HSWA HAFB G/M/00-01

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH FIGHTER WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO

ENTERED

K

22 OCT 2001

MEMORANDUM FOR NEW MEXICO ENVIRONMENT DEPARTMENT
Mr. James P. Bearzi
Chief, Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building 1
Santa Fe, NM 87505-6303

OCT 2001
RECEIVED

FROM: 49 CES/CD
550 Tabosa Avenue
Holloman AFB NM 88330-8458

SUBJECT: Final Work Plan, Holloman AFB 2001 Long-Term Groundwater Monitoring Program

1. Attached is the Final Workplan for the 2001 Long-Term Groundwater Monitoring Program conducted biennially by the Environmental Restoration Program at Holloman AFB (HAFB).

2. This plan incorporates the changes from the 1999 workplan agreed to by NMED and HAFB. Resolution of the comments made by NMED, in letters dated January 17, 2001 and May 9, 2001, on the proposed changes to the workplan was reached during the May 4, 2001 teleconference between Ms. Pam Moss and Ms. Carol Bieniulis of Foster Wheeler Environmental Corp., Mr. Jose Gallegos of HAFB and Mr. Rob Warder and yourself of NMED.

3. The biennial sampling under this workplan was conducted during the month of September 2001. HAFB is awaiting the results of the analysis. You will be provided a copy of the final report once it is completed.

4. If you have any questions, please contact Mr. Court Fesmire or Mr. Jose Gallegos at (505) 572-5395.

Howard E. Moffitt
HOWARD E. MOFFITT
Deputy Base Civil Engineer

Attachments:
1. Distribution List
2. "Final Work Plan for the 2001 Long-Term Groundwater Monitoring Program", September 2001

Attachment 1
Distribution List

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Headquarters, Air Combat Command
Langley Air Force Base,
Virginia

Final
Work Plan for the
2001 Long-Term Groundwater Monitoring Program

Holloman Air Force Base,
New Mexico

September 2001

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49 CES/CEV
Holloman Air Force Base,
New Mexico

Project Number: KWRD20017009

FINAL WORK PLAN
FOR THE 2001 LONG-TERM GROUNDWATER MONITORING PROGRAM
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:

49 CES/CEV
Holloman Air Force Base, NM
and
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Under Contract No. DACW45-94-D-0003
Delivery Order No. 32, Work Authorization Directive 9

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

September 2001

Project Number: KWRD20017009

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LIST OF ACRONYMS

AFB	Air Force Base
BTEX	benzene, toluene, ethylbenzene, and xylenes
BX	Base Exchange
CDAP	Chemical Data Acquisition Plan
CFR	Code of Federal Regulations
C-O-C	chain-of-custody
DOT	Department of Transportation
ECB	Environmental Chemical Branch
EPA	U.S. Environmental Protection Agency
FCR	field change request
HASP	Health and Safety Plan
IDW	investigation-derived waste
IRFNA	inhibited red fuming nitric acid
IWFNA	inhibited white fuming nitric acid
LIMS	Laboratory Information Management System
LTM	Long-Term Groundwater Monitoring
MOBBS	Mobile Bare Base Squadron
µs/cm	microsiemen per centimeter
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NFA	No further action
NTU	nephelometric turbidity unit
OCP	organochlorine pesticides
POL	petroleum, oils, and lubricants
PPE	personal protective equipment
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act

LIST OF ACRONYMS (concluded)

SC	specific conductance
SOP	Standard Operating Procedure
TCE	trichloroethene
TDS	total dissolved solids
TRPH	total residual petroleum hydrocarbons
UDMH	unsymmetrical dimethylhydrazine
UST	underground storage tank
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound
WMP	Waste Management Plan

1.0 INTRODUCTION

This Work Plan was prepared to support the Long-Term Groundwater Monitoring (LTM) Program for 17 Installation Restoration Program sites at Holloman Air Force Base (AFB), New Mexico (Figure 1-1). The LTM Program consists of the collection of groundwater samples for site-specific analyses once every 2 years over a 10-year period.

The initial activity of the LTM Program was a baseline sampling event which was completed in 1995 (Foster Wheeler Environmental Corporation [Foster Wheeler Environmental]/Groundwater Technology, Inc. [GTI], 1996). There have been subsequent sampling events in September 1997 (Foothills Engineering Consultants, Inc., 1998) and September 1999 (Foster Wheeler Environmental, 2000). The purpose of the LTM Program is to fulfill a requirement by the U.S. Environmental Protection Agency (EPA) Region 6 and New Mexico Environment Department (NMED) to submit the sites for a finding of No Further Action (NFA) on analytical results indicating that Holloman AFB is not degrading the quality of the groundwater at these sites.

1.1 DOCUMENT PURPOSE

The purpose of this Work Plan is to present the background information and project-specific procedures necessary to ensure that data collected during the September 2001 sampling event are of adequate quality for the purposes of assessing potential impacts to groundwater quality and to provide recommendations for future long-term groundwater monitoring. This Work Plan addresses the quality assurance (QA) elements required by *"General Chemistry Supplement to the Scope of Services"* from U.S. Army Corps of Engineers (USACE), Omaha District (1996). Field investigation procedures were prepared in accordance with the *"General Geology Supplement to the Scope of Services"* (USACE, 1992).

The CDAP was prepared in a manner that will permit the addition of future sites to the LTM Program by simply providing addenda to Section 3.0 of this work plan. Likewise, the Quality Assurance Project Plan (QAPP), Appendix B of the CDAP, facilitates the addition of analytical parameters, if required. Currently, field sampling covers long-term monitoring at the sites presented in Table 1-1. The locations of the 17 sites included in the 2001 LTM Program are presented in Figure 1-2.

Table 1-1. 2001 LTM Program Sites

Site	SWMU	Location
LF-01	106	Main Base Landfill
SS-02/SS-05	AOC-T	POL Spill Sites Nos. 1 and 2
SD-08	4, 82	Refuse Collection Truck Washrack
LF-10	101, 109	Old Main Base Landfill
OT-16 *	118, 132, AOC-A	Former Entomology Shop Area
SS-17 *	None	BX Service Station
LF-19	105	Golf Course Landfill
LF-21	116	West Area Landfill No. 2
LF-22	115	West Area Landfill No.1
LF-23	108	MOBBS Landfill
LF-29 *	104	Former Army Landfill
DP-30/SD-33	113B	Grease Trap Disposal Pits
SS-39 *	165, 177, 179, 181	Missile Fuel Spill Area
OT-44	AOC-P	Building 301 Aircraft Maintenance Area
SS-46 *	130	JP-4 Spill Site
SS-48	None	Military Gas Station
SS-56	None	West Ramp Fuel Spill

* These sites were added to the LTM Program during the 1997 sampling event. Site OT-45 was removed from the LTM Program after the 1995 baseline sampling event.

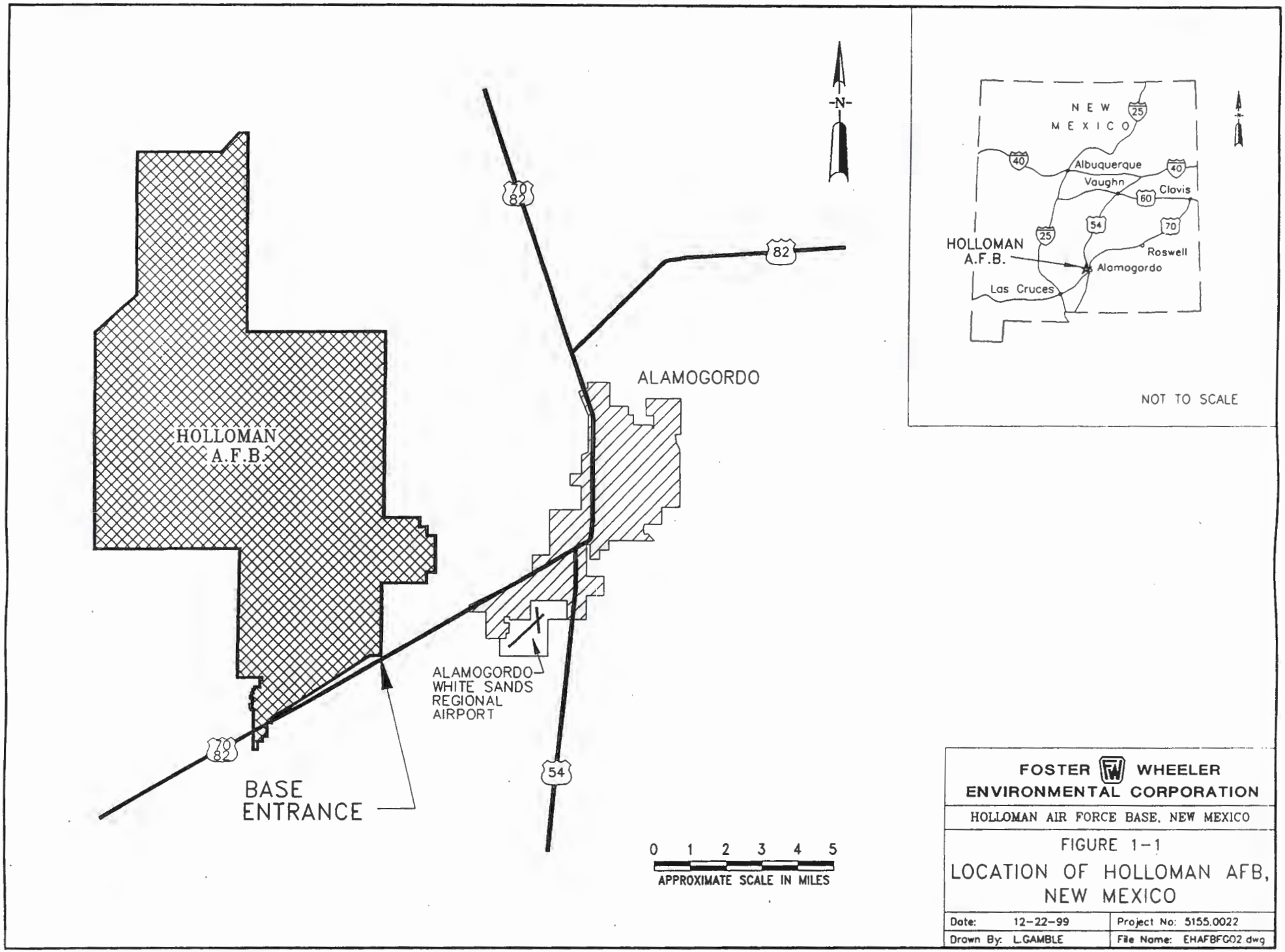
BX	Base Exchange	POL	Petroleum, oils, and lubricants
MOBBS	Mobile Bare Base Squadron	SWMU	Solid Waste Management Unit

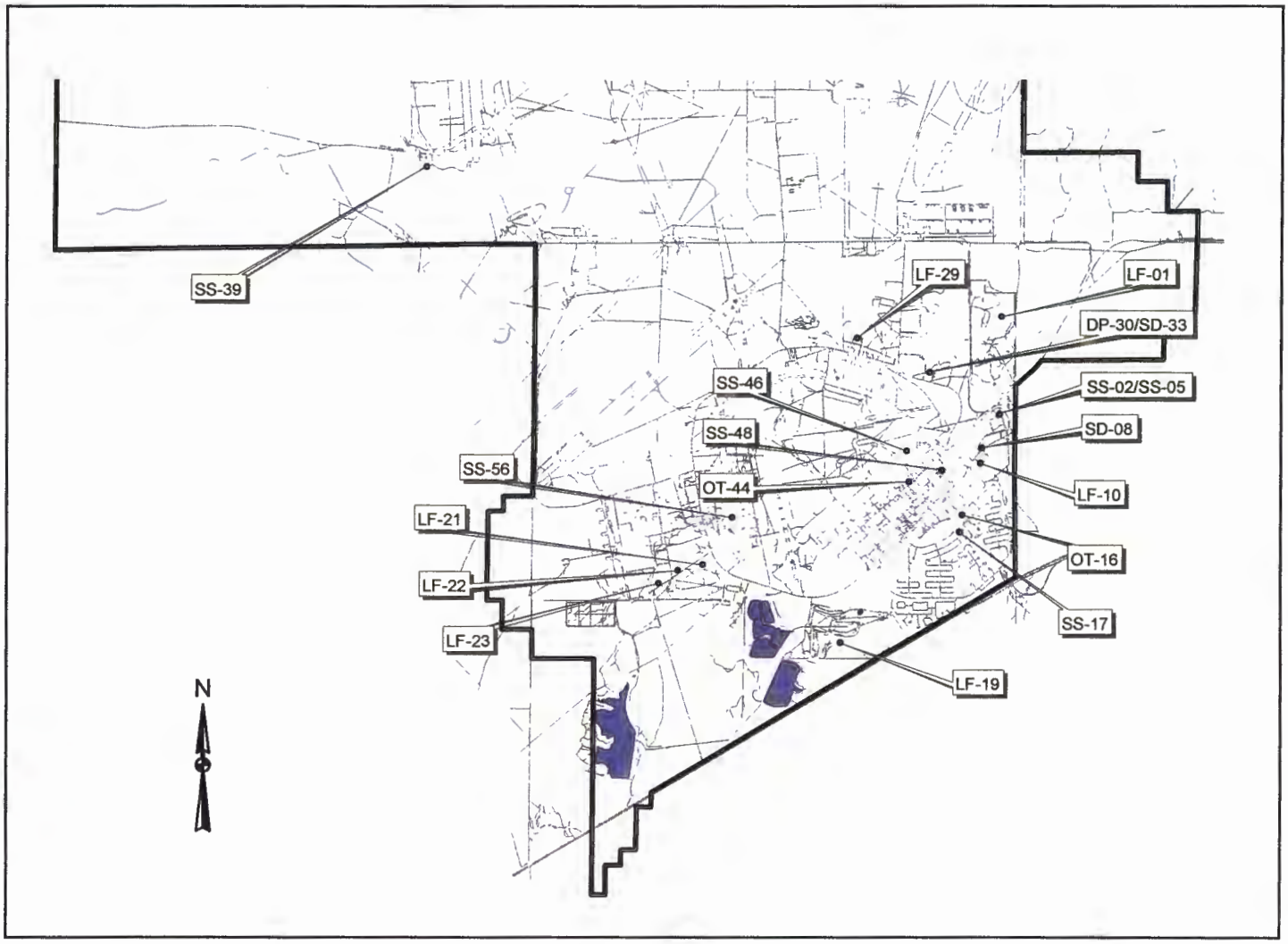
1.2 DOCUMENT ORGANIZATION

This Work Plan was prepared as an addendum to the 1999 LTM Program work plan (Foster Wheeler Environmental, 1999) and consists of the information necessary to conduct the required groundwater sampling in September 2001.

This Work Plan includes the site-specific LTM sampling plans and groundwater monitoring procedures. A description of procedures used for the collection of groundwater samples and sample handling are described in Section 2.0. A summary of site-specific sampling information, including the analytical requirements, is presented in Section 3.0. A discussion regarding the data evaluation protocol for the project is presented in Section 4.0. Document references are provided in Section 5.0.

Appendix A provides the standard operating procedures (SOPs) to be followed during field sampling activities. These SOPs were prepared for the previous LTM Program sampling events and will be used for the 2001 sampling event. The project-specific addendum to the QAPP (Appendix B) provides guidance relative to the contract laboratory and the expected analytical QA and quality control (QC) procedures required for the project. A project-specific addendum to the Final Basewide HASP is included as Appendix C and provides the health and safety protocol for the LTM groundwater sampling activities. Appendix D presents NMED comments on the 1999 LTM report and the responses to these comments, which are the basis for the 2001 analytical scope.


HOLLOMAN
A.F.B.
ALAMOGORDO
ALAMOGORDO-
WHITE SANDS
REGIONAL
AIRPORT
BASE
ENTRANCE
82
54
-N-
0 1 2 3 4 5
APPROXIMATE SCALE IN MILES
NEW
MEXICO
25
40
Albuquerque
Vaughn
Clovis
60
54
70
HOLLOMAN
A.F.B.
Roswell
Alamogordo
Las Cruces
NOT TO SCALE
FOSTER WHEELER
ENVIRONMENTAL CORPORATION
HOLLOMAN AIR FORCE BASE, NEW MEXICO
FIGURE 1-1
LOCATION OF HOLLOMAN AFB,
NEW MEXICO
Date: 12-22-99
Project No: 5155.0022
Drawn By: L.GAMBLE
File Name: EHAFBFG02 dwg



1.5 0 1.5 3 Miles

SITES

LF-01	MAIN BASE LANDFILL	OT-44	BLDG 301 - AIRCRAFT MAINTENANCE AREA
LF-10	OLD MAIN BASE LANDFILL	SD-08	REFUSE COLLECTION TRUCK WASHRACK
LF-19	GOLF COURSE LANDFILL	SS-02/SS-05	POL SPILL SITES NOS 1 AND 2
LF-21	WEST AREA LANDFILL NO 2	SS-17	BX SERVICE STATION
LF-22	WEST AREA LANDFILL NO 1	SS-39	MISSILE FUEL SPILL AREA
LF-23	MOBBS LANDFILL	SS-46	JP-4 SPILL SITE
LF-29	FORMER ARMY LANDFILL	SS-48	MILITARY GAS STATION
DP-30/SD-33	GREASE TRAP DISPOSAL PITS	SS-56	WEST RAMP FUEL SPILL
OT-16	FORMER ENTOMOLOGY SHOP AREA		

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 1-2
SITE LOCATION MAP

FOSTER WHEELER ENVIRONMENTAL CORPORATION

2.0 SAMPLING PROTOCOL

This section describes the protocol that will be followed to sample groundwater at each site in the 2001 LTM Program. As planned, each well will be purged and sampled manually using dedicated disposable Teflon® bailers. The sampling methods that will be used in the 2001 LTM Program follow the same procedures as those used in the 1999 event. If future sampling requires additional equipment, a field change request (FCR) will be submitted to Holloman AFB and USACE for approval. Each subsection below addresses the information necessary to complete the sampling required in the LTM Program. References to specific field operating procedures are contained in the SOPs provided in Appendix A as indicated below:

SOP A-1 Documentation, Sample Handling, Chain-of-Custody (C-O-C), and Shipping

SOP A-2 Sampling Equipment Decontamination

SOP A-3 Groundwater Sampling from Monitoring Wells for Chemical Analysis

SOP A-4 Calibration Procedures for Field Equipment

SOP A-5 Field Management of Investigation-Derived Waste (IDW)

2.1 FIELD EQUIPMENT CALIBRATION

The contractor will implement an equipment calibration program. Field equipment will be calibrated in accordance with recognized procedures provided by the manufacturers, American Society for Testing and Materials, the EPA, and/or National Institute of Standards and Technology. Elements of the existing program will include:

- A list that identifies the field equipment to be calibrated and the frequency of calibration of these devices.
- Methods to ensure proper handling, storage, and care of the test equipment such that the required accuracy of the equipment is maintained.

The following procedures will be implemented for out-of-calibration equipment:

- Any test equipment found to be out of calibration will be recalibrated. When test equipment cannot be properly calibrated or is damaged, an evaluation will be made to assess the validity of previous field test results since the last calibration. If previous field test results cannot be validated, the required field tests will be repeated using properly calibrated equipment.
- Any test equipment consistently found to be out of calibration will be repaired.
- Test equipment that cannot be repaired will be permanently removed from the program and replaced. Equipment will be tagged to signify that it cannot be used for project purposes.

Descriptions of typical calibration procedures for various pieces of field equipment are provided in SOP A-4 which is contained in Appendix A. If necessary, manufacturer procedures will be followed if they differ from the general procedures in SOP A-4.

2.2 WATER LEVEL MEASUREMENTS

Water levels will be measured in the monitoring wells at each site included in the 2001 LTM Program. The water level measurements will be conducted prior to pre-sample purging. Water level measurements will be collected using an electronic water level indicator and will be measured to the nearest 0.01 foot from the top of casing (TOC). A detailed procedure for performing water level measurements is described in SOP A-3, contained in Appendix A. Site-specific well gauging data forms that also provide available well completion information will also be completed (SOP A-3).

2.3 PRE-SAMPLE WELL PURGING

Each monitoring well to be sampled will be purged prior to sampling using a polyvinyl chloride (PVC) bailer. SOP A-3 (Appendix A) describes the purging procedure. Pre-sample purging is performed to remove stagnant water from the well casing and introduce groundwater of representative chemical quality into the well. Each well will be purged using a PVC bailer of at least three saturated casing volumes or until the wells are purged to dryness. During purging, measurements of pH, temperature, specific conductance, total dissolved solids (TDS), and turbidity will be recorded. Purging will be considered complete when three saturated casing volumes have been removed from the well and when the following parameters have stabilized as indicated:

- pH—Within 0.1 units
- Temperature—Within ± 2 degrees Celsius
- Specific conductance (SC)—Within 5 percent for SC less than or equal to 100 microsiemen per centimeter (μS/cm), and within 3 percent for SC greater than 100 μS/cm
- TDS—No standard applies (measurement taken for water quality purposes)
- Turbidity—Less than 5 nephelometric turbidity units (NTUs)

Wells purged to dryness prior to removal of at least three saturated casing volumes will be sampled when the well has recharged sufficiently for sample collection. The PVC bailer will be decontaminated between monitoring wells according to SOP A-2.

2.4 GROUNDWATER SAMPLE COLLECTION

Groundwater samples will be collected from each well after purging using a disposable Teflon® bailer. SOP A-3 (Appendix A) describes the sampling methodology. Groundwater samples to be analyzed for volatile organic compounds (VOCs) will be collected first, followed by organochlorine pesticides (OCPs), herbicides, metals, and TDS. Samples collected for dissolved metals will be preserved and filtered in the field.

2.5 SAMPLE HANDLING AND DOCUMENTATION

Proper sample handling and documentation is necessary to ensure the quality of analytical data collected during this program. Documentation includes the use of field logbooks, instrument calibration logs, sample collection forms, C-O-C forms, sample labels, and well purging records. Sample documentation and handling procedures are described in SOP A-1 (Appendix A).

The groundwater samples from each site will be segregated and then shipped in groups. A separate C-O-C form will be prepared for each site on a daily basis and included in the corresponding sample cooler shipped to the analytical laboratory.

A bound field logbook will be used to permanently record all field activities and general observations. The logbook will be filled out, initialed, and dated on a daily basis by the field sampling personnel, and will be reviewed by the field operations leader throughout the sampling event. The names of all visitors will also be entered in the logbook. General notes on project progress, problems encountered, and deviations from plans (with rationale) will be entered in the logbook.

The field operations leader will complete the Daily Quality Control Reports and submit them to the USACE representative on a weekly basis. The reports will be generated from data recorded in the field logbook.

2.6 SAMPLE CONTAINERS

The analytical requirements differ at each site included in the 2001 LTM Program, and each class of analyses has specific sample container and preservation requirements. Detailed information regarding the analytical protocol required for the 2001 LTM Program is presented in the QAPP contained in Appendix B of this CDAP. A summary of the required sample containers and preservatives for the LTM Program analytes is presented in Appendix B, Table 4-1.

2.7 SAMPLE NUMBERING SYSTEM

Each groundwater sample will be uniquely identified by both a field and laboratory sample identification number. The field sample numbering scheme to be used for the 2001 LTM Program will maintain consistency at each site and will be assigned by the field operations leader using an alphanumeric character string. The field sample numbers will contain a site location reference, a well identification number, and a flag identifying the sample as a representative sample or QA/QC sample. An example of a field sample identification number is presented below:

Sample Identification Number: LF01MW201

- LF01 Site identifier for LF-01 (Main Base Landfill)
- MW2 Well identification number for monitoring well MW2 at the site
- 01 The representative groundwater sample

Samples collected at SS-02/SS-05 and DP-30/SD-33 will be identified by using the site identifiers "SS02" and "DP30," respectively. The flags used to identify other samples include "02" for the field duplicate samples and "03" for the USACE QA samples.

2.8 SAMPLE HANDLING AND PRESERVATION PROCEDURES

Sample handling, preservation, and shipping procedures are discussed in SOP A-1 (Appendix A), and in Table 4-1 in Appendix B.
4-1).

2.9 SAMPLE EQUIPMENT DECONTAMINATION

Sample equipment decontamination procedures are discussed in SOP A-2 (Appendix A).

2.10 QUALITY ASSURANCE/QUALITY CONTROL SAMPLING

Duplicate groundwater samples will be collected and submitted to the contractor laboratory to ensure analytical QA/QC data quality objectives are met. In addition, field replicate samples for QA purposes will be submitted to the USACE Environmental Chemistry Branch (ECB) Laboratory of the Waterways Experiment Station. In accordance with the USACE Scope of Services for the LTM Program, the frequency of field duplicates and the USACE QA samples is 10 percent. One trip blank for VOC analysis will be included in each daily sample shipment throughout the course of the sampling program. The project-specific requirements for the collection of QA samples are presented in the QAPP (Appendix B). For the 2001 LTM sampling event, samples sent to the USACE CQAB laboratory will reference the project Laboratory Information Management System (LIMS) Number 6431.

2.11 WASTE MANAGEMENT

This section presents procedures that will be utilized to characterize, manage, and dispose of IDW generated during the LTM Program sampling activities. IDW generated during the project will be handled in accordance with applicable state and federal regulations. The procedures discussed in this CDAP are a summary of the applicable components of the Basewide Waste Management Plan (WMP) in effect at Holloman AFB (Radian, 1993). The IDW expected to be generated during the 2001 LTM Program includes purge water, personal protective equipment (PPE), disposable bailers, trash, and decontamination water. Waste minimization techniques will be employed where possible to reduce the quantity of IDW generated.

Purge water will be containerized at each site in Department of Transportation (DOT)-approved drums and a record/inventory of waste drums generated during the program will be kept by field personnel. The drum inventory list will contain the following information:

- Drum identification number
- Drum contents
- Sample location
- Drum filling date(s)

Once sampling activities are complete within an LTM site, all drums within that site will be staged at an on-site storage facility to await waste characterization.

2.11.1 Waste Characterization

Based upon the data collected during several previous sampling events and investigations, IDW generated during the 2001 LTM program is not anticipated to be hazardous. However, analytical results of groundwater samples collected from each well will be compared to the hazardous waste characterization regulatory criteria levels contained in Title 40, Code of Federal Regulations (CFR), Part 261 (40 CFR, Part 261), and a determination will be made as to whether purge water generated during sampling activities is hazardous. If necessary, IDW will be directly sampled for waste characterization and the analytical results will be compared to the criteria in 40 CFR, Part 261.

2.11.2 Management of Purge Water

Purge water will be generated during the 2001 LTM Program. The purge water from each site will be placed in separate DOT-approved drums, labeled as "Groundwater Well Purge Water—Analysis

Pending," and kept in a central location at each site. Waste characterization will be performed using groundwater sample analytical results as described above. It is not anticipated that water from the different sites will be mixed or bulked. If the latter occurs, a sample will be collected for waste characterization.

Once the characterization of purge water is complete, the handling of this waste will be as follows:

- If the analytical results indicate that the water is not hazardous and the results are less than the NMED action levels for discharge onto the ground surface or discharge to the sanitary sewer, Holloman AFB will be notified that the purge water may be suitable for discharge to ground surface or to the sanitary sewer, as appropriate. Once approval from Holloman AFB is received, the purge water will then be discharged accordingly.

- If the analytical results exceed the hazardous waste action levels or the NMED action levels for discharge onto the ground surface or discharge to the sanitary sewer, alternate disposal will be required. Should the waste be characterized as hazardous, the containers will be handled and disposed in accordance with RCRA hazardous waste requirements as described in Section 2.12 of this plan. This process would involve labeling the container(s) as hazardous waste and transporting the container(s) under a hazardous waste manifest for off-site disposal, or transferring the container(s) to the Holloman AFB permitted hazardous waste container storage area.

2.11.3 Decontamination Water

The generation of decontamination fluids (water and laboratory-grade detergent) will be minimized by use of disposable Teflon® bailers. All nondisposable sampling equipment will be decontaminated at each well using tubs or 5-gallon buckets. These containers will be marked as "Decontamination Water from GW Sampling–Nonpotable Water." Since the volume of decontamination water generated during the described field activities is anticipated to be small, all decontamination water will be allowed to evaporate to dryness.

2.11.4 Personal Protective Equipment and Sampling Equipment

Pursuant to the Basewide WMP prepared by Radian (1993), Holloman AFB has determined that PPE and other disposable items from all sites will be decontaminated and contained in sealed plastic trash bags and disposed as nonhazardous solid waste. Prior to disposal, the PPE and disposable items will be cleaned and decontaminated. The bags will be disposed of in a designated dumpster at the Base.

