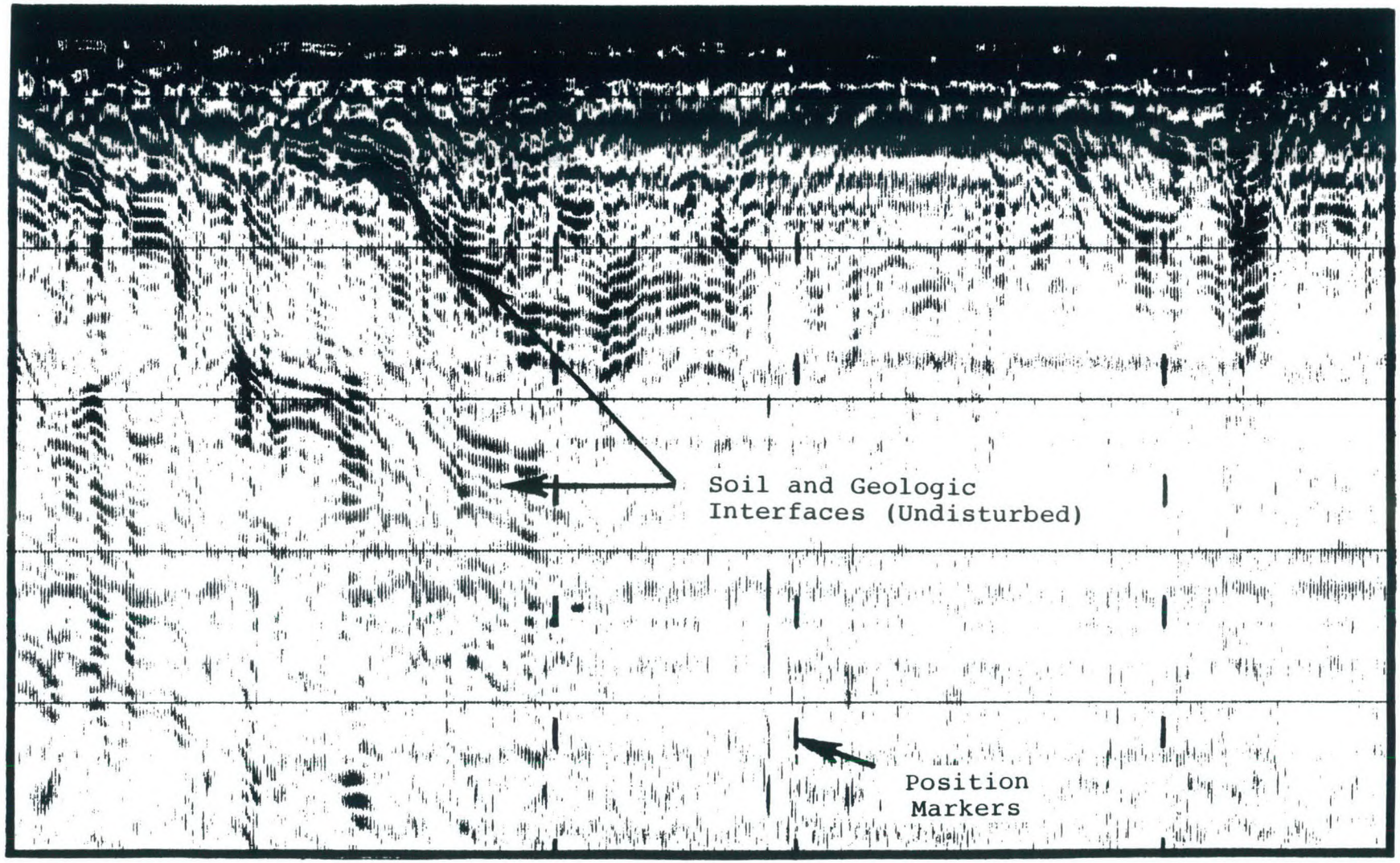


Figure 13: Ground Penetrating Radar Profile of an Undisturbed Area, Staging Area Adjacent to Landfill No. 1, Griffiss Air Force Base, Rome, New York

activities are an important part of the Minimal Actions outlined. If this monitoring shows additional future contamination, it may be necessary to implement one or more of the Additional Actions to further control the site. The Additional Actions are more complex and costly than those activities identified as Minimal Actions.

The New York State Department of Environmental Conservation (NYDEC) requires that a sanitary landfill which has been closed in the past must have been closed in accordance with regulations which were in effect at the time when that landfill was closed. If it was not closed properly in accordance with the regulations in effect at the time of closure, then it must be closed in accordance with current regulations. Municipal waste landfill closure regulations in place during the early 1970's required emplacement of a final cover and implementation of a monitoring program, but no details were provided in the regulations as to specifications for these requirements. Since Landfill No. 1 had a cover installed at closure, and a monitoring program consisting of daily security inspections was implemented, Landfill No. 1 appears to have been closed in compliance with then-existing regulations. Current regulatory requirements of New York were considered in the development of the Minimal and Additional Actions. Exerpts of the current governing regulations are contained in Appendix I.

5.4.2 Remedial Action Alternatives for Landfill No. 1

More extensive remedial actions might be applicable to Landfill No. 1 (shown in Figure 6) than to the other landfill sites due to the presence of a leachate seep at the toe of the fill near Six Mile Creek. The Minimal and Additional Actions for Landfill No. 1 are summarized in Table 10. The Minimal Action does not address treatment of the seep conditions for two reasons:

- The quality of the leachate seeping from the landfill does not appear to be a cause for major concern at thepresent time. As shown in Table 9, iron, zinc, and a volatile organic (toluene) were detected at low levels relative to human health criteria. At this low level toluene will probably volatilize by the time the Six Mile Creek leaves the base. Calcium and TOC levels were slightly elevated.

Table 10

Remedial Action Alternatives for Landfill No. 1
Griffiss Air Force Base, Rome, New York

MINIMAL ACTION OPTIONS

* • Clean up and properly dispose of exposed waste, exposed drums, wind-blown refuse and charred debris noted during field reconnaissance.

• Eliminate trail bike paths to reduce "wear and tear" on the landfill surface.

• Clear the landfill surface of volunteer vegetation, while leaving trees planted as part of the reforestation program undisturbed. Other areas should be cleared to facilitate placement of a partial cap.

* • Backfill surface depressions, compact and regrade the surface to provide positive drainage, provide a firm base for the final cover, and ensure that ponding of precipitation does not occur in the future.

• Apply a cover consisting of a six-inch clay cover and an 18-inch topsoil layer, only in non-forested areas, in order to reduce infiltration and provide support for new vegetative cover.

• Vegetate the cover using mulch stabilization to provide protection against erosion and enhance evapotranspiration of precipitation stored in the soil zone.

• Continue surface water and groundwater monitoring program to document leachate migration, if any. Wells W1, W5, W7 and P2 should be used for this monitoring program, as a minimum.

• Implement a regular inspection program to document the effectiveness of the remedial action.

ADDITIONAL ACTION ALTERNATIVES:

Depending upon environmental impacts and the results of the Minimal Action Options, the feasibility of the following actions should be investigated:

• Physical isolation of the spring, which would require a detailed site investigation to determine the source of the spring, and the pathways of migration of any contaminants detected. Waste around the spring would be excavated to eliminate landfill leachate as a source of spring recharge.

• Leachate treatment may become necessary if surface or groundwater or leachate quality deteriorates significantly. A treatability study would be the first step in this alternative.

• Installation of an area-wide multi-layered cover, as shown in Figure 14, may become necessary if excessive infiltration and subsequent leachate generation exacerbate the current low level of contamination off-site. Such a cover would extend over the entire landfill area, including currently reforested sections.

*Denotes minimum actions specified in current requirements of the New York Department of Environmental Conservation.

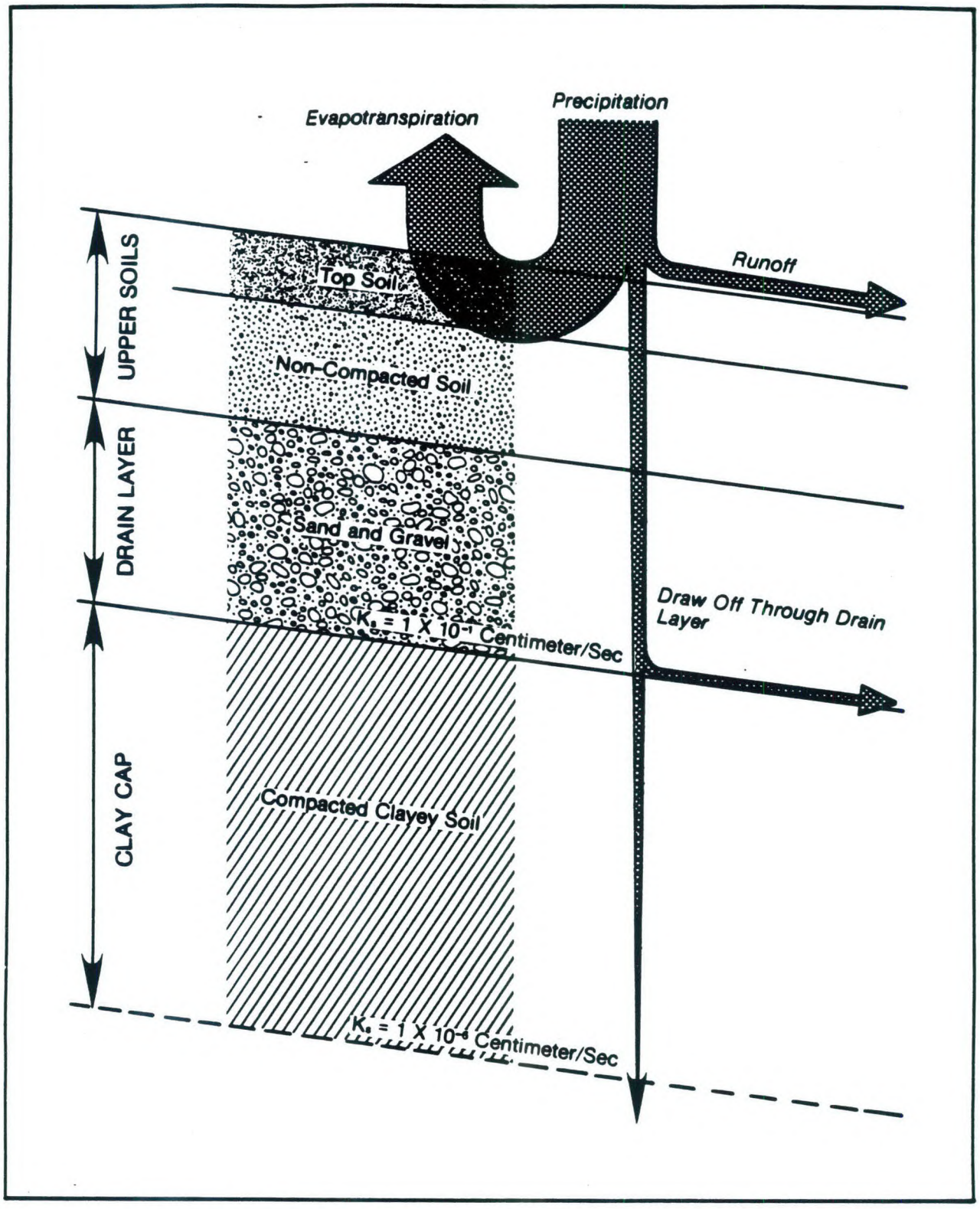


FIGURE 14 SCHEMATIC OF A MULTI-LAYERED LANDFILL COVER SYSTEM

- The quantity of leachate entering Six Mile Creek is small compared to the stream flow. Since the leachate contamination level is so low, it is greatly diluted by stream flow. No significant water quality difference (other than iron at Station S2 as noted above) were noted among the stream sampling points.

If the suggested continuing monitoring activities indicate that either of these conditions has changed (i.e. the leachate quality or stream quality degrades, or the leachate quantity increases) or if the aesthetics of the seep area are to be considered, it may be necessary to implement one ore more of the Additional Actions to address the problem. Table 10 summarizes the Minimal and Additional Action Alternatives for Landfill No. 1. Actions which would be required for compliance with existing landfill reguulations are indicated in Table 10.

Analytical data from the wells surrounding Well W5 indicate that area-wide groundwater cleanup should not be a primary alternative at this time. The occurrence of ethylbenzene in Well W5 appears to be an isolated occurrence unsupported by new contributions of leachate from Landfill No. 1. If additional chemical monitoring continues to show only low levels and localized areas of contamination, then we would recommend that future area-wide groundwater cleanup not be considered further as an Action Alternative. The Minimal Action is intended to reduce the infiltration which enters the landfill and subsequently recharges the leachate seep. Contact of infiltration with the buried waste contributes to leachate generation. The cover would be installed only in those areas where heavy reforestation has not taken place. Ground penetrating radar (GPR) might be used to more accurately determine the boundaries of the filled area prior to placing the clay layer. The regular inspection program specified in Table 10 would include:

- Examination of cover for differential settlement and erosion damage.
- Sampling of groundwater monitoring wells, leachate seeps and surface water.
- Checking for possible methane accumulation in nearby storage bunkers.
- Checking for evidence of any unauthorized entry and dumping.

A typical inspection frequency would be semi-annually for the first two years after completion of remedial action, and annually thereafter if no increased contamination levels occur. Table 11 summarizes a typical chemical monitoring program for a closed New York State sanitary landfill. A program of this type would be applicable to Landfill No. 1 at Griffiss Air Force Base since it was used primarily as a sanitary landfill when it was in active operation. The analytes listed reflect a general listing of tests which should detect leachate from a typical sanitary landfill.

The monitoring program should be continued for a minimum of five years. At the end of the first five years, the results should be evaluated and a decision made concerning possible future monitoring. If no contamination has been found it may be possible to discontinue the program. It may also be decided to continue the program, either as is, or on a reduced scale.

Unauthorized dumping is an important concern at this site due to its remote location. There is evidence, such as burned areas littered with discarded chemical cans and areas of discoloration, that suggests that such activity has recently occurred at Landfill No. 1. One speculative but unverifiable explanation of the low-level presence of a volatile organic compound such as ethylbenzene in Well No. 5 could be a past unauthorized dumping incident in the vicinity of that well.

If future sample analyses or visual inspections indicate that excessive contaminant migration is occurring, one or more Additional Actions might be required. Prior to implementation of any Additional Actions, a detailed site investigation should be undertaken to define more precisely the scope of the problem. A leachate treatability study would be needed in order to define an appropriate treatment scheme prior to implementing an option to collect and treat leachate. Such a scheme might consist of simple aeration to volatilize any organics, and to provide a crude level of biological treatment.

Table 11

Typical Groundwater Quality Monitoring Program
for A Sanitary Landfill in New York State

Semi-Annual Analyses	Annual Analyses
Chloride (Cl	Metals - Fe (sol)
Hardness (as $CaCO_3$)	- Zn (sol)
Phenolic compounds (as phenol)	Nitrate (NO_3)
Total Dissolved Solids (TDS)	Sulfate (SO_4)
COD	Volatile Organics - Benzene - Ethylbenzene
TOC	- Chlorobenzene - Toluene
pH	- Xylene - Trichloroethylene
Specific Conductance	

Wells to be samples under this program would include, as a minimum, W1, W5, W7 and P2.

If future inspections indicate that excessive infiltration is occurring, then a multi-layered cover system, such as is illustrated in Figure 14, might be considered. The purpose of the upper topsoil layer of such a cover system is to support vegetation, which, in turn, promotes evapotranspiration. Beneath the topsoil, the layer of non-compacted soil (native to the area) aids in supporting vegetation through its water-holding capacity, although this soil layer typically lacks the general composition and nutrients needed to adequately support vegetation. The drain layer serves to divert a large portion of the water which percolates through the upper soil layers; it is effective due its high permeability compared with the extremely low permeability of the clay cap. The water follows the path of least resistance, through the drain layer rather than through the cap. All water which permeates the clay layer will eventually percolate through the waste material and into the environment. However, the multi-layered cover system can be designed to divert as much as 90 percent of all precipitation away from the cap and the waste. This would decrease significantly the rate of leachate generation. Successful implementation of a multi-layer cover system over the entire site would require removal of all trees and vegetation currently growing on the landfill surface. For this reason, installation of a complete multi-layered cover system has been classified as an Additional Action to be considered only if the Minimal Action Options prove to be ineffective in preventing future contaminant generation and migration.

SECTION 6

CONFIRMATION STAGE INVESTIGATIONS AT OTHER SITES

6.1 GENERAL

The purpose of these additional Confirmation Stage Investigations was to detect whether or not environmental problems existed at several past waste disposal sites at Griffiss. These sites were identified from the Phase I Records Search recommendations and priority ranking analysis. The sites involved in these additional investigations were as follows:

- Landfill No. 2
- Landfill No. 5
- Landfill No. 6
- Landfill No. 7
- Dry Well at Building 301
- PCB Handling Area at Building 112

The locations of each of these sites are shown on the site index map shown in Figure 15. Several specific questions were to be answered as part of these investigations at each site:

- Does an environmental contamination problem exist at the site?
- Does a potential exist for off-site migration of any contamination found?
- Identify alternative actions which may be used to mitigate adverse environmental effects of any contamination found.
- If additional investigative work is required, make recommendations as to the nature and extent of that work.
- Suggest potential ways of restoring the environment to as near a normal level as is practical.

