UNITED STATES AIR FORCE

GRIFFISS AIR FORCE BASE
NEW YORK

FINAL SITE INVESTIGATION REPORT

FOR
BUILDING 215/216 OIL WATER SEPARATOR AND THE WEAPONS STORAGE AREA

DECEMBER 1993

11-1586.26

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

December 17, 1993

Ms. Barbara Moore/CEMRK-MD-H
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Subject: Final Site Investigation Report for the
Oil/Water Separator and the
Weapons Storage Area Sites
Griffiss Air Force Base, Rome, New York
Contract No. DACA 41-89-D-0124
Law Project No. 11-1584

Dear Ms. Moore:

Law Environmental, Inc., Government Services Division is pleased to submit the Final Site Investigation (SI) Report for the Oil/Water Separator and the Weapons Storage Area Sites, Griffiss AFB, Rome, New York.

Distribution of the Final SI Report is indicated on the attached Document Distribution List.

If you have any questions or need additional information, please do not hesitate to contact us at (404)590-4600.

Sincerely,

Thomas R. Malecki, P.G.
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TRM:mlh

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FINAL

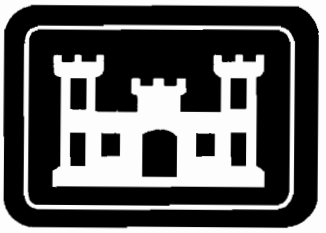
SITE INVESTIGATION REPORT

FOR

BUILDING 215/216
OIL/WATER SEPARATOR
WEAPONS STORAGE AREA

GRIFFISS AIR FORCE BASE, NEW YORK

PREPARED FOR



U.S. ARMY CORPS OF ENGINEERS

KANSAS CITY DISTRICT

DECEMBER 1993

PURPOSE OF DOCUMENT

The purpose of this document is to report on the results of a Site Investigation (SI) conducted at Griffiss Air Force Base during July and August of 1992. The purpose of the SI was to investigate suspected contamination at the Oil/Water Separator at Building 215/216 and the Weapons Storage Area.

The document is intended to provide the following:

- General background description of each site;
- Summary of regional characteristics influencing field activities;
- Site-specific characterization and methodology of the investigation;
- Results of the characterization and the nature and extent of the contamination at the site;
- Discussion of the contaminants present and migration potential to human receptors; and
- Summary of the findings of the investigation and recommendations.

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers - Kansas City District (CEMRK) has contracted with Law Environmental, Inc., Government Services Division (Law) to perform a Site Investigation (SI) at two sites at Griffiss Air Force Base (AFB), Rome, New York: the Oil/Water Separator at Building 215/216 and the Weapons Storage Area (WSA). This report documents the findings of the SI at these two sites.

1.1 PURPOSE

The purpose of this study was to complete a SI to identify if contamination is present at two sites at Griffiss AFB. Specifically, the investigation was designed to confirm the presence or absence of contamination at the designated sites; assess the potential for contaminant migration; identify levels of contaminants in environmental media relative to regulatory standards; and define future investigations and/or actions which may be required at the two sites.

1.2 SITE BACKGROUND

This section provides a brief description and history of Griffiss AFB. Site descriptions and histories for the two sites being investigated are provided in Section 1.3.

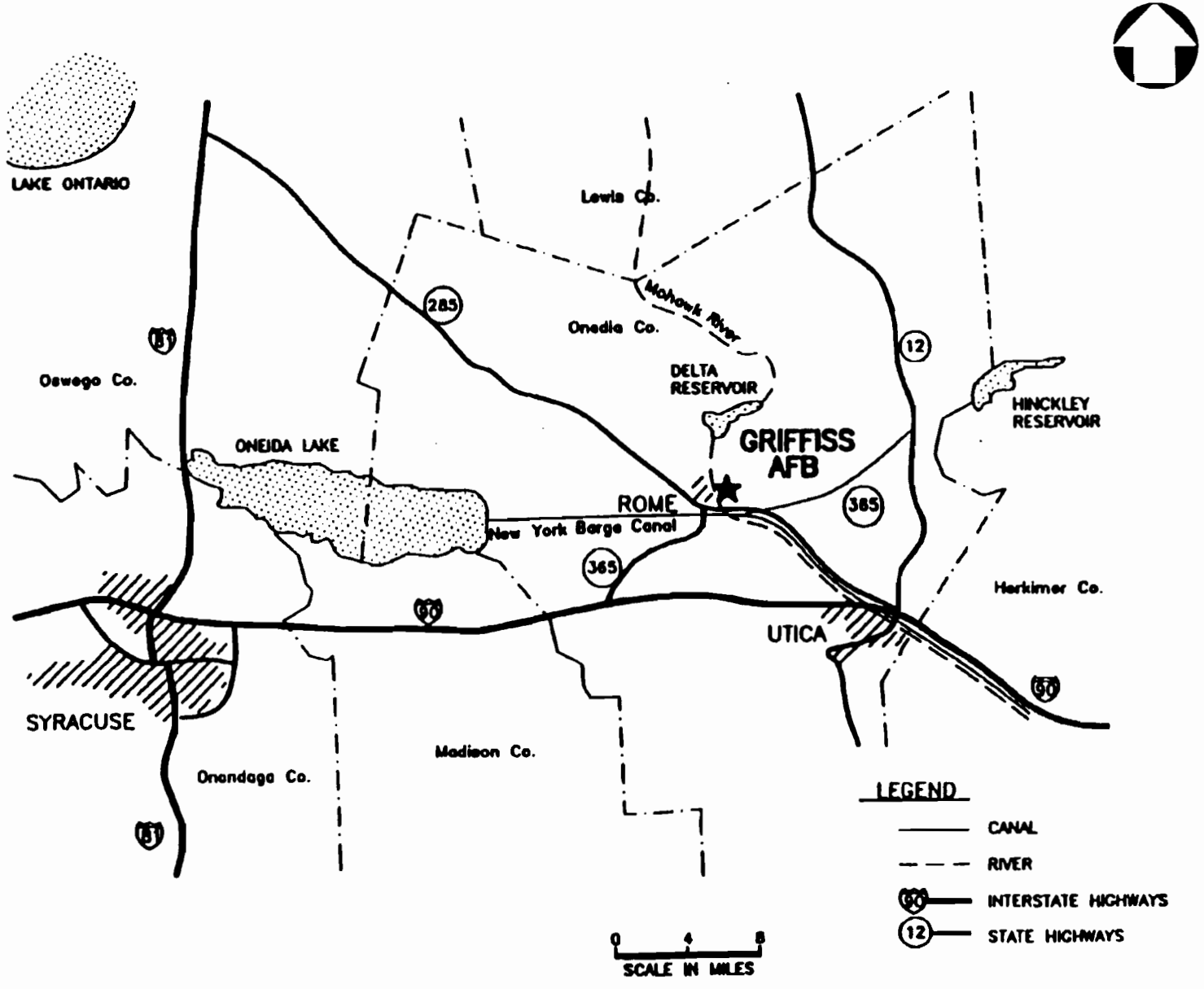
1.2.1 Site Description

Griffiss AFB is located in Oneida County, New York, approximately two miles northeast of the city of Rome, in central New York State (Figure 1-1). The base property covers approximately 3,900 acres and is situated in the relatively broad valley of the Mohawk River,

FIGURE 1-1

GRIFFISS AFB LOCATION MAP

ROME, NEW YORK



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at an average elevation of 504 feet, National Geodetic Vertical Datum. Besides the main base, 11 annex facilities are associated with Griffiss AFB. Two of these annexes are dedicated to base support, with the remainder used for research and development purposes by the Rome Labs of the Air Force Systems Command.

1.2.2 Site History

Griffiss AFB was established in 1942 as a Strategic Air Command bomber support installation. The 416th Bombardment Wing is the host unit at Griffiss AFB under the supervisory control of the Air Combat Command (ACC), a newly formed command based on the combination of the former Tactical Air Command and the Strategic Air Command. The 416th Bombardment Wing's mission is maintenance and implementation of effective air refueling operations while providing long-range bombardment capability on a global scale. The 416th Bombardment Wing is composed of two operational squadrons, six maintenance and support squadrons, and the 416th Combat Support Group. The base is currently undergoing realignment as of October 1993.

1.3 SCOPE OF INVESTIGATION

The SI at Griffiss AFB is intended to characterize potential contamination at two suspected hazardous substance and waste release locations, the Oil/Water Separator at Building 215/216 and the WSA. Figure 1-2 illustrates the location of each site.

1.3.1 Oil/Water Separator at Building 215/216

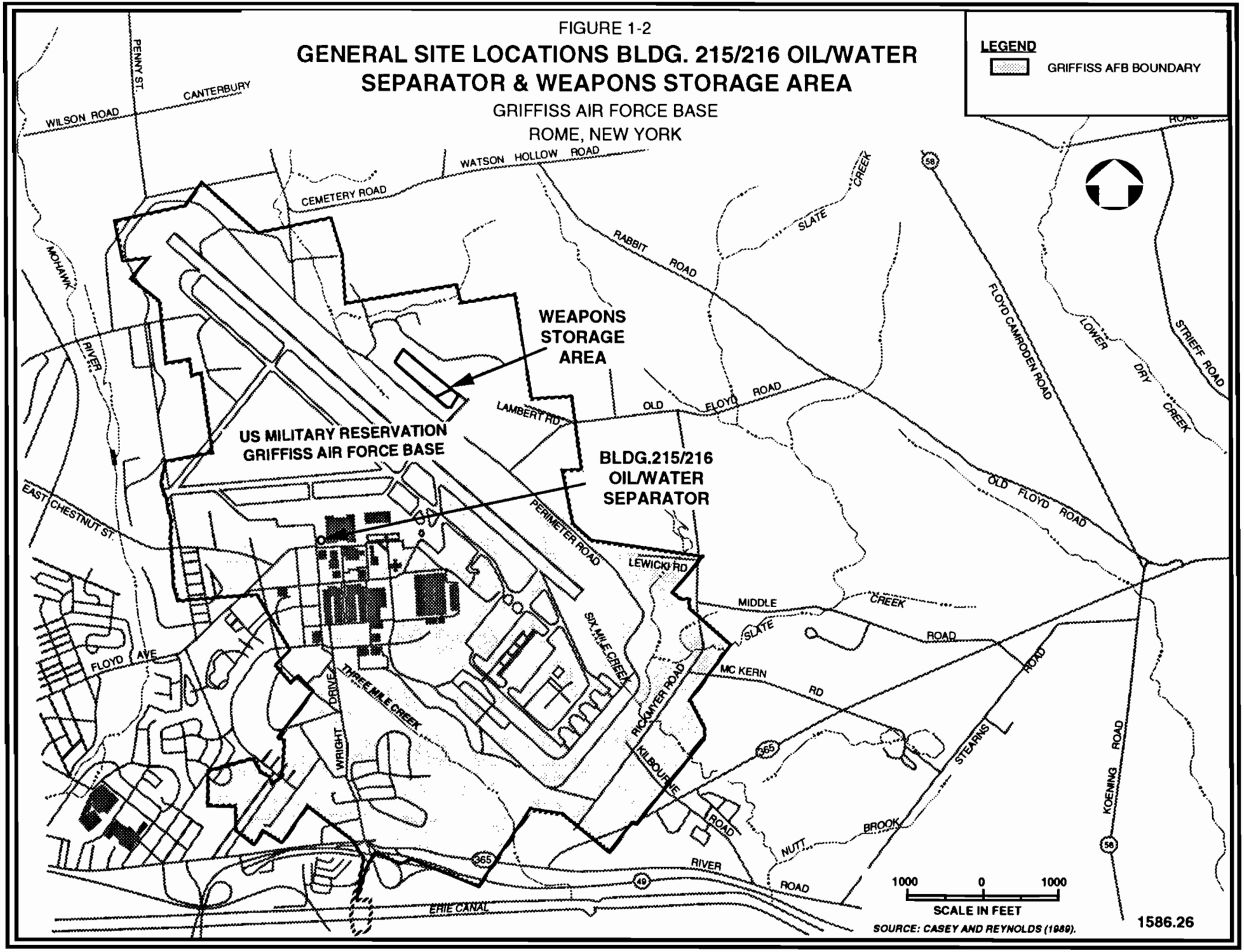
Buildings 215/216 are located in the central portion of Griffiss AFB north of Hangar Road and west of Building 101. The buildings

FIGURE 1-2

GENERAL SITE LOCATIONS BLDG. 215/216 OIL/WATER SEPARATOR & WEAPONS STORAGE AREA

GRIFFISS AIR FORCE BASE

ROME, NEW YORK



are contiguous and connected by a passageway. Buildings 215/216 were used until 1985 for fueling maintenance for vehicles (Figure 1-3). Buildings 215/216 currently contain administration offices for base maintenance operations. This facility is also a meeting area for maintenance crews to receive daily work assignments. The current Oil/Water Separator system was installed in 1980 inside Building 215 to replace an existing system. A 550-gallon underground oil accumulation tank was also installed at that time. The Oil/Water Separator system was designed to collect vehicle motor oils drained during maintenance activities. The Oil/Water Separator is located in an area between two restrooms and is only accessible from above via a crawl space above the dropped ceiling at this location.

Floor drains located in Buildings 215/216 drain into the Oil/Water Separator. The intercepted oil drains into a 550-gallon oil accumulation tank located west of Building 215 (SAC, 1980) (Figure 1-3). In the past, the accumulation tank has been pumped out periodically by a contractor. Water from the Oil/Water Separator discharges into a 6-inch vitrified tile sanitary sewer line west of the buildings and south of the oil accumulation tank (SAC, 1991).

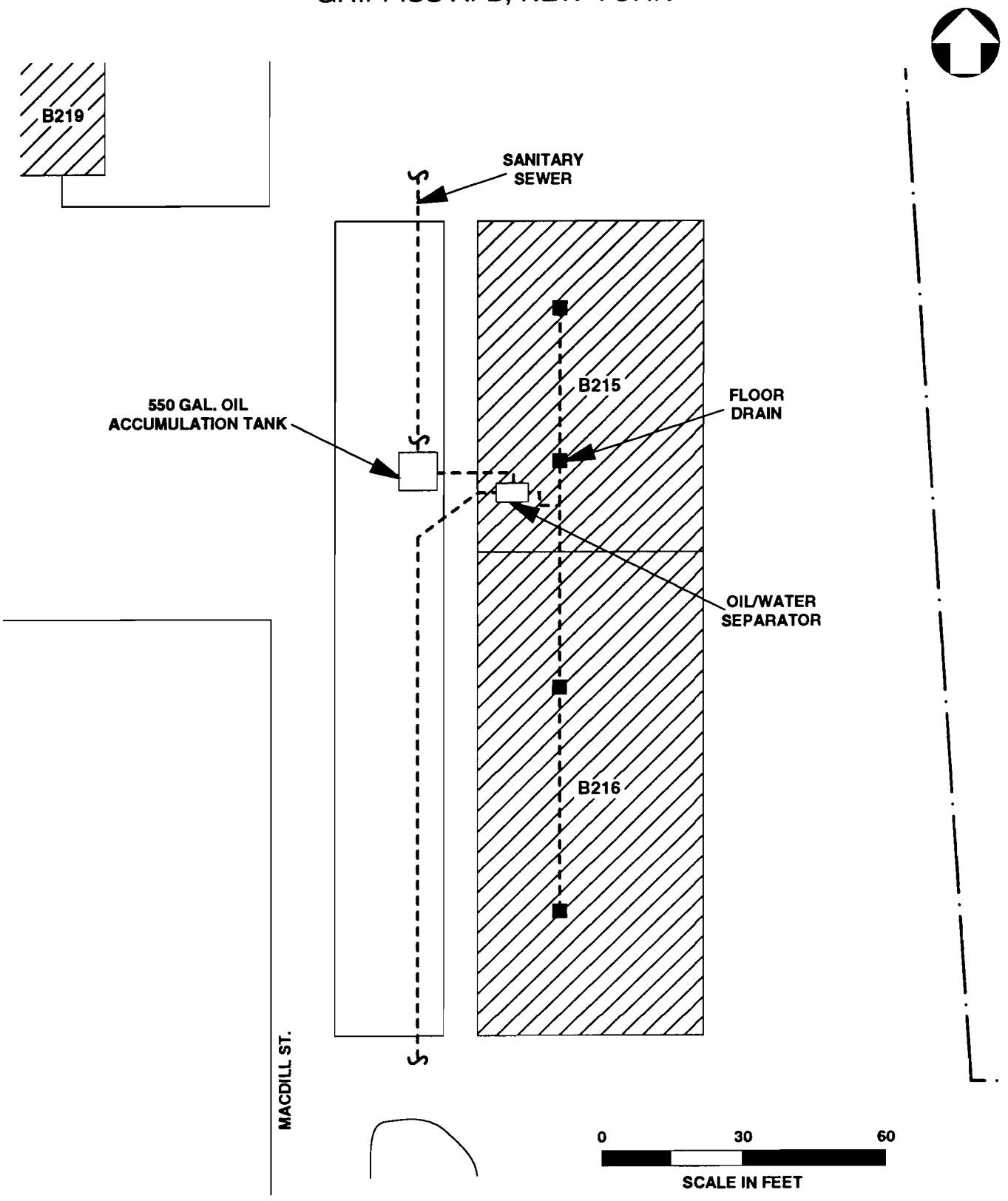
No previous investigations of potential soil or ground-water contamination have been conducted at this site.

During the SI, a soil gas survey was completed at the Oil/Water Separator at Building 215/216. One deep (12-foot) soil boring was completed at a distant location anticipated to be unaffected by the Oil/Water Separator; six soil borings were completed in close proximity to this facility. Soil samples were collected for chemical analysis from each of the soil borings.

FIGURE 1-3

OIL/WATER SEPARATOR AT BUILDINGS 215 & 216

GRIFFISS AFB, NEW YORK



1.3.2 Weapons Storage Area

The WSA is located in the northeastern portion of Griffiss AFB, north of Perimeter Road and Sixmile Creek to the west, and the eastern base boundary (Figure 1-2). This facility is used for munitions storage, and consists of a number of bunkers and support facilities.

Environmental events that have occurred at this site in the past consist of releases of petroleum oils resulting from routine operations, as well as transient events such as underground storage tank (UST) leakage and discharge of Aqueous Film Forming Foam (Blind, 1991). Aqueous Film Forming Foam (AFFF) is defined by MIL-F-243858 Specifications and consists of 76 percent water, 15 percent ethanol, 5 percent surfactant, 5 percent synthetic detergents and 4 percent urea.

Substances known or suspected to have been released into the environment at the WSA are primarily petroleum hydrocarbons, including heating oil, diesel fuel, JP-4 fuel, and hydraulic fluids. The AFFF was discharged into the AFFF lagoon located west of the WSA (Figure 1-4).

The use of paints and solvents in the past for vehicle maintenance also may have impacted the environment. These substances were used in Building 843, located in the southwestern portion of the WSA.

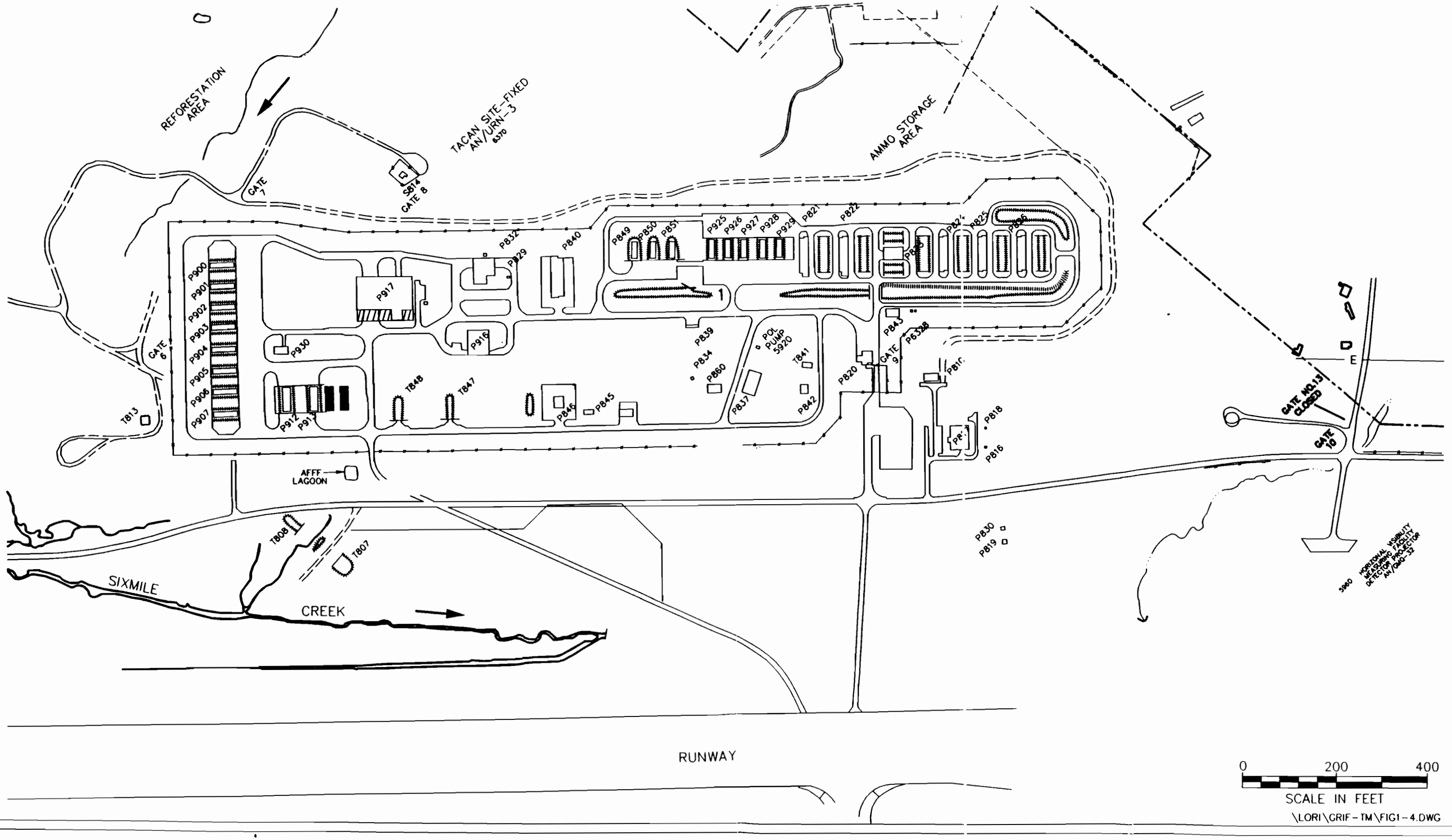
Polychlorinated biphenyl compounds (PCBs) may have been contained in WSA electrical equipment in the past, although there are currently no PCB transformers (greater than 500 parts per million PCBs) present at the WSA. PCB transformers are known to have been stored temporarily in B813, which is located adjacent to the WSA, from the early 1980s until the present. Results from the recently completed quarterly sampling effort (November, 1993) indicated that monitoring wells at the WSA did not detect PCBs in the ground water.

FIGURE 1--4

LOCATION MAP

WEAPONS STORAGE AREA

GRIFFISS AIR FORCE BASE – ROME, NEW YORK



Limited investigations have been conducted in areas within the WSA to address environmental issues, primarily UST leakage. No previous investigations of soil or ground-water conditions have been conducted to characterize the site as a whole. During the SI, four monitoring wells and four shallow soil borings (2-feet deep) were completed at the WSA. One monitoring well and soil boring were completed upgradient and topographically upslope, respectively; three monitoring wells and three soil borings were completed in positions downgradient from the facility. The expected hydrogeologic gradient was based on previous investigations at the base. Soil samples were collected from each of the borings at the WSA for chemical analysis. Ground-water samples for chemical analysis were collected from each of the monitoring wells at the WSA.

1.4 REPORT ORGANIZATION

This SI report is organized into six sections in addition to this introduction. The report organization is described briefly below:

1.0 INTRODUCTION - Discusses the purpose of the investigation and provides a general background of each site.

2.0 STUDY AREA CHARACTERIZATION - Summarizes regional characteristics influencing field activities.

3.0 SITE-SPECIFIC CHARACTERIZATION - Provides a detailed discussion of site-specific characteristic and methodology of the investigation.

4.0 NATURE AND EXTENT OF CONTAMINATION - Discusses the results of site characterization and the nature and extent of contamination at the site.

5.0 EXPOSURE ASSESSMENT - discusses contaminant presence and migration potential to human receptors.

6.0 SUMMARY AND CONCLUSIONS - Summarizes the findings of the investigation and makes recommendations for future work.

2.0 STUDY AREA CHARACTERIZATION

This section summarizes the regional area characteristics at Griffiss AFB. Study area characteristics discussed include geography, physiography, geology, and hydrogeology.

2.1 GEOGRAPHY AND PHYSIOGRAPHY

The regional geography and physiography for Griffiss AFB are discussed briefly below. This discussion includes location, climate, physiography, topography, and drainage.

2.1.1 Location

Griffiss AFB is located in Oneida County, New York, in the Mohawk River Valley. The base occupies 3,900 acres and borders the town of Rome.

2.1.2 Climate

Precipitation and snowfall data for Griffiss AFB are summarized in Table 2-1. Mean annual precipitation is 45.6 inches, and mean annual snowfall is 107 inches. Winter temperatures average 20°F. The spring, summer and fall seasons are relatively mild, with average temperatures ranging from 31° to 81°F. Wind speeds average 5 knots, primarily from the southwest.

2.1.3 Physiography

Several glacial features serve to influence the regional physiography. Remaining glacial features include eskers and a few

TABLE 2-1

PRECIPITATION AND SNOWFALL DATA
Griffiss AFB
Rome, New York

Month	Precipitation (In) Monthly				Snowfall (In) Monthly		
	Mean	Max	Min	Max 24 hrs	Mean	Max	Max 24 hrs
January	4.0	7.6	1.5	2.9	27.0	63.0	25.0
February	3.7	8.0	1.8	2.1	25.0	46.0	24.0
March	3.3	6.4	0.8	2.3	17.0	41.0	13.0
April	3.8	6.0	1.7	2.1	2.0	11.0	5.0
May	3.9	7.1	0.8	2.7	*	6.0	3.0
June	3.8	9.9	0.9	3.1	0.0	0.0	0.0
July	3.9	7.5	1.4	3.9	0.0	0.0	0.0
August	3.5	7.9	1.4	2.6	0.0	0.0	0.0
September	3.8	9.3	0.8	2.5	0.0	0.0	0.0
October	3.4	8.7	0.3	3.0	*	1.0	1.0
November	4.3	8.7	1.0	3.1	9.0	21.0	7.0
December	4.2	7.2	0.9	3.0	27.0	54.0	15.0
ANNUAL	45.6	9.9	0.3	3.9	107.0	63.0	25.0

Note: Indicated period of record is 35 years.

* Data not available.

Reference: Engineering Science, 1981

isolated kames near Oriskany, New York, southeast of Griffiss AFB. An esker is a winding ridge of stratified sediments deposited by a stream that flowed on, within or beneath a glacier. Kames are rounded, domed hills of stratified glacial drift deposited by melt water running off glacier margins or into melt depressions.

2.1.4 Topography

The present day topography of the Mohawk Valley is the result of two primary geologic processes. First, glacial deposition from the now extinct Glacial Lake Iroquois along with alluvial deposition. Secondly, subsequent erosion has resulted in the present day physiography. The topography of the region is generally flat and has an average elevation of 500 feet above sea level (NYDOT, 1978).

2.1.5 Drainage

Griffiss AFB lies within the Mohawk River Basin. The Basin has a drainage area of 3,456 square miles. The three notable streams draining the immediate area of the installation include the Mohawk River, Sixmile Creek, and Threemile Creek. The Mohawk River flows southward along the west boundary of the installation, changing to an eastward course at a point southwest of the base. Sixmile Creek flows westward then south near the eastern boundary of the installation, where it then joins the New York Barge Canal to the south. Threemile Creek originates in the southwestern portion of the base and flows into the Mohawk River. Runoff from the Griffiss AFB area flows into these streams via natural and man-made drainage features.

About 25 percent of the total precipitation for the central New York State area infiltrates into the ground-water system. A portion of this ground water will eventually be discharged as base

flow to feed area streams. The remaining 75 percent of precipitation is accounted for as either runoff or evaporation-transpiration.

2.2 GEOLOGY

The regional geology, including geologic setting, structural geology, geomorphology, soils and surface geology, hydrogeology, and hydrology are discussed below.

2.2.1 Geologic Setting

The unconsolidated deposits in the Griffiss AFB area are made up of Pleistocene age lacustrine Quaternary alluvial deposits .

Underlying the unconsolidated deposits, are the Upper Ordovician Utica and Frankfort shales and Middle Silurian shale and sandstone and dolomite beds (Figures 2-1 and 2-2). The Utica is a relatively soft, black and gray carbonaceous shale containing calcareous argillites. The Utica varies in thickness from 300 to 400 feet and dips (as measured at the City of Utica) four to five degrees southwest. The elevation of the bedrock surface is shown in Figure 2-3.

2.2.2 Structural Geology

Faulting of the Utica shale is not directly observable as considerable overburden deposits conceal discontinuities. Several faults in the Griffiss AFB area, including one approximately four miles east of the base near the town of Stittville, have been mapped. Also mapped is a 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 boundary of

FIGURE 2-1

SURFICIAL GEOLOGIC MAP

GRIFFISS AIR FORCE BASE

ROME, NEW YORK

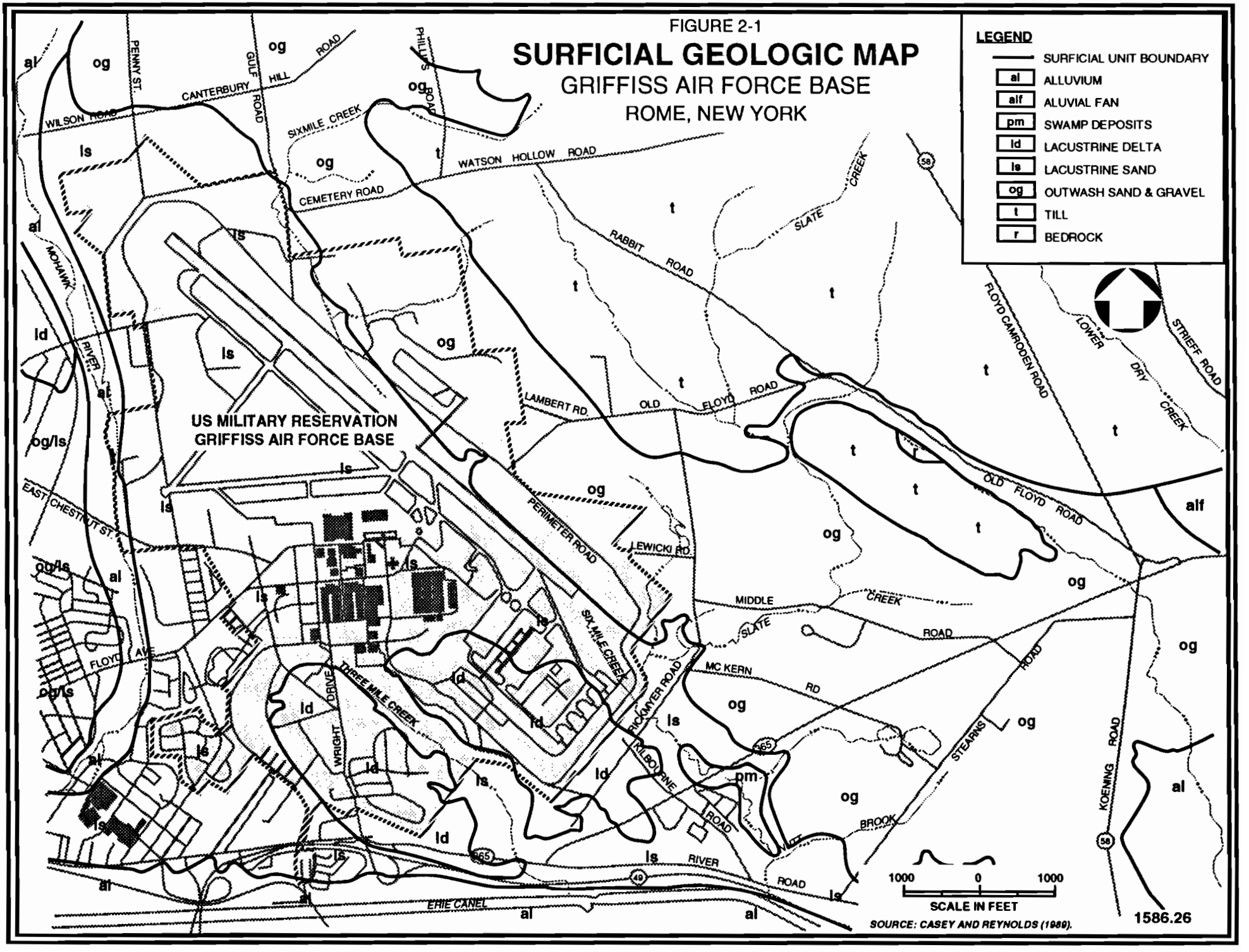
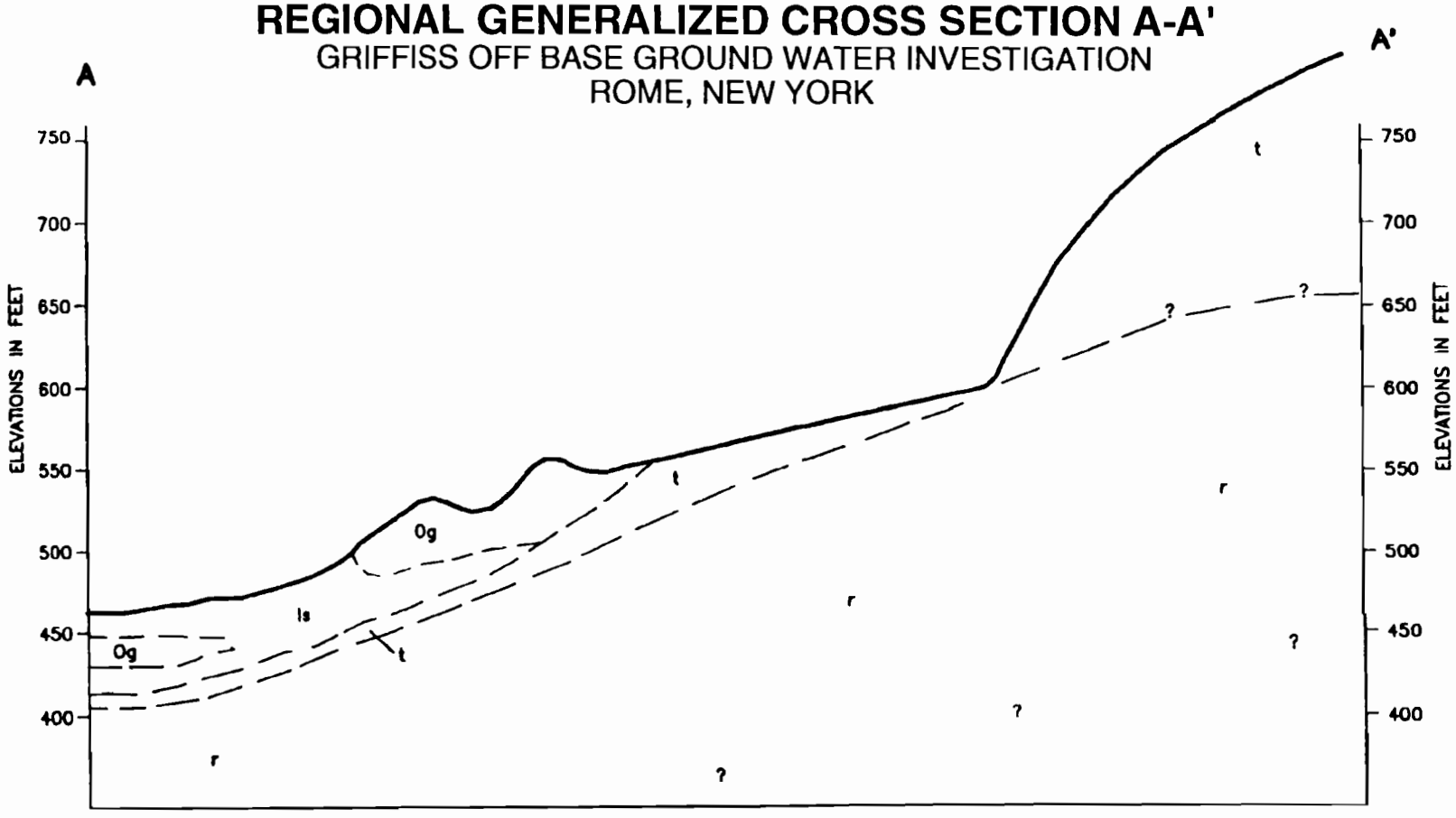


FIGURE 2-2

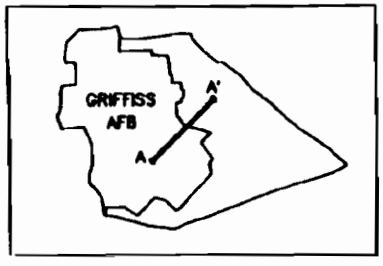
REGIONAL GENERALIZED CROSS SECTION A-A'

GRIFFISS OFF BASE GROUND WATER INVESTIGATION
ROME, NEW YORK



*DATUM IS SEA LEVEL

VERTICAL EXAGGERATION 20x



Og – GLACIOFLUVIAL DELTAIC OUTWASH–SAND AND GRAVEL
ls – LUCUSTRINE FLUVIAL SAND
t – TILL
r – BEDROCK–ORDORVICIAN FRANK, & UTICA SHALES

0 1 MILE

SOURCE: CASEY AND REYNOLDS (1989)

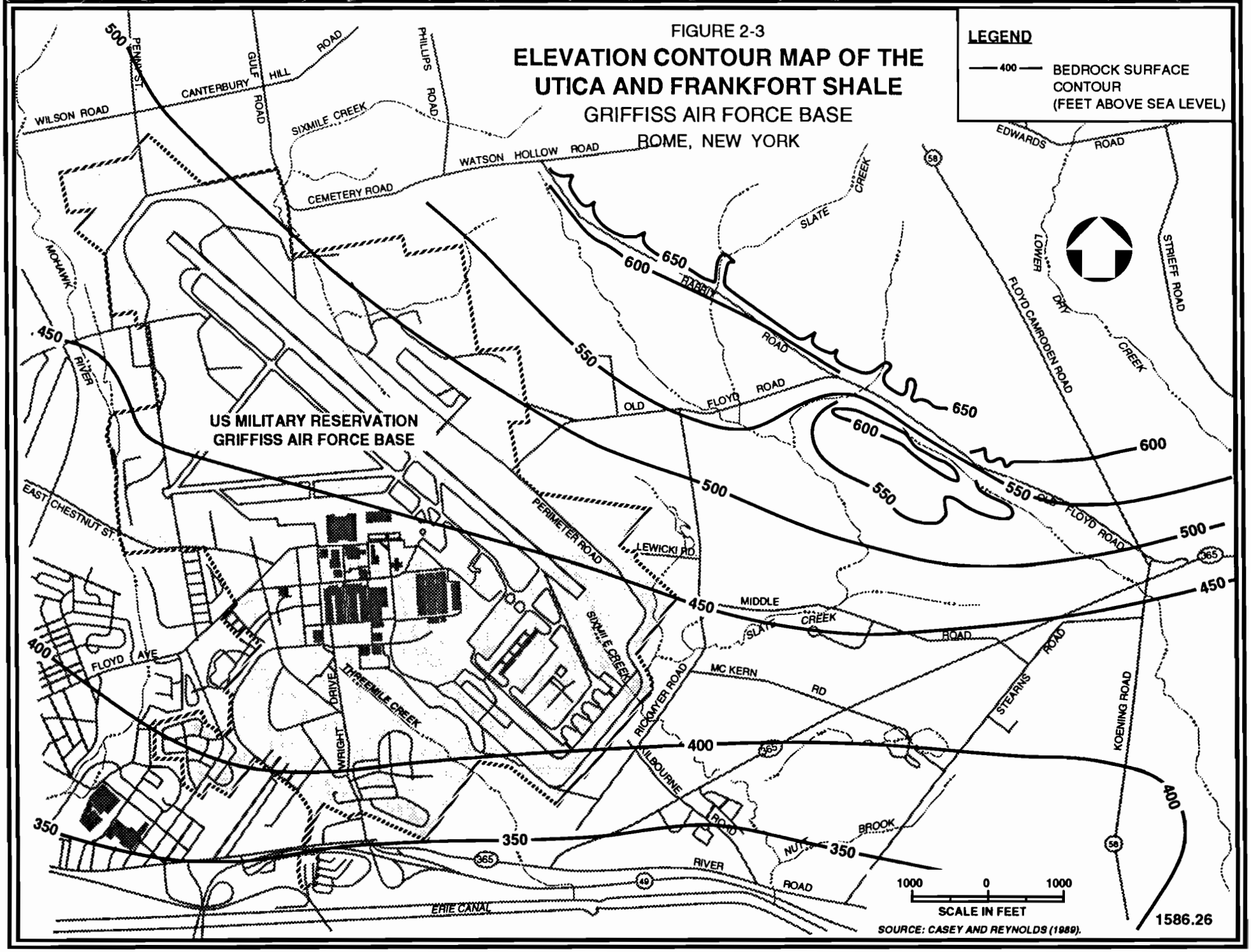
1586.23

FIGURE 2-3

ELEVATION CONTOUR MAP OF THE UTICA AND FRANKFORT SHALE

GRIFFISS AIR FORCE BASE

ROME, NEW YORK



the installation. This feature, observable on topographic maps and by satellite imagery, may represent a buried fault or simply a change in bedrock conditions. Numerous non-damaging earthquakes have occurred in central New York. These are possibly due to areas that were depressed by glacial weight. The rebound of such a zone may cause small tremors in isolated zones.

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 of southeast along the Mohawk Valley. Joint plane orientations tend to be vertical or nearly vertical.

2.2.3 Geomorphology

Glacial activity has been the primary influence on the geomorphology of the area. The preglacial bedrock topography has been eroded by ice movement into a series of rounded hills and gently sloping valleys. Glacial features found in the vicinity include drumlins, kames, kame terraces, kame deltas, and eskers.

2.2.4 Soils and Surface Geology

Figures 2-1 and 2-2 illustrate the surficial geology at the base. This area is described as having two distinct soil units, both of glacial origin. These are Pleistocene alluvial deposits that are typically confined to lowland areas as existing or former stream channels. The first unit of Pleistocene age glacio-fluvial deposits is composed of meltwater outwash (deltaic) sands and gravels (southwest area). These deposits are highly permeable, well sorted, coarse to fine gravel with sand. Deposits become finer grained with increasing distance from glacial borders. The second soil unit consists of glacial tills which are ice-contact

deposits of unstratified, unsorted mixtures of clay, silt, gravel, cobbles and boulders. These are relatively impermeable with moderate to high clay contents (Casey and Reynolds, 1989).

Other units located to the south of the study area include lacustrine delta deposits, and swamp deposits. Lacustrine delta deposits, composed of stratified coarse to fine gravel and sand, are fluvially deposited by melt water streams extending into a proglacial lake. The lacustrine sand is well sorted, stratified, fluvial sand deposited into a proglacial or postglacial lake. Swamp deposits, found along the eastern border of the installation, are postglacial to recent deposits of peat, organics, organic silt, and sand which have accumulated in poorly drained and localized depressions.

2.2.5 Hydrogeology

Hydrogeologic units of the Griffiss AFB area correspond directly to the geologic units previously reported and shown in Figures 2-1 and 2-2. The saturated thickness of the deposits is shown in Figure 2-4. A brief summary of each aquifer unit is described as follows:

- Quaternary 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 (gpm), averaging 11 gpm. Water derived from this unit is of variable quality, and is usually hard.

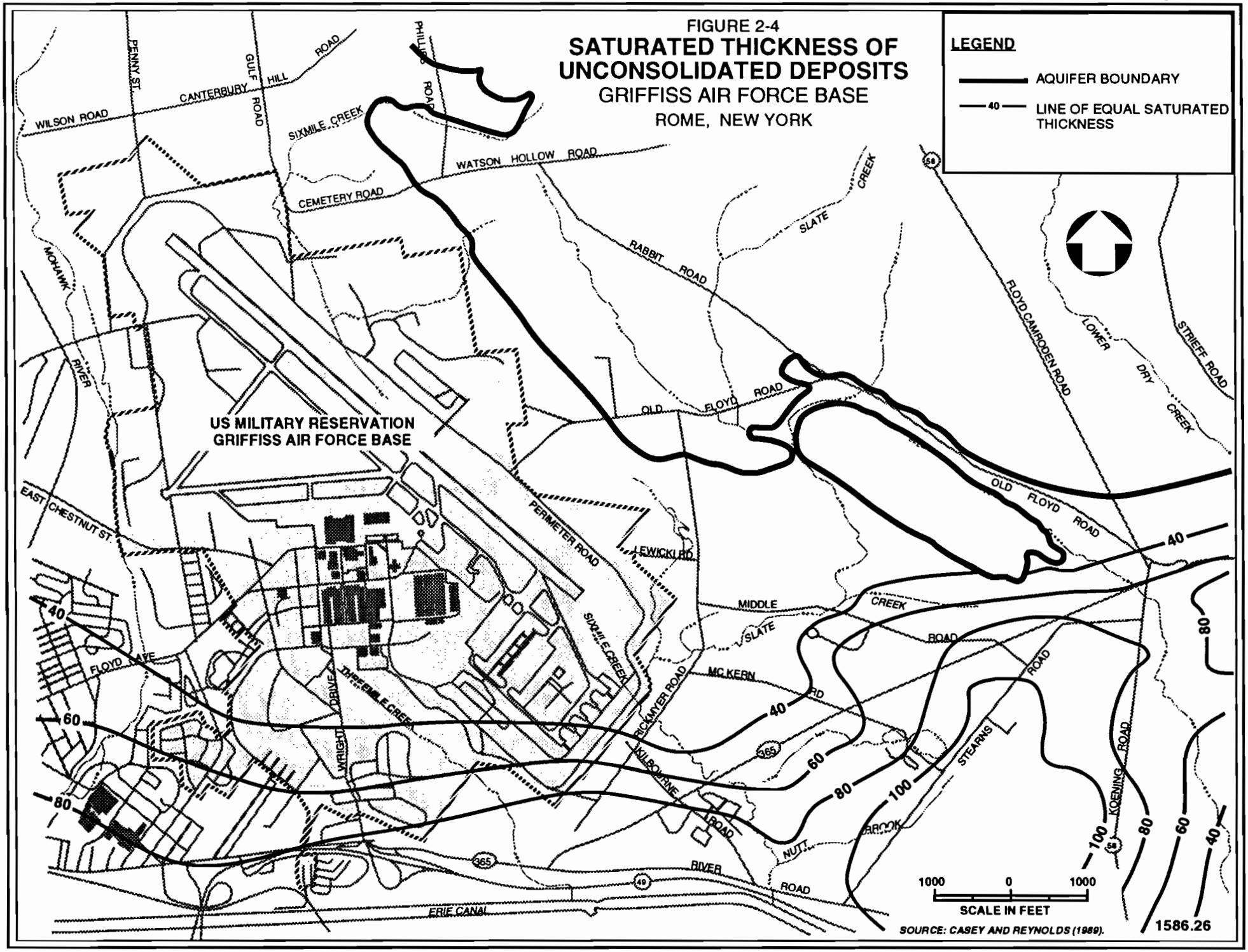
- Quaternary glacial deposits make up an unconsolidated unconfined aquifer comprised of primarily coarse-grained sediments. It varies in thickness from 10 to 140 feet.

FIGURE 2-4

SATURATED THICKNESS OF UNCONSOLIDATED DEPOSITS

GRIFFISS AIR FORCE BASE

ROME, NEW YORK



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 gpm, 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 (artesian) conditions locally. The unit ranges in thickness from 300 to 400 feet and typically yields from 0.5 to 48 gpm, averaging 7.5 gpm. Water supplies are normally drawn from upper reaches of this unit, as unit production declines with depth. Lower elevations may be naturally contaminated by salts, hydrogen sulfide and methane.

Ground-water levels in the Rome-Utica area are reported to fluctuate seasonally from 30 to 15 feet per year. Ground-water levels in similar hydrogeologic units are reported to vary from 5 to 25 feet in the adjacent Eastern Oswego Basin.

The water table of this region typically mirrors the topographic surface. Ground-water flow directions under unconfined conditions are typically from a high potentiometric level to a lower potentiometric level. Ground-water discharge zones are typically springs, streams or surface water bodies. Figure 2-5 shows the potentiometric surface of the surficial aquifer in the unconsolidated deposits.

2.2.6 Hydrology

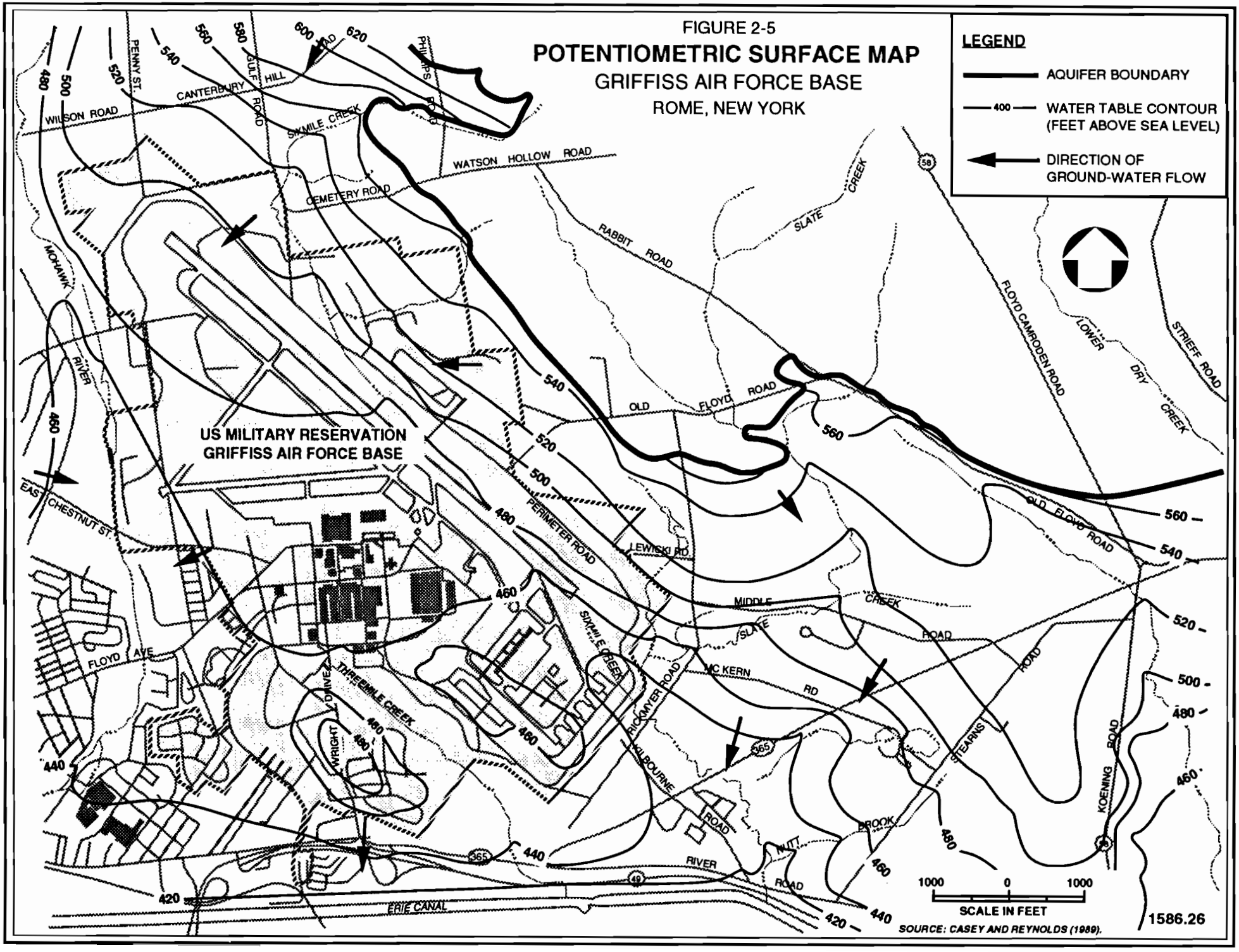
Surface drainage at Griffiss AFB is controlled mainly by a network of storm sewers discharging into the Mohawk River and its tributaries, Sixmile Creek and Threemile Creek. At the northeast

FIGURE 2-5

POTENTIOMETRIC SURFACE MAP

GRIFFISS AIR FORCE BASE

ROME, NEW YORK



and southwest end of the base are several areas of potential wetlands. A delineation of jurisdictional wetlands is being conducted during the Remedial Investigation at Griffiss AFB.

2.3 WATER RESOURCES

Upstate New York derives 36 percent of its water supply from ground-water sources. Most of the aquifers that supply this water are unconsolidated glacial and alluvial deposits that partly fill major bedrock valleys and their tributaries. Ground water in these aquifers may be found under both unconfined or confined conditions (Casey and Reynolds, 1988).

Local ground-water resources are primarily utilized by individuals in areas not served by regional or community systems or by farmers for agricultural purposes. Most of the Griffiss AFB area appears to lie within a ground-water recharge area. Recharge occurs where unconsolidated deposits exposed at ground surface capture precipitation. During dry periods, recharge occurs along stream beds traversing these deposits.

2.4 ENVIRONMENTALLY SENSITIVE CONDITIONS

There are no plant species at Griffiss AFB or in its vicinity which are considered to be threatened or endangered by the U.S. Department of Interior (50 CFR Part 17). However, several plants were identified at the base which are protected in New York, pursuant to Section 193.3 of the New York State (NYS) Environmental Conservation Law. These include: Pink Lady's Slipper (*Cypripedium acaule*), Orchid var. (*Orchis* spp.), Ferns var. (*Filicinae* spp.), *Ophioglossales* var. (*phioglossales* spp.), Adder's Tongue (*Erythronium amaricanum*), Burning Bush (*Euonymus* spp.), Lily var. (*Lilium* spp.), Clubmoss (*Lycopodium* spp.), Princess Pine

(*Lycopodium* spp.), Ground Pine (*Lycopodium* spp.), Heath Cypress (*Lycopodium* spp.), Trillium var. (*Trillium* spp.), Ginseng (*Panax quinguefolius*), American Bittersweet (*Celastrus scandens*), Flowering Dogwood (*Cornus florida*), Dutchman's Breeches (*Dicentra cucullaria*), Jack-in-the-Pulpit (*Arisaema hiphyllum*), Wintergreen (*Gaultheria procumbens*), Partridge Berry (*Mitchells repens*), and Bloodroot (*Sanguinaria* spp.). These plants were found to grow in some wooded portions of Griffiss AFB which have not been disturbed significantly by construction and development.

The following threatened or endangered animals and birds are reported to dwell within a 50-mile radius of the base: bog turtle, southern bald eagle, peregrine falcon, Indiana bat, and ipswitch sparrow. However, except for occasional transient individuals, no federally listed or proposed endangered or threatened species are known to exist at Griffiss AFB (USDI, 1992).

3.0 SITE-SPECIFIC CHARACTERIZATION SUMMARY

This section details the site-specific field investigation activities conducted at Griffiss AFB. Unless otherwise noted, field investigation activities were performed in accordance with the procedures and protocols outlined in the Final SI Work Plans dated May 1992.

3.1 FIELD ACTIVITIES

Field activities included a soil-gas survey, completion of seven deep soil borings, the completion of four shallow soil borings,the installation of four monitoring wells, soil sampling, ground-water sampling, in-situ permeability testing, and surveying activities.

3.1.1 Soil-Gas Survey

A soil-gas survey was conducted at the Oil/Water Separator at Building 215/216 by Tracer Research Corporation. The soil gas survey was conducted as a means of optimizing the location of the subsequent soil borings.

Sampling probes consisted of 7-foot lengths of ¾-inch diameter hollow steel pipes with detachable drive tips. The probes were advanced with truck mounted hydraulics to a depth of 6.5 feet below the ground surface. The soil gas was evacuated by use of a vacuum pump and analyzed by a gas chromatograph in the field. Appendix A contains the methodology and results of the soil-gas survey.

3.1.2 Soil Borings

Seven soil borings were completed at the Oil/Water Separator at Building 215/216. The borings were advanced to a depth of 12 feet and were intended to confirm the presence or absence of contamination in the soils near the Oil/Water Separator. The borings were advanced using a hand auger for the first two feet (0.0-2.0 feet); the remainder of the boring was advanced using a power-driven, hollow-stem auger, and samples were collected using a split-spoon sampler. A hand auger was used for the first two feet of the boring because it was expected to have a higher recovery rate. Appendix B contains copies of the Test Boring Records and the Hazardous and Toxic Waste (HTW) Drilling Logs for each boring.

3.1.3 Shallow Soil Borings

Four hand auger borings were completed at selected locations at the WSA. The borings were advanced to a depth of two feet using a stainless-steel hand auger. Appendix B contains copies of the Test Boring Records for the hand auger borings.

3.1.4 Well Installation

Four ground-water monitoring wells were installed at the WSA. The wells were installed in order to confirm the presence or absence of contamination in the ground water. Soil samples for chemical analysis were also collected from each monitoring well boring. The wells were drilled by hollow stem auger. Appendix B contains the Test Boring Record and HTW Drilling Logs for each well. The Monitoring Well Installation Diagrams are provided in Appendix C.

3.1.5 Well Development

Prior to development, each well was tested for floating product using a hydrocarbon probe. Floating product was not encountered in any of the monitoring wells. Wells were developed by surging and purging a minimum of five well bore volumes. Temperature, conductivity, pH and turbidity readings were recorded during development. Initial attempts to develop WSA-MW2 and WSA-MW4 to meet New York State Department of Environmental Conservation (NYSDEC) criteria of 50 Nephelometric Turbidity Units (NTUs) was unsuccessful. Additional development of these wells was done on November 20th, 1992. The additional development resulted in bringing the turbidity values for both wells below the 50 NTU requirement, and the wells were resampled. Well development information is contained in Appendix D.

3.1.6 Sampling Activities

For the first two feet (0.0-2.0 feet) of each soil boring and monitoring well boring, soil samples were collected using a hand auger. During the hollow-stem auger drilling process (2.0-30.0 feet), samples were collected using a 2-foot split-spoon sampler. A representative soil sample was selected for geotechnical analysis within the screened interval at each well. Appendix E contains the results of the geotechnical analysis. Soil samples were collected for chemical analysis from both the monitoring well borings and the soil borings from the following intervals:

- 0.0 to 0.5 ft.
- 0.5 to 1.0 ft.
- 1.0 to 2.0 ft.

} Hand Augered

- 2.0 to 4.0 ft.
- 4.0 to 6.0 ft.
- 6.0 to 8.0 ft.

- 8.0 to 10.0 ft.
- 10.0 to 15.0 ft.
- 15.0 to 20.0 ft.
- Every 10 feet thereafter to the total depth of the boring.
- Bottom two feet of boring.

Soil samples were collected from the four hand auger borings at depths of 0 to 0.5 feet, 0.5 to 1.0 feet, and 1.0 to 2.0 feet. The shallow soil borings were advanced and samples collected using a hand auger.

The initial ground-water sampling event occurred in August 1992. Samples were collected for chemical analysis from each of the four wells. Subsequent to the additional development of monitoring wells WSA-MW2 and WSA-MW4, a second round of sampling for all four wells at the WSA occurred in November 1992.

The technique used for ground-water sampling for each of these events was notably different. The first round of sampling was conducted using a dedicated teflon bailer. The November round of sampling was completed using a dedicated QED bladder pump. These two methods are considerably different in terms of the means by which the ground-water sample is moved from the aquifer to the sample bottles. The QED bladder pump moves the sample up the well to the surface by means of a "slow squeeze" by compressing the bladder. The sample moves at a constant rate through teflon-lined tubing directly into the sample bottle. The sample has minimal exposure to the ambient air and is less agitated in transit up the well, reducing the potential for volatile emissions. Additionally, a QED bladder pump can be set to pump and produce flow at a consistent rate for each sampling event, resulting in better consistency in sampling procedures for each well which is not possible with a bailer. Therefore, the samples collected during

November using the dedicated QED bladder pump are considered to be more representative of the aquifer.

Soil and ground-water analytical results from both the August and November rounds of sampling are discussed in Section 4.3.

3.1.7 Permeability Testing

Permeability testing was performed on each monitoring well after completion of ground-water sampling. Since all wells intercepted the ground water at the approximate midpoint of the well screen, only a slug-out test was performed. The results of the permeability tests are discussed in Section 3.3.3. Permeability test data and plots are contained in Appendix F.

3.1.8 Surveying

All monitoring wells were surveyed by Joanne Darcy Crum, L.S. Wells were surveyed at ground level and at the top of the well casing. The survey data are included as Appendix G.

3.2 OIL/WATER SEPARATOR AT BUILDING 215/216

The results of the field investigations at the Oil/Water Separator at Building 215/216 are discussed below.

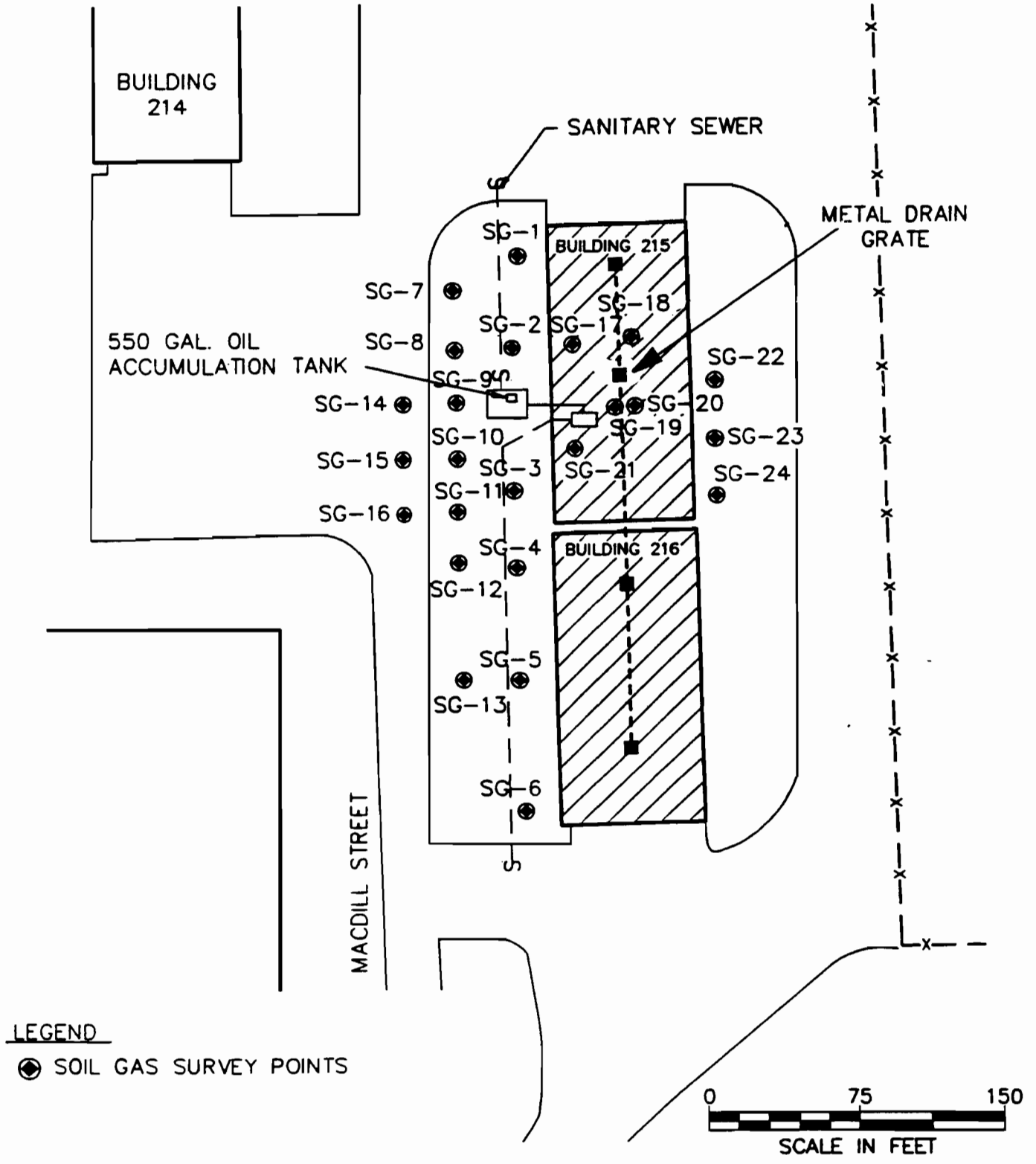
3.2.1 Soil Gas Survey

A soil gas survey was conducted to locate possible areas of contamination and to optimize the locations of the soil borings. A total of 24 soil gas samples were collected. The soil gas points were concentrated near the Oil/Water Separator and the 550-gallon storage tank (Figure 3-1). Elevated concentrations of total

FIGURE 3-1

SOIL GAS SAMPLING LOCATIONS

OIL/WATER SEPARATOR AT BUILDINGS 215 & 216
GRIFFISS AIR FORCE BASE AT ROME, NEW YORK



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volatile hydrocarbons, relative to background, were detected near the 550-gallon storage tank. Elevated concentrations of halocarbons were detected in Building 215, adjacent to the floor drain, and on the east side of the building. The apparent random nature of the results from the soil gas survey did not indicate a distinct plume of contaminants moving away from the building. Therefore, the soil borings were located as close as possible to the locations indicated in the work plans. The results of the soil gas survey can be found in Appendix A.

