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July 24, 1998

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FROM: AFBCA/DA-Griffiss
Environmental Section
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SUBJECT: Submittal - Primary Document - Final Supplemental Investigations Report

1. Enclosed please find the Final Supplemental Investigations Report for Griffiss AFB.

2. The present review period for these documents is 30 days. If review cannot be completed within this time, please advise.

3. If you have any questions, please contact Mike Wojnas, 315-330-2275.

MICHAEL F. MCDERMOTT
BRAC Environmental Coordinator

Attachment:
Primary Document -
Final Supplemental Investigations Report

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Final Response to Comments Draft Report for Supplemental Investigations of Areas of Concern Griffiss Air Force Base Submitted November 1997

Comments on Draft SI Report sections by Dean Williams, U.S. Army Corps of Engineers, Kansas City District, Dated November 1997.

Comment No. 1:

Landfills 1 and Landfill 5, Tables 4.3-2, 4.5-2, and 4.5-4: Parts per billion level standards are shown at the bottom of the tables. Any future cleanup goals for soil and sediments should not be shown at the parts per billion level.

Response to Comment No. 1:

Since the data reported by the lab is generally in parts per billion units (except for metals results), soil and sediment cleanup goals are presented in parts per billion units to facilitate direct comparisons.

Comment No. 2:

Landfill 5, Tables 4.5-2, 4.5-3, and 4.5-4: Multiple level of detection standards (mg/L, ug/L, etc.) are shown at the bottom of these tables. Please clarify which one represents the values shown in each of the tables.

Response to Comment No. 2:

Reported units are presented as part of each parameter heading (i.e., pesticides/PCBs [8081] [μg/kg], etc.) in each of the tables. The key at the end of each table only identifies the units referenced in the body of the table.

Comment No. 3:

Landfill 7 and Fire Protection Training Areas, Tables 4.7-2 and 4.10-2: Both mg/L and ug/L are shown at the bottom of the tables. Please clarify which one represents the values shown in the tables.

Response to Comment No. 3:

Reported units are presented as part of each parameter heading (i.e., Pesticides/PCBs [8081] [μg/kg], etc.) in each of the tables. The key at the end of each table only identifies the units referenced in the body of the table.

Comment No. 4:

Threemile and Sixmile Creeks, Tables 4.8-2, 4.9-2, and 4.9-3: There are no level of detection standards indicated at the bottom of the tables. Please clarify what they are for the values in these tables.

Response to Comment No. 4:

The unit of detection (μg) is presented as part of the parameter heading (i.e., Pesticides/PCBs [8081] [μg]). The unit (μg) is also identified in the key at the end of the table.

Comment No. 5:

Appendix D -In-Field Laboratory Sample Results: None of the tables in this appendix had a level of detection standard shown. Please clarify this in each table.

Response to Comment No. 5:

All in-field laboratory results presented in Appendix D are reported in μg/L. The unit of measure has been added to each Appendix D table.

Final Response to Comments Draft Report for Supplemental Investigations of Areas of Concern Griffiss Air Force Base Submitted November 1997

Comments on Draft SI Report sections by Masud Zaman, U.S. Army Corps of Engineers, Kansas City District, Dated November 1997.

Comment No. 1:

Figures 1-2A and 1-2B. Please mark and label at least a few major reference points on each figure.

Response to Comment No. 1:

Several reference points (e.g., Weapons Storage Area, Skyline Housing Area, Mohawk River, etc.) have been added or enlarged as requested.

Comment No. 2:

Page 2-19, section 2.11.8, line 11. Please include in the text, the field parameters tested and/or collected for the evaluation of natural attenuation of the groundwater.

Response to Comment No. 2:

Parameters for groundwater-screening samples, and groundwater monitoring well samples (including natural attenuation parameters) were added as requested.

Comment No. 3:

Page 2-20, section 2.13. Please include in the text the total number of monitoring wells surveyed during the Basewide Groundwater Elevation Survey.

Response to Comment No. 3:

The total number of monitoring well/piezometers (257) and surface water locations (20) surveyed during the Basewide Groundwater Elevation Survey were added to the text as requested.

Comment No. 4:

Page 2-21, line 1. After "Other IDW," please insert "including decontamination liquid waste."

Response to Comment No. 4:

The statement "including decontamination liquid waste" was added after "other IDW" as requested.

Comment No. 5:

Page 4.3-2, section 4.3.3, para. 3, line 2. Please delete the word "appropriate."

Response to Comment No. 5:

The word "appropriate" was deleted as requested.

Comment No. 6:

Page 4.3-3, section 4.3.4.2, line 2. Please describe the physical characteristics of the liquid sample collected from the excavated drum, such as color, odor, viscosity etc., in the text.

Response to Comment No. 6:

A description of the lube oil sample was added as requested.

Comment No. 7:

Table 4.3-2. Please replace "Lube Oil" in Columns 2 & 3 header with "Drum Contents" and add "TCLP."

Response to Comment No. 7:

"Lube Oil" in the header of Table 4.3-2 was changed to "Drum Contents," and "TCLP" was added to the heading of each appropriate parameter.

Comment No. 8:

Page 4.5-3, section 4.5.4.3, last sentence. This statement is unclear, please clarify.

Response to Comment No. 8:

Reference to natural attention parameters was removed from the last sentence, and the sentence was reworded for clarification, as requested.

Comment No. 9:

Figure 4.5-3. The section 4.5-2 on Remedial Investigation states that "the surface soil samples contained PAHs, dieldrin, and several heavy metals at concentrations exceeding the potential TBCs, and the PCB-1254 concentrations exceeding the NYSDEC cleanup goals," please explain why the tables on Figure 4.5-3 indicate NA in the RI column?

Response to Comment No. 9:

The tables on Figure 4.5-3 (and also Figures 4.7-3, 4.8-2, 4.9-3 and 4.9-4) represent sample results from SI samples. Since RI samples were collected at different locations, RI data is not applicable (NA), for comparison purposes, with the SI samples. In order to alleviate confusion, the RI sample result columns were removed from Figures 4.5-3, 4.7-3, 4.8-2, 4.9-3, and 4.9-4.

Comment No. 10:

Page 4.11-1, section 4.11.1, bullet 9. Please clarify the last statement of the bullet, which states that "and the south of the WSA (not addressed in the RI)."

Response to Comment No. 10:

Bullet 9 on page 4.11-1 was modified as follows: "Sixmile Creek (east side): draining southwest to Sixmile Creek, includes Landfill 7; and the area around LAWMW-9 south of the WSA (which is not considered an AOC)."

Comment No. 11:

Page 4.11-12, Threemile Creek west side Drainage Area. Please insert well number after "well" on line 1.

Response to Comment No. 11:

Well number "HS6MW-2" was added to line 1 as requested. In addition, the contaminant (benzidene) and concentration (50 μg/L) were also added.

Comment No. 12:

Page 4.11-12, Mohawk River Drainage Area, bullet 2. The vertical profile wells TCVMW-1 and TCVMW-2 are located too far south from Building 214 and 219 to be representative of these buildings as stated. These wells are located south of Tin City in the direction of groundwater flow. Please correct the statement in the bullet.

Response to Comment No. 12:

The second bullet under the Mohawk River Drainage Area was revised, as requested, to state the TCVMW-1 and TCVMW-1 were installed downgradient of Tin City and LAWMW-13 is also downgradient of Tin City.

Comment No. 13:

Page 4.11-13, section 4.11.3.2, para 1. In the other programs, there is no mention of 25 monitoring wells installed by AFCEE at the Hardfills a, b, & c. Please indicate in the text if these wells had been the part of the survey list during the supplemental investigation.

Response to Comment No. 13:

The first paragraph of section 4.11.3.2 was revised to clarify all the tasks involved with the Basewide Groundwater Elevation Survey. Water level measurements were collected from all existing wells/piezometers on base (i.e., 234 wells/38 piezometers), 23 off base wells, and 20 creek and storm sewer locations.

Comment No. 14:

Page 4.11-14, section 4.11.3.3, line 10-12. It is stated that "the natural attenuation (NA) parameters were a core set of parameters that were tested for at each location, plus some additional parameters necessary for evaluation at chlorinated hydrocarbon plume areas." Please list those parameters at least once somewhere in the text.

Response to Comment No. 14:

A description of natural attenuation parameters was added to Section 2.11.8, and reference to Section 2.11.8 was added to Section 4.11.3.3.

Comment No. 15:

Page 4.11-15, para. 1. It is stated that "Therefore, whatever groundwater does not discharge to the wetland at the toe of the landfill will travel southwest to discharge to a 30-inch storm drain running approximately 100 feet from the toe of the landfill." This is a very confusing statement. Please explain how this conclusion has been drawn? Is the storm drain so leaky that it can intercept the entire leftover groundwater flow? Please include field measurement data to support the statement.

Paragraph 2 discusses the extent of the TCE plume near the monitoring well LF7MW-17 and the wetland area at the toe of the landfill-7. Please clarify, how the extent of the plume was determined?

Response to Comment No. 15:

The last two sentences beginning with "Therefore, whatever groundwater....." in the first paragraph on page 4.11-15 were deleted and replaced with the following statements: "In addition to these groundwater seeps, some groundwater may be intercepted by a 30-inch storm drain buried approximately four feet below the surface of the wetland. This storm drain is submerged below the water table, as measured in the immediately adjoining wells LF7MW22 and LF7MW23. The presence of running water in the storm drain on October 16, 1997 at an estimated rate of 10 gallons per minute (GPM), at a time when the wetland was dry, there were no surface seeps, and there were no immediate precipitation events, suggests that groundwater may periodically enter the drain.

The extent of the TCE plume described in the second paragraph on page 4.11-15 is based on: width measurements between LF7MW-3R and LF7MW18R (approximately 800 feet) where no TCE was detected, and LF7MW22 and LF7TW-25 (approximately 400 feet) where TCE was detected; and length measurement between LF7MW17 and LF7TW-24 (approximately 350 feet). The first sentence of the second paragraph was revised as follows: "A narrow TCE plume (i.e., less than 500 feet wide, based on results from LF7MW-3R, LF7MW17, LF7MW18R, LF7MW22, and LF7TW-25) originates near monitoring well LF7MW17 and extends at least to the toe of the landfill (approximately 350 feet, based on results of LF7MW22, LF7TW-24, and LF7TW-25) so that the defined plume has a minimum area of approximately 4 acres, with a maximum concentration of 64 μg/L in LF7TW-25 (see Tables 4.11.4.1-2 and 4.11.4.1-3)." The second sentence "The possible extension..." was deleted.

Comment No. 16:

Page 4.11-20, para. 3. It is stated that numerous other wells and piezometers have been installed by other contractors within the area of Aprons 1 and 2, and no firm conclusion can be drawn for Nose Docks 1 & 2 pending the results of these wells. Please explain, why this data was not collected during the supplemental field investigation? Also clarify if there is a real possibility that the data be available for use before finalizing this report.

Response to Comment No. 16:

The installation of additional wells and piezometers by an AFCEE contractor was being performed while the SI fieldwork was being performed, and was not completed at the time of the submission of the draft RI report. Since the hydrology in the nosedock areas is complex due to the presence of multiple perched water zones, additional comments with regard to the AFCEE findings can not be presented in this report until a comprehensive overview of all available data can be performed. Therefore, paragraph 3 on page 4.11-20 of the draft SI report was removed.

Comment No. 17:

Page 4.11-21, section 4.11.4.8, paragraph 2. Please include upgradient well number after the word "well" on line 5, to clarify the statement.

Response to Comment No. 17:

"101MW-4" was added to the end of the second sentence in paragraph 2 of Section 4.11.4.8, as requested.

Comment No. 18:

Page 4.11-22, para. 1, lines 1-2. Please provide the invert and the groundwater elevations in the text to support the statement. Also in paragraph 2, please clarify how the area of the chloroform plume is determined?

Response to Comment No. 18:

The first sentence of the 2nd paragraph of Section 4.11.4.8 on page 4.11-22 was modified to include the water table elevations: 101MW-1 (459.66); 101MW-2 (459.33); and 101MW-3 (459.36); and storm drain invert at 458.6 feet above mean sea level.

Reference to the area of the chloroform plume has been deleted based on the response to comment No. 13 by D. Pocze (EPA).

Comment No. 19:

Page 4.11-25. The groundwater flow discussion on this page is somewhat hypothetical and very confusing. Please modify the discussion based on factual data of the site and the interpretation of the groundwater potentiometric surface map of the base, as discussed and agreed by Hussein Aldis, Tim Grady, Kirk Boese, and Masud Zaman during 18 December 1997 conference call. Please delete all may be statements from the discussion to simplify the text.

Response to Comment No. 19:

Paragraphs 2 and 3 on page 4.11-25 have been modified as follows: "The overall water table has a low gradient underneath the mock airplane. The storm drain that runs through the site has invert elevations that are below the local water table. Field observations made on October 16, 1997 at a time when there was no surface runoff from the site and no immediate precipitation events, indicated water flowing through the 48-inch storm drain at the manhole immediately south of Taxiway 21, approximately 800 feet southwest of the Fire Protection Training Area. The presence of water running through the storm drain may be the result of some groundwater infiltration into the pipe. This storm drain was dry further to the southwest where its elevation is above the water table. Therefore, it appears that the water which entered the pipe near the FPTA seeped out again."

"The discharge point of the storm drain system at the Mohawk River near well OBMW-31 was observed to be flowing at an estimated 30-40 gpm on October 16, 1997. At other times it has been measured at much greater flow rates (i.e., the Air Force measured the flow at 500 gpm on April 24, 1968, even though there had been little rain in the previous two weeks). This rate was comparable to the flow of Threemile Creek (620 gpm) measured on the same date. Therefore, some of the water flowing in this storm drain system may be partially due to groundwater infiltration in areas where the drain is below the groundwater along parts of its network, such as along Taxiway 17, as well as at the FPTA."

Comment No. 20:

Page 4.11-27, section 4.11.5, bullet 1. Please delete one of the LF1MW-5 on line 2.

Response to Comment No. 20:

One of the references to LF1MW-5 on line 2 was deleted as requested.

Comment No. 21:

Figure 4.11-1A & B. Label contour elevations more frequently, particularly along the southern edge of sheet A and the northern edge of sheet B.

Response to Comment No. 21:

Contour labels were added to Figures 4.11-1A & B as requested.

Final Response to Comments Draft Report for Supplemental Investigations of Areas of Concern Griffiss Air Force Base Submitted November 1997

Comments on Draft SI Report sections by Carol Dona, U.S. Army Corps of Engineers, Kansas City District, Dated January 6, 1998.

General Comments

General Comment No. 1:

The concentrations for 1,2-DCE are listed as total 1,2-DCE concentrations. Useful information would be the concentrations of the separate cis and trans isomers since the cis isomer is the predominant isomer formed in the biodegradation of TCE. Please clarify if the data can be divided into separate cis and trans concentrations.

Response to General Comment No. 1:

The concentrations of the 1,2-Dichloroethene cis and trans isomers have been added to the text and tables for the following groundwater monitoring well samples: LF6MW-2, LF6VMW-6, LF7MW-17, LF7MW-22, LF7TW-24, LAWMW-13, TMCMW-9, 782MW-1R, 782MW-6R2, and 775VMW-4,-8,-9R,-10, and 10/D.

General Comment No. 2:

In Appendix G, the anion description column contains Nitrate/Nitrite-N. The nitrate and nitrite concentrations need to be reported separately as the nitrite is the product of nitrate reacting with an electron acceptor. Please clarify what the concentrations in the Nitrate/Nitrite column represent and revise the tables so separate nitrate and nitrite concentrations are reported.

Response to General Comment No. 2:

The Tables in Appendix G have been modified to contain the requested information.

Specific Comments

Comment No. 1:

Page 4.11-15, 2nd paragraph: The Draft Report states that the decreases in PCE and corresponding increases in TCE are an indication that "natural attenuation by bioremediation is proceeding at a moderate rate" at Landfill 7. Further evidence of natural attenuation are the three detections of 1,2-dichloroethene and one detection of vinyl chloride at low concentration (Table 4.11.4.1-3). Please include in the text the 1,2-DCE and vinyl chloride information.

Response to Comment No. 1:

The second to last sentence of Section 4.11.4.1 on page 4.11-15 of the draft report was changed as follows: "Based on these results, biotransformation of the TCE plume may be occurring as indicated by the presence of the cis-and trans-1,2-dichloroethene, and vinyl chloride daughter products."

Comment No. 2:

Page 4.11-24, 3rd paragraph: The Draft Report states that there has been no indication of biotransformation to 1,2-DCE or vinyl chloride. Table 4.11.4.11-3 on 4.11-69 indicates that there were 2 detections of 1,2-Dichloroethene. Please clarify and revise the text as necessary.

Response to Comment No. 2:

The third paragraph on page 4.11-24 of the draft SI report was modified to contain results from 775VMW-9 and 775VMW-10, and the last sentence of the paragraph was deleted. A fourth paragraph was added discussing the biotransformation of PCE to TCE, TCE to 1,2-DCE, and 1,1,1-TCA to 1,1-DCE, based on the results presented in the revised Tables 4.11.4.11-2 and 4.11.4.11-3.

Comment No. 3:

Page 4.11-28: The Draft Report recommends that the groundwater at Tin City not be included in the FS "because no chemicals of concern were detected above screening criteria in the SI wells installed in this area, and a removal action is planned for the Building 255 drywell..." Although this statement is technically true, the data in Figure 4.11.4.13-2 show that in the geoprobe sampling a plume with TCE groundwater concentrations ranging between 10 and 91 micrograms/liter was found. Please describe further the conditions (depth, location, etc.) of the geoprobe samples and monitoring well samples and discuss possible reasons why the lower concentration and less frequent TCE detections occurred with the monitoring wells.

Response to Comment No. 3:

Geoprobe screen intervals at the Building 255 site were predominantly 15 to 25 feet below ground surface (BGS). The average depth to the water table was approximately 18

feet BGS. The screened intervals in 255VMW-1 and 255VMW-2 are 15 to 30 feet and 16 to 29 feet BGS, respectively. Although the screened intervals between the geoprobe sampling points and the monitoring wells is generally the same, the geoprobe samples represent a "snap shot" of the groundwater at a particular depth, at a particular time, whereas the monitoring well samples represent aquifer conditions more similar to a drinking water well sample (i.e., concentrations in flowing groundwater due to purging prior to sampling). However, a statement was added to the last sentence of Section 4.11.5 on page 4.11-28 of the draft report stating that groundwater in the Tin City area is being further evaluated.

Final Response to Comments Draft Report for Supplemental Investigations of Areas of Concern Griffiss Air Force Base Submitted November 1997

Comments on Draft SI Report sections by Douglas Pocze, United States Environmental Protection Agency, Dated February 2, 1998.

General Comments

General Comment No. 1:

The purpose of the SI was to fill data gaps identified during the RI. However, the SI does not completely fulfill this purpose. For instance, high OVA readings and the presence of drums at Landfill 1 were not investigated; similarly, high OVA readings and a petroleum-like substance at Landfill 6 were not investigated. In the groundwater AOC, the source areas at some AOCs still remain unidentified. As the investigation stands, such questions which remain can be answered during the sites proceeding into the FS or into presumptive remedy.

Response to General Comment No. 1:

High OVA readings in Landfill 1 test pits were due to methane (as determined by using a carbon filter on the OVA to distinguish between methane and other organic vapors); drums at Landfill 1 are currently being removed/sampled under another investigation; and the petroleum contaminated soils at Landfill 6 are from a known source, and a remedy is being proposed.

General Comment No. 2:

Throughout the On-Base Groundwater Contamination discussion (Section 4.11), a reduction in groundwater contamination is attributed to natural attenuation. However, this assumption is based solely on a decrease in contaminant concentration generally observed over a limited time frame. I cautioned you about attempting to prove natural attenuation without completing the RI and without an approved natural attenuation workplan. If you are still considering natural attenuation as a viable option, additional variables must be measured besides a limited trend of decreasing concentration. Following EPA guidance, OSWER Directive 9200.4-17, data should be collected regarding:

- source mass,
- groundwater flow,
- contaminant phase and distribution and partitioning between soil, groundwater, and soil gas,
- rates of biological and non-biological transformation, and
- an analysis of the way these factors vary with time.

Although some "natural attenuation" (physical) parameters were collected during the investigation, a cursory review of these results shows large variation both within and among the sampled wells and these results are not related to or discussed in the text. Consequently, reference to demonstrating natural attenuation should be removed from the text, or the discussion should be expanded to justify these claims.

Response to General Comment No. 2:

Reference to natural attenuation was removed from the text, however, the text was expanded to reference biotransformation (where applicable). Natural attenuation is being further evaluated.

General Comment No. 3:

Many of the landfill AOCs are candidates for presumptive remedies as agreed upon by the Air Force, NYSDEC and EPA. Therefore, I do not believe it is necessary to comment extensively on the landfill information; however, before a presumptive remedy can be approved, the following information should be properly identified:

- exact boundaries of the landfill; and
- location of suspected "hot spots."

This information should be part of the landfill waste consolidation report and cover investigation; however, for consistency, the updated maps and information should be included in this report.

Response to General Comment No. 3:

All landfill maps in the final SI report have been updated to include landfill boundaries from the Landfill Cover Investigation Report (LAW 1997).

General Comment No. 4:

The direction of inferred groundwater flow direction is noted on figures throughout the document, but the basis for the inferred groundwater flow is not documented. As noted below in the case of Landfill 5 and Landfill 6, the indicated direction of groundwater flow differs from that shown in the RI. The basis for all indicated groundwater flow directions

or corrections to previous believed groundwater flow directions should be discussed in the text.

Response to General Comment No. 4:

The basis for the inferred groundwater flow are Figures 4.11-1A and Figure 4.11-1B, the integrated groundwater hydraulic head contour map of the base. It is assumed, for purposes of showing the direction(s) of flow, that flow is generally at right angles to the contours at any given point, i.e., the aquifer materials are isotropic, since there are no data suggesting otherwise.

Because the contours bend and are seldom uniform in spacing, the average overall flow direction is generally depicted, or, if the flows differ markedly across a site more than one arrow is shown.

The text will be modified in each case to indicate this.

General Comment No. 5:

In several instances, reference is made to "laboratory problems" causing rejection of the first sample and a consequent resampling. More specific details should be provided as to the nature of these "problems."

Response to General Comment No. 5:

"Laboratory problems" were properly handled according to the approved SI Quality Assurance Project Plan, and appropriate corrective actions were taken and documented in the SI Quality Control Summary Report.

Specific Comments

Comment No. 1:

Section 4.3.4.1, pages 4.3-2 to 4.3-3. Test pit investigation at Landfill 1 shows that OVA readings, up to 900 ppm, were detected in the test pit. However, no samples were collected in these areas or an explanation given for the high readings. The text should be revised to state why these readings were obtained in the test pits, especially when only inert materials were encountered.

In addition, the test pits revealed a fine sand cover material which appears to show that these areas were not capped. The text should be revised to discuss the test pit lithology as it is related to the landfill cap and adequate soil cover over the landfill waste.

Response to Comment No. 1:

Elevated OVA readings were due to the presence of methane, as determined through the use of a carbon filter on the OVA. Since methane passes through the carbon while other organic vapors are absorbed, equal readings both with and without the carbon filter indicates the presence of methane only. Section 4.3.4.1 was clarified as requested.

Based on test pit lithology, it appears that this area of Landfill 1 is not capped. A detailed discussed of the landfill cap/cover is covered under the Landfill Cover Investigation Report.

Comment No. 2:

Section 4.3.4.3, pages 4.3-4 to 4.3-5. It appears from the text that various drums were encountered in Landfill 1, but soil under only one drum was sampled. The work plan did state that samples would be collected if drums were encountered. In addition, no explanation is given as to where these drums came from, since there is no mention of them in the RI nor in the Landfill Cover Investigation Report. Please explain why no samples were collected in these areas and where these drums may have come from.

Response to Comment No. 2:

The SI work plan states drums or soil beneath the drums will be sampled if encountered in test pits. The drums encountered at Landfill 1 were surficial, and are currently being removed/sampled under another program.

Comment No. 3:

Section 4.3.5, page 4.3-7. The text states that groundwater issues are discussed in Section 4.11. However, Section 4.11 does not mention Landfill 1 in any part of the text. This discrepancy between the two sections should be resolved.

This final SI conclusion for Landfill 1 is to perform an FS although now it has been agreed upon that a presumptive remedy will be implemented. However, the following information would be needed even for a presumptive remedy:

- It does not appear that the exact landfill boundaries are known. The landfill boundaries presented in the RI (and therefore, the SI) differ from those presented in the Landfill Cover Investigation Report. The boundaries should be confirmed, consistent and agreed upon by the USAF, EPA, and NYSDEC.

- The extent of the groundwater plume has not been determined. Monitoring wells should be installed downgradient of LF1MW-5 and LF1MW-6 to determine the extent of the groundwater plume. This will need to be developed in the presumptive remedy.

- Vertical profiling should be done to define the vertical extent of contamination.

Response to Comment No. 3:
Section 4.3.5 has been changed to state that groundwater issues for Landfill 1 are discussed in the FS.

1st bullet: All landfill maps in the final SI report have been updated to include landfill boundaries from the Landfill Cover Investigation Report (LAW 1997).

2nd bullet: The extent of the potential groundwater plume to the southwest of LF1MW-5 is not fully determined. The drainage swale between the Perimeter Road and the main runway has intermittent flow during much of the year and appears to represent a groundwater discharge area. The need for additional work is currently being evaluated.

3rd bullet: The depth to very low permeability bedrock (Utica Shale), is approximately five feet below the elevation of Sixmile Creek. Much of the upgradient groundwater is forced to the surface and runs into the creek as the result of the abrupt thinning of the aquifer at Sixmile Creek. The proposed remedy will create a low permeability barrier tied to the shale bedrock. Vertical profiling appears to be redundant in such a thin aquifer. Even if some contaminants have entered the shale bedrock, the low hydraulic conductivity measured in bedrock wells (10^{-8} to 10^{-11} cm/sec), implies that this material will not be readily recoverable.

Comment No. 4:

Section 4.5.5, pages 4.5-3 to 4.5-4. The text recommends an FS to evaluate remedial alternatives at Landfill 5. However, as agreed upon a presumptive remedy will be implemented and therefore, any remaining data gaps can be addressed in the presumptive remedy. During the RI investigation, several "hot spot" areas were identified during the soil gas survey. In addition, during a site walkover by myself several drums were discovered. However, these areas were not investigated during the SI. It is recommended that these areas be addressed during the presumptive remedy.

Response to Comment No. 4:

At Landfill 5, "hot spots" will be addressed through the implementation of the presumptive remedy and surficial drums were already sampled and removed under the Landfill Consolidation Program.

Comment No. 5:

Figure 4.5-2. This figure does not delineate the Landfill 6 boundary. The figure should be updated to include the assumed landfill boundary.

Response to Comment No. 5:

All landfill maps in the final SI report have been updated to include landfill boundaries from the Landfill Cover Investigation Report (LAW 1997).

Comment No. 6:

Section 4.6.4, page 4.6-2. During the excavation of LF6TP-2 at Landfill 6, a petroleum odor was noted and high OVA readings were detected. A petroleum-contaminated zone was found at 8 feet BGS and then backfilled. Please expand the text to explain why this area was not further investigated, particularly since disposal of petroleum waste was noted in the Landfill Cover Investigation Report.

Response to Comment No. 6:

Disposal of petroleum contaminated soils from tank farms 1 and 3 at Landfill 6 is known through historical information, and a remedy is being proposed under another program.

Comment No. 7:

Figure 4.6-1. The Landfill 6 boundary shown on this figure differs from the boundary presented in the RI. Additional information should be provided to support this change in boundary lines, or the figure should be revised to be consistent with the RI.

Response to Comment No. 7:

All landfill maps in the final SI report have been updated to include landfill boundaries from the Landfill Cover Investigation Report (LAW 1997).

Comment No. 8:

Figure 4.7-2. This figure does not delineate the Landfill 7 boundary. The figure should be updated to include the assumed landfill boundary.

Response to Comment No. 8:

All landfill maps in the final SI report have been updated to include landfill boundaries from the Landfill Cover Investigation Report (LAW 1997).

Comment No. 9:

Section 4.7.4.1, page 4.7-2. The discussion of the test pit investigation at Landfill 7 reported a fine sand cover material possibly suggesting that these areas were not capped. This result is at odds with the Landfill Cover Investigation Report which found brown, sandy clay materials throughout the landfill. The text should be revised to discuss the test pit lithology as it relates to the landfill cap and adequate soil cover over the wastes.

Response to Comment No. 9:

The lithology described in Section 4.7.4.1 on page 4.7-2 describes the soil/cover material encountered during test pit excavations. Variations with respect to the Landfill Cover Investigation Report descriptions may be due to actual sample locations between the two studies, sampling method, and/or training of the individuals describing the existing soils.

Comment No. 10:

Section 4.8.2, page 4.8-1. It is unclear why previous RI sediment samples at Threemile Creek are dismissed as "low level" radionuclides when the RI report showed levels of strontium-90 in the upper portions of Threemile Creek in the range of 0.18 - 5.47 pCi/kg, as compared to the average U.S. soils level of 0.7 pCi/kg. An explanation as to why radionuclide analysis was not considered necessary.

Response to Comment No. 10:

E & E agrees that the level of strontium-90 (5.47 pCi/g) in TMCSD-1 is above the average U.S. soil level of 0.7 pCi/g as cited above. (Please note the units of measure are pCi/g not pCi/kg). However, it is still considered low level. Aside from a detected level of slightly above the average concentration, the following are additional reasons why additional radionuclide analyses were not deemed necessary: it does not represent contamination from Landfill 4 (the only known source of radionuclides on the base) since the RI soil and groundwater samples showed only naturally occurring emitters that were not representative of the radionuclide materials reportedly deposited in Landfill 4; it was only detected in one of 24 samples above the average concentration; the elevated sample was collected at the headwaters of Threemile Creek, therefore, no additional upgradient samples could be collected; and samples 100 and 150 feet downgradient of TMCSD-1 were below the detection limit.

Comment No. 11:

Section 4.9.4.2, page 4.9-3. The text states that the source of pesticides from Rainbow Creek is not from basewide runoff. However, this assumption is based on two surface water samples. Due to the detection of pesticides in surface soils, the lack of sediment samples, and few data points, it appears that this statement is not justified. Until additional data is available, this statement should be removed from the text.

Response to Comment No. 11:

The second to last sentence in Section 4.9.4.2 on page 4.9-3 was revised to state that the source of pesticides/PCBs in Rainbow Creek remains unknown based on the lack of contaminants in samples collected at the headwaters of the creek.

Comment No. 12:

Section 4.11.4.1, page 4.11-15. The text states that a 30-inch storm drain is collecting groundwater approximately 100 feet from the toe of Landfill 7. However, it is unclear from the text whether this storm drain completely intercepts groundwater flow or additional groundwater is flowing beyond the storm drain. The text should be revised to address these concerns.

The text also states that natural attenuation is occurring in Landfill 7 due to a reduction in PCE and TCE concentrations in one well, LF7MW-17. The use of two sampling events is not statistically significant. Variations in the level of TCE can result from natural causes, or changes in sampling technique and laboratory analysis owing to the change in contractors. If anything, it is more remarkable that the difference in TCE concentration between the sampling events is only 5 μg/L. A review of the data presented in Figure 4.11.4.1-2 and Tables 4.11.4.1- and 4.11.4.1-3 reveal TCE at significant levels downgradient of LF7MW-17. In addition, the degradation of PCE and TCE might be expected to produce higher levels of 1,2-DCE and vinyl chloride than shown on Table 4.11.4.1-2. Reference to natural attenuation should be removed from this section. Other explanations should be discussed including migration of the plume, dispersion, and dilution.

Response to Comment No. 12:

The first paragraph on page 4.11-15 was modified to indicate that the 30-inch storm drain at the toe of Landfill 7 may be intercepting some groundwater.

The reference to natural attenuation, third from last sentence of Section 4.11.4.1 on page 4.11-15 was deleted as requested. However, the sentence was modified to contain additional information regarding biotransformation.

Comment No. 13:

Section 4.11.4.8, page 4.11-22. The text states that groundwater from Building 101 discharges to Threemile Creek through a storm drain trench. However, it is unclear whether the storm drain trench completely intercepts the groundwater flow. The text should be revised to address whether all or only a portion of the groundwater flow is intercepted, and whether any contamination is migrating downgradient of the storm drain trench.

The text states that natural attenuation is eliminating the chloroform plume, but it is unclear whether a chloroform plume actually exists. A review of the analysis performed on drilling source water, as presented on Table 2-2, page 2-23, shows detection of chloroform. If any of these wells were drilled or developed with this source water, it may explain the low levels originally detected, and it may account for the apparent decrease noted during the SI.

Response to Comment No. 13:

The following was inserted after the second paragraph, page 4.11-22: "The very low hydraulic gradients in this area and the flows in Threemile Creek can reasonably be interpreted in two ways only: either the hydraulic conductivity of the aquifer materials is significantly higher than elsewhere on Griffiss, or the installation of the large diameter storm drain with an extremely low gradient (0.002 feet/foot) has created an artificially low gradient in the groundwater by acting as a discharge point. The implication is that the "plume" from Building 101 is all captured by the storm drain trench."

Line 7 of the second paragraph on page 4.11-22 was modified to read "...(310,000 gpd or approximately 54 gallons per minute per 1,000 feet) for the remainder of its gauged length (4000 feet) within the former Griffiss AFB, ..."

The following was inserted on Line 5 on page 4.11-22: "or 21 gallons per minute per 1000 feet of major storm drain" after "or 193,000 gallons per day (gpd)."

Reference to natural attenuation, the last paragraph of Section 4.11.4.8 on page 4.11-22 was eliminated. A statement regarding the potential source of chloroform (i.e., drill water) was added to the end of the first paragraph on page 4.11-22.

Comment No. 14:

Section 4.11.4.9, pages 4.11-22 to 4.11-23. The SI investigation of Landfill 5 confirmed the presence of carbon tetrachloride in LF5MW-1. However, a significant data gap still exists at this site because the source of carbon tetrachloride, although apparently not Landfill 5, remains unknown according to this report. Therefore, the SI conclusion that a groundwater FS can proceed at this site cannot be supported until this source of contamination is determined.

In addition, the direction of groundwater flow, identified on Figure 4.11.4.9-1, is different from the flow presented in the RI. A discussion should be provided in the text that explains why the direction of groundwater flow is different than previously thought.

Response to Comment No. 14:

The following was inserted at the end of the 2nd paragraph of Section 4.11.4.9 on page 4.11-22: "Carbon tetrachloride in LF5MW-1 was only slightly above the ARAR. The distance between MW49D-01 and LF5MW-1 and MW49D-02 and LF5MW-1 (both free of carbon tetrachloride) is only 250 feet and 350 feet, respectively. Since LF5MW-1 is approximately 750 feet northeast of Threemile Creek, the low concentration and small potential area of contamination suggests that it is of minimal concern."

The direction of groundwater flow discrepancies are addressed in USEPA General Comment #4.

Comment No. 15:

Section 4.11.4.10, page 4.11-23. The data collected during the SI investigation of Landfill 6 only confirmed the results obtained during the RI, but did not fill any data gaps. The source of groundwater contamination is still unknown: the contamination may be from Landfill 6 or from Building 775. According to Section 4.11.4.11, page 4.11-24, Building 775 downgradient wells do not indicate biotransformation of TCE. Therefore, it is unreasonable to assume that the contamination detected in wells at Landfill 6 is a result of biotransformation of the TCE plume from Building 775. These questions should be addressed at this AOC before an FS is performed. The investigation which can be performed as part of the presumptive remedy should focus more on Landfill 6 as a source area, rather than Building 775.

The text discusses the VOC contamination of LF6MW-2 and speculates that it may have resulted from spills or discharges upgradient of the landfill. In view of the documentation of disposal of contaminated soils from Tank Farms 1 and 3 in Landfill 6 in the RI (Responses to Comments on the Draft Primary Report), speculation of other upgradient sources of VOCs appears unfounded. The text should be revised.

The text states that the plume discharges to Threemile Creek, but this result was not substantiated in the RI nor established in the SI. On the contrary, the vertical profiling finding of a maximum TCE contamination at 40 feet BGS may suggest that the plume dives below Threemile Creek. The text should be revised to discuss this issue.

In addition, the direction of groundwater flow, identified on Figure 4.11.4.10-1, is different from the flow presented in the RI. A discussion should be provided in the text that explains why the direction of groundwater flow is different than previously thought.

Response to Comment No. 15:

After further review of the existing SI data, and new SI data from 775VMW-9 and 775VMW-10, it appears as though biotransformation of PCE to TCE, TCE to 1,2-DCE, and 1,1,1-TCA to 1,1-DCE may be occurring at the Building 775 site. Therefore, the third paragraph on page 4.11-24 of the draft SI report has been modified to present this information.

Since the source and extent of VOC contamination at Landfill 6 is still inconclusive (i.e., whether it is from Landfill 6, Building 775, or both; and whether it dives below Threemile Creek), the need for additional information regarding this matter is being evaluated. Therefore, the following was deleted at end of Section 4.11.4.10 on page 4.11-23: "Possible sources of the plume include Building 775 (see Section 4.11.4.11) or the landfills."

The direction of groundwater flow presented in the SI is based on the basewide groundwater elevation survey performed during the SI. Therefore, it is likely that there are several areas on base where groundwater flow directions differ between the RI and SI. This issue is discussed in the second paragraph of Section 4.11.3.1

Comment No. 16:

Section 4.11.5, page 4.11-27. The overall conclusion for the groundwater AOC is to continue into the FS stage. Before an FS is done, the following information should be obtained:

- Relationship between perched zones and groundwater flow. The identification of perched groundwater throughout the base has added another variable into the difficulty of predicting groundwater flow and determining contaminant migration. The SI report states that it is impossible to determine perched groundwater during the drilling and installation of monitoring wells. As a result, many of the low recharge wells throughout the base may have screens within the perched groundwater table. The data obtained from these wells, i.e., hydraulic conductivity, was used in the basewide groundwater model to predict contaminant migration. Therefore, the groundwater model may erroneously predict smaller and slower migrating plumes than are actually present.

- Groundwater hydrogeological parameters. At this time, no reliable pump tests have been performed at the base. Pump tests would establish hydrogeological parameters used in the basewide groundwater modeling and would better define the groundwater flow direction within each AOC.

- Relationship between storm drains and groundwater flow. The base contains quite a few storm drains that appear to intercept groundwater flow. These storm drains present another uncertainty in the delineation of contaminant migration.

- In light of the SI findings of perched water conditions and significant influences of storm drains on groundwater flow, it may be advisable to re-examine the on-base groundwater model.

Response to Comment No. 16:

1st bullet: The area of perched zones at Griffiss is almost exclusively confined to the massive filling under the Apron 1 and Apron 2 area. Evidently differential compaction created layers of different hydraulic conductivity in the fill. Some of these support seasonal or semi-permanent perched zones. The fill is basically similar to natural aquifer materials since it is derived from cutting into the valley sides and moving and compacting the glacial outwash and lake delta materials. The distribution of contamination and the hydraulic gradients in wells installed into the permanent water table define the directions of flow. The regional groundwater model is not affected in any way.

Several contractors are working in the Apron 1 and Apron 2 area. Once their data is all available a more complete picture of the areas requiring remediation and subject to a Feasibility Study.

2nd bullet: Pump tests might be useful to establish average hydrologic parameters over a wide area, but none of the plumes so far identified encompass a wide area. Estimated rates of pumping required for remediation or containment of small plumes depend on very local conditions. The extent of migration provide a good basis for estimating rates of movement, and the cross-sectioned areas of the plumes provide good estimates of their volumes of flow. These data are more readily applied to local conditions than the hydraulic data derived from averaging properties over a large volume of aquifer.

3rd bullet: Storm drains that clearly intercept the groundwater do, in fact, simplify the interpretation of the hydrogeology. They act in effect like surface water, and become capture zones for groundwater. The fact that many of them (or their underlying gravel pads) act as discharge zones for groundwater much of the time is shown by their continuing to flow when there is no surface runoff entering them.

4th bullet: While the regional groundwater model has been useful in the past, it is presently not a factor in proposing remediation. Remediation is being based on local conditions and local distribution of contamination, supported by a detailed integration of hydraulic gradient data and surface water elevations across the entire base. These allow for delineation of each individual plume and an estimation of its actual or potential extent.

Additional Changes to Draft SI Report

Text

Section 1, page 1-3. Last paragraph changed to reflect the collection of 25 geoprobe samples at Building 133 AOC; and the drilling installation, and sampling of 775VMW-9, 775VMW-10, and 782MW-6R2 in November/December 1997.

Section 1, page 1-4. Disposal of all IDW was added to the first paragraph.

Section 2.11.2, page 2-11. Revised section to include all drill water samples collected during the field program.

Section 2.1.3, page 2-13. Revised first and second paragraphs to include Building 133 geoprobe samples collected in October/November 1997.

Section 2.11.6.2, page 2-16. Screen lengths were added for 775VMW-9 and 775VMW-10.

Section 2.14, page 2-21. A statement was added regarding the disposal of IDW drums.

Section 4.11.4.7, Page 4.11-20. The text was modified to include results from 782MW-6R2.

Section 4.11.4.11, page 4.11-24. The text was modified to include results from 775VMW-9 and 775VMW-10.

Tables

Table 2-1. Added information regarding water added to 775VMW-9, and filled in missing comments.

Table 2-2. Added DW-02 and DW-03.

Table 4.11.3.2-1. AP2MW-1, 773MW-2, 7763MW-3, 775MW-2, and TMC-USGS were updated.

Table 4.11.3.1-2. Semivolatile analysis results were added.

Table 4.11.4.7-1. Updated to include 782MW-6R2.

Table 4.11.4.7-2. Updated to include 782MW-6R2.

Table 4.11.4.7-3. Updated to include 782MW-6R2.

Table 4.11.4.8-2. The 101MW-1 result for bis (2-ethylhexyl) phthalate was corrected.

Table 4.11.4.10-2. Bis (2-ethylhexyl) phthalate results were added.

Table 4.11.4.11-1. Updated to include 775VMW-9 and 775VMW-10.

Table 4.11.4.11-2. Updated to include 775VMW-9 and 775VMW-10 and bis (2-ethylhexyl) phthalate results..

Table 4.11.4.11-3. Updated to include 775VMW-9 and 775VMW-10.

Table 4.11.12-2. Added bis (2-ethylhexyl) phthalate results and a footnote.

Figures

Figure 4.11-1A & 1B: Editorial changes (i.e., color of well labels/symbols); added 775VMW-9, 775VMW-10, and 782MW-6R2; corrected Sixmile Creek culverted section and groundwater contours near the creek.

Figure 4.11.4.1-1: Modified contour line near LF7SW-2.

Figure 4.11.4.2-1: Modified contour lines.

Figure 4.11.4.6-1: Finalized geoprobe locations.

Figure 4.11.4.6-2: Added results for 133GP-47, -48, -52, -53, and-55 and readjusted contours.

Figure 4.11.4.7-1: Modified contour lines and direction of groundwater flow, and added 782MW-6R2.

Figure 4.11.4.7-2: Modified direction of groundwater flow and added 782MW-6R2.

Figure 4.11.4.8-1: Modified contour line.

Figure 4.11.4.11-1: Modified contour lines and added 775VMW-9 and 775VMW-10.

Figure 4.11.4.11-2: Added 775VMW-9 and 775VMW-10.

Figure 4.11.4.12-1: Underlined groundwater elevation at ANGMW-4 and added note to legend.

Appendices

E Added logs for 775VMW-9, 775VMW-10, 782MW-6R2.

F Added logs for 775VMW-9, 765VMW-10, 782MW-6R2.

G Added NA parameters for 775VMW-9, 775VMW-10, and 782MW-6R2.

H A footnote was added to Table H-11 regarding date of water level measurement; water levels and footnotes were added to Table H-13 for 775VMW-9 and 775VMW-10; water levels and a footnote were added to Table H-14 for 782MW-6R1 and -6R2;

the groundwater elevations for HS2MW-1 was corrected; information in columns for LF1MW101 and LF1MW-1 in Table H-23 were rearranged; and the groundwater elevation for Lot 11MW-3 was corrected.

I Changed Drum No. 106 to 107 on Page I-3
Added Drum No. 106 to page I-14
Added New IDW inventory sheets (pages I-19 and I-20)

J Replaced entire Appendix J with updated info

K Added results from geoprobes 133GP31-55; vertical profiling of 775VMW-9 and 775VMW-10; and groundwater results from 775VMW-9, 775VMW-10, and 782MW-6R2.

Final Report for the Supplemental Investigations of Areas of Concern at the Former Griffiss Air Force Base Rome, New York

Volume I

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Acronym List

AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFCEE	Air Force Center for Environmental Excellence
AFFF	aqueous film-forming foam
AOC	Area of Concern
AOI	Area of Interest
ARAR	applicable or relevant and appropriate requirement
ASC	Analytical Services Center
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
BADP	Battery Acid Disposal Pit
BGS	below ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
CLY	Coal Storage Yard
CO	Carbon Monoxide
COPC	chemical of potential concern
DCE	dichloroethene
DO	dissolved oxygen
DoD	United States Department of Defense
DOT	United States Department of Transportation
E & E	Ecology and Environment, Inc.
EBS	environmental baseline survey
EPA	United States Environmental Protection Agency
EPS	Electrical Power Substation
ESI	Expanded Site Investigation
FDA	Fire Demonstration Area
FEIS	final environmental impact statement
FPTA	Fire Protection Training Area
FS	feasibility study
FSP	field sampling plan
GC	gas chromatograph
GIS	Geographical Information System
GLDC	Griffiss Local Development Corporation
GP	Geoprobe® Sample
GPR	ground-penetrating radar
H_2S	Hydrogen Sulfide

HSA	hollow-stem auger
HTW	hazardous and toxic waste
ID	inner diameter
IDW	investigation-derived waste
IRA	Interim Remedial Action
IRP	Installation Restoration Program
L69	Lot 69, Former Hazardous Waste Storage Area
Law Environmental	Law Environmental Services, Inc.
LEL	Lower Explosive Limit
LF	landfill
MH	manhole
MHZ	megahertz
MRD	Missouri River Division
MSL	mean sea level
MW	monitoring well
NA	natural attenuation
NFA	no further action
NPL	National Priorities List
NS	near-surface soil sample
NTU	nephelometric turbidity unit
NYANG	New York Air National Guard
NYSDEC	New York State Department of Environmental Conservation
O_2	Oxygen
OD	outer diameter
ORP	redox potential
OVA	organic vapor analyzer
OWS	Oil/water separator
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PID	photoionization detector
PISCES	passive in situ concentration/extraction sampler
ppm	parts per million
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QAPjP	quality assurance project plan
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
SAC	Strategic Air Command
SAR	Small Arms Range
SAS	Special Analytical Services
SD	sediment sample
SI	supplemental investigation
SFTA	Suspected Fire Training Area
SMC	Sixmile Creek
SOP	standard operating procedure
SOW	scope of work
STS	Sample Tracking System
SVOC	semivolatile organic compound
SW	surface water sample
TAGM	Technical and Administrative Guidance Memorandum

TBC	to be considered
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TM	technical manager
TMC	Threemile Creek
TOIC	top of inner casing
TP	test pit
TW	temporary well
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USCS	Unified Soil Classification System
UST	underground storage tank
VC	vinyl chloride
VMW	vertical profile monitoring well
VOC	volatile organic compound
W	storm sewer water sample
WL	Leachate sample
WSA	Weapons Storage Area

Executive Summary

Under contract to the United States Army Corps of Engineers (USACE), Kansas City District, Ecology and Environment, Inc. (E & E) conducted supplemental investigations (SIs) at 11 of the 31 Areas of Concern (AOC) at the former Griffiss Air Force Base (AFB) in Rome, New York. The AOCs included:

- Fire Demonstration Area (FDA);
- Suspected Fire Training Area (SFTA);
- Landfill 1 (LF-1);
- Landfills 2 and 3 (LF-2 and LF-3);
- Landfill 5 (LF-5);
- Landfill 6 (LF-6);
- Landfill 7 (LF-7);
- Threemile Creek (TMC);
- Sixmile Creek (SMC);
- Fire Protection Training Area (FPTA); and
- On-Base Groundwater.

The purpose of the SI program was to provide supplementary data to fill data gaps identified in the Remedial Investigation (RI) completed by Law Environmental Services, Inc. (Law Environmental) in 1996, and verify RI recommendations.

The SI program consisted of a review of RI field investigations, sample results, recommendations, and regulator comments (i.e., New York Department of Environmental Conservation [NYSDEC] and United States Environmental Protection Agency [EPA]) in order

to make SI recommendations. SI recommendations were reviewed by USACE, the Air Force Base Conversion Agency (AFBCA), NYSDEC, and EPA. A final SI Work Plan was submitted on March 24, 1997 (E & E 1997e). The SI field program was initiated on June 4, 1997, and will be completed in December 1997. Information gathered from work completed after this draft report is submitted will be provided as an addendum to the report. The investigations included probing wells for free product; test pit excavation; Geoprobe® and Hydropunch® groundwater screening sampling; temporary and permanent monitoring well installation and sampling; and Passive in situ concentration/extraction sampler (PISCES), surface water, storm sewer water, leachate, and near-surface soil sampling. Geoprobe groundwater screening sample results from on-base groundwater sites (i.e., LF-6, Building 133, and Building 255) were used to laterally place monitoring wells at or downgradient of the areas of highest contamination. Sample results from on-base groundwater sites (i.e., LF-6; Buildings 3, 255, and 775; FPTA, and Tin City) were used to vertically profile groundwater to allow for proper screen placement (i.e., in the zone of highest contamination).

Results of SI sample analyses were assessed with respect to the same criteria used to screen RI samples. Where possible, SI results were compared to RI results (i.e., for RI wells resampled during the SI). Other groundwater analytical results (e.g., natural attenuation parameters) will be used to evaluate remedies in the Feasibility Study (FS) (E & E 1997a). The remainder of SI sample analyses were used to provide additional AOC information to aid in a final recommendation (i.e., whether the site should be considered for no further action [NFA], removal action, FS, or long-term monitoring). Based on RI and SI results, the following actions were recommended:

- FDA - NFA was recommended in the RI. Since no free product was detected in the existing site well during the SI, the RI recommendation remains unchanged;

- SFTA - NFA was recommended in the RI. Since no free product was detected in any of the site monitoring wells during the SI, the RI recommendation remains unchanged.

- Landfill 1 - A FS was recommended in the RI. Based on SI results from non-groundwater field activities (i.e., test pit excavations and geophysical survey), the RI recommendation remains unchanged. Groundwater issues are discussed under the On-Base Groundwater AOC. However, the presence of surficial and partially buried drums observed during implementation of the geophysical survey, and the potentially buried drum identified in the Ground Penetrating Radar (GPR) survey may warrant a removal action.

- Landfills 2 and 3 - A FS was recommended in the RI. Based on SI results from non-groundwater field activities (i.e., test pit excavations), the RI recommendation remains unchanged. Groundwater issues are discussed under the On-Base Groundwater AOC.

- Landfill 5 - A FS was recommended in the RI. Based on SI results from non-groundwater field activities (i.e., test pit excavations, and near-surface soil and leachate sampling), the RI recommendation remains unchanged. Results from near-surface soils and leachate will be used in FS evaluations. Groundwater issues are discussed under the On-Base Groundwater AOC.

- Landfill 6 - A FS was recommended in the RI. Based on SI results from non-groundwater field activities (i.e., test pit excavations), the RI recommendation remains unchanged. Groundwater issues are discussed under the On-Base Groundwater AOC.

- Landfill 7 - A FS was recommended in the RI. Based on SI results from non-groundwater field activities (i.e., test pit excavations and leachate sampling), the RI recommendation remains unchanged. Leachate sample results will be used in FS evaluations. Groundwater issues are discussed under the On-Base Groundwater AOC.

- TMC - A FS was recommended in the RI. Based on SI results (i.e., pesticides appear to be entering TMC from Landfills 5 and 6, and possibly Hardfill 49c [based on proximity]). The RI recommendation remains unchanged. SI results will be used for FS evaluations.

- SMC - A FS was recommended in the RI. Based on SI results (i.e., pesticides are entering SMC from Landfill 1 and Rainbow Creek), the RI recommendation remains unchanged. SI results will be used for FS evaluations.

- FPTA - NFA was recommended in the RI if similar conditions were encountered during SI wells sampling. Based on SI results from storm sewer and groundwater sampling, the RI recommendation for NFA remains unchanged.

- On-Base Groundwater - A FS was recommended in the RI to address localized areas of groundwater contamination. Based on SI results from the resampling of existing wells and installation and sampling of new temporary and permanent wells, the RI recommendation for a FS remains unchanged. SI sampling results and the basewide groundwater elevation survey will be used in FS evaluations of AOCs contributing groundwater contamination above ARARs (i.e., Landfills 1, 2/3, 6, and 7; Buildings 101, 133, 773, 774, 775, 786, and 779; T9 Storage Area; Nose Docks 1 and 2; and FPTA).

1 Introduction

Ecology and Environment, Inc., (E & E), under contract to the United States Army Corps of Engineers (USACE), Kansas City District, Contract DACW41-94-D-9001, Delivery Order 0016, was tasked in 1996 to evaluate the need for supplemental investigations (SIs) for 31 Areas of Concern (AOCs) at the Former Griffiss Air Force Base (AFB) in Rome, New York (see Figures 1-1, 1-2A and 1-2B). In accordance with the Federal Facility Agreement and Resolution of Disputes between the United States Air Force (USAF), the United States Environmental Protection Agency (EPA), and the New York State Department of Environmental Conservation (NYSDEC), a remedial investigation (RI) and baseline risk assessment were conducted at these 31 AOCs by Law Environmental Services, Inc. (Law Environmental 1996). The purpose of the RI and risk assessment, respectively, was to evaluate the nature, level, and extent of potential contamination at the sites, and the potential effects of chemicals of potential concern (COPCs) on human health and the environment. The AOCs covered under the RI program included:

- Landfill 1 (LF-1);
- Landfills 2 and 3 (LF-2/3);
- Landfill 7 (LF-7)
- Suspected Fire Training Area (SFTA);
- Sixmile Creek (SMC);
- Electrical Power Substation (EPS);
- Landfill 4 (LF-4);
- Landfill 5 (LF-5);
- Landfill 6 (LF-6);

- Threemile Creek (TMC);
- Building 255 Drywells;
- Building 219 Drywell;
- Building 214 Former Vehicle Maintenance Shop;
- Building 101 Battery Acid Disposal Pit (BADP)/Yellow Submarine Underground Storage Tank (UST);
- Building 222 BADP;
- Building 3 Drywell;
- Building 301 Drywell;
- Building 112;
- Lot 69 Former Hazardous Waste Storage Area (Lot 69);
- Building 20 Locomotive Roundhouse;
- T-9 Storage Area;
- Coal Storage Yard (CLY);
- Building 133 Storage Vault;
- Building 786 (Nose Dock 5) Contaminated Soil;
- Nosedocks 1 and 2 (Buildings 782 and 783);
- Building 775 (Pumphouse 3) Trichloroethene (TCE) Contamination;
- Fire Protection Training Area (FPTA);
- Fire Demonstration Area (FDA);
- Glycol Use/Storage Areas;
- On-Base Groundwater; and
- Off-Base Groundwater;

The RI field investigations, sample results, recommendations, and regulator comments (i.e., NYSDEC and EPA) were reviewed in order to make SI recommendations. The final SI work plan was submitted by the Air Force Base Conversion Agency (AFBCA) to the EPA and

NYSDEC on March 24, 1997 (E&E 1997e). The work plan included the following investigations:

- FDA - probe FDAMW-1 for free product;
- SFTA - probe SFTAMW-1, -2, -3, -4, -4R for free product;
- LF-1 - test pit excavations and decommissioning of LF1MW102 bedrock well;
- LF-2/3 test pit excavations
- LF-5 - test pit excavations and near-surface (NS) soil and leachate (WL) sampling;
- LF-6 - test pit excavations;
- LF-7 - test pit excavations and leachate sampling;
- Threemile Creek - Passive in situ concentration/extraction sampler (PISCES) samples and surface water (SW) sampling;
- Sixmile Creek - PISCES, surface water and storm sewer manhole (MH) water (W) sampling;
- FPTA - storm sewer water and sediment (SD) sampling;
- On-Base Groundwater - Basewide groundwater elevation survey; probing 786MW-2 for free product; Geoprobe® (GP) groundwater survey at Buildings 133 and 255, and LF-6; installation and sampling of standard permanent monitoring wells (MWs) and existing wells at Buildings 101, 133, 775, and 786, Nose Docks 1 and 2, Landfill 5, and Fire Protection Training Area; installation and sampling of vertical profile monitoring wells (VMWs), and existing wells at Buildings 3, 255 and 775, Landfill 6 and FPTA, and Tin City; temporary well (TW) installation, sampling and decommissioning at Landfill 7, weapons storage area (WSA), Lot 69, and Building 101.

The SI field program was initiated on June 4, 1997, under Delivery Order 0021. The major portion of the field program was completed on August 29, 1997, with the following exceptions: the installation of the two replacement wells (782MW-6R1 and 782MW-6R2) in September and November 1997, respectively; the development and sampling of 782MW-6R2 in November and December 1997, respectively; the installation of 25 additional Geoprobe® groundwater survey points at Building 133; and the installation, development, and sampling of two additional vertical profile wells (775VMW-9 and 775 VMW-10) downgradient of the Building 775 site in November and December 1997.

USACE added the following tasks to E & E's original scope of work (SOW) during the field program: additional Geoprobe® samples at Buildings 133 and 255; two vertical profile wells at the Building 775 site; 10 Geoprobe® samples at Building 255 and 20 at Building 133; one monitoring well at the Building 133 site; geophysical survey and drum removal and sampling at Landfill 1; one leachate sample at Landfill 7; and off-site disposal of all Investigation-Derived Waste (IDW). Details of these additional tasks are described under each particular AOC in Section 4 of this report. All field changes to the original SOW are documented on Field Adjustment Forms presented in Appendix A.

Field methodologies are discussed in Section 2, screening methodologies are discussed in Section 3, results of each AOC are discussed in Section 4, and references are presented in Section 5. Appendices A through L contain all pertinent data supporting this document. Two previous *Quality Control Summary Reports* were submitted to USACE in August and October 1997 that contain data validation information associated with this sampling program (E & E 1997b, 1997d). Amendments to the Groundwater AOC QCSR (i.e., the addition of groundwater sampling of 775VMW-9, 775VMW-10, and 782MW-6R2) were submitted in April 1998.

1.1 Purpose and Goals

The purpose of the SI program was to fill data gaps associated with the RI performed for 11 of the 31 AOCs. The information from the SI will be used in conjunction with RI information to determine whether the particular AOC requires no further action (NFA), a removal action, a feasibility study (FS), or long-term monitoring.

1.2 Site Description

The former Griffiss AFB is located in the city of Rome in Oneida County, New York (see Figure 1-1). The base is bordered by the Mohawk River along part of its western boundary and by the New York State Barge Canal along its southern boundary. It consists of 3,552 acres, of which 3,278 acres were fee-purchased by the United States Government from 1941 to 1978, 257 acres (currently occupied by the former base golf course) were donated by Oneida County in 1942 for initial base construction, and 4 acres (along the barge canal, south of the railroad tracks) are leased from New York State. In addition, the base has 345 acres of clearance easements at both ends of its runway, 45 acres of right-of-way, and 5 acres of restricted easements adjacent to the former weapons storage area. Most of the former base is designated as Tract 243.000-0001-001 by the Oneida County Tax Office (Tetra Tech 1994).

The base underwent realignment on September 30, 1995. Existing organizations on the base (e.g., Rome Laboratory, New York Air National Guard [NYANG], and Defense Finance and Accounting Service) remained on government-retained land after that date; however, the remaining property is available for transfer.

1.3 Site Investigation History

In 1981, the United States Department of Defense (DoD) established the Installation Restoration Program (IRP) for the purpose of evaluating the environmental impact of operations on its bases. Since that time, the former Griffiss AFB has been studied by several contractors to determine the extent of site contamination to prioritize and perform cleanup actions.

A Phase I records search was conducted by USAF and Engineering-Science, Inc., in 1981. Nineteen sites were studied for potential contamination, and 15 were identified as AOCs. A Phase II study was performed by Roy F. Weston, Inc., in two stages: one in 1982 and one in 1985. During this study, 14 groundwater monitoring wells were installed, four surface water sampling stations were established, and ground-penetrating radar (GPR) and resistivity surveys were conducted.

Hydro-Environmental Technologies, Inc., conducted a study of four specific AOCs in 1986. Versar, Inc., reviewed the data on 15 AOCs in 1987 and determined that the available data were insufficient to conduct a feasibility study (FS). In the summer of 1987, Griffiss AFB was put on the National Priorities List (NPL) of the federal Superfund program.

In 1988, the Agency for Toxic Substances and Disease Registry (ATSDR) studied five AOCs to determine whether a health assessment could be performed, but again the data were insufficient (ATSDR 1988). Also in 1988, UNC Geotech was contracted to begin the process of determining which IRP sites could be designated for NFA and which should be maintained in a list of active AOCs (UNC Geotech 1991). Law Environmental, together with USAF and regulatory agency personnel, expanded this process in 1991 by studying 54 sites. It was determined that 31 of these sites were AOCs. A work plan, Field Sampling Plan (FSP), quality assurance project plan (QAPjP), and several technical memoranda were produced by Law Environmental (Law Environmental 1993) to study of these 31 AOCs in an RI. The Draft Final RI Report was issued by Law Environmental in December 1996 (Law Environmental 1996).

In the fall of 1992, a quarterly groundwater sampling and analysis program was initiated at well locations basewide. The program was completed at the end of 1993, and the

report was finalized in 1994. Law Environmental also conducted a second basewide study to identify Areas of Interest (AOIs), and 464 were identified (Law Environmental 1994). Since then, two additional AOIs were added, for a total of 466 AOIs. Of these AOIs, E & E has investigated a total of 33 AOIs during the Group I, Group II, and Group III AOI programs in 1995 and 1996 (E & E 1997f, 1997g, 1996a). Expanded Site Investigations (ESIs) for Group I and Group III AOIs were initiated in October 1997. In 1995, E & E completed development of a Geographical Information System (GIS) prototype to assist base personnel in the transfer of surplus real estate and serve as a database for the accumulation and management of site-specific information (i.e., analytical data, environmental baseline survey [EBS] information). The development and implementation of a fully functional GIS was completed in 1996.

Several limited-area studies and several baseline or planning studies have been conducted or are currently being conducted at Griffiss AFB by various contractors to AFBCA, the Air Force Center for Environmental Excellence (AFCEE), and USACE.

As required for realignment, a basewide EBS for Griffiss AFB, which summarizes much of the site work to date, was produced for USAF (Tetra Tech 1994). In addition, an EBS/AOI summary table cross-referencing numerical identifications, site descriptions, and comments from the respective documents was issued by Tetra Tech on June 19, 1995 (Tetra Tech 1995).

A Master Reuse Strategy for Griffiss Air Force Base was developed as a result of the Base Realignment and Closure (BRAC) Commission recommendation that the Base be realigned (Griffiss Local Development Corporation [GLDC] 1995). The reuse strategy consists of a master plan and implementation strategy that provides a framework to transform the base into a mixed-use business park with utility and open-space plans also included.

A *Final Environmental Impact Statement (FEIS) for the Disposal and Reuse of Griffiss Air Force Base* was issued in 1995 (USAF 1995). It specifies the anticipated environmental impacts associated with the disposal and reuse of the areas within the base.

1.4 Environmental Setting

1.4.1 Local Topography and Geology

The former Griffiss AFB lies within the Mohawk Valley between the Appalachian plateau and the Adirondack Mountains. The topography across the former base is relatively flat with elevations ranging from 435 to 595 feet above mean sea level (MSL). The highest elevations are to the northeast. A rolling plateau northeast of the former base reaches an

elevation of 1,300 feet. The New York State Barge Canal and the Mohawk River Valley south of the base lie below 430 feet above MSL.

Unconsolidated sediments at the former Griffiss AFB consist primarily of glacial till with minor quantities of clay and sand, and significant quantities of silt and gravel (Tetra Tech 1994). The thickness of these sediments ranges from 0 to 12 feet in the north-northeast to 130 feet in the south. In general, the average thickness of the unconsolidated sediments is 25 to 50 feet in the central portion and 100 to 130 feet in the south and southwest portions of the former base.

The bedrock beneath the base is composed of black Utica Shale. This gray and black carbonaceous unit generally dips from northeast to southwest.

1.4.2 Local Hydrogeology

The aquifer of interest in this study is the shallow water table aquifer within the unconsolidated sediments. The depth to groundwater in the water table aquifer ranges from the ground surface to 57 feet below ground surface (BGS) (Tetra Tech 1994). The shallow groundwater generally flows across the base from the slight topographic high in the northeast to the Mohawk River and the New York State Barge Canal in the southeast, mimicking the bedrock slope. However, several surface water creeks act as discharge areas for shallow groundwater, and drainage culverts and sewers intercept surface water runoff.

Based on a hydrogeological study that was performed at the former Griffiss AFB using flow-gauge measurements and nearby groundwater elevations, both Sixmile and Threemile creeks are gaining streams (UNC Geotech 1991; Law Environmental 1996). Underground sewers and drainage culverts with diameters up to 9 feet may also influence groundwater flow directions during high water table conditions. Basewide groundwater flow will be further discussed in Section 4 under the On-Base Groundwater AOC.

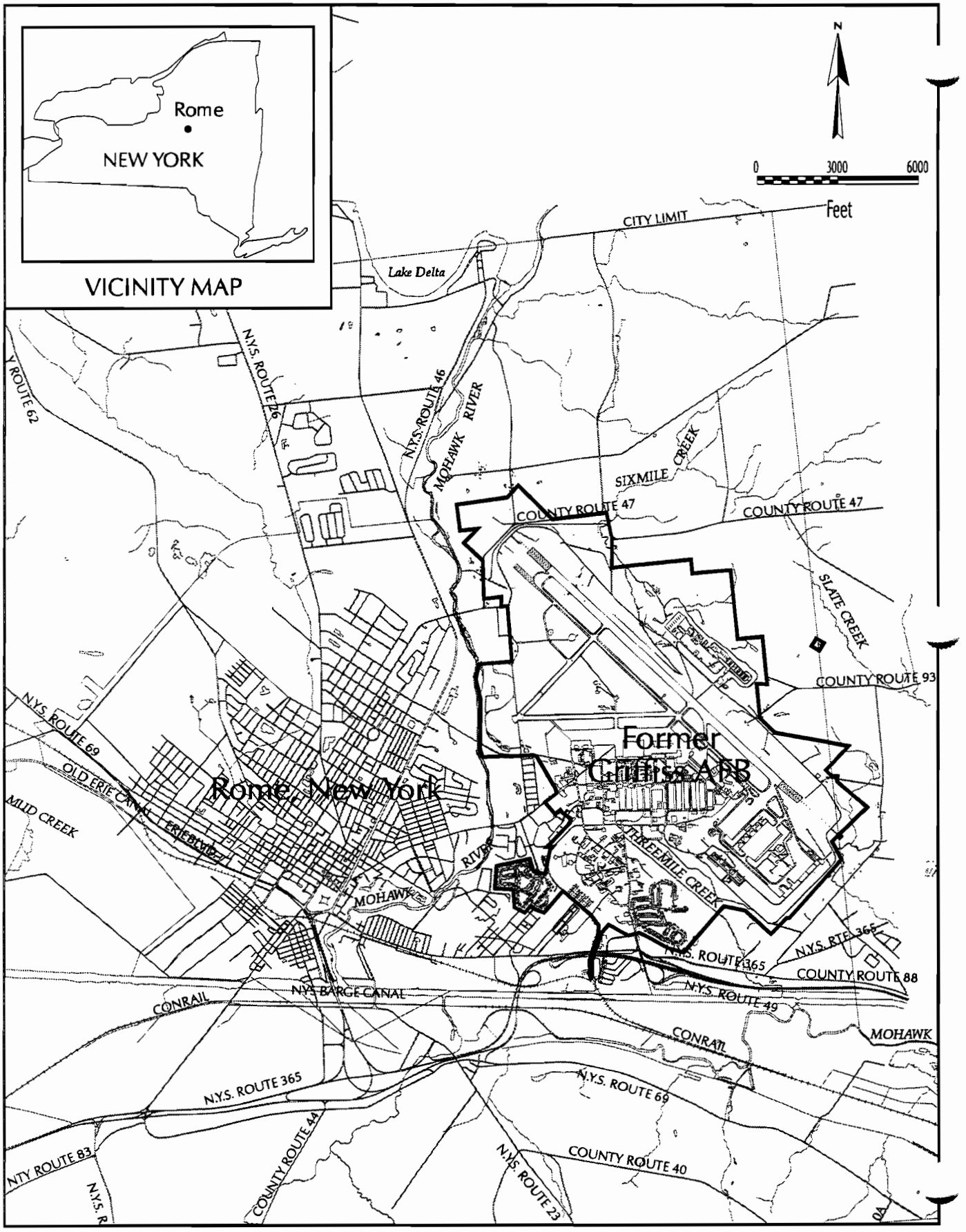

Figure 1-1 Griffiss AFB - Site Location Map

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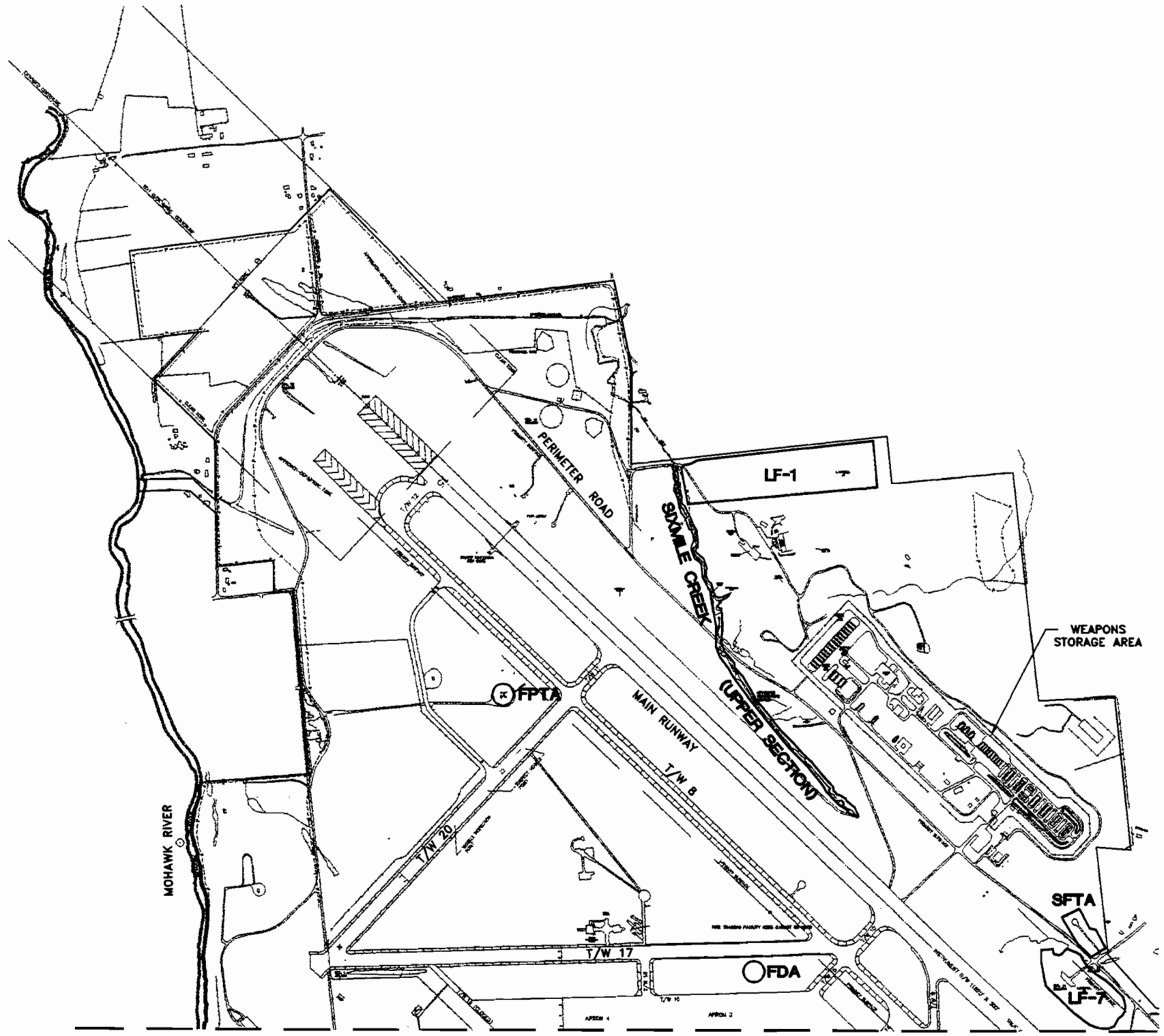

LEGEND

FDA	FIRE DEMONSTRATION AREA
FPTA	FIRE PROTECTION TRAINING AREA
LF-1	LANDFILL 1
LF-7	LANDFILL 7
SFTA	SUSPECTED FIRE TRAINING AREA

N

SCALE IN FEET

0 1,500 3,000 4,500

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 1-2A (NORTH)
GRIFFISS AFB
AOC LOCATION MAP

ecology and environment

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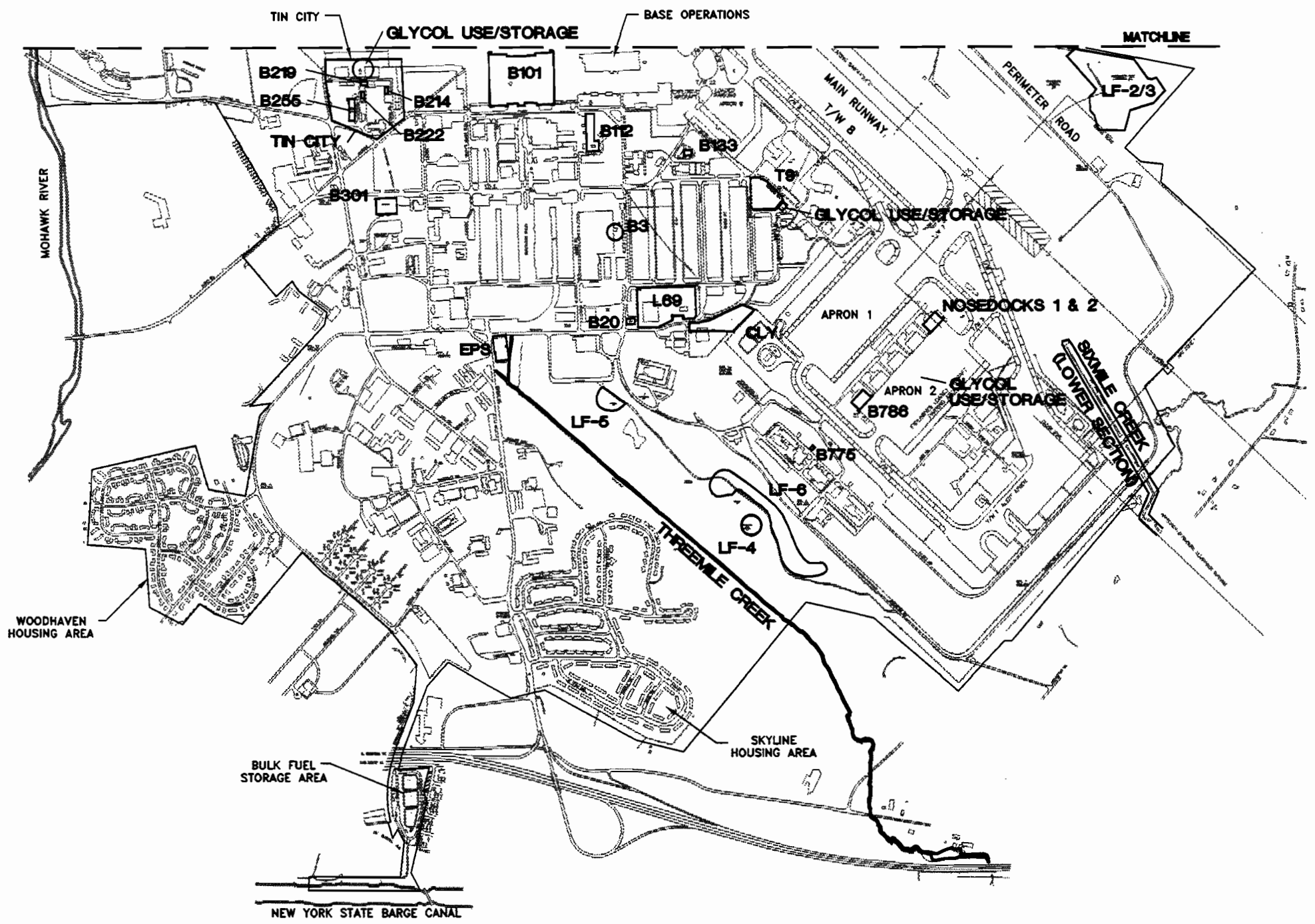

LEGEND

B3	BUILDING 3 DRYWELL
B20	BUILDING 20 LOCOMOTIVE ROUNDHOUSE
B101	BUILDING 101 BATTERY ACID DISPOSAL PIT/YELLOW SUBMARINE
B112	BUILDING 112
B133	BUILDING 133 STORAGE VAULT
B214	BUILDING 214 VEHICLE MAINTENANCE SHOP
B219	BUILDING 219 DRYWELL
B222	BUILDING 222 BATTERY ACID DISPOSAL PIT
B255	BUILDING 255 DRY WELLS
B301	BUILDING 301 DRYWELL
B775	BUILDING 775 TCE CONTAMINATION
B786	BUILDING 786 CONTAMINATED SOIL
CLY	COAL STORAGE YARD
EPS	ELECTRICAL POWER SUBSTATION
L69	LOT 69 HAZARDOUS WASTE STORAGE AREA
LF-2/3	LANDFILLS 2 AND 3
LF-4	LANDFILL 4
LF-5	LANDFILL 5
LF-6	LANDFILL 6

N

SCALE IN FEET

0 1,500 3,000 4,500

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 1-2B (SOUTH)
GRIFFISS AFB
AOC LOCATION MAP

ecology and environment

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2 Field Methodology

2.1 Introduction

The field portion of this investigation included: well decommissioning; probing wells for free product; test pit excavation; drum excavation and sampling; existing well, leachate, near-surface soil, storm sewer water, PISCES, and surface water sampling; a Geoprobe® groundwater survey; standard monitoring well, vertical profile well, and temporary well installation and sampling; a basewide groundwater elevation survey; and establishing survey coordinates for all new sample locations and wells. A backhoe was used to excavate test pits, and a truck-mounted drilling rig/Geoprobe® was used to install all but one well and perform Geoprobe® surveys. Due to dense vegetation and rugged terrain at Landfill 5, LF5MW-4 was installed with a track-mounted drill rig. Excavation, Geoprobe® sampling, and initial well drilling and installation was performed by Parratt-Wolff, Inc., of East Syracuse, New York. Additional Geoprobing at Building 133 and well installations (775VMW-9, 775VMW-10, and 782MW-6R2) were performed by SJB Services, Inc., of Buffalo, New York. The site survey was performed by LaFave, White, and McGivern, L.S., P.C., of Boonville, New York. This section identifies the number and type of sample matrices collected and describes the methodologies for the above-mentioned activities. Changes in the scope of work not covered in the SI work plan (E & E 1997e), were documented on field adjustment forms (see Appendix A).