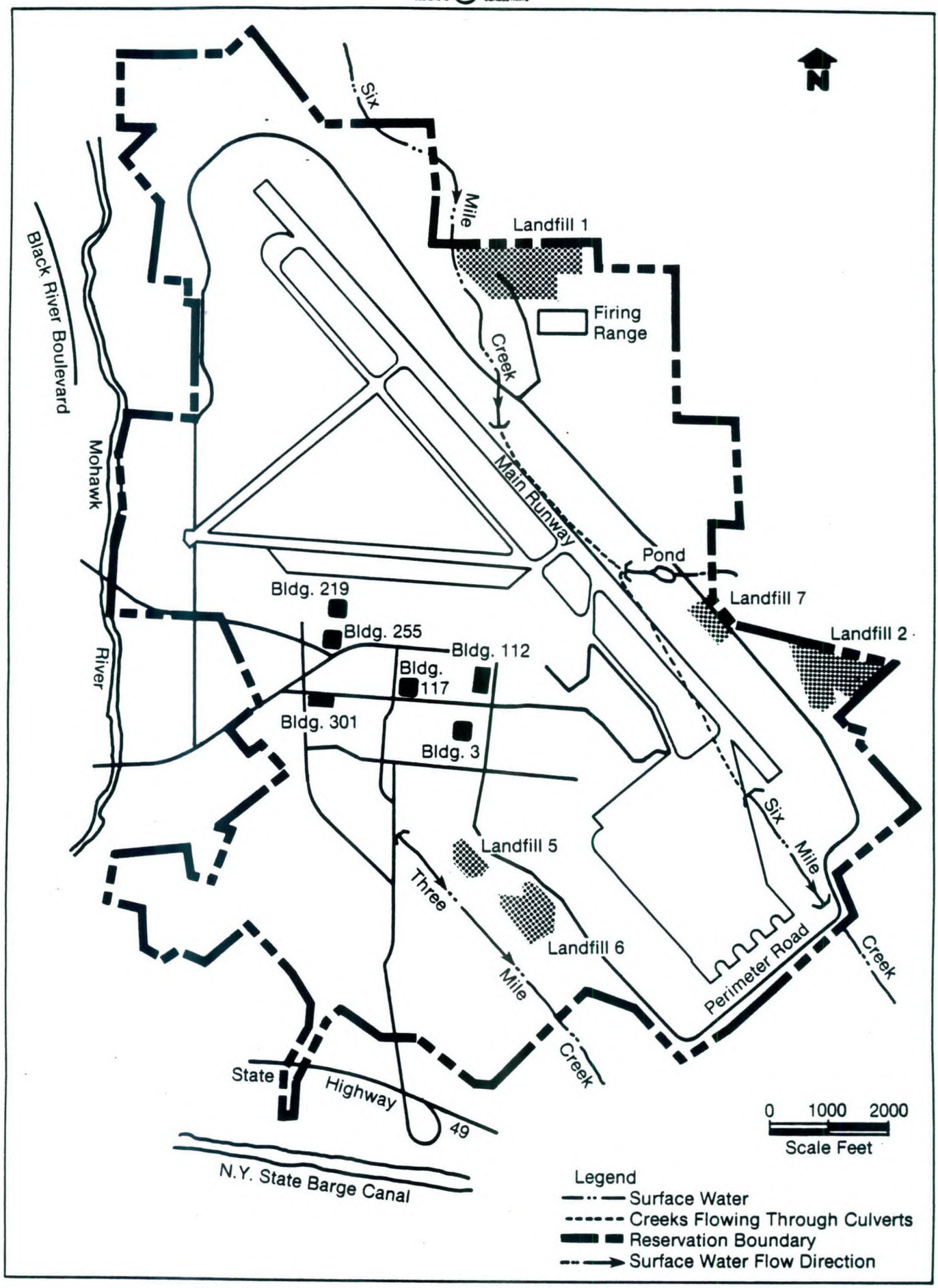


FIGURE 15 LOCATIONS OF LANDFILLS AND DISPOSAL SITES, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

- Suggest a future environmental monitoring program to document environmental conditions at the additional sites.

Based upon the results of the Phase I Records Search, and upon the lower priority ranking of these sites as compared with Landfill No. 1, only Confirmation Stage Investigations were ordered. The results of these investigations would be used to determine whether or not Quantification Stage investigations would be required.

6.2 CONFIRMATION STAGE ACTIVITIES COMMON TO ALL SITES

6.2.1 Site Reconnaissance

The first activity undertaken in these Confirmation Stage investigations was an in-depth field inspection of each site. Results of those inspections are detailed in subsequent portions of this report, under specific site headings. Inspection of vegetation around all the sites revealed almost no stressed or damaged vegetation. Neither was evidence of leachate seeps or chemically discolored soils found.

6.2.2 Remote Sensing Investigation

Aerial photos were obtained from the Intelligence Division, 416 Bomb Wing. These photos clearly depicted all of these additional sites during various years in the past, in both black and white and in thermal infrared prints. Inspection of these photos assisted in determining a better delineated set of boundaries for the sites than was possible from visual reconnaissance. Meticulous examination of the prints, however, detected no evidence of stressed vegetation or thermal irregularities which could have indicated the locations of any subsurface leachate plumes.

6.2.3 Earth Resistivity Surveys

WESTON conducted earth resistivity surveys around all of the sites using a Soiltest Model R-40 Resistivity Meter. The purpose of these surveys was to locate lateral changes in resistivity that may identify subsurface leachate plumes, in order to select sites for the single monitor well authorized for each site. Approximately 2,500 feet of profiles were run on a spot check basis at Landfill No. 2, 5, 6 and 7, and near the Entomology Lab Dry Well (Building 301) using both constant and variable electrode spacings. The surveys focused on most probable downgradient directions. Earth resistivity readings displayed no significant lateral variations thereby rendering the data inconclusive for defining leachate plumes.

Very rainy conditions prevented further work because wet ground affected the reliability of the data. Further efforts in earth resistivity were abandoned for additional sites. The decision was made to install a single downgradient monitor well at each site, as a means of determining the potential for any adverse groundwater impacts which may have been caused by contamination from the sites.

6.2.4 Installation of Monitor Wells

A detailed analysis of topography at each site was undertaken. This analysis revealed the most probable general water table flow direction for each site. One monitor well was placed adjacent to each site, and in a direction indicated by detailed topographic analysis to be downgradient of the site.

All five wells were drilled during November and December 1981, using auger drill equipment, and were drilled and developed in the manner described in Section 4.2.5 of this report. General well construction design followed that shown in Figure 4. Well construction details and boring logs are contained in Appendix C, and well configuration data are summarized in Table 12.

6.2.5 Groundwater Sampling and Analysis

On 22 January 1982, approximately two weeks after completion of development pumping, an initial round of water quality samples was taken from the five monitor wells. Sampling was accomplished as described in Section 4.2.6.1 of this report. Samples were taken for complete analyses of the U.S. EPA Priority Pollutant List, a listing of the compounds of which is in Appendix B of this report. Samples were transported on ice to the WESTON Laboratory, and were extracted and analyzed in accordance with Standard U.S. EPA protocols as noted in Section 4.2.6.3 of this report. Table 13 contains a summary of the data obtained by those analyses. Compounds listed in Appendix D, but not in Table 13, were below quantifiable detection limits.

Soluble chromium was detected in Wells W3, W4 and W8 at levels which could indicate some minor groundwater contamination. A high level of zinc was detected in Well W4 at the Entomology Lab. Copper and phenolic compounds (as phenol) were quantified, but at trace concentrations. Several other compounds were detected in trace amounts, most notably, some of the phthalates. WESTON's Quality Assurance (QA) Officer was of the opinion that a possible QA problem existed, due to the relatively low concentations of those contaminants detected, and due to the relatively high degree of scatter in the QA duplicates analyzed. Prudence indicated that additional analyses were needed, and the QA Officer requested an additional round of samples for a repeat analysis.

Table 12

Monitor Well Construction Data for Five Confirmation Stage Monitor Wells Installed at Landfill No. 2, 5, 6 and 7, and At the Entomology Lab (Building 301), November-December 1981

Well Number	Location Number	Depth (in feet)	Depth Interval of Screen (in feet)	Installation Date	Depth to Water in Feet Below Top of Casing (1-12-82)
W2	Landfill 7	32.0	22.0 - 32.0	11-25-81	20.2
W3	Landfill 2	27.0	17.0 - 27.0	11-24-81	12.7
W4	Entomology Lab	23.5	13.5 - 23.5	11-27-81	16.1
W8	Landfill 5	30.0	20.0 - 30.0	12-18-81	5.8
W9	Lnadfill 6	28.0	18.0 - 28.0	12-18-81	2.5

Table 13

Analyses of Groundwater Samples, Landfill No. 2, 5, 6 and 7, and at the Entomology Lab (Building 301)
11 January 1982

Well Number	Location Number	Cr(sol)[1] (mg/l)	Cu(sol) (mg/l)	Zn (sol) (mg/l)	Phenols (mg/l)	VOA[2] (ug/l)
W2	Landfill 2	<0.05	0.04	0.08	0.006	< 10
W3	Lanfilll 7	0.10	0.04	0.64	<0.005	< 10
W4	Entomology Lab	0.17	0.03	2.49	<0.005	< 10
W8	Landfill 5	0.10	0.09	0.43	<0.005	< 10
W9	Landfill 6	0.08	0.08	0.45	<0.005	< 10
Detection Limits		0.05	0.02	0.02	0.005	10 (each parameter)

[1](sol) indicates dissolved metals.

[2]VOA indicates U.S. EPA Priority Pollutant List Volatile Organic Compounds (see Appendix D).

On 16 February a second round of water samples was taken from the five wells, in exactly the same manner as previously described except that additional QA samples were taken. Table 14 is a summary of the results obtained from this second round of sampling. For ease of comparison, Table 13 data are also contained in Table 14. Only phenols were detected during this sampling round, and the phenols were detected at levels which are not of immediate environmental concern. No other compounds listed in Appendix D were detected.

6.2.6 Conclusions from the Confirmation Stage

The following conclusions were drawn from the results of the aforedescribe elements of the Confirmation Stage investigations at Landfill Nos. 2, 5, 6 and 7, and at the Entomology Lab (Building 301).

- Any leachate being produced by any of the four landfills is of very low concentration of only a very few compounds.
- No evidence was found for off-site migration of any contaminants from any of these landfills.
- No pesticides were detected in groundwater in the Entomology Lab well.
- It does not appear that a Quantification Stage Investigation will be needed at any of these five sites.
- Additional monitoring should be done during the next two years to verify the conditions.

6.3 LANDFILL NO. 2

6.3.1 Site Evaluation

Landfill No. 2 is located on a topographic high on the eastern edge of the base, as shown in Figure 16. The site covers about sixty acres of high ground set back several hundred yards from Perimeter Road. The landfill had been used for municipal wastes from residents of the base until early in 1981. At the time of this investigation its use had been largely discontinued, although the final trench used for waste disposal has not been completely closed. This trench continues to receive boiled domestic wastes from international flights. At the entrance from Perimeter Road a trench had been constructed across the access road in an attempt to block casual dumpers.

Table 14

Summary of all Confirmation Stage Analyses of Groundwater Samples, Landfill No. 2, 5, 6 and 7, and at the Entomology Lab (Building 301)

Well Number	Location Number	Date	Cr(sol)[1] (mg/l)	Cu(sol) (mg/l)	Zn (sol) (mg/l)	Phenols (mg/l)	VOA[2] (ug/l)
W2	Landfill 2	2-16	< 0.05	< 0.02	< 0.05	0.007	< 10
		1-11	< 0.05	0.04	0.08	0.006	< 10
W3	Landfill 7	2-16	< 0.05	< 0.02	< 0.05	0.024	< 10
		1-11	0.10	0.04	0.64	< 0.005	< 10
W4	Entomology Lab	2-16	< 0.05	< 0.02	< 0.05	0.021	< 10
		1-11	0.17	0.03	2.49	< 0.005	< 10
W8	Landfill 5	2-16	< 0.05	< 0.02	< 0.05	< 0.005	< 10
		1-11	0.10	0.09	0.43	< 0.005	< 10
W9	Landfill 6	2-16	< 0.05	< 0.02	< 0.05	0.014	< 10
		1-11	0.08	0.08	0.45	< 0.005	< 10
Detection Limits			0.05	0.02	0.05	0.005	10 (each parameter)

[1](sol) indicates dissolved metals.

[2]VOA indicates U.S. EPA Priority Pollutant List Volatile Organic Compounds (see Appendix D).

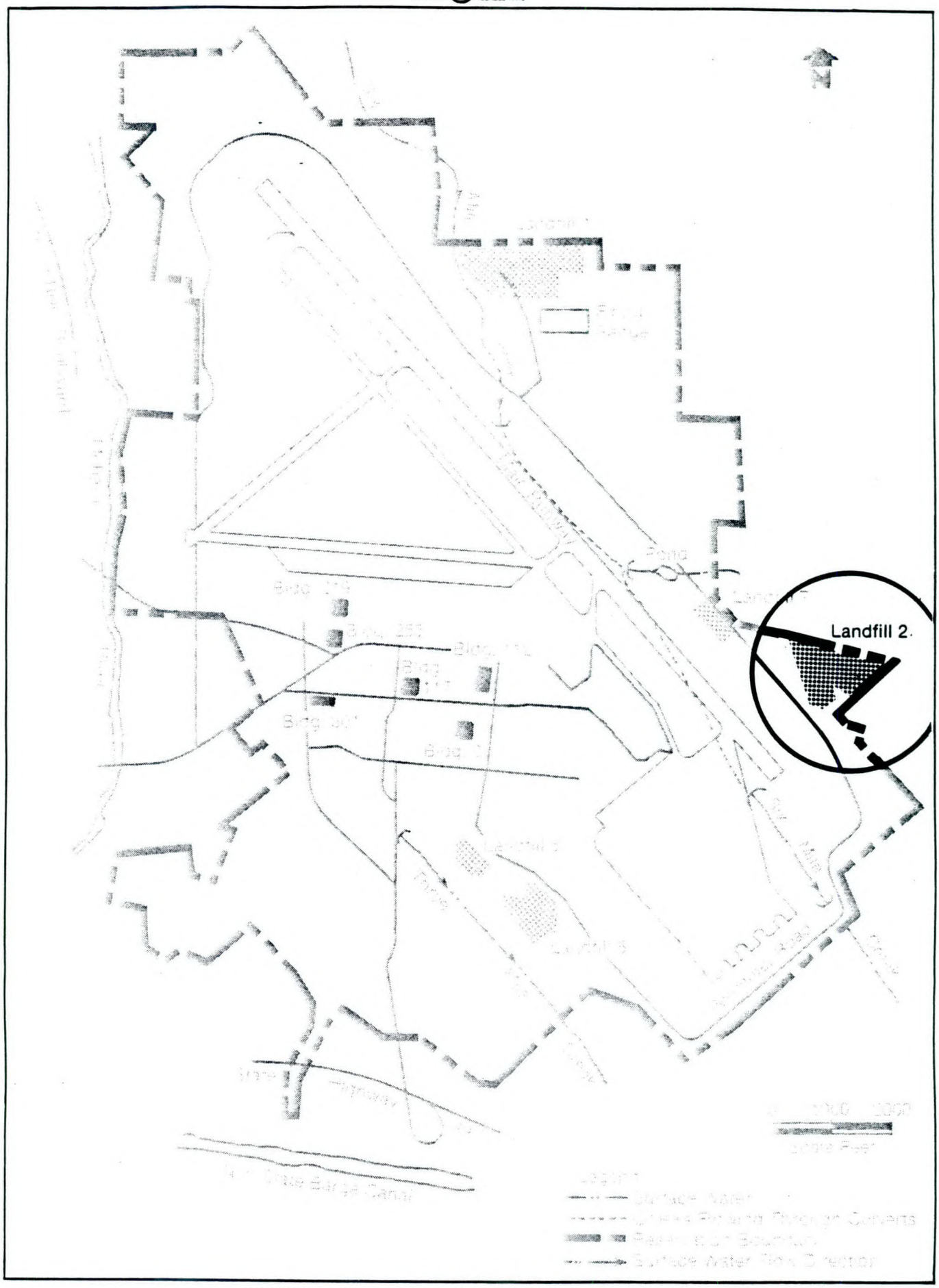


FIGURE 16 LOCATION OF LANDFILL NO. 2, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

The landfill has been partially closed by placement of a layer of coarse intermediate cover. The surface has been partially regraded to direct drainage to the southeast and southwest. The site is barren; revegetation has not yet been established and no soil cover has been emplaced. There is a scant growth of weeds on parts of the surface. Erosion gullies are present, particularly along the access road. Miscellaneous debris is scattered about the site.

Monitor Well W2 was installed adjacent to the landfill toe in a down gradient direction between the landfill and Perimeter Road. The location of Well W2 is shown on Figure 17, which is an expanded plan view of the Landfill No. 2 site configuration. Subsurface materials sampled during monitor well construction were predominantly fine- to coarse-grained sands. Bedrock was not encountered in boring W2. Groundwater quality analyses of samples from Well W2, as summarized in Tables 13 and 14, detected some potential contaminants at very low concentrations. However, it should be noted that this is the most recently active landfill at the base, and, as such, it has the highest probability of generating leachate in the near future of any of this group of sites. Recently deposited refuse is probably undergoing rapid decomposition with the landfill. Decomposition products and unrestricted infiltration of precipitation (due to the absence of a final cover) will combine to form this leachate. Therefore, the Air Force should complete closure of Landfill No. 2 in accordance with State regulations prior to the advent of major leachate generation from the filled materials.