3.2.2 Soil Borings

Soil borings SB-01 and SB-02 were completed to evaluate the north end of the sanitary sewer line. SB-03 and SB-04 were positioned downslope from the 550-gallon storage tank. SB-05 and SB-06 were completed to evaluate the southern end of the sanitary sewer line. SB-07 was completed on the northwest side of Building 215/216 to evaluate an area presumably unaffected by the oil/water separator (Figure 3-2). Each of the borings was advanced to a depth of 12 feet. The analytical results from the soil boring samples are discussed in Section 4.0.

The lithology of the soils encountered during the drilling of the soil borings at the site consists primarily of cobbles, gravels and silty sands, indicative of a glacial outwash environment. Figure 3-3 shows the interpreted north-south cross-section at the site.

3.3 WEAPONS STORAGE AREA

The WSA is located in the northeastern part of the base, north of Perimeter Road and Sixmile Creek to the west and the eastern base boundary (Figure 1-2). This facility is used to for munitions

FIGURE 3-2

SOIL BORING LOCATIONS

OIL/WATER SEPARATOR AT BUILDINGS 215 & 216
GRIFFISS AIR FORCE BASE AT ROME, NEW YORK

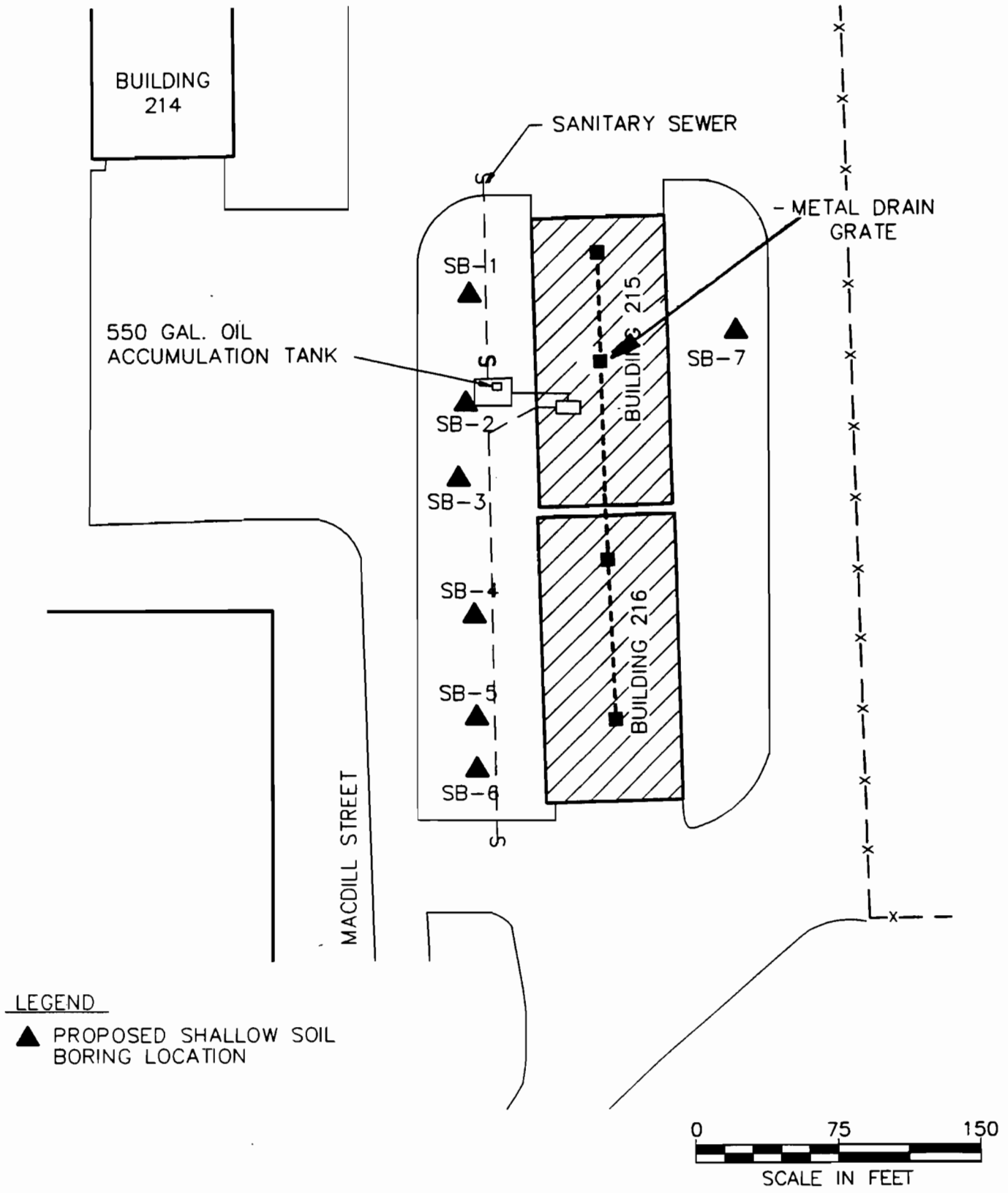

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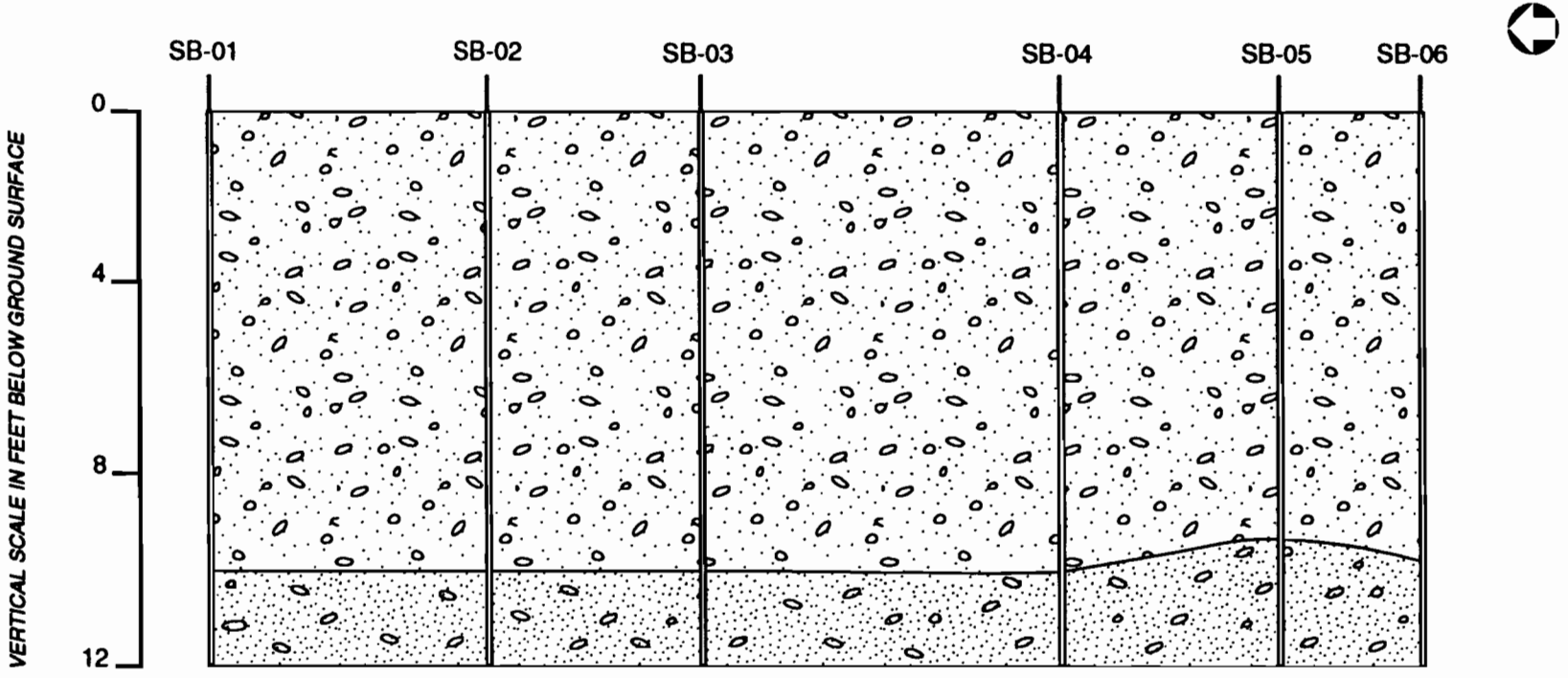
FIGURE 3-3

CROSS SECTION SB-01 TO SB-06
OIL/WATER SEPARATOR - BLDG. 215 & 216

GRIFFISS AIR FORCE BASE ROME, NEW YORK



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storage, and consists of a number of bunkers and support facilities (Figure 1-4). Environmental events that have occurred at the WSA are summarized below.

- As part of a program to construct bunkers in the northwestern portion of the WSA, JP-4 was found in soils excavated during initial construction. Planned soil borings were conducted by the base to evaluate the extent of contamination. A total of six borings were drilled. JP-4 was detected in boring soil samples collected from the 18 to 19.5 ft. depth, with a maximum detected concentration of 5,570 mg/kg. The bunkers were never constructed.

- A 500-gallon heating oil UST located at Building 838 became full of snow-melt water in the spring of 1990 as a result of fill port breakage, displacing the oil and flooding the paved and earthen-bermed area east of this building. The spill was cleaned up with absorbent pads and the UST was pumped out and repaired. The tank is still in use.

- Hydraulic equipment was used extensively in Building 829 until it was moved to Building 917. Chronic hydraulic fluid leaks were reported to have occurred during the early 1980s in a grassed area adjacent to Bay 7 at the northeastern side of the building and inside the building.

- Floor drains from the High Bay area (northern portion) of Building 917 flow to an Oil/Water Separator located north of the building. Three leach fields are located west of the Oil/Water Separator. Two of these fields are associated with a septic tank located at the northwest corner of the building.

  The Oil/Water Separator drains into the western leach field. The effluent from the Oil/Water Separator also drains to the AFFF lagoon located west of the WSA. When the AFFF system in

Building 917 is activated, the AFFF discharge is routed through the Oil/Water Separator to ultimately collect in the AFFF lagoon. The AFFF system has been activated several times in the past. The lagoon has no outlet and required pumping out during at least one AFFF discharge event.

- Possible chronic hydraulic oil (SAE 40) leakage occurred from 1973 to 1981 at Building 812.

- A 40-gallon diesel tank rupture occurred in the late 1980s at Building 912/913. Frozen ground was reported to have stopped penetration of the product and facilitated cleanup. Some soil was reportedly removed from the site.

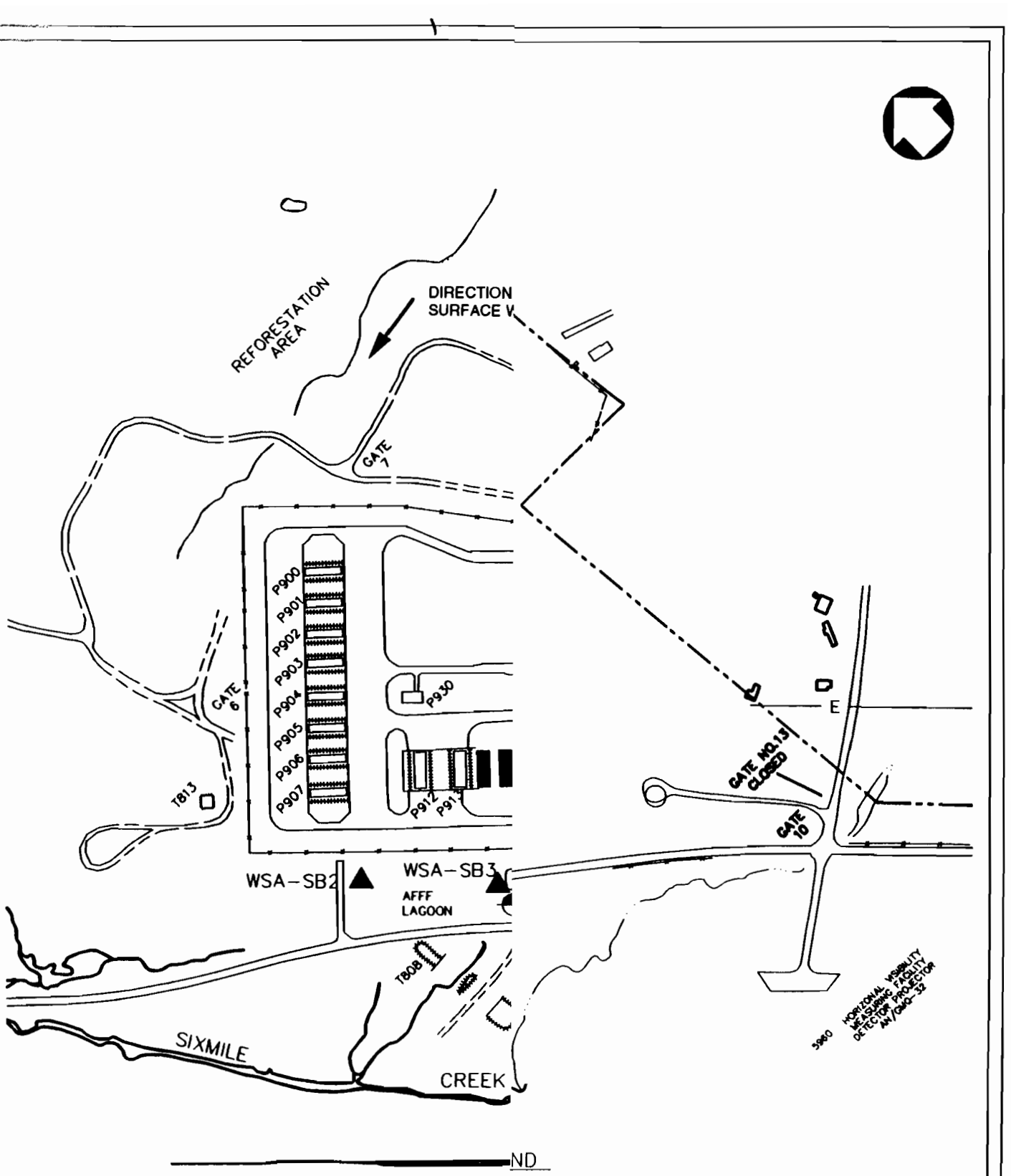
- Paints and solvents were used in the past at Building 843. This facility is a small trailer (non-powered trailer) maintenance facility located in the southwestern area of the WSA. The building reportedly contains a floor drain; however it is uncertain as to where this system discharges.

- Asbestos abatement was conducted at Building 821/822 (multi-cube storage areas). Asbestos was removed from pipe elbows and heating pipes in these buildings. Asbestos is still present in the boiler room. These buildings are marked to restrict access. Abatement also occurred at Building 823, consisting of both removal and encapsulation.

The results of the SI field investigations at WSA are discussed below. Figure 3-4 shows the location of the shallow soil borings and monitoring wells installed for this investigation.

3.3.1 Hand Auger Borings

A total of four hand auger borings were completed at the WSA. The purpose of the shallow hand auger borings was to augment the


REFORESTATION AREA
DIRECTION SURFACE W
GATE 7
GATE 6
GATE 10
GATE NO.15 CLOSED
P900
P901
P902
P903
P904
P905
P906
P907
P930
P912
P91
T813
T808
WSA-SB2
WSA-SB3
AFFF LAGOON
SIXMILE
CREEK
E
ND
MONITORING WELL LOCATION
SHALLOW (0-2') SOIL BORING LOCATION
0
200
400
SCALE IN FEET
\LORI\GRIF-TM\FIG3-4.DWG

shallow soil sampling conducted as part of the installation of the monitoring wells, by providing additional areal coverage at individual suspected sites of contamination. The soil borings were augered to a depth of two feet. The lithology of the soil borings was primarily silty to coarse sands and gravels. The depositional environment for this lithology cannot be addressed here, due to the high probability that much of the soil in the area of the WSA is fill material used in the construction of the facility.

3.3.2 Well Installation

WSA-MW1, the deepest well, was drilled to a depth of 30.0 feet and served as the anticipated hydrogeologic upgradient or background well. WSA-MW2, WSA-MW3, and WSA-MW4 were installed at locations anticipated to be hydrogeologically downgradient of the WSA. In addition to being downgradient wells, each of these wells was positioned to assess potential contamination based on environmental events which occurred at various facilities within or near the confines of the WSA. The following is a summary of the site-specific facilities and the rationale for the specific placement of the downgradient wells:

- Building 843 is located in the southwestern area of the WSA. Paints and solvents were used in this facility. Additionally, the building reportedly contains a floor drain; however, it is uncertain where this system discharges.

  Monitoring well WSA-MW2 was positioned downgradient of and as close to Building 843 as possible. The well was drilled to a depth of 15 feet.

- A 500-gallon heating oil UST located at Building 838 became full of snow-melt water in the spring of

1990, displacing the oil and flooding the paved and earthen-berm east and south of this building. The tank is still in use.

Shallow soil boring WSA-SB4 was hand augered in the earthen berm area south of Building 838. Monitoring well WSA-MW3 was placed outside the WSA security fence downgradient of Building 838. The well was drilled to a depth of 17.0 feet.

- The AFFF lagoon is located west of the WSA. The lagoon receives AFFF discharged from Building 917 located inside the WSA compound. The AFFF solution is routed through an underground auxiliary pipe associated with the Oil/Water Separator System at Building 917. The auxiliary pipe continues underground, and ultimately discharges into the northeast side of AFFF Lagoon.

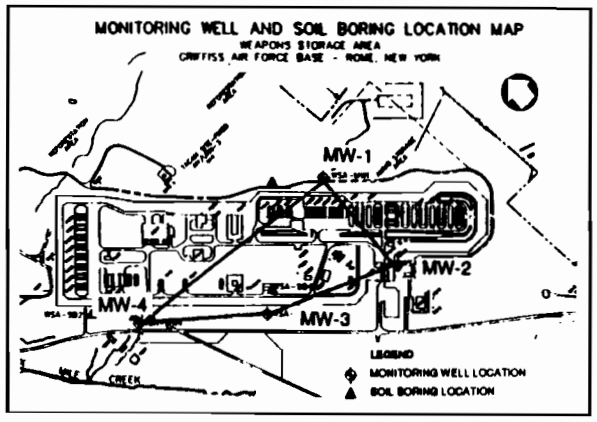
  Soil borings WSA-SB2 and WSA-SB3 were hand augered northwest of the AFFF lagoon. WSA-SB2 was positioned in an extended downgradient position. WSA-SB3 was intended to sample the soils immediately downgradient from the AFFF lagoon. Monitoring well WSA-MW4 was installed approximately 20 feet west, in a position anticipated to be hydrogeologically downgradient from the lagoon. The well was drilled to a depth of 18.0 feet.

The lithology of the soils at the WSA, as determined by the monitoring well borings, is primarily coarse sand and some gravel overlying a coarse sand zone. Figure 3-5 illustrates this sand gravel distribution. Because the soil material at WSA is reported to be fill material, it is not possible to describe the current stratigraphic distribution based on depositional environment.

FIGURE 3-5

GEOLOGICAL FENCE DIAGRAM
WEAPONS STORAGE AREA

GRIFFISS AIR FORCE BASE, ROME, NEW YORK



3.3.3 Permeability Tests

The aquifer of concern at the WSA is the unconfined surficial aquifer. Since none of the wells penetrated a distinct basal confining unit, the maximum thickness of the aquifer is unknown.

Hydraulic conductivity tests were performed by inserting a solid PVC rod into the saturated portion of the shallow aquifer in each well. The displacement of water resulting from insertion of the slug (known as the "falling head" portion of the test) was monitored with a downhole pressure transducer linked to a hydrologic monitor. When the water level returned to static, the slug was quickly removed, and the hydrologic monitor was simultaneously restarted. Removal of the slug produced an instantaneous lowering of water level in the casing. Monitoring of the rate of water level recovery to static conditions is known as a "rising head" test. The wells under evaluation were designed with the well screens extending above the water level; therefore, only measurements taken during the rising head portion of the test were used to estimate hydraulic conductivity (Bouwer, 1989).

Conductivity values were determined for the aquifer using the results of in-situ permeability tests. The Bower and Rice Method was used to calculate these values. Conductivity values ranged from 3.7×10^{-4} to 1.1×10^{-3} feet/minute. The results are indicative of silty to coarse sands. The following is a list of the conductivity results for each individual well:

- WSA-MW1: $K = 3.7 \times 10^{-4}$
- WSA-MW2: $K = 4.5 \times 10^{-4}$
- WSA-MW3: $K = 3.9 \times 10^{-3}$
- WSA-MW4: $K = 1.1 \times 10^{-3}$

The data used in these calculations can be found in Appendix F.

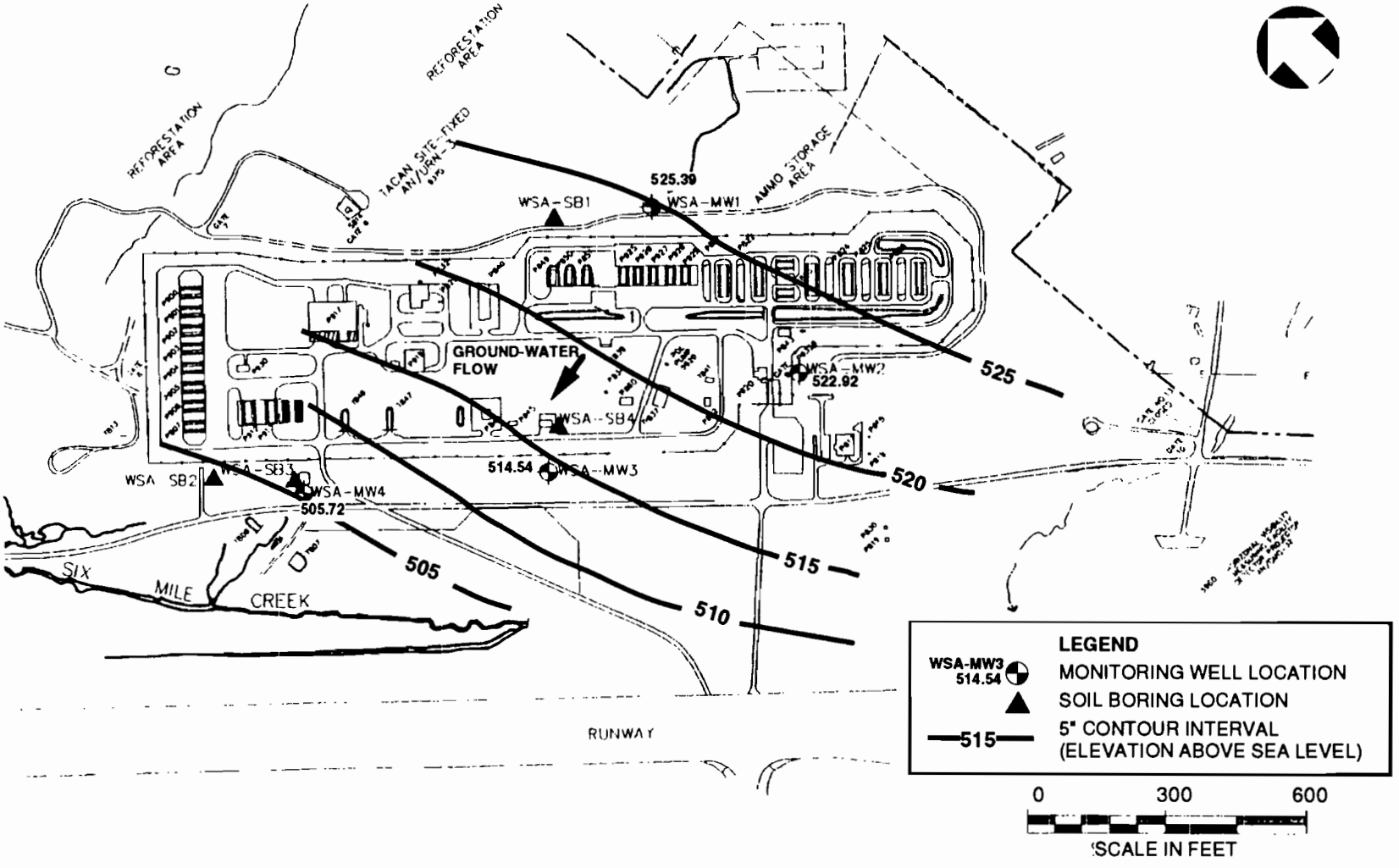
3.3.4 Potentiometric Surface

Static water level elevations adjusted to height above mean sea level are shown in Figure 3-6. Although the wells were not placed to conduct a hydrogeologic study, the contours indicate that the direction of ground-water flow is to the southwest, toward Sixmile Creek. The topography in the area also slopes to the southwest. Based upon this evidence, the most likely pathway of contaminant migration would be to the southwest, toward Sixmile Creek. Prior to this investigation, the ground-water flow was considered to be in a south-southwest direction.

FIGURE 3-6

INTERPRETED SURFICIAL AQUIFER POTENTIOMETRIC SURFACE MAP

WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE - ROME, NEW YORK



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4.0 NATURE AND EXTENT OF CONTAMINATION

The objective of the field investigation program at Griffiss AFB was to determine the presence or absence of contaminated ground water or soil at each site. Law collected representative samples for chemical analysis of soils from the Oil/Water Separator and soils and ground water from the WSA. This section discusses the results of the analytical program and the conclusions that can be drawn regarding the presence of contamination at these sites.

4.1 SAMPLING PROGRAM

The field program was conducted during July and August 1992. A brief description of sampling activities performed at the sites is provided in this section. Additional detailed information and sampling protocols are provided in Section 3.0 of this report and the Final Chemical Data Acquisition Plan (CDAP) (Law, 1992), published as a separate document.

4.1.1 Soil Gas Survey

A soil gas survey was conducted by Tracer Research Corporation (TRC). Soil gas samples were collected from 24 locations in and around Buildings 215/216. Sample collection methods and results are described in Section 3.1.1 and Appendix A.

4.1.2 Soil Sampling Program

Soil samples were collected from the Oil/Water Separator at Building 215/216 and the WSA. Deep soil borings were drilled at Building 215/216 to obtain soil samples and to provide subsurface information about stratigraphy and possible soil contamination.

Shallow soil samples were collected using a hand auger at the WSA to investigate possible surface soil contamination. Soil samples were also collected from the monitoring well borings at the WSA.

Shallow soil samples were collected using hand augers at depth intervals of 0 to 0.5 foot, 0.5 to 1 foot, and 1 to 2 feet. Sampling protocol described in Section 4.3 of the CDAP (Law, 1992) was followed for the sample collection. All samples were screened for volatile organic compounds (VOCs) using a photoionization detector (PID). All samples were submitted to the off-site laboratory for analysis.

Deep soil samples (2 feet to 12 feet) were collected from the boreholes performed at each site. Soil samples from the first two feet (0.0 feet to 2.0 feet) of these borings were collected using hand augers. Hand augering was discontinued upon encountering hard soil or pebbles. A two-foot (three-inch by two-foot) split-spoon sampler was used to collect the subsequent samples upon reaching the two-foot depth or after hand auger refusal. Samples were collected at intervals described in Section 3.1.6.

All soil samples were collected following the protocol described in Section 4.3 of the CDAP (Law, 1992). Each soil sample was screened for VOCs using a PID. All samples were submitted to the off-site laboratory for analysis.

In both split-spoon and hand-auger sampling, the sample for volatile organics fraction was collected first. The remaining sample was thoroughly mixed using a stainless-steel bowl and spoon, and the additional containers for the remaining parameters were filled.

4.1.2.1 Oil/Water Separator - Deep soil samples (2 feet to 12 feet) were collected from the boreholes performed at the Oil/Water

Separator Building 215/216. Soil samples from the first two feet (0.0 to 2.0 feet) of these borings were collected using a hand auger. There were a total of seven soil boring locations at this site.

4.1.2.2 Weapons Storage Area - There were four deep soil sample locations and four shallow soil sample locations at the WSA. The deep soil samples were collected from the four monitoring well locations during the installation of the monitoring wells. As was the case with the deep soil borings at the Oil/Water Separator, samples were collected using a hand auger from the first two feet (0.0 to 2.0 feet) of the monitoring well borings. The shallow soil samples collected from the shallow soil borings were obtained using a hand auger.

4.1.3 Ground-Water Sampling Program

Ground-water samples were collected from the WSA. A total of four monitoring wells were installed at this facility. One of the four monitoring wells was installed at the anticipated hydrogeologic upgradient location, and the remaining three were installed at anticipated hydrogeologic downgradient locations of the site. As indicated in Section 3.1.5, monitoring wells WSA-MW2 and WSA-MW4 were resampled in November, 1992 because the initial samples from these wells had NTU values in excess of the 50 NTU limit set by the NYSDEC. Only the results from the re-sampled wells are considered in the conclusions in this investigation. Ground-water samples were collected following the protocol described in Section 4.4.1 of the CDAP (Law, 1992).

The sample identification scheme is presented in Section 4.2.4 for shallow and deep soil borings at Building 215/216 and the WSA. This section also contains the sample identification scheme for ground-water samples collected at the WSA.

4.2 ANALYTICAL PROGRAM

The following section briefly describes the analytical program for soils and ground-water samples collected at both sites investigated. Additional details on analytical methods and procedures are provided in the Final CDAP (Law, 1992).

Soils and ground-water samples were analyzed in accordance with Environmental Protection Agency (USEPA) analytical methods. The methods are published in USEPA SW-846 (USEPA, 1986) and USEPA 600/4-79-020 (USEPA, 1983a). A brief synopsis of each analytical method used for this investigation is presented in Section 6.3 of the CDAP.

4.2.1 Soil Analyses

Soil samples from the boreholes at the Oil/Water Separator Building 215/216 were analyzed for the following parameters:

- Total Recoverable Petroleum Hydrocarbons (TRPH) (USEPA 9071/418.1M/Modified)
- Priority Pollutant (PP) Metals (USEPA 3050/6010/7000)
- Iron (Fe), Manganese (Mn), and Barium (Ba) (USEPA 3050/6010)

Soil samples from the monitoring well boreholes at WSA were analyzed for the following parameters:

- TRPH (USEPA 9071/418.1M/Modified)
- PP Metals (USEPA 3050/6010/7000)
- Fe, Mn, and Ba (USEPA 3050/6010)

Shallow soil samples from the hand auger locations at the WSA were analyzed for:

- Volatile Organic Compounds (VOCs) (USEPA 8240)
- Base Neutral Acid (BNA) extractables (USEPA 3550/8270)
- PP Metals (USEPA 3050/6010/7000)
- Fe, Mn, and Ba (USEPA 3050/6010)

4.2.2 Ground-Water Analyses

All ground-water samples collected from the WSA were analyzed for the following parameters:

- VOCs (USEPA 8240)
- BNAs (USEPA 8270)
- Total PP Metals (USEPA 3005/6010/7000)
- Dissolved PP Metals (USEPA 3005/6010/7000)
- Total and dissolved Fe, Mn, and Ba (USEPA 3005/6010)
- Total hexavalent chromium (USEPA 7196)

4.2.3 Soil Gas Samples

Soil gas samples were analyzed by TRC for the following parameters:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX)
- Total volatile hydrocarbons (TVHC)
- 1,1,1-trichloroethane (TCA)
- Trichloroethene (TCE)
- Tetrachloroethene (PCE)

4.2.4 Sample Identification

For clarification, the sample identification scheme is presented in the following sections.

4.2.4.1 Soil Samples - Shallow and deep soil samples from both sites are identified as indicated below:

Shallow Soil Samples from the Oil/Water Separator Building 215/16: For example, SB21503 (0 to 0.5 feet) indicates soil boring (sample) from boring No. 3 from the Building 215/216 OWS area collected from a depth of 0.0 to 0.5 feet. As indicated in Section 4.1.2, shallow soil borings ranged in depth from 0 to 2 feet. Deep soil borings ranged from 2 to 12 feet or point of auger refusal.

Deep Soil Samples from the Oil/Water Separator Building 215/216: These soil samples were identified as SB215XX (Y-Y) where SB indicates the soil boring (sample), 215 indicates the Building 215/216 area, and XX indicates the boring number. The numbers in the parentheses indicate the sampling interval.

Shallow Soil Samples from the WSA: These samples were identified as WSASBXX (Y-Y), where WSA indicates Weapons Storage Area, SB indicates soil boring (shallow) sample and XX indicates the type and/or number of the borehole. The numbers in the parentheses indicate the sampling interval. They ranged in depth from 0 to 2 feet. In the case of the WSA, shallow soil borings were collected separately from the deep soil boring or monitoring well boreholes, as shown on Figure 3-4.

For example, WSA-SB3(1-2) indicates the soil boring sample collected from the shallow soil boring No. 3 at the depth of one to two feet.

Deep Soil Samples from the WSA: These soil samples were identified as SBMWXX (Y-Y) where SB indicates soil boring (sample), MWXX indicates the type and number of the borehole and the numbers in the parentheses indicate the sampling interval.

For example, WSA-SBMW4 (6-8) indicates the soil boring sample collected at the six to eight-foot interval from the monitoring well No. 4 borehole at the Weapons Storage Area.

4.2.4.2 Ground-Water Samples - Ground-water samples submitted for off-site laboratory analysis were identified as WSAXXX, where WSA indicates the Weapons Storage Area and XXX indicates the monitoring well number.

For example, WSA-MW4 indicates the ground-water sample from monitoring well No. 4 at the Weapons Storage Area.

4.2.4.3 Quality Control Samples - The field quality control samples consisted of trip blanks and field duplicates. The trip blanks were identified as "TBs" and duplicates were identified by adding an 01 suffix to the field sample number.

For example, TB 825 indicates the trip blank accompanying the sample shipment of August (8) twenty-fifth (25), and WSAMW401 indicates the field duplicate of the ground-water sample (MW) collected from well No. 4 at WSA.

4.2.4.4 Soil Gas Samples - The soil gas samples were identified as SGX6.5, where SG indicates the soil gas sample, X indicates the consecutive sample number, and 6.5 indicates the depth of sample collection.

4.3 ANALYTICAL RESULTS

The following sections discuss the results of the analytical program for each site. The discussion focuses on the positive analytical results indicative of petroleum and solvent

contamination. Positive results which are the result of common laboratory contamination will not be discussed in the site-specific subsections. The quality control (QC) data include sample duplicates, matrix spike samples, trip blanks, method blanks and surrogate spike samples. Quality control issues affecting data interpretation at the sites are discussed in this section.

All of the data points collected are usable as reported by the laboratory. However, some results did not meet the required QC criteria. This can result from a number of causes, such as overlapping wavelength interference due to the elements within the sample matrix, or contamination caused by the laboratory extraction process. These types of effects prevent those samples from achieving the data quality objectives (DQOs) and should be used with discretion. The results which did not meet the DQOs were flagged with a data qualifier. The data qualifiers employed are defined below:

B - Sample result is less than five times (or ten in the case of a common lab contaminant) the concentration of a constituent detected in the method blank. This indicates laboratory contamination.

J - Estimated value; the compound meets the identification criteria but the result is less than the practical quantitation limit.

T - Analysis of the trip blank shipped with this sample indicated that the trip blank contained contaminants. This indicates possible cross contamination during shipping.

Site-specific summaries of positive analytical results for soils and ground-water samples are provided in the respective subsection for each site.

4.3.1 Oil/Water Separator at Building 215/216

The positive analytical results for the soil samples from this site are provided in Table 4-1.

As shown in Figure 4-1, TRPH was detected in three samples. The surface soil sample from SB21501 had a TRPH concentration of 97.3 mg/kg. The soil sample collected from this boring at a depth of 6 to 8 feet had a TRPH concentration of 33.5 mg/kg. The soil sample from SB21506 collected from a depth interval of 4 to 6 feet had a TRPH concentration of 165 mg/kg. None of the other soil samples collected at this site had detectable levels of TRPH.

Many metals are naturally occurring constituents in soils. As shown in Table 4-1, metals were detected in all soil samples collected. Although regional values for metals in soils are available, they are not entirely suitable for characterizing site-specific soil samples because of the highly variable nature of metals in soils. For example, soils containing shales or dolomites are typified by very high concentrations of iron and manganese, respectively. Due to these factors, no attempt was made to compare the results for metal concentrations as shown in Table 4-1.

4.3.2 The Weapons Storage Area

The following section describes the analytical results from the soil and ground-water sampling at the Weapons Storage Area.

4.3.2.1 Soil Sample Analysis - Surface and subsurface soil samples and ground-water samples were collected at this site. A total of four shallow hand-augered boreholes and four monitoring wells were installed at the site. One well (WSA-MW1) was located at the anticipated hydrogeologic upgradient location; the remaining wells

TABLE 4-1

POSITIVE RESULTS FOR SOIL BORING SAMPLES
OIL/WATER SEPARATOR
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SB21501 0-0.5'	SB21501 0.5-2'	SB21501 4-6'	SB21501 6-8'	SB21501 10-12'	SB21502 0-2'	SB21502 2-4'
Total Metals									
Arsenic	3050/7060	mg/kg(dry weight)	5.68	2.53	3.62	4.37	3.33	4.78	5.04
Barium	3050/6010	mg/kg(dry weight)	80.2	66.4	60.3	86.2	48.2	49.1	46.8
Cadmium	3050/6010	mg/kg(dry weight)	3.48	3.38	3.01	3.16	3.20	1.76	1.87
Chromium	3050/6010	mg/kg(dry weight)	13.0	8.07	10.9	10.6	8.52	7.16	5.08
Copper	3050/6010	mg/kg(dry weight)	27.5	16.0	27.8	32.0	42.9	22.6	17.6
Iron	3050/6010	mg/kg(dry weight)	23320	22260	20360	21460	27930	17440	13970
Lead	3050/7421	mg/kg(dry weight)	54.7	11.2	18.7	20.8	7.16	11.3	6.88
Manganese	3050/6010	mg/kg(dry weight)	852	1380	962	1010	1210	507	444
Mercury	7471	mg/kg(dry weight)	0.068	0.036	0.075	0.044	0.022	0.021	<0.021
Nickel	3050/6010	mg/kg(dry weight)	18.4	9.91	14.2	14.4	17.3	12.9	9.96
Selenium	3050/7740	mg/kg(dry weight)	<0.57	<0.60	<0.54	<0.55	0.56	<0.52	<0.52
Zinc	3050/6010	mg/kg(dry weight)	71.7	40.6	46.2	51.4	50.1	53.8	44.0
Total Recoverable Petroleum Hydrocarbons	9071/418.1	mg/kg(dry weight)	97.3	<29.7	<26.9	33.5	<28.0	<26.0	<26.0

TABLE 4-1

POSITIVE RESULTS FOR SOIL BORING SAMPLES
OIL/WATER SEPARATER
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SB21502 4-6'	SB21502 6-8'	SB21503 0-0.5'	SB21503 2-4'	SB2150301 2-4'	SB21503 4-6'	SB21503 6-8'
Total Metals									
Arsenic	3050/7060	mg/kg(dry weight)	7.48	3.43	4.36	3.16	2.91	3.81	2.65
Barium	3050/6010	mg/kg(dry weight)	66.0	42.2	61.2	46.0	53.2	51.0	41.7
Cadmium	3050/6010	mg/kg(dry weight)	3.31	2.61	2.08	3.18	2.46	3.00	2.86
Chromium	3050/6010	mg/kg(dry weight)	11.4	8.26	6.84	9.93	7.95	9.76	8.54
Copper	3050/6010	mg/kg(dry weight)	27.8	32.2	22.6	30.4	23.7	32.5	34.6
Iron	3050/6010	mg/kg(dry weight)	22780	22480	17010	23520	18050	23860	21940
Lead	3050/7421	mg/kg(dry weight)	43.1	9.67	15.6	14.8	12.5	38.1	8.34
Manganese	3050/6010	mg/kg(dry weight)	876	828	559	923	782	1130	956
Mercury	7471	mg/kg(dry weight)	0.045	0.043	0.043	0.045	0.045	0.054	0.034
Nickel	3050/6010	mg/kg(dry weight)	14.4	15.6	13.0	16.1	12.6	15.9	16.2
Selenium	3050/7740	mg/kg(dry weight)	<0.56	<0.54	<0.53	<0.56	<0.56	<0.54	<0.56
Zinc	3050/6010	mg/kg(dry weight)	60.9	49.2	42.8	69.0	49.1	58.4	47.3
Total Recoverable Petroleum Hydrocarbons	9071/418.1	mg/kg(dry weight)	<28.0	<27.2	<26.7	<27.9	<28.0	<27.3	<28.1

TABLE 4-1

POSITIVE RESULTS FOR SOIL BORING SAMPLES
OIL/WATER SEPARATER
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SB2150301 6-8'	SB21504 0-0.5'	SB21504 0-2'	SB21504 4-6'	SB21504 6-8'	SB21504 8-10'	SB21504 10-12'
Total Metals									
Arsenic	3050/7060	mg/kg(dry weight)	2.54	5.77	2.55	2.64	2.43	2.70	1.94
Barium	3050/6010	mg/kg(dry weight)	40.0	66.4	79.6	50.7	32.0	58.1	17.1
Cadmium	3050/6010	mg/kg(dry weight)	2.62	2.78	3.29	2.65	2.52	3.00	1.67
Chromium	3050/6010	mg/kg(dry weight)	7.70	8.73	9.39	9.53	6.80	12.4	6.21
Copper	3050/6010	mg/kg(dry weight)	35.4	25.4	19.2	23.4	29.4	24.2	22.7
Iron	3050/6010	mg/kg(dry weight)	21740	23530	21880	18340	22350	23070	17710
Lead	3050/7421	mg/kg(dry weight)	7.79	30.7	10.7	20.5	5.10	17.8	4.43
Manganese	3050/6010	mg/kg(dry weight)	1090	1190	1330	880	921	1110	518
Mercury	7471	mg/kg(dry weight)	0.033	0.057	0.070	0.056	0.033	0.058	<0.022
Nickel	3050/6010	mg/kg(dry weight)	14.5	15.2	11.1	12.8	11.6	13.8	12.3
Selenium	3050/7740	mg/kg(dry weight)	<0.55	<0.57	<0.59	<0.56	<0.55	<0.58	<0.54
Zinc	3050/6010	mg/kg(dry weight)	51.4	52.4	53.3	54.9	46.6	49.0	33.8
Total Recoverable Petroleum Hydrocarbons	9071/418.1	mg/kg(dry weight)	<27.3	<28.3	<29.3	<28.2	<27.4	<28.8	<27.0

TABLE 4-1

POSITIVE RESULTS FOR SOIL BORING SAMPLES
OIL/WATER SEPARATER
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SB215004 10-12'	SB21505 0-2'	SB21505 2-4'	SB21505 4-6'	SB21505 8-10'	SB21505 10-12'	SB21506 0-2'	SB21506 2-4'
Total Metals										
Arsenic	3050/7060	mg/kg(dry weight)	1.90	4.60	2.71	5.43	2.84	3.44	3.78	5.04
Barium	3050/6010	mg/kg(dry weight)	20.8	88.6	48.4	70.1	28.4	29.5	113	53.3
Cadmium	3050/6010	mg/kg(dry weight)	1.95	3.32	2.49	3.27	2.60	2.36	3.18	3.33
Chromium	3050/6010	mg/kg(dry weight)	6.13	9.62	7.65	15.4	7.15	14.5	8.04	9.84
Copper	3050/6010	mg/kg(dry weight)	20.6	24.0	15.5	35.3	23.3	28.6	18.2	33.7
Iron	3050/6010	mg/kg(dry weight)	16210	25070	18350	25700	18530	20530	23990	24600
Lead	3050/7421	mg/kg(dry weight)	4.46	30.0	5.08	23.7	4.70	5.40	19.4	5.37
Manganese	3050/6010	mg/kg(dry weight)	441	1600	901	1060	506	752	163	1030
Mercury	7471	mg/kg(dry weight)	<0.022	0.082	0.046	0.082	0.022	0.033	0.048	0.044
Nickel	3050/6010	mg/kg(dry weight)	11.0	13.3	8.81	15.8	11.5	12.4	9.18	13.7
Selenium	3050/7740	mg/kg(dry weight)	<0.54	<0.58	<0.58	<0.58	<0.54	<0.55	<0.60	<0.55
Zinc	3050/6010	mg/kg(dry weight)	30.6	212	41.4	67.3	32.3	40.7	53.3	43.1
Total Recoverable Petroleum Hydrocarbons	9071/418.1	mg/kg(dry weight)	<27.1	<29.1	<29.0	<29.2	<27.1	<27.5	<30.0	<27.3

TABLE 4-1

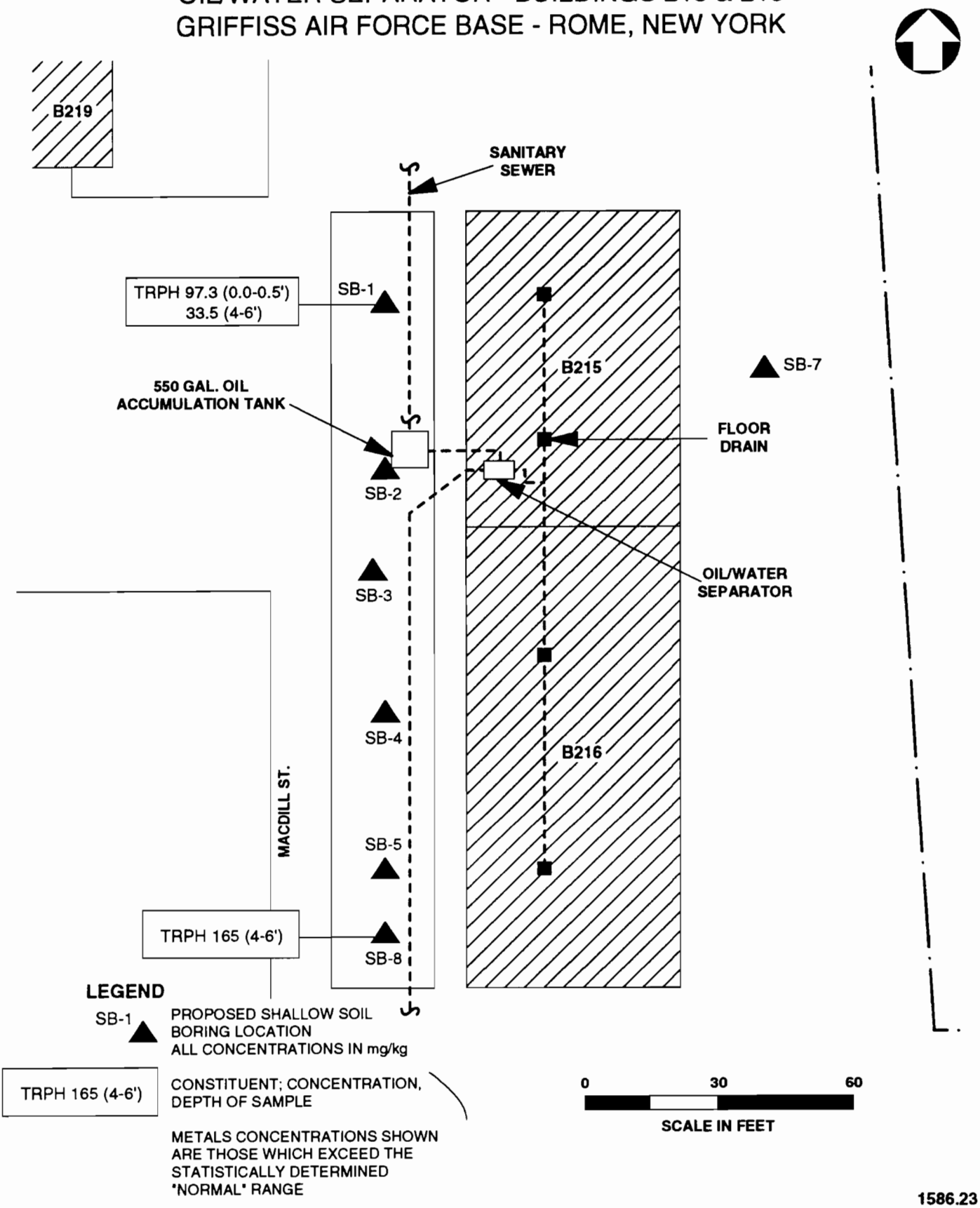
POSITIVE RESULTS FOR SOIL BORING SAMPLES
OIL/WATER SEPARATER
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SB21506 4-6'	SB21506 10-12'	SB2150601 10-12'	SB21507 0-2'	SB21507 2-4'	SB21507 8-10'	SB21507 10-12'
Total Metals									
Arsenic	3050/7060	mg/kg(dry weight)	4.89	2.72	2.62	2.75	3.82	8.22	5.88
Barium	3050/6010	mg/kg(dry weight)	59.6	24.9	36.1	97.6	29.0	54.1	33.4
Cadmium	3050/6010	mg/kg(dry weight)	3.26	2.18	2.16	3.25	3.66	3.36	3.07
Chromium	3050/6010	mg/kg(dry weight)	14.0	7.21	6.06	8.71	13.3	14.1	10.8
Copper	3050/6010	mg/kg(dry weight)	34.1	25.7	29.4	16.8	52.4	40.7	33.8
Iron	3050/6010	mg/kg(dry weight)	25040	19180	19050	21490	24740	26180	26670
Lead	3050/7421	mg/kg(dry weight)	30.6	5.03	4.75	16.3	7.79	15.3	7.99
Manganese	3050/6010	mg/kg(dry weight)	1060	557	764	914	696	1330	1020
Mercury	7471	mg/kg(dry weight)	0.057	0.022	<0.022	0.035	0.033	0.044	<0.022
Nickel	3050/6010	mg/kg(dry weight)	14.8	10.8	11.3	10.8	22.3	14.7	15.8
Selenium	3050/7740	mg/kg(dry weight)	<0.57	<0.55	<0.54	<0.58	<0.55	<0.55	<0.55
Zinc	3050/6010	mg/kg(dry weight)	63.3	35.8	43.1	51.6	40.9	52.8	52.5
Total Recoverable Petroleum Hydrocarbons	9071/418.1	mg/kg(dry weight)	165	<27.3	<27.1	<29.0	<27.3	<27.5	<27.4

FIGURE 4-1

POSITIVE ORGANIC SOIL SAMPLE RESULTS

OIL/WATER SEPARATOR - BUILDINGS 215 & 216
GRIFFISS AIR FORCE BASE - ROME, NEW YORK



(WSA-MW2, WSA-MW3, and WSA-MW4) were located at the anticipated hydrogeologic downgradient locations. One shallow hand-augered borehole was located upgradient of the site (WSA-SB1); the remaining shallow boreholes (WSA-SB2 through WSA-SB4) were located downgradient of suspected source areas. The positive analytical results for soils are provided in Table 4-2.

As shown in Figure 4-2, chloromethane (28 µg/kg) and 1,1,1-trichloroethane (6.8 µg/kg) were detected in shallow soil boring WSA - SB2 at the depth of 0 to 2 feet. Benzo(a)anthracene (43 µg/kg) was detected in the shallow soil boring WSA - SB3 at a depth of 1 to 2 feet. Bis(2-ethylhexyl)phthalate 57 µg/kg was detected in WSA-SB4. TRPH was also found in the soil samples from soil boring WSA - SBMW3 up to the depth of 8 to 10 feet.

4.3.2.2 Ground-Water Analysis - A total of four monitoring wells were installed at the site. Ground-water samples were collected from all four wells during both the August and November sampling events and sent to Princeton Testing Laboratory (PTL) for analysis.

Monitoring wells WSA-MW2 and WSA-MW4 initially could not be developed to reach the NYSDEC limits of 50 NTUs for turbidity; consequently the initial analytical results shown for these wells for the August 1992 sampling event were considered to be preliminary. These wells were redeveloped until a turbidity level of less than 50 NTUs was reached and re-sampled during November 1992. The preliminary results from WSA-MW2 and WSA-MW4 are shown for historical purposes and are not considered in the interpretations or conclusions in this report.

Because the ground-water samples were collected from two separate sampling events, the data from these two events have been interpreted separately. Comparisons between the upgradient well, WSA-MW1, and the downgradient wells are presented separately for each set of data.

TABLE 4-2

POSITIVE RESULTS FOR
SHALLOW SOIL BORING SAMPLES
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	WSASB1BG	WSASB2 0-0.5'	WSASB2 0.5-1'	WSASB201* 0.5-1'	WSASB2 1-2'	WSASB3 0-0.5'
Base Neutral/Acid Extractables								
Benzoic Acid	3550/8270	µg/kg	<1760	<1700	<1680	<1680	<1680	38 JB
Benzo(a)anthracene	3550/8270	µg/kg	<360	<350	<350	<350	<350	<360
bis(2-Ethylhexyl)phthalate	3550/8270	µg/kg	<360	<350	<350	<350	<350	<360
Total Metals In Solid								
Antimony	3050/6010	mg/kg(dry weight)	<3.3	<3.2	<3.2	3.16	3.16	<3.3
Arsenic	3050/7060	mg/kg(dry weight)	1.74	2.70	1.52	1.81	2.17	3.01
Barium	3050/6010	mg/kg(dry weight)	18.7	16.9	9.7	12.1	17.8	37.8
Cadmium	3050/6010	mg/kg(dry weight)	1.81	2.2	1.26	1.3	1.47	2.83
Chromium	3050/6010	mg/kg(dry weight)	4.2	6.2	3.05	3.2	3.05	8.04
Copper	3050/6010	mg/kg(dry weight)	10.8	15.2	10.1	9.9	11.4	24.1
Iron	3050/6010	mg/kg(dry weight)	11470	13510	8750	8940	10170	20960
Lead	3050/7421	mg/kg(dry weight)	4.94	3.65	1.65	1.82	2.65	17.6
Manganese	3050/6010	mg/kg(dry weight)	434	330	145	174	193	775
Mercury	7471	mg/kg(dry weight)	<0.022	0.032	0.032	<0.021	<0.021	0.043
Nickel	3050/6010	mg/kg(dry weight)	6.2	8.94	4.84	4.53	5.1	10.6
Selenium	3050/7740	mg/kg(dry weight)	<0.55	<0.53	<0.53	<0.53	<0.53	<0.54
Zinc	3050/6010	mg/kg(dry weight)	18.5	21.3	12.1	12.2	13.5	45.8
Total Solids, % (as received)		mg/kg(dry weight)	91%	94%	95%	95%	95%	92%
Purgeable Volatile Organics								
1,1,1-Trichloroethane	8240	µg/kg(dry weight)	<27	<27	6.8 J	<26	<26	<27
Acetone	8240	µg/kg(dry weight)	49 JB	19 JB	51 JB	49 JB	32 JB	33 JB
Chloromethane	8240	µg/kg(dry weight)	<55	<53	<53	<53	28 J	<54
Methylene Chloride	8240	µg/kg(dry weight)	25 JB	<27	6.8 JB	7.4 JB	8.4 JB	8.7 JB

* - Sample WSASB201(0.5-1') is a duplicate of sample WSASB2(0.5-1')
J - Estimated result
B - Result is estimated; may be biased high or false positive due to blank contamination

TABLE 4-2

POSITIVE RESULTS FOR
SHALLOW SOIL BORING SAMPLES
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	WSASB3 0.5-1'	WSASB3 1-2'	WSASB4 0-0.5'	WSASB4 0.5-1'	WSASB4 1-2'
Base Neutral/Acid Extractables							
Benzoic Acid	8270	µg/Kg	<1740	<1800	<1680	<1700	<1680
Benzo(a)anthracene	8270	µg/Kg	<360	43 J	<350	<350	<350
bis(2-Ethylhexyl)phthalate	8270	µg/Kg	<360	<370	57 J	<350	<350
Total Metals In Solid							
Antimony	3050/6010	mg/kg(dry weight)	<3.3	<3.4	<3.2	<3.2	<3.2
Arsenic	3050/7060	mg/kg(dry weight)	2.85	3.04	3.77	3.37	3.21
Barium	3050/6010	mg/kg(dry weight)	29.8	28.5	31.6	29.6	23.2
Cadmium	3050/6010	mg/kg(dry weight)	2.6	2.7	3.37	3.2	2.5
Chromium	3050/6010	mg/kg(dry weight)	8.3	7.2	10.4	8.5	6.42
Copper	3050/6010	mg/kg(dry weight)	16.6	18.5	31.8	36.3	27.4
Iron	3050/6010	mg/kg(dry weight)	16290	18540	24300	23560	19420
Lead	3020/7471	mg/kg(dry weight)	6.33	3.61	7.20	5.92	4.12
Manganese	3050/6010	mg/kg(dry weight)	505	530	1030	980	745
Mercury	7471	mg/kg(dry weight)	0.033	0.034	0.021	<0.021	<0.021
Nickel	3050/6010	mg/kg(dry weight)	8.3	10.2	13.4	14.8	12.8
Selenium	3050/7740	mg/kg(dry weight)	<0.54	<0.56	1.93	1.92	<0.53
Zinc	3050/6010	mg/kg(dry weight)	31.5	35.3	43.2	40.6	35.8
Total Solids, % (as received)		mg/kg(dry weight)	92%	89%	95%	94%	95%
Purgeable Volatile Organics							
1,1,1-Trichloroethane	8240	µg/kg(dry weight)	<27	<28	<26	<27	<26
Acetone	8240	µg/kg(dry weight)	53 JB	49 JB	39 JB	5 JB	26 B
Chloromethane	8240	µg/kg(dry weight)	<54	<56	<53	<53	<53
Methylene Chloride	8240	µg/kg(dry weight)	23 JB	26 JB	23 JB	6 JB	<26

J - Estimated result
B - Result is estimated; may be biased high or false positive due to blank contamination

TABLE 4-2

POSITIVE RESULTS FOR
DEEP SOIL BORING SAMPLES
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SBMW1 0-0.5'	SBMW1 0.5-1'	SBMW1 2-4'	SBMW1 4-6'	SBMW1 6-8'	SBMW1 8-10'
Total Metals								
Arsenic	3050/7060	mg/kg(dry weight)	3.40	2.88	2.45	4.32	1.5	2.02
Barium	3050/6010	mg/kg(dry weight)	50.2	40.2	14.0	27.2	14.3	15.2
Cadmium	3050/6010	mg/kg(dry weight)	2.18	2.77	2.26	2.20	1.36	1.65
Chromium	3050/6010	mg/kg(dry weight)	7.82	7.82	6.34	4.25	2.62	4.40
Copper	3050/6010	mg/kg(dry weight)	14.8	11.6	14.6	15.8	8.84	10.5
Iron	3050/6010	mg/kg(dry weight)	15380	17160	14700	15160	8040	11100
Lead	3050/7421	mg/kg(dry weight)	12.5	6.63	3.96	4.36	2.44	2.33
Manganese	3050/6010	mg/kg(dry weight)	601	522	268	410	390	341
Mercury	7471	mg/kg(dry weight)	0.034	0.057	<0.022	0.022	<0.023	<0.022
Nickel	3050/6010	mg/kg(dry weight)	7.59	7.87	10.2	8.44	6.42	7.31
Selenium	3050/7740	mg/kg(dry weight)	<0.57	<0.57	<0.54	<0.54	<0.57	<0.55
Thallium	3050/7841	mg/kg(dry weight)	<0.57	<0.57	<0.54	<0.54	<0.57	<0.55
Zinc	3050/6010	mg/kg(dry weight)	34.4	30.1	18.0	23.3	11.5	16.5
TRPH	9071/418.1	mg/kg(dry weight)	<28.7	<28.7	<27.0	<26.9	<28.4	<27.5

TABLE 4-2

POSITIVE RESULTS FOR
DEEP SOIL BORING SAMPLES
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SBMW101* 8-10'	SBMW1 10-15'	SBMW1 15-20'	SBMW2 0-0.5'	SBMW2 0.5-1'	SBMW2 2-4'
Total Metals								
Arsenic	3050/7060	mg/kg(dry weight)	1.53	1.89	1.58	5.56	3.02	3.14
Barium	3050/6010	mg/kg(dry weight)	13.4	10.0	12.7	26.2	27.1	54.1
Cadmium	3050/6010	mg/kg(dry weight)	1.32	1.14	1.65	2.70	2.79	2.54
Chromium	3050/6010	mg/kg(dry weight)	4.19	5.11	4.06	7.42	7.56	6.99
Copper	3050/6010	mg/kg(dry weight)	8.24	8.30	9.72	29.4	13.8	22.4
Iron	3050/6010	mg/kg(dry weight)	8210	8850	9770	20570	17920	19490
Lead	3050/7421	mg/kg(dry weight)	2.16	2.10	1.78	6.16	7.99	4.92
Manganese	3050/6010	mg/kg(dry weight)	264	226	236	611	781	398
Mercury	7471	mg/kg(dry weight)	<0.022	<0.023	0.044	0.032	<0.058	0.033
Nickel	3050/6010	mg/kg(dry weight)	5.71	7.33	4.40	13.7	10.2	14.9
Selenium	3050/7740	mg/kg(dry weight)	<0.55	<0.57	<0.55	<0.53	<0.58	<0.54
Thallium	3050/7841	mg/kg(dry weight)	<0.55	<0.57	<0.55	<0.53	<0.58	<0.54
Zinc	3050/6010	mg/kg(dry weight)	12.3	13.4	16.4	32.0	33.4	26.2
TRPH	9071/418.1	mg/kg(dry weight)	<27.5	<28.4	<27.5	<26.6	<29.1	<27.2

* – Sample SBMW101 (8-10') is a duplicate of sample SBMW1 (8-10').

TABLE 4-2

POSITIVE RESULTS FOR
SOIL BORING SAMPLES
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SBMW2 4-6'	SBMW2 6-8'	SBMW2 8-10'	SBMW201* 8-10'	SBMW3 0-0.5'	SBMW3 0.5-1'
Total Metals								
Arsenic	3050/7060	mg/kg(dry weight)	2.66	2.94	2.01	1.94	3.52	3.60
Barium	3050/6010	mg/kg(dry weight)	17.9	20.9	11.9	10.7	30	29.6
Cadmium	3050/6010	mg/kg(dry weight)	1.75	2.15	1.52	1.38	3.03	2.88
Chromium	3050/6010	mg/kg(dry weight)	6.34	7.58	4.68	4.5	7.9	7.7
Copper	3050/6010	mg/kg(dry weight)	15.0	19.6	13.4	12.1	23.7	26.4
Iron	3050/6010	mg/kg(dry weight)	16360	17570	12630	11450	18970	21520
Lead	3050/7421	mg/kg(dry weight)	3.93	4.20	3.56	3.32	5.07	7.12
Manganese	3050/6010	mg/kg(dry weight)	293	341	319	278	752	875
Mercury	7471	mg/kg(dry weight)	0.033	0.044	0.038	<0.025	0.032	0.033
Nickel	3050/6010	mg/kg(dry weight)	10.4	12.6	8.86	8.31	12.8	13.0
Selenium	3050/7740	mg/kg(dry weight)	<0.54	<0.55	<0.63	<0.62	<0.53	<0.54
Thallium	3050/7841	mg/kg(dry weight)	<0.54	<0.55	<0.63	<0.62	<0.53	<0.54
Zinc	3050/6010	mg/kg(dry weight)	22.2	23.7	18.0	17.6	41.1	42.8
TRPH	9071/418.1	mg/kg(dry weight)	<27.2	<27.5	<31.6	<31.2	<26.6	<27.2

* – Sample SBMW201 (8-10') is a duplicate of sample SBMW2 (8-10').