2.2 Well Decommissioning

2.2.1 Introduction

Bedrock monitoring well LF1MW102 at Landfill 1 was decommissioned on August 6 and 7, 1997, by Parratt-Wolff, Inc., under the supervision of an E & E field team. Well decommissioning was performed in accordance with the NYSDEC October 1996 Monitoring

Well Decommissioning Procedures (NYSDEC 1996) as stated on the SI work plan (E & E 1997e). All decommissioning procedures were performed using Level D personal protection.

LF1MW102 was installed on October 7, 1993, as part of the Griffiss AFB RI (Law Environmental 1996). The well was located at a northing of 1,183,830.765 and easting of 1,132,623.080 (see Figure 4.3-1). This bedrock well was approximately 52 feet deep and constructed of 2-inch inner diameter (ID) polyvinyl chloride (PVC) casing and screen (see well log in Appendix B). The well was originally drilled using a 4.25-inch hollow-stem auger (HSA) to the top of bedrock. Bedrock at LF1MW102 was encountered at a depth of 37.5 feet BGS. A 4-inch outer diameter (OD) carbon steel temporary casing was installed, and the bedrock was drilled using an HQ (3.78-inch OD) coring bit. Once the depth of completion was reached, the well was installed and the temporary steel casing was removed. LF1MW102 was completed approximately 2 feet above ground surface with a locking protective steel casing that was set at 4 feet below grade and surrounded by a concrete pad and three protective steel posts.

The NYSDEC well decommissioning procedures (NYSDEC 1996) state that the well must be overdrilled if a bedrock well seal is not competent. Because turbidity and pH were high during well development, the RI stated that there may be a breech in the bentonite seal resulting in grout contamination in the well. Therefore, the well was decommissioned by overdrilling.

2.2.2 Decommissioning Procedures

Overdrilling was used to assist in removing all well construction materials prior to grouting. The drill rig and associated equipment were decontaminated prior to and after decommissioning procedures. Decommissioning was performed according to the following procedures:

- The depth of the well was verified to be 54.3 feet from top of inner casing (TOIC) with a sounding tape;
- The protective casing and posts were removed by breaking up the concrete pad and hoisting the casing and posts with the drill rig cable and winch.
- Steel AW rods were placed inside the PVC well casing to guide the HSAs through the original borehole and prevent severing of the casing. Well completion sand was added to the inside of the PVC casing between the casing and the AW rods as a friction device to secure the casing.

- The well was overdrilled to the top of bedrock using 4.25-inch ID HSAs. The augers had outward-facing carbide cutting teeth to prevent severing the casing and drifting off center.

- Once the augers were at the top of rock, the AW rods and all of the PVC casing and screen were removed.

- After removing the casing and screen, the bedrock was reamed with a 3⅞-inch roller cone bit to a depth of 55 feet BGS, and the borehole was flushed out to remove all remaining well materials.

- Upon removal of all well materials, the borehole was grouted with a tremie pipe beginning at the bottom of the borehole using the following standard grout mixture:

  - One 94-pound bag Type I Portland Cement;
  - 3.9 pounds of powdered bentonite; and
  - 7.8 gallons of potable water.

- The top of grout was stabilized at 4.3 feet BGS, and a ferrous metal marker was embedded in the top of the grout.

- The remainder of the borehole (i.e., from 4.3 feet BGS to ground surface) was backfilled with native materials.

All solid wastes (i.e., well materials) generated during decommissioning procedures were placed in a United States Department of Transportation (DOT)-approved 55-gallon drum. The drum was transported to the on-site drum staging area at Landfill 6.

A monitoring well field inspection log form (see Figure 2-1) was completed prior to well decommissioning, and all records of the decommissioning procedure were recorded in the site logbook.

2.3 Probing Wells for Free Product

One well at the FDA site (FDA-MW1), five wells at the SFTA site (SFTMW-1, -2,-3,-4,-4R), and one well at the Building 786 (Nose Dock 5) Contaminated Soil site (786MW-2) were probed for free product (see Figures 4.1-1, 4.2-1, and 4.11.4.5-1, respectively) by an E & E field team on June 6, 1997, according to the SI work plan (E & E 1997e). In addition, 786MW-4 was also probed because it was initially mistaken for 786MW-2. A NYSDEC representative was present for the probing of all of the above-mentioned wells except 786MW-2. Probing of the wells was performed using Level D personal protection. Care was taken not to disturb the water column in wells prior to probing. The wells were probed by slowly lowering a clear, bottom-filling bailer into the well until no more than half of the bailer was

submerged, slowly removing the bailer from the well, and observing the presence or absence of oil, film, or emulsion on the top of the water column. The contents of the bailer were then poured into a clear glass jar for further observation. The contents were allowed to settle for a period of several hours before visually determining the presence or absence of free product. Bladder pumps (if present) in the wells were not removed.

Results of the probing for free product are provided under the appropriate AOC in Section 4 of this report. The condition of the water in the clear glass jar was recorded using a 35-mm color slide and submitted to USACE and AFBCA as a separate document.

2.4 Test Pit Excavations

Test pit excavations were performed at Landfills 1, 2/3, 5, 6, and 7 between July 14 and 17, 1997, in accordance with the SI work plan (E &E 1997e). The purpose of the excavations was to determine the presence or absence of buried drums. Test pit locations were chosen based on results of the geophysical surveys performed during the RI (see Figures 4.3-2, 4.4-1, 4.5-2, 4.6-2, and 4.7-2, respectively). With the exception of LF6TP-2, these locations represent areas of strong magnetic anomalies and/or metallic reflectors identified during GPR surveys performed for RI (Law Environmental 1996). The LF6TP-2 location was originally staked at what was believed to be the location indicated in the SI work plan (i.e., 300, 728), however, after the test pit was excavated, surveyed, and plotted on the base map, it was noted not be at the originally proposed location. The stake may have been moved prior to the excavation. USACE and EPA personnel were present for most of the test pit excavations. These test pit excavations were performed using Level D personal protection. In addition to the above-mentioned test pits, a drum was excavated between Landfill 1 and the small arms range (SAR) (see Figure 4.3-1). This work was performed as an addition to the original SOW, and was performed in Level B personal protection. Results of the test pit excavations are included in the discussion of the appropriate AOC in Section 4 of this report.

Test pits were excavated using a standard backhoe provided by Parratt-Wolff, Inc., under the supervision of an E & E field team. The size and depth of each excavation was based on field observations. In general, each test pit was approximately 25 feet in length, 2 feet in width, and 10 feet in depth. However, part of LF6TP-2 was only excavated to a depth of approximately 7 feet BGS because petroleum-contaminated soils were encountered at this depth (see Field Adjustment Form No. 21 in Appendix A).

The excavated material was temporarily placed adjacent to the excavation until the excavation was complete. The cap/cover material was segregated from the landfill contents by

stockpiling the cap/cover material separately from landfill material. Upon completion, the excavation was backfilled with the landfill material first, followed by the original cap/cover material. The sites were graded to their original condition. The backhoe bucket was steam cleaned before and after each test pit was excavated.

Test pit dimensions and lithologic descriptions were recorded in the field logbook by the team geologist. Each test pit was documented using color slides, which were submitted to USACE and AFBCA as a separate document. Details of the test pit excavations are provided under the appropriate AOC in Section 4 of this report.

2.5 Geophysical Surveys

Based on the identification of a partially buried drum between Landfill 1 and the SAR during an investigation by another contractor, geophysical surveys were performed by E & E at this site between June 25 and July 11, 1997. Since this work was not in the original SOW, the procedures outlined in the RI work plan (Law Environmental 1993) were implemented. The geophysical surveys performed at these sites consisted of magnetic surveys followed by GPR surveys.

A magnetometer survey grid was established over the required area by re-establishing the southern border of the RI geophysical survey grid (Law Environmental 1996) and extending the grid to the south 250 feet on the west end and 575 feet on the east end (see Figure 4.3-2). The southern portion of the RI grid and SI grid overlapped by approximately 75 feet to prevent data gaps between investigations. The SI grid was installed using a tape measure and Brunton compass. The grid is oriented north-south/east-west with the compass corrected to compensate for magnetic declination of 12° 18'west. Significant brush cutting was performed to enhance lines of site and facilitate physical access of each survey line. As with the RI survey grid, the line and station spacing in the SI survey grid was 25 feet. Pin flags were placed at each grid station and labeled with appropriate grid coordinates using a permanent marker. Magnetic readings were collected by walking survey lines oriented north-south. Results of the magnetometer and GPR surveys are presented in Section 4.3 and Appendix C of this report.

2.5.1 Magnetic Survey

The magnetic surveys were performed using an EG&G Geometrics Model G-856 Proton Precession magnetometer in both the standard operation mode (i.e., one sensor) for the collection of total earth magnetic field measurements and gradiometer mode. The gradiometer utilizes two sensors mounted on a vertical staff spaced 1 meter apart. Each sensor measures the magnitude of

the earth's magnetic field at each survey station. The readings from each sensor were stored in the magnetometer's memory.

A magnetometer measures the earth's total magnetic field in gammas. Short wavelength anomalies in the total field are caused by the presence of ferrous metal objects such as steel drums. These anomalies are apparent when the magnetic data are reduced. Because the earth's magnetic field naturally fluctuates throughout each day (i.e., diurnal drift), background readings were collected at a base station established at Landfill 1. The base station was located in an area of minimal interference from man-made features (e.g., buried wastes or utilities, overhead powerlines, fences, buildings, etc.).

Gradiometer data were used to determine the change in the earth's magnetic field across the 1-meter intervals (i.e., the magnetic gradient) and reported in units of gammas/meter. The magnetometer configured as a gradiometer has a higher resolution than a single-sensor magnetometer in defining changes in the earth's magnetic field caused by the presence of ferromagnetic materials. Gradiometer readings are not corrected for diurnal drift because the difference between each sensor is evaluated and diurnal drift effects both sensors.

Once the magnetic surveys were complete, the data stored in the magnetometer were transferred to a notebook computer using Mag Pac Version 4.1.5 (EG&G Geometrics 1992). Both total earth field and gradiometer data were processed using Surfer Version 6.0 software (Golden Software 1995). Results of the magnetometer surveys are presented in Section 4.3 and Appendix C of this report.

2.5.2 GPR Survey

GPR surveys were performed using a Mala Geoscience RAMAC GPR Unit with a 200-megahertz (MH_Z) antenna. Antennae of relatively higher frequency and shorter wavelength (i.e., 500 to 900 MH_Z) provide higher resolution when defining features of a few centimeters in size with respect to lower frequency antennae (i.e., 80 to 120 MH_Z). However, the depth of penetration of the higher frequency antennae are subsequently reduced. A 200-MH_Z antenna was used for this survey because the potential targets were buried drums which do not require the higher resolution. Since the depth of the potential drums was unknown, a low- to mid-range antenna was beneficial for achieving higher penetration depths.

The depth of penetration is calculated by the collection software provided with the instrument by inputting the dielectric constant of the subsurface materials. Values of dielectric constants and resulting radar pulse velocities vary with moisture content in the medium (i.e., unsaturated media have higher dielectric constants and pulse velocity). The soils underlying the

site are generally sand and silt, and the water table ranges from 4 feet to 22 feet beneath the survey area at Landfill 1 and the small arms range. Therefore, the dielectric constants for sand range from 4 to 30 with velocities of 55 to 150 m/μs, and silt from 9 to 23 with velocities of 63 to 100 m/μs, depending on the moisture content. Since the depth of penetration is variable based upon the contents of the subsurface materials and amount of soil moisture influencing the speed at which the radar pulses travel, an average velocity of 90 m/μs was chosen to process this data. Comparison of test profiles run over an existing UST and associated piping at the site using the assume velocity indicated a good correlation with the depth scale generated by the software with the assumed depth of these features (see Profiles 8 and 9 in Appendix C).

Four GPR survey lines were run in areas containing the strongest magnetic anomalies to verify the presence or absence of buried drums. The lines varied in length, depending upon the size of the magnetic anomaly, and are represented by a continuous subsurface profile. The horizontal axis of the profile represents distance in meters along ground surface of each line. The vertical axis of the profiles represents depth calculated by the instrument. The locations of the survey lines are shown on magnetic contour plots, and the profiles for each line and supporting data are included in Appendix C.

2.6 Leachate Sampling

One leachate sample was collected at each of the Landfills 5 and 7 (LF5WL-1 and LF7WL-1) on June 12, 1997 as stated in the SI work plan (see Figures 4.5-1 and 4.7-1, respectively). Each sample consisted of standing water that seeped from the base of the landfill. In addition, another leachate/seep sample (LF7WL-2) was collected at Landfill 7 (see Figure 4.7-1) because this leachate/seep was draining into the storm sewer at the base of the Landfill (see Figure 4.9-2), which was also sampled (SMCMH-1W) as part of the SMC AOC (see Section 2.8).

The samples were initially collected by submerging the appropriate sample containers in the leachate/standing water. Since the bottles were submerged directly into the sample medium, no equipment rinsate blank was collected (see Field Adjustment Form No. 6 in Appendix A).

Both locations were resampled on July 30, 1997, for polychlorinated biphenyl (PCB) (Methods 8081 and 525.2) because of a problem with the original sample analyses. Since the Landfill 5 sample location was dry at the time of the resampling, a small trench was excavated (approximately 2 feet BGS) with a decontaminated steel shovel. Appropriate sample containers

were submerged in the water-filled trench. Leachate sample results are presented under the appropriate AOC in Section 4 of this report.

2.7 Near-Surface Soil Sampling

Three near-surface soil samples (0 to 2 feet BGS) were collected on June 10, 1997, at Landfill 5 (see Figure 4.5-1) according to the SI work plan (E & E 1997e). The samples were collected to a depth of 2 feet BGS using a decontaminated stainless-steel hand auger. The contents of the hand auger were emptied into a dedicated, precleaned, stainless-steel bowl until the total depth was achieved. The violate organic compound (VOC) portion of the sample was collected directly from the last hand auger filled. The remainder of the sample was homogenized in the bowl prior to filling the remaining sample containers. Due to a problem in hexavalent chromium analyses and the short holding time (24 hours), all three locations were resampled for hexavalent chromium on July 30, 1997, using the same methods. Surface soil sample results are presented in Section 4.5 of this report.

2.8 Storm Sewer Sampling

One storm sewer water sample was collected on June 11, 1997, as part of the Sixmile Creek SI (see Figure 4.9-2), and two storm sewer water samples were collected on June 12, 1997 at the FPTA site (see Figure 4.10-1) according to the SI work plan (E & E 1997e). Although sediment samples from the FPTA manholes were planned, they were not collected because no sediment was present (see Field Adjustment Form No. 5 in Appendix A). The storm sewer water samples at FPTA were re-collected on July 30, 1997, for semivolatile organic compounds (SVOCs) (Method 525.2) due to a problem with original analyses. The SMCMH-1W and FPTAMH-1W samples were collected by removing the storm sewer grate and lowering a clean 8-ounce glass jar or stainless-steel beaker into the manhole, and transferring the water to the appropriate sample containers. Since the grate could not be removed from FPTAMH-2W, a disposable polyethylene bailer or a decontaminated teflon bailer were used to transfer the appropriate sample containers. Storm sewer sample results are presented under the appropriate AOC in Section 4 of this report.

2.9 PISCES Sampling

PISCES samples were collected from Threemile Creek and Sixmile Creek between June 6 and 20, 1997, and from Rainbow Creek between June 20 and July 7, 1997. PISCES are, in effect, artificial fish designed to be representative of the uptake of contamination by fish tissue. Three samples were collected from Threemile Creek (see Figure 4.8-1), nine from Sixmile Creek and its tributaries, and one from Rainbow Creek (see Figures 4.9-1 and 4.9-2). Due to planned reconstruction of Rainbow Creek by another contractor, the PISCES sample from Rainbow Creek was initially postponed. After further discussion with EPA and NYSDEC, the sample was reinstated (see Field Adjustment Form Nos. 2 and 32 in Appendix A). PISCES sampling was performed according to the SI work plan (E & E 1997e) modeled after the standard operating procedures (SOP) for contaminant trackdown studies (NYSDEC 1995).

The samplers were placed in inconspicuous locations having moderate, nonturbulent flow (i.e., less than 3 ft./sec). Since minimum water depth of 1.5 feet was required to prevent the sampler from touching the bottom of the water body (Preddice 1996) and almost all sites had less than the required depth, a small hole was excavated (where possible), and the sampler was attached to a new cinder block at the recommendation of Dr. John Hassett (1996). Each sampler contained 200 ml of hexane spiked with 60 ml of a mixture of tetra chlorometaxylene and decachlorobiphenyl spiking solution. The samplers were left in place for a period of two weeks. Due to insufficient water volume at the proposed location of SMCP-3, the sampler was moved approximately 250 feet east, and the duplicate/split sample scheduled for SMCP-1 was moved to the SMCP-6 location (see Field Adjustment Forms 1 and 10, respectively, in Appendix A). PISCES sample results are presented in Sections 4.8 and 4.9 of this report.

2.10 Surface Water Sampling

Two surface water samples were collected from Threemile Creek (see Figure 4.8-1), and two from Rainbow Creek as part of the Sixmile Creek SI (see Figure 4.9-2) on June 11 and 12, 1997, respectively. The samples were collected according to the SI work plan (E & E 1997e). Although the Rainbow Creek samples were initially postponed, they were later reinstated (see Field Adjustment Form Nos. 2 and 32 in Appendix A).

The samples were collected by submerging the appropriate containers into the water. Since no sampling equipment was used, the equipment rinsate scheduled for this task (TMCSW-RB1) was eliminated (see Field Adjustment Form No. 4 in Appendix A). Due to

problems with sample analyses, the Rainbow Creek samples (RCSW-1 and RCSW-2) were collected again on July 30 and August 15, 1997, respectively, for pesticides/PCB analysis (Method 8081). Surface water sample results are presented in Sections 4.8 and 4.9 of this report.

2.11 Subsurface Logging, Geoprobe® Surveying, Well Installations, and Groundwater Sampling

The subsurface investigation included collection of groundwater-screening samples using Geoprobe® and Hydropunch® techniques; and drilling, installing, and sampling temporary and permanent monitoring wells. Groundwater samples were collected near the surface of the water table using Geoprobe® techniques and from sampling temporary and standard permanent monitoring wells. In addition, vertical profiling of groundwater at 10-foot intervals using Hydropunch® techniques was performed from the surface of the water table to auger refusal or top of bedrock, which ever occurred first. Placement of the permanent well screen in the vertical profile wells was determined in the field based on results of the Hydropunch® screening samples. Groundwater screening samples collected using Geoprobe® and Hydropunch® techniques were analyzed for VOCs in the field by E & E's temporary field lab (see Section 2.12). Groundwater screening samples collected in October and November were sent to E & E's Analytical Services Center (ASC) in Lancaster, New York, for 24-hour turnaround analyses.

2.11.1 Subsurface Logging

Subsurface soil samples were collected from well bores for descriptive purposes only. Continuous 2-inch ID split-spoon samples were collected from each temporary and standard well bore (except 775MW-6) to the depth of completion. For vertical profile wells, continuous 2-inch ID split-spoons samples were collected from ground surface to the depth of completion except at Hydropunch® intervals. However, after drilling 775VMW- 4 to auger refusal at 97 feet BGS, split-spoon intervals were modified according to the following sample schedule for the remaining wells proposed in the work plan at the Building 775 AOC (see Field Adjustment Form Nos. 19, 24, 25, 27 and 31 in Appendix A):

- 775VMW-5 and 775VMW-7: no split-spoon samples from 0 to 50 feet BGS; continuous from 50 feet BGS to top of water table; no split-spoons from top of water table to 75 feet BGS; continuous from 75

feet BGS to top of till and 5-foot intervals from top of till to auger refusal;

- 775MW-6: no split-spoon samples from 0 to 50 feet BGS; and continuous from 50 feet to 78 feet BGS;
- 775VMW-8: continuous split-spoon samples only from 50 feet BGS to top of the water table; and
- 775VMW-9 and 775VMW-10: no split-spoon samples from 0 to 50 feet BGS, continuous from 50 feet BGS to top of water table, 5-foot intervals from water table to 75 feet BGS, continuous from 75 feet BGS to top of till; and 5-foot intervals from top of till to auger refusal.

The purpose of the modification was to alleviate well drilling and installation problems caused by heaving sands. Since the soils were determined to be extremely uniform to a depth of approximately 85 feet BGS (i.e., very fine sand and silt), the modified sampling schedule was implemented to facilitate the collection of continuous split-spoon samples only in areas where pertinent information was required (i.e., top of water table, and top of till).

All pertinent well drilling information was recorded on a hazardous and toxic waste (HTW) drill log (see Appendix E), according to procedures outlined in the SI work plan (E & E 1997e).

2.11.2 Drilling Water Source

Clean, potable water was used occasionally during drilling to facilitate well drilling and installation. The source of the water used between June 4 and September 8, 1997, was Hydrant 11 located south of Building 214. The source of the water used between October 27 and December 5, 1997, was a spigot on the east side of Building 520. The use of drill water at specific borings is summarized in Table 2-1. If water was added to a particular boring, two times the amount used was removed during well development. The water used for decontamination, geoprobing, and drilling was sampled on June 13 (Decon Hold Tank and Steamer), June 16 (Hydrant 11 and Decon Poly), June 20 (Rig Tank), July 22 (DW-01), and November 17, 1997 (DW-02 and DW-03). The Hydrant 11 sample was collected directly from the hydrant discharge and analyzed for VOCs by E & E's Field Lab for (Method 8021). The Decon Hold Tank sample was collected directly from the 55-gallon drum initially used to hold clean water on the mobile decon unit, and the steamer sample was collected from the steamer nozzle. Both samples were analyzed for VOCs by E & E's Field Lab (Method 8021). The Decon Poly sample was collected directly from the fill opening of the polyethylene tank which

replaced the 55-gallon drum on the mobile decon unit and was analyzed for VOCs by E & E's Field Lab (Method 8021). The Rig Tank sample was collected directly from the fill opening of the CME 55 rig tank and analyzed for VOCs by E & E's Field Lab (Method 8021). The DW-01 and DW-02 samples were collected directly from the discharge hose of the Parratt Wolff and SJB CME 75 drill rig tanks, respectively, and analyzed for VOCs and SVOCs by E & E's ASC (Methods 524.2 and 525.2, respectively). Finally, the DW-03 sample was collected directly from the fill opening of the decon polyethylene tank. Results of these samples are summarized in Table 2-2.

2.11.3 Geoprobe® Survey Methodology

Conventional Geoprobe® groundwater screening surveys were performed at the Landfill 6, Building 133 Storage Vault, and Building 255 Drywell sites. All Geoprobe® sampling was performed in Level D personal protection. The results of these surveys were used to determine the lateral placement of monitoring wells at these sites. In addition, Geoprobe® methods or equivalent (see Field Adjustment Form No. 7 in Appendix A) were also planned (E & E 1997) for vertical profiling of groundwater at the Landfill 6, FPTA, Building 3 Drywell, Building 775 TCE Contamination, and Tin City (Building 214, 219, and 255) sites. However, due to very compact soil conditions beneath the Building 775 site, the Geoprobe® screen point (or equivalent) could not be driven into the formation. Therefore, vertical profiling was performed predominantly by Hydropunch® techniques (see Field Adjustment Form No. 8 in Appendix A). The first groundwater screening sample (i.e., at the top of the water table) was collected by installing temporary, dedicated 1-inch or 2-inch PVC casing and 10-feet of screen (010 slot) through the augers into the 4-foot long pilot hole created by the split-spoon samplers advanced into the water table beyond the lead auger, and using a dedicated PVC mini-bailer to obtain the sample. Hydropunch® techniques were then used to collect the remaining groundwater screening samples at deeper depths. The Hydropunch® was not used at the top of the water table because several feet of hydraulic head is needed to fill the sampler with water. The results were used to determine the depth interval for the well screen. Hydropunch® procedures for vertical profiling are discussed under Section 2.11.5.2 in this report.

Geoprobe® survey grids were installed at Building 133 and Building 255 sites using a tape measure and brunton compass. Most of the sample locations were placed at 50-foot intervals, except for some samples at Building 133 that were spaced at 100-foot intervals (see Figures 4.11.4.6-1 and 4.11.4.13-1). The Geoprobe® survey locations at Landfill 6 were

chosen in the field based on the locations proposed in the SI work plan (E & E 1997e). Due to limited rig access, LF6GP-3 was moved approximately 90 feet northwest (see Field Adjustment Form No. 9 in Appendix A). Since the purpose of the Geoprobe® surveys at Buildings 133 and 255 was to determine the lateral extent of contamination, Geoprobe® locations at Building 133 were initially sampled from north to south and samples at Building 255 were collected from the center of the grid and progressed radially outward. The sampling in each grid continued until nondetects were established or all of the points designated in the Work Plan were sampled, whichever occurred first. Due to the presence of contamination in both grids (see Figures 4.11.4.6-2 and 4.11.4.13-2), additional samples were added to each grid (see Field Adjustment Form Nos. 11, 12, and 29 in Appendix A). All of the planned samples at Buildings 133 and 255 were collected between June 10 and 17, 1997. The planned samples at Building 133 were all collected on June 17, 1997. Based on the results of these samples, 45 samples were added during 11 sampling events (June 24 and 27; July 1, 2, and 25; October 31; and November 3, 6, 7, 20, and 21). The planned samples at Building 255 were collected on June 10, 12, 13, and 16, 1997. Based on these results, 10 samples were added during two sampling events (June 24 and 27). Results of all Geoprobe® groundwater screening samples are discussed under the appropriate AOC in section 4.11 and are presented in Appendices D and K of this report. Determination of monitoring well locations at these sites was based on the Geoprobe® survey results (i.e., the wells were placed at or downgradient of areas of highest contamination). Monitoring well locations at these sites were approved by the USACE Technical Manager (TM) prior to installation.

Geoprobe® sampling was performed by Parratt-Wolff, Inc. and SJB Services, Inc., under the supervision of an E & E Field Team. The Geoprobe® sampling was performed by Parratt-Wolff, Inc., using a 1-inch ID PVC temporary well as opposed to using the Geoprobe® Screen Point Sampler (see Field Adjustment Form No. 3 in Appendix A) during initial surveys. Surveys performed in October and November by SJB Services, Inc., were performed as stated in the SI work plan. The temporary well method was accomplished by driving 2.25-inch OD flush threaded steel rods with an expendable stainless steel point with a Geoprobe® hydraulic hammer mounted to the mast of a CME 55 drill rig. The rods were driven to a depth of approximately 5 feet below the top of the water table except for deeper samples (133GP01-VP01 [9.6 to 21.6 feet BGS], 133GP01-VP02 [24.8 to 28.4 feet BGS] and 133GP19-VP01 [10.6 to 24.6 feet BGS]) collected at the Building 133 site. One-inch ID PVC casing and 10-feet of screen (010 slot) was installed through the rods, and the rods were then retracted. The groundwater screening sample was then collected using a dedicated PVC mini-bailer. Once the

sample was collected, the PVC casing and screen was pulled, and the hole was backfilled with bentonite pellets. All Geoprobe® equipment was steam cleaned prior to and after sampling was performed at each sampling location.

2.11.4 Temporary Well Installation Methodology

A total of eight temporary wells were installed at Landfill 7, the WSA, Lot 69, and Building 101 (see Figures 4.11.4.1-1, 4.11.4.2-1, 4.11.4.3-1, and 4.11.4.8-1, respectively) All temporary well borings were drilled to the top of the water table using 4 1/4-inch ID HSA techniques with either a CME 55 or CME 75 truck-mounted drill rig. Continuous 2-inch ID split-spoon samples were collected in each boring until the depth of completion.

The temporary well borehole was drilled approximately 8 feet below the top of the water table. A clean 10-foot length of 2-inch ID PVC screen (010 slot) with threaded end plug followed by 2-inch ID PVC casing was installed inside the augers so that the top 2 feet of screen was above the water table. The augers were then removed from the ground. The temporary well was purged and sampled according to procedures outlined in section 2.11.8 of this report. Once the well was sampled the casing and screen were removed, the borehole was backfilled with the soil cuttings and the surface was regraded. A drilling summary of these wells is presented in Table 2-3.

2.11.5 Permanent Monitoring Well Installation Methodology

Permanent monitoring wells consisted of standard monitoring wells and vertical profile wells. Standard monitoring wells were installed across the top of the water table. Vertical profile wells were constructed in the same manner as standard wells, but the depth of the screened interval was determined by results of groundwater-screening samples collected using Hydropunch® techniques. The screening samples were collected at 10-foot intervals from the top of the water table to the top of the bedrock or auger refusal, whichever occurred first. Installation procedures for standard and vertical profile wells are described in the sections below. A drilling summary for permanent monitoring wells is presented in Table 2-4.

2.11.5.1 Standard Monitoring Well Installation Methodology

Standard monitoring wells were installed at the Building 786, Building 133, Nose Docks 1 and 2, Building 101, Landfill 5, Building 775, and FPTA sites (see Figures 4.11.4.5-1, 4.11.4.6-1, 4.11.4.7-1, 4.11.4.8-1, 4.11.4.9-1, 4.11.4.11-1, and 4.11.4.12-1,

respectively). The standard monitoring wells were drilled using the same equipment and procedures outlined for the temporary wells described in Section 2.11.4 with the exception of LF5MW-4. This well was drilled with a CME-850 track-mounted drill-rig because of the rugged terrain at Landfill 5. The wells were completed according to the procedures in Section 2.11.6.

Due to perched water conditions in the vicinity of Nose Dock 1 (Building 782), two replacement wells (782MW-6R1 and 782MW-6R2) were installed for 782MW-6 to obtain a sufficient water column from the true groundwater table.

2.11.5.2 Vertical Profile Well Installation Methodology

Vertical profile wells were installed at the Building 3, Landfill 6, Building 775, FPTA, and Tin City (Buildings 214, 219, and 255) sites (see Figures 4.11.4.4-1, 4.11.4.10-1, 4.11.4.11-1, 4.11.4.12-1, and 4.11.4.13-1, respectively). The wells were drilled using a combination of Hydropunch® and HSA techniques and installed using the same methods and design as standard monitoring wells described in Sections 3.12.5.1 and 3.12.6, respectively. Monitoring well drilling and installation were performed in Level D personal protection.

Vertical profile wells required discrete groundwater screening samples at 10-foot intervals beginning at the top of the water table and ending at the auger refusal or top of bedrock, whichever occurred first. This was accomplished using Hydropunch® water sampling methods. In addition to collecting groundwater-screening samples, 2-inch ID split-spoon samples were used to retrieve soil samples for well logging purposes.

Soil and groundwater sampling was performed in the following manner:

- Soil samples were collected (as designated in Section 2.11.1) using standard split-spoon techniques to approximately 4-feet into the top of the water table.
- The first groundwater screening sample was collected at the top of the water table using a mini-bailer through 1-inch or 2-inch PVC casing and screen as described in Section 2.11.3;
- Split-spoon sampling continued to the top of the next 10-foot interval (the intervals began at the depth corresponding to the top of the water table);
- A decontaminated Hydropunch® sampler was pushed up to 4-feet into the next undisturbed groundwater sampling interval (i.e., beginning at the next 10-foot interval). The sampler was allowed to fill for approximately 30 minutes prior to retrieval.

Hydropunching and split-spoon sampling continued in this alternating fashion until auger refusal, or the top of bedrock was reached. The last groundwater screening sample was collected from the zone near the bottom of the borehole (where auger refusal occurred) or immediately above the top of bedrock, where possible. Field Adjustment Form Nos. 10-1, 12-1, 13, 14, 15, 20, 22, and 26 in Appendix A document changes in proposed vertical profiling sampling.

Upon completion of the vertical profiling and rapid turnaround sample analyses in the field, the depth of the well screen was chosen based on the sample results and approved by the USACE TM. Once approval was received, a permanent monitoring well was installed according to the same procedures outlined in Section 2.11.6.

2.11.6 Well Design and Construction

2.11.6.1 Well Construction Materials

All monitoring wells were constructed using the same materials as those used during the RI (Law Environmental 1996). Therefore, riser material consisted of new, 2-inch ID, threaded, flush-joint PVC pipe. The riser pipe conforms to the American Society for Testing and Materials (ASTM) D 1785 standards for Schedule 40 pipe. Well screens consist of new, 2-inch ID, commercially fabricated, threaded, flush-joint, factory slotted (0.010) PVC screen. A threaded PVC plug was placed on the bottom of each well.

2.11.6.2 Screen Location

For standard monitoring wells, the top of the screen was installed 2 feet above the water table to allow for seasonal fluctuations. The location of the well screen in vertical profile wells was determined based on results of rapid-turnaround samples (i.e., the screen was placed in the most contaminated zone within the aquifer). If no contamination was detected, the top of the screen was placed 2 feet above the water table. Most well screens were 10 feet in length however, due to the proximity of the top of bedrock with respect to the top of the water table in the Building 255 and Tin City wells, the presence of several perched water zones in the vicinity of Nose Dock 1, and the presence of contaminants in vertical profile wells downgradient of Building 775, the following well screen lengths were installed:

Well No.	Screen Length (feet)
255VMW-1	15
255VMW-2	13
TCVMW-1	12
TCVMW-2	15
782MW-6R2	15
775VMW-9	15
775VMW-10	15

Changes in well screen lengths for wells proposed in the work plan are documented in Field Adjustment Form Nos. 15, 16, 17, and 18 and presented in Appendix A.

2.11.6.3 Filter Pack

A sand filter pack was installed in the annular space between the boring and well screen. Filter pack design was derived from data obtained from RI wells previously installed on the base.

The filter pack consists of clean, chemically inert, noncarbonated, well-sorted, No. 0 (0.02 to 0.04-inch) silica sand obtained from the Morie Co., Inc., in Millville, New Jersey. The sand filter pack was placed from the bottom of the borehole to approximately 2 feet above the top of the well screen. In wells with the screen set close to the surface, the height of the filter pack above the top of the screen was modified (see Table 2-4).

2.11.6.4 Bentonite Seal

A bentonite chip seal was installed in the annular space above the artificial filter pack. The seal was 3 feet thick if set below the water table, and 2 feet thick if set above the water table. To minimize bridging when the seal interval was set below the top of the water table, a 5-foot bentonite slurry, tremied in place, was used (see Field Adjustment Form Nos. 30 and 31 in Appendix A). In wells where the screen was close to the ground surface, a minimum of 1 foot of bentonite was used. The bentonite was hydrated with potable water if the seal was above the water table. The bentonite chip seal was allowed to hydrate a minimum of 12 hours prior to grouting the wells. However, wells with a bentonite slurry were completed by allowing the slurry to set for 1-hour, then placing 1-foot of sand filter pack above the slurry followed by bentonite cement grout.

2.11.6.5 Plumbness and Alignment

All risers and screens were set round, plumb, and true to line. Stainless-steel centralizers were installed in all wells greater than 20 feet in depth.

2.11.6.6 Grout Seal

A nonshrinking cement-bentonite grout mixture was placed in the annular space from the top of the bentonite seal to 4 feet below the ground surface, where possible, as specified by EPA Region II, to prevent possible damage to the well by frost heaving. Concrete was added in the remaining annular space at the same time the protective casing and concrete pad were installed (see Section 2.11.6.7). Due to significant grout loss at a depth of 13.6 feet BGS in LF6VMW-6, a bentonite hole plug was placed from 7.2 feet to 13.6 feet BGS to seal the apparent void (see Field Adjustment Form No. 23). The remainder of the well bore (i.e., 4 feet to 7.2 feet BGS) was filled with bentonite/cement grout.

The cement-bentonite mixture consisted of portland cement (ASTM-C150) and clean potable water in the proportion of not more than 7 gallons of water per 94-pound bag of cement. Additionally, 3% by weight of bentonite powder was added to the mixture to help reduce shrinkage. The grout mixture tremied into the annular space until undiluted grout was at the required depth (i.e., 4 feet BGS).

2.11.6.7 Well Completion Details

Both the standard and vertical profile monitoring wells were completed either 2 feet above ground surface or flush to ground surface, depending on the current use of the site (see Table 2-4). The aboveground completion consists of a 6-inch-diameter, locking, protective steel casing. Prior to installation of the steel casing, a 4-inch-diameter PVC casing was placed in the borehole from the top of the grout seal to 0.5 foot above ground surface (or 0.5 foot BGS for flush-mount wells). Cement was placed in the angular space between the edge of the borehole and the 4-inch PVC casing. The steel casing was then placed in the cement and set 3 feet BGS and was surrounded by a 3-foot by 3-foot by 4-inch thick concrete drainage pad. Three steel protective posts set 3 feet BGS in concrete were installed equidistant around the locking protective casing. The steel casing and posts were painted with rust-inhibiting brown and yellow paint, respectively. The flush-mount completion consist of a protective housing set flush to the ground surface surrounded by a concrete pad. The inner casing is a few inches BGS, and capped with a water-tight locking cap. QED model T1200 bladder pumps were

installed in all SI permanent wells except 782MW-6 and 782MW-6R1. Figure 2-2 illustrates the standard permanent well construction.

2.11.6.8 Well Identification

Wells were identified by a metal identification tag mounted inside each well casing, or under the manhole cap if flush-mounted, indicating the well identification number, well depth, and date of installation. The tags were labeled with an inscription pen and attached with steel cables to the well caps.

2.11.7 Well Development

Each new permanent monitoring well (except 782MW-6 and 782MW-6R1) was developed no sooner than 48 hours after grout placement. Temporary wells were not developed since there is no sand filter pack, and 782MW-6 and 782MW-6R1 were not developed due to insufficient water column and recharge. Development was performed by surging with a bailer and pumping with the bladder pumps until pH, temperature, and conductivity were stabilized, and turbidity of the discharge was 50 nephelometric turbidity units (NTUs) or less. Development was performed according to procedures outlined on the SI work plan (E & E 1996c). Well development data were recorded in the well development record section of the site geotechnical logbook (see Appendix E.).

2.11.8 Groundwater Sampling

Groundwater-screening samples were collected during the conventional Geoprobe® Survey, and via Hydropunch® during drilling of vertical profile wells. Groundwater was also collected from newly installed temporary and permanent monitoring wells, and selected existing wells. All groundwater-screening samples collected from the Geoprobe® surveys and vertical profile well installation underwent rapid-turnaround VOC analyses at either E & E's field lab (see Section 2.12 in this report), or E & E's ASC along with all pertinent quality control (QC) samples (i.e., trip blanks, rinsate blanks, duplicates, etc). Split samples were sent to Missouri, River Division (MRD) Laboratory in Omaha, Nebraska. Planned QC samples determined to be unnecessary and are documented in Field Adjustment Form Nos. 33 and 38 in Appendix A. All samples from permanent wells were sent to E & E's ASC for VOC and SVOC analyses. In addition to laboratory analyses, field measurements were collected from all wells except those at Lot 69, to determine whether Natural Attenuation (NA) should be evaluated in the FS.

Groundwater sampling and measurements of NA (see Appendix G) were performed according to the SI work plan (E & E 1997e). NA parameters included a core set of parameters that were tested for at each location, plus some additional parameters necessary for evaluation at chlorinated hydrocarbon plume areas. The core set of parameters included: dissolved oxygen (DO), pH, redox potential (ORP), ferrous iron, and alkalinity analyzed in the field; and chloride, nitrate/nitrite, and sulfate analyzed in the laboratory. The additional parameters included: total dissolved organic carbon (TOC), sulfite, and methane/ethane/ethene analyzed in the laboratory. Field and analytical NA parameter results are presented in Appendix G. NA parameter results are presented in this report only. The usability will be evaluated in the FS. All groundwater results are discussed in Section 4.11 of this report.

2.12 In-Field Geoprobe® Sample Analyses

Geoprobe® and Hydropunch® groundwater samples were analyzed for VOCs on a real-time basis in a temporary field lab at Griffiss AFB to assess the extent of the contamination and determine the optimum placement of wells and/or well screens. The field lab was run by a field chemist provided by E & E's ASC.

The primary objective of the sampling and analysis was to determine the presence or absence of the VOCs in the screening samples. Based on the historical data, a detection limit of 1 part per billion (ppb) was required. To meet these objectives, analyses were performed by Method 8021 as described in the RI QAPjP (Law Environmental 1993) with the modifications as indicated in E & E's QAPjP (E & E 1997c). The instruments used to perform these analyses consisted of a Tekmar 2000 Purge and Trap and Hewlett-Packard 5890 Series II Gas Chromatograph (GC) equipped with a photoionization detector (PID). The lab was mobilized on June 5, 6, and 9, 1997, and sample analyses were performed between June 10 and July 28. The lab was decommissioned on July 24, 30, and 31, 1997.

With the exception of seven Geoprobe® groundwater samples collected on June 24, 1997, and their associated duplicates, rinsates, and method blanks; and 775VMW-9 and 775VMW-10 Hydropunch® samples collected in November 1997, all other Geoprobe® and Hydropunch® groundwater samples were analyzed in the field lab. Due to a basewide power shutdown, Geoprobe® samples collected on June 24 were shipped to E & E's ASC for analysis. Results of all screening samples are discussed in Section 4.11 (0n-base groundwater AOC) and are presented in Appendix G of this report.

2.13 Basewide Groundwater Elevation Survey

The basewide groundwater elevation survey was performed in two stages. The first stage consisted of a well reconnaissance, and the second stage consisted of water level measurements. The well reconnaissance stage was performed periodically throughout the field program to locate all existing wells and determine their accessibility and condition. A total of 257 wells and 38 piezometers were located. Groundwater measurements of all the wells were obtained between August 18 and 26, 1997, using electronic water level indicators. Due to elevation discrepancies noted during generation of the basewide groundwater elevation contour map (see Figures 4.11-1A and 4.11-1B), a few wells were remeasured in September and October 1997. A total of 249 groundwater elevations were obtained from monitoring wells, and 16 were obtained from piezometers. Some elevations could not be obtained due to dry conditions or the lack of top of casing elevation. In addition, 20 water levels from various surface water sample locations in Threemile, Sixmile and Rainbow Creeks, and storm sewer manholes were also recorded as part of this survey. Results of the base wide groundwater and surface water elevation survey are discussed in Section 4.11 and are presented in Appendix H of this report.

2.14 Investigation-Derived Waste (IDW)

Investigation-derived soils and water were field screened by visual inspection and the use of an organic vapor analyzer (OVA) to determine initially whether these wastes were contaminated. If non-volatile visual contamination was noted, contaminants (e.g., PCBs) were suspected at a particular site, or field sample results indicated the presence of contamination, IDW associated with these sites was placed in 55-gallon drums. Drill cuttings that were not contaminated (based on field screening) were backfilled in the borehole for temporary wells or spread on the ground. Uncontaminated groundwater (based on field screening) was disposed of adjacent to the well. Other IDW containerized during this investigation includes decontamination pad plastic, and temporary well PVC casing and screen.

All drummed IDW (including decontamination liquid waste) was staged in an area adjacent to Landfill 6 pending analytical results for the respective AOC. The drums were hauled off site on December 19, 1997 and January 8, 1998, and shipped to Michigan Disposal Treatment Facility for subsequent landfilling at Wayne Disposal Landfill in Bellville, Michigan. A registry of all drums is provided in Appendix J.

2.15 Site Survey

A ground survey was performed by La Fave, White, and McGivern, L.S., P.C. to determine the horizontal locations of all test pits, temporary monitoring wells, and sample locations, and horizontal and vertical locations of all permanent monitoring wells and samples associated with surface water or manholes. The ground survey utilized existing bench marks located on the former Griffiss AFB. Horizontal measurements were performed to an accuracy of 0.0001 foot and vertical measurements to 0.01 foot. Survey results were plotted on appropriate existing base maps presented in Section 4 of this report. All survey data generated for this investigation is presented in Appendix J.

Table 2-1

SUMMARY OF WATER ADDED TO WELL BORES DURING DRILLING AND MONITORING WELL INSTALLATIONS SUPPLEMENTAL INVESTIGATION, FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Well Identification	Date Water Added	Volume of Water Added (gallons)	Comments	Source of Drill Water[a]
775VMW-4	July 24, 1997	20	Control flowing sand	CME 75 Drill Rig Tank
775VMW-5	July 18, 1997	10	Control flowing sand	CME 75 Drill Rig Tank
775VMW-7	July 22, 1997	40	Wash out soil cuttings in augers	CME 75 Drill Rig Tank
775VMW-8	July 28, 1997	40	Control flowing sand	CME 75 Drill Rig Tank
775VMW-9	November 7, 1997	120	Wash down bridged sand during well construction	Decon Poly Tank
225VMW-1	July 9, 1997	100	Wash out soil cuttings in auger	CME 75 Drill Rig Tank
LF6VMW-6	July 16, 1997	40	Wash out soil cuttings in auger	CME 75 Drill Rig Tank
FPTMW-4	August 1, 1997	10	Control flowing sand	CME 75 Drill Rig Tank
786MW-6	August 1, 1997	5	Wash off screen after installation	CME 75 Drill Rig Tank
WSATW-5	July 31, 1997	5	Wash out soil cuttings in auger	CME 75 Drill Rig Tank
WSATW-6	July 31, 1997	5	Wash out soil cuttings in auger	CME 75 Drill Rig Tank
782MW-6R1	September 8, 1997	55	Wash out bridged bentonite pellets	Decon Poly tank

[a] The source presented represents the water holding tank. The ultimate source is from Hydrant 11 located south of Building 214.

Table 2-2

ANALYTICAL DATA SUMMARY OF POSITIVE RESULTS FOR DRILL WATER SAMPLES SUPPLEMENTAL INVESTIGATION FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Parameter	Sample ID: / Sample Location: / Sample Source: / Date Sampled: / Laboratory:	Hydrant 11 / Hydrant 11 / Hydrant 11 / June 16, 1997 / E & E Field	Decon Poly / Polyethylene Tank / Hydrant 11 / June 16, 1997 / E & E Field	Rig Tank / CME 55 Tank / Hydrant 11 / June 20, 1997 / E & E Field	DW-01 / CME 75 Tank / Hydrant 11 / July 22, 1997 / E & E ASC	DW-02 / CME 75 Tank / Building 520 / November 17, 1997 / E & E ASC	DW-03 / Poly Tank / Building 520 / November 17, 1997 / E & E ASC
Volatiles (µg/L)							
Chloroform		ND	ND	ND	31		
Bromodichloromethane		ND	ND	ND	1.0		
Trichloroethene		ND	ND	ND	3.5		
Semivolatiles (µg/L)							
Naphthalene		ND	ND	ND	0.23 J		
Diethyphtalate		ND	ND	ND	0.27 J		
Pyrene		ND	ND	ND	0.32		
bis(2-ethylhexyl)phthalate		ND	ND	ND	1.6 B		

Key:
- B = Present in black sample.
- J = Estimated value.
- ND = Not detected.
- µg/L = Micrograms per liter.

Table 2-3

TEMPORARY WELL INSTALLATION SUMMARY
SUPPLEMENTAL INVESTIGATION
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

AOC	Temporary Well No.	Date Installed	Date Sampled	Date Decommissioned	Ground Elevation (Feet AMSL)	Total Depth Drilled (feet BGS)	Drill Method Interval (feet BGS)	Casing/Screen (010 Slot) ID (inches)	Screened Interval (feet BGS)	Water Level[a] (feet BGS)
Landfill 7	LF7TW-24	7-31-97	8-1-97	8-13-97	487.16	11	4.25	2	1 - 11	1.4
	LF7TW-25	7-31-97	8-1-97	8-13-97	487.05	12	4.25	2	1 - 11	2.05
Building 101	101TW-5	8-4-97	8-5-97	8-13-97	473.05	22	4.25	2	12 - 22	13.97
	101TW-6	8-4-97	8-5-97	8-13-97	471.61	21.6	4.25	2	11.6 - 21.6	13.04
Lot 69	L69TW-5	8-5-97	8-7-97	8-13-97	467.08	18	4.25	2	8 - 18	10.1
WSA	WSATW-5	7-31-97	8-4-97	8-13-97	501.96	14	4.25	2	4 - 14	6.86
	WSATW-6	7-31-97	8-6-97	8-13-97	515.68	13	4.25	2	3 - 13	5.80
	WSATW-7	8-1-97	8-6-97	8-13-97	516.20	26	4.25	2	16 - 26	21.65

[a] Water level measured prior to purging/sampling.

Key:

AMSL = Above mean sea level.
BGS = Below ground surface.
HSA = Hollow stem augers.
ID = Inner diameter.
TOIC = Top of inner casing.
WSA = Weapons storage area.

Table 2-4

PERMANENT MONITORING WELL CONSTRUCTION SUMMARY
SUPPLEMENTAL INVESTIGATION,
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

AOC	Monitoring Well No.	Well Type Standard/Vertical Profile Monitoring Well	Date Started	Date Completed	Drilling Company	Date Development Started	Date Development Completed	Date Sampled	PVC Well Casing/ Screen ID (inches)	Depth Drilled (feet BGS)	Total Casing Depth (feet TOIC)	TOIC Casing Elevation (feet AMSL)	Ground Elevation (feet AMSL)	Screened (0.10 Slot) Interval (feet BGS)	Sand Interval (feet BGS)	Bentonite Seal Interval (feet BGS)	Grout Interval (feet BGS)	Static Water Level[a]	Stickup or Flush (S/F)
Building 3	B3VMW-1	VMW	7-2-97	7-11-97	Parratt-Wolff, Inc.	7-23-97	7-23-97	8-25-97	2	48.8	17.56	467.34	467.78	8-18	6-19	4-6	3-4	9.88	F
Building 786	786MW-6	MW	8-1-97	8-8-97	Parratt-Wolff, Inc.	8-7-97	8-13-97	8-26-97	2	21	21.1	477.02	475.96	11-21	9-21	7-9	4-7	16.85	S
Building 133	133MW-1	MW	8-5-97	8-8-97	Parratt-Wolff, Inc.	8-13-97	8-13-97	8-28-97	2	18	18.6	469.76	468.40	8-18	6-18	4-6	0-4	11.73	S
	133MW-2	MW	8-5-97	8-8-97	Parratt-Wolff, Inc.	8-15-97	8-15-97	8-28-97	2	18	18.75	470.65	469.68	8-18	6-18	4-6	0-4	12.26	S
	133MW-3	MW	8-6-97	8-8-97	Parratt-Wolff, Inc.	8-13-97	8-13-97	8-28-97	2	18.3	17.4	469.07	468.20	8.2-18.2	6-18.2	4-6	0-4	10.78	S
Nose Docks 1 and 2	782MW-5	MW	8-5-97	8-8-97	Parratt-Wolff, Inc.	8-14-97	8-14-97	8-28-97	2	25.5	23.7	477.35	478.08	15-25	13-25.5	11-13	4-11	17.20	F
	782MW-6	MW	8-5-97	8-8-97	Parratt-Wolff, Inc.	8-12-97	—	—	2	16.5	17.1	477.68	477.01	6-16	4.5-16.5	3-4.5	0-3	15.73[c]	S
	782MW-6R1	MW	9-5-97	9-8-97	Parratt-Wolff, Inc.	9-10-97	—	—	2	26	26.17	To come	476.60	15-25	13-26	9.8-13	4-9.8	22.38[c]	S
	782MW-6R2	MW	11-18-97	11-24-97	SJB Services, Inc.	11-21-97	11-21-97	12-4-97	2	35	35.9	478.42	476.82	19.5-34.5	17.5-34.5	12-17.5	3-12	24.9	S

Key at end of table.

Table 2-4

PERMANENT MONITORING WELL CONSTRUCTION SUMMARY
SUPPLEMENTAL INVESTIGATION,
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

AOC	Monitoring Well No.	Well Type Standard/Vertical Profile Monitoring Well	Date Started	Date Completed	Drilling Company	Date Development Started	Date Development Completed	Date Sampled	PVC Well Casing/ Screen ID (inches)	Depth Drilled (feet BGS)	Total Casing Depth (feet TOIC)	TOIC Casing Elevation (feet AMSL)	Ground Elevation (feet AMSL)	Screened (0.10 Slot) Interval (feet BGS)	Sand Interval (feet BGS)	Bentonite Seal Interval (feet BGS)	Grout Interval (feet BGS)	Static Water Level[a]	Stickup or Flush (S/F)
Landfill 5	LF5MW-4	MW	8-4-97	8-8-97	Parratt-Wolff, Inc.	8-8-97	8-12-97	8-26-97	2	13	13.49	459.66	457.43	2-12	1.5-12.5	1-1.5	0-1	3.28	S
Landfill 6	LF6VMW-6	VMW	7-14-97	8-8-97	Parratt-Wolff, Inc.	7-28-97	8-12-97	8-27-97	2	90	44.82	473.56	472.86	35-45	33-46	31-33	4-31	17.90	S
Building 101	101MW-4	MW	8-7-97	8-8-97	Parratt-Wolff, Inc.	8-12-97	8-13-97	8-27-97	2	21	20.25	472.56	473.12	10.65-20.65	9-21	7-9	4-7	12.62	F
Building 775	775VMW-4	VMW	6-18-97	8-8-97	Parratt-Wolff, Inc.	8-1-97	8-15-97	8-29-97	2	97	72.38	518.51	517.64	60-70	56.8-71	54.8-56.8	4-54.8	58.00	S
	775VMW-5	VMW	7-16-97	8-8-97	Parratt-Wolff, Inc.	7-31-97	8-11-97	8-25-97	2	98.7	78.57	518.64	517.94	65-75	61.9-77	59-61.9	3-59	58.18	S
	775MW-6	MW	7-30-97	8-8-97	Parratt-Wolff, Inc.	8-4-97	8-14-97	8-28-97	2	80	78.86	518.02	517.18	68-78	64.8-78.8	59-64.8	4-59	58.01	S
	775VMW-7	VMW	7-21-97	8-8-97	Parratt-Wolff, Inc.	7-31-97	8-15-97	8-29-97	2	96.5	79.80	518.08	517.26	68-78	65-79.2	62-65	4-62	58.68	S
	775VMW-8	VMW	7-28-97	8-8-97	Parratt-Wolff, Inc.	8-1-97	8-6-97	8-25-97	2	90	80.23	518.22	517.29	68-78	64.9-78	59-64.9	8-59	60.18	S
	775VMW-9	VMW	11-4-97	11-14-97	SJB Services, Inc.	11-18-97	11-19-97	12-3-97 12-4-97	2	106	99.8	513.63	511.92	84-99	80.8-103	73-80.8	4-73	56.37	S

Key at end of table.

Table 2-4

PERMANENT MONITORING WELL CONSTRUCTION SUMMARY
SUPPLEMENTAL INVESTIGATION,
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

AOC	Monitoring Well No.	Well Type Standard/Vertical Profile Monitoring Well	Date Started	Date Completed	Drilling Company	Date Development Started	Date Development Completed	Date Sampled	PVC Well Casing/ Screen ID (inches)	Depth Drilled (feet BGS)	Total Casing Depth (feet TOIC)	TOIC Casing Elevation (feet AMSL)	Ground Elevation (feet AMSL)	Screened (0.10 Slot) Interval (feet BGS)	Sand Interval (feet BGS)	Bentonite Seal Interval (feet BGS)	Grout Interval (feet BGS)	Static Water Level[a]	Stickup or Flush (S/F)
	775VMW-10	VMW	11-12-97	11-19-97	SJB Services, Inc.	11-21-97	11-21-97	12-4-97	2	110	103.4	517.22	515.14	88-103	85-103	80-85	4-80	60.68	S
Fire Protection Training Area	FPTMW-4	MW	8-1-97	8-8-97	Parratt-Wolff, Inc.	8-7-97	8-13-97	8-27-97	2	18	19.40	486.48	485.29	8-18	6-18	5-6	4-5	11.00	S
	FPTVMW-5	VMW	6-27-97	8-8-97	Parratt-Wolff, Inc.	7-22-97	7-28-97	8-19-97	2	37.9	24.15	486.14	484.49	12.81-22.18	10-23	8-10	4-8	16.10	S
Tin City[b]	255VMW-1	VMW	7-8-97	8-8-97	Parratt-Wolff, Inc.	7-22-97	7-30-97	8-21-97	2	30.3	31.45	476.91	474.96	15-30	12.95-30.3	10.5-12.95	4-10.5	18.75	S
	255VMW-2	VMW	7-9-97	8-8-97	Parratt-Wolff, Inc.	7-22-97	7-24-97	8-21-97	2	29.4	30.5	476.77	475.25	16-29	14-29.4	12-14	4-12	20.82	S
	TCVMW-1	VMW	7-10-97	8-8-97	Parratt-Wolff, Inc.	7-22-97	7-24-97	8-21-97	2	32.5	33.8	476.99	475.08	20-32	18-32	16-18	4-16	20.45	S
	TCVMW-2	VMW	7-11-97	8-8-97	Parratt-Wolff, Inc.	7-21-97	7-30-97	8-22-97	2	35	34.8	476.92	475.64	18.5-33.5	16.5-35	14-16.5	4-14	20.58	S

[a] Water level measured prior to well sampling.
[b] Tin City includes Building 214, 219, and 255 AOCs.
[c] Water level measured prior to development.

Key at end of table.

Table 2-4 (Cont.)

Key:

AMSL = above mean sea level.
AOC = area of concern.
BGS = below ground surface.
ID = inner diameter.
TOIC = top of inner casing.

SITE NAME:

SITE ID.: LF-1
INSPECTOR: C. Taylor
DATE/TIME: 8-6-97/1310
WELL ID.: LF1MW102

MONITORING WELL FIELD INSPECTION LOG
NYSDEC WELL DECOMMISSIONING PROGRAM

	YES	NO
WELL VISIBLE? (If not, provide directions below)	X	
WELL I.D. VISIBLE?	X	
WELL LOCATION MATCH SITE MAP? (if not, sketch actual location on back)	X	

WELL I.D. AS IT APPEARS ON PROTECTIVE CASING OR WELL: LF1MW102

	YES	NO
SURFACE SEAL PRESENT?	X	
SURFACE SEAL COMPETENT? (If cracked, heaved etc./described below)	X	
PROTECTIVE CASING IN GOOD CONDITION? (If damaged, described below)	X	

HEADSPACE READING (ppm) AND INSTRUMENT USED OVA	0
TYPE OF PROTECTIVE CASING AND HEIGHT OF STICKUP IN FEET (if applicable)	2
PROTECTIVE MATERIAL TYPE:	steel
MEASURE PROTECTIVE CASING INSIDE DIAMETER (Inches)	6

	YES	NO
LOCK PRESENT?	X	
LOCK FUNCTIONAL?	X	
DID YOU REPLACE THE LOCK?		X
IS THERE EVIDENCE THAT THE WELL IS DOUBLE CASED? (If yes, describe below)		X
WELL MEASURING POINT VISIBLE?	X	

MEASURE WELL DEPTH FROM MEASURING POINT (Feet):	54.3
MEASURE DEPTH TO WATER FROM MEASURING POINT (Feet):	28.18
MEASURE WELL DIAMETER (Inches)	2
WELL CASING MATERIAL:	PVC
PHYSICAL CONDITION OF VISIBLE WELL CASING	Good
ATTACH ID MARKER (if well ID is confirmed) and IDENTIFY MARKER TYPE	Aluminum plate
PROXIMITY TO UNDERGROUND OR OVERHEAD UTILITIES	None

DESCRIBE ACCESS TO WELL: (Include accessibility to truck mounted rig, natural obstructions, overhead power lines, proximity to permanent structures, etc.); ADD SKETCH OF LOCATION ON BACK, IF NECESSARY.
LF1MW102 is located at edge of open field, approximately 200 feet southwest of access road, adjacent to LF1MW101. The well is accessible via truck-mounted rig. There are no overhead or underground utilities in vicinity of the well.

DESCRIBE WELL SETTING (For example, located in a field, in a playground, on pavement, in a garden, etc.) AND ASSESS THE TYPE OF RESTORATION REQUIRED.
LF1MW102 is located in an unmaintained open field on or near Landfill 1. No restoration will be required following decommissioning.

IDENTIFY ANY NEARBY POTENTIAL SOURCES OF CONTAMINATION, IF PRESENT (e.g., Gas station, salt pile, etc.):
LF1MW102 is located on/or downgradient of Landfill 1 at the former Griffiss Air Force Base.

REMARKS:
LF1MW102 is a bedrock well which will be decommissioned due to a suspected breech in the well seal based on high turbidity and pH readings observed during initial well development in October 1993.

Figure 2-1 MONITORING WELL LF1MW102 FIELD INSPECTION LOG FORM

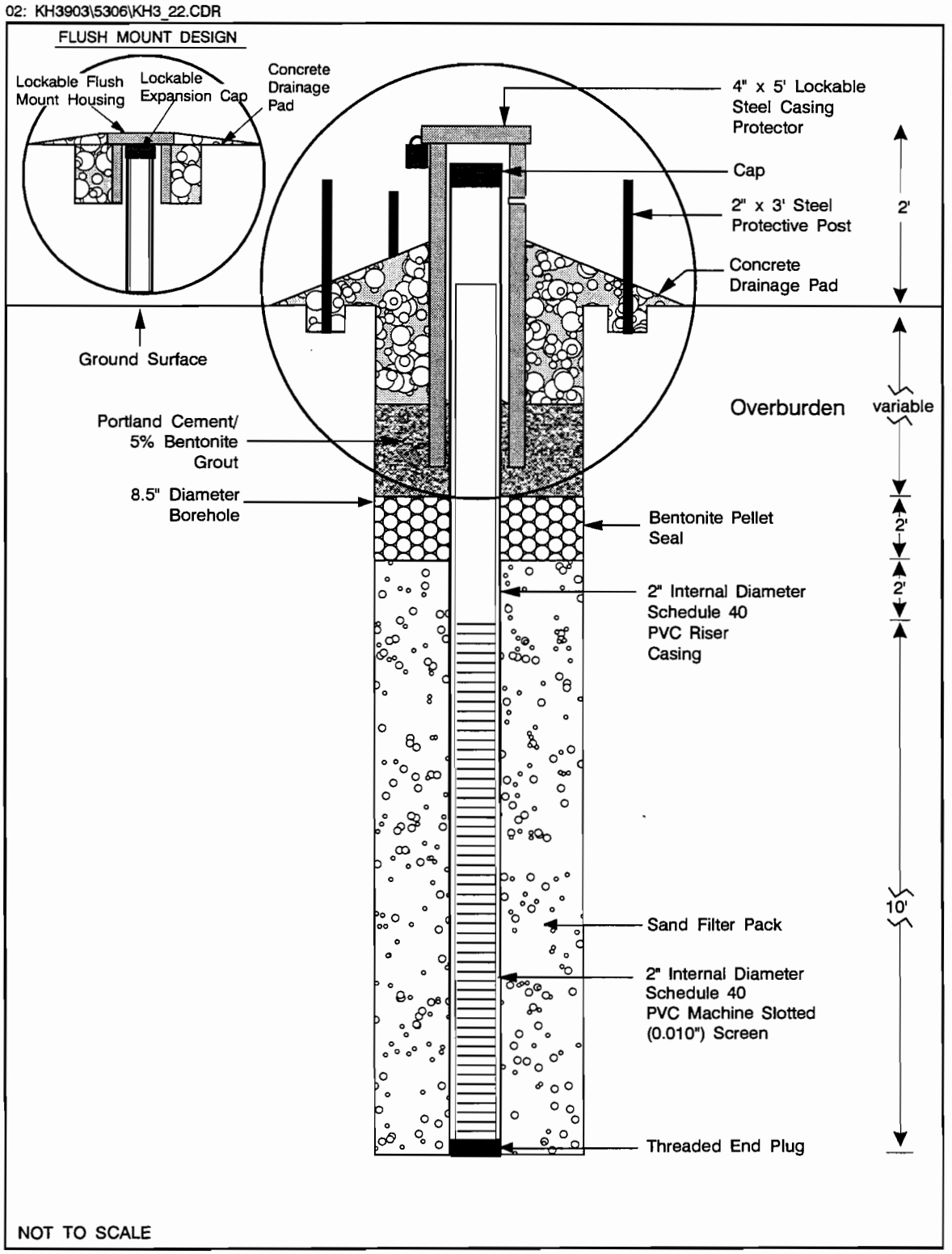


Figure 2-2 TYPICAL CONSTRUCTION FOR STANDARD PERMANENT MONITORING WELLS

3 Screening Methodology

3.1 Introduction

SI sample screening was performed using the same criteria presented in the Draft-Final RI (Law Environmental 1996). Section 1.3 of Volume 1 (Background Information) of the RI describes the screening processes used at each AOC. A summary of the RI screening criteria that are described in Section 1.3 of the RI and are applicable to the SI are presented in Section 3.2. Appendix L of this report also contains the related sample screening criteria tables from the RI and Part 703.6 of the New York Code of Rules and Regulations.

3.2 Regulatory Requirements

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigations are required to comply with federal and state applicable or relevant and appropriate requirements (ARARs). To-be-considered requirements (TBCs) must also be identified for the development and selection of remediation alternatives (Law Environmental 1996).

Potential ARARs are derived from both federal and state environmental laws or facility siting laws. The federal laws include federal environmental laws, statutes, and regulations. The standards identified by the state are laws that are generally more stringent than federal requirements (Law Environmental 1996).

The identification of ARARs is a two-stage process: determination of whether it is both relevant and appropriate (i.e., a requirements is either applicable, or it is relevant and appropriate, but not both). Applicable requirements are generally cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations

promulgated under federal or state law that address a hazardous substance, pollutant, contaminant, remedial action or location at a CERCLA site (Law Environmental 1996).

Although determination of whether a particular requirement is applicable to a site is based on legal prerequisites, relevant and appropriate requirements are based on professional judgment. Requirements need to be both relevant and appropriate to be considered ARARs (Law Environmental 1996).

TBCs are nonpromulgated to advisories or guidances issues by the state or federal governments. Though not legally binding, they are used in conjunction with potential ARARs to aid in the selection of remedial alternatives or cleanup goals (Law Environmental 1996).

Potential ARARs and TBCs can be divided into three categories: chemical-specific; location specific; and action-specific. Chemical-specific ARARs are usually health or risk-based values for groundwater and surface water. There are no chemical-specific ARARs for soil, sediments, or air. Table 1-2 of Volume 1 of the RI (see Appendix L) presents potential federal and state chemical-specific ARARs and TBCs; Table 1-3 identifies potential ARARs that may be applicable or relevant and appropriate for each; Table 1-4 identifies the state and federal TBCs for each AOC; Tables 1-5 and 1-6 identify potential chemical-specific (state and federal) ARARs for groundwater and surface water, respectively; and Table 1-7 identifies potential chemical-specific TBCs for soils. The most stringent criteria highlighted in Tables 1-5, 1-6, and 1-7 were used to screen both RI and SI data for comparison purposes only. Final determination of the governing ARARs and cleanup goals will be accomplished in the FS (E & E 1997a).

Location-specific ARARs are restrictions placed on concentrations of hazardous substances or conductance of activities solely because of their occurrence at locations such as flood plains, wetlands, historic places, sensitive ecosystems, or critical habitats (Law Environmental 1996). Although no location-specific federal or stated TBCs were identified, ARARs related to flood plains; fish, wildlife and endangered species; and wetlands are indicated by AOC in Table 1-12 of Volume 1 of the RI (see Appendix L).

Action-specific ARARs are technology-based or activity-based requirements or limitations on remedial actions. They do not determine the applicability of a given remedial action of a particular waste stream, but an evaluation of a specific remedial action's compliance within a remedial alternative with action-specific ARARs are used during the FS as a selection criterion to determine whether a remedial alternative will be applicable. Remedial alternatives consisting of a number of remedial actions are developed during the FS after all of the data concerning the nature and extent of contamination have been collected.

4 AOC-Specific Supplemental Investigation Results

This section of the SI Report contains a detailed discussion of each AOC, including a brief description of the historical use of the site, results of previous investigations of these areas, results of SI sampling, and SI conclusions.

4.1 Fire Demonstration Area

4.1.1 Site Description

The Fire Demonstration Area (FDA) is located in the north-central portion of the former base, south of Taxiway 17 and north of Building 100 (see Figures 1-2A and 4.1-1). The FDA was used from 1974 to 1992. Prior to 1987, fuels and miscellaneous flammable materials were ignited and extinguished on the ground surface. Subsequent to that date, a metal containment trough was installed to house the flammable liquids to be ignited. The trough was removed in 1992.

4.1.2 Remedial Investigation

The RI consisted of a soil gas/groundwater survey; the drilling of four soil borings; and the collection of 32 soil samples for in-field analysis, 12 soil samples for off-site analysis, and one groundwater sample from a temporary well. The subsurface soils contained benzo(a)pyrene, dieldrin, and arsenic in concentrations exceeding potential TBCs. The groundwater contained four pesticides at concentrations below potential TBCs and potential ARARs. No free product was noted in well FDA-MW1 during the RI field investigation or well sampling.

4.1.3 Supplemental Investigation

The SI at the FDA consisted of probing monitoring well FDA-MW1 for free product (Figure 4.1-1). If free product were detected in FDA-MW1, a sample of the product would have been collected and analyzed for VOCs and SVOCs. In addition, a fingerprint test would have been performed for fuel identification.

4.1.4 SI Results

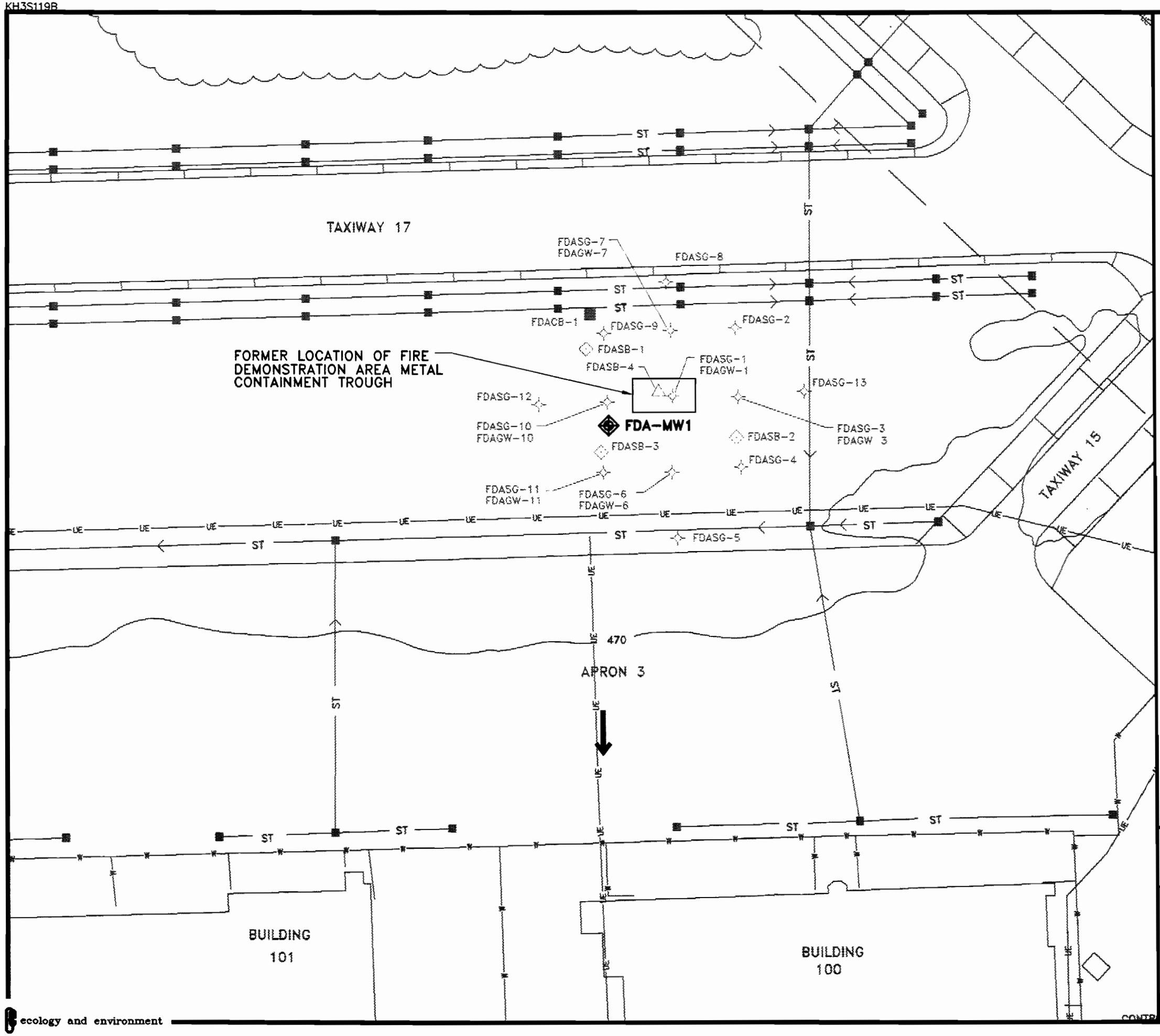
FDAMW1 was probed for free product on June 6, 1997. Neither organic vapors nor free product was detected; therefore, SI samples were not required.