2.12 HAZARDOUS WASTE DISPOSAL

Drums of IDW determined to be hazardous will either be removed from temporary accumulation at the end of 90 days for disposal at an off-site permitted facility or transferred to a permitted container storage

facility at Holloman AFB until disposal can be arranged. Off-site disposal facilities for hazardous waste will be selected on the basis of the waste characterization and in accordance with the land disposal restrictions (40 CFR Part 268). Selection of disposal facilities will conform to all applicable contractor, Base, and USACE compliance requirements.

3.0 SITE-SPECIFIC SAMPLING AND REPORTING REQUIREMENTS

The 2001 LTM Program includes the collection of groundwater samples from 65 monitoring wells located at 17 sites at Holloman AFB (Figure 1-2). This section of the CDAP presents a summary of the specific sampling requirements for each site.

Individual maps of each site showing the monitoring wells to be sampled are presented in Figures 3-1 through 3-17. Table 3-1 provides a summary of the information used to determine the site-specific requirements for sampling at the 17 sites. The information in Table 3-1 includes a brief description of the site history, sampling rationale, and LTM Program analytical requirements. Table 3-2 provides a tabulation of the analytical requirements for each site, which includes a list of the monitoring wells to be sampled, sample analytical requirements, and QA samples. The analytical scope for each site was revised based on comments provided by NMED on the final report for 1999 LTM program (Foster Wheeler Environmental, 2000). The state's comments were discussed by representative from NMED and Holloman AFB, and the results of this discussion was a analytical program focused on the analytes detected at each site that indicated a potential for groundwater degradation.

Table 3-1 Summary of Sites Included in the 2001 LTM Program

Site	SWMU	Location	Site History	Results of Investigations Prior to the LTM Program	Investigation Conclusions and Recommendations
LF-01	106	Main Base Landfill	Operated as a trench and fill disposal facility in 1958. Areal extent of landfill is approximately 210 acres. Landfill accepted solid waste and nonhazardous materials from industrial shops on Base. Small quantities of waste oils, solvents, and pesticides were reported disposed in the landfill.	VOCs and SVOCs have been detected in groundwater. Metals in groundwater have exceeded NMWQCC standards.	No risk to public health and environment. NMED recommended long-term monitoring. LTM should include analysis of VOCs and metals.
SS-02/ SS-05	AOC-T	POL Spill Sites No. 1 and No. 2	Two POL sites located in the eastern portion of the Base that are being remediated together. JP-4 and aviation fuel spills occurred periodically at the two sites.	Due to the nature of the contaminant releases, long-term monitoring is recommended for these sites.	Primary risk driver for these sites is their proximity to adjacent arroyo. LTM should include analysis of VOCs.
SD-08	4, 82	Refuse-Collection Truck Washrack	Washrack was used to clean refuse trucks where wash water flowed into an oil-water separator and was then discharged into the sanitary sewer. Pesticides were routinely applied to the trucks for fly control. The settling basin and separator occasionally became clogged and overflowed into the northwest corner of the washrack.	Metals, VOCs, and pesticides were detected in groundwater. Long-term monitoring for metals and pesticides is required as part of the site closure.	FS recommended an asphalt cap as the preferred remedial action of this site. LTM should include analysis of VOCs, metals, and organochlorine pesticides.
LF-10	101, 109	Old Main Base Landfill	Utilized from 1942 through 1958. Received domestic solid waste from the Base, ash from the Base incinerator, and possibly drums that contained waste oils and solvents.	SVOCs, pesticides, and TRPH detected in groundwater. Metals exceeded NMWQCC standards.	No risk to public health and environment. No further action warranted at site. NMED recommended long-term monitoring as a condition for NFA at the site. LTM should include analysis of VOCs and metals.
OT-16	118, 132, AOC-A	Former Entomology Shop Area	Located at Building 21 in the southeastern portion of the Base. Rinse water from pesticide-mixing operations were discharged to leach field located behind Building 21 and a pit on the southwest side of Building 21. Diesel fuel used to stabilize pesticides may also have been discharged. Pesticide holding tank located on the site, although no spills or releases have been reported.	VOCs and pesticides have been detected in groundwater.	No risk to public health and environment. Long-term monitoring recommended for this site. LTM should include analysis of VOCs and organochlorine pesticides
SS-17	- -	BX Service Station	Located on First Street in the main portion of the Base and approximately 2,500 ft from the main gate. The site contains several buildings including a service station, convenience store, a car wash, and residences. Up to 4 ft of free-phase product was observed on the water table and contamination extends under adjacent property. Site remediation is ongoing and monitoring also occurs under the Basewide LTO program.	Fuel-related VOCs have been detected in groundwater.	NMED requires site long-term monitoring to ensure no further migration of groundwater contamination. LTM should include analysis of VOCs.
LF-19	105	Golf Course Landfill	Site is located within an arroyo and was primarily used for the disposal of grass clippings from the golf course, but it is possible that unused rodenticide was place in the landfill.	Metals and fluoride exceeded RCRA Part S Corrective Action Levels.	No risk to public health and environment. Long-term monitoring of pesticides, herbicides, and metals recommended for this site. LTM should include analysis of VOCs and metals.
LF-21	116	West Area Landfill No. 2	Active during the 1970s when domestic trash, paper boxes, and tree trimmings were accepted at the landfill. Possibility that some drum disposal could have taken place also.	Groundwater action levels for arsenic, cadmium, benzene, and fluoride exceeded.	No risk to public health and environment. Long-term monitoring of VOCs, pesticides, herbicides, and metals recommended for this site. LTM should include analysis of VOCs and metals.

Table 3-1 Summary of Sites Included in the 2001 LTM Program

Site	SWMU	Location	Site History	Results of Investigations Prior to the LTM Program	Investigation Conclusions and Recommendations
LF-22	115	West Area Landfill No. 1	Active 1974 through 1978 when empty cans, cardboard, and plastic sheeting were accepted at the landfill. Possibility that some drum disposal could have taken place also.	Pesticides and metals detected in groundwater. Cadmium exceeded groundwater action level.	No risk to public health and environment. Long-term monitoring of VOCs, pesticides, herbicides, and metals recommended for this site. LTM should include analysis of VOCs, metals, organoclorine pesicides, PCBs, and herbicides.
LF-23	108	MOBBS Landfill	Borrow pit located west of the Solar Observatory that received cans of pesticides, 55-gallon drums of unknown contents, and demolition debris. Additional field surveys identified trailers, empty 55-gallon drums, and containers of roofing tar and asphalt visible on the landfill surface.	Lead in groundwater exceeded Base background concentration. One pesticide was detected in a downgradient well.	No risk to public health and environment. Long-term monitoring of VOCs, pesticides, herbicides, and metals recommended for this site. LTM should include analysis of organoclorine pesicides, PCBs, and herbicides.
LF-29	104	Former Army Landfill	Occupying 3 acres in the northern portion of the Base, site is located 300 ft north of Building 1001 and is surrounded by a 3-ft-high earthen berm. The former landfill is 400 ft by 350 ft. Operated from the 1950s to 1975, spent munitions and missiles were disposed at this site. Materials were also dumped outside of the berm approximately 200 ft south of the bermed area and consist primarily of construction debris.	Groundwater samples contained metals, VOCs, pesticides, and herbicides at concentrations less than action levels.	No further action was recommended for the site such that there is no risk to public health and environment. NMED recommended long-term monitoring for this site. LTM should include analysis of VOCs and SVOCs.
DP-30/ SD-33	113B	Grease Trap Disposal Pits	Disposal pits received waste from oil-water separators and grit chambers on the Base. Occasionally, the pits would accept sludge from vacuum trucks that were used to unclog sewer lines at the Primate Research Laboratory.	Groundwater samples contained metals, VOCs, gross alpha, gross beta, and pesticides at concentrations less than action levels.	No risk to public health and the environment. Long-term monitoring recommended for this site. LTM should include analysis of VOCs and metals.
SS-39	165, 177, 179, 181	Missile Fuel Spill Area	Approximately 3.5 miles northwest of main base area near Building 1176 and consists of two outfall areas located downslope from the oxidizer and propellant spill drain pipes and drainage troughs and sumps near the building. Facilities at site were involved in the fueling, detanking, and maintenance of test sleds. Fuels used at the site included UDMH, aniline, JP-4, IRFNA, IWFNA, liquid oxygen, dyes, and solid rocket propellants. Solvents used at the site included TCE.	VOCs were detected in groundwater at the site and in downgradient monitoring wells.	No risk to public health and environment. Long-term monitoring recommended for this site. LTM should include analysis of VOCs.
OT-44	AOC-P	Building 301 Aircraft Maintenance Hangar	Located south of Building 301, which was used for equipment maintenance. Petroleum hydrocarbons were observed floating on the water table during sewer line repair. The source of the petroleum is either from jet fuel spills or a leaking UST south of Building 301 that contained heating oil.	Contaminants at the site include TRPH, BTEX, and VOCs.	No risk to public health and environment. Long-term monitoring recommended for this site. LTM should include analysis of VOCs.

Table 3-1 Summary of Sites Included in the 2001 LTM Program

Site	SWMU	Location	Site History	Results of Investigations Prior to the LTM Program	Investigation Conclusions and Recommendations
SS-46	130	JP-4 Spill site	Underground fuel tank (25,000 gallons) installed in 1978 without containment located on the southeast side of Taxiway 4. Tank taken out of service in 1989 and removed in 1995.	TRPH, benzene, chlorobenzene, and toluene detected in groundwater samples.	No risk to public health and environment. No further action recommended for site. NMED recommended long-term monitoring as a condition for NFA at the site. LTM should include analysis of VOCs and dissolved lead.
SS-48	- -	Military Gas Station Grease Trap Disposal Pits	A military gas station that has been in operation for over 30 years (formerly referenced as Site 55). Releases from USTs have occurred at this site in the past. USTs that contained gasoline and diesel fuel were removed from this site in 1994. Disposal pits received waste from oil-water separators and grit chambers on the Base. Occasionally, the pits would accept sludge from vacuum trucks that were used to unclog sewer lines at the Primate Research Laboratory.	VOCs, including BTEX and solvents, and SVOCs were detected in groundwater at this site. Groundwater samples contained metals, VOCs, gross alpha, gross beta, and pesticides at concentrations less than action levels.	No risk to public health and environment. Long-term monitoring recommended for this site. No risk to public health and environment. Long-term monitoring recommended for this site. LTM should include analysis of VOCs and dissolved lead.
SS-56	- -	West Ramp Fuel Spill	A concrete pad approximately 2,100 ft by 600 ft that was used for parking and maintenance of airplanes. Suspected fuel contamination associated with past maintenance and spills investigated in 1991. Groundwater encountered 1 to 1.5 ft below ground surface.	Chromium, mercury, and BTEX were detected in groundwater samples. BTEX were detected at or below quantification limits. Metals did not exceed action levels.	No risk to public health and environment. Long-term monitoring recommended for this site. LTM should include analysis of VOCs and dissolved lead.

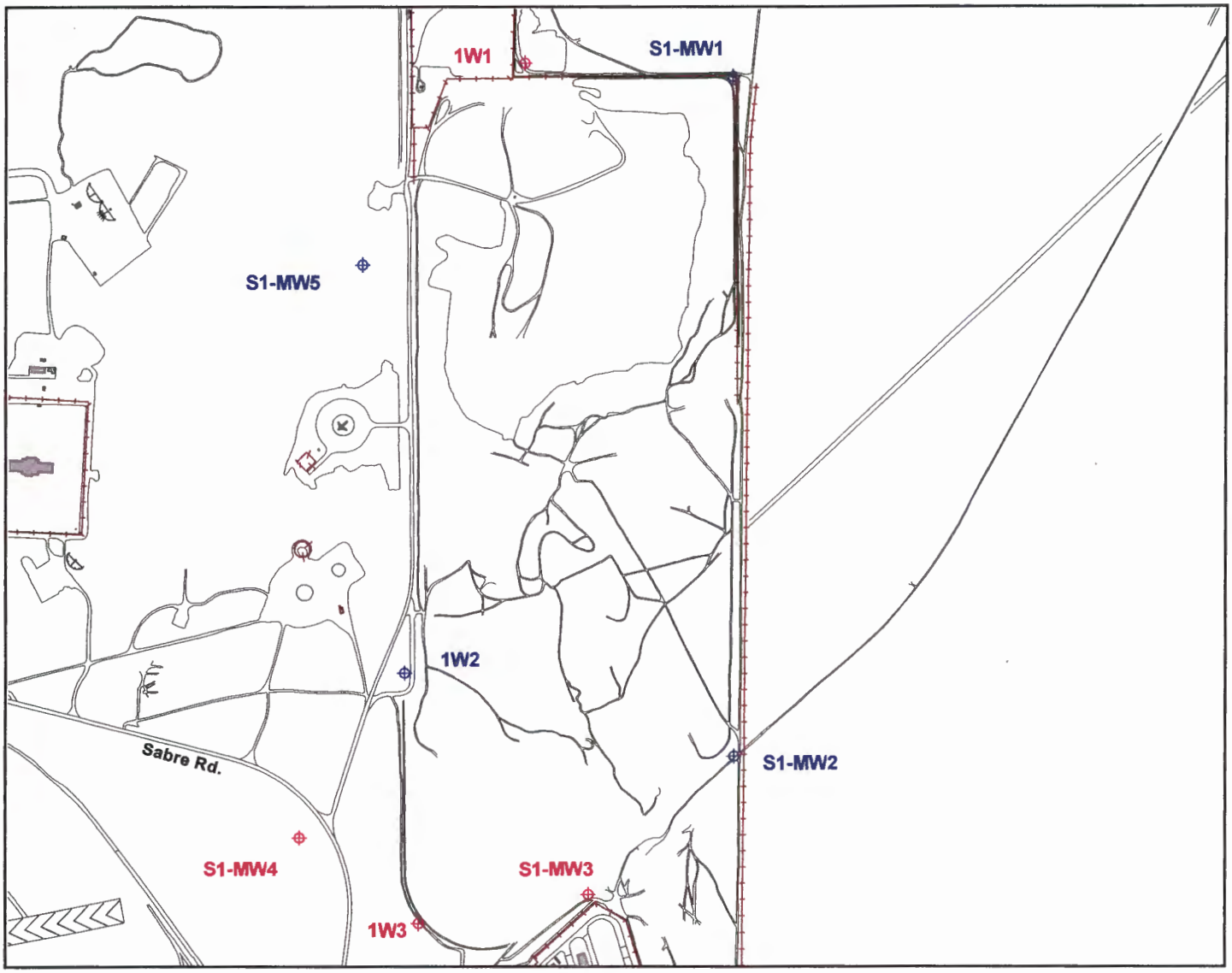
BTEX - Benzene, toluene, ethylbenzene, and xylenes
IRFNA - Inhibited red fuming nitric acid
IWFNA - Inhibited white fuming nitric acid
LTO - Long-term operations
NFA - No further action
NMED - New Mexico Environment Department
NMWQCC - New Mexico Water Quality Control Commission
POL - Petroleum, oil, and lubricants
RCRA - Resource Conservation and Recovery Act
SVOC - Semivolatile organic compound
TRPH - Total residual petroleum hydrocarbons
TCE - Trichloroethene
UDMH - Unsymmetrical dimethylhydrazine
UST - Underground Storage Tank
VOC - Volatile organic compound

Table 3-2. Sampling Summary for the 2001 LTM Program

		Sample Containers and Preservatives																
		VOCs 3 x 40 ml Septa, HCl, 4 degrees C						OCPs 1 x 1 L Glass, 4 degrees C	Herbicides 1 x 1 L Glass, 4 degrees C		Metals 2 x 500 mL Plastic, HNO_3, 4 degrees C (one bottle filtered and one unfiltered for mercury)								TDS 1 x 250 mL Plastic
Site	Well	All VOCs	1,2-Dichloro-ethane	Trichloro-ethene	Chloroform	Chloro-benzene	Methylene chloride	Lindane	4-Nitrophenol	Pichloram & MCPP	Arsenic	Barium	Chromium	Iron	Lead	Manganese	Mercury	Selenium	
LF-01	S1-MW1										■	■				■		■	2 samples analyzed for this site
	S1-MW2										■	■				■		■	
	S1-MW5										■	■				■		■	
	IW2										■	■				■		■	
LF-10	S10-MW2										■	■	■		■	■		■	2 samples analyzed for this site
	S10-MW3										■	■	■		■	■		■	
	S10-MW4										■	■	■		■	■		■	
	S10-MW6										■	■	■		■	■		■	
SD-08	MW-08-01		■								■	■		■	■	■			2 samples analyzed for this site
	MW-08-03		■								■	■		■	■	■			
	MW-08-04		■								■	■		■	■	■			
	MW-08-05		■								■	■		■	■	■			
LF-19	MW-19-01											■		■	■	■	■		2 samples analyzed for this site
	MW-19-02											■		■	■	■	■		
	MW-19-03											■		■	■	■	■		
LF-21	MW-21-01			■							■		■	■		■			2 samples analyzed for this site
	MW-21-02			■							■		■	■		■			
	MW-21-03			■							■		■	■		■			
	MW-21-04			■							■		■	■		■			
LF-22	MW-22-01									■	■	■		■	■	■		■	2 samples analyzed for this site
	MW-22-02									■	■	■		■	■	■		■	
	MW-22-03									■	■	■		■	■	■		■	
	MW-22-04									■	■	■		■	■	■		■	
LF-23	MW-23-01								■			■		■		■		■	2 samples analyzed for this site
	MW-23-02								■			■		■		■		■	
	MW-23-03								■			■		■		■		■	
	MW-23-04								■			■		■		■		■	
OT-44	S50-MW1	■																	2 samples analyzed for this site
	S50-MW2	■																	
	S50-MW3	■																	
	S50-MW6	■																	
SS-48	S55-MW2	■																	2 samples analyzed for this site
	S55-MW4	■																	
	S55-MW5	■																	
	S55-MW7	■																	
DP-30/ SD-33	MW-30/33-01	■									■	■		■				■	2 samples analyzed for this site
	MW-30/33-02	■									■	■		■				■	
	MW-30/33-03	■									■	■		■				■	
	MW-30/33-04	■									■	■		■				■	
SS-56	MW-56-01	■													■				2 samples analyzed for this site
	WCC-3	■													■				
	WCC-5	■													■				
SS-02/ SS-05	MW-02 & 05-03	■																	2 samples analyzed for this site
	MW-02 & 05-05	■																	
	MW-02 & 05-06	■																	
	MW-02 & 05-08	■																	
SS-46	MW-46-01	■													■				2 samples analyzed for this site
	MW-46-02	■													■				
	MW-46-03	■													■				
OT-16	118-MW1601			■	■	■	■												2 samples analyzed for this site
	118-MW1602			■	■	■	■	■											
	118-MW1603			■	■	■	■												
	118-MW1604			■	■	■	■												
SS-17	W-4	■																	2 samples analyzed for this site
	TH-22	■																	
	MW-BX-01	■																	
	MW-BX-02	■																	
SS-39	MW-39-01	■																	2 samples analyzed for this site
	MW-39-02	■																	
	MW-39-03	■																	
	MW-39-04	■																	
LF-29	MW-29-01	■																	2 samples analyzed for this site
	MW-29-06	■																	
	MW-29-07	■																	
	MW-29-08	■																	

Notes: Fifty percent of samples collected will be analyzed for total dissolved solids
Seven (7) wells will be sampled for field duplicates and ECB split samples.

C - Celsius
FD - Field duplicate sample
HCl - Hydrochloric acid
HNO_3 - Nitric acid
OCPs - Organochlorine pesticides
TDS - Total dissolved solids



NOTES:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

Magenta well symbols denote wells monitored for groundwater level only.

1000 0 1000 Feet

1 inch = 1000 ft

LEGEND

MONITORING WELL

ROAD

BUILDING

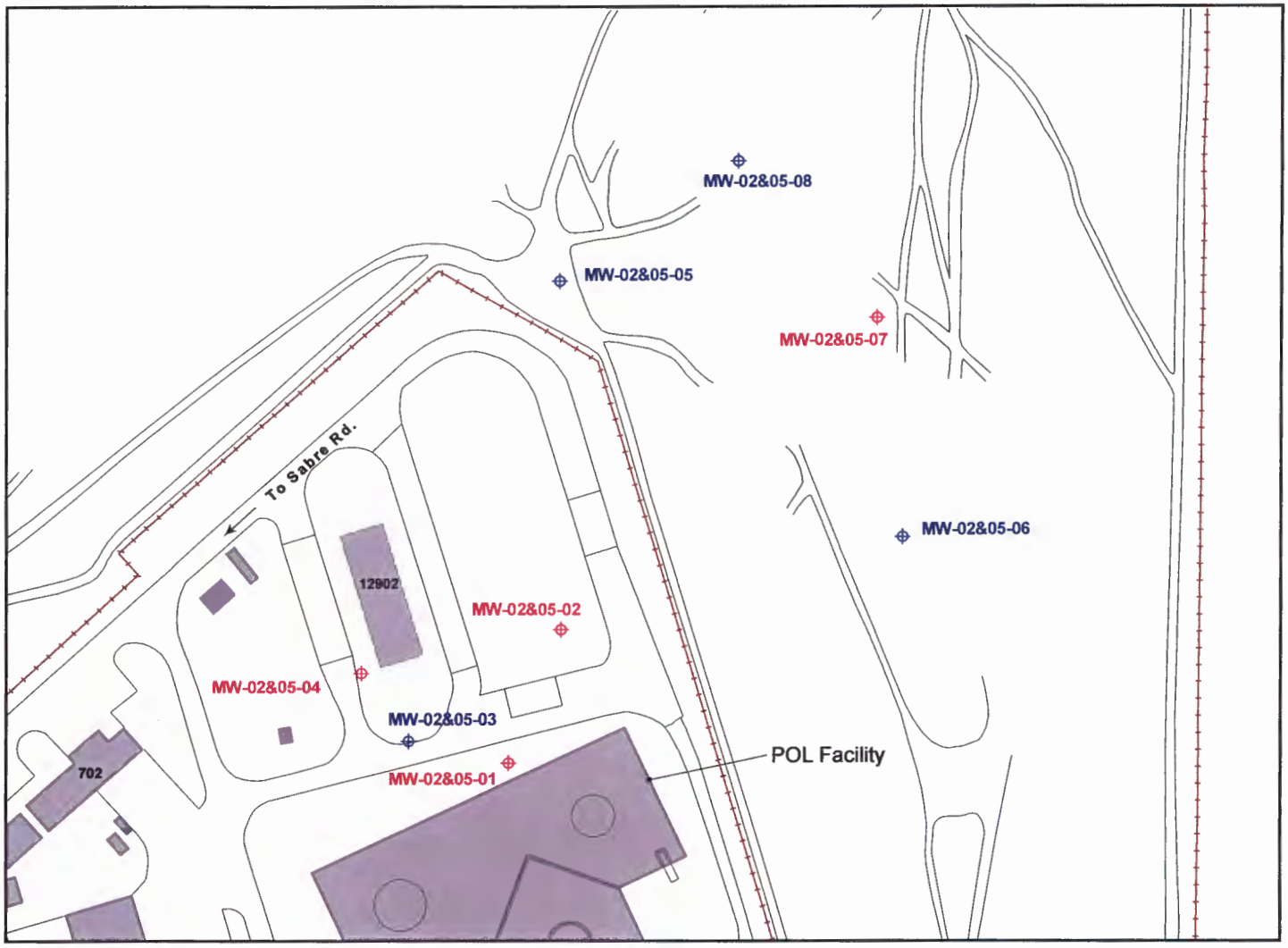
FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-1
SITE LOCATION MAP FOR LF-01

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTES:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

Magenta well symbols denote wells monitored for groundwater level only.

200 0 200 Feet

1 inch = 200 ft

LEGEND

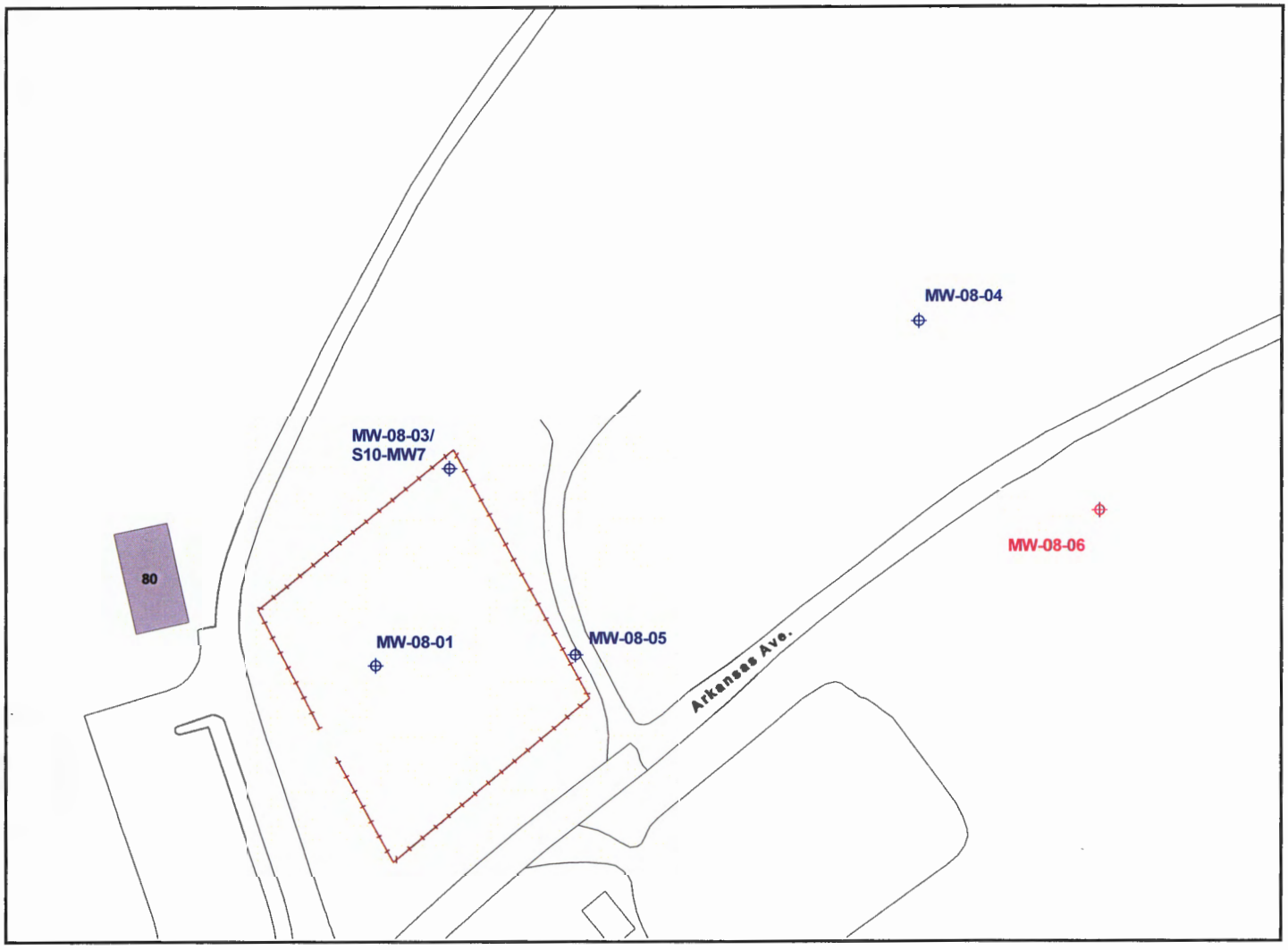
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-2
SITE LOCATION MAP FOR SS-02 AND SS-05

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTES:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

Magenta well symbols denote wells monitored for groundwater level only.