TABLE 4-2

POSITIVE RESULTS FOR
SOIL BORING SAMPLES
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SBMW3 2-4'	SBMW301* 2-4'	SBMW3 4-6'	SBMW3 6-8'	SBMW301** 6-8'	SBMW3 8-10'
Total Metals								
Arsenic	3050/7060	mg/kg(dry weight)	7.54	6.17	7.78	9.92	11.0	6.65
Barium	3050/6010	mg/kg(dry weight)	24.1	24.8	18.5	15.4	25.3	22.1
Cadmium	3050/6010	mg/kg(dry weight)	0.87	0.76	<0.54	<0.55	<0.56	<0.55
Chromium	3050/6010	mg/kg(dry weight)	4.4	1.4	2.12	1.5	2.33	2.53
Copper	3050/6010	mg/kg(dry weight)	11.3	10.2	5.82	5.55	4.44	5.4
Iron	3050/6010	mg/kg(dry weight)	7270	6490	2900	1570	2080	1570
Lead	3050/7421	mg/kg(dry weight)	9.75	7.97	8.13	11.3	10.1	9.28
Manganese	3050/6010	mg/kg(dry weight)	253	220	70	7.9	10.7	21.6
Mercury	7471	mg/kg(dry weight)	0.17	0.13	0.20	0.18	0.26	0.18
Nickel	3050/6010	mg/kg(dry weight)	5.22	5.33	<2.2	2.75	3.1	3.85
Selenium	3050/7740	mg/kg(dry weight)	1.47	1.25	1.96	1.85	2.09	1.80
Thallium	3050/7841	mg/kg(dry weight)	<0.54	<0.54	<0.54	0.90	0.76	<0.05
Zinc	3050/6010	mg/kg(dry weight)	17.8	13.5	5.92	3.85	4.7	4.62
TRPH	9071/418.1	mg/kg(dry weight)	172	105	76	36.3	38.9	29.7

* – Sample SBMW301 (2-4') is a duplicate of sample SBMW3 (2-4').

** – Sample SBMW301 (6-8') is a duplicate of sample SBMW3 (6-8').

TABLE 4-2

POSITIVE RESULTS FOR
SOIL BORING SAMPLES
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	SBMW3 10-15'	SBMW4 0-0.5'	SBMW4 0.5-1'	SBMW4 2-4'	SBMW4 4-6'	SBMW4 6-8'
Total Metals								
Arsenic	3050/7060	mg/kg(dry weight)	2.07	2.86	3.94	4.2	3.53	3.9
Barium	3050/6010	mg/kg(dry weight)	16.0	25.8	31.4	51	20.9	22.5
Cadmium	3050/6010	mg/kg(dry weight)	0.89	2.1	1.91	3.2	2.2	3.0
Chromium	3050/6010	mg/kg(dry weight)	4.11	7.4	6.8	10.5	7.14	8.2
Copper	3050/6010	mg/kg(dry weight)	10.6	17.4	21.3	24.6	23	29.8
Iron	3050/6010	mg/kg(dry weight)	10670	15170	16970	20900	26160	22730
Lead	3050/7421	mg/kg(dry weight)	2.90	10.8	12.8	19.4	4.05	7.53
Manganese	3050/6010	mg/kg(dry weight)	338	358	590	795	594	612
Mercury	7471	mg/kg(dry weight)	<0.24	0.033	0.33	0.045	<0.022	0.057
Nickel	3050/6010	mg/kg(dry weight)	6.5	11.3	11.5	12.6	10.8	16.8
Selenium	3050/7740	mg/kg(dry weight)	<0.60	<0.28	<0.27	<0.28	<0.27	<0.28
Thallium	3050/7841	mg/kg(dry weight)	<0.60	<0.56	<0.55	<0.57	<0.54	<0.57
Zinc	3050/6010	mg/kg(dry weight)	17.4	32.7	39.2	62.5	33.4	40.6
TRPH	9071/418.1	mg/kg(dry weight)	<29.8	<27.8	<27.5	<28.4	<26.9	<28.4

TABLE 4–2

POSITIVE RESULTS FOR
SOIL BORING SAMPLES
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

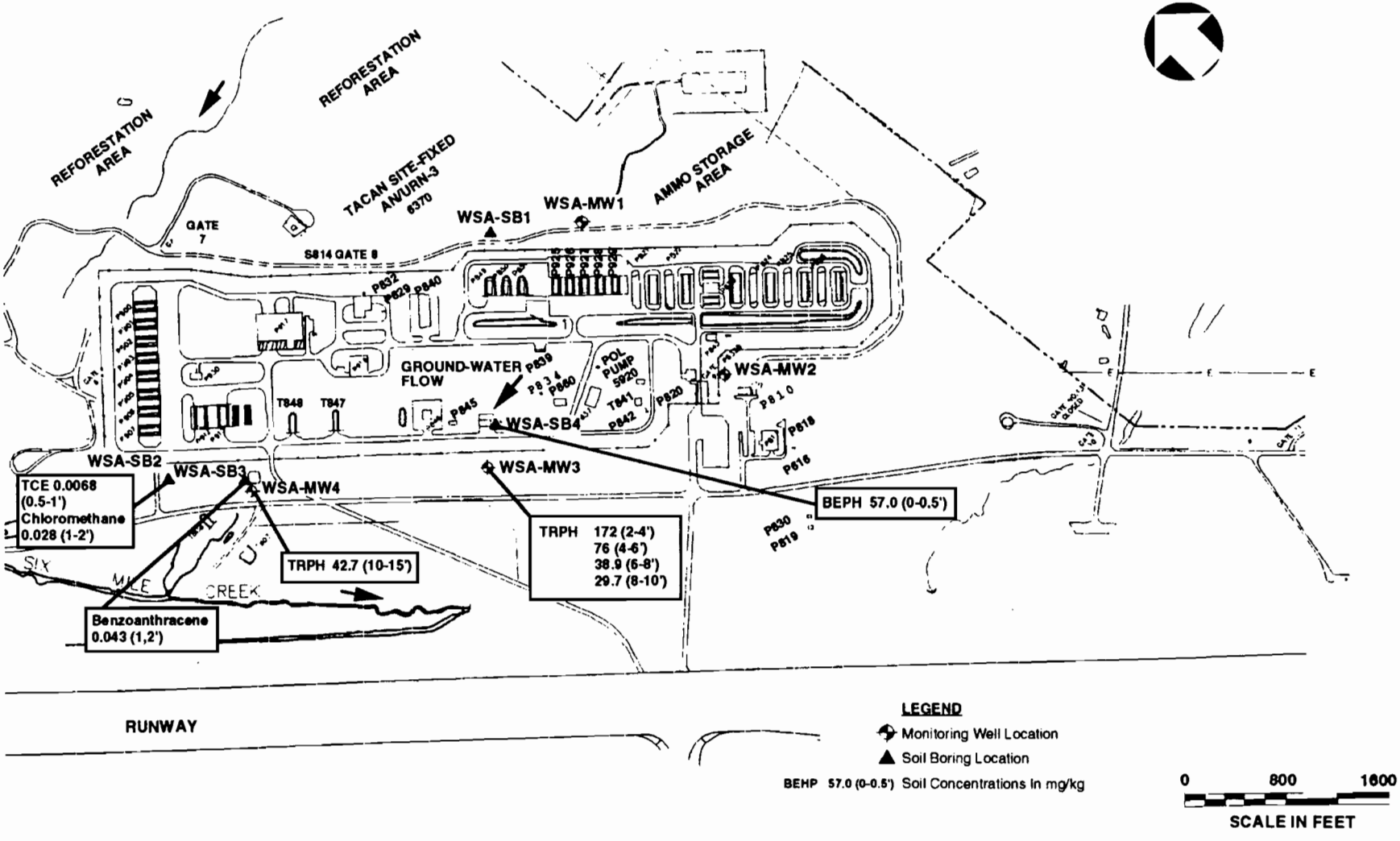
PARAMETER	EPA METHOD	UNITS	SBMW4 8–10'	SBMW401* 8–10'	SBMW4 10–15'
Total Metals					
Arsenic	3050/7060	mg/kg(dry weight)	3.6	3.2	3.7
Barium	3050/6010	mg/kg(dry weight)	34.8	32.6	32.1
Cadmium	3050/6010	mg/kg(dry weight)	2.80	2.82	2.8
Chromium	3050/6010	mg/kg(dry weight)	9.65	7.22	7.24
Copper	3050/6010	mg/kg(dry weight)	18.0	16.5	18.0
Iron	3050/6010	mg/kg(dry weight)	20740	19820	21200
Lead	3050/7421	mg/kg(dry weight)	9.4	9.64	23.6
Manganese	3050/6010	mg/kg(dry weight)	915	878	956
Mercury	7471	mg/kg(dry weight)	0.035	0.035	<0.024
Nickel	3050/6010	mg/kg(dry weight)	11.2	10.6	12.0
Selenium	3050/7740	mg/kg(dry weight)	<0.29	<0.29	<0.30
Thallium	3050/7841	mg/kg(dry weight)	<0.59	<0.59	<0.61
Zinc	3050/6010	mg/kg(dry weight)	47.4	43.2	45.7
TRPH	9071/418.1	mg/kg(dry weight)	<29.4	<29.4	42.7

* – Sample SBMW401 (10–15') is a duplicate of sample SBMW4 (10–15').

FIGURE 4-2

POSITIVE ORGANIC SOIL SAMPLE RESULTS

WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE ROME, NEW YORK



1586.23

As described in Section 3.1.6, the two sampling events were conducted using different sampling techniques. Because the ground-water samples collected during November 1992 employed a dedicated QED bladder pump, the analytical results from these samples are considered to be the most representative of the aquifer.

The positive analytical results for the ground-water samples from the August sampling event are summarized in Table 4-3. The positive analytical results for the ground-water samples from the November sampling event are summarized in Table 4-4.

The only organic constituent detected in ground water at the WSA was bis(2-ethylhexyl)phthalate at concentrations of 1.2 μg/L and 8.4 μg/L in MW-2 and MW-4, respectively. Dissolved manganese was found at a concentration level of 1.9 mg/L in the ground water from monitoring well WSA-MW3. Hexavalent chromium was not found in any of the ground-water samples.

TABLE 4-3

POSITIVE RESULTS OF GROUND-WATER SAMPLES
AUGUST 1992 SAMPLING EVENT
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	WSAMW1	WSAMW2*	WSAMW3	WSAMW4*
Base Neutral/Acids						
Benzylbutylphthalate	3510/8270	µg/liter	<10	<10	1 JB	<10
bis(2-Ethylhexyl)phthalate	3510/8270	µg/liter	2 JB	2 JB	6 JB	2 JB
Chromium, Hexavalent	SM 312B	mg/liter	ND	ND	ND	ND
Dissolved Metals						
Iron	3005/6010	mg/liter	<0.05	<0.05	<0.05	<0.05
Manganese	3005/6010	mg/liter	<0.01	0.01	1.9	<0.01
Zinc	3005/6010	mg/liter	<0.02	<0.02	<0.02	<0.02
Total Metals						
Aluminum	3005/6010	mg/liter	NS	NS	NS	NS
Arsenic	7060	mg/liter	0.015	<0.010	0.012	0.046
Barium	3005/6010	mg/liter	0.08	0.04	0.095	0.25
Cadmium	3005/6010	mg/liter	<0.01	<0.01	<0.01	0.01
Chromium	3005/6010	mg/liter	<0.02	<0.02	<0.02	0.05
Copper	3005/6010	mg/liter	0.09	<0.025	0.05	0.28
Iron	3005/6010	mg/liter	41	29.5	29.5	140
Lead	3020/7421	mg/liter	0.027	0.077	0.0152	0.0761
Manganese	3005/6010	mg/liter	2.7	0.28	3.4	11.8
Mercury	7470	mg/liter	<0.0002	<0.0002	<0.0002	0.0006
Nickel	3005/6010	mg/liter	<0.04	<0.04	<0.04	0.11
Zinc	3005/6010	mg/liter	0.09	0.022	0.064	0.30
Volatile Organics By GCMS						
Acetone	8240	µg/liter	<5	<5	<5	<5
Chloroform(Trichloromethane)	8240	µg/liter	<5	<5	<5	<5
Methylene chloride (dichloromethane)	8240	µg/liter	1.5 JT	1.5 JT	1.6 JT	1.6 JT
Toluene	8240	µg/liter	<5	1.0 JB	1.1 JB	<5

*Note: These wells were not sufficiently developed prior to sampling as evidenced by the turbid idities exceeding 50 NTU. The wells were subsequently re-developed and re-sampled during the November sampling event. The data from the August sampling event should not be used for interpretative purposes.

J - Estimated result

B - Result estimated; may be biased high or false positive due to method blank contamination

T - Contaminant found in trip blank

ND - Not-detected

NS - Not analyzed for this constituent

mg/liter - milligrams per liter

µg/liter - micrograms per liter

TABLE 4-4

POSITIVE RESULTS OF GROUND-WATER SAMPLES
NOVEMBER 1992 SAMPLING EVENT
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

PARAMETER	EPA METHOD	UNITS	WSAMW1	WSAMW2	WSAMW3	WSAMW4
Base Neutral/Acid Extractables						
Benzylbutylphthalate	3510/8270	µg/liter	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate	3510/8270	µg/liter	ND	1.2	<10	8.4
Chromium, Hexavalent	SM 312B	mg/liter	ND	ND	ND	ND
Dissolved Metals						
Iron	3005/6010	mg/liter	NS	<0.02	NS	<0.02
Manganese	3005/6010	mg/liter	NS	<0.01	NS	<0.01
Zinc	3005/6010	mg/liter	NS	0.12	NS	0.125
Total Metals						
Aluminum	3005/6010	mg/liter	0.64	0.34	0.44	<0.21
Arsenic	7060	mg/liter	<0.01	<0.010	<0.01	<0.010
Barium	3005/6010	mg/liter	0.008	<0.02	<0.02	<0.02
Cadmium	3005/6010	mg/liter	<0.01	<0.01	<0.01	<0.01
Chromium	3005/6010	mg/liter	<0.02	<0.02	<0.02	<0.02
Copper	3005/6010	mg/liter	<0.01	<0.025	<0.01	<0.025
Iron	3005/6010	mg/liter	0.76	0.435	0.62	<0.02
Lead	3020/7421	mg/liter	<0.005	<0.005	<0.005	<0.005
Manganese	3005/6010	mg/liter	0.07	0.03	2.5	<0.01
Mercury	7470	mg/liter	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	3005/6010	mg/liter	<0.04	<0.04	<0.04	<0.04
Zinc	3005/6010	mg/liter	0.274	0.20	0.21	0.12
Volatile Organics By GCMS						
Acetone	8240	µg/liter	<5	4.8 JB	1.3 JB	<5
Chloroform(Trichloromethane)	8240	µg/liter	<5	<5	<5	<5
Methylene chloride (dichloromethane)	8240	µg/liter	3.58	2.7 B	3.2 B	2.6 B
Toluene	8240	µg/liter	<5	<5	<5	<5

J – Estimated result
B – Result estimated; may be biased high or false positive due to blank contamination
T – Contaminant found in trip blank
ND – Not-detected
NS – Not analyzed for this constituent
mg/liter – milligrams per liter
µg/liter – micrograms per liter

5.0 EXPOSURE ASSESSMENT

This section describes the qualitative exposure assessment for both the Oil/Water Separator Building 215/216 and Weapons Storage Area.

5.1 INTRODUCTION

A Qualitative Exposure Assessment was performed for the two sites as a component of this SI. The exposure assessment was conducted in accordance with the USEPA's Risk Assessment Guidance For Superfund: Human Health Evaluation Manual (USEPA, 1989a) and Environmental Evaluation Manual (USEPA, 1989b).

The purpose of this qualitative exposure assessment is to provide an evaluation of the potential threat of site constituents to human health and the environment in the absence of any remedial action. The two sites under investigation are the Oil/Water Separator at Building 215/216 and the Weapons Storage Area (WSA).

The exposure assessment focuses on potential human receptors who work, or reside, at, or near, these sites. The likelihood that detected site constituents may migrate off-site and potentially impact surrounding communities was also examined. The selection of constituents of concern for each site was based on the identification of constituents in sampled media whose concentrations exceeded background levels. The nature and extent of contamination, the potential fate and transport of site-specific constituents, and the geological and hydrological features of the areas were reviewed in order to identify potential pathways whereby human and environmental receptors might be exposed to site constituents.

The exposure assessment was comprised of the following tasks:

- Constituent Characterization
- Contaminant Fate and Transport
- Potential Exposure Routes
- Regulatory Standards
- Exposure Characteristics
- Environmental Exposure Assessment

5.2 CONSTITUENT CHARACTERIZATION

In the following sections constituents of concern at each of the sites are identified. In instances in which laboratory blanks were contaminated, constituents which were present in field sample(s), at concentrations less than five times the measured concentrations of the same substances in laboratory blanks (qualified as B), were excluded as constituents of concern.

5.2.1 Oil/Water Separator at Building 215/216

Metals were detected in each of the borings at Building 215/216. Total Recoverable Petroleum Hydrocarbons (TRPH) were detected at two locations. The maximum detected concentrations of constituents of concern at this site are shown in Table 5-1.

5.2.2 Weapons Storage Area

Metals were detected in both shallow and deep soil borings at the WSA. Two volatile organic compounds (1,1,1,-trichloroethane and chloromethane), and one semi-volatile organic compound (benzo(a)anthracene), were detected at a single location in shallow soils. TRPH were detected in deep soils only. Tables 5-2 and 5-3 present the maximum concentrations of constituents detected in shallow, and deep soils, respectively.

TABLE 5-1

MAXIMUM DETECTED CONCENTRATIONS OF CONSTITUENTS PRESENT IN SOILS
OIL/WATER SEPARATOR AT BUILDING 215/216
Griffiss Air Force Base, New York

	Maximum Detected Concentrations											
	Soil Depth and Sample ID											
Constituents	0-2'		2-4'		4-6'		6-8'		8-10'		10-12'	
Metals (mg/kg):												
Arsenic	5.77	SB21507	5.04	SB21502	7.48	SB21502	4.37	SB21501	8.2	SB21507	5.88	SB21507
Copper	27.5	SB21501	52.4	SB21507	35.3	SB21505	35.4	SB2150301	40.7	SB21507	42.9	SB21501
Lead	54.7	SB21501	14.8	SB21503	43.1	SB21502	20.8	SB21501	17.8	SB21504	7.99	SB21507
Nickel	18.4	SB21501	22.3	SB21507	15.9	SB21503	16.2	SB21503	14.7	SB21507	17.3	SB21501
Zinc	212	SB21505	49.1	SB21503	67.3	SB21505	51.4	SB21501	52.8	SB21507	52.5	SB21507
TRPH	97.3	SB21501	ND		ND		33.5	SB21501	ND		ND	

mg/kg = milligrams per kilogram

(a) Sample identification corresponds to sample location
ND- Not detected

TABLE 5-2

MAXIMUM DETECTED CONCENTRATIONS OF CONSTITUENTS PRESENT IN SHALLOW SOILS
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

	Maximum Detected Concentrations					
	Soil Depth and Sample ID					
Constituents	0-0.5'		0.5-1'		1-2'	
Metals (mg/kg):						
Arsenic	5.56	WSASB2	3.94	WSASB4	3.21	WSASB4
Lead	17.6	WSASB3	12.8	WSASB4	4.12	WSASB4
Mercury	0.043	WSASB3	0.33	SBMW4	0.034	WSASB3
Volatile Organics (mg/kg):						
1,1,1-Trichloroethane	ND		0.0068	WSASB2	ND	
Chloromethane	ND		ND		0.028	WSASB2
Semi-Volatile Organics (mg/kg):						
Benzo(a)anthracene	ND		ND		0.043	WSASB3

mg/kg = milligrams per kilogram
(a) Sample identification corresponds to sample location
BR - Below "normal" range of metal concentrations
ND - Not detected

TABLE 5-3

MAXIMUM DETECTED CONCENTRATIONS OF CONSTITUENTS PRESENT IN DEEP SOILS
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

	Maximum Detected Concentrations											
	Soil Depth and Sample ID											
Constituents	2-4'		4-6'		6-8'		8-10'		10-15'		15-20'	
Metals (mg/kg):												
Arsenic	7.54	SBMW3	7.78	SBMW3	11	SBMW3	6.65		3.7	SBMW4	5.56	SBMW
Lead	19.4	SBMW4	8.13	SBMW3	11.3	SBMW3	9.64	SBMW401	23.6	SBMW4	6.16	SBMW
Mercury	0.17	SBMW3	0.20	SBMW3	0.26	SBMW301	0.18	SBMW3	ND		0.032	SBMW
Thallium	ND		ND		0.9	SBMW3	ND		ND		ND	
TRPH	172	SBMW3	76	SBMW3	38.9	SBMW3	29.7	SBMW3	42.7	SBMW4	ND	

mg/kg = milligrams per kilogram

(a) Sample identification corresponds to sample location

ND - Not detected

Ground-water samples collected in August, 1992 from downgradient monitoring well (WSA-MW3) contained a total of seven metals. Five metals and one semi-volatile organic compound (bis(2-ethylhexyl)phthalate were detected in ground water beneath the site during resampling in November, 1992. The maximum ground-water concentrations from two sampling efforts are shown in Tables 5-4 and 5-5.

5.3 CONTAMINANT FATE AND TRANSPORT

Potential exposure of human or environmental receptors to a particular compound, or element, is determined, in part, by the persistence of the constituent in the environmental medium of interest. The fate of site constituents and their potential migration from the site, or to other environmental media, depends upon the site's physical characteristics, the physical and chemical characteristics of individual constituents, and the nature and extent of constituent release. The physical and chemical characteristics of constituents detected at the Oil/Water Separator at Building 215/216 and WSA are presented in Table 5-6.

Transport of metals in the environment depends largely on form and speciation, the latter reflecting, in part, their multiple potential oxidation states. Environmental temperature, pH and the presence or absence of organic matter are key determinants of the form, or oxidation state, of metals in the environment. Movement of metals in soils at these two sites would be anticipated to be partially retarded due to their potential to adsorb to soil particles. The potential of metals detected in ground water at the WSA facility to migrate will be determined, at least in part, by their water solubility. Metals which exist in ionic states in aqueous solution will tend to be mobile and migrate with ground-water flow. Conversely, metals which assume non-ionic forms in aqueous solutions will likely precipitate and bind to soil

TABLE 5–4

MAXIMUM DETECTED CONCENTRATIONS OF CONSTITUENTS PRESENT IN GROUND WATER AUGUST 1992 SAMPLING EVENT WEAPONS STORAGE AREA Griffiss Air Force Base, New York

Constituents	Upgradient Ground Water Concentrations (mg/L)	Downgradient Ground Water Concentrations (mg/L)
Metals:		
Arsenic	0.015	0.012
Barium	0.08	0.095
Copper	0.09	0.05
Iron	41	29.5
Lead	0.027	0.0152
Mangenese	2.7	3.4
Zinc	0.09	0.064

mg/L = milligrams per liter

WSA–MW1 – Upgradient ground water monitoring well

WSA–MW3 – Downgradient ground water monitoring well

TABLE 5-5

MAXIMUM DETECTED CONCENTRATIONS OF CONSTITUENTS PRESENT IN GROUND WATER NOVEMBER 1992 SAMPLING EVENT WEAPONS STORAGE AREA Griffiss Air Force Base, New York

Constituents	Upgradient Ground Water Concentrations (mg/L)	Maximum Downgradient Ground Water Concentrations and Sample ID (mg/L)	
Metals			
Aluminum	0.64	0.44	WSA-MW3
Barium	0.008	ND	
Iron	0.76	0.62	WSA-MW3
Mangenese	0.07	2.5	WSA-MW3
Zinc	0.274	0.21	WSA-MW3
Semi-Volatile Organics			
Bis(2-ethylhexyl)phthalate	ND	0.0084	WSA-MW4
		0.0012	WSA-MW4

mg/L = milligrams per liter

WSA-MW1 - Upgradient ground water monitoring well

Sample identification corresponds to sample location

ND - Not detected

TABLE 5-6

SELECTED PHYSICAL AND CHEMICAL PROPERTIES
OF CONSTITUENTS OF CONCERN DETECTED AT
OIL/WATER SEPARATOR AT BUILDING 215/216 AND WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

Chemical Name	Mole Weight (g/mol)	Water Solubility (mg/L)	Vapor Pressure (mm Hg)	Henry's Law Constant (atm - m3/mol)	Koc (a) (ml/L)	log Kow (b)	Fish BCF (c) (L/kg)	Specific Gravity (25 ± 5° C)
Metals:								
Aluminum	27	NA	1	NA	NA	NA	NA	-
Antimony	122	NA	1	NA	NA	NA	1	-
Arsenic	75	NA	0	NA	NA	NA	44	-
Barium	137	NA	0	NA	NA	NA	NA	-
Cadmium	112	NA	0	NA	NA	NA	81	-
Chromium (III)	52	NA	0	NA	NA	NA	16	-
Copper	64	NA	0	NA	NA	NA	200	-
Iron	56	NA	0	NA	NA	NA	NA	-
Lead	207	NA	0	NA	NA	NA	49	-
Mangenese	55	NA	0	NA	NA	NA	NA	-
Mercury	201	NA	0	NA	NA	NA	NA	-
Nickel	59	NA	0	NA	NA	NA	47	-
Selenium	79	NA	0	NA	NA	NA	16	-
Zinc	65	NA	0	NA	NA	NA	47	-
Volatile Organics:								
1,1,1-Trichlorethane	133	1500	123	0.0144	152	2.5	5.6	1.35
Chloromethane	50	6500	4310	0.044	35	0.95	NA	0.92
Semi-Volatiles Orgaincs:								
Benzo(a)anthracene	228	0.0176	2.89E-11	2.29E-08	1E+06	5.61	10800	1.27
Bis(2-ethylhexyl) phthalate	390	0.4	8.16E-11	1.1E-05	1E+05	4.2	ND	0.99

- Not Applicable
NA- Not Available
ND- No Data
(a) Koc= Organic-Carbon Partition Coefficient
(b) Kow= Octanol-Water Partition Coefficient
(c) BCF= Bioconcentration Factor
SOURCE: USEPA, 1986; Verschueren, 1984; ATSDR, 1989, 1990, 1991; Howard, 1990

particles. The unconfined nature of the local aquifer will facilitate metal transport from shallow to deeper ground waters.

Volatile organic fuel constituents are relatively soluble in water, have a high vapor pressure, and have a low affinity for absorption to soil of low organic content. These physical properties, combined with the relatively high porosity of soils at Griffiss AFB, suggest that, over time, volatile constituents would tend to leach into the ground water, rather than adsorb to the site soils. Volatile and water soluble constituents of fuels released to surface soils (i.e., surface spills) would tend to volatilize, undergo photooxidation, and/or be transported to surface waters via surface runoff. Because of their water solubility, they can also leach into the ground water and also have the potential to migrate to deeper aquifers. Less water-soluble organic compounds with a specific gravity less than that of water will tend to float on top of the water table. Compounds floating on surficial ground waters may move laterally with ground-water flow and could potentially discharge to nearby surface water features such as Sixmile Creek, low-lying areas adjacent to Sixmile Creek, and the Mohawk River. Generally, volatile contaminants tend to evaporate from surface waters or undergo degradation via hydrolysis/oxidation processes; semi-volatile organic compounds may adsorb to sediments. Semi-volatile organics undergo limited biodegradation in aquatic sediments and may potentially accumulate in aquatic organisms. Metals leaching to surface waters tend to cycle between sediments and the water column.

Fuel constituents can potentially biodegrade into carbon dioxide and water through action of the microbial biomass in humus as well as in ground water. Several dozen species of microbes are naturally present in most soils which can affect this transformation. The actual rate of biodegradation is affected by the contaminant type and concentration, the composition and numbers of native microbial populations, the availability of inorganic

nutrients (e.g., nitrogen and phosphorous) and oxygen, physical conditions of the environment, and other largely environmental factors.

5.4 EXPOSURE ASSESSMENT

Human populations and environmental receptors in proximity of the Oil/Water Separator at Building 215/216 and the WSA were identified and the pathways by which those receptors might be exposed to constituents of potential concern identified at these sites are evaluated below.

5.4.1 Potential Human Receptors

The sites under investigation are located within the boundaries of Griffiss AFB. At present approximately 4,500 permanent military personnel are assigned to Griffiss AFB. An additional 3,000 civilians are employed at the base. The base is located approximately 2 miles northeast of the City of Rome, 14 miles southwest of the City of Utica, and approximately 0.5 mile west of the Town of Floyd. Figure 1-1 illustrates the regional setting of Griffiss AFB and shows the location of local population centers.

5.4.2 Oil/Water Separator at Building 215/216

The Oil/Water Separator Building at 215/216 site is located in the west-central portion of the base. Access to this site is not restricted and people work routinely in Buildings 215 and 216. Several buildings near the site are also occupied. The closest residential populations are located approximately one mile to the west and southwest of this site.

5.4.3 Weapons Storage Area

The WSA is located in the northeastern portion of the base. Access to the site is restricted by a fence and an extensive security system. Base personnel currently work routinely at this site. The closest residential populations are located 8,000 feet to the east of this site.

5.5 POTENTIAL ENVIRONMENTAL RECEPTORS

Potential environmental receptors that might be impacted by constituents on, or released from, the Oil/Water Separator at Buildings 215 and 216 and the WSA, were identified based on information obtained during a site visits by Law personnel in 1992, and from a previous investigative report (Environmental Science, 1981).

5.5.1 Terrestrial Vegetation

There is great diversity among wildlife communities in the vicinity of Griffiss AFB. These communities range from wetland systems to classic hardwood systems.

The Oil/Water Separator at Building 215/216 site is located in an industrialized portion of the base. The areas around Building 215/216 are paved and only small areas of grass exist adjacent to these buildings.

The WSA is characterized by buildings, grass-covered underground bunkers, paved accessways and open areas vegetated by grasses. The site is located near a wooded portion of the base located to the east of the WSA. The native vegetative cover on the wooded portion of the base is primarily an upland hardwood forest. A few species

of conifers are also present in the vicinity of the WSA. The most common species include the following: white pine, beech, birch, red sugar maple, black cherry and basswood.

5.5.2 Terrestrial Wildlife

Due to its location and industrial setting, the site of the Oil/Water Separator is not expected to support a diversified wildlife population. Small wildlife such as squirrel, cottontail rabbit, muskrat, raccoon, and striped skunk may be expected to enter this site. Birds that might potentially visit this area include orioles, red-wing blackbirds, killdeer, doves and pigeons, woodpeckers, owls, wrens, robins, thrushes and bluebirds.

The WSA is inhabited by birds and the other wildlife species identified above. Wildlife species typically associated with woodland and edge communities may also inhabit areas surrounding this site. Wildlife species observed in this part of the base include white-tailed deer, mink, red and grey fox and beaver. Frequently sighted birds include woodcock, pheasant, ruffed grouse, and dabbing duck. Song birds and perching birds are also abundant.

5.5.3 Aquatic Life

The Oil/Water Separator at Building 215/216 site is located approximately one mile from the Mohawk River. The Mohawk River supports a wide variety of aquatic species. This waterway is fished extensively by local populations. It is reported to contain brook trout (Salvelinnus fontinalis), white sucker (Catostomus commersoni), blacknose dace (Rhinicthys atratulus), creek chub (Semotilus atromaculatus) and other non-game species. Sixmile Creek also supports a large population of beaver, a factor that

results in the creation of pools and periodic flooding of the creek and its associated tributaries (USDI, 1992). The WSA lies approximately 600 feet from Sixmile Creek.

5.5.4 Threatened and Endangered Species

There are no federally listed threatened and endangered animal or plant species at the base or within the immediate vicinity (USDI, 1992). As mentioned in Section 2.4, several plants have been identified on the base which are protected by the NYS Environmental Conservation Law (NYCRR Part 193.3).

5.5.5 Critical Wildlife Habitats

The rivers, streams, wetlands and woodlands in the Griffiss AFB region are critical to aquatic and terrestrial wildlife. With the development of this area, open tracts of land and woodlands needed to support local wildlife have been reduced in areas. There are, however, no known critical wildlife habitats on Griffiss AFB (ES, 1981).

5.6 EXPOSURE PATHWAYS

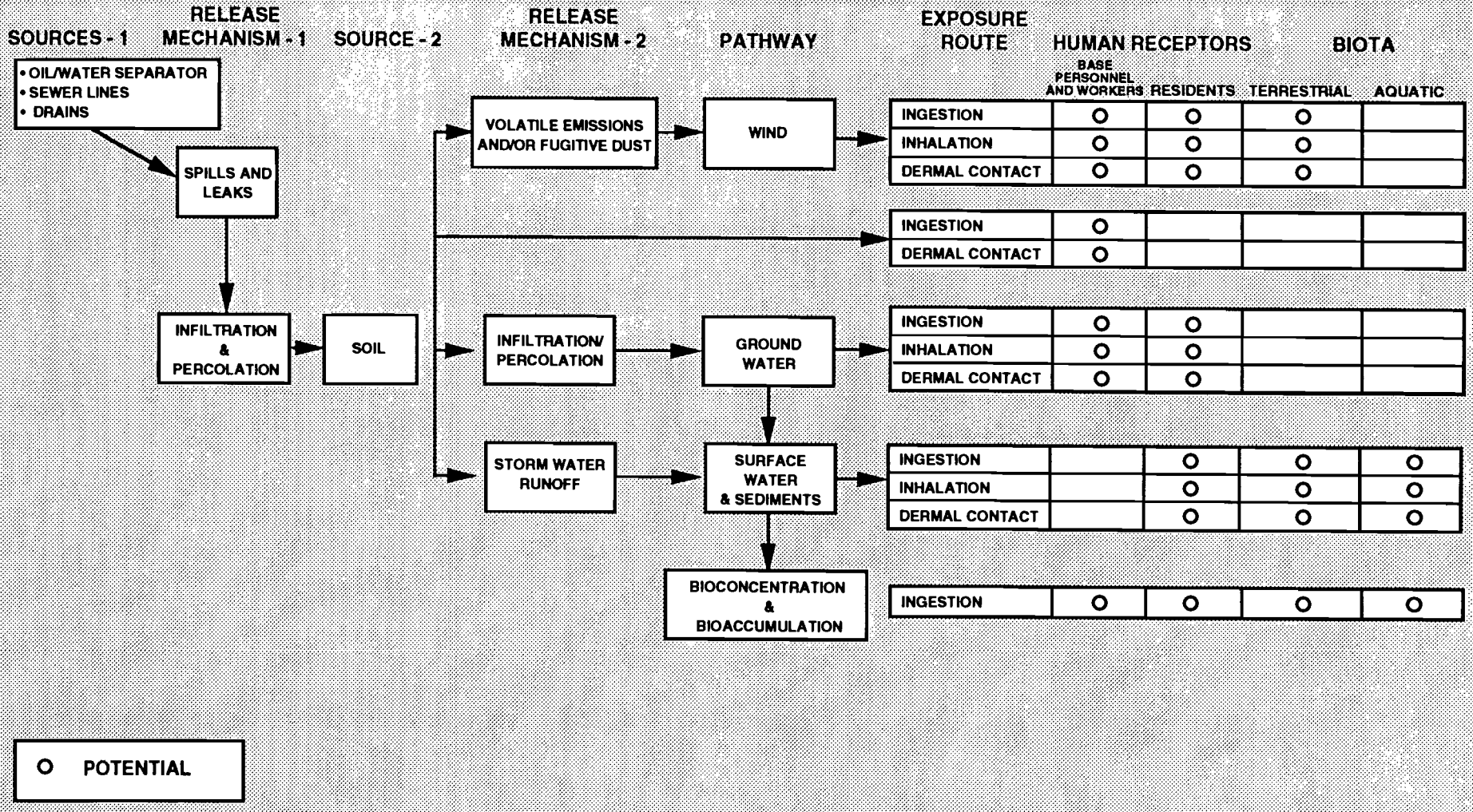
Potential sources of contamination and mechanisms of contaminant release for each site are identified and the exposure pathways through which such contaminants might impact upon human populations, and environmental receptors, are discussed below. Potential exposure pathways for the Oil/Water Separator at Building 215/216 site and the WSA are depicted on Figures 5-1 and 5-2, respectively.

FIGURE 5-1

POTENTIAL EXPOSURE PATHWAYS
OIL/WATER SEPARATOR AT BUILDING 215/216

GRIFFISS AIR FORCE BASE

ROME, NEW YORK



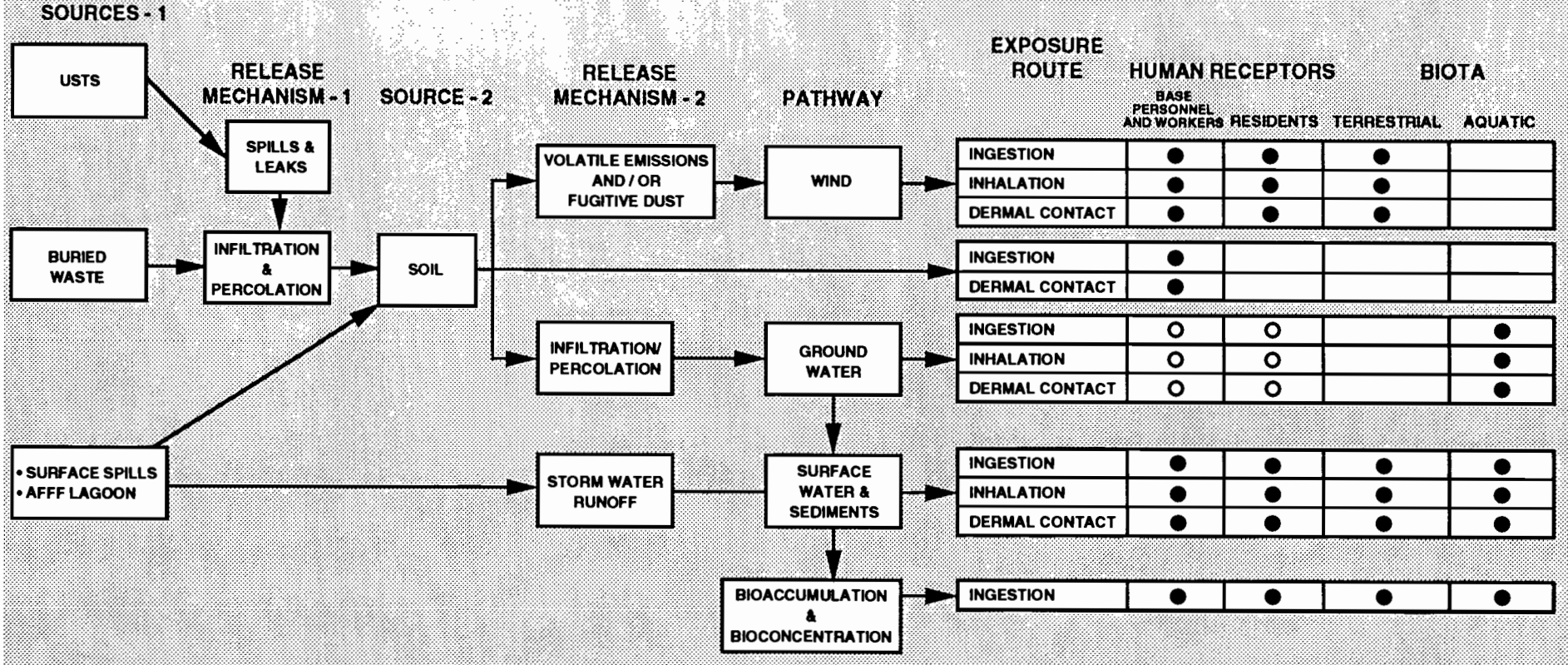
1586.23

FIGURE 5-2

POTENTIAL EXPOSURE PATHWAYS
WEAPONS STORAGE AREA

GRIFFISS AIR FORCE BASE

ROME, NEW YORK



1586.23

5.6.1 Potential Sources

This section discusses potential sources of contaminant release at these two sites.

5.6.1.1 Oil/Water Separator at Building 215/216 - Petroleum contamination at the Oil/Water Separator site may be due to leaks or releases from a 550-gallon oil accumulation tank and/or the sanitary sewer line into which the aqueous phase is discharged from the Oil/Water Separator. In addition, surface soil spills may have occurred when waste was emptied from the oil accumulation tank.

5.6.1.2 Weapons Storage Area - Fuel, petroleum products, and organic solvents are reported to have been released from several sources at the WSA. Fuel contamination may have occurred as a result of historic leaks from an UST adjacent to Building 838. In addition, fuel spills and hydraulic oil leaks to surface soils may have occurred during routine operations at this site, causing soil contamination in the vicinity of Buildings 912/913 and 917.

Organic solvents and paints previously employed in vehicle maintenance at Building 843 may have spilled onto surface soils. It is reported that the AFFF Lagoon routinely overflows during periods of heavy rain and may, therefore, also represent a potential source of contamination at this site.

5.6.2 Exposure Pathways

Constituents detected at these sites could potentially impact human and environmental receptors by several media-specific exposure pathways. Potential media-specific exposure pathways for each site are described in the following sections.

5.6.2.1 Ground Water - Base personnel and populations residing downgradient from the base receive potable water from municipal sources (i.e., the City of Rome) which are drawn from the surface waters of Fish Creek, classified by the NYSDEC as an "AA" surface water body, approximately 20 miles north of the base. Though ground water is not used as source of potable water, exposure to constituents detected in ground water beneath the WSA may occur through the ingestion of crops irrigated with contaminated ground water. Additionally, neighboring populations may be exposed to ground-water constituents following the potential discharge of the latter to local surface water features as discussed below.

5.6.2.2 Surface Waters - There are no surface water features within either site. The Oil/Water Separator at Building 215/216 site is located approximately one mile from the Mohawk River; and WSA and is located approximately six hundred feet from Sixmile Creek. Sixmile Creek is diverted underground into a culvert approximately 800 feet south of facility P907. However, local tributaries to the creek exist west of the AFFF Lagoon prior to its diversion. Sixmile Creek discharges to the New York State Barge Canal (NYSBC) approximately 1.5 miles southeast from the WSA. Storm water drainage from the WSA is also directed to Sixmile Creek. Ground waters beneath these sites may discharge to local surface waters. These surface waters, especially the Mohawk River, are used for recreation and fishing. Therefore, human receptors may potentially be exposed to site-specific constituents through incidental ingestion, dermal contact and ingestion of fish. However, since the Oil/Water Separator at Building 215/216 is located at considerable distance from the Mohawk River actual exposure point concentrations would be greatly reduced due to fate reduction, removal processes and dilution due to mixing.

5.6.2.3 Soil - Metals are the major constituents detected in shallow and deep soils at these sites which are expected to persist

in the environment. Both sites are generally grass-covered or paved; consequently, exposure to soil contaminants at either of these sites through the inhalation of fugitive dusts is likely to be minimal. Nevertheless, utility workers or future construction workers may be exposed to constituents in soils through inhalation of dusts, soil ingestion during hand-to-mouth activities and dermal contact. In addition, future operations, including the potential removal of tank(s) or the Oil/Water Separator at Building 215/216, or other activities necessitating extensive soil contact, may cause workers to be exposed to contaminants present in soils at the Oil/Water Separator at Building 215/216 site.

5.6.3 Summary of the Exposure Pathways

Potential exposure to ground-water contaminants may occur via ingestion of local irrigated crops by local populations. Ground water beneath these sites may discharge to local surface water features. People using Sixmile Creek, the NYSBC and the Mohawk River for recreational activity and fishing may be exposed to site-originating constituents via dermal contact, incidental ingestion and ingestion of fish. Future soil exposures through the inhalation of fugitive dusts, soil ingestion and dermal absorption may occur during site disturbances such as future remedial activities or construction.

5.7 REGULATORY STANDARDS

Several constituents that could potentially cause adverse effects to human health have been found in soils and ground water at these sites. This section summarizes the available guidelines and standards which have been established by the USEPA and New York State.

5.7.1 Human Health-Based Criteria for Constituents in Soil

Under the RCRA corrective action program, human health-based criteria were developed for constituents in soil for both carcinogens and systemic toxicants. RCRA Corrective Actions Levels (CALs) for soil serve as an indication as to whether corrective measures are indicated (Federal Register, 1990). The RCRA Soil CALs provide an estimate of the daily exposure an individual (including sensitive individuals) can experience without appreciable risk of health effects (or cancer in the case of carcinogens) during a lifetime. Criteria for constituents detected in soils in the vicinity of the Oil/Water Separator and the WSA, are shown in Table 5-7.

5.7.2 Water Quality Standards and Health-Based Criteria

Standards potentially applicable with respect to ground-water contamination at the WSA include Federal and New York State Maximum Contaminant Levels (MCLs) for drinking water and the New York Ground-Water Standards. The State MCLs are, generally, equal to federally promulgated standards.

MCLs are enforceable standards set under the Safe Drinking Water Act for ground water or for surface waters currently or potentially used as a drinking water source. MCLs establish the maximum contaminant concentration permitted in a source of potable water which is protective of human health and is technologically feasible.

The State of New York has promulgated regulations for ground-water quality based on the regulatory classification of the ground water. Since ground water in the vicinity of Griffiss AFB could potentially be utilized as a source of potable water, the standards for Class GA waters are applied. New York Class GA waters are

TABLE 5-7

CRITERIA FOR CONSTITUENTS PRESENT IN SOILS
OIL/WATER SEPARATOR AT BUILDING 215/216 AND WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

Constituents	Proposed RCRA Corrective Action Levels (CAL) For Soils (mg/kg)
Metals:	
Arsenic	80
Copper	NA
Lead	1,000 (a)
Mercury	20
Nickel	2,000
Thallium	7.2 (b)
Zinc	24,000 (b)
Volatile Organics:	
1,1,1-Trichlorethane	7,000
Chloromethane	NA
Semi-Volatile Organics:	
Benzo(a)anthracene	NA
TRPH	NA

mg/kg = milligrams per kilogram
NA – Not available
(a) Interim guidance on establishing soil cleanup levels for Superfund sites.
U.S. EPA 9355.4-02
(b) CALs calculated based on the following equation:
CAL = RfD * W/I * A
where:
CAL = Proposed RCRA Corrective Action Level for soil
RfD = Reference Dose (mg/kg-day)
W = Body weight (16 kg, 5 years old child)
I = Intake assumptions (0.2 g/day)
A = Absorption factor (1)

Source:
Federal Register, 1990. Proposed Rules. FR 55(145):30865-30870. July 27, 1990

defined as fresh ground waters found in the saturated zone of unconsolidated deposits and consolidated rock or bedrock. The best usage of Class GA waters is a source of potable water. Table 5-8 presents regulatory standards for constituents detected in Class GA ground water beneath the WSA.

Surface waters in the vicinity of the WSA were not sampled during the SI. However, shallow ground water beneath the WSA potentially recharges the nearby surface waters of Sixmile Creek. Accordingly, surface water quality criteria were employed in assessing the possible impact of local ground-water contamination on surface water quality.

Ambient Water Quality Criteria (AWQC) were established under the Clean Water Act (CWA) for the protection of human health, both from exposure through the ingestion of water and fish, or from fish ingestion alone. AWQC have also been established to protect aquatic life. AWQC represent non-enforceable guidance with respect to surface water quality. In addition, the State of New York has Surface Water Quality Standards (SWQS) for protection human health and aquatic life, respectively. SWQS for protection of human health have been developed based on a system of surface water classification. Sixmile Creek waters are classified by NYSDEC as "C" and "D". Specifically, that portion of Sixmile Creek which lies within the confines of the base is classified as "D" (i.e., suitable for secondary recreation) and as "C" above, and below, Griffiss AFB, the designation for trout water. SWQS were not available for those site-constituents detected in ground water beneath the WSA for surface water bearing "C" and "D" classifications. AWQC for protection of human health are presented in Table 5-8 whereas AWQC and SWQS for protection of aquatic life are shown in Table 5-9.

TABLE 5-8

REGULATORY STANDARDS AND CRITERIA FOR CONSTITUENTS PRESENT IN GROUND WATER
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

Constituents	Federal Maximum Contaminant Levels (mg/L) [a]	New York Maximum Contaminant Levels (MCL) (mg/L) [b]	New York Ground Water Standards Class GA Ground Water (mg/L) [c]	Protection of Human Health	
				Water and Fish Ingestion (mg/L) [d]	Fish Ingestion (mg/L) [d]
Metals:					
Aluminum	0.05–0.2 (S)	NA	NA	NA	NA
Arsenic	0.05	0.05	0.025	2.2E–06	1.8E–06
Barium	2	1	1	1	NA
Copper	1.3 (T)	1 (S)	0.2	NA	NA
Iron	0.3 (S)	0.3 (S)	0.3	0.3	NA
Lead	0.015 (T)	0.05	0.025	0.05	NA
Manganese	0.05 (S)	0.3 (S)	0.3	0.05	0.01
Zinc	5 (S)	5 (S)	0.3	NA	NA
Semi–Volatile Organics:					
Bis(2–ethylhexyl)phthalate	0.006	NA	0.05	NA	NA

mg/L = milligrams per liter
ND– Not detected
NA– Not available
(T)–At the "tap"
(S)–Secondary MCLs

Sources:

(a) Federal Register, 1991. Final MCLs, FR 55, 20:3528, January 30, 1991

(b) Chapter I State Sanitary Code, Part 5, Drinking Water Supplies, January 19, 1990

(c) New York State Water Quality Regulations for Surface Waters and Ground Waters. New York Codes and Regulations, 6NYCRR Parts 700 – 705

(d) Federal Register. 1980. Water Quality Criteria for 64 Toxic Pollutants/Catagories, FR45, 231:79318–79379 November, 28, 1980

TABLE 5-9

AMBIENT WATER QUALITY CRITERIA FOR THE PROTECTION OF AQUATIC LIFE
FOR CONSTITUENTS PRESENT IN GROUND WATER
Griffiss Air Force Base, New York

Constituents	Federal Ambient Water Quality Criteria (AWQC) For the Protection of Aquatic Life (mg/L) [a]		New York State Surface Water Quality Standards For the Protection of Aquatic Life (mg/L) [b]
	Acute	Chronic	
Metals (mg/L):			
Aluminum	NA	NA	0.1
Arsenic	NA	NA	0.19/0.36 [c]
Barium	NA	NA	NA
Copper	0.018	0.012	NA
Iron	1	NA	NA
Lead	0.08	0.0032	NA
Mangenese	NA	NA	NA
Zinc	0.13	0.11	0.3/NA
Semi-Volatile Organics:			
Bis(2-ethylhexyl)phthalate	NA	NA	0.0006

mg/L = milligram per liter

(a) Federal Register, 1980. Water Quality Criteria for 64 Toxic Pollutants/Catagories, FR45, 231:79318-79379 November, 28, 1980

(b) New York State WaterQuality Regulations for Surface Waters and Ground Waters. 6NYCRR Parts 700-705.

(c) First number indicates criterion for the portion of Sixmile Creek Classified as Surface Water Class "C"
The second number indicates criterion for the portion of the creek classified as "D"

NA- Not Available

5.8 SITE-SPECIFIC EVALUATION OF POTENTIAL RISKS

The purpose of the Qualitative Exposure Assessment is to assess the potential impact of constituents detected at the Oil/Water Separator at Building 215/216 site and the WSA on human health and environmental receptors. In the following sections, the levels of constituents detected at each site will be compared to appropriate standards and criteria. Since regulatory standards or criteria are not available for some constituents, a qualitative estimate of risk cannot always be made by comparing site-constituent concentrations with Applicable or Relevant and Appropriate Requirements (ARARs).

5.8.1 Oil/Water Separator at Building 215/216

Soil samples were collected from seven locations and analyzed for metals and TRPH. A total of twelve metals and TRPH were detected in soil samples collected at depths of up to 12 feet (Table 4-1). As shown in Table 4-1, only two metals, iron and manganese, were detected in relatively high concentrations in all soil samples from the site. The greatest concentration of iron (27,930 mg/kg) was detected in locations SB21501, at a depth of 10-12 feet. The highest concentrations of manganese (1,600 mg/kg) was detected in a surface soil sample (SB21505). TRPH were detected at one location (SB21501) in surface and moderate (6-8 feet) depth, at concentrations of 97.3, and 33.5 mg/kg, respectively. Sample soil location SB21501 lies approximately one hundred feet from the oil accumulation tank.

Table 5-10 presents a comparison of the soil constituents detected to RCRA Soil CALs. None of the constituents detected in soil at the WSA exceeds RCRA Soil CALs. RCRA Soil CALs were not available for copper and TRPH.

Based on a comparison of the soil concentrations detected to the proposed RCRA Soil CALs and an analysis of exposure pathways, there

TABLE 5-10

COMPARISON OF MAXIMUM DETECTED SOIL CONCENTRATIONS TO REGULATORY CRITERIA
OIL/WATER SEPARATOR – BUILDING 215/216
Griffiss Air Force Base, New York

	Maximum Detected Concentrations						Proposed RCRA
	Soil Depth						Corrective Action Levels (CAL) [a]
Constituents	0-2'	2-4'	4-6'	6-8'	8-10'	10-12'	For Soils
Inorganics (mg/kg):							
Arsenic	5.77	5.04	7.48	4.37	8.2	5.88	80
Copper	27.5	52.4	35.3	35.4	40.7	42.9	NA
Lead	54.7	14.8	43.1	20.8	17.8	7.99	1,000
Nickel	18.4	22.3	15.9	16.2	14.7	17.3	2,000
Zinc	212	49.1	67.3	51.4	52.8	52.5	24,000
TRPH	97.3	ND	165	33.5	ND	ND	NA

mg/kg = milligrams per kilogram
NA – Not available
ND – Not detected

(a) Source: Federal Register, 1990. Proposed Rules. FR 55 (145): 30865-30870. July, 1990

is no present risk to human health from soil constituents detected at this site. Persons working in the Buildings 215 and 216, as well as other adjacent buildings, have minimal contact with soils. Furthermore, potential exposure to fugitive dusts is likely to be minimal since, as mentioned in a previous section, the site is predominantly paved or vegetated by grass.

5.8.2 Weapons Storage Area

Both soil and ground water near the perimeter of the WSA were sampled as part of this investigation. Surface soil samples were obtained at eight locations (including four monitoring well boreholes). Deep soil samples were collected from monitoring well boreholes advanced to a maximum depth of 30 feet. Soil samples were analyzed for TRPH, VOCs, metals and BNAs. Ground-water samples were collected from four monitoring wells, one of which was located upgradient of the site. Soil samples were analyzed for TRPH, VOCs, metals and BNAs. Ground-water samples were analyzed for VOAs, BNAs and metals, including hexavalent chromium.

Thirteen metals, two volatile organic compounds (1,1,1-trichloroethane and chloromethane) and two semi-volatile organic compounds (bis(2-ethylhexyl)phthalate and benzo(a)anthracene) were detected in shallow soil samples (Table 4-3). Iron and manganese were detected at relatively high concentrations in all samples. The highest concentrations of these two metals were detected in WSA-SB4. Generally, the concentrations of all metals detected decreased at greater depth at each sampling location. High concentrations of iron and manganese may be characteristic of the geological formations in this region. Volatile compounds, 1,1,-trichloroethane (6.8 μg/kg) and chloromethane (28 μg/kg) were detected at low concentrations at one location, WSA-SB2, adjacent to Building 912/913, where a 40-gallon diesel tank once ruptured. Benzo(a)anthracene was detected in WSA-SB3 at 43 μg/kg at a location adjacent to the site of the former diesel tank rupture.

Thirteen metals and TRPH were detected in deep soil samples collected from WSA (Table 4-3). TRPH were detected at concentrations ranging from 29.2-172 mg/kg in SB-MW3 at four depths; 2-4, 4-6, 6-8 and 8-10 feet. SB-MW3 is located in close proximity to Building 838, the site of a reported leaking UST. SB-MW4, adjacent to the AFFF lagoon and downgradient of Buildings 912/913, contained 42.7 mg/kg of TRPH at a depth of 10 to 15 feet.

Comparison of detected constituent concentrations in shallow soils and deep soils to the proposed RCRA Soil CALs (Table 5-11 and 5-12) indicated that none of the constituents exceeded these proposed criteria.

Currently, the data indicate that soils at this site do not present an unacceptable risk to human populations. There are no uncovered soils or areas of stressed vegetation at this site. The site is either paved or vegetated with grasses; consequently there is little potential for formation of fugitive dusts.

Seven metals (arsenic, barium, copper, iron, lead, manganese and zinc) were detected in ground-water samples (Table 4-5) collected in August 1992. Five metals (aluminum, barium, iron, manganese and zinc) and one semi-volatile organic compound (bis(2-ethylhexyl) phthalate) were detected when the ground water was resampled in November 1992. In general, constituent concentrations detected in the ground water in the November sampling event were lower than the concentration from August sampling. This reduction may be due to use of a bladder pump in second sampling event. As discussed in Section 3.16, the November sampling event employed a QED bladder pump which results in samples which are more representative of the aquifer. Of the metals detected in both sampling events, iron and manganese were detected at the highest concentrations. The presence of appreciable concentrations of these two metals in the ground water may be due to leaching from local soils which appear to be naturally rich in iron and manganese (McGovern, NYSDEC). The

TABLE 5-11

COMPARISON OF MAXIMUM DETECTED SHALLOW SOIL CONCENTRATIONS
TO REGULATORY CRITERIA
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

Constituents	Maximum Detected Concentrations (Soil Depth) 0-0.5'	0.5-1'	1-2'	Proposed RCRA Corrective Action Levels (CAL) [a] For Soils
Metals (mg/kg):				
Arsenic	5.56	3.94	3.21	80
Lead	17.6	12.8	4.12	1,000
Mercury	0.043	0.33	0.034	20
Volatile Organics (mg/kg):				
1,1,1-Trichloroethane	ND	0.0068	ND	7,000
Chloromethane	ND	ND	0.028	NA
Semi-Volatile Organics (mg/kg):				
Benzo(a)anthracene	ND	ND	0.043	NA

mg/kg = milligram per kilogram
ND- Not Detected
BR- Below "normal" range of metal concentrations

Source:
(a) Federal Register, 1990. Proposed Rules. FR 55(145):30865-30870. July, 1990

TABLE 5-12

COMPARISON OF MAXIMUM DEEP SOIL CONCENTRATIONS TO REGULATORY CRITERIA
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

	Maximum Detected Concentrations							Proposed
	Soil Depth							RCRA Corrective Action Levels (CAL) [a]
Constituents	0-2'	2-4'	4-6'	6-8'	8-10'	10-15'	15-20'	For Soils
Metals (mg/kg):								
Arsenic	5.56	7.54	7.78	11.0	6.65	3.7	5.56	80
Lead	17.6	19.4	8.13	11.3	9.64	23.6	6.16	1,000
Mercury	0.33	0.17	0.20	0.26	0.18	ND	0.032	20
Thallium	ND	ND	ND	0.9	ND	ND	ND	7.2
TRPH	NS	172	76	38.9	29.7	42.7	ND	NA

mg/kg = milligrams per kilogram
NS – Not Sampled
ND– Not detected
NA – Not Available

(a) Source: Federal Register, 1990. Proposed Rules. FR 55 (145): 30865-30870. July, 1990

greatest concentration of bis(2-ethylhexyl) phthalate 8.4 µg/L was detected in a well located downgradient of the entire WSA (WSA-MW4).

Table 5-13 presents a comparison of the maximum ground-water constituent concentrations detected in samples recovered in August 1992, to appropriate regulatory standards and human health criteria. The maximum concentration of manganese and iron detected in upgradient and downgradient monitoring wells exceeded secondary Federal and State MCLs, New York Ground-water Standards and AWQC. The maximum concentration of arsenic exceeded AWQC only. In addition, the concentration of lead detected in the upgradient monitoring well, WSA-MW1, exceeded New York Ground Water Standards and federal action levels.

The maximum concentrations of manganese and iron detected in the upgradient and downgradient monitoring wells during resampling exceeded secondary Federal and State MCLs, New York Ground Water Standards and AWQC (Table 5-14). Aluminum and bis(2-ethylhexyl) phthalate exceeded Federal MCLs.

Ground water downgradient of the WSA contained iron and manganese at concentrations exceeding state and federal Secondary drinking water standards and New York ground-water standard for Class GA ground waters. In addition, aluminum detected in ground water during resampling exceeded Federal Secondary MCLs. Secondary drinking water standards are set to protect the aesthetic qualities of drinking water rather than human health effects. The secondary regulations are not federally enforceable but are intended as guidelines for the states. Currently, ground water in the vicinity of Griffiss AFB is not used as a source of drinking water. Should ground water be used in the future for drinking purposes, health risks from exposure to iron, aluminum and manganese detected in ground water beneath this site are not expected.

TABLE 5-13

COMPARISON OF MAXIMUM DETECTED GROUND-WATER CONCENTRATIONS
TO REGULATORY STANDARDS AND CRITERIA
AUGUST 1992 SAMPLING EVENT
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

Constituents	Upgradient Ground Water Concentrations	Downgradient Ground Water Concentrations	Federal Maximum Contaminant Levels (MCL)	New York Maximum Contaminant Levels (MCL)	New York Ground Water Standards	Federal Ambient Water Qualitly Criteria (AWQC) for the Protection of Human Health	
						Water and Fish Ingestion	Fish Ingestion
Metals (mg/L):							
Arsenic	0.015	0.012	0.05	0.05	0.025	2.2E-06	1.8E-06
Barium	0.08	0.095	2	1	1	1	NA
Copper	0.09	0.05	1.3 (T)	1 (S)	0.2	NA	NA
Iron	41	29.5	0.3 (S)	0.3 (S)	0.3	0.3	NA
Lead	0.027	0.0152	0.015 (T)	0.05	0.025	0.05	NA
Manganese	2.7	3.4	0.05 (S)	0.3 (S)	0.3	0.05	0.01
Zinc	0.09	0.064	5 (S)	5 (S)	0.3	NA	NA

mg/L = milligrams per liter
Exceeds criteria
ND- Not Detected
NA- Not Available
(T) - at the "tap"
(S) - Secondary MCLs

Sources:
Interim Final RCRA Facility Investigation (RFI) Guidance, Vol I, USEPA, 1989
Federal Register, 1980. Water Quality Criteria for 64 Toxic Pollutants/Catagories, FR45, 231:79318-79379 November, 28, 1980
Federal Register, 1991. Final MCLs, FR 55,20:3528, January 30, 1991
New York State Quality Standards. New York Codes and Regulations, Title 6 Part 703.5

TABLE 5-14

COMPARISON OF MAXIMUM DETECTED GROUND-WATER CONCENTRATIONS
TO REGULATORY STANDARDS AND CRITERIA
NOVEMBER 1992 SAMPLING EVENT
WEAPONS STORAGE AREA
Griffiss Air Force Base, New York

Constituents	Upgradient Ground Water Concentrations (WSA-MW1) (mg/L)	Maximum Downgradient Ground Water Concentrations (mg/L)	Federal Maximum Contaminant Levels (MCL) (mg/L)	New York Maximum Contaminant Levels (MCL) (mg/L)	New York Ground Water Standards (mg/L)	Federal Ambient Water Qualitly Criteria (AWQC) for the Protection of Human Health	
						Water and Fish Ingestion (mg/L)	Fish Ingestion (mg/L)
Metals (mg/kg):							
Aluminum	0.64	0.44	0.05-0.2 (S)	NA	NA	NA	NA
Barium	0.008	ND	2	1	1	1	NA
Iron	0.76	0.62	0.3 (S)	0.3 (S)	0.3	0.3	NA
Manganese	0.07	2.5	0.05 (S)	0.3 (S)	0.3	0.05	0.01
Zinc	0.274	0.21	5 (S)	5 (S)	0.3	NA	NA
Semi-Volatile Organics:							
Bis(2-ethylhexyl)phthalate	ND	0.0084	0.006	NA	0.05	NA	NA

mg/L = milligrams per liter
Exceeds criteria
ND- Not Detected
NA- Not Available
(T) - at the "tap"
(S) - Secondary MCLs

Sources:
Interim Final RCRA Facility Investigation (RFI) Guidance, Vol I, USEPA, 1989
Federal Register, 1980. Water Quality Criteria for 64 Toxic Pollutants/Catagories, FR45, 231:79318-79379 November, 28, 1980
Federal Register, 1991. Final MCLs, FR 55,20:3528, January 30, 1991
New York State Quality Standards. New York Codes and Regulations, Title 6 Part 703.5

5.9 ENVIRONMENTAL EXPOSURE ASSESSMENT

In the following sections, potential exposures of environmental receptors to site constituents detected at the Oil/Water Separator Building at 215/216 site and the WSA are discussed.