6.3.2 Concept Engineering Analysis

Landfill No. 2 will require proper closure when use is permanently discontinued. This site was used for waste disposal as recently as 1980 and has not yet been completely closed. Methane accumulation in the nearby buildings is not expected, but remains a possibility due to the porous nature of the native soils and the absence of a liner under the landfill. Unauthorized dumping does not appear to be a current problem at Landfill No. 2. Future problems of this sort can be detected quickly with a regular inspection program.

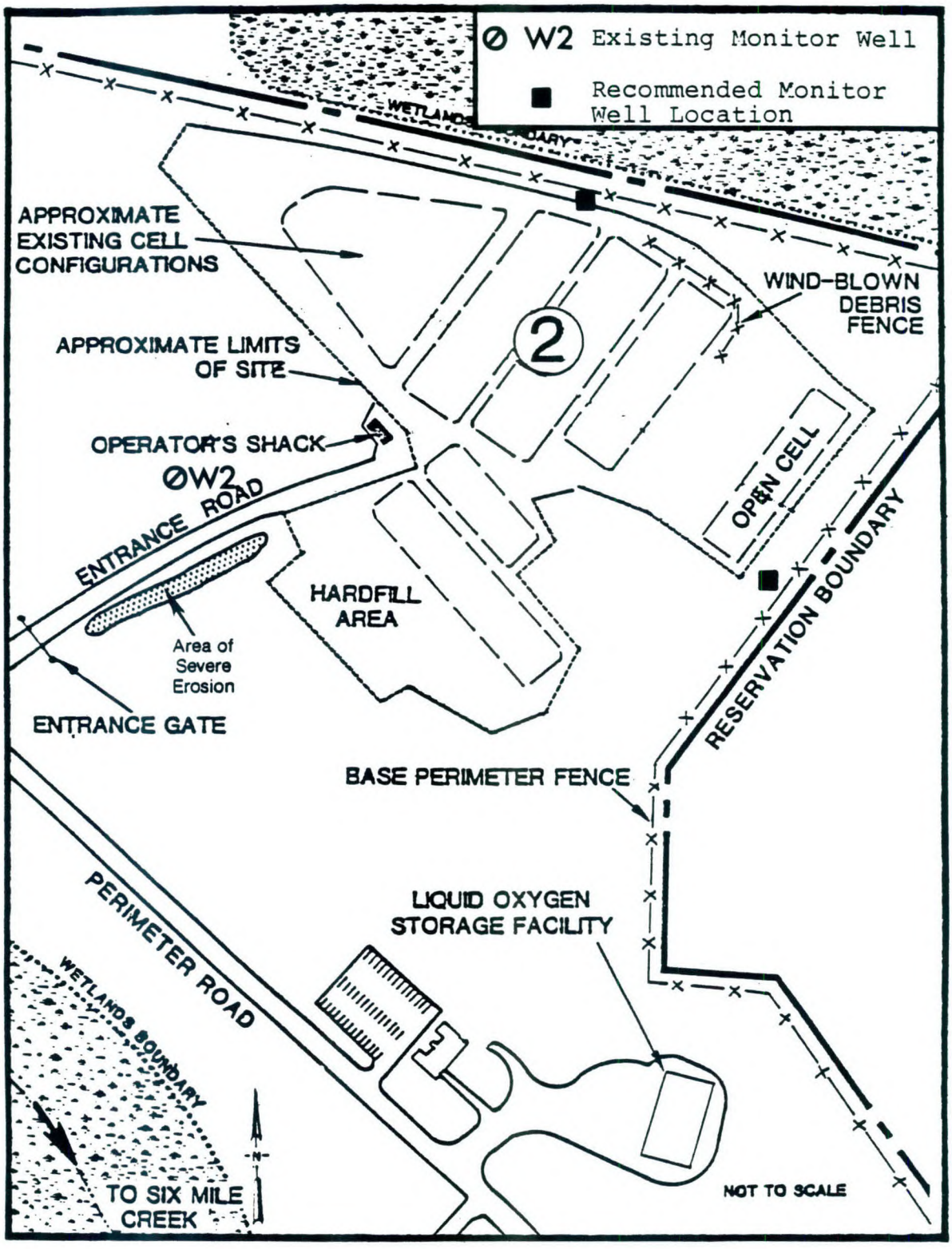


Figure 17: Expanded Plan View of Landfill No. 2, Griffiss Air Force Base, Rome, New York

The Minimal and Additional Actions for Landfill No. 2 are summarized in Table 15. Figure 18 is a schematic cross section representing the Minimal Action Options applied to existing conditions at the site. The Minimal Action described would serve to close Landfill No. 2 in accordance with New York State regulatory requirements for sanitary landfills. The regular inspection program specified in Table 15 would include:

- Examination of the cover for differential settlement and erosion damage.
- Sampling of groundwater monitoring well(s).
- Checking for possible methane accumulation in any nearby buildings.
- Checking for any evidence of unauthorized dumping.

Inspections of the site should take place semi-annually for the first two years after closure and annually thereafter. Table 11 summarizes a typical groundwater monitoring program for a closed sanitary landfill in the State of New York. A program of this type would be applicable to Landfill No. 2 at Griffiss Air Force Base. The analytes listed are those which should detect leachate emanating from a typical sanitary landfill. The groundwater and visual monitoring program should be continued for a minimum of five years. At the end of the first five years, the results should be evaluated and a decision made concerning possible future monitoring. If no contamination has been found it may be possible to discontinue the program. It may also be decided to continue the program, either as suggested above, or on a reduced scale and frequency.

6.4 LANDFILL NO. 5 AND 6

6.4.1 Site Evaluation

Landfill No. 5 and 6 are located adjacent to each other on the southeastern part of the base, to the northeast of Three Mile Creek, as shown in Figure 19. Due to their proximity and historic usage similarities, they will be discussed as a unit.

Table 15

Remedial Action Alternatives for Landfill No. 2,
Griffiss Air Force Base, Rome, New York

MINIMAL ACTION OPTIONS

* Clean up wind blown or exposed wastes for proper disposal.

* Remove standing water for proper disposal prior to emplacement of a final cover.

* Rough grade, backfill and compact the landfill surface to provide positive drainage and a firm base for a final cover, and to ensure that ponding of precipitation will not occur in the future.

* Place a final cover consisting of 18 inches of compacted, low permeability soil, and 6 inches of topsoil, as required by New York State Regulations.

* Vegetate final cover, with mulch stabilization to provide protection against erosion, and enhance reduction of infiltration of precipitation by increasing evapotranspirative losses.

* Repair erosion washouts, particularly to the south of the entrance road, to preserve site integrity.

* Implement a regular inspection program.

* Install two additional groundwater monitor wells, at the locations shown on Figure 17.

* Institute a regular groundwater quality monitoring program.

ADDITIONAL ACTIONS

- If monitoring data indicate that significant leachate generation and migration is occurring, a multi-layer cover system, such as the one shown in Figure 14, could be installed to further reduce infiltration to the landfill.

- If monitoring data indicate that contaminant migration is occurring, then additional monitor wells could be installed in order to define the extent of the migration.

*Indicates those actions which are minimal in order to satisfy current closure of the site as required by New York State Regulations (see Appendix I).

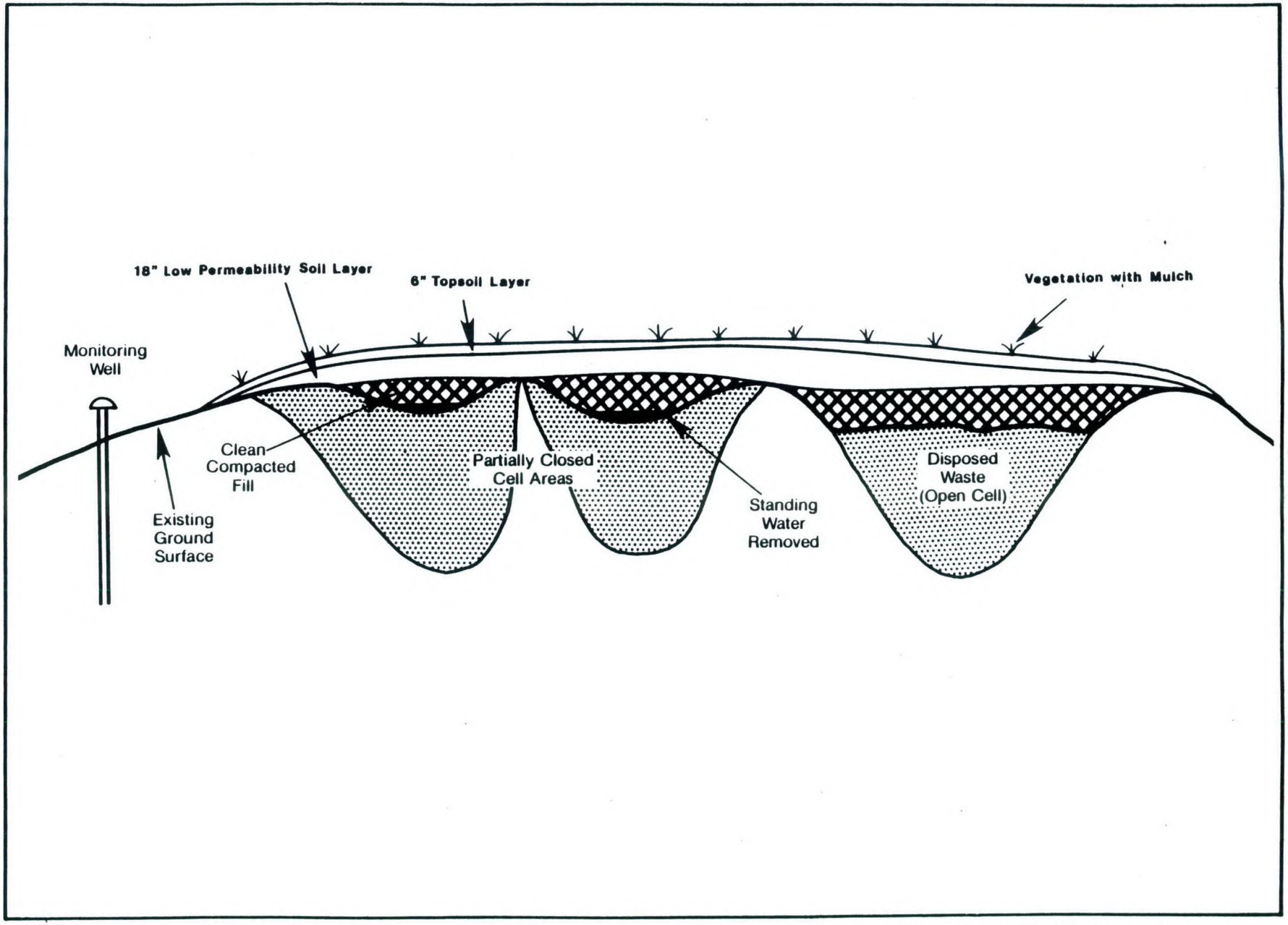


Figure 18: Typical Cross-Section of Minimal Action as Applied to Landfill No. 2, Griffiss Air Force Base, Rome, New York

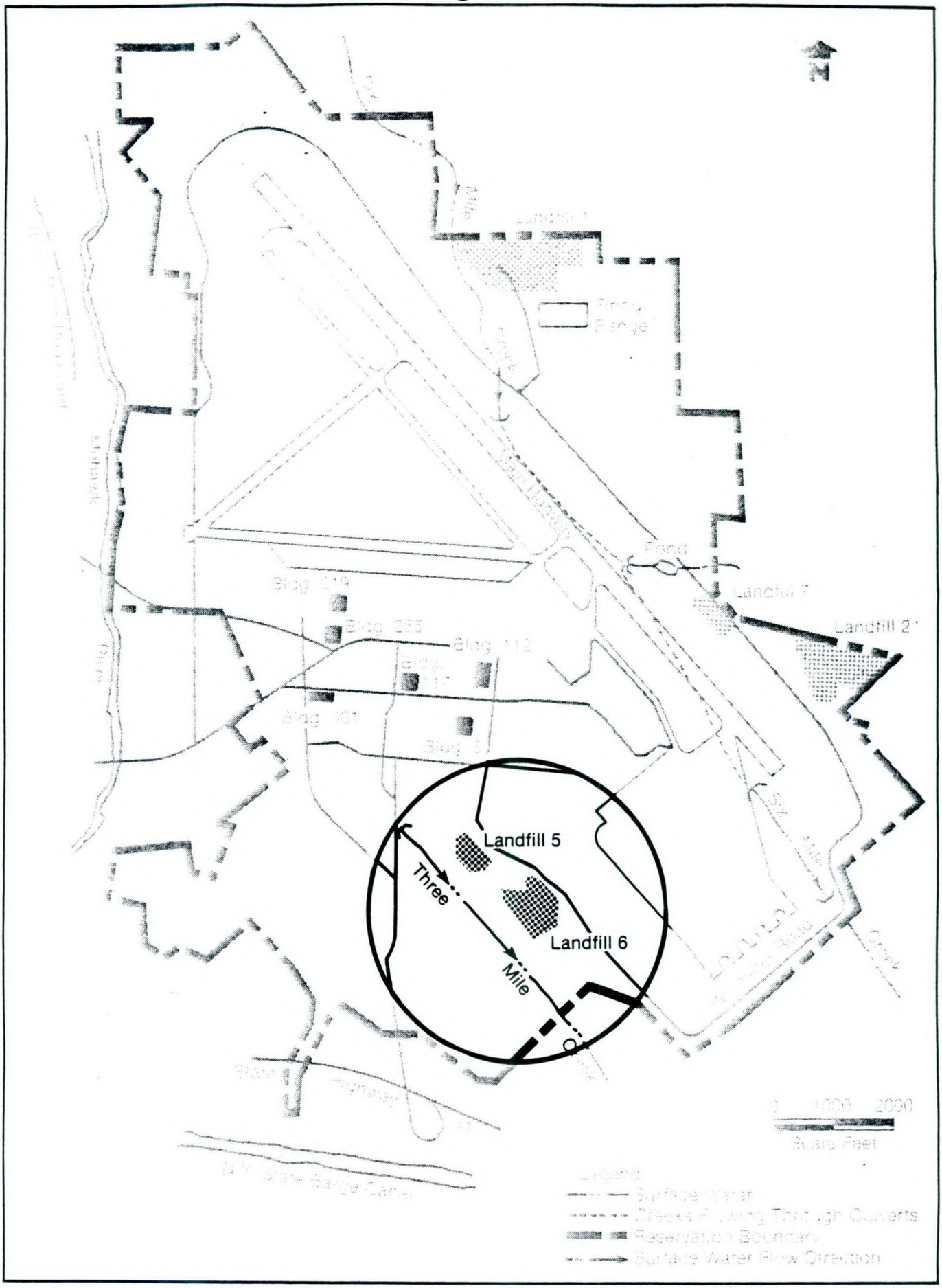


FIGURE 19 LOCATION OF LANDFILL NO. 5 AND 6, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

These landfills were operated in the late 1950's and contain municipal wastes that were burned and covered. Both landfills are built out over the flood plain of Three Mile Creek and the edges of the landfills drop off abruptly to the natural land surface approximately eight to 12 feet below the surface of the fill. Although no evidence of serious erosion was observed on these slopes, it appears that erosion may be a problem in the future, particularly in the spring of each year. The landfill surfaces are flat and overgrown with a thick brushy growth, except for the sloping area at the eastern end of Landfill No. 6 which is densely planted with mature softwoods. This revegetation has occurred in spite of a thin final soil cover material. At the time when these landfills were closed no regulations were in-place which governed and specified procedures for closure of sanitary landfills.

Monitor Well W8 was installed adjacent to the toe of Landfill No. 5 in a downgradient direction between the landfill and Three Mile Creek. Monitor Well W9 was installed in an analogous position at Landfill No. 6. The locations of both monitor wells are plotted on Figure 20, which is an expanded plan view of Landfill No. 5 and 6. Subsurface materials sampled during monitor well construction were predominantly fine-grained silty sands. Bedrock was not encountered in either boring. Groundwater quality analyses of samples from Wells W8 and W9, as summarized in Tables 13 and 14, detected no compounds at concentrations which will cause immediate environmental concern. Due to the ages of these two landfills, it appears that the probability of either of them generating significant quantities of leachate in the future is low. No further actions are recommended at Landfill No. 5 and 6.

6.5 LANDFILL NO. 7

6.5.1 Site Evaluation

Landfill No. 7 occupies approximately 4.5 acres located on the northeast side of the main runway, as shown on Figure 21. The boundaries of the site are not well defined. The landfill was active between 1950 and 1954 and contains domestic refuse type solid wastes, unknown types of liquid wastes, and miscellaneous wastes, all of which were burned in trenches. The landfill is located on a topographic high, is now completely grass covered or paved over, and is indistinguishable from adjacent areas. There is evidence that burrowing animals have removed some of the burned residues from the landfill. Other than localized depressions on the landfill surface, possibly caused by differential settlement, the site is graded to promote surface runoff in all directions. No serious erosion was observed.