100 0 100 Feet

1 inch = 100 ft

LEGEND

MONITORING WELL

ROAD

BUILDING

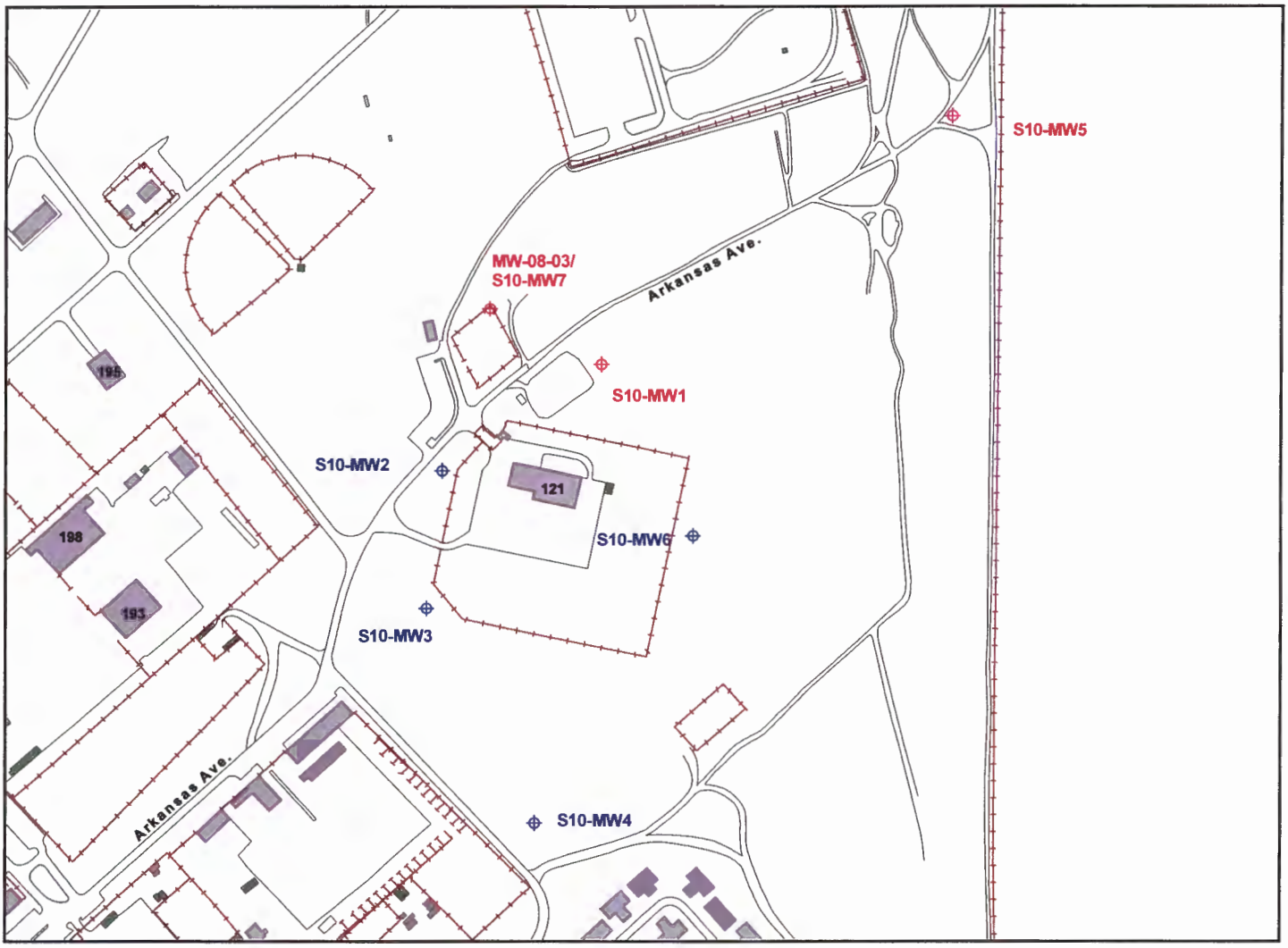
FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-3
SITE LOCATION MAP FOR SD-08

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTES:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

Magenta well symbols denote wells monitored for groundwater level only.

500 0 500 Feet

1 inch = 500 ft

LEGEND

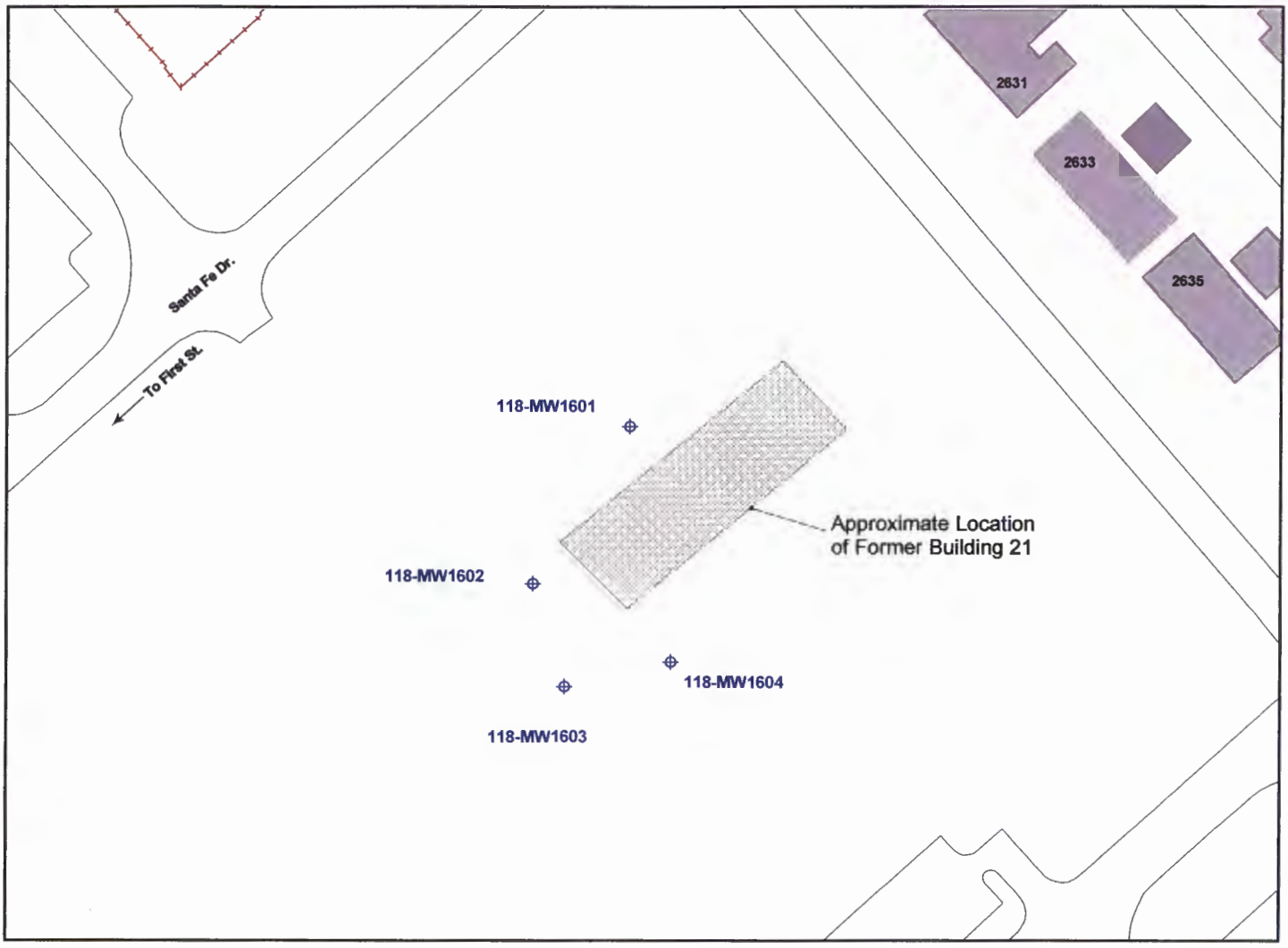
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-4
SITE LOCATION MAP FOR LF-10

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

100 0 100 Feet

1 inch = 100 ft

LEGEND

MONITORING WELL

ROAD

BUILDING

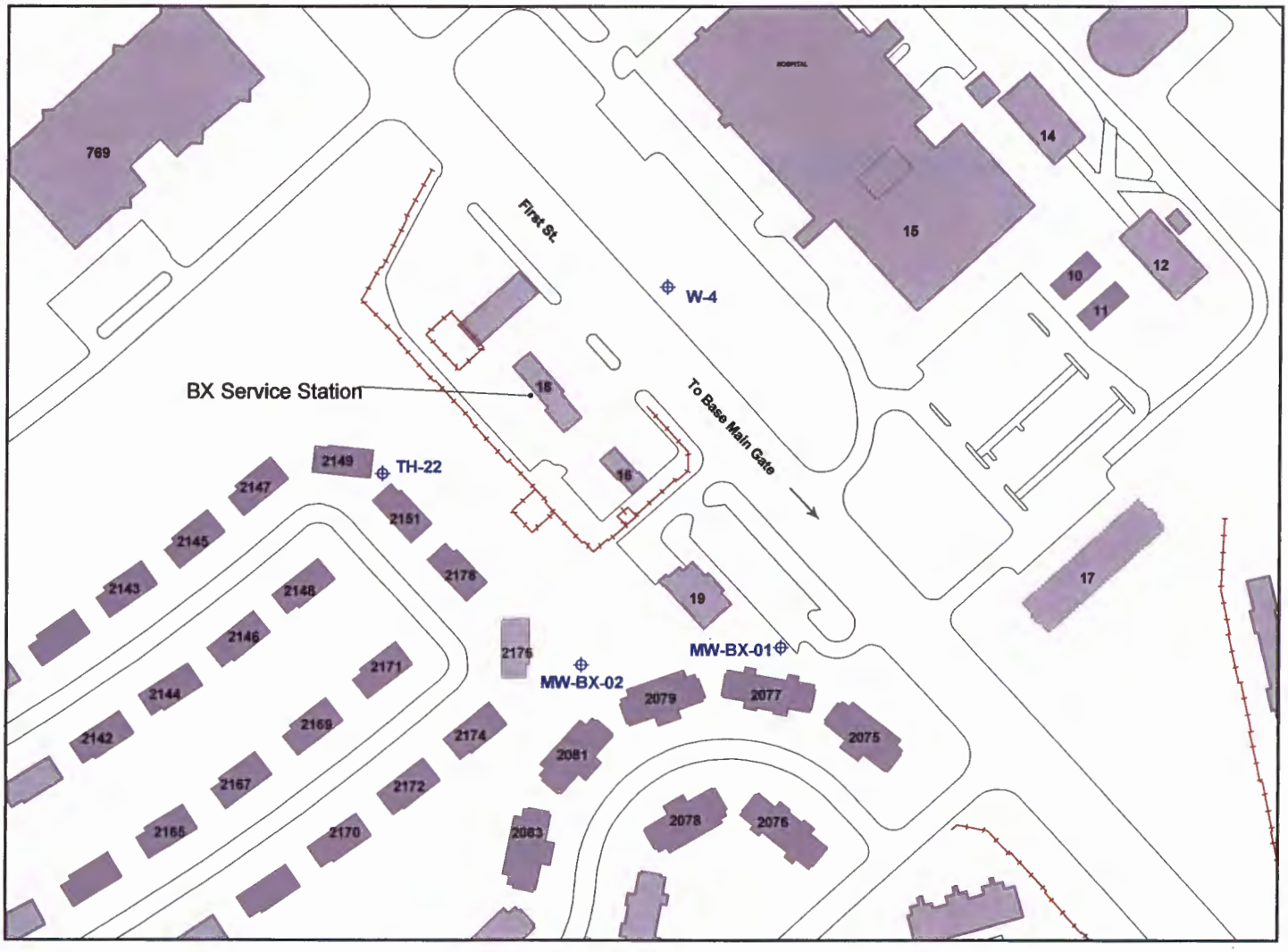
FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-5
SITE LOCATION MAP FOR OT-16

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

200 0 200 Feet

1 inch = 200 ft

LEGEND

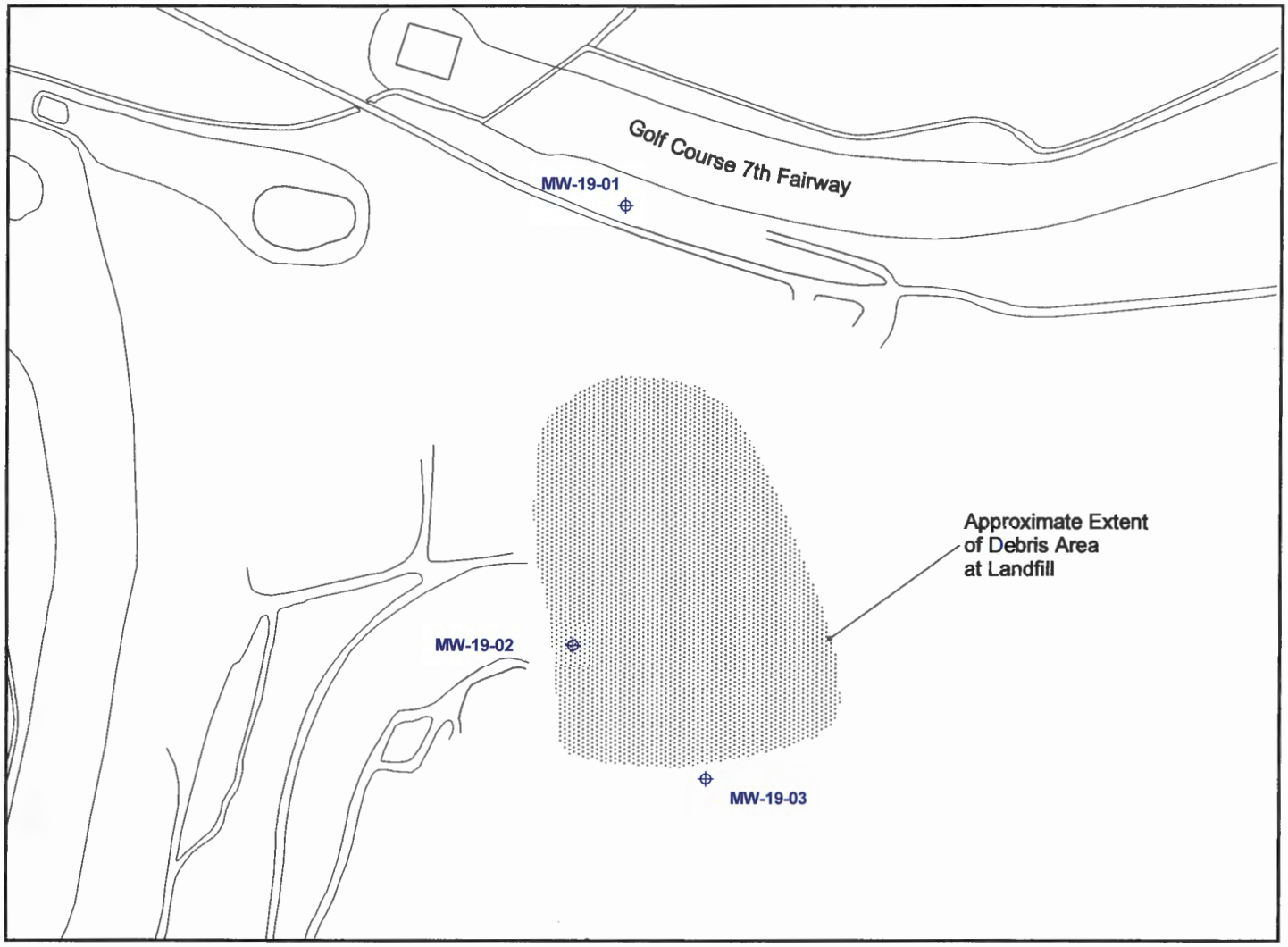
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-6
SS-17, BX SERVICE STATION

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

200 0 200 Feet

1 inch = 200 ft

LEGEND

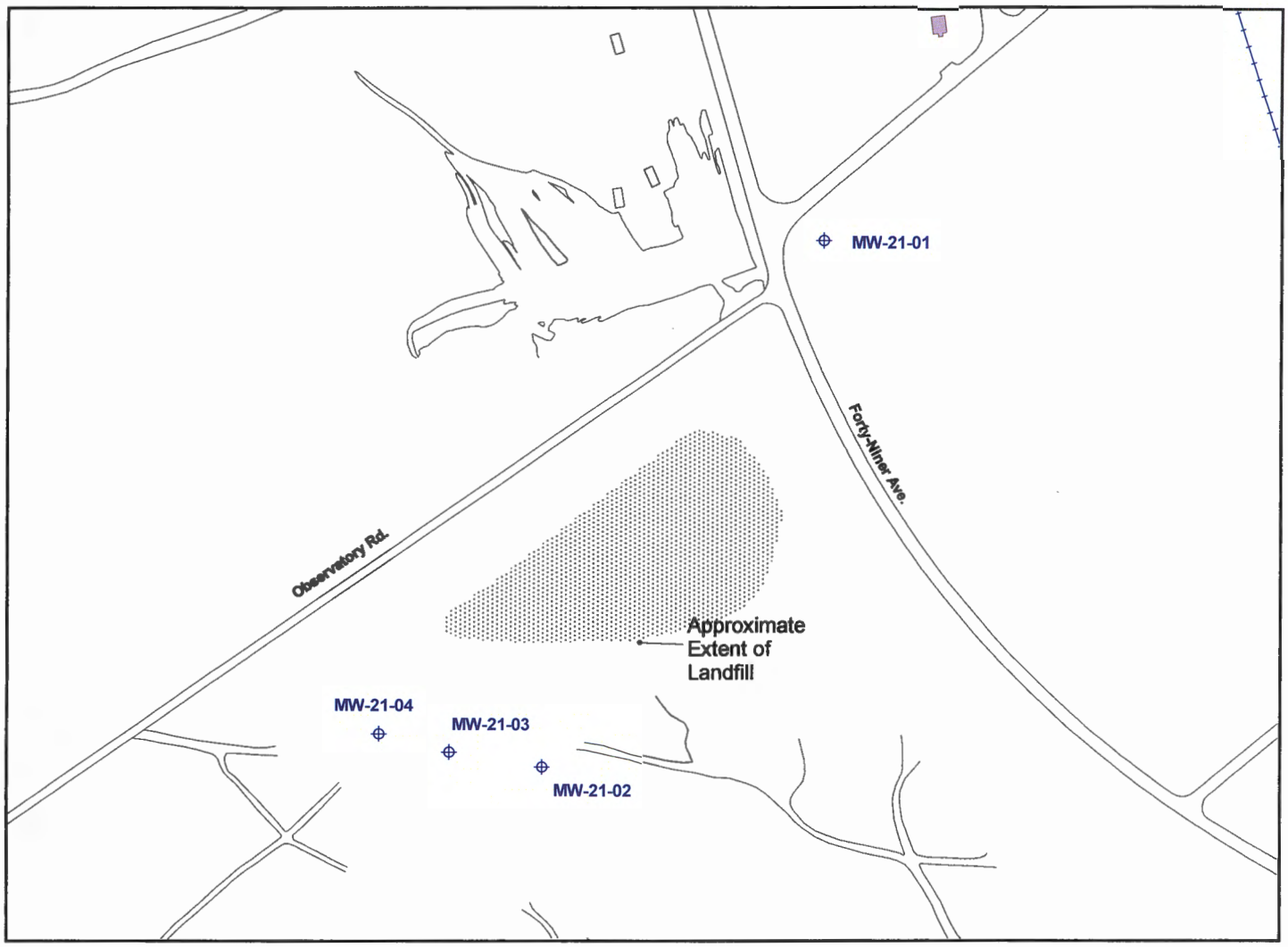
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-7
SITE LOCATION MAP FOR LF-19

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

300 0 300 Feet

1 inch = 300 ft

LEGEND

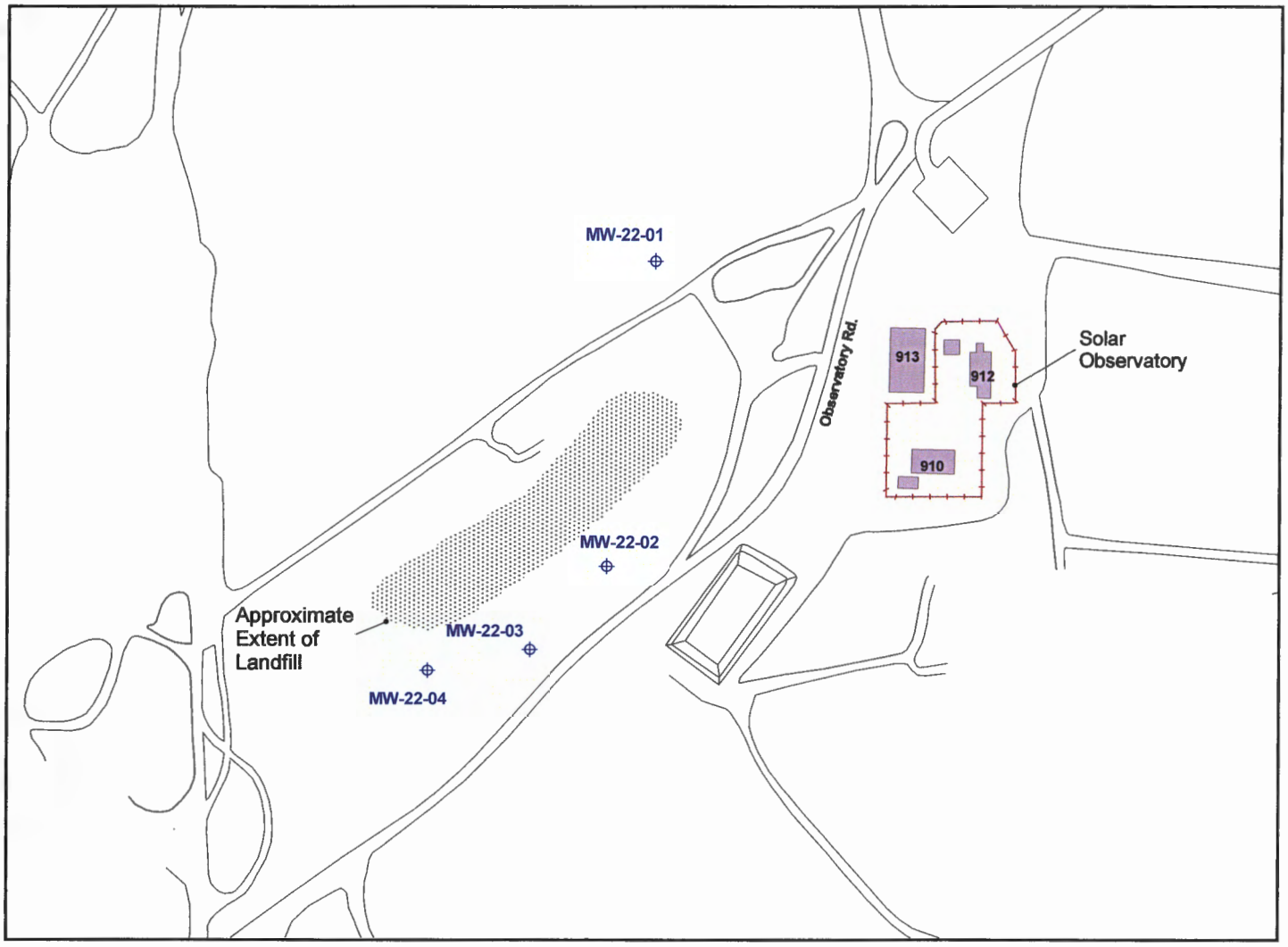
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-8
SITE LOCATION MAP FOR LF-21

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

200 0 200 Feet

1 inch = 200 ft

LEGEND

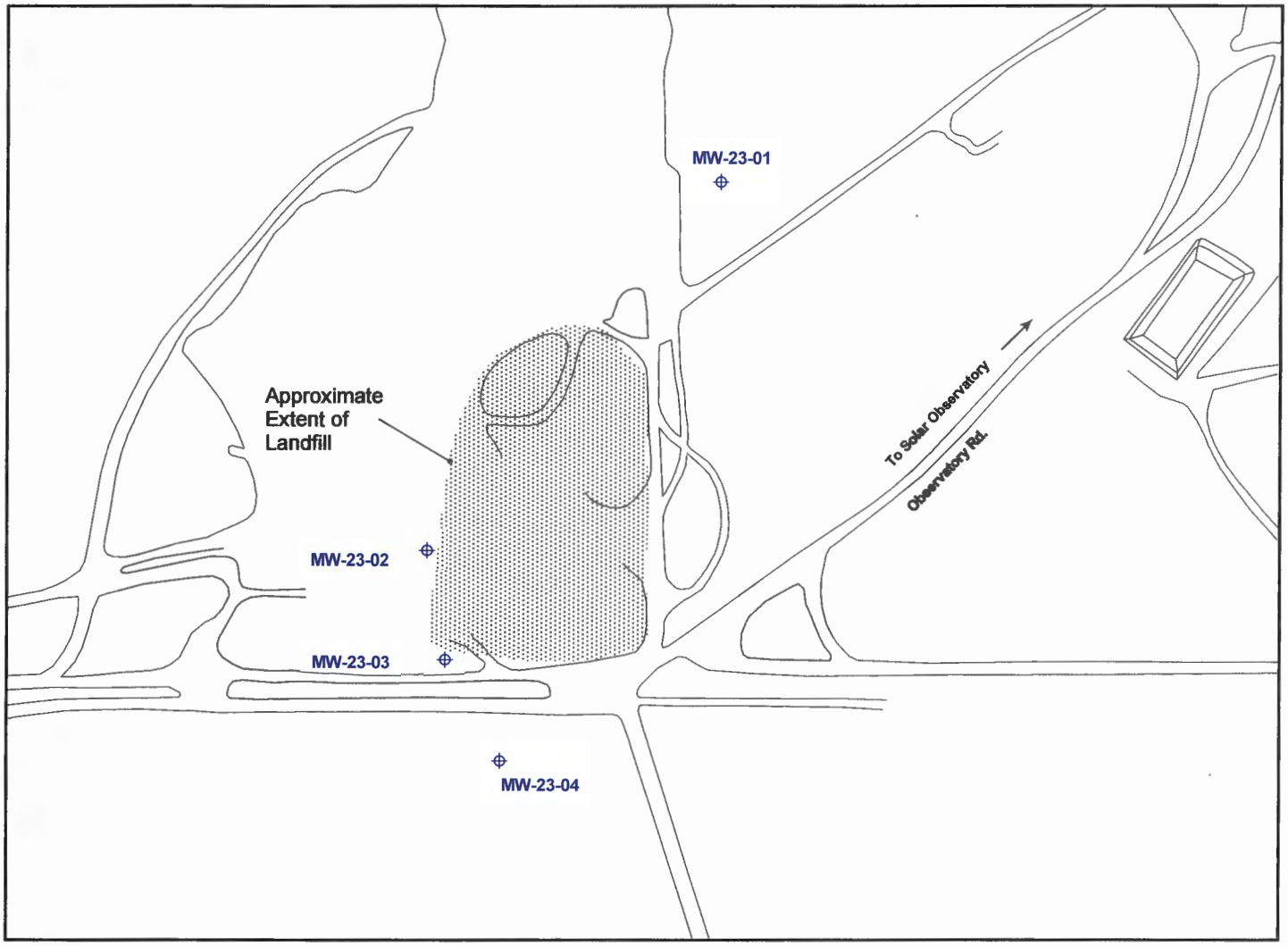
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-9
SITE LOCATION MAP FOR LF-22

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

200 0 200 Feet

1 inch = 200 ft

LEGEND

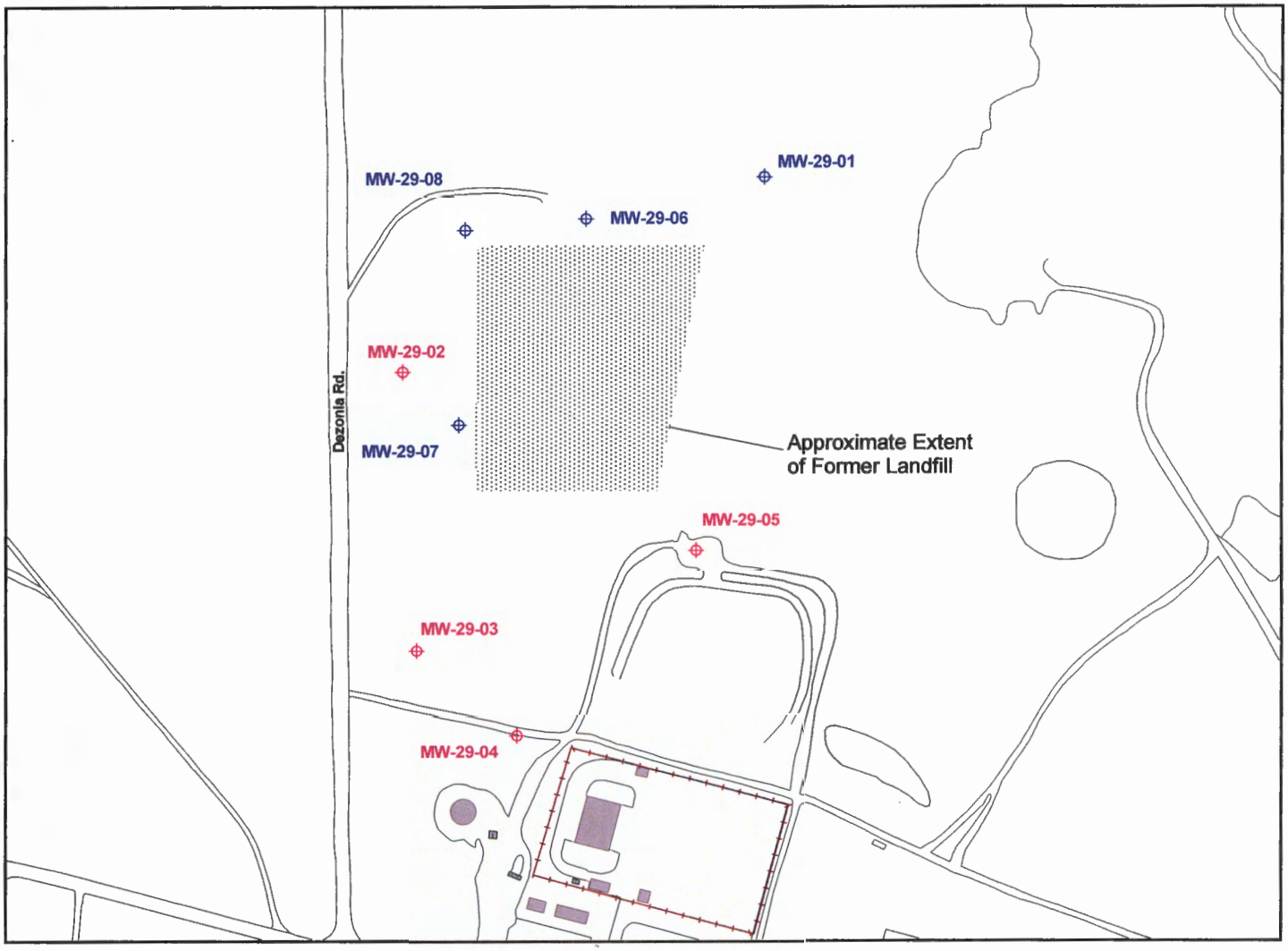
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-10
SITE LOCATION MAP FOR LF-23

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTES:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

Magenta well symbols denote wells monitored for groundwater level only.