5.9.1 Oil/Water Separator at Building 215/216

The concentrations of constituents detected in the environmental media sampled at the Oil/Water Separator at Building 215/216 site did not exceed the proposed RCRA Soil CALs. The site is located in an industrialized portion of the base which contains only small grassed or vegetated areas. The animal life dwelling or visiting this site is expected to be limited. Accordingly, it is expected that the soil constituents detected at this location will not present a significant hazard to animal welfare.

5.9.2 Weapons Storage Area

Since shallow ground waters from beneath the WSA may discharge to surface water in Sixmile Creek, constituents present in ground water beneath this site were compared to standards and criteria established to be protective of aquatic life. Three metals, (established to be copper, iron, and lead) were detected in ground-water samples collected in August, 1992, at levels exceeding AWQC (Table 5-15). The maximum concentrations of zinc detected in ground water in November, 1992, exceeded Federal AWQC and State SWQS (Table 5-16). New York State SWQS were exceeded by maximum concentrations of arsenic detected in the November 1992 resampling event. However, state standards were only available for arsenic, copper and zinc. Figure 5-3 indicates the location of those samples which exceeded federal AWQC or state SWQS. None of the constituents detected in soil samples from this site exceeded the proposed RCRA Soil CALs.

TABLE 5-15

COMPARISON OF MAXIMUM DETECTED GROUND-WATER CONCENTRATIONS
TO AMBIENT WATER QUALITY CRITERIA
FOR THE PROTECTION OF AQUATIC LIFE
FOR CONSTITUENTS PRESENT IN GROUND WATER
AUGUST 1992 SAMPLING EVENT
Griffiss Air Force Base, New York

Constituents	Upgradient Ground Water Concentrations	Maximum Ground Water Concentrations	Federal Ambient Water Quality Criteria (AWQC) For the protection of freshwater aquatic life		New York State Surface Water Quality Standards For the protection of aquatic life
			Acute	Chronic	
Metals (mg/L):					
Arsenic	0.015	0.012	NA	NA	0.19/0.36 (a)
Barium	0.08	0.095	NA	NA	NA
Copper	0.09	0.05	0.018	0.012	0.03
Iron	41	29.5	1	NA	NA
Lead	0.027	0.0152	0.08	0.0032	NA
Manganese	2.7	3.4	NA	NA	NA
Zinc	0.09	0.064	0.13	0.11	0.3/NA

mg/L = milligrams per liter

Exceeds Criteria

(a) First number indicates criterion for the portion of Sixmile Creek classified as Surface Water Class "C"
the second number indicates criterion for the portion of the creek classified as "D"

NA- Not available

Sources:

Interim Final RCRA Facility Investigation (RFI) Guidance, Vol I, USEPA, 1989

Federal Register, 1980. Water Quality Criteria for 64 Toxic Pollutants/Catagories, FR45, 231:79318-79379 November, 28, 1980

Federal Register, 1991. Final MCLs,FR 55,20:3528, January 30, 1991

New York State Quality Standards. New York Codes and Regulations, Title 6 Part 703.5

TABLE 5–16

COMPARISON OF MAXIMUM DETECTED GROUND–WATER CONCENTRATIONS
TO AMBIENT WATER QUALITY CRITERIA
FOR THE PROTECTION OF AQUATIC LIFE
FOR CONSTITUENTS PRESENT IN GROUND WATER
NOVEMBER 1992 SAMPLING EVENT
Griffiss Air Force Base, New York

Constituents	Upgradient Ground Water Concentrations	Maximum Downgradient Ground Water Concentrations	Federal Ambient Water Quality Criteria (AWQC) For the protection of freshwater aquatic life		New York State Surface Water Quality Standards For the protection of aquatic life
			Acute	Chronic	
Metals (mg/L):					
Arsenic	0.64	0.44	NA	NA	0.1
Barium	0.008	ND	NA	NA	NA
Iron	0.76	0.62	1	NA	NA
Manganese	0.07	2.5	NA	NA	NA
Zinc	0.274	0.21	0.13	0.11	0.3/NA
Semi–Volatile Organics:					
Bis(2–ethylhexyl)phthalate	ND	0.0084	NA	NA	NA

mg/L = milligrams per liter

Exceeds Criteria

(a) First number indicates criterion for the portion of Sixmile Creek classified as Surface Water Class "C"
the second number indicates criterion for the portion of the creek classified as "D"

NA– Not available

Resampled in November, 1992

Sources:

Interim Final RCRA Facility Investigation (RFI) Guidance, Vol I, USEPA, 1989

Federal Register, 1980. Water Quality Criteria for 64 Toxic Pollutants/Catagories, FR45, 231:79318–79379 November, 28, 1980

Federal Register, 1991. Final MCLs,FR 55,20:3528, January 30, 1991

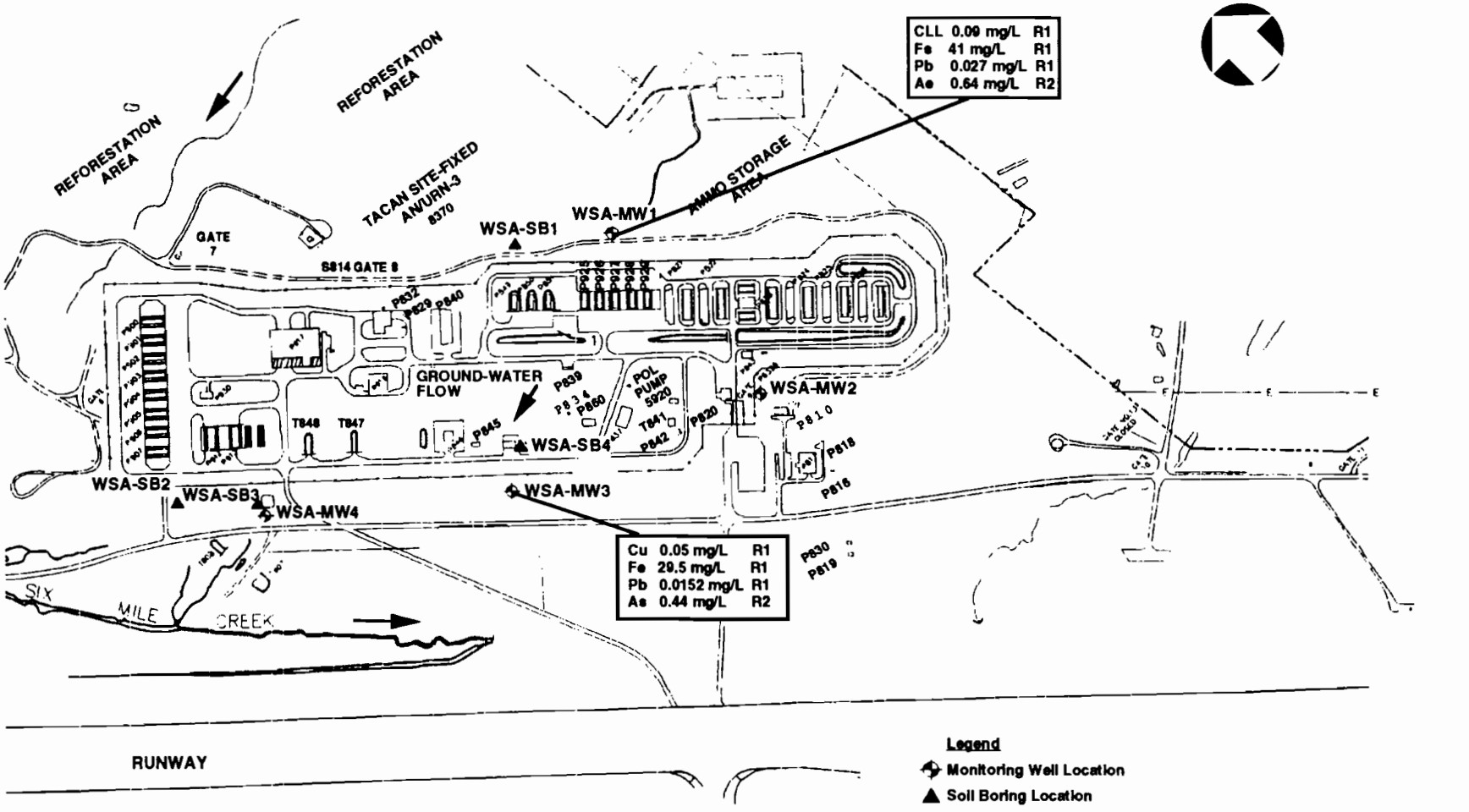
New York State Quality Standards. New York Codes and Regulations, Title 6 Part 703.5

FIGURE 5-3

GROUNDWATER SAMPLE RESULTS

WEAPONS STORAGE AREA

GRIFFISS AIR FORCE BASE ROME, NEW YORK



Constituents detected in ground water beneath the site may impact the quality of local surface waters as a consequence of ground water discharge to surface waters of Sixmile Creek. However, the magnitude of exposure may be diminished because concentration of site constituents at point of exposure is expected to be significantly reduced due to dilution, degradation and adsorption to sediments.

No large terrestrial life forms are thought to inhabit this site because of its high security nature, however, small burrowing animals may be present at the WSA. Exposure to soil constituents is thought to not represent a hazard to local fauna.

6.0 SUMMARY AND CONCLUSIONS

This section summarizes the findings and presents the conclusions based on the investigations conducted at the Oil/Water Separator Building 215/216 and the Weapons Storage Area.

The Oil/Water Separator Building 215/216 and the Weapons Storage Area (WSA) were investigated to determine the nature and extent of contamination.

An investigation of the soil at the Oil/Water Separator at Building 215/216 was conducted that included a soil gas survey and the drilling of seven 12-foot soil borings.

Both soil and ground-water conditions beneath the WSA were studied. This investigation included the augering of four 2-foot soil borings and the installation of four ground-water monitoring wells. Soil samples were collected from all of the soil borings as well as the monitoring well borings. Soil and ground-water samples were analyzed for selected indicators of potential chemical contamination. The conclusions and recommendations that were drawn based on environmental characterization, analytical results, and exposure assessment at these two sites are discussed in the following section.

6.1 OIL/WATER SEPARATOR AT BUILDING 215/216

Analytical testing of soils at this site indicated the presence of TRPH and metals. However, the measured concentrations of TRPH and metals in soil samples recovered from this site did not exceed the proposed RCRA Soil CALs.

At present, people working at this site have minimal direct contact with soils. Further, the chance of fugitive dust formation at this

site appears to be minimal since this site is largely paved or vegetated with grasses. Accordingly, potential human exposure to site constituents in soil through inhalation of fugitive dusts is unlikely. It is concluded, based on the exposure assessment presented in Section 5.0, that the potential impact on human health or environmental receptors from exposure to soil constituents at this site is presently not unacceptable.

6.2 WEAPONS STORAGE AREA

None of the metals found in the soil samples at the WSA borings were present in concentrations that exceeded the proposed RCRA Soil CALs.

The results of the exposure assessment indicate that soils at this site do not presently constitute an unacceptable risk to human populations or environmental receptors. There are no uncovered soils or areas of stressed vegetation at this site. The site is either paved or vegetated with grass, and consequently, there is little potential for formation of fugitive dusts.

Ground water downgradient and upgradient from the WSA was found to contain both manganese and iron in concentrations that exceeded federal and state secondary drinking water standards. Aluminum was also found to exceed the federal secondary MCL at both upgradient and downgradient locations. Secondary drinking water standards are established as a guidance to protect the aesthetic quality of drinking water rather than human health. The results of this investigation and the exposure assessment presented in Section 5.0 indicate that ground water beneath the WSA does not present an unacceptable risk to human health and environmental receptors.

The ground-water gradient in the vicinity of the WSA installation was reassessed following installation of four new monitoring wells

at this site. Prior to this investigation, the hydrogeologic gradient was considered to be downgradient to the south/southwest. The results of the present study indicate that the downgradient direction is to the southwest toward Sixmile Creek.

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COMMENT RESPONSES

SUBJECT: DRAFT SI REPORT BLDG 215/216 OIL/WATER SEPARATOR

PROJECT: 11-1586 GAFB SI OIL/WATER SEPARATOR AND WSA **PAGE:** 1 **OF** 2

DISCIPLINE: Chemist **COMMENTOR:** Ms. Daksha P. Dalal T.R. Malecki **DATE:** 11-18-93

DISCIPLINE: Geologist/Chemist **RESPONDENT:** Sushama Paranjape **DATE:** 11-18-93

COMMENT No.	LOCATION REFERRAL	*	RESPONSE
May 25, 1993 1a.	Chemistry Addendum	A	A copy of the Chemistry Addendum for the Draft SI Report April 1993 was submitted under separate cover, in a letter to Ms. Barbara Moore dated August 3, 1993.
1b.	Comment No. 3	D	The definition of AFFF lagoon is presented on page 1-7 of the Draft Report April 1993. It is not necessary to repeat the definition each time the acronym appears in the document if it is defined in a previous section. Therefore it was not defined again on Page 3-11 as requested in Comment No. 3.
	Comment No. 5	EX	Page 4-4 of the Draft SI Report April 1993 has been corrected to add EPA Method 418.1M as an extraction method for the Total Recoverable Petroleum Hydrocarbon analysis. The EPA Method 7000 is not applicable for the analysis of iron, manganese, and barium. Therefore it has been deleted from the method list in the third, sixth, and tenth bullet on Page 4-4 of the Draft SI Report.
	Comment No. 8	E	Section 4.3.1.1 has been deleted according to the meeting held February 2, 1993. The decision was made to consider the Soil Gas Survey as a "field screening tool" only, not as an analytical tool.
	Comment No. 11	E W	The comment has been addressed in the comment response dated January 29, 1993. No further response is required according to the conversation with D. Dalal CEMRK-ED-GE on June 25, 1993.
	Comment No. 14	A	All Chain-of-Custody Forms are enclosed with the Chemistry Addendum referred to in Comment 1a.
	Comment No. 15	A	The requested cooler receipt forms are enclosed with the Chemistry.
2.	General Comment on Grubb's Test	A	The Reference to the Grubb's Test has been removed.

CODE: A=Accepted D=Disagree W=Withdrawn E=Exception Noted EX=Explanation NA=Not Applicable

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COMMENT RESPONSES

SUBJECT: DRAFT SI REPORT BLDG 215/216 OIL/WATER SEPARATOR

PROJECT: 11-1586 GAFB SI OIL/WATER SEPARATOR AND WSA **PAGE:** 2 **OF** 2

DISCIPLINE: Chemist **COMMENTOR:** Ms. Daksha P. Dalal T.R. Malecki **DATE:** 11-18-93

DISCIPLINE: Geologist/Chemist **RESPONDENT:** Sushama Paranjape **DATE:** 11-18-93

COMMENT No.	LOCATION REFERRAL	*	RESPONSE
3.	Section 5.0	A	Section 5.0 has been revised to remove all refrences to and application of the Grubb's Test.
4.	Section 6.0	A	References to Grubb's Test have been removed. (2) The conclusions and recommendations in this section are based on the analytical chemistry results from the re-sampled Monitoring Wells WSA-MW2 and WSA-MW4 as indicated in Section 4.3.2.3. The conclusions presented in the Pre-Draft SI Report were intended to be preliminary until the re-sampled ground water from the subject wells could be reanalyzed. The conclusions in the Draft Final and Final Reports are based on the new data from the resampled wells.

CODE: A=Accepted D=Disagree W=Withdrawn E=Exception Noted EX=Explanation NA=Not Applicable

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DRAFT

COMMENT RESPONSES

SUBJECT: DRAFT SI REPORT BLDG 215/216 OIL/WATER SEPARATOR

PROJECT: 11-1586 GAFB SI OIL/WATER SEPARATOR AND WSA **PAGE:** 1 **OF** 3

DISCIPLINE: Chemist **COMMENTOR:** Ms. Daksha P. Dalal T.R. Malecki **DATE:** 6-14-93

DISCIPLINE: Geologist/Chemist **RESPONDENT:** Sushama Paranjape **DATE:** 6-21-93

COMMENT No.	LOCATION REFERRAL	*	RESPONSE
1a.	Chemistry Addendum	A	A copy of the Chemistry Addendum for the Draft SI Report April 1993 is submitted with this response.
1b.	Comment No. 3	D	The definition of AFFF lagoon is presented on page 1-7 of the Draft Report April 1993. It is not necessary to repeat the definition each time the acronym appears in the document if it is defined in a previous section. Therefore it was not defined again on Page 3-11 as requested in Comment No. 3.
	Comment No. 5	EX	Page 4-4 of the Draft SI Report April 1993 has been corrected to add EPA Method 418.1M as an extraction method for the Total Recoverable Petroleum Hydrocarbon analysis. The EPA Method 7000 is not applicable for the analysis of iron, manganese, and barium. Therefore it has been deleted from the method list in the third, sixth, and tenth bullet on Page 4-4 of the Draft SI Report.
	Comment No. 8	E	Section 4.3.1.1 has been deleted according to the meeting held February 2, 1993. The decision was made to consider the Soil Gas Survey as a "field screening tool" only, not as an analytical tool.
	Comment No. 11	E W	The comment has been addressed in the comment response dated January 29, 1993. No further response is required according to the conversation with D. Dalal CEMRK-ED-GE on June 25, 1993.
	Comment No. 14	A	All Chain-of-Custody Forms are enclosed with the Chemistry Addendum referred to in Comment 1a.
	Comment No. 15	A	The requested cooler receipt forms are included with this response.
2.	General Comment on Grubb's Test	A	Revise Section 4.3.1 Page 4-15 to clarify the use of the Grubb's Test. Add the following to Paragraph 3 on Page 4-15 for clarification.

CODE: A=Accepted D=Disagree W=Withdrawn E=Exception Noted EX=Explanation NA=Not Applicable

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COMMENT RESPONSES

DRAFT

SUBJECT: DRAFT SI REPORT BLDG 215/216 OIL/WATER SEPARATOR

PROJECT: 11-1586 GAFB SI OIL/WATER SEPARATOR AND WSA PAGE: 2 OF 3

DISCIPLINE: Chemist COMMENTOR: Ms. Daksha P. Dalal DATE: 6-14-93
T.R. Malecki

DISCIPLINE: Geologist/Chemist RESPONDENT: Sushama Paranjape DATE: 6-21-93

COMMENT No.	LOCATION REFERRAL	*	RESPONSE
			Analysis of the concentration of metals in the soil at both the Oil/Water Separator and the WSA indicated that the data followed a normal distribution. The data was analyzed using the W Test. This test is a method for determining whether a data set has been drawn from an underlying normal distribution. The results of this test indicated the data have sufficiently normal distribution for analysis using the Grubb's Test. For this reason, the Grubb's Test was chosen as a means of identifying outliers within the data set.
		EX	The input data to the Grubb's Test consisted of both the native concentrations for metals and the suspected contamination. With the exception of extreme cases, environmental data tends to follow a normal distribution.
		EX	The identification of a given metal concentration as an outlier is based upon the statistical significance of the metal's concentration relative to the data set. Depending on the range of the data, it is possible to have an outlier which is only a few ppm greater in concentration than those concentrations which are considered to be part of the "normal" set. The results of the Grubb's Test were not used to the exclusion of existing information and knowledge of the soil geology at the base. For example, the concentrations identified by the test as normal and outliers, closely parallel the concentration ranges published by the NYSDEC and the USGS for metals in soil for this area.
3.	Section 5.0	E	See Response to Comment No. 3
4.	Section 6.0	NA	(1) As indicated in the text, none of the metal concentrations at either site exceeded the proposed RCRA Soil CALs. Therefore, the use of the Grubb's Test or any other method to estimate the normal range for the concentration of metals in soils is inconsequential in this particular instance. (2) The conclusions and recommendations in this section are based on the analytical chemistry results from the re-sampled Monitoring Wells WSA-MW2 and WSA-MW4 as indicated in Section 4.3.2.3.

CODE: A=Accepted D=Disagree W=Withdrawn E=Exception Noted EX=Explanation NA=Not Applicable

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COMMENT RESPONSES

DRAFT

SUBJECT: DRAFT SI REPORT BLDG 215/216 OIL/WATER SEPARATOR

PROJECT: 11-1586 GAFB SI OIL/WATER SEPARATOR AND WSA PAGE: 3 OF 3

DISCIPLINE: Chemist COMMENTOR: Ms. Daksha P. Dalal DATE: 6-14-93
T.R. Malecki

DISCIPLINE: Geologist/Chemist RESPONDENT: Sushama Paranjape DATE: 6-21-93

COMMENT No.	LOCATION REFERRAL	*	RESPONSE
			The conclusions presented in the Pre-Draft SI Report were intended to be preliminary until the re-sampled ground water from the subject wells could be reanalyzed.

CODE: A=Accepted D=Disagree W=Withdrawn E=Exception Noted EX=Explanation NA=Not Applicable

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COMMENT RESPONSES

SUBJECT: PRE-DRAFT SI REPORT AT BUILDING 215/216 O/W SEPARATOR & WSA GAFB

PROJECT: 11-1586 OIL/WATER SEPARATOR & WSA **PAGE:** 1 **OF** 2

DISCIPLINE: Chemist **COMMENTOR:** Daksha P. Dalal **DATE:** 01-25-93

DISCIPLINE: Chemist **RESPONDENT:** Sushma Paranjape **DATE:** 01-27-93

COMMENT No.	LOCATION REFERRAL	*	RESPONSE
1.	Page 3-5	A	Added "Therefore, the soil borings were positioned as close as possible to the original locations indicated in the Pre-Investigation Submittal for GAFB, May 1992."
2.	Page 3-10	A	Symbols and scale will be added.
3.	Page 3-11	A	Definition for AFFF will be added.
4.	Page 4-3	A	Last two lines will be revised to clear the confusion regarding the word "subsample".
5.	Page 4-4	A	Extraction method for TRPH will be added. The typo in the tenth bullet will be corrected.
6.	Page 4-5	W	No Action as per telephone conversation with D. Dalal on 1-28-93.
7.	Page 4-5	A	Sampling interval information will be added to Sections 4.1.2.1 and 4.1.2.2.
8.	Page 4-8	A	Text will be revised to refer to Appendix B for numerical values of the contaminants detected in soil gas survey.
9.	Page 4-9	D	Soil gas points are provided on Figure 3-1, page 3-6.
10.	Page 4-15	W	No action per GAFB meeting 2-02-93.
11.	Page 5-6	E	Background sample identification number is provided in the footnote of Table 5-3.

1586.25

CODE: **A=Accepted** **D=Disagree** **W=Withdrawn** **E=Exception Noted** **NA=Not Applicable**

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COMMENT RESPONSES

SUBJECT: PRE-DRAFT SI REPORT AT BUILDING 215/216 O/W SEPARATOR & WSA GAFB

PROJECT: 11-1586 OIL/WATER SEPARATOR & WSA **PAGE:** 2 **OF** 2

DISCIPLINE: Chemist **COMMENTOR:** Daksha P. Dalal **DATE:** 01-25-93

DISCIPLINE: Chemist **RESPONDENT:** Sushama Paranjape **DATE:** 01-27-93

COMMENT No.	LOCATION REFERRAL	*	RESPONSE
12.	Appendices	A	1) Page numbers will be assigned to all Appendices.
		W	2) QA/QC sample numbers are provided in the laboratory data. Comment withdrawn as per conversation with Ms. Dalal on 1-28-93.
		A	3) "Law Environments metals" removed.
		A	4) Background locations at WSA are identified in Appendix I as follows: Shallow soil - WSASBI BG Deep soil - SBMWI Ground water - WSAMWI In addition, Appendix I will be annotated to indicate background sample.
13.	General	A	Extraction method for TRPH will be added to the text.
14.	General	A	Missing chain-of-custody forms will be provided.
15.	General	A	Missing cooler receipt forms will be provided.
16.	General	A	Please refer to comment 13 for TRPH extraction method. Dissolved metals and hexavalent chromium analysis on the ground-water samples was performed according to the Work Plans (page 4-6, May 1992).
17.	General	NA	"QA/QC report from MRD is still in progress". No response from Law required.

CODE: **A=Accepted** **D=Disagree** **W=Withdrawn** **E=Exception Noted** **NA=Not Applicable**

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COMMENT RESPONSES

SUBJECT: DRAFT SI REPORT BLDG 215/216 OIL/WATER SEPARATOR

PROJECT: 11-1586 GAFB SI OIL/WATER SEPARATOR AND WSA **PAGE:** 1 **OF** 2

DISCIPLINE: Chemist **COMMENTOR:** Ms. Daksha P. Dalal T.R. Malecki **DATE:** 6-14-93

DISCIPLINE: Geologist/Chemist **RESPONDENT:** Sushama Paranjape **DATE:** 6-21-93

COMMENT No.	LOCATION REFERRAL	*	RESPONSE
May 25, 1993 1a.	Chemistry Addendum	A	A copy of the Chemistry Addendum for the Draft SI Report April 1993 was submitted under separate cover, in a letter to Ms. Barbara Moore dated August 3, 1993.
1b.	Comment No. 3	D	The definition of AFFF lagoon is presented on page 1-7 of the Draft Report April 1993. It is not necessary to repeat the definition each time the acronym appears in the document if it is defined in a previous section. Therefore it was not defined again on Page 3-11 as requested in Comment No. 3.
	Comment No. 5	EX	Page 4-4 of the Draft SI Report April 1993 has been corrected to add EPA Method 418.1M as an extraction method for the Total Recoverable Petroleum Hydrocarbon analysis. The EPA Method 7000 is not applicable for the analysis of iron, manganese, and barium. Therefore it has been deleted from the method list in the third, sixth, and tenth bullet on Page 4-4 of the Draft SI Report.
	Comment No. 8	E	Section 4.3.1.1 has been deleted according to the meeting held February 2, 1993. The decision was made to consider the Soil Gas Survey as a "field screening tool" only, not as an analytical tool.
	Comment No. 11	E W	The comment has been addressed in the comment response dated January 29, 1993. No further response is required according to the conversation with D. Dalal CEMRK-ED-GE on June 25, 1993.
	Comment No. 14	A	All Chain-of-Custody Forms are enclosed with the Chemistry Addendum referred to in Comment 1a.
	Comment No. 15	A	The requested cooler receipt forms are enclosed with the Chemistry.
2.	General Comment on Grubb's Test	A	The Reference to the Grubb's Test has been removed.

CODE: A=Accepted D=Disagree W=Withdrawn E=Exception Noted EX=Explanation NA=Not Applicable

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COMMENT RESPONSES

SUBJECT: DRAFT SI REPORT BLDG 215/216 OIL/WATER SEPARATOR

PROJECT: 11-1586 GAFB SI OIL/WATER SEPARATOR AND WSA **PAGE:** 2 **OF** 2

DISCIPLINE: Chemist **COMMENTOR:** Ms. Daksha P. Dalal T.R. Malecki **DATE:** 6-14-93

DISCIPLINE: Geologist/Chemist **RESPONDENT:** Sushama Paranjape **DATE:** 6-21-93

COMMENT No.	LOCATION REFERRAL	*	RESPONSE
3.	Section 5.0		Section 5.0 has been revised to remove all refrences to and application of the Grubb's Test.
4.	Section 6.0		References to Grubb's Test have been removed. (2) The conclusions and recommendations in this section are based on the analytical chemistry results from the re-sampled Monitoring Wells WSA-MW2 and WSA-MW4 as indicated in Section 4.3.2.3. The conclusions presented in the Pre-Draft SI Report were intended to be preliminary until the re-sampled ground water from the subject wells could be reanalyzed. The conclusions in the Draft Final and Final Reports are based on the new data from the resampled wells.

CODE: A=Accepted D=Disagree W=Withdrawn E=Exception Noted EX=Explanation NA=Not Applicable

DRAFT

May 25, 1993

CEMRK-ED-GE (200-1c)

MEMORANDUM FOR MD-H (Ms. Barbara Moore)

SUBJECT: Technical Review (Chemical) of Comment responses and Draft Site Investigation Report for Building 215/216 Oil/Water Separator and weapons Storage area at Griffiss Air Force Base in Rome, New York by LAW December, 1992.

1. As requested, our Chemist has reviewed above referenced document and following are our concerns which needs to be addressed.

a. A-E has not submitted the Chemistry Addendum which has prevented us from performing a complete review. It is imperative to review the chemistry addendum for Data comparison and the completeness of the data for site assessment.

b. Comment # 3, # 5, # 8, # 11, # 14, and # 15, are addressed in the comment responses. However, the proposed responses are not reflected in the Draft report. We recommend addressing those comments or provide satisfactory clarification.

2. We also noticed that the Draft submittal has extra set of manipulated data using the Grubbs Test. Communication with our statistical consultant suggests that the Grubbs Test is a statistical means for finding outliers where normal distribution is expected. It has not been established that background contamination is normally distributed. By assuming that it is if in fact it is not, what may be considered an outlier (contamination) by the Grubbs test may in fact be background. Along with this is the fact that the concentrations designated as contamination are only a few ppm outside the range of the "forced" normally distributed data, which further demonstrates the improbability of gleaning any meaningful results from these statistics. We recommend eliminating all the relevant information which uses Grubbs Test manipulation.

3. Section 5.0 needs to be rewritten for consistency and clarifications. All tables are have been altered due to Grubbs test and some of the metals data have been coincidentally eliminated. We also recommend revising section 5.0 without Grubbs Test interpretation.

DRAFT

CEMRK-ED-GE (200-1c) May 25, 1993

MEMORANDUM FOR MD-H (Ms. Barbara Moore)

SUBJECT: Technical Review (Chemical) of Comments responses and Draft Site Investigation Report for Building 215/216 Oil/Water Separator and weapons Storage area at Griffiss Air Force Base in Rome, New York by LAW December, 1992.

4. We also noticed the drastic changes in the Section 6.0 for the summary and Conclusions which reflects the Data interpretation from the Grubbs Test. The Pre-Draft submittal interpretation presented the threat to the human beings as metals were higher than the regulatory guidelines while the Draft submittal interpretation presented no threats in spite of the higher concentration of metals in the ground water. Section 6.0, Summary and Conclusion needs to be clearer and more conclusive as to whether contamination exists or not. The Grubbs Test is used in the current submittal as mentioned earlier in paragraph c. As the use of the Grubbs test is inappropriate in this instance, the conclusions presented in the current submittal should be re-evaluated and resubmitted.

5. The point of contact for this matter is Daksha P. Dalal, Chemist, at extension 7882.

Chief, Geotechnical Branch
FRANCKE WALBERG

CHEMICAL REVIEW COMMENTS Corps of Engineers, Kansas City District	TO: MD-H, Moore FROM:ED-GE, Dalal
PROJECT & LOCATION: Oil/Water Separator and Weapon Storage Area at Griffiss Air Force Base, Rome, New York.	Review Date: January 25, 93
Reviewer: Daksha P. Dalal, ED-GE	
SUBMITTAL: Pre-Draft Site Investigation at Building 215/216 Oil/Water Separator and Weapons Storage Area submitted by LAW dated December 1992.	

ITEM #	REF #	COMMENTS
1	Page 3-5	Section 3.2.2.1, Soil Gas Survey, line 3 to 5, text suggests that soil gas survey were inconclusive. If that is the case than how the soil borings were selected.
2	Page 3-10	Figure 3-4, please provide definitions for the symbols used in the map.
3	Page 3-11	Please give the entire name for AFFF acronym.
4	Page 4-3	Section 4.1.3, please give the explanation for subsamples for VOA. Are they different from the regular samples?
5	Page 4-4	Section 4.2.1.1, First bullet, can you provide the information about the extraction method for TRPH? Tenth Bullet, please correct the method number to Fe, Mn, and Ba (EPA 3050/6010/7000).
6	Page 4-5	First paragraph, please provide the correct extraction method number for metals for groundwater matrix.
7	Page 4-5	Section 4.2.1.4.1, please include the information regarding the depths at which soil samples were collected at the O/W Separator buildings and weapons storage areas.
8	Page 4-8	Section 4.3.1.1, line 3 and 4 indicates that highest concentrations of toluene and TVHC were detected during the soil gas survey west of 550 gallon oil tank. However no numerical numbers are provided to assess the contamination. Please provide relevant reference or information for assessment of contamination through leakage from the tank.

DRAFT

CHEMICAL REVIEW COMMENTS Corps of Engineers, Kansas City District	TO: MD-H, Moore FROM:ED-GE, Dalal
PROJECT & LOCATION: Oil/Water Separator and Weapon Storage Area at Griffiss Air Force Base, Rome, New York.	Review Date: January 25, 93
Reviewer: Daksha P. Dalal, ED-GE	
SUBMITTAL: Pre-Draft Site Investigation at Building 215/216 Oil/Water Separator and Weapons Storage Area submitted by LAW dated December 1992.	

9	Page 4-9	Figure 4-1, please provide soil gas survey points on the map.
10	Page 4-15	Second paragraph indicates that Oil/Water Separator and 550 gallon tanks are not the source of contamination. There are conflicting statements in the preceding paragraphs and in section 4.3.1.1. Please give explanation for the ambiguous statements.
11	Page 5-6	Table 5-3, The table does not provide the corresponding sample identification number for the outlines data for background sample.
12	General Appendices	1. Please assign the page number for all the pages in the appendices. 2. Appendix I, recommend numbering all the data tables. Provide the summary of all the identification numbers for samples including QA/QC, and MS/MSD. 3. All the tables for metals, has the title Law Env'l Metals in solid. Is there any particular reason that the Metals are listed under the above mentioned title? 4. Recommend providing the data for background groundwater sample analysis for comparison.

DRAFT

CHEMICAL REVIEW COMMENTS Corps of Engineers, Kansas City District	TO: MD-H, Moore FROM:ED-GE, Dalal
PROJECT & LOCATION: Oil/Water Separator and Weapon Storage Area at Griffiss Air Force Base, Rome, New York.	Review Date: January 25, 93
Reviewer: Daksha P. Dalal, ED-GE	
SUBMITTAL: Pre-Draft Site Investigation at Building 215/216 Oil/Water Separator and Weapons Storage Area submitted by LAW dated December 1992.	

COMMENTS ON THE CHEMISTRY DATA ADDENDUM		
13	General	Provide the extraction method for TRPH and Bench report copy to accompany the data package.
14	General	Some of the samples are not accounted for in the chain-of-custody forms eg. background samples. Please edit and provide for the rest of the chain-of-custody forms.
15	General	It seems that some of the cooler receipt forms are missing in the data package. Please provide all the cooler receipt forms.
16	General	All the request forms for analysis for TRPH has only 418.1 method and does not indicate the number for extraction. Please provide the information as per which method was utilized for TRPH extraction. There seems confusion about the groundwater analysis for metals. Scope does not specify the dissolved metals analysis or hexavalent chromium. The contractor should be responsible for the cost accrued.
17	General	QA/QC report from MRD is still in progress. Data package will be validated after the receipt of the MRD QA/QC report.

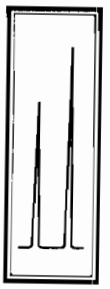
APPENDIX A

SOIL GAS SURVEY

Shallow Soil Gas Investigation

Griffiss Air Force Base
Rome, New York

July 27-30, 1992



Prepared for:

LAW ENVIRONMENTAL
114 Town Park Drive
Kennesaw, Georgia 30144

Telephone: (404) 499-6800

FAX: (404) 421-3593

Prepared by:

TRACER RESEARCH CORPORATION
3855 North Business Center Drive
Tucson, Arizona 85705-2944

Telephone: (602) 888-9400

FAX: (602) 293-1306

Shallow Soil Gas Investigation

GRIFFISS AFB

Rome, New York
July 27-30,1992

Submitted by: Peter Pelizza

Patricia S. Santos

2-92-243-S

TABLE OF CONTENTS

TABLES

1.0 GRIFFISS AIR FORCE BASE INVESTIGATION

Tracer Research Corporation (Tracer Research) performed a shallow soil gas investigation around buildings 215 and 216 at Griffiss Air Force Base, in Rome, New York. The investigation was conducted July 27 through 30, 1992, for Law Environmental.

1.1 Objective

The purpose of the investigation was to characterize and determine the extent of possible contamination by screening shallow soil gas for the presence of volatile organic chemicals (VOCs). Soil gas samples were collected and analyzed for the following hydrocarbons and halocarbons.

benzene, toluene, ethylbenzene, and xylenes (BTEX)
total volatile hydrocarbons (TVHC)
1,1,1 trichloroethane (TCA)
trichloroethene (TCE)
tetrachloroethene (PCE)

1.2 Overview of Results

For this investigation, 24 soil gas samples were collected from 6.5 feet below grade from 24 locations. Toluene, TVHC, TCA, TCE, and PCE were detected in some of the soil gas samples collected at this site. No benzene, ethyl benzene, or xyenes were detected in any of the soil gas samples.

The analytical results from this soil gas investigation are condensed in Appendix A. The data are presented by location and by analyte concentration. When the compound was not detected, the detection limit is presented as a "less than" value, e.g., <0.0001 ug/L. A map of the sampling locations is included in Appendix B.

Soil gas samples are identified by sample location and sampling depth. For example, SG-1-6.5' represents soil gas sample number one, collected at a depth of 6.5 feet below the ground surface.

2.0 SITE DESCRIPTION

The site of this investigation is Buildings 215 and 216 at Griffiss Air Force Base. Samples were collected from beneath the road and sidewalks on the east and west side of the buildings. Samples were also collected from inside Building 215. Law Environmental representatives reported the subsurface was made up of sandy loamy topsoil with a possibility of some fill dirt over glacial tills. The depth to groundwater was reported to occur between 8 to 25 feet below grade.

3.0 SAMPLING PARAMETERS

Soil gas sampling probes consisted of 7-foot lengths of 3/4-inch diameter hollow steel pipe. The probes were fitted with detachable drive tips and advanced to depths of 6.5 feet below ground surface (bgs). A rock drill had to be used in Building 215 to drill through cement varying in thickness from 6 to 12 inches. All of the probes were hydraulically pushed and pounded to the desired depth.

The aboveground end of each probe was fitted with an aluminum reducer (manifold) and a length of polyethylene tubing leading to a vacuum pump. Soil gas was pulled by the vacuum pump into the probe. Samples were collected in a glass syringe by inserting a syringe needle through a silicone rubber segment in the evacuation line and down into the steel probe. The vacuum was monitored by a vacuum gauge to ensure an adequate gas flow from the vadose zone was maintained.

The volume of air within the probe was purged by evacuating 2 to 5 probe volumes of gas. The evacuation time in minutes versus the vacuum in inches of mercury (Hg) was used to calculate the necessary evacuation time. The vacuum in inches Hg was recorded at each sampling location.

Sample probe vacuums ranged from 2 to 4 inches Hg. The vacuum capacity of the pump was approximately 22 inches Hg.

4.0 ANALYTICAL PARAMETERS

During this investigation, 6 to 10 milliliters (mL) of soil gas were collected for each sample and immediately analyzed in the Tracer Research analytical van. Subsamples (duplicates) from these samples were injected into the gas chromatograph (GC) in volumes of 500 microliters (uL).

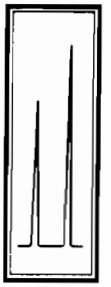
4.1 Analyte Class

The soil gas samples were analyzed for the following analyte classes and compounds:

Analyte Class: Aromatic Hydrocarbons
benzene, toluene, ethylbenzene, xylenes (BTEX)

Analyte Class: Aromatic, Aliphatic, and Alicyclic Hydrocarbons
total volatile hydrocarbons (TVHC)

Analyte Class: Halocarbon
1,1,1 trichlorethane (TCA)
trichlorethene (TCE)
tetrachloroethene (PCE)



4.2 Chromatographic System

A Hewlett Packard Model 5890 Series II gas chromatograph, equipped with an electron capture detector (ECD), a flame ionization detector (FID), and two computing integrator, was used for the soil gas analyses. Halocarbons and Hydrocarbons were separated in the GC on two 6 foot by 1/8 inch outer diameter (OD) packed analytical columns (10% OV101 stationary phase bonded to 80/100 mesh Chromosorb W support) in a temperature controlled oven and detected on the ECD and FID. Nitrogen was used as the carrier gas.

The instrument calibrations were checked periodically throughout each day to monitor the response factor and retention time. The following paragraphs explain the GC, ECD, and FID processes.

GC Process

The soil gas vapor is injected into the GC where it is swept through the analytical column by the carrier gas. The detector senses the presence of a component different from the carrier gas and converts that information to an electrical signal. The components of the sample pass through the column at different rates, according to their individual properties, and are detected by the detector. Compounds are identified by the time it takes them to pass through the column (retention time).

ECD Process

The ECD captures low energy thermal electrons that have been ionized by beta particles. The flow of these captured electrons into an electrode produces a small current, which is collected and measured. When the halogen atoms (halocarbons) are introduced into the detector, electrons that would otherwise be collected at the electrode are captured by the sample, resulting in decreased current. The current causes the computing integrator to record a peak on a chromatogram. The area of the peak is compared to the peak generated by a known standard to determine the concentration of the analyte.

FID Process

The FID utilizes a flame produced by the combustion of hydrogen and air. When a component, which has been separated on the GC analytical column, is introduced into the flame, a large increase in ions occurs. A collector with a polarizing voltage is applied near the flame and the ions are attracted and produce a current, which is proportional to the amount of the sample compound in the flame. The electrical current causes the computing integrator to record a peak on a chromatogram. By measuring the area of the peak and comparing that area to the integrator response of a known aqueous standard, the concentration of the analyte in the sample is determined.

4.3 Analyses

The detection limits for target compounds depend on the sensitivity of the detector to the individual compound as well as the volume of the injection. The detection limits of the target compounds were calculated from the response factor, the sample size, and the calculated minimum peak size (area) observed under the conditions of the analyses. If any compound was not detected in an analysis, the detection limit is given as a "less than" value, e.g., <0.1 ug/L. The approximate detection limits for the target compounds are presented in the table in the table on the following page.

Table 1. Detection Limits for Soil Gas Compounds

Compound	Detection Limits (ug/L)
Benzene	0.08
Toluene	0.1
Ethylbenzene	0.3
Xylenes	0.4
Total volatile hydrocarbons	0.4
1,1,1 trichloroethane	0.0003
trichlorethene	0.0006
tetrachloroethene	0.0007

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

Tracer Research's Quality Assurance (QA) and Quality Control (QC) program was followed to maintain data that was reproducible through the investigation. An overview presenting the significant aspects of this program is presented below.

Soil Gas Sampling Quality Assurance

To ensure consistent collection of soil gas samples, the following procedures are performed:

- Sampling Manifolds

Tracer Research's custom designed sampling manifold connects the sample probe to the vacuum line and pump. The manifold is designed to eliminate sample exposure to the polymeric (plastic) materials that connect the probe to the vacuum pump.

The sampling manifold is attached to the end of the probe, forming an air tight union between the probe and the silicone tubing septum. The septum connects the manifold to the pump vacuum line and permits syringe sampling.

This sampling system allows the sample to be taken upstream of the sampling pump, manifold, and septum. Since cross contamination of sampling equipment can be a major problem, Tracer Research replaces the materials (probe and syringe), between sampling points, that contact the soil gas before or during sampling.

-Sampling Probes

Steel probes are used only once each day. To eliminate the possibility of cross contamination, they are washed with high pressure soap and hot water spray, or steam-cleaned. Enough sampling probes are carried on each van to avoid the need to re-use any during the day.

-Glass Syringes

Glass syringes are used for only one sample a day and are washed and baked out at night. If they must be used twice, they are purged with carrier gas (nitrogen) and baked out between probe samplings.

-Sampling Efficiency

Soil gas pumping is monitored by a vacuum gauge to ensure that an adequate flow of gas from the soil is maintained. A reliable gas sample can be obtained if the sample vacuum gauge reading is at least 2 inches Hg less than the maximum measured vacuum of the vacuum pump.

Analytical Quality Assurance Samples

Quality assurance samples are performed at the below listed, or greater, frequencies. The frequency depends on the number of soil gas samples analyzed and the length of time of the survey:

Table 2. Quality Assurance Samples

Sample type	Frequency
Ambient Air Samples	2 per day or per site
Analytical Method Blanks	5% (1 per 20 samples or 1 a day)
Continuing Calibration Check	20% (1 every 5 samples)
Field System Blank	10% (1 every 10 samples or 1 a day)
Reagent Blank	1 per set of working standards
Replicate Samples	100% of all soil gas samples

The ambient air samples are obtained on site by sampling the air immediately outside the mobile analytical van and directly injecting it into the GC. Analytical method blanks are taken to demonstrate that the analytical instrumentation is not contaminated. These are performed by injecting carrier gas (nitrogen) into the GC with the sampling syringe. Subsampling syringes are also checked in this fashion.

The injector port septa through which soil gas samples are injected into the GC are replaced daily to prevent possible gas leaks from the chromatographic column. All sampling and subsampling syringes are decontaminated after use and are not used again until they have been decontaminated by washing in anionic detergent and baking at 90°C.

Field system blanks are analyzed to check for contamination of the sampling apparatus, e.g., probe and sampling syringe. A sample is collected using standard soil gas sampling procedures, but without putting the probe into the ground. The results are compared to those obtained from a concurrently sampled ambient air analysis.

If the blanks detect compounds of interest at concentrations that indicate equipment contamination or concentrations that exceed normal background levels (ambient air analysis), corrective actions are performed. If the problem cannot be corrected, an out-of-control event is documented and reported.

A reagent blank is performed to ensure the solvent used to dilute the stock standards is not contaminated. Analytical instruments are calibrated daily using fresh working standards made from National Institute of Sciences and Technology traceable standards and reagent blanked solvents.

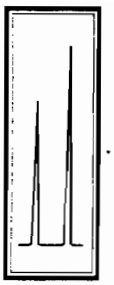
Quantitative precision is assured by replicating analysis of 100 percent of the soil gas samples. Replicate analyses are performed by subsampling vapors from the original sampling syringe.

6.0 RESULTS

For this investigation, 24 soil gas samples were collected at depths of 6.5 feet below grade from 24 locations. A summary of the soil gas investigation is presented in the following table.

Table 3. Soil Gas Sample Summary

Compound	# of samples in which compound was detected	Low conc. ug/L	High conc. ug/L	Sample(s) with high conc.
Benzene	0	NA	NA	NA
Toluene	3	0.1	0.7	SG-15
Ethylbenzene	0	NA	NA	NA
Total xylenes	0	NA	NA	NA
TVHC	17	0.4	9	SG-15
TCA	15	0.0003	0.01	SG-20,SG-22 SG-23
TCE	19	0.0006	0.03	SG-17,SG-18
PCE	17	0.0008	0.08	SG-23



Four air samples were collected during the course of the investigation. TVHC was detected in two (0.2 ug/l and 0.5 ug/l) of the air samples, and TCA was detected in three of the air samples (0.0004 ug/l, 0.0005 ug/l, and 0.0006 ug/l). None of the other compounds were detected in any of the air samples. The air samples help to establish background levels of target compounds at a site.

Concentrations of toluene and TVHC greater than back ground levels were detected west of the 550 gallon oil tank (Figures 1A & 1B). Background levels of TVHC were detected across the majority of the site, with a concentration of 1 ug/L detected at sample location SG-1-6.5'. These two compound are commonly associated with a variety of fuels and oils.

Concentrations of TCA, TCE, and PCE greater than 0.01 ug/l were detected in Building 215 around the drain and on the east side of the building (Figures 1C, 1D, & 1E). Concentrations of TCA and PCE greater than 0.01 ug/l were also detected on the southern end of the pipeline at sample location SG-6-6.5'.

APPENDIX A Condensed Data

TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
LAW ENVIRONMENTAL/GRIFFIS AFB/ROME, NEW YORK/JOB #2-92-243-S
07/27/92

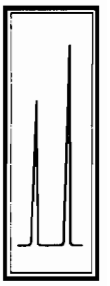
SAMPLE	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XLYENES µg/L	TVHC µg/L	TCA µg/L	TCE µg/L	PCE µg/L
AIR	<0.04	<0.09	<0.2	<0.2	0.5	0.0006	<0.0003	<0.0004
SG-1-6.5'	<0.08	<0.2	<0.4	<0.4	1	0.001	0.004	0.001
SG-2-6.5'	<0.08	<0.2	<0.4	<0.4	<0.4	<0.0003	<0.0006	<0.0007
SG-3-6.5'	<0.08	<0.2	<0.4	<0.4	0.4	0.0003	0.0006	0.005
SG-4-6.5'	<0.08	<0.2	<0.4	<0.4	0.6	<0.0003	<0.0006	0.002
SG-5-6.5'	<0.08	<0.2	<0.4	<0.4	0.4	0.0003	0.001	0.03
SG-6-6.5'	<0.08	<0.2	<0.4	<0.4	0.7	0.001	0.002	0.03
SG-7-6.5'	<0.08	<0.2	<0.4	<0.4	0.7	0.0005	0.0006	<0.0007
SG-8-6.5'	<0.08	<0.2	<0.4	<0.4	<0.4	0.0006	<0.0006	<0.0007
SG-9-6.5'	<0.08	<0.2	<0.4	<0.4	0.5	0.0009	0.002	<0.0007
SG-10-6.5'	<0.08	0.6	<0.4	<0.4	1	0.0005	<0.0006	<0.0007
SG-11-6.5'	<0.08	<0.2	<0.4	<0.4	<0.4	<0.0003	0.0007	<0.0007
SG-12-6.5'	<0.08	<0.2	<0.4	<0.4	<0.4	<0.0003	0.004	<0.0007
SG-13-6.5'	<0.08	<0.2	<0.4	<0.4	<0.4	<0.0003	0.009	0.03
AIR	<0.04	<0.09	<0.2	<0.2	<0.2	<0.0006	<0.0003	<0.0004

Analyzed by: L. Schenmeyer
Proofed by: _____

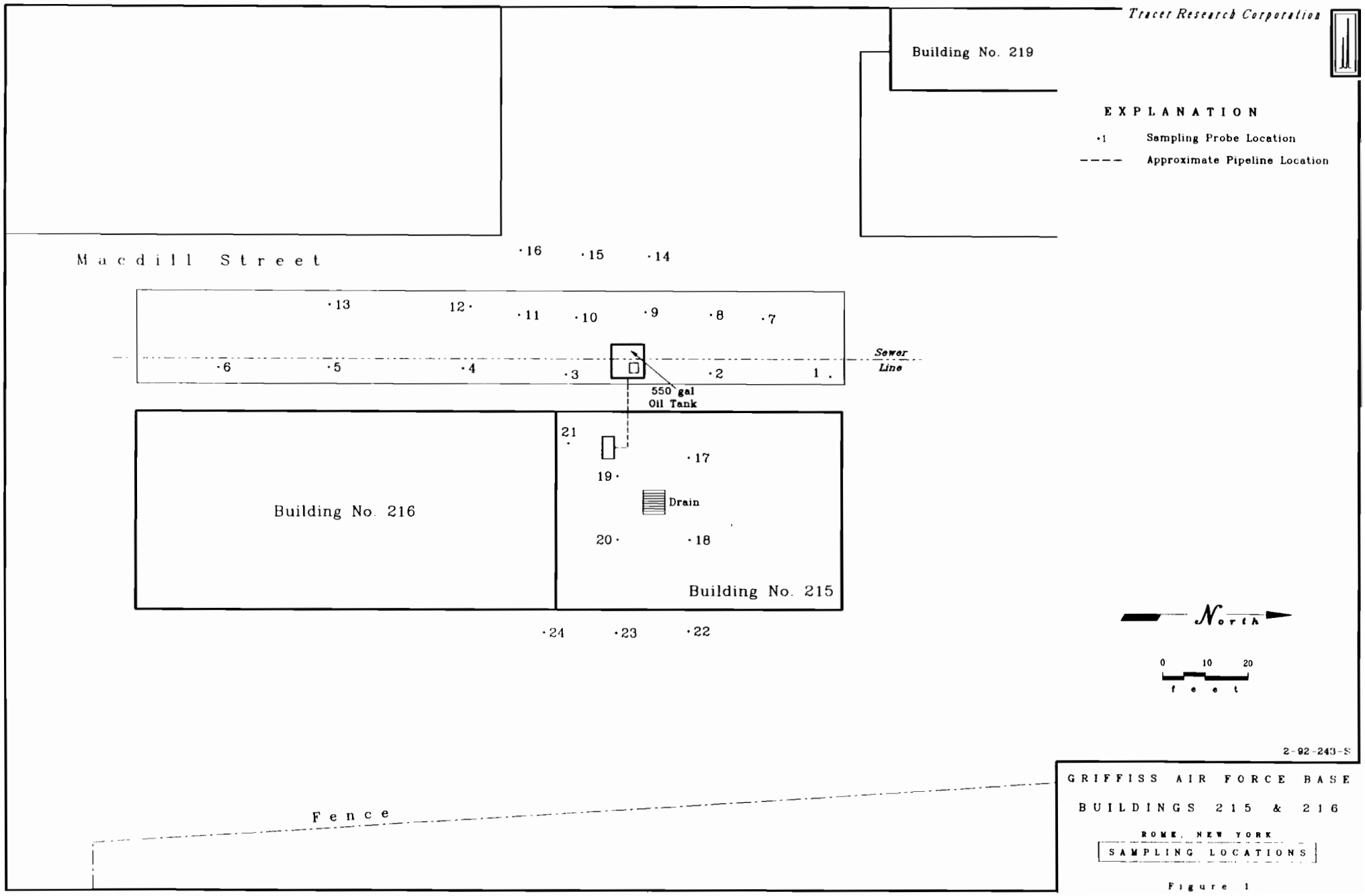
TRACER RESEARCH CORPORATION - ANALYTICAL RESULTS
LAW ENVIRONMENTAL/GRIFFIS AFB/ROME, NEW YORK/JOB #2-92-243-S
07/29/92

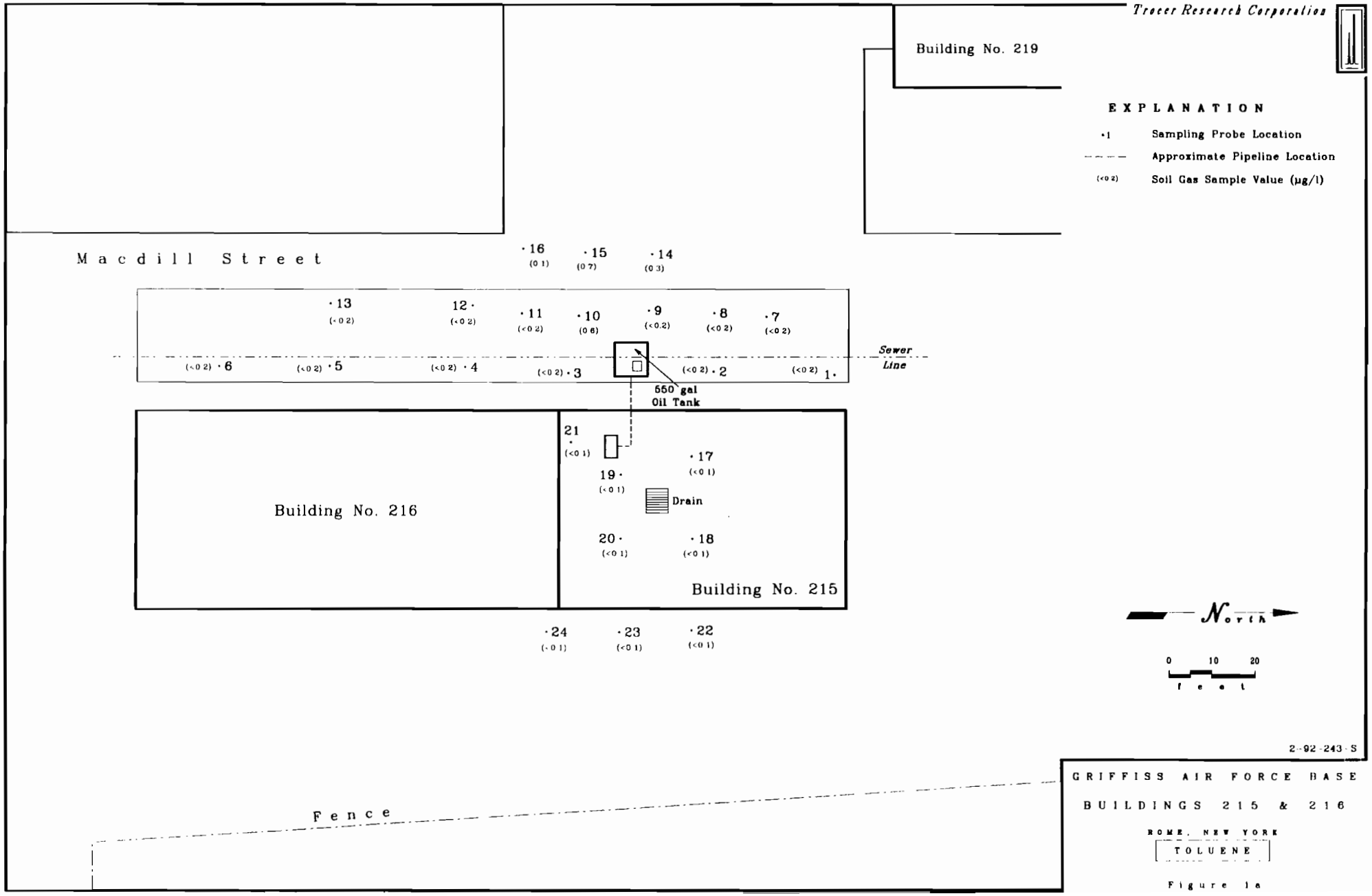
SAMPLE	BENZENE µg/L	TOLUENE µg/L	ETHYL BENZENE µg/L	XLYENES µg/L	TVHC µg/L	TCA µg/L	TCE µg/L	PCE µg/L
AIR	<0.03	<0.07	<0.1	<0.2	0.2	0.0005	<0.0003	<0.004
SG-14-6.5'	<0.06	0.3	<0.3	<0.4	6	<0.0003	0.006	0.001
SG-15-6.5'	<0.06	0.7	<0.3	<0.4	9	<0.0003	<0.004	0.001
SG-16-6.5'	<0.06	0.1	<0.3	<0.4	0.7	<0.0003	0.006	0.0008
SG-18-6.5'	<0.06	<0.1	<0.3	<0.4	0.8	0.009	0.03	0.05
SG-17-6.5'	<0.06	<0.1	<0.3	<0.4	0.6	0.008	0.03	0.05
AIR	<0.03	<0.07	<0.3	<0.2	0.2	0.0008	<0.0003	<0.0004
SG-19-6.5'	<0.06	<0.1	<0.3	<0.4	0.4	0.0003	0.02	0.05
SG-20-6.5'	<0.06	<0.1	<0.3	<0.4	0.7	0.01	0.02	0.06
SG-21-6.5'	<0.06	<0.1	<0.3	<0.4	<0.3	<0.0003	0.01	0.04
SG-22-6.5'	<0.06	<0.1	<0.3	<0.4	<0.5	0.01	<0.02	0.07
SG-23-6.5	<0.06	<0.1	<0.3	<0.4	0.6	0.01	0.02	0.08
SG-24-6.5'	<0.06	<0.1	<0.3	<0.4	0.6	0.006	<0.005	0.03
AIR	<0.03	<0.07	<0.1	<0.2	0.3	0.0004	<0.0003	<0.0004

Analyzed by: L. Schemmeyer
Proofed by: _____



APPENDIX B Field Map


Tracer Research Corporation
Building No. 219
EXPLANATION
·1 Sampling Probe Location
Approximate Pipeline Location
Macdill Street
·16
·15
·14
·13
12·
·11
·10
·9
·8
·7
·6
·5
·4
·3
·2
1 .
Sewer Line
550 gal Oil Tank
21
·17
19·
Drain
Building No. 216
20·
·18
Building No. 215
·24
·23
·22
North
0 10 20
feet
2-92-243-S
Fence
GRIFFISS AIR FORCE BASE
BUILDINGS 215 & 216
ROME, NEW YORK
SAMPLING LOCATIONS
Figure 1


Tracer Research Corporation
Building No. 219
EXPLANATION
•1 Sampling Probe Location
Approximate Pipeline Location
(<0.2) Soil Gas Sample Value (µg/l)
Macdill Street
•16 (0.1)
•15 (0.7)
•14 (0.3)
•13 (<0.2)
12• (<0.2)
•11 (<0.2)
•10 (0.6)
•9 (<0.2)
•8 (<0.2)
•7 (<0.2)
Sewer Line
(<0.2) •6
(<0.2) •5
(<0.2) •4
(<0.2) •3
(<0.2) •2
(<0.2) 1•
550 gal Oil Tank
Building No. 216
21 • (<0.1)
•17 (<0.1)
19• (<0.1)
Drain
20• (<0.1)
•18 (<0.1)
Building No. 215
•24 (<0.1)
•23 (<0.1)
•22 (<0.1)
North
0 10 20
feet
Fence
2-92-243-S
GRIFFISS AIR FORCE BASE
BUILDINGS 215 & 216
ROME, NEW YORK
TOLUENE
Figure 1a