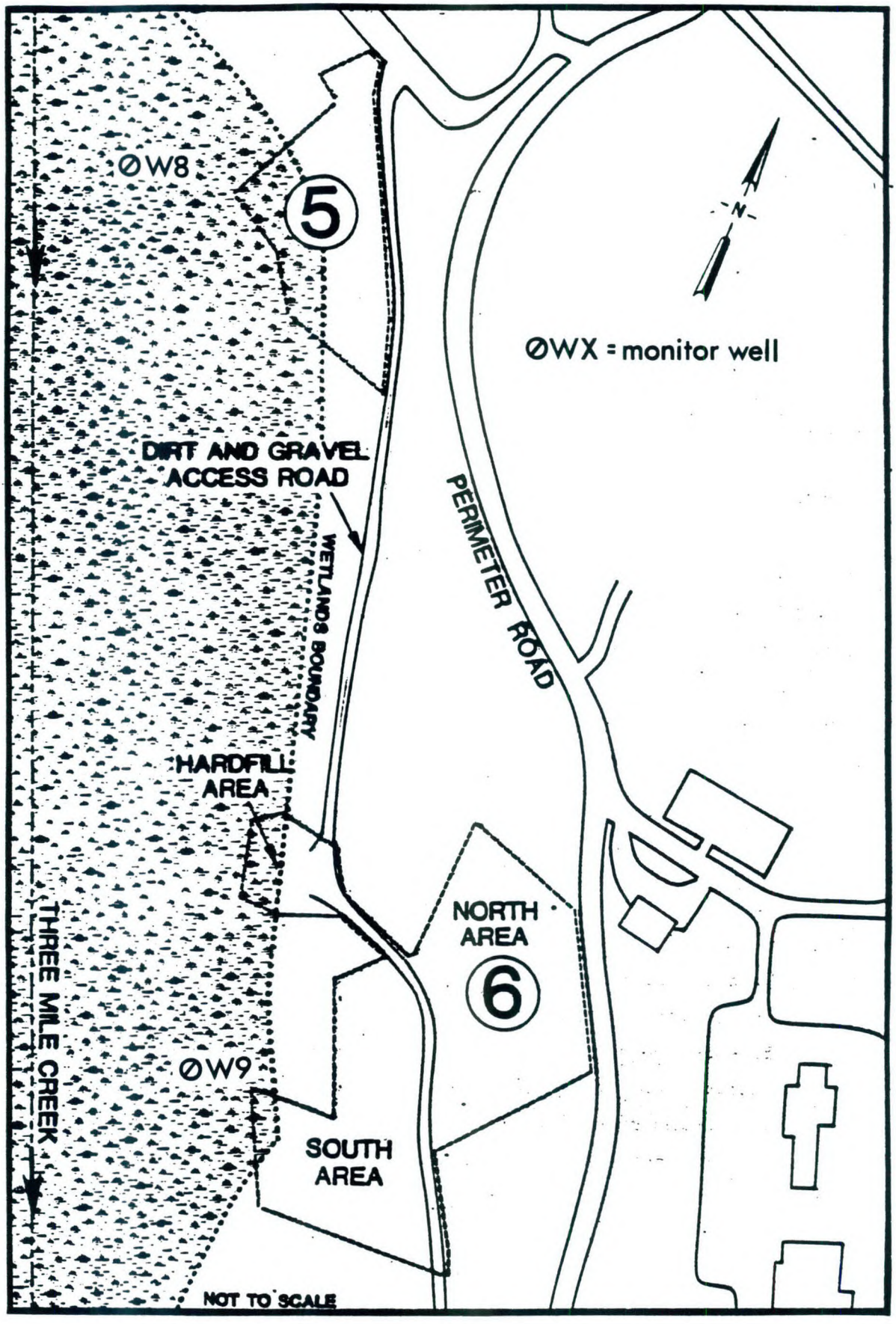


Figure 20: Expanded Plan View of Landfill No. 5 and 6, Griffiss Air Force Base, Rome, New York

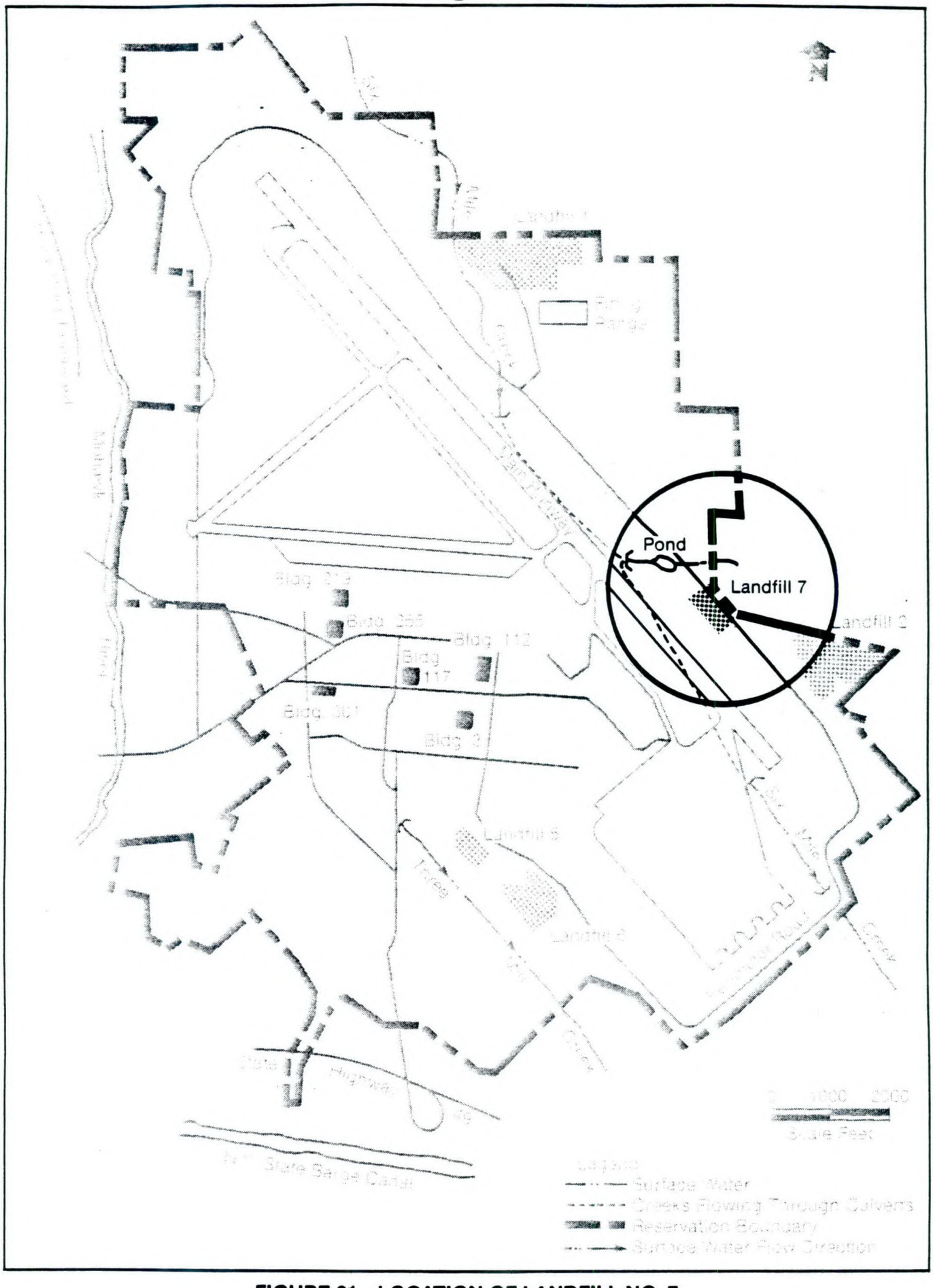


FIGURE 21 LOCATION OF LANDFILL NO. 7, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Monitor Well W3 was installed adjacent to the toe of Landfill No. 7 in a down gradient direction between the landfill and Six Mile Creek. The location of Monitor Well W3 is shown on Figure 22, which is an expanded plan view of Landfill No. 7. Subsurface materials sampled during monitor well construction were predominantly fine- to coarse-grained sands. Bedrock was not encountered at this boring site. Groundwater quality analyses of samples from Well W3, as summarized in Tables 13 and 14, detected no compounds at concentrations which will cause immediate environmental concern. Due to the age of this landfill, the probability that significant leachate generation will occur in the future is low. No further actions are recommended at Landfill No. 7.

6.6 DRY WELL EVALUATION

6.6.1 General

WESTON interviewed Base Bioenvironmental Engineering and Civil Engineering personnel to gain some insights into the nature of the dry wells used for disposal or storage of waste chemicals in the past. Many of these dry wells are constructed as gravel filled pits three to four feet on a side and ten feet deep. Others are poured concrete tanks of roughly similar dimensions. They were used either for storage or for direct disposal of liquid chemical and chemical-related wastes in the past.

6.6.2 Site Evaluations

The locations of most of the dry wells are imprecisely known, since many of them are completely buried or paved over with parking lots. Most of the dry wells are constructed in such a way that there is no method for inspecting the tanks from the ground surface. Aerial photo coverage of the base, discussed in Section 6.2.2 of this report, was of no assistance in either locating the dry wells or in identifying leachate plumes emanating from any of them. One of the few dry wells which could be located was the one adjacent to the Entomology Laboratory (Building 301).

6.6.3 Entomology Lab (Building 301) Dry Well

The location of this facility within the main developed part of the base is shown on Figure 23. This dry well was used for an unknown number of years for the disposal of small quantities of water used for washing pesticide containers (<1 gallon per day of rinsewater) and for small quantities of off-specification pesticides (<2 gallons per year).

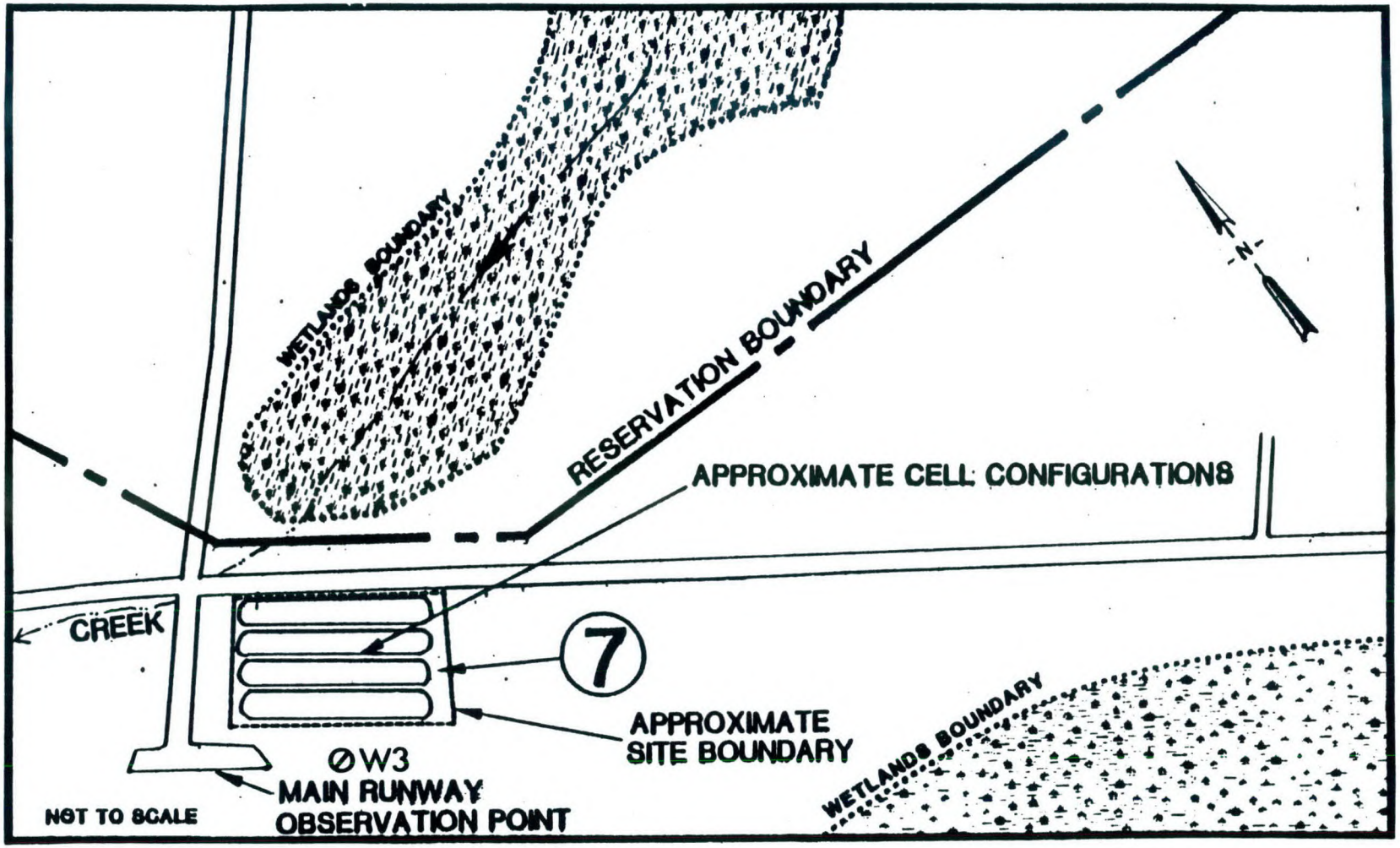


Figure 22: Expanded Plan View of Landfill No. 7, Griffiss Air Force Base, Rome, New York

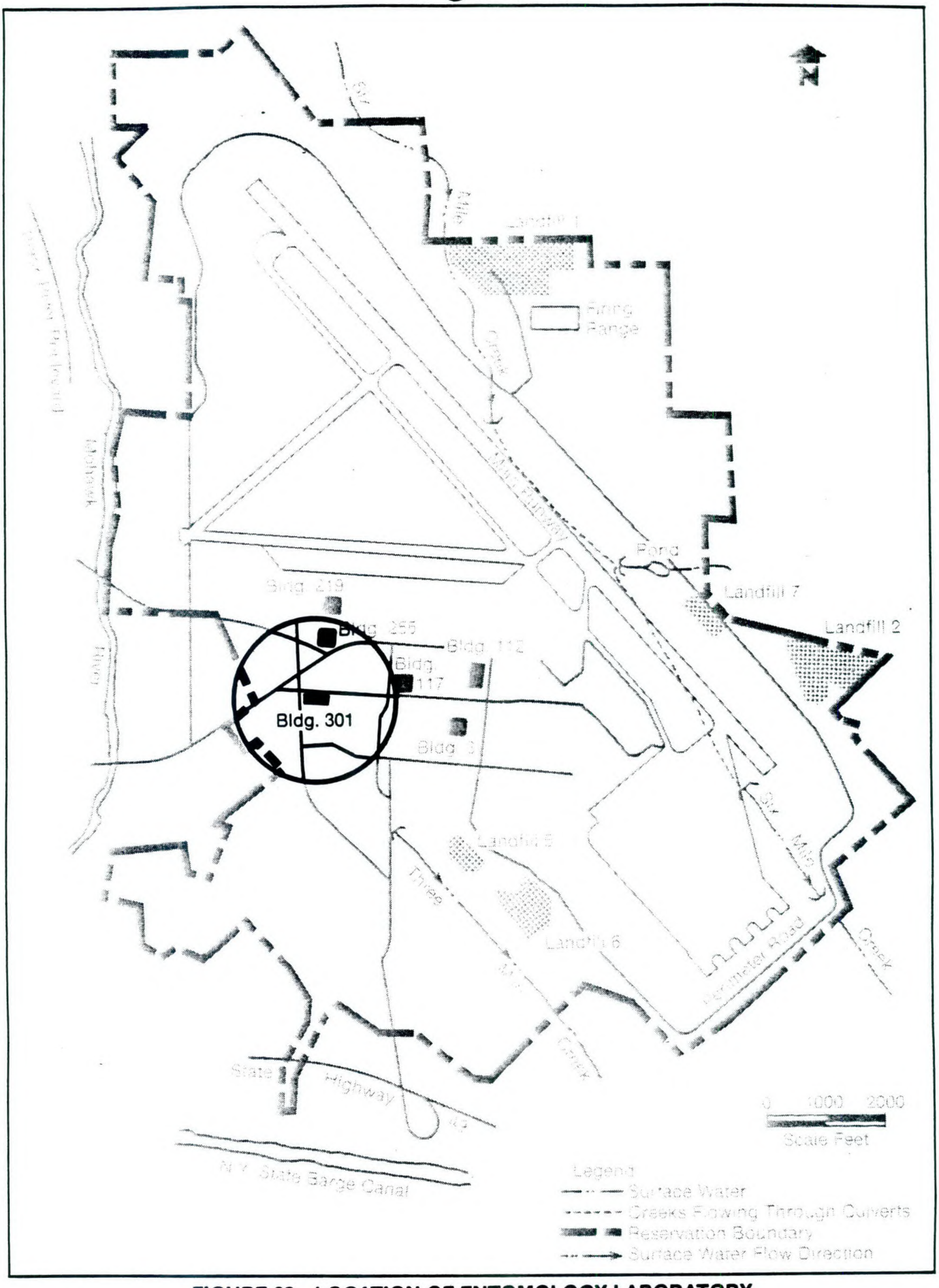


FIGURE 23 LOCATION OF ENTOMOLOGY LABORATORY, BUILDING 301, GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Monitor Well W4 was installed within 50 feet of the Entomology Lab Dry Well. Topographic analysis was of no assistance in determining a downgradient direction from the dry well. This is because Building 301 lies within the central portion of the Base, which has been subjected to massive cut and fill operations in order to level out any natural relief which was present. Well W4 was installed as close to the dry well as buried utilities, parking lots, buildings and roads would allow. Subsurface materials sampled during monitor well construction were predominantly coarse gravel and sand. Bedrock was not encountered at this boring site. Groundwater quality analyses of samples from Well W4, as summarized in Tables 13 and 14, detected no pesticides.