Black well symbols denote wells that had no samples collected and no water level measurements taken.

300 0 300 Feet

1 inch = 300 ft

LEGEND

MONITORING WELL

ROAD

BUILDING

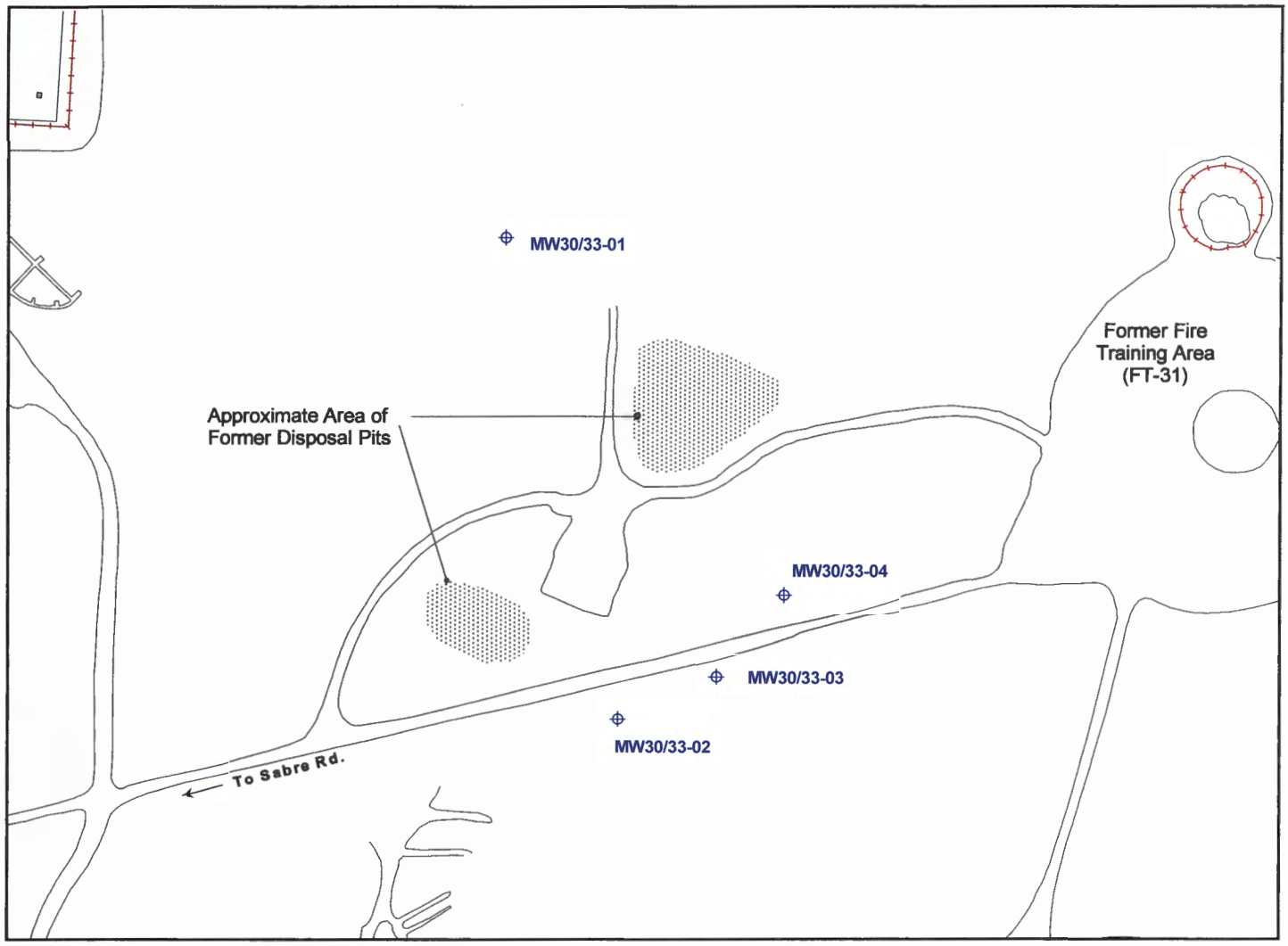
FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-11
LF-29, FORMER ARMY LANDFILL

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

200 0 200 Feet

1 inch = 200 ft

LEGEND

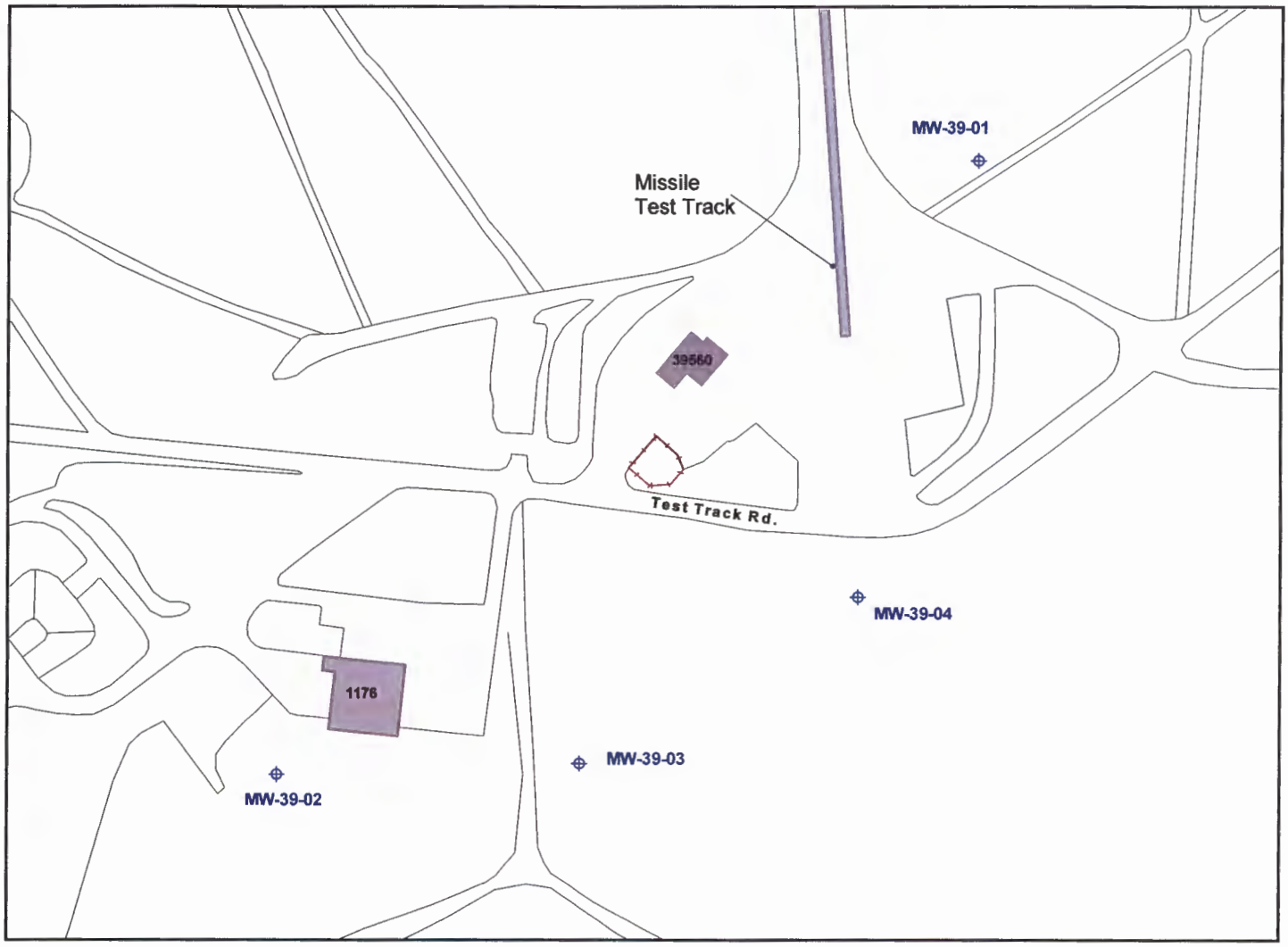
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-12
SITE LOCATION MAP FOR DP-30 AND SD-33

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

200 0 200 Feet

1 inch = 200 ft

LEGEND

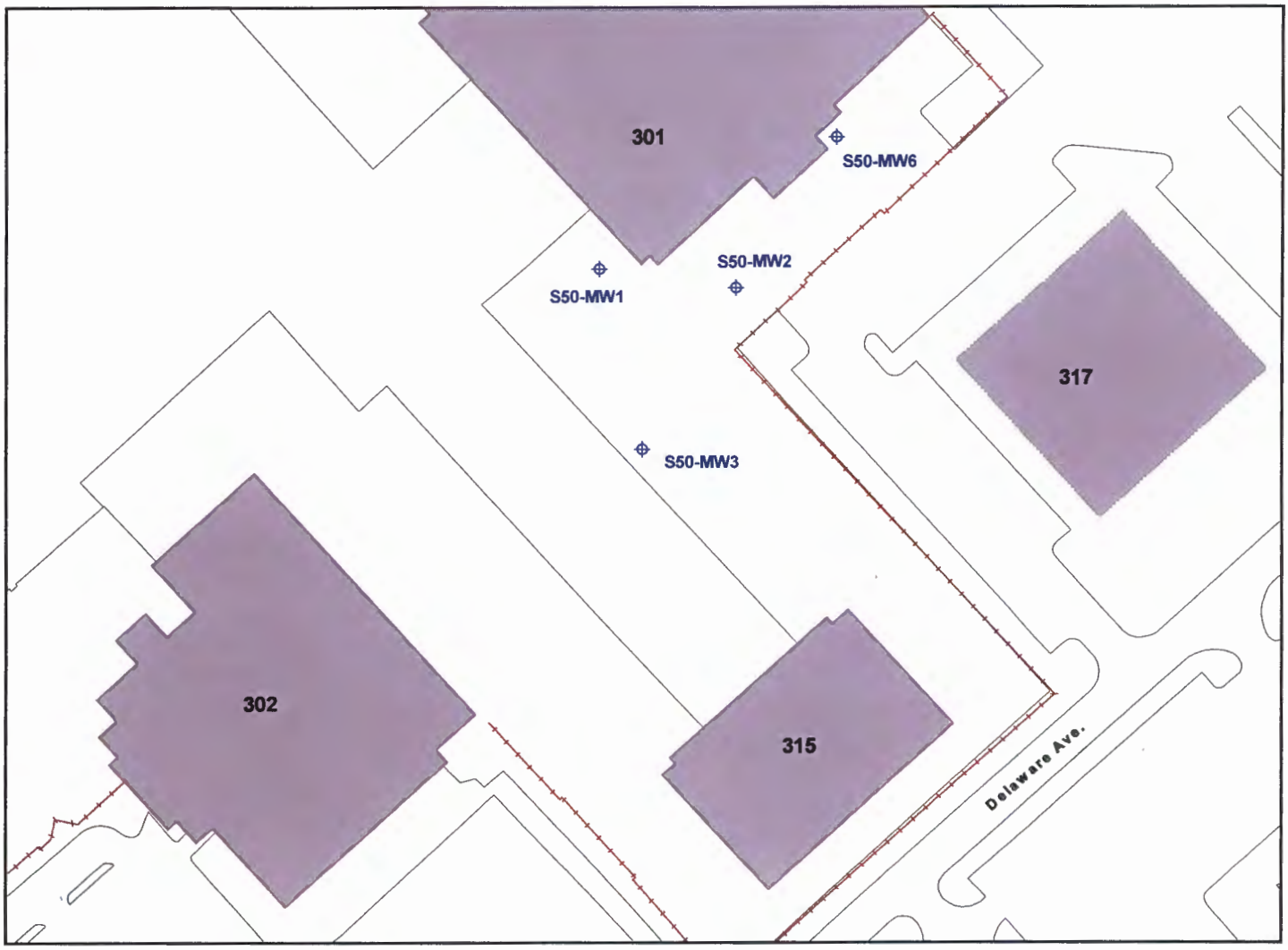
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-13
SS-39, MISSILE FUEL SPILL AREA

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

100 0 100 Feet

1 inch = 100 ft

LEGEND

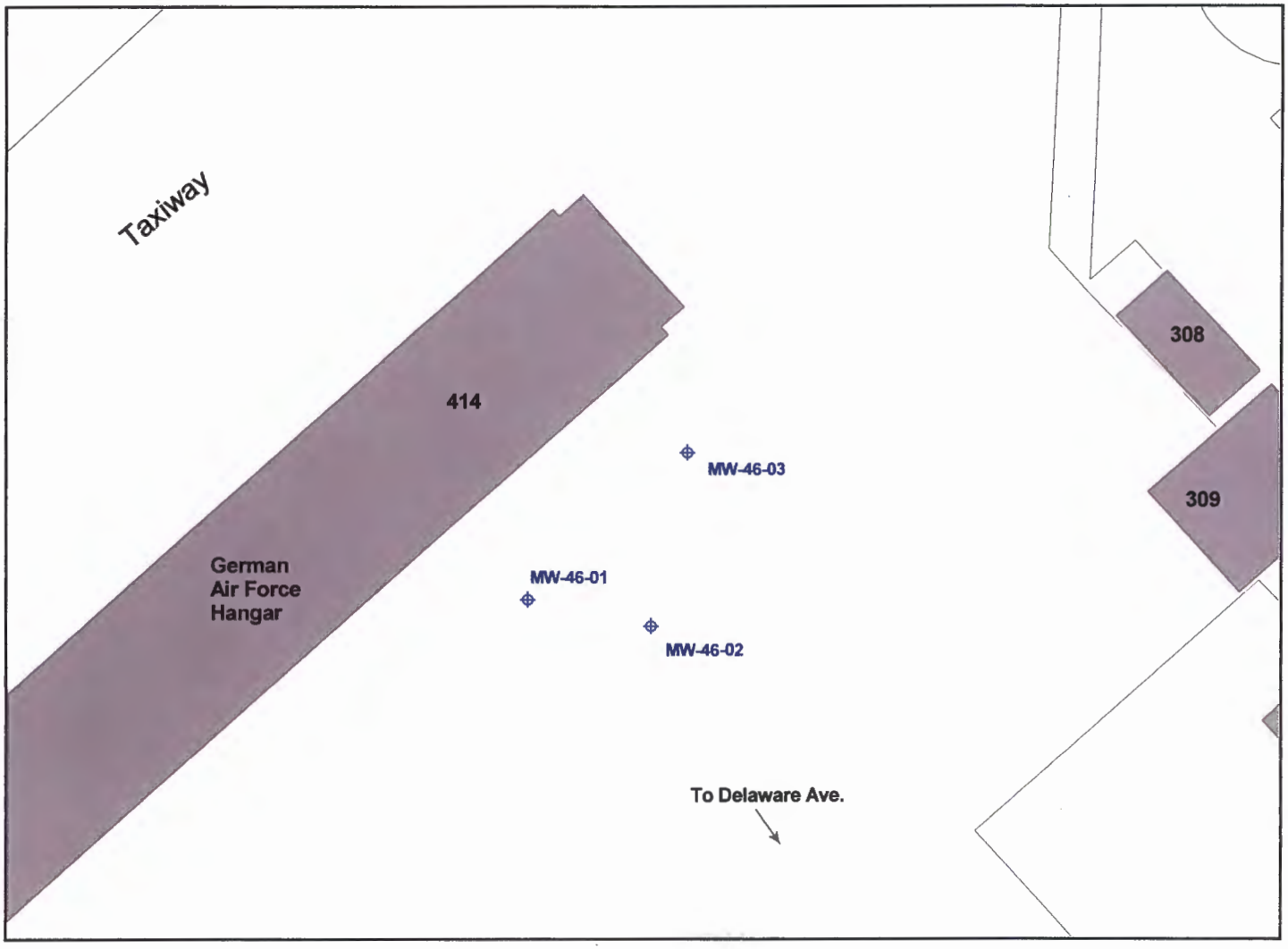
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-14
SITE LOCATION MAP FOR OT-44

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

100 0 100 Feet

1 inch = 100 ft

LEGEND

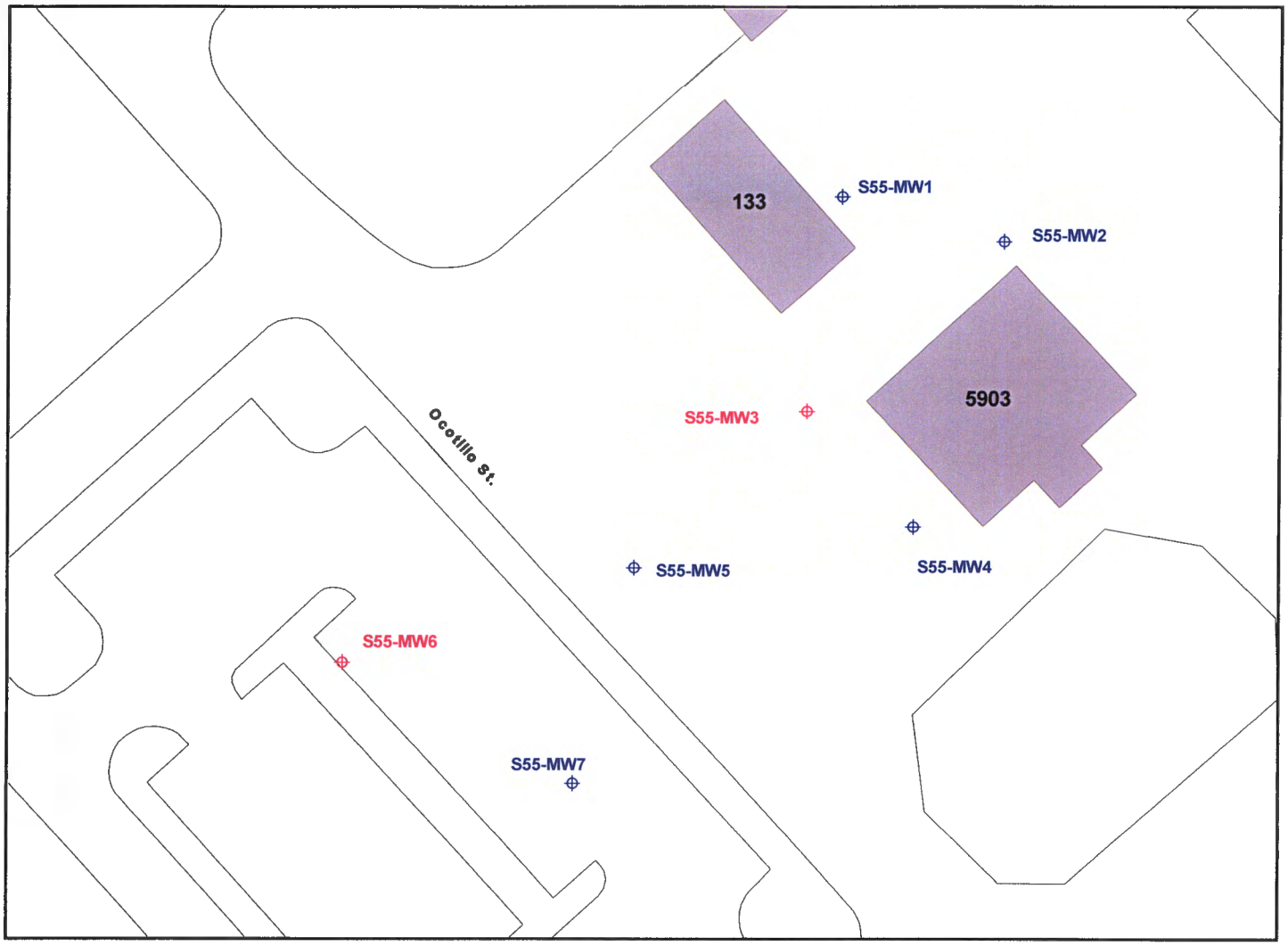
- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-15
SITE LOCATION MAP FOR SS-46

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTES:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

Magenta well symbols denote wells monitored for groundwater level only.

50 0 50 Feet

1 inch = 50 ft

LEGEND

MONITORING WELL

ROAD

BUILDING

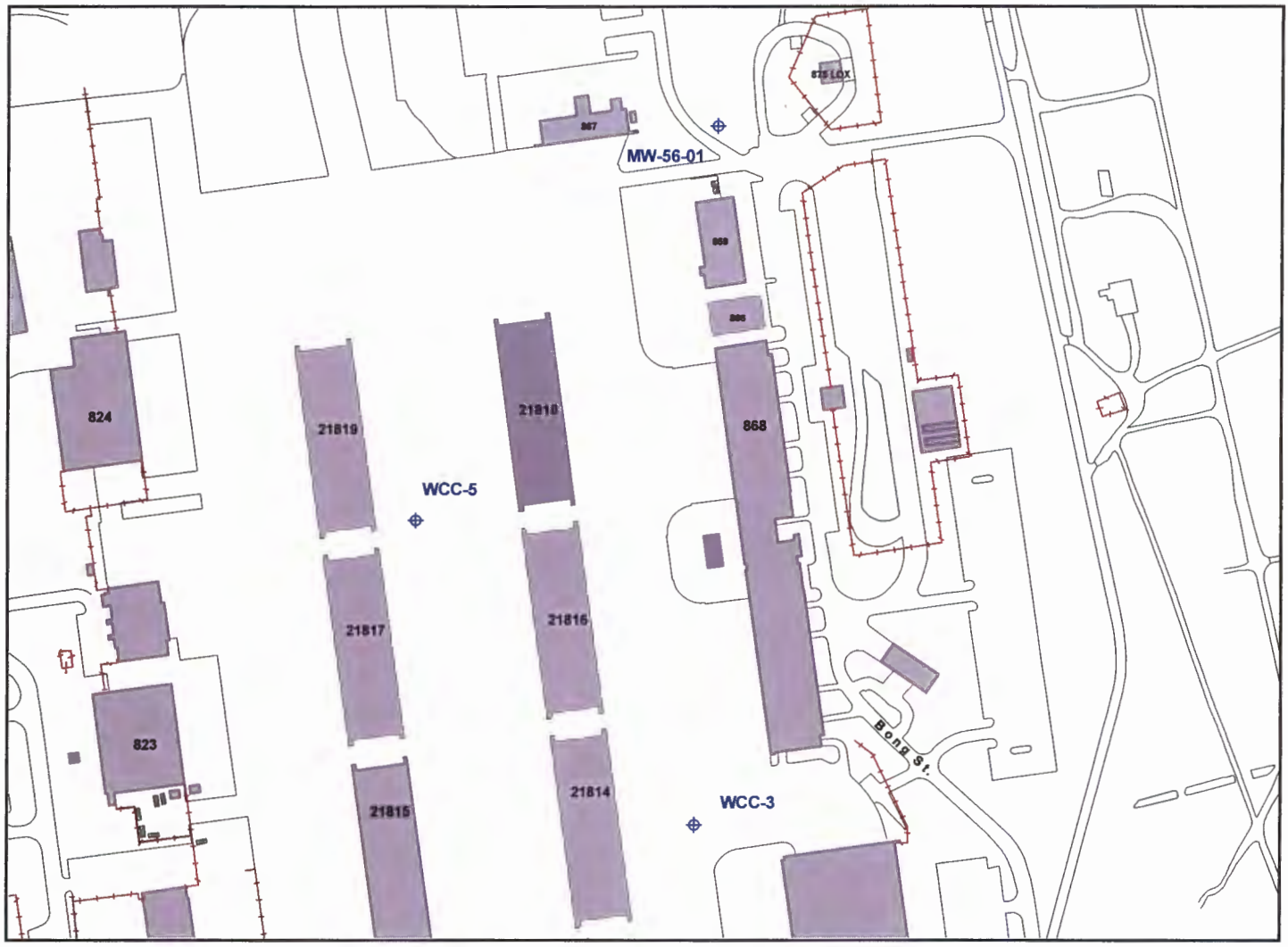
FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-16
SITE LOCATION MAP FOR SS-48

FOSTER WHEELER ENVIRONMENTAL CORPORATION



NOTE:

Blue well symbols denote wells monitored for both groundwater level and groundwater quality.

300 0 300 Feet

1 inch = 300 ft

LEGEND

- MONITORING WELL
- ROAD
- BUILDING
- FENCE

N

LONG-TERM GROUNDWATER MONITORING
HOLLOMAN AIR FORCE BASE, NEW MEXICO

FIGURE 3-17
SITE LOCATION MAP FOR SS-56

FOSTER WHEELER ENVIRONMENTAL CORPORATION

4.0 DATA EVALUATION AND REPORTING PROTOCOL

The analytical data from the 2001 LTM Program will be evaluated by comparing current data to site-specific historical data and New Mexico Water Quality Control Commission Standards. The results of the 2001 LTM Program data evaluation will be presented in a report with a format similar to the 1999 LTM Program report. The 2001 LTM Program report will provide site-specific evaluations on hydrology and water quality through the presentation of maps and tables summarizing hydrology and groundwater quality at each site. The data evaluation and reporting protocols are discussed in detail below.

4.1 DATA EVALUATION

To determine whether further action or additional investigation at any site is warranted, analytical results from the 2001 LTM Program will be reviewed for each sampling round. Because analytical data have only been collected biannually, and because some historical data date back to 1989, the initial round of sampling conducted in 1995 will be used to establish baseline conditions at each site. For sites that are added to the LTM Program subsequent to 1995 (Foster Wheeler Environmental/GTI, 1996), the 1997 (Foothills Engineering Consultants, Inc., 1998) LTM sampling events will be considered representative of baseline conditions for those sites.

Analytical results for individual sites from the 2001 LTM Program will be compared to site-specific baseline conditions, the results of the 1997 and 1999 sampling events, and NMWQCC standards. If significant changes in water quality, such as anomalous detections where there were previously none or an order of magnitude change based on historical results, are indicated by an increase in concentration, confirmation samples will be collected from the affected monitoring wells within a two-month period to substantiate the analytical results. Groundwater confirmation samples will only be analyzed for the parameters that indicate a significant increase for a chemical of concern. If there are wells that are not included in the LTM Program, but may be impacted by a chemical of concern, these wells will be considered for inclusion in the confirmation sampling. Plans for confirmation sampling will be submitted to Holloman AFB and USACE for approval through use of FCRs. In the event that confirmation sampling indicates that a significant increase has occurred, Holloman AFB and USACE will be notified for guidance on further action under this program relative to the regulatory requirements.

4.2 PROJECT REPORTING

Following each round of sampling within the LTM Program, draft and final groundwater sampling reports will be prepared. The report will discuss significant exceedances and provide a comparison of results to the previously reported conditions for each site. Potentiometric surface maps will be prepared for each

site based on the water level measurements taken at each site during the sampling program. When possible, information will be provided in tabular format similar to the 1999 LTM report in order to provide easy comparison between sampling rounds within the current and subsequent reports.

The purpose of this Work Plan is to not only present the background information and project-specific procedures necessary to assess groundwater quality, but also to provide recommendations for future long-term groundwater monitoring at Holloman AFB. The outcome of the data evaluation will provide a basis for recommendations for future monitoring under the LTM. Any recommendation made in the LTM report to either discontinue the monitoring of a site or revise the analytical requirements at a site will be supported by the data evaluation results and discussed in the report.

5.0 REFERENCES

Foothill Engineering Consultants, Inc.
1998. Final Report for the 1997 Long-term Groundwater Monitoring Program, Holloman Air Force Base, New Mexico, February.

