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

30 AUG 2000

MEMORANDUM FOR NEW MEXICO ENVIRONMENT DEPARTMENT
Attn: Hazardous Waste Bureau
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ENTERED

SEP 2000

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

SUBJECT: 1999 Long Term Monitoring (LTM) Report, Holloman AFB

1. Enclosed is the report on the results of the 1999 Long-Term Monitoring conducted at Holloman AFB.

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

HOWARD E. MOFFITT
Deputy Base Civil Engineer

Enclosure:
Final 1999 Long-Term Groundwater Monitoring Report

cc:
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Final
1999 Long-Term Groundwater Monitoring Report

Holloman Air Force Base, New Mexico

June 2000

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49 CES/CEV
Holloman Air Force Base
New Mexico

Project Number: KWRD19997009

FINAL

1999 LONG-TERM GROUNDWATER MONITORING REPORT

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

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ACRONYMS

AFB	Air Force Base
AOC	area of concern
BRA	baseline risk assessment
BTEX	benzene, toluene, ethylbenzene, and xylenes
CDAP	Chemical Data Acquisition Plan
CRDL	contract-required detection limit
DDD	1,1-bis(chlorophenyl)-2,2-dichloroethane
DDE	1,1-bis(chlorophenyl)-2,2-dichloroethene
DDT	1,1-bis(chlorophenyl)-2,2,2-trichloroethane
EPA	United States Environmental Protection Agency
FEC	Foothill Engineering Consultants, Inc.
Foster Wheeler	Foster Wheeler Environmental Corporation
ft	feet
ft/ft	feet per foot
GTI	Groundwater Technology, Incorporated
IDL	instrument detection limit
LTM	long-term groundwater monitoring
mg/kg	milligrams per kilogram
MOBBS	Mobile Bare Base Squadron
msl	mean sea level
NMED	New Mexico Environment Department
OCP	organochlorine pesticide
PCB	polychlorinated biphenyl
POL	petroleum, oils, and lubricants
ppm	parts per million

ACRONYMS (continued)

QA	quality assurance
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	remedial investigation
SOP	standard operating procedure
SVE	soil vapor extraction
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TOC	top of casing
TOX	total organic halogens
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
USACE	United States Army Corps of Engineers
UST	underground storage tank
VOC	volatile organic compound
µg/L	micrograms per liter

EXECUTIVE SUMMARY

This report presents the results of the 1999 Long-Term Groundwater Monitoring (LTM) Program for selected Resource Conservation and Recovery Act and Installation Restoration Program sites at Holloman Air Force Base, New Mexico. The 1999 LTM Program represents the third of five sampling events scheduled as part of a 10-year voluntary program in which monitoring is performed once every two years. The first LTM Program sampling event was conducted in August 1995. The objective of the LTM Program is to meet United States Environmental Protection Agency Region 6 and New Mexico Environment Department requirements for conditionally closing the sites included in the programs. Although active remediation in the form of free-phase product removal is ongoing at a few of the sites, this program supports conditional closure of all LTM sites as presented in their appropriate decision documents.

In this report, analytical results obtained during the 1999 LTM Program activities were evaluated and compared with results generated in 1995 and 1997. For sites investigated during all three events, analytical results reported in 1995 served as baseline concentrations from which to compare all subsequent results. For the six sites introduced in 1997, analytical results obtained during the 1997 LTM Program served as baseline concentrations from which to compare all subsequent results.

In general, groundwater sample results from 1999 were consistent with sample results from previous LTM Programs (did not change by one order of magnitude). Eight of the wells had analyte detections that exceeded New Mexico Groundwater Quality Standards. Overall, more metals were detected in 1999 than in previous years. This increase in the number of detections of metals is due to improved analytical technologies that have resulted in analytical methods with lower detection limits than previously available.

Recommendations for revising the 2001 LTM Program were made for 12 of the 17 sites addressed in this report. These recommendations primarily focus on decreasing the number of constituents in the analytical requirements for each site. A recommendation was made to resurvey TOC elevations of monitoring wells at LF-29 because groundwater elevations for September and December 1999 appear erroneous and could not easily be contoured. Additional

recommendations have been made pertaining to removing root growth from wells at three landfills prior to sampling.

Table ES-1 summarizes the 1999 LTM Program and the recommendations for the 2001 LTM Program.