4.1.5 SI Conclusions

Results of the RI field activities indicated few exceedances of potential ARARs or TBCs in soils and grab groundwater samples. Based on these results and results of the baseline risk assessment, the RI included an NFA recommendation for this site (Law Environmental

1996). Since free product was not detected in the on-site monitoring well during the SI, the NFA recommendation remains unchanged.

KH3S119B



LEGEND

- WELL CHECKED FOR FREE PRODUCT
- RI MONITORING WELL
- RI SOIL BORING
- RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- RI CATCH BASIN SAMPLE
- RI SOIL GAS AND/OR GROUNDWATER SCREENING SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- 470 — TOPOGRAPHIC CONTOUR LINE
- ST — STORM SEWER
- UE — UNDERGROUND ELECTRIC
- STORM SEWER MANHOLE

N

SCALE IN FEET

0 200 400 600

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.1-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
FIRE DEMONSTRATION AREA

ecology and environment

PLOTTED BUFF:11/3/97

4.2 Suspected Fire Training Area

4.2.1 Site Description

The Suspected Fire Training Area (SFTA) is located in the east-central portion of the former base, approximately 500 feet north-northwest of Gate No. 13 and 150 feet east of Perimeter Road (see Figures 1-2A and 4.2-1). From the 1960s to 1974, the site was allegedly used for fire training using aircraft fuel and JP-4 wastes. Although the RI states that the site might have been used for fire training as early as the 1940s, historical aerial photos indicate that the area was undeveloped until 1957 when the runway was expanded. The site was cleared of vegetation in 1960. By 1967, most of the cleared area was revegetated, but a small dirt road was visible. A plane was present at the site in the 1971, 1972, and 1973 aerial photos but was absent in the 1974 aerial photo. No evidence of burning was noted in any of the aerial photos.

4.2.2 Remedial Investigation

The RI consisted of a soil gas survey; the drilling of four soil borings; the collection of four surface soil samples, 19 subsurface soil samples, and one grab groundwater sample; and the installation and sampling of four monitoring wells. Because SFTMW-4 was dry upon well completion, replacement well SFTMW-4R was installed. Only low levels (i.e., below potential TBCs and potential ARARs) of contaminants were detected at the site. No free product was noted in any of the monitoring wells during the RI field investigation or during well sampling.

4.2.3 Supplemental Investigation

The SI at the SFTA consisted of probing monitoring wells SFTMW-1, SFTMW-2, SFTMW-3, SFTMW-4, and SFTMW-4R for free product (see Figure 4.2-1). If free product were detected in any of the monitoring wells, a sample of the product would have been collected and analyzed for VOCs and SVOCs. In addition, a fingerprint test would also be performed for fuel identification.

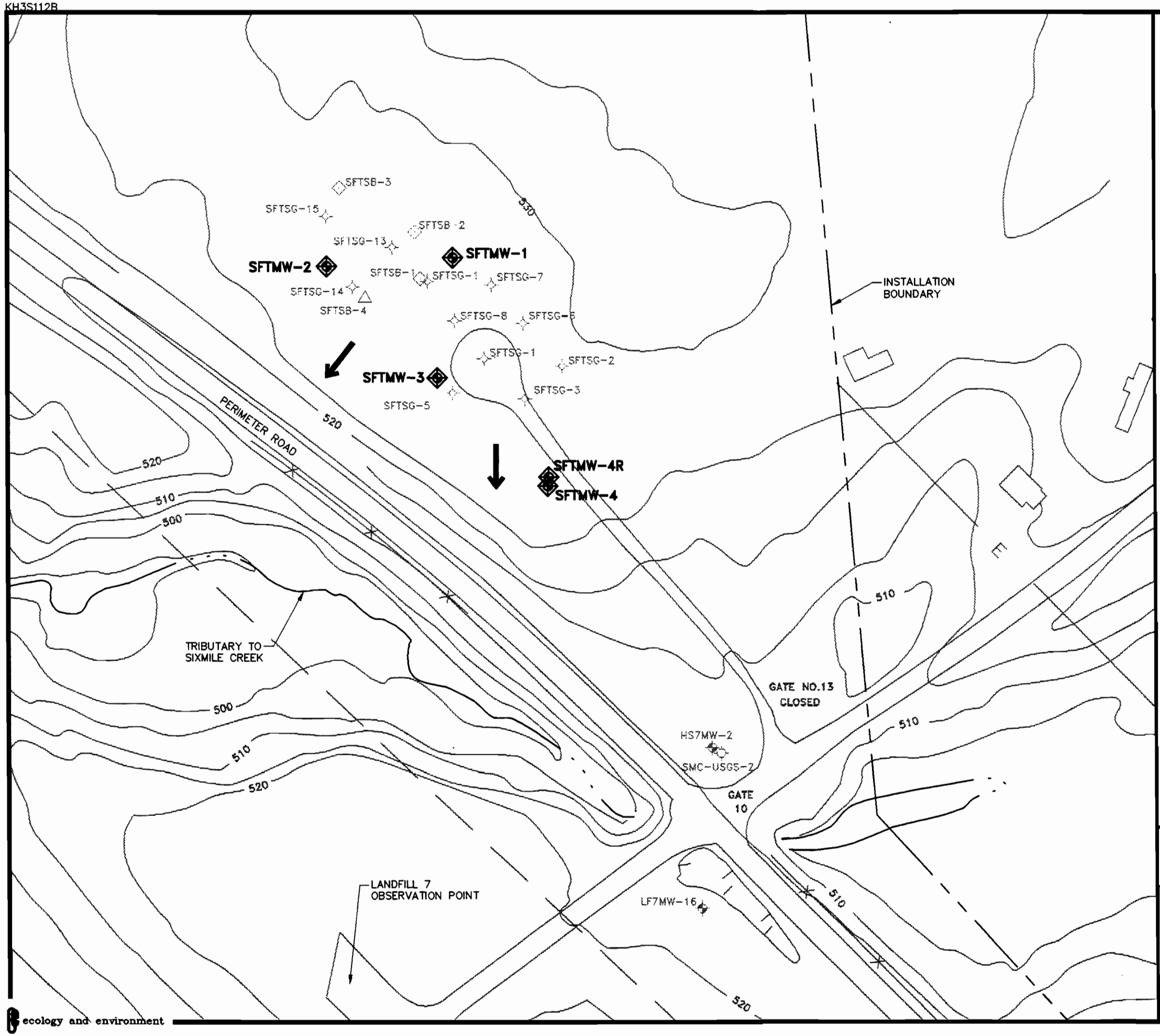
4.2.4 SI Results

The wells at SFTA were probed for free product on June 6, 1997. Neither OVA readings nor free product were detected; therefore, SI samples were not required.

4.2.5 SI Conclusions

Results of the RI field activities and baseline risk assessment resulted in a no further action recommendation (Law Environmental 1996). Since free product was not detected in the on-site monitoring wells during the SI, the NFA recommendation remains unchanged.

KH3S112B



LEGEND

- WELL CHECKED FOR FREE PRODUCT
- RI MONITORING WELL
- RI SOIL BORING
- RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- RI SOIL GAS AND/OR GROUNDWATER SCREENING SAMPLE
- USGS PIEZOMETER
- DIRECTION OF GROUNDWATER FLOW
- 530 — TOPOGRAPHIC CONTOUR LINE

N

SCALE IN FEET

0 100 200 300

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.2-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
SUSPECTED FIRE TRAINING AREA

ecology and environment

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4.3 Landfill 1

4.3.1 Site Description

Landfill 1 is located in the northeastern portion of the former base on the east side of Sixmile Creek (see Figures 1-2A and 4.3-1). The unlined 22-acre landfill received solid waste from 1960 to 1973. Prior to that, the site was used as a gravel quarry. The contents of the landfill are unknown; however, debris from a fire at the base commissary was reportedly buried in the western portion of the landfill in 1973, and waste ash from the steam plant was used as cover material at some time during landfill operations. The landfill was partially capped in the 1970s and landscaped with trees. The existing capped areas were regraded and recapped with additional soil cover in 1984.

4.3.2 Remedial Investigation

The RI consisted of a geophysical survey; a passive soil gas survey at 18 locations; the installation of four monitoring wells; and the analysis of seven surface soil samples, six surface water samples, two leachate samples, 18 sediment samples, and groundwater samples from 12 monitoring wells. The geophysical survey identified numerous anomalies representing eight disposal trenches and numerous discrete disposal locations. Of these anomalies, GPR profiles confirmed two strong subsurface reflections as buried metallic objects. These reflections are located near grid coordinates 750,670 and 525,815 (see Figure 4.3-2). The passive soil gas survey detected chlorinated solvents (predominantly tetrachloroethylene [PCE]), and petroleum fuel constituents. Surface soil samples contained VOCs, SVOCs, pesticides, and inorganics at concentrations below potential ARARs and TBCs. Surface water contained several PCBs, one pesticide, iron, and lead at concentrations above potential ARARs and TBCs. Leachate contained several VOCs, SVOCs, pesticides, PCBs, inorganics, glycols, ammonia-nitrogen, and hydrogen sulfide. No potential ARARs or TBCs were established for the leachate medium. Finally, groundwater contained VOCs, a pesticide, and several metals at concentrations exceeding potential ARARs and TBCs, and total glycols at concentrations exceeding the NYSDEC groundwater drinking standard. The bedrock well (LF1MW102) was not sampled because of high pH believed to be the result of grout contamination.

4.3.3 Supplemental Investigation

The SI at Landfill 1 consisted of the decommissioning of bedrock monitoring well LF1MW102 and the excavation of test pits (LF1TP-1, LF1TP-2) at two RI geophysically anomalous areas. An additional test pit excavation and associated sampling, and geophysical survey between Landfill 1 and the Small Arms Range were requested by USACE on June 11, 1997 (modification 2101 to Delivery Order 0021). The purpose of this additional work was to determine the nature of the contents of the partially buried drum, and whether other drums exist in this area. The drum contents were to be sampled before the drum was contained in an 85-gallon overpack drum.

LF1MW102 (see Figure 4.3-1) was deemed unusable during the RI because of potential grout contamination. The well was properly decommissioned during the SI to prevent vertical migration of contaminants into the bedrock. Well decommissioning was performed according to the SI Work Plan (E & E 1997c) and as described in Section 2.2 of this report.

Test pit excavations (LF1TP-1 and LF1TP-2) were performed at the two RI magnetic/GPR anomalous locations (approximate RI grid coordinates 750,670 and 525,815, respectively) (see Figure 4.3-2). These locations were identified in Volume 1 (Appendix B) of the draft final RI (Law Environmental 1996). A description of the test pit excavations is provided below in Section 4.3.4.1. Although three samples per test pit were included in the SI work plan, the samples were not collected because drums were not encountered (see Table 4.3-1).

4.3.4 SI Results

4.3.4.1 Test Pit Excavations

On July 14, 1997, two test pits (LF1TP-1 and LF1TP-2) were excavated at Landfill 1 at two RI magnetic/GPR anomalous locations (Figure 4.3-2). Both pits were excavated to a maximum depth of 10 feet BGS, oriented in an east-west direction, and backfilled immediately after the investigation. Test pit photodocumentation will be provided to USACE and AFBCA in a separate document.

The lithology encountered in the first test pit (LF1TP-1) consisted of medium brown very fine to fine sand to a depth of 1 foot BGS, light brown fine sand with some silt from 1 to 6 feet BGS, and gray fine sand from 6 to 10 feet BGS. Household trash composed of plastic pieces and bottles, glass bottles, wood fragments, metal, paper, and cloth scraps was encountered from a depth of approximately 4 to 9 feet BGS. An OVA reading of over 100 parts per

million (ppm) was recorded with and without a charcoal filter from this depth. Since methane passes through carbon while other organic vapors are absorbed, an equal OVA reading with and without the carbon filter indicates the presence of methane only. Explosimeter readings of 0% lower explosive limit (LEL), 20.9% oxygen (O_2), and 0 ppm for hydrogen sulfide (H_2S) and carbon monoxide (CO) were recorded. At approximately 6 feet BGS, a 5-foot-long steel I-beam and scattered 2-foot-square steel plates were unearthed near the center of the pit, and these items appear to cause of the strong geophysical anomaly. The test pit walls began to collapse at a depth of approximately 10 feet BGS due to the sandy nature of the material. No drums were encountered in this test pit.

The lithology in the second test pit (LF1TP2) consisted of medium brown fine sand and silt with 20-30% rounded gravel and cobbles from 0 to 2 feet BGS. At a depth of approximately 2 feet BGS similar household trash was encountered and OVA readings of 30 to 50 ppm were recorded. Explosimeter readings of 0% LEL, 20.8% O_2, and 0 ppm for H_2S and CO were recorded. At 7 feet BGS the material became much less dense and was composed mostly of construction debris with less household debris. The construction debris consisted of small metal scraps, wood timbers and boards. An OVA reading of 900 ppm was recorded with and without a charcoal filter, thus indicating the presence of methane only. Explosimeter readings of 0%LEL, 20.9% O_2, and 0 ppm for H_2S and CO were recorded in the bottom of the trench. No drums, large metallic objects, or other obvious causes of the reported anomalies were discovered.

4.3.4.2 Drum Excavation and Sampling

One drum was excavated and sampled at Landfill 1 on July 14, 1997. The partially exposed and crushed 55-gallon drum was labeled "Lube Oil, Sinclair REF-1." A lube oil sample (LF1-DR1) was collected from inside the drum through an open bung on the top of the drum and analyzed for toxicity characteristic leaching procedure (TCLP) VOCs and SVOCs, and Resource Conservation and Recovery Act (RCRA) characteristics (see Table 4.3-1). The sample was a black, very viscous, grease-like material. Explosimeter readings of 1% LEL, 20.8% O_2, 0-1 ppm H_2S and 1 ppm CO were recorded during sampling. The soil beneath the drum was visibly contaminated with lube oil and placed in an 85-gallon overpack drum. Since the crushed drum did not fit completely in the overpack drum, the exposed portion was covered with plastic. On July 17, a confirmation sample soil sample (LF1DR1-NS1) was collected from beneath the previously excavated drum. This sample was tested for VOCs, SVOCs, pesticides/PCBs, metals, and % solids. Based on the sample results, the contents of the crushed

drum were resampled (LF1DR-1R) on August 21, 1997, and tested for PCBs (see Table 4.3-1). Table 4.3-2 summarizes drum and soil results. The crushed drum and associated soils will be disposed of at a permitted facility in November 1997.

4.3.4.3 SI Geophysical Survey

During the installation of the magnetic survey grid and performance of the survey itself between June 25 and July 11, 1997, several areas containing metallic debris or other sources of magnetic interference were noted (see Magnetic Maps in Appendix C). These areas include:

- Monitoring well LF1MW-8 near survey grid coordinate 525, 1700;
- Six or more exposed or buried 55-gallon drums near survey coordinate 650, 1700. One drum had no top and contained a purple colored soil;
- A flagpole at survey grid coordinate 862, 871;
- An empty gas or oil can near survey grid coordinate 650, 1625;
- Three 55-gallon drums were strapped together and lying on their sides, and the bung was open on the top drum (bottom 2 drums are rotted) near survey grid coordinate 800, 1700;
- A half buried, semi-crushed 55-gallon drum near survey grid coordinate 825, 1200;
- A completely exposed 55-gallon drum with open bung labeled "D-A Diesel Oil, Superior All Purpose" was found 10 feet east of survey grid coordinate 850, 1175. A metal bucket, possibly a buried drum, a 2-inch steel pipe and valve, vehicle tire, and miscellaneous scrap metal were in the immediate vicinity (i.e., 5 to 10 feet south of the diesel oil drum);
- A partially buried drum near survey grid coordinate 875, 1500 (this drum was sampled and removed as part of the SI);
- A metal bucket near survey grid coordinate 875, 1650;
- Surficial scrap sheet metal near survey grid coordinate 900, 400;
- One UST near survey grid coordinate 950, 1100;
- A metal pipe near survey grid coordinate 950, 1125;
- A metal pipe near survey grid coordinate 975, 750;

- Building 853 between grid coordinates 950, 1050/950, 1100, and 1050, 1100/1050, 1125;
- A metal utility cover near survey grid coordinate 975, 1125;
- A partially buried railroad track segment near survey grid coordinate 1000, 450;
- Monitoring wells LF1MW101 and LF1MW102 near survey grid coordinate 1000, 475 (LF1MW102 was decommissioned as part of the SI);
- A guy wire for a utility pole near survey grid coordinate 1000, 1175;
- A metal sign and pile of concrete bricks near survey grid coordinate 1025, 800;
- Five "Delco-Remi" vehicle generators near survey grid coordinate 1025, 875;
- A partially buried 55-gallon drum without a top near survey grid coordinate 1025, 925;
- Monitoring well MW49A01 near survey grid coordinate 1050, 1650;
- Numerous metal paint cans near survey grid coordinate 1075, 575;
- A stack of metal pipes near survey grid coordinate 1100, 725;
- A metal cable near survey grid coordinate 1100, 850;
- The shooting range pavillion near survey grid coordinate 1100, 1225;
- Shooting range concrete tubes near survey grid coordinate 1100, 1250 and 1175, 1250;
- Monitoring well MWSAR03 near survey grid coordinate 1100, 1425;
- Monitoring well LF1P-2 near survey grid coordinate 1112, 362;
- A metal tub and other metal debris near survey grid coordinate 1125, 525;
- A metal sign near survey grid coordinate 1125, 575;
- Metal banding near survey grid coordinate 1150, 525;
- Electrical wire near survey grid coordinate 1150, 725; and
- Monitoring well LF1MW-9 near survey grid coordinate 1082, 1150.

The presence of surficial metallic objects can affect the response of the magnetometer, depending upon the size and mass of the object. Results of the magnetic and GPR surveys are described in the following sections.

Magnetometer Survey Results

Several anomalous areas were identified in both the total earth's magnetic field and gradiometer data contour maps (see Figures C-1 and C-2). In most cases, the anomalies in the total earth's field measurements correlate well with the gradiometer measurements. Several of the anomalies detected are the result of surficial features (i.e., Building 853 and an associated UST, the shooting range pavilion and concrete tubes, monitoring wells LF1MW101 and LF1MW102, the railroad track segment, etc. However, there are approximately eight unexplained anomalies. GPR profiles were run over the strongest of these anomalies (see Figures C-1 and C-2 in Appendix C) to determine the presence of buried drums. The elongated east-west anomaly in the west-central portion of the grid appears to represent a disposal trench. The anomaly is located between survey grid coordinates 875, 425 and 875, 1050, and may potentially extend to 875, 1325 (see Figures 4.3-2 and C-1). GPR Profile 7 was run over most of this trench. This anomaly is similar in size and magnitude as three other trench anomalies detected during the RI Geophysical Survey. Small localized anomalies were detected at 975, 925 and 1125, 825. The source of these anomalies is unknown. GPR Profile 2 was run over one of these anomalies (i.e., the anomaly at 975, 925). Four other unknown anomalies were detected between survey grid coordinates 575, 1425 and 575, 1525; 700, 1400 and 625, 1475; 1000, 1450 and 925, 1550; and 1075, 1475 and 1075 and 1575 (see Figure 4.3-2). GPR Profile 3 was performed over the anomaly at 575, 1425 and 575, and 1525. GPR Profile 5 was performed over the anomaly at 700, 1400 and 625, 1475. Results of the GPR survey are discussed below.

GPR Survey Results

As previously stated, GPR profiles were performed over four of the eight of the magnetic anomalies detected (Profiles 2,3,5, and 7). The profiles were run over the four strongest magnetic anomalies. In addition, two test profiles were run over a known UST and associated underground piping (see Profiles 8 and 9, respectively, in Appendix C). The results of these profiles were used to verify the instrument responsiveness.

The following is a summary and depth of penetration of GPR profile results:

- GPR Profile 2 indicated no anomalous features.
- GPR Profile 3 indicated one strong reflector (less than 3 feet below ground surface) near survey grid coordinate 575, 1490. The source of this reflector is unknown.
- Profile 5 indicated no anomalous features.
- GPR Profile 7 indicated several anomalous features, but none of these features clearly represent buried drums. Based on the GPR results and visual results of Test Pit LF1TP-1, which was excavated in a nearby trench anomaly (see Section 4.3.4-1), the likelihood of drums in this trench is minimal.
- GPR Profile 8 indicates a typical UST reflection of less than 3 feet BGS.
- GPR Profile 9 indicates four pipes associated with UST-853 that are buried at a depth of less than 3 feet BGS.

In summary, only one strong GPR reflector was detected (at survey grid coordinate 575, 1490) in the GPR profiles (see Profile 3 in Appendix C). The source of this reflector is unknown.

4.3.5 SI Conclusions

Results of the RI field activities and baseline risk assessment indicated that chemicals of concern are present in surface soil, sediment, and groundwater at and near the site at levels that pose unacceptable risks to human health and the environment. Therefore, a FS was recommended to evaluate potential remedies for this site (Law Environmental 1996).

The identification of partially or fully exposed drums during the geophysical survey indicate that additional sampling and a removal action should be considered in addition to the FS recommendation. No drums were encountered during test pit excavations. Based on results of SI non-groundwater field activities, the RI recommendation for soil/sediment remains unchanged. Groundwater issues are discussed in the FS report (E & E 1998).

Table 4.3-1
LISTING OF SAMPLES TAKEN AND SKIPPED AT LANDFILL 1
GRIFFISS AFB SUPPLEMENTAL INVESTIGATION

11/5/97

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: %-Solid	Anions a	Anions b	COD	Cr6	Cryanide	Fingrprt	MRD	M.E.E.	Pest	PCB	pH	SVOC	TOC	VOC
Six Mile Creek (E) Landfill 1	SI	LF1DR-1	7/14/97	ASC	not	0.0 -	M	T	N1											X				X
	SI	LF1DR-1R	8/21/97	ASC	not	0.0 -	N	T	N1											X				
	SI	LF1DR1-NS1	7/17/97	ASC	Soil	0.0 -	M	T	N1	X			X	X				X	X	X	X	X	X	X
	SI	LF1TP-1 Z1		ASC	Soil	-	Y	S	N1	X			XX					X	X	X	X	X	X	X
	SI	LF1TP-1 Z2		ASC	Soil	-	Y	S	N1	X			XX					X	X	X	X	X	X	X
	SI	LF1TP-1 Z3		ASC	Soil	-	Y	S	N1	X			XX					X	X	X	X	X	X	X
	SI	LF1TP-2 Z1		ASC	Soil	-	Y	S	N1	X			XX					X	X	X	X	X	X	X
	SI	LF1TP-2 Z2		ASC	Soil	-	Y	S	N1	X			XX					X	X	X	X	X	X	X
	SI	LF1TP-2 Z3		ASC	Soil	-	Y	S	N1	X			XX					X	X	X	X	X	X	X
	SI-QA/QC	LF1TP-RB1		ASC	Eqpt. Washwater	-	Y	S	EB1				XX					X	X	X	X	X	X	X

Note: Depth is measured in feet.

Key:

* = existing monitoring well
Anions a = chloride, nitrate/nitrate, phosphate, sulfate
Anions b = sulfide
AOC = Area of Concern
ASC = E and E's Analytical Services Center
BOD = biological oxygen demand
COD = chemical oxygen demand
Cr6 = hexavalent chromium
EB1, EB2 = equipment rinsate
/D = duplicate sample
Eqpt = equipment
Fd = field
FD1 = field duplicate
Fingrprt = fingerprint analysis
FR1 = field replicate/split
GW = groundwater
N1 = original
NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
M.E.E. = methane, ethane and ethene
MRD = Missouri River Division laboratory
MS1 = matrix spike/matrix spike duplicate
/MSD = matrix spike/matrix spike duplicate
PCB = polychlorinated biphenyl
Pest = pesticide
QA/QC = quality assurance/quality control sample
QC = quality control
RB = rinsate blank
Rsmp = resample
/S = split sample
SI = Supplemental Investigation
SVOC = semivolatile organic compound
Stat = status (O = open; S = skipped; T = taken)
TOC = total organic carbon
TB = trip blank
TB1, TB2 = trip blank
TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
VOC = volatile organic compound
WP = sample in the work plan (Y= yes; N= no)

Table 4.3-2

ANALYTICAL DATA SUMMARY OF POSITIVE RESULTS FOR THE CRUSHED DRUM AND CONFIRMATION SOIL SAMPLES LANDFILL 1/SMALL ARMS RANGE AREA FORMER GRIFFISS AFB SI

Parameter / Sample ID: / Date Collected: / Matrix:	LF1DR-1 7/14/97 Drum Contents	LF1DR-1R 8/21/97 Drum Contents	LF1DR1-NS1 7/17/97 Soil
TCLP Volatiles (µg/kg)			
Methylene Chloride	NA	NA	1.3 J
TCLP Semivolatiles (µg/kg)			
Anthracene	NA	NA	50 J
Benzo(a)anthracene	NA	NA	220 J
Benzo(a)pyrene	NA	NA	150 J
Benzo(b)fluoranthene	NA	NA	300 J
Benzo(g,h,i)perylene	NA	NA	120 J
Carbazole	NA	NA	43 J
Chrysene	NA	NA	230 J
Dibenzo(a,h)anthracene	NA	NA	45 J
Fluoroanthene	NA	NA	410 J
Indeno(1,2,3-cd)pyrene	NA	NA	110 J
Phenanthrene	NA	NA	340 J
Pyrene	NA	NA	530
TCLP Pesticides/PCBs (µg/kg)			
PCB-1260	NA	NA	2,300
TCLP Metals (mg/kg)			
Aluminum	NA	NA	5,900
Arsenic	NA	NA	17
Barium	NA	NA	72
Beryllium	NA	NA	1.4
Cadmium	NA	NA	1.8
Calcium	NA	NA	21,000
Chromium (total)	NA	NA	78
Cobalt	NA	NA	5.9
Copper	NA	NA	35
Iron	NA	NA	27,000

Key at end of table.

Table 4.3-2

ANALYTICAL DATA SUMMARY OF POSITIVE RESULTS FOR THE CRUSHED DRUM AND CONFIRMATION SOIL SAMPLES LANDFILL 1/SMALL ARMS RANGE AREA FORMER GRIFFISS AFB SI

Parameter	Sample ID: / Date Collected: / Matrix:	LF1DR-1 7/14/97 Drum Contents	LF1DR-1R 8/21/97 Drum Contents	LF1DR1-NS1 7/17/97 Soil
Magnesium		NA	NA	1,200
Manganese		NA	NA	99
Mercury		NA	NA	0.6
Nickel		NA	NA	30
Potassium		NA	NA	970
Sodium		NA	NA	110
Vanadium		NA	NA	38
Zinc		NA	NA	66
Solids (%)		NA	NA	83
Flash Point		No flash at 140°F	NA	NA
pH		4.4	NA	NA
TCLP Metals (mg/L)				
Barium		1.5	NA	NA

Key:

J = Estimated concentration.
mg/kg = Milligrams/kilogram.
mg/L = Milligram/liter.
NA = Not applicable.
SI = Supplemental Investigation.
TCLP = Toxicity Characteristic Leaching Procedure.
µg/kg = Micrograms/kilogram.

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LEGEND

- RI MONITORING WELL DECOMMISSIONED DURING THE SUPPLEMENTAL INVESTIGATION
- EXISTING WELL
- HARDFILL/SMALL ARMS RANGE MONITORING WELL
- RI MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI LEACHATE SAMPLE
- RI SURFACE SOIL SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- INSTALLATION BOUNDARY
- LANDFILL 1 BOUNDARY
- 540 TOPOGRAPHIC CONTOUR LINE
- OE OVERHEAD ELECTRIC
- UE UNDERGROUND ELECTRIC
- W WATER LINE

N

SCALE IN FEET

0 250 500 750

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Figure 4.3-1
SUPPLEMENTAL INVESTIGATION
DECOMMISSIONED MONITORING WELL LOCATION MAP
LANDFILL 1

ecology and environment

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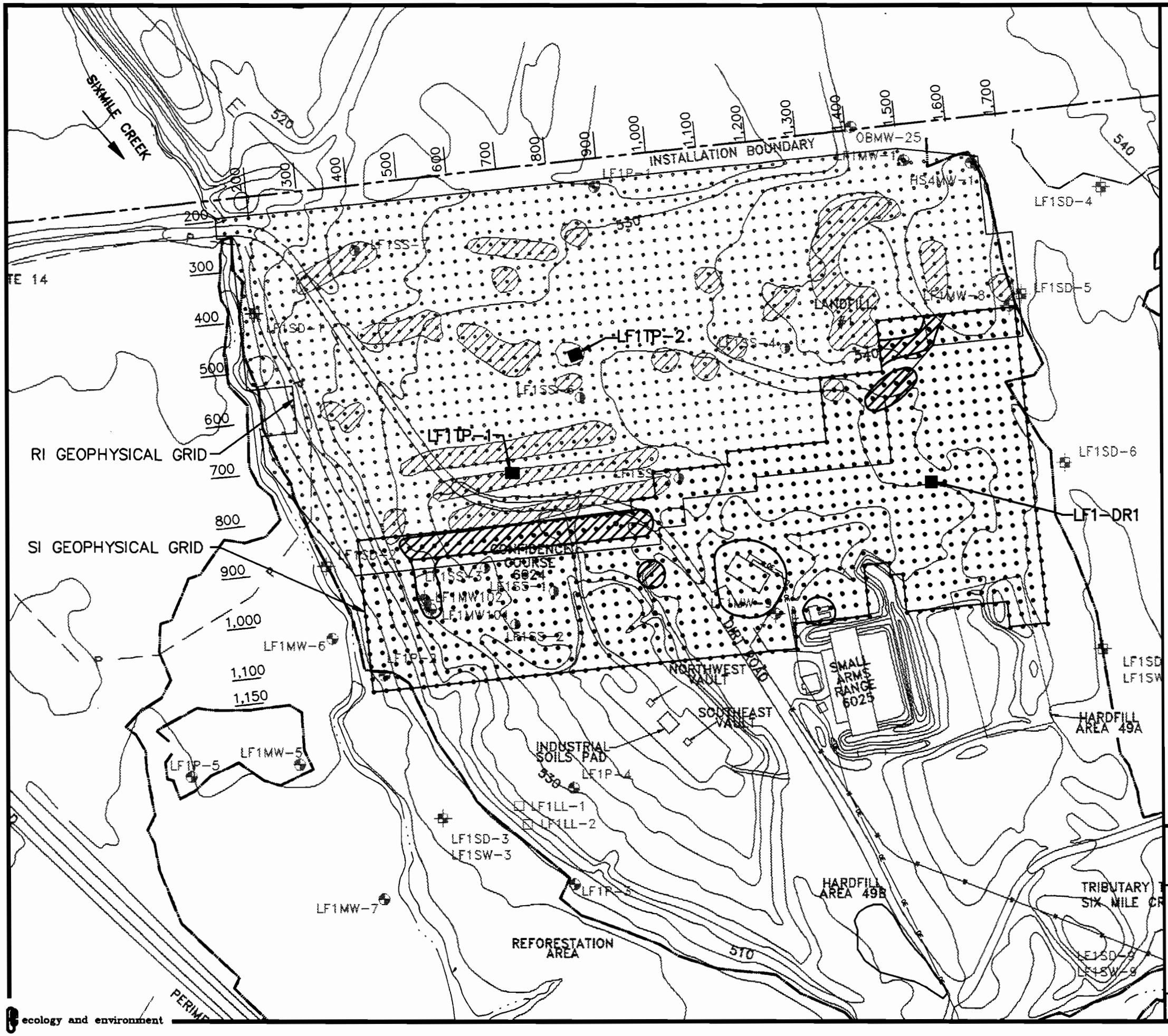

LEGEND

- SUPPLEMENTAL INVESTIGATION TEST PIT LOCATION
- STRONG RI MAGNETIC ANOMALY
- STRONG SI MAGNETIC ANOMALY
- RI MAGNETIC ANOMALY (ATTRIBUTED TO SURFACE FEATURES)
- SI MAGNETIC ANOMALY (ATTRIBUTED TO SURFACE FEATURES)
- RI MAGNETIC DATA POINT
- SI MAGNETIC DATA POINT
  NOTE: THERE IS A 75 FOOT OVERLAP BETWEEN TH RI GRID AND THE SI GRID
- EXISTING WELL
- RI MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI LEACHATE SAMPLE
- RI SURFACE SOIL SAMPLE
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- INSTALLATION BOUNDARY
- 540 TOPOGRAPHIC CONTOUR LINE
- OE OVERHEAD ELECTRIC
- UE UNDERGROUND ELECTRIC
- W WATER LINE

NOTE: THE LOCATIONS OF MAGNETIC ANOMALIES AND MAGNETIC DATA POINTS ARE APPROXIMATE.

(FT.) Y, (FT.) X
GEOPHYSICAL SURVEY GRID AXES ORIENTATION

N

SCALE IN FEET

0 250 500 750

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Figure 4.3-2
SUPPLEMENTAL INVESTIGATION GEOPHYSICAL SURVEY AND TEST PIT LOCATION MAP LANDFILL 1

ecology and environment

Plotted Date: 11/3/97

4.4 Landfills 2 and 3

4.4.1 Site Description

Landfills 2 and 3 (LF-2/3) are located on a topographic high east of Perimeter Road near the east-central boundary of the former base (see Figures 1-2A and 4.4-1). Landfill 2 was reportedly a permitted 13-acre disposal area that accepted solid waste from 1973 to 1982 (Law Environmental 1996). Because Landfill 3 is an asbestos disposal cell located within the boundary of Landfill 2, these two units are designated as a single AOC. The landfills are unlined, and three areas of Landfill 2 are capped. Landfill 2 received hardfill solid waste and on-board waste from overseas aircraft. Landfill 3 received approximately 1 ton of asbestos waste.

4.4.2 Remedial Investigation

The RI consisted of a geophysical survey; a passive soil gas survey at 43 locations; the analysis of three surface soil samples, seven surface water samples, 14 sediment samples, and one groundwater sample from an existing well; and the drilling and sampling of five monitoring wells. The geophysical survey identified the presence of three major linear features, and the anomalies within these features were consistent with trenches or pits backfilled with ash, cinders, or disseminated metallic debris. Buried metallic objects, which may represent hardfill, were determined to be present in the southern portion of the landfill. The strongest GPR reflection was located near grid coordinate 612.5,542. Other metallic objects were identified near grid coordinates 364,736 and 370,730 (see Figure 4.4-1). The soil gas samples contained several VOCs (acetone, ethylbenzene, and toluene). Surface soils contained polynuclear aromatic hydrocarbons (PAHs), copper, and arsenic at concentrations exceeding potential TBCs. Surface water contained PAHs, phthalates, pesticides, and metals at concentrations exceeding potential ARARs. Sediment contained PCBs and metals at concentrations exceeding potential TBCs. The groundwater contained VOCs, glycols, and metals at concentrations exceeding potential ARARs.

4.4.3 Supplemental Investigation

The SI at Landfills 2 and 3 consisted of the excavation of one test pit at both RI magnetic/GPR anomalous locations (RI approximate grid coordinates 612.5,400; 364,736)(see Figure 4.4-1). These anomalies were suspected to represent buried drums. The locations of these anomalies were identified in Volume 1 (Appendix B) of the draft final RI (Law Environ-

mental 1996). Although three samples per test pit were included in the SI work plan, samples were not collected because drums were not encountered.

4.4.4 SI Results

On July 15, 1997 test pits LF2/3TP-1 and LF2/3TP-2 were excavated at Landfills 2 and 3 at the two magnetic/GPR anomalous locations (Figure 4.4-1). The first test pit (LF2/3TP-1) was oriented in southwest-northeast direction and excavated to a maximum depth of 8 feet BGS. The lithology in the test pit consisted of weathered, medium brown silt, sand, and gravel with trace clay from 0 to 4 feet BGS and the same material but unweathered from 4 to 8 feet BGS. OVA readings and Explosimeter readings during excavation showed that LEL, H_2S and CO were all zero. Oxygen readings were in the normal range. Large concrete blocks (approximately 1'x 3'x 10") were encountered near the surface while larger blocks (approximately 3'x 2'x 2') of steel-reinforced concrete were found to a depth of 4 feet BGS. Native soil was reached at 4 feet BGS. An approximately 6-foot-long, 2.5-inch-diameter steel pipe and a steel vehicle tailgate (approximately 3.5 feet in length) were also found in the trench and are believed to be the cause of the strong geophysical anomalies. Neither drums nor other trash was found in the trench.

The second test pit (LF2/3TP-2) was oriented in a southwest to northeast direction and excavated to a maximum depth of 9 feet BGS. A gray-brown silt and clay with approximately 20% rounded gravel and cobbles was the only lithology observed in the trench. Very dense household trash was encountered at 3 inches BGS and extended to the base of the trench. The trash consisted of wood fragments and boards, pop cans, plastic bags and other plastic debris, paper, glass, and foam rubber pipe insulation. Water entered the southwest end of the test pit during excavation at a depth of 8 feet BGS. OVA readings during excavation ranged from 0 to 50 ppm and Explosimeter readings of 1% LEL, 20.9% O_2, 2 ppm H_2S and 12 ppm CO were recorded. No drums, large metallic objects, or other obvious causes of the reported anomalies were discovered.

4.4.5 SI Conclusions

Results of the RI field activities and baseline risk assessment indicated that chemicals of concern are present in surface soil in the vicinity of the former skeet range, and in the groundwater at and near the site that may pose unacceptable risk to human health and the environment. Therefore, a feasibility study to evaluate potential remedies was recommended for this site (Law Environmental 1996).

Drums were not encountered during test pit excavations. Based on SI non-groundwater activities, the RI recommendation for soils remains unchanged. Groundwater issues are discussed in Section 4.11 of this report.

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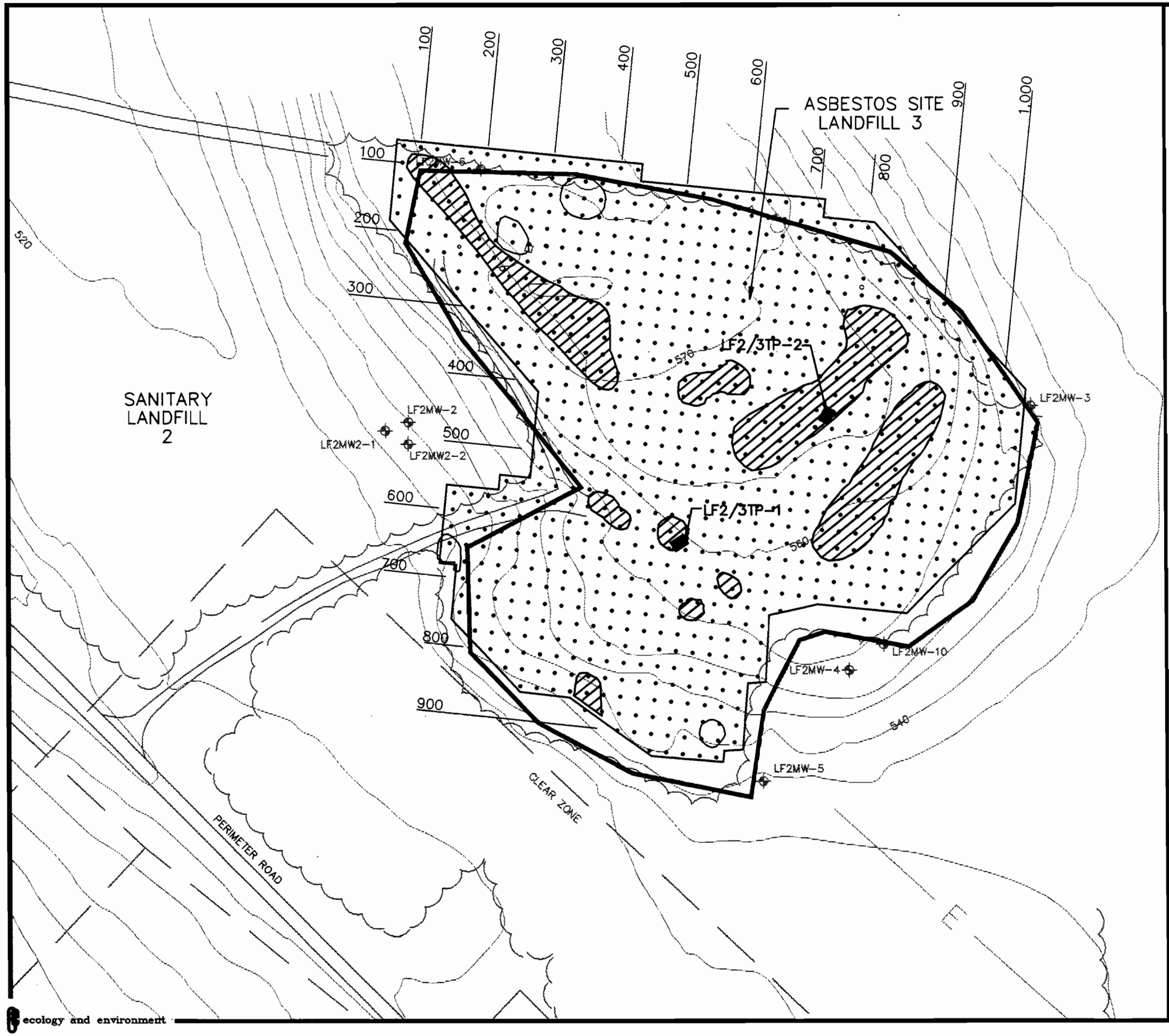

LEGEND

- SUPPLEMENTAL INVESTIGATION TEST PIT LOCATION
- STRONG RI MAGNETIC ANOMALY
- RI MAGNETIC ANOMALY, (ATTRIBUTED TO SURFACE FEATURES)
- RI MAGNETIC DATA POINT
- RI MONITORING WELL
- 515 — TOPOGRAPHIC CONTOUR LINE
- LANDFILL 2/3 BOUNDARY

NOTE: THE LOCATIONS OF MAGNETIC ANOMALIES AND MAGNETIC DATA POINTS ARE APPROXIMATE.

(FT.) Y
(FT.) X

GEOPHYSICAL SURVEY GRID AXES ORIENTATION

N

SCALE IN FEET

0 150 300 450

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.4-1
SUPPLEMENTAL INVESTIGATION
TEST PIT LOCATION MAP
LANDFILLS 2 AND 3

ecology and environment

4.5 Landfill 5

4.5.1 Site Description

Landfill 5 (LF-5) is located in the south-central portion of the former base, south of Patrick Square, immediately southwest of the unpaved access road and east of Threemile Creek (see Figures 1-2B and 4.5-1). Landfill 5 is an unlined, uncapped 4-acre landfill partially on the floodplain of Threemile Creek. It operated for one year following the abandonment of Landfill 6 in 1959. Landfill 5 reportedly contains municipal wastes that were burned and covered.

4.5.2 Remedial Investigation

The RI consisted of a geophysical survey; a passive soil gas survey at 26 locations; the installation of three monitoring wells; and the collection of three surface soil samples, 12 sediment samples, and groundwater samples from the three new wells and one existing well. The geophysical survey indicated the presence of numerous near-surface ferromagnetic materials. The soil gas survey indicated the presence of VOCs in all but four sample locations. Chloromethane was widespread across the site; acetone and butanone were prevalent in the southern area; fuel constituents were detected at 12 locations; and isolated occurrences of chlorinated solvents were also detected. Surface soil samples contained PAHs, dieldrin, and several metals at concentrations exceeding potential TBCs, and PCB-1254 concentrations exceeding NYSDEC cleanup goals. Sediment samples collected from the drainage ditch contained chemicals not found in the surface soils or sediments at other areas in the vicinity of the landfill. Of these chemicals, PAHs and metals were detected at concentrations exceeding potential ARARs, and PCB-1260 was detected at concentrations exceeding NYSDEC cleanup goals. Storm water from the base discharges to the ditch. Pond sediments contained PAHs and metals at concentrations above potential ARARs. Groundwater samples contained carbon tetrachloride at a concentration exceeding the NYSDEC standard; and PCBs, metals, and glycols at concentrations exceeding potential ARARs.

4.5.3 Supplemental Investigation

The SI at Landfill 5 consisted of the excavation of three test pits (LF5TP-1, LF5-TP-2, and LF5TP-3); the collection of one leachate sample (LF5WL-1) and three near-surface soil samples (LF5NS-1, LF5NS-2, and LF5NS-3); and the installation and sampling of one monitoring well (LF5MW-4) (see Table 4.5-1, Figures 4.5-1 and 4.5-2). Because monitoring well installation and sampling were performed as part of the On-Base Groundwater SI, it will

be discussed under Section 4.11 in this report. A list of samples, analyses, and required QC samples collected at this site is provided in Table 4.5-1.

Because there were no specific grid coordinates cited in the RI as potential drum locations, test pit excavations were performed at the location of the three strongest RI geophysical anomalies (see Figure 4.5-2). The locations of LF5TP-1, LF5TP-2, and LF5TP-3 are at grid coordinates 200,225; 415,260, and 637,375, respectively. Although three samples per test pit were included in the SI work plan, samples were not collected because drums were not encountered.

4.5.4 SI Results

4.5.4.1 Test Pit Excavations

On July 16, 1997, test pits LF5TP-1, LF5TP-2 and LF5TP-3 were excavated at Landfill 5 at the three strongest RI magnetic/GPR anomalous locations (see Figure 4.5-2). The lithology in test pit LF5TP-1 consisted of: gray-brown silt with some sand and traces of clay, gravel, and cobbles from 0 to 1 foot BGS; brown silt with some sand, gravel and cobbles and scattered debris (mostly steel) throughout from 1 to 8 feet BGS; and brown silt with some sand, gravel, and cobbles from 8 to 10 feet BGS. Construction debris was encountered at 1 foot BGS and consisted of 6-inch-thick concrete slabs, several 2-inch ID steel pipes, metal sheeting, strips of metal, bricks, electrical wires, and some lumber. The metal debris encountered is believed to be the cause of the geophysical anomaly. No OVA or Explosimeter readings above action levels were observed, and no drums were encountered.

The lithology in test pit LF5TP-2 consisted of tan very fine sand with approximately 25% rounded gravel and cobbles and trace silt from 0 to 2 feet BGS; and medium brown very fine to medium sand with silt, coarse sand, gravel and cobbles from 2 to 10 BGS. Debris encountered from 2 to 10 feet BGS consisted of concrete, asphalt, 8-foot wood fragments, 2-inch-diameter steel pipe, several steel plates and sheets, steel angle iron, steel straps, wiring, and 2- to 3.5-foot-long sections of 18-inch-diameter trees. The metal debris is believed to be the cause of the geophysical anomaly. No OVA or Explosimeters readings above action levels were observed, and no drums were encountered.

Test pit LF5TP-3 revealed sand loam with very fine to medium sand and gravel and cobbles from 0 to 2 feet BGS, a brown organic layer (peat like) from 2.5 to 3 feet BGS, and gray moderate to high plasticity clay representing native undisturbed soils from 3 to 5 feet BGS. The trench was discontinued at 5 feet BGS. Debris was encountered from 0 and 2.5

BGS including one 3-inch-wide, 12-foot-long steel beam, some bricks, and wood. No drums were encountered. Although OVA readings in the trench were up to 200 ppm, they are believed to be methane. No other readings were detected above action levels. The steel beam is believed to be the cause of the geophysical anomaly.

4.5.4.2 Near-Surface Soil

Three near surface soil grab samples (LF5NS-1, LF5NS-2 and LF5NS-3) were collected from Landfill 5 on June 10, 1997 (see Figure 4.5-1). Sample LF5NS-1 revealed the presence of two pesticides (chlordane and dieldrin) and four PAHs at concentrations slightly higher than the screening criteria (see Figure 4.5-3 and Table 4.5-4). Sample LF5NS-2 contained concentrations of heptachlor epoxide of almost five times greater than the screening criteria as well as eight PAHs at relatively high concentrations. Sample LF5NS-3 also contained dieldrin, the same four PAHs detected in sample LF5NS-1 and benzo(b)fluoranthene at levels above the screening criteria. Arsenic, lead, and mercury were detected at concentrations slightly higher than the screening criteria in all samples. Slightly elevated levels of zinc were detected in two samples, cadmium and calcium were detected in sample LF5NS-2 and beryllium in LF5NS-3. A complete summary of the positive results from near surface soil analysis is provided in Table 4.5-2, and a summary of those exceeding the screening criteria are provided in Table 4.5-4. Results of these samples will be used in FS evaluations.

4.5.4.3 Leachate

One leachate/seep sample (LF5WL-1) was collected on June 12, 1997, from an intermittent pond immediately adjacent to the southeast side of Landfill 5 (Figure 4.5-1). A second sample was collected from the same locality on July 30, 1997 because of laboratory problems with the initial sample, and reanalyzed for semivolatiles. The only substances detected at concentrations exceeding the screening criteria were iron and manganese at 20 times and twice their respective screening criteria (see Tables 4.5-3 and 4.5-5). Anion, biological oxygen demand (BOD), chemical oxygen demand (COD), hardness, and pH results provided in Table 4.5-3 will be discussed in the FS.

4.5.5 SI Conclusions

Results of the RI field activities and baseline risk assessment indicated that chemicals of concern are in the groundwater, surface soil, and sediments at and near the site that pose an

unacceptable risk to human health and the environment. Therefore, an FS was recommended to evaluate remedial alternatives for the site (Law Environmental 1996).

Based on results of the SI nongroundwater field activities (i.e, no durms were encountered during test pit excavations; near-surface soil contained pesticides, PAHs, and some metals above screening criteria; and the ponded water south of the landfill is unaffected), the RI recommendation for soils/sediments remains unchanged. Groundwater issues are discussed in Section 4.11 of this report.

Table 4.5-1
LISTING OF SAMPLES TAKEN AND SKIPPED AT LANDFILL 5

Griffiss AFB - Supplment Invstgtn

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-FdNAa	-FdVOC	Anlonsa	Anlonsb	BOD	COD	Cr6	Cyanlde	Flngrpt	Hardnes	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Three Mile Creek (E) Landfill 5	SI	LF5TP-1 Z2		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI-QA/QC	LF5TP-1 Z2/D		ASC	Soil	-	Y	S	FD1	X							X	X				X		X			X			X
	SI-QA/QC	LF5TP-1 Z2/S		MRD	Soil	-	Y	S	FR1	X							X	X				X		X			X			X
	SI	LF5TP-1 Z3		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF5TP-2 Z1		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF5TP-2 Z2		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF5TP-2 Z3		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF5TP-3 Z1		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF5TP-3 Z2		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF5TP-3 Z3		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI-QA/QC	LF5TP-RB1		ASC	Eqpt. Washwater	-	Y	S	EB1								X	X				X		X			X			X
	SI	LF5TP-1 Z1		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF5NS-1	6/10/97	ASC	Soil	0 - 2	Y	T	N1	X								X				X		X			X			X
	SI-QA/QC	LF5NS-1 /MSD	6/10/97	ASC	Soil/QC Matrix	0 - 2	Y	T	MS1	X							X	X				X		X			X			X
	SI	LF5NS-2	6/10/97	ASC	Soil	0 - 2	Y	T	N1	X								X				X		X			X			X
	SI	LF5NS-3	6/10/97	ASC	Soil	0 - 2	Y	T	N1	X								X				X		X			X			X
	SI-QA/QC	LF5NS-3 /D	6/10/97	ASC	Soil	0 - 2	Y	T	FD1	X								X				X		X			X			X
	SI-QA/QC	LF5NS-3 /S	6/10/97	MRD	Soil	0 - 2	Y	T	FR1	X							X	X				X		X			X			X
	SI-QA/QC	LF5NS-RB1	6/10/97	ASC	Eqpt. Washwater	-	Y	T	N1									X				X		X			X			X
	SI	LF5WL-1	6/12/97	ASC	Leachate	0 - 0	Y	T	N1				X		X	X	X	X		X		X			X			X	X	
	SI-QA/QC	LF5WL-1 /MSD	6/12/97	ASC	Water/QC Matrix	0 - 0	Y	T	MS1				X		X	X	X	X		X		X		X	X	X		X	X	
	SI---Rsmp	LF5NS-1	7/30/97	ASC	Soil	0 - 2	N	T	N1	X							X													
	SI---Rsmp	LF5NS-2	7/30/97	ASC	Soil	0 - 2	N	T	N1	X							X													
	SI---Rsmp	LF5NS-3	7/30/97	ASC	Soil	0 - 2	N	T	N1	X							X													
	SI-QA/QC-Rsmp	LF5NS-3 /D	7/30/97	ASC	Soil	0 - 2	N	T	FD1	X							X													
	SI-QA/QC-Rsmp	LF5NS-RB1	7/30/97	ASC	Eqpt. Washwater	-	N	T	N1								X													
	SI---Rsmp	LF5WL-1	7/30/97	ASC	Leachate	0 - 0	N	T	N1															X		X				

Table 4.5-1
LISTING OF SAMPLES TAKEN AND SKIPPED AT LANDFILL 5 (cont.)

Griffiss AFB - Supplment Invstgtn

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: % Solids	Field Anals	Anions a	BOD	COD	Cr6	Cyanide	Fingrprt	Hard.	M.E.E.	Metals	PCB 525	PCB Pest	pH	SVOC 525	TOC	VOC 524	VOCs

Note: Depth is measured in feet.

Key:

- * = existing monitoring well
- Anions a = chloride, nitrate/nitrate, phosphate, sulfate
- Anions b = sulfide
- AOC = Area of Concern
- ASC = E and E's Analytical Services Center
- BOD = biological oxygen demand
- COD = chemical oxygen demand
- Cr6 = hexavalent chromium
- EB1, EB2 = equipment rinsate
- /D = duplicate sample
- Eqpt = equipment
- Fd = field
- FD1 = field duplicate
- Fingrprt = fingerprint analysis
- FR1 = field replicate/split
- GW = groundwater
- N1 = original
- NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
- M.E.E. = methane, ethane and ethene
- MRD = Missouri River Division laboratory
- MS1 = matrix spike/matrix spike duplicate
- /MSD = matrix spike/matrix spike duplicate
- PCB = polychlorinated biphenyl
- Pest = pesticide
- QA/QC = quality assurance/quality control sample
- QC = quality control
- RB = rinsate blank
- Rsmp = resample
- /S = split sample
- SI = Supplemental Investigation
- SVOC = semivolatile organic compound
- Stat = status (O = open; S = skipped; T = taken)
- TOC = total organic carbon
- TB = trip blank
- TB1, TB2 = trip blank
- TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
- VOC = volatile organic compound
- WP = sample in the work plan (Y= yes; N= no)

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR THE NEAR SURFACE SOIL SAMPLES FROM LANDFILL 5 FORMER GIRFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	LF5NS-1	LF5NS-2	LF5NS-3	LF5NS-3 /D
Sample Date:	6/10/97	6/10/97	6/10/97	6/10/97
Sample Depth (ft):	0 - 2	0 - 2	0 - 2	0 - 2
%Moisture (160.3) (%)				
Moisture	13	14	24	25
Pesticides/PCBs (8081) (µg/kg)				
4,4-DDD	58	46 U	6.6 J	11 J
4,4-DDE	49	49 J	30	31
4,4-DDT	180	50 J	23 J	24 J
Aldrin	5.7 U	23 J	4.0	4.0
Chlordane	82	27 J	29	28
Dieldrin	350	46 U	61	57
Heptachlor epoxide	5.7 U	93 J	11	12
Semivolatiles (8270B) (ug/kg)				
Acenaphthene	750 U	3,900	97 J	140 J
Anthracene	82 J	15,000	470	480
Benzo(a)anthracene	480 J	53,000	2,800 J	2,300 J
Benzo(a)pyrene	590 J	50,000 J	2,600 J	2,400 J
Benzo(b)fluoranthene	1,100 J	75,000 J	4,900	3,600
Benzo(ghi)perylene	1,100 J	23,000 J	1,200 J	1,100 J
Benzo(k)fluoranthene	750 U J	39,000 J	440 U J	440 U J
bis(2-Ethylhexyl)phthalate	300 J	3,800 U J	65 J	70 J
Carbazole	750 U	3,000 J	130 J	250 J
Chrysene	530 J	52,000	2,600 J	2,300 J
Di-n-butyl-phthalate	84 J	3,800 U	440 U	440 U
Dibenzo(a,h)anthracene	200 J	4,500 J	650 J	660 J
Dibenzofuran	750 U	1,500 J	46 J	84 J
Fluoranthene	710 J	90,000	3,100	3,200
Fluorene	750 U	5,500	140 J	230 J
Indeno(1,2,3-cd)pyrene	390 J	21,000 J	1,200 J	1,100 J
Phenanthrene	430 J	48,000	1,800	1,900
Pyrene	1,100 J	110,000	4,900	5,100

☐ = Result exceeds screening criteria

key at end of table

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR THE NEAR SURFACE SOIL SAMPLES FROM LANDFILL 5 FORMER GIRFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	LF5NS-1	LF5NS-2	LF5NS-3	LF5NS-3 /D
Sample Date:	6/10/97	6/10/97	6/10/97	6/10/97
Sample Depth (ft):	0 - 2	0 - 2	0 - 2	0 - 2
TAL Metals (6010) (mg/kg)				
Aluminum	8,200	7,000	9,500	8,400
Antimony	0.35	0.96	0.81	0.77
Arsenic	4.7	5.6	17	17
Barium	150 J	40 J	91 J	82 J
Beryllium	0.57 U	0.58 U	1.1	0.99
Cadmium	0.57 U	2.4	0.66 U	0.66 U
Calcium	20,000 J	37,000 J	7,200 J	18,000 J
Chromium (total)	18	14	14	12
Cobalt	5.3	5.7	10	8.4
Copper	27	29	31	29
Iron	16,000	13,000	19,000	17,000
Lead	110 J	78 J	53 J	48 J
Magnesium	2,900	4,200	1,900	2,100
Manganese	640	370	700	560
Mercury (solid)	0.14	0.14	0.16	0.28
Nickel	14	11	22	19
Potassium	1,000	760	1,000	940
Selenium	0.57 U	1.1	1.3	1.3
Sodium	84	90	80	98
Thallium	0.23 U	0.23 U	0.35	0.36
Vanadium	18	17	25	24
Zinc	130 J	210 J	89 J	72 J

Key:

– = Samples not analyzed for this parameter
/D = Duplicate sample
J = Estimated concentration
mg/kg = Milligrams per kilogram
ug/kg = Micrograms per kilogram
UJ = Undetected; estmated detection limit reported

☐ = Result exceeds screening criteria

Table 4.5-3

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR LEACHATE SAMPLES FROM LANDFILL 5 FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	LF5WL-1		LF5WL-1	
Sample Date:	6/12/97		7/30/97	
Sample Depth (ft):	0 - 0		0 - 0	
Anions				
(300) (mg/L)				
Chloride	2.0		--	
Sulfate	5.9		--	
BOD				
(5210) (mg/L)				
Biological Oxygen Demand	27	J	--	
COD				
(410.2) (mg/L)				
Chemical Oxygen Demand	130		--	
Hardness				
(130.2) (mg/L CaCO3)				
Hardness	180		--	
pH				
(150.1) (S.U.)				
pH	6.7		--	
Semivolatiles				
(525.2) (ug/L)				
bis(2-Ethylhexyl)phthalate	--		75	R
Butylbenzylphthalate	--		0.62	J
di-n-Butylphthalate	--		0.42	J
TAL Metals				
(6010) (ug/L)				
Aluminum	500		--	
Barium	75		--	
Calcium	44,000		--	
Copper	25		--	
Iron	12,000		--	
Lead	11		--	
Magnesium	3,500		--	

☐ = Result exceeds screening criteria

key at end of table

Table 4.5-3 (cont.)

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR LEACHATE SAMPLES FROM LANDFILL 5 FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	LF5WL-1		LF5WL-1
Sample Date:	6/12/97		7/30/97
Sample Depth (ft):	0 - 0		0 - 0
TAL Metals (6010) (ug/L)			
Manganese	1,200		--
Potassium	6,700		--
Sodium	1,700		--
Zinc	97		--
TOC (9060) (mg/L)			
Total organic carbon	55		--
Volatiles (524.2) (ug/L)			
Toluene	5.5	J	--

Key:

– = Samples not analyzed for this parameter
/D = Duplicate sample
J = Estimated concentration
mg/L = Milligrams per liter
ug/L = Micrograms per liter
UJ = Undetected; Estimated detection limit reported

= Result exceeds screening criteria

Table 4.5-4

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR NEAR SURFACE SOIL SAMPLES, LANDFILL 5 SUPPLEMENTAL INVESTIGATION, FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criteria
Pesticides/PCBs (µg/kg)				
4,4-DDD	3/4	6.6 J - 58	0	2,900
4,4-DDE	4/4	30 - 49	0	2,000
4,4-DDT	4/4	23-180	0	2,000
Aldrin	3/4	4.0 - 23 J	0	41
Chlordane	4/4	27 J - 82	1	40
Dieldrin	3/4	61 - 350	3	40
Heptachlor epoxide	3/4	11 - 93	1	20
Semivolatiles (µg/kg)				
Acenaphthene	3/4	97 J - 3,900	0	5,000
Anthracene	4/4	82 J - 15,000	0	50,000
Benzo(a)anthracene	4/4	480 J - 53,000	4	224
Benzo(a)pyrene	4/4	590 J - 50,000 J	4	61
Benzo(b)fluoranthene	4/4	1,100 J - 75,000 J	3	1,100
Benzo(g,h,i)perylene	4/4	1,100 J - 23,000 J	0	50,000
Benzo(k)fluoranthene	1/4	39,000 J	1	1,100
bis(2-Ethylhexyl)phthalate	3/4	65 J - 300 J	0	50,000
Carbazole	3/4	130 J - 3,000 J	0	290,000
Chrysene	4/4	530 J - 52,000	4	400
Di-n-butyl-phthalate	1/4	84 J	0	8100
Dibenzo(a,h)anthracene	4/4	200 J - 4,500 J	4	14
Dibenzofuran	3/4	46 J - 1,500 J	0	6,200
Fluoranthene	4/4	710 J - 90,000	1	50,000
Fluorene	3/4	140 J - 5,500	0	50,000
Ideno (1,2,3-cd)pyrene	4/4	390 J - 21,000 J	0	32,000
Phenanthrene	4/4	430 J - 48,000	0	50,000
Pyrene	4/4	1,100 J - 110,000	1	50,000

Key at end of table.

Table 4.5-4

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR NEAR SURFACE SOIL SAMPLES, LANDFILL 5 SUPPLEMENTAL INVESTIGATION, FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criteria
TAL Metals (mg/kg)				
Aluminum	4/4	8,200 - 9,500	0	18,306
Antimony	4/4	0.35 - 0.96	0	3.4
Arsenic	4/4	4.7 - 17	4	3.3
Barium	4/4	40 J - 150 J	0	300
Beryllium	2/4	0.99 - 1.1	2	0.65
Cadmium	1/4	2.4	1	1.0
Calcium	4/4	7,200 J - 37,000 J	1	23,821
Chromium (total)	4/4	12 - 18	0	22.6
Cobalt	4/4	5.3 - 10	0	30
Copper	4/4	27 - 31	0	43
Iron	4/4	13,000 - 19,000	0	47,350
Lead	4/4	48 J - 110 J	4	36.2
Magnesium	4/4	1,900 - 4,200	0	7,175
Manganese	4/4	370 - 700	0	2,106
Mercury (solid)	4/4	0.14 - 0.28	4	0.1
Nickel	4/4	11 - 22	0	46
Potassium	4/4	760 - 1,000	0	1,993
Selenium	3/4	1.1 - 1.3	0	2.0
Sodium	4/4	80 - 98	0	259
Thallium	2/4	0.35 - 0.36	0	0.9
Vanadium	4/4	17 - 25	0	150
Zinc	4/4	72 J - 210 J	2	120

Key:

ARAR = Applicable or Relevant and Appropriate Requirement.
J = estimated concentration.
mg/L = milligrams per liter.
NA = Not available or not applicable.
TBC = To be considered criteria.
μg/kg = micrograms per kilogram.
μg/L = micrograms per liter.

Table 4.5-5

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCS FOR LEACHATE SAMPLE LANDFILL 5 SUPPLEMENTAL INVESTIGATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criteria
Semivolatiles (μg/L)				
bis(2-Ethylhexyl)phthalate	1/1	75 R	0	4,200
Butylbenzylphthalate	1/1	0.62 J	—	NA
di-n-Butylphthalate	1/1	0.42 J	—	NA
TAL Metals (μg/L)				
Aluminum	1/1	500	0	2,000
Barium	1/1	75	0	2,000
Calcium	1/1	44,000	—	NA
Copper	1/1	25	0	1,000
Iron	1/1	12,000	1	600
Lead	1/1	11	0	50
Magnesium	1/1	3,500	—	NA
Manganese	1/1	1,200	1	600
Potassium	1/1	6,700	—	NA
Sodium	1/1	1,700	—	NA
Zinc	1/1	97	0	5,000
Volatiles (μg/L)				
Toluene	1/1	5.5 J	—	NA

Key:

ARAR = Applicable or Relevant and Appropriate Requirement.
J = Estimated concentration.
NA = Not available or not applicable.
R = Rejected/unusable.
TBC = To be considered.
μg/L = Micrograms per liter.

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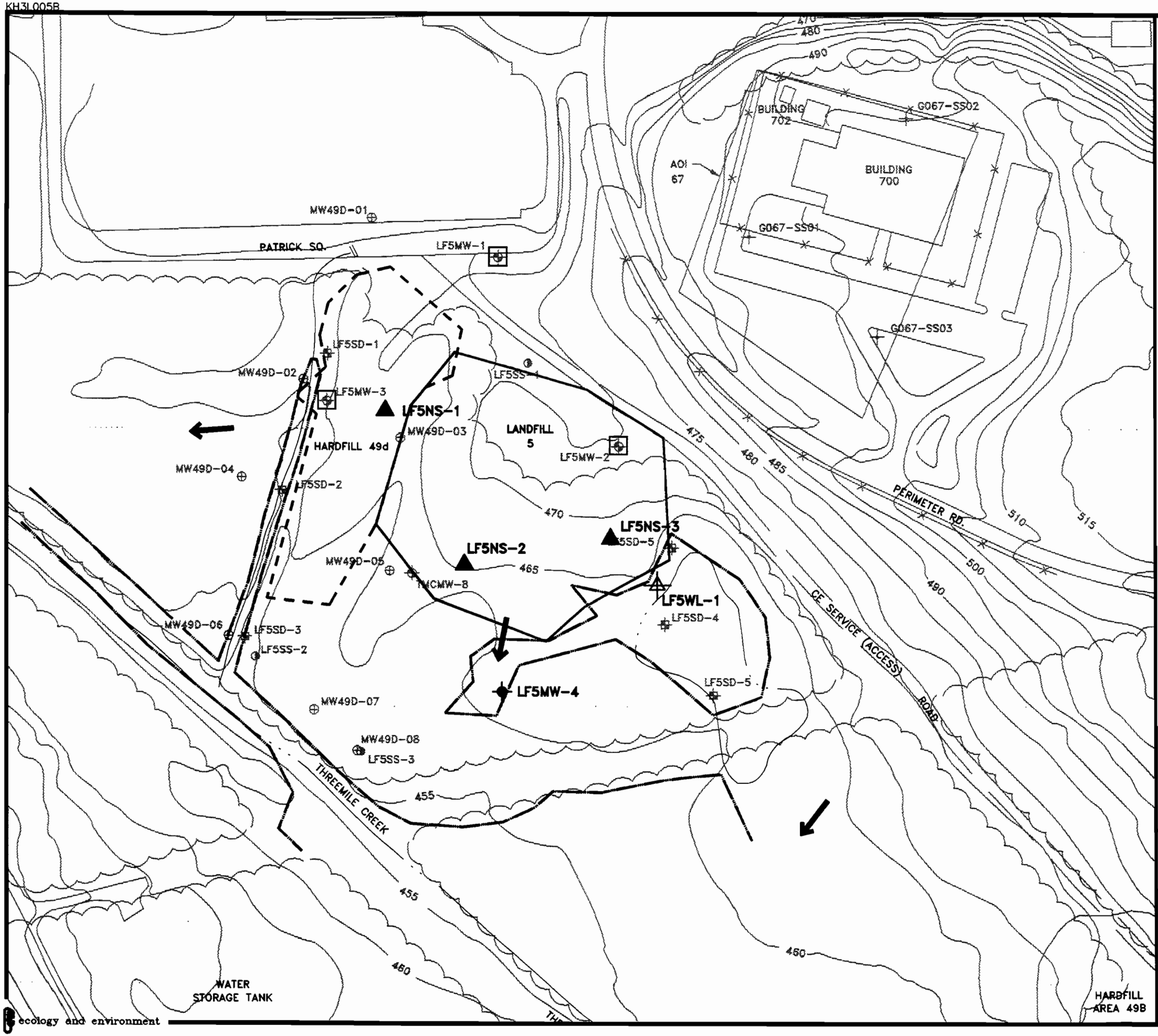

ecology and environment

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATIONS
- SUPPLEMENTAL INVESTIGATION NEAR-SURFACE SOIL SAMPLE
- SUPPLEMENTAL INVESTIGATION LEACHATE SAMPLE
- GROUP III AOI BORING/TEMPORARY MONITORING WELL LOCATION
- RI MONITORING WELL
- HARDFILL 49D MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- 515 TOPOGRAPHIC CONTOUR LINE
- HARDFILL 49d BOUNDARY
- LANDFILL 5 BOUNDARY

N

SCALE IN FEET

0 150 300 450

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.5-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
LANDFILL 5

BUFF plotted:07/16/98 REB

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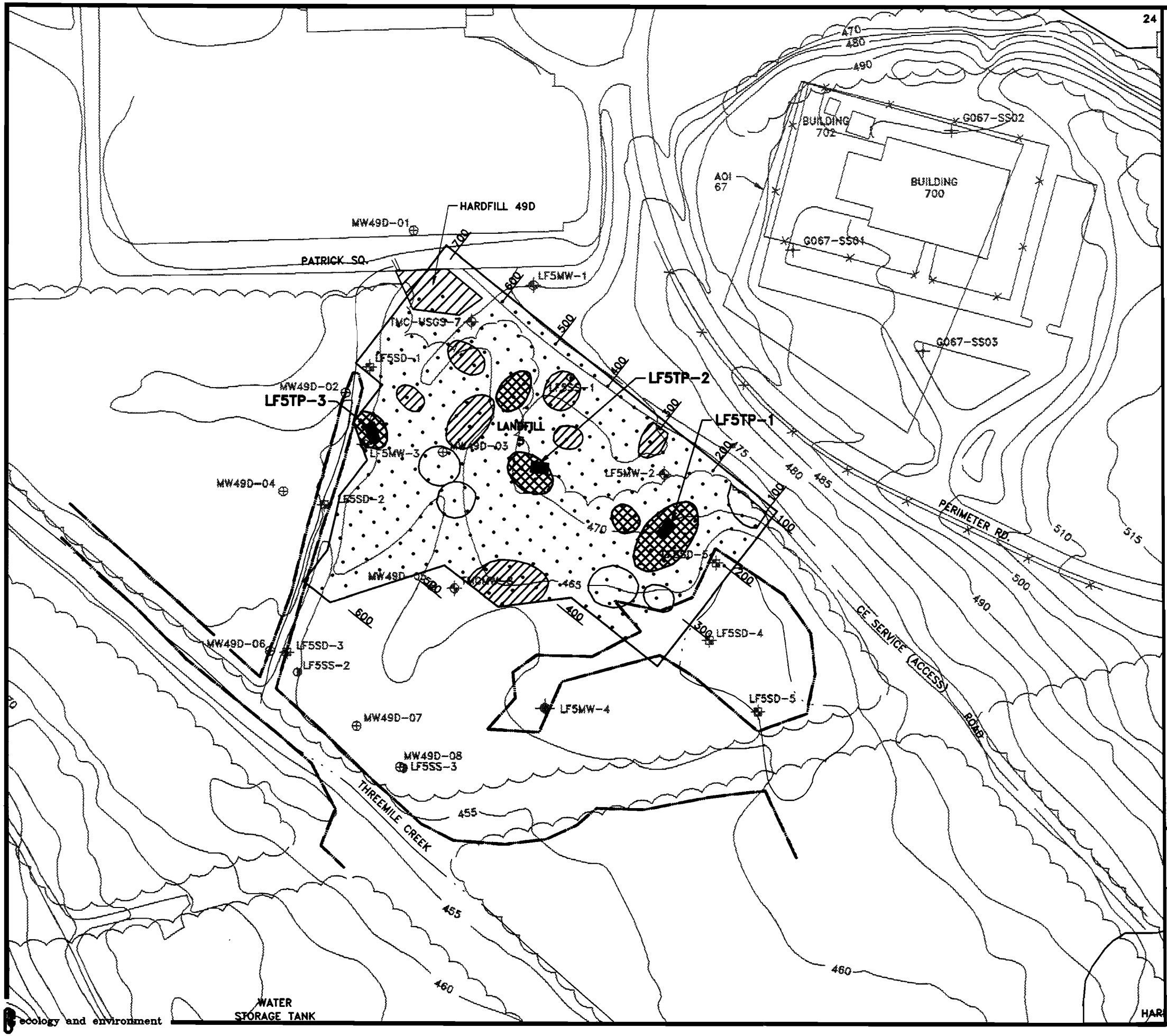


LEGEND

- SUPPLEMENTAL INVESTIGATION TEST PIT LOCATION
- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- STRONG RI MAGNETIC ANOMALY
- RI MAGNETIC ANOMALY
- RI MAGNETIC ANOMALY, (ATTRIBUTED TO SURFACE FEATURES)
- RI MAGNETIC DATA POINT
- RI MONITORING WELL
- HARDFILL 49D MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- FENCE
- JURISTICIONAL WETLANDS BOUNDARY
- 515 TOPOGRAPHIC CONTOUR LINE

NOTE: THE LOCATION OF MAGNETIC ANOMILIES AND MAGNETIC DATA POINTS ARE APPROXIMATE.