Foster Wheeler Environmental (Foster Wheeler Environmental Corporation)
2000. Final 1999 Long-Term Groundwater Monitoring Report. Holloman Air Force Base. June.

1999. Final Chemical Data Acquisition Plan Long-Term Monitoring Program. Holloman Air Force Base. September.

Foster Wheeler Environmental/GTI (Foster Wheeler Environmental Corporation/Groundwater Technology, Inc.)
1996. Draft Final 1995 Long-Term Groundwater Monitoring Program, Holloman Air Force Base, New Mexico, June.

Radian
1993. Waste Management Plan for RCRA Facility Investigation at Holloman Air Force Base. Table 2, Phase 1 RFI. October.

USACE (U.S. Army Corps of Engineers)
1996. General Chemistry Supplement to the Scope of Services, Omaha District.

1992. General Geology Supplement to the Scope of Services, Omaha District.

Appendix A

Standard Operating Procedures

APPENDIX A -- Standard Operating Procedures (SOPs)

A-1 Documentation, Sample Handling, Chain-of-Custody, and Shipping

A-2 Sampling Equipment Decontamination

A-3 Groundwater Sampling From Monitoring Wells for Chemical Analysis

A-4 Calibration Procedures for Field Equipment

A-5 Field Management of Investigation-Derived Waste (IDW)

SOP A-1
DOCUMENTATION, SAMPLE HANDLING, CHAIN-OF-CUSTODY, AND SHIPPING

1.0 OBJECTIVE

This SOP contains specific details concerning sample control, documentation, and transportation procedures.

2.0 EQUIPMENT AND MATERIAL

The following equipment will be necessary to complete sample documentation, handling, and shipment:

Forms and Records

- Log books;
- Chain-of-custody forms;
- Custody seals;
- Sample identification labels; and
- Daily Quality Control Report (DQCR) (Appendix B).

Shipping Supplies

- Clear tape;
- Rigid plastic coolers;
- Strapping tape;
- "This Side Up" arrow labels;
- Address labels;
- Heavy-duty plastic trash bags and ties;

- Small and large resealable plastic bags;
- Protective mesh for various sample bottle sizes;
- Absorbent material for packing samples; and
- Ice.

3.0 METHODOLOGY

Sample control and documentation are necessary to ensure the defensibility of data and to verify the quality and quantity of work performed in the field. Accountable documents include field log books, instrument calibration log books, sample logs, correspondence, sample labels, chain-of-custody forms, photographs, and analytical records. All information pertinent to a field activity must be entered into a log book, including uncompleted work.

3.1 Sample Control and Documentation

All log books should be numbered and are to be bound with consecutively numbered pages; log book pages and data should never be removed. Loose-leaf forms, sample logs, and figures used for sample location will be kept in a 3-ring binder. Indelible black ink will be used for recording all data. At minimum, the following data should be recorded during the course of the investigation:

- Date, field observations, and weather conditions, including any unusual circumstances;
- Calibration of field equipment before sample analysis;
- Names of field crew members;
- Name of the sample collector;
- Identification of sampling location and depth of sample;
- Rough sketch of sampling location related to significant physical objects;
- Depth to water at groundwater sampling locations;
- Purge method and purge volume;
- Sample collection method;
- Types and numbers of sample containers used;
- Preservatives used;
- Results of field analysis; and
- Sample observations (color, turbidity, odor, soil type, etc.).

To change an incorrect entry, draw a line through the entry, write the change above or

adjacent to the entry, and date and initial the change. If anyone other than the person to whom a log book is assigned makes an entry, that person should date and sign the entry. All project log books are to be turned over to the document control officer at the end of each work period and to a central file at the end of the field activity.

The field team leader will complete DQCRs (Appendix B) at the end of each day. The completed reports will be sent weekly to the USACE-Project Manager and Base Environmental Coordinator.

3.2 Sample Labeling

In addition to the field log book, a complete sample label should be filled out for each sample.

All sample containers should be sealed immediately after sample collection. Samplers should place the completed sample label onto the sample container and secure it with clear tape. Sample labels must identify the sample identification (ID), site, sample type, sampler's initials, sampling location, depth, time, date, analyses requested, laboratory, containers, and any special instructions. Labels should be completed with black waterproof ink.

3.3 Sample Control/Chain-of-Custody/Shipment

Once the samples have been collected and labeled, they should be kept cool with ice or in a refrigerator. The following procedures are for sample handling and shipment to a laboratory for analysis:

A) A separate chain-of-custody form and shipping container (cooler) will be used for each site.

B) Fill out a chain-of-custody form for every sample shipping container (cooler). Information recorded on this form includes the following:

- Samples collected and corresponding laboratory analyses;
- Time and date of sample;

- Sample number;
- Type of sample;
- Sampler's initials;
- Preservatives used;
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis;
- Relinquisher's signature, date, and time; and
- Special instructions.

C) Double check the information on the chain-of-custody form against the sample labels and sample logs. Make sure each sample is accounted for and that samples are being sent to the correct laboratory.

D) Wipe the sample container exteriors clean with a paper towel dampened with clean water.

E) Ensure that each container has a properly completed label.

F) Place the sample containers in resealable plastic bags. Containers from the same sample location and depth can be placed in the same bag, but separate samples from different sites will not be placed in the same bag to prevent cross-contamination. Sufficient packing material will be wrapped-around any glass containers placed in the same plastic bags to minimize potential for breakage.

G) Place the sample container(s) in a cooler lined with a large plastic garbage bag.

H) Pack the container(s) with ample amounts of packing material to prevent possible breakage and absorb liquid material released should breakage occur. This material should be place under the container(s) and between all containers for multiple container shipments to prevent the containers from touching each other or the bottom of the shipping container.

I) Place ice among the sample containers to maintain the samples at or below 4°C during transport.

J) Add any needed absorbent to fill all void spaces.

K) Seal the completed chain-of-custody form for the appropriate cooler in a resealable plastic bag and tape it to the inside of the top lid of the cooler. The sample custodian should retain the pink copy of the form and maintain it in a file of field documentation.

L) Securely close the outer shipping container with strapping tape around both ends. If there is a drain on the cooler, tape it shut.

M) Affix signed and dated custody seals to all closures on the shipping container to prevent tampering.

N) Place a piece of clear tape over the custody seals to prevent tearing during shipping.

O) Affix "This Side Up" arrows on two opposing sides of the cooler. No Department of Transportation (DOT) placards are required.

Compliance with all applicable DOT and International Air Transport Association (IATA) shipping regulations is required.

4.0 COMMENTS

- To expedite the sampling and shipping process, it is recommended that preprinted sample labels, chain-of-custody forms, address labels, and overnight delivery forms be used.
- If using a refrigerator to store sample, monitor the temperature using a thermometer and be careful not to freeze water samples.

GTEL ENVIRONMENTAL LABORATORIES, INC

4211 MAY AVE.
WICHITA, KS 67209
(316) 945-2624
(800) 633-7936

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

50938

Company Name: Phone #:

FAX #:

Company Address: Site Location:

Project Manager: Client Project ID: (#)

(NAME)

I attest that the proper field sampling procedures were used during the collection of these samples. Sampler Name (Print):

Field Sample ID	GTEL Lab # (Lab Use only)	# CONTAINERS	Matrix: WATER	SOIL	AIR	SLUDGE	PRODUCT	OTHER	Method Preserved: HCl	HNO_3	H_2SO_4	ICE	UNPRESERVED	OTHER (Specify)	Sampling: DATE	TIME

ANALYSIS REQUEST | OTHER

BTEX 602 ☐ 8020 ☐ with MTBE ☐ | BTEX/Gas Hydrocarbons PID/FID ☐ with MTBE ☐ | Hydrocarbons GC/FID Gas ☐ Diesel ☐ Screen ☐ | Hydrocarbon Profile (SIMDIS) ☐ | Oil and Grease 413.1 ☐ 413.2 ☐ SM-503 ☐ | TPH/IR 418.1 ☐ SM 503 ☐ | EDB by 504 ☐ DBCP by 504 ☐ | EPA 503.1 ☐ EPA 502.2 ☐ | EPA 601 ☐ EPA 8010 ☐ | EPA 602 ☐ EPA 8020 ☐ | EPA 608 ☐ 8080 ☐ PCB only ☐ | EPA 624/PPL ☐ 8240/TAL ☐ NBS (+15) ☐ | EPA 625/PPL ☐ 8270/TAL ☐ NBS (+25) ☐ | EPA 610 ☐ 8310 ☐ | EP TOX Metals ☐ Pesticides ☐ Herbicides ☐ | TCLP Metals ☐ VOA ☐ Semi-VOA ☐ Pest ☐ Herb ☐ | EPA Metals - Priority Pollutant ☐ TAL ☐ RCRA ☐ | CAM Metals TTLC ☐ STLC ☐ | Lead 239.2 ☐ 200.7 ☐ 7420 ☐ 7421 ☐ 6010 ☐ | Organic Lead ☐ | Corrosivity ☐ Flash Point ☐ Reactivity ☐

TAT
Priority (24 hr) ☐
Expedited (48 hr) ☐
7 Business Days ☐
Other_____
Business Days ☐

Special Handling
GTEL Contact _____
Quote/Contract # _____
Confirmation # _____
P.O. # _____

QA/QC Level
Blue ☐ CLP ☐ Other ☐ _____

SPECIAL DETECTION LIMITS

SPECIAL REPORTING REQUIREMENTS

FAX ☐

REMARKS:

Lab Use Only Lot #: Storage Location

Work Order #:

CUSTODY RECORD

	Date	Time	
Relinquished by Sampler:			Received by:
Relinquished by:			Received by:
Relinquished by:			Received by Laboratory: Waybill #

SOP A-2
SAMPLING EQUIPMENT DECONTAMINATION

1.0 OBJECTIVE

Decontamination of sampling tools is performed as a QA measure and safety precaution. It helps prevent cross-contamination among samples and helps maintain a clean working environment for the safety of field personnel. The methodology for decontamination was prepared in accordance with the following documents:

EPA. 1991. *Environmental Compliance Branch, Standard Operating Procedures and Quality Assurance Manual* (SOPQAM), U.S. Environmental Protection Agency, Region IV, Environmental Services Division, Athens, Georgia.

NIOSH, OSHA, USCG, and EPA. 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.* Prepared by the National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), U.S. Coast Guard (USCG), and Environmental Protection Agency (EPA). U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, NIOSH report, October 1985. Washington, D.C.: U.S. Government Printing Office.

2.0 EQUIPMENT AND MATERIAL NEEDS

- Soap: Laboratory grade, non-phosphated - or equivalent;
- Tap water;
- Reagent-grade water;
- Pesticide-grade isopropanol (only to be used where LPH is encountered);
- Cleaning brushes;
- Cleaning containers: plastic bucket and galvanized steel pans;
- Waste containers as outlined in Appendix C and A-5; and
- Health and safety equipment as outlined in the Site Safety and Health Plan (SSHP).

3.0 METHODOLOGY

Small, reusable equipment, including sampling equipment, is mainly decontaminated by rinsing with liquids that include soap or detergent solutions, tap water, deionized water, or solvents. Following decontamination, if the equipment is not to be reused immediately, it will be stored, protected from recontamination by wrapping in aluminum foil, and appropriately rinsed before the next use.

3.1 Pre-Sampling Decontamination Activities

A) Don the appropriate PPE, as specified in the SSHP and as required for the specific work area.

B) Assemble containers and equipment for decontamination, designing the decontamination station in such a manner as to prevent liquid from spilling onto the ground.

C) Decontaminate all new equipment or equipment not previously decontaminated before use.

D) If the protective wrapping on a piece of precleaned equipment has been torn, or if there is any question about its cleanliness, the equipment should be considered contaminated and undergo the full decontamination procedures before it is used.

3.2 Decontaminating Sampling Procedure

A) Remove any solid particles form the equipment or material by brushing and rinsing with available potable water. This will remove gross contamination.

B) Wash equipment with a brush and a phosphate-free detergent solution.

C) Rinse equipment thoroughly with potable water.

D) Double rinse the equipment with reagent-grade water.

E) Allow equipment to air dry thoroughly. If there is not enough time to air dry complete, the equipment should be rinsed with copious (minimum of three [3] rinses) amounts of reagent water. Equipment may then be reused immediately.

F) Unless the equipment is going to be used immediately, it must be wrapped in new aluminum foil, shiny side out, to keep it clean until needed. For large bulky equipment, new visqueen can be substituted for the aluminum foil.

4.0 COMMENTS

- Any field equipment not used during a field activity must be decontaminated before its return to the equipment stock for reuse at another site. This requirement applies even if the aluminum foil on precleaned equipment is not torn. This requirement can be waived only if after initial decontamination, the equipment was sealed in plastic.
- At each phase of the decontamination process, decontamination fluids and rinsates should be collected and managed as outlined in Appendix C and SOP A-5 (Field Management of Investigation-Derived Waste).
- Isopropanol rinse should be omitted for any equipment such as plastic well-sounding tapes.
- Solvents should not be used on any type of non-Teflon® plastic equipment that will contact an environmental sample or be introduced into a monitoring well.

SOP A-3

GROUNDWATER SAMPLING FROM MONITORING WELLS FOR CHEMICAL ANALYSIS

1.0 OBJECTIVE

This SOP outlines the methods used for conducting groundwater sampling. These procedures will be followed to ensure that samples collected from monitor wells are representative of the groundwater in the formation within which the well is screened. Groundwater sampling of any new monitor wells shall not commence until a minimum of two days has elapsed since completion of well development, allowing time for stabilization of groundwater conditions in the well.

2.0 EQUIPMENT AND MATERIALS

Wells to be monitored during the LTM program will be purged with factory decontaminated disposable Teflon® bailers.

Equipment and materials required for groundwater sampling include:

- Sufficient number (10% more bailers than the number of wells to be sampled) disposable Teflon® bailers to complete the project;
- Interface probe;
- pH/temperature/specific conductance/dissolved oxygen/redox potential meter, and -through cell;
- Manufacturer supplied calibration standards for all field equipment;
- 1-11 pH paper;
- If field filtration is necessary, 0.45 micron cellulose-based membrane filter;
- Decontamination supplies as specified in SOP A-2;
- Sample containers, preservatives (concentrated HNO_3, H_2SO_4 HCl, etc.), coolers, sample labels, and ice (Table A-3-1);
- Field documentation (field log book, field data sheets, chain-of-custody forms, etc.);
- Well gauging, purging, and sampling monitoring form (Attached);

- Water containers as specified in SOP A-5, Field Management of Investigation-Derived Waste (IDW); and
- Health and safety equipment as specified in the SSHP.

3.0 METHODOLOGY

The following procedures are for: 1) wells with no dedicated pump system.

A) Ensure that all equipment is properly calibrated and operating by following the manuals provided by the equipment manufacturer. Typical calibration procedures for various field equipment is discussed in SOP A-4. Record results of the equipment in the log book.

B) Locate well and record well number, site, date, time, weather conditions, and condition of well completion on first the site-specific well gauging form (Attached), then on the well gauging, purging, and sampling form (Attached), and finally in the field log book.

C) Open well, noting condition of inner well seal/cap on the groundwater sampling log.

D) Measure depth to water (DTW), and total well depth with an electric-water level meter. If hydrocarbon odors are noted on the probe after monitoring, then either an acrylic bailer and/or an oil-water interface probe should be used to verify that product is not present.

E) Calculate total submerged casing volume, using the following formula:

$$V = 3.14\ r^2 L \times 7.48\ \text{gals./ft}^3$$

where:

V = submerged casing volume;
r = inside radius of casing (ft); and
L = height of water column in well (ft).

F) If purging with a bailer, lower purging bailer slowly to desired depth (total depth or mid-point of screened interval).

G) Bail water until desired volume and/or water quality measurements have stabilized.

H) Measure pH, specific conductance, and temperature, of the discharge water throughout purging. Measurements should be recorded at an interval sufficient to determine changes in water quality parameters: a maximum of one reading every gallon for wells containing a small volume of water, and a minimum of about 5 readings per purge. Purging will be complete when these parameters have stabilized to within ±0.10 pH units, 10% change in mohms or microseconds per centimeter (us/cm) specific conductance, and ±10% change in temperature over a successive well volume. A minimum of three wetted casing volumes will be purged or the well will be purged until dry. Record the water quality readings and the volume purged on the 1) well gauging, purging, and sampling monitoring form (Attached) and the monitoring well purging record form.

I) Collect one final depth to water measurement with the decontaminated electronic water level indicator or interface probe to ensure that sufficient water remains in the well to fill all required sample containers (estimated at 50% of saturated well casing).

J) Slowly lower dedicated or disposable Teflon® bailer into wells. Volatile organic analysis (VOA) samples should be collected first. Samples to be analyzed for volatile organic compounds (VOCs) should not contain any headspace or air bubbles in capped vials. Care should be taken to avoid agitation and splashing of the sample.

K) Preservatives for VOA samples need to be added to the vial prior to sampling. It is important to add an adequate amount of preservative to the VOA vials, as these samples cannot be reopened to check pH following collection. Samples for other analyses should have the preservatives added to the full sample bottle until the desired pH is reached.

L) Complete the sample labels accurately and legible and affix to the sample bottles with

clear packaging tape. Individual sample bottles (and groups of three VOA vials) will be placed in resealable plastic bags and stored on ice prior to shipping (SOP A-1).

M) Collect and manage all wastes as outlined in SOP A-5.

N) Decontaminate all sampling equipment that has touched contaminated water, soil, or wastes (see SOP A-2).

O) If disposable bailers are used, dispose of them as IDW in accordance with SOP A-5.

TABLE A-3-1
CONTAINER AND PRESERVATION REQUIREMENTS FOR WATER SAMPLING

REFERENCE METHOD	PARAMETER	CONTAINER[1,4]	SAMPLE PRESERVATION[2]	MAXIMUM HOLDING TIME[3] Extraction	Analysis
EPA 8260 or 8020	Volatile Organic Compounds	3x40 mL G, Septa	pH<2, HCl Ice to 4°C	–	14 d
EPA 8080[5]	Organo- chlorine pesticides/PCBs	1x1 L amber, G[5]	Ice to 4°C	7 d	40 d
EPA 8150[5]	Chlorinated Herbicides	1x1 L amber, G[5]	Ice to 4°C	7d	40 d
EPA 6010A/7000 series	Dissolved Metals	1x1 L, P	Filter, HNO_3 Ice to 4°C	–	28 d to 6 mo
EPA 340.2	Fluoride	1x500 mL plastic	Ice to 4°C	–	28 d
Full Suite	TCLP	3x1 L amber, G	Ice to 4°C	14d	–

1 All container must have Teflon®-lined seals (Teflon®-lined septa for all VOA vials).

2 Sample preservation will be done in the field immediately upon sample collection. If samples are filtered in the field, differential pressure methods and 45 micron filters will be used. Preservation is added after filtration. VOA samples must never be filtered.

3 When only one holding time is given, it implies total holding time from sampling until analysis.

4 Sample containers specified include sufficient volume for Matrix Spike/Matrix Spike Duplicate (MS/MSD) for all analytes except for organochlorine pesticides and PCBs, chlorinated herbicides, and organophosphorus pesticides.

5 An additional two (2) containers per analyte category of the noted pesticides and herbicides are needed to conduct the MS/MSD analyses. The additional samples will need to be collected on 5% for the samples.

d = days L = Liter G = glass
mo = months mL = Milliliter P = High-density polyethylene

4.0 COMMENTS

- Dedicated sampling devices are installed in many wells to minimize the potential for cross-contamination and reduce the need for decontamination. Only the portable submersible purge pump, the E-line and Teflon® bailer (if used) will need decontamination between wells. Decontamination procedures are presented in SOP A-2.
- If the well should be pumped dry during purging, the sampler will wait until sufficient water (50% of saturated casing volume) has recharged to the well, and then proceed to sample as outlined in this SOP.
- In field filtration is necessary, the filter used will be a cellulose-based membrane filter of 0.45 micron nominal pore size. The sample must be filtered immediately after collection to minimize chances in the concentration of the substance of interest. Samples are only passed through the filter once. Samples are then preserved immediately as required. All paperwork accompanying the samples to the laboratory should clearly state that the samples have been field-filtered, in order to avoid second filtration at the laboratory.
- If disposable in-line filters are not used, use the following method for filtration:

  - filter apparatus must be made of polyethylene, polypropylene, or borosilicate glass.
  - The filter apparatus will be rinsed with a ten percent (10%) HNO_3 solution, followed by a demonstrated analyte-free deionized water rinse.
  - Pour the sample into the filter apparatus and filter sample through a cellulose-based membrane filter of 0.45 micron nominal size. Samples are only passed through the filter once.
  - Preserve sample immediately as required.

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

SITE: LF-01 Main Base Landfill

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW1	2	25.5	4099.39						
MW3	2	26.5	4096.97						
MW5	2	42.2	4114.89						
IW2	2	40	4100.69						
Wells to be monitored only									
MW2	2	35.5	4098.62						
[illegible]	2	29.5	4096.15						
IW1	2	58	4096.15						
IW3	2	34	4092.04						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

SITE: LF-10 Old Main Base Landfill

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW2	2	18.83	4089.00						
MW3	2	18.83	4084.21						
MW4	2	18.83	4081.31						
MW6	2	19.83	4083.50						
Wells to be monitored only									
MW1(L)	2	18.83	4087.66						
MW5	2	18.8	4081.54						
MW7	2	19.83	4088.24						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

SITE: SD-08 Refuse Collection Truck Washrack

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW-08-01	2	19.7	4085.87						
MW-08-03	2	19.7	4088.28						
MW-08-04	--	19.7	4085.91						
MW-08-05	--	19.7	4084.45						
Wells to be monitored only									
MW-08-02	2	16.7	4088.16						
MW-08-06	--	16.7	4084.58						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

E: LF-19 Golf Course Landfill

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW-19-01	2	15	4049.35						
MW-19-02	2	13	4045.63						
MW-19-03	2	17	4050.01						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

SITE: LF-21 West Area Landfill No. 2

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW-21-01	2	14	4046.59						
MW-21-02	2	14	4042.97						
MW-21-03	2	14	4041.77						
MW-21-04	2	14	4039.99						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

RECORDED BY:

SITE: LF-22 West Area Landfill No. 1

INTERFACE PROBE NO.:

PROJECT NO.: LTM Program 830012201.01.

INTERFACE PROBE CORRECTION: FT.

DATE:

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW-22-01	2	15.9	4039.0						
MW-22-02	2	16.5	4038.7						
MW-22-03	2	19	4038.9						
MW-22-04	2	18.5	4040.09						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

SITE: LF-23 MOBBS Landfill

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW-23-01	2	14.58	4037.10						
MW-23-02	2	14	4030.50						
MW-23-03	2	14	4030.44						
MW-23-04	2	14.09	4030.95						

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

SITE: OT-44 Building 301 Aircraft Maintenance Area

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW1	2	18.42	4069.69						
MW2	2	18.42	4069.90						
MW3	2	17.92	4069.66						
MW6	2	19.42	4069.97						
Wells to be monitored only									
/4	2	19.5	4071.4						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

SITE: OT-45 AGE Refueling Station

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW2	2	17.5	4070.79						
MW3	2	17.5	4071.03						
MW4	2	17.5	4070.83						
MW7	2	18.42	4069.87						
Wells to be monitored only									
[illegible]	2	17.5	4071.54						
MW5	2	17.5	4070.19						
MW8	2	18.33	4070.69						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

SITE: SS-48 Military Gas Station

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW1	2	18.42	4080.51						
MW3	2	18.42	4080.22						
MW4	2	19.42	4080.16						
MW5	2	18.75	4079.16						
Wells to be monitored only									
[illegible]2	2	18.42	4081.39						
MW6	2	18.75	4078.29						
MW7	2	18.75	4078.7						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

ENT: Holloman AFB - LTM Program

SITE: SS-56 West Ramp Fuel Spill

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
WCC-2	2	13.5	–						
WCC-3	2	8.45	–						
WCC-4	2	7.48	–						
WCC-5	2	13.75	–						
Wells to be monitored only									
WCC-1	2	20.5	–						
WCC-6	2	8.27	–						
							TOTAL GALLONS BAILED		

REMARKS:

WELL GAUGING DATA FORM

CLIENT: Holloman AFB - LTM Program

SITE: DP-30 & SD-33 Grease Trap Disposal Pits

PROJECT NO.: LTM Program 830012201.01.

DATE:

RECORDED BY:

INTERFACE PROBE NO.:

INTERFACE PROBE CORRECTION: FT.

WEATHER:

WELL NUMBER	WELL DIAMETER (INCH)	WELL DEPTH (FEET)	TOP OF CASING ELEVATION (FEET)	DEPTH OF WELL FROM TOP OF CASING (FEET)	DEPTH TO WATER FROM TOP OF CASING (FEET)	DEPTH TO PRODUCT FROM TOP OF CASING (FEET)	PRODUCT THICKNESS (FEET)	GALLONS OF PRODUCT BAILED	COMMENTS (WATER IN MANHOLE/ LOCK OR CAP MISSING, PURGE AMOUNT)
Wells to be monitored and sampled									
MW-30/33-01	2	29.1	4104.7						
MW-30/33-02	2	32	4104						
MW-30/33-03	2	24	4102.98						
MW-30/33-04	2	29	4102.3						

WELL GAUGING, PURGING, A[illegible]AMPLING MONITORING FORM

Project Name/Location _____ Date: _____

Project Number _____ Technician _____

		A	B	C	D	E										
Well Number	Well Diameter (Inches)	Gallons Per Foot	Well Depth (Feet)	Depth To Water FromTop Of Casing (Feet)	Feet Of Water In Well (B – C)	Gallons Of Water In Well (A x D)	Gallons Of Water To Purge (E x 3)	Purge Method (Bail/Pump)	Time Purging Began (HH:MM)	Actual Amount Purged (Gallons)	Depth To Water After Purging (Feet)	Depth To Water Prior To Sampling (Feet)	Time Sample Collected (HH:MM)	Sample With Disposable Or Decontaminated Bailer	Metals Samples Filtered (Y/N)

Well Diameter	Gallons Per Foot
1"	0.04
2"	0.16
3"	0.37
4"	0.65
6"	1.47
8"	2.61
10"	4.08

Comments:

MONITORING WELL PURGING RECORD

JOB NAME:
LOCATION:
EQUIPMENT:

DATE:
SAMPLER(S):

WELL ID:

TIME	GALLONS PURGED	pH	CONDUCTIVITY (us/cm)	TEMPERATURE (°F)	COMMENTS

WELL ID:

TIME	GALLONS PURGED	pH	CONDUCTIVITY (us/cm)	TEMPERATURE (°F)	COMMENTS

SOP A-4

CALIBRATION PROCEDURES FOR FIELD EQUIPMENT

1.0 OBJECTIVE

This SOP outlines the methods used for control, calibration adjustment, and maintenance of the various field equipment. Equipment will be calibrated and adjusted at specified, predetermined intervals following recognized standards. Typical calibration procedures are discussed below. Calibration activities will generally follow these procedures, however, these procedures will be superseded by written instructions for any particular instrument. All calibration performed will be documented on a calibration log. A typical calibration log is attached.

2.0 EQUIPMENT AND MATERIALS

Calibration procedures that are discussed include:

- pH meter;
- Temperature meter;
- Specific Conductivity meter;
- Photoionization Detector (PID);
- Combustible Gas Indicator (LEL meter)/Oxygen Meter (O_2); and
- Organic Vapor Analyzer (OVA).

3.0 METHODOLOGY

pH Meter

Calibration frequency - Prior to sampling on a daily basis at the start of each shift.

- Place electrode system into container of buffer solution with a pH value nearest to estimated pH value of sample;
- Immerse thermometer into buffer solution;
- Wait a minimum of two minutes, then set temperature control to match thermometer indication;
- Turn function selector to pH;
- Adjust the standardize control until the meter indicates the pH of the buffer as determined from pH/temperature table;
- Turn function selector off; and
- Remove electrode and thermometer and rinse with distilled water.

Temperature Meter

Calibration frequency - Each day prior to field activities with a National Bureau of Standards (NBS)-calibrated thermometer.

Specific Conductivity Meter

Calibration frequency - Prior to sampling on a daily basis

Check Zero, Calibrate using internal standard ("Test" button).

Photoionization Detector (PID)

Calibration frequency - Once at start of each shift.

- Attach probe, set meter to standby position and zero the meter, check battery indicator;
- Attach regulator and host to calibration gas tanks (isobutylene);
- Attach end of hose to probe and turn meter switch to 0-200 scale;
- Open regulator, check tank pressure, and read tank calibration gas concentration supplied with tank;
- With span dial set to 9.8, read and record meter reading;
- If the meter reading is off from the calibration gas concentration by more than ±5%, the meter must be adjusted by the following procedure:
    1. Remove instrument from its shell.
    2. Locate the pot in the middle of the upper portion of the circuit board and adjust it until the meter reading equals the calibration gas concentration.
    3. There are two pots on either edge of the middle of the circuit board. These are used to check the bias adjustment between the three scales using the 0-200 scale as a reference.
    4. Replace the instrument in its shell. Record any adjustments which were made.