Table ES-1. Summary of 1999 Long-Term Monitoring Findings and Recommendations

Site	1999 Analyses (EPA Methods)	1999 Results Above CRDL	1999 Results Above NMGWQ Standards	2001 LTM Program Recommendations
LF-01	VOCs (8260B), Metals (6010B Trace, 7470A)	Manganese	None	The only metals detected in 3 events above the CRDL were selenium and manganese. Recommend monitoring for these metals only in the next sampling round.
LF-10	VOCs (8260B), Metals (6010B Trace, 7470A)	Chromium, Manganese	None	Only metals detected in 3 events above the CRDL were arsenic, chromium, lead, and manganese. Arsenic values reported for the 1995 event were probably reported below the CRDL but not flagged as such when comparing the values to the 1999 (B) values. Recommend monitoring for chromium, lead, and
SD-08	VOCs (8260B), Metals (6010B Trace, 7470A), Organochlorine Pesticides (8081A)	1,2-Dichloroethane; 1,2-Dichloropropane; Iron; Manganese; gamma-Chlordane	1,2-Dichloroethane, Iron, Manganese	Analyze only for barium, lead, iron, and manganese.
LF-19	VOCs (8260B), Metals (6010B Trace, 7470A)	Iron, Manganese, Mercury	Manganese	Drop VOCs from program since no VOCs have been detected above the CRDL for the 3 events. Analyze for only metals detected above the CRDL (barium, iron, lead, manganese, and mercury).
LF-21	VOCs (8260B), Metals (6010B Trace, 7470A)	TCE, Iron, Manganese	None	Analyze for VOCs (TCE), barium, iron, and manganese. Remove roots from all wells 2 weeks prior to sampling to ensure that representative water level measurements and groundwater samples are obtained.
LF-22	VOCs (8260B), Metals (6010B Trace, 7470A), Organochlorine Pesticides (8081A), PCBs (8082), Herbicides (8151A)	Manganese; 2,4-D; MCPP; Picloram	None	Delete VOCs and OCPs since none were detected above the CRDL for 3 events. Analyze for herbicides, iron, and manganese.
LF-23	VOCs (8260B), Metals (6010B Trace, 7470A), Organochlorine Pesticides (8081A), PCBs (8082), Herbicides (8151A)	Iron, Manganese, 4-Nitrophenol	Manganese, Selenium	Delete VOCs and OCPs. Analyze for iron, manganese, selenium, and herbicides only.
OT-44	VOCs (8260B)	Carbon disulfide	None	No changes to the current LTM Program are recommended at this time.
SS-48	VOCs (8260B), Dissolved lead (6010B Trace)	Benzene, Ethylbenzene	Benzene, Ethylbenzene	Delete lead analysis.
DP-30 & SD-33	VOCs (8260B), Metals (6010B Trace, 7470A)	Chloroform; 1,1-Dichloroethane; TCE	1,1-Dichloroethane, TCE	Analyze for VOCs, iron, and selenium only. Remove roots from all wells 2 weeks prior to sampling to ensure that representative water level measurements and groundwater samples are obtained.
SS-56	VOCs (8260B), Dissolved lead (6010B Trace)	None	None	No changes to the current LTM Program are recommended at this time.

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Table ES-1. Summary of 1999 Long-Term Monitoring Findings and Recommendations

Site	1999 Analyses (EPA Methods)	1999 Results Above CRDL	1999 Results Above NMGWQ Standards	2001 LTM Program Recommendations
SS-02 & SS-05	VOCs (8260B)	Benzene; Ethylbenzene; Toluene; m,p-Xylenes; o-Xylene	Benzene, Ethylbenzene	No changes to the current LTM Program are recommended.
SS-46	VOCs (8260B), Dissolved lead (6010B Trace)	None	None	No changes to the current LTM Program are recommended at this time.
OT-16	VOCs (8260B), Organochlorine Pesticides (8081A)	Chloroform, TCE, gamma-BHC	None	Consider collecting additional samples at 118-MW1601 to confirm detections of chloroform and TCE. No other changes to the current LTM Program are recommended.
SS-17	VOCs (8260B)	Benzene; 1,2-Dichloroethane; Ethylbenzene	Benzene, 1,2-Dichloroethane	No changes to the current LTM Program are recommended.
SS-39	VOCs (8260B)	Carbon tetrachloride; TCE	None	Remove roots from all wells 2 weeks prior to sampling to ensure that representative water level measurements and groundwater samples are obtained.
LF-29	VOCs (8260B), SVOCs (8270C)	Chloroform; 1,2-Dichloroethane	1,2-Dichloroethane	Delete SVOCs. Resurvey top of casing elevations.