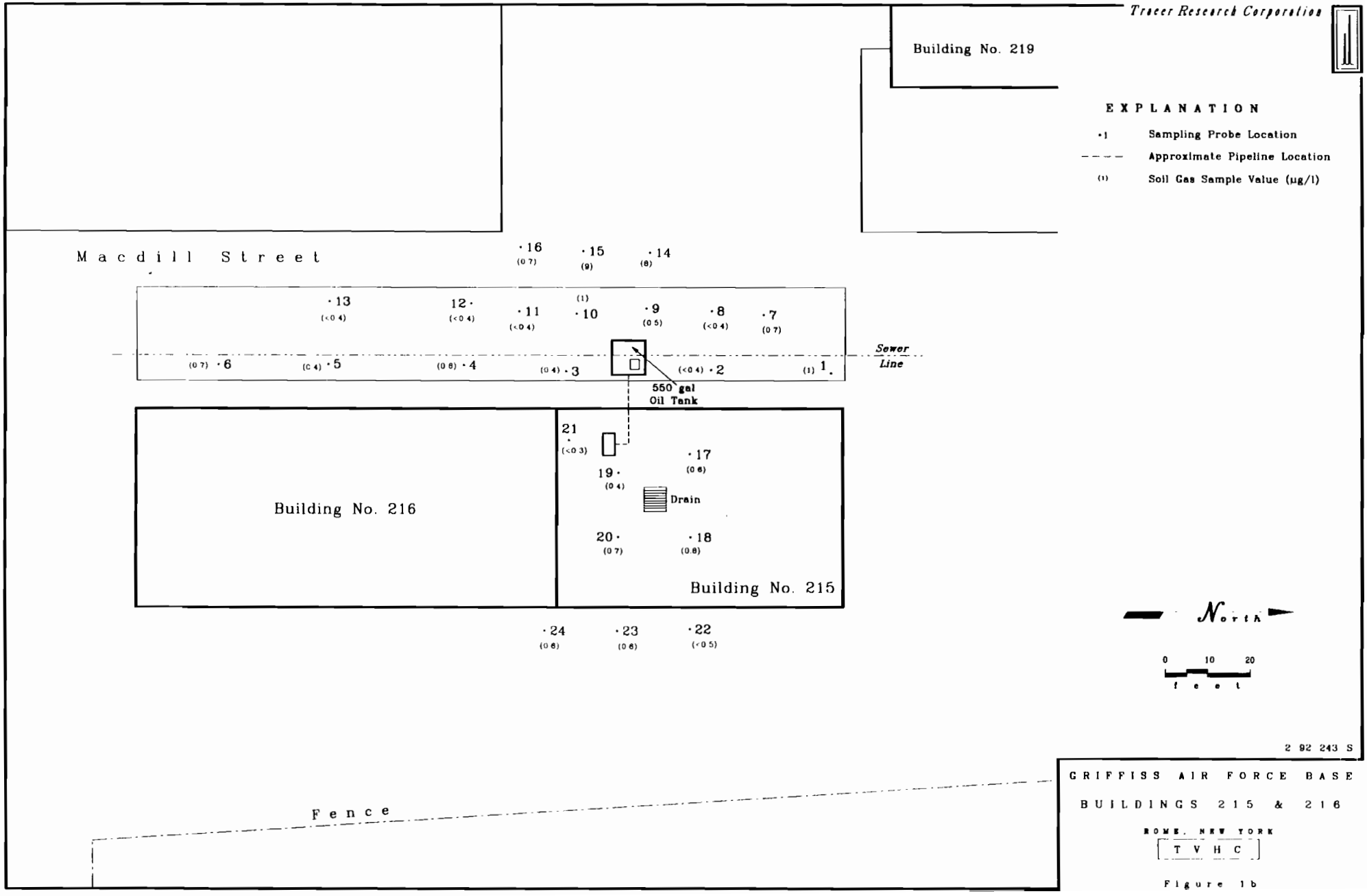
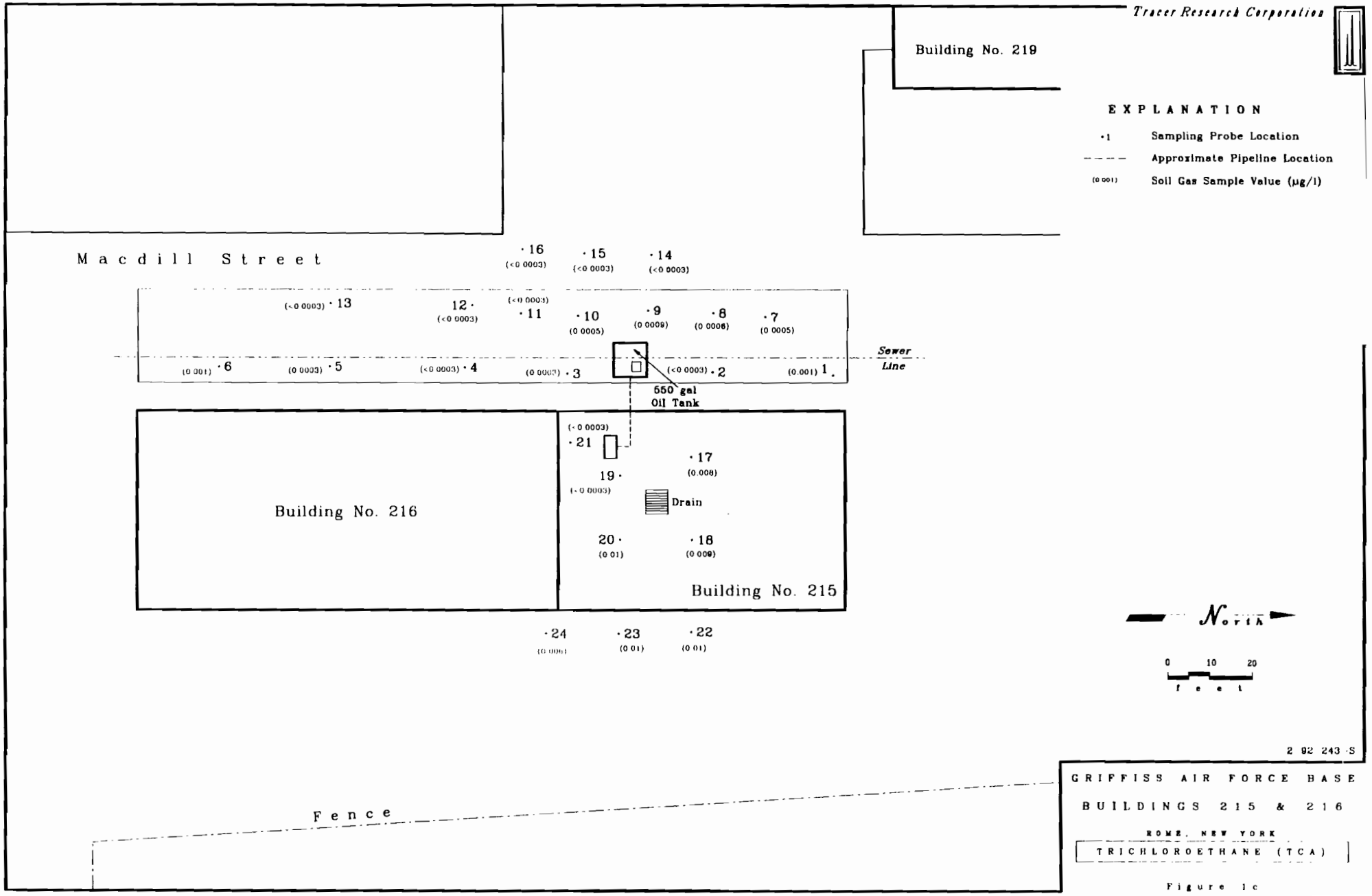

Tracer Research Corporation
Building No. 219
EXPLANATION
•1 Sampling Probe Location
Approximate Pipeline Location
(1) Soil Gas Sample Value (µg/l)
Macdill Street
•16 (0.7)
•15 (9)
•14 (8)
•13 (<0.4)
12• (<0.4)
•11 (<0.4)
(1) •10
•9 (0.5)
•8 (<0.4)
•7 (0.7)
Sewer Line
(0.7) •6
(0.4) •5
(0.8) •4
(0.4) •3
(<0.4) •2
(1) 1•
550 gal Oil Tank
Building No. 216
21• (<0.3)
•17 (0.6)
19• (0.4)
Drain
20• (0.7)
•18 (0.8)
Building No. 215
•24 (0.6)
•23 (0.6)
•22 (<0.5)
North
0 10 20
feet
Fence
2 92 243 S
GRIFFISS AIR FORCE BASE
BUILDINGS 215 & 216
ROME, NEW YORK
TVHC

Figure 1b



2 92 243 S

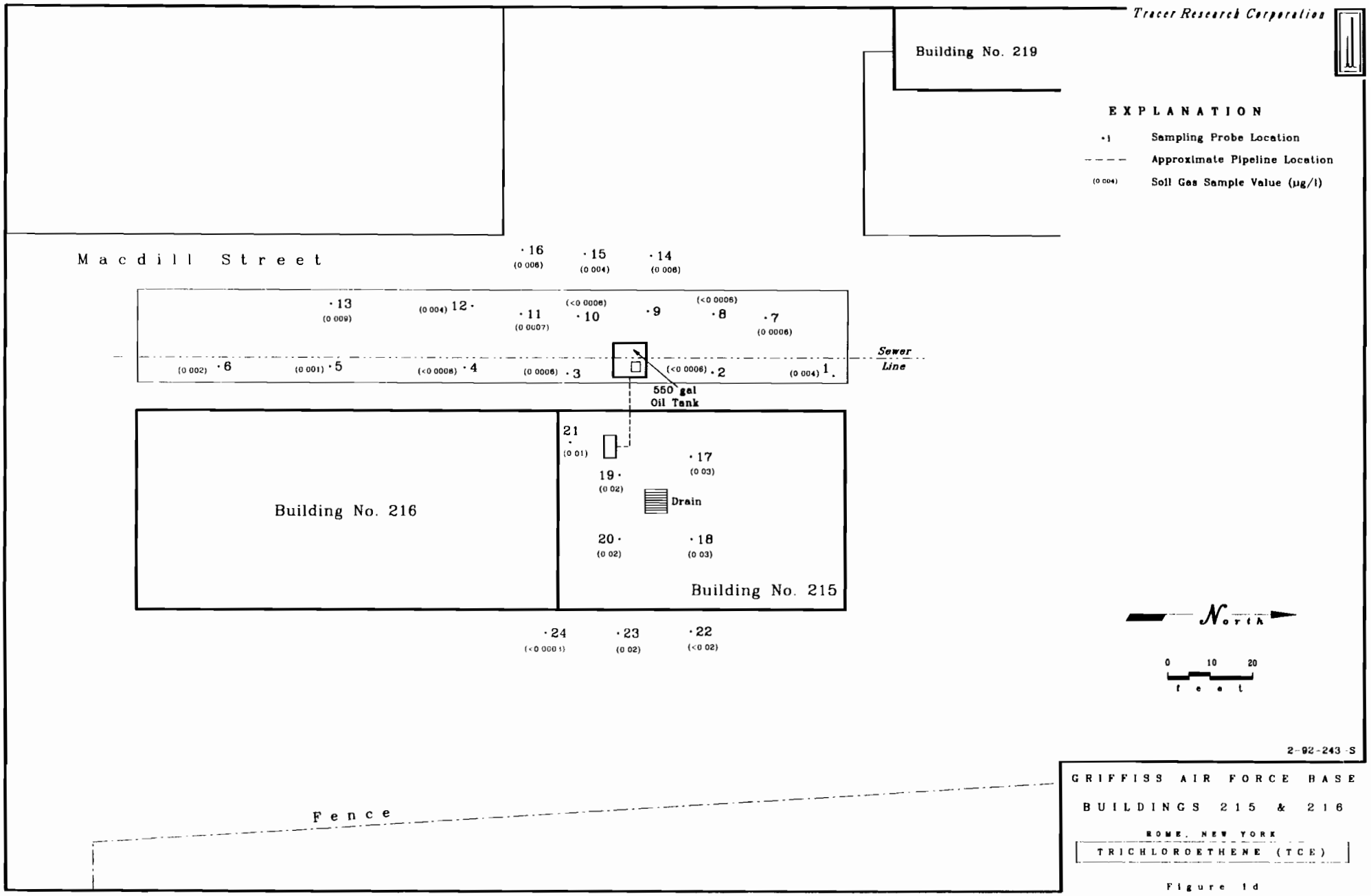
GRIFFISS AIR FORCE BASE

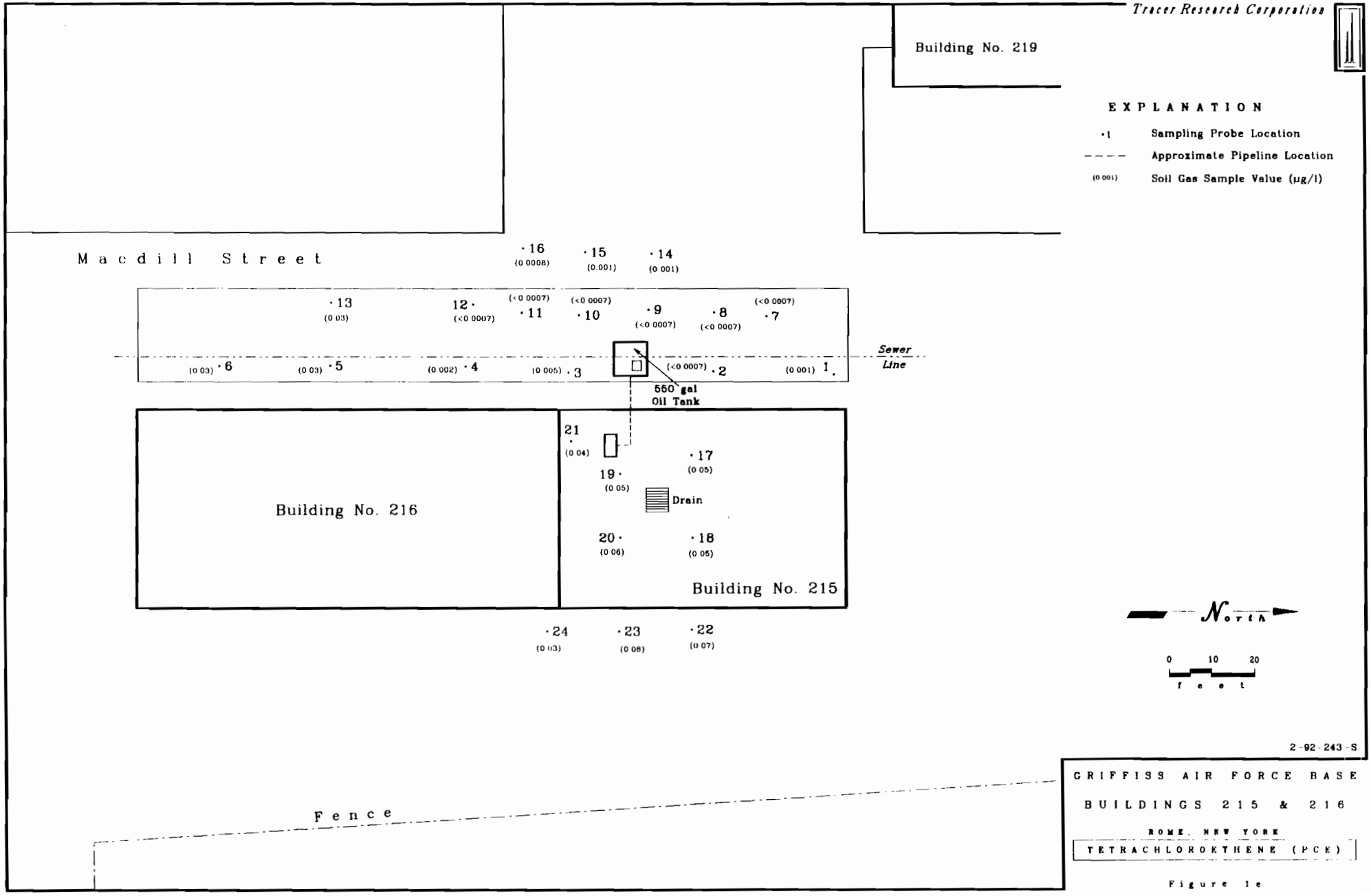
BUILDINGS 215 & 216

ROME, NEW YORK

TRICHLOROETHANE (TCA)

Figure 1c


Tracer Research Corporation
Building No. 219
EXPLANATION
•1 Sampling Probe Location
Approximate Pipeline Location
(0.004) Soil Gas Sample Value (µg/l)
Macdill Street
•16 (0.006)
•15 (0.004)
•14 (0.006)
•13 (0.009)
(0.004) 12•
•11 (0.0007)
(<0.0006) •10
•9
(<0.0006) •8
•7 (0.0006)
Sewer Line
(0.002) •6
(0.001) •5
(<0.0008) •4
(0.0006) •3
(<0.0006) •2
(0.004) 1•
550 gal Oil Tank
21 • (0.01)
•17 (0.03)
19• (0.02)
Drain
Building No. 216
20• (0.02)
•18 (0.03)
Building No. 215
•24 (<0.0001)
•23 (0.02)
•22 (<0.02)
North
0 10 20
feet
2-92-243-S
Fence
GRIFFISS AIR FORCE BASE
BUILDINGS 215 & 216
ROME, NEW YORK
TRICHLOROETHENE (TCE)
Figure 1d



2-92-243-S

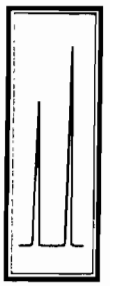
GRIFFISS AIR FORCE BASE

BUILDINGS 215 & 216

ROME, NEW YORK

TETRACHLOROETHENE (PCE)

Figure 1e



Tracer Research Corporation appreciates the opportunity of being of service to your organization. Because we are constantly striving to improve our service to you, we welcome any comments or suggestions you may have about how we can be more responsive to the needs of your organization.

This soil gas report was prepared by Peter Reko. If you have any questions about the field work, analytical results, or this report, please give Pete a call at (602) 888-9400.

APPENDIX B

TEST BORING RECORDS/HTW DRILLING LOGS

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER _____
JOB NUMBER _____
DATE STARTED _____
DATE COMPLETED _____
DRILLED BY _____
LOGGED BY _____
CHECKED BY _____

REMARKS:

LEGEND for
Soil Borings

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SOIL BORING	SYM-BOLS	FIELD TESTS	SPT N VALUE
		Size and types of drilling and sampling equipment: CME 75, Diedrich D-50 4 1/4" I.D., 7 5/8" O.D. Hollow Stem Auger (HSA) 3" x 24" split spoon Chemical Analysis (O) A. Shallow Borings / 0 - 2') VOC - Volatile Organic Compounds BNA - Base, Neutral, Acid * Metals B. Deep Soil Borings TRPH - Total Recoverable Petroleum Hydrocarbons * Metals - includes 13 priority pollutants, & Fe Mn, Ba Color: Munsell Soil Color Chart Backfill Samples Augered Interval Grout Backfill Stabilized ground water level Sample Screening / Workplace Monitoring HNU = Manufacturer brand name for a Photoionization Detector, measured in parts per million OXY = Oxygen Level in percent LEL = Lower Explosive Limit			Augered Interval No Sampling		1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-SB-01
JOB NUMBER 11-1586
DATE STARTED 8/7/92
DATE COMPLETED 8/7/92
DRILLED BY —
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

Hand Augered to 2'
Chemical Analysis (Metals, VOA, BNA) = O
Boring backfilled to surface,
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SHALLOW SOIL BORING	SYM-BOLS	LAB TESTS	SPT N VALUE
537.10	0.0	Brown (10 YR 4/3) SAND; dry		O	HNU=0	
	2.0	Boring Terminated				

1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-SB-02
JOB NUMBER 11-1586
DATE STARTED 8/7/92
DATE COMPLETED 8/7/92
DRILLED BY ——
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

Hand Augered to 2'
Chemical Analysis (Metals, VOA, BNA) = O
Boring backfilled to surface,
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SHALLOW SOIL BORING	SYM-BOLS	LAB TESTS	SPT N VALUE
514.51	0.0					
	0.5	Yellowish red (5 YR 5/8) SAND; dry		O	HNU=0	
	1.0			O		
	2.0			O		
		Boring Terminated				1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-SB-03
JOB NUMBER 11-1586
DATE STARTED 8/7/92
DATE COMPLETED 8/7/92
DRILLED BY —
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS:

Hand Augered to 2'
Chemical Analysis (Metals, VOA, BNA) = O
Boring backfilled to surface,
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SHALLOW SOIL BORING	SYM-BOLS	LAB TESTS	SPT N VALUE
518.00	0.0					
	0.5	Dark grayish brown (10 YR 4/2) SAND with little gravel; dry		O	HNU=0	
	1.0			O		
	2.0			O		
		Boring Terminated				

1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-SB-04
JOB NUMBER 11-1586
DATE STARTED 8/7/92
DATE COMPLETED 8/7/92
DRILLED BY —
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

Hand Augered to 2'
Chemical Analysis (Metals, VOA, BNA) = O
Boring backfilled to surface,
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SHALLOW SOIL BORING	SYM-BOLS	LAB TESTS	SPT N VALUE
530.92	0.0					
	0.5	Dark brown (10 YR 3/3) SAND with some gravel; dry		O	HNU=0	
	1.0			O		
	2.0			O		
		Boring Terminated				

1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER SB-01
JOB NUMBER 11-1586
DATE STARTED 8/8/92
DATE COMPLETED 8/8/92
DRILLED BY D. RICHMOND
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

CME 75 HSA 4 1/4" I.D., 7 5/8" O.D.
3" x 24" Split Spoon Sampler
Chemical Analysis (Metals and TRPH) = O
Grouted to 5' then backfill to surface
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SOIL BORING	SYM-BOLS	FIELD TESTS	SPT N VALUE
476.14	0.0	Dark brown (10 YR 4/3) coarse SAND with some pebbles and cobbles; dry (SP)		O	HNU=0 OXY=21% LEL=0%	HAND AUGER TO 2'
474.14	2.0	No Recovery from 2' - 4'		O	HNU=0 OXY=21% LEL=0%	
472.14	4.0	Reddish brown (5 YR 4/3) medium dense SAND with some silt and cobbles (SP)			HNU=0 OXY=21% LEL=0%	0
471.14	5.0			O	HNU=0 OXY=20% LEL=0%	20
468.14	8.0	No Recovery from 8' - 10'		O	HNU=0 OXY=21% LEL=0%	10
466.14	10.0	Dark brown (7.5 YR 4/3) medium dense SAND; wet (SP)		O	HNU=0 OXY=21% LEL=0%	17
464.14	12.0	Boring Terminated				22
						1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER SB-02
JOB NUMBER 11-1586
DATE STARTED 8/8/92
DATE COMPLETED 8/8/92
DRILLED BY D. RICHARDSON
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

CME 75 HSA 4 1/4" I.D., 7 5/8" O.D.
3" x 24" Split Spoon Sampler
Chemical Analysis (Metals and TRPH) = O
Grouted to 5' then backfill to surface
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SOIL BORING	SYM-BOLS	FIELD TESTS	SPT N VALUE
						HAND AUGERED TO 2'
475.85	0.0	Dark brown (10 YR 4/3) medium dense SAND with some pebbles, gravel and cobbles; dry (SP)			HNU=0 OXY=21% LEL=0%	
475.85	2.0	Same as above, but loose and moist		O	HNU=0 OXY=21% LEL=0%	13
471.85	4.0	Same as above, but yellowish brown (10 YR 5/4) and medium dense				8
470.85	5.0				HNU=0 OXY=21% LEL=0%	
469.85	6.0	Same as above, but wet		O		11
				O	HNU=0 OXY=21% LEL=0%	
467.85	8.0	No Recovery from 8' - 10'		X		
				X	HNU=0 OXY=21% LEL=0%	
465.85	10.0	Same as 6' - 8' interval				
				O	HNU=0 OXY=21% LEL=0%	13
463.85	12.0	Boring Terminated				1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER SB-03
JOB NUMBER 11-1586
DATE STARTED 8/8/92
DATE COMPLETED 8/8/92
DRILLED BY D. RICHARDSON
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

CME 75 HSA 4 1/4" I.D., 7 5/8" O.D.
3" x 24" Split Spoon Sampler
Chemical Analysis (Metals and TRPH) = O
Grouted to 5' then backfill to surface
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SOIL BORING	SYM-BOLS	FIELD TESTS	SPT N VALUE
						HAND AUGERED TO 2'
475.49	0.0	Dark brown (10 YR 3/3) SAND with some silt and gravel (SP)		O	HNU=0 OXY=21% LEL=0%	
474.99	0.5	No Recovery 0.5' - 2'				
473.49	2.0	Dark yellowish brown (10 YR 4/4) loose SAND with some pebbles and gravel; dry (SP)			HNU=0 OXY=21% LEL=0%	
471.49	4.0			O		7
470.49	5.0				HNU=0 OXY=21% LEL=0%	
469.49	6.0	Same as above, but medium dense and moist		O		17
					HNU=0 OXY=21% LEL=0%	
467.49	8.0	No Recovery from 8' - 10'		O		14
					HNU=0 OXY=21% LEL=0%	
465.49	10.0	Dark grayish brown (10 YR 4/2) medium dense SAND with some cobbles and little gravel; wet (SP)			HNU=0 OXY=21% LEL=0%	13
463.49	12.0	Boring Terminated				1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER SB-04
JOB NUMBER 11-1586
DATE STARTED 8/8/92
DATE COMPLETED 8/8/92
DRILLED BY D. RICHARDSON
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

CME 75 HSA 4 1/4" I.D., 7 5/8" O.D.
3" x 24" Split Spoon Sampler
Chemical Analysis (Metals and TRPH) = O
Grouted to 5' then backfill to surface
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SOIL BORING	SYM-BOLS	FIELD TESTS	SPT N VALUE
						HAND AUGERED TO 2'
475.86	0.0	Dark brown (10 YR 3/3) medium dense SAND with some silt and gravel; dry (SP)		O	HNU=0 OXY=21% LEL=0%	
473.86	2.0			O	HNU=0 OXY=21% LEL=0%	12
471.86	4.0	Very dark grayish brown (10 YR 3/2) SAND with some gravel and cobbles (SP)			HNU=0 OXY=21% LEL=0%	
470.86	5.0					
469.86	6.0			O	HNU=0 OXY=21% LEL=0%	
467.86	8.0			O	HNU=0 OXY=21% LEL=0%	19
465.86	10.0	Dark grayish brown (10 YR 4/2) medium dense SAND with some cobbles and little gravel; wet (SP)		O	HNU=0 OXY=21% LEL=0%	13
463.86	12.0	Boring Terminated		O		13
						1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER SB-05
JOB NUMBER 11-1586
DATE STARTED 8/9/92
DATE COMPLETED 8/9/92
DRILLED BY D. RICHARDSON
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

Diedrich D-50 HSA 4 1/4" I.D., 7 5/8" O.D.
3" x 24" Split Spoon Sampler
Chemical Analysis (Metals and TRPH) = O
Grouted to 5' then backfill to surface
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SOIL BORING	SYM-BOLS	FIELD TESTS	SPT N VALUE
						HAND AUGERED TO 2'
475.56	0.0	Very dark grayish brown (10 YR 3/2) medium dense SAND with some gravel and cobbles; dry (SP)		O	HNU=0 OXY=21% LEL=0%	
473.56	2.0	Dark yellowish brown (10 YR 4/4) medium dense m-c SAND and gravel with little rock fragments; moist (SP)		O	HNU=0 OXY=21% LEL=0%	13
471.56	4.0	Very dark grayish brown (10 YR 3/2) medium dense fine coarse SAND with some gravel and cobbles; moist (SP)		O	HNU=0 OXY=21% LEL=0%	20
470.56	5.0					
469.56	6.0	No Recovery from 6' - 8'		O		17
467.56	8.0	Dark yellowish brown (10 YR 4/4) medium dense coarse SAND with some gravel; moist (SP)			HNU=0 OXY=21% LEL=0%	
465.56	10.0			O	HNU=0 OXY=21% LEL=0%	25
463.56	12.0	Boring Terminated		O		16
						1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER SB-06
JOB NUMBER 11-1586
DATE STARTED 8/9/92
DATE COMPLETED 8/9/92
DRILLED BY D. RICHARDSON
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

Diedrich D-50 HSA 4 1/4" I.D., 7 5/8" O.D.
2" x 24" Split Spoon Sampler
Chemical Analysis (Metals and TRPH) = O
Grouted to 5' then backfill to surface
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SOIL BORING	SYM-BOLS	FIELD TESTS	SPT N VALUE
475.30	0.0	Very dark brown (10 YR 3/2) medium dense SAND with some gravel; dry (SP)			HNU=0 OXY=21% LEL=0%	
473.70	1.6					15
473.30	2.0	Dark yellowish brown (10 YR 4/6) medium dense SAND with some gravel and cobbles; dry (SP)		O	HNU=0 OXY=21% LEL=0%	
471.30	4.0	Same as above		O		18
470.30	5.0				HNU=0 OXY=20% LEL=0%	
469.30	6.0			O		
		No Recovery 6' - 10'			HNU=0 OXY=21% LEL=0%	
					HNU=0 OXY=21% LEL=0%	
465.30	10.0				HNU=0 OXY=21% LEL=0%	
		Dark brown (10 YR 3/3) medium dense SAND with little pebbles and gravel; wet (SP)		O		17
463.30	12.0	Boring Terminated				1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER SB-07
JOB NUMBER 11-1586
DATE STARTED 8/9/92
DATE COMPLETED 8/9/92
DRILLED BY D. RICHARDSON
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 1

Diedrich D-50 HSA 4 1/4" I.D., 7 5/8" O.D.
2" x 24" Split Spoon Sampler
Chemical Analysis (Metals and TRPH) = O
Grouted to 5' then backfill to surface
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SOIL BORING	SYM-BOLS	FIELD TESTS	SPT N VALUE
					HNU=0 OXY=21% LEL=0%	HAND AUGERED TO 2'
476.36	0.0	Dark brown (10 YR 3/3) medium dense SAND and gravel; dry (SP)				
475.56	1.7				HNU=0 OXY=21% LEL=0%	
475.26	2.0	Yellowish brown (10 YR 5/4) medium dense SAND with some gravel and cobbles; dry (SP)		O		20
472.26	4.0	No Recovery 4' - 8'		O		29
471.26	5.0					
470.26	6.0					
468.26	8.0	Dark grayish brown (10 YR 5/2) medium dense SAND with some gravel; moist (SP)			HNU=0 OXY=21% LEL=0%	
466.26	10.0	Dark brown (10 YR 3/3) medium dense SAND with some gravel and cobbles; wet (SP)		O	HNU=0 OXY=21% LEL=0%	17
				O		11
464.26	12.0	Boring Terminated				1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER _____
JOB NUMBER _____
DATE STARTED _____
DATE COMPLETED _____
DRILLED BY _____
LOGGED BY _____
CHECKED BY _____

REMARKS:

PAGE 1 OF 1

LEGEND for
Monitoring Wells

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	SOIL BORING	SYM-BOLS	FIELD TESTS	SPT N VALUE

Size and types of drilling and sampling equipment:

CME 75
4 1/4" I.D., 7 5/8" O.D. Hollow Stem Auger (HSA)
3" x 24" split spoon

Geotechnical Analysis (□):
M - Moisture content (ASTM D 2216)
A - Atterberg Limits (ASTM D 428)
S - Seive analysis (ASTM D 421 & 422)

Chemical Analysis (O):

TRPH - Total Recoverable Petroleum Hydrocarbons

Metals - includes 13 priority pollutants & Fe, Mn, Ba

Color: Munsell Soil Color Chart

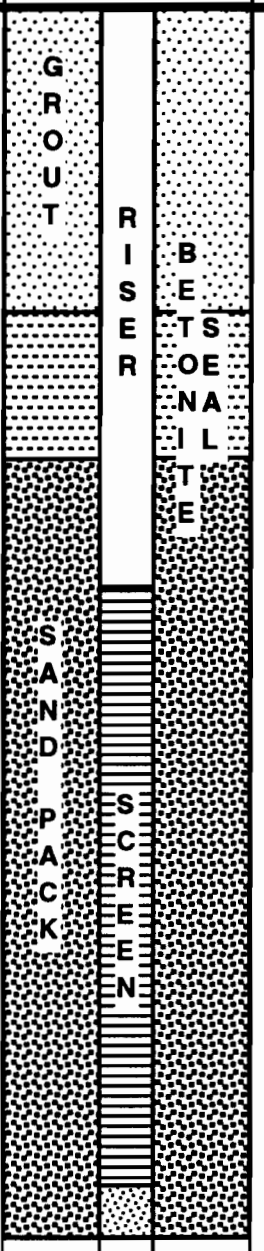
Stabilized ground water level

Sample Screening / Work Space Monitoring

HNU = Manufacturer brand name for Photoionization Detector, measured in parts per million

OXY = Oxygen Level in percent

LEL = Lower Explosive Limit



= STABILIZED WATER LEVEL

1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-MW-01
JOB NUMBER 11-1586
DATE STARTED 8/6/92
DATE COMPLETED 8/7/92
DRILLED BY D. RICHMOND
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 3
CME 75 HSA 4 1/4" I.D., 7 5/8 O.D.
3" X 24" Split Spoon Sampler
Depth to ground water: 22.94 TOC
Chemical analysis (Metals and TRPH) = O
Geotechnical Analysis (Atterburg limits, sieve analysis, & moisture content) = □
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	MONITORING WELL CONSTRUCTION	SYM-BOLS	FIELD TESTS	SPT N VALUE
548.33	+1.96	Top of casing				HAND AUGERED TO 2'
546.37	0.0	Dark yellowish brown (10 YR 4/6) SAND with a little gravel; dry (SP)		O O	HNU=0 OXY=21% LEL=0%	NA
544.17	2.2	Dark yellow brown (10 YR 4/6) medium dense SAND with flat rock fragments; dry (SP)		O	HNU=0 OXY=21% LEL=0%	11
	4.0				HNU=0 OXY=21% LEL=0%	
541.07	5.3	Medium dense SAND and ROCK FRAGMENTS; dry (SP)		O		14
540.37	6.0	Brown (7.5 YR 5/4) medium dense SAND with little gravel; wet @ 7.5' (SP)			HNU=0 OXY=22% LEL=0%	
	8.0	Same as above, but no gravel		O	HNU=0 OXY=21% LEL=0%	14
	10.0	Same as above		O		13
						1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-MW-01
JOB NUMBER 11-1586
DATE STARTED 8/6/92
DATE COMPLETED 8/7/92
DRILLED BY D. RICHMOND
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS:

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	MONITORING WELL CONSTRUCTION	SYM-BOLS	FIELD TESTS	SPT N VALUE
						11
531.37	15	Same as above		O		
	16	Same as above			HNU=0 OXY=21% LEL=0%	
528.37	18.0	Same as above				
	20.0	Same as above		O	HNU=0 OXY=21% LEL=0%	
	22.0	Same as above				15
523.43	22.94			▼ 8-21-92 TOC		
	24.0	Same as above			HNU=0 OXY=21% LEL=0%	
	26.0	Same as above		□		1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-MW-01
JOB NUMBER 11-1586
DATE STARTED 8/6/92
DATE COMPLETED 8/7/92
DRILLED BY D. RICHMOND
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS:

PAGE 3 OF 3

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	MONITORING WELL CONSTRUCTION	SYM-BOLS	FIELD TESTS	SPT N VALUE
516.35	30.02				HNU=0 OXY=21% LEL=0%	
		Same as above				12
514.37	32.0	Boring Terminated				
						1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-MW-02
JOB NUMBER 11-1586
DATE STARTED 8/6/92
DATE COMPLETED 8/7/92
DRILLED BY D. RICHMOND
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 2
CME 75 HSA 4 1/4" I.D., 7 5/8 O.D.
3" x 24" Split Spoon Sampler
Depth to ground water: 11.03 TOC
Chemical analysis (Metals and TRPH) = O
Geotechnical Analysis (Atterburg limits, sieve analysis, & moisture content) = □
Scale: 1" = 2'

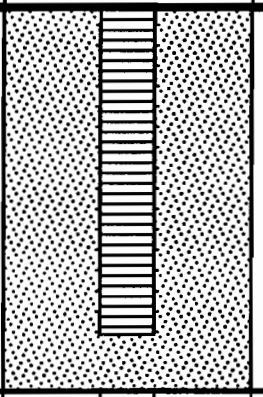
ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	MONITORING WELL CONSTRUCTION	SYM-BOLS	FIELD TESTS	SPT N VALUE
533.95	+1.96	Top of casing				HAND AUGERED TO 2'
531.99	0.0	Reddish brown (5 YR 4/4) SAND with some gravel; dry (SP)		O O	HNU=0 OXY=21% LEL=0%	
530.29	1.7					NA
	2.0	Reddish brown (5 YR 4/3) medium dense to loose SAND; dry (SP)			HNU=0 OXY=21% LEL=0%	
528.99	3.0					
527.99	4.0	Same as above		O	HNU=0 OXY=21% LEL=0%	10
526.79	5.2					
	6.0	Same as above		O	HNU=0 OXY=21% LEL=0%	7
	8.0	Same as above		□ O	HNU=0 OXY=21% LEL=0%	5
	10.0					
520.96	11.03			▼ 8-21-92 TOC		5
	12.0					1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-MW-02
JOB NUMBER 11-1586
DATE STARTED 8/6/92
DATE COMPLETED 8/7/92
DRILLED BY D. RICHMOND
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS:

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	MONITORING WELL CONSTRUCTION	SYM-BOLS	FIELD TESTS	SPT N VALUE
516.97	15.22	Same as above				
515.99	16.0	Boring Terminated				

1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-MW-03
JOB NUMBER 11-1586
DATE STARTED 8/5/92
DATE COMPLETED 8/6/92
DRILLED BY D. RICHARDSON
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 2
CME 75 HSA 4 1/4" I.D., 7 5/8 O.D.
3" x 24" Split Spoon Sampler
Depth to ground water: 12.71 TOC
Chemical Analysis (Metals and TRPH) = O
Geotechnical Analysis (Atterburg limits, sieve analysis, & moisture content) = □
Scale: 1" = 2'

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	MONITORING WELL CONSTRUCTION	SYM-BOLS	FIELD TESTS	SPT N VALUE
530.34	+2.86	Top of casing				HAND AUGERED TO 2'
527.48	0.0	Dark Reddish Brown (5 YR 3/2) SAND with some gravel; dry (SP)		O O	HNU=0 OXY=21% LEL=0%	NA
523.48	2.0	Black (7.5 YR 2/0) very loose SAND with some silt and little gravel; dry (SP)			HNU=0 OXY=21% LEL=0%	4
522.48	4.0			O	HNU=0 OXY=21% LEL=0%	2
	6.0					
521.22	6.0 6.26	(SP)		O	HNU=0 OXY=21% LEL=0%	3
	8.0	Same as above, but medium dense and wet (SP)		O	HNU=0 OXY=21% LEL=0%	11
517.48	10.0	Very dark grey (10 YR 3/1) medium dense SAND with little clay and gravel; wet (SC)		O		14
515.98	11.5	Yellowish brown (10 YR 5/4) very dense fine SAND with some silt and clay; wet (SC)				
515.48	12.0					1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-MW-03
JOB NUMBER 11-1586
DATE STARTED 8/5/92
DATE COMPLETED 8/6/92
DRILLED BY D. RICHARDSON
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS:

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	MONITORING WELL CONSTRUCTION	SYM-BOLS	FIELD TESTS	SPT N VALUE
		Same as above				
514.77	12.71	Brown (7.5 YR 4/3) loose SAND with trace clay; wet (SW)		8-21-92 TOC		
	14				HNU=0 OXY=21% LEL=0%	
511.68	15.8					
	16.0	Same as above, but very loose				9
510.48	17.0	Boring Terminated				
						1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-MW-04
JOB NUMBER 11-1586
DATE STARTED 8/4/92
DATE COMPLETED 8/4/92
DRILLED BY D. RICHMOND
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS: PAGE 1 OF 2
CME 75 HSA 4 1/4" I.D., 7 5/8 O.D.
3" x 24" Split Spoon Sampler
Depth to ground water: 13.46 TOC
Chemical Analysis (Metals and TRPH) = O
Geotechnical Analysis (Atterburg limits, sieve analysis, & moisture content) = □
Scale: 1" = 2'

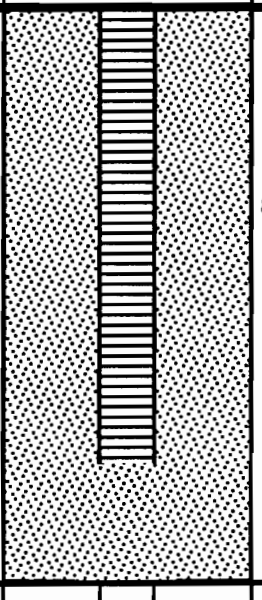
ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	MONITORING WELL CONSTRUCTION	SYM-BOLS	FIELD TESTS	SPT N VALUE
519.24	+1.83	Top of casing				HAND AUGER TO 2'
517.41	0.0	Very dark brown (5 YR 3/2) SAND with some gravel; dry (SP)		O O	HNU=0 OXY=21% LEL=0%	NA
515.41	2.0	Dark yellowish brown (10 YR 3/4) very dense SAND with some gravel; dry (SP)			HNU=0 OXY=21% LEL=0%	58
513.41	4.0	Yellowish brown (10 YR 5/4) medium dense SAND with little gravel; dry (SP)		O	HNU=0 OXY=21% LEL=0%	21
512.41	5.0					
511.41	6.0	Same as above, but loose and moist		O	HNU=0 OXY=21% LEL=0%	9
509.91	8.0	Same as above		O	HNU=0 OXY=21% LEL=0%	7
507.41	10.0	Dark brown (7.5 YR 4/3) medium dense SAND; wet		O	HNU=0 OXY=21% LEL=0%	17
	12.0					1586.22

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

TEST BORING RECORD

BORING NUMBER WSA-MW-04
JOB NUMBER 11-1586
DATE STARTED 8/4/92
DATE COMPLETED 8/4/92
DRILLED BY D. RICHMOND
LOGGED BY T.R. MALECKI
CHECKED BY J.G. SIEGEL

REMARKS:

ELEV. IN FEET	DEPTH IN FEET	DESCRIPTION	MONITORING WELL CONSTRUCTION	SYM-BOLS	FIELD TESTS	SPT N VALUE
503.95	13.46			8-21-92 TOC	HNU=0 OXY=21% LEL=0%	23
502.41	15.0					
	16.0	Same as above				14
500.24	17.17				HNU=0 OXY=21% LEL=0%	
499.41	18.0	Same as above, but dense				33
		Boring Terminated				

1586.22

HTW DRILLING LOG

HOLE No. SB-01

1. COMPANY NAME: Law Environmental Inc.	2. DRILLING SUBCONTRACTOR: Parratt & Wolff
SHEET 1 OF 3 SHEETS	
3. PROJECT: GAFB 11-1586 O/W Separator	4. LOCATION: Rome, New York
5. NAME OF DRILLER: Doug Richmond	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-75
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: HSA; 3" x 2' Split Spoon	8. HOLE LOCATION: O/W Separator Bld 214/215
	9. SURFACE ELEVATION:
	10. DATE STARTED: 08/08/92 — 11. DATE COMPLETED: 8/8/92
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: NA
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TRPH			NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Vert	✓		Grout to 5'	Thomas R. [signature]

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	0.0–2.0 (1.0)	Sand (SP) 60% Coarse Sand 30% Gravel 10% Cobbles Tr[illegible] Dk Brn 4/3 (10YR) Dry	HnU = 0.0	Sample @ 0.5'	① 0.0-0.5; ② 0.5-2.0	0.5 ft 2 [illegible] 5 [illegible] 9	HnU = 0.0 Oxy = 21.0 LEL = 0.0 Rec. 0.5'
	2.0–4.0 (3.0)	No recovery 2.0–4.0'	HnU = 0.0				HnU = 0.0 Oxy = 21.0 LEL = 0.0 Rec. 0
	4.0	Silty, Coarse Sand (SP) Reddish Brown 3/4 5YR Firm Dry	HnU = 0		③ 4.0-6.0	3 12 5 6	HnU = 0.0 Oxy = 21.0 LEL = 0.0 Rec 0.4'

HTW DRILLING LOG

HOLE NO. SB-01

PROJECT GAFB 11-1586 O/W | INSPECTOR J.R. Malecki | SHEET 2 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO f	BLOW COUNTS g	REMARKS h
	6.0	60% SAND 35% gravel 5% cobbles	1				
	7.0	Same as Above	HnU = 0.0		(4) 6.0-8.0		HnU = 0.0 Oxy = ? LEL Rec. 1.5'
	8.0						
	9.0	no recovery 8.0-10.0'	HnU = 0.0			6 9 8 9	HnU = 0.0 Oxy = ? LEL = 0.0 REC. 0.0
	10.0	Gravelly Sand (SW) 60% coarse sand 10% fine sand 30% gravel Dk. Brn d/2 10 YR Fine Wet	HnU 0.0		(5) 10.0-12.0	10 11 13 9	HnU = 0.0 Oxy = 21.0 LEL = 0.0 REC. 2.0'
	12.0	Total Depth Soil Boring = 12.0'	HnU —				~~HnU = 0.0~~ ~~Oxy = 21%~~ ~~LEL 0.0~~ REC. —
	13.0						

MRK FORM JUN 89 55-2

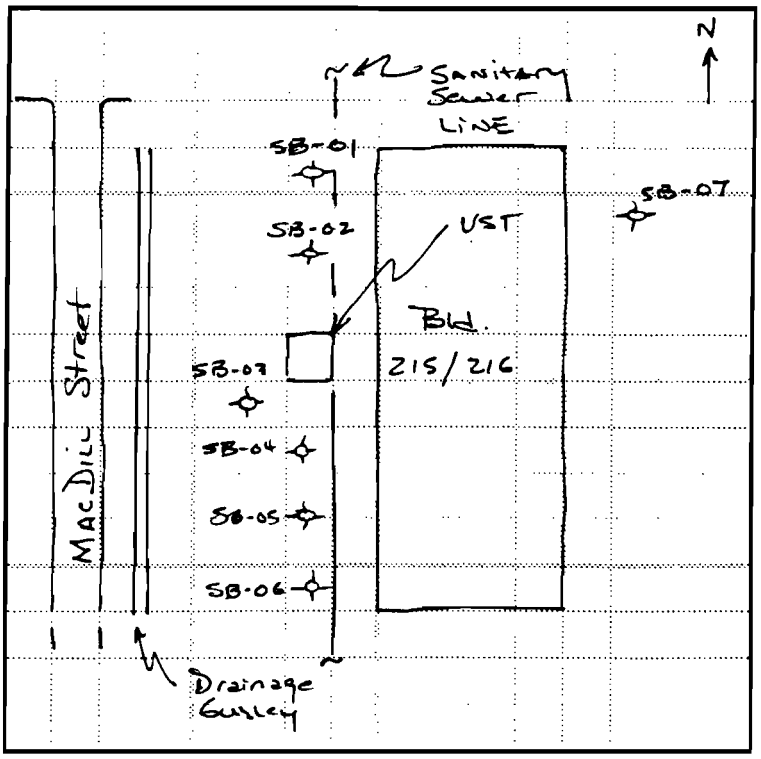
PROJECT GAFB 11-1586 O/W Separator 24"

HOLE NO. SB-01

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
GAFB 11-1586 O/W SEP.	T.R. MALECKI	SB-01
		SHEET 3 OF 3 SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: HnU w/ 11.7 ev Lamp
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HnU Neotronic's Quad Meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/____	= Lower Explosive Limit
Oxy/O2/____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

HnU = Trademark of HnU Systems
Dk = Dark
Brn = Brown

HTW DRILLING LOG

HOLE No. SB-02

1. COMPANY NAME: Law Environmental	2. DRILLING SUBCONTRACTOR: Parratt & Wolf	SHEET 1 OF 2 SHEETS
3. PROJECT: GAFB 11-1586 O/W Separator	4. LOCATION: Rome, New York	
5. NAME OF DRILLER: Doug Richmond	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-75	
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: HSA; 2" x 2' Split Spoon	8. HOLE LOCATION: O/W Separator Bld 215/216	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 08/08/92	11. DATE COMPLETED: 08/08/92
12. OVERBURDEN THICKNESS: -NA-	15. DEPTH GROUNDWATER ENCOUNTERED: NA	
13. DEPTH DRILLED INTO ROCK: -NA-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
			NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TRPH			NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Vertical	✓		Soil Boring	Thomas R. Gilleran

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	1.0	Gravelly Sand (SP) [illegible] Coarse Sand [illegible] Cobbles/Gravel [illegible] Cobbles [illegible] Brown 3/4 [illegible] Dry	HnU= 0.0		(1) 0.0-2.0	[illegible]	HnU= [illegible] Oxy= [illegible] LEL= [illegible] REC= 1.2 ft
	2.0	Same as Above Moist	[illegible]		(2) [illegible]	[illegible]	HnU=0.0 Oxy=21 LEL=0.0 REC. 1.4
	4.0	Gravelly Sand (SP) [illegible] Sand [illegible] Cobbles [illegible] Brown 5/4 [illegible]	[illegible]		(3) 4.0-6.0	8 4 7 7	HnU=0.0 Oxy= [illegible] LEL= [illegible] REC. [illegible]

HTW DRILLING LOG

HOLE NO. SB-02

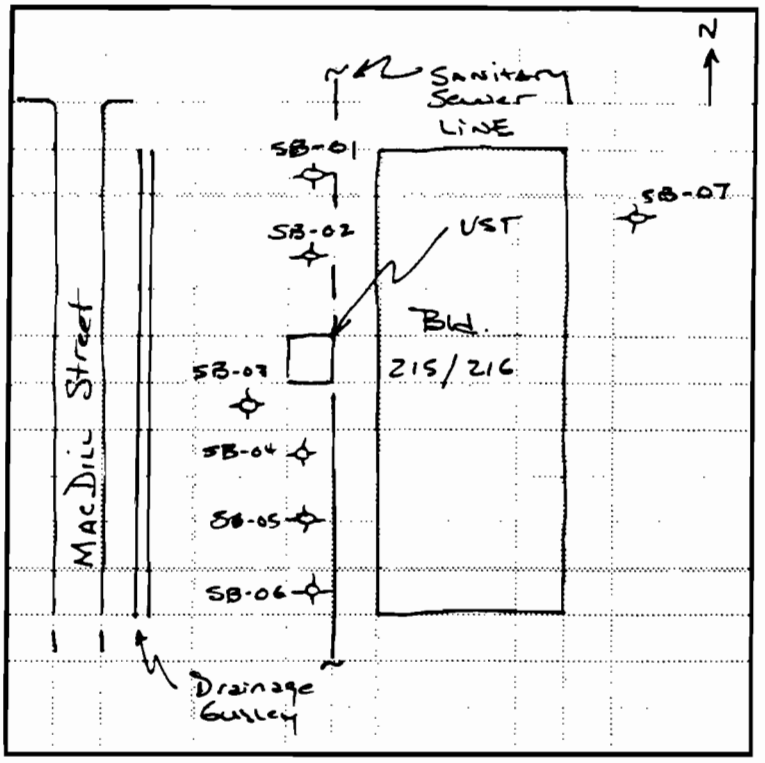
PROJECT GAFB 11-1586 O/W | INSPECTOR T.R. Malecki | SHEET 2 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		Firm Moist					
	6.0				(A) 6.0-8.0		HnV = 0.0 Oxy = 21 LEL = 0.0 Rec. 6.5
		Same As Above Wet	HnV = 0.0				
	8.0						
		No Recovery	HnV 0.0				HnV = 0.0 Oxy = 21 LEL = 0.0 Rec = 6.0
	10.0						
		Same As Above Wet	HnV = 0.0				HnV = 0.0 Oxy = 21 LEL = 0 Rec = 0.7
	12.0						
		Total Depth Boring = 12.0'					
	13.0						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
GAFB 11-1586 O|W SEP.	T.R. MALECKI	SB-02
		SHEET 3 OF 3 SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: HnU w/ 11.7 ev lamp
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HnU Neotronic's Quad Meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/ ____	= Lower Explosive Limit
Oxy/O_2/ ____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

HnU = Trademark for HnU Systems

Dil = Dark

HTW DRILLING LOG

HOLE No. SB-03

1. COMPANY NAME: Law Environmental Inc.	2. DRILLING SUBCONTRACTOR: Parratt & Wolff	SHEET 1 OF 2 SHEETS
3. PROJECT: GAFB 11-1586 O/W	4. LOCATION: Rome, N.Y.	
5. NAME OF DRILLER: Doug Richmond	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-75	
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: HSA; 3" 2" Split Spoon	8. HOLE LOCATION: West [illegible]	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 08/08/92	11. DATE COMPLETED: 08/08/92
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED:	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 12.0	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
			NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TRPH			NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Vent.	✓			[signature]

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	0.0–2.0	gravelly silty SAND (SP) 60% SAND 20% Silt 20% Gravel, Dk Brn 3/3 10YR [illegible]; 0.5 - 2.0 [illegible]			① 0.0-0.5		[illegible] = 0.0 [illegible] Rec 0.[illegible]
	2.0–4.0	[G]ravel SAND (SP) [6]0% SAND 20% [illegible] 20% Gravel [illegible] Brn [illegible] [illegible] Dry	HNU = 0.[illegible]		② 2.0-4.0	[illegible]	[illegible] = 0.0 [illegible] 1.0
	4.0–6.0	Same As Above	HNU = 0.0		③ 4.0-6.0	[illegible]	[illegible] 0.8

HTW DRILLING LOG

HOLE NO. SB-03

PROJECT GAFB 11-1586 O/W Separator

INSPECTOR T.R. Malecki

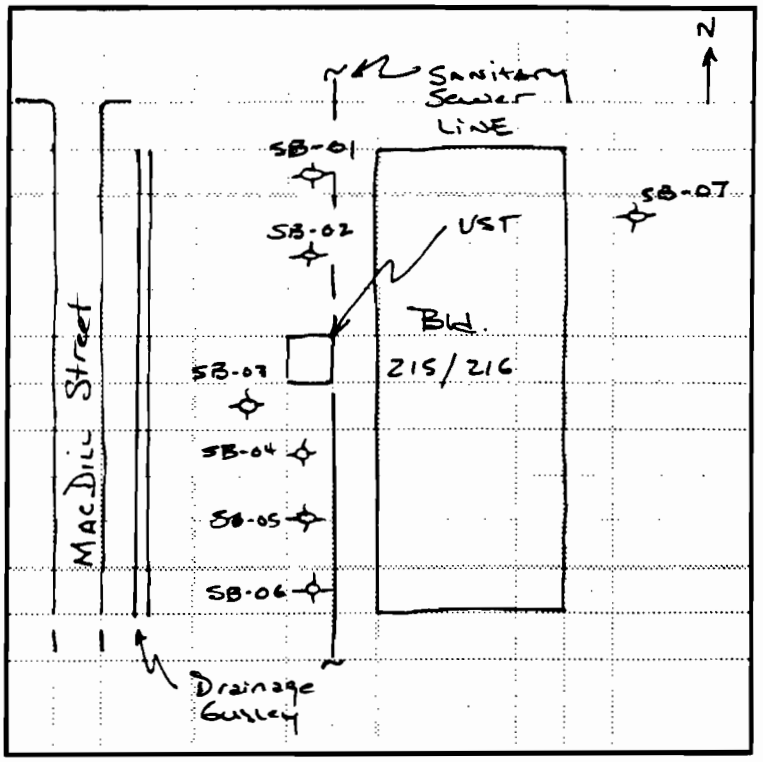
SHEET 1 OF 2 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	6.0				(4) 6.0 - 8.0		
	7.0						
	8.0						
	9.0						0.0
	10.0		1 unit = 0.0				
	11.0						
	12.0						
	13.0						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.	SHEET OF SHEETS
GAFB 11-1586 O/W Sep.	T.R. Malecki	SB-03	3 of 3

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: HnU w/ 11.7 ev lamp
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HnU Neotronic's Quad Meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/____	= Lower Explosive Limit
Oxy/O2/_____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Co	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

HnU = Trademark
Dk = Dark
Brn = Brown

HTW DRILLING LOG

HOLE No. SB-04

1. COMPANY NAME: LAW ENVIRONMENTAL Inc.	2. DRILLING SUBCONTRACTOR: PARROTT & WOLFF	SHEET 1 OF 3 SHEETS
3. PROJECT: 11-1586 GAFB O\W SEPARATOR	4. LOCATION: ROME NEW YORK	
5. NAME OF DRILLER: DAVE RICHMOND	6. MANUFACTURER'S DESIGNATION OF DRILL: CME 75	
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~HSA~~ 2" x 3" Split Spoon	8. HOLE LOCATION: Building 215/216	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 08/08/92	11. DATE COMPLETED: 08/09/92
12. OVERBURDEN THICKNESS: — NA —	15. DEPTH GROUNDWATER ENCOUNTERED:	
13. DEPTH DRILLED INTO ROCK: — NA —	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TRPH			NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
FILL	✓			Steven A. Malecki

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	1.0	GRAVEL SILTY SAND (SP) 60% SAND 30% SILT 20% ~~SAND~~ GRAVEL FORM DRY DK BROWN 3/3 10YR	HNU = 0.0			6 7 5 5	HNU = 0.0 OXY = 21 LEL = 0 REC. 1.0'
	2.0	SAME AS ABOVE DRY	HNU = 0.0				HNU = 0.0 OXY = 21 LEL = 0.0 REC. 1.8'
	3.0						
	4.0	GRAVEL COBBLE SAND (SP) 60% SAND 20% GRAVEL 20% COBBLES	HNU = 0.0				HNU = 8.3 OXY = 21 LEL = 0.0 REC. 1.8'

HTW DRILLING LOG

HOLE NO. SB-04

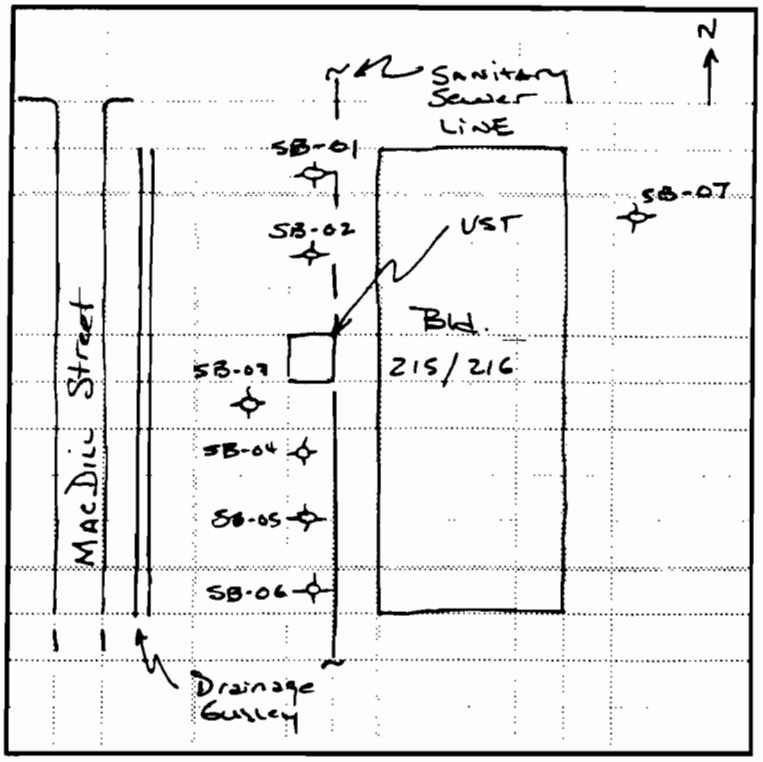
PROJECT | INSPECTOR | SHEET 1 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		V. DK grayish Brn 3/2 10YR					
	6.0						
		Same As Above	HNU = 0.0	Sample @ 6.5'		8 13 6 4	HNU = 0.0 Oxy = 21.1 LEL = 0.0 Rec 0.5'
	7.0						
	8.0						
		Same As Above	HNU = 0.0			4 6 7 5	HNU = 0.0 Oxy = 21. LEL = 0.0 REC. = 0.5'
	9.0						
	10.0						
		Gravel SAND (SP) 80% SAND 20% Gravel Dk Yellow Brown 4/4 (10 YR) Firm Wet	HNU = 0.0			4 6 7 5	HNU = 0.0 Oxy = 21. LEL = 0.0 Rec. 0.5'
	11.0						
	12.0	Total Depth Boring 12.0'					
	13.0						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
GAFB 11-1586 O/W SEP.	T.R. MALECKI	SB-04
		SHEET 3 OF 3 SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: HnU w/ 11.7 ev lamp
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HnU Neotronic's Quad Meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/____	= Lower Explosive Limit
Oxy/O_2/_____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

HnU = Trademark

DK = Dark

Brn = Brown

HTW DRILLING LOG

HOLE No. SB-05

1. COMPANY NAME: Law Environmental Inc	2. DRILLING SUBCONTRACTOR: Parratt & Wolff	SHEET 1 OF 3 SHEETS
3. PROJECT: H-1586 GAFB O/W Separator	4. LOCATION: Rome, New York	
5. NAME OF DRILLER: Doug Richmond	6. MANUFACTURER'S DESIGNATION OF DRILL: Diedrich D-50	
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: HSA; 2" x 2" Split Spoon	8. HOLE LOCATION: Building 215/216	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 08/09/92	11. DATE COMPLETED: 08/09/92
12. OVERBURDEN THICKNESS: — NA —	15. DEPTH GROUNDWATER ENCOUNTERED: NA	
13. DEPTH DRILLED INTO ROCK: — NA —	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TRPH			NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Vertical	✓			Thomas P. Smolech

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
		Gravelly SAND (SP)			① 0.0-2.0	4	HNU=0.0
		60% SAND				11	Oxy=21
		20% Gravel				12	LEL=0.0
	1.0	20% Cobbles	HNU= 0.0			5	Rec 2.0
		V. DK Grayish Brn					100%
		3/2 10(YR)					
		Firm					
	2.0	Dry					
		Gravelly SAND (SP)			② 2.0-4.0	5	HNU=0.0
		60% Med to Coarse Sand				10	Oxy=21
		30% Gravel	HNU= 0.0			10	LEL=0.0
		10% Rock Frags				18	Rec 2.0'
	3.0	DK Yellowish Brn 4/4 10YR					
		Firm					
		Moist					
	4.0	Gravel Cobble SAND (SP)			③ 4.0-6.0	15	HNU=0.0
		60% Fine-Coarse Grn. Sand	HNU= 0.0	Sample @ 4.5'		8	Oxy=21.1
		20% Gravel				9	LEL=0.0
		20% Cobbles				7	Rec 1.5'
		V. DK Grayish Brn. 3/2 10YR					

HTW DRILLING LOG

HOLE No. SB-05

PROJECT | INSPECTOR | SHEET 1 OF SHEETS

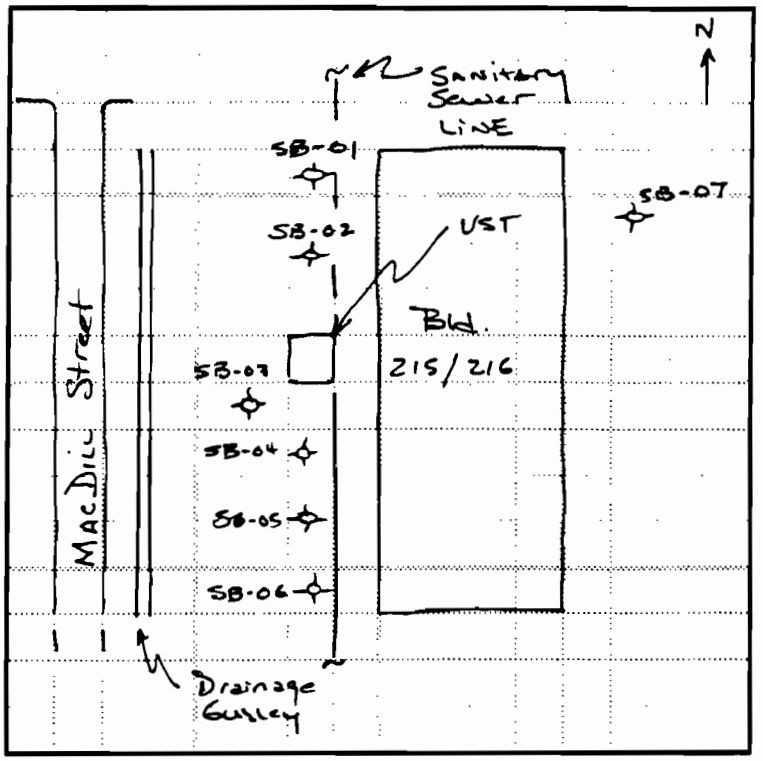
ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
		Firm Moist					
	6.0	NO Recovery	H_2N =				H_2N = 0.0 LEL = 0.0 O_2 = 21. Rec = 6.0
	8.0	Gravel SAND (SP) 80% coarse sand 20% Gravel Dk yellowish Brn. 4/4 (10YR)	H_2N = 0.0		(4) 8.0-10.0	17 16 9 4	H_2N = 0.0 O_2 = 21.0 LEL = 0.0 Rec = 1.7'
	9.0	Moist					
	10.0	Same As Above wet	H_2N =		(5) 10.0-12.0	8 7 9 5	H_2N = 0.0 O_2 = 21 LEL = 0.0 Rec = 0.7'
	11.0						
	12.0	Total Depth Boring 12.0'					
	13.0						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
GARB 11-1586 O/W SEP.	T.R. MALECKI	SB-05

SHEET 3 OF 3 SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: HnU w/ 11.7 ev lamp
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HnU Neotronic's Quad Meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/____	= Lower Explosive Limit
Oxy/O_2/_____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

HnU = Trademark

HTW DRILLING LOG

HOLE No. SB-06

1. COMPANY NAME: LAW ENVIRONMENTAL	2. DRILLING SUBCONTRACTOR: PATTOTT & WOLFF	SHEET 1 OF 3 SHEETS
3. PROJECT: GAFB 11-1586 O/W SEPARATOR	4. LOCATION: ROME, NEW YORK	
5. NAME OF DRILLER: DOUG RICHMOND	6. MANUFACTURER'S DESIGNATION OF DRILL: TIEDRICH D-50	
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: HSA; 2'X2" SPLIT SPOON	8. HOLE LOCATION: BUILDING 215/216	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 08/09/92	11. DATE COMPLETED: 08/09/92
12. OVERBURDEN THICKNESS: -NA-	15. DEPTH GROUNDWATER ENCOUNTERED: -NA-	
13. DEPTH DRILLED INTO ROCK: -NA-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: -NA-	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): -NA-	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
			-NA-

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TRPH			-NA- %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
VERTICAL	✓			Thomas R. Malvehi

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	1.0	GRAVELLY SAND (SP) 80% SAND 20% GRAVEL V. DK BRN 3/2 10YR FIRM DRY	HNU = 0.0		(1) 0.0-2.0	3 7 8 8	HNU = 0.0 OXY = 20.9 LEL = 0.0 REC. = 1.2'
	2.0	GRAVEL COBBLE SAND (SP) 60% SAND 20% GRAVEL 20% COBBLES DK YELLOWISH BRN 4/6 10YR FIRM DRY	HNU = 0.0		(2) 2.0-4.0	21 10 8 9	HNU = 0.0 OXY = 20.9 LEL = 0.0 REC. = 1.3'
	4.0	SAME AS ABOVE	HNU = 0.0		(3) 4.0-6.0	10 18 12 9	HNU = 0.0 OXY = 20.9 LEL = 0.0 REC. =

HTW DRILLING LOG

HOLE NO. SB-06

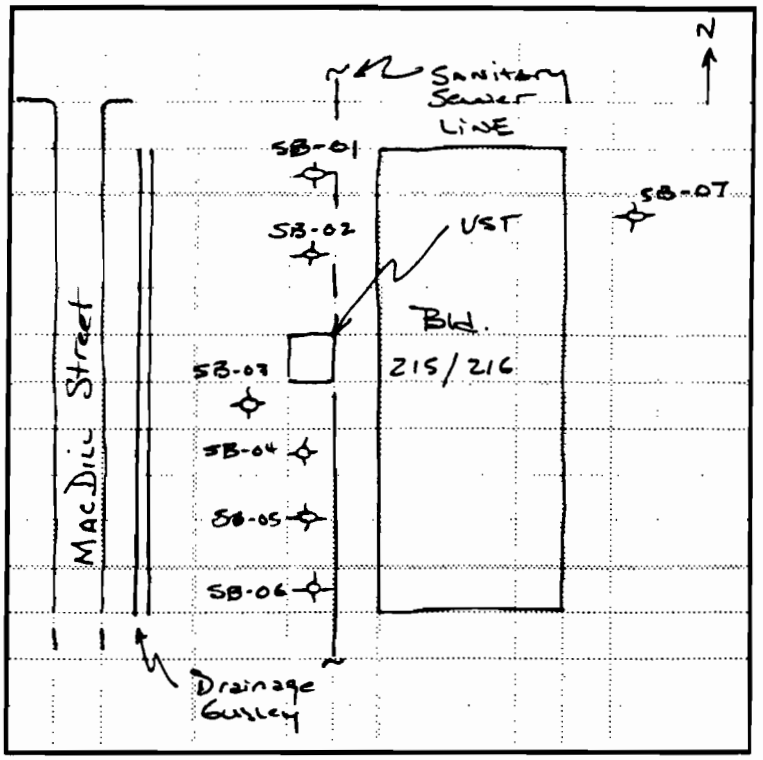
PROJECT | INSPECTOR | SHEET OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	6.0	No Recovery	HnU=				HnU= 0.0 Oxy = 20.9 LEL = 0.0 Rec. 0.0
	8.0						
	9.0	No Recovery	HnU=				HnU = 0.0 Oxy = 20.9 LEL = 0.0 REC. 6.0
	10.0	Gravel SAND (SP) 90% SAND 10% Pebbles/Gravel ~~no Recovery~~ Dark Brown 3/3 10YR Firm wet	HnU = 0.0		(4) 10.0 - 12.0	4 8 9 7	HnU = 0.0 Oxy = 21.0 LEL = 0.0 REC. = 0.0
	11.0						
	12.0						
	13.0						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
GAFB 11-1586 O/W Sep.	T.R. Malecki	SB-06
		SHEET 3 OF 3 SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: HnU w/ 11.7 ev lamp
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HnU Neotronic's Quad Meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/____	= Lower Explosive Limit
Oxy/O2/_____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

HnU = Trademark

HTW DRILLING LOG

HOLE No. SB-07

1. COMPANY NAME: Law Environmental Inc.	2. DRILLING SUBCONTRACTOR: Parratt & Wolff
3. PROJECT: GATR 11-1586	4. LOCATION: Rome, New York
5. NAME OF DRILLER: Doug Richmond	6. MANUFACTURER'S DESIGNATION OF DRILL: Diedrich D-50
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" HSA; 2" x 2' Split Spoon	8. HOLE LOCATION: Building 215/216
	9. SURFACE ELEVATION:
	10. DATE STARTED: 08/07/92 — 11. DATE COMPLETED: 08/09/92
12. OVERBURDEN THICKNESS: -NA-	15. DEPTH GROUNDWATER ENCOUNTERED: -NA-
13. DEPTH DRILLED INTO ROCK: -NA-	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: -NA-
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): -NA-

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
			-NA-

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TRPH			NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Vertical	✓			Thomas R. Malecki

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	0	Gravelly SAND (SP) 70% Sand 30% Gravel Dk Brown 3/3 10YR	HnU= 0.0		① 0.0-2.0	4 8 12 16	HnU= Oxy=20.9 LEL=0.0 Rec 1.1'
	1.1	Dry					
	2.0	Gravel SAND (SP) 60% Sand 20% Gravel 20% Cobbles Reddish Brn 5/4 10YR	HnU= 0.0		② 2.0-4.0	13 15 14 11	HnU=0.0 Oxy=20.9 LEL= Rec. 1.3'
	3.0						
	4.0	No Recovery	HnU=				HnU= Oxy= LEL= Rec.