Combustible Gas Indicator (LEL meter)/Oxygen Meter (O_2)

Calibration frequency - Minimum of every other day

- Turn meter on, allow time to stabilize, check battery;
- Adjust lower explosive limit (LEL) reading to zero percent;
- Adjust Oxygen Meter to 20.8 percent;
- Attach regulator and hose to calibration tank (propane);

- Attach calibration hose to meter port while opening valve, read and record tank pressure;
- Read LEL meter;
- Consult calibration book for appropriate response curve (propane) and
- Record meter reading curve value.

Organic Vapor Analyzer (OVA)

- Turn on electronics and zero instrument on X-10 scale, with the gas select dial set to 300;
- Turn on pump and hydrogen, ignite flame and check that instrument is in survey mode (both backflush and inject valve in up position);
- Introduce a methane standard between 90 and 100 parts per million (ppm). If meter reading is within ±5% of the calibration gas concentration, instrument is field ready. Record meter readings, control settings, source of standard and related information;
- If the meter reading is not within ±5% of the calibration gas concentration, the meter must be adjusted by the following method:
    1. Remove instrument internals from instrument shell.
    2. With meter connected to standard, adjust R-32 trimpot on circuit board to make meter read to standard.
    3. Remove instrument from standard, turn off hydrogen flame, and adjust meter to 4 ppm with the zero adjust knob.
    4. Switch to X-1 scale and adjust R-31 trimpot to make meter read 4 ppm.
    5. Return to X-10 scale and adjust meter to 40 ppm with zero adjust know.
    6. Switch to X-100 scale and adjust R-33 trimpot to make meter read 400 ppm.
    7. Replace instrument internals in instrument shell, turn on and relight instrument, and record any adjustment and all pertinent information.

Instrument (Name/Model No./Serial No.): _____

Manufacturer _____ Date Purchased _____

Calibration Date	Initial Settings	Standard/Gas Used	Procedure	Adjustments Made	Final Settings	Signature	Comments

SOP A-5

FIELD MANAGEMENT OF INVESTIGATION-DERIVED WASTE (IDW)

1.0 OBJECTIVE

To collect and manage IDW in accordance with state and federal regulations, this SOP provides easy-to-follow procedures for characterizing, handling, storing, and disposing of IDW generated during the LTM field program. Details of the waste management procedures are presented in Section 2.10. IDW management techniques emphasize waste minimization.

2.0 EQUIPMENT AND MATERIAL NEEDS

- DOT-approved drums and containers;
- IDW "Analysis Pending" labels (Attached);
- "Hazardous Waste" labels and Non Hazardous labels (Attached);
- Indelible markers (i.e., Sharpie®);
- Clear adhesive tape;
- Ratchet, socket, and crescent wrench for opening/closing drums;
- PPE;
- Plastic buckets for carrying purge water to drums;
- Absorbent pads or booms for cleaning up spills;
- Wooden pallets;
- Waste inventory form (Attached); and
- Photoionization detector (PID) or Flame ionization detector (FID).

3.0 METHODOLOGY

3.1 Purge Water and Decontamination Water

A) Conduct sampling in accordance with SOP A-3.

B) Place an adhesive label on the side of the container. Using an indelible marker, write the following information on the label.

- The phrase "Analysis Pending";
- Accumulation start date;
- Name of waste (e.g., soil from soil or well boring ID numbers); and
- Name and phone number of Holloman AFB contact (BEC).

C) When label is complete, cover it with a piece of clear adhesive tape.

D) Use the sites analytic results for characterization. If the sites analytical results do not meet the appropriate action levels then conduct waste characterization of the fluids in the drum.

E) If necessary, sample the drum/container with a drum thief or bailer.

F) Analyze the sample for the TCLP suite of metals, volatiles, and pesticides and herbicides.

G) The appropriate tables in the WMP (Appendix C) should be referenced for disposal options once the laboratory data is obtained.

3.2 PPE and Disposable Sampling Equipment Waste

A) Removed excess solid and liquid waste from PPE and disposable sampling equipment.

B) Place all PPE and sampling equipment to be disposed of in sealed plastic trash bags.

C) Dispose of trash bags in a dumpster at the IDW staging area.

D) If a Base dumpster is not located near the IDW staging area, arrange for one that can be used during the course of the investigation.

4.0 COMMENTS

Be sure each container is labeled in accordance with step C) of the Methodology section in this SOP (Section 3.1 above). Be sure that the contractor's name never appears on the label; only the contact person of Holloman AFB should appear on the label. Drums will be stored at the temporary storage unit on pallets pending analysis.

If IDW that may be hazardous is discharged to the ground at the well location, Holloman AFB is potentially liable for unauthorized land disposal of hazardous waste. Only IDW from: 1) Criteria 1 and 2 Sites which contains constituents below the Health-Based Levels designated in Table 2-2, Appendix C, 2) waste which is not characteristically hazardous, designated in Table 2-1, Appendix C; and, 3) waste which does not contain free-phase hydrocarbons may be discharged to the ground surface.

Section 2.11 of the Work Plan presents the procedures that will be utilized to characterize, manage and dispose of IDW generated during the LTM Program sampling activities.

Page _____ of _____

CONTAINERIZED MATERIALS LOG

PROJECT _____

CITY _____ **STATE** _____

Drum Number	Well or Boring Number	Material Type	Date Filled		Location Moved to	Final Disposition	Signatures of Movers
			First	Last			

HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

IF FOUND, CONTACT THE NEAREST POLICE, OR
PUBLIC SAFETY AUTHORITY, OR THE
U.S. ENVIRONMENTAL PROTECTION AGENCY

PROPER D.O.T.
SHIPPING NAME_____ UN OR NA#_____

GENERATOR INFORMATION:

NAME_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

EPA
ID NO._____

EPA
WASTE NO._____

ACCUMULATION
START DATE_____

MANIFEST
DOCUMENT NO._____

HANDLE WITH CARE!

CONTAINS HAZARDOUS OR TOXIC WASTES

STYLE WM 6

Printed by LABELMASTER, Div. of AMERICAN LABELMARK CO. CHICAGO, IL 60646

NON-CLASSIFIED WASTE MATERIAL

LABORATORY ANALYSIS IN PROGRESS

CAUTION: THE CONTENTS OF THIS CONTAINER HAVE NOT BEEN CLASSIFIED AND MUST BE MANAGED WITH CAUTION UNTIL CLASSIFIED AND THEN MANAGED ACCORDINGLY. DO NOT OPEN OR MOVE WITHOUT PRIOR APPROVAL FROM GENERATOR/CONTRACTOR. CONTENTS MAY BE HARMFUL TO HUMAN HEALTH OR THE ENVIRONMENT.

MATERIAL: _____

SITE ADDRESS: _____

_____

_____

ACCUMULATION DATE: _____

GENERATOR: _____

GENERATOR CONTACT & PHONE: _____

CONTRACTOR CONTACT & PHONE: _____

_____

_____

NOTE: THIS CONTAINER CANNOT BE SHIPPED UNTIL CLASSIFICATION IS COMPLETE AND CONTAINER IS APPROPRIATELY MARKED AND LABELED IN ACCORDANCE WITH EPA AND D.O.T. REGULATIONS.

NCWM-P

Printed by: Mesa Label Express, 8525 Arjons, Ste. T, San Diego, CA 92126 (619) 693-4988

Appendix B

Project-Specific Addendum to the Quality Assurance Project Plan

2001 LONG-TERM GROUNDWATER MONITORING PROGRAM
PROJECT-SPECIFIC ADDENDUM TO THE QUALITY ASSURANCE PROJECT PLAN
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:

49 CES/CEV
Holloman Air Force Base, NM
and
HQ ACC/CEVC
Langley Air Force Base, VA

Prepared by:

Foster Wheeler Environmental Corporation
6605 Uptown Blvd., NE, Suite 220
Albuquerque, NM 87110

Under Contract No. DACW45-94-D-0003
Delivery Order 32, Work Authorization Directive 9

U.S. Army Corps of Engineers
Omaha District
Omaha Nebraska

September 2001

Project Number: KWRD20017009

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7.0 REFERENCES B-4

Attachments

Attachment 1 Analytical Method Precision and Accuracy Requirements, Method Quantification Limits, and Quality Control

LIST OF TABLES

Table 4-1 LTM Groundwater Sample Container, Preservation, and Holding Time Requirements B-6

LIST OF ACRONYMS

AFB	Air Force Base
°C	degrees centigrade
DOM	Delivery Order Manager
DQO	data quality objectives
ECB	Environmental Chemical Branch
EPA	U.S. Environmental Protection Agency
Foster Wheeler Environmental	Foster Wheeler Environmental Corporation
glass	amber glass
HC1	hydrochloric acid
HNO_3	nitric acid
LCS	laboratory control sample
LIMS	Laboratory Information Management System
LTM	Long-Term Groundwater Monitoring Program
mL	milliliter
MS	matrix spike
MSD	matrix spike duplicate
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RPD	relative percent difference
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was prepared as an Addendum to the Holloman Air Force Base (AFB) Work Plan for the Long-Term Groundwater Monitoring Program (LTM) Volume II — Quality Assurance Project Plan (EBASCO, 1995). This QAPP Addendum addresses deviations from the 1995 QAPP that will be implemented to ensure that the data collected during the September 2001 LTM event will be of adequate quality to achieve the LTM program data quality objectives (DQOs).

This QAPP addresses the quality assurance (QA) elements required by the U.S. Army Corps of Engineers (USACE) Omaha District, General Chemistry Supplement to the Scope of Services (USACE, 1996).

The sampling scope, summary of sites and well designations, and the site-specific analytical parameters to be included in the September 2001 sampling event are presented in the Work Plan Addendum (Foster Wheeler Environmental, 2001).

2.0 PROJECT ORGANIZATION AND FUNCTIONAL AREA RESPONSIBILITIES

2.1 ROLES AND RESPONSIBILITIES

Mr. Derek Johnson, is the Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) Delivery Order Manager (DOM) for Holloman AFB projects and reports to the Program Manager. The DOM will have overall responsibility, authority, and accountability for the project.

Ms. Carol Bieniulis, of Foster Wheeler Environmental, is the Task Manager for the LTM. She is responsible for oversight of LTM tasks, including field activities and reporting. The Task Manager reports directly to the DOM.

Ms. Pam Moss, of Foster Wheeler Environmental, is the Project Chemist in support of the LTM. In this capacity, she will oversee laboratory performance and validation and management of the analytical data.

2.2 OFF-SITE ANALYTICAL LABORATORY

The analytical laboratory subcontractor for the LTM Program has not been determined at this time. Information on the analytical laboratory will be included in the final work plan.

2.3 USACE ENVIRONMENTAL CHEMICAL BRANCH (ECB) LABORATORY OF THE WATERWAYS EXPERIMENT STATION

The USACE ECB will perform analysis on seven QA replicate samples to ensure data comparability and quality. The QA replicate samples will be submitted to the ECB under the laboratory information management system (LIMS) number 6431.

3.0 DATA QUALITY OBJECTIVES

DQOs for the September 2001 LTM sampling event are described in the USACE Scope of Services, November 2000, and include the following:

- Collect groundwater samples at each of the 65 monitoring wells within the 17 sites to detect potential contaminant releases and/or provide results to support site closure determination
- Ensure data quality through the use of a ECB laboratory
- Use analytical techniques to achieve practical quantitation limits that are comparable to the New Mexico Water Quality Control Commision Standards (NMED, 1995)

- Provide analytical results with known accuracy and precision through use of performance demonstrated methods and ECB QA samples
- Achieve an analytical data completeness goal of 95 percent for the September sampling event

The LTM Program QA and quality control (QC) requirements will follow those specified in the *General Chemistry Supplement to the Scope of Services* (USACE, 1996). These requirements include the following control samples:

- Field duplicates: 10 percent of field samples
- Trip blanks: 1 per cooler containing volatile organic compound (VOC) samples
- ECB QA samples: 10 percent of field samples

The QA/QC requirements for the LTM program do not include field blank or equipment rinse blank samples.

3.1 PRECISION AND ACCURACY

Precision and accuracy objectives for the analytical parameters associated with the LTM program include laboratory control sample (LCS) and matrix spike (MS)/matrix spike duplicate (MSD) sample percent recoveries, MS/MSD relative percent difference (RPD), and laboratory duplicate sample RPD for metals. The analytical method precision and accuracy objectives for the LTM September 2001 sampling event will be presented in Attachment 1 in the final version of this QAPP Addendum once the subcontractor laboratory is selected.

3.2 PRACTICAL QUANTITATION LIMITS

Analytical methods, compounds, and practical quantitation limits for the September 2001 LTM sampling event are presented in Attachment 1 of this QAPP Addendum.

4.0 FIELD ACTIVITIES

Discussions pertaining to field activities and procedures are detailed in the CDAP Addendum (Foster Wheeler Environmental, 2000). The sample container and preservation requirements for the September 2001 LTM sampling event are presented in Table 4-1.

5.0 LABORATORY ANALYTICAL PROCEDURES

The analytical laboratory selected for the 2001 LTM program is EMAX Laboratories, Inc. Samples will be shipped on a daily basis to the laboratory's Torrance, California facility as shown below.

EMAX Laboratories, Inc.
1835 205th Street
Torrance, California 90501
(310) 618-8889
Project Contact: Richard Beauvil

The analytical methods to be performed for the 2001 LTM event will be in accordance with U.S. Environmental Protection Agency (EPA) SW-846, *Test Methods for Evaluating Solid Waste, Third Edition and Updates* (EPA, 1986) and include the following:

- VOCs—EPA SW-846, method 8260B
- Organochlorine pesticides—EPA SW-846, method 8081A
- Herbicides—EPA SW-846, method 8151A
- Dissolved metals—EPA SW-846, method Trace 6010B
- Total mercury—EPA SW-846, method 7470A
- Total dissolved solids—EPA method 160

The individual analytes included in each method are identified in Attachment 1. The method-specific calibration and QC checks are presented in Attachment 1 of this QAPP Addendum.

Table 4-1. LTM Groundwater Sample Container, Preservation, and Holding Time Requirements

Parameter	Container (1)	Preservation (2)	Maximum Holding Times (3)	
			Analysis	Extraction
Volatile organic compounds	3 x 40-mL septa vials	HCl pH<2 Ice to 4°C	NA	14 days
Organochlorine pesticides	1 x 1-liter glass	Ice to 4°C	7 days	40 days
Herbicides	1 x 1-liter glass	Ice to 4°C	7 days	40 days
Dissolved metals	1 x 500-mL plastic	HNO_3 pH<2	NA	180 days
Total mercury	1 x 500-mL plastic	HNO_3 pH<2	NA	28 days
Total dissolved solids	1 x 250-ml plastic	Ice to 4°C	NA	7 days

1 All containers must have Teflon®-lined lids.
2 Sample filtration and preservation will occur in the field.
3 When only one holding time is given, it implies total holding time from sampling to analysis.

HCl – Hydrochloric acid
HNO_3 – Nitric acid
glass – Amber glass
mL – Milliliter
NA – Not applicable
°C – Degrees Celsius

In addition to the analytical method protocols, the QAPP specifies the following information:

- Laboratory organization
- QAPP overview
- Laboratory facilities
- Staff qualifications and training
- Instrument and equipment
- Material procurement and subcontractors
- Sample entering, data handling, and reporting
- Quality assessment techniques
- Control of test procedures
- Instrument calibration procedures
- Internal QAP review and auditing

6.0 QUALITY ASSURANCE AUDITS

Foster Wheeler Environmental will not perform an audit of the analytical laboratory subcontractor in support of the September 2001 LTM sampling event. Oversight of field sampling activities for the LTM Program will be performed by the field operations leader.

7.0 REFERENCES

EBASCO/GTI (EBASCO/Groundwater Technology, Inc.)
1995. Holloman Air Force Base Final Chemical Data Acquisition Plan Long Term Groundwater Monitoring Program Volume II – Quality Assurance Project Plan.

EPA (U.S. Environmental Protection Agency)
1986. Test Methods for Evaluating Solid Waste, Third Edition and Updates.

Foster Wheeler Environmental (Foster Wheeler Environmental Corporation)
2001. Final Work Plan for the 2001 Long-Term Groundwater Monitoring Program, Holloman Air force Base. September.

2000. Holloman Air Force Base Long Term Groundwater Monitoring Program Chemical Data Acquisition Plan Addendum.

NMED (New Mexico Environment Department)
1995. Water Quality Control Commission Regulations, NMED Water Quality Bureau.

USACE (U.S. Army Corp of Engineers)
1996. General Chemistry Supplement to the Scope of Services. January.

Attachment 1

Analytical Method Precision and Accuracy Requirements, Method Quantification Limits, and Quality Control

SUMMARY OF MDL RL & QC LIMITS

160.1	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE					
Total Dissolved Solids	4.228	10	mg/L	80-120	20

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

6010B	3010A	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
Aluminum		0.050	0.2	mg/L	80-120	20
Antimony		0.050	0.1	mg/L	80-120	20
Arsenic		0.025	0.1	mg/L	80-120	20
Barium		0.001	0.01	mg/L	80-120	20
Beryllium		0.001	0.01	mg/L	80-120	20
Boron		0.010	0.1	mg/L	80-120	20
Cadmium		0.005	0.01	mg/L	80-120	20
Calcium		0.150	1	mg/L	80-120	20
Chromium		0.006	0.02	mg/L	80-120	20
Cobalt		0.011	0.02	mg/L	80-120	20
Copper		0.005	0.02	mg/L	80-120	20
Iron		0.006	1	mg/L	80-120	20
Lead		0.025	0.1	mg/L	80-120	20
Magnessium		0.050	1	mg/L	80-120	20
Manganese		0.003	0.1	mg/L	80-120	20
Molybdenum		0.006	0.1	mg/L	80-120	20
Nickel		0.015	0.02	mg/L	80-120	20
Potassium		0.750	5	mg/L	80-120	20
Selenium		0.053	1	mg/L	80-120	20
Silver		0.010	0.02	mg/L	80-120	20
Sodium		0.070	1	mg/L	80-120	20
Strontium		0.003	0.01	mg/L	80-120	20
Thallium		0.052	0.1	mg/L	80-120	20
Tin		0.050	0.1	mg/L	80-120	20
Vanadium		0.005	0.02	mg/L	80-120	20
Zinc		0.027	0.1	mg/L	80-120	20

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

6010B	3050B	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
Aluminum		5.029	20	mg/Kg	80-120	20
Antimony		3.942	10	mg/Kg	80-120	20
Arsenic		2.689	10	mg/Kg	80-120	20
Barium		0.338	1	mg/Kg	80-120	20
Beryllium		0.336	1	mg/Kg	80-120	20
Boron		2.286	10	mg/Kg	80-120	20
Cadmium		0.438	1	mg/Kg	80-120	20
Calcium		11.614	100	mg/Kg	80-120	20
Chromium		0.809	2	mg/Kg	80-120	20
Cobalt		1.028	2	mg/Kg	80-120	20
Copper		0.784	2	mg/Kg	80-120	20
Iron		10.000	20	mg/Kg	80-120	20
Lead		2.076	10	mg/Kg	80-120	20
Magnessium		15.706	100	mg/Kg	80-120	20
Manganese		0.389	1	mg/Kg	80-120	20
Molybdenum		0.902	5	mg/Kg	80-120	20
Nickel		0.550	2	mg/Kg	80-120	20
Potassium		71.564	500	mg/Kg	80-120	20
Selenium		4.642	10	mg/Kg	80-120	20
Silver		1.095	2	mg/Kg	80-120	20
Sodium		17.980	100	mg/Kg	80-120	20
Strontium		0.323	1	mg/Kg	80-120	20
Thallium		1.918	5	mg/Kg	80-120	20
Tin		2.876	5	mg/Kg	80-120	20
Vanadium		0.786	2	mg/Kg	80-120	20
Zinc		0.288	1	mg/Kg	80-120	20

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

6010B-TRACE 3010A	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE					
Arsenic	3.500	10	ug/L	80-120	20
Cadmium	1.329	10	ug/L	80-120	20
Lead	5.000	10	ug/L	80-120	20
Manganese	3.272	10	ug/L	80-120	20
Selenium	3.500	10	ug/L	80-120	20
Thallium	4.254	10	ug/L	80-120	20
Vanadium	2.780	10	ug/L	80-120	20

6010B-TRACE 3050B	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE					
Arsenic	0.150	1	mg/Kg	80-120	20
Cadmium	0.100	1	mg/Kg	80-120	20
Copper	0.221	1	mg/Kg	80-120	20
Lead	0.200	1	mg/Kg	80-120	20
Manganese	0.153	1	mg/Kg	80-120	20
Selenium	0.468	1	mg/Kg	80-120	20
Thallium	0.606	2	mg/Kg	80-120	20
Vanadium	0.154	1	mg/Kg	80-120	20

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

7470A	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE					
Mercury	0.118	0.5	ug/L	80-120	20

7471A	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE					
Mercury	0.025	0.1	mg/Kg	80-120	20

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

8260B	5030B	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
1,1,1,2-Tetrachloroethane		0.600	5	ug/Kg	80-120	50
1,1,1-Trichloroethane		1.559	5	ug/Kg	78-133	50
1,1,2,2-Tetrachloroethane		0.500	5	ug/Kg	68-144	50
1,1,2-Trichloro1,2,2-trifluoethane		2.029	5	ug/Kg	50-150	50
1,1,2-trichloroethane		0.500	5	ug/Kg	71-129	50
1,1-Dichloroethane		1.290	5	ug/Kg	80-121	50
1,1-Dichloroethene		1.664	5	ug/Kg	70-129	50
1,1-Dichloropropene		1.602	5	ug/Kg	80-127	50
1,2,3-Trichlorobenzene		2.120	5	ug/Kg	64-143	50
1,2,3-Trichloropropane		0.500	5	ug/Kg	73-145	50
1,2,4-Trichlorobenzene		1.997	5	ug/Kg	69-139	50
1,2,4-Trimethylbenzene		0.956	5	ug/Kg	74-126	50
1,2-Dibromo-3-chloropropane		0.891	5	ug/Kg	61-147	50
1,2-Dibromoethane		0.500	5	ug/Kg	62-150	50
1,2-Dichlorobenzene		0.500	5	ug/Kg	79-122	50
1,2-Dichloroethane		0.624	5	ug/Kg	69-132	50
1,2-Dichloropropane		0.616	5	ug/Kg	72-124	50
1,3,5-Trimethylbenzene		1.329	5	ug/Kg	75-125	50
1,3-Dichlorobenzene		0.894	5	ug/Kg	80-118	50
1,3-Dichloropropane		0.500	5	ug/Kg	80-128	50
1,4-Dichlorobenzene		0.592	5	ug/Kg	74-126	50
1-Chlorohexane		1.738	5	ug/Kg	80-129	50
2,2-Dichloropropane		0.953	5	ug/Kg	76-128	50
2-Butanone(MEK)		2.500	10	ug/Kg	40-150	50
2-Chloroethyl Vinyl Ether		0.541	5	ug/Kg	50-150	50
2-Chlorotoluene		1.134	5	ug/Kg	73-128	50
2-Hexanone		2.500	10	ug/Kg	55-144	50
4-Chlorotoluene		1.016	5	ug/Kg	80-125	50
4-Methyl-2-Pentanone(MIBK)		2.500	10	ug/Kg	58-150	50
Acetone		2.500	10	ug/Kg	50-148	50
Acrolein		11.171	20	ug/Kg	50-150	50

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

8260B	5030B	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
Acrylonitrile		2.500	10	ug/Kg	50-150	50
Benzene		1.166	5	ug/Kg	75-125	50
Bromobenzene		0.658	5	ug/Kg	80-134	50
Bromochloromethane		0.500	5	ug/Kg	80-119	50
Bromodichloromethane		0.549	5	ug/Kg	71-130	50
Bromoform		0.500	5	ug/Kg	62-141	50
Bromomethane		3.299	10	ug/Kg	57-158	50
Carbon Disulfide		1.585	5	ug/Kg	64-113	50
Carbon Tetrachloride		1.000	5	ug/Kg	69-141	50
Chlorobenzene		0.926	5	ug/Kg	80-126	50
Chloroethane		3.093	10	ug/Kg	62-140	50
Chloroform		1.025	5	ug/Kg	80-132	50
Chloromethane		4.730	10	ug/Kg	56-144	50
cis-1,2-Dichloroethene		1.092	5	ug/Kg	80-120	50
cis-1,3-Dichloropropene		0.695	5	ug/Kg	72-125	50
Dibromochloromethane		0.676	5	ug/Kg	70-128	50
Dibromomethane		0.684	5	ug/Kg	80-126	50
Dichlorodifluoromethane		1.539	5	ug/Kg	43-165	50
DIPE		0.660	5	ug/Kg	50-150	50
ETBE		0.500	5	ug/Kg	50-150	50
Ethyl Methacrylate		0.500	5	ug/Kg	50-150	50
Ethylbenzene		1.182	5	ug/Kg	78-121	50
Hexachlorobutadiene		1.812	5	ug/Kg	80-129	50
Iodomethane		1.297	5	ug/Kg	50-150	50
Isopropyl Benzene		1.366	5	ug/Kg	76-121	50
m,p-Xylene		2.237	10	ug/Kg	50-150	50
Methyl Tert-Butyl Ether		0.500	5	ug/Kg	49-146	50
Methylene Chloride		0.500	5	ug/Kg	66-131	50
n-Butylbenzene		1.500	5	ug/Kg	80-129	50
n-Propylbenzene		1.435	5	ug/Kg	49-165	50
Naphthalene		3.281	5	ug/Kg	74-136	50
o-Xylene		0.924	5	ug/Kg	60-149	50

SUMMARY OF MDL RL & QC LIMITS

8260B	5030B	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
p-Isopropyltoluene		1.251	5	ug/Kg	74-130	50
sec-Butylbenzene		1.506	5	ug/Kg	77-122	50
Styrene		0.854	5	ug/Kg	75-129	50
T-Butanol		3.757	25	ug/Kg	50-150	50
TAME		0.500	5	ug/Kg	50-150	50
tert-Butylbenzene		1.386	5	ug/Kg	80-120	50
Tetrachloroethene		1.540	5	ug/Kg	80-120	50
Toluene		1.231	5	ug/Kg	78-126	50
trans-1,2-Dichloroethene		1.287	5	ug/Kg	78-123	50
trans-1,3-Dichloropropene		0.500	5	ug/Kg	69-135	50
trans-1,4-Dichloro-2-butene		1.274	5	ug/Kg	50-150	50
Trichloroethene		1.266	5	ug/Kg	68-127	50
Trichlorofluoromethane		1.831	5	ug/Kg	61-139	50
Vinyl Acetate		1.000	5	ug/Kg	79-124	50
Vinyl Chloride		3.484	10	ug/Kg	80-125	50
SURROGATE						
1,2-Dichloroethane-d4					70-139	
4-Bromofluorobenzene				ug/Kg	73-124	
Toluene-d8					71-125	

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

8260B	5030B	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
1,1,1,2-Tetrachloroethane		0.805	5	ug/L	50- 150	30
1,1,1-Trichloroethane		1.543	5	ug/L	70- 133	30
1,1,2,2-Tetrachloroethane		0.438	5	ug/L	68- 144	30
1,1,2-Trichloro1,2,2-trifluoroethane		2.230	5	ug/L	50- 150	30
1,1,2-trichloroethane		0.552	5	ug/L	63- 129	30
1,1-Dichloroethane		1.231	5	ug/L	66- 136	30
1,1-Dichloroethene		1.607	5	ug/L	52- 149	30
1,1-Dichloropropene		1.954	5	ug/L	56- 127	30
1,2,3-Trichlorobenzene		0.543	5	ug/L	64- 143	30
1,2,3-Trichloropropane		0.343	5	ug/L	65- 145	30
1,2,4-Trichlorobenzene		0.597	5	ug/L	66- 139	30
1,2,4-Trimethylbenzene		1.011	5	ug/L	76- 126	30
1,2-Dibromo-3-chloropropane		0.623	5	ug/L	62- 147	30
1,2-Dibromoethane		0.635	5	ug/L	50- 150	30
1,2-Dichlorobenzene		0.565	5	ug/L	73- 122	30
1,2-Dichloroethane		0.270	5	ug/L	67- 132	30
1,2-Dichloropropane		0.522	5	ug/L	68- 124	30
1,3,5-Trimethylbenzene		1.260	5	ug/L	78- 125	30
1,3-Dichlorobenzene		0.783	5	ug/L	75- 131	30
1,3-Dichloropropane		0.435	5	ug/L	67- 128	30
1,4-Dichloro-2-butene		1.030	5	ug/L	50- 150	30
1,4-Dichlorobenzene		0.647	5	ug/L	74- 126	30
1-Chlorohexane		1.856	5	ug/L	72- 129	30
2,2-Dichloropropane		0.868	5	ug/L	62- 146	30
2-Butanone(MEK)		2.331	5	ug/L	50- 150	30
2-Chloroethyl Vinyl Ether		0.718	5	ug/L	50- 150	30
2-Chlorotoluene		1.102	5	ug/L	79- 128	30
2-Hexanone		1.211	5	ug/L	53- 165	30
4-Chlorotoluene		1.030	5	ug/L	73- 125	30
4-Methyl-2-Pentanone(MIBK)		1.000	5	ug/L	50- 150	30
Acetone		1.197	5	ug/L	37- 165	30
Acrolein		10.777	20	ug/L	50- 150	30