Since no pesticides were detected in Well W4 it would appear that this dry well is of no immediate environmental concern. It is WESTON's understanding that the practice of disposing of hazardous and potentially hazardous chemicals into dry wells has been discontinued. The minimal remedial actions WESTON recommends for this dry well, and for any other chemical-receiving dry wells on the Base, are as follows:

- If any dry wells are still being used for chemical disposal, this practice should be terminated immediately.

- All drains connecting to dry wells on the Base should be identified, and either plugged, disconnected or controlled usage established.

6.7 PCB HANDLING AREA, BUILDING 112

6.7.1 General

PCB has been handled at the loading docks at Building 112, the High Power Laboratory. In the past spills are known to have occurred in this area. In addition, leakage from a transformer on the roof of Building 112 has caused contamination of roof materials. The location of Building 112 is shown on Figure 24.

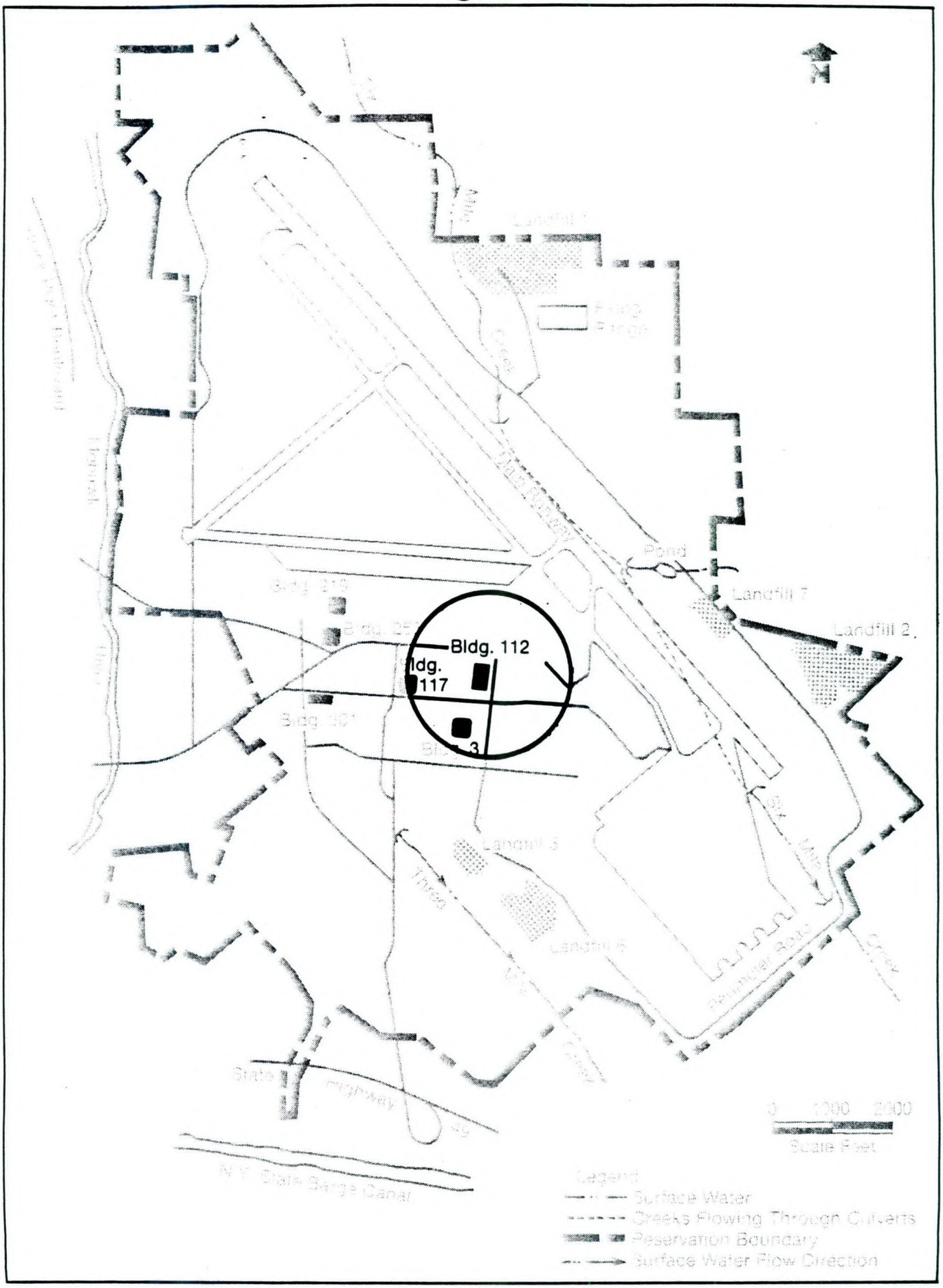


FIGURE 24 LOCATION OF PCB SPILL AREA, BUILDING 112 GRIFFISS AIR FORCE BASE, ROME, NEW YORK

6.7.2 Investigation of PCB Spills

During July and August 1981, Base Bioenvironmental Engineers conducted a program of soil sampling and testing for PCB that included areas by the loading docks on the west side of Building 112. Sampling was done in seven locations, labelled A through G, as shown on Figure 25. PCB was found at locations D and E adjacent to the loading dock near the southwest corner of the building, in concentrations of from 5 to 530 mg/kg at depths of up to 40 inches. Table 16 presents the results obtained by the Air Force contract laboratory. WESTON's investigation was to test for PCB in other areas not already identified in the Air Force Study.

Subsurface soil sampling was done at five locations with a truck-mounted auger rig. Because of the coarse gravel in the soil, split spoon sampling was not practical, so soil samples were recovered directly from the auger. The auger was advanced one foot at a time with composite samples taken from each foot. After each sample the auger was washed with detergent and loose soil was removed from in and around the boring before advancing the auger. Surface grab samples were taken at three additional locations. All samples were logged and stored in glass bottles with foil lined caps.

Boring and grab-sampling locations are shown on Figure 25. Boring B-1 was advanced to three feet, while Borings B-2 through B-5 each were advanced to five feet. Samples from locations S-1, S-2 and S-3 are surface grab samples. The results of WESTON's analyses of these soil samples for PCB are in Table 17. Analyses were planned to be done in a step-wise schedule commencing with the shallowest sample from each site. If PCB concentrations were above the USEPA Action Level of 50 mg/kg in any sample, the next lower sample would also be analyzed. Since all concentrations of PCB in the surface samples were below the USEPA Action Level, no analyses were run on deeper samples. Analysis of the sample for Boring B-1 detected no measurable PCB, while analyses of samples from Borings B-2 through B-5 detected PCB at the lower limit of detection. Analyses of surface grab samples A, B and C detected 6.6, 9.6 and 7.0 mg/kg of PCB, respectively.

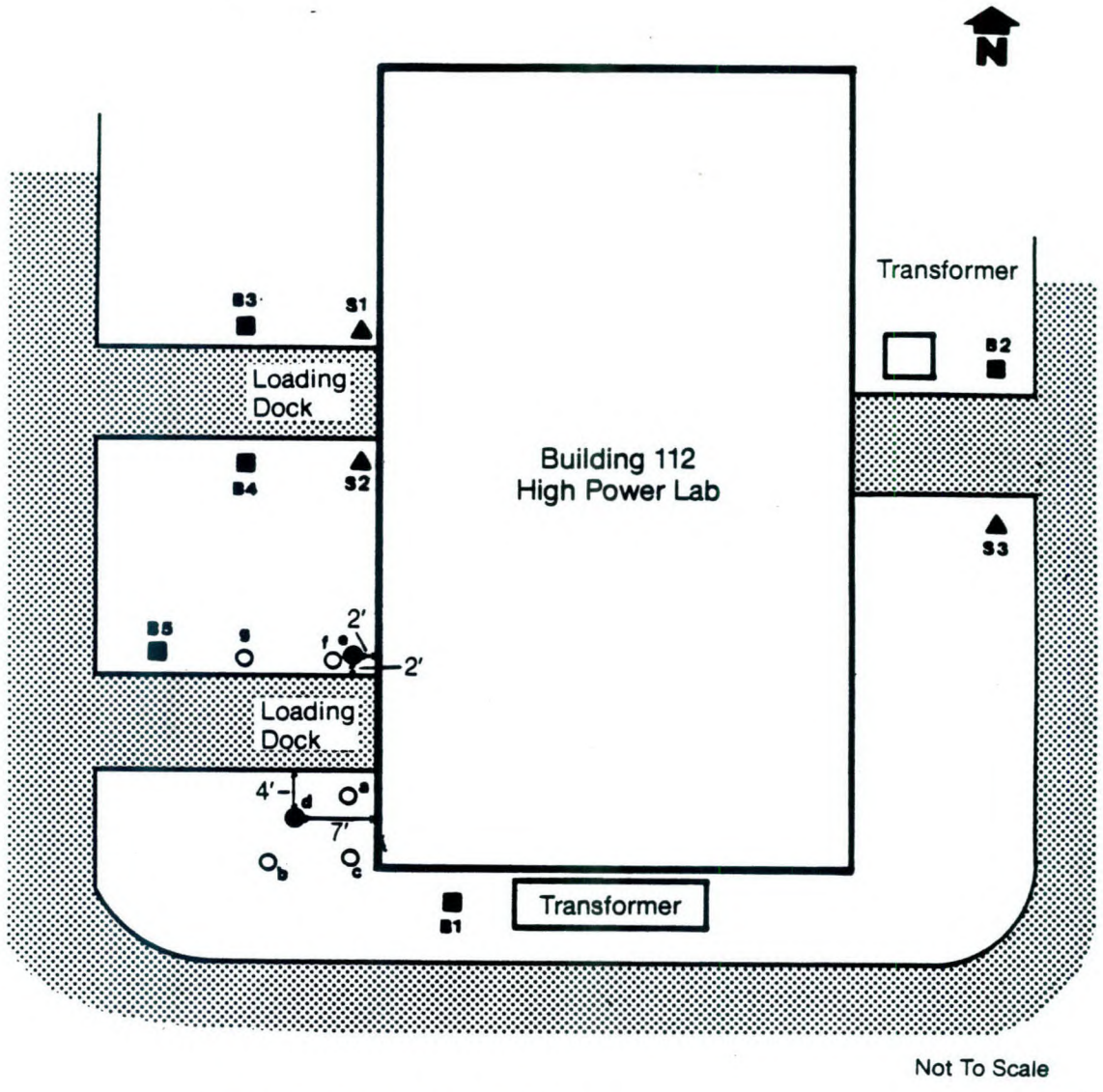


Figure 25: Locations of Soil Samples for PCB Analysis, Building 112, Griffiss Air Force Base, Rome, New York

Table 16

Historical PCB Data
Air Force Investigation, Building 112,
Griffiss Air Force Base

Depth Interval Sampled (feet)	PCB Concentration (mg/kg)**	
	Location "d"	Location "e"
0.25	125	170
0.50	86	122
1.00	78	108
1.50	63	20
2.00	39	5
2.50	30	72
3.00	50	444
3.30	26	530

*All samples were collected and analyzed by the U.S. Air Force during July and August 1981.
**Expressed as mg/kg of Aroclor 1260.

Table 17

Confirmation Stage Soil PCB Data, Building 112,
Griffiss Air Force Base

Sample Location	Depth Interval (feet)	PCB (mg/kg)*
B-1	0.0 - 1.0	<5.0
B-2	0.0 - 1.0	5.0
B-3	0.0 - 1.0	5.0
B-4	0.0 - 1.0	5.0
B-5	0.0 - 1.0	5.0
S-1	0.0 - 0.5	6.6
S-2	0.0 - 0.5	9.6
S-3	0.0 - 0.5	7.0

*All samples were collected and analyzed by WESTON during April and May 1982.
**Expressed as ppm of Aroclor 1260.

6.7.3 Remedial Action Alternatives

The remedial action alternatives for the PCB-contaminated soils at Building 112 have not been grouped as in previous remedial action sections. This is because the handling of all PCB-contaminated materials is regulated under the Toxic Substances Control Act (TSCA). The materials to be considered at Building 112 include:

- Soils contaminated with PCB in concentrations greater than 50 mg/kg.
- Roof material contaminated with PCB in concentrations greater than 50 mg/kg.

Soils contaminated with PCB in concentrations greater than 50 mg/kg must be disposed in either an Annex I (approved for PCB disposal) incinerator or in an Annex II (approved for PCB disposal) chemical waste landfill. Research is currently in progress at the Franklin Institute in Philadelphia, and at other facilities, into methods of chemical neutralization of PCB-contaminated soils; however, this technology is not yet proven on a commercial scale, and has not been approved by USEPA. It may be desirable to excavate and dispose of all PCB-contaminated soils with concentrations greater than 10 mg/kg, providing a higher level of environmental protection than excavation of only soils contaminated with concentrations greater than 50 mg/kg of PCB. The variability of PCB concentrations with depth, as shown in Table 16, may be due to past spill excavation and filling accomplished by Base personnel. Due to this variability complete excavation may be a practical necessity.

Within a 5-foot radius of locations "d" and "e" all soils should be excavated to a depth of 3.5 feet for proper disposal. This is a volume of soil of approximately five cubic yards. Soil samples should be obtained from the bottoms of the excavations and analyzed for PCB concentrations. If the concentrations obtained are below the Action Level of 50 mg/kg the excavations can be backfilled. If the data exceed the Action Level, then the excavations should be deepened and soil analyses repeated until Action Level concentrations are no longer present, then the excavations may be backfilled.

Samples were taken of potentially contaminated roofing materials and of an oil spot adjacent to the roof-mounted transformer. Results of PCB analyses of these samples are shown in Table 18. Roofing materials are contaminated with PCB in excess of the USEPA Action Level of 50 mg/kg. The leak in the transformer should be repaired, and then contaminated roof materials should be removed and replaced. Contaminated roof material must be handled in the same manner as contaminated soils, by disposal in an Annex I incinerator or an Annex II chemical waste landfill.

Table 18

Analysis of Roof and Oil Samples, Building 112,
Griffiss Air Force Base

Sample Identification	PCB Concentration (ppm)
Roof Sample 1	397
Roof Sample 2	153
Grease (from front of transformer)	990,000

NUS CORPORATION

1300 NORTH 17TH STREET
SUITE 1320
ARLINGTON, VIRGINIA 22209
703-522-8802

REFERENCE 5

May 15, 1984
C-582-5-4-160

Mr. Bruce Mero
Environmental Coordinator
Griffiss Air Force Base
Rome, NY 13440

SUBJECT: Scoring of Griffiss Air Force Base for Potential Inclusion on the National Priorities List (NPL)

REFERENCES: 1) Telephone Conversations Between B. Mero, Griffiss AFB and R.Jubach, NUS Corporation, May 8, and May 11, 1984

2) Memorandum From Paul Beam, US Environmental Protection Agency To Bruce Mero, Griffiss AFB (Attached)

Dear Mr. Mero:

As I indicated during our telephone conversation of May 8, 1984 and as discussed in Mr. Paul Beam's attached memorandum to you, NUS required additional information in order to score the Griffiss Air Force Base for a forthcoming National Priorities List update.

The requests for additional information were discussed with you during our May 8 and May 11, telephone conversations. For documentation purposes, attached is a synopsis of the pertinent requests including your noted responses. I would appreciate your reviewing the questions and responses for accuracy and if there are any errors, omissions, or inconsistencies, please inform me so the record can be corrected. Should you detect a problem, an expedient response is requested as our final score for this facility is required to be provided to the U.S. EPA as soon as possible.

I appreciate your assistance in this regard. You have been most helpful and cooperative in providing me with the necessary information.

Sincerely,

Robert Jubach

Robert Jubach
Environmental Scientist

(2) Attachments

GRIFFISS AIR FORCE BASE

Requests for Additional Information

1. NUS has received the following two documents 1) Installation Restoration Program, Phase I Record Search, Hazardous Materials Disposal Sites, Griffiss AFB, New York, July 1981, and 2) Phase II, Problem Confirmation and Quantification Study, Griffiss Air Force Base Rome, New York, Final Report, December 1982. Are there any other reports or documents currently available which could be provided?

RESPONSE

There are no other reports available at this time. Further investigation has led to the need of additional Phase II activities. Phase IIA will begin on Monday May 14, 1984, to analyze possible groundwater contamination from the old fuel oil tank farm near Building 117. A benzene plume has been detected in the groundwater. Phase IIA will aid in quantifying the contamination. Phase IIA will also involve investigation of Landfill 7 as leachate high in phenolics have been discovered and odors have been detected. Additional drywells will also be examined. The Phase I report provided the best data and information at the time but additional investigation since the report could yeld more accurate information although nothing has been quantified at this time.

2. Are the waste quantities and materials provided in Tables 4.2 and 4.3 of the Phase I report accurate?

RESPONSE

These tables provided a reasonably good estimate at the time that the Phase I report was compiled. It is felt that better estimates could be provided now although nothing quantitative has been compiled. The amounts in the tables may be somewhat misleading since the totals often refer to container sizes (e.g., gallons of paint or solvents) rather than liquid quantities. The exact liquid or sludge amounts cannot be determined. Use of the quantities in Tables 4.2 and 4.3 would provide a hazardous waste quantity larger than amounts actually deposited.

3. What types of solvents, alcohols, acids, metals, etc. were deposited? (Tables 4.2 and 4.3 do not indicate this.)

RESPONSE

The exact types are not knonw since there are no records to refer to. Solvents used were generally petroleum solvents such as TCE and MEK.