X (FT.)
Y (FT.)

GEOPHYSICAL SURVEY GRID AXES ORIENTATION

N

SCALE IN FEET

0 150 300 450

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.5-2
SUPPLEMENTAL INVESTIGATION
TEST PIT LOCATION MAP
LANDFILL 5

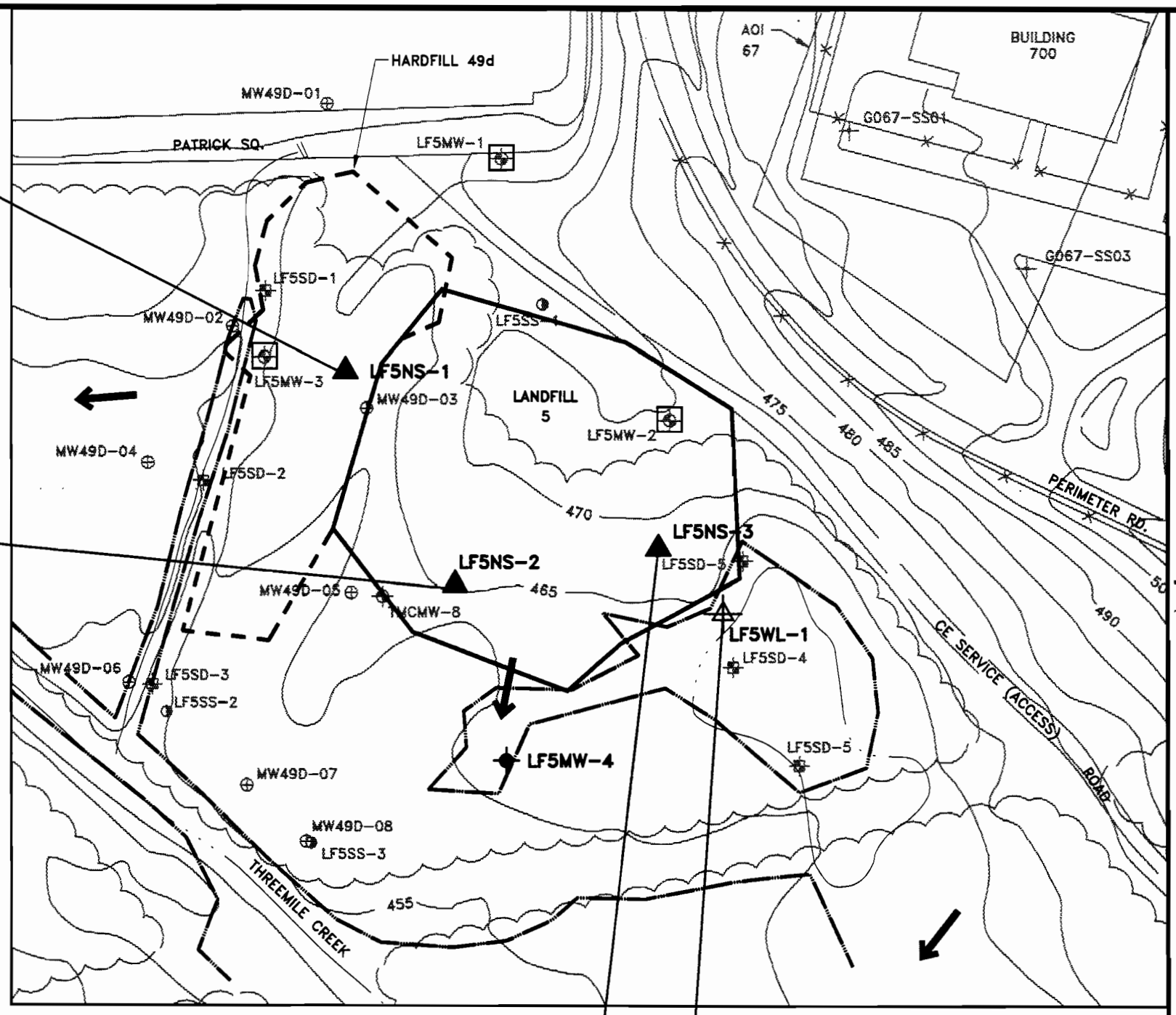
ecology and environment

Plotted Buff:10/13/97

KH3S516B

LF5NS-1	(µg/kg)
Organic Parameter	SI
Chlordane	82
Dieldrin	350
Benzo (a) anthracene	480J
Benzo (a) pyrene	590J
Chrysene	530J
Dibenzo (a,h) anthracene	200J
	(mg/kg)
Inorganic Parameter	SI
Arsenic	4.7
Lead	110J
Mercury (solid)	0.14
Zinc	130J

LF5NS-2	(µg/kg)
Organic Parameter	SI
Heptachlor epoxide	93J
Benzo (a) anthracene	53,000
Benzo (a) pyrene	50,000J
Benzo (b) fluoranthene	75,000J
Benzo (k) fluoranthene	39,000J
Chrysene	52,000
Dibenzo (a,h) anthracene	4,500J
Fluoranthene	90,000
Pyrene	110,000
	(mg/kg)
Inorganic Parameter	SI
Arsenic	5.6
Cadmium	2.4
Calcium	37,000J
Lead	78J
Mercury (solid)	0.14
Zinc	210J



LF5NS-3	(µg/kg)
Organic Parameter	SI
Dieldrin	61
Benzo (a) anthracene	2,800J
Benzo (a) pyrene	2,600J
Benzo (b) fluoranthene	4,900
Chrysene	2,600J
Dibenzo (a,h) anthracene	660J(d)
	(mg/kg)
Inorganic Parameter	SI
Arsenic	17
Beryllium	1.1
Lead	53J
Mercury (solid)	0.28(d)

LF5WL-1	(µg/L)
Inorganic Parameter	SI
Iron	12,000
Maganese	1,200

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATIONS
- SUPPLEMENTAL INVESTIGATION NEAR-SURFACE SOIL SAMPLE
- SUPPLEMENTAL INVESTIGATION LEACHATE SAMPLE
- GROUP III AOI BORING/TEMPORARY MONITORING WELL LOCATION
- RI MONITORING WELL
- HARDFILL 49D MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- HARDFILL 49d BOUNDARY
- LANDFILL 5 BOUNDARY
- 515 TOPOGRAPHIC CONTOUR LINE
- J ESTIMATED CONCENTRATION
- (d) RESULT FROM DUPLICATE SAMPLE

NOTE: RESULT EXCEEDS POTENTIAL ARAR OR TBC UNLESS OTHERWISE NOTED.

N

SCALE IN FEET

0 150 300 450

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.5-3
SUPPLEMENTAL INVESTIGATION SELECTED SOIL AND LEACHATE SAMPLE RESULT MAP LANDFILL 5

ecology and environment

BUFF plotted: 07/15/98 REB

4.6 Landfill 6

4.6.1 Site Description

Landfill 6 (LF-6) is located near the south-central parts of the former base, on the north side of the unpaved access road, southwest of Perimeter Road and Strategic Air Command (SAC) Hill (see Figures 1-2B and 4.6-1). Landfill 6 is an unlined, 8-acre landfill that received from 38,000 to 62,000 cubic yards of hardfill and general refuse, some of which was burned from 1955 to 1959. In the 1980s, fuel-contaminated soils from Tank Farms 1 and 3 were disposed of in the southern portion of the landfill and capped.

4.6.2 Remedial Investigation

The RI consisted of a geophysical survey; a passive soil gas survey at 33 locations; the installation of six wells; and the collection of eight surface soil samples and groundwater samples from the six new wells and one existing well. The geophysical survey indicated the presence of shallow metallic objects. Two of the magnetic anomalies at grid coordinates 300,728 and 232,912.5 may represent buried drums, based on confirmation with GPR. The soil gas survey indicated the presence of VOCs in 16 of the 33 locations. Acetone was most commonly detected, along with benzene and toluene. Isolated occurrences of TCE, PCE, and chloromethane were also detected. Surface soils from the erosion gullies indicated the presence of PAHs, pesticides, PCBs, and metals at concentrations below potential TBCs. Petroleum hydrocarbons were detected at a concentration of 100 mg/kg. Downgradient groundwater samples did not contain high levels of contamination; however, sodium and total glycol levels exceeded potential ARARs in the upgradient well, and benzene, cis-1,2-dichloroethylene (DCE) vinyl chloride (VC), glycols, and metals levels exceeded potential ARARs in downgradient wells.

4.6.3 Supplemental Investigation

The SI at Landfill 6 consisted of the excavation of two test pits (LF6TP-1 and LF6TP-2); the collection of Geoprobe® groundwater screening samples at four locations (LF6GP-1 through -4); and the installation and sampling of one vertical profile monitoring well (LF6VMW-6) (see Table 4.6-1 and Figures 4.6-1 and 4.6.2). Because the Geoprobe® sampling and vertical profile well installation and sampling were performed as part of the On-Base Groundwater SI, they are discussed in Section 4.11 in this report.

Test pits LF6TP-1 and LF6TP-2 were to be excavated (RI grid coordinates 232,912.5, and 300,728, respectively), which were the two magnetic/GPR anomalous areas suspected to contain buried drums (see Figure 4.6-2). These locations were identified in Volume 1 (Appendix A) of the draft final RI (Law Environmental 1996). Although both test pits were staked at the proposed locations, the stake for LF6TP-2 was unknowingly moved prior to the excavation. Therefore, after the actual test pit was excavated, surveyed, and plotted on the base map, it was discovered to be at approximate grid coordinate 300,825. Since drums were not encountered in either test pit, samples were not collected. The results of the test pit excavations are described in Section 4.6.4 below.

4.6.4 SI Results

On July 15, 1997, test pits LF6TP-1 and LF6TP-2 were excavated at Landfill 6 (see Figure 4.6-2). Test pit LF6TP-1 was oriented in a northwest-southeast direction and excavated to a maximum depth of 9 feet BGS. The lithology in the test pit consisted of: brown clay with some silt (cover material) from 0 to 2 feet BGS; medium brown sand and silt with rounded gravel and cobbles and a small amount of debris from 2 to 6.5 feet BGS; and tan very fine sand and silt (native material) from 6.5 to 9 feet BGS. Trash and debris were scattered thinly from 2 to 6.5 feet BGS and consisted of 2- to 4-inch wood fragments, black and clear plastic sheeting, asphalt pieces and electrical wiring. At a depth of 2 feet BGS, three large 2.5- to 5-inch-ID steel pipes ranging from 6 and 10 feet in length were encountered, and they are believed to be the cause of the strong geophysical anomaly. During excavation OVA readings and Explosimeter readings for % LEL, H_2S and CO were all zero. Oxygen readings were in a normal range. The trench was backfilled immediately after the excavation was complete.

Test pit LF6TP-2 was excavated to a maximum depth of 8 feet BGS and to a length of 17 feet. The lithology in the test pit consisted of medium brown clay with trace silt and gravel from 0 to 2 feet BGS, and gray-brown sand and silt with 30% rounded gravel and cobbles from 2 to 8 feet BGS. The material was notably wet to moist from 6 to 8 feet BGS, but water was not encountered in the trench. A petroleum odor was noticed at approximately 6 feet BGS and corresponded with OVA readings of 100 to 400 ppm in the trench. The detected vapors were determined not to be methane. A maximum OVA reading of 40 ppm was obtained from the piles of excavated material, but a reading of zero was recorded in the breathing zone. A draeger tube test indicated vinyl chloride was not present. Neither trash nor any metallic debris was encountered in the trench. The pit was excavated to the top of the petroleum-contaminated zone at approximately 8 feet BGS and then backfilled.

4.6.5 SI Conclusions

Results of RI field activities and baseline risk assessment indicated the presence of chemical of concern in groundwater and soil at and near the site that pose unacceptable risks to human health and the environment. A FS was recommended to evaluate remedial alternatives to mitigate the migration of contaminants from the landfill to the soil and groundwater.

Drums were not encountered during test pit excavations. Although LF6TP-2 was excavated at the wrong location, the likelihood of a drum or drums at the correct location is minimal based on review of the geophysical survey data results (the magnitude of the anomaly in question is of much lower magnitude than other anomalies investigated at Landfill 6 and the other landfills where drums were not encountered. The general source of the geophysical anomalies at the landfills was scrap metal, I-beams, pipes, etc. Based on results of the SI nongroundwater field activities, the RI recommendation for soil remains unchanged. Groundwater issues are discussed in Section 4.11 of this report.

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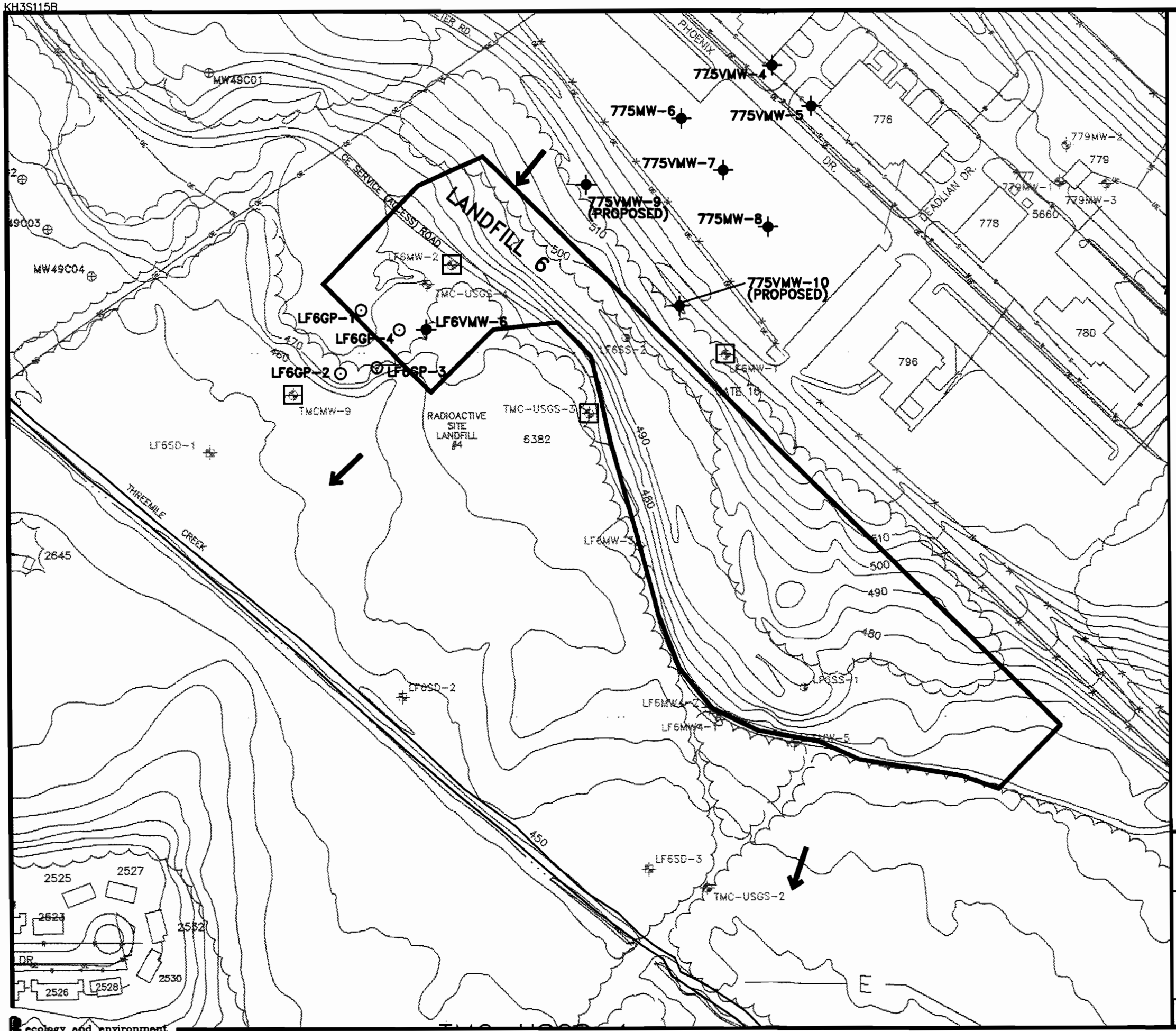

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATIONS
- SUPPLEMENTAL INVESTIGATION GEOPROBE GROUNDWATER SCREENING SAMPLE
- RI MONITORING WELL
- HARDFILL 49C MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- LANDFILL 6 BOUNDARY
- TOPOGRAPHIC CONTOUR LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- SANITARY SEWER
- WATER LINE

N

SCALE IN FEET

0 200 400 600

ecology and environment

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.6–1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
LANDFILL 6

BUFF plotted:07/14/98 REB

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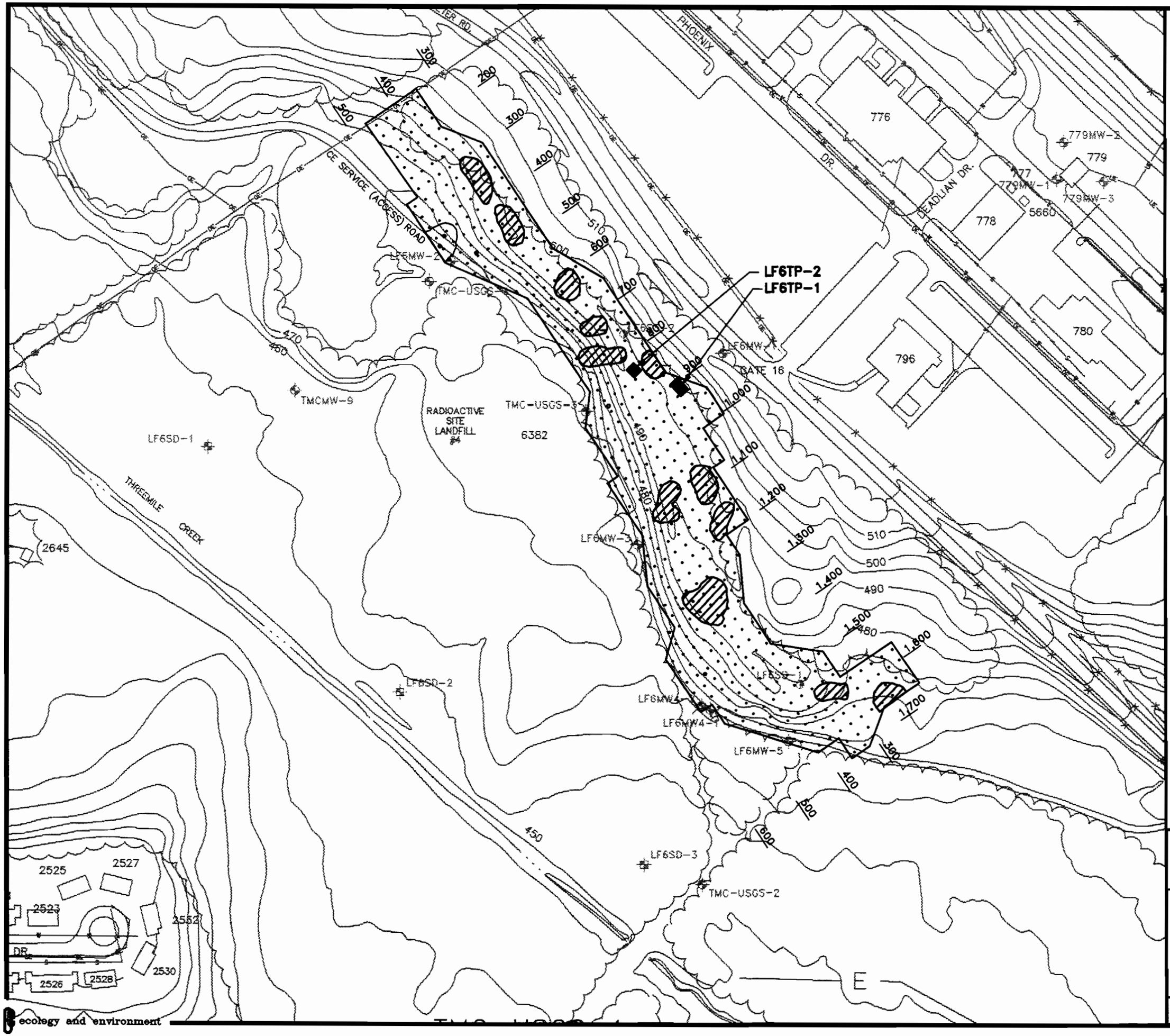

ecology and environment

LEGEND

- SUPPLEMENTAL INVESTIGATION TEST PIT LOCATION
- STRONG RI MAGNETIC ANOMALY
- RI MAGNETIC ANOMALY (ATTRIBUTED TO SURFACE FEATURES)
- RI MAGNETIC DATA POINT
- RI MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- FENCE
- TOPOGRAPHIC CONTOUR LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- SANITARY SEWER
- WATER LINE

NOTE: LOCATION OF MAGNETIC ANOMALIES AND MAGNETIC DATA POINTS ARE APPROXIMATE.

X (FT.) Y (FT.)

GEOPHYSICAL SURVEY GRID AXES ORIENTATION

N

SCALE IN FEET

0 200 400 600

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.6-2
SUPPLEMENTAL INVESTIGATION
TEST PIT LOCATION MAP
LANDFILL 6

Plotted: 10/13/96

4.7 Landfill 7

4.7.1 Site Description

Landfill 7 is located northeast of the main runway (Runway 15/33), south of Perimeter Road, and southwest of the Suspected Fire Training Area (see Figures 1-2A and 3.7-1). It reportedly received domestic refuse solid waste, unknown liquid wastes, and miscellaneous airplane parts from 1950 to 1954. Waste burning was a common practice. The landfill was partially capped in 1985 with a 6-inch clay cap covered by 6 inches of topsoil and grass.

4.7.2 Remedial Investigation

The RI consisted of a geophysical survey; a passive soil gas survey at 24 locations; the installation of four new monitoring wells and replacement of two existing wells; and the collection of three surface soil samples, five surface water samples, 20 sediment samples, and groundwater samples from 10 wells. Four major trenches and several smaller discrete anomalous areas were detected by the geophysical survey (see Figure 3.7-2). VOCs were detected in four of the 24 soil gas sample locations in the southern area of the landfill. Surface soils contained benzo(a)pyrene and several metals in excess of potential TBCs. Surface water contained bis(2-ethylhexyl)phthalate, phenanthrene, pyrene, and several metals at concentrations exceeding potential TBCs. Sediment contained several VOCs, but potential TBCs were not identified for the compounds detected. Several PAHs, pesticides, metals, and bis(2-ethylhexyl)phthalate were also detected in the sediment samples at concentrations exceeding potential TBCs. Groundwater contained VOCs, several metals, and glycols at concentrations exceeding potential ARARs.

4.7.3 Supplemental Investigation

The SI for Landfill 7 consisted of excavating three test pits (LF7TP-1, LF7TP-2, and LF7TP-3); collecting two leachate/seep samples (LF7WL-1 and LF7WL-2); installing and sampling two temporary wells (LF7TW-24 and LF7TW-25); and sampling six existing site wells (LF7MW-3R, LF7MW-16, LF7MW-17, LF7MW-18R, LF7MW-22, and HS7MW-1) (see Table 4.7-1 and Figures 4.7-1 and 4.7-2). Because the installation and sampling of the temporary wells and the sampling of existing wells was performed as part of the On-Base Groundwater SI, these events will be discussed in Section 4.11. A list of samples, analyses, and required QC samples is provided in Table 4.7-1.

Because no specific grid coordinates are cited in the RI as potential drums, test pits were excavated at the locations of the three strongest magnetic anomalies (see Figure 4.7-2). The locations of LF7TP-1, LF7TP-2, and LF7TP-3 are at approximate grid coordinates 1100, 360; 1437, 112; and 1445, 312, respectively. No drums were encountered thus no samples were collected. The results of the test pit excavations are discussed in Section 4.7.4.

Leachate samples LF7WL-1 and LF7WL-2 were collected at two locations (see Figure 4.7-1) and are described in Section 4.7-5.

4.7.4 SI Results

4.7.4.1 Test Pit Excavations

On July 17, 1997, test pits LF7TP-1, LF7TP-2, and LF7TP-3 were excavated at Landfill 7 at the three magnetic/GPR anomalous locations (see Figure 4.7-2). Test pit LF7TP-1 was oriented in an north-south direction and excavated to a maximum depth of 10 feet BGS. The lithology in the test pit was composed of disturbed, medium brown, very fine to medium grained sand with some rounded gravel and cobbles from 0 to 5 feet BGS, and native, tightly packed very fine to medium grained sand with no course material or debris from 5 to 10 feet BGS. Debris was encountered between 2 and 3 feet BGS and consisted of one large 6-inch-wide piece of angular steel scrap of unknown length which protruded from the side of the trench, two small pieces of rubber, and a plastic bag. The steel scrap is suspected to be the cause of the geophysical anomaly. No drums were found. OVA readings and Explosimeter readings during excavation for LEL, H_2S and CO were all zero. Oxygen readings were in a normal range. The trench was backfilled immediately after investigation.

Test pit LF7TP-2 was oriented perpendicular to the runway and Perimeter Road. The pit was excavated to a maximum depth of 10 feet BGS and immediately backfilled after investigation. The lithology consisted of: light brown silt and sand with 25% rounded gravel and cobbles from 0 to 2.5 feet BGS; the same material with some debris from 2.5 to 4 feet BGS; black silt/soot with rounded gravel and cobbles and 20% debris by volume from 4 to 8 feet BGS; and brown silt and sand with 50% concrete by volume from 8 to 10 feet BGS. The debris consisted of scattered bricks, wood fragments, asphalt, black soot, concrete reinforcement wire, large concrete pieces, and thick metal wires. The metal wires may have caused the geophysical anomaly over the area. No drums were found. Unsustained OVA readings of up to 5 ppm were observed in the trench, and OVA readings of 4 ppm were observed in the

breathing zone. Methane was not the cause of these readings. Explosimeter readings for O_2, % LEL, H_2S and CO were all below action levels throughout the excavation.

Test pit LF7TP-3 was excavated to a maximum depth of 10 feet BGS and revealed medium brown silt and very fine to medium sand with some rounded gravel and cobbles from 0 to 3 feet BGS, and black silt-like ash and burnt debris from 3 to 10 feet BGS. The burnt debris located within the ash consisted of paper, wood fragments, tin cans, and other household materials, as well as some steel cable, steel bands, unidentified steel fragments and glass bottles. The steel debris was likely caused the geophysical anomalies over the area. No drums were found. Additionally, several small-diameter glass tubes (approximately 3-inches in length) were uncovered and labeled as "Procaine Hydrochloride 2% with Epinephrine 1-50,000, Neo-quest Chemical Company Inc., Philadelphia, Control Number 93310." Maximum OVA readings for methane were 200 ppm in the trench and 0.5 ppm in the breathing zone. Explosimeter readings for O_2, % LEL, H_2S and CO were all below action levels throughout the excavation. The trench was backfilled immediately following investigation.

4.7.4.2 Leachate

Leachate/seep samples LF7WL-1 and LF7WL-2 were collected from Landfill 7 on June 12, 1997. The first sample was collected from the southeast corner of the landfill that was described by base personnel as containing discolored, oily water with an ammonia odor. The second sample was collected directly downgradient of the observation point (see Figure 4.7-1). The same locations were resampled on July 30, 1997, and reanalyzed for semivolatiles as a result of laboratory problems during analysis of the initial sample. Iron and magnesium were the only substances from both locations that were detected at concentrations exceeding the screening criteria (see Table and Figure 4.7-3). A complete summary of the positive results are presented in Table 4.7-2. Leachate sample results will be used in FS evaluations.

4.7.5 SI Conclusions

Results of RI field activities and the baseline risk assessment indicated that chemicals of concern are present in groundwater at and near the site that pose risks that are not acceptable for the protection of human health and the environment. A FS was recommended to evaluate potential remedial alternatives to mitigate the risk posed by chemicals present in the groundwater.

Drums were not encountered during test pit excavation, and only iron and magnesium were detected at concentrations above screening levels. Based on results of the SI non-groundwater field activities, the RI recommendation remains unchanged. Groundwater issues are discussed in Section 4.11 of this report.

9/25/97

Table 4.7-1
LISTING OF SAMPLES TAKEN AND SKIPPED AT LANDFILL 7

Griffiss AFB - Supplment Invstgtn

ANALYSES

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-Fd NAa	-Fd VOC	Anionsa	Anionsb	BOD	COD	Cr6	Cyanides	Fingrpt	Hardnes	M.E.E..	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Six Mile Creek (E) Landfill 7	SI-QA/QC	LF7TP-_ Z_/MSD		ASC	Soil/QC Matrix	-	Y	S	MS1	X							X	X				X		X			X			X
	SI	LF7TP-1 Z1		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF7TP-1 Z2		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI-QA/QC	LF7TP-1 Z2/D		ASC	Soil	-	Y	S	FD1	X							X	X				X		X			X			X
	SI-QA/QC	LF7TP-1 Z2/S		MRD	Soil	-	Y	S	FR1	X							X	X				X		X			X			X
	SI	LF7TP-1 Z3		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF7TP-2 Z1		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF7TP-2 Z2		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF7TP-2 Z3		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF7TP-3 Z1		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF7TP-3 Z2		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI	LF7TP-3 Z3		ASC	Soil	-	Y	S	N1	X							X	X				X		X			X			X
	SI-QA/QC	LF7WL-RB1		ASC	Eqpt. Washwater	-	Y	S	EB1				X		X	X	X	X		X		X		X	X	X		X	X	
	SI---Rsmp	LF7WL-1	7/30/97	ASC	Leachate	0 - 0	Y	T	N1															X		X				
	SI	LF7WL-1	6/12/97	ASC	Leachate	0 - 0	Y	T	N1				X		X	X	X	X		X		X			X			X	X	
	SI-QA/QC	LF7WL-1 /D	6/12/97	ASC	Leachate	0 - 0	Y	T	FD1				X		X	X	X	X		X		X			X			X	X	
	SI-QA/QC-Rsmp	LF7WL-1 /D	7/30/97	ASC	Leachate	0 - 0	Y	T	FD1															X		X				
	SI-QA/QC	LF7WL-1 /S	6/12/97	MRD	Leachate	0 - 0	Y	T	FR1				X		X	X	X	X		X		X		X	X	X		X	X	
	SI	LF7WL-2	8/15/97	ASC	Leachate	0 - 0	N	T	N1				X		X	X	X	X		X		X		X	X	X		X	X	

Table 4.7-1
LISTING OF SAMPLES TAKEN AND SKIPPED AT LANDFILL 7 (cont.)

Griffiss AFB - Supplment Invstgtn

ANALYSES

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-Fd NAa	-Fd VOC	Anions a	Anions b	BOD	COD	Cr6	Cyanide	Fingrprt	Hardness	M.E.E.	Metals	PCB 525	Pest PCB	pH	SVOC 525	SVOCs	TOC	VOC 524	VOCs

Note: Depth is measured in feet.

Key:

* = existing monitoring well	FD1 = field duplicate	QC = quality control
Anions a = chloride, nitrate/nitrate, phosphate, sulfate	Fingrprt = fingerprint analysis	RB = rinsate blank
Anions b = sulfide	FR1 = field replicate/split	Rsmp = resample
AOC = Area of Concern	GW = groundwater	/S = split sample
ASC = E and E's Analytical Services Center	N1 = original	SI = Supplemental Investigation
BOD = biological oxygen demand	NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)	SVOC = semivolatile organic compound
COD = chemical oxygen demand		Stat = status (O = open; S = skipped; T = taken)
Cr6 = hexavalent chromium	M.E.E. = methane, ethane and ethene	TOC = total organic carbon
EB1, EB2 = equipment rinsate	MRD = Missouri River Division laboratory	TB = trip blank
/D = duplicate sample	MS1 = matrix spike/matrix spike duplicate	TB1, TB2 = trip blank
Eqpt = equipment	/MSD = matrix spike/matrix spike duplicate	TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
Fd = field	PCB = polychlorinated biphenyl	
	Pest = pesticide	VOC = volatile organic compound
	QA/QC = quality assurance/quality control sample	WP = sample in the work plan (Y= yes; N= no)

Table 4.7-2

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR THE LEACHATE SAMPLES FROM LANDFILL 7 FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	LF7WL-1	LF7WL-1	LF7WL-1 /D	LF7WL-1 /D	LF7WL-2
Sample Date:	6/12/97	7/30/97	6/12/97	7/30/97	8/15/97
Sample Depth (ft):	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0
Anions (300) (mg/L)					
Chloride	3.9	--	4.3	--	2.2
Nitrate + Nitrite Ions	0.10 U	--	0.10 U	--	0.29
Phosphate	0.50 U	--	0.50 U	--	0.45
Sulfate	2.4	--	2.8	--	2.2
BOD (5210) (mg/L)					
Biological Oxygen Demand	6.7 J	--	12 J	--	2.4 U
COD (410.2) (mg/L)					
Chemical Oxygen Demand	20	--	17	--	34
Hardness (130.2) (mg/L CaCO3)					
Hardness	260	--	270	--	250
Hex. Chromium (7196) (mg/L)					
Hexavalent Chromium	0.010 U	--	0.030	--	10 U

key at end of table

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR THE LEACHATE SAMPLES FROM LANDFILL 7 FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	LF7WL-1	LF7WL-1	LF7WL-1 /D	LF7WL-1 /D	LF7WL-2
Sample Date:	6/12/97	7/30/97	6/12/97	7/30/97	8/15/97
Sample Depth (ft):	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0
pH (150.1) (S.U.)					
pH	7.1	--	7.2	--	8.0
Semivolatiles (525.2) (ug/L)					
bis(2-Ethylhexyl)phthalate	--	3.9 R	--	3.4 R	1.8
Butylbenzylphthalate	--	1.0 U	--	0.35 J	1.0 U
di-(2-Ethylhexyl)adipate	--	1.5 J	--	0.45 J	1.0 U
TAL Metals (6010) (ug/L)					
Aluminum	780 J	--	1,300 J	--	100 U
Barium	35	--	41	--	39
Calcium	79,000	--	79,000	--	81,000
Iron	3,300	--	4,900	--	1,500
Lead	5.0 U	--	6.6	--	5.0 U
Magnesium	8,300	--	8,500	--	10,000
Manganese	1,100	--	1,100	--	1,300
Potassium	2,100	--	2,200	--	6,500
Sodium	3,000	--	2,900	--	1,200
Zinc	13 J	--	41 J	--	10 U

key at end of table

= Result exceeds screening criteria

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR THE LEACHATE SAMPLES FROM LANDFILL 7 FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	LF7WL-1	LF7WL-1	LF7WL-1 /D	LF7WL-1 /D	LF7WL-2
Sample Date:	6/12/97	7/30/97	6/12/97	7/30/97	8/15/97
Sample Depth (ft):	0 - 0	0 - 0	0 - 0	0 - 0	0 - 0
TOC (415.1) (mg/L)					
Total organic carbon	11	--	9.4	--	5.4
Volatiles (524.2) (ug/L)					
Toluene	2.3	--	2.2	--	0.50 U

Key:

-- = Samples not analyzed for this parameter
/D = Duplicate sample
J = Estimated concentration
mg/L = Milligrams per liter
ug/L = Micrograms per liter
R = Rejected
UJ = Undetected: Estimated detection limit reported
U = Not detected

Table 4.7-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR LEACHATE SAMPLES LANDFILL 7 SUPPLEMENTAL INVESTIGATION FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARS and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criteria
Volatiles (µg/L)				
Toluene	1/3	2.2 - 2.3	—	NA
Semivolatiles (µg/L)				
bis(2-Ethylhexyl)phthalate	2/3	1.8 - 3.9R	0	4,200
Butylbenzylphthalate	1/3	0.35 J	—	NA
di-(2-Ethylhexyl)edipate	1/3	1.5 J - 0.45 J	—	NA
TAL Metals (µg/L)				
Aluminum	1/3	780 J - 1,300	0	2,000
Barium	2/3	35 - 41	0	2,000
Calcium	2/3	79,000 - 81,000	—	NA
Hexavalent Chromium	1/3	30	—	NA
Iron	2/3	1,500 - 4,900	3	600
Lead	1/3	6.6	0	600
Magnesium	2/3	8,300 - 10,000	—	NA
Manganese	2/3	1,100 - 1,300	3	600
Potassium	2/3	2,100 - 6,500	—	NA

Key at end of table.

Table 4.7-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR LEACHATE SAMPLES LANDFILL 7 SUPPLEMENTAL INVESTIGATION FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARS and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criteria
Sodium	2/3	1,200 - 3,000	—	NA
Zinc	1/3	13 J - 41 J	0	5,000

Note: Potential ARARs are Ground-Water Effluent Standards cited in 6 NYCRR Part 703.6.

Key:

ARAR = Applicable or Relevant and Appropriate Requirement.
J = Estimated concentration.
NA = Not available or not applicable.
R = Rejected
TBC = To be considered criteria
μg/L = micrograms per liter.

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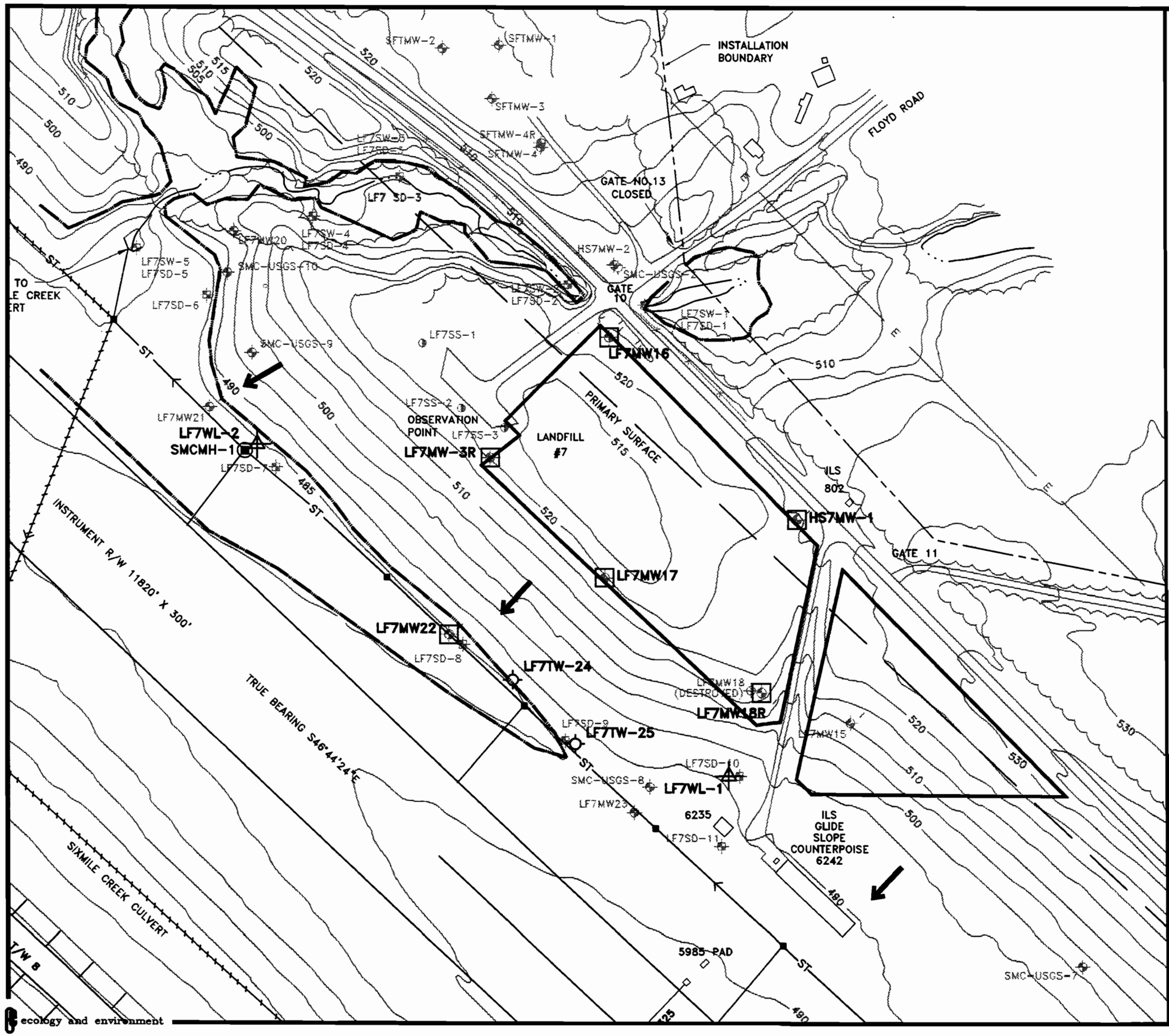

LEGEND

- SUPPLEMENTAL INVESTIGATION TEMPORARY WELL
- SUPPLEMENTAL INVESTIGATION LEACHATE SAMPLE
- SUPPLEMENTAL INVESTIGATION STORM SEWER WATER SAMPLE
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- RI MONITORING WELL
- USGS PIEZOMETER
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- STORM SEWER MANHOLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- INSTALLATION BOUNDARY
- LANDFILL 7 BOUNDARY
- 510 — TOPOGRAPHIC CONTOUR LINE
- ST — STORM SEWER
- CULVERTED SECTION OF SIXMILE CREEK

N

SCALE IN FEET

0 225 450 675

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.7-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
LANDFILL 7

ecology and environment

BUFF plotted: 07/14/98 REB

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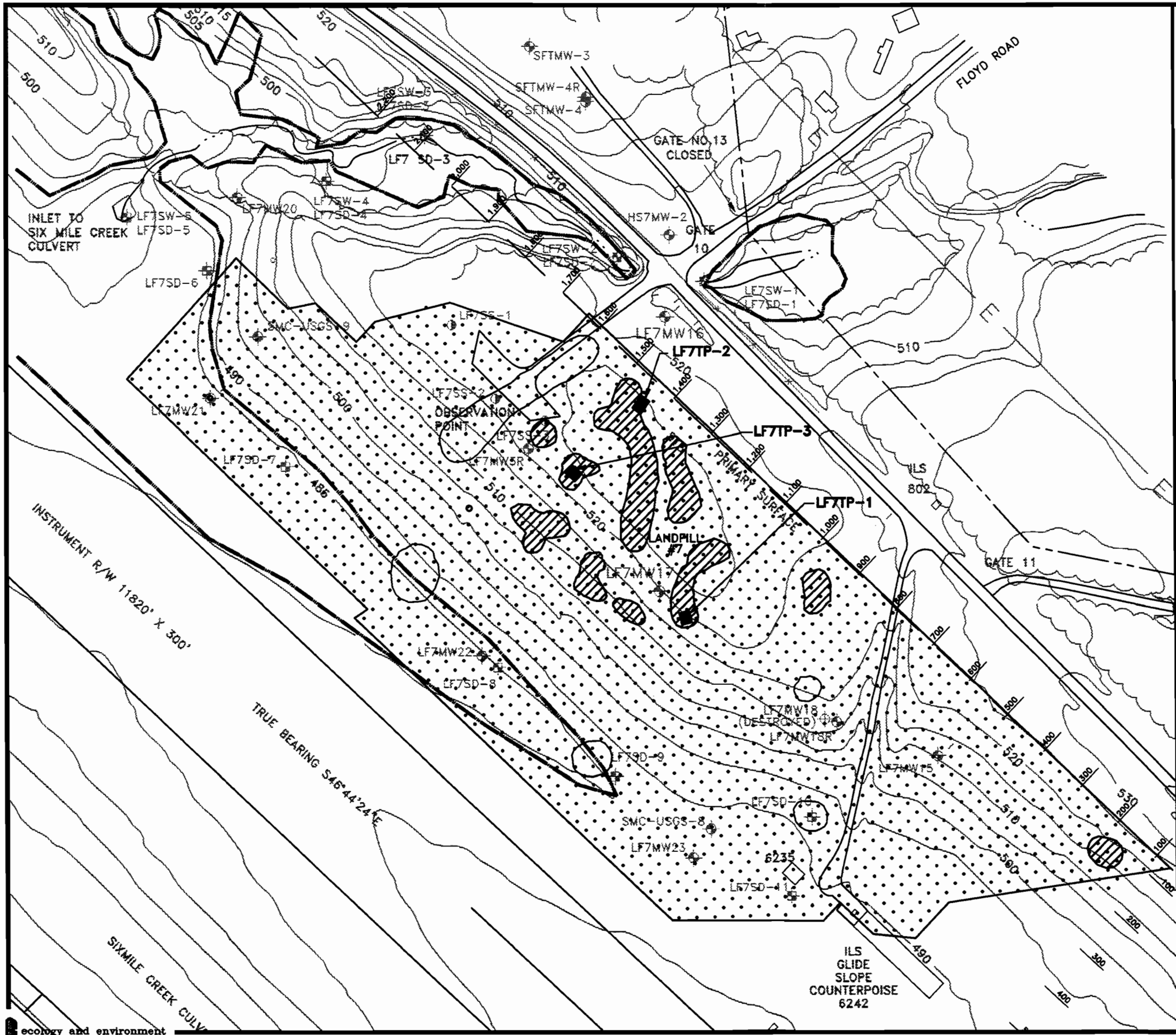


LEGEND

- SUPPLEMENTAL INVESTIGATION TEST PIT LOCATION
- STRONG RI MAGNETIC ANOMALY
- RI MAGNETIC ANOMALY, (ATTRIBUTED TO SURFACE FEATURES)
- RI MAGNETIC DATA POINT
- RI MONITORING WELL
- RI SURFACE WATER AND/ OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- INSTALLATION BOUNDARY
- 510 TOPOGRAPHIC CONTOUR MAP

NOTE: LOCATION OF MAGNETIC ANOMALIES AND MAGNETIC DATA POINTS ARE APPROXIMATE.

X (FT.)
Y (FT.)

GEOPHYSICAL SURVEY GRID AXES ORIENTATION

N

SCALE IN FEET

0 200 400 600

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

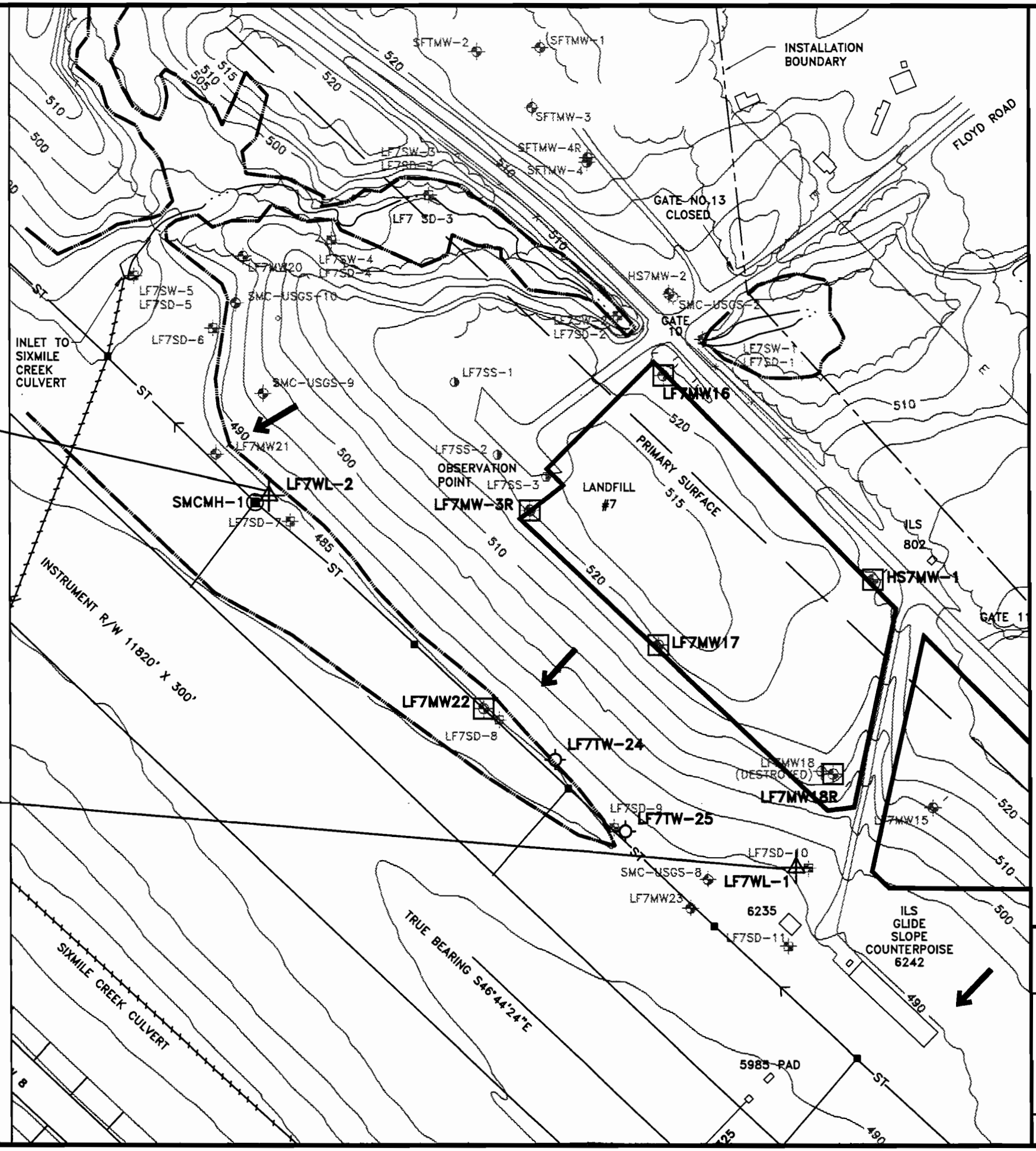
Figure 4.7-2
SUPPLEMENTAL INVESTIGATION
TEST PIT LOCATION MAP
LANDFILL 7

PLOTTED BUFF:10/13/97

KH3S517B

LF7WL-2	(µg/L)
Inorganic Parameter	SI
Iron	1,500
Manganese	1,300

LF7WL-1	(µg/L)
Inorganic Parameter	SI
Iron	3,300
Manganese	1,100



LEGEND

- SUPPLEMENTAL INVESTIGATION TEMPORARY WELL
- SUPPLEMENTAL INVESTIGATION LEACHATE SAMPLE
- SUPPLEMENTAL INVESTIGATION STORM SEWER WATER SAMPLE
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- RI MONITORING WELL
- USGS PIEZOMETER
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- STORM SEWER MANHOLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- INSTALLATION BOUNDARY
- 510 TOPOGRAPHIC CONTOUR LINE
- ST STORM SEWER
- CULVERTED SECTION OF SIXMILE CREEK
- LANDFILL 7 BOUNDARY

NOTE: RESULT EXCEEDS POTENTIAL ARAR OR TBC, UNLESS OTHERWISE NOTED.

N

SCALE IN FEET

0 225 450 675

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.7-3
SUPPLEMENTAL INVESTIGATION SELECTED LECHATE SAMPLE RESULT MAP LANDFILL 7

ecology and environment

BUFF plotted: 07/14/98 REB

4.8 Threemile Creek

4.8.1 Site Description

The headwaters of Threemile Creek (TMC) originate at the intersection of Ellsworth Road and Wright Drive at the points of discharge for the base storm water collection system (see Figures 1-2B and 4.8-1). The creek flows southeast and empties into the New York State Barge Canal, approximately 1 mile south of the former base. It receives surface water runoff from the south-central portion of the base, including several AOCs (the Electrical Power Substation, Landfills 4, 5, and 6, and Hardfills 49c and 49d).

4.8.2 Remedial Investigation

The RI consisted of the assessment of in situ water quality parameters and aquatic habitat at four locations; the delineation of jurisdictional wetlands; the delineation of 100- and 500-year floodplains; the collection of benthic and drift macroinvertebrates from four locations to assess species abundance and numbers; the collection of sediments from eight locations for particle size and four locations for toxicity testing; the collection of fish at four locations to survey species diversity and numbers and obtain fish tissue for chemical analysis; the collection pf 24 sediment samples from 12 locations; and the collection of 12 surface water samples. In addition, sediment samples B27SD-1 and B27SD-2 from Threemile Creek were collected as part of the Electrical Power Substation AOC. The surface water contained VOCs, pesticides, and metals at concentrations exceeding potential ARARs. The sediment contained VOCs, SVOCs, PCBs, and metals at concentrations exceeding potential ARARs, and low levels of strontium 89 in seven of the 24 samples, strontium 90 in three of the 24 samples, and uranium in 23 of the 24 samples.

4.8.3 Supplemental Investigation

The SI for Threemile Creek consisted of collecting three passive in situ concentration/extraction sampler (PISCES) samples (TMCP-1, TMCP-2, and TMCP-3) and two surface water samples (TMCSW-13 and TMCSW-14) (see Figure 4.8-1). A list of samples, analyses, and required QC samples is provided in Table 4.8-1.

PISCES samples TMCP-1, TMCP-2, and TMCP-3 were collected near RI surface water/sediment samples TMCSW/SD-6, TMCSW/SD-9, and LF6SW/SD-11, respectively, (see Figure 4.8-1) and according to the procedures described in Section 2.9 of this report. The analytical results of the PISCES samples are discussed in Section 4.8.4.

Surface water samples TMCSW-13 and TMCSW-14 were collected from inside the culverts at the headwaters of Threemile Creek (see Figure 4.8-1). The samples were collected according to the procedures described in Section 2.10 of this report. The results of the surface water analyses are described in Section 4.8.5.

4.8.4 SI Results

4.8.4.1 PISCES Samples

Three PISCES samples (TMCP-1, TMCP-2 and TMCP-3) were collected from Threemile Creek on June 20, 1997 (Figure 4.8-2). No contaminants were detected in TMCP-1, which was collected adjacent to Landfill 5 and upgradient of the small drainageway from Landfill 5 and Hardfill 49d. TMCP-2 was located downgradient of Landfill 5, and TMCP-3 was located off base, downgradient of Landfills 5 and 6. Minor amounts of three pesticides (dieldrin, endosulfan sulfate, and gamma-BHC [lindane]) were detected in TMCP-2 and TMCP-3. Additionally, 4,4-DDD was detected in TMCP-3 (see Table 4.8.2). Concentrations of dieldrin, endosulfan sulfate, and lindane were 1.5 to 4 times higher in the samples collected farthest downgradient. Therefore, Landfill 5, Landfill 6, and possibly Hardfills 49c and 49d might be contributing pesticides to Threemile Creek. The pesticide 4,4-DDD appears to be from Landfill 6 only. PCBs were not detected in any of the samples. PISCES sample results will be used as a screening tool in FS evaluations for surface water contamination. They cannot be compared to surface water ARARs or TBCs, nor can they be used to develop cleanup goals.

4.8.4.2 Surface Water Samples

On June 11, 1997 surface water samples TMCSW-13 and TMCSW-14 were collected from the culvert outfall effluent south and southeast of the Electrical Power Substation AOC before it mixed with the headwaters of Threemile Creek (see Figure 4.8-2). Pesticides/PCBs were not detected in the samples. Surface water sample results will be used in FS evaluations.

4.8.5 SI Conclusions

Results of RI field activities and baseline risk assessment indicated the need for a FS to evaluate potential remedial alternatives for Threemile Creek (Law Environmental 1996).

Several pesticides were detected in PISCES samples downgradient of Landfills 5 and 6 and Hardfill 49c and 49d, but no pesticides/PCBs were detected in upgradient surface water

samples. Based on these SI results, it appears that Landfills 5 and 6, and possibly Hardfills 49c and 49d (based on proximity), might be contributing pesticides to Threemile Creek. Therefore, the RI recommendation remains unchanged.

Table 4.8-1
LISTING OF SAMPLES TAKEN AND SKIPPED AT THREEMILE CREEK

7/31/97

Griffiss AFB - Supplment Invstgtn

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES
Three Mile Creek	SI	TMCP-1	6/20/97	ASC	PISCES	1.24	Y	T	N1	XX
	SI	TMCP-2	6/20/97	ASC	PISCES	2	Y	T	N1	XX
	SI	TMCP-3	6/20/97	ASC	PISCES	1	Y	T	N1	XX
	SI	TMCSW-13	6/11/97	ASC	Surface Water	0 - 1.9	Y	T	N1	XX
	SI	TMCSW-14	6/11/97	ASC	Surface Water	0 - 2.2	Y	T	N1	XX
	SI-QA/QC	TMCSW-RB1		ASC	Eqpt. Washwater	-	Y	S	EB1	XX

Note: Depth is measured in feet.

Key:

- * = existing monitoring well
- Anions a = chloride, nitrate/nitrate, phosphate, sulfate
- Anions b = sulfide
- AOC = Area of Concern
- ASC = E and E's Analytical Services Center
- BOD = biological oxygen demand
- COD = chemical oxygen demand
- Cr6 = hexavalent chromium
- EB1, EB2 = equipment rinsate
- /D = duplicate sample
- Eqpt = equipment
- Fd = field
- FD1 = field duplicate
- Fingrprt = fingerprint analysis
- FR1 = field replicate/split
- GW = groundwater
- N1 = original
- NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
- M.E.E. = methane, ethane and ethene
- MRD = Missouri River Division laboratory
- MS1 = matrix spike/matrix spike duplicate
- /MSD = matrix spike/matrix spike duplicate
- PCB = polychlorinated biphenyl
- Pest = pesticide
- QA/QC = quality assurance/quality control sample
- QC = quality control
- RB = rinsate blank
- /S = split sample
- SI = Supplemental Investigation
- SVOC = semivolatile organic compound
- Stat = status (O = open; S = skipped; T = taken)
- TOC = total organic carbon
- TB = trip blank
- TB1, TB2 = trip blank
- VOC = volatile organic compound
- WP = sample in the work plan (Y= yes; N= no)

Table 4.8-2

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR THE PISCES SAMPLES FROM THREEMILE CREEK GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	TMCP-1	TMCP-2	TMCP-3
Sample Date:	6/20/97	6/20/97	6/20/97
Sample Depth (ft):	1.24	2	1
Pesticides/PCBs (8081) (ug)			
4,4-DDD	0.0050 U J	0.0050 U J	0.0066 J
Dieldrin	0.0050 U J	0.0066 J	0.025 J
Endosulfan sulfate	0.012 U J	0.0088 J	0.013 J
gamma-BHC (Lindane)	0.0025 U J	0.0058 J	0.017 J

Key:

--- = Sample not analyzed for this parameter
/D = Duplicate sample
J = Estimated concentration
P = PISCES sample
PCBs = Polychlorinated biphenyls
U = Not detected
ug = Micrograms
UJ = Not detected; estimated detection limit reported

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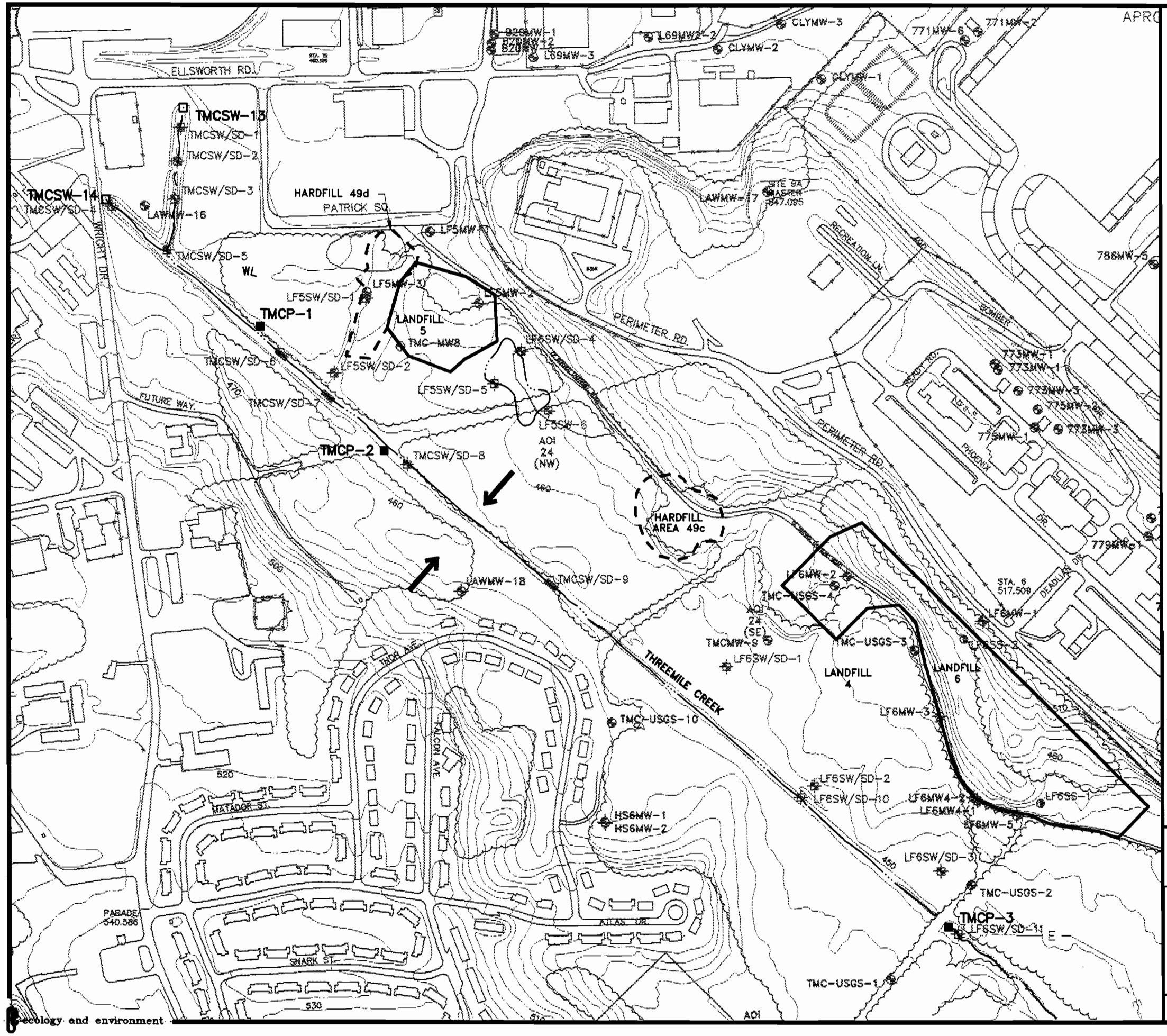

LEGEND

- SUPPLEMENTAL INVESTIGATION SURFACE WATER SAMPLE
- SUPPLEMENTAL INVESTIGATION PISCES SAMPLE
- EXISTING MONITORING WELL
- RI MONITORING WELL
- RI SURFACE WATER SAMPLE (SW) AND SEDIMENT (SD) SAMPLE
- RI SURFACE SOIL SAMPLE
- TMCPS-1 — RI FISH SAMPLING SECTION OF CREEK
- RI BENTHIC MACROINVERTEBRATE SAMPLE
- MS1 — RI METER-SQUARE KICKNET SAMPLE
- CPOM — RI COARSE PARTICULATE ORGANIC MATTER SAMPLE
- HD — RI HESTER-DENDY SUBSTRATE SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- HARDFILL BOUNDARY
- LANDFILL BOUNDARY

N

SCALE IN FEET

0 400 800 1,200

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.8-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
THREEMILE CREEK

ecology and environment

BUFF plotted:07/16/98 REB

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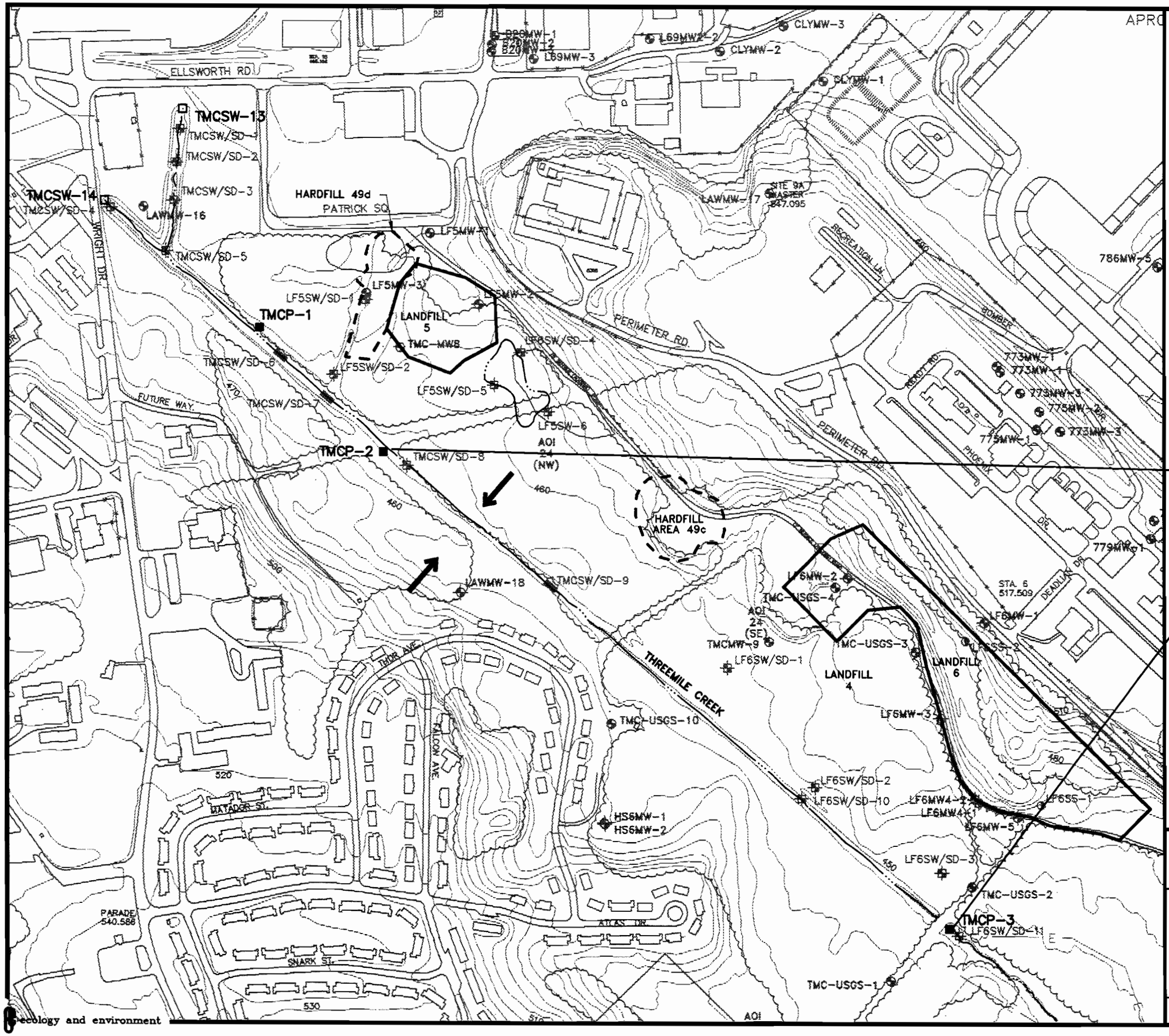

LEGEND

- SUPPLEMENTAL INVESTIGATION SURFACE WATER SAMPLE
- SUPPLEMENTAL INVESTIGATION PISCES SAMPLE
- EXISTING MONITORING WELL
- RI MONITORING WELL
- RI SURFACE WATER SAMPLE (SW) AND SEDIMENT (SD) SAMPLE
- RI SURFACE SOIL SAMPLE
- TMCPS–1 — RI FISH SAMPLING SECTION OF CREEK
- RI BENTHIC MACROINVERTEBRATE SAMPLE
- MS1 — RI METER–SQUARE KICKNET SAMPLE
- CPOM — RI COARSE PARTICULATE ORGANIC MATTER SAMPLE
- HD — RI HESTER–DENDY SUBSTRATE SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- HARDFILL BOUNDARY
- LANDFILL BOUNDARY
- J — ESTIMATED CONCENTRATION

TMCP–2	(µg)
Organic Parameter	SI
Dieldrin	0.0066J
Endosulfan sulfate	0.0088J
gamma–BHC (Lindane)	0.0058J

TMCP–3	(µg)
Organic Parameter	SI
4,4 – DDD	0.0066J
Dieldrin	0.025J
Endosulfan sulfate	0.013J
gamma–BHC (Lindane)	0.017J

N

SCALE IN FEET

0 400 800 1,200

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.8–2
SUPPLEMENTAL INVESTIGATION PISCES SAMPLE RESULT MAP THREEMILE CREEK

ecology and environment

BUFF plotted:07/14/98 REB

4.9 Sixmile Creek

4.9.1 Site Description

Sixmile Creek (SMC) enters the base from the northeast, flows southeast, and empties into the New York State Barge Canal. It is partially contained within an enclosed concrete culvert system parallel to the runway (see Figures 4.9-1 and 4.9-2). The creek receives surface water runoff and storm water discharge from the base. Leachate from Landfill 1 was observed draining directly into the creek. The creek also receives surface water runoff from Landfills 2 and 3, and 7, and from the Weapons Storage Area (WSA). The Sixmile Creek AOC also includes an aqueous film forming foam (AFFF) lagoon. Overflow of this lagoon has caused surface discharge to Sixmile Creek.

4.9.2 Remedial Investigation

The RI consisted of benthic macroinvertebrate and fisheries surveys; the delineation of wetlands; and the collection of 28 sediment samples from Sixmile Creek, six sediment samples from the Mohawk River, six sediment samples from the Barge Canal, two sediment samples from the AFFF lagoon, 14 surface water samples from Sixmile Creek, three surface water samples from the Mohawk River, three surface water samples from the Barge Canal, one surface water sample from the AFFF lagoon, and fish from Sixmile Creek for whole-body tissue analysis. Surface water from Sixmile Creek contained one SVOC and metals at concentrations exceeding potential ARARs. Sediment from Sixmile Creek contained one VOC (benzene) at concentrations exceeding potential TBCs from a background sampling location, and several SVOCs and metals at concentrations exceeding potential TBCs. Surface water and sediment also contained petroleum hydrocarbons, glycols, and Strontium 89 and 90. The Mohawk River surface water contained one metal (aluminum) exceeding potential ARARs. Sediments from the Mohawk River contained SVOCs, pesticides, one PCB, and two metals at concentrations exceeding TBCs. The Barge Canal surface water contained vinyl chloride and four metals at concentrations exceeding potential ARARs. Sediment from the Barge Canal contained one SVOC, and several pesticides, herbicides, and metals at concentrations exceeding potential TBCs.

4.9.3 Supplemental Investigation

The SI for Sixmile Creek consisted of the collection of nine PISCES samples from Sixmile Creek and its tributaries (SMCP-1 through SMCP-9) and one from Rainbow Creek (RCP-1); one water sample from a storm sewer (SMCMH-1W); and two surface water samples

from Rainbow Creek (RCSW-1 and RCSW-2) (see Figures 4.9-1 and 4.9-2). A list of samples, analyses, and required QC samples is provided in Table 4.9-1.

Four of the PISCES samples (SMCP-1, SMCP-2, SMCP-4, and SMCP-5) were collected from the upper section of Sixmile Creek, upstream of the culverted section; two samples (SMCP-3 and SMCP-6) were collected from unnamed tributaries of Sixmile Creek; one sample (SMCP-7) was collected from a tributary of Slate Creek; two samples (SMCP-8 and SMCP-9) were collected from the lower section of Sixmile Creek, downstream of the culverted section; and one sample (RCP-1) was collected from Rainbow Creek prior to the culvert that joins the Sixmile Creek culvert (see Figures 4.9-1 and 4.9-2).

One water sample (SMCMH-1W) was collected from the storm sewer manhole immediately upgradient of the Sixmile Creek culverted section, which is downgradient of Landfill 7. Two surface water samples (RCSW-1 and RCSW-2) were collected at the outfalls of two storm sewers at the headwaters of Rainbow Creek (see Figure 4.9-2). The storm sewer sample and surface water samples were collected according to procedures outlined in Section 2.9 of this report. The results of the PICSES and water sample analyses are discussed in Section 4.9.3.1 and 4.9.3.2, respectively.

4.9.4 SI Results

4.9.4.1 PISCES Samples

Nine PISCES samples (SMCP-1 through SMCP-9) from Sixmile Creek and its tributaries and one sample (RCP-1) from Rainbow Creek were collected on June 20, 1997 and July 7, 1997, respectively. Minor amounts of at least one pesticide were detected in all samples except SMCP-4 (see Tables 4.9-2 and 4.9-3 and Figures 4.9-3 and 4.9-4). PCBs were not detected in any of the samples.

- Sample SMCP-1 was collected upgradient of the base and contained a minor amount of heptachlor.
- Sample SMCP-2, which was collected downgradient of Landfill 1 (SMCP-2) contained minor amounts of aldrin, alpha-BHC, lindane, and an elevated level of heptachlor. (Heptachlor was detected at 2.6 times the concentration of the upgradient sample.)
- SMCP-3, which was collected from the unnamed tributary of Sixmile Creek near Hardfill 49b, contained minor amounts of 4,4-DDD and 4,4-DDE.
- SMCP-4, which was collected farther downgradient of Landfill 1 and the unnamed tributary and upgradient of the WSA, was the only sample that did not contain pesticides.

- Sample SMCP-5 contained a minor amount of aldrin. The sample was collected downgradient of the northern portion of the WSA and upstream of the culverted section of Sixmile Creek.

- Sample SMCP-6, which was collected near the eastern base boundary in an unnamed tributary of Sixmile Creek, contained a minor amount of endosulfan sulfate in the original sample, but not in the duplicate.

- Sample SMCP-7 which was collected from an unnamed tributary of Slate Creek, contained aldrin, but aldrin was not detected in SMCP-9, which was collected off base and downgradient of the confluence of SMC and Slate Creek.

- Sample SMCP-8 contained Alpha-BHC, but it was not detected in any of the nearby upgradient samples. The sample also contained three pesticides.

- Sample SMCP-9 contained minor amounts of 4,4-DDD, alpha-BHC, chlordane, dieldrin, and endosulfan sulfate.

- Sample RCP-1 contained minor amounts of 10 different pesticides. Three of these pesticides (4,4-DDD, chlordane, and dieldrin) were detected farther downgradient in sample SMCP-8, which was collected near the SMC culvert outfall.

In summary, Landfill 1 and Rainbow Creek appear to be contributing pesticides to Sixmile Creek. PISCES sample results will be used as a screening tool in FS evaluations for surface water contamination. They cannot be compared to surface water ARARs or TBCs, nor can they be used to develop cleanup goals.

4.9.4.2 Surface Water Samples

Water samples were collected from the storm sewer at the base of Landfill 7, which is upgradient of the culverted section of Sixmile Creek (SMCMH-1W), and from the storm sewer outfalls at the head waters of Rainbow Creek (RCSW-1 and RCSW-2) on June 11 and June 12, 1997, respectively (Figure 4.9-4). Due to laboratory problems with the analysis of the initial samples, RCSW-1 was collected again on July 30, 1997, and RCSW-2 was collected again on August 15, 1997. Neither pesticides nor PCBs were detected in any of the samples. Since the samples from the headwaters of Rainbow Creek did not contain pesticides or PCBs, the source of the contaminants in the creek still remains unknown. Surface water sample results will be used in FS evaluations.