HTW DRILLING LOG

HOLE NO. SB-07

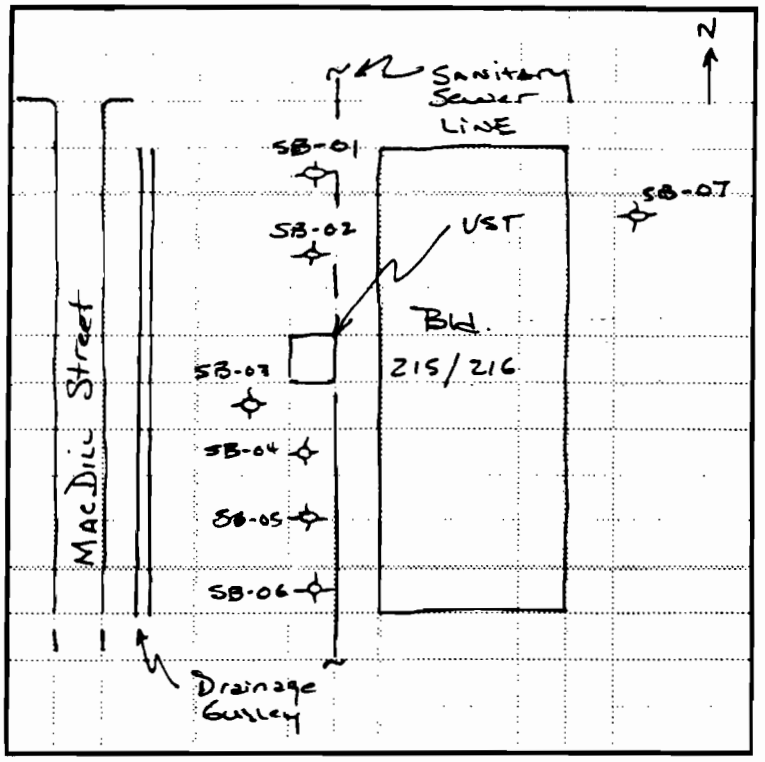
PROJECT | INSPECTOR | SHEET 2 OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	6.0	No Recovery	HnU =				HnU = Oxy = LEL = Rec.=
	7.0						
	8.0	Gravel SAND (SP 80% SAND 20% Gravel Dk Grayish Brn 5/2 10 YR ~~WET~~ Moist	HnU=		(3) 8.0-10.0	9 9 8 8	HnU=0.0 Oxy=21 LEL=0.0 Rec.= 2.3'
	9.0						
	10.0	Gravel SAND w/ Cobbles (SP) 60% SAND 20% Gravel 20% Cobbles Dk Brown 3/3 10 YR Wet	HnU= 0.0		(4) 10.0-12.0	6 6 5 7	HnU=0.0 Oxy=20.9 LEL=0.0 Rec.= 0.3'
	11.0						
	12.0	Total Depth of Boring 12.0'					
	13.0						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
GAFB 11-1586 O/W SEP.	T.R. MALECKI	SB-07
		SHEET 3 OF 3 SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: HnU w/ 11.7 ev lamp
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HnU Neotronic's Quad Meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/____	= Lower Explosive Limit
Oxy/O_2/_____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

HnU = Trademark

HTW DRILLING LOG

HOLE No. WSA - SB - 01

1. COMPANY NAME: Law Environmental	2. DRILLING SUBCONTRACTOR: NA	SHEET 1 OF 1 SHEETS
3. PROJECT: 11-1586 OIW & WSA	4. LOCATION: NEW York, City of Rome	
5. NAME OF DRILLER: - NA -	6. MANUFACTURER'S DESIGNATION OF DRILL: NA	
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4" Hand Augered	8. HOLE LOCATION: NE Site of WSA	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 08/07/92	11. DATE COMPLETED: 08/07/92
12. OVERBURDEN THICKNESS: - NA -	15. DEPTH GROUNDWATER ENCOUNTERED: - NA -	
13. DEPTH DRILLED INTO ROCK: - NA -	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 2.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

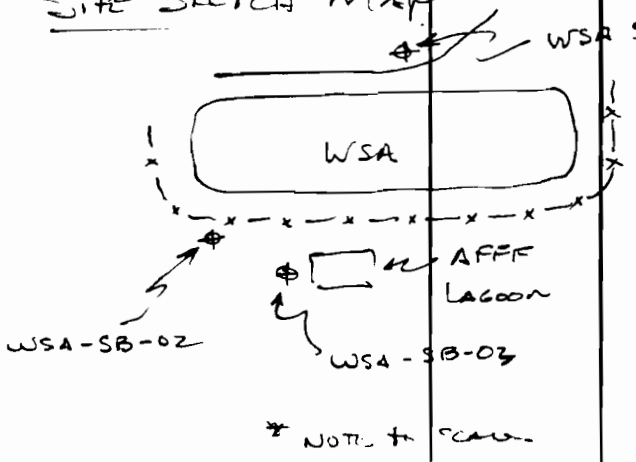
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	✓	✓	~~TRPH~~ The	BNA		NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓			Thomas R. Malecki

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	0.5	SAND (SW) 100% SAND Brown 4/3 10YR Dry	HnV = 0.0		① 0.0 - 2.0'		① Color using Munsell Color Chart ② Percents are estimates
	1.0						
	1.5						
	2.0						

Site Sketch Map



HTW DRILLING LOG

HOLE No. WSA - SB - 02

1. COMPANY NAME: LAW Environmental Inc.	2. DRILLING SUBCONTRACTOR: NA
3. PROJECT: 11-1586 O/W @ WSA	4. LOCATION: Rome New York
5. NAME OF DRILLER: — NA —	6. MANUFACTURER'S DESIGNATION OF DRILL: NA
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Hand Auger	8. HOLE LOCATION: W of WSA Near Bld 912 & 913
	9. SURFACE ELEVATION:
	10. DATE STARTED: 08/07/92 — 11. DATE COMPLETED: 08/07/92
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: NA
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA
14. TOTAL DEPTH OF HOLE: 2.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA

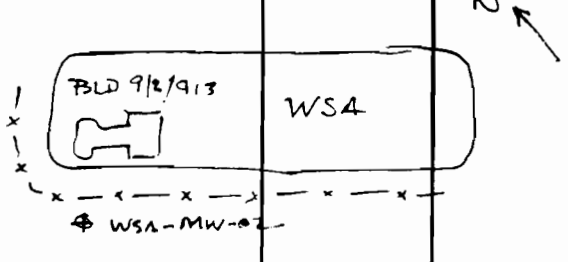
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	✓	✓	~~TRPH~~	BNA		

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓			Thomas R Malecki

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	0.5	SAND (SW) 100% SAND YELLOWISH RED 5/8 5YR DRY	HNU = 0.0		(1) 0.0 - 0.5 (2) 0.5 - 1.0		(1) Color using Munsell Color Chart (2) Percents Are estimates
	1.0						
	1.5				(3) 1.0 - 2.0		
	2.0						

S.F. Sketch Map



* Not to Scale

HTW DRILLING LOG

HOLE No. WSA-SB-03

1. COMPANY NAME: LAW ENVIRONMENTAL	2. DRILLING SUBCONTRACTOR: NA
3. PROJECT: 11-1586 O\W # WSA	4. LOCATION: Rome, New York
5. NAME OF DRILLER: NA	6. MANUFACTURER'S DESIGNATION OF DRILL: NA
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Hand Auger	8. HOLE LOCATION: SE SIDE Bld 838 WSA
	9. SURFACE ELEVATION:
	10. DATE STARTED: 08\07\92 — 11. DATE COMPLETED: 08\07\92
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: NA
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA
14. TOTAL DEPTH OF HOLE: 2.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA

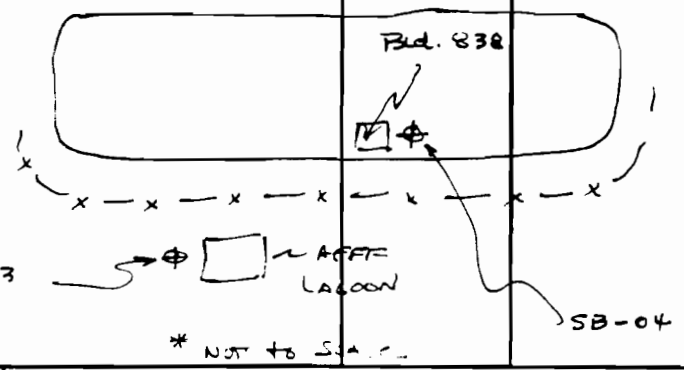
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	✓	✓	~~TRPH~~ Pb	BNA		NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓			Thomas R. Waleski

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	0.5	Gravel SAND (SP) 90% SAND 10% Gravel DK Grayish Brown 4/2 10YR	HNU= 0.0		① 0.0-0.5 ② 0.5-1.0		① Color using Munsell Color Chart ② percents are estimates
	1.0						
	1.5	Dry			③ 1.0-2.0		
	2.0						

Site Sketch Map



HTW DRILLING LOG

HOLE No. WSA-SB-04

1. COMPANY NAME: ABB Environmental	2. DRILLING SUBCONTRACTOR: NA
SHEET 1 OF 1 SHEETS	
3. PROJECT: F-1586 O'w & WSA, GAFB	4. LOCATION: Rome, NY. Inside Fence Area of WSA
5. NAME OF DRILLER: NA	6. MANUFACTURER'S DESIGNATION OF DRILL: NA
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Hand Augered	8. HOLE LOCATION: Inside Fence Area WSA
	9. SURFACE ELEVATION:
	10. DATE STARTED: 08/07/92 — 11. DATE COMPLETED: 08/07/92
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: NA
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA
14. TOTAL DEPTH OF HOLE: 2.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA

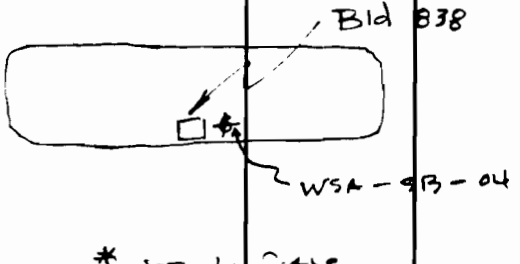
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	✓	✓	~~TRPH~~ TAL	BNA		NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	✓			Thomas D. Haleen

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	0.5	Gravel SAND (SP) 80% Coarse SAND 20% Gravel Dark Brown 3/3 10YR Dry	H_2S = 0.0		① 0.0-0.5 ② 0.5-1.0 ③ 1.0-2.0 "		① Color using Munsell Color Chart ② Percents are estimates
	1.0						
	1.5						
	2.0						

Site Sketch Map



* Not to scale

FIGURE

HTW DRILLING LOG

HOLE No. WSA - MW-51

1. COMPANY NAME: NAW Environmental Inc.	2. DRILLING SUBCONTRACTOR: Parratt & Wolff
3. PROJECT: 11-1586 O/W & WSA	4. LOCATION: Rome, New York
5. NAME OF DRILLER: Dave Richmond	6. MANUFACTURER'S DESIGNATION OF DRILL: CME 75
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2 1/4 ID; 8.0 OD; Hollow Stem Auger; 3" x 2 Split Spoon	8. HOLE LOCATION: NE SIDE OF WSA
	9. SURFACE ELEVATION:
	10. DATE STARTED: 08/06/92
	11. DATE COMPLETED: 08/07/92
12. OVERBURDEN THICKNESS: - NA -	15. DEPTH GROUNDWATER ENCOUNTERED: 26.6' GSL
13. DEPTH DRILLED INTO ROCK: - N/A -	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 22.94 TOC
14. TOTAL DEPTH OF HOLE:	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 23.03 TOC 8/24/92

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TPH			N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Vert				Thomas P. Sheridan

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
		SAND (SP) 90% SAND 10% Gravel DK Yellowish Brn 4/6 10YR Dry	HnU = 0.0	C	(1) (2) (3) (4) 0.5 - 0.5	NA Hand Auger	HnU = 0.0 Oxy = 21.0 LEL = 0.0 rec = 1.5
	1.0				(2) 0.5 - 1.0		
	2.0	SAND w/ RK Frags 80% SAND 20% FLAT "SHALE-like" Rock Frags. DK. Yellow Brown 4/6 10YR Firm Dry	HnV = 0.0	Sample 1 @ 2.5'	(3) 2 - 4.0	4 5 6 8	HnU = 0.0 Oxy = 21.1 LEL = 0.0 rec = 3.0
	4.0	SAME AS ABOVE to 5.3'	HnU = 0.0		(4) 4.0 - 6.0	5 6 8 7	HnU = 0.0 Oxy = 21.0 rec = 0.0 REC = 2.0

HTW DRILLING LOG

HOLE NO. WSA-MW-01

PROJECT 11-1586 O|W & WSA

INSPECTOR R. Malecki

SHEET 2 OF 6 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		SAND (SP) 50% SAND 50% PEA GRAVEL Firm Brn					NOTE: SAND lense w/ UNIDENTIFIED RE EVAL.
	6.0	SAND (SW) 90.0% SAND 10% Gravel Brown 5/6 7.5YR Firm Wet @ 7.5'	HNU= 0.6	3 (Sample @ 7.5')	(5) 6.0-8.0	3 6 8 9	HNU= 1.0 Oxy= 20.9 LEL= 0.0 REC.= 2.0
	8.0	Same as above Zero Gravel	HNU= 0.0		(6) 8.0-10.0	3 5 [illegible]	HNU< 1.0 Oxy= 20.1 LEL= 0.0 REC.= 2.0
	10.0	10-12 Same as above	HNU= [illegible]		(7) 10-15.0 [illegible]	4 7 9 9	HNU= Oxy= LEL= REC= 2.0
	12.0	12-14 Same as above	HNU= [illegible]			[illegible]	HNU= [illegible] Oxy= [illegible] LEL= 0 REC= [illegible]
	13.6						

HTW DRILLING LOG

HOLE NO. WSA - MW-01

PROJECT 11-1586 o/w & WSA

INSPECTOR T.R. Maleski

SHEET 3 OF 6 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	15.0	SAME AS ABOVE	HnU = —	Sample ③ ② 15.0'			HNU = 0.0 Oxy = 21.0 LEL = 0.0 Rec. = 1.7' NOTE: 2" Spoon
	16.0						
	17.6		HnU = —		⑧ 15.0-20.0.		HnU = 0.0 Oxy = 21 LEL = 0.0 Rec. = 1.5' 15-17
	18.0						
	19.0						
	20.0	SAME AS ABOVE	HnU = 0.0		7. 7 8 7	7 7 8 7	(HNU) = 0.0 Oxy = 21 LEL = 0.0 Rec 1.8'
	21						
	22						

HTW DRILLING LOG

HOLE NO.

PROJECT: I-1586 WSA

INSPECTOR: T.R. Mocks

SHEET - OF 6 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	24						
	25	SAME AS ABOVE WET @ 26.6	HnU = 0.0.	LAB SAMPLE @ 26.0'			HnU = 0.0 LEL = 0.0 Oxy = 21% Rec. = 2.0 WET on 25' SAMPLE
	26						
	27						
	28						
	29						
	30	SAME As Above	HnU = 0.0			4 4 8 5	HnU = 0.0 Oxy = 21 LEL = 0.0 Rec. 0.5'
	31						

HTW DRILLING LOG

HOLE NO. WSA-MW-01

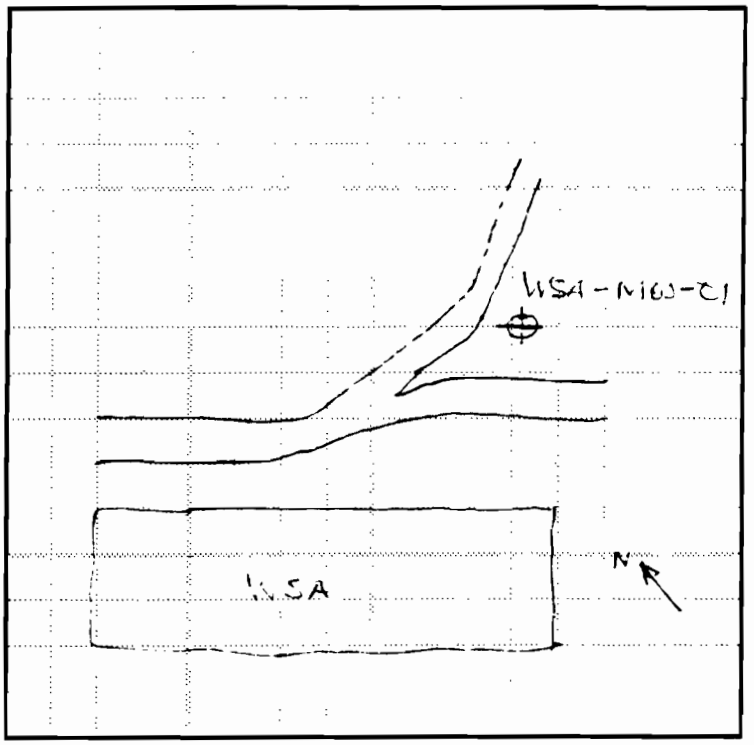
PROJECT 11-1586 WSA | INSPECTOR R. Maleski | SHEET 5 OF 6 SHEETS

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO f	BLOW COUNTS g	REMARKS h
				Sample @ 32'			
		TOTAL DEPTH OF BORING = 32.0					
	33						
		NOTE: in TIP OF SPLIT SPOON there appears to be a gravel layer or Major lith change.					
	34						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
IL-1586 O/W & WSA	T.R. Malecki	WSA-MW-01
		SHEET 6 OF 6 SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: HNu w/ 11.7 ev lamp
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HNu, 1 portable sound meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/ ____	= Lower Explosive Limit
Oxy/O2/_____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

Brn = Brown
Dk = Dark

HTW DRILLING LOG

HOLE No. WSA MW-07

1. COMPANY NAME: LAW Environmental Inc.	2. DRILLING SUBCONTRACTOR: Layne & Wolff	SHEET 1 OF 4 SHEETS
3. PROJECT: 1'-1586 O/W & WSA	4. LOCATION: Rome, New York	
5. NAME OF DRILLER: Doug Richmond	6. MANUFACTURER'S DESIGNATION OF DRILL: CME MODEL 75	
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 6 1/4 ID; 8.0 OD; HSA; 3"x2' Split Spoon	8. HOLE LOCATION: ~~West~~ East End WSA	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 08/06/92	11. DATE COMPLETED: 08/07/92
12. OVERBURDEN THICKNESS: - NA -	15. DEPTH GROUNDWATER ENCOUNTERED: 8.0'	
13. DEPTH DRILLED INTO ROCK: - NA -	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 11.03' TOC (2.1' stickup) on 8/2/92	
14. TOTAL DEPTH OF HOLE: 32.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 7.58' GSL ~72hrs AFTER Drilling	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TRIP			NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Vert.		✓		Thomas P. Walecki

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
	1.0	SAND (SP) w/ Gravel 85% SAND 15% Gravel Reddish Brn. 5YR (4/4) Dry	HNU = 0.0		① 0-0.5 ② 0.5-1.0	Hand Auger	HNU = 0.0 Oxy = 21.0 LEL = 0.0 REC. 1.0
	2.0 3.0	SAND (SW) 100% SAND Reddish Brown 4/3 5YR Firm Dry	HNU = 0.0	Sample @ 2.5	③ 2.0-4.0	1 4 6 5	HNU = 0.0 Oxy = 21.0 LEL = 0.0 REC. 2.0
	4.0	Same as Above Dry	HNU = 0.0		④ 4.0-6.0	3 3 4 4	HNU = 0.0 Oxy = 20.9 LEL = 0.0 REC. 2.0

HTW DRILLING LOG

HOLE NO. WSA-MW-07

PROJECT 11-1586 O|W & WSA

INSPECTOR T.R. McAleck

SHEET 1 OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	6.0	Same As Above Wet @ 6.0'	HnU = 0.0	Sample 2 @ 7.5 in B Sample	(5) 6.0-8.0	2 2 3 4	HnU = 0.0 Oxy = 21.0 LEL = 0.0 Rec. = 2.0
	8.0	Same As Above Wet	HnU = 0.0		(6) 8.0-10.0	1 2 3 4	HnU = 0.0 Oxy = 21.9 LEL = 0.0 Rec. 2.0
	10.0	Same As Above	HnU = 0.0	Sample 3 @ 12.0'			HnU = Oxy = LEL = Rec 2.0
	12.0	Same As Above	HnU = 0.0				HnU = 0.0 Oxy = 21.1 LEL = 0.0 Rec 2.0
	13.0						

HTW DRILLING LOG

HOLE NO. WSA-MW-02

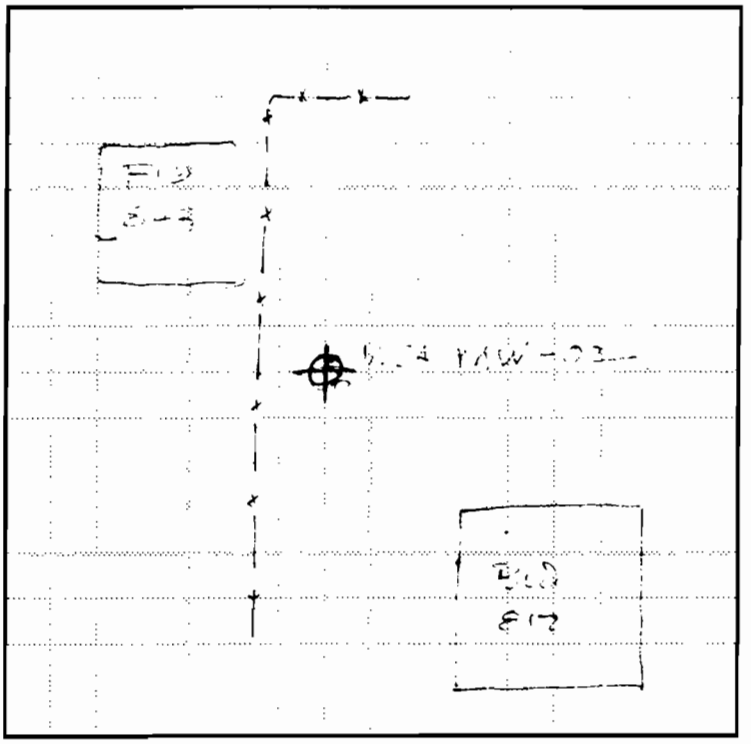
PROJECT 11-1586 O&W & WSA | INSPECTOR T.R. Malecki | SHEET 5 OF 6 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14.0						
	15.0	No recovery / attempt on last sample due to sloughing sands and mud					Cuttings same as above HNU = 0.0 Oxy = 21.1 LEL = 0.0
	16.0	Total Depth 16.0' Sloughing sands resulted in an actual TD of 16.0'					
	17.0						
	18.0						
	20.0						
	22						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
11-1586 O/W & WSA	T.R. Malecki	WSA - MW - 02
		SHEET 1 OF 4 SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: Encl. w/ 11.7 ev lamp.
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: Encl. Photovac Total Meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/ ____	= Lower Explosive Limit
Oxy/O_2/_____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

HTW DRILLING LOG

HOLE No. WSA - MW-03

1. COMPANY NAME: Law Environmental Inc.	2. DRILLING SUBCONTRACTOR: Tarratt & Wolff
3. PROJECT: 11-1586 O/W & WSA	4. LOCATION: Rome, New York
5. NAME OF DRILLER: Dave Richmond	6. MANUFACTURER'S DESIGNATION OF DRILL: CME
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 6 1/4 I.D.; 8.0 O.D.; HSA; 3' x 2' Split Spoon	8. HOLE LOCATION: WSA (So. West Side)
	9. SURFACE ELEVATION:
	10. DATE STARTED: 8/5/92 — 11. DATE COMPLETED: 8/5/92
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: 7.8 ft
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 7.2' 24 Hrs
14. TOTAL DEPTH OF HOLE: 17.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 8.40 (GSL) 8/10/92

*18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		— NA —

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TRPH			NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Vert		✓		Thomas P. Maleski

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
		SAND (SP) 80% SAND 20% Gravel DK Reddish Brn 3/2 5YR Dry	HnU = 0.0		(1) 0.0-0.5 Hand Augers (2) 0.5-1.0	Hand Auger	HnU = 0.0 Oxy = 21% LEL = 0 Rec. 1.0' Lost NO rec. 1-2.0'
	1.6						
	2.0	SAND (SP) 70% SAND 20% SILT 10% Gravel Rk Frags Black 2/0 7.5 YR Very Loose Dry	HnU = 0.0	Sample 1 @ 2.5'	4 2 2 3 (3) 2.0-4.0	4 2 2 3	HnU = 0.0 Oxy = 21.1 LEL = 0 Rec 2.0
	3.0						
	4.0	SAME AS Above Dry	HnU = 0.0		1 1 1 1	1 1 1 1	HnU = 0.0 Oxy = 21 LEL = 0.0 Rec. 2.0

HTW DRILLING LOG

HOLE NO. WSA-MW-03

PROJECT 11-1586 Olw and Q. WSA | INSPECTOR T.R. Malecki | SHEET OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
				Sample 2 @ 5.0'	(4) 4.0-6.0		Quad Meter Down
	6.0	SAME AS Above Wet @ 7.8'	HnU = 0.0		(5) 6.0-8.0	1 2 1 2	HnU = 0.0 Oxy = LEL = Rec. 1.5 Wet @ 7.8'
	8.0	SAME As Above WET	HnU = 0.0		(6) 8.0-10.0	1 5 6 6	HnU = 0.0 Oxy = 21.1 LEL = 0.0 Rec. = 0.5' NO GEOTECH
	9.8						
	16.0	Clayey SAND (SC) w/Gravel 80% SAND 10% Clay 10% Gravel V. DK. Gray 3/1 10YR Firm Wet	HnU = 0.0	Sample @ 11.5 GT.	(7) 10.0-15.0	2 6 8 22	HnU = 0.0 Oxy = 21% LEL = 0.0 Rec. 1.8
	11.0						
	12.0	Clayey SAND (SC) 60% FINE SAND 20% SILT 20% Clay MOIST - Dry - FIRM YELLOW (5Y 6/8) 5/4 (10YR) SAME AS ABOVE (NOTE: extremely Fn. Grain SAND) Very Dense WET	HnU = 0.0	Sample 4 @ 11.9'		21 39 29 37	HnU = 0.0 Oxy = 21.0 LEL = 0.0 Rec. 0.5
	13.0						

HTW DRILLING LOG

HOLE NO. WSA - MW-07

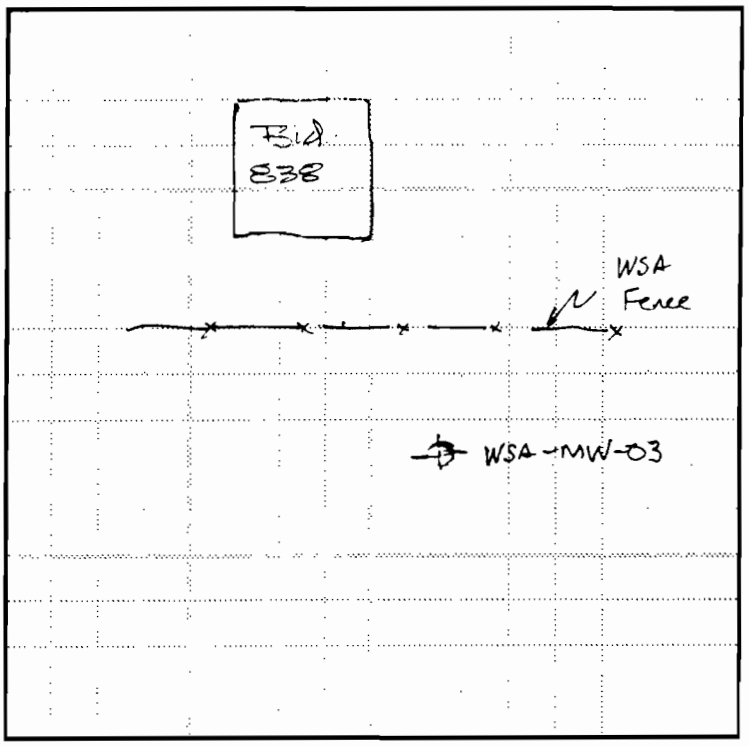
PROJECT 11-1586 O/W & WSA | INSPECTOR T. R. MALECKI | SHEET OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	15.0	SAND (SW) 98% SAND 2% CLAY BROWN 4/3 7.5 YR LOOSE WET	HnV = 0.0	GEOTECH @ 15.0' LAB SAMPLE	3 4 5 6		HnV = 0.0 Oxy = 21 LEL = 0.0 REC 2.0
	16.0						
	17.0	RUNNING SANDS PREVENT TAKING LAST 2" SAMPLE TOTAL DEPTH 17.0'	HnV =				HnV = 0.0 Oxy = 21 LEL = 0.0 REC. 0.0
	18.0						
	19.0						
	20.0						
	21.0						
	22.0						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
11-1586 O/W & WSA	T.R. Malecki	WSA-MW-03
		SHEET 1 OF SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: Hnu w/ 11.7 ev lamp
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HnU Neotronics Quad meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/____	= Lower Explosive Limit
Oxy/O2/_____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

V. = Very
Brn. = Brown
WSA = Weapons Storage Area.
DK = Dark

HTW DRILLING LOG

HOLE No. WSA-MW-04

1. COMPANY NAME: LAW ENVIRONMENTAL INC	2. DRILLING SUBCONTRACTOR: PARRATT & WOLFF
SHEET 1 OF 4 SHEETS	
3. PROJECT: GAFB 11-1586 O/W & WSA	4. LOCATION: ROME, NEW YORK
5. NAME OF DRILLER: DOUG RICHMOND	6. MANUFACTURER'S DESIGNATION OF DRILL: CME
7. SIZE AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 6" ID; 8.0 O.D.; HSA Hollow Stem Auger; 3" x 2' Split Spoon Samples	8. HOLE LOCATION: SW SIDE WSA
	9. SURFACE ELEVATION:
	10. DATE STARTED: 08/04/92
	11. DATE COMPLETED: 08/04/92
12. OVERBURDEN THICKNESS: NA	15. DEPTH GROUNDWATER ENCOUNTERED: 12.0'
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 11.1 (GSL) on 8/18/92
14. TOTAL DEPTH OF HOLE: 18.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 13.46 on 8/21/92 (TOC)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		✓	TPH			NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
VERT.				Thomas D. Malecki

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX No. e	ANALYTICAL SAMPLE No. f	BLOW COUNTS g	REMARKS h
		SAND (SP) w/ Gravel 75% Sand 25% Gravel V. Dk. Brn 3/2 5 YR DRY	HnU = 0.0		(1) 0.0-0.5' (2) 0.5-1.0	Hand Auger	HnU=0.0 Exp=0.0 Oxy=21% rec. 1.0
	1.0	1.0 - 2.0 No Recovery					
	2.0	SAND (SP) 20% Gravel 80% Sand Dk Yellowish Brn 3/4 YR Very Dense DRY	HnU = 0.0	Sample 2 (3) 2.-'	(3) 2.0-4.0	16 30 28 28	HnU=0.0 Exp=0.0 Oxy=21% Rec. 2.0'
	3.0						
	4.0	SAND (SP) 90% Sand 10% Gravel Yellowish Brn. 5/4 10YR Firm	HnU= 0.0		(4) 4.0-6.0	11 11 10 7	HnU=0.0 Oxy=21% Exp=0.0

HTW DRILLING LOG

HOLE NO. WSA-MW-0

PROJECT 11-1586 O|W & WSA | INSPECTOR T.R. Malecki | SHEET 2 OF 4 SHEETS

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO f	BLOW COUNTS g	REMARKS h
		Dry	HnV = 0.0	Sample 2 @ 5.0'			Rec 2.0' HnV = 0.0
	6	6.0 - 7.0 NO REC.					
		SAND (SP) 90% SAND 10% Gravel } Color Same as ABOVE	HnV = 0.0		(5) 6.0-8.0	5 5 4 3	HnV = Oxy = 21 LEL = 0.0
	7	Loose Moist					rec. 1.0'
				Sample 3 @ 7.5'			
	8	SAME AS ABOVE	HnV = 0.0		(6) 8.0-10.0	3 3 4 6	HnV = 0.0 Oxy = LEL = rec. 2.0
	9						
	10	SAND (SW) 100% SAND Dk. Brown 4/3 7.5YR Firm		Sample 4 @ 10.0'			HnV = 0.0 LEL = 0.0 Oxy = 21. rec. 2.0
	11	Wet @ 12.0'	HnV = 0.0		(7) 10.0-15.0	9 8 11	
	12						HnV = 0.
		SAME AS ABOVE	HnV = 6.0			6 8 15 18	Oxy = 21. LEL = 0. rec. 2.0
	13						

HTW DRILLING LOG

HOLE NO. WSA-MW-0

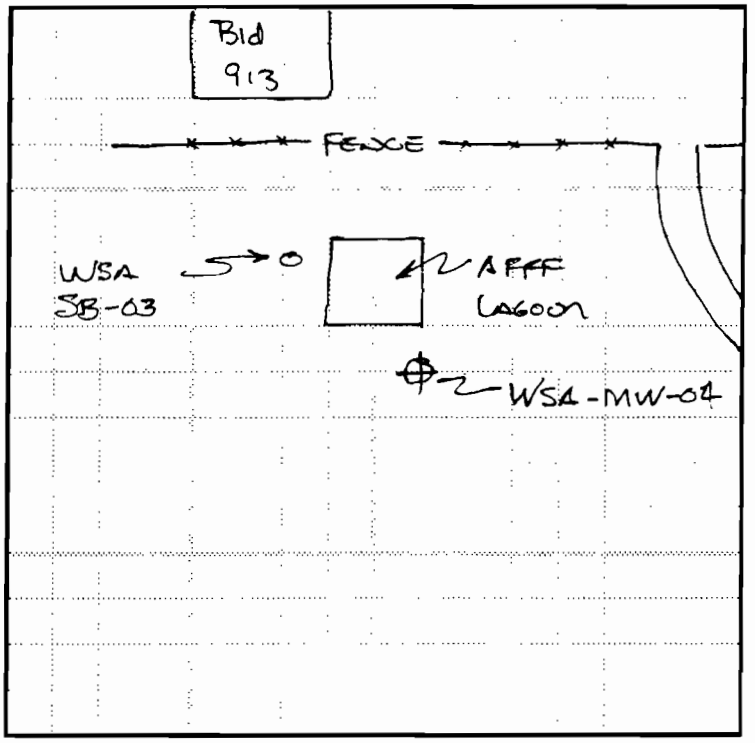
PROJECT 11-1586 - OW & WSA | INSPECTOR T.R. Malecki | SHEET 3 OF 4 SHEETS

ELEV a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO f	BLOW COUNTS g	REMARKS h
						2, 8, 15, 18	HNU = 0.0 LEL = 0.0 Oxy = 21.1 rec. 2.0
	15	14.0 – 16.0 SAME AS ABOVE	HNU = 0.0	GEOTECH Sample @ 15.8' LAB Sample		4, 2, 12, 28	
	16	SAME AS ABOVE	HNU = 0.0			7, 12, 21, 26	HNU = 0.0 LEL = 0.0 Oxy = 21.1 rec. 2.0
	18.0	TOTAL DEPTH OF BORING = 18.0'					

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE No.
11-1586 O/W & WSA	T.R. MALECKI	MW-04 WSA
		SHEET 1 4 OF 4 SHEETS

SITE SKETCH MAP



LEGEND

1. Field Screening Equipment: HNU w/ 11.7 ev Lamp & Neotronics Quad meter
2. Color Description with Munsell Color Chart.
3. Percents given are estimates.
4. Borehole working environment monitored with the following equipment: HNU & Neotronics Quad meter.
5. Symbols in ( ) indicate notable change.

ABBREVIATIONS

LEL/EXP/____	= Lower Explosive Limit
Oxy/O_2/____	= % Oxygen
HSA	= Hollow Stem Auger
Rec.	= Recovered
CME	= Central Mine Equipment
BLD	= Building
W/	= with
@	= at
Cs	= Coarse Grained
Med	= Medium Grained
Fn =	= Fine Grained

V. = Very
Brn. = Brown
Dk = Dark

APPENDIX C

MONITORING WELL INSTALLATION DIAGRAMS

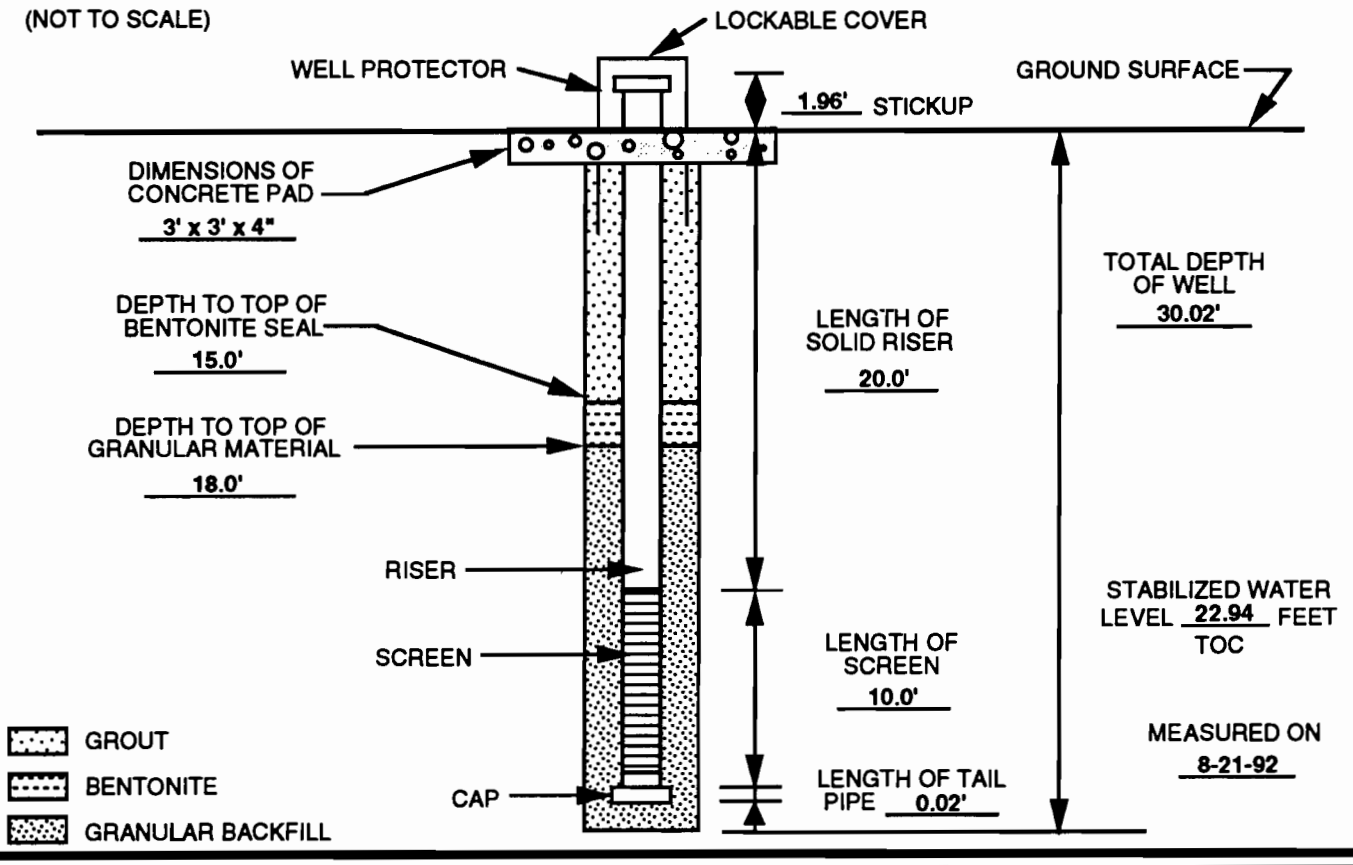
TYPE II MONITORING WELL INSTALLATION DIAGRAM

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION
KENNESAW, GEORGIA

JOB NAME GAFB WEAPONS STORAGE AREA
WELL NO. WSA MW-01 JOB NO. 11-1586
DATE 8/6-7/92 TIME 1415-1700
WELL LOCATION NORTH EAST SIDE OF WSA

GROUND SURFACE ELEVATION 546.37'
TOP OF SCREEN ELEVATION 526.37'
REFERENCE POINT ELEVATION 548.33'
TYPE SAND PACK Silica Sand GRADATION 20/30
SAND PACK MANUFACTURER Morie Co.
SCREEN MATERIAL Schedule 40 threaded PVC
MANUFACTURER Diedrich
RISER MATERIAL Schedule 40 threaded PVC
MANUFACTURER Diedrich
RISER DIAMETER 2.0"
DRILLING TECHNIQUE HSA
AUGER SIZE AND TYPE 4 1/4" I.D. 7 5/8" O.D.

BENTONITE TYPE Envird Plug Medium Pellets
MANUFACTURER WYO - BEN., Inc.
CEMENT TYPE Quickrete
MANUFACTURER Quickrete
BOREHOLE DIAMETER 8 1/4"
SCREEN DIAMETER 2.0" SLOT SIZE 0.01"
LAW ENVIRONMENTAL, INC. FIELD REPRESENTATIVE Mr. Malecki
DRILLING CONTRACTOR Parrot & Wolff
AMOUNT BENTONITE USED 3 - 50 lb. bags
AMOUNT CEMENT USED 9 - 80 lb. bags
AMOUNT SAND USED 14 - 50 lb. bags
STATIC WATER DEPTH (after dev.) 22.94'



QA / QC

INSTALLED BY: D. Richmond
INSTALLATION OBSERVED BY: T.R. Malecki
DISCREPANCIES:
CHECKED BY: J.G. Siegel DATE: 11-13-92

1586.22

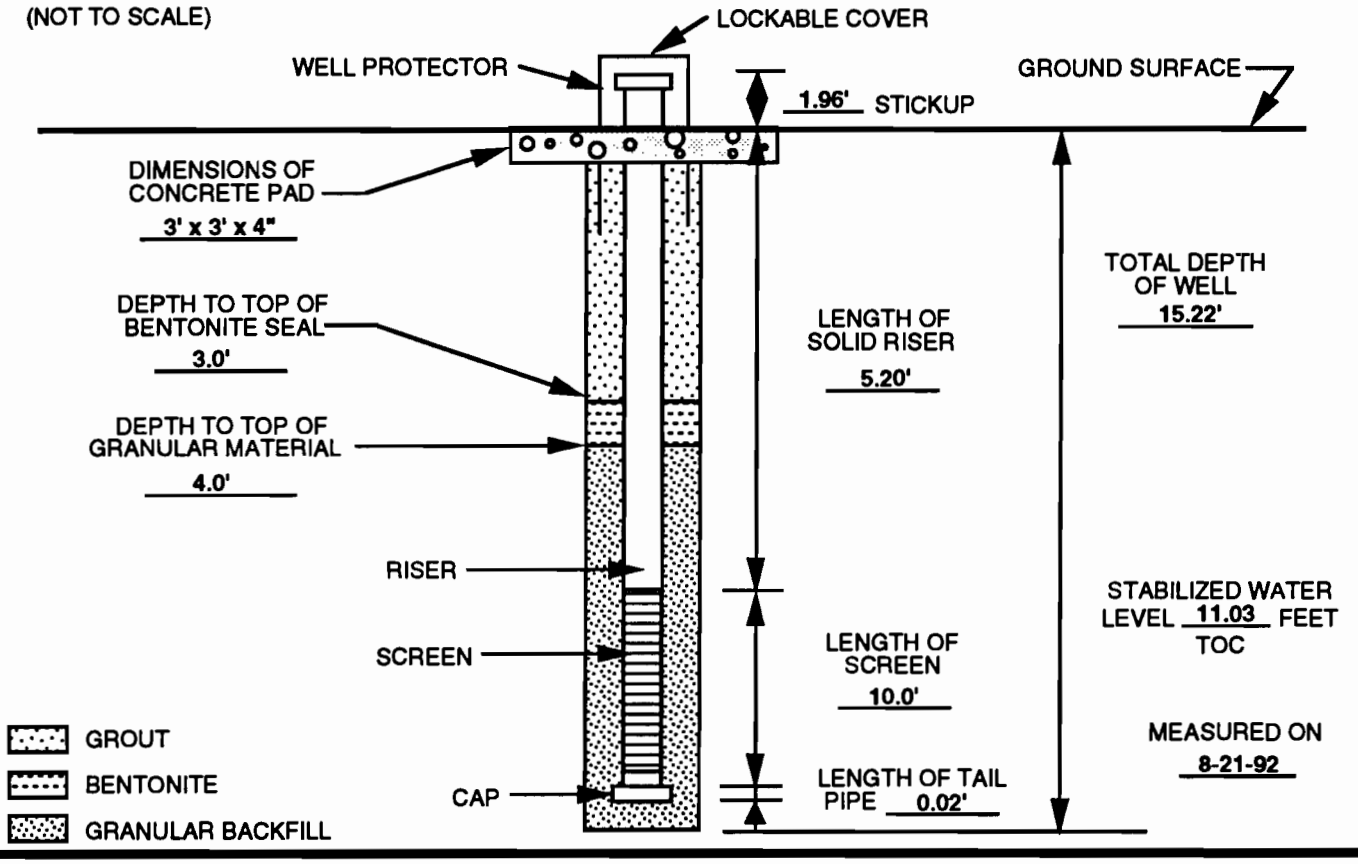
TYPE II MONITORING WELL INSTALLATION DIAGRAM

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION
KENNESAW, GEORGIA

JOB NAME GAFB WEAPONS STORAGE AREA
WELL NO. WSA MW-02 JOB NO. 11-1586
DATE 8/6/92 TIME 1120
WELL LOCATION EAST END OF WSA

GROUND SURFACE ELEVATION 531.99'
TOP OF SCREEN ELEVATION 526.77'
REFERENCE POINT ELEVATION 533.95'
TYPE SAND PACK Silica Sand GRADATION 20/30
SAND PACK MANUFACTURER Morie Co.
SCREEN MATERIAL Schedule 40 threaded PVC
MANUFACTURER Diedrich
RISER MATERIAL Schedule 40 threaded PVC
MANUFACTURER Diedrich
RISER DIAMETER 2.0"
DRILLING TECHNIQUE HSA
AUGER SIZE AND TYPE 4 1/4" I.D. 7 5/8" O.D.

BENTONITE TYPE Enviro Plug Medium Pellets
MANUFACTURER WYO - BEN, Inc.
CEMENT TYPE Quickrete
MANUFACTURER Quickrete
BOREHOLE DIAMETER 8 1/4"
SCREEN DIAMETER 2.0" SLOT SIZE 0.10"
LAW ENVIRONMENTAL, INC.
FIELD REPRESENTATIVE T.R. Malecki
DRILLING CONTRACTOR Parrot & Wolff
AMOUNT BENTONITE USED 3/4 - 50 lb. bag
AMOUNT CEMENT USED 9 - 80 lb. bags
AMOUNT SAND USED 10 - 50 lb. bags
STATIC WATER DEPTH (after dev.) 11.03'



QA / QC

INSTALLED BY: D. Richmond
INSTALLATION OBSERVED BY: T.R. Malecki
DISCREPANCIES:
CHECKED BY: J.G. Siegel DATE: 11-13-92

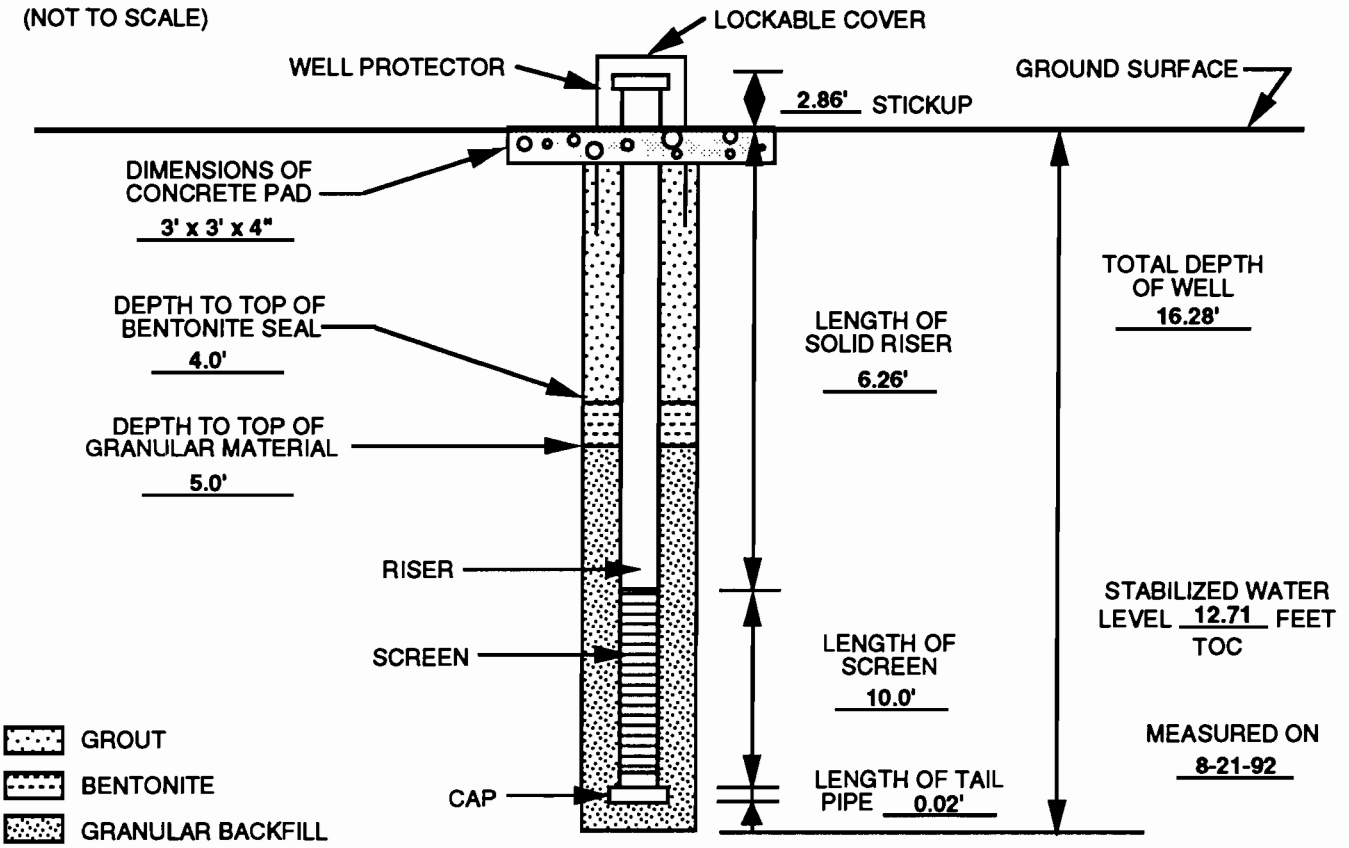
TYPE II MONITORING WELL INSTALLATION DIAGRAM

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION
KENNESAW, GEORGIA

JOB NAME GAFB WEAPONS STORAGE AREA
WELL NO. WSA MW-03 JOB NO. 11-1586
DATE 8/5/92 TIME 1440
WELL LOCATION SOUTH WEST SIDE OF WSA

GROUND SURFACE ELEVATION 527.48'
TOP OF SCREEN ELEVATION 521.22'
REFERENCE POINT ELEVATION 530.34'
TYPE SAND PACK Silica Sand GRADATION 20/30
SAND PACK MANUFACTURER Morie Co.
SCREEN MATERIAL Schedule 40 threaded PVC
MANUFACTURER Diedrich
RISER MATERIAL Schedule 40 threaded PVC
MANUFACTURER Diedrich
RISER DIAMETER 2.0"
DRILLING TECHNIQUE HSA
AUGER SIZE AND TYPE 4 1/4" I.D. 7 5/8" O.D.

BENTONITE TYPE Enviro Plug Medium Pellets
MANUFACTURER WYO - BEN, Inc.
CEMENT TYPE Quickrete
MANUFACTURER Quickrete
BOREHOLE DIAMETER 8 1/4"
SCREEN DIAMETER 2.0" SLOT SIZE 0.01"
LAW ENVIRONMENTAL, INC.
FIELD REPRESENTATIVE T.R. Malecki
DRILLING CONTRACTOR Parrot & Wolff
AMOUNT BENTONITE USED 1/2- 50 lb. bag
AMOUNT CEMENT USED 13 - 80 lb. bags
AMOUNT SAND USED 13 - 50 lb. bags
STATIC WATER DEPTH (after dev.) 12.71'



QA / QC

INSTALLED BY: D. Richmond
INSTALLATION OBSERVED BY: T.R. Malecki
DISCREPANCIES:
CHECKED BY: J.G. Siegel DATE: 11-13-92

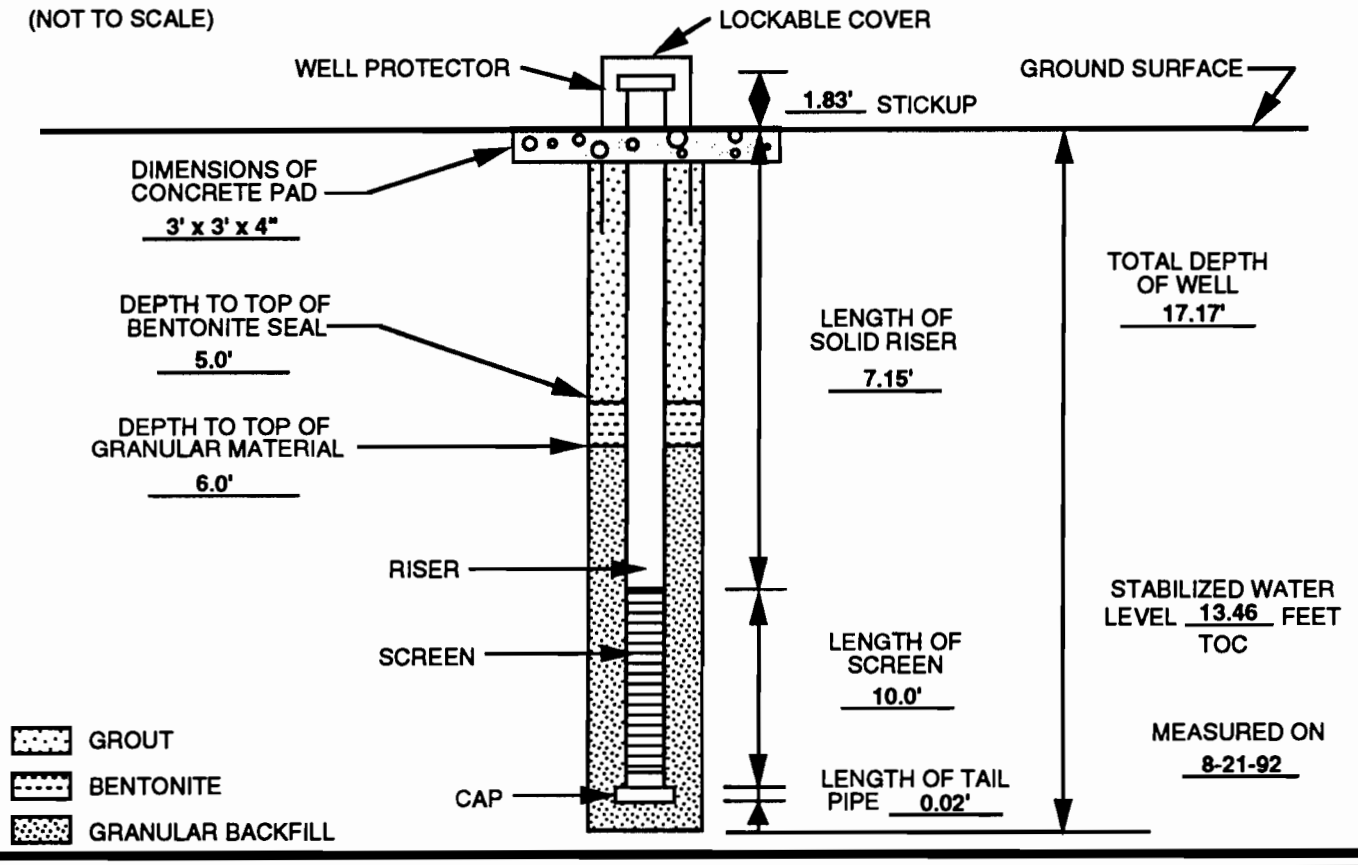
TYPE II MONITORING WELL INSTALLATION DIAGRAM

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION
KENNESAW, GEORGIA

JOB NAME GAFB WEAPONS STORAGE AREA
WELL NO. WSA MW-04 JOB NO. 11-1586
DATE 8/4/92 TIME 1750
WELL LOCATION SOUTH WEST SIDE OF WSA

GROUND SURFACE ELEVATION 517.41'
TOP OF SCREEN ELEVATION 510.26'
REFERENCE POINT ELEVATION 519.24'
TYPE SAND PACK Silica Sand GRADATION 20/30
SAND PACK MANUFACTURER Morie Co.
SCREEN MATERIAL Schedule 40 threaded PVC
MANUFACTURER Diedrich
RISER MATERIAL Schedule 40 threaded PVC
MANUFACTURER Diedrich
RISER DIAMETER 2.0"
DRILLING TECHNIQUE HSA
AUGER SIZE AND TYPE 4 1/4" I.D. 7 5/8" O.D.