4. Are there any RCRA permits for storage or disposal facilities on the base?

RESPONSE

Griffiss AFB has a RCRA Part A Interim Status permit which applies to the entire base.

5. For how many years were the drywells in operation?

RESPONSE

The battery shop drywells have been in operation since approximately 1945 while the entomology lab drywell began being used in 1970.

6. Can information be provided concerning on-and off-facility targets for ground water and surface water?

RESPONSE

The base no longer uses the potable water wells discussed in the Phase I report and is now supplied by the Rome Municipal Water System. Approximately 7000 people live and work on-base. There are no wells on base. Some houses off the southeast end of the base use well water. The County Health Department in Utica may be able to provide some information. There are no requirements for providing well logs so data may be difficult to obtain.

7. What occurred during the PCB spill at the Floyd Test site?

RESPONSE

The PCB actually spilled into a containment area which was lined with clay and then immediately cleaned up.

8. What is the status of the PCB spill at Building 112?

RESPONSE

There is a leaking transformer on the building roof. It is estimated that 10 gallons have spilled in total. PCB has been detected in soils near the loading dock from spills of unknown amounts. Any amount disposed of on the ground was extremely small. Approximately 37,000 gallons of PCB contaminated oil is stored in Building 112.

9. How many drums of contaminants were stored at Lot 69 prior to decommissioning of the storage area? What contaminants were stored there and what containment system was used?

RESPONSE

Several hundred drums were stored at Lot 69 (200 would be a reasonable number) not all of which were totally filled with contaminants. The list of contaminants provided in Table 4.10 of the Phase I report is a reasonable inventory of what was stored there. The area had a concrete surface with a six to eight inch dike but no leachate collection system. No known spills occurred.

10. Where are the nearest houses that use well water to the Griffiss AFB Facility Boundary?

RESPONSE

Houses exist just off the facility near Landfill No. 7 and in Wright Settlement near Landfill No 1.

REFERENCE 6

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
GRIFFISS-3	5/9/84	PM

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
P. LAMBERT	ONEIDA COUNTY HEALTH DEPT.	(315)798-5702

AND: R. JUBACH (NUS)

DISCUSSION:

THERE ARE NO SURFACE WATER INTAKES (FOR DRINKING OR IRRIGATION) WITHIN 4 MILES OF GRIFFISS AFB. THE ROME INTAKE IS 10-15 MILES NORTH OF THE BASE.

LAMBERT BELIEVES HOUSES EAST OF THE AIR FORCE BASE (AND ROME) ARE ON PRIVATE WELLS. KNOWS NOTHING ABOUT NUMBER OF WELLS OR DEPTHS. CITY OF FLOYD IS ALL PRIVATE WELLS. NO IRRIGATION IN THE AREA THAT HE IS AWARE OF.

CITY OF ROME ENGINEER - FRANK CLARK 336-6000

ACTION ITEMS:

REFERENCE 7

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
GRIFFISS - 5	5/11/84	AM

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
JOHN JACKSON	ONEIDA COUNTY SOILS CONSERVATION SVC	(315)797-5320

AND: R. JUBACH (NUS)

DISCUSSION:

NO IRRIGATION PRACTICED IN ONEIDA COUNTY THAT HE IS AWARE OF. IF THERE IS ANY, IT IS ON A VERY SMALL SCALE BUT HE IS NOT SURE OF ITS EXISTENCE.

ACTION ITEMS:

REFERENCE 12

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
GRIFFISS-10	5/14/84	AM

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
PAUL HAMILTON	U.S. FISH AND WILDLIFE SERVICE	(607)753-9334

AND: BOB JUBACH (NUS)

DISCUSSION:

FISH AND WILDLIFE SERVICE ACCEPTS STATE REGULATIONS IN NEW YORK FOR WETLANDS CLASSIFICATION. GENERALLY, IF AN AREA IS CLASSIFIED A WETLANDS BY THE STATE OF NEW YORK, THEN THE AREA WOULD BE CLASSIFIED A WETLANDS ACCORDING TO FEDERAL REGULATIONS. THE ONLY DIFFERENCES WOULD BE FOR THOSE AREAS ABOVE HEADWATERS WHICH DOES NOT APPLY TO THE ROME AREA.

ACTION ITEMS:

REFERENCE 13

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
GRIFFISS-4	5/10/84	PM

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
FRANK CLARK	CITY OF ROME	(315)336-6000

AND:

R. JUBACH (NUS)

DISCUSSION:

CLARK IS THE CITY ENGINEER FOR THE CITY OF ROME AND IS COGNIZANT OF THE MUNICIPAL WATER SUPPLY SYSTEM.

THE ROME MUNICIPAL INTAKE IS ON FISH CREEK NEAR ANNSVILLE, NY 12 mi WNW OF ROME. THE ROME MUNICIPAL WATER SUPPLY SYSTEM SERVES APPROXIMATELY 50,000 PEOPLE. THE SYSTEM SERVES ROME, GRIFFISS AFB, ½ THE TOWN OF LEE, STANWIX AND STANWIX HEIGHTS. NOTHING EAST OF GRIFFISS AFB IS ON THE DISTRIBOTION SYSTEM. FRANK WILL SEND A MAP OF THE DISTRIBOTION SYSTEM. HE DOESN'T KNOW OF ANY WELLS SHUT DOWN BECAUSE OF CONTAMINATION. THE CITIES OF FLOYD AND MARCY USE PRIVATE WELLS.

LOCAL WELL DRILLERS BATES BROTHERS - 337-9740
LEE BATES - 337-2560

~~ACTION ITEMS:~~

SOILS CONSERVATION SERVICE - UTICA 793-8141
ONEIDA COUNTY FIELD OFFICE NEW HARTFORD 797-5320

REFERENCE 14

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
GRIFFISS-6	5/11/84	AM

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
RUSS LOGALBO	UTICA WATER BOARD	(315) 798-3301

AND: R. JUBACH (NUS)

DISCUSSION:

THE UTICA MUNICIPAL WATER SYSTEM SERVES UP TO THE CITY BOUNDARY OF FLOYD AND ORISKANY, NO FURTHER WEST. THE SYSTEM DOES NOT SERVE CAMRODEN.

THE INTAKE IS AT HINCKLEY RESERVOIR 20 mi NNE OF UTICA.

ACTION ITEMS:

REFERENCE 15

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
GRIFFISS-15	6/21/84	AM

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
BRUCE MERO	GRIFFISS AFB	( )

AND: Bob JUBACH (NUS)

DISCUSSION:

BATTERY ACID WASTES THAT WERE DISPOSED OF [redacted] CAME FROM LEAD STORAGE CELLS. THE ACID WAS NEUTRALIZED BEFORE BEING DEPOSITED IN DRYWELLS. BEGINNING ABOUT ONE MONTH AGO, WASTES WERE DISPOSED OF IN DRUMS AND DRYWELLS ARE NO LONGER USED.

DRYWELLS ARE NOT PART OF THEIR RCRA PERMIT.

THREE AND SIX MILE CREEKS ARE CURRENTLY USED FOR RECREATION. (e.g. FISHING AND SWIMMING).

ACTION ITEMS: N/A

NUS 067 REVISED 0581

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 416TH COMBAT SUPPORT GROUP (SAC)
GRIFFISS AIR FORCE BASE, NEW YORK 13441

RECEIVED R. JUBACH 6/20/84

REFERENCE 16

REPLY TO ATTN OF: DEEVE (B.H. Mero, 2098)

13 JUN 1984

SUBJECT: Scoring of Department of Defense Sites for Inclusion on the National Priorities List (NPL)

TO: United States Environmental Protection Agency
Office of Solid Waste and Emergency Response
Hazardous Site Control Division
ATTN: Mr Paul M. Beam
NPL/Federal Facility Coordinator
Washington, D.C. 20460

1. Reference:

a. USEPA undated letter, subject as above.

b. NUS Corp letter, 5 May 84, subject: Scoring of Griffiss AFB for Potential Inclusion on the National Priorities List (NPL) (w/atch)

2. We have reviewed the synopsis of telephone discussion between NUS Corporation, Mr Robert Jubach, and our Installation Environmental Coordinator, Mr Bruce H. Mero. We have minor changes to offer on Mr Mero's responses to Mr Jubach's questions which will provide additional data or clarify points.

a. Response to Item #1 - Mr Mero's response to this question indicated that there were no additional Installation Restoration Program reports other than the ones referenced. We might add that Fred C. Hart Associates prepared a report titled Field Investigations of Uncontrolled Hazardous Waste Sites; Hazardous Waste Site Investigation, Griffiss AFB, Rome, New York. (Task report to the Environmental Protection Agency Contract Nr 60-01-6056) dated October 30, 1981, which may assist your determination. Additionally, the Surveillance and Analysis Division Region 2, EPA prepared a report, Waste Disposal Site Investigation Griffiss AFB, NY dated 10 July 1980, which you may also wish to refer to. We assume both reports to be on file at Region II, EPA.

b. Response to Item #2 - Mr Mero's response should indicate that the landfilling disposal activity on the referenced list actually refers to the empty containers (pails, cans or bags) being landfilled rather than the liquid contents of those containers, which was used for its intended purpose.

c. Response to Item #3 - Mr Mero's response should read"solvents used were generally petroleum solvents, TCE and MEK."

d. Responses to Item #4,5,6 and 7 are correct as reported.

e. Response to Item #8 - Mr Mero's response was incorrectly reported. The final sentence should read "approximately 37,000 gallons of PCB contaminated oil was,at one time, used in Bldg 112. This oil was disposed

of in October 1982.

f. Response to Item #9 - Mr Mero's response should read "Several hundred drums were stored at Lot 69 (200 would be a reasonable number) not all of which were filled with contaminants. Many were previously empty drums which had filled with rainwater. The list of contaminants provided in table 4.10 of the Phase I Report is a reasonable inventory of what was stored there. The area had a concrete surface with a six to eight inch dike but no leachate collection system. No known spills occurred."

g. Response to Item #10 is correct as reported.

3. We appreciate the opportunity to participate in your evaluation. Should additional information be needed, please feel free to contact Mr Mero, 315-330-2098.

Michael J. Howayeck

MICHAEL J. HOWAYECK, Lt Col, USAF
Base Civil Engineer

REFERENCE 17

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
GRIFFISS-11	5/14/84	AM

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
MRS. LEE BATES	LEE BATES WELL	(315) 337-2560

AND: R. JUBACH (NUS)

DISCUSSION:

WELLS IN THE ROME AREA ARE DRILLED UNTIL HITTING A MINIMUM OF 5 GAL/MIN FLOW. SOMETIMES THIS OCCURS VERY SHALLOW (40 TO 50 ft) AND SOMETIMES RATHER DEEP (APPROXIMATELY 300 ft). THE DEPTH HOWEVER IS GENERALLY 80 TO 100 ft. THEY ARE NOT CONCERNED ABOUT WHICH AQUIFER THEY ARE IN.

ACTION ITEMS:

REFERENCE 18

NUS CORPORATION — TELECON NOTE

CONTROL NO:	DATE:	TIME:
GRIFFISS-16	6/22/84	PM

DISTRIBUTION:

BETWEEN:	OF:	PHONE:
FRANK JENNINGS	DEPT. OF TRANSPORTATION	(315)793-2554

AND: Bob JUBACH (NUS)

DISCUSSION:

DEPTH OF THE NEW YORK STATE BARGE CANAL NEAR ROME

DREDGE DEPTH = 14 Ft

DEPTH OVER LOCKS = 13 Ft

ACTION ITEMS:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Scoring of Department of Defense sites for Inclusion On the National Priorities LIst (NPL)

FROM: Paul M. Beam, NPL/Federal Facility Coordinator
Hazardous Site Control Division

TO: Mr. Bruce Mero, Environmental Coordinator

The Environmental Protection Agency (EPA) and the Department of Defense (DOD) have jointly undertaken a project to score DOD installations for potential inclusion on the second proposed NPL Update scheduled for Federal Register publication on July 31, 1984. This scoring effort is being conducted by NUS Corporation and several EPA Regional Offices with data input by the three services and Defense Logistics Agency. The lead military entity is the Office of the Assistant Secretary of Defense for Manpower, Installations and Logistics.

On February 24, 1984, a letter was forwarded to the three services and DLA[OASA (IL&FM), SAF/MIQ, OASN (I&F) and Director, DLA] by Mr. Robert A. Stone, Deputy Assistant Secretary of Defense for Installations which directed the services to provide EPA with Installation Restoration Phase I and II reports for several predetermined DOD installations. In addition, the services were to provide all other relevant information (i.e., unpublished monitoring data) to assist the scoring effort.

The scoring teams evaluating your installation have identified data elements which must be obtained before the scoring process may continue. As procedure dictates, the scoring team will have notified your installation contact in advance to resolve the data element issues. This memorandum with the questions identified in the attachment will act as confirmation of their communique with you for documentation purposes.

If you have any questions concerning the data required, please contact me at 202-475-8106.

Attachment

EPA HAZARD RANKING SYSTEM SCORING

SITE NAME: GRIFFISS AIR FORCE BASE

LOCATION/DESCRIPTION: ROME, NEW YORK

REVIEWER: ROBERT JUBACH JUNE 20, 1984

GROUND WATER ROUTE SCORE

RATING FACTOR	UNMULTIPLIED ASSIGNED VALUE
OBSERVED RELEASE	45.
ROUTE CHARACTERISTICS	
DEPTH TO AQUIFER OF CONCERN	N/A
NET PRECIPITATION	N/A
PERMEABILITY OF UNSATURATED ZONE	N/A
PHYSICAL STATE	N/A
CONTAINMENT	N/A
WASTE CHARACTERISTICS	
TOXICITY/PERSISTENCE	18.
HAZARDOUS WASTE QUANTITY	1.
TARGETS	
GROUND WATER USE	3.
DISTANCE TO NEAREST WELL/POPULATION SERVED	30.

CALCULATED SGW = 58.1633

CALCULATED SM = 34.21

EPA HAZARD RANKING SYSTEM SCORING

SITE NAME: GRIFFISS AIR FORCE BASE

LOCATION/DESCRIPTION: ROME, NEW YORK

REVIEWER: ROBERT JUBACH JUNE 20, 1984

SURFACE WATER ROUTE SCORE

RATING FACTOR	UNMULTIPLIED ASSIGNED VALUE
OBSERVED RELEASE	45.
ROUTE CHARACTERISTICS	
FACILITY SLOPE AND INTERVENING TERRAIN	N/A
1-YEAR 24-HOUR RAINFALL	N/A
DISTANCE TO NEAREST SURFACE WATER	N/A
PHYSICAL STATE	N/A
CONTAINMENT	N/A
WASTE CHARACTERISTICS	
TOXICITY/PERSISTENCE	12.
HAZARDOUS WASTE QUANTITY	1.
TARGETS	
SURFACE WATER USE	2.
DISTANCE TO A SENSITIVE ENVIRONMENT	3.
POPULATION SERVED/DISTANCE TO WATER INTAKE DOWNSTREAM	0.

CALCULATED SSW = 10.9091

CALCULATED SM = 34.21

EPA HAZARD RANKING SYSTEM SCORING

SITE NAME: GRIFFISS AIR FORCE BASE

LOCATION/DESCRIPTION: ROME, NEW YORK

REVIEWER: ROBERT JUBACH JUNE 20, 1984

AIR ROUTE SCORE

RATING FACTOR	UNMULTIPLIED ASSIGNED VALUE
OBSERVED RELEASE	0.
WASTE CHARACTERISTICS	
REACTIVITY AND COMPATIBILITY	N/A
TOXICITY	N/A
HAZARDOUS WASTE QUANTITY	N/A
TARGETS	
POPULATION WITHIN 4-MILE RADIUS	N/A
DISTANCE TO A SENSITIVE ENVIRONMENT	N/A
LAND USE	N/A

CALCULATED SA = 0.0000

CALCULATED SM = 34.21

CITY OF ROME WATER SYSTEM

SCALE IN MILES

WATER MAINS (SIZE AS SHOWN)

HYDRANTS

APPROVED BY _____

1" = 0.5mi

FISH CREEK DAM
ANNSVILLE ROAD
old 36 INCH CONCRETE AQUEDUCT
now 48" R.C.P. CONDUIT
WEST LEE
LEE CENTER
Treatment Plant
TABERG
BLOSSVALE
BECKS GROVE
COONROD
SEIFERTS CORNERS
HAWKINS CORNERS
STOKES
BEARTOWN
WESTERNVILLE
LAKE DELTA
ROME STATE SCHOOL
STANWIX
G.A.F.B.
CITY OF ROME
NEW YORK STATE BARGE CANAL
N.Y.S. ROUTE 69
N.Y.S. ROUTE 46
N.Y.S. ROUTE 365
N.Y.C.R.R.
O.&W.R.R.
TOWN OF VIENNA
TOWN OF LEE
TOWN OF WESTERN
TOWN OF FLOYD
TOWN OF VERONA
CITY OF ROME
TOWN OF WESTMORELAND
OUTSIDE ROME
TOWN OF WHITESTOWN

ROME NEW YORK

WATER DISTRIBUTION SYSTEM

TO STOKES RESERVOIR 26,600'

20" TO OLD PUMP HOUSE

30" TO AIR DEPOT

TO STOKES RESERVOIR

WOOD CREEK

TURIN RD.