4.9.5 SI Conclusions

Results of RI field activities and baseline risk assessment indicated the need for a FS to study the potential remedial alternatives for Sixmile Creek.

Pesticides detected in PISCES samples collected from Sixmile Creek appear to be originating mainly from Landfill 1 and Rainbow Creek. Neither pesticides nor PCBs were detected in sewer water samples collected downgradient of Landfill 7 or surface water samples collected from the headwaters of Rainbow Creek. Landfill 1 and Rainbow Creek will be addressed in the FS, however, Rainbow Creek and the associated Coal Storage Yard AOC underwent a removal action in July and August 1997. The RI recommendation remains unchanged based on SI results of PISCES and surface water sampling.

Page 1 of 2

9/26/97

Table 4.9-1
LISTING OF SAMPLES TAKEN AND SKIPPED AT SIXMILE CREEK

Griffiss AFB - Supplment Invstgtn

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: %Solids	-FdNAa	-FdVOC	Anionsa	Anionsb	BOD	COD	Cr6	Cyanide	Fingerpt	Hardnes	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Six Mile Creek	SI	RCP-1	7/7/97	ASC	PISCES	1.3 - 1.3	Y	T	N1														X	X						
	SI	SMCP-1	6/20/97	ASC	PISCES	0.65 - 0.65	Y	T	N1														X	X						
	SI-QA/QC	SMCP-1 /D	6/20/97	ASC	PISCES	0.65 - 0.65	Y	S	FD1														X	X						
	SI-QA/QC	SMCP-1 /S	6/20/97	MRD	PISCES	0.65 - 0.65	Y	S	FR1														X	X						
	SI	SMCP-2	6/20/97	ASC	PISCES	0.65 - 0.65	Y	T	N1														X	X						
	SI	SMCP-3	6/20/97	ASC	PISCES	0.75 - 0.75	Y	T	N1														X	X						
	SI	SMCP-4	6/20/97	ASC	PISCES	1 - 1	Y	T	N1														X	X						
	SI	SMCP-5	6/20/97	ASC	PISCES	1 - 1	Y	T	N1														X	X						
	SI	SMCP-6	6/20/97	ASC	PISCES	1 - 1	Y	T	N1														X	X						
	SI-QA/QC	SMCP-6 /D	6/20/97	ASC	PISCES	1 - 1	N	T	FD1														X	X						
	SI-QA/QC	SMCP-6 /S	6/20/97	MRD	PISCES	1 - 1	N	T	FR1														X	X						
	SI	SMCP-7	6/20/97	ASC	PISCES	0.20 - 0.20	Y	T	N1														X	X						
	SI	SMCP-8	6/20/97	ASC	PISCES	1.25 - 1.25	Y	T	N1														X	X						
	SI	SMCP-9	6/20/97	ASC	PISCES	1 - 1	Y	T	N1														X	X						
	SI-QA/QC	SMCMH-RB1	6/11/97	ASC	Eqpt. Washwater	0 - 0	Y	T	EB1														X	X						
	SI---Rsmp	RCSW-1	7/30/97	ASC	Surface Water	0 - 0.25	Y	T	N1															X						
	SI	RCSW-1	6/12/97	ASC	Surface Water	0 - 1 20	Y	T	N1														X							
	SI-QA/QC-Rsmp	RCSW-1 /D	7/30/97	ASC	Surface Water	0 - 0.25	Y	T	FD1															X						
	SI-QA/QC	RCSW-1 /D	6/12/97	ASC	Surface Water	0 - 1.20	Y	T	FD1														X							
	SI-QA/QC	RCSW-1 /S	6/12/97	MRD	Surface Water	0 - 1.20	Y	T	FR1														X	X						
	SI	RCSW-2	6/12/97	ASC	Surface Water	0 - 0.25	Y	T	N1														X							
	SI	RCSW-2R	8/15/97	ASC	Surface Water	0 - 0.04	Y	T	N1															X						
	SI	SMCMH-1W	6/11/97	ASC	Surface Water	4.93 - 4.98	Y	T	N1														X	X						

Table 4.9-1
LISTING OF SAMPLES TAKEN AND SKIPPED AT SIXMILE CREEK (cont.)

Griffiss AFB - Supplment Invstgtn

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: % Solids; Ferrous Iron; Anions a; Anions b; BOD; COD; Cr6; Hydrocarbons; Methane, Ethane, Ethene; PCBs; pH; SVOCs; TOC; VOCs; VOCs

Note: Depth is measured in feet.

Key:

- * = existing monitoring well
- Anions a = chloride, nitrate/nitrate, phosphate, sulfate
- Anions b = sulfide
- AOC = Area of Concern
- ASC = E and E's Analytical Services Center
- BOD = biological oxygen demand
- COD = chemical oxygen demand
- Cr6 = hexavalent chromium
- EB1, EB2 = equipment rinsate
- /D = duplicate sample
- Eqpt = equipment
- Fd = field
- FD1 = field duplicate
- Fingrprt = fingerprint analysis
- FR1 = field replicate/split
- GW = groundwater
- N1 = original
- NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
- M.E.E. = methane, ethane and ethene
- MRD = Missouri River Division laboratory
- MS1 = matrix spike/matrix spike duplicate
- /MSD = matrix spike/matrix spike duplicate
- PCB = polychlorinated biphenyl
- Pest = pesticide
- QA/QC = quality assurance/quality control sample
- QC = quality control
- RB = rinsate blank
- Rsmp = resample
- /S = split sample
- SI = Supplemental Investigation
- SVOC = semivolatile organic compound
- Stat = status (O = open; S = skipped; T = taken)
- TOC = total organic carbon
- TB = trip blank
- TB1, TB2 = trip blank
- TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
- VOC = volatile organic compound
- WP = sample in the work plan (Y= yes; N= no)

Table 4.9-2

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR THE PISCES SAMPLES FROM SIXMILE CREEK FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	RCP-1	SMCP-1	SMCP-2	SMCP-3	SMCP-4	SMCP-5	SMCP-6
Sample Date:	7/7/97	6/20/97	6/20/97	6/20/97	6/20/97	6/20/97	6/20/97
Sample Depth (ft):	1.3	.65	.65	.75	1	1	1
Pesticides/PCBs (8081) (ug)							
4,4-DDD	0.10	0.0050 U J	0.0050 U J	0.013 J	0.0050 U J	0.0050 U J	0.0050 U J
4,4-DDE	0.025	0.0050 U J	0.0050 U J	0.0050 J	0.0050 U J	0.0050 U J	0.0050 U J
4,4-DDT	0.036	0.012 U J	0.012 U J	0.012 U J	0.012 U J	0.012 U J	0.012 U J
Aldrin	0.025	0.0025 U J	0.0090 J	0.0025 U J	0.0025 U J	0.0050 J	0.0025 U J
alpha-BHC	0.0025 U	0.0025 U J	0.0080 J	0.0025 U J	0.0025 U J	0.0025 U J	0.0025 U J
beta-BHC	0.0064	0.0025 U J	0.0025 U J	0.0025 U J	0.0025 U J	0.0025 U J	0.0025 U J
Chlordane	0.11	0.0025 U J	0.0025 U J	0.0025 U J	0.0025 U J	0.0025 U J	0.0025 U J
Dieldrin	0.025	0.0050 U J	0.0050 U J	0.0050 U J	0.0050 U J	0.0050 U J	0.0050 U J
Endosulfan II	0.018	0.0050 U J	0.0050 U	0.0050 U J	0.0050 U J	0.0050 U J	0.0050 U J
Endosulfan sulfate	0.012 U	0.012 U J	0.012 U J	0.012 U J	0.012 U J	0.012 U J	0.0080 J
gamma-BHC (Lindane)	0.0036	0.0025 U J	0.0040 J	0.0025 U J	0.0025 U J	0.0025 U J	0.0025 U J
Heptachlor	0.028	0.0080 J	0.021 J	0.0025 U J	0.0025 U J	0.0025 U J	0.0025 U J

Key:

--- = Sample not analyzed for this parameter
/D = Duplicate sample
J = Estimated concentration
P = PISCES sample
PCBs = Polychlorinated biphenyls
U = Not detected
ug = Micrograms
UJ = Not detected; estimated detection limit reported

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR THE PISCES SAMPLES FROM SIXMILE CREEK FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	SMCP-6 /D			SMCP-7			SMCP-8			SMCP-9		
Sample Date:	**6/20/97**			**6/20/97**			**6/20/97**			**6/20/97**		
Sample Depth (ft):	**1**			**.2**			**1.25**			**1**		
Pesticides/PCBs (8081) (ug)												
4,4-DDD	0.0050	U	J	0.0050	U	J	0.011		J	0.0070		J
Aldrin	0.0025	U	J	0.0080		J	0.0025	U	J	0.0025	U	J
alpha-BHC	0.0025	U	J	0.0025	U	J	0.0038		J	0.0028		J
Chlordane	0.0025	U	J	0.0025	U	J	0.051		J	0.035		J
Dieldrin	0.0050	U	J	0.0050	U	J	0.067		J	0.043		J
Endosulfan sulfate	0.012	U	J	0.012	U	J	0.012	U	J	0.013		J

Key:

--- = Sample not analyzed for this parameter
/D = Duplicate sample
J = Estimated concentration
P = PISCES sample
PCBs = Polychlorinated biphenyls
U = Not detected
ug = Micrograms
UJ = Not detected; estimated detection limit reported

Table 4.9-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR PISCES SAMPLES SIXMILE CREEK SUPPLEMENTAL INVESTIGATION FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent Criterion	Most Stringent Criterion
Pesticides/PCBs ((µg)				
4,4-DDD	4/11	0.007 J - 0.10	—	NA
4,4-DDE	2/11	0.005 J - 0.025	—	NA
4,4-DDT	1/11	0.036	—	NA
Aldrin	4/11	0.005 J - 0.025	—	NA
Alpha-BHC	3/11	0.0028 J - 0.008 J	—	NA
Beta-BHC	1/11	0.0064	—	NA
Chlordane	3/11	0.035 J - 0.11	—	NA
Dieldrin	3/11	0.025 - 0.067 J	—	NA
Endosulfan II	1/11	0.018	—	NA
Endosulfan sulfate	2/11	0.008 J - 0.013 J	—	NA
Gamma-BHC (Lindane)	2/11	0.0036 J - 0.0040 J	—	NA
Heptachlor	3/11	0.008 J - 0.028	—	NA

Key
ARAR = Applicable or relevant and appropriate requirement
J = Estimated concentration
NA = Not available or applicable
PCB = Polychlorinated biphenyl
µg = Microgram
TBCs = to be considered criteria
PICES = Passive in situ concentration/extraction sampler

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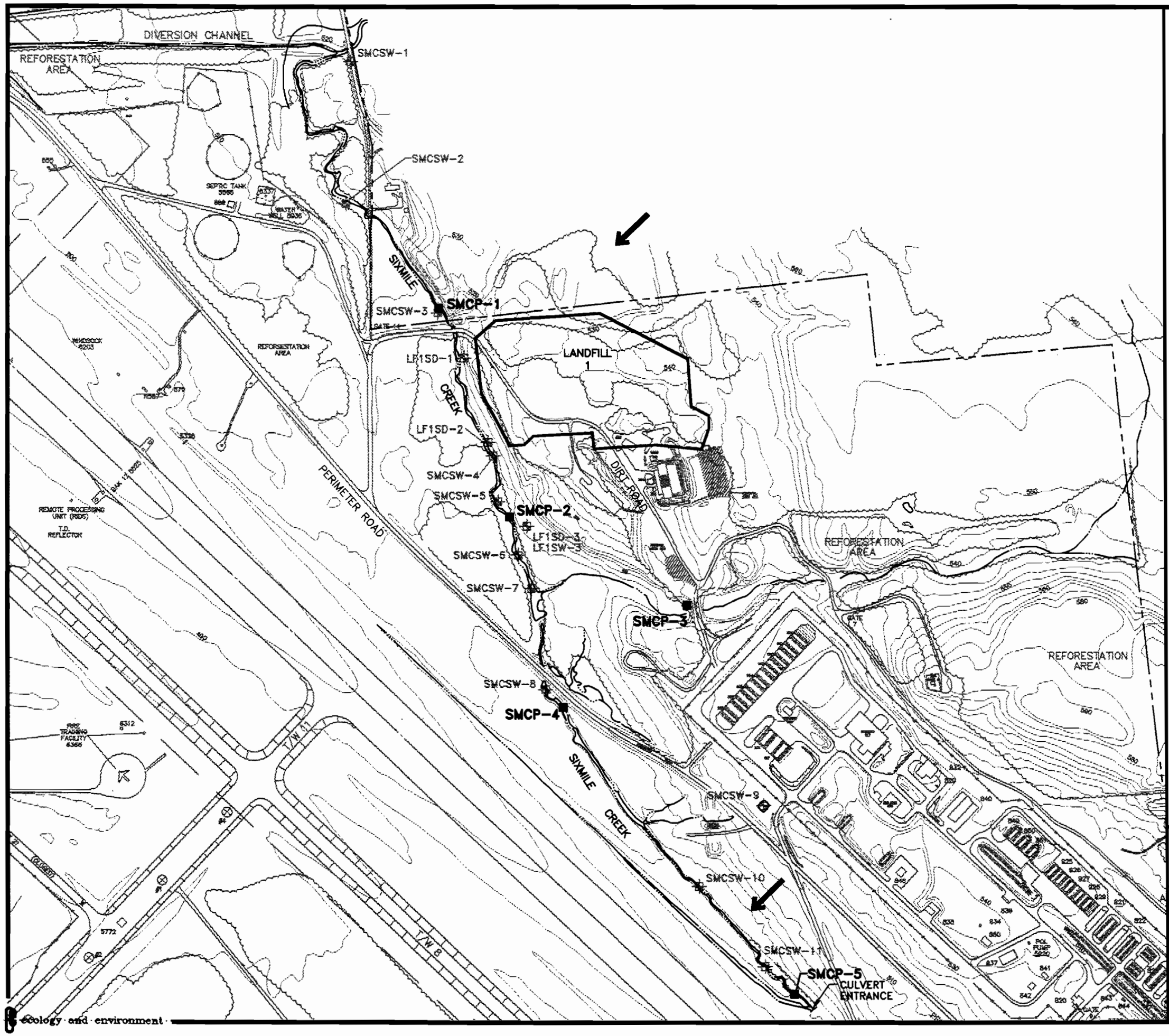

LEGEND

- SUPPLEMENTAL INVESTIGATION PISCES SAMPLE
- RI SURFACE WATER SAMPLE (SW) AND SEDIMENT (SD) SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- LANDFILL 1 BOUNDARY

N

SCALE IN FEET

0 600 1,200 1,800

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.9-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
UPPER SIXMILE CREEK

ecology and environment

BUFF plotted: 07/14/98 REB

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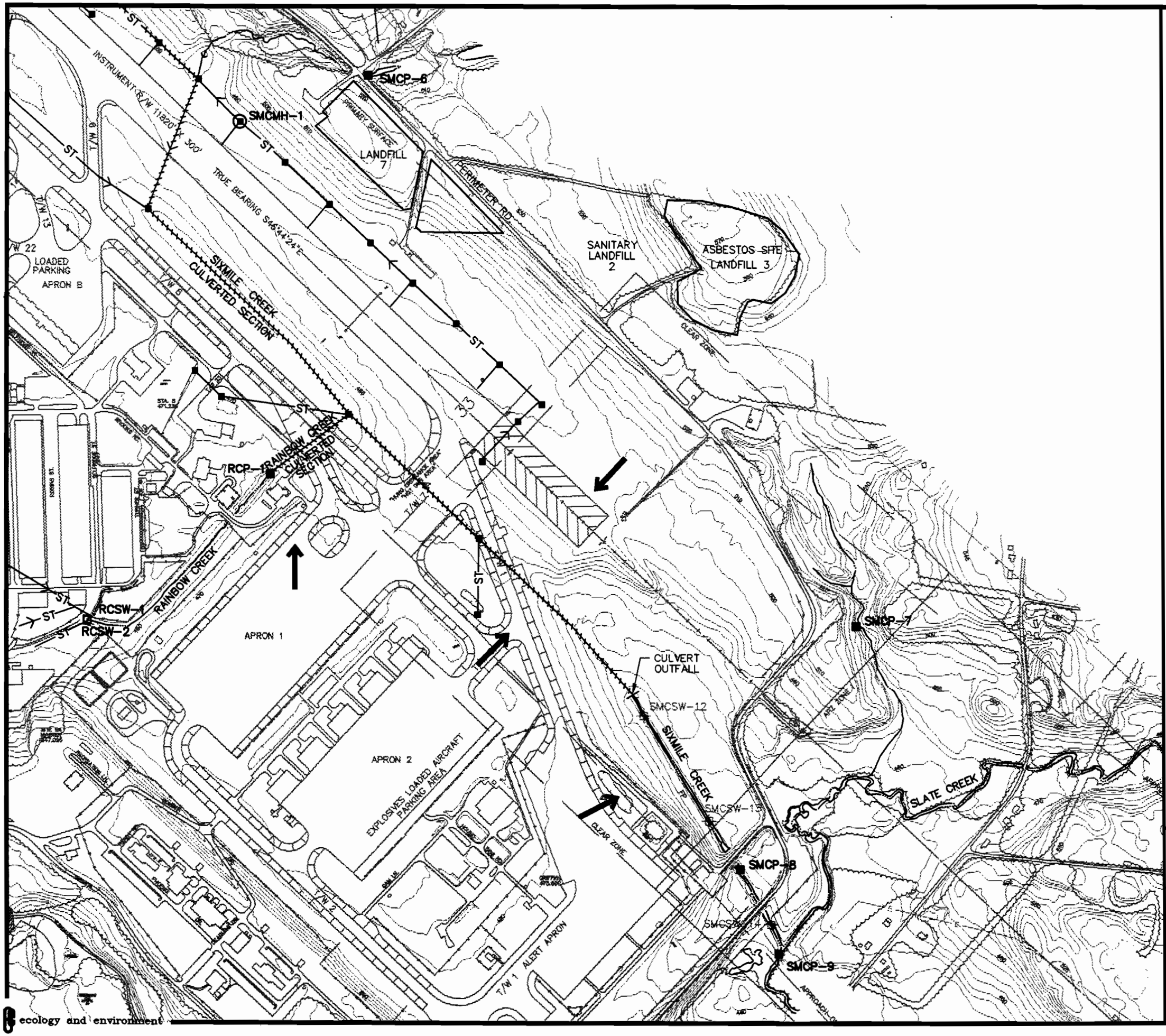

LEGEND

- SUPPLEMENTAL INVESTIGATION PISCES SAMPLE
- SUPPLEMENTAL INVESTIGATION SURFACE WATER SAMPLE
- SUPPLEMENTAL INVESTIGATION STORM SEWER WATER SAMPLE
- STORM SEWER MANHOLE
- RI SURFACE WATER SAMPLE (SW) AND SEDIMENT (SD) SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- ST — STORM SEWER
- CULVERTED SECTION OF SIXMILE CREEK
- LANDFILL BOUNDARY

N

SCALE IN FEET

0 700 1,400 2,100

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.9-2
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
LOWER SIXMILE CREEK

ecology and environment

BUFF plotted: 07/14/98 REB

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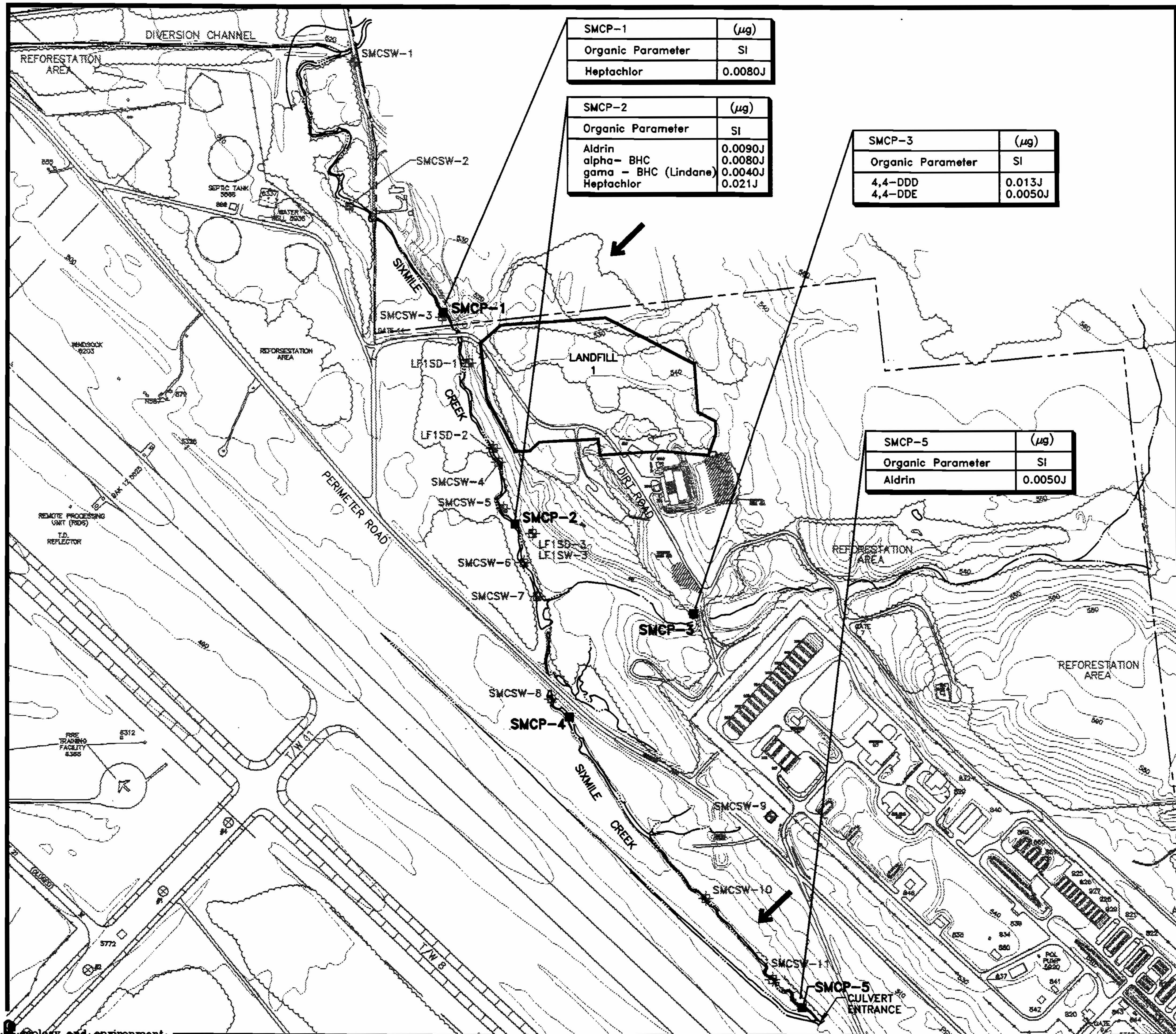

SMCP-1	(μg)
Organic Parameter	SI
Heptachlor	0.0080J

SMCP-2	(μg)
Organic Parameter	SI
Aldrin	0.0090J
alpha- BHC	0.0080J
gama - BHC (Lindane)	0.0040J
Heptachlor	0.021J

SMCP-3	(μg)
Organic Parameter	SI
4,4-DDD	0.013J
4,4-DDE	0.0050J

SMCP-5	(μg)
Organic Parameter	SI
Aldrin	0.0050J

LEGEND

■ SUPPLEMENTAL INVESTIGATION PISCES SAMPLE

RI SURFACE WATER SAMPLE (SW) AND SEDIMENT (SD) SAMPLE

DIRECTION OF GROUNDWATER FLOW

J ESTIMATED CONCENTRATION

LANDFILL 1 BOUNDARY

SCALE IN FEET

0 600 1,200 1,800

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.9-3
SUPPLEMENTAL INVESTIGATION
PISCES SAMPLE RESULT MAP
UPPER SIXMILE CREEK

ecology and environment

BUFF plotted: 07/14/98 REB

KH3S520B

SMCP-6	(µg)
Organic Parameter	SI
Endosulfan sulfate	0.0080J

RCP-1	(µg)
Organic Parameter	SI
4,4-DDD	0.010
4,4-DDE	0.025
4,4-DDT	0.036
Aldrin	0.025
beta - BHC	0.0064
Chlordane	0.11
Dieldrin	0.025
Endosulfan II	0.018
gamma - BHC (Lindane)	0.0036
Heptachlor	0.028

SMCP-7	(µg)
Organic Parameter	SI
Aldrin	0.0080J

SMCP-8	(µg)
Organic Parameter	SI
4,4-DDD	0.011J
alpha - BHC	0.038J
Chlordane	0.051J
Dieldrin	0.067J

SMCP-9	(µg)
Organic Parameter	SI
4,4-DDD	0.0070J
alpha - BHC	0.0028J
Chlordane	0.035J
Dieldrin	0.043J
Endosulfan sulfate	0.013J

LEGEND

- SUPPLEMENTAL INVESTIGATION PISCES SAMPLE
- SUPPLEMENTAL INVESTIGATION SURFACE WATER SAMPLE
- SUPPLEMENTAL INVESTIGATION STORM SEWER WATER SAMPLE
- STORM SEWER MANHOLE
- RI SURFACE WATER SAMPLE (SW) AND SEDIMENT (SD) SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- ST — STORM SEWER
- CULVERTED SECTION OF SIXMILE CREEK
- LANDFILL BOUNDARY
- J ESTIMATED CONCENTRATION

N

SCALE IN FEET

0 700 1,400 2,100

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.9-4
SUPPLEMENTAL INVESTIGATION
PISCES SAMPLE RESULTS MAP
LOWER SIXMILE CREEK

BUFF plotted: 07/14/98 REB

ecology and environment

4.10 Fire Protection Training Area

4.10.1 Site Description

The Fire Protection Training Area (FPTA) is located southwest of Taxiway 8, northwest of Taxiway 20, and northeast of Taxiway 21 (see Figures 1-2A and 4.10-1). Beginning in the 1960s, the site was used to simulate aircraft fuel fires with JP-4 fuel and waste. Original FPTA activities were conducted on bare soil at this site. In 1985, contaminated soil was removed and a new 100-foot-diameter FPTA was constructed with a clay-lined concrete basin and mock aircraft in the center. A JP-4 underground storage tank (UST) located northeast of the concrete basin and an underground pipeline supply fuel to be ignited. An oil/water separator (OWS) system, which has been reported to overflow frequently, is used to collect waste liquids generated during fire training. A storm drain, which is believed to intercept groundwater, runs directly below the site.

4.10.2 Remedial Investigation

The RI investigation consisted of a soil gas/groundwater survey; the drilling of 13 soil borings; the collection and in-field analysis of 63 subsurface soil samples from the soil borings and off-site confirmatory laboratory analysis of 39 of the samples; and installation and sampling of three groundwater monitoring wells. Several low-level VOCs were detected in the soil gas and groundwater survey. Field screening of soils indicated the presence of elevated levels of toluene and TCE; however, only SVOCs were detected at concentrations exceeding potential ARARs in the laboratory samples tested. Concentrations of several VOCs exceeded potential ARARs in the groundwater sample from FPTMW-1.

4.10.3 Supplemental Investigation

The SI for the FPTA consisted of: the collection of two samples (FPTAMH-1W and FPTAMH-2W) from the storm sewer running beneath the site; the installation and sampling of one monitoring well (FPTMW-4) and one vertical profile well (FPTVMW-5); and the sampling of three existing site wells (FPTMW-1 through -3). Because well installation and sampling were performed as part of the On-Base Groundwater SI, they are discussed in Section 4.11 of this report. A list of samples, analyses, and required QC samples is provided in Table 4.10-1. Surface water samples from the storm sewer were collected from one manhole immediately upgradient and one manhole immediately downgradient of the site (see Figure 4.10-1). The samples were collected according to the procedures outlined in Section 2.8 in this report.

4.10.4 SI Results

4.10.4.1 Storm Sewer Water Samples

On June 12, 1997, two water samples (FPTMH-1W and FPTMH-2W) were collected from a storm sewer running beneath the southeast section of the Fire Protection Training Area (Figure 4.10-1). The same localities were re-sampled for semivolatiles on July 30, 1997, due to laboratory problems with the analysis of the initial samples. Bis(2-Ethylhexyl)phthalate was detected in both samples. The level of this compound in FPTMH-2W exceeded the screening criteria of 6 μg/L (see Table 4.10-2). However, this compound is a common lab and field contaminant resulting from the use of surgical gloves. Moreover, analytical results for this compound were rejected based on the results of the laboratory control sample as indicated in the QCSR (E & E 1997d). No other volatile or semivolatile contaminants were detected.

4.10.4.2 Sediment Samples

Although the collection of sediment samples from the storm sewer was proposed in the work plan, no sediment was present in the sewer.

4.10.5 SI Conclusions

Results of RI field activities and baseline risk assessment indicated elevated concentrations of fuel-related contaminants in the groundwater sample from FPTMW-1. The presence of the contaminants would result in potential unacceptable adverse noncarcinogenic health effects if the groundwater in the vicinity of this well were used as an industrial water supply. The RI recommended re-sampling the FPTA wells and recommended no further action if similar conditions were encountered (LAW Environmental 1996).

Although results of the SI storm sewer samples did not indicate the presence of VOC or SVOC contaminants of concern, results of groundwater sampling warrant that site be addressed in the FS for the On-Base Groundwater AOC. Groundwater issues are discussed in Section 4.11 of this report.

Table 4.10-1
LISTING OF SAMPLES TAKEN AND SKIPPED AT THE FIRE PROTECTION TRAINING AREA

9/14/97

Griffiss AFB - Supplment Invstgtn

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: % Solids NVOA	Ferrous Iron	Anions a	Anions b	BOD	COD	Cr6	Fingrprt	Hard.	M.E.E.	MRD	PCB 525	PCB	pH	SVOC 525	TOC	VOC 524	VOCs
zMohawk River Fire Pr. Training Area	SI	FPTAMH-1SD		ASC	Sediment	-	Y	S	N1	X														X		X	
	SI	FPTAMH-2SD		ASC	Sediment	-	Y	S	N1	X														X		X	
	SI-QA/QC	FPTAMH-RBSD		ASC	Eqpt. Washwater	-	Y	S	FD1															X		X	
	SI	FPTAMH-1W	6/12/97	ASC	Surface Water	-	Y	T	N1																	X	
	SI-QA/QC	FPTAMH-1W /MSD	6/12/97	ASC	Water/QC Matrix	-	Y	T	MS																	X	
	SI	FPTAMH-2W	6/12/97	ASC	Surface Water	-	Y	T	N1																	X	
	SI-QA/QC	FPTAMH-RB1W	6/12/97	ASC	Eqpt. Washwater	-	N	T	FD1																	X	
	SI---Rsmp	FPTAMH-1W	7/30/97	ASC	Surface Water	-	Y	T	N1															X			
	SI---Rsmp	FPTAMH-2W	7/30/97	ASC	Surface Water	-	Y	T	N1															X			
	SI-QA/QC-Rsmp	FPTAMH-RB1W	7/30/97	ASC	Eqpt. Washwater	-	N	T	FD1															X			

9.39 – 9.64

9.39 – 9.64

15.30 – 15.64

9.39 – 9.64

15.30 – 15.64

Note: Depth is measured in feet.

Key:

* = existing monitoring well
Anions a = chloride, nitrate/nitrate, phosphate, sulfate
Anions b = sulfide
AOC = Area of Concern
ASC = E and E's Analytical Services Center
BOD = biological oxygen demand
COD = chemical oxygen demand
Cr6 = hexavalent chromium
EB1, EB2 = equipment rinsate
/D = duplicate sample
Eqpt = equipment
Fd = field
FD1 = field duplicate
Fingrprt = fingerprint analysis
FR1 = field replicate/split
GW = groundwater
N1 = original
NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
M.E.E. = methane, ethane and ethene
MRD = Missouri River Division laboratory
MS1 = matrix spike/matrix spike duplicate
/MSD = matrix spike/matrix spike duplicate
PCB = polychlorinated biphenyl
Pest = pesticide
QA/QC = quality assurance/quality control sample
QC = quality control
RB = rinsate blank
Rsmp = resample
/S = split sample
SI = Supplemental Investigation
SVOC = semivolatile organic compound
Stat = status (O = open; S = skipped; T = taken)
TOC = total organic carbon
TB = trip blank
TB1, TB2 = trip blank
TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
VOC = volatile organic compound
WP = sample in the work plan (Y= yes; N= no)

ANALYTICAL DATA SUMMARY OF THE POSITIVE RESULTS FOR STORM SEWER SAMPLES FROM THE FPTA FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Sample No.:	FPTAMH-1W	FPTAMH-1W	FPTAMH-2W	FPTAMH-2W
Sample Date:	6/12/97	7/30/97	6/12/97	7/30/97
Sample Depth (ft):	9.39 – 9.64	9.39 – 9.64	15.30 – 15.64	15.30 – 15.64
Semivolatiles (525.2) (ug/L)				
bis(2-Ethylhexyl)phthalate	–	3.1 R	–	9.8 R

Key:

-- = Samples not analyzed for this parameter
/D = Duplicate sample
J = Estimated concentration
mg/L = Milligrams per liter
ug/L = Micrograms per liter
UJ = Undetected; Estimated detection limit reported

☐ = Result exceeds screening criteria

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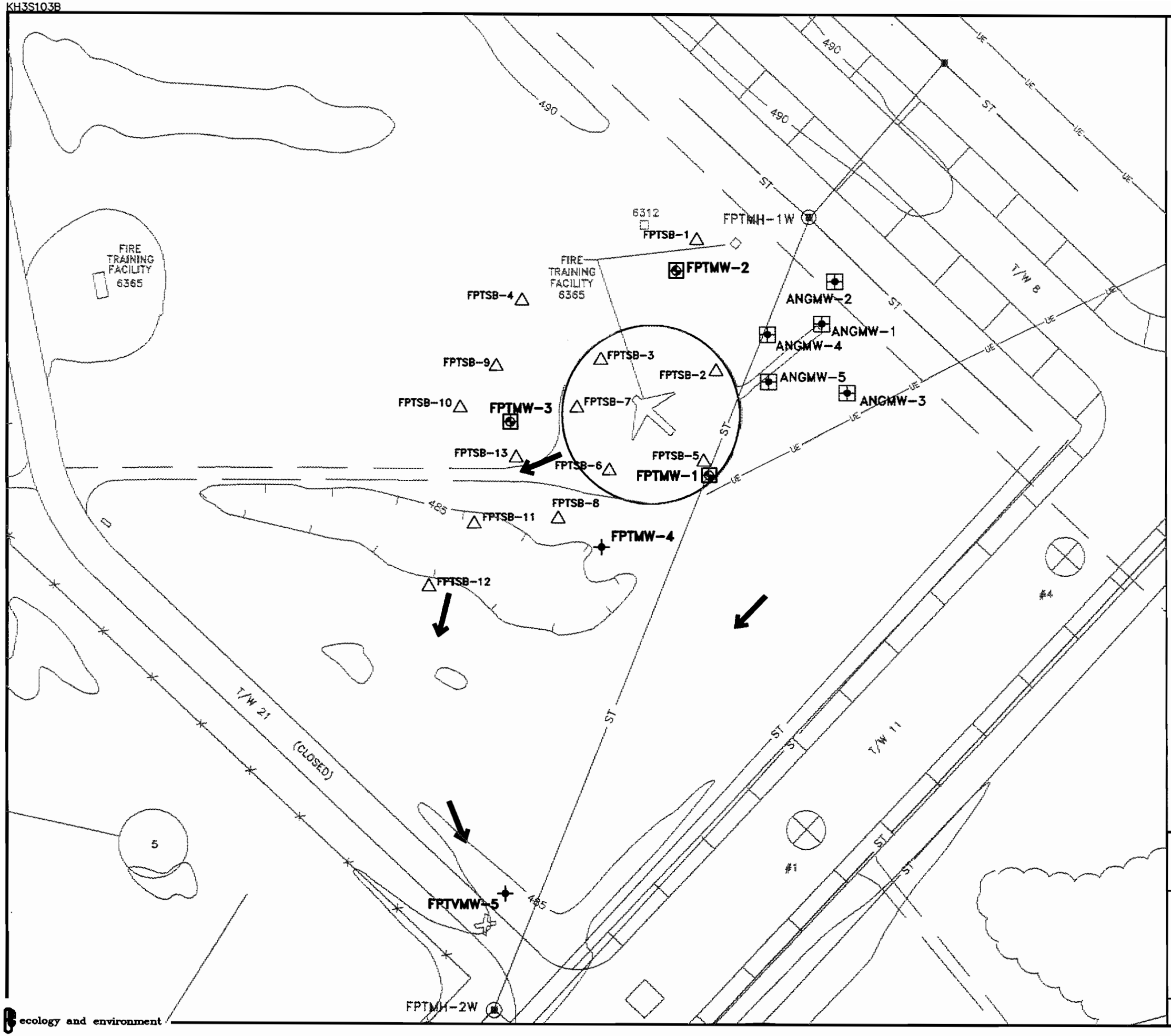

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- SUPPLEMENTAL INVESTIGATION STORM SEWER WATER SAMPLE
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- RI MONITORING WELL
- AIR NATIONAL GUARD MONITORING WELL
- RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- STORM SEWER MANHOLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- 490 TOPOGRAPHIC CONTOUR LINE
- UE UNDERGROUND ELECTRIC
- ST STORM SEWER

N

SCALE IN FEET

0 150 300 450

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.10-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
FIRE PROTECTION TRAINING AREA

ecology and environment

PLOTTED BUFF:10/13/97

4.11 On-Base Groundwater Contamination

4.11.1 Site Description

The On-Base Groundwater AOC addresses groundwater contamination from all of the AOCs and the area south of the WSA, which is not an AOC. Although regional groundwater flow beneath the former base is to the south and southwest, there are several recharge and discharge areas, drainage ditches and creeks, and large-diameter storm water drains set into the top of the water table that locally influence groundwater flow directions. The depth of groundwater beneath the former base varies with topography and ranges from less than 2 feet BGS in low-lying areas to approximately 60 feet BGS in areas of high elevation. Based on the comprehensive overview of all available basewide groundwater data, the groundwater regime at the former base was divided into eight distinct areas on the basis of geologic/hydrologic features (E & E 1996b), and these interpretations were verified during this investigation (see Figures 4.11-1A [North] and -1B [South]):

- Sixmile Creek (east side) Drainage Area;
- Sixmile Creek (west side) Drainage Area;
- Threemile Creek (east side) Drainage Area;
- Threemile Creek (west side) Drainage Area;
- Mohawk River Drainage Area;
- New York State Barge Canal (east of Threemile Creek) Drainage Area;
- New York State Barge Canal (west of Threemile Creek) Drainage Area; and
- Slate Creek Drainage Area

The On-Base Groundwater AOC SI consists of thirteen sites that are distributed among the following four basewide hydrologic regions:

- **Sixmile Creek (east side):** draining southwest to Sixmile Creek, includes Landfill 7; and the area around LAWMW-9 south of the WSA (which is not considered an AOC);
- **Sixmile Creek (west side):** draining generally east to Sixmile Creek, with some flow via storm drains and/or Rainbow Creek, includes Lot 69 former Hazardous Waste Storage Area; Building 3 Drywell; Building 786 contaminated soil; Building 133 Storage Vault; and Nose Docks 1 and 2;

- **Threemile Creek (east side):** draining generally south and southeast to Threemile Creek, includes Building 101 BADP/Yellow Submarine (via storm drains); Landfill 5; Landfill 6; and Building 775 TCE contamination; and

- **Mohawk River Drainage:** draining generally southwest and west to the Mohawk River, includes the Fire Protection Training Area (via storm drain); and Tin City (Building 214 former Vehicle Maintenance Shop, Building 219 Drywell, and Building 255 Drywells).

Only the Tin City group of AOCs affect the groundwater that could leave the base and travel for some distance off base before entering surface water. No wells on the facility boundary are impacted by these sites, so there is no evidence of any AOCs impacting off-base groundwater. No AOCs occur in those areas whose groundwater discharges to Slate Creek or to the New York State Barge Canal.

Descriptions of the sites included under the On-Base Groundwater AOC SI are provided below.

4.11.1.1 Landfill 7

Landfill 7 is described in Section 4.7 of this report (see Figure 4.11.4.1-1).

4.11.1.2 South of Weapons Storage Area

This site is located on the north side of the main runway between Perimeter Road and the culverted section of Sixmile Creek, south of the former WSA (see Figure 4.11.4.2-1). The area is not known to have been an AOC, but levels of TCE in groundwater in well LAWMW-9 detected during the RI indicated that this area could be a source of contamination.

4.11.1.3 Lot 69 Former Hazardous Waste Storage Area

The Lot 69 Former Hazardous Waste Storage Area site is located in the central portion of the former base, south of current Building Pads 5, 6, and 7 (see Figure 4.11.4.3-1). The site currently occupied by Buildings 11 and 15. From 1965 to 1982, it was used as an unfenced interim storage area for liquid and solid hazardous wastes. Spills reportedly occurred during that time.

4.11.1.4 Building 3 Drywell

The former Building 3 Drywell was located on the east-central side of Building 3 in the central portion of the former base (see Figure 4.11.4.4-1). From the 1960s to 1984, the drywell was used to dispose of cleaning solvents, etching acids with metal salts, paint thinner, methanol, acetone, and TCE. The drywell and surrounding contaminated soils were excavated and removed in 1987.

4.11.1.5 Building 786 (Nose Dock 5) Contaminated Soil

Building 786 (Nose Dock 5) is located in the southeast portion of the former base between Aprons 1 and 2 on the southeast end of the main runway (see Figure 4.11.4.5-1). The site consisted of an aboveground storage tank (AST) used for the collection of waste oil, solvents, and fuel from the Aerospace Ground Equipment Shop. In 1990, the AST and some of the surrounding contaminated soil were removed. The AST was replaced with two USTs.

4.11.1.6 Building 133 Storage Vault

The former Building 133 Storage Vault was located southwest of Building 133 in the central portion of the former base (see Figure 4.11.4.6-1). The vault was a concrete UST with a 4,000-gallon capacity. From 1977 to 1992, the vault was used to collect waste oils from the floor drain system in Building 133. The vault was removed in 1997.

4.11.1.7 Nose Docks 1 and 2

Nose Docks 1 and 2 are located at Buildings 782 and 783, respectively, in the southeast portion of the former base between Aprons 1 and 2 (see Figure 4.11.4.7-1). This AOC consists of two sites of soil contamination: releases from an oil/water separator system located near the northeast corner of Building 782; and soils saturated with fuel that caught fire as the result of sparks generated by trenching operations near Nose Docks 1 and 2 and Apron 1 in July 1990. The oil/water separator was a concrete vault operated from the 1940s to 1995 to collect fuel and water mixtures and miscellaneous wash-down wastes from the five nose docks. The oil/water separator was removed and replaced in 1995.

4.11.1.8 Building 101 Battery Acid Disposal Pit/Yellow Submarine UST

Building 101 BADP/Yellow Submarine UST is located south of Apron 3, in the central portion of the base (see Figure 4.11.4.8-1). Building 101 was an industrial waste treatment

facility. The AOC consists of a former battery acid disposal pit (BADP), which received spent battery acid from the 1940s to 1985, and a 12,000-gallon ("Yellow Submarine") UST that received plating wastes from 1973 to 1987. The Yellow Submarine UST was removed in 1993.

4.11.1.9 Landfill 5

Landfill 5 was described in Section 4.5 of this report (see Figure 4.11.4.9-1).

4.11.1.10 Landfill 6

Landfill 6 was described in Section 4.6 of this report (see Figure 4.11.4.10-1).

4.11.1.11 Building 775 (Pumphouse 3) TCE Contamination

Building 775 is located on SAC Hill in the southeast portion of the former base (see Figure 4.11.4.11-1). TCE and PCE were detected in the groundwater at Pumphouses 3 and 4 (former buildings 775 and 779). A TCE storage tank was reportedly located near this site in Building 774. Pumphouse 3 was used to supply JP-4 jet fuel to aircraft.

4.11.1.12 Fire Protection Training Area

The FPTA was described in Section 4.10 of this report (see Figure 4.11.4.12-1).

4.11.1.13 Tin City (Including Building 214 Vehicle Maintenance Shop, Building 219 Drywell, and Building 255 Drywells)

Tin City is located south of Apron 4 in the central portion of the former base (see Figure 4.11.4.13-1). It encompasses the area between Hill Road, MacDill Street, Hangar Road, and Apron 4, and includes Buildings 212, 214-216, 219-224, and 255. Four AOCs—Building 214 Vehicle Maintenance Shop, Building 219 Drywell, Building 222 BADP, and Building 255 Drywells—were included in the RI. Only the Building 222 BADP AOC is not included under the On-Base Groundwater AOC SI because it has been recommended for Interim Remedial Action (IRA).

A floor drain in Building 214 is connected to an OWS. The aqueous phase discharged to the sanitary sewer, and the oil discharged to a UST. The waste oil UST has overflowed in the past. The drywell at Building 219 was reportedly used for disposal of liquid wastes for an unknown period ending sometime in the 1970s. Spills of fuel oil also were reported to have

occurred at this site. The Building 255 Drywell AOC included three drywells associated with Building 255, one drywell associated with Building 223, one drywell associated with former Building 230, and two drywells associated with Buildings 215/216. The Building 255 drywells reportedly received liquid wastes (i.e., lube oil, engine cleaning compounds, caustics, acids, and paints) from the vehicle maintenance shop at which radiators and gas tanks were repaired. The Building 223 drywell was connected to a laboratory sink that was reportedly used to wash off laboratory equipment/glassware and to dispose of fuel residuals. No other disposal information for the other drywells was provided in the RI.

4.11.2 Remedial Investigations

The RI for the On-base Groundwater AOC consisted of:

- The drilling and installation of 23 monitoring wells;
- Hydraulic conductivity testing of 22 of the 23 wells;
- Groundwater sampling of the 23 wells and 16 pre-existing wells;
- Subsurface soil sampling for visual classification and geotechnical analysis at 23 wells;
- The installation of five staff gauges along Sixmile Creek and three along Threemile Creek;
- The installation of three flow cells and three piezometers along Sixmile Creek and two flow cells and piezometers along Threemile Creek; and
- The collection of groundwater measurements from 25 wells and piezometers along the two creeks, along with stream flow data for five rainfall events.

Forty-two VOCs, 43 SVOCs, 54 herbicides/pesticides, 23 metals, glycols, and cyanide were detected in the groundwater. Twenty VOCs were detected at concentrations exceeding potential ARARs. The most frequently detected VOCs were petroleum-related compounds; however, some chlorinated solvents were also detected. Fourteen SVOCs were detected at concentrations exceeding potential ARARs. The most frequently detected SVOCs were gamma-chlordane and several PAHs. Four pesticides (ethylene dibromide, aldicarb, alpha-BHC, and paraquat) were detected at concentrations exceeding potential ARARs. The metals that most frequently were detected at concentrations exceeding potential ARARs were aluminum, iron, manganese, sodium, and thallium. Twenty-eight samples contained glycols at concentrations exceeding New York State drinking water standards. Four analytes were

modeled (benzene, arsenic, TCE, and glycols). Six arsenic plumes, three benzene plumes, 10 TCE plumes, and 11 glycol plumes were inferred from the model, which indicated that the plumes are not likely to spread from their current locations.

A description of RI activities at sites included under the On-Base Groundwater AOC SI is provided below.

4.11.2.1 Landfill 7

A discussion of RI activities conducted at Landfill 7 was provided in Section 4.7 of this report.

4.11.2.2 South of Weapons Storage Area

During the RI, groundwater from well LAWMW-9 contained TCE at a concentration of 7.6 μg/L, which exceeds the maximum contaminant level of 5 μg/L. TCE was not detected in the closest upgradient well, WSAMW-2, which is approximately 1,500 feet northeast. The extent of contamination could not be determined because only one well was affected.

4.11.2.3 Lot 69 Former Hazardous Waste Storage Area

The RI consisted of: a geophysical survey; the drilling of eight borings; the collection and analysis of 35 soil samples; the installation of five monitoring wells; the collection and on-site analysis of 18 soil samples from the monitoring well boreholes (six samples submitted for off-site confirmatory analysis); and the collection and analysis of five groundwater samples. Four SVOCs, one PCB mixture, and several metals were detected in the soils at concentrations exceeding potential TBCs. One pesticide and several metals were detected in groundwater at concentrations exceeding potential ARARs.

4.11.2.4 Building 3 Drywell

The RI consisted of the drilling of two soil borings and the collection and analysis of one groundwater screening sample from each boring. Metal concentrations exceeding potential ARARs were detected in the groundwater screening samples; however, concentrations of metals are typically elevated in such samples because of the turbidity.

4.11.2.5 Building 786 (Nose Dock 5) Contaminated Soil

The RI consisted of: the drilling of one soil boring; the collection of five soil samples from the borehole; the installation of two monitoring wells; and the collection of four groundwater samples, one each from two existing wells and the two newly installed wells. Analytical results for the soil samples indicated the presence of PAHs and toluene at concentrations exceeding potential TBCs. Several VOCs were detected in the groundwater at concentrations exceeding potential ARARs.

4.11.2.6 Building 133 Storage Vault

The RI consisted of: the drilling of four soil borings and the collection and analysis of four subsurface soil samples and one groundwater sample from each boring. Analytical results indicated the presence of VOCs and SVOCs in both soil and groundwater at concentrations exceeding potential TBCs and potential ARARs.

4.11.2.7 Nose Docks 1 and 2

The RI consisted of: a soil gas survey; the drilling of 24 soil borings; the drilling and installation of four monitoring wells; and the collection of one waste oil sample from the oil/water separator, 129 soil and 12 grab groundwater samples from the borings for field screening analysis, 60 soil samples from the soil borings for off-site laboratory analysis, six surface soil/sediment samples, and groundwater samples from each new monitoring well. No analytes were detected in any of the soil gas samples. Several VOCs, SVOCs, and metals were detected in the waste oil samples. Several VOCs and SVOCs were detected in the field screening of soils. Confirmatory sample analyses indicated the presence of several VOCs, SVOCs, and metals at concentrations exceeding potential TBCs. In addition, one pesticide and one PCB aroclor were also detected at concentrations exceeding potential TBCs. Petroleum hydrocarbons were detected in 42 of the 60 soil samples. Several SVOCs, metals, and one pesticide were detected in the surface soil/sediment at concentrations exceeding potential TBCs, and all samples contained petroleum hydrocarbons. Several VOCs were detected in the grab groundwater samples that were field screened. Confirmatory sample analyses indicated the presence of several VOCs, metals, and petroleum hydrocarbons at concentrations exceeding potential ARARs.

4.11.2.8 Building 101 BADP/Yellow Submarine UST

The RI consisted of the drilling of one soil boring and the collection of six soil samples and one groundwater screening sample from the boring. The RI at the Yellow Submarine UST consisted of: a soil gas/groundwater survey; the installation of two groundwater monitoring wells; the sampling and analysis of the two newly installed wells and one existing well; and the collection of sediment samples from one catch basin. The analytical results of the BADP soil sample indicated the presence of two SVOCs and several metals at concentrations exceeding potential ARARs and potential TBCs. Analytical results of the groundwater samples from the Yellow Submarine UST revealed two VOCs, three SVOCs, one pesticide, and four metals at concentrations exceeding potential ARARs.

4.11.2.9 Landfill 5

A discussion of RI activities conducted at Landfill 5 is provided in Section 4.5 of this report.

4.11.2.10 Landfill 6

A discussion of RI activities conducted at Landfill 6 is provided in Section 4.6 of this report.

4.11.2.11 Building 775 (Pumphouse 3) TCE Contamination

The RI consisted of: a soil gas/groundwater survey; the collection of three surface soil samples; the drilling of one soil boring; the collection and in-field analysis of 28 subsurface soil samples from the soil boring; and the confirmatory off-site laboratory analysis of two subsurface soil samples. Analytical results indicated the presence of TCE and PCE in the subsurface soil and groundwater in the vicinity of Building 773, Building 774, and Building 775, indicating that Building 774 and Building 775 are also potential sources of the TCE contamination in the area.

4.11.2.12 Fire Protection Training Area

A discussion of RI activities conducted at the Fire Protection Training Area is provided in Section 4.10 of this report.

4.11.2.13 Tin City (Including Building 214 Vehicle Maintenance Shop, Building 219 Drywell, and Building 255 Drywells)

Tin City includes three AOCs studied under both the RI and SI: Building 214 Vehicle Maintenance Shop; Building 219 Drywell; and Building 255 Drywells. A discussion of RI activities conducted under these AOCs is provided below.

Building 214 Vehicle Maintenance Shop

The RI at the Building 214 Vehicle Maintenance Shop consisted of: a geophysical survey; a soil gas/groundwater screening survey; the collection of three surface soil samples; the drilling of nine soil borings; the collection and analysis of 62 subsurface soil samples for headspace screening and/or chemical analysis; and the installation and sampling of two temporary monitoring wells. Analytical results indicated the presence of PAHs and several metals in the soils at concentrations exceeding potential TBCs. Low levels of VOCs, SVOCs, and pesticides were detected in the groundwater. The highest concentrations were detected in samples collected near the southeast corner of Building 214.

Building 219 Drywell

The RI consisted of a surface geophysical survey, test pit excavation, the drilling of one soil boring, and the collection of seven subsurface soil samples and one groundwater sample from the soil boring. Contaminant concentrations at the site did not exceed potential TBCs or potential ARARs.

Building 255 Drywells

The RI consisted of: a geophysical survey to locate drywells; the excavation of three test pits to locate drywells; the drilling of 11 soil borings; the collection of 63 subsurface soil samples; and the installation and sampling of eight temporary monitoring wells. None of the drywells was located by the geophysical survey or test pit excavations. VOCs, SVOCs, PCBs, and several metals were detected in subsurface soils at concentrations exceeding potential ARARs. VOCs, SVOCs, and PCBs were detected in groundwater at concentrations exceeding potential ARARs.

4.11.3 Supplemental Investigation

4.11.3.1 Well Installation and Groundwater Sampling

The installation and sampling of permanent and/or temporary monitoring wells and resampling of existing wells were proposed in areas where contaminant concentrations in groundwater had exceeded potential ARARs during the RI, where the extent of a possible plume was undefined, or where groundwater divides or flow directions were undefined. At some sites (LF-6, Building 133, and Tin City), a Geoprobe® groundwater screening survey was performed prior to well installation. The groundwater screening samples collected during these surveys underwent rapid-turnaround analyses in a field laboratory (see Section 2.12), and the results were used to place the permanent wells in or downgradient of the areas of highest contamination.

The Geoprobe® surveys were performed according to the procedures described in Section 2.11.3 of this report. Permanent monitoring wells were either standard wells similar to those installed during the RI or vertical profile wells. Standard monitoring wells were installed according to procedures described in Section 2.11.5.1 of this report. Vertical profile wells were installed in areas requiring characterization of groundwater contaminants with depth. Groundwater samples were collected at 10-foot intervals beginning at the surface of the water table to the top of bedrock or auger refusal, whichever occurred first. The samples were analyzed in the field, and the results were used to place the vertical location of the well screen at the most contaminated zone. Vertical profile well installation procedures are described in Section 2.11.5.2 of this report. Temporary well installation and groundwater sampling was performed according to procedures described in Sections 2.11.4 and 2.11.8, respectively, of this report.

The following tasks for the On-Base Groundwater AOC SIs were proposed under each of the identified groundwater areas that drained to a specified surface water body.

Sixmile Creek (east side) Drainage Area

The Sixmile Creek (east side) Drainage Area showed groundwater contamination from Landfill 7 and the WSA that justified an SI. The proposed SI tasks (see Tables and Figures 4.11.4.1-1 and 4.11.4.2-1) consisted of:

- Construction and sampling of two temporary wells at Landfill 7 (LF7TW-24 and LF7TW-25);

- Resampling existing wells LF7MW-3R, LF7MW-16, LF7MW-17, LF7MW-18R, LF7MW-22, and HS7MW-1;

- Construction and sampling of three temporary wells at the WSA (WSATW-5, WSATW-6, and WSATW-7); and

- Resampling existing well WSAMW-2.

Sixmile Creek (west side) Drainage Area

The Sixmile Creek (west side) Drainage Area showed groundwater contamination from Lot 69, Building 3 Drywell, Building 786 Contaminated Soil, Building 133, and Nose Docks 1 and 2 that justified SIs. The proposed SI tasks (see Tables and Figures 4.11.4.3-1, 4.11.4.4-1, 4.11.4.5-1, 4.11.4.6-1, and 4.11.4.7-1) consisted of:

- Resampling one existing well (L69MW-4) and construction and sampling of one temporary well (L69MW-5) at Lot 69;

- Construction and sampling of one vertical profile well (B3VMW-1) at Building 3;

- Construction and sampling of permanent monitoring well (786MW-6) at Building 786, resurveying 786MW-2 to clarify groundwater elevation discrepancies, and probing 786MW-2 and 786MW-4 for free product;

- A Geoprobe® groundwater survey to site three permanent monitoring wells (133MW-1, 133MW-2, and 133MW-3) at Building 133, and sampling of existing well HS5MW-1. However, this existing well was later determined to be destroyed (see Field Adjustment Form No. 36 in Appendix A); and

- Construction and sampling of two permanent monitoring wells (782MW-5 and 782MW-6) at Nose Docks 1 and 2 and resampling three existing wells (782MW-1, 782MW-2, and 782MW-3R). Although the work plan stated that 782MW-1 was to be resampled, replacement well 782MW-1R was actually resampled (see Field Adjustment Form No. 35 in Appendix A). Because perched water encountered in 782MW-6 and replacement well 782MW-6R1, neither of these wells produced enough water for development. Therefore, a second replacement well (782MW-6R2) was installed and sampled.

Threemile Creek (east side) Drainage Area

The Threemile Creek (east side) Drainage Area showed groundwater contamination from Building 101, Landfills 5 and 6, and Building 775 that justified SIs. The SI tasks (see Tables and Figures 4.11.4.8-1, 4.11.4.9-1, 4.11.4.10-1, and 4.11.4.11-1) consisted of:

- Resampling existing wells 101MW-1, 101MW-2, and 101MW-3, and construction and sampling of one permanent monitoring well (101MW-4) and two temporary wells (101TW-5 and 101TW-6) near Building 101 AOC;

- Construction and sampling of one permanent monitoring well (LF5MW-4) at Landfill 5, and resampling existing wells LF5MW-1, LF5MW-2, and LF5MW-3;

- A Geoprobe® survey to locate one vertical profile well (LF6VMW-6) at Landfill 6, construction and sampling of that well, and resampling existing wells LF6MW-1, LF6MW-2, TMC-USGS-3, and TMCMW-9); and

- Construction and sampling of six vertical profile wells (775VMW-4, 775VMW-5, 775VMW-7, 775VMW-8, 775VMW-9, and 775VMW-10) and one monitoring well (775MW-6) near Building 775, and resampling six existing wells (773MW-1, 773MW-2, 773MW-3, 775MW-1, 775MW-2, and 775MW-3). Wells 775MW-1 and 775MW-3 could not be sampled due to well obstructions.

Threemile Creek (west side) Drainage Area

The Threemile Creek (west side) Drainage Area contained only one well (H56MW-2) from which VOCs and/or SVOCs in groundwater exceeded ARARs (i.e., benzidene at 50 μg/L). Because there are no upgradient sites other than the housing area and the contamination was limited in nature, no SI was proposed.

Mohawk River Drainage Area

The Mohawk River Drainage Area showed groundwater contamination from the Fire Protection Training Area and Tin City AOCs (Building 214, Building 219, and Building 255) that justified SIs. SI tasks (see Tables and Figures 4.11.4.12-1 and 4.11.4.13-1) consisted of:

- Resampling existing wells FPTMW-1, FPTMW-2, and FPTMW-3, and the construction and sampling of one monitoring well (FPTMW-4) and one vertical profile well (FPTVMW-5) at the Fire Protection Training area; and

- A Geoprobe® groundwater survey to locate two vertical profile wells (255VMW-1 and 255VMW-2) for the Building 255 part of Tin City, construction and sampling of those wells, construction and sampling of two vertical profile wells (TCVMW-1 and TCVMW-2) downgradient of the Buildings 214 and 219 part of Tin City, and resampling existing well LAWMW-13, also downgradient of Tin City.

New York state Barge Canal (east of Threemile Creek) Drainage Area

The New York State Barge Canal (east of Threemile Creek) Drainage Area has no upgradient AOCs, and groundwater contamination in this area was not recommended to be addressed in the FS.

New York State Barge Canal (west of Three Mile Creek) Drainage Area

The New York State Barge Canal (west of Threemile Creek) Drainage Area has no upgradient AOCs, and groundwater contamination in this area was not recommended to be addressed in the FS.

Slate Creek Drainage Area

The Slate Creek Drainage Area has no upgradient AOCs, and groundwater contamination in this area was not recommended to be addressed in the FS.

4.11.3.2 Basewide Groundwater Elevation Survey

In addition to the above-mentioned groundwater investigations, a basewide groundwater elevation survey was performed. The survey involved verifying top of casing elevations and/or location coordinates of several existing wells (771MW-5, AP2MW-1, TF3MW-1, 786MW-2, WSAMW-1, and CLYMW-1) because of apparent elevation or location discrepancies; obtaining location coordinates and top of casing elevations of all newly installed permanent wells associated with this investigation and wells installed as part of other programs in which no survey coordinates existed (e.g., five NYANG wells at Fire Protection Training Area, three Lot 11 wells and one Apron 1 well); measuring groundwater levels in all accessible on-site wells/piezometers (i.e., 234 wells/38 piezometers) and selected off-site wells (i.e., 23 wells); and measuring selected surface water levels from creeks and storm sewer manholes (i.e., 21 locations) within a one-week time period (see Appendix H). Procedures for this task are described in Section 2.13 of this report. The information gathered in this investigation was used to update, refine, and confirm E & E's basewide groundwater contour map originally prepared in April 1996 (E & E 1996b).

Results of this survey (see Figures 4.11-1A and 4.11-1B) indicate minor deviations in localized flow patterns throughout the base from those previously interpreted. No significant changes in the overall groundwater flow patterns were recognized with respect to those first

identified in E & E's initial basewide groundwater contour map using data collected in late summer of 1993 and 1994 (E & E 1996b). One important finding, other than the confirmation of previous interpretations, is that a large area of multiple level perched groundwater exists beneath Apron 1 and the surrounding area (see Figure 4.11-2). The number of perched zones and each zone's areal extent were not fully characterized in this study.

In addition to obtaining basewide groundwater elevations, observations of well integrity were also performed during this task. The following information was recorded: total depth; water level; and condition of the well lock, protective casing, inner cap, and other miscellaneous items. Results of these observations can be used to determine the wells in which integrity may be jeopardized by the absence of well locks, inner well caps, broken protective casings, obstructions in the well, or other miscellaneous conditions. A summary of wells whose integrity is questionable is provided in Table 4.11.3.2-1. Eight of these wells (101MW-2, 101MW-3, 773MW-2, 773MW-3, 775MW-2, 782MW-3R, FPTMW-1, and LAWMW-13) were sampled as part of the SI program. Two wells scheduled to be sampled during the SI (775MW-1 AND 775MW-3) could not be sampled for the reasons listed in the table. No unusual results were detected in samples collected from these wells.

4.11.3.3 Groundwater Analyses

Groundwater analyses performed during this investigation may be divided into three classes. The first class consisted of in-field analysis of Geoprobe®/HydroPunch® groundwater screening samples for VOCs (SW8021) only. Results of these analyses were used to choose well locations or screen depths as previously described in this section. The second class consists of VOC (EPA 524.2) and SVOC (EPA 525.2) analyses. These analyses were performed on all samples collected from temporary and permanent wells to document the levels of contamination present in the aquifer at the various locations. The area-specific selection of organic analyses was made based on historical information from each location. Finally, the third class of analyses were a suite of parameters selected to determine whether natural attenuation (NA) should be evaluated in the FS at any of these sites. NA parameters were a core set of parameters that were tested for at each location, plus some additional parameters necessary for evaluation at chlorinated hydrocarbon plume areas (see Section 2.11.8). These parameters were selected based on guidance published by the Air Force (*Technical Protocol for Implementing Intrinsic Remediation with Long-Term Monitoring for Natural Attenuation of Fuel Contamination Dissolved in Groundwater* [Wiedemeier 1995] and *Overview of the Technical Protocol for Natural Attenuation of Chlorinated Aliphatic Hydrocarbons in Ground Water*

Under Development for the U.S. Air Force Center for Environmental Excellence [Wiedemeier n.d.]). These parameters include inorganics such as dissolved oxygen and various anions that provide clues to the type of metabolic activity that may be occurring within the aquifer, as well as additional organic analyses to indicate substrates and end products from NA biotransformation. Although these analyses do not necessarily completely demonstrate that NA is occurring at a specific site, they will be used to determine whether NA should be retained or ruled out in the FS. NA parameter results for samples analyzed in the field and laboratory are presented in Appendix G. This report only presents these analyses; actual evaluations are discussed in the FS (E & E 1997a).

4.11.4 SI Results

4.11.4.1 Landfill 7

The installation and sampling of two temporary wells, the resampling of five existing wells, and measurement of the water table leads to the following conclusions.

There is a steep hydraulic gradient (greater than 2%) under the landfill, and the slope of the topography is closer to 10%. This combination results in seeps and the formation of a wetland at the toe of the landfill, where the water table at LF7MW22 is only 2 feet BGS, while the water table under the center of the landfill is 20 to 30 feet BGS (see Figure 4.11.4.1-1). In addition to these groundwater seeps, some groundwater may be intercepted by a 30-inch storm drain buried approximately four feet below the surface of the wetland. This storm drain is submerged below the water table, as measured in the immediately adjoining wells LF7MW22 and LF7MW23. The presence of running water in the storm drain on October 16, 1997 at an estimated rate of 10 gallons per minute (GPM), at a time when the wetland was dry, there were no surface seeps, and there were no immediate precipitation events, suggests that groundwater may periodically enter the drain.

A narrow TCE plume (i.e., less than 500 feet wide based on results of LF7MW-3R, LF7MW17, LF7MW18R, LF7MW22, and LF7TW-25) originates near monitoring well LF7MW17 and extends at least to the wetland at the toe of the landfill (approximately 350 feet based on results of LF7MW22, LF7TW-24, and LF7TW-25), so that the defined plume has a minimum area of approximately 4 acres with a maximum concentration of 64 μg/L in LF7TW-25 (see Tables 4.11.4.1-2 and 4.11.4.1-3). The volume of flow in this plume is heavily dependent on the assessment of what proportion exits the groundwater into the wetland at the toe of the landfill. Since the depth of groundwater is slight at this point, there is a high

potential for TCE to migrate into the atmosphere. Even using the most conservative assumptions, it is unlikely that the amount of TCE discharging from the landfill exceeds 50 grams/year (1.8 ounces/year). Previous analyses (Law Environmental 1996, Volume 4, Table 1-1) indicate that perchloroethene (PCE), a precursor of TCE during reductive dechlorination, was detected at concentrations of up to 105 μg/L in LF7MW17 in August 1984, and TCE was non-detect, whereas by May 1991, the PCE was not detected but TCE was detected a concentrations up to 45 μg/L. During RI sampling, TCE was detected at concentrations up to 31 μg/L, and during SI resampling, TCE was detected at concentrations up to 26 μg/L (see Tables 4.11.4.1-2 and 4.11.4.1-3 and Figure 4.11.4.1-2). Based on these results, biotransformation of the TCE plume may be occurring as indicated by presence of cis- and trans-1,2-dichloroethene, and vinyl chloride daughter products. TCE was also detected in LF7MW-22 at 11 μg/L and in LF7MW-24 at 13 μg/L. All of these levels exceed screening criteria (see Table 4.11.4.1-2 and 4.11.4.1-3).

4.11.4.2 South of the Weapons Storage Area

The WSA area was investigated during the SI because TCE had been detected (7.6 μg/L) during the August 1994 RI (see Figure 4.11.4.2-2). Upgradient monitoring well WSAMW-2 was resampled during the SI, and three temporary wells were installed and sampled. A sample collected from one of these temporary wells, WSATW-6, contained TCE (31 μg/L), chloroform (9.0 μg/L), and PCE (7.5 μg/L) (see Tables 4.11.4.2-2 and 4.11.4.2-3 and Figure 4.11.4.2-2). None of these compounds was detected in WSAMW-2, which is approximately 1,150 feet directly upgradient. A sample collected from WSATW-7, which is approximately 800 feet downgradient, contained only chloroform (0.66 μg/L). A sample collected from WSATW-5 contained bis-(2-ethylhexyl)phthalate at an estimated level of 83 μg/L, but only in one of two duplicate samples. This is interpreted as contamination from the field sampling or laboratory handling since low levels of phthalates are generally artifacts from the use of protective gloves.

The groundwater area affected by TCE, PCE, and chloroform could be as much as 8 acres and possibly extends to the nearest surface water (Sixmile Creek), which is approximately 600 feet southwest of LAWMW-9 and 500 feet of WSATW-7 (see Figure 4.11.4.2-1).

4.11.4.3 Lot 69 Former Hazardous Waste Storage Area

This site lies within the level, built-up area at the center of the former Griffiss AFB, at the north end of SAC Hill, and close to the surface and groundwater drainage divide between Rainbow Creek and Threemile Creek. Immediately adjoining wells include Coal Storage Yard (CLY), and Building 20 (B20) wells (see Figure 4.11.4.3-1). East-west hydraulic gradients are extremely low partly because the site is traversed by a 30-inch storm drain which has a very low gradient (0.13 percent) leading to Rainbow Creek. The three wells at Building 20 just west of Lot 69 appear to mark the groundwater divide between Rainbow Creek and Threemile Creek.

During the RI, low levels of carbon tetrachloride were detected in samples collected from L69MW2-1 (4 μg/L) L69MW-1 (4.1 μg/L), and L69MW-4 (0.4 μg/L). Low concentrations of chloroform were also detected in samples collected from L69MW-1, L69MW2-1, L69MW2-2, and L69MW-4 at levels ranging from 0.3 μg/L to 1.2 μg/L. Samples collected from L69MW-1 also contained pesticides, gamma-BHC (0.0027 μg/L), and 4,4-DDD (0.067 μg/L) at concentrations that exceeded cleanup goals.

During the SI, L69MW-4 was resampled, and temporary well L69TW-5 was installed and sampled at a location between L69MW-4 and the storm drain that is believed to be intercepting groundwater. Very low levels of carbon tetrachloride and chloroform (less than 1 μg/L) were present in water collected from L69MW-4, and 2-butanone (18 μg/L) was detected in the temporary well (see Tables 4.11.4.3-2 and 4.11.4.3-3). None of these concentrations exceeded screening criteria. Groundwater exits the site in the storm drain/storm drain trench and discharges to Rainbow Creek.

4.11.4.4 Building 3 Drywell

A single new vertical profile well was installed as part of the SI because grab groundwater samples from boreholes drilled during the RI had indicated the presence of low levels of chlorinated VOCs (chloroform, 111-trichloroethane, PCE, and TCE). None of the VOC concentrations exceeded 2 μg/L. The vertical profile groundwater screening samples collected from B3VMW-1 indicated the presence of TCE (1.6 μg/L) at the top of the water table (i.e., approximately 11 feet BGS), but TCE was not detected at a depth of 48 feet BGS. Therefore the screen was set from 8 to 18 feet BGS.

The groundwater sample from the SI well indicated the presence of 1,1,1 trichloroethane (0.83 μg/L), chloroform (1.0 μg/L), PCE (estimated 0.36 μg/L), TCE (2.7

μg/L), and bis(2-ethylhexyl) phthalate (estimated 5.7 μg/L) (see Tables 4.11.4.4-2 and 4.11.4.4-3). None of these concentrations exceeds screening criteria.

Flow of groundwater from this well appears to be towards a 66-inch storm drain that discharges to Rainbow Creek (see Figure 4.11.4.4-1). Even though this drain is to be disconnected, crushed, and filled, it is still likely to remain as a conduit for groundwater flow, since it will be filled in with demolition debris and the gravel in the pipe trench will be unaffected.

4.11.4.5 Building 786 Contaminated Soil

During the RI, groundwater from one well was found to exceed the most stringent ARARs: samples collected from 786MW-2 showed 1,2,4-trimethylbenzene (270 μg/L), 1,3,5-trimethylbenzene (80 μg/L), ethylbenzene (160 μg/L), isopropyl benzene (39 μg/L), meta and para-xylene (810 μg/L), n-propylbenzene (110 μg/L), naphthalene (51 μg/L), ortho-xylene (110 μg/L), and sec-butylbenzene (6.2 μg/L) (see Figure 4.11.4.5-2). All but the isopropyl benzene and sec-butylbenzene results were obtained from a secondary dilution of the sample.

Because of the marked difference in hydraulic head between 786MW-2 and nearest adjoining well 786MW-4 (i.e., 2.34 feet difference over approximately 45 feet, implying a 5% gradient), it was concluded that the water table at 786MW-2 is perched (see Figures 4.11-2 and 4.11.4.5-1). By contrast, the local hydraulic gradient in the permanent or deeper water table appears to be generally less than 1.5%.

The contamination in 786MW-2 could have originated at the suspected source area around 786MW-3 and migrated northward in the perched zone, but as the other wells appear to be screened in the deeper zone, there is no evidence of a northward gradient in the perched zone. The only other contamination detected near Building 786 was detected in samples collected from 786MW-5, which is northwest of the building and the supposed source. As noted during the RI, this contamination is unlikely to have originated at the source area unless it first migrated down into the deeper water table. Samples collected from SI well 786MW-6 showed only di-n-octylphthalate (estimated 0.14 μg/L), a compound that was not noted in any of the adjoining wells and probably is not site related. Low levels of phthalates are often field and/or laboratory artifacts from the use of protective gloves.

It should be noted that, as a minimum, there are at least two levels of perched water and probably several isolated lenses of perched water at each level under Aprons 1 and 2. This makes the identification of flow directions a matter of interpretation and causes uncertainty. The criterion of excessive hydraulic gradients is used to distinguish perched wells from wells in

the continuously saturated zone. Since the entire area is characterized by cut and fill as the result of massive construction altering the natural hydrology (see Figure 4.11-2), the perched layers are not resting on natural geologic materials, but presumably on layers created by compaction within otherwise very similar materials. Such layers cannot be visually distinguished during drilling with hollow-stem augers or from split-spoon samples.

4.11.4.6 Building 133 Storage Vault

The former storage vault on the southwest corner of Building 133 was a 4,000-gallon concrete vault used to collect waste oils from the floor drain system. Its depth (approximately 15.7 feet), ensures that it extended well below the top of groundwater, which is approximately 10 feet BGS. During the RI, the surrounding soil was found to contain petroleum-related compounds and PAHs, as would be expected from used oils, at concentrations exceeding ARARs. Grab groundwater samples contained similar compounds, and TCE was detected in one sample collected from 133HP-1 at a concentration of 1.9 μg/L.