SUMMARY OF MDL RL & QC LIMITS

8260B	5030B	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
Acrylonitrile		3.016	20	ug/L	50- 150	30
Benzene		1.033	5	ug/L	67- 125	30
Bromobenzene		0.653	5	ug/L	74- 134	30
Bromochloromethane		0.621	5	ug/L	49- 164	30
Bromodichloromethane		0.757	5	ug/L	70- 130	30
Bromoform		0.277	5	ug/L	55- 141	30
Bromomethane		2.739	5	ug/L	35- 158	30
Carbon Disulfide		1.826	5	ug/L	24- 113	30
Carbon Tetrachloride		0.751	5	ug/L	62- 141	30
Chlorobenzene		0.879	5	ug/L	71- 126	30
Chloroethane		1.503	5	ug/L	20- 165	30
Chloroform		1.013	5	ug/L	63- 132	30
Chloromethane		2.515	5	ug/L	49- 144	30
cis-1,2-Dichloroethene		1.138	5	ug/L	65- 135	30
cis-1,3-Dichloropropene		0.602	5	ug/L	73- 142	30
Dibromochloromethane		0.671	5	ug/L	64- 128	30
Dibromomethane		0.583	5	ug/L	66- 126	30
Dichlorodifluoromethane		1.552	5	ug/L	49- 165	30
DIPE		0.632	5	ug/L	50- 150	30
ETBE		0.628	5	ug/L	50- 150	30
Ethyl Methacrylate		0.294	5	ug/L	50- 150	30
Ethylbenzene		1.340	5	ug/L	79- 121	30
Hexachlorobutadiene		1.587	5	ug/L	55- 163	30
Iodomethane		0.888	5	ug/L	50- 150	30
Isopropyl Benzene		1.402	5	ug/L	77- 121	30
m,p-Xylene		2.620	10	ug/L	79- 124	30
Methyl Tert-Butyl Ether		0.549	5	ug/L	59- 146	30
Methylene Chloride		0.779	5	ug/L	20- 149	30
n-Butylbenzene		1.137	5	ug/L	78- 136	30
n-Propylbenzene		1.145	5	ug/L	75- 129	30
Naphthalene		0.949	5	ug/L	65- 165	30
o-Xylene		1.070	5	ug/L	82- 125	30

SUMMARY OF MDL RL & QC LIMITS

8260B	5030B	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
p-Isopropyltoluene		1.340	5	ug/L	78- 130	30
sec-Butylbenzene		1.426	5	ug/L	78- 122	30
Styrene		0.892	5	ug/L	76- 129	30
T-butanol		3.308	25	ug/L	50- 150	30
TAME		0.455	5	ug/L	50- 150	30
tert-Butylbenzene		1.296	5	ug/L	76- 120	30
Tetrachloroethene		1.842	5	ug/L	66- 138	30
Toluene		1.023	5	ug/L	69- 126	30
trans-1,2-Dichloroethene		1.251	5	ug/L	62- 137	30
trans-1,3-Dichloropropene		0.549	5	ug/L	61- 135	30
Trichloroethene		1.491	5	ug/L	67- 127	30
Trichlorofluoromethane		1.708	5	ug/L	33- 165	30
Vinyl Acetate		0.605	5	ug/L	50-150	30
Vinyl Chloride		1.914	5	ug/L	57- 149	30
SURROGATE						
1,2-Dichloroethane-d4			5	ug/L	63- 139	30
4-Bromofluorobenzene			5	ug/L	73- 125	30
Toluene-d8			5	ug/L	75- 124	30

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

8260B	5030B-Low	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
1,1,1,2-Tetrachloroethane		0.164	1	ug/L	80 -127	30
1,1,1-Trichloroethane		0.131	1	ug/L	70 -127	30
1,1,2,2-Tetrachloroethane		0.278	1	ug/L	68 -129	30
1,1,2-Trichloro1,2,2-trifluoroethane		0.205	1	ug/L	50-150	30
1,1,2-trichloroethane		0.226	1	ug/L	79 -136	30
1,1-Dichloroethane		0.116	1	ug/L	80 -133	30
1,1-Dichloroethene		0.145	1	ug/L	75 -125	30
1,1-Dichloropropene		0.216	1	ug/L	76 -135	30
1,2,3-Trichlorobenzene		0.170	1	ug/L	75 -133	30
1,2,3-Trichloropropane		0.158	1	ug/L	65 -139	30
1,2,4-Trichlorobenzene		0.204	1	ug/L	80 -130	30
1,2,4-Trimethylbenzene		0.142	1	ug/L	76 -123	30
1,2-Dibromo-3-chloropropane		0.160	2	ug/L	75 -132	30
1,2-Dibromoethane		0.158	1	ug/L	80 -127	30
1,2-Dichlorobenzene		0.161	1	ug/L	73 -120	30
1,2-Dichloroethane		0.171	1	ug/L	67 -132	30
1,2-Dichloropropane		0.171	1	ug/L	77 -127	30
1,3,5-Trimethylbenzene		0.151	1	ug/L	78 -121	30
1,3-Dichlorobenzene		0.168	1	ug/L	75 -122	30
1,3-Dichloropropane		0.158	1	ug/L	80 -133	30
1,4-Dichloro-2-butene		0.266	10	ug/L	50-150	30
1,4-Dichlorobenzene		0.139	1	ug/L	74 -123	30
1-Chlorohexane		0.106	1	ug/L	50-150	30
2,2-Dichloropropane		0.182	1	ug/L	62 -134	30
2-Butanone(MEK)		1.801	10	ug/L	45 -150	30
2-Chloroethyl Vinyl Ether		0.281	5	ug/L	50-150	30
2-Chlorotoluene		0.195	1	ug/L	79 -121	30
2-Hexanone		1.000	10	ug/L	50-150	30
4-Chlorotoluene		0.183	1	ug/L	73 -127	30
4-Methyl-2-Pentanone(MIBK)		1.000	10	ug/L	59 -150	30
Acetone		1.909	10	ug/L	51 -157	30

SUMMARY OF MDL RL & QC LIMITS

8260B	5030B-Low	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
Acrolein		4.492	50	ug/L	50-150	30
Acrylonitrile		4.561	10	ug/L	50-150	30
Benzene		0.179	1	ug/L	79 -126	30
Bromobenzene		0.156	1	ug/L	74 -123	30
Bromochloromethane		0.142	1	ug/L	78 -127	30
Bromodichloromethane		0.147	1	ug/L	70 -130	30
Bromoform		0.217	1	ug/L	72 -136	30
Bromomethane		0.130	1	ug/L	35 -153	30
Carbon Disulfide		0.130	1	ug/L	74 -123	30
Carbon Tetrachloride		0.168	1	ug/L	71 -132	30
Chlorobenzene		0.120	1	ug/L	80 -127	30
Chloroethane		0.181	1	ug/L	72 -129	30
Chloroform		0.117	1	ug/L	74 -127	30
Chloromethane		0.404	1	ug/L	58 -135	30
cis-1,2-Dichloroethene		0.132	1	ug/L	73 -133	30
cis-1,3-Dichloropropene		0.166	1	ug/L	73 -132	30
Dibromochloromethane		0.193	1	ug/L	74 -145	30
Dibromomethane		0.155	1	ug/L	76 -132	30
Dichlorodifluoromethane		0.422	1	ug/L	59 -134	30
DIPE		0.129	2	ug/L	50 -150	30
ETBE		0.122	2	ug/L	50 -150	30
Ethyl Methacrylate		0.215	1	ug/L	50-150	30
Ethylbenzene		0.110	1	ug/L	79 -120	30
Hexachlorobutadiene		0.193	1	ug/L	78 -133	30
Iodomethane		0.139	2	ug/L	50-150	30
Isopropyl Benzene		0.159	1	ug/L	77 -126	30
m,p-Xylene		0.243	2	ug/L	79 -122	30
Methylene Chloride		0.122	2	ug/L	69 -118	30
MTBE		0.131	1	ug/L	59 -129	30
n-Butylbenzene		0.141	1	ug/L	78 -126	30
n-Propylbenzene		0.153	1	ug/L	75 -127	30
Naphthalene		0.267	1	ug/L	65 -149	30

SUMMARY OF MDL RL & QC LIMITS

8260B	5030B-Low	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
o-Xylene		0.115	1	ug/L	82 -118	30
p-Isopropyltoluene		0.182	1	ug/L	78 -125	30
sec-Butylbenzene		0.180	1	ug/L	78 -125	30
Styrene		0.110	1	ug/L	76 -130	30
T-butanol		4.850	25	ug/L	50 -150	30
TAME		0.154	1	ug/L	50 -150	30
tert-Butylbenzene		0.128	1	ug/L	76 -125	30
Tetrachloroethene		0.176	1	ug/L	80 -129	30
Toluene		0.117	1	ug/L	80 -125	30
trans-1,2-Dichloroethene		0.151	1	ug/L	78 -134	30
trans-1,3-Dichloropropene		0.178	1	ug/L	74 -131	30
Trichloroethene		0.155	1	ug/L	67 -128	30
Trichlorofluoromethane		0.170	1	ug/L	68 -133	30
Vinyl Acetate		0.686	2	ug/L	50-150	30
Vinyl Chloride		0.252	1	ug/L	73 -134	30
SURROGATE						
1,2-Dichloroethane-d4					63-132	30
4-Bromofluorobenzene				ug/L	73 -129	30
Toluene-d8					75 -122	30

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

8260B	5035	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
1,1,1,2-Tetrachloroethane		0.499	5	ug/Kg	80-120	50
1,1,1-Trichloroethane		0.477	5	ug/Kg	78-133	50
1,1,2,2-Tetrachloroethane		0.313	5	ug/Kg	68-144	50
1,1,2-Trichloro1,2,2-trifluoroethane		1.000	5	ug/Kg	50-150	50
1,1,2-trichloroethane		1.148	5	ug/Kg	71-129	50
1,1-Dichloroethane		0.486	5	ug/Kg	80-121	50
1,1-Dichloroethene		0.514	5	ug/Kg	70-129	50
1,1-Dichloropropene		1.094	5	ug/Kg	80-127	50
1,2,3-Trichlorobenzene		0.484	5	ug/Kg	64-143	50
1,2,3-Trichloropropane		0.563	5	ug/Kg	73-145	50
1,2,4-Trichlorobenzene		0.624	5	ug/Kg	69-139	50
1,2,4-Trimethylbenzene		0.304	5	ug/Kg	74-126	50
1,2-Dibromo-3-chloropropane		1.148	10	ug/Kg	61-147	50
1,2-Dibromoethane		0.638	5	ug/Kg	62-150	50
1,2-Dichlorobenzene		0.298	5	ug/Kg	79-122	50
1,2-Dichloroethane		0.892	5	ug/Kg	69-132	50
1,2-Dichloropropane		0.387	5	ug/Kg	72-124	50
1,3,5-Trimethylbenzene		0.432	5	ug/Kg	75-125	50
1,3-Dichlorobenzene		0.300	5	ug/Kg	80-118	50
1,3-Dichloropropane		0.679	5	ug/Kg	80-128	50
1,4-Dichloro-2-butene		0.808	10	ug/Kg	50-150	50
1,4-Dichlorobenzene		0.341	5	ug/Kg	74-126	50
1-Chlorohexane		0.269	5	ug/Kg	80-129	50
2,2-Dichloropropane		0.402	5	ug/Kg	76-128	50
2-Butanone(MEK)		2.751	20	ug/Kg	40-150	50
2-Chlorotoluene		0.526	5	ug/Kg	73-128	50
2-Hexanone		1.917	20	ug/Kg	55-144	50
4-Chlorotoluene		0.410	5	ug/Kg	80-125	50
4-Methyl-2-Pentanone(MIBK)		1.631	20	ug/Kg	58-150	50
Acetone		2.736	20	ug/Kg	50-148	50
Acrolein		12.848	50	ug/Kg	50-150	50

SUMMARY OF MDL RL & QC LIMITS

8260B	5035	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
Acrylonitrile		2.522	50	ug/Kg	50-150	50
Benzene		0.346	5	ug/Kg	75-125	50
Bromobenzene		0.366	5	ug/Kg	80-134	50
Bromochloromethane		0.814	5	ug/Kg	80-119	50
Bromodichloromethane		0.363	5	ug/Kg	71-130	50
Bromoform		0.328	5	ug/Kg	62-141	50
Bromomethane		2.537	5	ug/Kg	57-158	50
Carbon Disulfide		0.279	5	ug/Kg	64-113	50
Carbon Tetrachloride		0.439	5	ug/Kg	69-141	50
Chlorobenzene		0.250	5	ug/Kg	80-126	50
Chloroethane		3.183	10	ug/Kg	62-140	50
Chloroform		0.444	5	ug/Kg	80-132	50
Chloromethane		2.506	5	ug/Kg	56-144	50
cis-1,2-Dichloroethene		0.250	5	ug/Kg	80-120	50
cis-1,3-Dichloropropene		0.335	5	ug/Kg	72-125	50
Dibromochloromethane		0.578	5	ug/Kg	70-128	50
Dibromomethane		0.795	5	ug/Kg	80-126	50
Dichlorodifluoromethane		2.754	10	ug/Kg	43-165	50
DIPE		0.669	5	ug/Kg	50-150	50
ETBE		0.777	5	ug/Kg	50-150	50
Ethyl Methacrylate		0.790	5	ug/Kg	50-150	50
Ethylbenzene		0.326	5	ug/Kg	78-121	50
Hexachlorobutadiene		0.514	5	ug/Kg	80-129	50
Iodomethane		1.510	5	ug/Kg	50-150	50
Isopropyl Benzene		0.466	5	ug/Kg	76-121	50
m,p-Xylene		0.731	10	ug/Kg	79-124	50
Methylene Chloride		1.430	10	ug/Kg	66-131	50
MTBE		1.208	5	ug/Kg	49-146	50
n-Butylbenzene		0.250	5	ug/Kg	74-136	50
n-Propylbenzene		0.250	5	ug/Kg	80-129	50
Naphthalene		3.171	10	ug/Kg	49-165	50
o-Xylene		0.277	5	ug/Kg	80-125	50

SUMMARY OF MDL RL & QC LIMITS

8260B 5035	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE					
p-Isopropyltoluene	0.250	5	ug/Kg	74-130	50
sec-Butylbenzene	0.295	5	ug/Kg	77-122	50
Styrene	0.509	5	ug/Kg	75-129	50
T-butanol	26.064	50	ug/Kg	50-150	50
TAME	0.860	5	ug/Kg	50-150	50
tert-Butylbenzene	0.250	5	ug/Kg	80-120	50
Tetrachloroethene	0.370	5	ug/Kg	80-120	50
Toluene	0.544	5	ug/Kg	78-126	50
trans-1,2-Dichloroethene	0.332	5	ug/Kg	78-123	50
trans-1,3-Dichloropropene	0.524	5	ug/Kg	69-135	50
Trichloroethene	0.315	5	ug/Kg	68-127	50
Trichlorofluoromethane	0.268	5	ug/Kg	61-139	50
Vinyl Acetate	0.435	5	ug/Kg	50-150	50
Vinyl Chloride	2.347	5	ug/Kg	60-149	50
SURROGATE					
1,2-Dichloroethane-d4			ug/Kg	66-157	
4-Bromofluorobenzene			ug/Kg	65-145	
Toluene-d8			ug/Kg	70-139	

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

8260B	5035X	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
1,1,1,2-Tetrachloroethane		30.474	500	ug/Kg	50-150	50
1,1,1-Trichloroethane		64.821	500	ug/Kg	78-126	50
1,1,2,2-Tetrachloroethane		25.666	500	ug/Kg	80-120	50
1,1,2-Trichloro1,2,2-trifluoroethane		77.806	500	ug/Kg	73-145	50
1,1,2-trichloroethane		18.040	500	ug/Kg	78-133	50
1,1-Dichloroethane		58.958	500	ug/Kg	80-126	50
1,1-Dichloroethene		80.351	500	ug/Kg	43-165	50
1,1-Dichloropropene		72.754	500	ug/Kg	78-123	50
1,2,3-Trichlorobenzene		35.832	500	ug/Kg	71-129	50
1,2,3-Trichloropropane		50.800	500	ug/Kg	61-139	50
1,2,4-Trichlorobenzene		39.529	500	ug/Kg	64-143	50
1,2,4-Trimethylbenzene		47.083	500	ug/Kg	50-150	50
1,2-Dibromo-3-chloropropane		21.461	500	ug/Kg	61-147	50
1,2-Dibromoethane		22.193	500	ug/Kg	50-150	50
1,2-Dichlorobenzene		29.200	500	ug/Kg	69-132	50
1,2-Dichloroethane		25.000	500	ug/Kg	80-121	50
1,2-Dichloropropane		37.028	500	ug/Kg	80-127	50
1,3,5-Trimethylbenzene		58.380	500	ug/Kg	74-126	50
1,3-Dichlorobenzene		39.160	500	ug/Kg	79-122	50
1,3-Dichloropropane		17.574	500	ug/Kg	72-124	50
1,4-Dichloro-2-butene		44.858	500	ug/Kg	80-118	50
1,4-Dichlorobenzene		35.797	500	ug/Kg	50-150	50
1-Chlorohexane		68.177	500	ug/Kg	80-129	50
2,2-Dichloropropane		59.886	500	ug/Kg	80-128	50
2-Butanone(MEK)		63.928	1000	ug/Kg	50-150	50
2-Chloroethyl Vinyl Ether		36.467	500	ug/Kg	50-150	50
2-Chlorotoluene		55.175	500	ug/Kg	73-128	50
2-Hexanone		52.649	500	ug/Kg	78-121	50
4-Chlorotoluene		35.297	500	ug/Kg	80-125	50
4-Methyl-2-Pentanone(MIBK)		50.000	1000	ug/Kg	50-150	50
Acetone		98.916	1000	ug/Kg	50-150	50

SUMMARY OF MDL RL & QC LIMITS

8260B 5035	MDL	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE					
Acrolein	299.240	1000	ug/Kg	50-150	50
Acrylonitrile	50.000	1000	ug/Kg	50-150	50
Benzene	46.206	500	ug/Kg	75-125	50
Bromobenzene	32.448	500	ug/Kg	80-134	50
Bromochloromethane	31.181	500	ug/Kg	80-119	50
Bromodichloromethane	27.002	500	ug/Kg	71-130	50
Bromoform	23.860	500	ug/Kg	62-141	50
Bromomethane	61.151	500	ug/Kg	57-158	50
Carbon Disulfide	70.202	500	ug/Kg	64-113	50
Carbon Tetrachloride	73.261	500	ug/Kg	69-141	50
Chlorobenzene	35.829	500	ug/Kg	80-126	50
Chloroethane	63.865	500	ug/Kg	62-140	50
Chloroform	45.203	500	ug/Kg	80-132	50
Chloromethane	93.770	500	ug/Kg	56-144	50
cis-1,2-Dichloroethene	45.486	500	ug/Kg	70-129	50
cis-1,3-Dichloropropene	33.387	500	ug/Kg	76-128	50
Dibromochloromethane	36.411	500	ug/Kg	70-128	50
Dibromomethane	34.497	500	ug/Kg	62-150	50
Dichlorodifluoromethane	89.641	500	ug/Kg	74-126	50
DIPE	31.645	500	ug/Kg	50-150	50
ETBE	22.556	500	ug/Kg	69-135	50
Ethyl Methacrylate	18.117	500	ug/Kg	50-150	50
Ethylbenzene	50.958	500	ug/Kg	50-150	50
Hexachlorobutadiene	73.546	500	ug/Kg	55-144	50
Iodomethane	51.011	500	ug/Kg	80-129	50
Isopropyl Benzene	59.482	500	ug/Kg	50-150	50
m,p-Xylene	95.325	1000	ug/Kg	79-124	50
Methyl Tert-Butyl Ether	19.210	500	ug/Kg	58-150	50
Methylene Chloride	24.351	500	ug/Kg	74-130	50
n-Butylbenzene	69.752	500	ug/Kg	74-136	50
n-Propylbenzene	59.653	500	ug/Kg	49-165	50
Naphthalene	23.933	500	ug/Kg	49-146	50
o-Xylene	38.480	500	ug/Kg	80-125	50
p-Isopropyltoluene	62.938	500	ug/Kg	76-121	50
sec-Butylbenzene	63.200	500	ug/Kg	77-122	50
Styrene	36.865	500	ug/Kg	80-129	50
T-butanol	246.363	2000	ug/Kg	50-150	50
TAME	13.745	500	ug/Kg	75-129	50
tert-Butylbenzene	58.597	500	ug/Kg	80-120	50
Tetrachloroethene	72.616	500	ug/Kg	68-144	50
Toluene	51.450	500	ug/Kg	80-120	50
trans-1,2-Dichloroethene	60.894	500	ug/Kg	80-120	50
trans-1,3-Dichloropropene	21.298	500	ug/Kg	72-125	50
Trichloroethene	56.719	500	ug/Kg	69-139	50
Trichlorofluoromethane	89.868	500	ug/Kg	68-127	50
Vinyl Acetate	49.008	500	ug/Kg	50-150	50

Vinyl Chloride	98.433	500	ug/Kg	60-149	50
SURROGATE					
1,2-Dichloroethane-d4	ug/Kg	70-139			
4-Bromofluorobenzene	ug/Kg	71-125			
Toluene-d8	ug/Kg	73-124			

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

8081A	3520C	MDL 1st C	MDL 2nd C	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE							
4,4'-DDD		0.032	0.024	0.2	ug/L	78-137	30
4,4'-DDE		0.030	0.112	0.2	ug/L	80-130	30
4,4'-DDT		0.019	0.014	0.2	ug/L	65-145	30
Aldrin		0.011	0.011	0.1	ug/L	53-128	30
alpha-BHC		0.008	0.009	0.1	ug/L	44-137	30
alpha-Chlordane		0.005	0.009	0.1	ug/L	80-122	30
beta-BHC		0.013	0.013	0.1	ug/L	71-135	30
delta-BHC		0.012	0.015	0.1	ug/L	58-165	30
Dieldrin		0.077	0.022	0.2	ug/L	74-124	30
Endosulfan I		0.025	0.008	0.1	ug/L	66-165	30
Endosulfan II		0.010	0.011	0.2	ug/L	80-144	30
Endosulfan Sulfate		0.011	0.011	0.2	ug/L	76-164	30
Endrin		0.010	0.010	0.2	ug/L	73-137	30
Endrin Aldehyde		0.010	0.010	0.2	ug/L	29-165	30
Endrin Ketone		0.011	0.016	0.2	ug/L	80-150	30
gamma-BHC		0.008	0.007	0.1	ug/L	58-127	30
gamma-Chlordane		0.005	0.006	0.1	ug/L	79-130	30
Heptachlor		0.008	0.019	0.1	ug/L	48-150	30
Heptachlor Epoxide		0.005	0.005	0.1	ug/L	80-127	30
Methoxychlor		0.083	0.058	1	ug/L	66-162	30
Toxaphene		1.307	1.284	3	ug/L	50-150	30
SURROGATE							
Decachlorobiphenyl					ug/L	69-127	
Tetrachloro-m-xylene					ug/L	47-119	

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

8081A	3550B	MDL 1st C	MDL 2nd C	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE							
4,4'-DDD		0.968	1.057	4	ug/Kg	71-136	50
4,4'-DDE		0.917	1.065	4	ug/Kg	80-120	50
4,4'-DDT		0.634	0.510	4	ug/Kg	55-169	50
Aldrin		0.479	0.713	2	ug/Kg	55-133	50
alpha-BHC		0.206	0.190	2	ug/Kg	67-120	50
alpha-Chlordane		0.167	0.167	2	ug/Kg	78-120	50
beta-BHC		0.376	0.224	2	ug/Kg	80-124	50
delta-BHC		0.239	0.532	2	ug/Kg	64-146	50
Dieldrin		0.336	0.333	4	ug/Kg	76-126	50
Endosulfan 1		0.731	0.321	2	ug/Kg	73-144	50
Endosulfan II		0.348	0.609	4	ug/Kg	80-135	50
Endosulfan Sulfate		0.400	0.552	4	ug/Kg	65-160	50
Endrin		0.333	0.333	4	ug/Kg	78-159	50
Endrin Aldehyde		0.333	0.352	4	ug/Kg	39-121	50
Endrin Ketone		0.433	0.444	4	ug/Kg	80-160	50
gamma-BHC		0.266	0.174	2	ug/Kg	67-129	50
gamma-Chlordane		0.208	0.191	2	ug/Kg	80-127	50
Heptachlor		0.226	0.312	2	ug/Kg	58-147	50
Heptachlor Epoxide		0.167	0.167	2	ug/Kg	80-130	50
Methoxychlor		3.466	2.438	20	ug/Kg	77-160	50
Toxaphene		8.250	8.250	40	ug/Kg	50-150	50
SURROGATE							
Decachlorobiphenyl					ug/Kg	70-119	
Tetrachloro-m-xylene					ug/Kg	62-114	

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

SUMMARY OF MDL RL & QC LIMITS

8151A	MDL 1st C	MDL 2nd C	RL	UNIT	QCL (%R)	RPD
TARGET ANALYTE						
2,4,5-T	5.495	4.997	10	ug/Kg	53-150	50
2,4,5-TP(Silvex)	5.037	4.804	10	ug/Kg	54-150	50
2,4-D	3.514	5.018	10	ug/Kg	36-150	50
2,4-DB	5.955	7.630	20	ug/Kg	51-150	50
Dalapon	10.320	3.892	20	ug/Kg	20-150	50
Dicamba	6.997	5.466	20	ug/Kg	47-150	50
Dichloroprop	4.186	4.826	10	ug/Kg	47-150	50
Dinoseb	2.000	1.628	10	ug/Kg	20-115	50
MCPA	177.523	365.289	2000	ug/Kg	30-150	50
MCPP	170.805	249.456	2000	ug/Kg	30-150	50
SURROGATE						
2,4-DCPAA				ug/Kg	38-150	
TARGET ANALYTE						
2,4,5-T	0.175	0.160	0.4	ug/L	44-160	30
2,4,5-TP(Silvex)	0.190	0.181	0.4	ug/L	53-164	30
2,4-D	0.147	0.147	0.4	ug/L	26-165	30
2,4-DB	0.232	0.217	0.4	ug/L	20-153	30
Dalapon	0.231	0.078	0.4	ug/L	20-141	30
Dicamba	0.230	0.563	0.8	ug/L	25-171	30
Dichloroprop	0.151	0.157	0.4	ug/L	48-143	30
Dinoseb	0.122	0.039	0.4	ug/L	20-107	30
MCPA	9.266	6.275	200	ug/L	35-179	30
MCPP	10.012	8.172	200	ug/L	35-160	30
SURROGATE						
2,4-DCPAA				ug/L	43-144	

Comment: The RL and QCL specified in this document is the in-house default value. The contract takes precedence in the event that the project specifies the required RL and QC Limits. The MDL values were released in August 2001 and validated quarterly thereafter.

Appendix C

Project-Specific Addendum to the Final Basewide Health and Safety Plan

2001 LONG-TERM GROUNDWATER MONITORING PROGRAM PROJECT-SPECIFIC ADDENDUM TO THE FINAL BASEWIDE HEALTH AND SAFETY PLANHOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:

49 CES/CEV
Holloman Air Force Base, NM
and
HQ ACC/CEVC
Langley Air Force Base, VA

Prepared by:

Foster Wheeler Environmental Corporation
6605 Uptown Blvd., NE, Suite 220
Albuquerque, NM 87110

Under Contract No. DACW45-94-D-0003
Delivery Order 32, Work Authorization Directive 9

U.S. Army Corps of Engineers
Omaha District
Omaha Nebraska

September 2001

Project Number: KWRD20017009

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LIST OF ACRONYMS

AHA	Activity Hazard Analysis
AFB	Air Force Base
BTEX	benzene, toluene, ethylbenzene, and xylenes
ESS	Environmental Safety Specialist
Foster Wheeler Environmental	Foster Wheeler Environmental Corporation
HASP	Health and Safety Plan
LTM	Long-Term Groundwater Monitoring
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million

1.0 INTRODUCTION

This Appendix is a project-specific addendum to the Final Basewide Health and Safety Plan (HASP) for Holloman Air Force Base (AFB). This Appendix provides the site-specific health and safety requirements for the Long-Term Monitoring Groundwater (LTM) Program activities to be conducted at Holloman AFB, New Mexico by Foster Wheeler Environmental Corporation (Foster Wheeler Environmental).