Notes:
AOC - Area of concern
CRDL - contract-required detection limit
EPA - United States Environmental Protection Agency
LTM - Long-Term Monitoring
NMGWQ - New Mexico Groundwater Quality
PCB - polychlorinated biphenyl
SVOC - semivolatile organic compound
SWMU - Solid Waste Management Unit
TCE - trichloroethylene
Trace - inductively coupled plasma trace analysis
VOC - volatile organic compound

1.0 INTRODUCTION

This report presents the results of the 1999 Long-Term Groundwater Monitoring (LTM) Program for 17 Resource Conservation and Recovery Act (RCRA) and Installation Restoration Program sites at Holloman Air Force Base (AFB), New Mexico (Figure 1-1). Sites were included in the LTM Program based on investigations and risk assessments conducted for each site. The community participation, background information, quantitative risk assessments, and selected remedies are summarized in the Decision Document for each site or presented in the following documents: *Decision Documents for Installation Restoration Program Sites* (Walk, Haydel & Associates 1990), *Decision Documents Installation Restoration Program* (Ebasco 1995), and *Proposed Plans–Investigation, Study, and Recommendations for 29 Waste Sites* (Radian 1993b). These documents establish the requirement for long-term groundwater monitoring as a condition of site closure. The objective of the LTM Program is twofold:

- Ensure for the three sites with ongoing remediation that the selected remedy has effectively stopped the release of contamination to the groundwater, and/or
- Ensure for all 17 sites that further degradation to groundwater quality is not occurring.

The LTM Program is designed as a 10-year program with monitoring performed once every two years. The 1999 LTM Program represents the third of five scheduled sampling events. The first and second LTM Program sampling events were conducted in August 1995 and September 1997, respectively.

During the 1995 LTM Program, monitoring was conducted at 12 different sites. Eleven of these sites (OT-45 was eliminated) were included in the 1997 sampling event along with six additional sites. All 17 of the 1997 LTM sites were included in the 1999 sampling event and are listed in Table 1-1.

The 1999 LTM Program activities included measuring static water levels and collecting groundwater samples at selected monitoring wells. Groundwater samples were collected from 66 monitoring wells located at the 17 LTM sites listed in Table 1-1. Site locations are shown on Figure 1-2. Groundwater samples were submitted for site-specific chemical analyses including

volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), chlorinated herbicides, total mercury, dissolved RCRA metals, iron, manganese, and dissolved lead. Analyses were performed in accordance with *SW-846 Test Methods for Evaluating Solid Waste*, third edition and updates (United States Environmental Protection Agency [EPA] 1986) as specified in Table 2-1.

Table 1-1. 1999 Long-Term Monitoring Program Sites

Site	SWMU	Location
LF-01	106	Main Base Landfill
LF-10	101, 109	Old Main Base Landfill
SD-08	4, 82	Refuse Collection Truck Washrack
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
OT-44	AOC-P	Building 301 Aircraft Maintenance Hangar
SS-48	None	Military Gas Station
DP-30/SD-33	113B	Grease Trap Disposal Pits
SS-56	None	West Ramp Fuel Spill
SS-02/SS-05 *	AOC-T	POL Spill Sites Nos. 1 and 2
SS-46 *	130	JP-4 Spill Site
OT-16 *	118, 132, AOC-A	Former Entomology Shop Area
SS-17 *	None	BX Service Station
SS-39 *	165, 177, 179, 181	Missile Fuel Spill Area
LF-29 *	104	Former Army Landfill

* 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.

1.1 PURPOSE

This report presents the background and site-specific information necessary to assess groundwater quality and provides recommendations for future long-term groundwater monitoring at Holloman AFB. The data evaluation will provide the basis for recommending future monitoring under the LTM Program. Any recommendation made in this report to either revise the analytical requirements at a site is supported by the data evaluation results.

1.2 DOCUMENT ORGANIZATION

This 1999 LTM Report presents groundwater sampling procedures and site-specific background information and analytical results. The document contains the following five sections:

- Section 1.0–Introduction
- Section 2.0–Sampling Procedures
- Section 3.0–Site-Specific Long-Term Monitoring Results
- Section 4.0–Conclusions and Recommendations
- Section 5.0–References

Pertinent site background information and specific agreements made between the United States Air Force and the New Mexico Environment Department (NMED) for each site are presented in the *Draft Final 1995 Long-Term Groundwater Monitoring Report* (Foster Wheeler Environmental Corporation [Foster Wheeler] and Groundwater Technology Government Services, Inc. [GTI] 1996). This information, which provides the basis for the site-specific 1999 LTM Program, has been updated and is summarized in Section 3.0.

This report also includes three appendices. Appendix A presents the Data Quality Control Summary Report for the analytical data collected during the September 1999 LTM Program sampling event. Appendix B provides the analytical results from the subcontractor laboratory for environmental samples and field duplicates. Field sampling and monitoring well gauging information is provided in Appendix C.