The SI involved groundwater sampling by Geoprobe® at 52 locations around Building 133 (see Figure 4.11.4.6-1). Preliminary results indicated that volatiles in the groundwater were non-detect in most cases, except in samples immediately south of the building near the former tank (see Figure 4.11.4.6-2 and Appendix D). These volatiles include TCE at 133GP-01 (29 μg/L) and 133GP-17 (45 μg/L); elevated levels of several benzene compounds, ethylbenzene, naphthalene, toluene, and xylenes in 133GP-01; elevated levels of benzene compounds in 133GP-16; and elevated levels of benzene compounds, ethylbenzene, naphthalene, and xylenes in 133GP-17. In addition, the 133GP-01 sample exhibited a strong petroleum odor and a prominent sheen upon sample collection.

A low-level TCE plume, below cleanup levels, was indicated by Geoprobe® groundwater screening samples collected at 24 locations west, southwest, and north of Building 133, with concentrations ranging from 0.8 to 3.0 μg/L. In addition, petroleum-related compounds (e.g., benzenes, naphthalene, and xylenes) were detected in two samples (133GP-44 and 133GP-45) collected several hundred feet northwest of Building 133. These results are clearly unrelated to the storage vault or any known site building. The source of this contamination is unknown at this time; however, six more samples will be collected in November 1997 at the proposed locations illustrated on Figure 4.11.4.6-2. The analytical results for this sampling will be provided as an addendum to this report.

Three wells were installed, one upgradient of Building 133 (133MW-2) and two downgradient (133MW-1 and 133MW-3) (see Field Adjustment Form No. 34 in Appendix A).

Samples collected from all three wells showed low levels of chlorinated solvents including 1,1,1-trichloroethane (estimated 0.36 μg/L to 0.60 μg/L); PCE (estimated 0.37 μg/L to 0.98 μg/L); and TCE (1.3 μg/L to 3.9 μg/L). The well nearest to the vault (133MW-1) showed 16 μg/L of total xylenes, which is probably related to the vault (see Tables 4.11.4.6-2 and 4.11.4.6-3). The chlorinated solvents are unlikely to be related to Building 133, since the upgradient well (133MW-2) shows levels that are similar to those in the two downgradient wells.

Groundwater in this area currently flows approximately 800 feet southwest to discharge to a 66-inch storm drain leading to Rainbow Creek. This storm drain is to be crushed and filled, and it will be replaced by one currently being installed as a new deep storm drain along Brooks Road, which will intercept groundwater flow just south of Building 144, and also convey it to Rainbow Creek.

4.11.4.7 Nose Docks 1 and 2 (Buildings 782 and 783)

During the RI two locations were investigated: an oil/water separator near the northeast corner of Building 782; and the site of a fire in a trench excavated between Building 783 and Apron 1, where the ground "was reported to be saturated with fuel" (Law December 1996, Volume 26). The RI involved sampling of soil, soil gas, grab groundwater samples from boreholes and groundwater from four monitoring wells. Wells 782MW-1, 782MW-3, and 782MW-4 were replaced by wells 782MW-1R, 782MW-3R and 782MW-4R because the initial wells were installed into perched water which subsequently declined in hydraulic head until there was insufficient water for adequate development and sampling. The subsequent installation of piezometers in this area has indicated that at least two perched water tables exist near or under Nose Docks 1 and 2, a phenomenon apparently occurring at the site of wells AP2MW-2, AP2MW-2R, and AP2MW-3 approximately 1,000 feet southeast of the site (see Figures 4.11-2 and 4.11.4.7-1).

During the RI, fuel-related contamination was detected in two wells (782MW-2 and 782MW-4R). These wells are closest to the trench fire site and to the oil/water separator, respectively. Several contaminants were detected at concentrations exceeding screening criteria: acetone and toluene were detected in samples from 782MW-2; benzene was detected in samples collected from 782MW-1R and 782MW-2; cis-1,2-dichloroethene and hexachlorobutadiene were detected in samples collected from 782MW-4R; and ethylbenzene, naphthalene, 1,2,4- and 1,3,5-trimethylbenzene, and xylenes were detected in samples collected from 782MW-2 and 782MW-4R above screening criteria (see Figure 4.11.4.7-2). Only a trace

of cis-1,2-dichloroethene (0.4 μg/L estimated) was detected in a sample from 782MW-1R, which is downgradient of 782MW-4R.

Two new wells, 782MW-5 and 782MW-6, were installed during the SI and sampled along with several existing wells. The initial well at 782MW-6 proved to be in a perched zone, and a replacement well (782MW-6R1) initially installed with water standing at 13.6 feet below surface 1.25 hours after the borehole was completed showed water at 22.3 feet from the top of casing four days later. Approximately one month later, the same well showed a water table at 24.29 feet from the top of casing. The recharge rate for this well was too low to permit adequate development. Therefore, a second replacement well (782MW-6R2) was installed in November 1997. In the absence of clearly discernable geologic controls, these data imply that perching layers cannot be identified during drilling; the layers are disturbed by the effect of well installation, and the perched water slowly leaks into the underlying water table as a direct result of this disturbance.

Currently, it appears that two separate source areas have created plumes migrating in different directions, and no downgradient wells have been found to establish the maximum length of each plume. Well 782MW-1R, which is downgradient of 782MW-4R, still shows a trace of cis-1,2-dichloroethene (1.0 μg/L), benzene (66 μg/L), and 1,1-dichloroethane (2.3 μg/L), all of which are potentially from the same source as that affecting 782MW-4R. The benzene concentration detected in the SI sample is 14 times greater than the concentration detected in the RI sample (4.8 μg/L). The lack of trimethylbenzene in 782MW-1R is puzzling, since these were the most prominent contaminants in the RI sample from 782MW-4R. Acetone and toluene were not detected in 782MW-2; however, benzene (1.8 μg/L) and total xylenes (35J μg/L) were detected above ARARs. The new SI well, 782MW-5, encountered saturation at 16 to 18 feet BGS, and what is interpreted as the former land surface (base of fill) was encountered at 21 feet BGS. The total depth of borehole was 25.5 feet, and the water table stabilized at 21.5 feet BGS. In many ways this well was similar to 782MW-6R1, but the water table did not drop so far as to require a replacement well. The groundwater collected from this well showed total xylenes (130 μg/L) and benzene (3.6 μg/L) (see Tables 4.11.4.7-2 and 4.11.4.7-3 and Figure 4.11.4.7-2). This could represent contamination migrating north from the area of 782MW-2, which would be in accordance with the interpretation of the groundwater flow direction (see Figure 4.11.4.7-1). 782MW-6R2 contained cis-1,2-DCE (37 μg/L) and vinyl chloride (26 μg/L) above ARARs. The source of these contaminants is unknown. No firm conclusion can be drawn until other potential sources that may have been discovered in

this area by other contractors can be considered and an integrated picture of hydraulic gradients can be developed for the various saturated zones.

4.11.4.8 Building 101 BADP/Yellow Submarine

According to the RI, groundwater collected from the three wells south of Building 101 contained low levels of chlorinated solvents. The most significant contaminants were PCE (7.7 μg/L) and TCE (4.8 μg/L). Both were detected in 101MW-1, which is adjacent to the south side of the "Yellow Submarine" UST. Cis-1,2-dichloroethene was detected at an estimated level of 120 μg/L in downgradient monitoring well 101MW-2. Screening of soil gas and groundwater samples collected by Hydropunch® established that Building 101 is the probable source of these contaminants.

The SI included resampling the three existing wells; installing and sampling one new permanent, upgradient well (101MW-4); and installing and sampling two downgradient, temporary wells. Analytical results of the SI sampling and water level measurements indicate a significant level of bis(2-ethylhexyl)phthalate (8.9 μg/L) and a slight trace of chloroform (1.2 μg/L estimated) in samples collected from the upgradient well 101MW-4. Both 101MW-1 and 101MW-3, which are directly downgradient of 101MW-4, showed significant levels of chloroform (19 μg/L in both cases), while 101MW-1 also showed PCE at 0.98 μg/L. Slight traces of TCE were detected in all downgradient wells (0.47 μg/L to 1.2 μg/L) (see Tables 4.11.4.8-2 and 4.11.4.8-3, and Figure 4.11.4.8-2). The levels of chlorinated solvents detected in SI samples from 101MW-1 and 101MW-2 were significantly lower than the levels detected in the RI samples (i.e., from June 1993 to July 1997, a decline of approximately 99.7% has occurred in contaminant levels of both PCE and TCE). The presence of chloroform in the original RI samples may have been from the use during drilling of potable water which commonly contains chloroform (see Table 2-2). This would account for the decrease in chloroform in RI wells resampled during the SI.

The groundwater discharges to Threemile Creek, probably through the storm drain trench, since the wells all show groundwater elevations (101MW-1 [459.66], 101MW-2[459.33], and 101MW-3 [459.36]) above the elevation of the invert (458.6) of the immediately adjacent storm drain. During the stream mechanics survey, the discharge of Threemile Creek, immediately below the storm drain outlets, even at its lowest flow rate measured on July 26, 1995, flowed at a rate of 0.3 cubic foot per second ($foot^3$/sec) or 193,000 gallons per day (gpd) or 21 gallons per minute per 1000 feet of major storm drain (Law Environmental 1996, Volume 31; see Appendix D). Since Threemile Creek only showed a gain of 0.4 μg/L 8

foot^3/sec (310,000 gpd) or approximately 54 gallons per minute per 1000 feet for the remainder of its gauged length (4000 feet) within the former Griffiss AFB, it is clear that significant flows of groundwater discharge to the creek from the area traversed by the storm drains. The maximum measured discharge from just below the storm drain outlets during the stream mechanics survey was 1.93 foot^3/sec (1,247,000 gpd), on April 4, 1995. This rate of flow implies significant high permeability zones connecting to the creek, based on the very low average hydraulic gradients leading toward the head of the creek (less than 0.2% from Building 101 to Threemile Creek). The very low hydraulic gradients in this area and the flows in Threemile Creek can reasonably be interpreted in two ways only: either the hydraulic conductivity of the aquifer materials is significantly higher than elsewhere on Griffiss, or the installation of the large diameter storm drain with an extremely low gradient (0.002 feet/foot) has created an artificially low gradient in the groundwater by acting as a discharge point. The implication is that the "plume" from Building 101 is all captured by the storm drain trench.

4.11.4.9 Landfill 5

Landfill 5 is immediately adjacent to Hardfill 49d. The large number of monitoring wells (12) within an area of approximately 16 acres allows for a detailed estimation of flow directions.

During the RI, the only elevated levels of organics above potential ARARs or TBCs in groundwater were carbon tetrachloride in a sample collected from LF5MW-1 (6.6 μg/L), several PCBs and PAHs, and Guthion in LF5MW-2, and Lindane in LF5MW-3 (0.8 μg/L) (see Figure 4.11.4.9-2). Carbon tetrachloride in LF5MW-1 was only slightly above the ARAR. The distance between MW49D-01 and LF5MW-1 and MW49D-02 and LF5MW-1 (both free of carbon tetrachloride) is only 250 feet and 350 feet, respectively. Since LF5MW-1 is approximately 750 feet northeast of Threemile Creek, the low concentration and small potential area of contamination suggests that it is of minimal concern.

During the SI, one additional downgradient well (LF5MW-4) was installed and sampled, and three existing wells were resampled (LF5MW-1, LF5MW-2, and LF5MW-3). The SI results confirmed the presence of carbon tetrachloride at LF5MW-1 (6.1 μg/L), but no other results exceeded cleanup criteria (see Tables 4.11.4.9-2 and 4.11.4.9-3). Since LF5MW-1 is the upgradient well, the carbon tetrachloride is obviously from an upgradient source and not related to the landfill. The closest AOC with carbon tetrachloride above screening criteria is Lot 69, approximately 1,000 feet northeast. Buildings 700 and 702 are the only upgradient

buildings within 1,000 feet, but LF5MW-1 is adjacent to a drainage swale which might result in contaminated recharge to the well from surface runoff.

4.11.4.10 Landfill 6

The groundwater results of the RI indicated that one well, LF6MW-2, was clearly contaminated with cis-1,2-dichloroethene (170 μg/L) (total), vinyl chloride (30 μg/L), and benzene (1.4 μg/L) (see Figure 4.11.4.10-2). Cis-1,2-dichloroethene and vinyl chloride are products of the reductive dechlorination of TCE. Since this well is hydraulically downgradient of the landfill, it might have been contaminated as the result of the landfill or the result of spills or discharges of TCE upgradient of the landfill.

The SI involved collection of Geoprobe® groundwater screening samples to help locate and sample vertical profile well LF6VMW-6, which is downgradient of LF6MW-2, and resampling existing wells LF6MW-1, LF6MW-2, TMC-USGS-3, and TMCMW-9. Analytical results of the four Geoprobe® groundwater screening samples were all nondetect. Therefore, the proposed well location was moved northeast, closer to the contaminated RI well (LF6MW-2). Vertical profile groundwater screening samples for LF6VMW-6 indicated the presence of TCE (27 μg/L) at 40 feet BGS (see Appendix D). TCE was not detected in any of the other groundwater screening samples beginning at 17 feet BGS to 80 feet BGS. Therefore, the screen was set from 35 to 45 feet BGS.

The resampling confirmed the presence of cis-1,2-dichloroethene (DCE) (83 μg/L), and trans-1,2-DCE (1.4 μg/L), vinyl chloride (20 μg/L), and benzene (1.2 μg/L estimated) in the LF6MW-2; and cis-1,2-DCE (0.30J) in TMCMW-9. Samples collected from the new well (LF6VMW-6) contained cis-1,2-DCE (180 μg/L), trans-1,2-DCE (2.2 μg/L); vinyl chloride (29 μg/L), TCE (26 μg/L), and benzene (1.0 μg/L), indicating that there is no obvious decline in concentration towards Threemile Creek, although the increase may reflect the reduced dilution of the plume by other groundwater, which is the effect of screening the new well at the depth of maximum contamination. The plume may discharge to or go under Threemile Creek approximately 700 feet downgradient. Biotransformation appears to be occurring due to the presence of cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride daughter products of TCE.

4.11.4.11 Building 775 TCE Contamination

TCE was first detected in groundwater from wells near Building 775 in 1989, and subsequent investigations have found TCE to be widespread in both soil gas and groundwater in

the vicinity of Buildings 774, 775, and 776. The SI involved resampling of existing monitoring wells 773MW-1, -2 and -3, and 775MW-2. (Well 775MW-1 could not be sampled because the submersible pump does not function, and the casing at well 775MW-3 is broken, and the well is filled with sand; see Field Adjustment Form No. 28 in Appendix A); and the construction and sampling of eight new wells (775VMW-4, 775VMW-5, 775MW-6, 775VMW-7, 775VMW-8, 775VMW-9, and 775VMW-10). Six of the seven wells are vertical profile wells.

SI sampling results indicate that the TCE plume was present in all new wells downgradient of Building 774 (see Figure 4.11.4.11-2). TCE concentrations ranged from 33 to 230 μg/L in vertical profile groundwater screening samples from the Hydropunch®, and 18 to 100 μg/L in groundwater samples from the wells. Well screens in the new SI wells were set in the zone of highest contamination. Other contaminants of concern are chloroform in 773MW-1 (8.4 μg/L), PCE in 773MW-2 (6.3 μg/L), and dibenzo(a,h)anthracene (0.61 μg/L) in 775VMW-9, which are above screening criteria, and a low level of PCE in 773MW-1 (1.9 μg/L).

To better define the extent and degree of TCE contamination at this site, two wells (775VMW-9 and 775VMW-10) were installed in addition to the SI Work Plan in November 1997. The wells were installed on the south side of Perimeter Road, downgradient of 775MW-6, 775VMW-7 and 775VMW-8. This extended the search for the plume another 225 feet downgradient. Well 775VMW-9 contained 20 μg/L of TCE, and 775VMW-10 contained 86 μg/L of TCE. Both of these levels were above screening criteria. In addition, 775VMW-10 contained 5.0 μg/L of 1,1,1-TCA.

Evidence of biotransformation is noticed based on the presence of 1,1,1-TCA and TCE in 773MW-1 and 775MW-2, where TCE is a daughter product of 1,1,1-TCA; TCE and cis-1,2-DCE in 775VMW-5, -8, and -10, where cis-1,2-DCE is a daughter product of TCE; and 1,1,1-TCA and 1,1-DCE in 775VMW-10, where 1,1-DCE is a daughter product of 1,1,1-TCA.

4.11.4.12 Fire Protection Training Area

The Fire Protection Training Area (FPTA) still used for training fire-fighters in extinguishing fires using a mock airplane. A UST used to store fuel for firefighting exercises has reportedly leaked at the site. Downgradient wells showed fuel-related contaminants (FPMW-1), naphthalene (0.7 μg/L in FPTMW-3), and methylene chloride (7.6 μg/L in FPTMW-2) exceeding the screening criteria (see Figure 4.11.4.12-2).

The FPTA was investigated as part of the SI because a storm drain traverses the site at a depth sufficient to intersect the water table, and the drain was found to flow strongly at the manhole southwest of the intersections of Taxiways 20 and 21. The installation of five wells by the Air National Guard (ANGMW-1 through ANGMW-5) to investigate the UST leak provided additional groundwater elevation data (see Figure 4.11.4.12-1).

The overall water table has a low gradient underneath the mock airplane. The storm drain that runs through the site has invert elevations that are below the local water table. Field observations made on October 16, 1997 at a time when there was no surface runoff from the site and no immediate precipitation events, indicated water flowing through the 48-inch storm drain at the manhole immediately south of Taxiway 21, approximately 800 feet southwest of the Fire Protection Training Area. The presence of water running through the storm drain may be the result of some groundwater infiltration into the pipe. This storm drain was dry further to the southwest where its elevation is above the water table. Therefore, it appears that the water which entered the pipe near the FPTA seeped out again.

The discharge point of the storm drain system at the Mohawk River near well OBMW-31 was observed to be flowing at an estimated 30-40 gpm on October 16, 1997. At other times it has been measured at much greater flow rates (i.e., the Air Force measured the flow at 500 gpm on April 24, 1968, even though there had been little rain the previous two weeks). This rate was comparable to the flow of Threemile Creek (620 gpm) measured on the same date. Therefore, some of the water flowing in this storm drain system may be partially due to groundwater infiltration in areas where the drain is below the groundwater along parts of its network, such as along Taxiway 17, as well as at the FPTA.

During the SI the only significant contaminant found in the FPTA wells was methylene chloride, which was detected in a sample collected from upgradient monitoring well FPTMW-2 (7.6 μg/L) and a sample collected from FPTVMW-5 (370 μg/L). Since methylene chloride was not detected at a similar concentration in soil gas or groundwater, it is likely that the result for FPTVMW-5 is laboratory related. FPTVMW-5 was resampled and no methylene chloride was detected; therefore, the methylene chloride in FPTMW-2 is also probably laboratory related. Groundwater in the vicinity of FPTVMW-5 discharges to the storm drain located approximately 50 feet downgradient of the well. Water in the storm drain exhibits turbulent flow. Based on these results, it does not appear that groundwater remediation is required at this site.

4.11.4.13 Tin City (Buildings 214 Vehicle Maintenance Shop , 219 Drywell, and 255 Drywells)

Tin City is a complex of buildings on the west side of the base, south of Taxiway 17. Previously installed wells LAWMW-10, (upgradient), LAWMW-111, LAWMW-12, and LAWMW-13 had been used to establish a hydraulic gradient from LAWMW-20 (460.75) to LAWMW-13 (456.95) in a southwesterly direction. No significant contaminants had been detected except TCE (3.2 μg/L) and chloroform (3.4 μg/L) in LAWMW-13 (Law Environmental 1996, Volume 31, Appendix 3, Table E-2).

The SI specifically investigated the presence of VOCs and SVOCs in groundwater around the former drywell at Building 255, downgradient of Building 214 former Vehicle Maintenance Shop, and the Building 219 Drywell. A Geoprobe® survey was used to site two new wells at Building 255 (255VMW-1 and 255VMW-2) (see Figure 4.11.4.13-1). The Geoprobe® survey implied a source of chlorinated solvents at the location of the suspected drywell and a small groundwater plume migrating south-southeast from that location. This was contrary to the hydraulic gradient data obtained up to that time, but the new wells were sited on the basis of the Geoprobe® data. Two vertical profile wells (TCVMW-1 and TCVMW-2) were placed downgradient of Buildings 219 and 214 respectively. All the new wells were sampled and LAWMW-13 was resampled.

Analytical results show that LAWMW-13 is the only well impacted by TCE (3.0 μg/L), chloroform (3.9 μg/L), and total 1,2-DCE (2.2 μg/L). Low levels of chloroform were also detected in 255VMW-2, TCVMW-1, and TCVMW-2; and TCE was detected in 255VMW-2 (see Tables 4.11.4.13-2 and 4.11.4.13-3). None of these concentrations exceed screening criteria. Based solely on an unexpectedly deep water table in 255VMW-2, the water table contours imply that LAWMW-13 is not immediately downgradient of any of the buildings or locations investigated. However, because the water table contours explain the distribution of contamination at Building 255 found during the Geoprobe® survey, it is assumed that they are correctly measured. Concentrations of TCE ranged from 91.9 μg/L in 255GP-07 near the drywell to nondetect on the south side of Mohawk Drive (see Figure 4.11.4.13-2 and Appendix D).

4.11.5 SI Conclusions

The RI identified Landfills 1, 2/3, and 7 and the FPTA as localized areas of contamination that do not extend beyond the immediate vicinity of the site. These AOCs were not grouped into an operable unit because of their proximity. However, based on the similar nature of contaminants and the proximity of these AOCs, the following sites/AOCs were recommended to be combined into operable units: the Pumphouse 5 site, Nose Docks 1 and 2 AOC, and Building 786 AOC for petroleum VOCs in groundwater; Building 786 AOC, sites/AOCs associated with SAC Hill (Buildings 773, 774, 775, and 779), and the Landfill 6 AOC for chlorinated VOCs in groundwater; and the Building 20, Lot 69, and Coal Storage Yard AOCs for PAHs in groundwater. The RI recommended a FS for all the these sites/AOCs except Building 20, Lot 69, and the Coal Storage Yard. A FS was also recommended for groundwater at Landfill 5, and possibly at Buildings 101, 133, 222, 255 (pending further delineation of groundwater contamination). Results of the RI baseline risk assessment using pre-RI data and RI data indicated no unacceptable risks from the use of groundwater as a potable water supply (Law Environmental 1996).

After reviewing all historical basewide groundwater data, especially RI and SI results, the SI supports the conclusion that Landfills 1, 2/3, and 7, and the FPTA AOCs are localized areas of contamination that do not extend beyond the immediate vicinity of the sites. Buildings 101 and 133 and the area south of the WSA also fall into this same category. Despite their relative proximity and the similarity of identified organic compounds, Pumphouse 5, Nose Docks 1 and 2, and Building 786 should not be combined into an operable unit for future consideration in a FS because their source areas are unrelated. In addition, the Building 786 AOC should not be included with the SAC Hill and Landfill 6 AOCs as an operable unit because the contaminants of concern (petroleum VOCs versus chlorinated solvents, respectively) and source areas are unrelated.

Finally, the following sites/AOCs are currently being considered for inclusion in the On-Base Groundwater FS: Landfills 1, 6, and 7; Buildings 101, 133, 773, 774, 775, and 779; the FPTA, Nose Docks 1 and 2; T9 Storage Area/Building 43; and the area south of the WSA. These sites/AOCs are considered for the FS based on the following historical information and SI results:

- The presence of several organic compounds in historical data, mainly in LF1MW-5, LF1MW101, and LF1P-2 at levels exceeding screening criteria;

- The presence of 1,2 dichloroethene, benzene, and vinyl chloride in LF6MW-2 and LF6VMW-6, and TCE in LF6VMW-6 at levels exceeding screening criteria;

- The presence of TCE in LF7MW17, LF7MW22, LF7TW-24, and LF7TW-25 at levels exceeding screening criteria;

- Although levels of chlorinated solvents detected in 101MW-1, 101MW-2, and 101MW-3 above screening criteria in historical samples have significantly decreased below the criteria in SI samples, the site will still be included in the FS;

- The presence of xylenes above screening criteria in 133MW-1 and low levels of TCE in Geoprobe groundwater screening samples south, west, north, and northeast of Building 133;

- The presence of PCE in 773MW-2 and TCE in all SI Building 775 vertical profile groundwater screening and well samples at levels above screening criteria;

- The presence of petroleum VOCs in FPTMW-1 at levels exceeding screening criteria;

- The presence of petroleum VOCs in 782MW-1R, 782MW-2, 782MW-3R, 782MW-4R, and 782MW-5 at levels exceeding screening criteria;

- The presence of 1,2-dichloroethene in T9MW-2, and several petroleum related compounds in B43MW-2 in historical samples at levels exceeding screening criteria; and

- The presence of PCE and TCE in WSATW-6 and TCE in LAWMW-9 (RI result) at levels exceeding screening criteria.

Groundwater at Landfills 2 and 3 is not recommended to be included in the FS because all RI results recorded above screening criteria are isolated occurrences, indicating no groundwater plumes associated with this landfill; groundwater at Landfill 5 is not recommended to be included in the FS because the only chemical of concern detected above screening criteria was carbon tetrachloride in an upgradient well, indicating the source is not related to Landfill 5; and groundwater at Tin City (including the Building 214, 219, 222, and 255 AOCs) is not recommended to be included in the FS because no chemicals of concern were detected above screening criteria in the SI wells installed in this area, and a removal action is planned for the Building 255 drywell (E & E 1997a). However, groundwater in the Tin City area is being further evaluated.

Table 4.11.3.2-1

LIST OF POTENTIALLY JEOPARDIZED WELLS/PIEZOMETERS
FORMER GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Well/Piezometer ID	No Well Lock	No Inner Cap	Broken Protective Casing	Broken Inner Casing	Obstruction	Miscellaneous	Comments
All Apron 1 Piezometers	x						1-inch PVC Piezometers, some with only slip-on caps, others with no caps
All B43 Piezometers	x						1-inch PVC Piezometers, some with only slip-on caps, others with no caps
ANGMW-1	x						
ANGMW-2	x						
ANGMW-3	x						
ANGMW-4	x						
ANGMW-5	x						
AP2MW-1	x						
101MW-2	x						
101MW-3	x						
301MW-4						x	Pump tubing too high to properly close protective cover
771MW-1A	x						
771MW-2A	x						
771MW-3A	x						
773MW-2			x				Protective cover pulls off and is cracked
773MW-3			x				Protective cover pulls off and is cracked

Table 4.11.3.2-1

LIST OF POTENTIALLY JEOPARDIZED WELLS/PIEZOMETERS
FORMER GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Well/Piezometer ID	No Well Lock	No Inner Cap	Broken Protective Casing	Broken Inner Casing	Obstruction	Miscellaneous	Comments
775MW-1					x	x	Broken pump, pump stuck in well
775MW-2	x		x		x		No protective cover, pump stuck in well
775MW-3	x	x	x	x	x		Inner casing filled with soil and broken at ground surface
781MW-3			x				Missing Allen screw to hold protective cover
782MW-3	x						
782MW-3R						x	4-inch PVC sleeve obstructing well locking capabilities
786MW-1			x				Broken protective cover
786MW-2	x	x					Inner cap of flush-mount well not water tight
786MW-3	x	x					Inner cap of flush-mount well not water tight
786MW-4	x						
FDAMW-1		x					
FPTMW-1						x	Bentonite has swelled around the inner casing in the flush-mount housing and covered the well cap. Bentonite was observed inside the casing
HS1MW-1		x					
LF2MW-10		x					
OBMW-322	x						

Table 4.11.3.2-1

LIST OF POTENTIALLY JEOPARDIZED WELLS/PIEZOMETERS
FORMER GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Well/Piezometer ID	No Well Lock	No Inner Cap	Broken Protective Casing	Broken Inner Casing	Obstruction	Miscellaneous	Comments
LAW MW-3	x						
LAWMW-8	x	x					Inner cap of flush-mount well not water tight
LAWMW-10	x	x					Inner cap of flush-mount well not water tight
LAWMW-13	x	x					Inner cap of flush-mount well not water tight
LAWMW-14	x	x					Inner cap of flush-mount well not water tight
LAWMW-15	x	x					Inner cap of flush-mount well not water tight
LAWMW-16	x	x					Inner cap of flush-mount well not water tight
LAWMW-18	x	x					Inner cap of flush-mount well not water tight
SMC-USGS-9	x						
SFTAMW-1	x						
TF3CE-3	x	x					
TMC-USGS-4	x						

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Table 4.11.4.1-1
LISTING OF SAMPLES TAKEN SKIPPED OR ADDED
LANDFILL 7
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

Location-AOC-			Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES
												%Solid - NVOC - Fdd Anions a - Fdd Anions b - Fdd AOC - Fdd BOD - Fdd COD - Fdd Cr6 - Fdd Fingrprt - Fdd FE. - Fdd HMMS - Fdd MEE - Fdd PCB 525 - Fdd pH - Fdd SVOC 525 - Fdd TOC - Fdd VOC 524 - Fdd VOCs 524 - Fdd
Six Mile Creek (E)	Landfill 7	On-Base G	SI- *	HS7MW-1	8/20/97	ASC	Groundwater	25.0 - 35.0	Y	T	N1	X XX X X XX
			SI- *	LF7MW-16	8/19/97	ASC	Groundwater	8.0 - 23.0	Y	T	N1	X XX X X XX
			SI-QA/QC	LF7MW-16 /D	8/19/97	ASC	Groundwater	8.0 - 23.0	Y	T	FD1	X XX X X XX
			SI-QA/QC	LF7MW-16 /S	8/19/97	MRD	Groundwater	8.0 - 23.0	Y	T	FR1	X XX X X XX
			SI- *	LF7MW-17	8/20/97	ASC	Groundwater	20.0 - 35.0	Y	T	N1	X XX X X XX
			SI- *	LF7MW-18R	8/20/97	ASC	Groundwater	20.0 - 33.0	Y	T	N1	X XX X X XX
			SI- *	LF7MW-22	8/20/97	ASC	Groundwater	6.0 - 11.0	Y	T	N1	X XX X X XX
			SI- *	LF7MW-3R	8/19/97	ASC	Groundwater	13.1 - 23.1	Y	T	N1	X XX X X XX
			SI	LF7TW-24	8/1/97	ASC	Groundwater	1.0 - 11.0	Y	T	N1	X XX X X XX
			SI	LF7TW-25	8/1/97	ASC	Groundwater	1.0 - 11.0	Y	T	N1	X XX X X XX
			SI-QA/QC	LF7TW-RB1	8/1/97	ASC	Eqpt. Washwater	-	Y	T	EB1	X XX X X XX

Note: Depth is measured in feet.

Key:

* = existing monitoring well
Anions a = chloride, nitrate/nitrate, phosphate, sulfate
Anions b = sulfide
AOC = Area of Concern
ASC = E and E's Analytical Services Center
BOD = biological oxygen demand
COD = chemical oxygen demand
Cr6 = hexavalent chromium
EB1, EB2 = equipment rinsate
/D = duplicate sample
Eqpt = equipment
Fd = field
FD1 = field duplicate
Fingrprt = fingerprint analysis
FR1 = field replicate/split
GW = groundwater
N1 = original
NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
M.E.E. = methane, ethane and ethene
MRD = Missouri River Division laboratory
MS1 = matrix spike/matrix spike duplicate
/MSD = matrix spike/matrix spike duplicate
PCB = polychlorinated biphenyl
Pest = pesticide
QA/QC = quality assurance/quality control sample
QC = quality control
RB = rinsate blank
Rsmp = resample
/S = split sample
SI = Supplemental Investigation
SVOC = semivolatile organic compound
Stat = status (O = open; S = skipped; T = taken)
TOC = total organic carbon
TB = trip blank
TB1, TB2 = trip blank
TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
VOC = volatile organic compound
WP = sample in the work plan (Y= yes; N= no)

Table 4.11.4.1-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - LANDFILL 7
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	HS7MW-1	LF7MW-3R	LF7MW-16	LF7MW-16/D	LF7MW-17	LF7MW-18R	LF7MW-22	LF7TW-24	LF7TW-25
Sample Date:	8/20/97	8/19/97	8/19/97	8/19/97	8/20/97	8/20/97	8/20/97	8/1/97	8/1/97
Sample Depth (ft.):	25-35	13.1-23.1	8-23	8-23	20-35	20-33	6-11	1-11	1-11
Volatiles (524.2) ug/L									
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	0.58
cis-1,2-Dichloroethene	ND	ND	ND	ND	0.39 J	ND	4.4	0.75	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	0.51	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	0.26 J	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	3.5
Trichloroethene	ND	ND	0.31 J	0.33 J	26	ND	11	13	64
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	0.35 J	ND
Semivolatiles (525.2) ug/L									
Napthalene	ND	ND	ND	ND	ND	ND	ND	ND	0.28JR

Key:

☐ = Result exceeds screening criteria
-- = Not detected; or positive result rejected by validation
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
NA = Analyte not analyzed for
ND = Not detected; or positive result rejected by validation
R = Rejected
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Table 4.11.4.1-3

FREQUENCY OF DETECTION AND EXCEEDENCE OF POTENTIAL TBCs FOR GROUNDWATER SAMPLES LANDFILL 7, SUPPLEMENTAL INFORMATION
FORMER GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
1,1-Dichloroethene	1/9	0.58	0	5
cis-1,2-Dichloroethene	3/9	0.39J - 4.9	0	5
trans-1,2-Dichloroethene	1/9	0.51	0	5
Benzene	1/9	0.26J	0	0.7
Chloroform	1/9	3.5	0	7
Trichloroethene	6/9	0.31J - 64	4	5
Vinyl Chloride	1/9	0.35J	0	2

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

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Table 4.11.4.2-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
WEAPONS STORAGE AREA
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES
Six Mile Creek (E) WSA On-Base GW	SI- *	WSAMW-2	7/30/97	ASC	Groundwater	5.2 - 15.2	Y	T	N1	X XX X X XX
	SI	WSATW-5	8/4/97	ASC	Groundwater	4.0 - 14.0	Y	T	N1	X XX X X XX
	SI-QA/QC	WSATW-5 /D	8/4/97	ASC	Groundwater	4.0 - 14.0	Y	T	FD1	X XX X X XX
	SI-QA/QC	WSATW-5 /S	8/4/97	MRD	Groundwater	4.0 - 14.0	Y	T	FR1	X XX X X XX
	SI	WSATW-6	8/6/97	ASC	Groundwater	3.0 - 13.0	Y	T	N1	X XX X X XX
	SI	WSATW-7	8/6/97	ASC	Groundwater	16.0 - 26.0	Y	T	N1	X XX X X XX
	SI-QA/QC	WSATW-RB1		ASC	Eqpt. Washwater	-	Y	S	EB1	X XX X X XX

ANALYSES columns: % Solids; Field Parameters; NA a; Anions a; Anions b; BOD; COD; Cr6; Fingrprt; M.E.E.; MS1 /MSD; PCB Pest; pH; SVOC 525; TOC 5252; VOC 524

Note: Depth is measured in feet.

Key:

* = existing monitoring well
Anions a = chloride, nitrate/nitrate, phosphate, sulfate
Anions b = sulfide
AOC = Area of Concern
ASC = E and E's Analytical Services Center
BOD = biological oxygen demand
COD = chemical oxygen demand
Cr6 = hexavalent chromium
EB1, EB2 = equipment rinsate
/D = duplicate sample
Eqpt = equipment
Fd = field
FD1 = field duplicate
Fingrprt = fingerprint analysis
FR1 = field replicate/split
GW = groundwater
N1 = original
NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
M.E.E. = methane, ethane and ethene
MRD = Missouri River Division laboratory
MS1 = matrix spike/matrix spike duplicate
/MSD = matrix spike/matrix spike duplicate
PCB = polychlorinated biphenyl
Pest = pesticide
QA/QC = quality assurance/quality control sample
QC = quality control
RB = rinsate blank
Rsmp = resample
/S = split sample
SI = Supplemental Investigation
SVOC = semivolatile organic compound
Stat = status (O = open; S = skipped; T = taken)
TOC = total organic carbon
TB = trip blank
TB1, TB2 = trip blank
TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
VOC = volatile organic compound
WP = sample in the work plan (Y= yes; N= no)

Table 4-11.4.2-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - WSA
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	WSAMW-2	WSATW-5	WSATW-5/D	WSATW-6	WSATW-7
Sample Date:	7/31/97	8/4/97	8/4/97	8/6/97	8/6/97
Sample Depth (ft.):	5.2-15.2	4-14	4-14	3-13	16-26
Volatiles (524.2) ug/L					
Chloroform	ND	ND	ND	9.0	0.66
Tetrachloroethene	ND	ND	ND	7.5	ND
Trichloroethene	ND	0.31 J	0.33 J	31	ND
Semivolatiles (525.2) ug/L					
bis(2-Ethylhexyl)phthalate	ND	ND	83 J	ND	ND
Diethylphthalate	1.7	ND	ND	ND	ND

Key:

☐ = Result exceeds screening criteria
NA = Not analyzed for
ND = Not detected
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Table 4.11.4.2-3

FREQUENCY OF DETECTION AND EXCEEDANCES OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES WEAPONS STORAGE AREA, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (µg/L)				
Chloroform	2/5	0.66 - 9.0	1	7
Tetrachloroethene	1/5	7.5	1	5
Trichloroethene	2/5	0.31J - 31	1	5
Semivolatiles (µg/L)				
bis (2-Ethylhexyl) phthalate	1/5	83J	1	6
Diethylphthalate	1/5	1.7	0	50

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
µg/L = Micrograms per liter.
J = Estimated concentration.

10/9/97

Table 4.11.4.3-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
LOT 69
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: % Solids	Anions a	Anions b	BOD	COD	Cr6	Cyanide	Fingrprt	Hardness	M.E.E.	Pest	PCB	pH	SVOCs	TOC	VOCs
Six Mile Creek (W) Lot 69 On-Base GW	SI- *	L69MW-4	8/11/97	ASC	Groundwater	8.0 - 18.0	Y	T	N1														X	X	X
	SI-QA/QC	L69MW-4 /D	8/11/97	ASC	Groundwater	8.0 - 18.0	Y	T	FD1														X	X	X
	SI-QA/QC	L69MW-4 /S	8/11/97	MRD	Groundwater	8.0 - 18.0	Y	T	FR1														X	X	X
	SI	L69TW-5	8/7/97	ASC	Groundwater	8.0 - 18.0	Y	T	N1														X	X	X
	SI-QA/QC	L69TW-RB1	8/7/97	ASC	Eqpt. Washwater	0.0 -	Y	T	EB1														X	X	X

Note: Depth is measured in feet.

Key:

- * = existing monitoring well
- Anions a = chloride, nitrate/nitrate, phosphate, sulfate
- Anions b = sulfide
- AOC = Area of Concern
- ASC = E and E's Analytical Services Center
- BOD = biological oxygen demand
- COD = chemical oxygen demand
- Cr6 = hexavalent chromium
- EB1, EB2 = equipment rinsate
- /D = duplicate sample
- Eqpt = equipment
- Fd = field
- FD1 = field duplicate
- Fingrprt = fingerprint analysis
- FR1 = field replicate/split
- GW = groundwater
- N1 = original
- NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
- M.E.E. = methane, ethane and ethene
- MRD = Missouri River Division laboratory
- MS1 = matrix spike/matrix spike duplicate
- /MSD = matrix spike/matrix spike duplicate
- PCB = polychlorinated biphenyl
- Pest = pesticide
- QA/QC = quality assurance/quality control sample
- QC = quality control
- RB = rinsate blank
- Rsmp = resample
- /S = split sample
- SI = Supplemental Investigation
- SVOC = semivolatile organic compound
- Stat = status (O = open; S = skipped; T = taken)
- TOC = total organic carbon
- TB = trip blank
- TB1, TB2 = trip blank
- TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
- VOC = volatile organic compound
- WP = sample in the work plan (Y= yes; N= no)

**ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - LOT69
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK**

Client Id:	L69MW-4	L69MW-4/D	L69TW-5
Sample Date:	8/11/97	8/11/97	8/7/97
Sample Depth (ft.):	8-18	8-18	8-18
Volatiles (524.2) ug/L			
1,1,1-Trichloroethane	ND	0.25 J	ND
2-Butanone	ND	ND	18
Carbon tetrachloride	0.49 J	0.47 J	ND
Chloroform	0.49 J	0.46 J	ND

Key:

ND = Not detected
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Note:
No positive results exceed screening criteria at this AOC.

Table 4.11.4.3-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES LOT 69, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
1,1,1 Trichloroethane	1/3	0.25J	0	5
2-Butanone	1/3	18	0	50
Carbon tetrachloride	1/3	0.47J - 0.49J	0	5
Chloroform	1/3	0.46 - 0.49J	0	7

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

10/9/97

Table 4.11.4.4-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
BUILDING 3
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

Location-AOC-			Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-Fd NAa	-Fd VOC	Anions a	Anions b	BOD	COD	Cr6	Cyanide	Fingrprt	Hardness	M.E.E.	Metals	PCB 525	Pest PCB	pH	SVOC 525	SVOCs	TOC	VOC 524	VOCs
Six Mile Creek (W)	Building 3	On-Base	SI	B3VMW-1	8/25/97	ASC	Groundwater	8.0 - 18.0	Y	T	N1																	X			X	
			SI	B3VMW-1 VP01	7/2/97	FIELD	Groundwater	10.4 - 11.5	Y	T	N1			X																		
			SI	B3VMW-1 VP02	7/7/97	FIELD	Groundwater	20.0 - 22.0	Y	T	N1			X																		
			SI	B3VMW-1 VP03	7/7/97	FIELD	Groundwater	30.0 - 32.0	Y	T	N1			X																		
			SI	B3VMW-1 VP04	7/7/97	FIELD	Groundwater	40.0 - 42.0	Y	T	N1			X																		
			SI-QA/QC	B3VMW-1 VP04/D	7/7/97	FIELD	Groundwater	40.0 - 42.0	N	T	FD1			X																		
			SI-QA/QC	B3VMW-1 VP04/S	7/7/97	MRD	Groundwater	40.0 - 42.0	N	T	FR1			X																		
			SI	B3VMW-1 VP05	7/7/97	FIELD	Groundwater	48.0 - 48.8	N	T	N1			X																		
			SI-QA/QC	B3VMW-RB1VP	7/7/97	ASC	Eqpt. Washwater	-	Y	T	EB1			X																		
			SI-QA/QC	B3VMW-1 VP03/D		FIELD	Groundwater	-	Y	S	FD1			X																		
			SI-QA/QC	B3VMW-1 VP03/S		MRD	Groundwater	-	Y	S	FR1			X																		

Note: Depth is measured in feet.

Key:

* = existing monitoring well
Anions a = chloride, nitrate/nitrate, phosphate, sulfate
Anions b = sulfide
AOC = Area of Concern
ASC = E and E's Analytical Services Center
BOD = biological oxygen demand
COD = chemical oxygen demand
Cr6 = hexavalent chromium
EB1, EB2 = equipment rinsate
/D = duplicate sample
Eqpt = equipment
Fd = field
FD1 = field duplicate
Fingrprt = fingerprint analysis
FR1 = field replicate/split
GW = groundwater
N1 = original
NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
M.E.E. = methane, ethane and ethene
MRD = Missouri River Division laboratory
MS1 = matrix spike/matrix spike duplicate
/MSD = matrix spike/matrix spike duplicate
PCB = polychlorinated biphenyl
Pest = pesticide
QA/QC = quality assurance/quality control sample
QC = quality control
RB = rinsate blank
Rsmp = resample
/S = split sample
SI = Supplemental Investigation
SVOC = semivolatile organic compound
Stat = status (O = open; S = skipped; T = taken)
TOC = total organic carbon
TB = trip blank
TB1, TB2 = trip blank
TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
VOC = volatile organic compound
WP = sample in the work plan (Y= yes; N= no)

Table 4.11.4.4-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - BUILDING 3
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	**B3VMW-1**
Sample Date:	8/25/97
Sample Depth (ft.):	8-18
Volatiles (524.2) ug/L	
1,1,1 Trichloroethane	0.83
Chloroform	1.0
Tetrachloroethene	0.36 J
Trichloroethene	2.7
Semivolatiles (525.2) ug/L	
bis(2-Ethylhexyl)phthalate	5.7 J

Key:

AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Note:
No positive results exceed screening criteria at this AOC.

Table 4.11.4.4-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES, BUILDING 3, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
1,1,1 Trichloroethane	1/1	0.83	0	5
Chloroform	1/1	1.0	0	7
Tetrachloroethene	1/1	0.36J	0	5
Trichloroethene	1/1	2.7	0	5
Semivolatiles (μg/L)				
bis (2-Ethylhexyl) phthalate	1/1	5.7J	0	6

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

10/9/97

Table 4.11.4.5-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
BUILDING 786
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

Location-AOC-		Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: 6-Field Indicators	Anions a	Anions b	BOD	COD	Cr6	Eqpt Rinsate	Fingerprint Analysis	M.E.E.	MRD	PCB Test	pH	SVOC 525	TOC	VOC 524
Six Mile Creek (W)	Building 786	On-Base GSI	786MW-6	8/26/97	ASC	Groundwater	11.0 - 21.0	Y	T	N1	X	X											X		X
		SI- *	786MW-2FP		ASC	Groundwater	-	Y	S	N1								X					X		X

Note: Depth is measured in feet.

Key:

*	= existing monitoring well	FD1	= field duplicate	QC	= quality control
Anions a	= chloride, nitrate/nitrate, phosphate, sulfate	Fingrprt	= fingerprint analysis	RB	= rinsate blank
Anions b	= sulfide	FR1	= field replicate/split	Rsmp	= resample
AOC	= Area of Concern	GW	= groundwater	/S	= split sample
ASC	= E and E's Analytical Services Center	N1	= original	SI	= Supplemental Investigation
BOD	= biological oxygen demand	NA a	= field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)	SVOC	= semivolatile organic compound
COD	= chemical oxygen demand			Stat	= status (O = open; S = skipped; T = taken)
Cr6	= hexavalent chromium	M.E.E.	= methane, ethane and ethene	TOC	= total organic carbon
EB1, EB2	= equipment rinsate	MRD	= Missouri River Division laboratory	TB	= trip blank
/D	= duplicate sample	MS1	= matrix spike/matrix spike duplicate	TB1, TB2	= trip blank
Eqpt	= equipment	/MSD	= matrix spike/matrix spike duplicate	TCLP disp	= Toxicity Characteristic Leaching Procedure disposal parameters
Fd	= field	PCB	= polychlorinated biphenyl		
		Pest	= pesticide	VOC	= volatile organic compound
		QA/QC	= quality assurance/quality control sample	WP	= sample in the work plan (Y= yes; N= no)

Table 4.11.4.5-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - BUILDING 786
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	**786MW-6**
Sample Date:	8-26-97
Sample Depth (ft.):	11-21
Semivolatiles (525.2) ug/L	
di-n-Octylphthalate	0.14 J

Key:

AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Note:
No positive results exceed screening criteria at this AOC.

Table 4.11.4.5-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES, BUILDING 786, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Semivolatiles (μg/L)				
di-n-Octylphthalate	1/1	0.14J	0	50

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

Table 4.11.4.6-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
BUILDING 133
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

ANALYSES

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-Fd NAa	-Fd VOC	Anions a	Anions b	BOD	COD	Cr6	Cyanides	Flngrpt	Hardnes	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Six Mile Creek (W) Building 133 On-Base G	SI	133MW-1	8/28/97	ASC	Groundwater	8.0 - 18.0	Y	T	N1		X		X													X			X	
	SI	133MW-2	8/28/97	ASC	Groundwater	8.0 - 18.0	Y	T	N1		X		X													X			X	
	SI	133MW-3	8/29/97	ASC	Groundwater	8.2 - 18.2	Y	T	N1		X		X													X			X	
	SI- *	HS5MW-1		ASC	Groundwater	-	Y	S	N1		X		X													X			X	
	SI-QA/QC	133GP-RB1	6/17/97	FIELD	Eqpt. Washwater	-	Y	T	EB1			X																		
	SI-QA/QC	133GP-RB2	7/1/97	FIELD	Eqpt. Washwater	-	N	T	EB1			X																		
	SI-QA/QC	133GP-RB3	7/25/97	FIELD	Eqpt. Washwater	-	N	T	EB1			X																		
	SI	133GP-01	6/17/97	FIELD	Groundwater	8.7 - 12.7	Y	T	N1			X																		
	SI	133GP-01 VP01	7/25/97	FIELD	Groundwater	9.7 - 21.6	N	T	N1			X																		
	SI	133GP-01 VP02	7/25/97	FIELD	Groundwater	24.0 - 28.4	N	T	N1			X																		
	SI	133GP-02	6/17/97	FIELD	Groundwater	8.4 - 9.4	Y	T	N1			X																		
	SI	133GP-03	6/17/97	FIELD	Groundwater	9.1 - 14.0	Y	T	N1			X																		
	SI-QA/QC	133GP-03 /MSD	6/17/97	FIELD	Water/QC Matrix	9.1 - 14.0	Y	T	MS1			X																		
	SI	133GP-04	6/17/97	FIELD	Groundwater	8.5 - 9.5	Y	T	N1			X																		
	SI-QA/QC	133GP-04 /D	6/17/97	FIELD	Groundwater	8.5 - 9.5	Y	T	FD1			X																		
	SI-QA/QC	133GP-04 /S	6/17/97	MRD	Groundwater	8.5 - 9.5	Y	T	FR1			X																		
	SI	133GP-05	6/17/97	FIELD	Groundwater	8.0 - 13.4	Y	T	N1			X																		
	SI	133GP-06	6/17/97	FIELD	Groundwater	8.8 - 14.1	Y	T	N1			X																		
	SI-QA/QC	133GP-06 /D	6/17/97	FIELD	Groundwater	8.8 - 14.1	Y	T	FD1			X																		
	SI-QA/QC	133GP-06 /S	6/17/97	MRD	Groundwater	8.8 - 14.1	Y	T	FR1			X																		
	SI	133GP-07	6/17/97	FIELD	Groundwater	8.8 - 13.6	Y	T	N1			X																		
	SI	133GP-08	6/17/97	FIELD	Groundwater	8.1 - 13.6	Y	T	N1			X																		
	SI	133GP-09	6/17/97	FIELD	Groundwater	9.0 - 13.3	Y	T	N1			X																		
	SI	133GP-10	6/17/97	FIELD	Groundwater	7.4 - 14.1	Y	T	N1			X																		
	SI	133GP-11	6/17/97	FIELD	Groundwater	7.7 - 12.7	Y	T	N1			X																		
	SI	133GP-12	6/17/97	FIELD	Groundwater	7.7 - 14.0	Y	T	N1			X																		
	SI	133GP-13	6/17/97	FIELD	Groundwater	7.3 - 13.6	Y	T	N1			X																		
	SI	133GP-14	6/24/97	FIELD	Groundwater	8.6 - 13.8	N	T	N1			X																		
	SI	133GP-15	6/24/97	FIELD	Groundwater	7.5 - 13.1	N	T	N1			X																		
	SI	133GP-16	6/27/97	FIELD	Groundwater	10.2 - 13.6	N	T	N1			X																		
	SI	133GP-17	6/27/97	FIELD	Groundwater	10.5 - 14.1	N	T	N1			X																		
	SI	133GP-18	6/27/97	FIE	roundwater	10.3 - 14.2	N	T	N1			X																		

10/9/97

Table 4.11.4.6-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
BUILDING 133
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

ANALYSES

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-FdNAa	-FdVOC	Anions a	Anions b	BOD	COD	Cr6	Cyanides	Fingerprint	Hardness	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Six Mile Creek (W) Building 133 On-Base G	SI	133GP-19	7/1/97	FIELD	Groundwater	9.1 - 13.3	N	T	N1			X																		
	SI	133GP-19 VP01	7/25/97	FIELD	Groundwater	10.6 - 24.5	N	T	N1			X																		
	SI	133GP-20	7/1/97	FIELD	Groundwater	10.0 - 13.3	N	T	N1			X																		
	SI-QA/QC	133GP-20 /D	7/1/97	FIELD	Groundwater	10.0 - 13.3	N	T	FD1			X																		
	SI-QA/QC	133GP-20 /S	7/1/97	MRD	Groundwater	10.0 - 13.3	N	T	FR1			X																		
	SI	133GP-21	7/1/97	FIELD	Groundwater	10.5 - 14.4	N	T	N1			X																		
	SI	133GP-22	7/1/97	FIELD	Groundwater	10.8 - 13.8	N	T	N1			X																		
	SI	133GP-23	7/2/97	FIELD	Groundwater	10.4 - 14.2	N	T	N1			X																		
	SI	133GP-24	7/25/97	FIELD	Groundwater	10.1 - 14.8	N	T	N1			X																		
	SI	133GP-25	7/25/97	FIELD	Groundwater	10.2 - 14.6	N	T	N1			X																		
	SI	133GP-26	7/25/97	FIELD	Groundwater	10.6 - 14.9	N	T	N1			X																		
	SI	133GP-27	7/25/97	FIELD	Groundwater	10.6 - 14.0	N	T	N1			X																		
	SI	133GP-28	7/25/97	FIELD	Groundwater	10.6 - 14.8	N	T	N1			X																		
	SI	133GP-29	7/25/97	FIELD	Groundwater	10.4 - 14.5	N	T	N1			X																		
	SI	133GP-30	7/25/97	FIELD	Groundwater	10.9 - 14.5	N	T	N1			X																		

Table 4.11.4.6-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
BUILDING 133
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK (Cont.)

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES

Note: Depth is measured in feet.

Key:

*	= existing monitoring well	FD1	= field duplicate	QC	= quality control
Anions a	= chloride, nitrate/nitrate, phosphate, sulfate	Fingrprt	= fingerprint analysis	RB	= rinsate blank
Anions b	= sulfide	FR1	= field replicate/split	Rsmp	= resample
AOC	= Area of Concern	GW	= groundwater	/S	= split sample
ASC	= E and E's Analytical Services Center	N1	= original	SI	= Supplemental Investigation
BOD	= biological oxygen demand	NA a	= field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)	SVOC	= semivolatile organic compound
COD	= chemical oxygen demand			Stat	= status (O = open; S = skipped; T = taken)
Cr6	= hexavalent chromium	M.E.E.	= methane, ethane and ethene	TOC	= total organic carbon
EB1, EB2	= equipment rinsate	MRD	= Missouri River Division laboratory	TB	= trip blank
/D	= duplicate sample	MS1	= matrix spike/matrix spike duplicate	TB1, TB2	= trip blank
Eqpt	= equipment	/MSD	= matrix spike/matrix spike duplicate	TCLP disp	= Toxicity Characteristic Leaching Procedure disposal parameters
Fd	= field	PCB	= polychlorinated biphenyl		
		Pest	= pesticide	VOC	= volatile organic compound
		QA/QC	= quality assurance/quality control sample	WP	= sample in the work plan (Y= yes; N= no)

Table 4.11.4.6-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - BUILDING 133
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	133MW-1	133MW-2	133MW-3
Sample Date:	8/28/97	8/28/97	8/28/97
Sample Depth (ft.):	8-18	8-18	8.2-18.2
Volatiles (524.2) ug/L			
1,1,1-Trichloroethane	0.36 J	0.60	0.86
Chloroform	ND	ND	1.0
Tetrachloroethene	0.84	0.98	0.37 J
Total Xylenes	16	ND	ND
Trichloroethene	1.3	2.5	3.9

Key:

☐ = Result exceeds screening criteria
-- = Not detected
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Table 4.11.4.6-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES, BUILDING 133, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
1,1,1-Trichloroethane	3/3	0.36J - 0.86	0	5
Chloroform	1/3	1.0	0	7
Tetrachloroethene	3/3	0.37J - 0.98	0	5
Total Xylenes	1/3	16	1	5
Trichloroethene	3/3	1.3 - 3.9	0	5

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

Table 4.11.4.7-1

LISTING OF SAMPLES TAKEN SKIPPED OR ADDED
BUILDING 782
GROUNDWATER AOC - SUPPLEMENTAL INVESTIGATION
FORMER GRIFFISS AFB, ROME, NEW YORK

4/3/98

Location-AOC-			Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: % Solids	Ferrous Iron	Anions a	Anions b	BOD	COD	Cr6	Fingrprt	Hydrocarbon Degrad. Eqpt.	M.E.E.	Methane Ethane Ethene	PCB 8082	Pest 8081	pH	SVOC 8270	TOC	VOC 8260	VOC 524.2
Six Mile Creek (W)	Building 782	On-Base G	SI- *	782MW-1R	8/26/97	ASC	Groundwater	18.3 - 28.0	Y	T	N1	X		X												X		X
			SI- *	782MW-2	8/27/97	ASC	Groundwater	10.0 - 20.0	Y	T	N1	X		X												X		X
			SI-QA/QC	782MW-2 /D	8/27/97	ASC	Groundwater	10.0 - 20.0	Y	T	FD1	X		X												X		X
			SI-QA/QC	782MW-2 /S	8/27/97	MRD	Groundwater	10.0 - 20.0	Y	T	FR1	X		X												X		X
			SI- *	782MW-3R	8/26/97	ASC	Groundwater	16.6 - 31.5	Y	T	N1	X		X												X		X
			SI	782MW-5	8/28/97	ASC	Groundwater	15.0 - 25.0	Y	T	N1	X		X												X		X
			SI	782MW-6		ASC	Groundwater	-	Y	S	N1	X		X												X		X
			SI	782MW-6R2	12/4/97	ASC	Groundwater	19.5 - 34.5	N	T	N1	X		X												X		X
			SI-QA/QC	782MW-RB1		ASC	Eqpt. Washwater	-	Y	S	EB1	X		X												X		X

Note: Depth is measured in feet.

Key:

* = existing monitoring well
Anions a = chloride, nitrate/nitrate, phosphate, sulfate
Anions b = sulfide
AOC = Area of Concern
ASC = E and E's Analytical Services Center
BOD = biological oxygen demand
COD = chemical oxygen demand
Cr6 = hexavalent chromium
EB1, EB2 = equipment rinsate
/D = duplicate sample
Eqpt = equipment
Fd = field
FD1 = field duplicate
Fingrprt = fingerprint analysis
FR1 = field replicate/split
GW = groundwater
N1 = original
NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
M.E.E. = methane, ethane and ethene
MRD = Missouri River Division laboratory
MS1 = matrix spike/matrix spike duplicate
/MSD = matrix spike/matrix spike duplicate
PCB = polychlorinated biphenyl
Pest = pesticide
QA/QC = quality assurance/quality control sample
QC = quality control
RB = rinsate blank
Rsmp = resample
/S = split sample
SI = Supplemental Investigation
SVOC = semivolatile organic compound
Stat = status (O = open; S = skipped; T = taken)
TOC = total organic carbon
TB = trip blank
TB1, TB2 = trip blank
TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
VOC = volatile organic compound
WP = sample in the work plan (Y= yes; N= no)

Table 4.11.4.7-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - BUILDING 782
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	782MW-1R	782MW-2	782MW-2/D	782MW-3R	782MW-5	782VMV-6R2
Sample Date:	8/26/97	8/27/97	8/27/97	8/26/97	8/28/97	12/4/97
Sample Depth (ft.):	18.3-28.3	10-20	10-20	16.6-31.6	15-25	19.5-34.5
Volatiles (524.2) ug/L						
1,1-Dichloroethane	2.3	--	--	--	--	0.39 J
cis-1,2-Dichloroethene	1.0	--	--	--	--	37
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	1.1
2-Butanone	--	90	79	--	--	--
Benzene	66	1.8	1.1	0.31 J	3.6	0.33 J
Ethylbenzene	--	4.2	--	--	--	--
Total Xylenes	--	35 J	20 J	--	130	--
Vinyl Chloride	--	--	--	--	--	26
Semivolatiles (525.2) ug/L						
2-Methylnaphthalene	--	3.0	2.8 J	--	--	--
Butylbenzylphthalate	--	--	--	1.8	--	--
Naphthalene	--	6.2	5.7	--	--	--
Anions (300) mg/L						
Chloride	36	1.1	1.1	44	2.2	42
Sulfate	0.22	1.3	1.3	0.34	0.13 J	7.7

Key:

☐ = Result exceeds screening criteria.
-- = Not detected.
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
TOC = Total organic carbon.
U = Not detected above method detection limit.
ug/L = Micrograms per liter.

Table 4.11.4.7-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES NOSE DOCKS 1 AND 2, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
1,1-Dichloroethane	2/16	0.39 - 2.3	0	5
cis-1,2-Dichloroethene	2/6	1.0 - 37	0	5
trans-1,2-Dichloroethene	1/6	1.1	0	5
2-Butanone	2/6	79 - 90	2	50
Benzene	6/6	0.31J - 66	4	0.7
Ethylbenzene	1/6	4.2	0	5
Total Xylenes	2/6	20J - 130	3	5
Vinyl chloride	1/6	26	1	5
Semivolatiles (μg/L)				
2-Methylnaphthalene	1/6	2.8J - 3.0	0	50
Butylbenzylphthalate	1/6	1.8	0	50
Naphthalene	1/6	5.7 - 6.2	0	10

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

Table 4.11.4.8-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
BUILDING 101
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

ANALYSES

Location-AOC-			Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-FdNAa	-FdVOC	Anions a	Anions b	BOD	COD	Cr6	Cyanide	Fingrprt	Hardness	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Three Mile Creek (E)	Building 101	On-Base	SI- *	101MW-1	7/24/97	ASC	Groundwater	8.2 - 18.2	Y	T	N1		X		X	X							X					X		X	X	
			SI- *	101MW-2	7/25/97	ASC	Groundwater	10.7 - 20.7	Y	T	N1		X		X	X							X					X		X	X	
			SI- *	101MW-3	7/29/97	ASC	Groundwater	8.0 - 18.8	Y	T	N1		X		X	X							X					X		X	X	
			SI	101MW-4	8/27/97	ASC	Groundwater	10.0 - 20.7	Y	T	N1		X		X	X							X					X		X	X	
			SI-QA/QC	101TW-05 /MSD	8/5/97	ASC	Water/QC Matrix	12.0 - 22.0	Y	T	MS1		X		X	X							X					X		X	X	
			SI	101TW-5	8/5/97	ASC	Groundwater	12.0 - 22.0	Y	T	N1		X		X	X							X					X		X	X	
			SI	101TW-6	8/5/97	ASC	Groundwater	11.0 - 21.6	Y	T	N1		X		X	X							X					X		X	X	
			SI-QA/QC	101MW-RB1		ASC	Eqpt. Washwater	-	Y	S	EB1		X		X	X							X					X		X	X	

Note: Depth is measured in feet.

Key:

*	=	existing monitoring well	FD1	=	field duplicate	QC	=	quality control
Anions a	=	chloride, nitrate/nitrate, phosphate, sulfate	Fingrprt	=	fingerprint analysis	RB	=	rinsate blank
Anions b	=	sulfide	FR1	=	field replicate/split	Rsmp	=	resample
AOC	=	Area of Concern	GW	=	groundwater	/S	=	split sample
ASC	=	E and E's Analytical Services Center	N1	=	original	SI	=	Supplemental Investigation
BOD	=	biological oxygen demand	NA a	=	field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)	SVOC	=	semivolatile organic compound
COD	=	chemical oxygen demand				Stat	=	status (O = open; S = skipped; T = taken)
Cr6	=	hexavalent chromium	M.E.E.	=	methane, ethane and ethene	TOC	=	total organic carbon
EB1, EB2	=	equipment rinsate	MRD	=	Missouri River Division laboratory	TB	=	trip blank
/D	=	duplicate sample	MS1	=	matrix spike/matrix spike duplicate	TB1, TB2	=	trip blank
Eqpt	=	equipment	/MSD	=	matrix spike/matrix spike duplicate	TCLP disp	=	Toxicity Characteristic Leaching Procedure disposal parameters
Fd	=	field	PCB	=	polychlorinated biphenyl			
			Pest	=	pesticide	VOC	=	volatile organic compound
			QA/QC	=	quality assurance/quality control sample	WP	=	sample in the work plan (Y= yes; N= no)

Table 4.11.4.8-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - BUILDING 101
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	101MW-1	101MW-2	101MW-3	101MW-4	101TW-5	101TW-6
Sample Date:	7/24/97	7/25/97	7/29/97	8/27/97	8/5/97	8/5/97
Sample Depth (ft.):	8.2-18.2	10.7-20.7	8.8-18.8	10.7-20.7	12-22	11.6-21.6
Volatiles (524.2) ug/L						
Bromodichloromethane	ND	ND	0.81	ND	ND	ND
Chloroform	19	1.5	19	1.2	ND	ND
Tetrachloroethene	0.98	ND	ND	ND	ND	ND
Trichloroethene	0.88	1.2	0.52	ND	0.72	0.47 J
Semivolatiles (525.2) ug/L						
bis(2-Ethylhexyl)phthalate	10R	ND	ND	8.9	ND	ND
Diethylphthalate	ND	0.12 J	ND	ND	ND	ND

Key:

☐ = Result exceeds screening criteria
ND = Not detected; or positive result rejected by validation
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
R = Rejected.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Table 4.11.4.8-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES, BUILDING 101, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
Bromodichloromethane	1/6	0.81	0	50
Chloroform	4/6	1.2 - 19	2	7
Tetrachloroethene	1/6	0.98	0	5
Trichloroethene	5/6	0.47J - 1.2	0	5
Semivolatiles (μg/L)				
bis (2-Ethylhexyl) phthalate	1/6	8.9	1	6
Diethylphthalate	1/6	0.12J	0	50

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

Table 4.11.4.9-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
LANDFILL 5
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK (Cont.)

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: % Solid	Anions a	Anions b	BOD	COD	Cr6	Fingrprt	MEE	MRD	PCB	pH	SVOC 525	TOC	VOC 524
Three Mile Creek (E) Landfill 5 On-Base G	SI- *	LF5MW-1	8/26/97	ASC	Groundwater	8.0 - 18.0	Y	T	N1		X	X									X		X
	SI- *	LF5MW-2	8/22/97	ASC	Groundwater	9.0 - 19.0	Y	T	N1		X	X									X		X
	SI- *	LF5MW-3	8/22/97	ASC	Groundwater	3.2 - 13.2	Y	T	N1		X	X									X		X
	SI	LF5MW-4	8/26/97	ASC	Groundwater	2.0 - 12.0	Y	T	N1		XX	X									X		X
	SI-QA/QC	LF5MW-RB1		ASC	Eqpt. Washwater	-	Y	O	EB1		X	X									X		X

Note: Depth is measured in feet.

Key:

- * = existing monitoring well
- Anions a = chloride, nitrate/nitrate, phosphate, sulfate
- Anions b = sulfide
- AOC = Area of Concern
- ASC = E and E's Analytical Services Center
- BOD = biological oxygen demand
- COD = chemical oxygen demand
- Cr6 = hexavalent chromium
- EB1, EB2 = equipment rinsate
- /D = duplicate sample
- Eqpt = equipment
- Fd = field
- FD1 = field duplicate
- Fingrprt = fingerprint analysis
- FR1 = field replicate/split
- GW = groundwater
- N1 = original
- NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
- M.E.E. = methane, ethane and ethene
- MRD = Missouri River Division laboratory
- MS1 = matrix spike/matrix spike duplicate
- /MSD = matrix spike/matrix spike duplicate
- PCB = polychlorinated biphenyl
- Pest = pesticide
- QA/QC = quality assurance/quality control sample
- QC = quality control
- RB = rinsate blank
- Rsmp = resample
- /S = split sample
- SI = Supplemental Investigation
- SVOC = semivolatile organic compound
- Stat = status (O = open; S = skipped; T = taken)
- TOC = total organic carbon
- TB = trip blank
- TB1, TB2 = trip blank
- TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
- VOC = volatile organic compound
- WP = sample in the work plan (Y= yes; N= no)

Table 4.11.4.9-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - LANDFILL 5
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	LF5MW-1	LF5MW-2	LF5MW-3	LF5MW-4
Sample Date:	8/26/97	8/22/97	8/22/97	8/26/97
Sample Depth (ft.):	8-18	9-19	3.2-13.2	2-12
Volatiles (524.2) ug/L				
Carbon tetrachloride	6.1	ND	ND	ND
Chloroform	2.7	ND	ND	ND
Semivolatiles (525.2) ug/L				
di-n-Butylphthalate	ND	ND	1.4	ND

Key:

☐ = Result exceeds screening criteria
ND = Not detected
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Table 4.11.4.9-3

FREQUENCY OF DETECTION AND EXCEEDANCES OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES, LANDFILL 5, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (µg/L)				
Carbon tetrachloride	1/4	6.1	1	5
Chloroform	1/4	2.7	0	7
Semivolatiles (µg/L)				
di-n-Butylphthalate	1.4	1.4	0	50

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
µg/L = Micrograms per liter.
J = Estimated concentration.

10/9/97

Table 4.11.4.10-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
LANDFILL 6
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

ANALYSES

Location-AOC-			Phases		Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-FdNAa	-FdVOC	Anionsa	Anionsb	BOD	COD	Cr6	Cyanides	Fingrpt	Hardnes	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Three Mile Creek (E)	Landfill 6	On-Base G	SI-	*	LF6MW-1	7/30/97	ASC	Groundwater	57.0 - 67.0	Y	T	N1		X		X	X							X					X		X	X	
			SI-	*	LF6MW-2	7/29/97	ASC	Groundwater	16.0 - 26.0	Y	T	N1		X		X	X							X					X		X	X	
			SI		LF6VMW-6	8/27/97	ASC	Groundwater	35.0 - 45.0	Y	T	N1		X		X	X							X					X		X	X	
			SI-	*	TMC-USGS-3	7/30/97	ASC	Groundwater	24.0 - 26.5	Y	T	N1		X		X	X							X					X		X	X	
			SI-	*	TMCMW-9	8/26/97	ASC	Groundwater	18.0 - 28.0	Y	T	N1		X		X	X							X					X		X	X	
			SI-QA/QC		LF6GP-RB1	6/18/97	FIELD	Eqpt. Washwater	-	Y	T	EB1			X																		
			SI		LF6GP-01	6/18/97	FIELD	Groundwater	18.2 - 19.4	Y	T	N1			X																		
			SI		LF6GP-02	6/18/97	FIELD	Groundwater	14.6 - 19.5	Y	T	N1			X																		
			SI		LF6GP-03	6/18/97	FIELD	Groundwater	15.0 - 18.4	Y	T	N1			X																		
			SI		LF6GP-04	6/18/97	FIELD	Groundwater	16.7 - 19.3	Y	T	N1			X																		
			SI-QA/QC		LF6VMW-1 VP01/MSD	7/14/97	FIELD	Water/QC Matrix	16.5 - 20.0	Y	T	MS1			X																		
			SI		LF6VMW-6 VP01	7/14/97	FIELD	Groundwater	16.5 - 20.0	Y	T	N1			X																		
			SI-QA/QC		LF6VMW-6 VP01/D	7/14/97	FIELD	Groundwater	16.5 - 20.0	Y	T	FD1			X																		
			SI-QA/QC		LF6VMW-6 VP01/S	7/14/97	MRD	Groundwater	16.5 - 20.0	Y	T	FR1			X																		
			SI		LF6VMW-6 VP02	7/14/97	FIELD	Groundwater	29.0 - 30.0	Y	T	N1			X																		
			SI		LF6VMW-6 VP03	7/14/97	FIELD	Groundwater	39.0 - 40.0	Y	T	N1			X																		
			SI		LF6VMW-6 VP04	7/15/97	FIELD	Groundwater	49.0 - 50.0	Y	T	N1			X																		
			SI		LF6VMW-6 VP05	7/15/97	FIELD	Groundwater	59.0 - 60.0	Y	T	N1			X																		
			SI		LF6VMW-6 VP06	7/15/97	FIELD	Groundwater	69.0 - 70.0	Y	T	N1			X																		
			SI		LF6VMW-6 VP07	7/15/97	FIELD	Groundwater	79.0 - 80.0	Y	T	N1			X																		
			SI		LF6VMW-6 VP08		FIELD	Groundwater	-	Y	S	N1			X																		
			SI		LF6VMW-6 VP09		FIELD	Groundwater	-	Y	S	N1			X																		

Table 4.11.4.10-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
LANDFILL 6
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK (Cont.)

ANALYSES

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-FdNAa	-FdVOC	Anions a	Anions b	BOD	COD	Cr6	Cyanide	Fingrprt	Hardnes	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs

Note: Depth is measured in feet.