ROME HOSPITAL

ONEIDA COUNTY HOME & HOSPITAL

U.S. HOUSING

AIR DEPOT

BASE HOUSING

R.R. SPUR

ROME FREE ACADEMY

FRANKLYN'S FIELD

VOGEL PARK

WRIGHT PARK

BELL ISLE PARK

ST. JOHN'S CEMETERY

ST. PETER'S CEMETERY

TO SEWAGE DISPOSAL PLANT

Air Base Fuel Storage

CHESTNUT

CEDAR

OAK

WALNUT

SYCAMORE

PINE

LOCUST

LINDEN

MAPLE

GARDEN

DEAN

PROSPECT

ELM

BLOOMFIELD

PARK ST.

LIBERTY

DOMINICK

CALVERT

ARMSTRONG

CLINTON ST.

CLINTON

MATTHEW

HENRY

RIDGE

ADAMS

WHITESBORO

WILLETT

COURT

CAMP ST.

ELWOOD

BATAVIA

CEDARBROOK

LAUREL

DEL RAY

OXFORD CT.

CONCORD PL.

WATERLOOK DR.

MASSENA

HIGHLAND

JERVIS

THOMAS

WILLIAM

EMBARGO

STANWIX

HUNTINGTON

PARK ST.

MUCK ROAD

ERIE CANAL (ABANDONED)

INDUSTRIAL TRACKS

NEW YORK CENTRAL R.R. RW&O.

N.Y.C. R.R. INDUSTRIAL TRACKS

BARGE CANAL

MAIN LINE

RAIL ROAD

CITY YARD

MILL ST.

RACE

ESSEX

STATE

MARTIN ST.

NORTH ST.

WEST ST.

JAMES ST. PLAYGROUND

CORPORATION LINE

TO GRISKANY

TO STANWIX

TO WESTMORELAND

STANWIX

CENTRAL R.R.

OFFICE OF CITY ENGINEER · ROME, N. Y.

Detailed L.E.Z.	File No.
Traced L.E.Z.	Field Book No.
Checked E.L.E.	Drawing No. 1176
Approved E.L.E.	Date JAN. 1965
Scale AS SHOWN	Sheet No. 1 of 1

SCALE IN FEET

0 500 1000 2000 3000

KEY

- SIZE AS SHOWN
- 8 INCH
- 6 INCH
- 4 INCH
- HYD. WITH STEAMER
- HYD. WITHOUT STEAMER
- VALVE
- 10 - 6 REDUCER
- PLUG

SPECIAL TAP - SR

REVISED

JAN 1947	JAN 1948	JAN 1949	JAN 1950	JAN 1962
1953	1959	1966	1963	1972
8-82	4-30-84			

Facility name: Griffiss Air Force Base

Location: Rome, New York

EPA Region: II

Person(s) in charge of the facility: Bruce Mero

Environmental Coordinator

(315) 330-2098

Name of Reviewer: Robert Jubach (NUS Corporation) Date: May 31, 1984

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The site is an active Air Force Base at which wastes were generated from industrial shops and laboratories. Contaminants such as solvents and battery wastes were disposed of in landfills and/or drywells. On-base sampling showed contamination in ground and surface water.

Scores: S_M = 34.20 (S_{gw} = 58.16 S_{sw} = 10.91 S_a = 0)

S_{FE} =

S_{DC} =

FIGURE 1
HRS COVER SHEET

Stuart Haus (NUS Corp) 7/13/84

Katt 7/13/84

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			19	26	
5 Targets					3.5
Ground Water Use	0 1 2 (3)	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 (30) 32 35 40	1	30	40	
Total Targets Score			39	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			33,345	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	58.16		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Draft
7/13/84

Surface Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0	(45)	1	45	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.						
2 Route Characteristics						4.2
Facility Slope and Intervening Terrain	0 1 2 3		1		3	
1-yr. 24-hr. Rainfall	0 1 2 3		1		3	
Distance to Nearest Surface Water	0 1 2 3		2		6	
Physical State	0 1 2 3		1		3	
Total Route Characteristics Score					15	
3 Containment	0 1 2 3		1		3	4.3
4 Waste Characteristics						4.4
Toxicity/Persistence	0 3 6 9 (12) 15 18		1	12	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8		1	1	8	
Total Waste Characteristics Score				13	26	
5 Targets						4.5
Surface Water Use	0 1 (2) 3		3	6	9	
Distance to a Sensitive Environment	0 1 2 (3)		2	6	6	
Population Served/Distance to Water Intake Downstream	(0) 4 6 8 10 12 16 18 20 24 30 32 35 40		1	0	40	
Total Targets Score				12	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5				7020	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{SW} =	10.91		

0 0-3% slope
2
3 <1000 ft
to 6 mi Cr
3 - solvents

2 Top soil cap
Eye 6/11/86

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

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Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
4 Multiply 1 x 2 x 3			0	35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0,00		

FIGURE 9
AIR ROUTE WORK SHEET

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	S	S^2
Groundwater Route Score (S_{gw})	58.16	3382.59
Surface Water Route Score (S_{sw})	10.91	119.03
Air Route Score (S_a)	0.00	0.00
$S_{gw}^2 + S_{sw}^2 + S_a^2$		3501.62
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		59.17
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		34.20

FIGURE 10
WORKSHEET FOR COMPUTING S_M

DATT
2/13/84

August 16, 1982

QUALITY ASSURANCE TEAM

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference. Include the location of the document.

FACILITY NAME: Griffas Air Force Base

LOCATION: Rome, NY

DATE SCORED: 7/13/84

PERSON SCORING: Stuart Haus

PRIMARY SOURCE(S) OF INFORMATION (e.g., EPA region, state, FIT, etc.):

NUS Corporation Files
Rosslyn, VA

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

COMMENTS OR QUALIFICATIONS:

Score would increase if hazardous waste quantity could be documented

SHaff
7/13/84

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

Phenols, Benzene, Ethylbenzene.
Reference 2, Section 5, Tables 4 and 7, and Section 6.

Tetrachloroethylene
Pb, Cu
EJE 8/11/86

Rationale for attributing the contaminants to the facility:

Detailed ground water sampling around Landfill 1 showed the listed contaminants in concentrations above those found in the background monitoring well. Levels of phenols above background were also discovered in sampling wells downgradient of Landfills 2, 5, 6, and 7 and Building 301 (entomology lab). January 11, 1982 sampling results were not considered due to quality assurance concerns.

Reference 2, Sections 5 and 6. ***

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern:

The three aquifers underlying the base area are a source of well water for drinking purposes. Sediments of the upper two quaternary aquifers occur surficially throughout the area and on-base sampling of ground water has shown contamination in both these sediments. These two aquifers may also serve as recharge and storage units for the underlying Utica Shale Bedrock aquifer, although the amount of recharge is unknown.
Reference 1 pp 3-5, 3-9, 3-10 to 3-12; References 2, p 3-7 and Sections 5 and 6; References 6 and 7.

Depth(s) from the ground surface to the highest seasonal level of the saturated zone (water table(s)) of the aquifer(s) of concern:

Not Applicable

Depth from the ground surface to the lowest point of waste disposal/storage:

Not Applicable

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Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

Not Applicable

Mean annual lake or seasonal evaporation (list months for seasonal):

Not Applicable

Net precipitation (subtract the above figures):

Not Applicable

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Not Applicable

Permeability associated with soil type:

Not Applicable

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Not Applicable

* * *

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7/13/84

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Not Applicable

Method with highest score:

Not Applicable

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Disposal practices at the facility were such that the following compounds were known to be disposed of in landfills and drywells: Trichloroethylene, Methyl Ethyl Ketone, Toluene, and Lead (from lead storage cell battery wastes). In addition, Phenols, Benezene and Ethlybenzene were discovered in groundwater sampling and were also evaluated. Reference 1, Tables 4.2, 4.3, and 4.4, pp. 4-1 to 4-37; Reference 2, Sections 5 and 6; References 5, 15 and 16.

HRS score: Lead -18, Phenol-12, Trichloroethylene-12, Benzene -12, Toluene-9, Ethylbenzene-9, Methyl Ethyl Ketone-6

References 3 and 4

Compound with highest score:

Lead HRS Score = 18
References 3 and 4

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Unknown. Contaminants have been detected in groundwater sampling; therefore the hazardous waste quantity is greater than zero. An HRS value of 1 will be applied. Reference 3.

Basis of estimating and/or computing waste quantity:

Reference 1, Tables 4.2 - 4.4, provide a discussion of estimated waste quantities and types and past disposal practices (i.e., landfills and drywells) at the facility. The estimates provide the best available quantitative information at this time although they are only estimates since detailed records have not been maintained. Estimates of quantity are not very exact and are only provided in terms of 1980 production. These quantities at times refer not to liquid or sludge amounts but to the container size. Waste storage facilities (e.g. Lot 69 drum storage) were not considered because of containment practices, the absence of known spills, and the fact that the storage area has been decommissioned.

Because of the questionable waste quantities, the HRS quantity is unknown, however, since contaminants have been detected in groundwater sampling, it is known that the hazardous waste quantity is greater than zero. Reference 1, Tables 4.2 - 4.4, pp. 4-1 to 4-37; References 5 and 16.

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7/13/84

5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

The aquifers discussed on page 2 of this documentation package are used for drinking water although most drinking water sources in the area are from municipal water supplies which use surface water. Within the three miles of the facility, those residences which do not use the cites of Rome or Utica municipal water obtain water from wells. The average well depth is approximately 80 to 100 feet in the area as the two quaternary aquifers (shallow) are the most productive.
Reference 1, p 3-11 and References 13, 14, and 17.

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Houses located on Floyd Avenue northeast of Landfill 7 which are not served by the city of Rome municipal water system.
(Griffiss AFB is served by the city of Rome.)
References 5, 8, 9, 10, 11, 13 and 14.

Distance to above well or building:

400 feet
References 5, 8, 9, 10, 11, 13 and 14.

Population Served by Ground Water Wells Within a 3-Mile Radius

Identify water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

A house count was conducted using topographic maps some of which were compiled in 1955. The count excluded the homes served by the Rome and Utica municipal water supplies, since municipal water supplies use surface water sources. Since the maps are based on 1955 data, a count with more up-to-date information may be larger although it is anticipated that the final score will not be significantly changed. All homes within 3-miles were counted since the potential exists for wells to be drawing from any of the three aquifers as well as the potential for interaction between the aquifers. Homes were considered on both sides of the Mohawk River and New York State Barge Canal because of the potential for contaminant migration between aquifers and because of the unlikelihood that the river and canal serve as barriers to the local ground water flow since the wells in the area are much deeper than the 14 foot deep barge canal.
Number of houses = 608, Number of people = 608 x 3.8 = 2310.
References 3, 8, 9, 10, 11, 13, 14, 17, and 18.

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

None noted
Reference 7

Total population served by ground water within a 3-mile radius:

2310 people (water supply wells) + 0 people (irrigation) = 2310 People Total

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SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility, or downhill from it (5 maximum):

Toluene
Surface water sampling has been accomplished by the Air Force in the perennial seep from Landfill 1 (see below) and in Six Mile Creek which flows near Landfills 1, 2, 3, and 7 and into which the seep from Landfill 1 drains. Toluene has been detected in the seep.

Reference 2, pp. 5-24 to 5-29.

Rationale for attributing the contaminants to the facility:

Leachate has been observed draining from Landfill 1 into Six Mile Creek. Observations of the leachate stream have shown this to be a perennial seep originating in the landfill area. The seep appears to be, at least in part, a spring recharged, in part, from the landfill. The seep thus constitutes perennial surface water. Toluene has been detected in the seep. Toluene is also known to have been disposed in the landfill.

Reference 1, p. 4-16 and Table 4-2.
Reference 2, p. 5-2, Figure 6, pp 5-24 to 5-29.

2 ROUTE CHARACTERISTICS

<u>Facility Slope and Intervening Terrain</u>

Average slope of facility in percent:

Not Applicable

Name/description of nearest downslope surface water:

Not Applicable

Average slope of terrain between facility and above-cited surface water body in percent:

Not Applicable

Is the facility located either totally or partially in surface water?

Not Applicable

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Is the facility completely surrounded by areas of higher elevation?

Not Applicable

1-Year 24-Hour Rainfall in Inches

Not Applicable

Distance to Nearest Downslope Surface Water

Not Applicable

Physical State of Waste

Not Applicable

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Not Applicable

Method with highest score:

Not Applicable

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4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Trichloroethylene, Methyl Ethyl Ketone, Toluene, Phenols, Benzene, and Ethylbenzene. (See Groundwater Toxicity and Persistence) Since the battery wastes were deposited in drywells only and there appears to be no surface water migration potential for contaminants deposited in the drywells, lead is not considered as a compound for evaluation for surface water.
Reference 1, Tables 4.2-4.4, pp 4-1 to 4-37; Reference 2, Sections 5 and 6; References 5, 15 and 16.

Compound with highest score:

trichloroethylene
Benezene and Phenols HRS score = 12
References 3 and 4.

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

See Groundwater Hazardous Waste Quantity

Basis of estimating and/or computing waste quantity:

See Groundwater Hazardous Waste Quantity

* * *

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

The leachate stream from Landfill 1 has measured contamination and flows into Six Mile Creek. Six Mile Creek is currently used for recreation (e.g., fishing and swimming).
Reference 1, p 4-16 and References 8, 9, 10, 11, and 15.

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Is there tidal influence?

No
References 8-11.

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Not Applicable

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Landfill 1 is extended due to the observed release in the leachate stream and therefore now contacts a designated wetland, zero feet.
Reference 1, p 3-18 and p 4-15; Reference 12.

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

Not Applicable

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

None
References 13 and 14.

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Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

None
Reference 7

Total population served:

Zero

Name/description of nearest of above-cited water bodies:

Not Applicable

Distance to above-cited intakes, measured in stream miles.

Not Applicable

Satt
7/13/84

AIR ROUTE

1 OBSERVED RELEASE

Contaminants detected:

No information was found to indicate that any measurements of air contamination have been made. Therefore, the rating factor for observed release must be given an assigned value of zero and the value of S_a must be zero.
References 1 and 2

Date and location of detection of contaminants

Not Applicable

Methods used to detect the contaminants:

Not Applicable

Rationale for attributing the contaminants to the site:

Not Applicable

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Not Applicable

Most incompatible pair of compounds:

Not Applicable

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7/13/84

Toxicity

Most toxic compound:

Not Applicable

Hazardous Waste Quantity

Total quantity of hazardous waste:

Not Applicable

Basis of estimating and/or computing waste quantity:

Not Applicable

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi **0 to 1 mi** **0 to ½ mi** **0 to ¼ mi**

Not Applicable

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Not Applicable

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Not Applicable

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7/13/84

Distance to critical habitat of an endangered species, if 1 mile or less:

Not Applicable

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Not Applicable

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Not Applicable

Distance to residential area, if 2 miles or less:

Not Applicable

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Not Applicable

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Not Applicable

Is a historic or landmark site (National Register of Historic Places and National Natural Landmarks) within the view of the site?

Not Applicable

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REFERENCES
GRIFFISS AIR FORCE BASE

1. "Installation Restoration Program, Phase I Record Search, Hazardous Materials Disposal Sites, Griffiss AFB, New York.", July 1981.

2. "Installation Restoration Program, Final Report, Phase II-Problem Confirmation and Quantification Study, Griffiss Air Force Base, Rome, New York", December 1982.

3. Barrett, Kris W., S. Steven Chang, Stuart A. Haus, and Andrew M. Platt, Uncontrolled Hazardous Waste Site Ranking System, A User's Manual, MITRE Corporation, MTR-8ZW111, August 1982.

4. Sax, N.I., Dangerous Properties of Industrial Materials, Fifth ed., Van Nostrand Reinhold, New York, 1979.

5. Letter from R. Jubach, NUS Corporation, to Bruce Mero, Griffiss AFB, May 15, 1984, C-582-5-4-160.

6. Telephone conversation between R. Jubach, NUS Corporation and P. Lambert, Oneida County Health Department, May 9, 1984.

7. Telephone conversation between R. Jubach, NUS Corporation and J. Jackson, Oneida County Soils Conservation Service, May 11, 1984.

8. U.S. Department of the Interior, Geological Survey, Rome, NY Quadrangle, N-4307.5-W7522.5/7.5, 1955.

9. U.S. Department of the Interior, Geological Survey, Oriskany, NY Quadrangle, N4307.5-W7515/7.5, 1955.

10. U.S. Department of the Interior, Geological Survey, Westernville, NY Quandrangle, N4315-W7522.5/7.5, 1955 Photorevised in 1978.

11. U.S. Department of the Interior, Geological Survey, North Western N.Y. Quandrangle, N4315-W7515/7.5, 1955.

12. Telephone conversation between R. Jubach, NUS Corporation and P. Hamilton, U.S. Fish and Wildlife Service, Cortland NY, May 14, 1984.

13. Telephone conversation between R. Jubach, NUS Corporation and F. Clark, City of Rome Engineer, May 10, 1984 (includes maps of the City of Rome municipal water system)

14. Telephone conversation between R. Jubach, NUS Corporation and R. Logalbo, City of Utica Water Board, May 11, 1984.

15. Telephone conversation between R. Jubach, NUS Corporation and Bruce Mero, Griffiss AFB, June 21, 1984.

16. Letter from Lt Col Michael Howayeck, USAF, Griffiss AFB, to Paul Beam, U.S. EPA, June 13, 1984.

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17. Telephone conversation between R. Jubach, NUS Corporation, and Mrs. Lee Bates, Lee Bates Well, May 14, 1984.

18. Telephone conversation between R. Jubach, NUS Corporation, and Frank Jennings, New York Department of Transportation, June 22, 1984.