BENTONITE TYPE Enviro Plug Medium Pellets
MANUFACTURER WYO - BEN, Inc.
CEMENT TYPE Quickrete
MANUFACTURER Quickrete
BOREHOLE DIAMETER 8 1/4"
SCREEN DIAMETER 2.0" SLOT SIZE 0.01"
LAW ENVIRONMENTAL, INC.
FIELD REPRESENTATIVE T.R. Malecki
DRILLING CONTRACTOR Parrot & Wolff
AMOUNT BENTONITE USED 1/2- 50 lb. bag
AMOUNT CEMENT USED 14 - 80 lb. bags
AMOUNT SAND USED 14 - 50 lb. bags
STATIC WATER DEPTH (after dev.) 13.46'



QA / QC

INSTALLED BY: D. Richardson INSTALLATION OBSERVED BY: T.R. Malecki
DISCREPANCIES: CHECKED BY: J.G. Siegel DATE: 11-12-92

APPENDIX D

WELL DEVELOPMENT DATA SHEETS

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

JOB NAME GAFB WEAPONS STORAGE AREA JOB No. 11-1586

BY ADM/TRM CHECKED JGS SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. Well No. WSA - MW-01
2. Date of Installation : 8/6-7/92
3. Date of Development : 8/20/92
4. Static Water Level : Before Development 22.90 ft.: 24 Hours After 22.94 ft
5. Quantity of Water Loss During Drilling, If Used 0 Gal.
6. Quantity of Standing Water in Well and Annulus Before Development 5.15 Gal.

	Start	During		End
7. Specific Conductance (umhos/cm)	254			250
Temperature (c°)	58.6			57.7
pH (s.u.)	6.82			6.94

8. Depth From Top of Well Casing to Bottom of Well 31.98 ft. (from Well Installation Diagram)
9. Well Diameter 2"
10. Screen Length 10 ft.
11. Minimum Quantity of Water to be Removed (5 Well Volumes) 26 gallons
12. Depth to Top of Sediment : Before Development 31.98 ft.; After Development 31.98 ft.
13. Physical Character of Water: Initially turbid; brown. Cleared up considerablly after 1 hour.
14. Type and Size of Well Development Equipment : McCulloch Centrifugal pump with 1" I.D. 100 psi HDPE tubing with brass foot valve attached.
15. Description of Surge Technique, If Used : Surged with tube and brass foot valve attached for 15 min. throughout water column, then periodically during development.
16. Height of Well Casing Above Ground Surface : 1.96 ft. (from Well Installation Diagram)
17. Quantity of Water Removed : 100 Gal. Time for Removal : 1/40 Hr./Min.
18. 1-Liter Water Sample Collected : 1700 (Time)
19. Turbidity in Nephelometric Units 34.3 NTUs

*Development Conditions : 1) Well Water if Reasonably Clear
2) Sediment Thickness 5% of Screen Length
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus
4) Stabilization of Specific Conductance and Water Temperature

HF

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

JOB NAME GAFB WEAPONS STORAGE AREA JOB No. 11-1586

BY ADM/TRM CHECKED JGS SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. Well No. WSA - MW-02
2. Date of Installation : 8/6/92
3. Date of Development : 8/20/92
4. Static Water Level : Before Development 11.46 ft.: 24 Hours After 11.03 ft
5. Quantity of Water Loss During Drilling, If Used 0 Gal.
6. Quantity of Standing Water in Well and Annulus Before Development 4.15 Gal.

	Start	During		End
7. Specific Conductance (umhos/cm)	2.50		87.5	102
Temperature (c°)	65.4		69.1	68.1
pH (s.u.)	6.32		6.60	6.51

8. Depth From Top of Well Casing to Bottom of Well 17.18 ft. (from Well Installation Diagram)
9. Well Diameter 2"
10. Screen Length 10 ft.
11. Minimum Quantity of Water to be Removed (5 Well Volumes) 21 gallons
12. Depth to Top of Sediment : Before Development 17.18 ft.; After Development 17.18 ft.
13. Physical Character of Water: Initially turbid; brown. Cleared up as development proceeded, ended cloudy.
14. Type and Size of Well Development Equipment : McCulloch Centrifugal pump with 1" I.D. HDPE tubing with brass foot valve attached.
15. Description of Surge Technique, If Used : Surged with tube and brass foot valve attached for 15 min. throughout water column, then periodically during development.
16. Height of Well Casing Above Ground Surface : 1.96 ft. (from Well Installation Diagram)
17. Quantity of Water Removed : 50 Gal. Time for Removal : 4/0 Hr./Min.
18. 1-Liter Water Sample Collected : 8/21/92 (Time)
19. Turbidity in Nephelometric Units 183.1 NTUs

*Development Conditions : 1) Well Water if Reasonably Clear
2) Sediment Thickness 5% of Screen Length
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus
4) Stabilization of Specific Conductance and Water Temperature

HF

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

JOB NAME GAFB WEAPONS STORAGE AREA JOB No. 11-1586

BY WMC/ADM CHECKED TRM SHEET 1 OF 1

WELL DEVELOPMENT DATA
(Additional Development)

1. Well No. WSA - MW-02
2. Date of Installation : 8/6/92
3. Date of Development : Additional Development on 11/21/92
4. Static Water Level : Before Development 10.76 ft.: 24 Hours After 12.91 ft
5. Quantity of Water Loss During Drilling, If Used 0 Gal.
6. Quantity of Standing Water in Well and Annulus Before Development 17.5 Gal.

	Start	During		End
7. Specific Conductance (umhos/cm)	256	100	82.4	81.5
Temperature (c°)	55.1	49.2	48.7	49.0
pH (s.u.)	7.82	7.89	7.95	7.97

8. Depth From Top of Well Casing to Bottom of Well 17.18 ft. (from Well Installation Diagram)
9. Well Diameter 2"
10. Screen Length 10 ft.
11. Minimum Quantity of Water to be Removed (5 Well Volumes) 87.5 gallons
12. Depth to Top of Sediment : Before Development 17.25 ft.; After Development 17.25 ft.
13. Physical Character of Water: Clear
14. Type and Size of Well Development Equipment : 5' QED Airlift pump with surge rings attached
15. Description of Surge Technique, If Used : Surged with Airlift pump across the entire submerged screened interval (surged 4 times for a total of 28 minutes)
16. Height of Well Casing Above Ground Surface : _____ ft. (from Well Installation Diagram)
17. Quantity of Water Removed : 25 Gal. Time for Removal : 0/50 Hr./Min.
18. 1-Liter Water Sample Collected : 1025 (Time)
19. Turbidity in Nephelometric Units 3.6 NTUs

*Development Conditions : 1) Well Water if Reasonably Clear
2) Sediment Thickness 5% of Screen Length
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus
4) Stabilization of Specific Conductance and Water Temperature

HF

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

JOB NAME GAFB WEAPONS STORAGE AREA JOB No. 11-1586

BY ADM/TRM CHECKED JGS SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. Well No. WSA - MW-03
2. Date of Installation : 8/5/92
3. Date of Development : 8/19-20/92
4. Static Water Level : Before Development 12.68 ft.: 24 Hours After 12.71 ft
5. Quantity of Water Loss During Drilling, If Used 0 Gal.
6. Quantity of Standing Water in Well and Annulus Before Development 4.7 Gal.

	Start	During		End
7. Specific Conductance (umhos/cm)	584	583	659	454
Temperature (c°)	65.5	67.1	66.4	60.1
pH (s.u.)	7.49	7.69	8.43	6.51

8. Depth From Top of Well Casing to Bottom of Well 19.14 ft. (from Well Installation Diagram)
9. Well Diameter 2"
10. Screen Length 10 ft.
11. Minimum Quantity of Water to be Removed (5 Well Volumes) 23.5
12. Depth to Top of Sediment : Before Development 19.14 ft.; After Development 19.14 ft.
13. Physical Character of Water: Initially turbid; brown. Cleared up during development.
14. Type and Size of Well Development Equipment : McCulloch Centrifugal pump with 1" I.D. HDPE tubing with brass foot valve attached.
15. Description of Surge Technique, If Used : Surged with tube throughout water column for 15 min. then periodically during development.
16. Height of Well Casing Above Ground Surface : 2.86 ft. (from Well Installation Diagram)
17. Quantity of Water Removed : 80 Gal. Time for Removal : 10/0 Hr./Min.
18. 1-Liter Water Sample Collected : 1100 (Time)
19. Turbidity in Nephelometric Units 15.80 NTUs

*Development Conditions : 1) Well Water if Reasonably Clear
2) Sediment Thickness 5% of Screen Length
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus
4) Stabilization of Specific Conductance and Water Temperature

HF

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

JOB NAME GAFB WEAPONS STORAGE AREA JOB No. 11-1586

BY ADM/TRM CHECKED JGS SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. Well No. WSA - MW-04
2. Date of Installation : 8/4/92
3. Date of Development : 8/18-19/92
4. Static Water Level : Before Development 13.40 ft.: 24 Hours After 13.46 ft
5. Quantity of Water Loss During Drilling, If Used 0 Gal.
6. Quantity of Standing Water in Well and Annulus Before Development 4 Gal.

	Start	During		End
7. Specific Conductance (umhos/cm)	519	588	603	594
Temperature (c°)	61.6	61.9	62	61.1
pH (s.u.)	6.81	7.06	7.20	7.35

8. Depth From Top of Well Casing to Bottom of Well 19 ft. (from Well Installation Diagram)
9. Well Diameter 2"
10. Screen Length 10 ft.
11. Minimum Quantity of Water to be Removed (5 Well Volumes) 20
12. Depth to Top of Sediment : Before Development 19 ft.; After Development 19 ft.
13. Physical Character of Water: Initially turbid; brown. Ended still turbid
14. Type and Size of Well Development Equipment : McCulloch Centrifugal pump with 1" I.D. HDPE tube with brass foot valve; in addition to dedicated PVC Bailer.
15. Description of Surge Technique, If Used : Surged with tube for 15 min. throughout water column then used bailor periodically during development.
16. Height of Well Casing Above Ground Surface : 1.83 ft. (from Well Installation Diagram)
17. Quantity of Water Removed : >200 Gal. Time for Removal : 4/0 Hr./Min.
18. 1-Liter Water Sample Collected : 1000 (Time)
19. Turbidity in Nephelometric Units >200 NTUs

*Development Conditions : 1) Well Water if Reasonably Clear
2) Sediment Thickness 5% of Screen Length
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus
4) Stabilization of Specific Conductance and Water Temperature

HF

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION

JOB NAME GAFB WEAPONS STORAGE AREA JOB No. 11-1586

BY WMC/FSG CHECKED TRM SHEET 1 OF 1

WELL DEVELOPMENT DATA
(Additional Development)

1. Well No. WSA - MW-04
2. Date of Installation : 8/4/92
3. Date of Development : Additional Development on 11/20/92
4. Static Water Level : Before Development 13.25 ft.: 24 Hours After 13.20 ft
5. Quantity of Water Loss During Drilling, If Used 0 Gal.
6. Quantity of Standing Water in Well and Annulus Before Development 16 Gal.

	Start	During		End
7. Specific Conductance (umhos/cm)	377	369	366	368
Temperature (c°)	49.5	49.4	49.3	49.7
pH (s.u.)	8.32	6.02	6.00	6.02

8. Depth From Top of Well Casing to Bottom of Well 19 ft. (from Well Installation Diagram)
9. Well Diameter 2"
10. Screen Length 10 ft.
11. Minimum Quantity of Water to be Removed (5 Well Volumes) 80 gallons
12. Depth to Top of Sediment : Before Development 19.15 ft.; After Development 19.15 ft.
13. Physical Character of Water: Clear
14. Type and Size of Well Development Equipment : 5' QED Airlift pump with surge rings attached
15. Description of Surge Technique, If Used : Same (surged 5 times for a total of 26 minutes)
16. Height of Well Casing Above Ground Surface : _____ ft. (from Well Installation Diagram)
17. Quantity of Water Removed : 149 Gal. Time for Removal : 1/31 Hr./Min.
18. 1-Liter Water Sample Collected : 1615 (Time)
19. Turbidity in Nephelometric Units 5.24 NTUs

*Development Conditions : 1) Well Water if Reasonably Clear
2) Sediment Thickness 5% of Screen Length
3) Removal of 5 Well Volumes, Including Saturated Filter Annulus
4) Stabilization of Specific Conductance and Water Temperature

HF

APPENDIX E

GEOTECHNICAL ANALYSIS

APPENDIX F

GEOTECHNICAL ANALYSIS

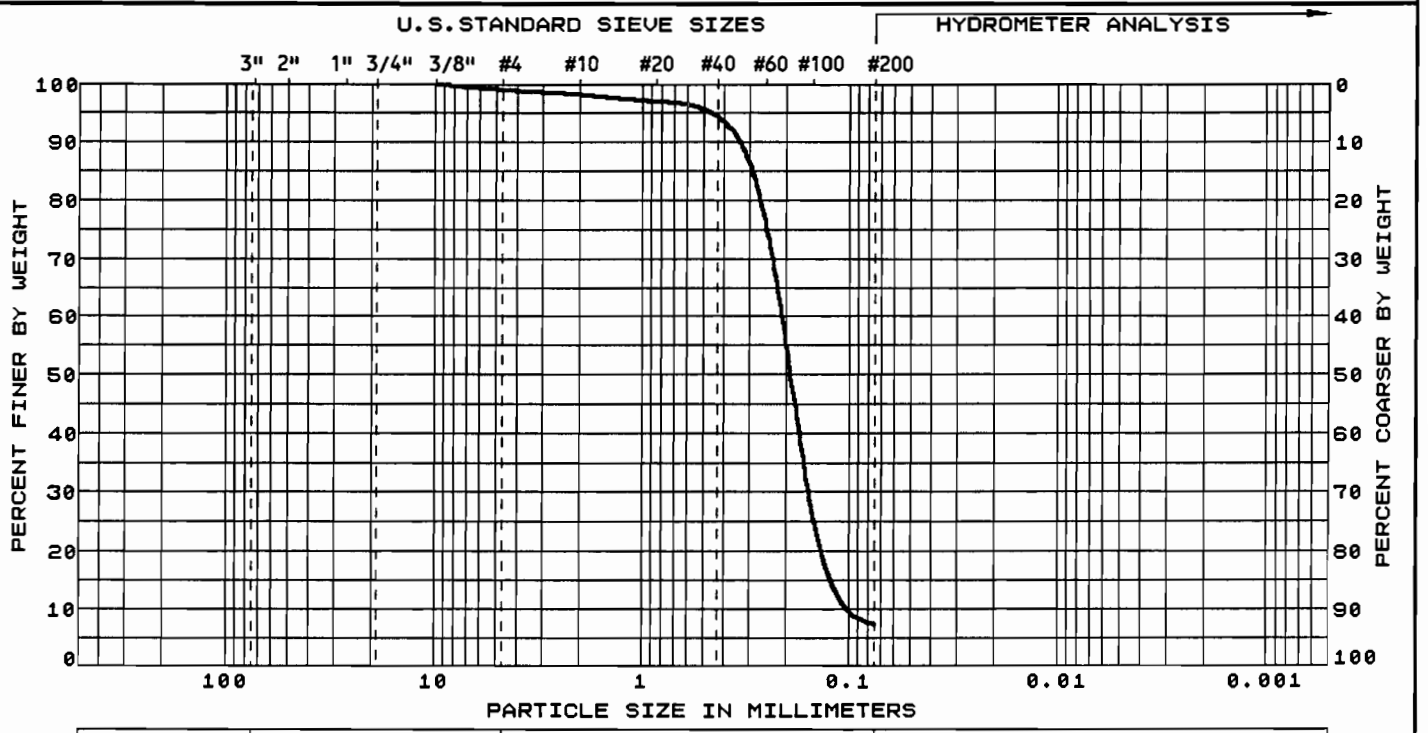
LAW ENVIRONMENTAL, INC.
300 CHASTAIN CNTR BLVD, SUITE 315
KENNESAW, GEORGIA 30144
404-425-7879

PARTICLE SIZE DISTRIBUTION & PHYSICAL PROPERTIES

CLIENT USACOE/CEMRK
Kansas City, Missouri
CLIENT JOB NO./PO# _____

JOB NO. 11-1586
LAB NO. 02580
PROJECT GAFB Weapons Storage Area
SAMPLE ID MW-01 Jar 26'

DATE October 7, 1992
PAGE 1



COBBLES	GRAVEL		SAND			SILT & CLAY
	COARSE	FINE	CO.	MEDIUM	FINE	

U.S.STANDARD SIEVE SIZE		*PERCENT PASSING	HYDROMETER
SIEVE NO.	SIEVE SIZE (MILLIMETERS)		PARTICLE DIAMETER (MILLIMETERS)
3"	75		0.050
2"	50		0.020
1-1/2"	37.5		0.005
1"	25		0.002
3/4"	19		0.001
1/2"	12.5		
3/8"	9.5	100.0	
No.4	4.75	99.1	
No.10	2.00	98.3	
No.20	0.850	97.1	
No.40	0.425	94.3	
No.60	0.250	75.4	
No.100	0.150	27.0	
No.200	0.075	7.4	

*REMARKS: TABULATED HYDROMETER VALUES ARE COMPUTER INTERPOLATED FROM A LINEAR DATA PLOT. PLOTTED VALUES MAY BE MORE ACCURATE FOR THE 0.050 mm PARTICLE DIAMETER.

TESTED BY: HJ JM MO

TOTAL POROSITY (%) _____
EFFECTIVE SIZE (mm) _____
COEFFICIENT OF UNIFORMITY 2.58
COEFFICIENT OF CURVATURE 1.37
LIQUID LIMIT NP
PLASTIC LIMIT NP
PLASTICITY INDEX NP
CLASSIFICATION POORLY GRADED SAND with SILT (SP-SM)
WATER CONTENT (%) 16.7
DRY DENSITY (PCF) _____
SPECIFIC GRAVITY OF SOLIDS _____
HYDRAULIC CONDUCTIVITY (cm/sec - 20C) _____
TEST PROCEDURES: ASTM D422, D2216, D4318, D2487.

LAW ENVIRONMENTAL, INC.
M. A. O'Kelley

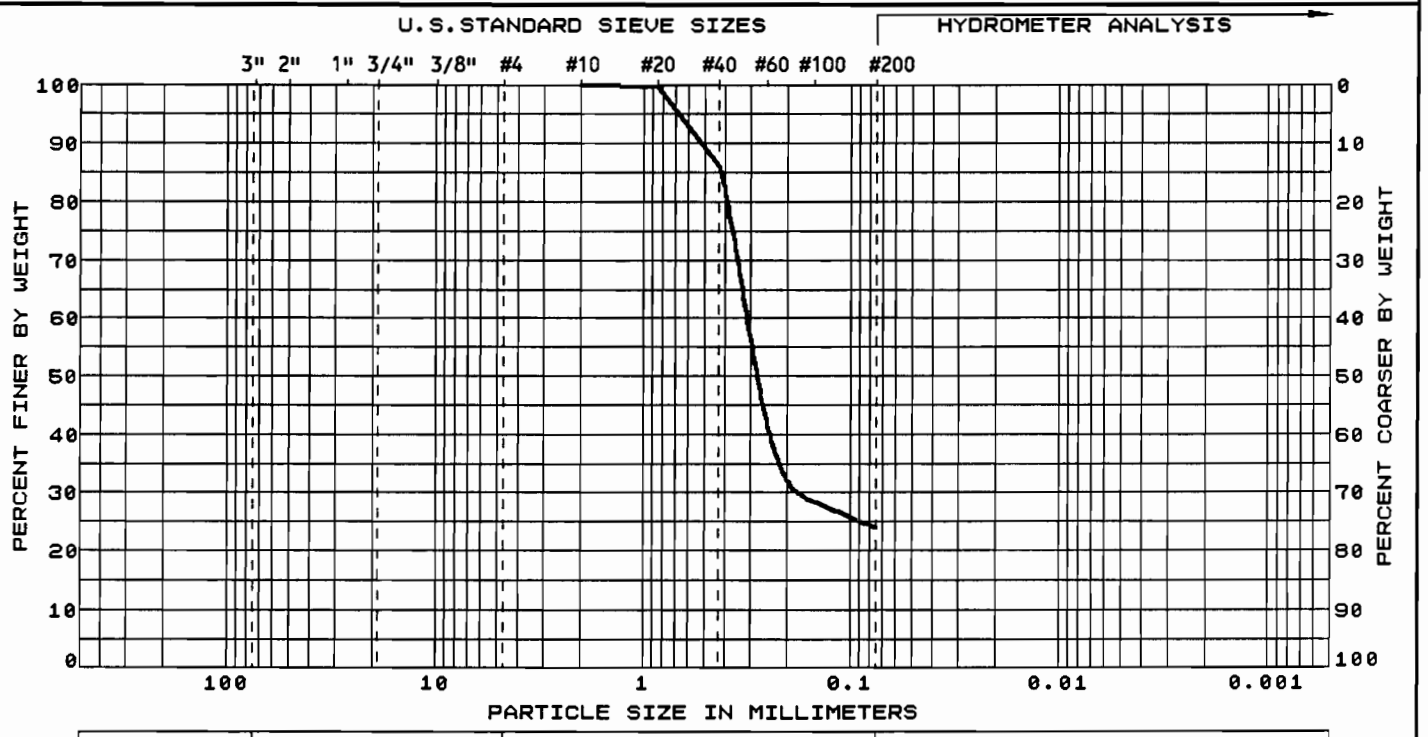
LAW ENVIRONMENTAL, INC.
300 CHASTAIN CNTR BLVD, SUITE 315
KENNESAW, GEORGIA 30144
404-425-7879

PARTICLE SIZE DISTRIBUTION & PHYSICAL PROPERTIES

CLIENT USACOE/CEMRK
Kansas City, Missouri
CLIENT JOB NO./PO# _____

JOB NO. 11-1586
LAB NO. 02581
PROJECT GAFB Weapons Storage Area
SAMPLE ID MW-02 Jar 7.5'

DATE October 7, 1992
PAGE 2



COBBLES	GRAVEL		SAND			SILT & CLAY
	COARSE	FINE	CO.	MEDIUM	FINE	

U.S.STANDARD SIEVE SIZE		*PERCENT PASSING	HYDROMETER
SIEVE NO.	SIEVE SIZE (MILLIMETERS)		PARTICLE DIAMETER (MILLIMETERS)
3"	75		0.050
2"	50		0.020
1-1/2"	37.5		0.005
1"	25		0.002
3/4"	19		0.001
1/2"	12.5		
3/8"	9.5		
No.4	4.75		
No.10	2.00	100.0	
No.20	0.850	99.6	
No.40	0.425	85.9	
No.60	0.250	41.4	
No.100	0.150	28.6	
No.200	0.075	23.9	

*REMARKS: TABULATED HYDROMETER VALUES ARE COMPUTER INTERPOLATED FROM A LINEAR DATA PLOT. PLOTTED VALUES MAY BE MORE ACCURATE FOR THE 0.050 mm PARTICLE DIAMETER.

TESTED BY: HJ JM MO

TOTAL POROSITY (%) _____
EFFECTIVE SIZE (mm) _____
COEFFICIENT OF UNIFORMITY _____
COEFFICIENT OF CURVATURE _____
LIQUID LIMIT NP
PLASTIC LIMIT NP
PLASTICITY INDEX NP
CLASSIFICATION SILTY SAND (SM)

WATER CONTENT (%) 7.2
DRY DENSITY (PCF) _____
SPECIFIC GRAVITY OF SOLIDS _____
HYDRAULIC CONDUCTIVITY (cm/sec - 20C) _____
TEST PROCEDURES: ASTM D422, D2216, D4318, D2487.

LAW ENVIRONMENTAL, INC.
M. A. O'Kelly

LAW ENVIRONMENTAL, INC.
300 CHASTAIN CNTR BLVD, SUITE 315
KENNESAW, GEORGIA 30144
404-425-7879

PARTICLE SIZE DISTRIBUTION & PHYSICAL PROPERTIES

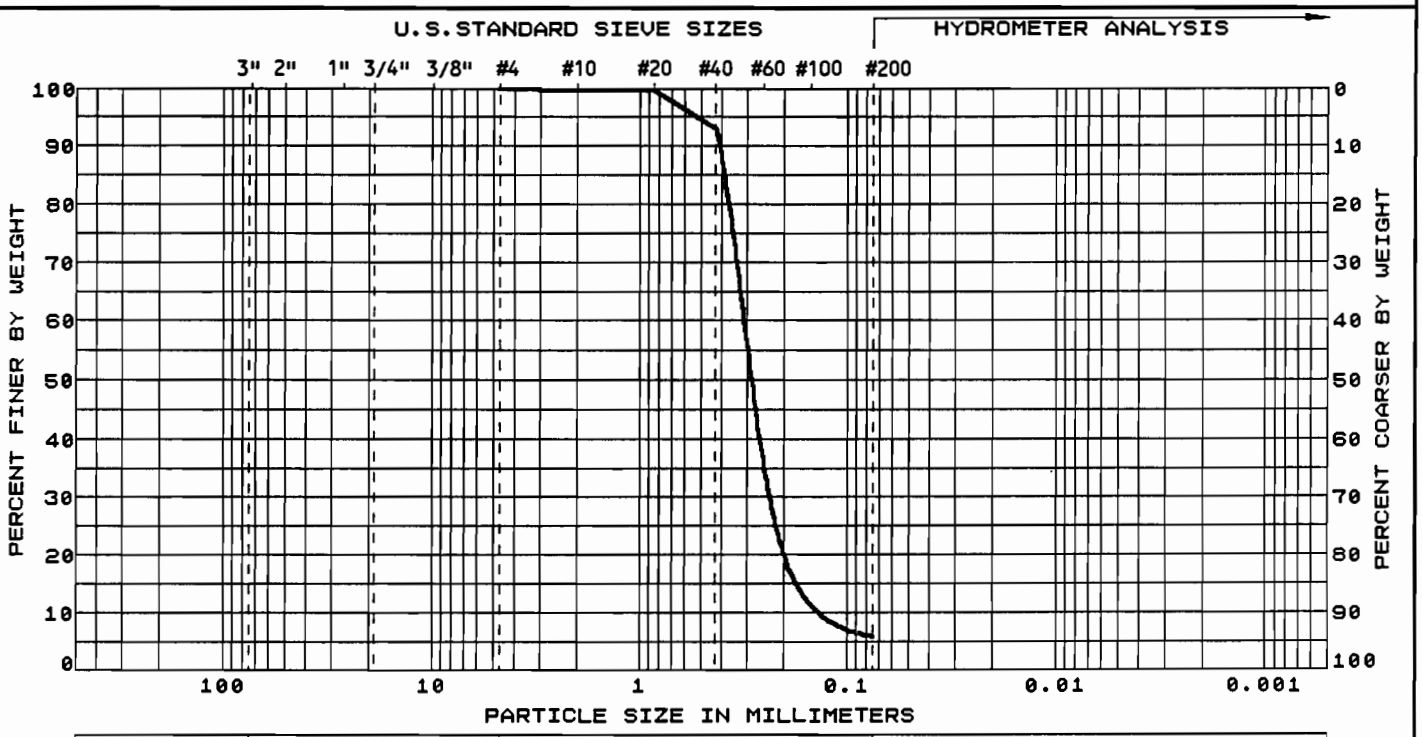
CLIENT USACOE/CEMRK
Kansas City, Missouri

JOB NO. 11-1586
LAB NO. 02582
PROJECT GAFB Weapons Storage Area

DATE October 7, 1992
PAGE 3

CLIENT JOB NO./PO#

SAMPLE ID MW-03 Jar 15'



COBBLES	GRAVEL		SAND			SILT & CLAY
	COARSE	FINE	CO.	MEDIUM	FINE	

U.S.STANDARD SIEVE SIZE		*PERCENT PASSING	HYDROMETER
SIEVE NO.	SIEVE SIZE (MILLIMETERS)		PARTICLE DIAMETER (MILLIMETERS)
3"	75		0.050
2"	50		0.020
1-1/2"	37.5		0.005
1"	25		0.002
3/4"	19		0.001
1/2"	12.5		
3/8"	9.5		
No.4	4.75	100.0	
No.10	2.00	99.8	
No.20	0.850	99.6	
No.40	0.425	92.9	
No.60	0.250	35.0	
No.100	0.150	11.5	
No.200	0.075	5.8	

*REMARKS: TABULATED HYDROMETER VALUES ARE COMPUTER INTERPOLATED FROM A LINEAR DATA PLOT. PLOTTED VALUES MAY BE MORE ACCURATE FOR THE 0.050 mm PARTICLE DIAMETER.

TESTED BY: HJ JM MO

TOTAL POROSITY (%)
EFFECTIVE SIZE (mm)
COEFFICIENT OF UNIFORMITY 2.51
COEFFICIENT OF CURVATURE 1.28
LIQUID LIMIT NP
PLASTIC LIMIT NP
PLASTICITY INDEX NP
CLASSIFICATION POORLY GRADED SAND with SILT (SP-SM)
WATER CONTENT (%) 16.8
DRY DENSITY (PCF)
SPECIFIC GRAVITY OF SOLIDS
HYDRAULIC CONDUCTIVITY (cm/sec - 20C)
TEST PROCEDURES: ASTM D422, D2216, D4318, D2487.

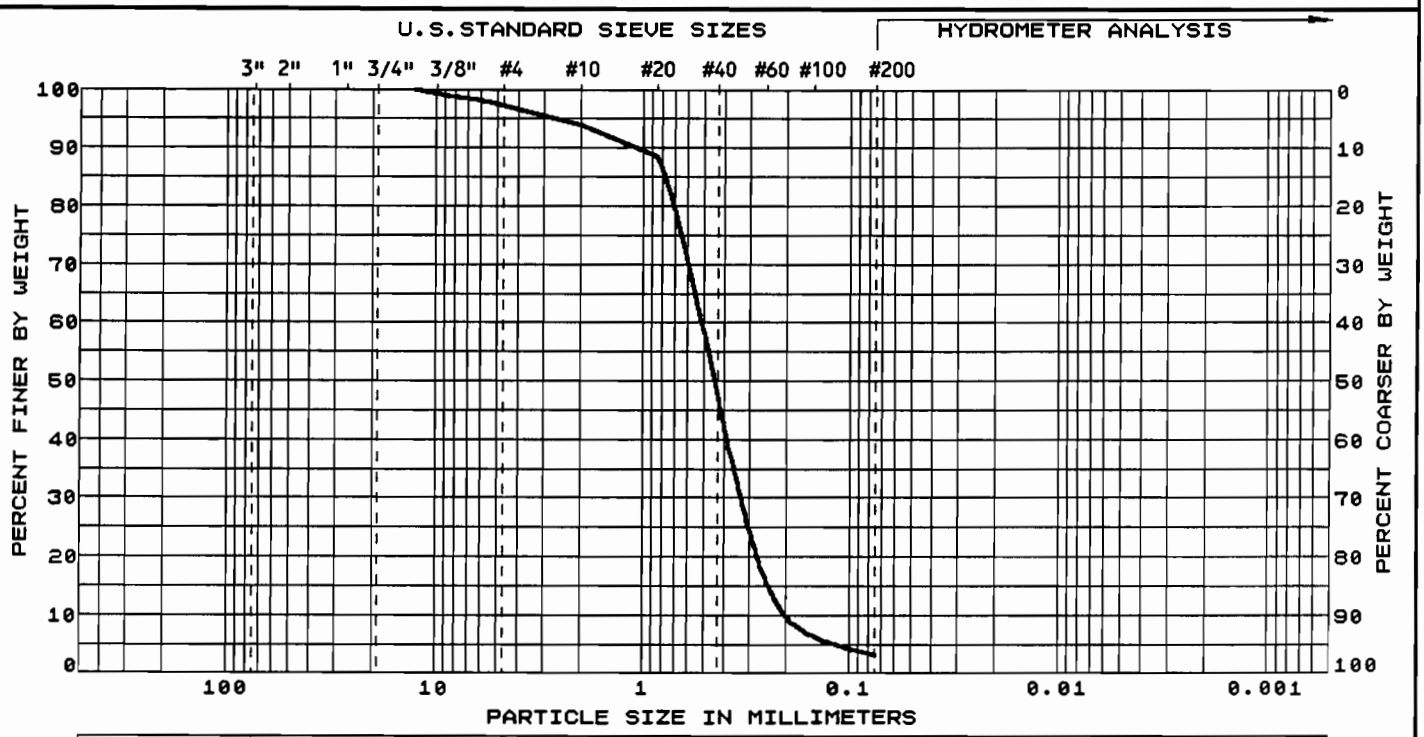
LAW ENVIRONMENTAL, INC.
M.A. O'Kelly

LAW ENVIRONMENTAL, INC.
300 CHASTAIN CNTR BLVD, SUITE 315
KENNESAW, GEORGIA 30144
404-425-7879

PARTICLE SIZE DISTRIBUTION & PHYSICAL PROPERTIES

CLIENT USACOE/CEMRK
Kansas City, Missouri
CLIENT JOB NO./PO# _____

JOB NO. 11-1586 DATE October 7, 1992
LAB NO. 02583 PAGE 4
PROJECT GAFB Weapons Storage Area
SAMPLE ID MW-04 Jar 15'



COBBLES	GRAVEL		SAND			SILT & CLAY
	COARSE	FINE	CO.	MEDIUM	FINE	

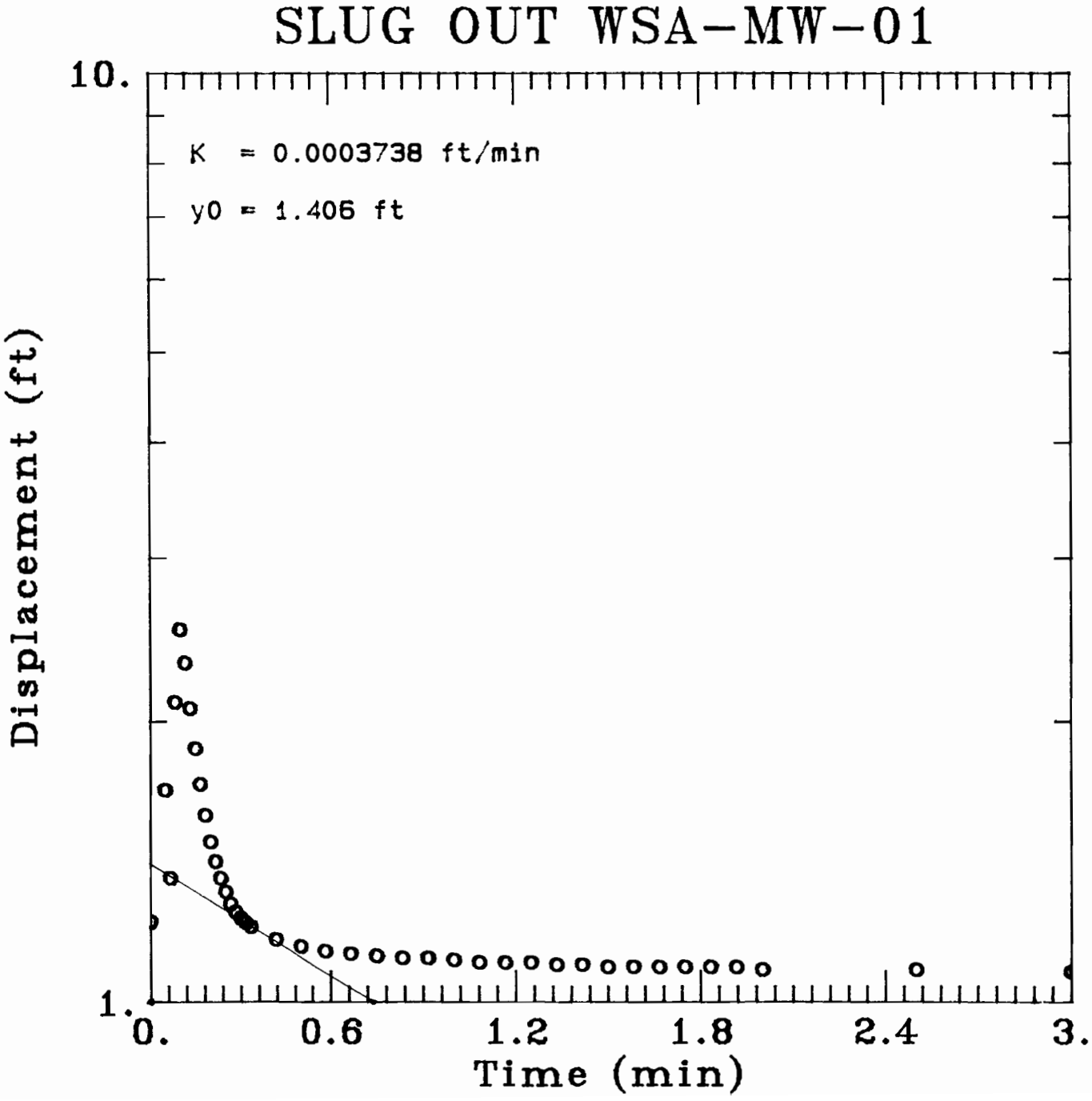
U.S.STANDARD SIEVE SIZE		*PERCENT PASSING		HYDROMETER
SIEVE NO.	SIEVE SIZE (MILLIMETERS)			PARTICLE DIAMETER (MILLIMETERS)
3"	75			0.050
2"	50			0.020
1-1/2"	37.5			0.005
1"	25			0.002
3/4"	19			0.001
1/2"	12.5	100.0		
3/8"	9.5	99.2	*REMARKS: TABULATED HYDROMETER VALUES ARE COMPUTER INTERPOLATED FROM A LINEAR DATA PLOT. PLOTTED VALUES MAY BE MORE ACCURATE FOR THE 0.050 mm PARTICLE DIAMETER.	
No.4	4.75	97.3		
No.10	2.00	94.1		
No.20	0.850	88.5		
No.40	0.425	46.1		
No.60	0.250	15.7		
No.100	0.150	6.6		
No.200	0.075	3.2		
			TESTED BY: HJ JM MO	

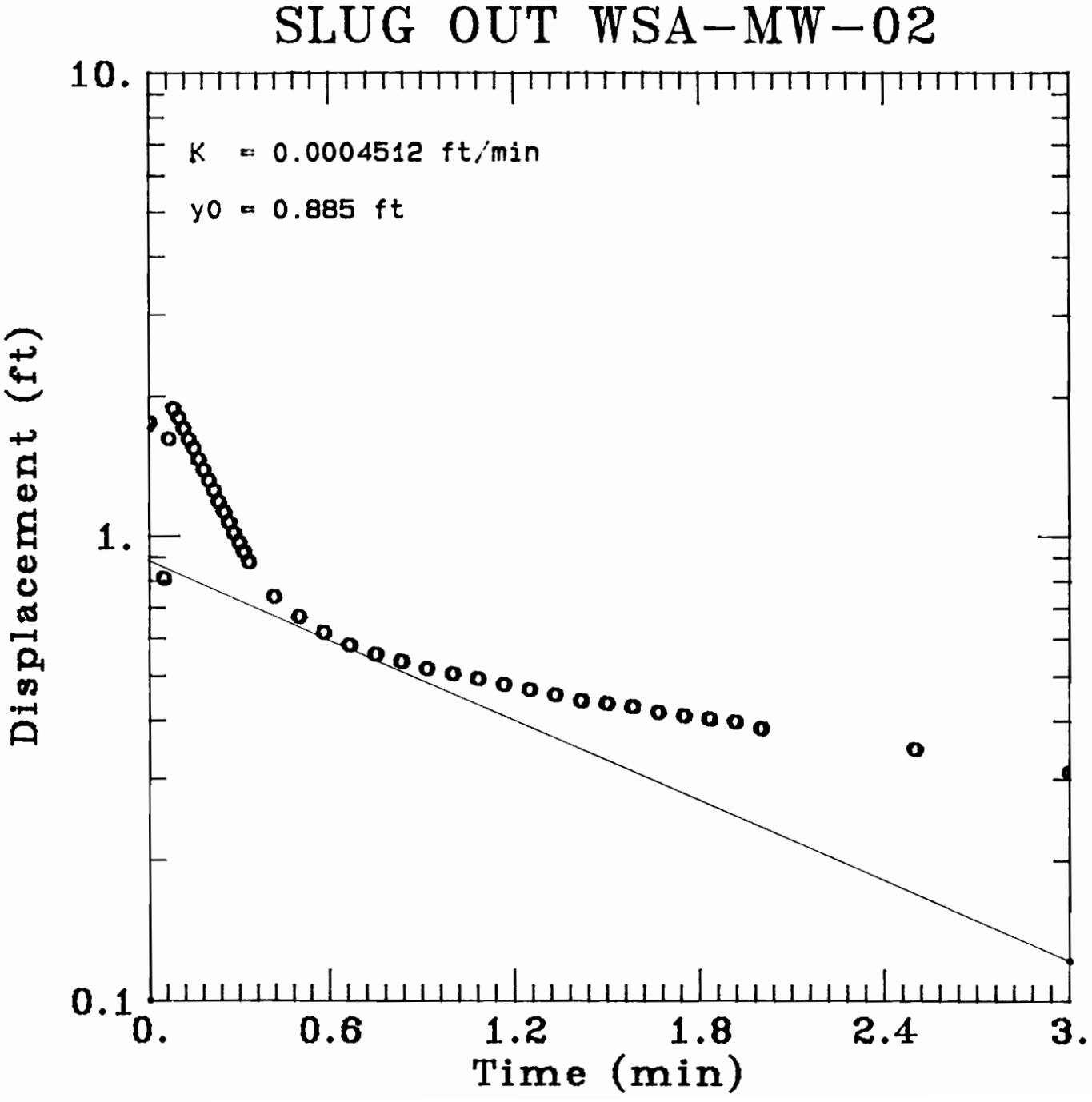
TOTAL POROSITY (%) _____
EFFECTIVE SIZE (mm) _____
COEFFICIENT OF UNIFORMITY 2.94
COEFFICIENT OF CURVATURE 1.06
LIQUID LIMIT NP
PLASTIC LIMIT NP
PLASTICITY INDEX NP
CLASSIFICATION POORLY GRADED SAND (SP)
WATER CONTENT (%) 18.8
DRY DENSITY (PCF) _____
SPECIFIC GRAVITY OF SOLIDS _____
HYDRAULIC CONDUCTIVITY (cm/sec - 20C) _____
TEST PROCEDURES: ASTM D422, D2216, D4318, D2487.

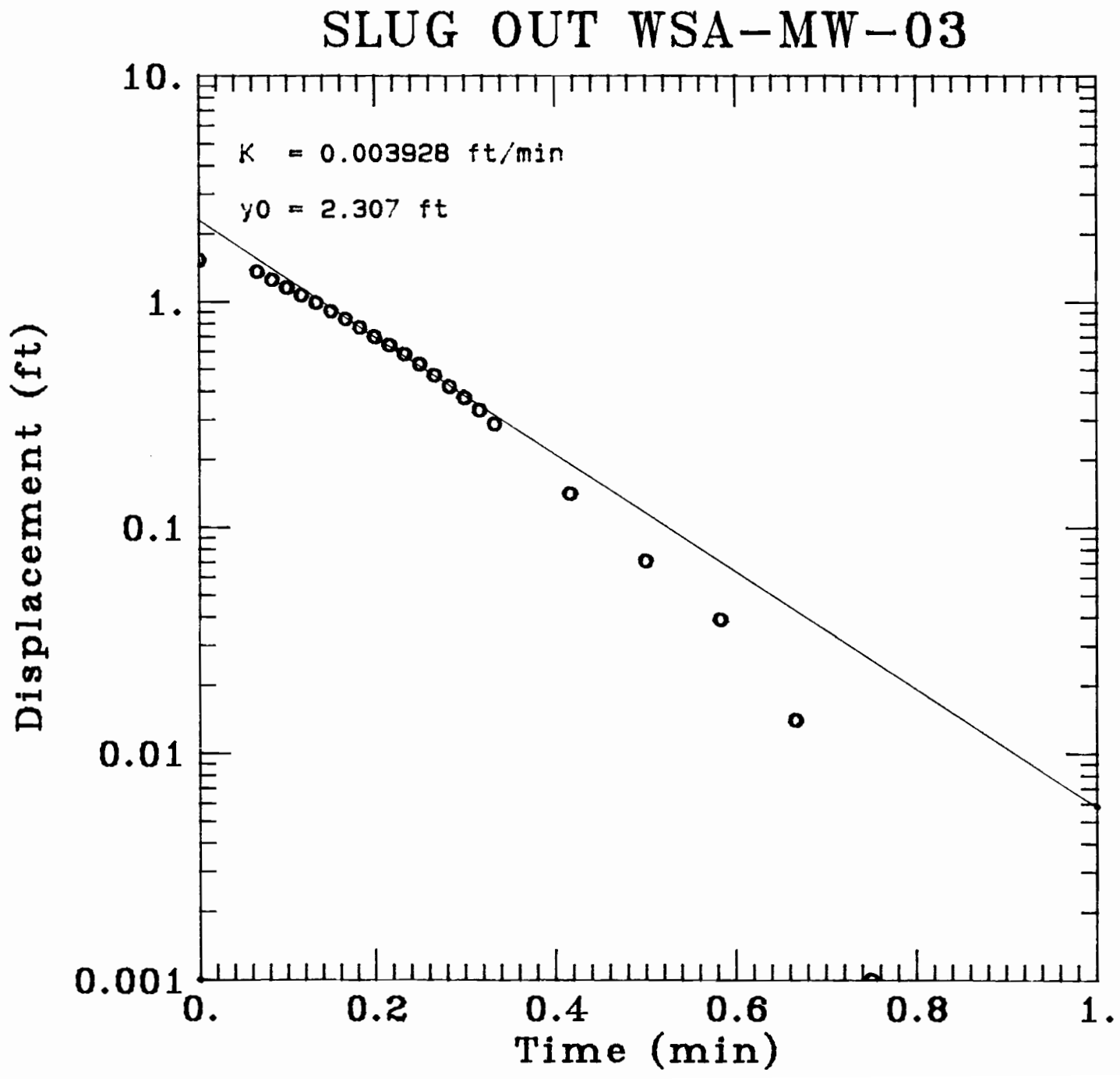
LAW ENVIRONMENTAL, INC.
M. A. O'Kelly

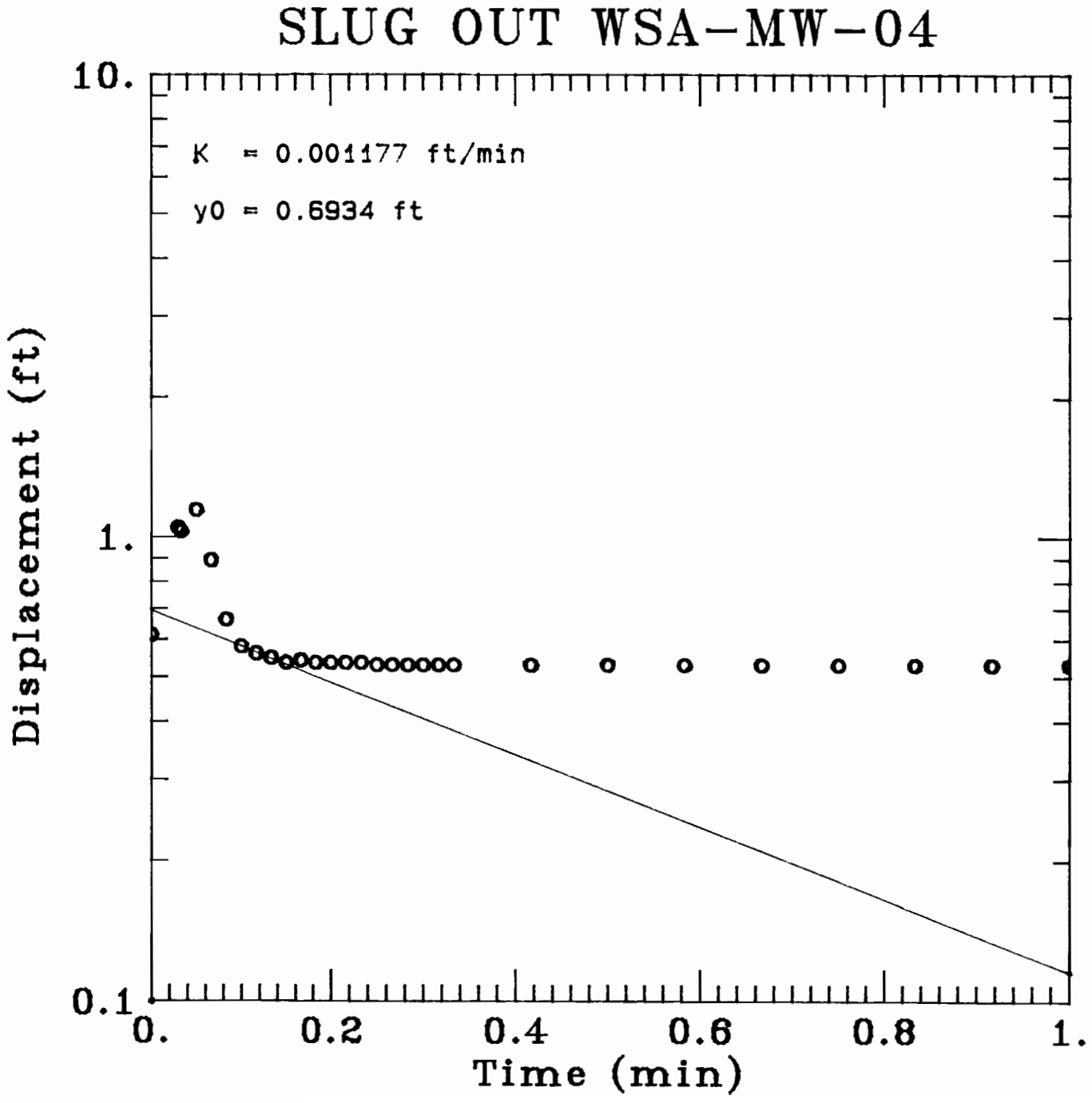
APPENDIX F

IN-SITU PERMEABILITY TESTS


SLUG OUT WSA-MW-01
K = 0.0003738 ft/min
y0 = 1.406 ft
Displacement (ft)
10.
1.
0.
0.6
1.2
1.8
2.4
3.
Time (min)


SLUG OUT WSA-MW-02
K = 0.0004512 ft/min
y0 = 0.885 ft
Displacement (ft)
10.
1.
0.1
0.
0.6
1.2
1.8
2.4
3.
Time (min)


SLUG OUT WSA-MW-03
K = 0.003928 ft/min
y0 = 2.307 ft
Displacement (ft)
10.
1.
0.1
0.01
0.001
0.
0.2
0.4
0.6
0.8
1.
Time (min)


SLUG OUT WSA-MW-04
K = 0.001177 ft/min
y0 = 0.6934 ft
Displacement (ft)
10.
1.
0.1
0.
0.2
0.4
0.6
0.8
1.
Time (min)

SLUG OUT WSA-MW-01

SE1000C
Environmental Logger
08/25 18:22

Unit# 01533 Test 3

INPUT 1: Level (F) TOC

Reference 1.686
Linearity 0.000
Scale factor 20.070
Offset -0.260
Delay mSEC 50.000

Step 1 08/25 11:32:24

Elapsed Time	INPUT 1
0.05	1.686
0.0666	1.356
0.0833	2.098
0.1	2.51
0.1166	2.313
0.1333	2.066
0.15	1.869
0.1666	1.711
0.1833	1.584
0.2	1.483
0.2166	1.413
0.2333	1.356
0.25	1.311
0.2666	1.273
0.2833	1.248
0.3	1.229
0.3166	1.216
0.3333	1.204
0.4166	1.166
0.5	1.147
0.5833	1.134
0.6666	1.128
0.75	1.121
0.8333	1.115
0.9166	1.115
1	1.109
1.0833	1.102
1.1666	1.102
1.25	1.102
1.3333	1.096
1.4166	1.096
1.5	1.09

SLUG OUT WSA-MW-02

SE1000C
Environmental Logger
08/25 18:18

Unit# 01533 Test 4

INPUT 1: Level (F) TOC

Reference 1.881
Linearity 0.000
Scale factor 20.070
Offset -0.260
Delay mSEC 50.000

Step 1 08/25 13:10:12

Elapsed Time	INPUT 1
0.05	0.81
0.0666	1.621
0.0833	1.881
0.1	1.799
0.1166	1.704
0.1333	1.615
0.15	1.545
0.1666	1.463
0.1833	1.387
0.2	1.317
0.2166	1.253
0.2333	1.184
0.25	1.127
0.2666	1.07
0.2833	1.013
0.3	0.968
0.3166	0.924
0.3333	0.879
0.4166	0.74
0.5	0.67
0.5833	0.619
0.6666	0.581
0.75	0.556
0.8333	0.537
0.9166	0.518
1	0.505
1.0833	0.493
1.1666	0.48
1.25	0.467
1.3333	0.455
1.4166	0.442
1.5	0.436
1.5833	0.429
1.6666	0.417
1.75	0.41
1.8333	0.404
1.9166	0.398
2	0.385

SLUG OUT WSA-MW-03

SE1000C
Environmental Logger
08/25 17:57

Unit# 01533 Test 5

INPUT 1: Level (F) TOC

Reference 1.358
Linearity 0.000
Scale factor 20.070
Offset -0.260
Delay mSEC 50.000

Step 1 08/25 15:06:02

Elapsed Time	INPUT 1
0.0666	1.358
0.0833	1.25
0.1	1.155
0.1166	1.067
0.1333	0.99
0.15	0.908
0.1666	0.838
0.1833	0.769
0.2	0.699
0.2166	0.642
0.2333	0.585
0.25	0.528
0.2666	0.471
0.2833	0.42
0.3	0.376
0.3166	0.331
0.3333	0.287
0.4166	0.141
0.5	0.071
0.5833	0.039
0.6666	0.014
0.75	0.001

SLUG OUT WSA-MW-04

SE1000C
Environmental Logger
08/25 17:45

Unit# 01533 Test 6

INPUT 1: Level (F) TOC

Reference 1.049
Linearity 0.000
Scale factor 20.070
Offset -0.260
Delay mSEC 50.000

Step 1 08/25 16:05:25

Elapsed Time	INPUT 1
0.03	1.049
0.0333	1.03
0.05	1.145
0.0666	0.891
0.0833	0.663
0.1	0.58
0.1166	0.561
0.1333	0.549
0.15	0.536
0.1666	0.542
0.1833	0.536
0.2	0.536
0.2166	0.536
0.2333	0.536
0.25	0.53
0.2666	0.53
0.2833	0.53
0.3	0.53

APPENDIX G

SURVEY DATA

MONITORING WELL & SOIL BORINGS SURVEY INFORMATION

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

WELL DESIGNATION	COORDINATES	ELEVATION	REMARKS
WSA-MW 01	N 1181492.8740 E 1136120.9853	G 546.37 C 548.33	
WSA-MW 02	N 1180469.0812 E 1136048.7610	G 531.99 C 533.95	
WSA-MW 03	N 1180971.2532 E 1134913.3834	G 527.48 C 530.34	
WSA-MW 04	N 1181718.3342 E 1134022.7089	G 517.41 C 519.24	
WSA-SB 01	N 1181779.8395 E 1135753.8331	G 537.10	
WSA-SB 02	N 1182047.5657 E 1133763.3400	G 514.51	
WSA-SB 03	N 1181782.3326 E 1134031.1046	G 518.00	
WSA-SB 04	N 1181102.0751 E 1135091.4271	G 530.92	

G designates elevation of ground at well or boring site.
C designates well casing elevation.
The above elevations are based on Defense Mapping Agency Report of Geodetic Survey Data dated 12 September 1978, Triangulation Station 11, Elev. 524.028.
The above coordinates are based on North American Datum (NAD) 1983 relative to Site 9A Master.

Joanne Darcy
Crum

MONITORING WELL & SOIL BORINGS SURVEY INFORMATION

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

WELL DESIGNATION	COORDINATES	ELEVATION	REMARKS
SG-01	N 1177541.7915 E 1131019.4381	G 475.82	
SG-02	N 1177511.7897 E 1131020.7423	G 475.78	
SG-03	N 1177472.8501 E 1131021.3051	G 475.57	
SG-04	N 1177451.7805 E 1131021.9986	G 475.72	
SG-05	N 1177421.1932 E 1131022.7375	G 475.73	
SG-06	N 1177384.8462 E 1131024.2907	G 475.56	
SG-07	N 1177527.1634 E 1131005.0604	G 475.23	
SG-08	N 1177510.9912 E 1131005.5652	G 475.78	
SG-09	N 1177496.7416 E 1131006.0535	G 475.95	
SG-10	N 1177481.4252 E 1131006.2955	G 474.73	
SG-11	N 1177466.9522 E 1131006.3599	G 474.65	
SG-12	N 1177453.0408 E 1131006.6771	G 474.54	
SG-13	N 1177421.1577 E 1131008.0157	G 474.74	
SG-15	N 1177496.1598 E 1130991.2556	G 475.59	

CONTINUED

NOTE: Soil gas points SB-15 through SB-17 mislabeled. See revisions on following pages.

Jeanne Daley
Chem

SG-16	N 1177481.1632 E 1130991.3550	G 475.59	
SG-17	N 1177466.2206 E 1130991.6322	G 475.55	
SG-22	N 1177501.6579 E 1131074.6864	G 475.81	
SG-23	N 1177486.9561 E 1131075.0470	G 475.81	
SG-24	N 1177471.4857 E 1131075.5722	G 475.72	
SB 215-01	N 1177523.6654 E 1131013.5919	G 476.14	
SB 215-02	N 1177496.1416 E 1131014.3409	G 475.85	
SB 215-03	N 1177472.2421 E 1131010.6378	G 475.49	
SB 215-04	N 1177434.8236 E 1131015.4371	G 475.86	
SB 215-05	N 1177405.5250 E 1131015.9747	G 475.56	
SB 215-06	N 1177392.6916 E 1131016.0469	G 475.30	
SB 215-07	N 1177514.7142 E 1131087.8416	G 476.26	
BLDG 215	N 1177546.0345 E 1131067.9978	G 475.96	NE CORNER
BLDG 215	N 1177380.7678 E 1131072.6770	G 475.88	SE CORNER
BLDG 215	N 1177379.5306 E 1131029.8078	G 475.85	SW CORNER
BLDG 215	N 1177544.7661 E 1131025.1272	G 475.88	NW CORNER

G designates elevation of ground at well or boring site.
C designates well casing elevation.
The above elevations are based on Defense Mapping Agency Report of Geodetic Survey Data dated 12 September 1978, Triangulation Station 2, Elev. 486.067.
The above coorinates are based on North American Datum (NAD) 1983 relative to Site 9A Master.

Joanne Darcy Cuss

JOANNE DARCY CRUM, L.S.
PROFESSIONAL LAND SURVEYOR

MONITORING WELL & SOIL BORINGS SURVEY INFORMATION

GRIFFISS AIR FORCE BASE
ROME, NEW YORK

WELL DESIGNATION	COORDINATES	ELEVATION	REMARKS
SG-01	N 1177541.7915 E 1131019.4381	G 475.82	
SG-02	N 1177511.7897 E 1131020.7423	G 475.78	
SG-03	N 1177472.8501 E 1131021.3051	G 475.57	
SG-04	N 1177451.7805 E 1131021.9986	G 475.72	
SG-05	N 1177421.1932 E 1131022.7375	G 475.73	
SG-06	N 1177384.8462 E 1131024.2907	G 475.56	
SG-07	N 1177527.1634 E 1131005.0604	G 475.23	
SG-08	N 1177510.9912 E 1131005.5652	G 475.78	
SG-09	N 1177496.7416 E 1131006.0535	G 475.95	
SG-10	N 1177481.4252 E 1131006.2955	G 474.73	
SG-11	N 1177466.9522 E 1131006.3599	G 474.65	
SG-12	N 1177453.0408 E 1131006.6771	G 474.54	
SG-13	N 1177421.1577 E 1131008.0157	G 474.74	
SG-14	N 1177496.1598 E 1130991.2556	G 475.59	

CONTINUED

45 WEST MAIN STREET ✦ COBLESKILL, NEW YORK 12043
TEL (518) 234-4650 ✦ FAX (518) 234-7405

SG-15	N 1177481.1632 E 1130991.3550	G 475.59	
SG-16	N 1177466.2206 E 1130991.6322	G 475.55	
SG-22	N 1177501.6579 E 1131074.6864	G 475.81	
SG-23	N 1177486.9561 E 1131075.0470	G 475.81	
SG-24	N 1177471.4857 E 1131075.5722	G 475.72	
SB 215-01	N 1177523.6654 E 1131013.5919	G 476.14	
SB 215-02	N 1177496.1416 E 1131014.3409	G 475.85	
SB 215-03	N 1177472.2421 E 1131010.6378	G 475.49	
SB 215-04	N 1177434.8236 E 1131015.4371	G 475.86	
SB 215-05	N 1177405.5250 E 1131015.9747	G 475.56	
SB 215-06	N 1177392.6916 E 1131016.0469	G 475.30	
SB 215-07	N 1177514.7142 E 1131087.8416	G 476.26	
BLDG 215	N 1177546.0345 E 1131067.9978	G 475.96	NE CORNER
BLDG 215	N 1177380.7678 E 1131072.6770	G 475.88	SE CORNER
BLDG 215	N 1177379.5306 E 1131029.8078	G 475.85	SW CORNER
BLDG 215	N 1177544.7661 E 1131025.1272	G 475.88	NW CORNER

CONTINUED

45 WEST MAIN STREET ◆ COBLESKILL, NEW YORK 12043
TEL (518) 234-4650 ◆ FAX (518) 234-7405

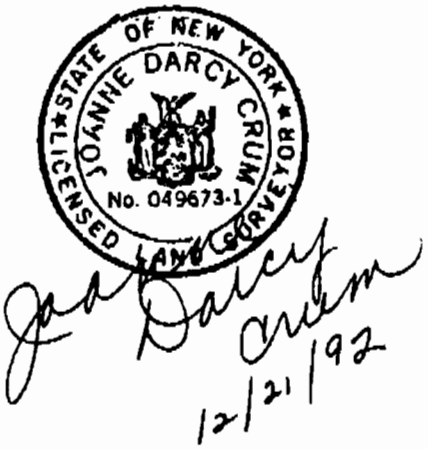
JOANNE DARCY CRUM, L.S.
PROFESSIONAL LAND SURVEYOR

The above elevations are based on Defense Mapping Agency Report of Geodetic Survey Data dated 12 September 1978, Triangulation Station 2, Elev. 486.067.
The above coorinates are based on North American Datum (NAD) 1983 relative to Site 9A Master.

REVISED 12/21/92

Revisions made to change I.D. numbers from SG-15 through SG-17 to SG-14 through SG-16 per phone request of Thomas Malecki on this date.

Joanne Darcy Crum, L.S.