Key:

- * = existing monitoring well
- Anions a = chloride, nitrate/nitrate, phosphate, sulfate
- Anions b = sulfide
- AOC = Area of Concern
- ASC = E and E's Analytical Services Center
- BOD = biological oxygen demand
- COD = chemical oxygen demand
- Cr6 = hexavalent chromium
- EB1, EB2 = equipment rinsate
- /D = duplicate sample
- Eqpt = equipment
- Fd = field
- FD1 = field duplicate
- Fingrprt = fingerprint analysis
- FR1 = field replicate/split
- GW = groundwater
- N1 = original
- NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
- M.E.E. = methane, ethane and ethene
- MRD = Missouri River Division laboratory
- MS1 = matrix spike/matrix spike duplicate
- /MSD = matrix spike/matrix spike duplicate
- PCB = polychlorinated biphenyl
- Pest = pesticide
- QA/QC = quality assurance/quality control sample
- QC = quality control
- RB = rinsate blank
- Rsmp = resample
- /S = split sample
- SI = Supplemental Investigation
- SVOC = semivolatile organic compound
- Stat = status (O = open; S = skipped; T = taken)
- TOC = total organic carbon
- TB = trip blank
- TB1, TB2 = trip blank
- TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
- VOC = volatile organic compound
- WP = sample in the work plan (Y= yes; N= no)

Table 4.11.4.10-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - LANDFILL 6
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	LF6MW-1	LF6MW-2	LF6VMW-6	TMC-USGS-3	TMCMW-9
Sample Date:	7/30/97	7/29/97	8/27/97	7/30/97	8/26/97
Sample Depth (ft.):	57-67	16-26	35-45	24-26.5	18-28
Volatiles (524.2) ug/L					
cis-1,2-Dichloroethene	ND	83	180	ND	0.30 J
trans-1,2-Dichloroethene	ND	1.4	2.2	ND	ND
Benzene	ND	1.2 J	1.0	ND	ND
Trichloroethene	ND	ND	26	ND	ND
Vinyl chloride	ND	20	29	ND	ND
Semivolatiles (525.2) ug/L					
bis(2-Ethylhexyl) phthalate	30R	ND	ND	33R	ND
Butylbenzylphthalate	ND	ND	ND	ND	1.2
Diethylphthalate	ND	ND	0.38 J	ND	ND

Key:

☐ = Result exceeds screening criteria
ND = Not detected; or positive result rejected by validation
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
R = Rejected.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Table 4.11.4.10-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES, LANDFILL 6, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
cis-1,2-Dichloroethene	3/5	0.30J - 180	2	5
trans-1,2-Dichloroethene	2/5	1.4 - 2.2	0	5
Benzene	2/5	1.0 - 1.2J	2	0.7
Trichloroethene	1/5	26	1	5
Vinyl Chloride	2/5	20 - 29	2	2
Semivolatiles (μg/L)				
Butylbenzylphthalate	1/5	1.2	0	50
Diethylphthalate	1/5	0.38J	0	50

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

Page 1 of 3

4/10/98

Table 4.11.4.11-1

LISTING OF SAMPLES TAKEN SKIPPED OR ADDED
BUILDING 775
GROUNDWATER AOC - SUPPLEMENTAL INVESTIGATION
FORMER GRIFFISS AFB, ROME, NEW YORK

ANALYSES

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	% Solids	-Fd NAa	-Fd VOC	Anions a	Anions b	BOD	COD	Cr6	Cyanide	Fingrpl	Hardnes	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Three Mile Creek (E) Building 775 On-Base	SI- *	773MW-1	7/22/97	ASC	Groundwater	48.5 - 63.5	Y	T	N1		X		X	X							X					X		X	X	
	SI-QA/QC	773MW-1 /MSD	7/22/97	ASC	Water/QC Matrix	48.5 -	Y	T	MS1		X		X	X							X					X		X	X	
	SI- *	773MW-2	7/23/97	ASC	Groundwater	48.0 - 62.0	Y	T	N1	X	X		X	X							X					X		X	X	
	SI- *	773MW-3	7/23/97	ASC	Groundwater	49.0 - 60.0	Y	T	N1		X		X	X							X					X		X	X	
	SI- *	775MW-1		ASC	Groundwater	-	Y	S	N1		X		X	X							X					X		X	X	
	SI- *	775MW-2	7/24/97	ASC	Groundwater	50.0 - 56.0	Y	T	N1		X		X	X							X					X		X	X	
	SI- *	775MW-3		ASC	Groundwater	-	Y	S	N1		X		X	X							X					X		X	X	
	SI	775MW-6	8/28/97	ASC	Groundwater	68.0 - 78.0	Y	T	N1		X		X	X							X					X		X	X	
	SI	775MW-6 /D	8/28/97	ASC	Groundwater	68.0 - 78.0	Y	T	FD1		X		X	X							X					X		X	X	
	SI	775MW-6 /S	8/28/97	MRD	Groundwater	68.0 - 78.0	Y	T	FR1		X		X	X							X					X		X	X	
	SI	775VMW-10	12/4/97	ASC	Groundwater	88.0 - 103.	N	T	N1		X		X	X							X					X		X	X	
	SI	775VMW-10 VP01	11/12/97	ASC	Groundwater	60.0 - 62.0	N	T	N1																					X
	SI	775VMW-10 VP01/D	11/12/97	ASC	Groundwater	60.0 - 62.0	N	T	FD1																					X
	SI	775VMW-10 VP01/S	11/12/97	MRD	Groundwater	60.0 - 62.0	N	T	FR1																					X
	SI	775VMW-10 VP02	11/13/97	ASC	Groundwater	72.0 - 74.0	N	T	N1																					X
	SI	775VMW-10 VP03	11/13/97	ASC	Groundwater	80.0 - 82.0	N	T	N1																					X
	SI	775VMW-10 VP04	11/13/97	ASC	Groundwater	90.0 - 92.0	N	T	N1																					X
	SI	775VMW-10 VP05	11/13/97	ASC	Groundwater	00.0- 102.	N	T	N1																					X
	SI	775VMW-10 VP06	11/13/97	ASC	Groundwater	10.0- 112.	N	T	N1																					X
	SI	775VMW-10/D	12/4/97	ASC	Groundwater	88.0 - 103.	N	T	FD1		X		X	X							X					X		X	X	
	SI	775VMW-10/S	12/4/97	MRD	Groundwater	88.0 - 103.	N	T	FR1		X		X	X							X					X		X	X	
	SI	775VMW-4	8/29/97	ASC	Groundwater	60.0 - 70.0	Y	T	N1		X		X	X							X					X		X	X	
	SI	775VMW-4 VP01	6/19/97	FIELD	Groundwater	-	Y	T	N1			X																		
	SI	775VMW-4 VP02	6/19/97	FIELD	Groundwater	-	Y	T	N1			X																		
	SI	775VMW-4 VP03	6/20/97	FIELD	Groundwater	81.0 - 81.0	Y	T	N1			X																		
	SI	775VMW-4 VP04	6/20/97	FIELD	Groundwater	91.0 - 91.0	Y	T	N1			X																		
	SI	775VMW-4 VP05		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-4 VP06		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-4 VP07		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-4 VP08		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-4 VP09		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-4 VP10		FIELD	Groundwater	-	Y	S	N1			X																		

Table 4.11.4.11-1

LISTING OF SAMPLES TAKEN SKIPPED OR ADDED
BUILDING 775
GROUNDWATER AOC - SUPPLEMENTAL INVESTIGATION
FORMER GRIFFISS AFB, ROME, NEW YORK

ANALYSES

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-FdNAa	-FdVOC	Anionsa	Anionsb	BOD	COD	Cr6	Cyanides	Fingrpt	Hardnes	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Three Mile Creek (E) Building 775 On-Base	SI	775VMW-5	8/25/97	ASC	Groundwater	65.0 - 75.0	Y	T	N1		X		X	X							X					X		X	X	
	SI	775VMW-5 VP01	7/16/97	FIELD	Groundwater	57.0 - 59.7	Y	T	N1			X																		
	SI	775VMW-5 VP02	7/17/97	FIELD	Groundwater	71.0 - 72.0	Y	T	N1			X																		
	SI	775VMW-5 VP03	7/17/97	FIELD	Groundwater	81.0 - 82.0	Y	T	N1			X																		
	SI	775VMW-5 VP04	7/18/97	FIELD	Groundwater	90.5 - 91.0	Y	T	N1			X																		
	SI	775VMW-5 VP05		FIELD	Groundwater	-	Y	S	N1			X																		
	SI-QA/QC	775VMW-5 VP05/D		FIELD	Groundwater	-	Y	S	FD1			X																		
	SI-QA/QC	775VMW-5 VP05/S		MRD	Groundwater	-	Y	S	FR1			X																		
	SI	775VMW-5 VP06		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-5 VP07		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-5 VP08		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-5 VP09		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-5 VP10		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-5R	8/28/97	ASC	Groundwater	65.0 - 75.0	Y	T	N1				X																	
	SI	775VMW-7	8/29/97	ASC	Groundwater	68.0 - 78.0	Y	T	N1		X		X	X							X					X		X	X	
	SI	775VMW-7 VP01	7/22/97	FIELD	Groundwater	58.0 - 58.8	Y	T	N1			X																		
	SI	775VMW-7 VP02	7/22/97	FIELD	Groundwater	68.0 - 70.0	Y	T	N1			X																		
	SI	775VMW-7 VP03	7/22/97	FIELD	Groundwater	78.0 - 80.0	Y	T	N1			X																		
	SI	775VMW-7 VP04	7/22/97	FIELD	Groundwater	88.0 - 90.0	Y	T	N1			X																		
	SI	775VMW-7 VP05		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-7 VP06		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-7 VP07		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-7 VP08		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-7 VP09		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-7 VP10		FIELD	Groundwater	-	Y	S	N1			X																		
	SI	775VMW-8	8/25/97	ASC	Groundwater	68.0 - 78.0	Y	T	N1		X		X	X							X					X		X	X	
	SI	775VMW-8 VP01	7/28/97	FIELD	Groundwater	58.0 - 60.0	N	T	N1			X																		
	SI	775VMW-8 VP02	7/28/97	FIELD	Groundwater	68.0 - 70.0	N	T	N1			X																		
	SI	775VMW-8 VP03	7/28/97	FIELD	Groundwater	78.0 - 80.0	N	T	N1			X																		
	SI-QA/QC	775VMW-8 VP03/D	7/28/97	FIELD	Groundwater	78.0 - 80.0	N	T	FD1			X																		
	SI-QA/QC	775VMW-8 VP03/MSD	7/28/97	FIELD	Water/QC Matrix	-	Y	T	MS1			X																		
	SI-QA/QC	775VMW-8 VP03/S	7/28/97	MRD	Groundwater	78.0 - 80.0	N	T	FR1			X																		

Table 4.11.4.11-1

LISTING OF SAMPLES TAKEN SKIPPED OR ADDED
BUILDING 775
GROUNDWATER AOC - SUPPLEMENTAL INVESTIGATION
FORMER GRIFFISS AFB, ROME, NEW YORK

4/10/98

ANALYSES

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-FdNAa	-FdVOC	Anions a	Anions b	BOD	COD	Cr6	Cyanide	Fingrprt	Hardness	M.E.E.	Metals	PCB525	PestPCB	pH	SVOC525	SVOCs	TOC	VOC524	VOCs
Three Mile Creek (E) Building 775 On-Base	SI	775VMW-8 VP04	7/28/97	FIELD	Groundwater	88.0 - 90.0	N	T	N1			X																		
	SI	775VMW-8R	8/28/97	ASC	Groundwater	68.0 - 78.0	Y	T	N1				X																	
	SI	775VMW-9	12/3/97	ASC	Groundwater	84.0 - 99.0	N	T	N1		X		X	X							X					X		X	X	
	SI	775VMW-9 VP01	11/4/97	ASC	Groundwater	56.0 - 58.0	N	T	N1																					X
	SI	775VMW-9 VP02	11/4/97	ASC	Groundwater	66.0 - 68.0	N	T	N1																					X
	SI	775VMW-9 VP03	11/4/97	ASC	Groundwater	76.0 - 77.5	N	T	N1																					X
	SI	775VMW-9 VP04	11/5/97	ASC	Groundwater	86.0 - 88.7	N	T	N1																					X
	SI	775VMW-9 VP05	11/5/97	ASC	Groundwater	96.0 - 98.0	N	T	N1																					X
	SI	775VMW-9R	12/4/97	ASC	Groundwater	84.0 - 99.0	N	T	N1		X		X	X							X					X		X	X	
	SI	775VMW-RB1	11/17/97	ASC	Eqpt. Washwater	-	N	T	EB1																					X
	SI-QA/QC	775VMW-RB1VP	7/18/97	ASC	Eqpt. Washwater	-	Y	T	EB1																					X
	SI-QA/QC	775VMW-RB2VP	7/22/97	ASC	Eqpt. Washwater	-	Y	T	EB2																					X
	SI	775VMWDW01	6/19/97	FIELD	Water/QC Matrix	0.0 - 0.0	N	T	N1			X																		
	SI	RIG TANK	6/20/97	FIELD	Water/QC Matrix	0.0 - 0.0	N	T	N1			X																		

Note: Depth is measured in feet.

Key:

* = existing monitoring well
Anions a = chloride, nitrate/nitrate, phosphate, sulfate
Anions b = sulfide
AOC = Area of Concern
ASC = E and E's Analytical Services Center
BOD = biological oxygen demand
COD = chemical oxygen demand
Cr6 = hexavalent chromium
EB1, EB2 = equipment rinsate
/D = duplicate sample
Eqpt = equipment
Fd = field
FD1 = field duplicate
Fingrprt = fingerprint analysis
FR1 = field replicate/split
GW = groundwater
N1 = original
NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
M.E.E. = methane, ethane and ethene
MRD = Missouri River Division laboratory
MS1 = matrix spike/matrix spike duplicate
/MSD = matrix spike/matrix spike duplicate
PCB = polychlorinated biphenyl
Pest = pesticide
QA/QC = quality assurance/quality control sample
QC = quality control
RB = rinsate blank
Rsmp = resample
/S = split sample
SI = Supplemental Investigation
SVOC = semivolatile organic compound
Stat = status (O = open; S = skipped; T = taken)
TOC = total organic carbon
TB = trip blank
TB1, TB2 = trip blank
TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
VOC = volatile organic compound
WP = sample in the work plan (Y= yes; N= no)

Table 4.11.4.11-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWTER AOC - BUILDING 775
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	773MW-1	773MW-2	773MW-3	775MW-2	775MW-6	775MW-6/D	775VMW-9	775VMW-9R	775VMW-10	775VMW-10/D
Sample Date:	7-55-97	7/23/97	7/23/97	7/24/97	8/28/97	8/28/97	12/3/97	12/4/97	12/4/97	12/4/97
Sample Depth (ft.):	48.5-63.5	48-63	49-64	50-65	68-78	68-78	84-99	84-99	88-103	88-103
Volatiles (524.2) ug/L										
1,1,1-Trichloroethane	0.42 J	--	--	--	1.7	1.7	NA	--	4.8	5
Chloroform	8.4	--	0.44 J	--	3.0	2.9	NA	1.4	1.3	1.4
Tetrachloroethene	1.9	6.3	--	2.0	--	--	NA	--	--	--
Trichloroethene	2.9	--	1.1	11	40	41	NA	20	81	86
1,1-dichloroethene	--	--	--	--	--	--	NA	--	0.72	0.73
cis-1,2-dichloroethene	--	--	--	--	--	--	NA	--	0.44 J	0.46 J
Semivolatiles (525.2) ug/L										
Acenaphthene	--	--	--	0.33 J	--	--	--	NA	--	--
Dibenzofuran	--	--	--	0.16 J	--	--	--	NA	--	--
Diethylphthalate	--	--	--	0.18 J	--	--	--	NA	--	0.73 J
Fluoranthene	--	--	--	0.34 J	--	--	--	NA	--	--
Fluorene	--	--	--	0.20 J	--	--	--	NA	--	--
Naphthalene	--	--	--	0.11 J	--	--	--	NA	--	--
Phenanthrene	--	--	--	0.61 J	--	--	--	NA	--	--
Pyrene	--	--	--	0.28 J	--	--	--	NA	--	--
Dibenzo(a,h)anthracene	--	--	--	--	--	--	0.61 J	NA	--	--
bis(2-ethylhexylphthalate)	--	--	--	4.3R	--	--	--	NA	--	--
Anions (300) mg/L										
Chloride	140	1.2	2.1	1.1	30	30	63	NA	41	40
Nitrate/Nitrite-N	1.9	2.2	2.3	1.3	2.3	2.2	1.0	NA	4.2	4.3
Sulfate	15	7.8	7.8	6.1	27	28	2.6	NA	33	31
M/E/E (8015) ug/L										
Methane	--	--	--	--	120 J	100 J	NA	2900	--	--
Total Organic Carbon (415.1) mg/L										
Total Organic Carbon	4.4	--	--	--	1.6	1.6	--	NA	--	--

Key at end of table

Table 4.11.4.11-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - BUILDING 775
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	775VMW-4	775VMW-5	775VMW-5R	775VMW-7	775VMW-8	775VMW-8R
Sample Date:	8/29/97	8/25/97	8/28/97	8/29/97	8/25/97	8/28/97
Sample Depth (ft.):	60-70	65-75	65-75	68-78	68-78	68-78
Volatiles (524.2) ug/L						
1,1,1-Trichloroethane	0.32 J	1.9	NA	1.3	1.3	NA
1,2-Dichloroethene (total)	--	0.43 J	NA	--	0.43 J	NA
Chloroform	0.54	0.43 J	NA	1.5	1.4	NA
Trichloroethene	18	95	NA	78	100	NA
Anions (300) mg/L						
Chloride	34	NA	53	38	NA	35
Nitrate/Nitrite-N	1.2	NA	2.3	3.6	NA	3.6
Sulfate	31	NA	26	24	NA	25
M/E/E (8015) ug/L						
Methane	980 J	54 J	NA	53 J	10 J	NA
Total Organic Carbon (415.1) mg/L						
Total Organic Carbon	--	1.2	NA	--	--	NA

Key:

☐ Result exceeded screening criteria.

--- = Not detected; or positive result rejected by validation
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
NA = Not analyzed for.
R = Rejected.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Table 4.11.4.11-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES, BUILDING 775, SUPPLEMENTAL INFORMATION
FORMER GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
1,1-Dichloroethene	1/13	0.72	0	5
cis-1,2-Dichloroethene	3/13	0.43 - 0.46	0	5
Chloroform	11/13	0.43J - 8.4	1	7
Tetrachloroethene	3/13	1.9 - 6.3	1	5
1,1,1-Trichloroethane	9/13	0.32J - 5	0	5
Trichloroethene	12/13	1.1 - 100	6	5
Semivolatiles (μg/L)				
Acenaphthene	1/13	0.33J	0	20
bis(2-ethylhaxyl)phthalate	1/13	4-3R	1	4
dibenzo(a,h)anthracene	1/13	0.61J	1	0.3
Dibenzofuran	1/13	0.16J	0	50
Diethylphthalate	2/13	0.18J - 0.73J	0	50
Fluoranthene	1/13	0.34J	0	50
Fluorene	1/13	0.20J	0	50
Naphthalene	1/13	0.11J	0	10
Phenanthrene	1/13	0.61J	0	50
Pyrene	1/13	0.28J	0	50

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

10/9/97

Table 4.11.4.12-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
FIRE PROTECTION TRAINING AREA
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

Location-AOC-			Phases		Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES: % Solids	Ferrous Iron	Alkalinity	Anions	BOD	COD	Cyanide	Field parameters	Hardness	Methane, Ethane, Ethene	PCB 525	Pest PCB	pH	SVOC 525	TOC	VOC 524	VOCs
Mohawk River	Fire Pr. Training Area	On-B	SI-	*	FPTMW-1	8/18/97	ASC	Groundwater	10.0 - 20.0	Y	T	N1			X	X										X		X
			SI-	*	FPTMW-2	8/19/97	ASC	Groundwater	10.0 - 20.0	Y	T	N1			X	X												X
			SI-	*	FPTMW-2R	8/27/97	ASC	Groundwater	9.0 - 19.0	Y	T	N1													X			
			SI-	*	FPTMW-3	8/18/97	ASC	Groundwater	9.0 - 19.0	Y	T	N1			X	X												X
			SI-QA/QC		FPTMW-3 /MSD	8/18/97	ASC	Water/QC Matrix	9.0 - 19.0	Y	T	MS1			X	X										X		X
			SI-	*	FPTMW-3R	8/27/97	ASC	Groundwater	9.0 - 19.0	Y	T	N1													X			
			SI		FPTMW-4	8/27/97	ASC	Groundwater	8.0 - 18.0	Y	T	N1			X	X										X		X
			SI		FPTVMW-5	8/19/97	ASC	Groundwater	12.0 - 22.0	Y	T	N1			X	X										X		X
			SI		FPTVMW-5 VP01	6/30/97	FIELD	Groundwater	14.1 - 17.6	Y	T	N1			X													
			SI		FPTVMW-5 VP02	6/30/97	FIELD	Groundwater	24.0 - 26.4	Y	T	N1			X													
			SI-QA/QC		FPTVMW-5 VP02/D	6/30/97	FIELD	Groundwater	24.0 - 26.4	Y	T	FD1			X													
			SI-QA/QC		FPTVMW-5 VP02/S	6/30/97	MRD	Groundwater	24.0 - 26.4	Y	T	FR1			X													
			SI		FPTVMW-5 VP03	7/1/97	FIELD	Groundwater	34.0 - 34.6	Y	T	N1			X													
			SI		FPTVMW-5 VP04	7/1/97	FIELD	Groundwater	36.0 - 37.9	N	T	N1			X													
			SI		FPTVMW-5R	8/29/97	ASC	Groundwater	12.0 - 22.0	Y	T	N1															X
			SI-QA/QC		FPTVMW-RB1VP	7/1/97	FIELD	Eqpt. Washwater	-	Y	T	EB1			X													

Table 4.11.4.12-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
FIRE PROTECTION TRAINING AREA
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK (Cont.)

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES

Note: Depth is measured in feet.

Key:

*	= existing monitoring well	FD1	= field duplicate	QC	= quality control
Anions a	= chloride, nitrate/nitrate, phosphate, sulfate	Fingrprt	= fingerprint analysis	RB	= rinsate blank
Anions b	= sulfide	FR1	= field replicate/split	Rsmp	= resample
AOC	= Area of Concern	GW	= groundwater	/S	= split sample
ASC	= E and E's Analytical Services Center	N1	= original	SI	= Supplemental Investigation
BOD	= biological oxygen demand	NA a	= field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)	SVOC	= semivolatile organic compound
COD	= chemical oxygen demand			Stat	= status (O = open; S = skipped; T = taken)
Cr6	= hexavalent chromium	M.E.E.	= methane, ethane and ethene	TOC	= total organic carbon
EB1, EB2	= equipment rinsate	MRD	= Missouri River Division laboratory	TB	= trip blank
/D	= duplicate sample	MS1	= matrix spike/matrix spike duplicate	TB1, TB2	= trip blank
Eqpt	= equipment	/MSD	= matrix spike/matrix spike duplicate	TCLP disp	= Toxicity Characteristic Leaching Procedure disposal parameters
Fd	= field	PCB	= polychlorinated biphenyl		
		Pest	= pesticide	VOC	= volatile organic compound
		QA/QC	= quality assurance/quality control sample	WP	= sample in the work plan (Y= yes; N= no)

Table 4.11.4.12-2

ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - FIRE PROTECTION TRAINING AREA
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK

Client Id:	FPTMW-1	FPTMW-2	FPTMW-2R	FPTMW-3	FPTMW-3R	FPTMW-4	FPTVMW-5	FPTVMW-5R
Sample Date:	8/18/97	8/19/97	8/27/97	8/18/97	8/27/97	8/27/97	8/19/97	8/29/97
Sample Depth (ft.):	10-20	10-20	9-19	9-19	9-19	8-18	12-22	12-22
Volatiles (524.2) ug/L								
Ethylbenzene	0.82	ND	NA	ND	NA	ND	ND	ND
Methylene chloride	ND	7.6	NA	ND	NA	ND	370[a]	ND
Total Xylenes	1.1	ND	NA	ND	NA	ND	ND	ND
Trichloroethene	ND	ND	NA	0.39 J	NA	ND	ND	ND
Semivolatiles (525.2) ug/L								
bis(2-Ethylhexyl)phthalate	ND	NA	ND	NA	ND	NR	37JR	NA
Butylbenzylphthalate	ND	NA	ND	NA	0.71 J	0.93 J		NA

[a] Since no methylene chloride was detected in the vertical profile groundwater samples collected and analyzed during well drilling, the presence of methylene chloride is believed to be a laboratory artifact. This well was resampled, and no methylene chloride was detected in the resample. Therefore, the original result has been disregarded in the SI results discussion.

Key:

☐ = Result exceeds screening criteria
ND = Not detected; or positive result rejected by validation
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
NA = Not analyzed for
R = Rejected.
TOC = Total organic carbon.
U = Not detected above method detection limit.
ug/L = Micrograms per lilter.

Table 4.11.4.12-3

FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES FIRE PROTECTION TRAINING AREA, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
Ethylbenzene	1/5	0.82	0	5
Methylene Chloride	1/5	7.6	1	5
Total Xylenes	1/5	1.1	0	5
Trichloroethene	1/5	0.39J	0	5
Semivolatiles (μg/L)				
Butylbenzylphthalate	2/5	0.71J - 0.93J	0	50

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

10/9/97

Table 4.11.4.13-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
TIN CITY
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK

ANALYSES

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	%Solids	-FdNAa	-FdVOC	Anionsa	Anionsb	BOD	COD	Cr6	Cyanides	Flngrpts	Hardness	M.E.E.	Metals	PCB525	PestPCB	pH.	SVOC525	SVOCs	TOC	VOC524	VOCs
zMohawk River Tin City On-Base GW	SI	255VMW-1	8/21/97	ASC	Groundwater	15.0 - 30.0	Y	T	N1		X		X	X							X					X		X	X	
	SI-QA/QC	255VMW-1 /D	8/21/97	ASC	Groundwater	15.0 - 30.0	Y	T	FD1		X		X	X							X					X		X	X	
	SI-QA/QC	255VMW-1 /S	8/21/97	MRD	Groundwater	15.0 - 30.0	Y	T	FR1		X		X	X							X					X		X	X	
	SI	255VMW-2	8/21/97	ASC	Groundwater	16.0 - 29.0	Y	T	N1		X		X	X							X					X		X	X	
	SI-	LAWMW-13	7/29/97	ASC	Groundwater	14.0 - 24.0	Y	T	N1		X		X	X							X					X		X	X	
	SI	TCVMW-1	8/21/97	ASC	Groundwater	20.0 - 32.0	Y	T	N1		X		X	X							X					X		X	X	
	SI	TCVMW-2	8/22/97	ASC	Groundwater	18.5 - 33.5	Y	T	N1		X		X	X							X					X		X	X	
	SI	255GP-01	6/16/97	FIELD	Groundwater	18.3 - 24.2	Y	T	N1			X																		
	SI	255GP-02	6/16/97	FIELD	Groundwater	17.2 - 24.5	Y	T	N1			X																		
	SI	255GP-03	6/16/97	FIELD	Groundwater	16.5 - 21.6	Y	T	N1			X																		
	SI	255GP-04	6/11/97	FIELD	Groundwater	17.5 - 20.0	Y	T	N1			X																		
	SI	255GP-05	6/11/97	FIELD	Groundwater	16.4 - 20.0	Y	T	N1			X																		
	SI	255GP-06	6/10/97	FIELD	Groundwater	17.1 - 20.0	Y	T	N1			X																		
	SI	255GP-07	6/10/97	FIELD	Groundwater	19.2 - 20.0	Y	T	N1			X																		
	SI	255GP-08	6/10/97	FIELD	Groundwater	17.3 - 20.0	Y	T	N1			X																		
	SI	255GP-09	6/10/97	FIELD	Groundwater	16.1 - 20.0	Y	T	N1			X																		
	SI	255GP-10	6/10/97	FIELD	Groundwater	17.6 - 20.0	Y	T	N1			X																		
	SI-QA/QC	255GP-10 /D	6/10/97	FIELD	Groundwater	17.6 - 20.0	Y	T	FD1			X																		
	SI-QA/QC	255GP-10 /S	6/10/97	MRD	Groundwater	17.6 - 20.0	Y	T	FR1			X																		
	SI	255GP-11	6/12/97	FIELD	Groundwater	18.2 - 25.0	Y	T	N1			X																		
	SI	255GP-12	6/12/97	FIELD	Groundwater	19.3 - 25.0	Y	T	N1			X																		
	SI-QA/QC	255GP-12 /D	6/12/97	FIELD	Groundwater	19.3 - 25.0	Y	T	FD1			X																		
	SI-QA/QC	255GP-12 /S	6/12/97	MRD	Groundwater	19.3 - 25.0	Y	T	FR1			X																		
	SI	255GP-13	6/12/97	FIELD	Groundwater	17.5 - 25.0	Y	T	N1			X																		
	SI	255GP-14	6/13/97	FIELD	Groundwater	17.5 - 25.0	Y	T	N1			X																		
	SI-QA/QC	255GP-14 /MSD	6/13/97	FIELD	Water/QC Matrix	17.4 - 25.0	Y	T	MS1			X																		
	SI	255GP-15	6/13/97	FIELD	Groundwater	17.8 - 25.0	Y	T	N1			X																		
	SI	255GP-16	6/13/97	FIELD	Groundwater	15.0 - 25.0	Y	T	N1			X																		
	SI	255GP-17	6/13/97	FIELD	Groundwater	18.1 - 25.0	Y	T	N1			X																		
	SI	255GP-18	6/13/97	FIELD	Groundwater	17.0 - 20.0	Y	T	N1			X																		
	SI	255GP-19	6/13/97	FIELD	Groundwater	19.1 - 21.5	Y	T	N1			X																		
	SI	255GP-20	6/16/97	F	Groundwater	19.6 - 25.0	Y	T	N1			X																		

Table 4.11.4.13-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
TIN CITY
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK (Cont.)

Location-AOC-	Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES
zMohawk River Tin City On-Base GW	SI	255GP-21	6/16/97	FIELD	Groundwater	19.8 - 26.8	Y	T	N1	X
	SI	255GP-22	6/16/97	FIELD	Groundwater	19.6 - 22.6	Y	T	N1	X
	SI	255GP-23	6/16/97	FIELD	Groundwater	19.0 - 24.3	Y	T	N1	X
	SI	255GP-24	6/16/97	FIELD	Groundwater	18.6 - 22.8	Y	T	N1	X
	SI	255GP-25	6/16/97	FIELD	Groundwater	15.9 - 24.3	Y	T	N1	X
	SI	255GP-26	6/24/97	FIELD	Groundwater	17.0 - 24.5	N	T	N1	X
	SI-QA/QC	255GP-26 /D	6/24/97	FIELD	Groundwater	17.0 - 24.5	N	T	FD1	X
	SI-QA/QC	255GP-26 /S	6/24/97	MRD	Groundwater	17.0 - 24.5	N	T	FR1	X
	SI	255GP-27	6/24/97	FIELD	Groundwater	17.6 - 24.5	N	T	N1	X
	SI	255GP-28	6/24/97	FIELD	Groundwater	19.4 - 20.4	N	T	N1	X
	SI	255GP-29	6/24/97	FIELD	Groundwater	18.6 - 20.1	N	T	N1	X
	SI	255GP-30	6/24/97	FIELD	Groundwater	18.6 - 24.2	N	T	N1	X
	SI	255GP-31	6/24/97	FIELD	Groundwater	17.7 - 24.2	N	T	N1	X
	SI	255GP-32	6/24/97	FIELD	Groundwater	17.2 - 24.3	N	T	N1	X
	SI	255GP-33	6/27/97	FIELD	Groundwater	19.4 - 24.2	N	T	N1	X
	SI	255GP-34	6/27/97	FIELD	Groundwater	18.8 - 21.8	N	T	N1	X
	SI	255GP-35	6/27/97	FIELD	Groundwater	18.4 - 21.6	N	T	N1	X
	SI	255GP-RB1	6/12/97	FIELD	Eqpt. Washwater	-	Y	T	EB1	X
	SI	255GP-RB2	6/16/97	FIELD	Eqpt. Washwater	-	Y	T	EB1	X
	SI	255GP-RB3	6/24/97	FIELD	Eqpt. Washwater	-	Y	T	EB1	X
	SI	255VMW-1 VP01	7/8/97	FIELD	Groundwater	20.0 - 22.0	Y	T	N1	X
	SI-QA/QC	255VMW-1 VP01/MSD	7/8/97	FIELD	Water/QC Matrix	20.0 - 22.0	Y	T	MS1	X
	SI	255VMW-2 VP01	7/9/97	FIELD	Groundwater	19.9 - 21.5	Y	T	N1	X
	SI	255VMW-2 VP02	7/9/97	FIELD	Groundwater	26.0 - 28.0	Y	T	N1	X
	SI	TCVMW-1 VP01	7/10/97	FIELD	Groundwater	18.5 - 21.7	Y	T	N1	X
	SI	TCVMW-1 VP02	7/10/97	FIELD	Groundwater	26.0 - 28.0	Y	T	N1	X
	SI-QA/QC	TCVMW-1 VP02/D	7/10/97	FIELD	Groundwater	26.0 - 28.0	Y	T	FD1	X
	SI-QA/QC	TCVMW-1 VP02/S	7/10/97	MRD	Groundwater	26.0 - 28.0	Y	T	FR1	X
	SI	TCVMW-2 VP01	7/11/97	FIELD	Groundwater	18.9 - 20.0	Y	T	N1	X
	SI	TCVMW-2 VP02	7/11/97	FIELD	Groundwater	29.0 - 30.0	Y	T	N1	X
	SI-QA/QC	TCVMW-RB1VP	7/11/97	ASC	Eqpt. Washwater	0.0 -	Y	T	EB1	X
	SI	255VMW-1 VP02		FIELD	Groundwater	-	Y	S	N1	X

Table 4.11.4.13-1
LISTING OF SAMPLES TAKEN, SKIPPED OR ADDED
TIN CITY
GROUNDWATER AOC-SUPPLEMENTAL INVESTIGATIONS
FORMER GRIFFISS AFB, ROME, NEW YORK (Cont.)

Location-AOC-			Phases	Sample Number	Samp. Date	Lab	Matrix	Depth	WP	Stat	Type	ANALYSES
zMohawk River	Tin City	On-Base GW	SI	DECON HOLD	6/13/97	FIELD	Water/QC Matrix	18.3 - 24.2	N	O	N1	X
			SI	DECON POLY	6/16/97	FIELD	Water/QC Matrix	18.3 - 24.2	N	O	N1	X
			SI	HYDRANT 11	6/16/97	FIELD	Water/QC Matrix	18.3 - 24.2	N	O	N1	X
			SI	STEAMER	6/13/97	FIELD	Water/QC Matrix	18.3 - 24.2	N	O	N1	X

Note: Depth is measured in feet.

Key:

- * = existing monitoring well
- Anions a = chloride, nitrate/nitrate, phosphate, sulfate
- Anions b = sulfide
- AOC = Area of Concern
- ASC = E and E's Analytical Services Center
- BOD = biological oxygen demand
- COD = chemical oxygen demand
- Cr6 = hexavalent chromium
- EB1, EB2 = equipment rinsate
- /D = duplicate sample
- Eqpt = equipment
- Fd = field
- FD1 = field duplicate
- Fingrprt = fingerprint analysis
- FR1 = field replicate/split
- GW = groundwater
- N1 = original
- NA a = field natural attenuation parameters (DO, pH, ORP, Fe, alkalinity)
- M.E.E. = methane, ethane and ethene
- MRD = Missouri River Division laboratory
- MS1 = matrix spike/matrix spike duplicate
- /MSD = matrix spike/matrix spike duplicate
- PCB = polychlorinated biphenyl
- Pest = pesticide
- QA/QC = quality assurance/quality control sample
- QC = quality control
- RB = rinsate blank
- Rsmp = resample
- /S = split sample
- SI = Supplemental Investigation
- SVOC = semivolatile organic compound
- Stat = status (O = open; S = skipped; T = taken)
- TOC = total organic carbon
- TB = trip blank
- TB1, TB2 = trip blank
- TCLP disp = Toxicity Characteristic Leaching Procedure disposal parameters
- VOC = volatile organic compound
- WP = sample in the work plan (Y= yes; N= no)

Table 4.11.4.13-2

**ANALYTICAL DATA SUMMARY
OF THE POSITIVE RESULTS FOR THE
ON-BASE GROUNDWATER AOC - TIN CITY
FORMER GRIFFISS AIR FORCE BASE, ROME, NEW YORK**

Client Id:	255VMW-1	255VMW-1/D	255VMW-2	LAWMW-13	TCVMW-1	TCVMW-2
Sample Date:	8/21/97	8/21/97	8/21/97	7/29/97	8/21/97	8/22/97
Sample Depth (ft.):	15-30	15-30	16-29	14-24	20-32	18.5-33.5
Volatiles (524.2) ug/L						
cis-1,2-Dichloroethene	ND	ND	ND	2.2	ND	ND
Chloroform	ND	ND	0.59	3.9	0.73	0.42 J
Trichloroethene	ND	ND	0.40 J	3.0	ND	ND

Key:

ND = Not detected
AOC = Area of Concern.
J = Estimated concentration.
M/E/E = Methane/Ethane/Ethene.
mg/L = Milligrams per liter.
TOC = Total organic carbon.
U = Not detected above method detection llimit.
ug/L = Micrograms per lilter.

Note:
No positive results exceed screening criteria at this AOC.

Table 4.11.4.13-3

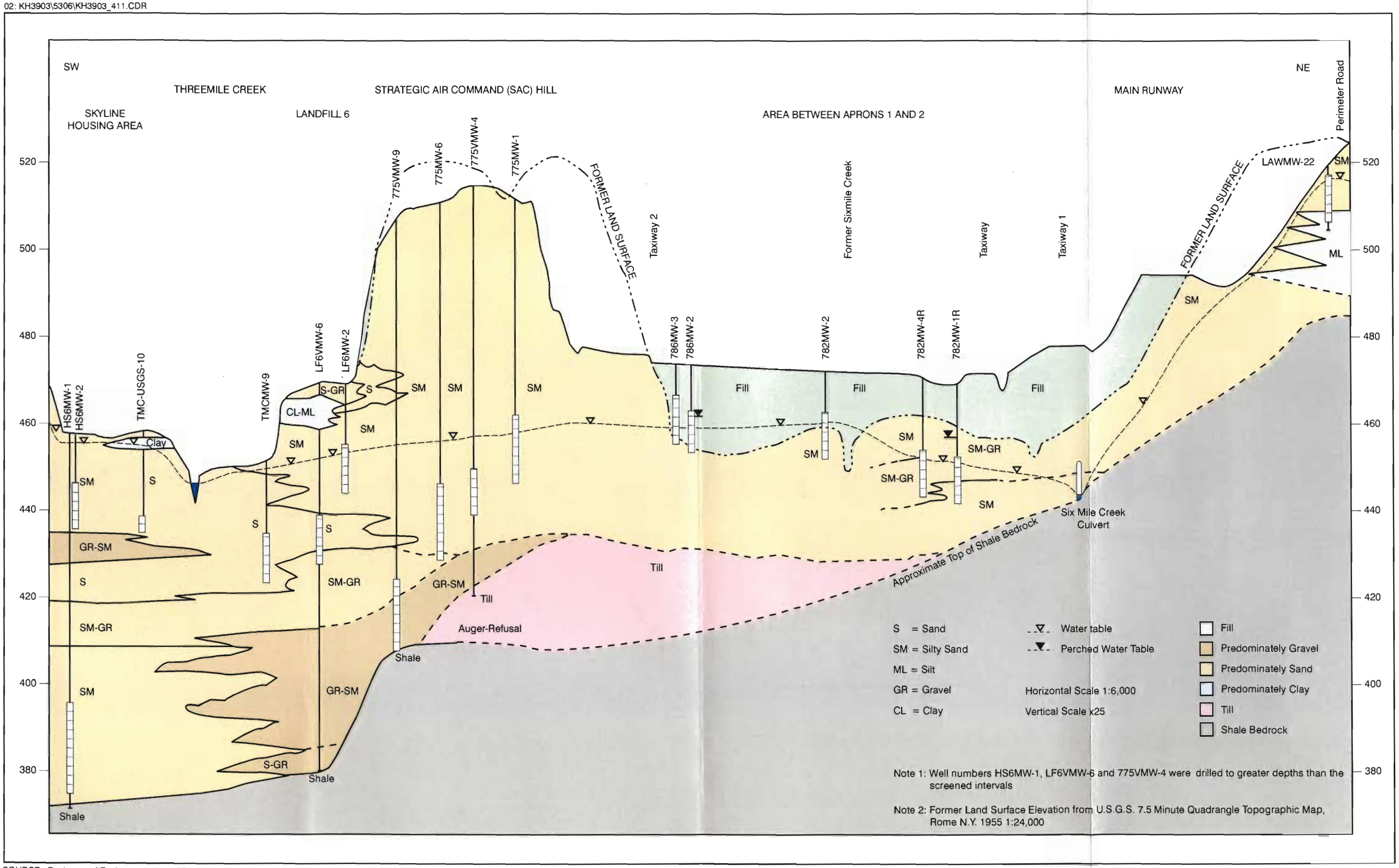
FREQUENCY OF DETECTION AND EXCEEDANCE OF POTENTIAL ARARs AND TBCs FOR GROUNDWATER SAMPLES TIN CITY, SUPPLEMENTAL INFORMATION FORMER GRIFFISS AIR FORCE BASE ROME, NEW YORK

Parameter	Frequency of Detection	Range of Detected Concentrations	Comparison to ARARs and TBCs	
			Frequency of Detection Above Most Stringent	Most Stringent Criterion
Volatiles (μg/L)				
cis-1,2-Dichloroethene	1/6	2.2	0	5
Chloroform	4/6	0.42J - 3.9	0	7
Trichloroethene	2/6	0.4J - 3.0	0	5

Key:

ARAR = Applicable or relevant and appropriate requirement.
TBC = To be considered criteria.
μg/L = Micrograms per liter.
J = Estimated concentration.

02: KH3903\5306\KH3903_411.CDR



Note 1: Well numbers HS6MW-1, LF6VMW-6 and 775VMW-4 were drilled to greater depths than the screened intervals

Note 2: Former Land Surface Elevation from U.S.G.S. 7.5 Minute Quadrangle Topographic Map, Rome N.Y. 1955 1:24,000

SOURCE: Ecology and Environment, Inc. 1997.

Figure 4.11-2 GEOLOGIC CROSS SECTION OF A-A' SUPPLEMENTAL INVESTIGATION FORMER GRIFFISS AFB, ROME, NY

KH3S513B

SFTMW-2 515.29
SFTMW-1 518.40
SFTMW-3 516.64
SFTMW-4R 505.52
SFTMW-4 508.76
INSTALLATION BOUNDARY
FLOYD ROAD
GATE NO.13 CLOSED
LF7SW-6
LF7SD-3
LF7SW-4
LF7SD-4
LF7MW20 489.92
SMC-USGS-10 DRY
LF7SW-5
LF7SD-5
INLET TO SIXMILE CREEK CULVERT
463±
LF7SD-6
SMC-USGS-9 487.87
LF7MW21 479.24
SMCMH-1 475.69
LF7WL-2
LF7SD-7
SIXMILE CREEK CULVERT
INSTRUMENT R/W 11820' X 300'
30" STORM DRAIN
478±
LF7MW17 493.48
LF7MW22 483.33
LF7SD-8
LF7TW-24
479±
LF7TW-25
LF7SD-9
SMC-USGS-8 486.02
LF7MW23 485.18
LF7WL-1
LF7SD-10
LF7SD-11
TRUE BEARING S46°44'24"E
SIXMILE CREEK CULVERT
T/W 8
HS7MW-2
SMC-USGS-2 504.27
GATE 10
LF7SW-1
LF7SD-1
SMCP-6 503.13
LF7SS-1
LF7MW16 503.65
LF7SD-2
LF7SS-2
LF7SS-3
OBSERVATION POINT
LANDFILL #7
LF7MW-3R 501.94
PRIMARY SURFACE
ILS 802
HS7MW-1 506.75
GATE 11
LF7MW18 (DESTROYED)
LF7MW18R 496.27
LF7MW15 502.13
6235
ILS GLIDE SLOPE COUNTERPOISE 6242
24" STORM DRAIN
5985 PAD
SMC-USGS-7 500.21

LEGEND

- SUPPLEMENTAL INVESTIGATION TEMPORARY WELL
- SUPPLEMENTAL INVESTIGATION LEACHATE SAMPLE
- SUPPLEMENTAL INVESTIGATION STORM SEWER WATER SAMPLE
- EXISTING MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- 506.75 EXISTING MONITORING WELL WITH GROUNDWATER ELEVATION
- 504.27 USGS PIEZOMETER WITH GROUNDWATER ELEVATION
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- STORM SEWER MANHOLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- INSTALLATION BOUNDARY
- 510 TOPOGRAPHIC CONTOUR LINE
- ST STORM SEWER
- CULVERTED SECTION OF SIXMILE CREEK
- 5-FOOT GROUNDWATER CONTOUR
- LANDFILL 7 BOUNDARY

NOTE: GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997

N

SCALE IN FEET
0 225 450 675

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.1-1
SUPPLEMENTAL INVESTIGATION SAMPLE LOCATION AND GROUNDWATER CONTOUR MAP LANDFILL 7

ecology and environment

BUFF plotted: 07/14/98 REB

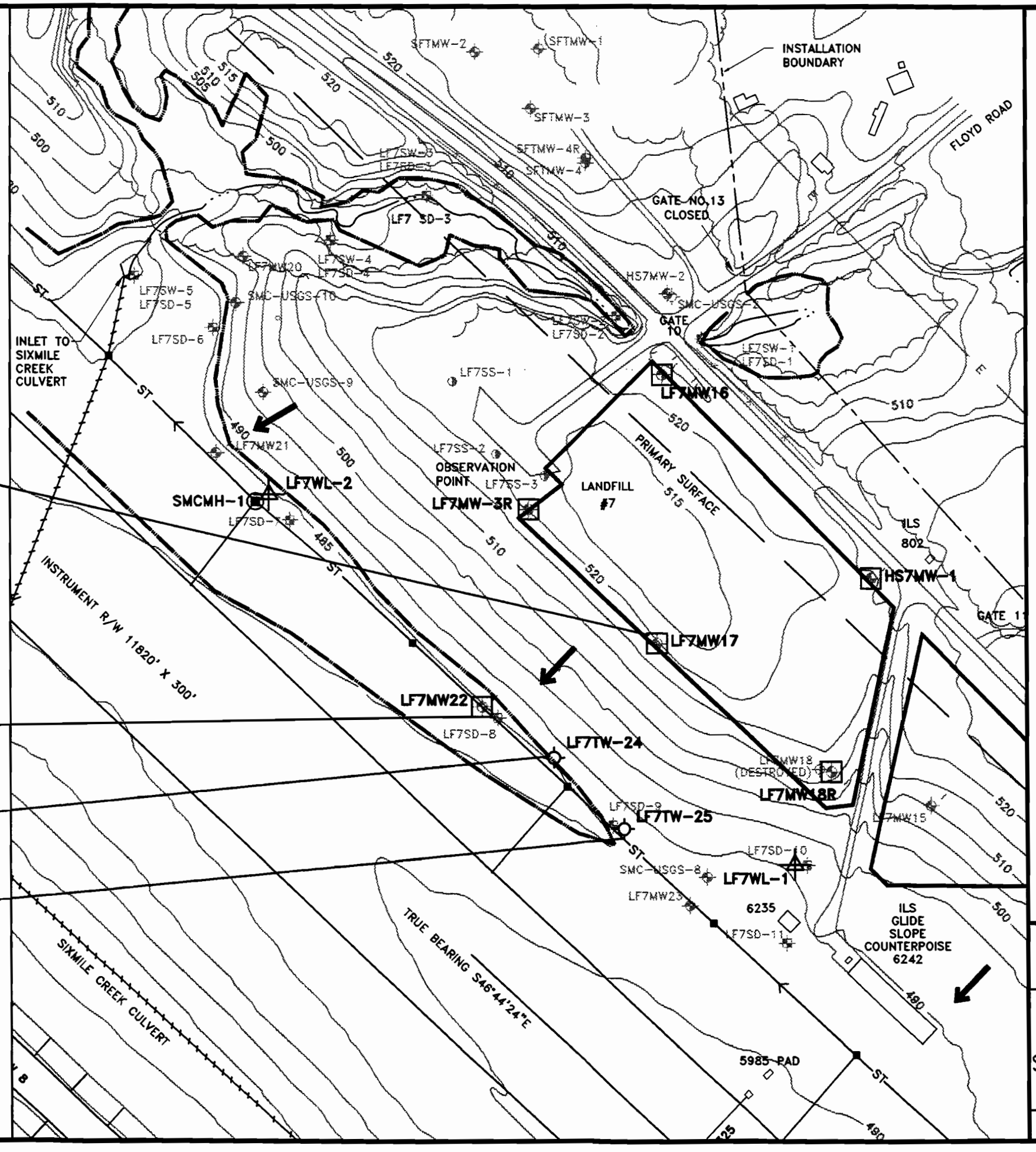
KH3S514B

LF7MN-17	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	31	26

LF7MW-22	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	NA	11

LF7TW-24	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	NA	13

LF7TW-25	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	NA	64



LEGEND

- SUPPLEMENTAL INVESTIGATION TEMPORARY WELL
- SUPPLEMENTAL INVESTIGATION LEACHATE SAMPLE
- SUPPLEMENTAL INVESTIGATION STORM SEWER WATER SAMPLE
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- RI MONITORING WELL
- USGS PIEZOMETER
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- STORM SEWER MANHOLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- INSTALLATION BOUNDARY
- 510 TOPOGRAPHIC CONTOUR LINE
- ST STORM SEWER
- CULVERTED SECTION OF SIXMILE CREEK
- LANDFILL 7 BOUNDARY

-- NOT ANALYZED
NA NOT APPLICABLE

NOTE: RESULT EXCEEDS POTENTIAL ARAR OR TBC UNLESS OTHERWISE NOTED.

SINCE SI GROUNDWATER WAS ONLY TESTED FOR VOCs AND SVOCs, ONLY RI VOCs AND SVOCs EXCEEDING ARARS OR TBCs ARE PRESENTED.

N

SCALE IN FEET

0 225 450 675

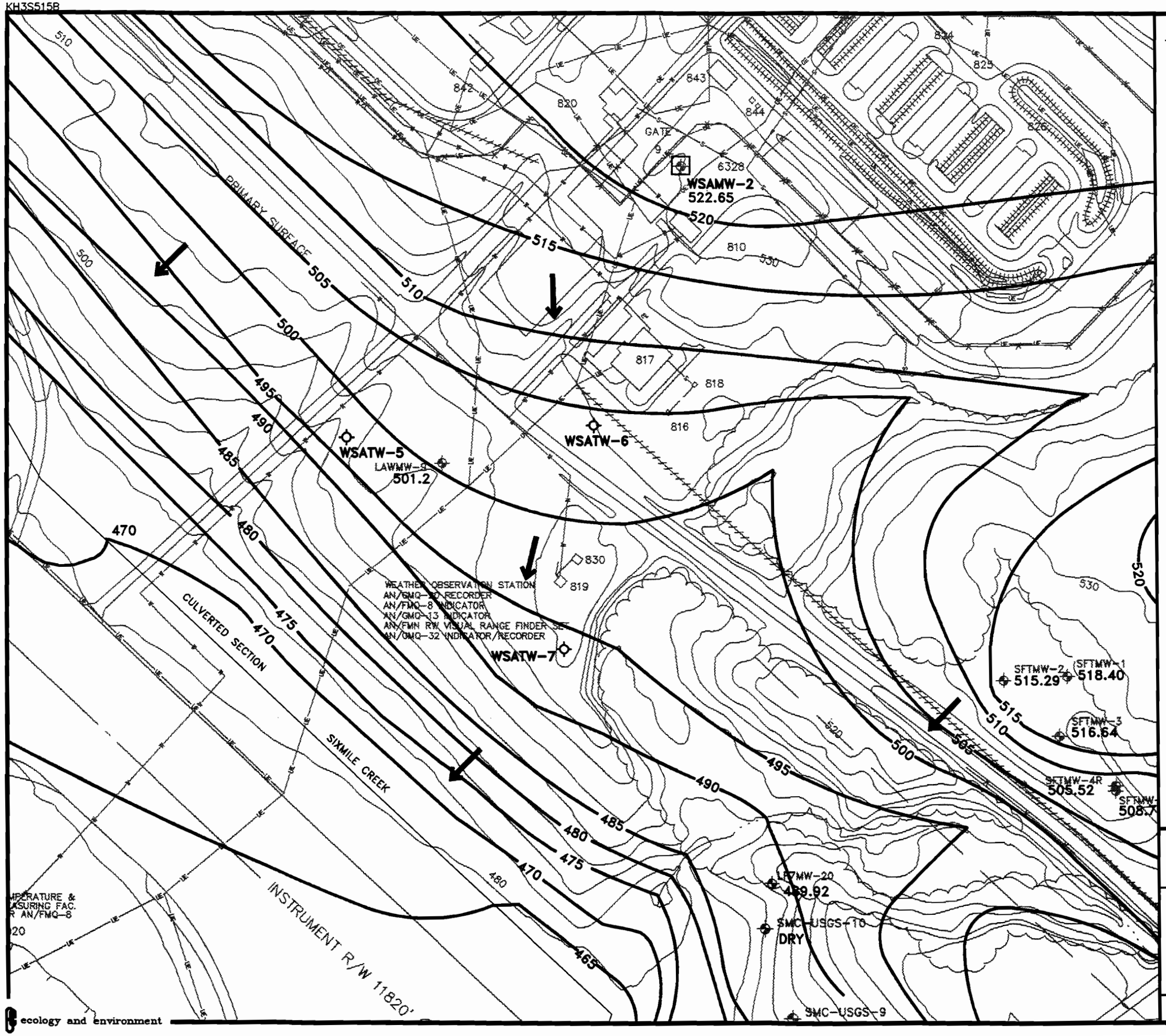
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.1-2
SUPPLEMENTAL INVESTIGATION SELECTED GROUNDWATER SAMPLE RESULT MAP LANDFILL 7

ecology and environment

BUFF plotted: 07/14/98 REB

KH3S515B



LEGEND

- SUPPLEMENTAL INVESTIGATION TEMPORARY WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- 501.20 RI MONITORING WELL WITH GROUNDWATER ELEVATION
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- TOPOGRAPHIC CONTOUR LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- SANITARY SEWER
- OVERHEAD ELECTRIC
- ABANDONED UNDERGROUND ELECTRIC
- 5-FOOT GROUNDWATER CONTOUR LINE

NOTE: GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997

N

SCALE IN FEET

0 200 400 600

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.2-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION AND
GROUNDWATER CONTOUR MAP
WSA AREA

ecology and environment

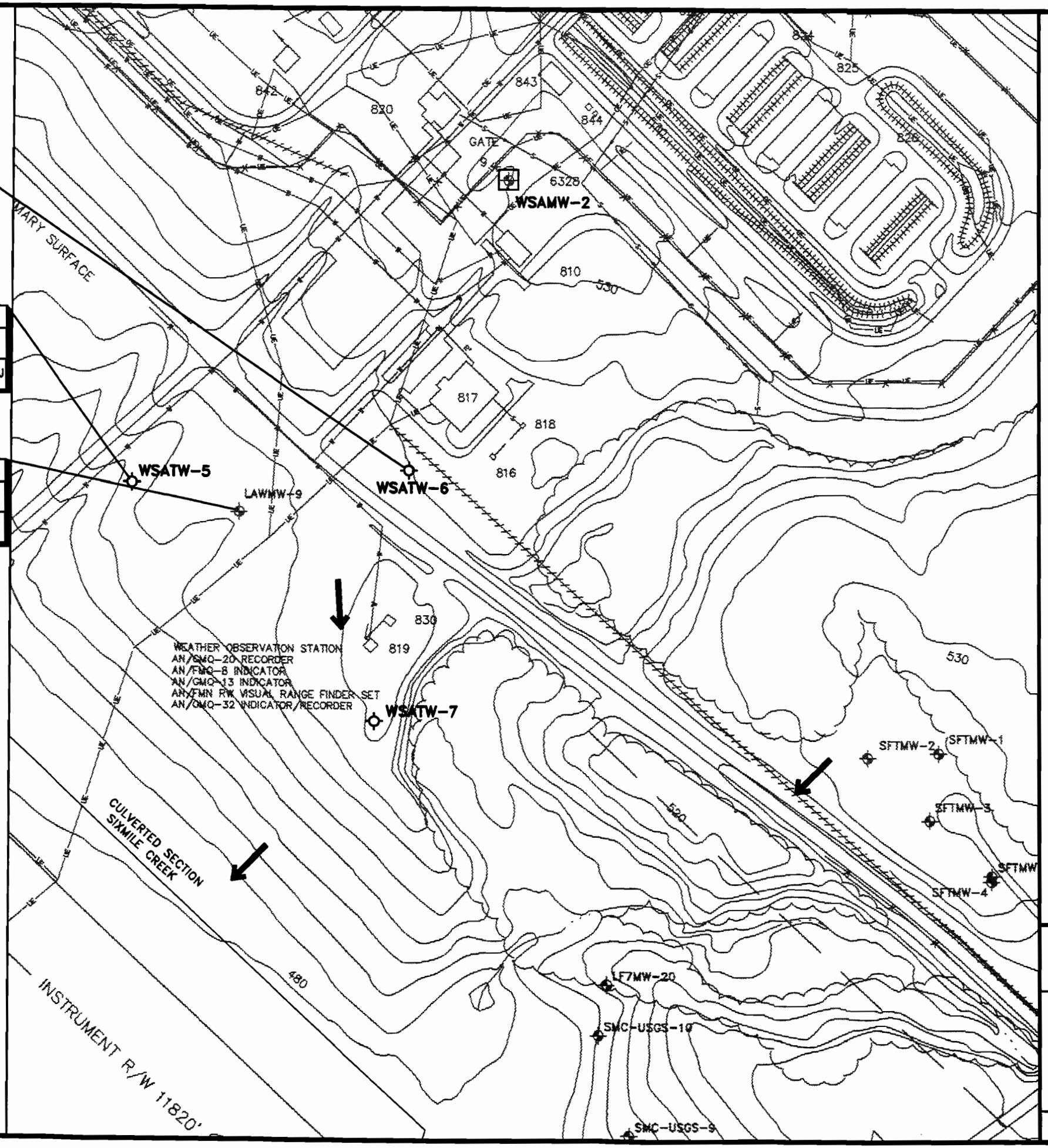
Plotted Buff:04/16/98 MEH

KH3S410B

WSATW-6	(µg/L)	
Organic Parameter	RI	SI
Chloroform	NA	9.0
Tetrachloroethene	NA	7.5
Trichloroethene	NA	31

WSATW-5	(µg/L)	
Organic Parameter	RI	SI
bis (2-ethylhevyl) phthalate	NA	83J

LAWMW-9	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	7.6	NA



LEGEND

- SUPPLEMENTAL INVESTIGATION TEMPORARY WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- RI MONITORING WELL
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- TOPOGRAPHIC CONTOUR LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- SANITARY SEWER
- OVERHEAD ELECTRIC
- ABANDONED UNDERGROUND ELECTRIC
- J ESTIMATED CONCENTRATION
- NA NOT APPLICABLE

NOTES:

1: RESULTS EXCEED POTENTIAL ARAR OR TBC UNLESS OTHERWISE NOTED.

2: SINCE SI GROUNDWATER WAS ONLY TESTED FOR VOCs AND SVOCs, ONLY RI VOCs AND SVOCs EXCEEDING ARARS OR TBCs ARE PRESENTED.

N

SCALE IN FEET

0 200 400 600

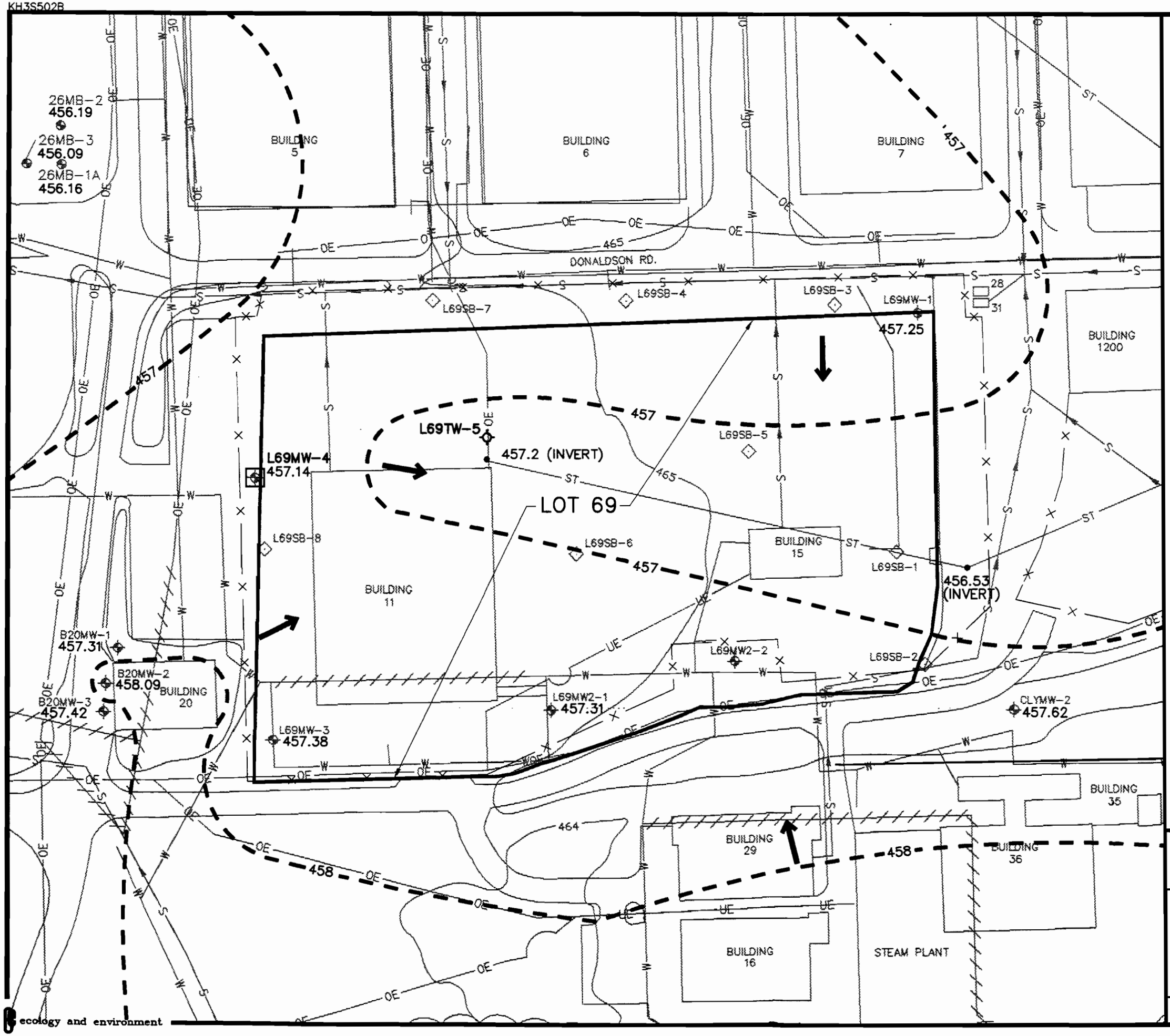
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.2-2
SUPPLEMENTAL INVESTIGATION
SELECTED GROUNDWATER SAMPLE
RESULT MAP
WSA AREA

ecology and environment

Plotted Buff: 11/14/97

KH3S502B



LEGEND

- SUPPLEMENTAL INVESTIGATION TEMPORARY WELL
- 457.14 — RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION WITH GROUNDWATER ELEVATION
- RI SOIL BORING
- 457.31 — RI MONITORING WELL WITH GROUNDWATER ELEVATION
- STORM SEWER MANHOLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- SANITARY SEWER LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- WATER LINE
- STORM SEWER
- TOPOGRAPHIC CONTOUR LINE
- 1-FOOT GROUNDWATER CONTOUR LINE

NOTE:
GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997
(EXCEPT B26 WELLS WHICH WERE RECORDED IN OCTOBER 1997)

N

SCALE IN FEET

0 100 200 300

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.3-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION AND
GROUNDWATER CONTOUR MAP
LOT 69

BUFF plotted:07/14/98 REB

KH3S503B

TF3MW25
457.66
TF3MW21
457.55
TF3MW23
G101-SS01
G101-SS02
LS16
B3VMW-1
457.24
FORMER
BUILDING 3
DRYWELL
LOCATION
BLDG.
4
B3SB-1
B3SB-2
BUILDING
5869
TRANSFORMER
ENCLOSURE
BUILDING 3
G058-SS03
LS17
LOT11MW-2
457.86
LOT11MW-1
457.98
LOT11MW-3
457.82
BROOKS RD.
PAINE ST.
PARK ST.
OTIS ST.
MOODY ST.
STORM DRAIN
457
456
BLDG.
14
26MB-2
456.19
26MB-1
456.09
26MB-1A
456.16
G058-SS01
G058-SS02
MARKET ST.
PARKING
PARKING
PARKING
L69MW-4
457.14
L69TW-5

LEGEND

- 457.24 — SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- SUPPLEMENTAL INVESTIGATION TEMPORARY MONITORING WELL
- RI SOIL BORING
- 456.19 — EXISTING WELL WITH GROUNDWATER ELEVATION
- GROUP I AOI LEAD-SCREEN AUGER BORING
- GROUP III AOI SOIL BORING
- GROUP III AOI BORING/TEMPORARY MONITORING WELL
- DIRECTION OF GROUNDWATER FLOW
- 1-FOOT GROUNDWATER CONTOUR LINE
- FENCE
- SEWER LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- WATER LINE

NOTE:
GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997
(EXCEPT B26 WELLS WHICH WERE RECORDED IN OCTOBER 1997).

N

SCALE IN FEET
0 150 300 450

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.4-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION AND
GROUNDWATER CONTOUR MAP
BUILDING 3 - DRYWELL

ecology and environment

BUFF plotted:07/14/98 REB

KH3S504B

HE8A

E8MW-2
459.87

HE9A
460.66

VP1A
461.28

LE6C
461.75

LE7C
462.16

BLAST DEFLECTORS

786MW-6
459.40

LE9B
DRY

LD4B
461.52

786MW-5
459.9

EXISTING USTs

786MW-2
463.1(PERCHED)

786MW-4
460.76

786MW-1
461.22

786MW-3
460.87

786SB-1

VALVE PIT

FORMER ABOVE GROUND WASTE SOLVENT TANK

AREA OF SOIL CONTAMINATION

BUILDING 784
NOSE DOCK 3

BUILDING 785
NOSE DOCK 4

BUILDING 786
NOSE DOCK 5

APRON 2

BUILDING 7001

FUEL HYDRANTS

460
461
462

LEGEND

- 459.40 — SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- WELL CHECKED FOR FREE PRODUCT
- 460.87 — EXISTING WELL WITH GROUNDWATER ELEVATION
- 459.9 — RI MONITORING WELL WITH GROUNDWATER ELEVATION
- RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- 480 — TOPOGRAPHIC CONTOUR LINE
- 1-FOOT GROUNDWATER CONTOUR LINE
- 5-FOOT GROUNDWATER CONTOUR LINE

NOTE:
GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997

N

SCALE IN FEET

0 100 200 300

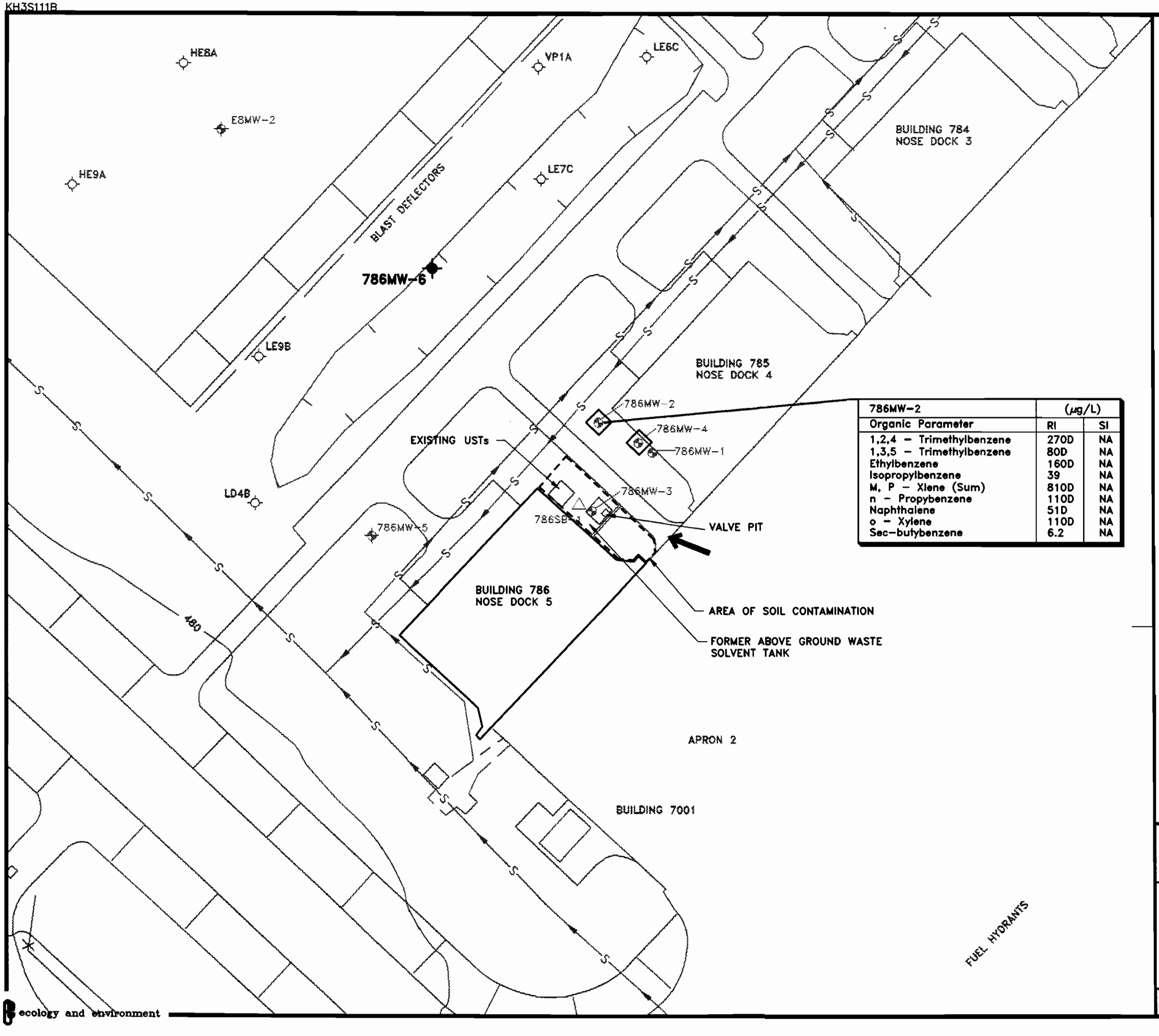
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.5-1
SUPPLEMENTAL INVESTIGATION SAMPLE LOCATION AND GROUNDWATER CONTOUR MAP
BUILDING 786 (NOSE DOCK 5)

ecology and environment

PLOTTED BUFF: 04/116/98 MEH

KH3S111B



786MW-2	(µg/L)	
Organic Parameter	RI	SI
1,2,4 – Trimethylbenzene	270D	NA
1,3,5 – Trimethylbenzene	80D	NA
Ethylbenzene	160D	NA
Isopropylbenzene	39	NA
M, P – Xlene (Sum)	810D	NA
n – Propybenzene	110D	NA
Naphthalene	51D	NA
o – Xylene	110D	NA
Sec–butybenzene	6.2	NA

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- WELL CHECKED FOR FREE PRODUCT
- EXISTING WELL
- RI MONITORING WELL WITH GROUNDWATER ELEVATION
- RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- 480 TOPOGRAPHIC CONTOUR LINE
- NA NOT APPLICABLE

NOTES:

1. RESULT EXCEEDS POTENTIAL ARAR OR TBC, UNLES OTHERWISE NOTED.
2. SINCE SI GROUNDWATER WAS ONLY TESTED FOR VOCs AND SVOCs, ONLY RI VOCs AND SVOCs EXCEEDING ARARs OR TBCs ARE PRESENTED.

N

SCALE IN FEET

0 100 200 300

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.5–2
SUPPLEMENTAL INVESTIGATION
SELECTED GROUNDWATER SAMPLE
RESULT MAP
BUILDING 786 (NOSE DOCK 5)

ecology and environment

PLOTTED BUFF:11/14/97

KH3S505B

LEGEND

458.34 ✦ SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION

○ SUPPLEMENTAL INVESTIGATION GEOPROBE GROUNDWATER SCREENING SAMPLE

△ RI SOIL BORING/GRAB GROUNDWATER SAMPLE

DIRECTION OF GROUNDWATER FLOW

1-FOOT GROUNDWATER CONTOUR LINE

5-FOOT GROUNDWATER CONTOUR LINE

NOTE:
1. GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997
2. PROPOSED GEOPROBE LOCATIONS WILL BE SAMPLED IN NOVEMBER 1997.

N

SCALE IN FEET

0 100 200 300

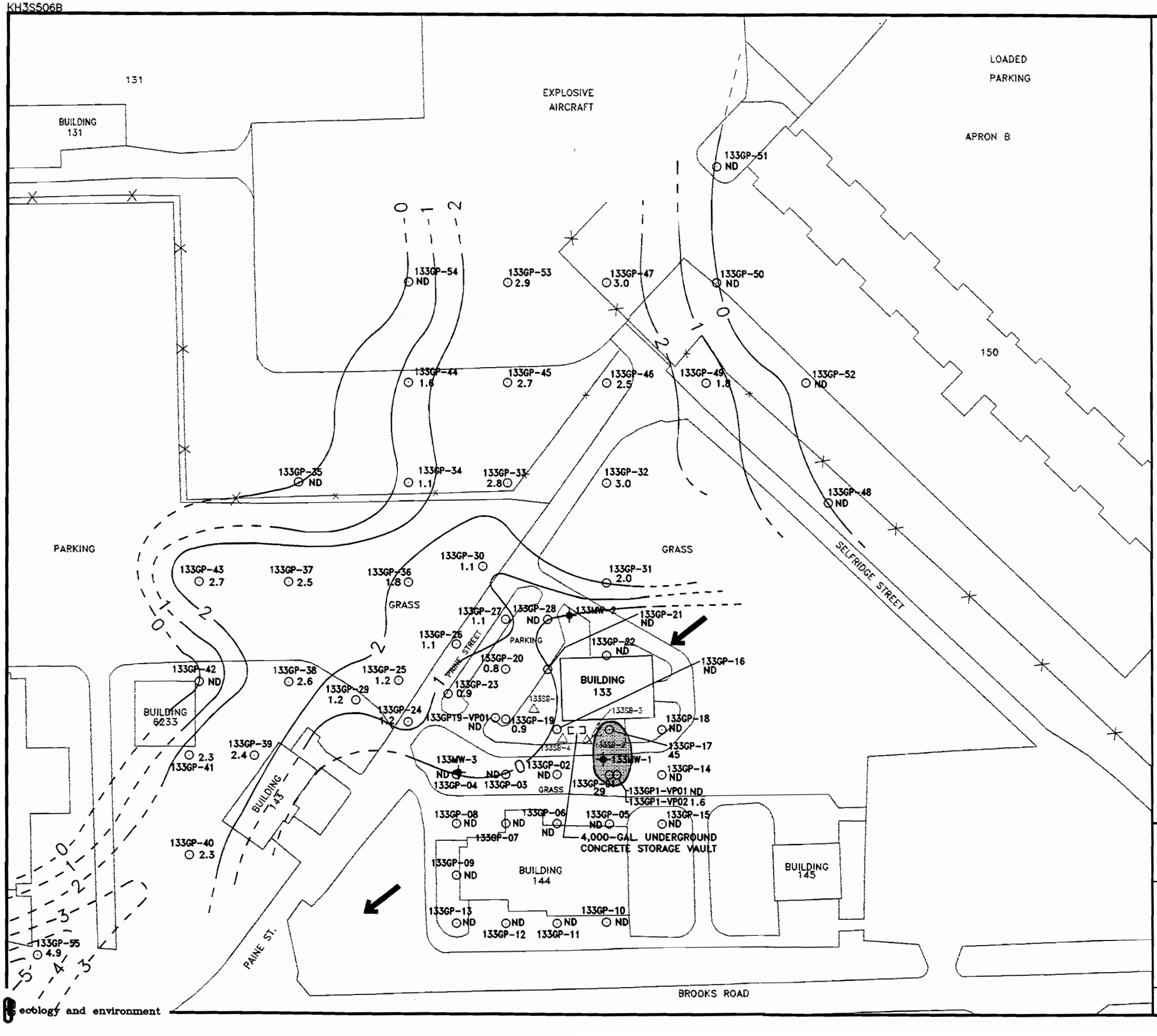
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.6-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION MAP
GROUNDWATER CONTOUR MAP
BUILDING 133 STORAGE VAULT

ecology and environment

PLOTTED BUFF: 04/16/98 MEH

KH3S506B



LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- 1.1 — SUPPLEMENTAL INVESTIGATION GEOPROBE GROUNDWATER SCREENING SAMPLE WITH TCE CONCENTRATION IN µg/L
- RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- ND — NOT DETECTED
- TCE — TRICHLOROETHENE
- CONCENTRATION CONTOUR INTERVAL = 1 µg/L
- TCE CONCENTRATION 30–45 µg/L

NOTES:

1) GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997
2) PROPOSED GEOPROBE LOCATIONS WILL BE SAMPLED IN NOVEMBER 1997

N

SCALE IN FEET

0 100 200 300

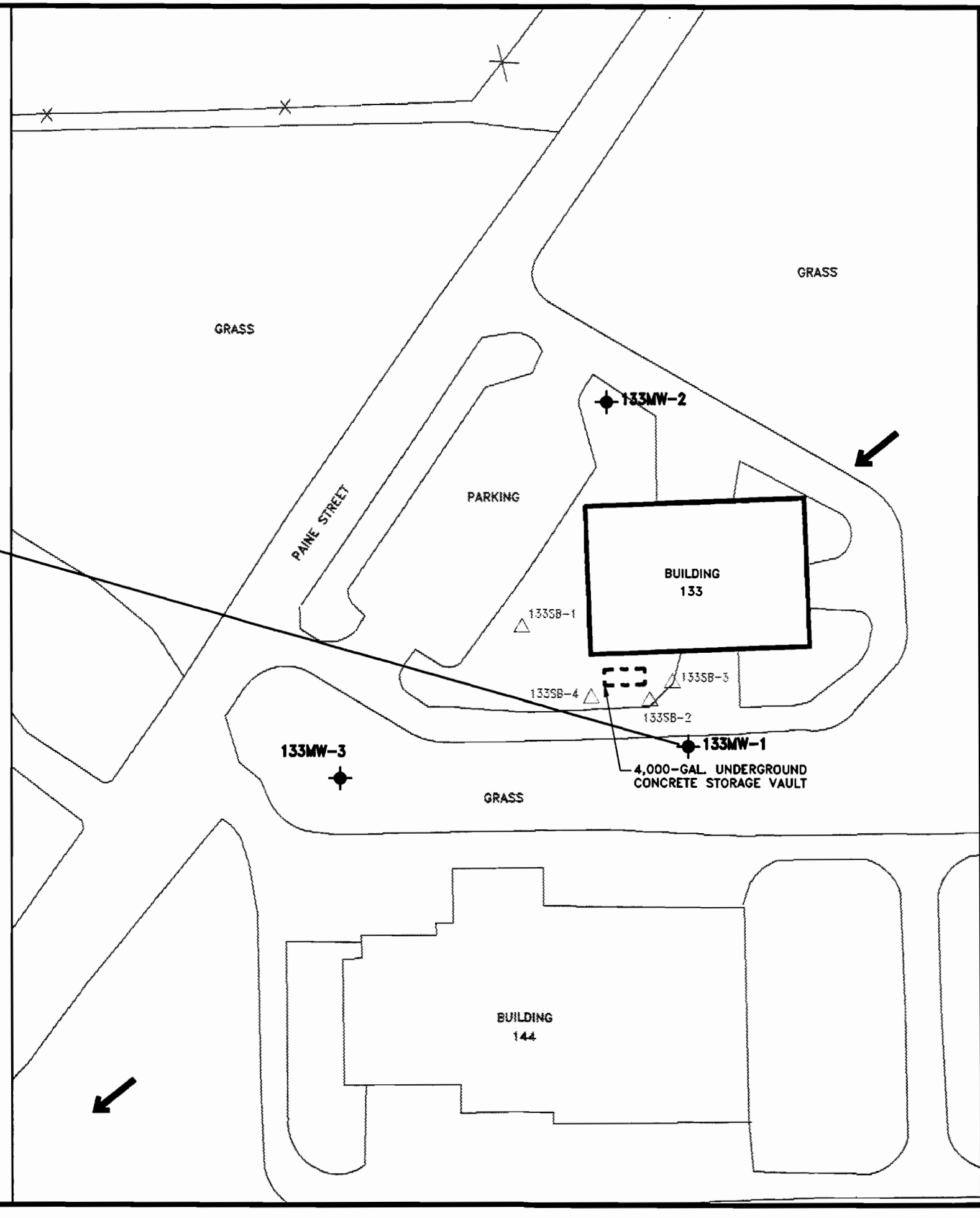
ecology and environment

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.6–2
SUPPLEMENTAL INVESTIGATION
GEOPROBE GROUNDWATER SCREENING
SAMPLE RESULT MAP FOR TCE
BUILDING 133 STORAGE VAULT

PLOTTED BUFF: 04/16/98 MEH

KH3S412B



133MW-1	(µg/L)	
Organic Parameter	RI	SI
Total Xylenes	NA	16

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- △ RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- NA NOT APPLICABLE

NOTE:

1. RESULT EXCEEDS POTENIAL ARAR OR TBC UNLESS OTHERWISE NOTED.
2. SINCE SI GROUNDWATER WAS ONLY TESTED FOR VOCs AND SVOCs, ONLY RI VOCs AND SVOCs EXCEEDING ARARs OR TBCs ARE PRESENTED.