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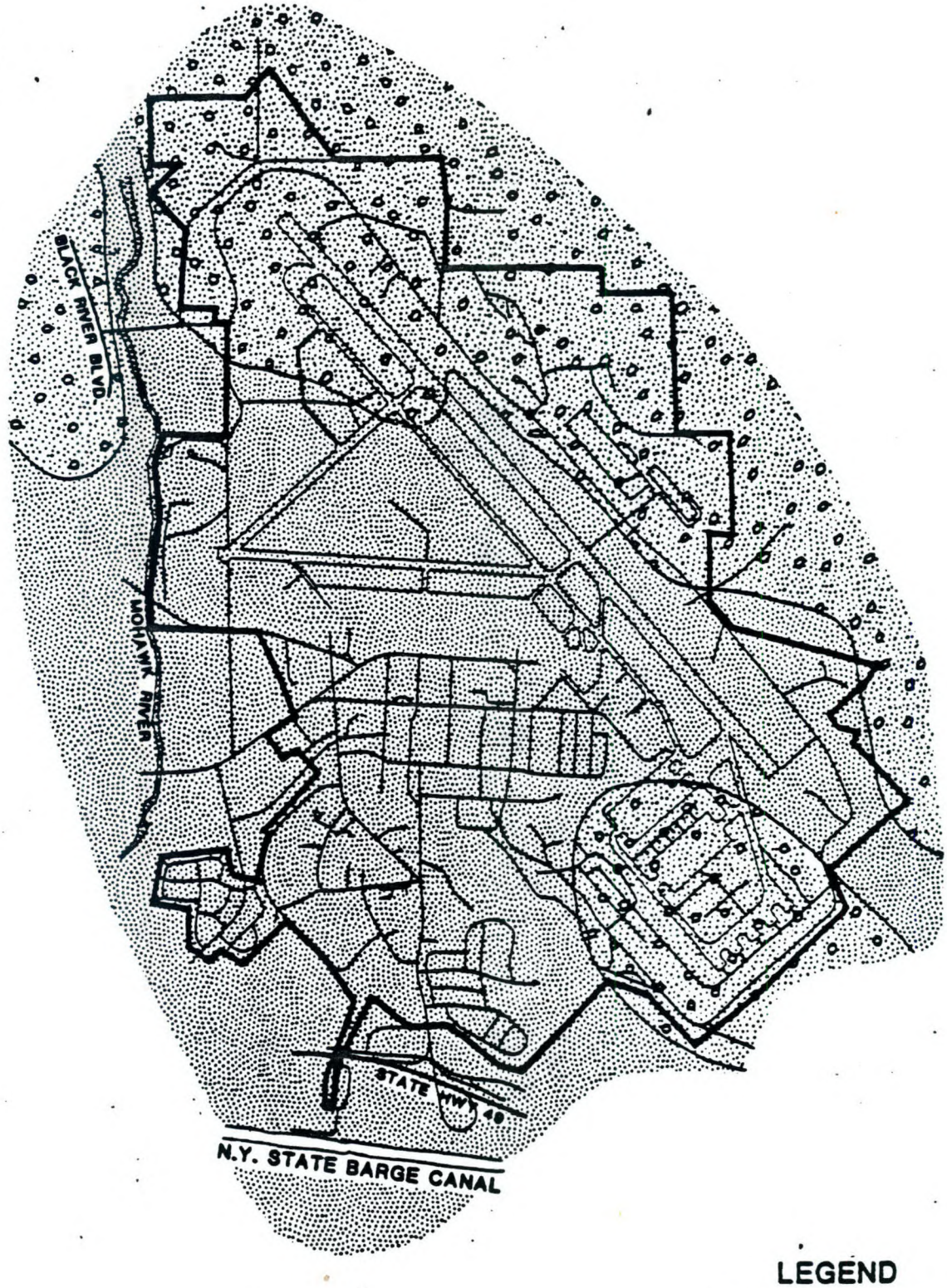
REFERENCE 1

FIGURE 3.2

EXCERPTS

GRIFFISS AFB

SURFICIAL GEOLOGY



LEGEND

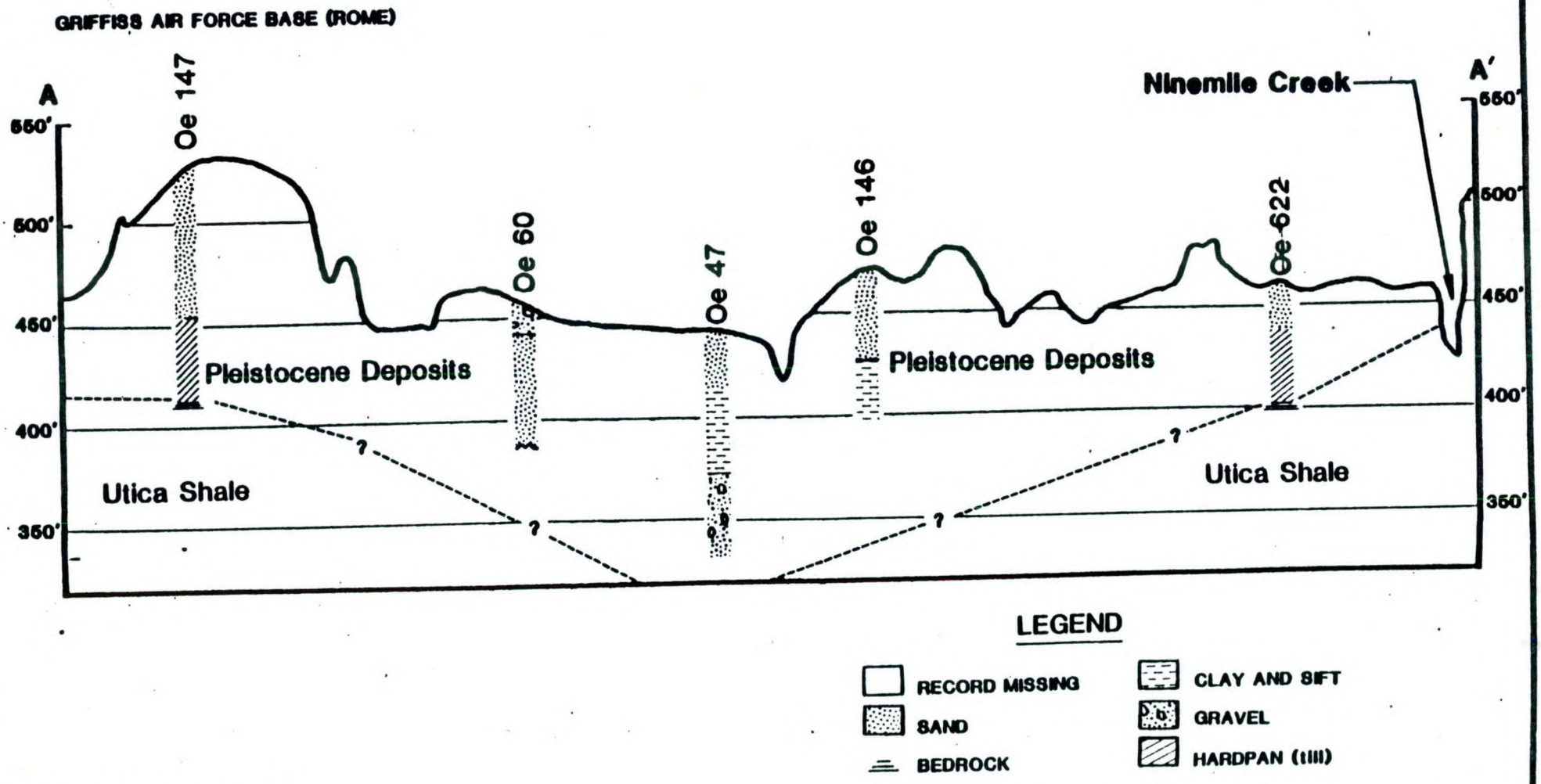
- QUATERNARY GLACIAL DEPOSITS
- QUATERNARY LACUSTRINE & ALLUVIAL DEPOSITS
- RESERVATION BOUNDARY

SOURCE: HALBERG, ET AL., 1962

GRIFFISS AFB

GEOLOGIC SECTION

FROM THREEMILE CREEK TO NINEMILE CREEK ALONG THE MOHAWK RIVER VALLEY



SOURCE: HALBERG, ETAL, 1962

FIGURE 3.4

faults in the Griffiss area, including one approximately four miles east of the base near the town of Stittville. In addition, they have mapped a structural lineament extending north-south from the Lake Delta Reservoir along the approximate course of the Mohawk River, terminating at a point at or near the western installation boundary. The structural lineament is a linear feature detected by topographic survey, satellite or U-2 photography and may represent a buried fault or simply a change in bedrock conditions. The relationship between earthquake activity and locally mapped lineaments and faults is unknown, however, numerous small, non-damaging earthquakes have occurred in central New York. These are due to the activity of Holocene "pop-ups", a localized zone possibly depressed by glacial weight. The recovery of such a zone may cause a small tremor in isolated areas.

Sedimentary strata of the Rome area are known to be jointed. Joint planes of this area are oriented north, west and southwest, with the predominant direction being east or southeast along the Mohawk Valley. Joint plane dips tend to be vertical or nearly vertical (Isachsen and McKendree, 1977b).

A thorough understanding of local structural geology is often necessary in order to investigate ground-water flow amounts, rates, directions and possible channelization of flow in fractured consolidated aquifers. In many cases of fractured rock aquifers, a fracture trace analysis usually precedes field work in order to determine the appropriate number, depth and location of monitoring wells.

HYDROLOGY

Ground Water

Ground-water resources in the project area have been briefly summarized by Halbert et al (1962) and Sinnott and Cushing (1978). Additional data have been obtained from Kantrowitz (1970), primarily reconnaissance studies based upon the compilation of available information. An attempt to incorporate installation well data into this discusison was not successful as well logs have not been retained on file.

It has been stated that one reason for a lack of ground-water resources data has been the region's traditional dependence on surface water supplies and no current regulations requiring the permitting of

industrial or domestic supply water wells (P. Lambert, Oneida County Public Health Department, 1981). It is presently estimated that approximately 95 percent of the region's water supplies are derived from surface sources. Ground water sources are primarily utilized by individuals in areas not served by regional or community systems such as the sparsely populated town of Floyd, or by farmers for irrigation purposes.

Most of the Griffiss Air Force Base area appears to lie within a ground-water recharge area. Recharge occurs where unconsolidated deposits are exposed at ground surface, or during dry periods, along stream beds traversing these deposits. Regional recharge has been estimated by Kantrowitz (1970) to be equivalent to 25 percent of total precipitation.

Hydrogeologic Units: Hydrogeologic units of the Griffiss Air Force Base area correspond directly to the geologic units previously reported (Halberg, et al 1962) and shown in Figure 3.2. A brief summary of each unit follows:

- Quatenary lacustrine and alluvial deposits comprise an unconsolidated, unconfined aquifer made up of primarily fine-grained sediments. It varies in thickness from 70 to 150 feet. Wells screened into this unit average 68 feet in depth. The well yield ranges from 2 to 40 gallons per minute, averaging 11 gpm. Water derived from this unit is of variable quality, and is usually hard.

- Quaternary glacial deposits make up an unconsolidated unconfined aquifer comprised of primarily coarse-grained sediments. It varies in thickness from 10 to 140 feet. Wells screened into this unit average 67 feet in depth. This is the most productive aquifer of the region, with typical yields varying from 10 to 290 gallons per minute, averaging 80 gpm. The water is reported to be of good quality.

- Utica shale comprises a consolidated, usually unconfined aquifer containing water in weathered upper zones, in joints, bedding planes and in secondary fissures. This unit may function under confined (artisian) conditions locally. The unit ranges in thickness from 300 to 400 feet and typical yields from 0.5 to 48 gallons per minute, averaging 7.5 gpm. Water supplies are normally drawn from upper reaches of this unit as unit reliability declines with depth, and lower elevations may be naturally contaminated by salts, hydrogen sulfide or methane.

The unconsolidated hydrogeologic units receive recharge from precipitation and from streamflow in dry periods. The unconsolidated aquifers serve as both recharge and storage units for the underlying rock aquifer.

Ground-water levels in the Rome-Utica area are reported to fluctuate seasonally from 3 to 15 feet per year, Kantrowitz (1970) reports that the ground-water levels in similar hydrogeologic units may vary from 5 to 25 feet in the adjacent Eastern Oswego Basin.

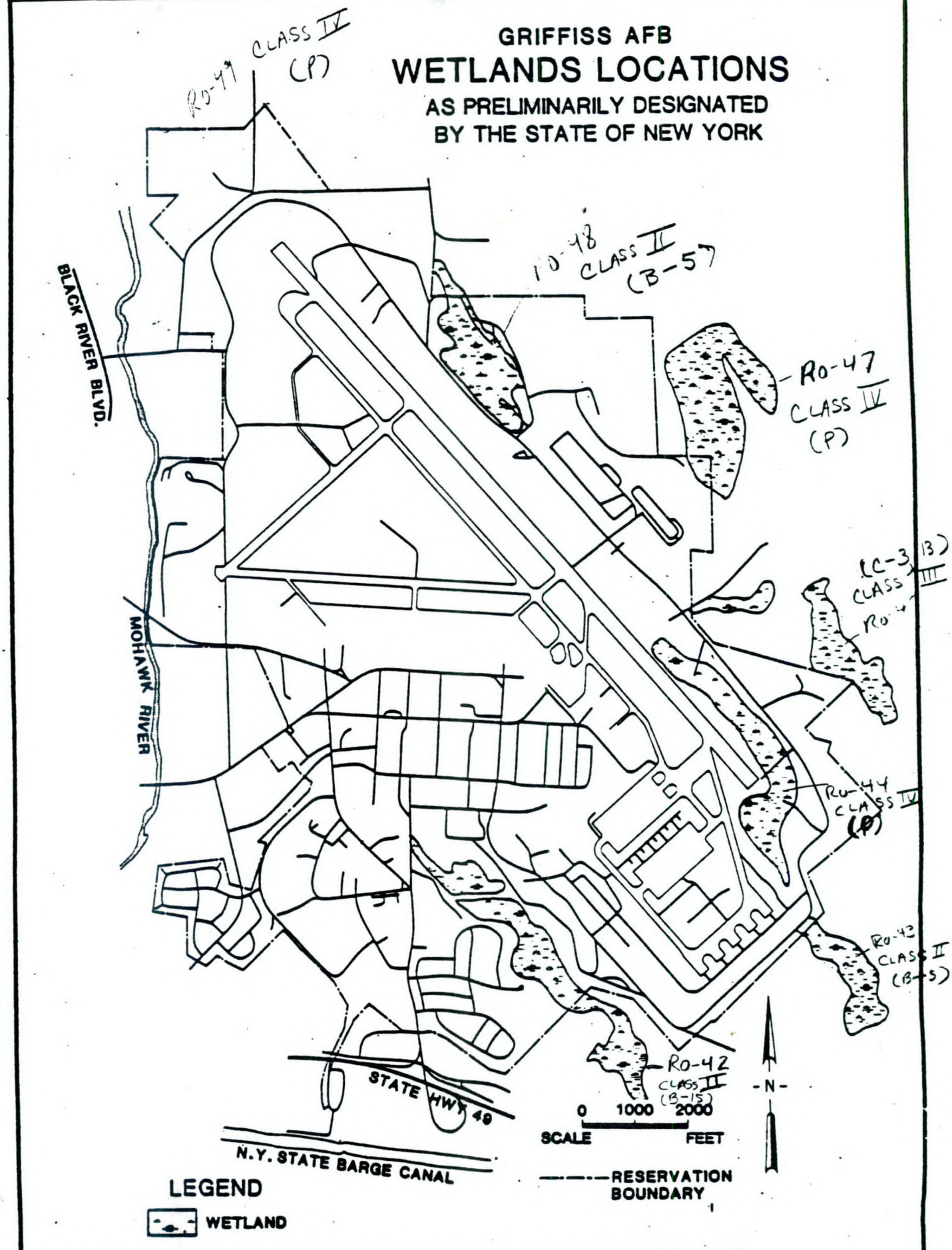
The water table of this region is reported to be a subdued replica of the topographic surface (Kantrowitz, 1970). Ground-water flow directions under unconfined conditions are typically down-gradient from a high potentiometric level to a lower potentiometric level. Ground-water discharge zones are typically springs, streams or surface water bodies.

The actual ground-water flow directions for the Griffiss Air Force Base area are undefined. Similarly, ground-water flow velocities and other physical characteristics of local aquifers have not been reported.

Surface Water

The New York State Department of Environmental Conservation has primary regulatory responsibility for the maintenance of water quality in the Griffiss Air Force Base area. Section 17-0301 of the State Environmental Conservation Law (Classificaton of Waters and Adoption of Standards) sets forth the legislative authority for both the assignment of stream classifications for all the waters of the state and the adoption of standards applicable to those classifications. The existing standards applicable to all classes of waters are set forth in Parts 700-703, Title 6, Official Compilation of Codes, Rules and Regulations. Waters of the Mohawk-West Canada Creek Planning Area are classified according to the following schedule, based upon utilization:

Classification	Utilization
AA	Water Supply - no discharges permitted
A	Water Supply
B	Bathing
C (T)	Fishing - trout stream
C	Fishing
D	Secondary contact recreation



SOURCE: GRIFFISS AFB COMPREHENSIVE PLAN DOCUMENTS, SEPT. 1980