45 WEST MAIN STREET ✦ COBLESKILL, NEW YORK 12043
TEL (518) 234-4650 ✦ FAX (518) 234-7405

APPENDIX H

ANALYTICAL DATA SUMMARY TABLES

OIL/WATER SEPARATOR

SOIL BORING SAMPLES

TOTAL ANALYTICAL DATA SUMMARY TABLES
OIL/WATER SEPARATOR
GRIFFISS AIR FORCE BASE
SOIL BORING SAMPLES
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SB21501 0–0.5'	SB21501 0.5–2'	SB21501 4–6'	SB21501 6–8'	SB21501 10–12'	SB21502 0–2'	SB21502 2–4'
TOTAL METALS									
Antimony	3050/6010	mg/kg(dry weight)	<3.42	<3.56	<3.23	<3.32	<3.4	<3.12	<3.11
Arsenic	3050/7060	mg/kg(dry weight)	5.68	2.53	3.62	4.37	3.33	4.78	5.04
Barium	3050/6010	mg/kg(dry weight)	80.2	66.4	60.3	86.2	48.2	49.1	46.8
Beryllium	3050/6010	mg/kg(dry weight)	<0.29	<0.30	<0.27	<0.28	<0.28	<0.26	<0.26
Cadmium	3050/6010	mg/kg(dry weight)	3.48	3.38	3.01	3.16	3.20	1.76	1.87
Chromium	3050/6010	mg/kg(dry weight)	13.0	8.07	10.9	10.6	8.52	7.16	5.08
Copper	3050/6010	mg/kg(dry weight)	27.5	16.0	27.8	32.0	42.9	22.6	17.6
Iron	3050/6010	mg/kg(dry weight)	23320	22260	20360	21460	27930	17440	13970
Lead	3050/7421	mg/kg(dry weight)	54.7	11.2	18.7	20.8	7.16	11.3	6.88
Manganese	3050/6010	mg/kg(dry weight)	852	1380	962	1010	1210	507	444
Mercury	7471	mg/kg(dry weight)	0.068	0.036	0.075	0.044	0.022	0.021	<0.021
Nickel	3050/6010	mg/kg(dry weight)	18.4	9.91	14.2	14.4	17.3	12.9	9.96
Selenium	3050/7740	mg/kg(dry weight)	<0.57	<0.60	<0.54	<0.55	0.56	<0.52	<0.52
Silver	3050/6010	mg/kg(dry weight)	<0.57	<0.60	<0.54	<0.55	<0.56	<0.52	<0.52
Thallium	3050/7841	mg/kg(dry weight)	<0.57	<0.60	<0.54	<0.55	<0.56	<0.52	<0.52
Zinc	3050/6010	mg/kg(dry weight)	71.7	40.6	46.2	51.4	50.1	53.8	44.0
TRPH	9071/418.1	mg/kg(dry weight)	97.3	<29.7	<26.9	33.5	<28.0	<26.0	<26.0

FOOTNOTES:
1) SB215 0301 (2–4') is a duplicate of SB215 03 (2–4')
2) SB215 0301 (6–8') is a duplicate of SB215 03 (6–8')
3) SB215 004 (10–12') is a duplicate of SB215 04 (10–12')
4) SB215 0601 (10–12') is a duplicate of SB215 06 (10–12')

TOTAL ANALYTICAL DATA SUMMARY TABLES
OIL/WATER SEPARATOR
GRIFFISS AIR FORCE BASE
SOIL BORING SAMPLES
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SB21502 4-6'	SB21502 6-8'	SB21503 0-0.5'	SB21503 2-4'	SB2150301 2-4'	SB21503 4-6'	SB21503 6-8'
TOTAL METALS									
Antimony	3050/6010	mg/kg(dry weight)	<3.37	<3.26	<3.21	<3.35	<3.36	<3.27	<3.37
Arsenic	3050/7060	mg/kg(dry weight)	7.48	3.43	4.36	3.16	2.91	3.81	2.65
Barium	3050/6010	mg/kg(dry weight)	66.0	42.2	61.2	46.0	53.2	51.0	41.7
Beryllium	3050/6010	mg/kg(dry weight)	<0.28	<0.27	<0.27	<0.28	<0.28	<0.27	<0.28
Cadmium	3050/6010	mg/kg(dry weight)	3.31	2.61	2.08	3.18	2.46	3.00	2.86
Chromium	3050/6010	mg/kg(dry weight)	11.4	8.26	6.84	9.93	7.95	9.76	8.54
Copper	3050/6010	mg/kg(dry weight)	27.8	32.2	22.6	30.4	23.7	32.5	34.6
Iron	3050/6010	mg/kg(dry weight)	22780	22480	17010	23520	18050	23860	21940
Lead	3050/7421	mg/kg(dry weight)	43.1	9.67	15.6	14.8	12.5	38.1	8.34
Manganese	3050/6010	mg/kg(dry weight)	876	828	559	923	782	1130	956
Mercury	7471	mg/kg(dry weight)	0.045	0.043	0.043	0.045	0.045	0.054	0.034
Nickel	3050/6010	mg/kg(dry weight)	14.4	15.6	13.0	16.1	12.6	15.9	16.2
Selenium	3050/7740	mg/kg(dry weight)	<0.56	<0.54	<0.53	<0.56	<0.56	<0.54	<0.56
Silver	3050/6010	mg/kg(dry weight)	<0.56	<0.54	<0.53	<0.56	<0.56	<0.54	<0.56
Thallium	3050/7841	mg/kg(dry weight)	<0.56	<0.54	<0.53	<0.56	<0.56	<0.54	<0.56
Zinc	3050/6010	mg/kg(dry weight)	60.9	49.2	42.8	69.0	49.1	58.4	47.3
TRPH	9071/418.1	mg/kg(dry weight)	<28.0	<27.2	<26.7	<27.9	<28.0	<27.3	<28.1

FOOTNOTES:
1) SB215 0301 (2-4') is a duplicate of SB215 03 (2-4')
2) SB215 0301 (6-8') is a duplicate of SB215 03 (6-8')
3) SB215 004 (10-12') is a duplicate of SB215 04 (10-12')
4) SB215 0601 (10-12') is a duplicate of SB215 06 (10-12')

TOTAL ANALYTICAL DATA SUMMARY TABLES
OIL/WATER SEPARATOR
GRIFFISS AIR FORCE BASE
SOIL BORING SAMPLES
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SB2150301 6-8'	SB21504 0-0.5'	SB21504 0-2'	SB21504 4-6'	SB21504 6-8'	SB21504 8-10'	SB21504 10-12'	SB215004 10-12'
TOTAL METALS										
Antimony	3050/6010	mg/kg(dry weight)	<3.28	<3.40	<3.52	<3.38	<3.29	<3.46	<3.24	<3.26
Arsenic	3050/7060	mg/kg(dry weight)	2.54	5.77	2.55	2.64	2.43	2.70	1.94	1.90
Barium	3050/6010	mg/kg(dry weight)	40.0	66.4	79.6	50.7	32.0	58.1	17.1	20.8
Beryllium	3050/6010	mg/kg(dry weight)	<0.27	<0.28	<0.29	<0.28	<0.27	<0.29	<0.27	<0.27
Cadmium	3050/6010	mg/kg(dry weight)	2.62	2.78	3.29	2.65	2.52	3.00	1.67	1.95
Chromium	3050/6010	mg/kg(dry weight)	7.70	8.73	9.39	9.53	6.80	12.4	6.21	6.13
Copper	3050/6010	mg/kg(dry weight)	35.4	25.4	19.2	23.4	29.4	24.2	22.7	20.6
Iron	3050/6010	mg/kg(dry weight)	21740	23530	21880	18340	22350	23070	17710	16210
Lead	3050/7421	mg/kg(dry weight)	7.79	30.7	10.7	20.5	5.10	17.8	4.43	4.46
Manganese	3050/6010	mg/kg(dry weight)	1090	1190	1330	880	921	1110	518	441
Mercury	7471	mg/kg(dry weight)	0.033	0.057	0.070	0.056	0.033	0.058	<0.022	<0.022
Nickel	3050/6010	mg/kg(dry weight)	14.5	15.2	11.1	12.8	11.6	13.8	12.3	11.0
Selenium	3050/7740	mg/kg(dry weight)	<0.55	<0.57	<0.59	<0.56	<0.55	<0.58	<0.54	<0.54
Silver	3050/6010	mg/kg(dry weight)	<0.55	<0.57	<0.59	<0.56	<0.55	<0.58	<0.54	<0.54
Thallium	3050/7841	mg/kg(dry weight)	<0.55	<0.57	<0.59	<0.56	<0.55	<0.58	<0.54	<0.54
Zinc	3050/6010	mg/kg(dry weight)	51.4	52.4	53.3	54.9	46.6	49.0	33.8	30.6
TRPH	9071/418.1	mg/kg(dry weight)	<27.3	<28.3	<29.3	<28.2	<27.4	<28.8	<27.0	<27.1

FOOTNOTES:
1) SB215 0301 (2-4') is a duplicate of SB215 03 (2-4')
2) SB215 0301 (6-8') is a duplicate of SB215 03 (6-8')
3) SB215 004 (10-12') is a duplicate of SB215 04 (10-12')
4) SB215 0601 (10-12') is a duplicate of SB215 06 (10-12')

TOTAL ANALYTICAL DATA SUMMARY TABLES
OIL/WATER SEPARATOR
GRIFFISS AIR FORCE BASE
SOIL BORING SAMPLES
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SB21505 0-2'	SB21505 2-4'	SB21505 4-6'	SB21505 8-10'	SB21505 10-12'	SB21506 0-2'	SB21506 2-4'	SB21506 4-6'	SB21506 10-12'
TOTAL METALS											
Antimony	3050/6010	mg/kg(dry weight)	<3.50	<3.48	<3.50	<3.25	<3.30	<3.60	<3.28	<3.44	<3.28
Arsenic	3050/7060	mg/kg(dry weight)	4.60	2.71	5.43	2.84	3.44	3.78	5.04	4.89	2.72
Barium	3050/6010	mg/kg(dry weight)	88.6	48.4	70.1	28.4	29.5	113	53.3	59.6	24.9
Beryllium	3050/6010	mg/kg(dry weight)	<0.29	<0.29	<0.29	<0.27	<0.28	<0.3	<0.27	<0.29	<0.27
Cadmium	3050/6010	mg/kg(dry weight)	3.32	2.49	3.27	2.60	2.36	3.18	3.33	3.26	2.18
Chromium	3050/6010	mg/kg(dry weight)	9.62	7.65	15.4	7.15	14.5	8.04	9.84	14.0	7.21
Copper	3050/6010	mg/kg(dry weight)	24.0	15.5	35.3	23.3	28.6	18.2	33.7	34.1	25.7
Iron	3050/6010	mg/kg(dry weight)	25070	18350	25700	18530	20530	23990	24600	25040	19180
Lead	3050/7421	mg/kg(dry weight)	30.0	5.08	23.7	4.70	5.40	19.4	5.37	30.6	5.03
Manganese	3050/6010	mg/kg(dry weight)	1600	901	1060	506	752	163	1030	1060	557
Mercury	7471	mg/kg(dry weight)	0.082	0.046	0.082	0.022	0.033	0.048	0.044	0.057	0.022
Nickel	3050/6010	mg/kg(dry weight)	13.3	8.81	15.8	11.5	12.4	9.18	13.7	14.8	10.8
Selenium	3050/7740	mg/kg(dry weight)	<0.58	<0.58	<0.58	<0.54	<0.55	<0.60	<0.55	<0.57	<0.55
Silver	3050/6010	mg/kg(dry weight)	<0.58	<0.58	<0.58	<0.54	<0.55	<0.60	<0.55	<0.57	<0.55
Thallium	3050/7841	mg/kg(dry weight)	<0.58	<0.58	<0.58	<0.54	<0.55	<0.60	<0.55	<0.57	<0.55
Zinc	3050/6010	mg/kg(dry weight)	212	41.4	67.3	32.3	40.7	53.3	43.1	63.3	35.8
TRPH	9071/418.1	mg/kg(dry weight)	<29.1	<29.0	<29.2	<27.1	<27.5	<30.0	<27.3	165	<27.3

FOOTNOTES:
1) SB215 0301 (2-4') is a duplicate of SB215 03 (2-4')
2) SB215 0301 (6-8') is a duplicate of SB215 03 (6-8')
3) SB215 004 (10-12') is a duplicate of SB215 04 (10-12')
4) SB215 0601 (10-12') is a duplicate of SB215 06 (10-12')

TOTAL ANALYTICAL DATA SUMMARY TABLES
OIL/WATER SEPARATOR
GRIFFISS AIR FORCE BASE
SOIL BORING SAMPLES
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SB2150601 10–12'	SB21507 0–2'	SB21507 2–4'	SB21507 8–10'	SB21507 10–12'
TOTAL METALS							
Antimony	3050/6010	mg/kg(dry weight)	<3.25	<3.48	<3.28	<3.30	<3.29
Arsenic	3050/7060	mg/kg(dry weight)	2.62	2.75	3.82	8.22	5.88
Barium	3050/6010	mg/kg(dry weight)	36.1	97.6	29.0	54.1	33.4
Beryllium	3050/6010	mg/kg(dry weight)	<0.27	<0.29	<0.27	<0.28	<0.27
Cadmium	3050/6010	mg/kg(dry weight)	2.16	3.25	3.66	3.36	3.07
Chromium	3050/6010	mg/kg(dry weight)	6.06	8.71	13.3	14.1	10.8
Copper	3050/6010	mg/kg(dry weight)	29.4	16.8	52.4	40.7	33.8
Iron	3050/6010	mg/kg(dry weight)	19050	21490	24740	26180	26670
Lead	3050/7421	mg/kg(dry weight)	4.75	16.3	7.79	15.3	7.99
Manganese	3050/6010	mg/kg(dry weight)	764	914	696	1330	1020
Mercury	7471	mg/kg(dry weight)	<0.022	0.035	0.033	0.044	<0.022
Nickel	3050/6010	mg/kg(dry weight)	11.3	10.8	22.3	14.7	15.8
Selenium	3050/7740	mg/kg(dry weight)	<0.54	<0.58	<0.55	<0.55	<0.55
Silver	3050/6010	mg/kg(dry weight)	<0.54	<0.58	<0.55	<0.55	<0.55
Thallium	3050/7841	mg/kg(dry weight)	<0.54	<0.58	<0.55	<0.55	<0.55
Zinc	3050/6010	mg/kg(dry weight)	43.1	51.6	40.9	52.8	52.5
TRPH	9071/418.1	mg/kg(dry weight)	<27.1	<29.0	<27.3	<27.5	<27.4

FOOTNOTES:
1) SB215 0301 (2–4') is a duplicate of SB215 03 (2–4')
2) SB215 0301 (6–8') is a duplicate of SB215 03 (6–8')
3) SB215 004 (10–12') is a duplicate of SB215 04 (10–12')
4) SB215 0601 (10–12') is a duplicate of SB215 06 (10–12')

WEAPONS STORAGE AREA

SHALLOW SOIL SAMPLES

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
SHALLOW SOIL BORING SAMPLES

PARAMETER	UNITS	WSASB1BG	WSASB2 0–0.5'	WSASB2 0.5–1'	WSASB201* 0.5–1'	WSASB2 1–2'	WSASB3 0–0.5'
Base Neutral/Acids, Method 8270							
1,2,4–Trichlorobenzene	microgram/kilogram	<360	<350	<350	<350	<350	<360
1,2–Dichlorobenzene	microgram/kilogram	<360	<350	<350	<350	<350	<360
1,3–Dichlorobenzene	microgram/kilogram	<360	<350	<350	<350	<350	<360
1,4–Dichlorobenzene	microgram/kilogram	<360	<350	<350	<350	<350	<360
2,4,5–Trichlorophenol	microgram/kilogram	<1760	<1700	<1680	<1680	<1680	<1740
2,4,6–Trichlorophenol	microgram/kilogram	<360	<350	<350	<350	<350	<360
2,4–Dichlorophenol	microgram/kilogram	<360	<350	<350	<350	<350	<360
2,4–Dimethylphenol	microgram/kilogram	<360	<350	<350	<350	<350	<360
2,4–Dinitrophenol	microgram/kilogram	<1760	<1700	<1680	<1680	<1680	<1740
2,4–Dinitrotoluene	microgram/kilogram	<360	<350	<350	<350	<350	<360
2,6–Dinitrotoluene	microgram/kilogram	<360	<350	<350	<350	<350	<360
2–Chloronaphthalene	microgram/kilogram	<360	<350	<350	<350	<350	<360
2–Chlorophenol	microgram/kilogram	<360	<350	<350	<350	<350	<360
2–Methylnaphthylene	microgram/kilogram	<360	<350	<350	<350	<350	<360
2–Methylphenyl	microgram/kilogram	<360	<350	<350	<350	<350	<360
2–Nitroaniline	microgram/kilogram	<1760	<1700	<1680	<1680	<1680	<1740
2–Nitrophenol	microgram/kilogram	<360	<350	<350	<350	<350	<360
3–Nitroaniline	microgram/kilogram	<1760	<1700	<1680	<1680	<1680	<1740
4–Chloro–3–methylphenol	microgram/kilogram	<360	<350	<350	<350	<350	<360
4–Chloroaniline	microgram/kilogram	<360	<350	<350	<350	<350	<360
4–Methylphenol	microgram/kilogram	<360	<350	<350	<350	<350	<360
4–Nitrophenol	microgram/kilogram	<1760	<1700	<1680	<1680	<1680	<1740
Acenaphthene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Acenaphthylene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Benzoic Acid	microgram/kilogram	<1760	<1700	<1680	<1680	<1680	38 JB
Benzyl Alcohol	microgram/kilogram	<360	<350	<350	<350	<350	<360
Dibenzofuran	microgram/kilogram	<360	<350	<350	<350	<350	<360
Dimethylphthalate	microgram/kilogram	<360	<350	<350	<350	<350	<360
Hexachlorobutadiene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Hexachlorocyclopentadiene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Hexachloroethane	microgram/kilogram	<360	<350	<350	<350	<350	<360
Isophorone	microgram/kilogram	<360	<350	<350	<350	<350	<360
N–Nitrosodimethylamine	microgram/kilogram	<360	<350	<350	<350	<350	<360
N–nitroso–di–n–propylamine	microgram/kilogram	<360	<350	<350	<350	<350	<360
Naphthalene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Nitrobenzene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Phenol	microgram/kilogram	<360	<350	<350	<350	<350	<360
bis(2–Chloroethoxy)methane	microgram/kilogram	<360	<350	<350	<350	<350	<360
bis(2–Chloroethyl)ether	microgram/kilogram	<360	<350	<350	<350	<350	<360
bis(2–Chloroisopropyl)ether	microgram/kilogram	<360	<350	<350	<350	<350	<360
Diethylphthalate	microgram/kilogram	<360	<350	<350	<350	<350	<360

* – Sample WSASB201(0.5–1') is a duplicate of sample WSASB2(0.5–1')

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
SHALLOW SOIL BORING SAMPLES

PARAMETER	UNITS	WSASB1BG	WSASB2 0–0.5'	WSASB2 0.5–1'	WSASB201* 0.5–1'	WSASB2 1–2'	WSASB3 0–0.5'
Base Neutral/Acids, Method 8270 (cont'd)							
4–Chlorophenyl phenyl ether	microgram/kilogram	<360	<350	<350	<350	<350	<360
Fluorene	microgram/kilogram	<360	<350	<350	<350	<350	<360
4–Nitroaniline	microgram/kilogram	<1760	<1700	<1680	<1680	<1680	<1740
4,6–Dinitro–2–methylphenol	microgram/kilogram	<1760	<1700	<1680	<1680	<1680	<1740
N–nitrosodiphenylamine	microgram/kilogram	<360	<350	<350	<350	<350	<360
4–Bromophenyl phenyl ether	microgram/kilogram	<360	<350	<350	<350	<350	<360
Hexachlorobenzene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Pentachlorophenol	microgram/kilogram	<1760	<1700	<1680	<1680	<1680	<1740
Phenanthrene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Benzidine	microgram/kilogram	<360	<350	<350	<350	<350	<360
Anthracene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Di–n–butylphthalate	microgram/kilogram	<360	<350	<350	<350	<350	<360
Fluoranthene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Pyrene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Benzylbutylphthalate	microgram/kilogram	<360	<350	<350	<350	<350	<360
3,3–Dichlorobenzidine	microgram/kilogram	<725	<700	<700	<700	<700	<720
Benzo(a)anthracene	microgram/kilogram	<360	<350	<350	<350	<350	<360
bis(2–Ethylhexyl)phthalate	microgram/kilogram	<360	<350	<350	<350	<350	<360
Chrysene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Di–n–octylphthalate	microgram/kilogram	<360	<350	<350	<350	<350	<360
Benzo(b)fluoranthene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Benzo(k)fluoranthene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Benzo(a)pyrene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Indeno(1,2,3–cd)pyrene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Dibenzo(a,h)anthracene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Benzo(g,h,i)perylene	microgram/kilogram	<360	<350	<350	<350	<350	<360
Law Env'l Metals in Solid							
Antimony	mg/kg(dry weight)	<3.3	<3.2	<3.2	3.16	3.16	<3.3
Arsenic	mg/kg(dry weight)	1.74	2.70	1.52	1.61	2.17	3.01
Barium	mg/kg(dry weight)	18.7	16.9	9.7	12.1	17.8	37.8
Beryllium	mg/kg(dry weight)	<0.275	<0.26	<0.26	<0.26	<0.26	<0.27
Cadmium	mg/kg(dry weight)	1.81	2.2	1.26	1.3	1.47	2.83
Chromium	mg/kg(dry weight)	4.2	6.2	3.05	3.2	3.05	8.04
Copper	mg/kg(dry weight)	10.8	15.2	10.1	9.9	11.4	24.1
Iron	mg/kg(dry weight)	11470	13510	8750	8940	10170	20960
Lead	mg/kg(dry weight)	4.94	3.65	1.65	1.82	2.65	17.6
Manganese	mg/kg(dry weight)	434	330	145	174	193	775
Mercury	mg/kg(dry weight)	<0.022	0.032	0.032	<0.021	<0.021	0.043
Nickel	mg/kg(dry weight)	6.2	8.94	4.84	4.53	5.1	10.6
Selenium	mg/kg(dry weight)	<0.55	<0.53	<0.53	<0.53	<0.53	<0.54

* – Sample WSASB201(0.5–1') is a duplicate of sample WSASB2(0.5–1')

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
SHALLOW SOIL BORING SAMPLES

PARAMETER	UNITS	WSASB1BG	WSASB2 0–0.5'	WSASB2 0.5–1'	WSASB201* 0.5–1'	WSASB2 1–2'	WSASB3 0–0.5'
Law Env'l Metals in Solid (cont'd)							
Silver	mg/kg(dry weight)	<0.55	<0.53	<0.53	<0.53	<0.53	<0.54
Thallium	mg/kg(dry weight)	<0.55	<0.53	<0.53	<0.53	<0.53	<0.54
Zinc	mg/kg(dry weight)	18.5	21.3	12.1	12.2	13.5	45.8
Total Solids, % (as received)		91%	94%	95%	95%	95%	92%
Purgeable Volatile Organics, Method 8240							
1,1,1–Trichloroethane	ug/kg(dry weight)	<27	<27	6.8 J	<26	<26	<27
1,1,2,2–Tetrachloroethane	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
1,1,2–Trichloroethane	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
1,1–Dichloroethane	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
1,1–Dichloroethene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
1,2–Dichloroethane	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
1,2–Dichloroethene (Total)	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
1,2–Dichloropropane	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
1,3–Dichlorobenzene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
1,4–Dichlorobenzene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
2–Butanone	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
2–Chloroethylvinylether	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
2–Hexanone	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
4–Methyl–2–Pentanone	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Acetone	ug/kg(dry weight)	49 JB	19 JB	51 JB	49 JB	32 JB	33 JB
Acrolein	ug/kg(dry weight)	<270	<270	<260	<260	<260	<270
Acrylonitrile	ug/kg(dry weight)	<270	<270	<260	<260	<260	<270
Benzene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Bromodichloromethane	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Bromoform	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Bromomethane	ug/kg(dry weight)	<55	<53	<53	<53	<53	<54
Carbon Disulfide	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Carbon Tetrachloride	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Chlorobenzene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Chloroethane	ug/kg(dry weight)	<55	<53	<53	<53	<53	<54
Chloroform	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Chloromethane	ug/kg(dry weight)	<55	<53	<53	<53	28 J	<54
Dibromochloromethane	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Ethylbenzene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Methylene Chloride	ug/kg(dry weight)	25 JB	<27	6.8 JB	7.4 JB	8.4 JB	8.7 JB
Styrene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Tetrachloroethene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Toluene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27

* – Sample WSASB201(0.5–1') is a duplicate of sample WSASB2(0.5–1')
J – Estimated result
B – Result estimated; may be biased high or false positive due to blank contamination

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
SHALLOW SOIL BORING SAMPLES

PARAMETER	UNITS	WSASB1BG	WSASB2 0–0.5'	WSASB2 0.5–1'	WSASB201* 0.5–1'	WSASB2 1–2'	WSASB3 0–0.5'
Purgeable Volatile Organics, Method 8240 (cont'd)							
Total Xylenes	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Trichloroethene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Trichlorofluoromethane	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Vinyl Acetate	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
Vinyl Chloride	ug/kg(dry weight)	<55	<53	<53	<53	<53	<54
cis–1,3–Dichloropropene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27
trans–1,3–Dichloropropene	ug/kg(dry weight)	<27	<27	<26	<26	<26	<27

* – Sample WSASB201(0.5–1') is a duplicate of sample WSASB2(0.5–1')

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
SHALLOW SOIL BORING SAMPLES

PARAMETER	UNITS	WSASB3 0.5–1'	WSASB3 1–2'	WSASB4 0–0.5'	WSASB4 0.5–1'	WSASB4 1–2'
Base Neutral/Acids, Method 8270						
1,2,4–Trichlorobenzene	microgram/kilogram	<360	<370	<350	<350	<350
1,2–Dichlorobenzene	microgram/kilogram	<360	<370	<350	<350	<350
1,3–Dichlorobenzene	microgram/kilogram	<360	<370	<350	<350	<350
1,4–Dichlorobenzene	microgram/kilogram	<360	<370	<350	<350	<350
2,4,5–Trichlorophenol	microgram/kilogram	<1740	<1800	<1680	<1700	<1680
2,4,6–Trichlorophenol	microgram/kilogram	<360	<370	<350	<350	<350
2,4–Dichlorophenol	microgram/kilogram	<360	<370	<350	<350	<350
2,4–Dimethylphenol	microgram/kilogram	<360	<370	<350	<350	<350
2,4–Dinitrophenol	microgram/kilogram	<1740	<1800	<1680	<1700	<1680
2,4–Dinitrotoluene	microgram/kilogram	<360	<370	<350	<350	<350
2,6–Dinitrotoluene	microgram/kilogram	<360	<370	<350	<350	<350
2–Chloronaphthalene	microgram/kilogram	<360	<370	<350	<350	<350
2–Chlorophenol	microgram/kilogram	<360	<370	<350	<350	<350
2–Methylnaphthylene	microgram/kilogram	<360	<370	<350	<350	<350
2–Methylphenyl	microgram/kilogram	<360	<370	<350	<350	<350
2–Nitroaniline	microgram/kilogram	<1740	<1800	<1680	<1700	<1680
2–Nitrophenol	microgram/kilogram	<360	<370	<350	<350	<350
3–Nitroaniline	microgram/kilogram	<1740	<1800	<1680	<1700	<1680
4–Chloro–3–methylphenol	microgram/kilogram	<360	<370	<350	<350	<350
4–Chloroaniline	microgram/kilogram	<360	<370	<350	<350	<350
4–Methylphenol	microgram/kilogram	<360	<370	<350	<350	<350
4–Nitrophenol	microgram/kilogram	<1740	<1800	<1680	<1700	<1680
Acenaphthene	microgram/kilogram	<360	<370	<350	<350	<350
Acenaphthylene	microgram/kilogram	<360	<370	<350	<350	<350
Benzoic Acid	microgram/kilogram	<1740	<1800	<1680	<1700	<1680
Benzyl Alcohol	microgram/kilogram	<360	<370	<350	<350	<350
Dibenzofuran	microgram/kilogram	<360	<370	<350	<350	<350
Dimethylphthalate	microgram/kilogram	<360	<370	<350	<350	<350
Hexachlorobutadiene	microgram/kilogram	<360	<370	<350	<350	<350
Hexachlorocyclopentadiene	microgram/kilogram	<360	<370	<350	<350	<350
Hexachloroethane	microgram/kilogram	<360	<370	<350	<350	<350
Isophorone	microgram/kilogram	<360	<370	<350	<350	<350
N–Nitrosodimethylamine	microgram/kilogram	<360	<370	<350	<350	<350
N–nitroso–di–n–propylamine	microgram/kilogram	<360	<370	<350	<350	<350
Naphthalene	microgram/kilogram	<360	<370	<350	<350	<350
Nitrobenzene	microgram/kilogram	<360	<370	<350	<350	<350
Phenol	microgram/kilogram	<360	<370	<350	<350	<350
bis(2–Chloroethoxy)methane	microgram/kilogram	<360	<370	<350	<350	<350
bis(2–Chloroethyl)ether	microgram/kilogram	<360	<370	<350	<350	<350
bis(2–Chloroisopropyl)ether	microgram/kilogram	<360	<370	<350	<350	<350
Diethylphthalate	microgram/kilogram	<360	<370	<350	<350	<350

* – Sample WSASB201(0.5–1') is a duplicate of sample WSASB2(0.5–1')

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
SHALLOW SOIL BORING SAMPLES

PARAMETER	UNITS	WSASB3 0.5–1'	WSASB3 1–2'	WSASB4 0–0.5'	WSASB4 0.5–1'	WSASB4 1–2'
Base Neutral/Acids, Method 8270 (cont'd)						
4–Chlorophenyl phenyl ether	microgram/kilogram	<360	<370	<350	<350	<350
Fluorene	microgram/kilogram	<360	<370	<350	<350	<350
4–Nitroaniline	microgram/kilogram	<1740	<1800	<1680	<1700	<1680
4,6–Dinitro–2–methylphenol	microgram/kilogram	<1740	<1800	<1680	<1700	<1680
N–nitrosodiphenylamine	microgram/kilogram	<360	<370	<350	<350	<350
4–Bromophenyl phenyl ether	microgram/kilogram	<360	<370	<350	<350	<350
Hexachlorobenzene	microgram/kilogram	<360	<370	<350	<350	<350
Pentachlorophenol	microgram/kilogram	<1740	<1800	<1680	<1700	<1680
Phenanthrene	microgram/kilogram	<360	<370	<350	<350	<350
Benzidine	microgram/kilogram	<360	<370	<350	<350	<350
Anthracene	microgram/kilogram	<360	<370	<350	<350	<350
Di–n–butylphthalate	microgram/kilogram	<360	<370	<350	<350	<350
Fluoranthene	microgram/kilogram	<360	<370	<350	<350	<350
Pyrene	microgram/kilogram	<360	<370	<350	<350	<350
Benzylbutylphthalate	microgram/kilogram	<360	<370	<350	<350	<350
3,3–Dichlorobenzidine	microgram/kilogram	<720	<740	<690	<700	<700
Benzo(a)anthracene	microgram/kilogram	<360	43 J	<350	<350	<350
bis(2–Ethylhexyl)phthalate	microgram/kilogram	<360	<370	57 J	<350	<350
Chrysene	microgram/kilogram	<360	<370	<350	<350	<350
Di–n–octylphthalate	microgram/kilogram	<360	<370	<350	<350	<350
Benzo(b)fluoranthene	microgram/kilogram	<360	<370	<350	<350	<350
Benzo(k)fluoranthene	microgram/kilogram	<360	<370	<350	<350	<350
Benzo(a)pyrene	microgram/kilogram	<360	<370	<350	<350	<350
Indeno(1,2,3–cd)pyrene	microgram/kilogram	<360	<370	<350	<350	<350
Dibenzo(a,h)anthracene	microgram/kilogram	<360	<370	<350	<350	<350
Benzo(g,h,i)perylene	microgram/kilogram	<360	<370	<350	<350	<350
Law Env'l Metals in Solid						
Antimony	mg/kg(dry weight)	<3.3	<3.4	<3.2	<3.2	<3.2
Arsenic	mg/kg(dry weight)	2.85	3.04	3.77	3.37	3.21
Barium	mg/kg(dry weight)	29.8	28.5	31.6	29.6	23.2
Beryllium	mg/kg(dry weight)	<0.27	<0.28	<0.26	<0.26	<0.26
Cadmium	mg/kg(dry weight)	2.6	2.7	3.37	3.2	2.5
Chromium	mg/kg(dry weight)	8.3	7.2	10.4	8.5	6.42
Copper	mg/kg(dry weight)	16.6	18.5	31.8	36.3	27.4
Iron	mg/kg(dry weight)	16290	18540	24300	23560	19420
Lead	mg/kg(dry weight)	6.33	3.61	7.20	5.92	4.12
Manganese	mg/kg(dry weight)	505	530	1030	980	745
Mercury	mg/kg(dry weight)	0.033	0.034	0.021	<0.021	<0.021
Nickel	mg/kg(dry weight)	8.3	10.2	13.4	14.8	12.8
Selenium	mg/kg(dry weight)	<0.54	<0.56	1.93	1.92	<0.53

* – Sample WSASB201(0.5–1') is a duplicate of sample WSASB2(0.5–1')

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
SHALLOW SOIL BORING SAMPLES

PARAMETER	UNITS	WSASB3 0.5–1'	WSASB3 1–2'	WSASB4 0–0.5'	WSASB4 0.5–1'	WSASB4 1–2'
Law Env'l Metals in Solid (cont'd)						
Silver	mg/kg(dry weight)	<0.54	<0.56	<0.53	<0.53	<0.53
Thallium	mg/kg(dry weight)	<0.54	<0.56	<0.53	<0.53	<0.53
Zinc	mg/kg(dry weight)	31.5	35.3	43.2	40.6	35.8
Total Solids, % (as received)		92%	89%	95%	94%	95%
Purgeable Volatile Organics, Method 8240						
1,1,1–Trichloroethane	ug/kg(dry weight)	<27	<28	<26	<27	<26
1,1,2,2–Tetrachloroethane	ug/kg(dry weight)	<27	<28	<26	<27	<26
1,1,2–Trichloroethane	ug/kg(dry weight)	<27	<28	<26	<27	<26
1,1–Dichloroethane	ug/kg(dry weight)	<27	<28	<26	<27	<26
1,1–Dichloroethene	ug/kg(dry weight)	<27	<28	<26	<27	<26
1,2–Dichloroethane	ug/kg(dry weight)	<27	<26	<26	<27	<26
1,2–Dichloroethene (Total)	ug/kg(dry weight)	<27	<28	<26	<27	<26
1,2–Dichloropropane	ug/kg(dry weight)	<27	<28	<26	<27	<26
1,3–Dichlorobenzene	ug/kg(dry weight)	<27	<28	<26	<27	<26
1,4–Dichlorobenzene	ug/kg(dry weight)	<27	<28	<26	<27	<26
2–Butanone	ug/kg(dry weight)	<27	<28	<26	<27	<26
2–Chloroethylvinylether	ug/kg(dry weight)	<27	<28	<26	<27	<26
2–Hexanone	ug/kg(dry weight)	<27	<28	<26	<27	<26
4–Methyl–2–Pentanone	ug/kg(dry weight)	<27	<28	<26	<27	<26
Acetone	ug/kg(dry weight)	53 JB	49 JB	39 JB	5 JB	26 B
Acrolein	ug/kg(dry weight)	<270	<280	<260	<270	<260
Acrylonitrile	ug/kg(dry weight)	<270	<280	<260	<270	<260
Benzene	ug/kg(dry weight)	<27	<28	<26	<27	<26
Bromodichloromethane	ug/kg(dry weight)	<27	<28	<26	<27	<26
Bromoform	ug/kg(dry weight)	<27	<28	<26	<27	<26
Bromomethane	ug/kg(dry weight)	<54	<56	<53	<53	<53
Carbon Disulfide	ug/kg(dry weight)	<27	<28	<26	<27	<26
Carbon Tetrachloride	ug/kg(dry weight)	<27	<28	<26	<27	<26
Chlorobenzene	ug/kg(dry weight)	<27	<28	<26	<27	<26
Chloroethane	ug/kg(dry weight)	<54	<56	<53	<53	<53
Chloroform	ug/kg(dry weight)	<27	<26	<26	<27	<26
Chloromethane	ug/kg(dry weight)	<54	<56	<53	<53	<53
Dibromochloromethane	ug/kg(dry weight)	<27	<28	<26	<27	<26
Ethylbenzene	ug/kg(dry weight)	<27	<28	<26	<27	<26
Methylene Chloride	ug/kg(dry weight)	23 JB	26 JB	23 JB	6 JB	<26
Styrene	ug/kg(dry weight)	<27	<28	<26	<27	<26
Tetrachloroethene	ug/kg(dry weight)	<27	<28	<26	<27	<26
Toluene	ug/kg(dry weight)	<27	<28	<26	<27	<26

* – Sample WSASB201(0.5–1') is a duplicate of sample WSASB2(0.5–1')
J – Estimated result
B – Result estimated; may be biased high or false positive due to blank contamination

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
SHALLOW SOIL BORING SAMPLES

PARAMETER	UNITS	WSASB3 0.5–1'	WSASB3 1–2'	WSASB4 0–0.5'	WSASB4 0.5–1'	WSASB4 1–2'
Total Xylenes	ug/kg(dry weight)	<27	<28	<26	<27	<26
Trichloroethene	ug/kg(dry weight)	<27	<28	<26	<27	<26
Trichlorofluoromethane	ug/kg(dry weight)	<27	<28	<26	<27	<26
Vinyl Acetate	ug/kg(dry weight)	<27	<28	<26	<27	<26
Vinyl Chloride	ug/kg(dry weight)	<54	<56	<53	<53	<53
cis–1,3–Dichloropropene	ug/kg(dry weight)	<27	<28	<26	<27	<26
trans–1,3–Dichloropropene	ug/kg(dry weight)	<27	<28	<26	<27	<26

* – Sample WSASB201(0.5–1') is a duplicate of sample WSASB2(0.5–1')

WEAPONS STORAGE AREA

DEEP SOIL SAMPLES

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
DEEP SOIL SAMPLES FROM MONITORING WELL BORINGS
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SBMW1 0–0.5'	SBMW1 0.5–1'	SBMW1 2–4'	SBMW1 4–6'	SBMW1 6–8'	SBMW1 8–10'
Total Metals								
Antimony	3050/6010	mg/kg(dry weight)	<3.4	<3.4	<3.2	<3.2	<3.4	<3.3
Arsenic	3050/7060	mg/kg(dry weight)	3.40	2.88	2.45	4.32	1.5	2.02
Barium	3050/6010	mg/kg(dry weight)	50.2	40.2	14.0	27.2	14.3	15.2
Beryllium	3050/6010	mg/kg(dry weight)	<0.29	<0.29	<0.27	<0.27	<0.28	<0.28
Cadmium	3050/6010	mg/kg(dry weight)	2.18	2.77	2.26	2.20	1.36	1.65
Chromium	3050/6010	mg/kg(dry weight)	7.82	7.82	6.34	4.25	2.62	4.40
Copper	3050/6010	mg/kg(dry weight)	14.8	11.6	14.6	15.8	8.84	10.5
Iron	3050/6010	mg/kg(dry weight)	15380	17160	14700	15160	8040	11100
Lead	3050/7421	mg/kg(dry weight)	12.5	6.63	3.96	4.36	2.44	2.33
Manganese	3050/6010	mg/kg(dry weight)	601	522	268	410	390	341
Mercury	7471	mg/kg(dry weight)	0.034	0.057	<0.022	0.022	<0.023	<0.022
Nickel	3050/6010	mg/kg(dry weight)	7.59	7.87	10.2	8.44	6.42	7.31
Selenium	3050/7740	mg/kg(dry weight)	<0.57	<0.57	<0.54	<0.54	<0.57	<0.55
Silver	3050/6010	mg/kg(dry weight)	<0.57	<0.57	<0.54	<0.54	<0.57	<0.55
Thallium	3050/7841	mg/kg(dry weight)	<0.57	<0.57	<0.54	<0.54	<0.57	<0.55
Zinc	3050/6010	mg/kg(dry weight)	34.4	30.1	18.0	23.3	11.5	16.5
TRPH	9071/418.1	mg/kg(dry weight)	<28.7	<28.7	<27.0	<26.9	<28.4	<27.5

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
DEEP SOIL SAMPLES FROM MONITORING WELL BORINGS
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SBMW101* 8–10'	SBMW1** 10–15'	SBMW1 15–20'	SBMW2 0–0.5'	SBMW2 0.5–1'	SBMW2 2–4'
Total Metals								
Antimony	3050/6010	mg/kg(dry weight)	<3.3	<3.4	<3.3	<3.2	<3.5	<3.3
Arsenic	3050/7060	mg/kg(dry weight)	1.53	1.89	1.58	5.56	3.02	3.14
Barium	3050/6010	mg/kg(dry weight)	13.4	10.0	12.7	26.2	27.1	54.1
Beryllium	3050/6010	mg/kg(dry weight)	<0.27	<0.28	<0.27	<0.26	<0.29	<0.27
Cadmium	3050/6010	mg/kg(dry weight)	1.32	1.14	1.65	2.70	2.79	2.54
Chromium	3050/6010	mg/kg(dry weight)	4.19	5.11	4.06	7.42	7.56	6.99
Copper	3050/6010	mg/kg(dry weight)	8.24	8.30	9.72	29.4	13.8	22.4
Iron	3050/6010	mg/kg(dry weight)	8210	8850	9770	20570	17920	19490
Lead	3050/7421	mg/kg(dry weight)	2.16	2.10	1.78	6.16	7.99	4.92
Manganese	3050/6010	mg/kg(dry weight)	264	226	236	611	781	398
Mercury	7471	mg/kg(dry weight)	<0.022	<0.023	0.044	0.032	<0.058	0.033
Nickel	3050/6010	mg/kg(dry weight)	5.71	7.33	4.40	13.7	10.2	14.9
Selenium	3050/7740	mg/kg(dry weight)	<0.55	<0.57	<0.55	<0.53	<0.58	<0.54
Silver	3050/6010	mg/kg(dry weight)	<0.55	<0.57	<0.55	<0.53	<0.58	<0.54
Thallium	3050/7841	mg/kg(dry weight)	<0.55	<0.57	<0.55	<0.53	<0.58	<0.54
Zinc	3050/6010	mg/kg(dry weight)	12.3	13.4	16.4	32.0	33.4	26.2
TRPH	9071/418.1	mg/kg(dry weight)	<27.5	<28.4	<27.5	<26.6	<29.1	<27.2

* – Sample SBMW101 (8–10') is a duplicate of sample SBMW1 (8–10').

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
DEEP SOIL SAMPLES FROM MONITORING WELL BORINGS
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SBMW2 4–6'	SBMW2 6–8'	SBMW2 8–10'	SBMW201* 8–10'	SBMW3 0–0.5'	SBMW3 0.5–1'
Total Metals								
Antimony	3050/6010	mg/kg(dry weight)	<3.3	<3.3	<3.8	<3.8	<3.2	<3.3
Arsenic	3050/7060	mg/kg(dry weight)	2.66	2.94	2.01	1.94	3.52	3.60
Barium	3050/6010	mg/kg(dry weight)	17.9	20.9	11.9	10.7	30	29.6
Beryllium	3050/6010	mg/kg(dry weight)	<0.27	<0.27	<0.32	<0.31	<0.266	<0.27
Cadmium	3050/6010	mg/kg(dry weight)	1.75	2.15	1.52	1.38	3.03	2.88
Chromium	3050/6010	mg/kg(dry weight)	6.34	7.58	4.68	4.5	7.9	7.7
Copper	3050/6010	mg/kg(dry weight)	15.0	19.6	13.4	12.1	23.7	26.4
Iron	3050/6010	mg/kg(dry weight)	16360	17570	12630	11450	18970	21520
Lead	3050/7421	mg/kg(dry weight)	3.93	4.20	3.56	3.32	5.07	7.12
Manganese	3050/6010	mg/kg(dry weight)	293	341	319	278	752	875
Mercury	7471	mg/kg(dry weight)	0.033	0.044	0.038	<0.025	0.032	0.033
Nickel	3050/6010	mg/kg(dry weight)	10.4	12.6	8.86	8.31	12.8	13.0
Selenium	3050/7740	mg/kg(dry weight)	<0.54	<0.55	<0.63	<0.62	<0.53	<0.54
Silver	3050/6010	mg/kg(dry weight)	<0.54	<0.55	<0.63	<0.62	<0.53	<0.54
Thallium	3050/7841	mg/kg(dry weight)	<0.54	<0.55	<0.63	<0.62	<0.53	<0.54
Zinc	3050/6010	mg/kg(dry weight)	22.2	23.7	18.0	17.6	41.1	42.8
TRPH	9071/418.1	mg/kg(dry weight)	<27.2	<27.5	<31.6	<31.2	<26.6	<27.2

* – Sample SBMW201 (8–10') is a duplicate of sample SBMW2 (8–10').

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
DEEP SOIL SAMPLES FROM MONITORING WELL BORINGS
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SBMW3 2-4'	SBMW301* 2-4'	SBMW3 4-6'	SBMW3** 6-8'	SBMW301* 6-8'	SBMW3 8-10'
Total Metals								
Antimony	3050/6010	mg/kg(dry weight)	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3
Arsenic	3050/7060	mg/kg(dry weight)	7.54	6.17	7.78	9.92	11.0	6.65
Barium	3050/6010	mg/kg(dry weight)	24.1	24.8	18.5	15.4	25.3	22.1
Beryllium	3050/6010	mg/kg(dry weight)	<0.27	<0.27	<0.27	<0.27	<0.28	<0.27
Cadmium	3050/6010	mg/kg(dry weight)	0.87	0.76	<0.54	<0.55	<0.56	<0.55
Chromium	3050/6010	mg/kg(dry weight)	4.4	1.4	2.12	1.5	2.33	2.53
Copper	3050/6010	mg/kg(dry weight)	11.3	10.2	5.82	5.55	4.44	5.4
Iron	3050/6010	mg/kg(dry weight)	7270	6490	2900	1570	2080	1570
Lead	3050/7421	mg/kg(dry weight)	9.75	7.97	8.13	11.3	10.1	9.28
Manganese	3050/6010	mg/kg(dry weight)	253	220	70	7.9	10.7	21.6
Mercury	7471	mg/kg(dry weight)	0.17	0.13	0.20	0.18	0.26	0.18
Nickel	3050/6010	mg/kg(dry weight)	5.22	5.33	<2.2	2.75	3.1	3.85
Selenium	3050/7740	mg/kg(dry weight)	1.47	1.25	1.96	1.85	2.09	1.80
Silver	3050/6010	mg/kg(dry weight)	<0.54	<0.54	<0.54	<0.55	<0.56	<0.55
Thallium	3050/7841	mg/kg(dry weight)	<0.54	<0.54	<0.54	0.90	0.76	<0.50
Zinc	3050/6010	mg/kg(dry weight)	17.8	13.5	5.92	3.85	4.7	4.62
TRPH	9071/418.1	mg/kg(dry weight)	172	105	76	36.3	38.9	29.7

* – Sample SBMW301 (2-4') is a duplicate of sample SBMW3 (2-4').
** – Sample SBMW301 (6-8') is a duplicate of sample SBMW3 (6-8').

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
DEEP SOIL SAMPLES FROM MONITORING WELL BORINGS
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SBMW3 10–15'	SBMW4 0–0.5'	SBMW4 0.5–1'	SBMW4 2–4'	SBMW4 4–6'	SBMW4 6–8'
Total Metals								
Antimony	3050/6010	mg/kg(dry weight)	<3.6	<3.3	<3.3	<3.4	<3.2	<3.4
Arsenic	3050/7060	mg/kg(dry weight)	2.07	2.86	3.94	4.2	3.53	3.9
Barium	3050/6010	mg/kg(dry weight)	16.0	25.8	31.4	51	20.9	22.5
Beryllium	3050/6010	mg/kg(dry weight)	<0.30	<0.28	<0.27	<0.28	<0.27	<0.28
Cadmium	3050/6010	mg/kg(dry weight)	0.89	2.1	1.91	3.2	2.2	3.0
Chromium	3050/6010	mg/kg(dry weight)	4.11	7.4	6.8	10.5	7.14	8.2
Copper	3050/6010	mg/kg(dry weight)	10.6	17.4	21.3	24.6	23	29.8
Iron	3050/6010	mg/kg(dry weight)	10670	15170	16970	20900	26160	22730
Lead	3050/7421	mg/kg(dry weight)	2.90	10.8	12.8	19.4	4.05	7.53
Manganese	3050/6010	mg/kg(dry weight)	338	358	590	795	594	612
Mercury	7471	mg/kg(dry weight)	<0.24	0.033	0.33	0.045	<0.022	0.057
Nickel	3050/6010	mg/kg(dry weight)	6.5	11.3	11.5	12.6	10.8	16.8
Selenium	3050/7740	mg/kg(dry weight)	<0.60	<0.28	<0.27	<0.28	<0.27	<0.28
Silver	3050/6010	mg/kg(dry weight)	<0.595	<0.56	<0.55	<0.57	<0.54	<0.57
Thallium	3050/7841	mg/kg(dry weight)	<0.60	<0.56	<0.55	<0.57	<0.54	<0.57
Zinc	3050/6010	mg/kg(dry weight)	17.4	32.7	39.2	62.5	33.4	40.6
TRPH	9071/418.1	mg/kg(dry weight)	<29.8	<27.8	<27.5	<28.4	<26.9	<28.4

TOTAL ANALYTICAL DATA SUMMARY TABLES
WEAPONS STORAGE AREA
GRIFFISS AIR FORCE BASE
DEEP SOIL SAMPLES FROM MONITORING WELL BORINGS
SAMPLING CONDUCTED 3 THRU 10 AUGUST, 1992

PARAMETER	EPA METHOD	UNITS	SBMW4 8–10'	SBMW401* 8–10'	SBMW4 10–15'
Total Metals					
Antimony	3050/6010	mg/kg(dry weight)	<3.5	<3.5	<3.7
Arsenic	3050/7060	mg/kg(dry weight)	3.6	3.2	3.7
Barium	3050/6010	mg/kg(dry weight)	34.8	32.6	32.1
Beryllium	3050/6010	mg/kg(dry weight)	<0.29	<0.29	<0.30
Cadmium	3050/6010	mg/kg(dry weight)	2.80	2.82	2.8
Chromium	3050/6010	mg/kg(dry weight)	9.65	7.22	7.24
Copper	3050/6010	mg/kg(dry weight)	18.0	16.5	18.0
Iron	3050/6010	mg/kg(dry weight)	20740	19820	21200
Lead	3050/7421	mg/kg(dry weight)	9.4	9.64	23.6
Manganese	3050/6010	mg/kg(dry weight)	915	878	956
Mercury	7471	mg/kg(dry weight)	0.035	0.035	<0.024
Nickel	3050/6010	mg/kg(dry weight)	11.2	10.6	12.0
Selenium	3050/7740	mg/kg(dry weight)	<0.29	<0.29	<0.30
Silver	3050/6010	mg/kg(dry weight)	<0.59	<0.59	<0.61
Thallium	3050/7841	mg/kg(dry weight)	<0.59	<0.59	<0.61
Zinc	3050/6010	mg/kg(dry weight)	47.4	43.2	45.7
TRPH	9071/418.1	mg/kg(dry weight)	<29.4	<29.4	42.7

* – Sample SBMW401 (8–10') is a duplicate of sample SBMW4 (8–10').

WEAPONS STORAGE AREA

GROUND-WATER SAMPLES

...STORAGE AREA
GRIFFISS AIR FORCE BASE
GROUND WATER SAMPLES
SAMPLING CONDUCTED 24 THRU 26 AUGUST, 1992

PARAMETER	METHOD	UNITS	WSAMW1	WSAMW1**	WSAMW2	WSAMW2**	WSAMW3	WSAMW3**	WSAMW4	WSAMW4**	WSAMW401*
Base Neutral/Acids											
1,2,4-Trichlorobenzene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-Dichlorobenzene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,3-Dichlorobenzene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dichlorophenol	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dimethylphenol	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dinitrophenol	3510/8270	ug/liter	<50	<50	<50	<50	<50	<50	<50	<50	<50
2,4-Dinitrotoluene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,6-Dinitrotoluene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Chloronaphthalene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Chlorophenol	3510/8270	ug/liter	<10 J	<10	<10 J	<10	<10 J	<10	<10 J	<10	<10 J
2-Methylnaphthylene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Methylphenol	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Nitroaniline	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-Nitrophenol	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
3-Nitroaniline	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol	3510/8270	ug/liter	<10 J	<10	<10 J	<10	<10 J	<10	<10 J	<10	<10 J
4-Chloroaniline	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Methylphenol	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Nitrophenol	3510/8270	ug/liter	<50 J	<50	<50 J	<50	<50 J	<50	<50 J	<50	<50 J
Acenaphthene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acenaphthylene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzoic Acid	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzyl Alcohol	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibenzofuran	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dimethylphthalate	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachloroethane	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Isophorone	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
N-Nitrosodimethylamine	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
N-nitroso-di-n-propylamine	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Naphthalene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrobenzene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Phenol	3510/8270	ug/liter	<10 J	<10	<10 J	<10	<10 J	<10	<10 J	<10	<10 J

** Resampled in Nov. 1992
* – Sample WSAMW401 is a duplicate of sample WSAMW4.
J – Estimated result
B – Result estimated; may be biased high or false negative due to blank contamination
T – Contaminant found in trip blank

ANALYTICAL DATA SUMMARY TABLES
WEAPON STORAGE AREA
GRIFFISS AIR FORCE BASE
GROUND WATER SAMPLES
SAMPLING CONDUCTED 24 THRU 26 AUGUST, 1992

PARAMETER	METHOD	UNITS	WSAMW1	WSAMW1**	WSAMW2	WSAMW2**	WSAMW3	WSAMW3**	WSAMW4	WSAMW4**	WSAMW401*
Base Neutral/Acids (cont.)											
bis(2-Chloroethoxy)methane	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
bis(2-Chloroethyl)ether	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
bis(2-Chloroisopropyl)ether	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Diethylphthalate	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Chlorophenyl phenyl ether	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Fluorene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Nitroaniline	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
4,6-Dinitro-2-methylphenol	3510/8270	ug/liter	<50	<50	<50	<50	<50	<50	<50	<50	<50
N-nitrosodiphenylamine	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-Bromophenyl phenyl ether	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorobenzene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol	3510/8270	ug/liter	<50 J	<50	<50 J	<50	<50 J	<50	<50 J	<50	<50 J
Phenanthrene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzidine	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Anthracene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Di-n-butylphthalate	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Fluoranthene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzylbutylphthalate	3510/8270	ug/liter	<10	<10	<10	<10	1 JB	<10	<10	<10	<10
3,3-Dichlorobenzidine	3510/8270	ug/liter	<20	<20	<20	<20	<20	<20	<20	<20	<20
Benzo(a)anthracene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate	3510/8270	ug/liter	2 JB	<10	2 JB	1.2	6 JB	<10	2 JB	8.4	1 JB
Chrysene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Di-n-Octylphthalate	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(a)pyrene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Pyrene	3510/8270	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexavalent Chromium	SM 312B	mg/liter	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dissolved Metals											
Antimony	3005/6010	mg/liter	<0.06	NS	<0.06	NS	<0.06	NS	<0.06	NS	<0.06
Arsenic	7060	mg/liter	<0.01	NS	<0.01	NS	<0.01	NS	<0.01	NS	<0.01

** Resampled in Nov. 1992
* – Sample WSAMW401 is a duplicate of sample WSAMW4.
J – Estimated result
B – Result estimated; may be biased high or false negative due to blank contamination
T – Contaminant found in trip blank

ANALYTICAL DATA SUMMARY TABLES
WEAPON STORAGE AREA
GRIFFISS AIR FORCE BASE
GROUND WATER SAMPLES
SAMPLING CONDUCTED 24 THRU 26 AUGUST, 1992

PARAMETER	METHOD	UNITS	WSAMW1	WSAMW1**	WSAMW2	WSAMW2**	WSAMW3	WSAMW3**	WSAMW4	WSAMW4**	WSAMW401*
Dissolved Metals (cont'd)											
Barium	3005/6010	mg/liter	<0.02	NS	<0.02	NS	<0.02	NS	<0.02	NS	<0.02
Beryllium	3005/6010	mg/liter	<0.005	NS	<0.005	NS	<0.005	NS	<0.005	NS	<0.005
Cadmium	3005/6010	mg/liter	<0.01	NS	<0.01	NS	<0.01	NS	<0.01	NS	<0.01
Chromium	3005/6010	mg/liter	<0.02	NS	<0.02	NS	<0.02	NS	<0.02	NS	<0.02
Copper	3005/6010	mg/liter	<0.025	NS	<0.025	NS	<0.025	NS	<0.025	NS	<0.025
Iron	3005/6010	mg/liter	<0.05	NS	<0.05	NS	<0.05	NS	<0.05	NS	0.23
Lead	3020/7421	mg/liter	<0.005	NS	<0.005	NS	<0.005	NS	<0.005	NS	<0.005
Manganese	3005/6010	mg/liter	<0.01	NS	0.01	NS	1.9	NS	<0.01	NS	<0.01
Mercury	7470	mg/liter	<0.0002	NS	<0.0002	NS	<0.0002	NS	<0.0002	NS	<0.0002
Nickel	3005/6010	mg/liter	<0.04	NS	<0.04	NS	<0.04	NS	<0.04	NS	<0.04
Selenium	7740	mg/liter	<0.01	NS	<0.01	NS	<0.01	NS	<0.01	NS	<0.01
Silver	3005/6010	mg/liter	<0.01	NS	<0.01	NS	<0.01	NS	<0.01	NS	<0.01
Thallium	3020/7841	mg/liter	<0.01	NS	<0.01	NS	<0.01	NS	<0.01	NS	<0.01
Zinc	3005/6010	mg/liter	<0.02	NS	<0.02	NS	<0.02	NS	<0.02	NS	0.023
Total Metals											
Aluminum	3005/6010	mg/liter	NS	0.64	NS	0.34	NS	0.44	NS	<0.21	<0.21
Antimony	3005/6010	mg/liter	<0.06	<0.05	<0.06	<0.05	<0.06	<0.05	<0.06	<0.05	<0.06
Arsenic	7060	mg/liter	0.015	<0.010	<0.010	<0.01	0.012	<0.010	0.046	<0.01	0.046
Barium	3005/6010	mg/liter	0.08	<0.02	0.04	<0.02	0.095	<0.02	0.25	<0.02	0.244
Beryllium	3005/6010	mg/liter	<0.005	<0.008	<0.005	<0.008	<0.005	<0.008	<0.005	<0.008	<0.005
Cadmium	3005/6010	mg/liter	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01
Chromium	3005/6010	mg/liter	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	0.05
Copper	3005/6010	mg/liter	0.09	<0.01	<0.025	<0.01	0.05	<0.01	0.28	<0.01	0.26
Iron	3005/6010	mg/liter	41	0.76	29.5	0.435	29.5	0.62	140	<0.02	133
Lead	3020/7421	mg/liter	0.027	<0.005	0.077	<0.005	0.0152	<0.005	0.0761	<0.005	0.0739
Manganese	3005/6010	mg/liter	2.7	0.07	0.28	0.03	3.4	2.5	11.8	<0.01	11.2
Mercury	7470	mg/liter	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	0.0004
Nickel	3005/6010	mg/liter	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.11	<0.04	0.105
Selenium	7740	mg/liter	<0.01	<0.01	<0.01	<0.005	<0.01	<0.01	<0.01	<0.005	<0.01
Silver	3005/6010	mg/liter	<0.01	<0.01	<0.01	<0.03	<0.01	<0.01	<0.01	<0.03	<0.01
Thallium	3020/7841	mg/liter	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	3005/6010	mg/liter	0.09	0.274	0.022	0.20	0.064	0.21	0.30	0.12	0.288
Volatile Organics											
1,1,1-Trichloroethane	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethane	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethane	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethylene (1,1-Dichloroethene)	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5

** Resampled in Nov. 1992 ; NS-- Not sampled
* – Sample WSAMW401 is a duplicate of sample WSAMW4.
J – Estimated result; T– Contaminant found in trip blank
B – Result estimated; may be biased high or false negative due to blank contamination

ANALYTICAL DATA SUMMARY TABLES
WEAPON STORAGE AREA
GRIFFISS AIR FORCE BASE
GROUND WATER SAMPLES
SAMPLING CONDUCTED 24 THRU 26 AUGUST, 1992

PARAMETER	METHOD	UNITS	WSAMW1	WSAMW1**	WSAMW2	WSAMW2**	WSAMW3	WSAMW3**	WSAMW4	WSAMW4**	WSAMW401*
Volatile Organics (cont'd)											
1,2-Dichloropropane	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloroethane	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Trans-dichloroethylene	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,3-Dichloropropylene (1,3-dichloropropene)	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
2-Chloroethylvinyl Ether	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Acrolein	8240	ug/liter	<50	<50	<50	<50	<50	<50	<50	<50	<50
Acrylonitrile	8240	ug/liter	<50	<50	<50	<50	<50	<50	<50	<50	<50
Benzene	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform (tribromomethane)	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon Tetrachloride (Tetrachloromethane)	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorodibromomethane (Dibromochloromethane)	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	8240	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroform(Trichloromethane)	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	1.0 J
Dichlorobromomethane (Bromodichloremethane)	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Methyl bromide (bromomethane)	8240	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methyl chloride (chloromethane)	8240	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene chloride (dichloromethane)	8240	ug/liter	1.5 JT	3.5 B	1.5 JT	2.7 B	1.6 JT	3.2 B	1.6 JT	2.6 B	1.7 JT
Tetrachloroethylene (Tetrachloroethene)	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	8240	ug/liter	<5	<5	1.0 JB	<5	1.1 JB	<5	<5	<5	<5
Trichloroethylene (Trichloroethene)	8240	ug/liter	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl chloride (Chloroethylene:Chloroethene)	8240	ug/liter	<10	<10	<10	<10	<10	<10	<10	<10	<10

** Resampled in Nov. 1992
* – Sample WSAMW401 is a duplicate of sample WSAMW4.
J – Estimated result
B – Result estimated; may be biased high or false negative due to blank contamination
T – Contaminant found in trip blank

APPENDIX I

REFERENCES

REFERENCES

ATSDR, 1989-1991. Agency for Toxic Substances and Disease Registry. Toxicological Profiles for Various Compounds. Atlanta, GA.

Blind, 1991. Personal communication with Law Environmental, Inc. personnel. Source: Sgt. Blind, Weapons Storage Area, Griffiss Air Force Base, NY.

Bouwer, H. The Bouwer and Rice Slug Test - An Update. Ground Water. Volume 27, No. 3., May/June 1989.

Casey, G. and Reynolds, R.J., 1989. Hydrogeology of the Stratified - Drift Aquifers in the Rome Area, Oneida County, New York. Water-Resources Invest. Report 88-4155. USGS Albany, New York.

EPA, 1979. Methods for Chemical Analysis of Water and Wastes. Environmental Monitoring and Support Laboratory; Cincinnati, Ohio. EPA-600/4-79-020.

ES, 1981. Installation Restoration Program Phase I - Record Search, Hazardous Materials Disposal Sites, Griffiss AFB, New York. Atlanta, GA. Engineering Science, Inc.

ES, 1981. Installation Restoration Program Phase I - Record Search, Hazardous Materials Disposal Sites, Griffiss AFB, New York. Prepared for U.S. Air Force AFESC/DE/Tyndall AFB, Florida, Engineering Science, July, 1981.

Federal Register, 1980. Water Quality Criteria for 64 Toxic Pollutants/Categories. FR (45)(231): 7931-79379.

Federal Register, 1990, Vol. 55, No. 145, Subpart S, Appendix B, July 27, 1990, P. 30798-30884.

Howard, 1990. Handbook of Environmental Fate and Exposure Data for Organic Chemical. Lewis Publishers, Inc. Chelsea, MI.

McGovern, E.ca. (No Date). Background Concentration of 20 Elements in Soils with Special Regard to New York State. Wildlife Resources Center, (NYDEC) Delmar, New York.

NYDOT, 1978. Topographic map. Rome Quadrangle, New York, Oneida County. 7.5 Minute Series Planimetric. New York State Department of Transportation, Albany, NY.

New York State Code of Rules and Regulations, Endangered and Threatened Plant Species. NYCRR, Part 193.3.

New York State Water Quality Regulations for Surface Waters and Ground Waters. New York Codes and Regulations; Title 6 Parts 700-705.

SAC, 1980. As-Built Drawing - Install O/W Separator System at Building 215/216, Sheet 1 of 1. Strategic Air Command, Civil Engineering, Griffiss AFB, NY.

SAC, 1991. Base Comprehensive Plan, Sanitary Sewerage System, Griffiss Air Force Base, Rome NY. Tab No. G-2, Sheet 1 of 2., Rev. 9/30/91. Strategic Air Command, Civil Engineering, Griffiss AFB, NY.

USDI, 1992. Letter - L.P. Corin, United States Department of the Interior, Fish and Wildlife Service. 9 October, 1992.

USEPA, 1989a. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Vol. I United States Environmental Protection Agency, Office of Emergency and Remedial Response, EPA 540/1-89/0022, Washington, D.C.: December 1989.

USEPA, 1989b. Risk Assessment Guidance for Superfund: Environmental Evaluation Manual, Vol II, United States Environmental Protection Agency, Office of Emergency and Remedial Response, EPA 540/1-89/001, Washington, D.C.: March, 1989.

USEPA, 1989c. RCRA Facility Investigation (RFI) Guidance, Vol. I, EPA 520/SW-89-031, May 1989.

Verschueren, 1984. Verschueren, Karel. Handbook of Environmental Data on Organic Chemicals, 2nd edition. New York, NY: Van Westrend Reinhold Co.