N

SCALE IN FEET

0 50 100 150

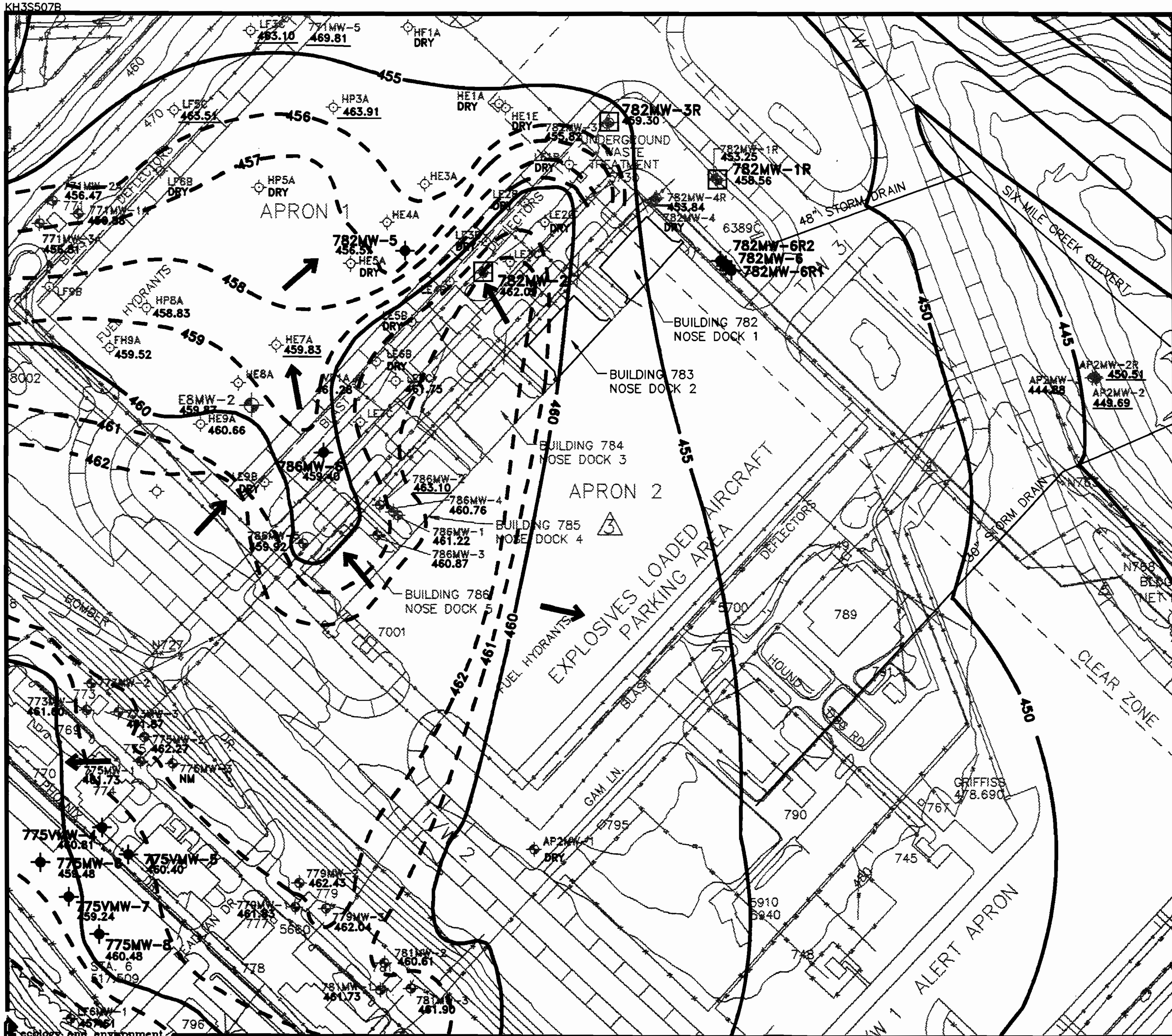
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.6-3
SUPPLEMENTAL INVESTIGATION
SELECTED GROUNDWATER SAMPLE
RESULT MAP
BUILDING 133 STORAGE VAULT

ecology and environment

PLOTTED BUFF:11/13/97

KH3S507B



LEGEND

- 456.57 SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- 460.76 RI MONITORING WELL WITH GROUNDWATER ELEVATION
- 461.75 TEMPORARY WELL/ PIEZOMETER WITH GROUNDWATER ELEVATION
- 459.87 EXISTING WELL WITH GROUNDWATER ELEVATION
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- 510 TOPOGRAPHIC CONTOUR LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- SANITARY SEWER
- 1-FOOT GROUNDWATER CONTOUR LINE
- 5-FOOT GROUNDWATER CONTOUR LINE

NOTE:

GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997

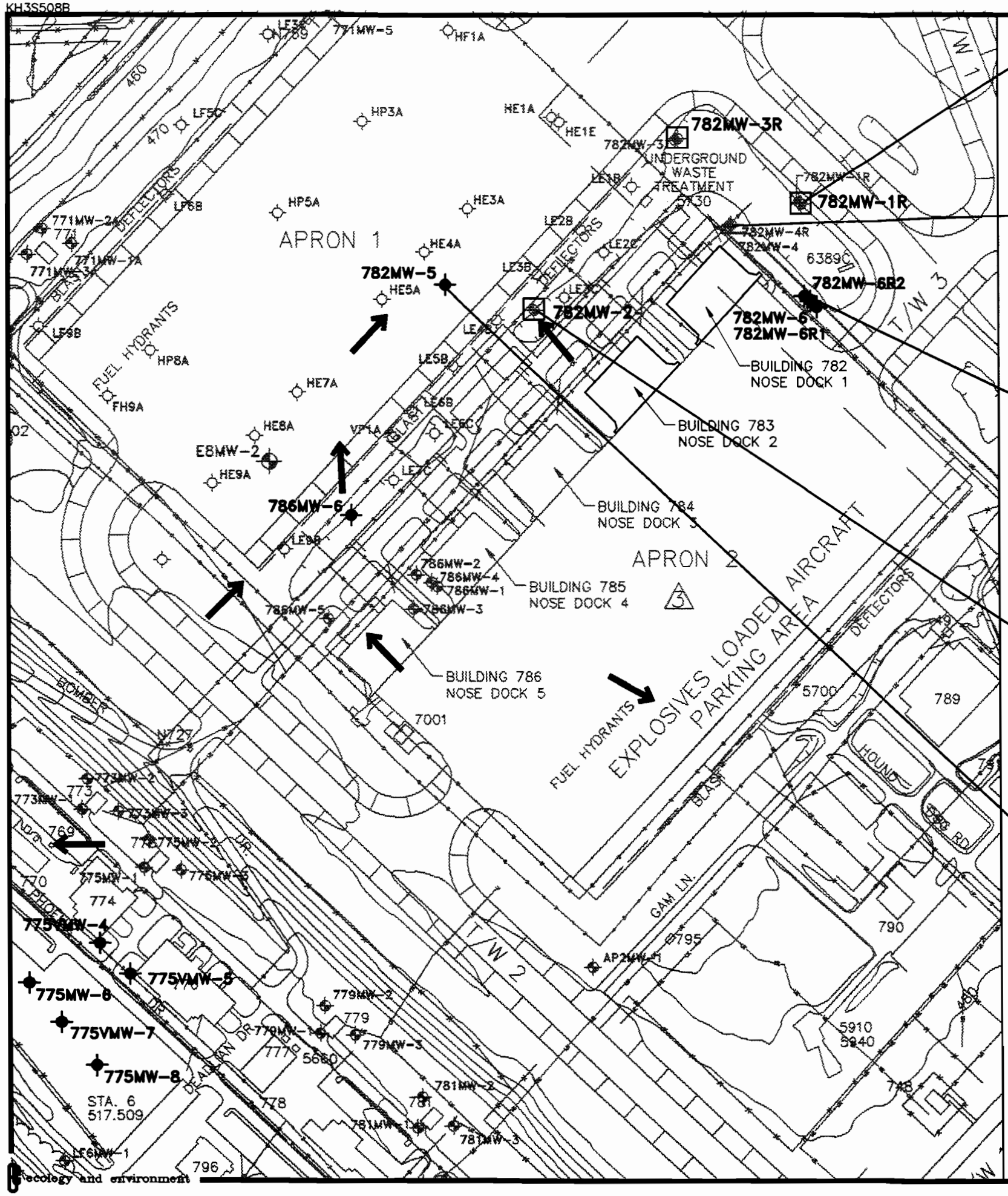
SCALE IN FEET

0 300 600 900

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.7-1
SUPPLEMENTAL INVESTIGATION SAMPLE LOCATION AND GROUNDWATER CONTOUR MAP
NOSE DOCKS 1 & 2 (BUILDINGS 782/783)

KH3S508B



782MW-1R	(µg/L)	
Organic Parameter	RI	SI
Benzene	4.8	66

782MW-4R	(µg/L)	
Organic Parameter	RI	SI
1, 2, 4-Trimethylbenze	520D	NA
1, 3, 5-Trimethylbenze	180D	NA
Benzene	23	NA
Ethylbenzene	39	NA
Hexachlorabutadiene	1.2	NA
M, P-Xylene	100D	NA
Naphthalene	28D	NA
cis-1, 2-Dichloroethene	12	NA

782MW-6R2	(µg/L)	
Organic Parameter	RI	SI
1, 2-Dichloroethene (TOTAL)	NA	35
Vinylchloride	NA	26

782MW-2	(µg/L)	
Organic Parameter	RI	SI
1, 2, 4-Trimethylbenze	62	ND
1, 3, 5-Trimethylbenze	24	ND
2-Butanone	ND	90
Acetone	66	ND
Benzene	410D	1.8
Ethylbenzene	36	4.2a
Total Xylenes	220	35J
Naphthalene	17	6.2a
Toluene	140D	ND

782MW-5	µg/L	
Organic Parameter	RI	SI
Benzene	NA	3.6
Total Xylenes	NA	130

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- RI MONITORING WELL
- TEMPORARY WELL/ PIEZOMETER
- EXISTING WELL
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- 510 TOPOGRAPHIC CONTOUR LINE
- UNDERGROUND ELECTRIC
- WATER LINE
- SANITARY SEWER

a DOES NOT EXCEED ARARs OR TBCs

D DILUTED

NA NOT APPLICABLE

ND NOT DETECTED

J ESTIMATED CONCENTRATION

NOTES:

1) RESULT EXCEEDS POTENTIAL ARAR OR TBC, UNLESS OTHERWISE NOTED.

2) SINCE SI GROUNDWATER WAS ONLY TESTED FOR VOCs AND SVOCs, ONLY RI VOCs AND SVOCs EXCEEDING ARARs OR TBCs ARE PRESENTED

N

SCALE IN FEET

0 300 600 900

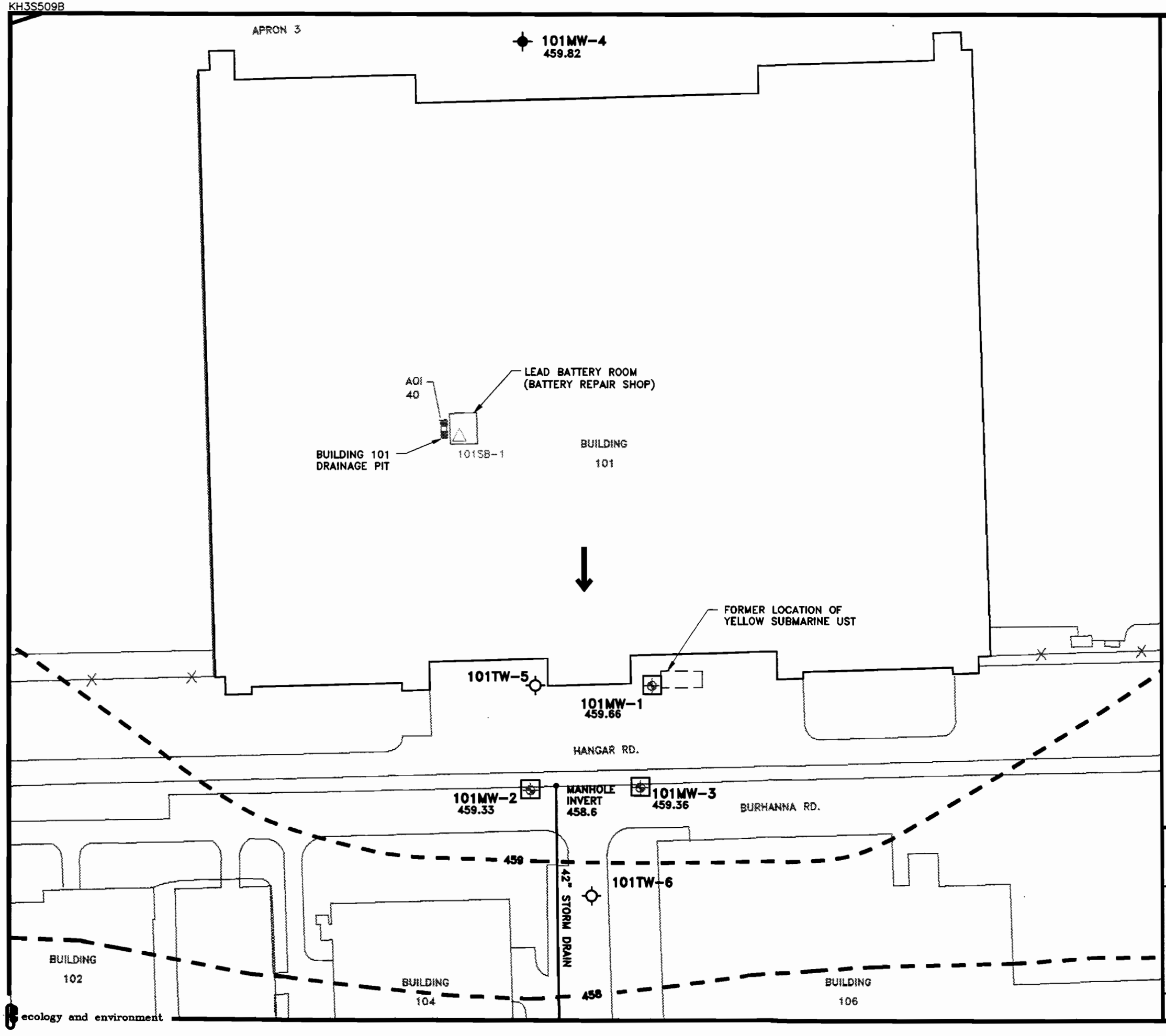
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.7-2
SUPPLEMENTAL INVESTIGATION
SELECTED GROUNDWATER
SAMPLE RESULT MAP
NOSE DOCKS 1 & 2 (BUILDINGS 782/783)

ecology and environment

Plotted: 04/16/98 MEH

KH3S509B



LEGEND

- 459.82 — SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- SUPPLEMENTAL INVESTIGATION TEMPORARY WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- 459.66 — RI MONITORING WELL WITH GROUNDWATER ELEVATION
- RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- INSTALLATION BOUNDARY
- 1-FOOT GROUNDWATER CONTOUR LINE

NOTE:
GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997.

N

SCALE IN FEET

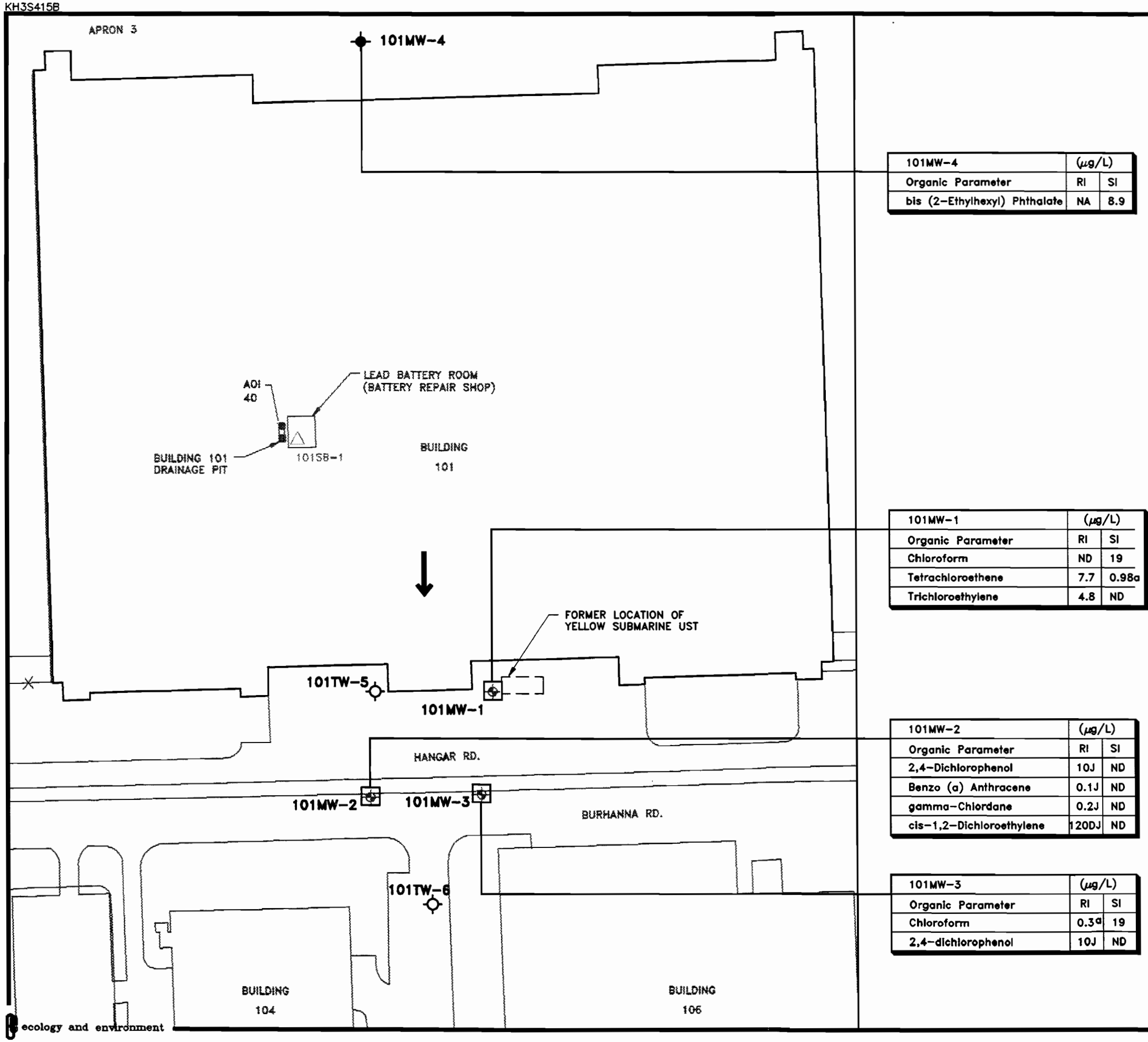
0 100 200 300

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.8-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION AND
GROUNDWATER CONTOUR MAP
BUILDING 101
BADP/YELLOW SUBMARINE UST SITE

BUFF plotted:07/14/98 REB

KH3S415B



101MW-4	(µg/L)	
Organic Parameter	RI	SI
bis (2-Ethylhexyl) Phthalate	NA	8.9

101MW-1	(µg/L)	
Organic Parameter	RI	SI
Chloroform	ND	19
Tetrachloroethene	7.7	0.98a
Trichloroethylene	4.8	ND

101MW-2	(µg/L)	
Organic Parameter	RI	SI
2,4-Dichlorophenol	10J	ND
Benzo (a) Anthracene	0.1J	ND
gamma-Chlordane	0.2J	ND
cis-1,2-Dichloroethylene	120DJ	ND

101MW-3	(µg/L)	
Organic Parameter	RI	SI
Chloroform	0.3[a]	19
2,4-dichlorophenol	10J	ND

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- SUPPLEMENTAL INVESTIGATION TEMPORARY WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- RI MONITORING WELL
- RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- INSTALLATION BOUNDARY
- a DOES NOT EXCEED ARARs OR TBCs
- ND NOT DETECTED
- J ESTIMATED CONCENTRATIONS
- NA NOT APPLICABLE
- D DILUTED

NOTE 1: RESULT EXCEEDS POTENTIAL ARAR OR TBC UNLESS OTHERWISE NOTED.

2: SINCE SI GROUNDWATER WAS ONLY TESTED FOR VOCs AND SVOCs, ONLY RI VOCs AND SVOCs EXCEEDING ARARs AND TBCs ARE PRESENTED.

N

SCALE IN FEET

0 100 200 300

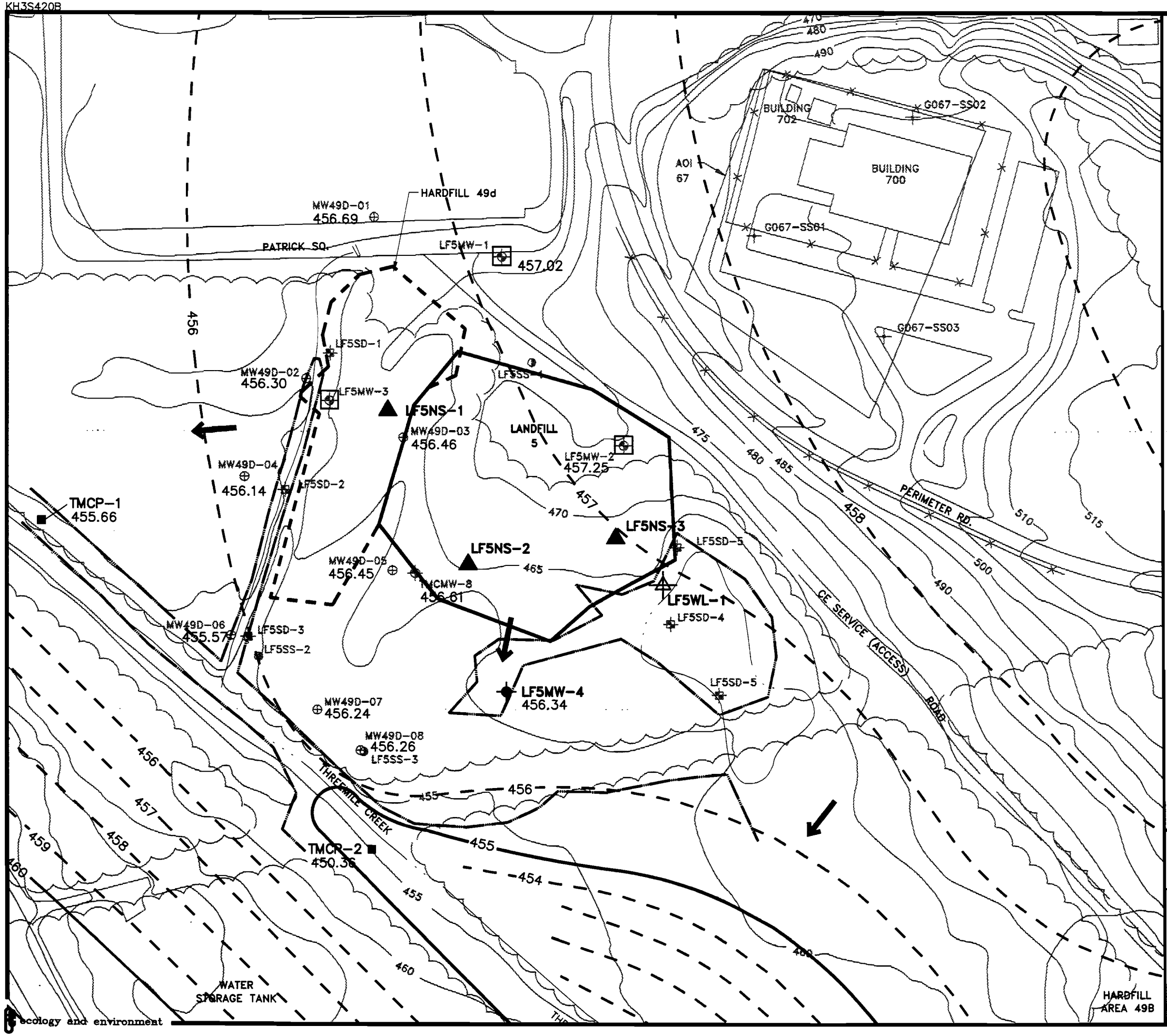
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.8-2
SUPPLEMENTAL INVESTIGATION
SELECTED GROUNDWATER SAMPLE RESULT MAP
BUILDING 101
BADP/YELLOW SUBMARINE UST SITE

ecology and environment

PLOTTED BUFF:11/14/97

KH3S420B



LEGEND

- 456.34 — SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- 457.02 — RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATIONS WITH GROUNDWATER ELEVATION
- SUPPLEMENTAL INVESTIGATION NEAR-SURFACE SOIL SAMPLE
- SUPPLEMENTAL INVESTIGATION LEACHATE SAMPLE
- 455.66 — PISCES SAMPLE LOCATION WITH CREEK SURFACE WATER ELEVATION
- GROUP III AOI BORING/TEMPORARY MONITORING WELL LOCATION
- RI MONITORING WELL
- HARDFILL 49D MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- 515 — TOPOGRAPHIC CONTOUR LINE
- 1-FOOT GROUNDWATER CONTOUR LINE
- 5-FOOT GROUNDWATER CONTOUR LINE
- HARDFILL 49d BOUNDARY
- LANDFILL 5 BOUNDARY

NOTE:
GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997

N

SCALE IN FEET

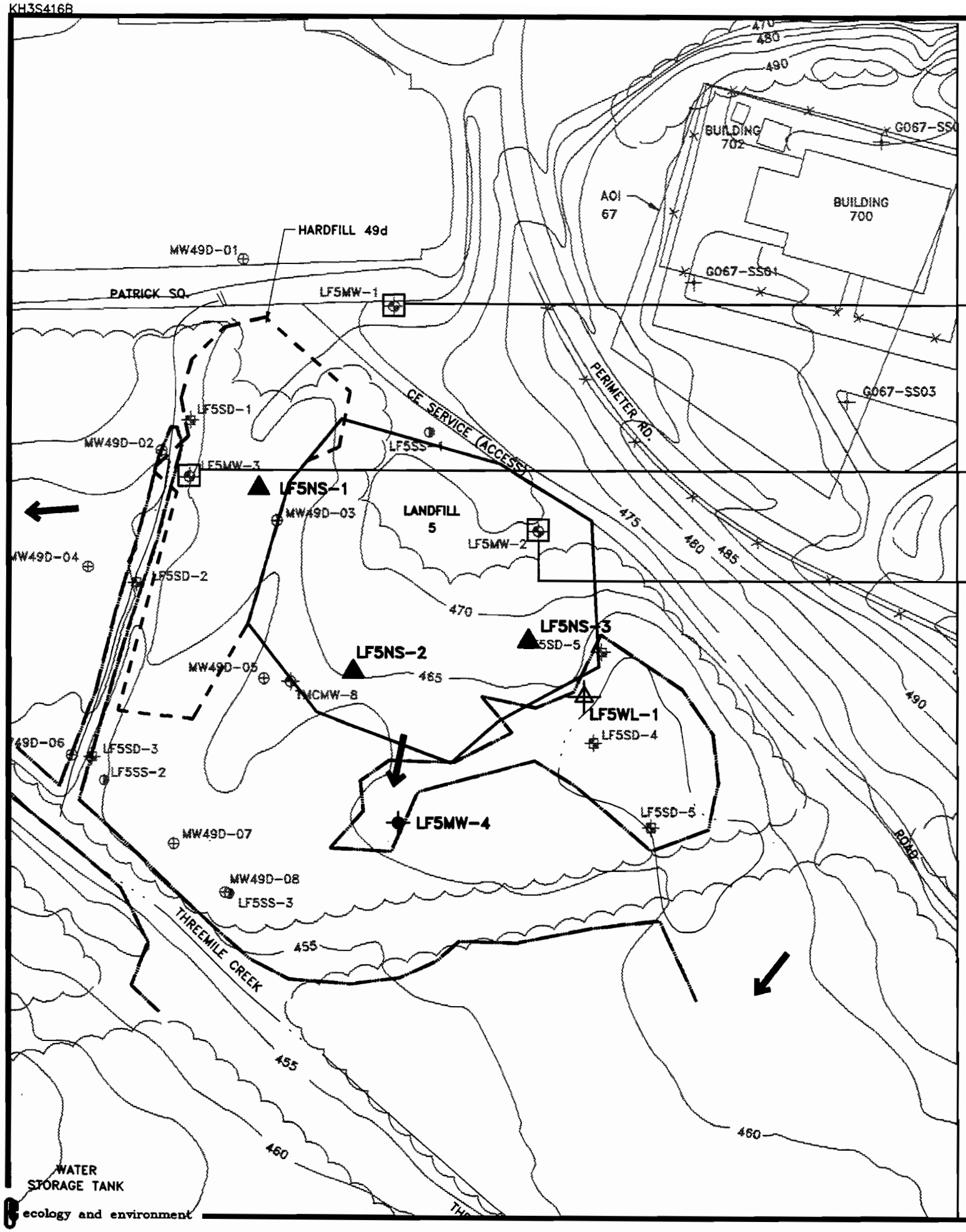
0 150 300 450

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.9-1
SUPPLEMENTAL INVESTIGATION SAMPLE LOCATION AND GROUNDWATER CONTOUR MAP LANDFILL 5

Date plotted: 01/14/98 KEB

KH3S416B



LF5MW-1	(µg/L)	
Organic Parameter	RI	SI
Carbon Tetrachloride	6.6	6.1

LF5MW-3	(µg/L)	
Organic Parameter	RI	SI
gamma-BHC (Lindane)	.08	ND

LF5MW-2	(µg/L)	
Organic Parameter	RI	SI
2,2,3,3,4,4,6-Heptachlorobiphenyl	0.2J	ND
2,2,3,4,6-Pentachlorobiphenyl	0.2J	ND
2,2,4,4,5,6-Hexachlorobiphenyl	0.3J	ND
Benzo (a) Anthracene	0.05J	ND
Benzo (b) Fluoranthene	0.03J	ND
bis (2-Ethylhexyl) Phthalate	7J	ND
Chrysene	0.04J	ND
Guthion	0.08	ND

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATIONS
- SUPPLEMENTAL INVESTIGATION NEAR-SURFACE SOIL SAMPLE
- SUPPLEMENTAL INVESTIGATION LEACHATE SAMPLE
- GROUP III AOI BORING/TEMPORARY MONITORING WELL LOCATION
- RI MONITORING WELL
- HARDFILL 49D MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- JURISDICTIONAL WETLANDS BOUNDARY
- 515 TOPOGRAPHIC CONTOUR LINE
- ND NOT DETECTED
- HARDFILL 49d BOUNDARY
- LANDFILL 5 BOUNDARY
- J ESTIMATED CONCENTRATION

NOTES:
1) RESULT EXCEEDS POTENTIAL ARAR OR TBC UNLESS OTHERWISE NOTED.
2) SINCE SI GROUNDWATER WAS ONLY TESTED FOR VOCs AND SVOCs, ONLY RI VOCs AND SVOCs EXCEEDING ARARs OR TBCs ARE PRESENTED.

N

SCALE IN FEET

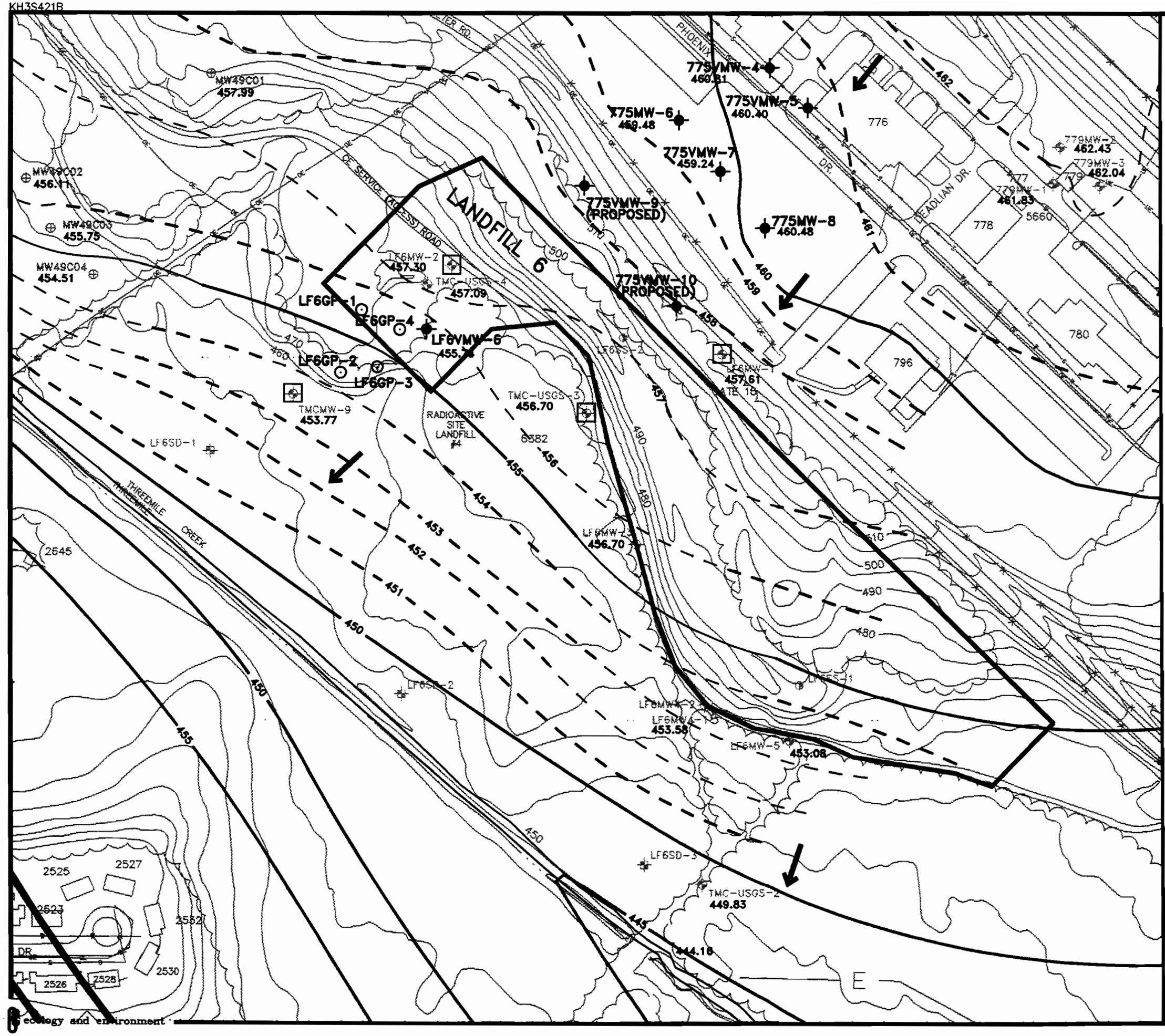
0 150 300 450

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.9-2
SUPPLEMENTAL INVESTIGATION
SELECTED GROUNDWATER SAMPLE RESULT MAP
LANDFILL 5

Date plotted: 01/14/98 KEB

KH3S421B



LEGEND

- 455.74 — SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- 457.61 — EXISTING MONITORING WELL/PIEZOMETER RESAMPLED DURING SUPPLEMENTAL INVESTIGATION WITH GROUNDWATER ELEVATION
- SUPPLEMENTAL INVESTIGATION GEOPROBE GROUNDWATER SCREENING SAMPLE
- 456.70 — EXISTING MONITORING WELL WITH GROUNDWATER ELEVATION
- 456.11 — HARDFILL 49C MONITORING WELL WITH GROUNDWATER ELEVATION
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- TOPOGRAPHIC CONTOUR LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- SANITARY SEWER
- WATER LINE
- 1-FOOT GROUNDWATER CONTOUR LINE
- 5-FOOT GROUNDWATER CONTOUR LINE
- LANDFILL 6 BOUNDARY

NOTE:
GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997

N

SCALE IN FEET

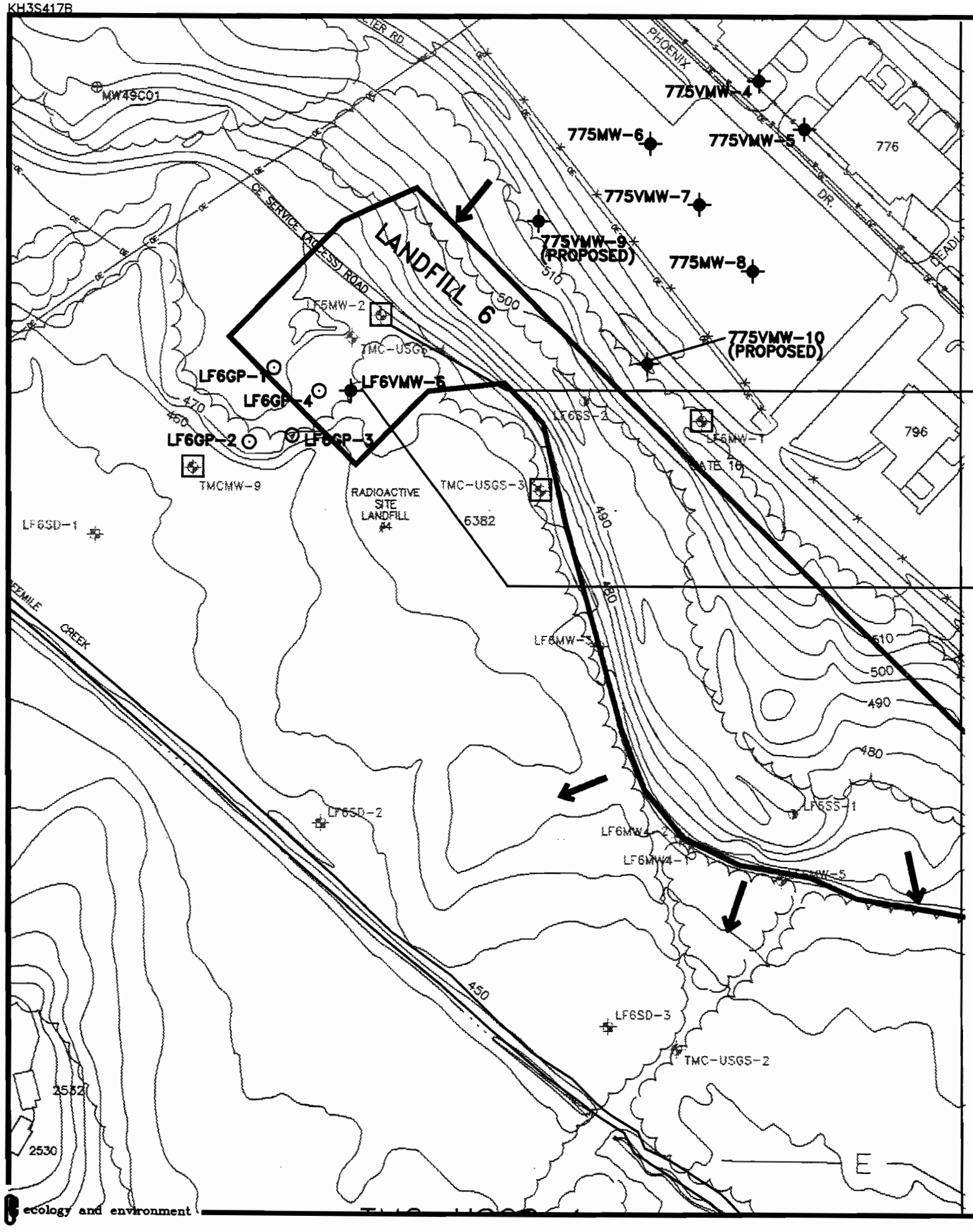
0 200 400 600

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.10-1
SUPPLEMENTAL INVESTIGATION SAMPLE LOCATION AND GROUNDWATER CONTOUR MAP LANDFILL 6

BUFF plotted:10/14/98 RLB

KH3S417B



LF6MW-2	(µg/L)	
Organic Parameter	RI	SI
1,2-Dichloroethene (Total)	170	83
Benzene	1.4	1.2J
Vinyl Chloride	30	20

LF6VMW-6	(µg/L)	
Organic Parameter	RI	SI
1,2-Dichloroethene (Total)	NA	180
Benzene	NA	1.0
Trichloroethene	NA	26
Vinyl Chloride	NA	29

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL.
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATIONS
- SUPPLEMENTAL INVESTIGATION GEOPROBE GROUNDWATER SCREENING SAMPLE
- RI MONITORING WELL
- HARDFILL 49C MONITORING WELL
- RI SURFACE WATER AND/OR SEDIMENT SAMPLE
- RI SURFACE SOIL SAMPLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- TOPOGRAPHIC CONTOUR LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- SANITARY SEWER
- WATER LINE
- LANDFILL 6 BOUNDARY
- J ESTIMATED CONCENTRATIONS
- NA NOT APPLICABLE

NOTES:

1) RESULT EXCEEDS POTENTIAL ARAR OR TBC UNLESS OTHERWISE NOTED.

2) SINCE SI GROUNDWATER WAS ONLY TESTED FOR VOCs AND SVOCs, ONLY RI VOCs AND SVOCs EXCEEDING ARARs OR TBCs ARE PRESENTED.

N

SCALE IN FEET

0 200 400 600

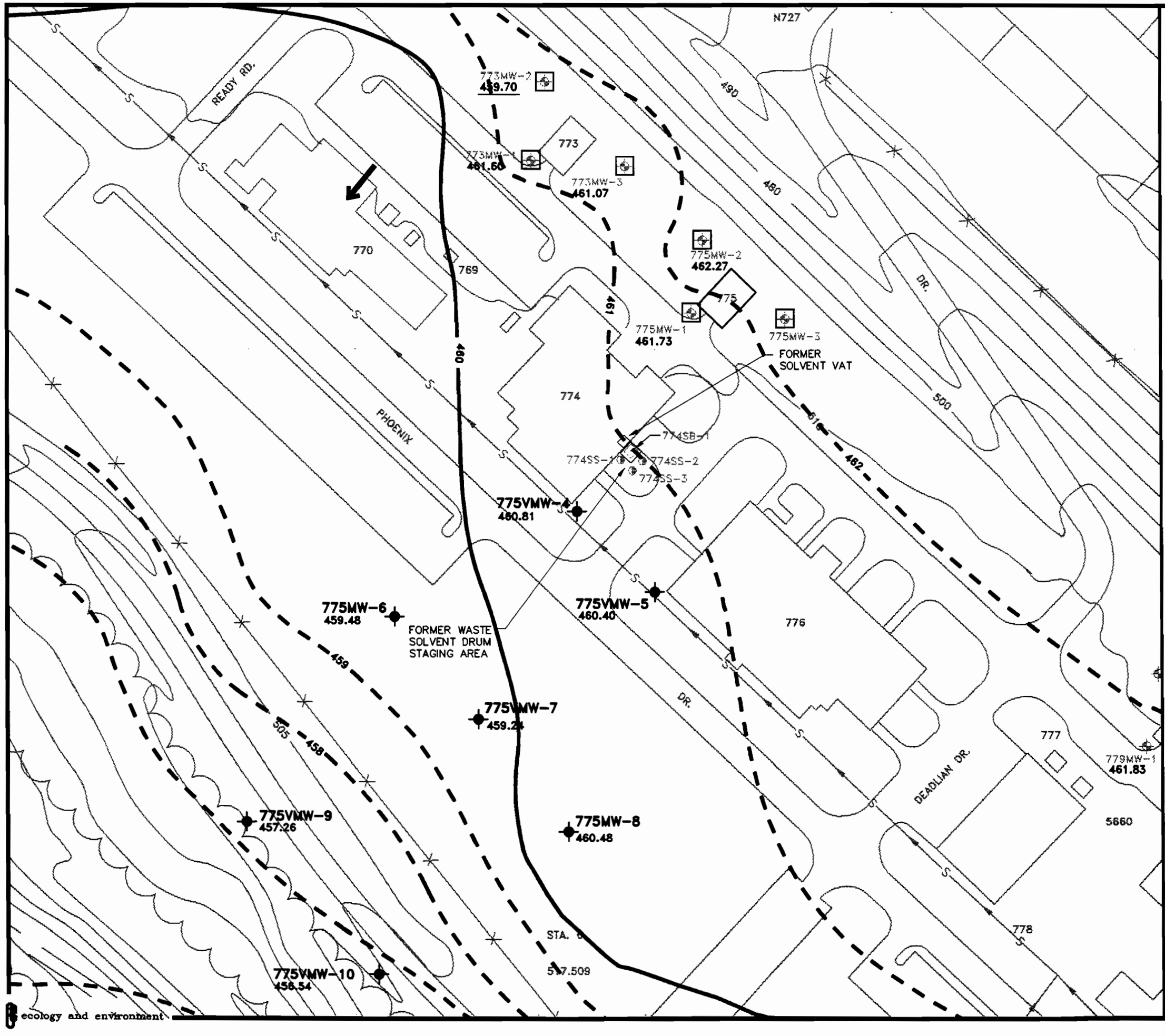
ecology and environment

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.10-2
SUPPLEMENTAL INVESTIGATION
SELECTED GROUNDWATER SAMPLE RESULT MAP
LANDFILL 6

BUFF plotted: 07/14/98 REB

KH3S510B



LEGEND

- 460.81 — SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATIONS
- 462.43 — RI MONITORING WELL WITH GROUNDWATER ELEVATION
- RI SURFACE SOIL SAMPLE
- RI SOIL BORING
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- 490 — TOPOGRAPHIC CONTOUR LINE
- 1-FOOT GROUNDWATER CONTOUR MAP
- 5-FOOT GROUNDWATER CONTOUR LINE

NOTE:
GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997 (EXCEPT 773 WELLS WHICH WERE REMEASURED IN OCTOBER 1997)

N

SCALE IN FEET

0 100 200 300

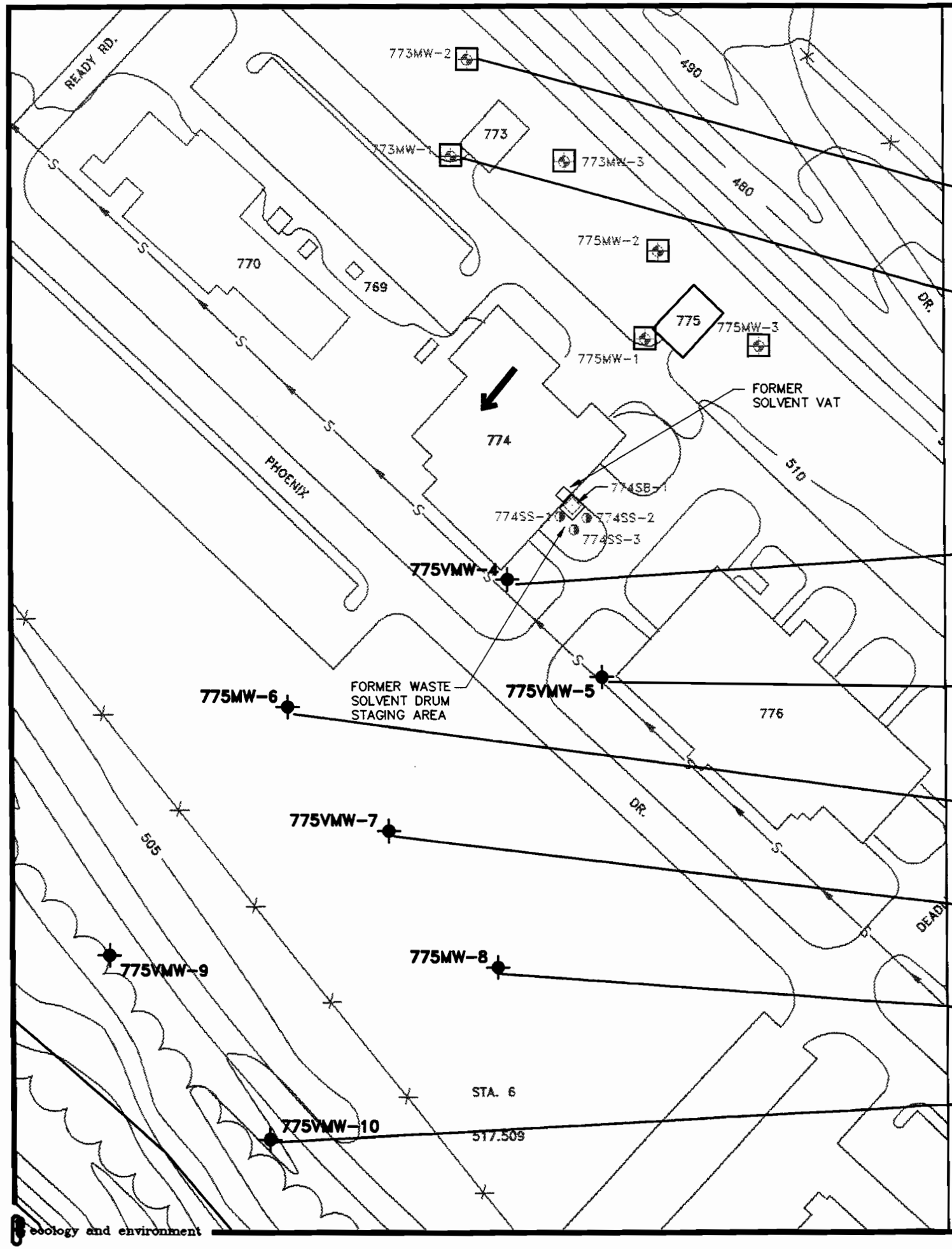
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.11-1
SUPPLEMENTAL INVESTIGATION SAMPLE LOCATION AND GROUNDWATER CONTOUR MAP
BUILDING 775 (PUMPHOUSE 3)

ecology and environment

PLOTTED BUFF: 04/16/98 MEH

KH3S511B



773MW-2	(µg/L)	
Organic Parameter	RI	SI
Tetrachloroethene	NA	6.3

773MW-1	(µg/L)	
Organic Parameter	RI	SI
Chloroform	NA	8.4

775VMW-4	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	NA	18

775VMW-5	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	NA	95

775VMW-6	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	NA	40

775VMW-7	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	NA	78

775VMW-8	(µg/L)	
Organic Parameter	RI	SI
Trichloroethene	NA	100

775VMW-10/D	(µg/L)	
Organic Parameter	RI	SI
1,1,1 – Trichloroethane	NA	5
Trichloroethene	NA	86

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATIONS
- RI MONITORING WELL
- RI SURFACE SOIL SAMPLE
- RI SOIL BORING
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- 490 TOPOGRAPHIC CONTOUR LINE
- NA NOT APPLICABLE

NOTES:

1) RESULT EXCEEDS POTENTIAL ARAR OR TBC UNLESS OTHERWISE NOTED.
2) SINCE SI GROUNDWATER WAS ONLY TESTED FOR VOCs AND SVOCs ONLY RI VOCs AND SVOCs EXCEEDING ARARs OR TBCs ARE PRESENTED.

N

SCALE IN FEET

0 100 200 300

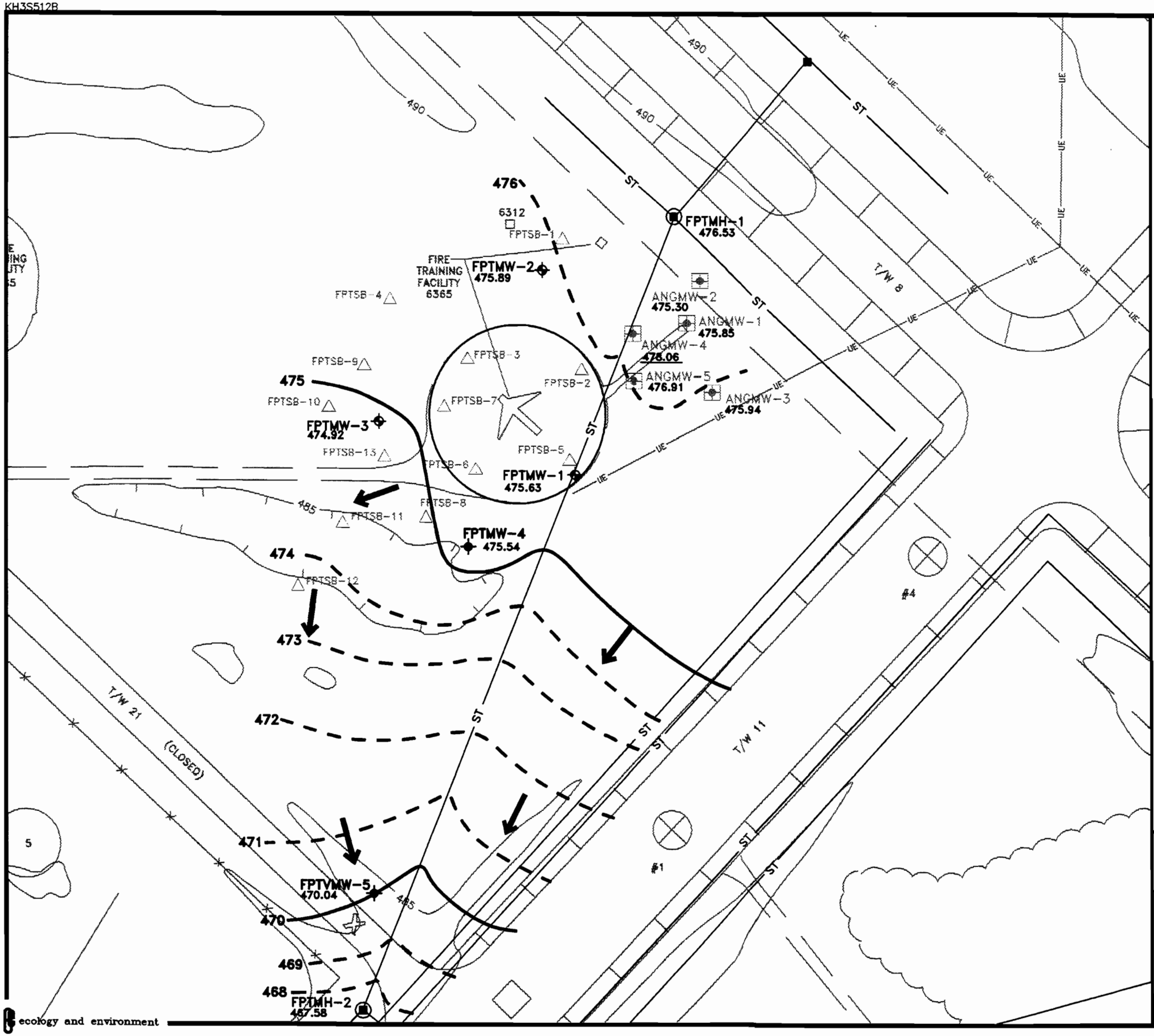
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.11-2
SUPPLEMENTAL INVESTIGATION
SELECTED GROUNDWATER SAMPLE RESULT MAP
BUILDING 775 (PUMPHOUSE 3)

ecology and environment

PLOTTED BUFF: 04/16/98 MEH

KH3S512B



LEGEND

- 475.54 — SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- 476.53 — SUPPLEMENTAL INVESTIGATION STORM SEWER SAMPLE LOCATION WITH GROUNDWATER ELEVATION
- 478.06 — AIR NATIONAL GUARD MONITORING WELL WITH GROUNDWATER ELEVATION
- 475.63 — RI MONITORING WELL WITH GROUNDWATER ELEVATION
- △ — RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- 478.06 — DATA POINT NOT CONTOURED
- ■ — STORM SEWER MANHOLE
- FENCE
- DIRECTION OF GROUNDWATER FLOW
- 1-FOOT GROUNDWATER CONTOUR LINE
- 5-FOOT GROUNDWATER CONTOUR LINE
- 490 — TOPOGRAPHIC CONTOUR LINE
- UE — UNDERGROUND ELECTRIC
- ST — STORM SEWER

NOTE:
GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997

N

SCALE IN FEET

0 150 300 450

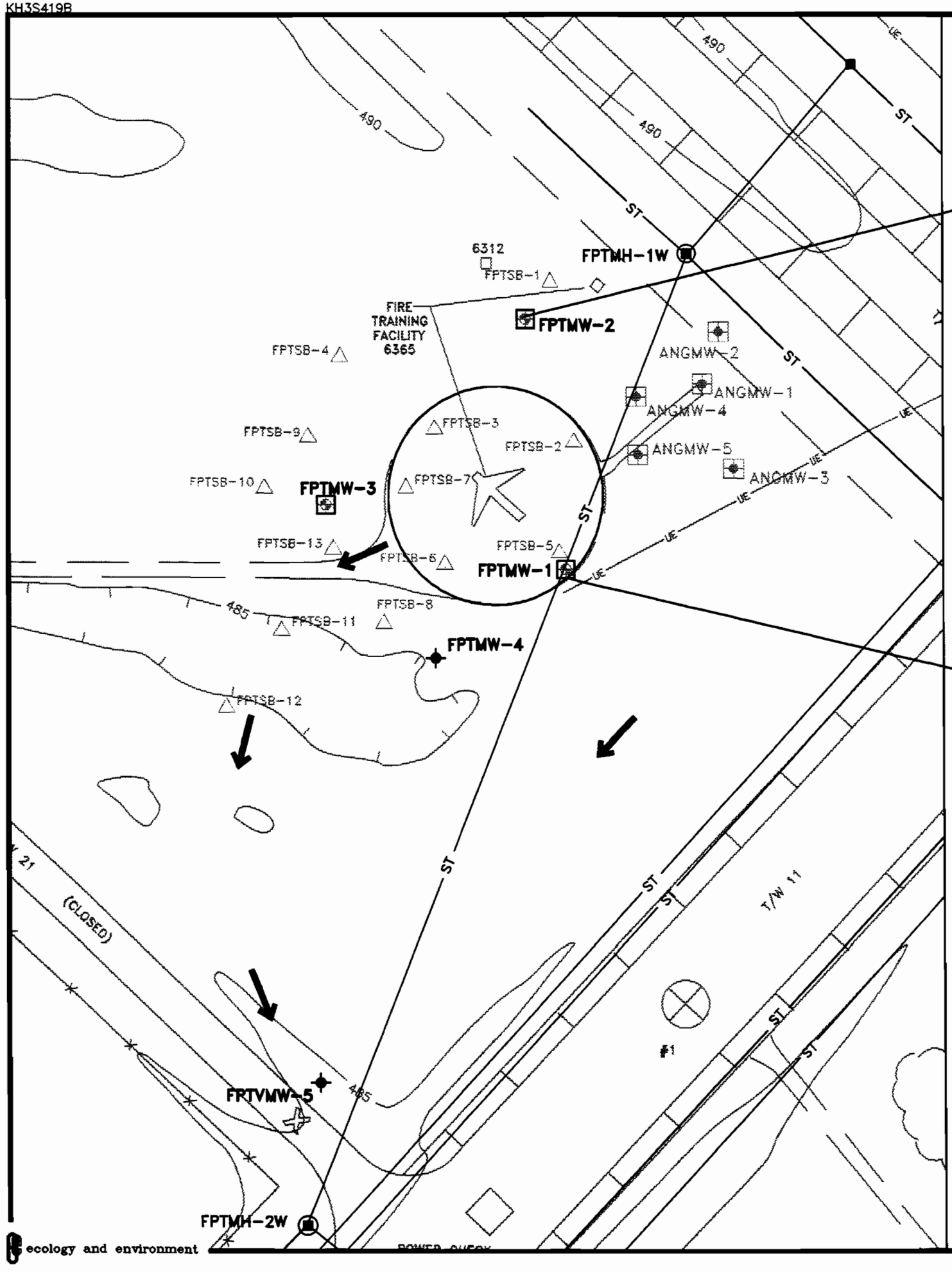
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.12-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION AND
GROUNDWATER CONTOUR MAP
FIRE PROTECTION TRAINING AREA

ecology and environment

PLOTTED BUFF: 04/ ^ '98 MEH

KH3S419B



FPTMW-2	(µg/L)	
Organic Parameter	RI	SI
Methylene Chloride	ND	7.6

FPTMW-1	(µg/L)	
Organic Parameter	RI	SI
Ethylbenzene	39D	0.82 a
Naphthalene	75	ND
1,2,4-Trimethylbenzene	150D	ND
1,3,5-Trimethylbenzene	66D	ND
Total Xylenes	66D	1.1 a

LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL
- SUPPLEMENTAL INVESTIGATION STORM SEWER WATER SAMPLE
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- RI MONITORING WELL
- AIR NATIONAL GUARD MONITORING WELL
- RI SOIL BORING/GRAB GROUNDWATER SAMPLE
- STORM SEWER MANHOLE
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- TOPOGRAPHIC CONTOUR LINE
- UNDERGROUND ELECTRIC
- STORM SEWER
- a DOES NOT EXCEED ARARs OR TBCs
- D DILUTED
- ND NOT DETECTED

NOTE:
1) RESULT ESCEEDS POTENTIAL ARAR OR TBC UNLESS OTHERWISE NOTED.

N

SCALE IN FEET

0 150 300 450

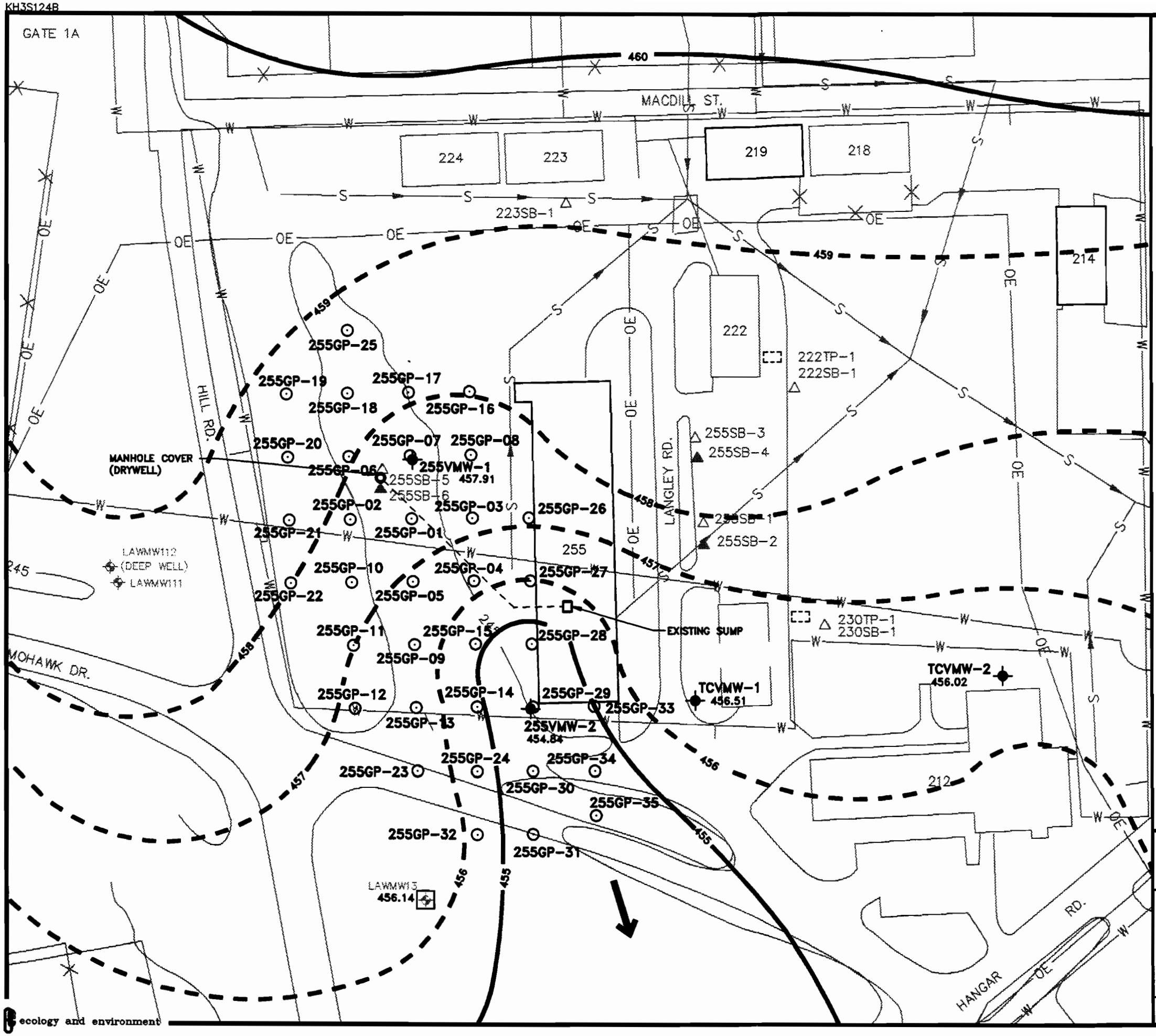
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.12-2
SUPPLEMENTAL INVESTIGATION
SELECTED GROUNDWATER SAMPLE RESULT MAP
FIRE PROTECTION TRAINING AREA

ecology and environment

PLOTTED BUFF: 11/13/97

KH3S124B



LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL WITH GROUNDWATER ELEVATION
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION WITH GROUNDWATER ELEVATION
- SUPPLEMENTAL INVESTIGATION GEOPROBE GROUNDWATER SCREENING SAMPLE
- RI MONITORING WELL
- RI SOIL BORING
- RI SOIL BORING/GRAB GROUND-WATER SAMPLING LOCATION
- RI TEST PIT LOCATION
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- TOPOGRAPHIC CONTOUR LINE
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- SANITARY SEWER
- WATER LINE
- 1-FOOT GROUNDWATER CONTOUR LINE
- 5-FOOT GROUNDWATER CONTOUR LINE

NOTE:
GROUNDWATER ELEVATIONS RECORDED IN AUGUST 1997

N

SCALE IN FEET

0 80 160 240

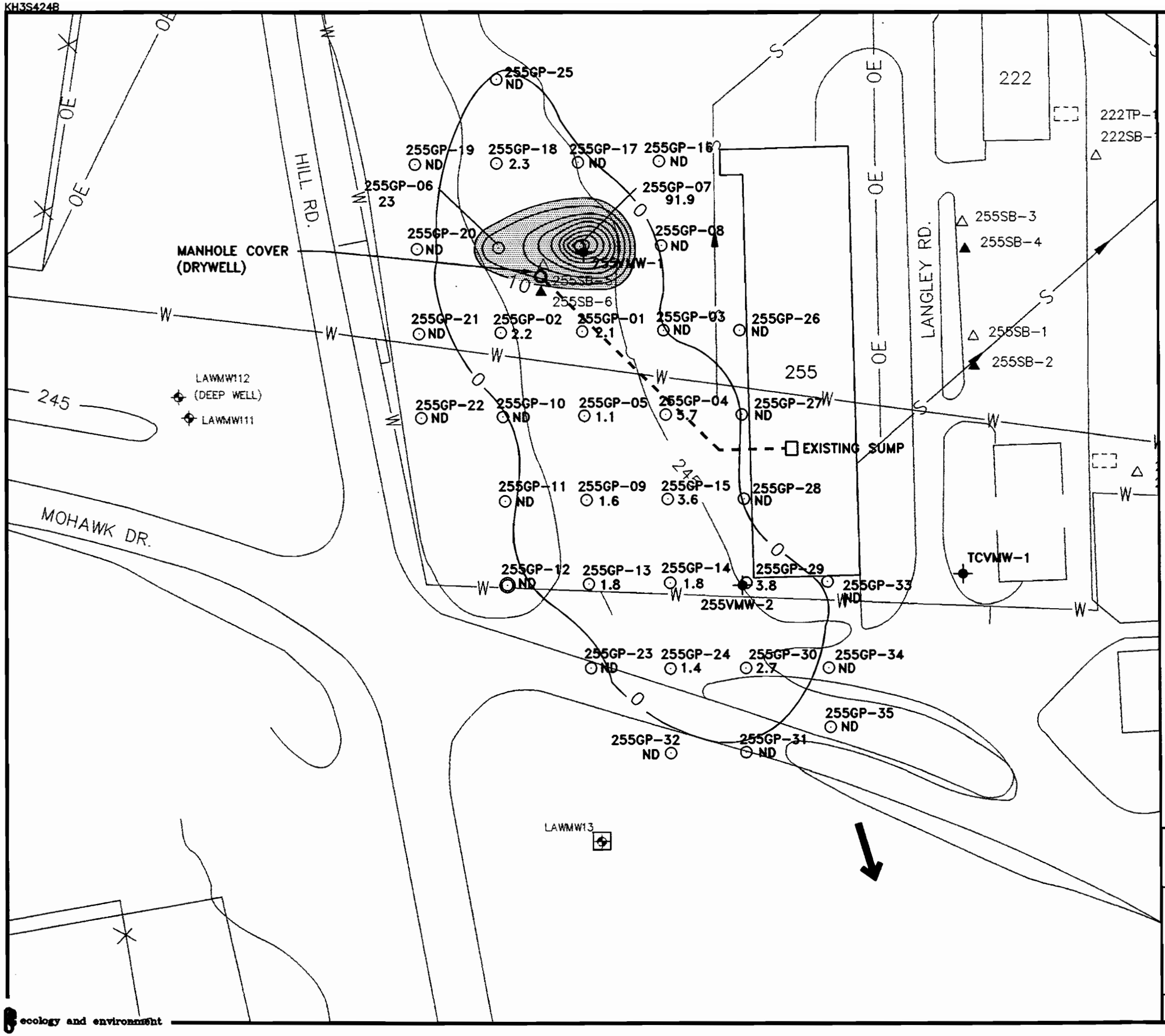
UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.13-1
SUPPLEMENTAL INVESTIGATION
SAMPLE LOCATION AND
GROUNDWATER CONTOUR MAP
TIN CITY
(INCLUDING BLDG. 214, 219, AND 255 AOCs)

ecology and environment

PLOTTED BUFF: 11/14/97

KH3S424B



LEGEND

- SUPPLEMENTAL INVESTIGATION MONITORING WELL.
- RI MONITORING WELL RESAMPLED DURING SUPPLEMENTAL INVESTIGATION
- 2.2 — SUPPLEMENTAL INVESTIGATION GEOPROBE GROUNDWATER SCREENING SAMPLE WITH TCE CONCENTRATION IN µg/L
- RI MONITORING WELL
- RI SOIL BORING
- RI SOIL BORING/GRAB GROUND-WATER SAMPLING LOCATION
- RI TEST PIT LOCATION
- DIRECTION OF GROUNDWATER FLOW
- FENCE
- 245 — TOPOGRAPHIC CONTOUR LINE
- OE — OVERHEAD ELECTRIC
- UE — UNDERGROUND ELECTRIC
- S — SANITARY SEWER
- W — WATER LINE
- ND — NOT DETECTED
- TCE — TRICHLOROETHENE
- CONCENTRATION CONTOUR INTERVAL = 10 µg/L
- TCE CONCENTRATION 10–91.9 µg/L

N

SCALE IN FEET

0 60 120 180

UNITED STATES AIR FORCE
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

Figure 4.11.4.13–2
SUPPLEMENTAL INVESTIGATION
GEOPROBE GROUNDWATER SCREENING
SAMPLE RESULT MAP FOR TCE
TIN CITY
(INCLUDING BLDG. 214, 219, AND 255 AOCs)

ecology and environment

PLOTTED BUFF: 11/14/97

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