This addendum will supplement the Final Basewide HASP (Foster Wheeler Environmental, 2000) in areas that require specific control measures related to the project tasks. Specific control measures will be identified for each hazard, expanding on the general control descriptions provided in the Final Basewide HASP. This addendum contains requirements for personnel and training, project history, site control, hazard evaluation, and emergency response activities.

This HASP addendum was prepared to support field activities associated with the LTM for selected Resource, Conservation, and Recovery Act and Installation Restoration Program sites at Holloman AFB. The LTM Program consists of the collection of groundwater samples for site-specific analysis every 2 years for a total of 10 years. The purpose of the LTM Program is to fulfill a requirement by the U.S. Environmental Protection Agency Region 6 and New Mexico Environment Department to conditionally close the participating sites in the program.

2.0 PROJECT DESCRIPTION

The primary activity of LTM field program which requires this HASP addendum includes the collection of groundwater samples from 65 wells at the 17 sites at Holloman AFB. A complete scope of work is discussed in the Work Plan for the 2001 Long-Term Groundwater Monitoring Program at Holloman AFB.

3.0 HAZARD ASSESSMENT

3.1 CHEMICAL HAZARDS

Several potential site contaminants were identified during the review of existing project documentation. This information includes sampling results from the previous LTM sampling events. Although toxicological information exists for the chemicals of concern, the potential for exposure during groundwater sampling is minimal with the proper implementation of hazard control measures, personal protective equipment (PPE), and good work practices. A complete list of contaminants, exposure symptoms, and exposure limits is included in the Final Basewide HASP.

3.2 ACTIVITY HAZARD ANALYSIS

The Activity Hazard Analysis (AHA) prepared for LTM activities to be performed by Foster Wheeler Environmental employees and site subcontractor personnel in September is included as Attachment 1 to this addendum. Measures to be taken to mitigate potential hazards in the field are also included in Attachment 1. This is intended to supplement the AHA included in the Final Basewide HASP.

3.3 HAZARD COMMUNICATION

Information regarding chemical hazards not addressed in the Final Basewide HASP may be accessed by consulting the Foster Wheeler Environmental Hazard Communication Program. Personnel working under this addendum will receive training covering the hazards associated with sampling activities, site contaminants of concern, biological hazards, PPE, and all aspects of the Final Basewide HASP.

4.0 PERSONNEL PROTECTION

Personnel will wear PPE during all field activities when the following conditions occur: (1) activities where the potential for exposure to contamination exists; (2) site activities that may generate vapor, gases, particulates, mists, or aerosols; or (3) direct dermal contact with the contaminant. For the LTM activities, PPE must be worn during all sampling activities, sample handling, sample preparation, and sample shipping preparation. It is anticipated that Level D or modified Level D will be required for all field activities. All previous work conducted during the LTM at these sites on Holloman AFB was conducted in Level D PPE. Thus, the potential for upgrade is minimal. Level D will be used in accordance with Section 6.4 of the Final Basewide HASP. The project Environmental Safety Specialist (ESS) will determine adequacy of PPE and assess whether protection needs to upgraded or downgraded.

4.1 LEVEL D PROTECTION

The following PPE is considered Level D protection:

- Coveralls or work clothes (pants and shirt)
- Leather or chemical-resistant work boots with steel toe
- Work gloves
- Hard hat (as determined by ESS)
- Hearing protection (as determined by ESS)
- Outer latex disposable boots (as determined by ESS)
- Disposable nitrile outer gloves and latex inner gloves (required for sampling)
- Safety glasses, chemical splash goggles, or a face shield (required for sampling)

4.2 MODIFIED LEVEL D PROTECTION

Modified Level D protection will be used when an increased need for dermal protection (tyvek coveralls) is recognized or if air monitoring results are above action levels in accordance with Section 6.4.2 of the Final Basewide HASP.

4.3 LEVEL C PROTECTION

Level C protection is not anticipated; however, requirements for Level C protection are provided in Section 6.4.3 of the Final Basewide HASP.

5.0 AIR MONITORING

Air monitoring action levels were developed to indicate the chemical concentrations in the breathing zone that require an upgrade in the level of PPE. General air monitoring guidelines are presented in the Final Basewide HASP. Although it is not anticipated that they will be used, all site personnel will be fitted for respirators and trained for their use (i.e., donning and doffing).

Air monitoring falls into two categories: direct reading/environmental monitoring and personal exposure monitoring. A photoionization detector (PID), photovac MicroTip, equipped with a 10.6-electron volt

lamp, calibrated with isobutylene, and referenced to benzene in air, will be used to monitor the breathing zone of workers to assess the potential presence of volatile organic vapors. Isobutylene has ionization potentials below 10 and will produce relative responses of approximately 1:1 using the PID.

PID readings will be obtained as each monitoring well is opened and in the breathing zone of the sampling personnel. Monitoring will continue intermittently throughout sampling activities at a frequency of once every 15 minutes or at some other frequency as determined by the ESS.

Based on previous monitoring results the primary volatile contaminants in the groundwater at LTM sites are benzene, toluene, ethylbenzene, and xylenes (BTEX). Benzene levels in BTEX are usually a very minor component of the overall constituents. Sustained levels of over 5 parts per million (ppm) organic vapors in the breathing zone will require an upgrade of respiratory protection to Level C. Personnel will wear full-face respirators with organic vapor cartridges. If MSA respirator cartridges are used, cartridges will be used for 8 hours per day and discarded at the end of the shift. This assumes that the site humidity is less than 50 percent, ambient air temperature does not exceed 100 degrees Fahrenheit, and that total organic vapors as measured by a PID or flame ionization detector do not exceed 50 ppm at any time. This conservative approach presumes 20 percent of the measured organic vapors are benzene, which is unlikely. If cartridges other than MSA are used, the Project Environmental Safety Manager should be contacted for a cartridge replacement schedule from the cartridge manufacturer.

6.0 PROJECT PERSONNEL AND EMERGENCY PROCEDURES

Key project personnel on the 2001 LTM Program (Delivery Order 32, Work Authorization Directive 9) their responsibilities, and telephone numbers are provided in Table C-1. Emergency contacts for this project are provided in the Health and Safety Contact Summary Sheet on the following page. Ms. Carol Bieniulis of Foster Wheeler Environmental will serve as the Task Manager. Mr. James Morning will act as the field operations leader and ESS during groundwater sampling activities.

Table C-1. Key Project Personnel

Name	Responsibility	Telephone Number
Derek Johnson, PE	Delivery Order Manager	505-878-8905 505-301-4712 (cell)
Carol Bieniulis	Task Manager	505-878-8924 505-301-4715 (cell)
James Morning	Site Manager at Holloman AFB, Field Operations Leader/ESS	505-679-2100 505-430-2307 (cell)
Roger Margotto, CIH	Project Environmental Safety Manager	619-471-3503 714-810-3742 (pager)

6.1 HOSPITAL ROUTE

Figure C-1 depicts the route to the civilian hospital in Alamogordo, New Mexico. Figure C-2 (Attachment 3) is map of the LTM sites at Holloman AFB.

HEALTH AND SAFETY CONTACT SUMMARY SHEET

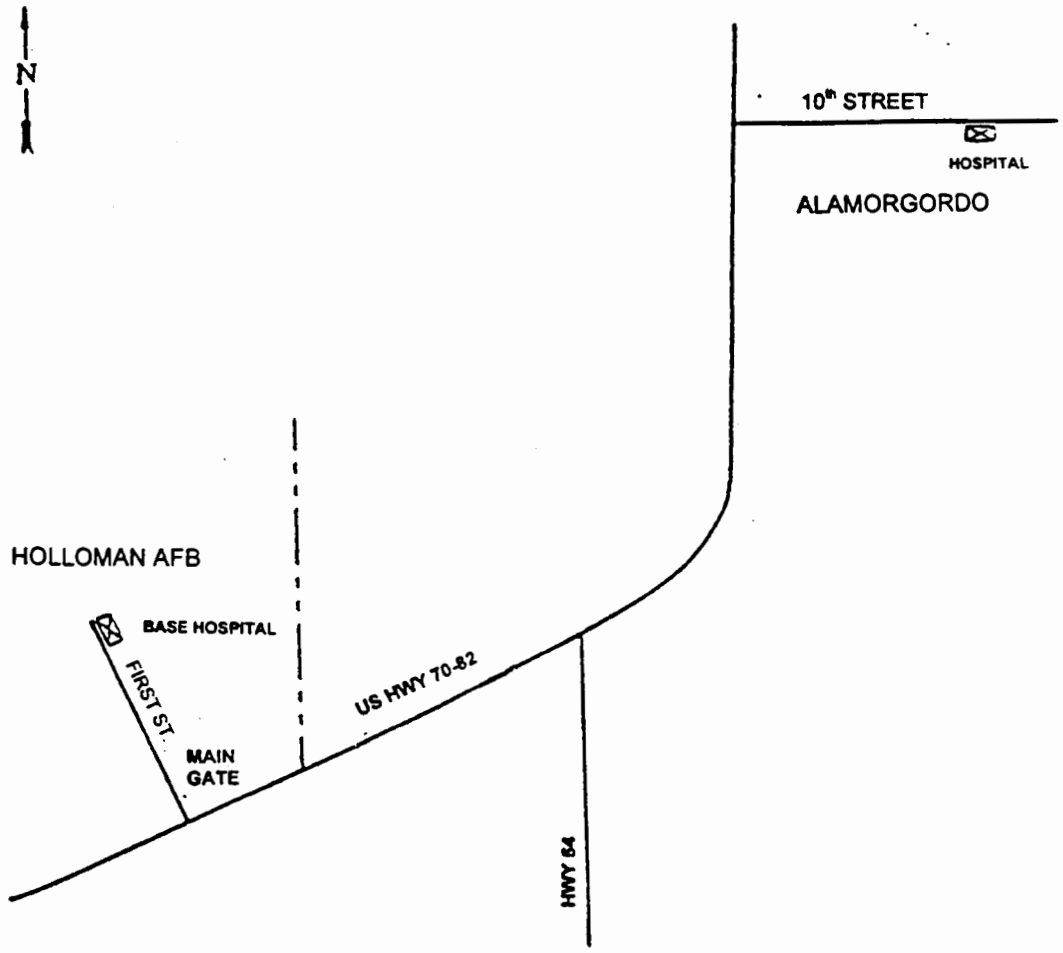
CONTACT NAMES AND TELEPHONE NUMBERS

Name and Position	Telephone Number
Foster Wheeler Environmental Corporation, 6605 Uptown Blvd. Suite 220 Albuquerque, NM 87110	505-878-8900
Carol Bieniulis, Task Manager	505-878-8924 505-301-4715 (cell)
Charles Madewell Field Operations Leader/ESS	505-878-8904 505-301-4717 (cell)
Derek Johnson, PE Delivery Order Manager	505-878-8905 505-301-4712 (cell)
Court Fesmire, Base Point of Contact	505-572-5395
James Morning, Foster Wheeler Environmental Site Manager Field Operations Leader/ESS	505-679-2100 505-430-2307 (cell)

EMERGENCY TELEPHONE NUMBERS

Agency	Telephone Number
Ambulance (Base)	911
Fire Department (Base)	7228
Poison Control	1-800-432-6266 (within New Mexico) 505-272-2222 (outside New Mexico)
EPA (Information line)	800-424-9346
National Response Center	800-424-8802
Chemtrec	800-424-9300
49th Medical Clinic	505-572-2778
Civilian Hospital (Alamogordo) Gerald Champion Memorial Hospital	505-439-6100

Figure C-1. Route to Civilian Hospital



Hospital Directions:

From Main Gate. Turn left onto US 70-82. Turn right onto 10th Street. The hospital is on right side of road.

Hospital Information:

Name: Gerald Champion Memorial Hospital
Address: 1209 East 9th Street
City, State: Alamogordo, NM
Phone: (505) 439-2100

Use in non-life threatening situations.

6.2 HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT

All onsite project personnel and visitors are required to read the Final Basewide HASP (Foster Wheeler Environmental, 2000) and the site-specific addendum and sign the Health and Safety Plan Acknowledgement (Attachment 2) prior to conducting field activities. Foster Wheeler Environmental personnel have the authority to stop field activities at this site if an activity is not performed in accordance with the requirements of the Final Basewide HASP or this site-specific addendum.

7.0 INCIDENT REPORTING

In the event of an incident, an Incident Report and Investigation Form as provided in the Final Basewide HASP must be completed within 24 hours. This is an internal reporting document. In addition to the current Foster Wheeler Environmental incident reporting procedures, accident investigation procedures pursuant to the U.S. Army Corps of Engineers EM 385-1-1 (USACE, 1996), Section 01.D should be implemented.

8.0 APPROVALS

By their signature, the undersigned certify that this HASP addendum is approved and will be used for operations to be conducted at Holloman AFB under Delivery Order 32, Work Authorization Directive 9 at Holloman AFB.

Derek Johnson, PE
Delivery Order Manager

Date 8/29/01

James Morning, OHST CHST
Environmental Safety Specialist

Date 8/30/01

Roger Margotto, CIH
Project Health and Safety Manager

Date 8/22/01

9.0 REFERENCES

Foster Wheeler Environmental (Foster Wheeler Environmental Corporation) 2000. Basewide Health and Safety Plan (Revision). April.

US Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, 3 September 1996

Attachment 1
Activity Hazard Analysis

Activity Hazard Analysis

Project: 2001 Long-Term Monitoring Program

Holloman Air Force Base, New Mexico

Field Activity	Potential Hazard	Protective Measures and Controls
Mobilization of equipment and supplies	Back injuries	Site personnel will be instructed by the ESS on proper lifting techniques. Mechanical devices should be used to reduce manual lifting of material. Team lifting should be utilized if mechanical devices are not available.
	Slips, trips, and falls	Maintain work areas in a safe and orderly manner, locate unloading areas on even terrain. Mark and repair tripping hazards.
	Dropped objects	Wear steel-toed boots and hard hats meeting ANSI Standards Z41 and Z89.1, respectively.
	Cuts, pinches, and smashes	Wear cut-resistant work gloves when handling sharp objects. Maintain all hand and power tools in safe condition. Keep guards on while using all power tools.
Groundwater Sampling	Back injuries	Site personnel will be instructed by the ESS on proper lifting techniques. Mechanical devices should be used to reduce manual lifting of material. Team lifting should be utilized if mechanical devices are not available.
	Slips, trips, and falls	Maintain works areas in a safe and orderly manner. Unloading areas should be on even terrain. Mark and repair tripping hazards.
	Dropped objects	Wear steel-toed boots and hard hats meeting ANSI Standards Z41 and Z89.1, respectively.
	Contact with poisonous insects, spiders, and snakes	Monitor site for presence of insects, spiders, and snakes. Before donning gloves and work boots, look for insects and spiders that may be inside.
	Heat stress	Stay hydrated throughout the day. Implement a work-rest regiment that will allow for work breaks in cool area out of the sun.
	Eye injuries	Wear safety glasses meeting ANSI Standard Z87 during sampling activities.
	Chemical exposure	PPE will be selected by the ESS in accordance with the HASP addendum. Air monitoring will be conducted in accordance with the HASP addendum.
	Cuts, pinches, and smashes	Wear cut-resistant work gloves when handling sharp objects. Maintain all hand and power tools in safe condition. Keep guards on while using all power tools.

Activity Hazard Analysis

Project: 2001 Long-Term Monitoring Program

Holloman Air Force Base, New Mexico

Field Activity	Potential Hazard	Protective Measures and Controls
Decontamination and Waste Management	Back injuries	Site personnel will be instructed by the ESS on proper lifting techniques. Mechanical devices should be used to reduce manual lifting of material. Team lifting should be utilized if mechanical devices are not available.
	Slips, trips, and falls	Maintain work areas in a safe and orderly manner, locate unloading areas on even terrain. Mark and repair tripping hazards.
	Dropped objects	Wear steel-toed boots and hard hats meeting ANSI standards Z41 and Z89.1, respectively.
	Eye injuries	Wear safety glasses meeting ANSI Standard Z87 during decontamination activities.
	Chemical exposure	PPE will be selected by the ESS in accordance with the HASP addendum. Air monitoring will be conducted in accordance with the HASP addendum.
	Cuts, pinches, and smashes	Wear cut-resistant work gloves when handling sharp objects. Maintain all hand and power tools in safe condition. Keep guards on while using all power tools.

ANSI - American National Standard Institute
ESS - Environmental Safety Specialist
HASP - Health and Safety Plan
PPE - Personal protective equipment

Attachment 2
Health and Safety Plan Acknowledgement

HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT

This form serves as documentation that field personnel have read, have been informed and understand the provisions of the Holloman AFB Final Basewide Health and Safety Plan (HASP) and the project-specific addendum to the HASP for the Long-Term Groundwater Monitoring Program.

Each field team member will read the Final Basewide HASP and the project-specific addendum. Once the plans have been read, each person will sign this form after the site-specific training is complete before being permitted to work on site. In signing this form, each person will understand the following statement:

I have read, or have been informed of, the Holloman AFB Final Basewide HASP and the project specific addendum for the Long-Term Monitoring activities. I understand the information presented and will comply with the provisions contained therein.

Name	Signature	Date

Attachment 3
Figure C-2: LTM Sites at Holloman AFB

Appendix D

New Mexico Environment Department Comments And Responses on the 1999 Long-Term Groundwater Monitoring Report

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Road, Building E
Santa Fe, New Mexico 87505
Telephone (505) 827-1557
Fax (505) 827-1544

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

PAUL R. RITZMA
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

CD
CEV
CEVR)6

May 09, 2001

Mr. Howard Moffitt
Deputy Base Civil Engineer
49 CES/CIV
550 Tabosa Avenue
Holloman Air Force Base, NM 88330-8458

RE: REVIEW OF THE FINAL LONG-TERM GROUNDWATER MONITORING REPORT, JUNE 2000.
HOLLOMAN AIR FORCE BASE, EPA ID # NM6572124422-2
HWB-HAFB 00-003

Dear Mr. Moffitt:

The Hazardous Waste Bureau (HWB) of the New Mexico Environment Department (NMED) is submitting a revised comment letter to Holloman Air Force Base (HAFB) concerning the Final Long-Term Groundwater Monitoring Report that HAFB submitted to the HWB on September 6, 2000. This letter reflects changes to the original NMED comment letter to HAFB dated January 17, 2001, based upon phone conversations with HAFB and Foster Wheeler Environmental Corporation.

NMED hereby approves of the 1999 LTM Report as submitted. Please incorporate the following comments into the 2001 LTM Report and sampling event.

1) NMED recommends that sample analysis values be reported as a less than instrument detection limit, versus a non-detect (ND) reporting.
2) Page 3-7, Table 3-3; NMED recommends continuing the LF-01 sampling program for Arsenic, Barium, Manganese, and Selenium. NMED approves of discontinuing sampling for VOCs and Organochlorine Pesticides.

3) Page 3-11, Table 3-5; NMED recommends continuing the LF-10 sampling program for Arsenic, Barium, Chromium, Lead, Manganese, and Selenium. NMED approves of the discontinuance of sampling for VOCs and organochlorine pesticides.
4) Page 3-15, Table 3-7; NMED recommends continuing the SD-08 sampling program for 1,2-Dichloroethane, Arsenic, Barium, Lead, Iron, and Manganese.
5) Page 3-20, Table 3-9; NMED recommends continuing the LF-19 sampling program for Barium, Iron, Lead, Manganese and Mercury. Consideration should be given to investigating the LF-19 site in an attempt to determine the source of the manganese detected in monitoring well MW-19-01.
6) Page 3-24, Table 3-11; NMED recommends continuing the LF-21 sampling program for TCE, Arsenic, Barium, Iron, Manganese, and Selenium. NMED advises HAFB to continue investigating the LF-21 site in an attempt to determine the cause of the TCE contamination detected in upgradient monitoring well MW-21-01.
7) Page 3-28, Table 3-13; NMED recommends continuing the LF-22 sampling program for Arsenic, Barium, Iron, Manganese, Selenium, and chlorinated herbicides listed in the table. NMED approves of the discontinuance of sampling for VOCs, polychlorinated biphenyls and organochlorine pesticides. NMED recommends that HAFB continue investigating the LF-22 site in an attempt to determine the cause of the chlorinated herbicides (MCPP and Pichloram) and Manganese detected in upgradient monitoring well MW-22-01.
8) Page 3-32, Table 3-15; NMED recommends continuing the LF-23 sampling program for Barium, Iron, Manganese, Selenium, and chlorinated herbicides. NMED approves of the discontinuance of sampling for VOCs, organochlorine pesticides, and polychlorinated biphenyls. Consideration should be given into investigating the LF-23 site in an attempt to determine the cause of the Iron, 4-nitrophenol, and Manganese detected in upgradient monitoring well MW-23-01.
9) Page 3-35, Table 3-17; NMED approves of no changes to the LTM Program for OT-44.
10) Page 3-38, Table 3-19; NMED approves of the discontinuance of sampling for Lead at SS-48.
11) Page 3-42, Table 3-21; NMED recommends continuing the DP-30/SD-33 sampling program for VOCs, Arsenic, Barium, Iron, and Selenium.
12) Page 3-45, Table 3-23; NMED approves of no changes to the LTM Program for SS-56.
13) Page 3-49, Table 3-25; NMED approves of no changes to the LTM Program for SS-02/SS-05.
14) Page 3-52, Table 3-27; NMED approves of no changes to the LTM Program for SS-46.
15) Page 3-55, Paragraph 3.14.3; NMED recommends continuing the OT-16 sampling program for VOCs and Lindane in 118-MW1602.
16) Page 3-60, Table 3-31; NMED approves of no changes to the LTM Program for SS-17. HAFB should investigate possible scenarios to control the migration of the 1,2-Dichloroethane and Benzene detected in groundwater samples from MW-BX-01.
17) Page 3-64, Table 3-33; NMED approves of no changes to the LTM Program for SS-39.

18) Page 3-67, Table 3-35; NMED recommends that HAFB continue the LF-29 sampling program for VOCs. NMED approves of the discontinuance of sampling for SVOCs.

NMED concurs with the recommendation that TOC elevations of LF-29 associated monitoring wells be re-surveyed.

If you have any questions please contact me or Robert Warder at the address above or by telephone at (505) 841-9033.

Sincerely,

Cornelius A. Amindyas
Project Leader
Holloman Air Force Base

CAA/rw

cc: James P. Bearzi, NMED HWB
John E. Keiling, NMED HWB
Robert S. Dinwiddie, NMED HWB
Robert Warder, NMED HWB
Pam Allen, NMED HWB
Allen Chang, EPA Region 6 (6PD-N)
Court Fesmire, HAFB
John Poland, HAFB

File: Red HAFB 01, Reading File

Responses to Comments from the New Mexico Environment Department–May 9, 2001
Final 1999 Long-Term Groundwater Monitoring Report (June 2000)
Holloman Air Force Base, New Mexico

General:

A meeting was held on May 4, 2001 between the New Mexico Environment Department (NMED) Hazardous Waste Bureau, Holloman Air Force Base (AFB), and Foster Wheeler Environmental to discuss comments on the Final 1999 Long-Term Groundwater Monitoring (LTM) Report. Resolution of the comments made by NMED will be addressed in the upcoming 2001 LTM program. In general, NMED accepted all of the recommendations made in the 1999 LTM report, but added individual constituents to the analytical requirements for the sites included in the LTM program as indicated below.

Comment 1:

Response: In the 2001 LTM report nondetections will be reported as a "less than" value which will indicate the method reporting limit for the analyte as provided by the analytical laboratory. This approach for reporting nondetections will be applied only to data collected during the 1999 and 2001 sampling events.

Comment 2—LF-01:

Response: NMED agrees with the 1999 LTM recommendation for LF-01 to continue analyzing for selenium and manganese; and discontinue monitoring for volatile organic compounds (VOCs) and organochlorine pesticides (OCPs). In addition, NMED requests monitoring continue for arsenic and barium. Even though NMED agreed to the discontinuation of OCPs monitoring at LF-01, it is noted that OCPs were not previously sampled for at the site.

Comment 3—LF-10:

Response: NMED agrees with the 1999 LTM recommendation for LF-10 to continue analyzing for chromium, lead, and manganese; and discontinue monitoring for VOCs and OCPs. In addition, NMED requests monitoring continue for arsenic, barium and selenium. Even though NMED agreed to the discontinuation of OCPs monitoring at LF-10, it is noted that OCPs were not previously sampled for at the site.

Comment 4—SD-08:

Response: NMED agrees with the 1999 LTM recommendation for SD-08 to continue analyzing for barium, iron, lead, and manganese; and discontinue monitoring for OCPs and all, but one, VOCs. In addition, NMED requests monitoring continue for arsenic and 1,2-dichloroethane.

Comment 5—LF-19:

Response: NMED agrees with the 1999 LTM recommendation for LF-19 to continue analyzing for barium, iron, lead, manganese, and mercury; and the discontinue monitoring for VOCs. As requested, consideration will be given to determine the source of manganese in the upgradient well.

Comment 6—LF-21:

Response: NMED agrees with the 1999 LTM recommendation for LF-21 to continue analyzing for trichloroethene (TCE), barium, iron, and manganese. In addition, NMED requests monitoring

continue for arsenic and selenium. As requested, consideration will be given to determine the source of TCE in the upgradient well.

Comment 7—LF-22:

Response: NMED agrees with the 1999 LTM recommendation for LF-22 to continue analyzing for chlorinated herbicides, iron, lead, and manganese; and discontinue monitoring for VOCs, OCPs and polychlorinated biphenyl's (PCBs). In addition, NMED requests monitoring continue for arsenic, barium, and selenium. As requested, consideration will be given to determine the source of chlorinated herbicides (MCPP and Pichloram) and manganese in the upgradient well.

Comment 8—LF-23:

Response: NMED agrees with the 1999 LTM recommendation for LF-23 to continue analyzing for chlorinated herbicides, iron, manganese, and selenium; and discontinue monitoring for VOCs, OCPs and PCB's. In addition, NMED requests monitoring continue for barium. As requested, consideration will be given to determine the source of iron, manganese, and 4-nitrophenol in the upgradient well.

Comment 9—OT-44:

Response: NMED agrees with the 1999 LTM recommendation that there should be no changes to the LTM program at OT-44 at this time. Only monitoring for VOCs will continue.

Comment 10—SS-48:

Response: NMED agrees with the 1999 LTM recommendation to discontinue analyzing for lead. Only monitoring for VOCs will continue at SS-48.

Comment 11—DP-30/SD-33:

Response: NMED agrees with the 1999 LTM recommendation to continue analyzing for VOCs, iron, and selenium. In addition, NMED requests monitoring continue for arsenic and barium.

Comment 12—SS-56:

Response: NMED agrees with the 1999 LTM recommendation that there should be no changes to the LTM program at SS-56 at this time. Only monitoring for VOCs and lead will continue.

Comment 13—SS-02/SS-05:

Response: NMED agrees with the 1999 LTM recommendation that there should be no changes to the LTM program at SS-02/SS-05 at this time. Only monitoring for VOCs will continue.

Comment 14—SS-46:

Response: NMED agrees with the 1999 LTM recommendation that there should be no changes to the LTM program at SS-46 at this time. Only monitoring for VOCs and lead will continue.

Comment 15—OT-16:

Response: NMED agrees with the 1999 LTM recommendation for OT-16 to continue analyzing for VOCs (chloroform, chlorobenzene, methylene chloride, and TCE only). NMED recommends that Lindane (gamma-BHC), be analyzed for at well 118-MW1602 only and discontinue monitoring OCPs at all other wells. Monitoring for chloroform and TCE will continue as confirmation sampling of the 1999 sampling event.

Comment 16—SS-17:

Response: NMED agrees with the 1999 LTM recommendation that there should be no changes to the LTM program at SS-17 at this time. Only monitoring for VOCs will continue. As requested, the potential for migration of VOCs, particularly 1,2-dichloroethane and benzene, will be evaluated with respect to downgradient groundwater quality.

Comment 17—SS-39:

Response: NMED agrees with the 1999 LTM recommendation that there should be no changes to the LTM program at SS-39 at this time. Only monitoring for VOCs will continue.

Comment 17—LF-29:

Response: NMED agrees with the 1999 LTM recommendation that monitoring for SVOCs be discontinued at LF-29. Only monitoring for VOCs will continue.

TO VIEW THE MAP AND/OR MAPS WITH THIS DOCUMENT, PLEASE CALL THE HAZARDOUS WASTE BUREAU AT 505-476-6000 TO MAKE AN APPOINTMENT